

Chroma

**Automatic Transformer Test System
3300/3302
User's Manual**

Edition
September 2002
P/N A11 000320

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1. Introduction

1.1 General

The **33XX 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 33xx is to enhance the working efficiency and products quality based on decade's experience and efforts 33XX series including 3300, 3302. 3300 are transformer scan testing, 3302 is for transformer scan and single component test, for convenient, we call 33XX series.

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 33XX unit easy to be operate and ensure the high accuracy.

The accuracy is 0.1%. The measurement device (optional) may performing 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, $|Z|$, Δ , $\Delta\%$, DCR, Turn-Ratio

Second test parameters -- Q, D, R, θ

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

■ **Measurement Range** :

L	-	.0001uH	~	9999.9H
C	-	.001pF	~	999.99mF
R	-	.0001 Ω	~	999.99M Ω
$ Z $	-	.0001 Ω	~	999.99M Ω
Q	-	.0001	~	99999
D	-	.0001	~	99999
θ	-	- 90.00°	~	+ 90.00°
DCR	-	.01m Ω	~	99.999K Ω
Np	-	.01	~	999.9Turn
Ns	-	.01	~	999.9Turn (+, —)

■ **Measurement Frequency** : 20Hz to 1MHz

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

■ **Equivalent Circuit** : Series, Parallel

■ **Zeroing Calibration** : Open, Short

■ **Turn-Ratio** : 1kHz to 1MHz, 0.1V to 10Vrms

❗ **Notice :**

The maximum input voltage of this instrument is 10 Vpeak. 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)

Table 1-1 33XX Interface equipment

	RS-232	Printer	Handler	Memory Card	Scanner	DCA Bias
3300	✓	✓	✓	✓	✓	Option
3302	✓	✓	✓	✓	✓	Option

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.

Table 1-2 Standard Accessories

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 13300299	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 000320	1	English
Ground lead	W38 001660	1	80cm length

Table 1-3 Optional 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 000001	1	2M SRAM CARD
Scan Box 3001A	9 13250199	1	20 pin scan box
Test Cable (4-Terminal)	9 13300599	1	In use at ESR < 10m Ω
BIAS current expanded interface	8 13301200	1	Capable control Zentech1320 20A current

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
θ	: Phase angle
Δ	: 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
θ (deg)/ θ (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, Middle and Slow.

2.2 Test Signals

- **Frequency:**
3300,3302 : 20~1MHz
Accuracy : $\pm(0.01\% \pm 0.01\text{Hz})$

- **Signal Level:**

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

- **Output Impedance:** 100 Ω , $\pm 3\%$ (CONST R_{SOU.}: 320X)

- **Test Signal Level Monitor:**

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

¹: Add the impedance measurement accuracy (%) to the voltage level monitor accuracy when the DUT's impedance is < 100 Ω .

2.3 Measurement Range

Parameter	Range	
$ Z $, R, X	0.1 m Ω	to 999.999 M Ω
$ 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
θ	-90.00 °	to 90.00 °
$\Delta\%$	-100.00%	to 100.00 %
DCR	0.01 m Ω	to 99.999 k Ω
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: ≥ 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 θ_e is accuracy error of phase angle θ >

Table 2-1 |Z|- θ Accuracy

 Z (Ω)	10M	± 2% ±1.3°	±0.5% ±0.4°			
	1M	±0.5% ±0.3°	±0.15% ±0.09°	±2.0% ±1.2°		
	100K	±0.35% ±0.2°	±0.15% ±0.08°	±1.5% ±0.8°		
	10K					
	1K	±0.3% ±0.2°	±0.1% ±0.04°	±1.5% ±0.3°	±2% ±2.0°	
	100					
	10					
	1					
	100m	±1.8% ±1.1°	±0.8% ±0.5°	±5.5% ±3.0°	±6% ±4.0°	
		20	100	1K	10K	100K

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 : ± (0.5% + 0.2mΩ) > 10mΩ

± (1% + 0.2mΩ) < 10mΩ

6. Turn-Ratio Accuracy : ± (0.5% + 0.2T)

2.7 List Sweep (3302 only)

A maximum of 9 frequencies or test signal levels can be programmed. Single or sequential test can be performed.

2.8 Comparator Function (3302 only)

Ten bin sorting for the primary measurement parameter, and IN/OUT decision output for the secondary measurement parameter.

Sorting Modes:

Sequential mode: Sorting into unnested bins with absolute upper and lower limits.

Tolerance mode: Sorting into nested bins with absolute or percent limits.

Bin Count:

0 to 999999

List Sweep Comparator:

HIGH/PASS/LOW decision output for each point in the list sweep table.

2.9 Interfaces

Printer Interface : Standard Printer Interface.

RS-232 Interface : Standard RS-232 Interface.

Handler Interface: PASS/FAIL/Ext Trig.

2.10 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

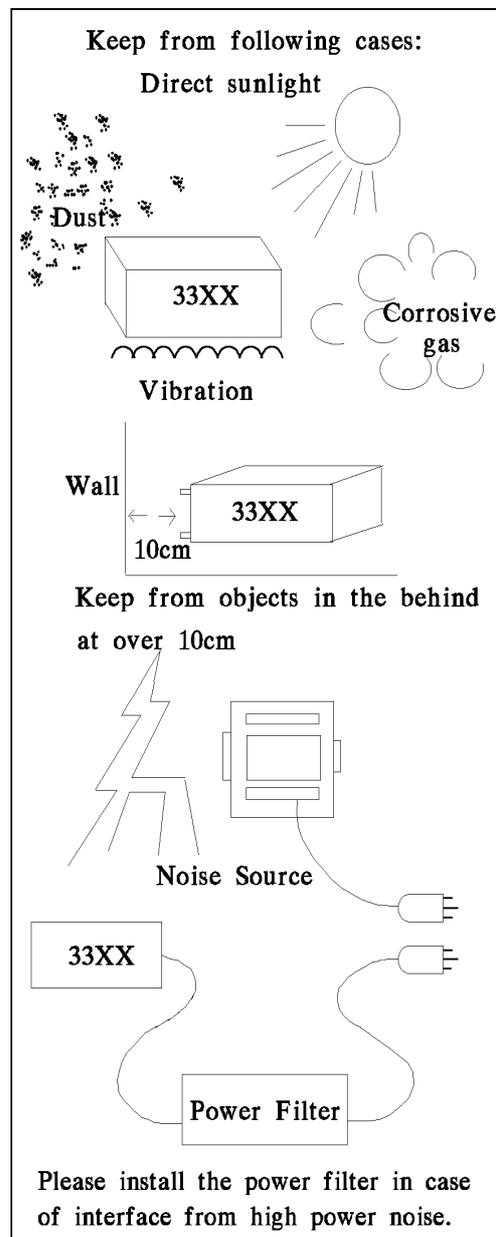
3.1 Ambient Environment

(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 $0\sim 40^{\circ}\text{C}$ 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 $-25^{\circ}\text{C} \sim +70^{\circ}\text{C}$. 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

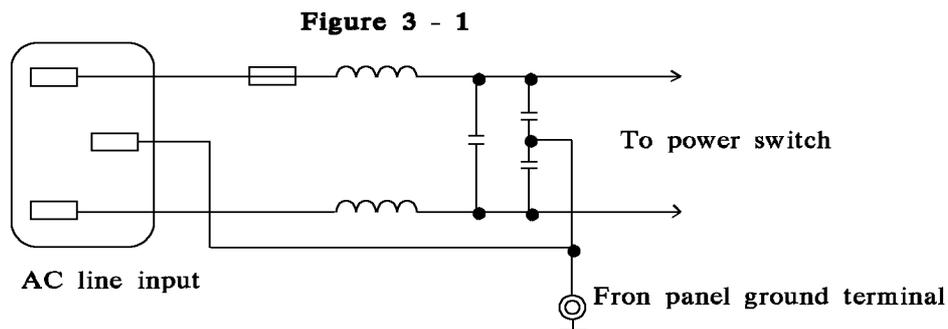
Before plug in power cord, make sure power is off state, and the voltage in rear panel is meet required voltage. The power supply frequency please use the 50 Hz or 60Hz.

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

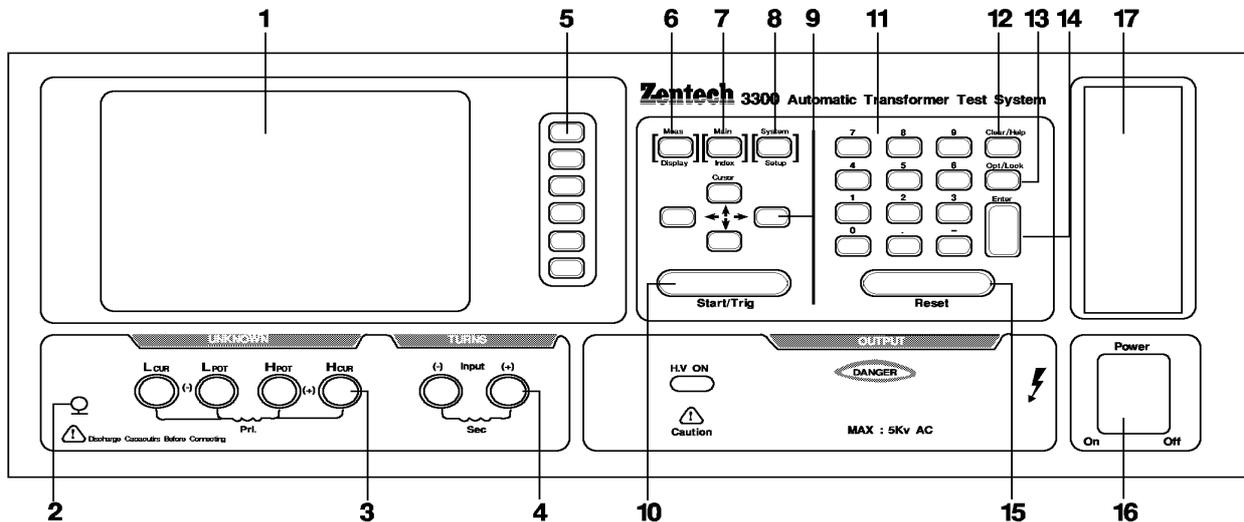
For connecting 33XX LCZ to D.U.T (Unknown device) can through the BNC connector that marks H_{CUR} , H_{POT} , L_{POT} , L_{CUR} . (If want to measure the PH and Turn Ratio of transformer must use the terminator of Sec(+) and Sec(-), so usually need external test device. Notice the L_{CUR} and L_{POT} 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, 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_{CUR} : Current drive terminal, high.

H_{POT} : Potential detector terminal, high.

L_{POT} : Potential detector terminal, low.

L_{CUR} : 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.

① 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 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 need 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.

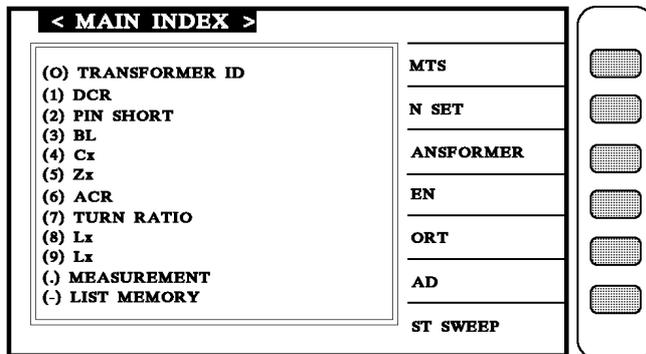
(14) ENTER (confirm) key

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.



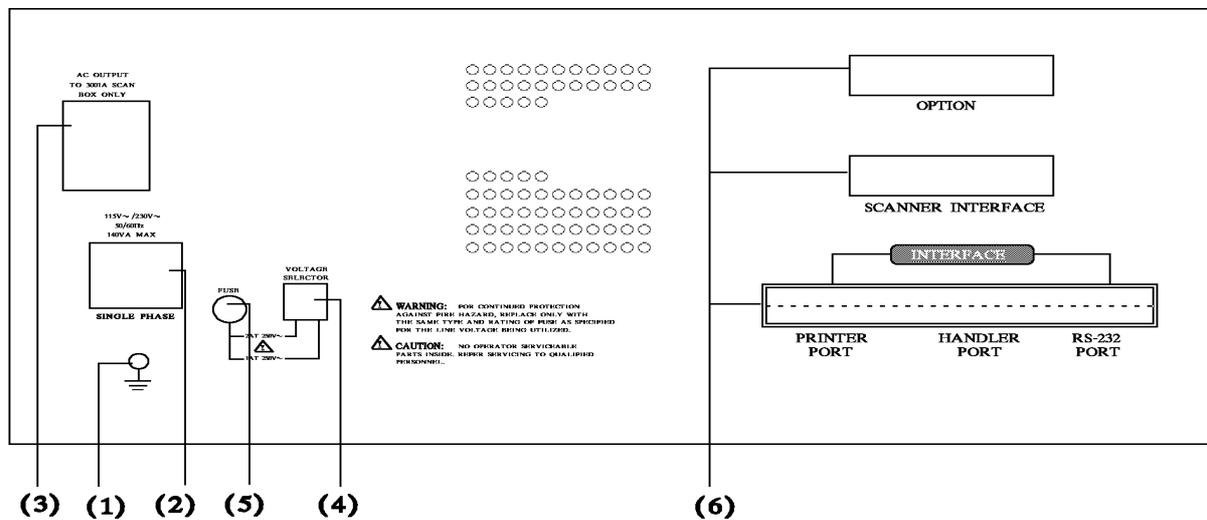
(16) POWER switch

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 Electrotechnical 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:

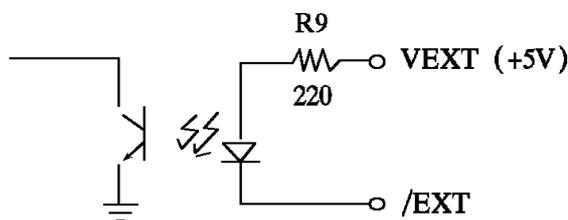
There are 5 signal controlled interface cards as following:

- 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 not be a negative value. High signal voltage must grate than 2.5V, can not 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)

Table 4-1 Handler interface signal control form

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

- e. DCA Control Interface

4.3 System Parameters Setting Description

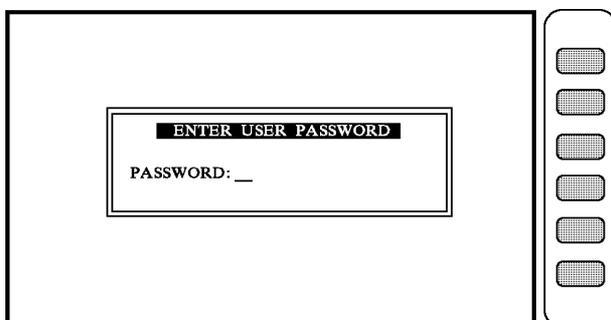
4.3.1 System Configuration

1. 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 33XX model, press [3][3][X][X][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 33XX model, press [3][3][X][X][Enter]. The display is like below:

press this key to start the system setting screen

< SYSTEM SETUP >

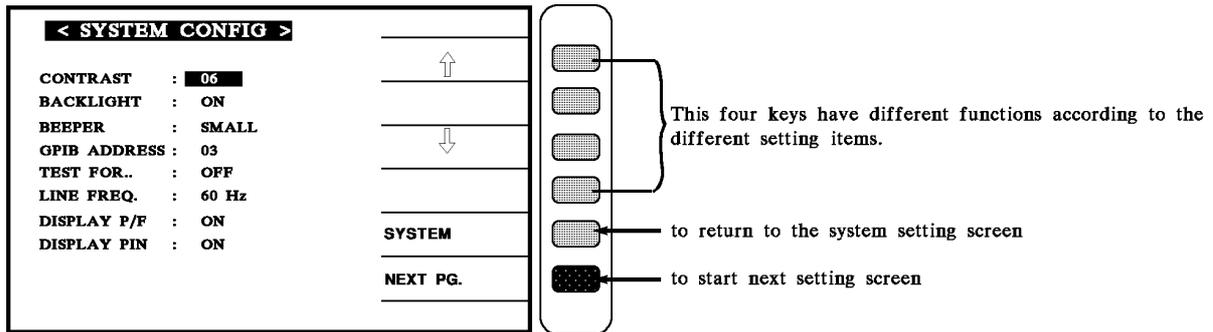
(0) MEMORY MANAGEMENT.
 (1) PASSWORD SETUP.
 (2) BOX TEST.
 (3) MEMORY CARD MANAGEMENT.
 (4) PRINT TEST.
 (5) RS-232 SETUP.

CALIBRATION
STORE
RECALL
SET TIME
SYSTEM CONFIG
SET DEVIATION

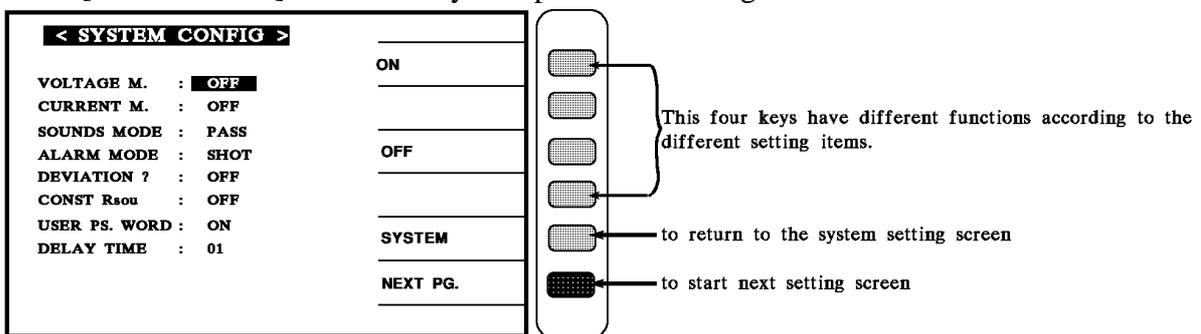
[Meas Display]]	Main Index]]	System Setup]
	[[[

- [] to start the system calibration screen
- [] to store the data into the memory
- [] to recall the saved data
- [] to start the system's data and time setting screen
- [] to start the system parameter setting screen
- [] press this key to start the testing error setting screen

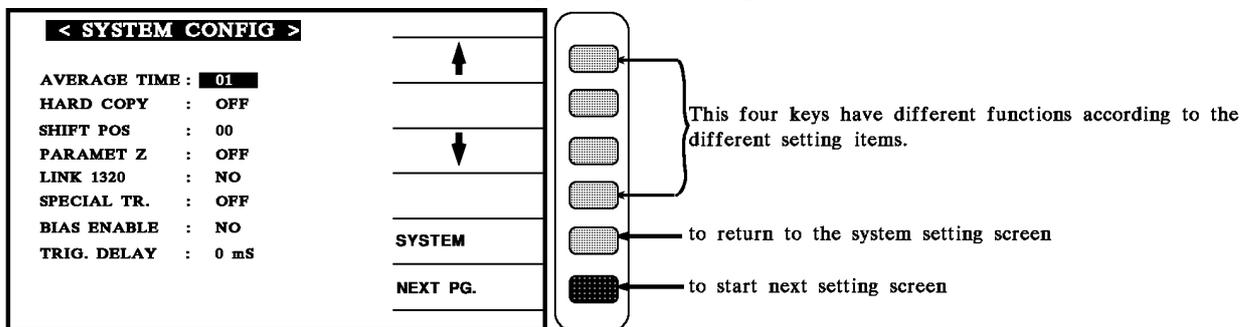
Press [SYSTEM CONFIG] to start the system parameter setting screen as shown below:



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:

To adjust the light or dark of the display. The value is being set on "06" 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 [].

BACK-LIGHT:

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 BACK-LIGHT by pressing and adjust it by pressing [ON] and [OFF].

BEEPER:

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)

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", 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 60Hz, 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 the 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." 4 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 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 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 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 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 Rsour:

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 Rsour. 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 desire 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 of transformers are 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 directly choose from PROGRAM menu.

PARAMETER Z: (3302 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 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 ($-\mu r$)" 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:

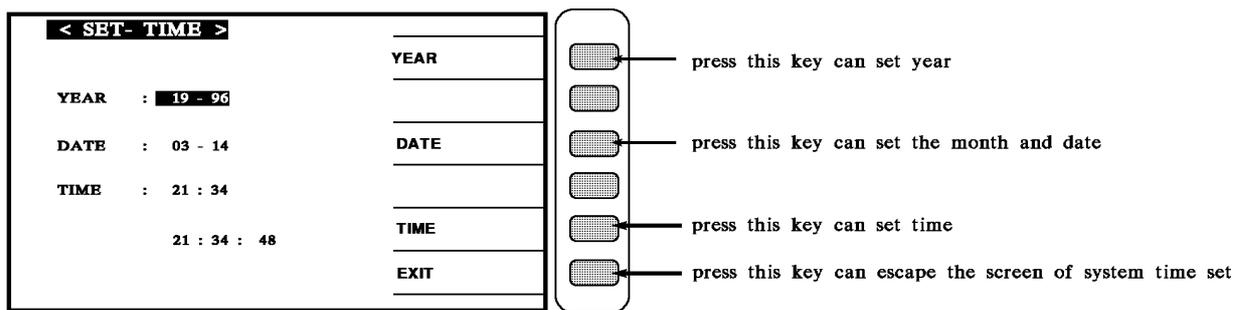
System has installed 1A bias current (option), if under the BIN SET mode for testing, it needs to switch BIAS ENABLE to "YES" status. Then BIN SET function will according to setup current for testing.

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

1. 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

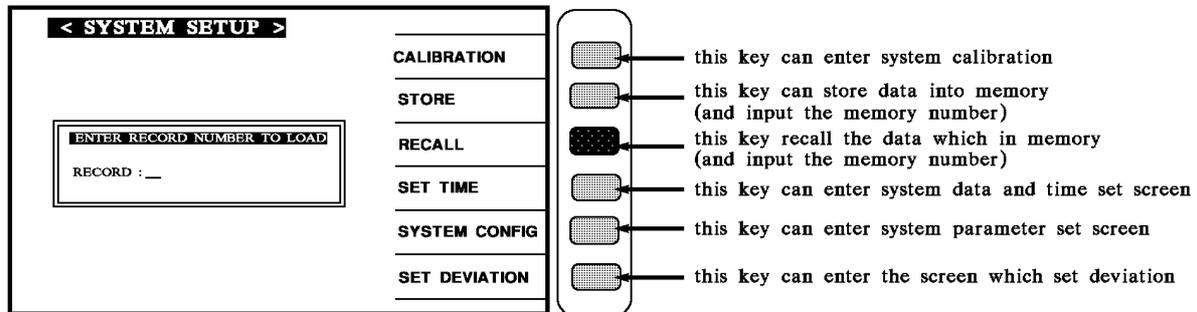
TIME : hour-min **EXIT** : for esc.

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

1. 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.

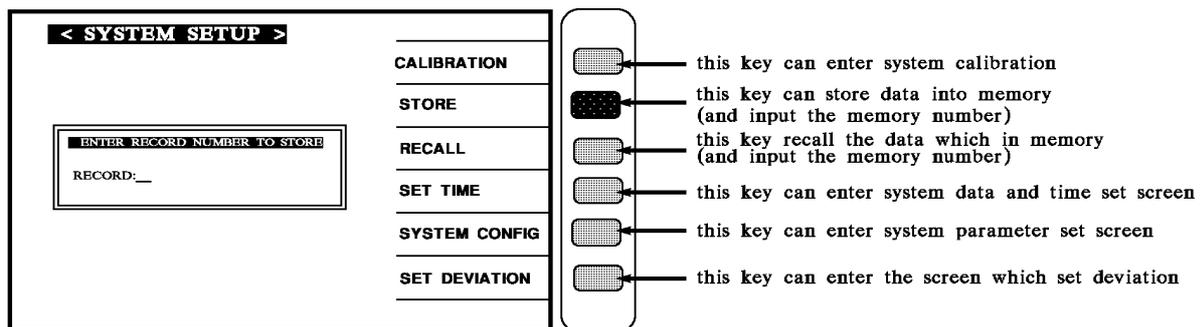
If the recall data successfully, then screen will show RECALL: 1?

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?

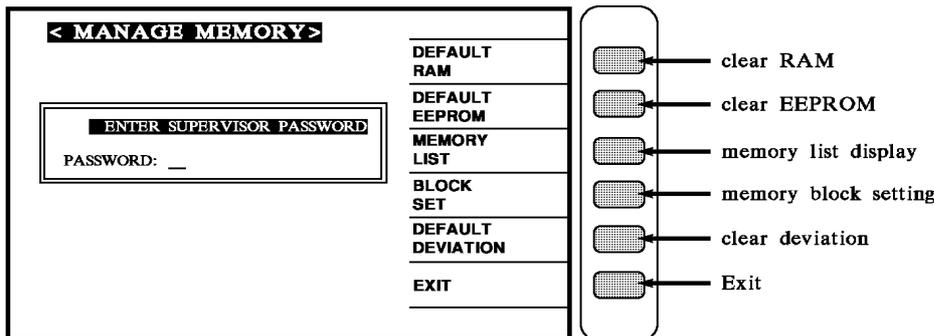
All the items are number, the range is from 0~159, 160 items, but inside 0~20 items are interior memory of instrument, 26~159 are the data from external memory card.

ⓘ 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

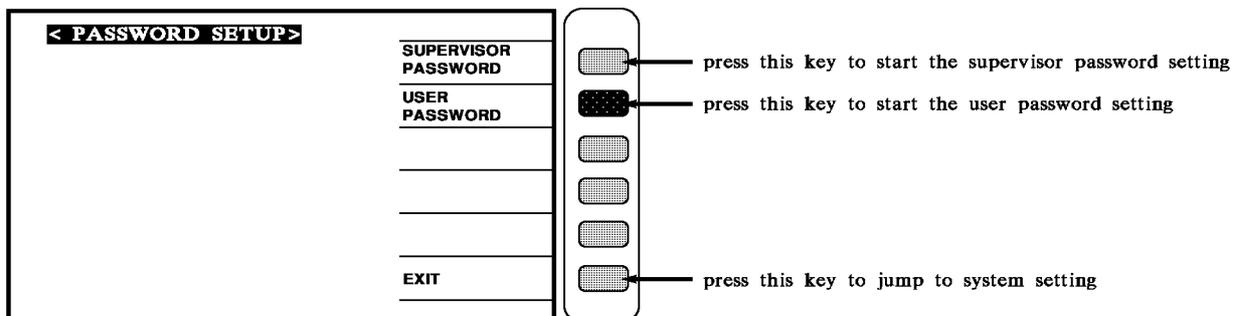
At SYSTEM SETUP status, press number key [0] key to enter < MEMORY MANAGEMENT > menu as shown:



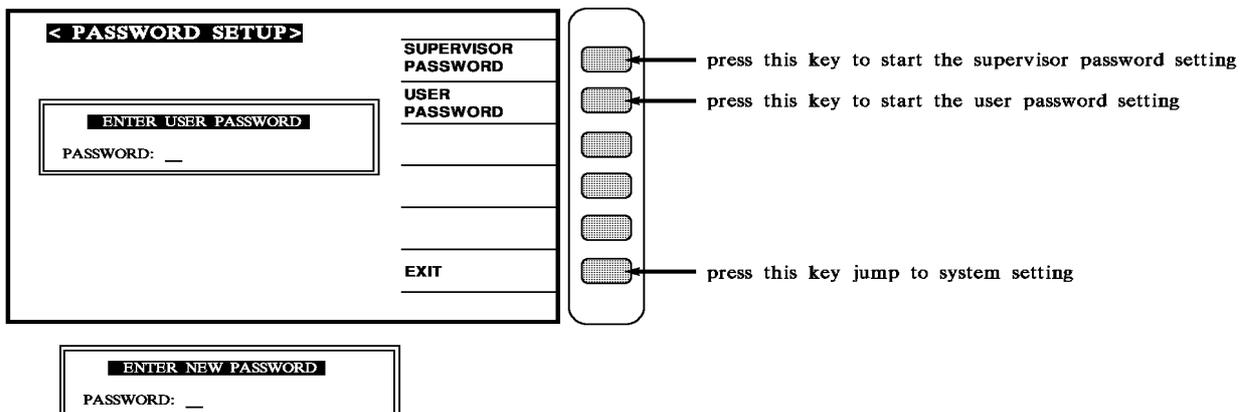
First at all, it needs to enter user's password, then it can enter memory management instruction.

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:



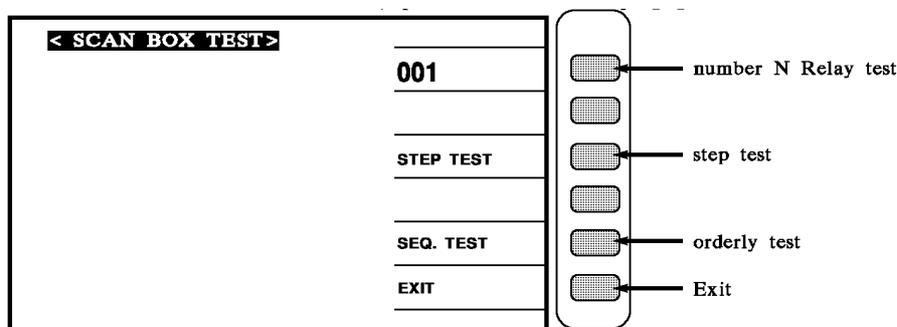
When the display shows the following screen, please key in new supervisor password (max. 10 digital). Then press [Enter].



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.

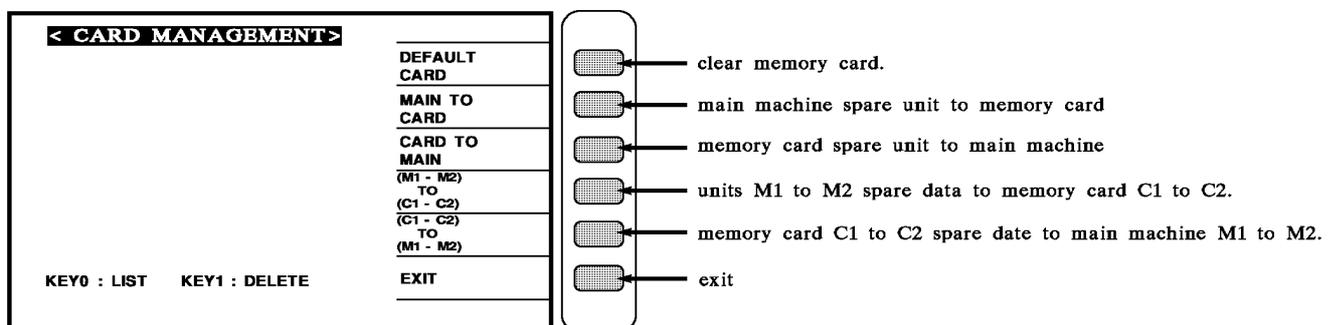
4.3.7 Scan Test Box (Box Test)

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



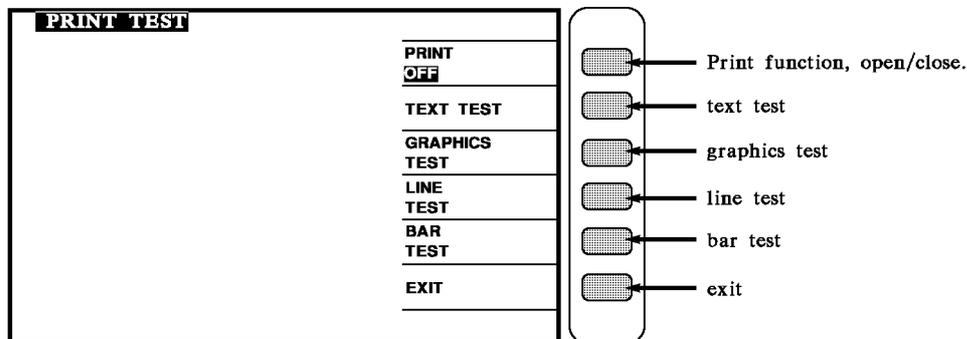
4.3.8 Memory Card Management Function

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



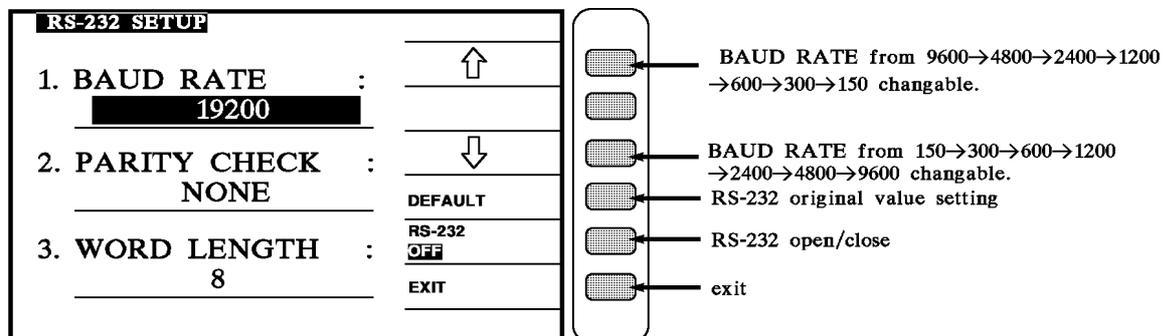
4.3.9 Print Testing

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



4.3.10 RS-232 Setup

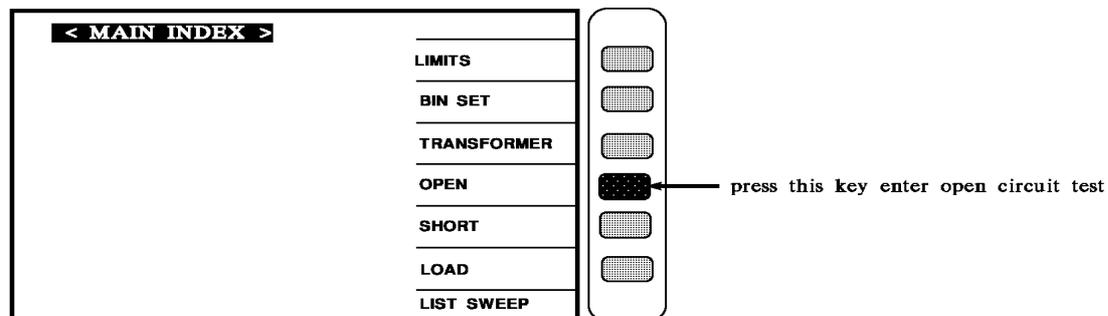
At SYSTEM SETUP status, press number key [5] to enter <RS-232 SETUP> display, as show:



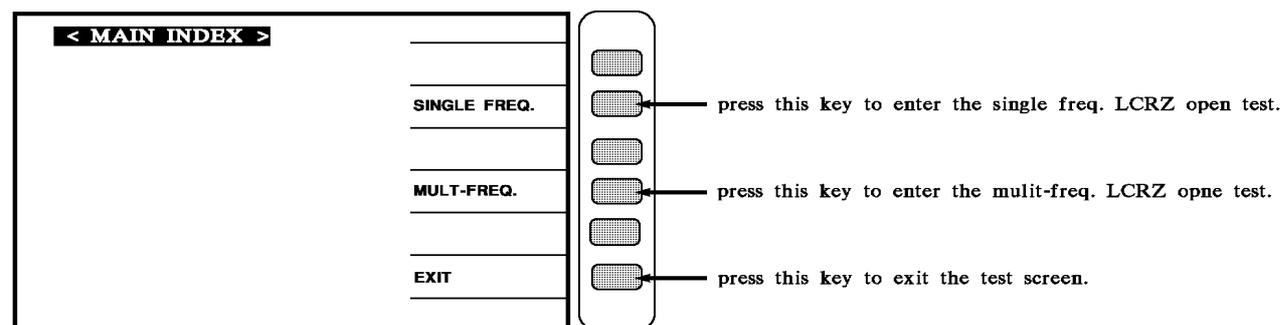
4.4 Operation Instruction

4.4.1 Open Test

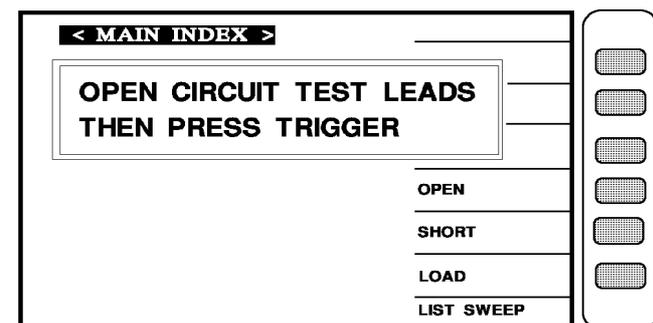
After turn the instrument on and show every event is ok, press [Main Index] to enter main index, then press the key shows "OPEN" on the screen, as below:



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 :

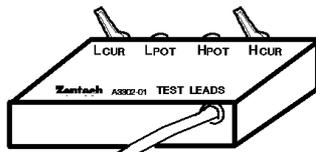
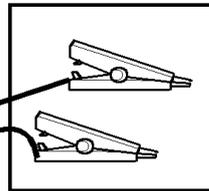
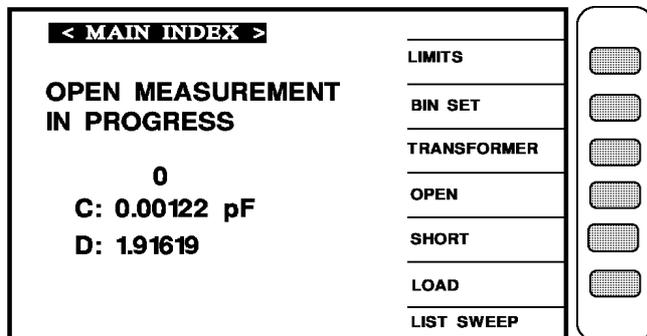


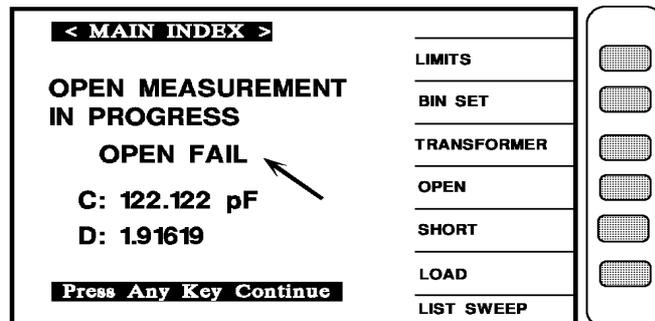
Figure 4-1 Open test



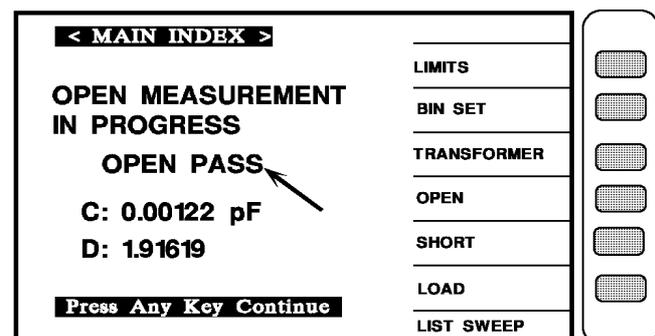
After finish the cable connecting, press [Trig] to start open test, it will show the condition of open test on the screen as below:



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:

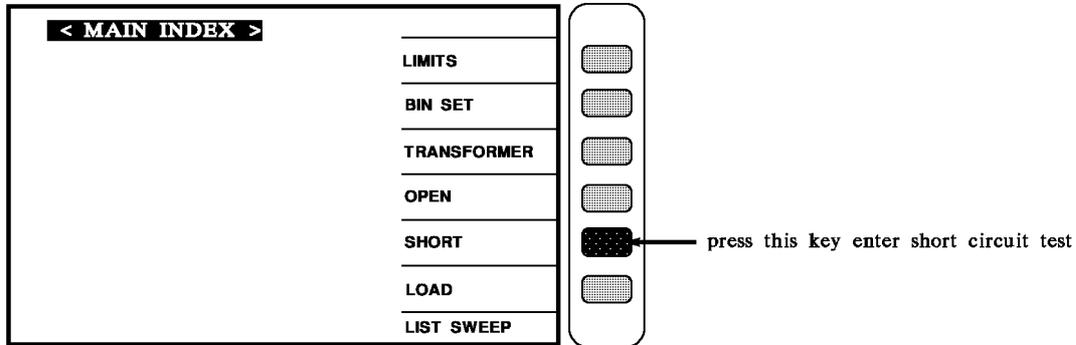


When open test is current, the screen will shows [OPEN PASS], the mean is open test finished, press any key will escape to another index as below the arrow head pointing:

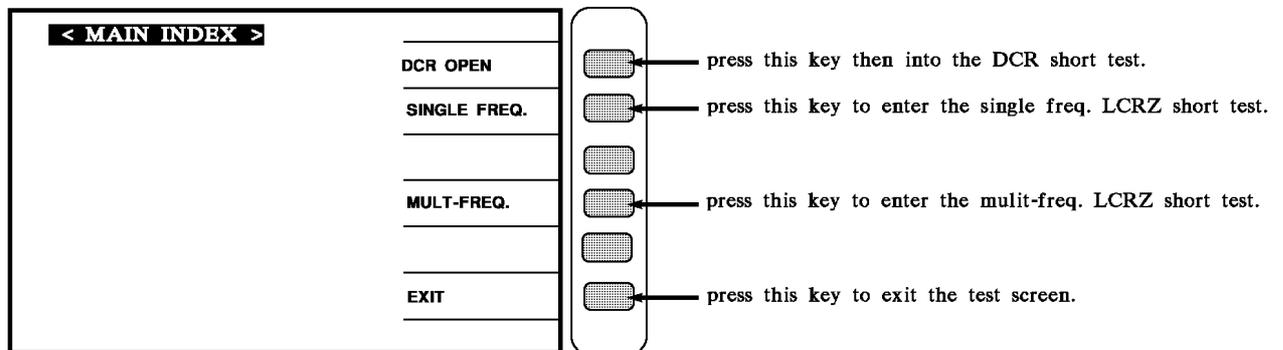


4.4.2 Short Test

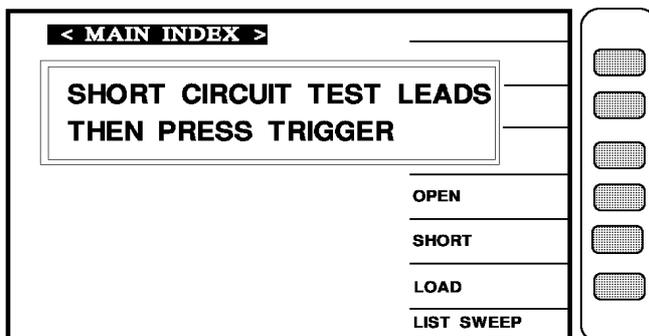
After turn the instrument on and show every event is ok, press [Main Index] to enter main index, then press the key shows "SHORT" on the screen, as below :



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:

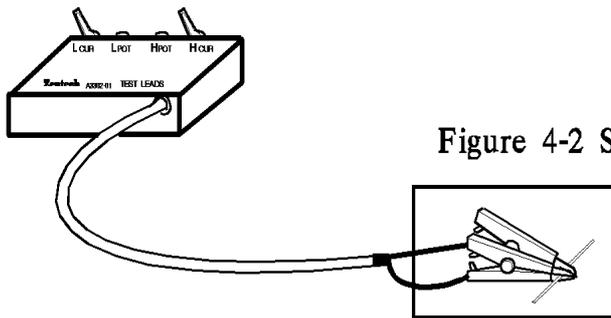
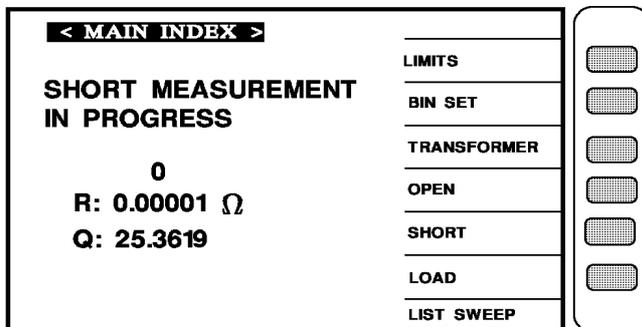
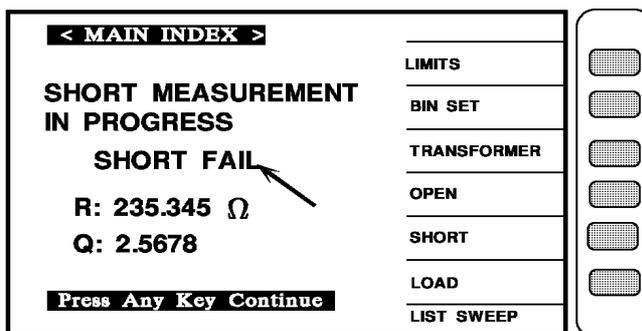


Figure 4-2 Short test

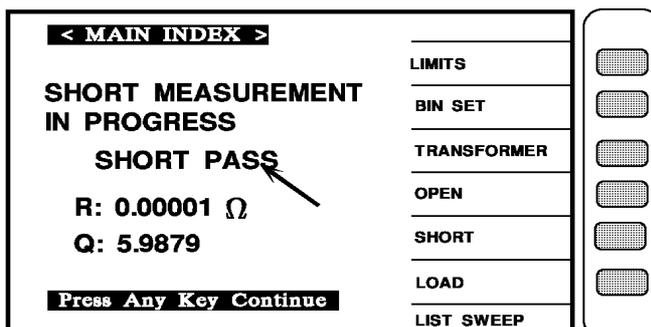
After finish the cable connecting, press [Trig] to start short test, it will show the condition of short test on the screen as below:



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 :

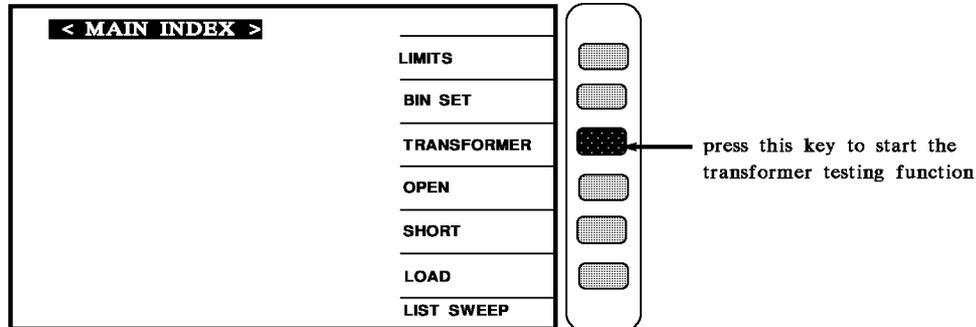


When short test is current, the screen will shows [SHORT PASS], the mean is short test finished, press any key will escape to another index as below the arrow head pointing :

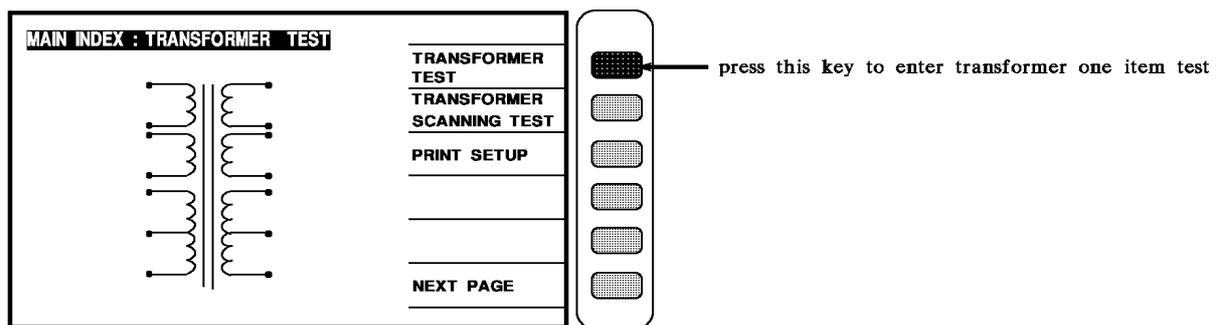


4.4.3 Single Transformer Test

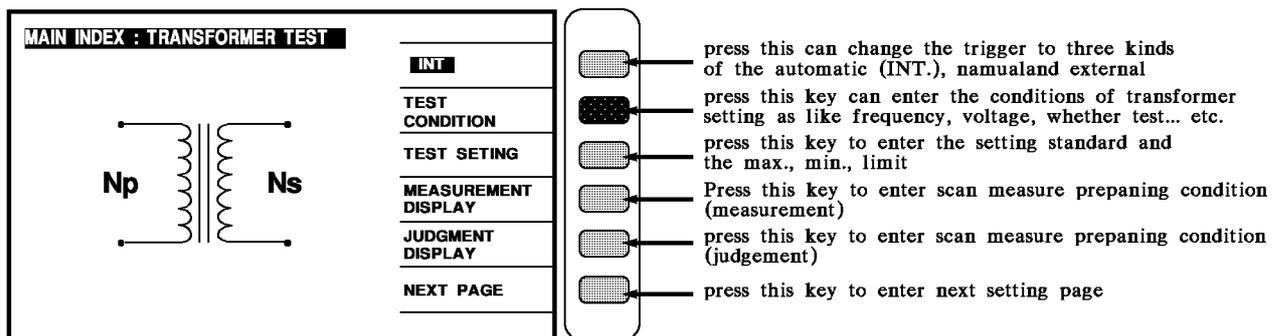
1. The display shows Chroma's name, phone no., fax no., model no. and programming version (around 2 seconds) after the main power of the unit is switch ON.



2. 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:



3. 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:



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

TEST CINDITION			
MODE	FREQ	VOLT. ✓ / ✗	✓
TURN	1.000KHz	1.00V	✓
Lx	1.000KHz	1.00V	✓
L.K.	1.000KHz	1.00V	✓
Cx	1.000KHz	1.00V	✗
DCR			✓
PS			✗
BL			✗

TEST SET
MEAS. DISP.
JUDG. DISP.
NEXT PAGE

- press this key to open test frequency of item
- press this key to close this test function of item
- press this key directly enter the transformer and test fixture pin change
- press this key to enter scan measure prepaning condition (measurement)
- press this key to set the order of scan measure condition
- press this key to enter the next setting page

There are some parameters as following:

TURN : transformer turn ratio and phase test

Lx : transformer inductance test

Lk : transformer leakage inductance test

DCR : transformer DC resistance

■ 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 back-light, the values may change by pressing the key which under the Cursor.

TRANSFORMER : TEST SETTING	
MODE	< TURN RATIO >
TURN	<div style="border: 1px solid black; padding: 5px; text-align: center;"> STD : 1.00 T Np </div>
Lx	
L.K.	
Cx	
DCR	
PS	
BL	
	↑ ABS % ↓ DISP. MEAS. DISP. JUDG. NEXT

- press this key to move the block area upward
- press this key to change the judgement absolute value(ABS) or %
- press this key to move the block area downward
- press this key to enter measure screen
- press this key to enter judgement screen
- press this key to enter next set screen

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.

In show area the [DISP. MEAS.] and [DISP. JUDG.] 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:

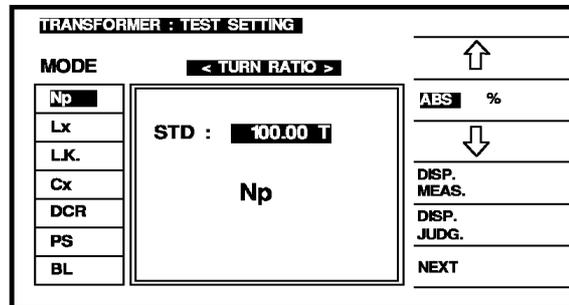
Input parameter setting:

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

	Np	Ns	Lx	L.k.	DCR
STD.	100.0 T	10.0 T	9.800 mH	120.0 uH	120.0 mΩ
HIGH		10.2 T	+ 5%	150.0 uH	150.0 mΩ
LOW		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.



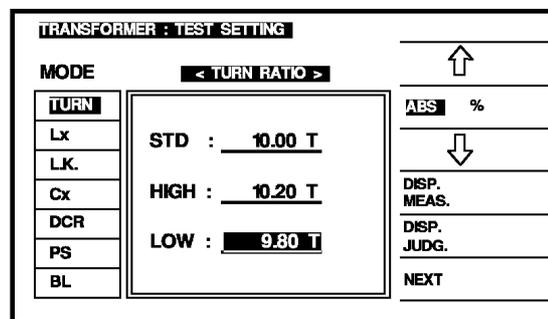
This setting item is to set the Ns parameter of TURN -RATIO, the method of input is as below:

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.



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

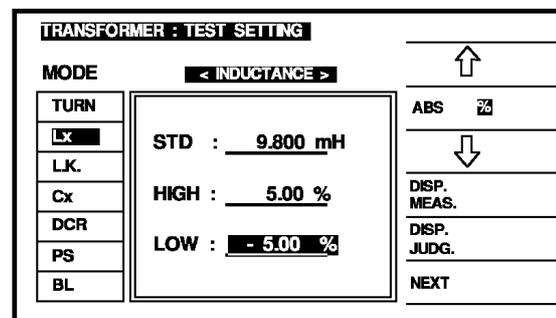
[ABS %]

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.



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

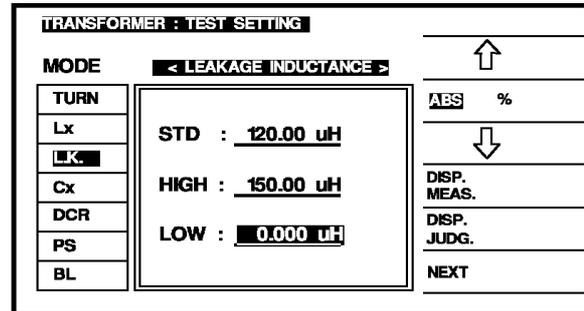
[ABS %]

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.



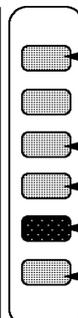
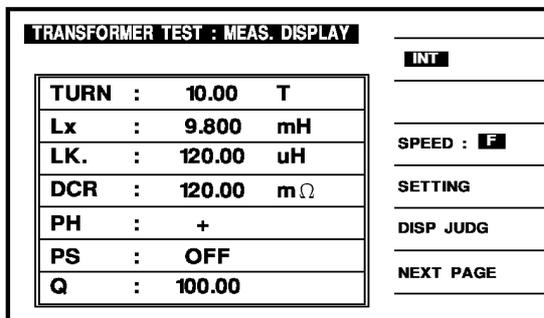
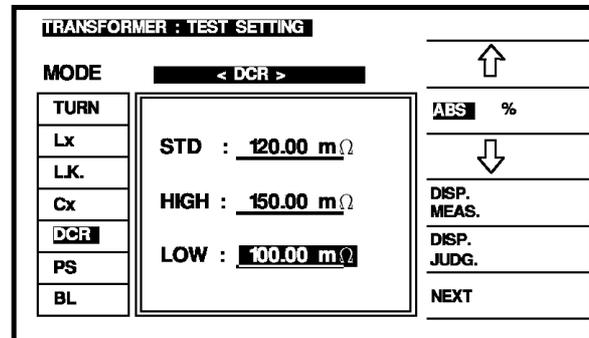
This setting item is to set the primary parameter of the DCR, the method of input is as below:

STD. : [1] [2] [0] [mΩ] [Enter]

HIGH: [1] [5] [0] [mΩ] [Enter]

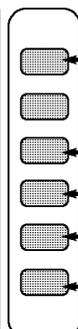
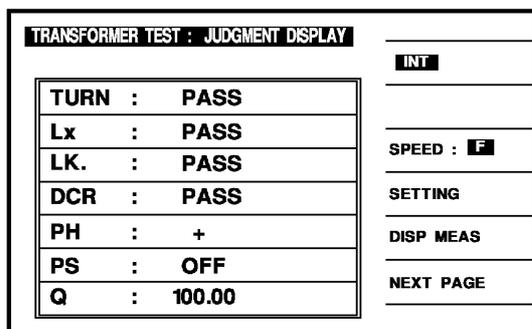
LOW: [1] [0] [0] [mΩ] [Enter]

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



- 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

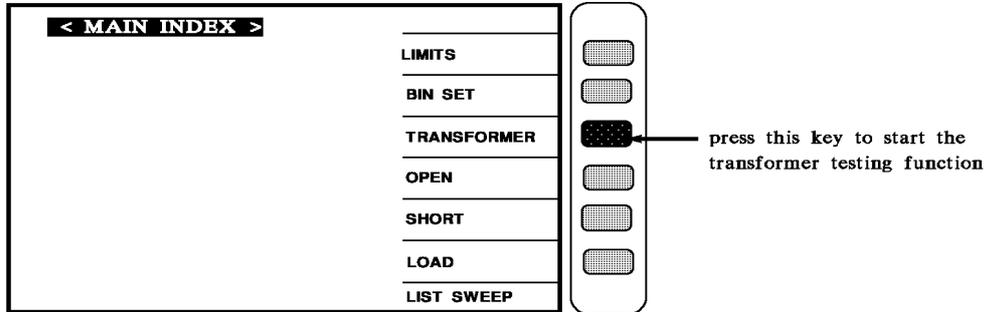
Press the key [DIST. JUDG.] to enter the measure judgment screen as below:



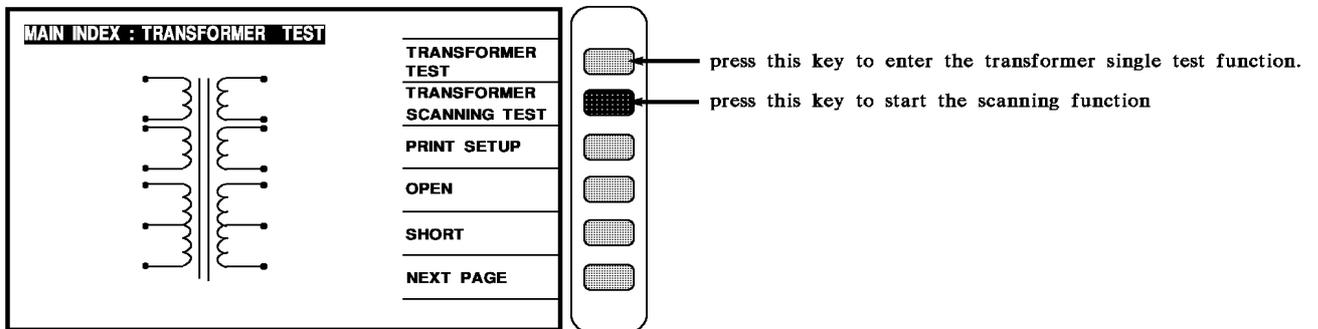
- press this key can change the trigger to three kinds of the automatic (INT.), manual, and external
- press this key to change the test speed slow, middle and fast
- press this key can directly enter the screen of parameter setting
- press this key can change to measure judgement screen
- press this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

4.4.4 Test Fixture (Scan Box) Operation

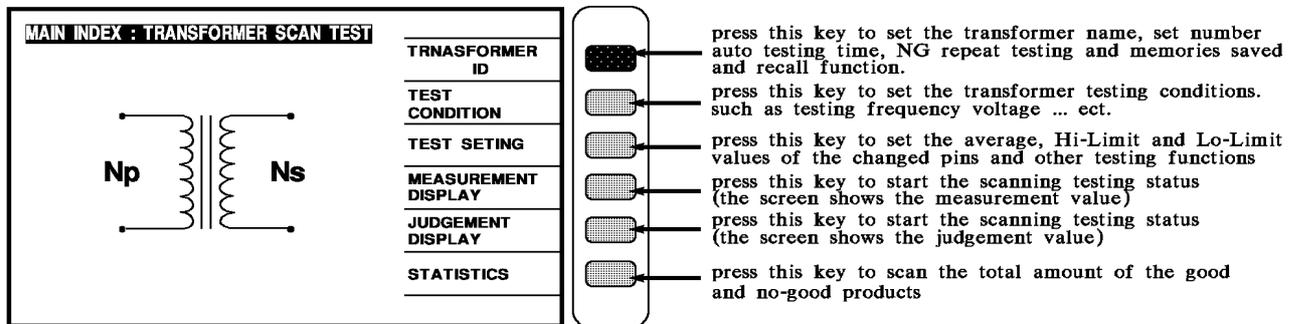
1. The display shows Chroma's name, phone no., fax no., model no. and programming version (around 2 seconds) after the main power of the unit is switch ON.



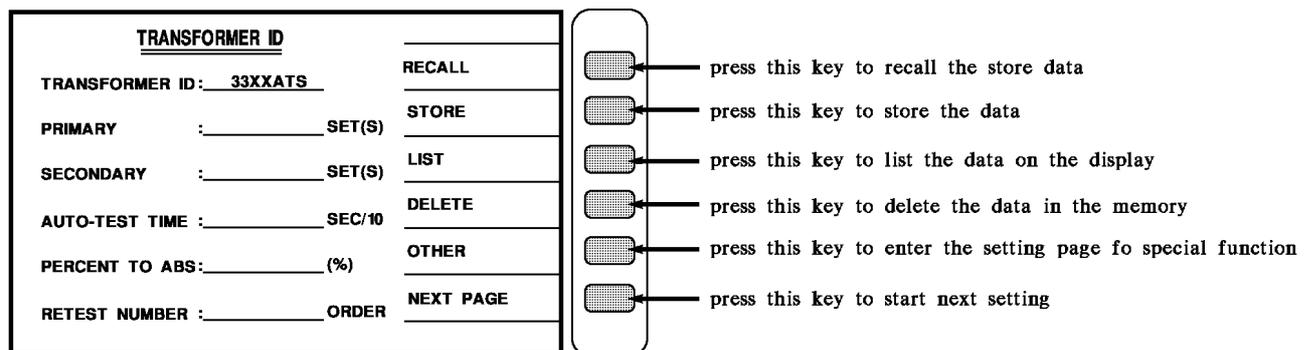
2. The testing function menu is as follows:



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 testing time for automatic. 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 no-good repeat testing times. 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	✓
Cx	1.000KHz	1.00V	✗
Zx	1.000KHz	1.00V	✓
ACR	1.000KHz	1.00V	✗
DCR			✗
PS (X)	BL (X)	HP (X)	

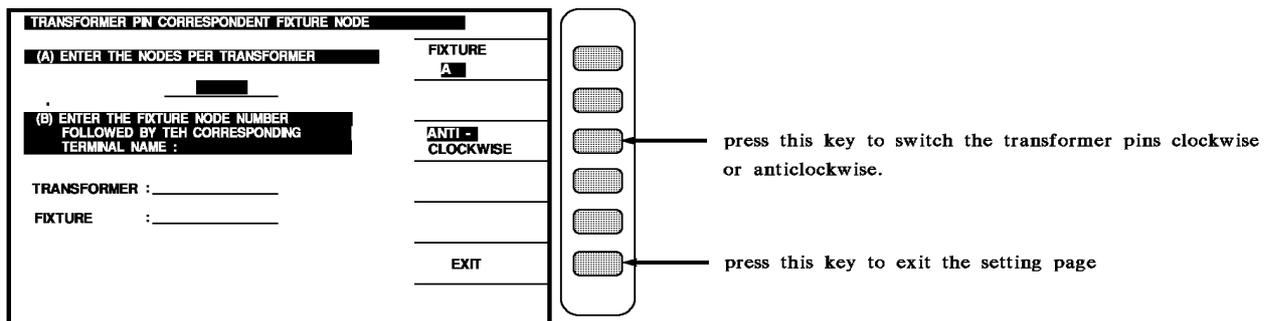
✓	
✗	
TEST SET	
MEAS. DISP.	
STEP SEQ.	
N.P.	
[·] FREQ	

- 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 preparation 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 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 back-light, the values may change by pressing the  key which under the Cursor.



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

(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.

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			

PRIMARY : 1

TURN RATIO

INDUCTANCE

LEAKAGE L.

DCR

NEXT PAGE

KEY [.]

CORRESPONDENT

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

press this key to set the standard, Hi and Lo-Limit values of the turn-ratio.

press this key to set the standard, Hi and Lo-Limit values of the inductance.

press this key to set the standard, Hi and Lo-Limit values of the Leakage Inductance

press this key to set the standard, Hi and Lo-Limit values of the DCR.

press this key go to next screen

press [.] key into the automatic pin number change screen

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

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			

PRIMARY : 1

PIN SHORT

BALANCE

CAPACITANCE

NEXT ITEM

NEXT PAGE

KEY [.]

CORRESPONDENT

press this key to set the switching pin's.

press this key to set the pin short testing of the transformer.

press this key to set the balance testing of the transformer.

press this key to set the capacitance testing of the transformer.

press this key to start next item test setting screen.

press this key to return the pervious setting screen.

press [.] key into the automatic pin number change 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 pin on transformer reflect to the fixture. It is still a guidable operation what just following the method of the display to key in the testing parameter and 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 back-light, the value may change by pressing the key which under the Cursor.

TURN - RATIO TEST SETTING			
1	STANDARD	HI LIMIT	LO LIMIT
1 - 2	█		
3 - 4			

PRI: 1

ABS %

TURN

CLEAR ROW

CLEAR ALL

NEXT PAGE

PHASING

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 to select the judgment model, such as : TURN, VOLTAGE, N_s : N_p, and V_s : V_p

press this to clear all the setting values on the display

press this key to clear the values of the row on the display

press the key to go to next setting screen

phasing judgement

UNIT : TURN (T)

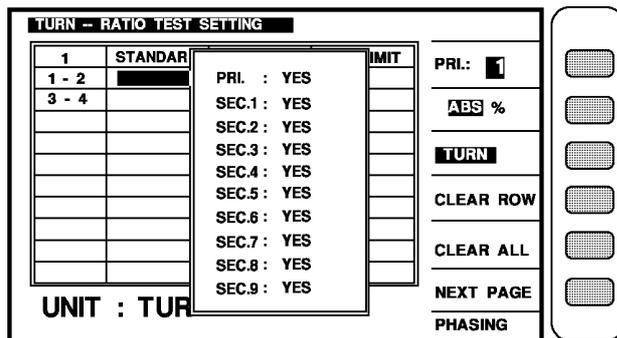
The above parameters are described as following :

- 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

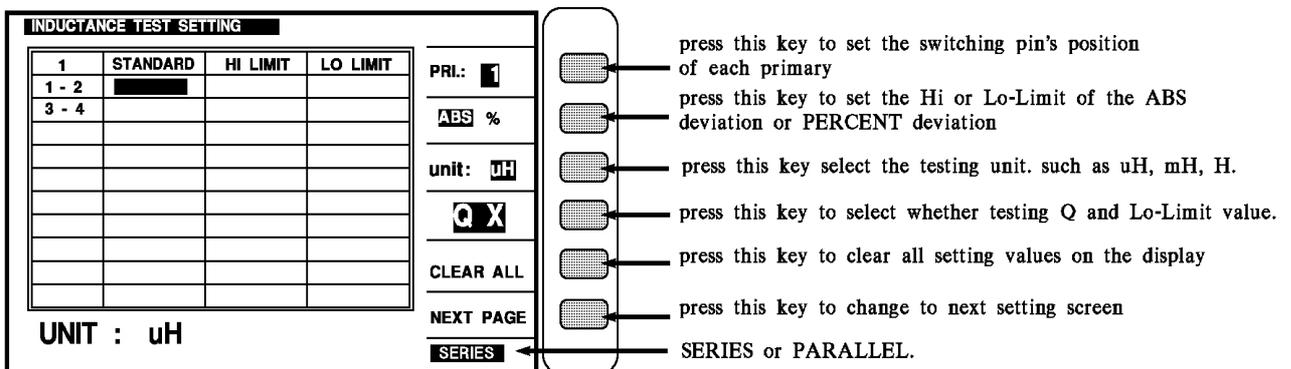
The following screen is for setting the **TURN RATIO JUDGMENT** of the transformer. It is still a guidable operation what just following the method of the display to key in the testing parameter and finish it by pressing [Enter] to jump to next testing item. As above, by pressing [Enter] of the last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

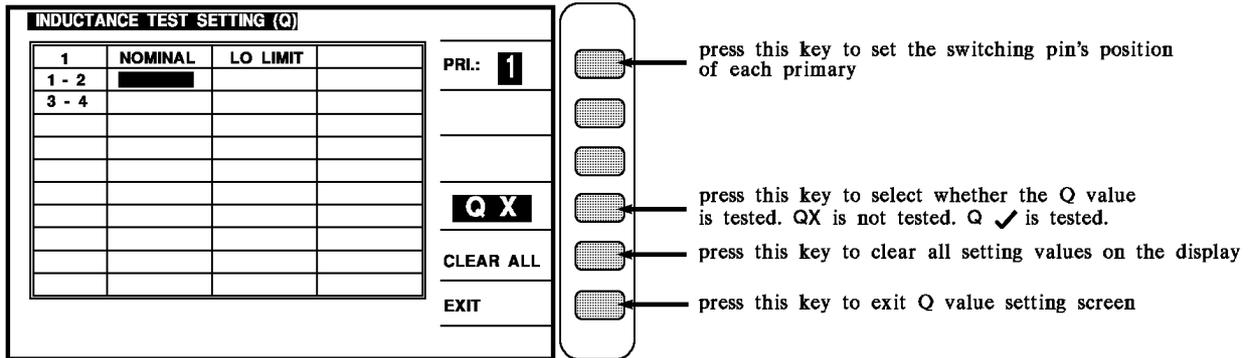
If want to move the block randomly, can use the  keys under cursor to forward way to move.



Judgment screen if needs to ignore any set in 9 sets of secondary just change YES to NO.



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



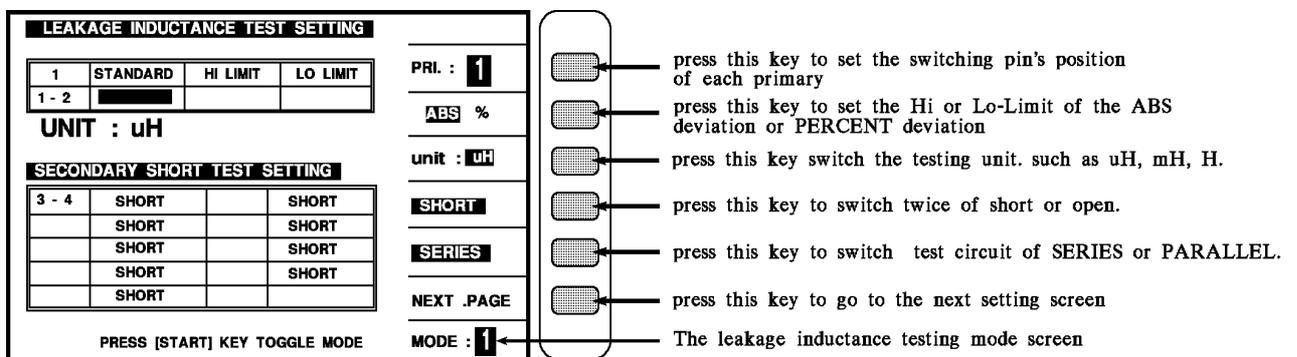
Above parameters are described as following:

- 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 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 user desire to change the setting on each back-light, 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	[REDACTED]		
TRANSFORMER FIXTURE			
LK. 1			SHORT
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 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 back-light, the values may change by pressing the key which under the Cursor.

DCR TEST SETTING			
1	STANDARD	HI LIMIT	LO LIMIT
1 - 2	[REDACTED]		
3 - 4			

PRI.: **1**

ABS %

unit : **mΩ**

CLEAR ROW

CLEAR ALL

NEXT PAGE

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 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 back-light, 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 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 back-light, the values may change by pressing the  key which under CURSOR.

TRANSFORMER : BALANCE SETTING	
NOMINAL VALUE : █	BL : 1
BALANCE -- L1 : PRI.	ABS %
BALANCE -- L2 : PRI.	unit : uH
ABS(L1 -- L2) < _____ (%)	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)

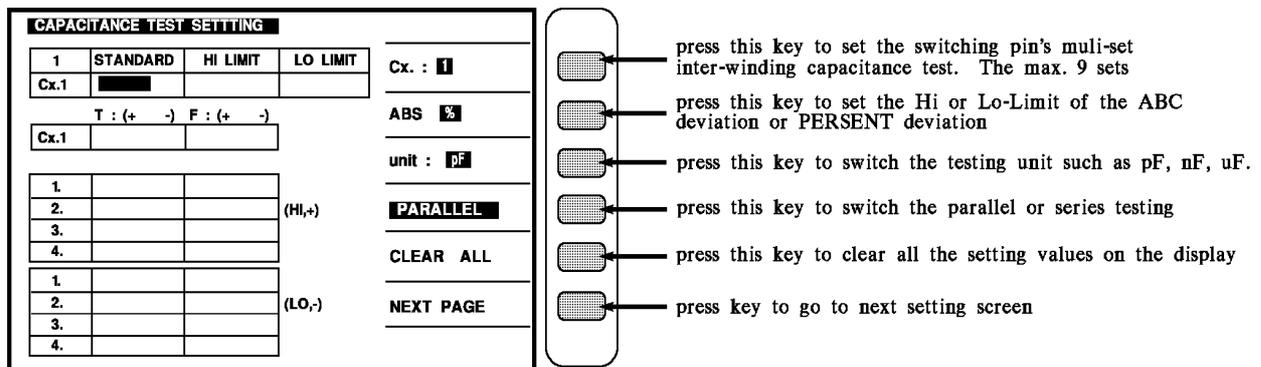
press this key to go to next setting screen

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 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 back-light, the values may change by pressing the  key which under Cursor.



The screenshot shows the 'CAPACITANCE TEST SETTING' screen. It contains several data entry fields and control buttons. Annotations on the right side of the screen describe the functions of six physical keys:

- 1. press this key to set the switching pin's multi-set inter-winding capacitance test. The max. 9 sets
- 2. press this key to set the Hi or Lo-Limit of the ABC deviation or PERSENT deviation
- 3. press this key to switch the testing unit such as pF, nF, uF.
- 4. press this key to switch the parallel or series testing
- 5. press this key to clear all the setting values on the display
- 6. press key to go to next setting screen

Above parameters are described as following:

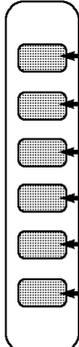
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-Limit value
- LO LIMIT : The judgment of the Lo-Limit value
- Cx.1...9 : The stray capacity inductance testing set
- TRANSFORMER : Pin position of the transformer
- FIXTURE : The Pin on transformer reflects to the fixture
- 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 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 back-light, the values may change by pressing the  key which under Cursor.

SCAN TEST : MEASUREMENT											
	LX	TURN	DCR	P	B						
PRI :											
SEC1 :											
SEC2 :											
SEC3 :											
SEC4 :											
SEC5 :											
SEC6 :											
SEC7 :											
SEC8 :											
SEC9 :											
L.K. :											
PSHT :	00	01	02	03	04	05	06	07	08	09	10

LOAD STD.	OFF
DEVIATION	OFF
SPEED :	M
PRI :	1
TEST FAIL	CONTINUE
PRINT	OFF
BIAS	OFF
AUTO	



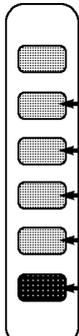
- press this key "ON" to save next testing value being standard value
- press this key to switch the judgment mode on trun, voltage, Np : Ns, or Vp : Vs
- press this key to alter testing speed as S,M,F
- press this key to set the primary testing value on multi-set
- press this key to continue or stop testing while the DUT is fail
- press this key to start preparation testing status (judgment result display)

When the display shows this screen 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 back-light 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.

SCAN TEST : JUDGMENT											
	LX	TURN	DCR	P	B						
PRI :											
SEC1 :											
SEC2 :											
SEC3 :											
SEC4 :											
SEC5 :											
SEC6 :											
SEC7 :											
SEC8 :											
SEC9 :											
L.K. :											
PSHT :	00	01	02	03	04	05	06	07	08	09	10

ABS :	%
SPEED :	M
PRI :	1
TEST FAIL	CONTINUE
NEXT PAGE	
AUTO	



- press this key to alter the judgment of the ABS deviation or PERCENT deviation
- press this key to alter testing speed as S,M,F
- press thjis key to set the primary testing value on multi-sets
- press this key to continue or stop testing while the DUT is fail
- press this key then enter the screen of good and no-good counter

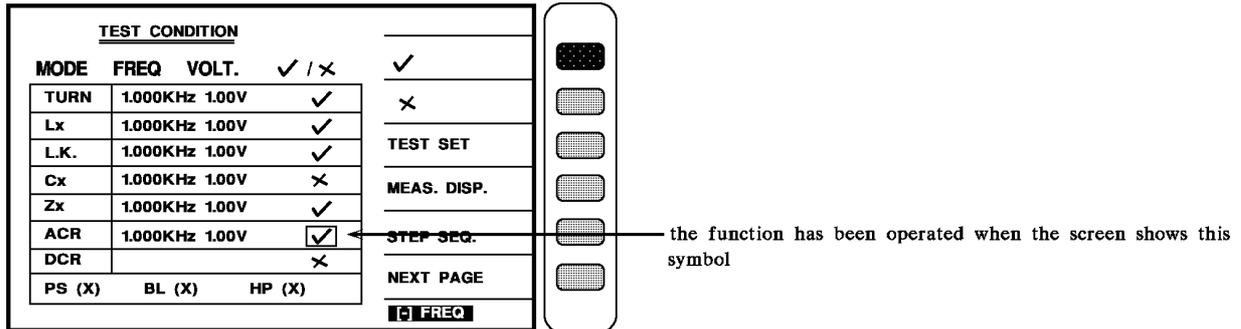
When the display shows this screen which means the unit is under testing. For starting the testing, just put the DUT on the Fixture and press the [Start] key on the SCAN BOX. The PASS means the DUT is good. The HIGH or LOW indicates the result of DUT and the value will be back-light. The testing mode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

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

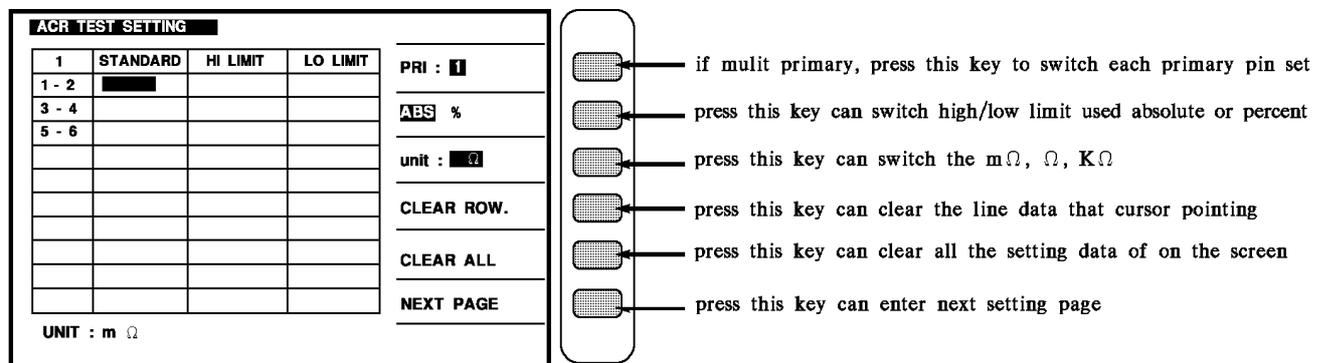
Notice: this function can be used under Lx, LK, Q testing, addition on to input the test conditions, the Lx, LK, Q should be opened then can test.

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 :

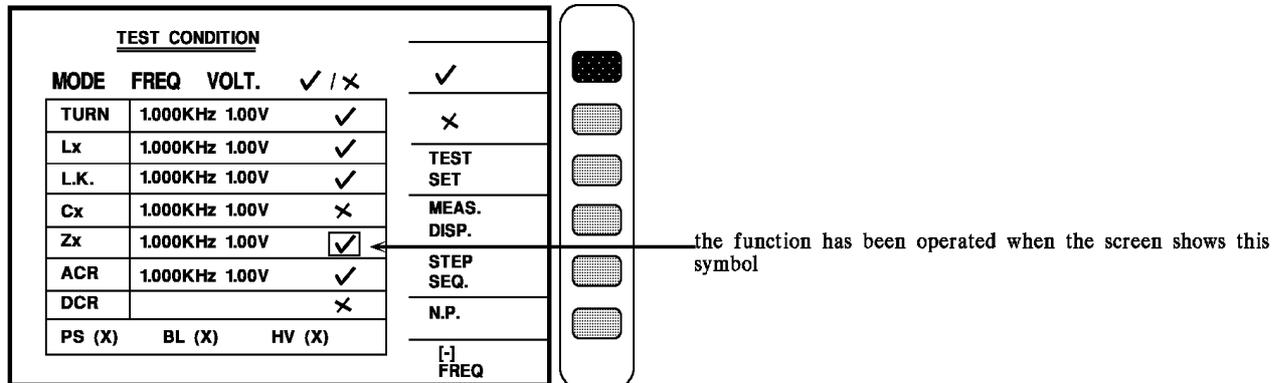
- PRI : The first level pin setting
- 1-2, 3-4, 5-6 : The secondary turns of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-limit value
- LO LIMIT : The judgment of the Lo-limit value

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.

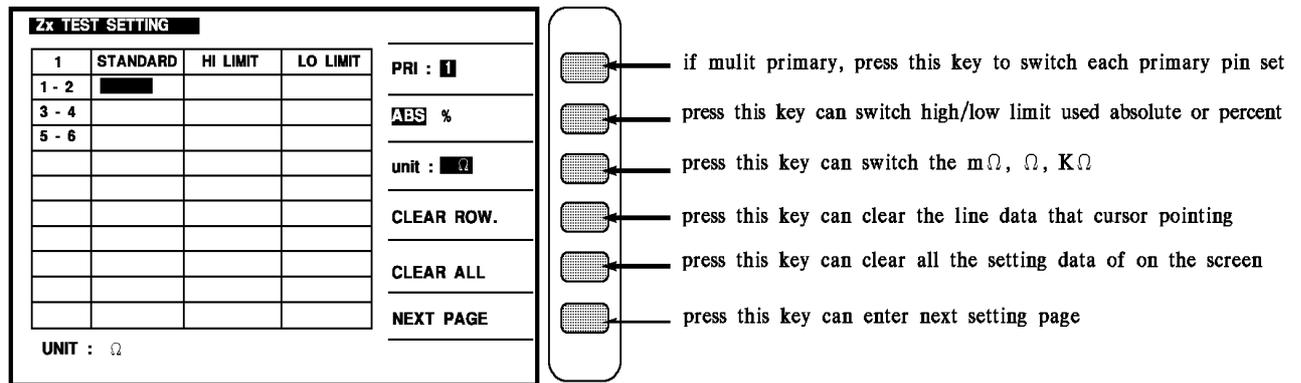
If want to change setting on the block-light, use the four keys under cursor to move.

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:

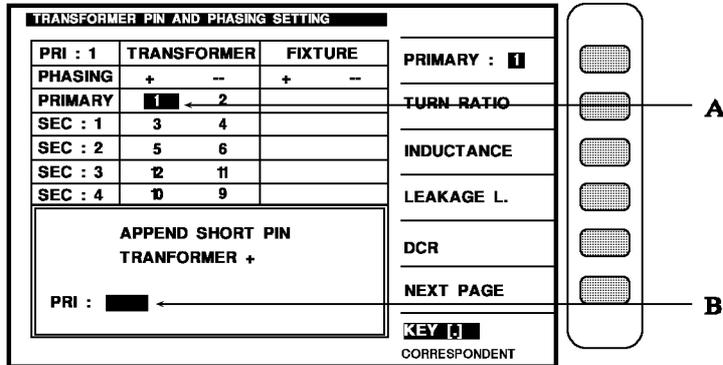
- PRI : The first level pin setting
- 1-2, 3-4, 5-6 : The secondary turns of the transformer
- STANDARD : The standard value of each turn
- HI LIMIT. : The judgment of the Hi-limit value
- LO LIMIT : The judgment of the Lo-limit value

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.

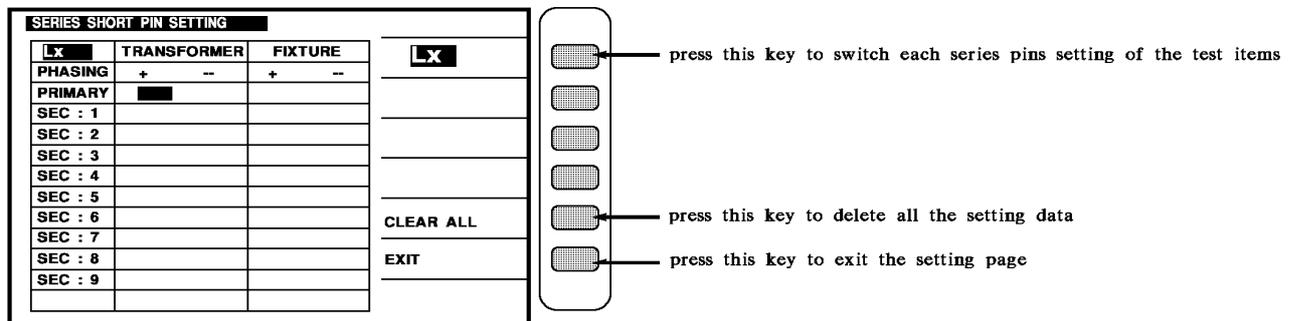


Above figure description

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:

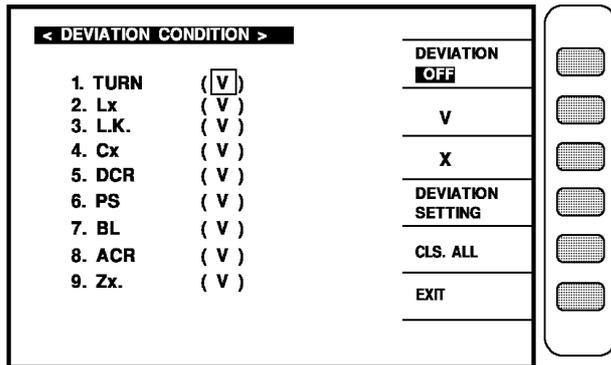


Pin series testing can according to test items and set up the series position, set up method is selected the test item, than according to the series pin need to be set to the winding, for exit the display, only press exit key. If has use pins auto correspond function, only set up transformer pins.

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:

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



- c. Make selection of deviation item by tick "✓" & cross "X" key.
- d. Press "DEVIATION" key to confirm the function is ON.
SETTING
- e. Press EXIT key to enter <SCAN TEST: MEASUREMENT> for auto transformer scanning, under this state. work "DEVIATION" will become back-lighted shown as figure 5-2a.

(Date show underneath of DEVIATION is what the time users have use this function)
Arrow appointed, the area would become backlighted, after the test, it will return to the original.

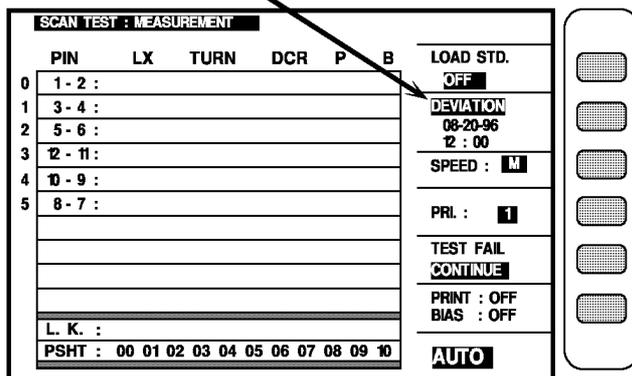
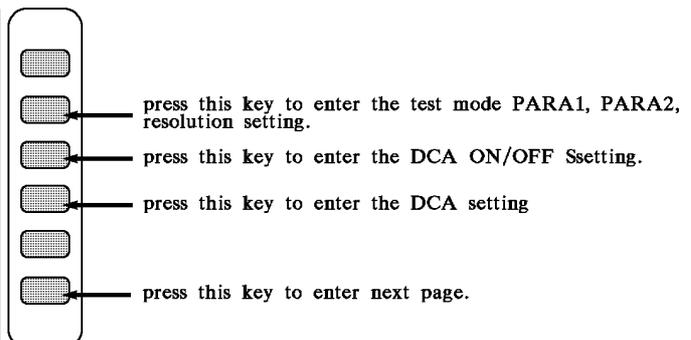
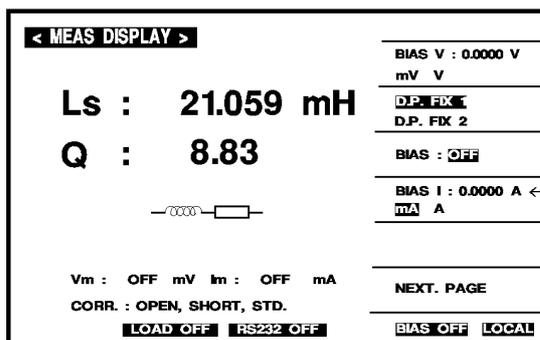
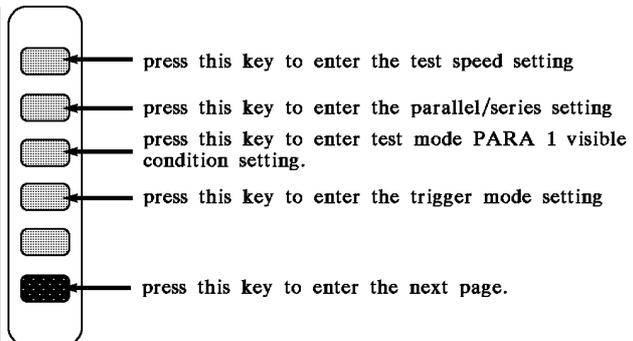
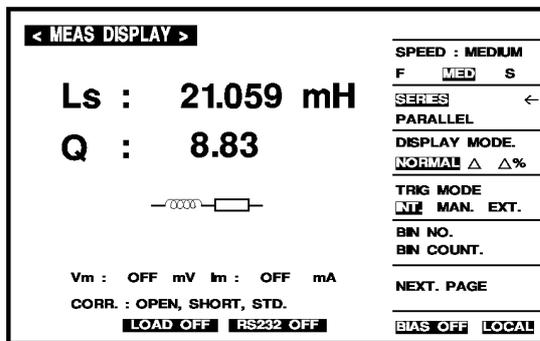
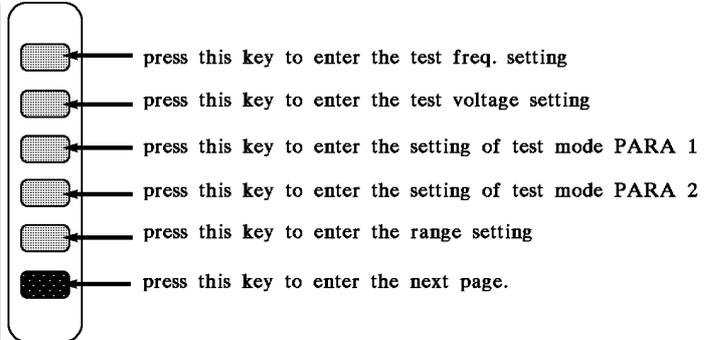
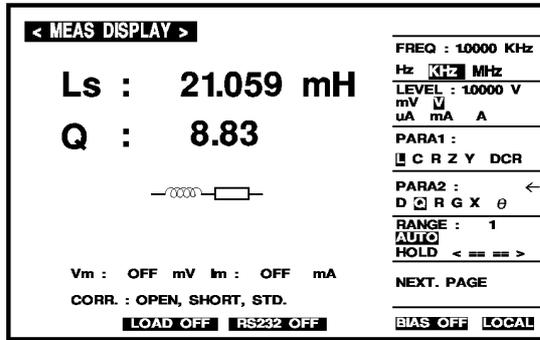


Figure 5 - 2a

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 back-lighted will disappear, it means the deviation error compensation is done. In second time you press [Start] key you will see the value is deviated.

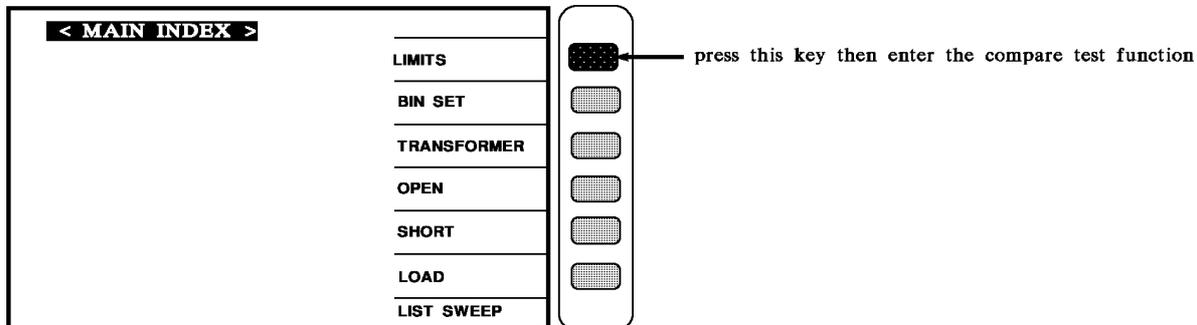
4.4.12 LCRZ Parameter Analysis. (3302 only)

1. Turn the power on, the instrument shows every things OK, press [Meas Display] to enter the LCRZ component parameter test.

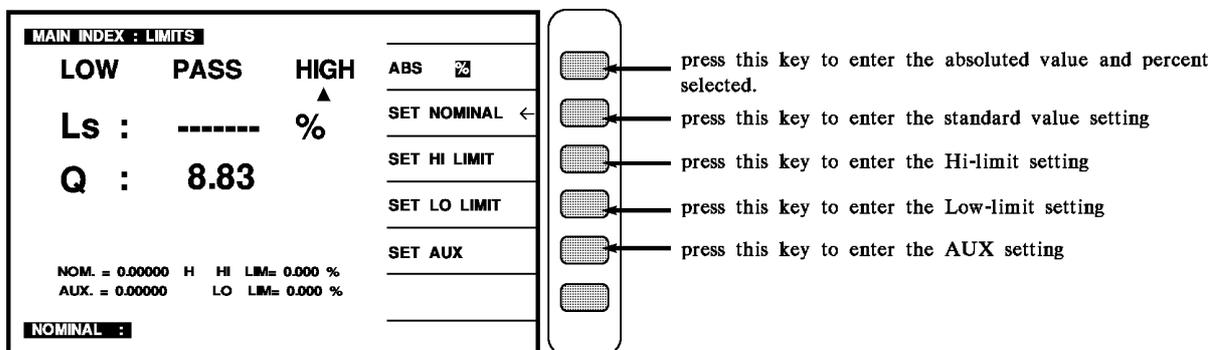


4.4.13 Compare Test (3302 only)

Turn the power on, the screen shows everything OK, press [Main Index] to enter the main index, at this time, please press the key shows which on the screen LIMITS as below :

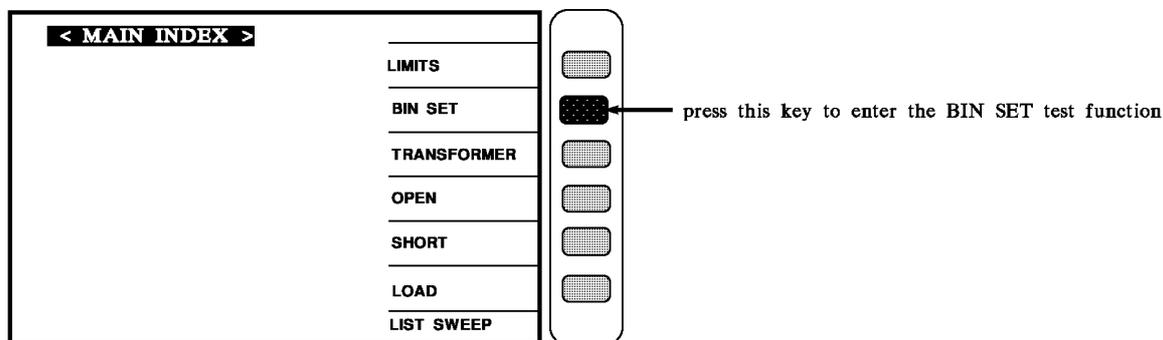


After press [LIMITS] key, the screen shows as below:



4.4.14 BIN SET (3302 only)

Turn the power on, the screen shows everything OK, press [Main Index] to enter the main index, at this time, please press the key which on the screen and BIN SET as below :



After press [BIN SET] key, the screen shows as below:

MODE : < L - Q >	BIN : 1	ABS %				
NOM :	BIN : 0	STORE				press this key to enter the absolduted value and percent selected.
AUXH :	BIN : 0	RECALL				press this key to store the setting condition.
AUXL :	BIN : 0	BIN NO.				press thie key to recall the records
COMP : ON	AUX : ON	BIN COUNT				
BIN	HIGH	LOW	NEXT PG.			
1.						
2.						
3.						

MODE : < L - Q >						
BIN	HIGH	LOW				press this key to store this setting condition
4.				STORE		
5.				RECALL		press this to recall the data that we need
6.				BIN NO.		
7.			BIN COUNT			
8.			NEXT PG.	press this key to enter next page		

4.4.15 Multi-frequency Scan Test (LIST SWEEP) (3302 only)

1. Turn the power on, the screen shows everything OK, press [Main Index] to enter the main index. Please press Start / Trig key, to enter LIST SWEEP function.

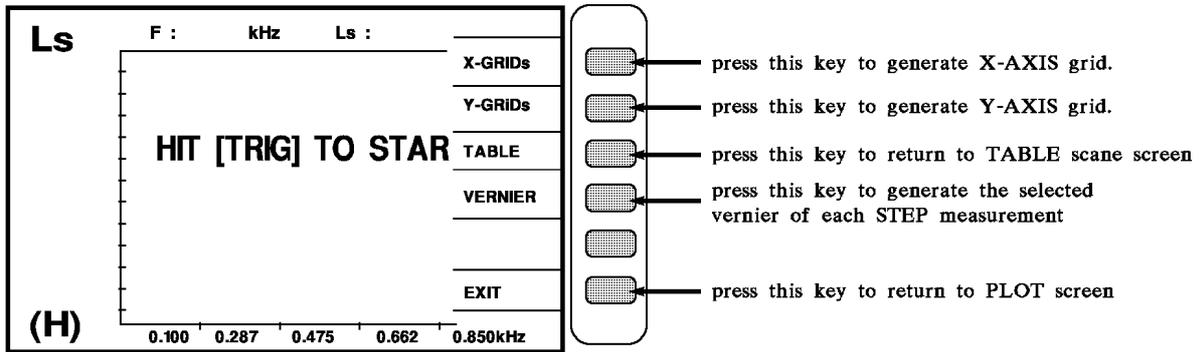
< MAIN INDEX >						
		LCRZ SCAN				press this key to enter the LCRZ Multi-frequency scane test
		PARA. SWEEP				press this key to enter the PARA. SWEEP function test
		BIAS SCAN				press this key to enter the Overlap Current Multi-frequency scane test
		EXIT				

- a. When enter [LCRZ SCAN] function, the screen shows as below:

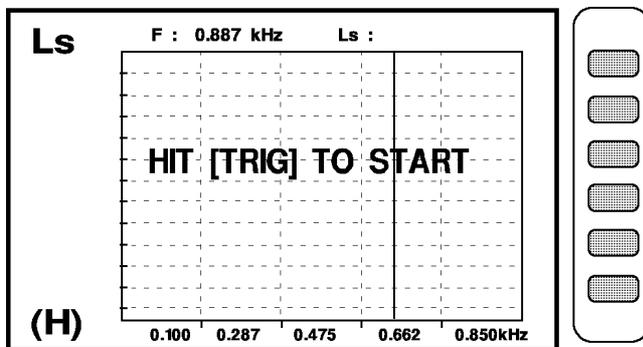
SWEET SETUP					
MODE :	SEC				
FREQ K	VOLT V	PARA	HIGH	LOW	SEQ.
1					STEP
2					
3					
4					DELETE LINE
5					RUN SWEEP
6					
7					EXIT
8					
9					

Follow cursor to input F & V

When it enters the PLOT screen as shown above, press TRIG to do PLOT drawing. Press the Help key can enter the hidden function screen as shown below.

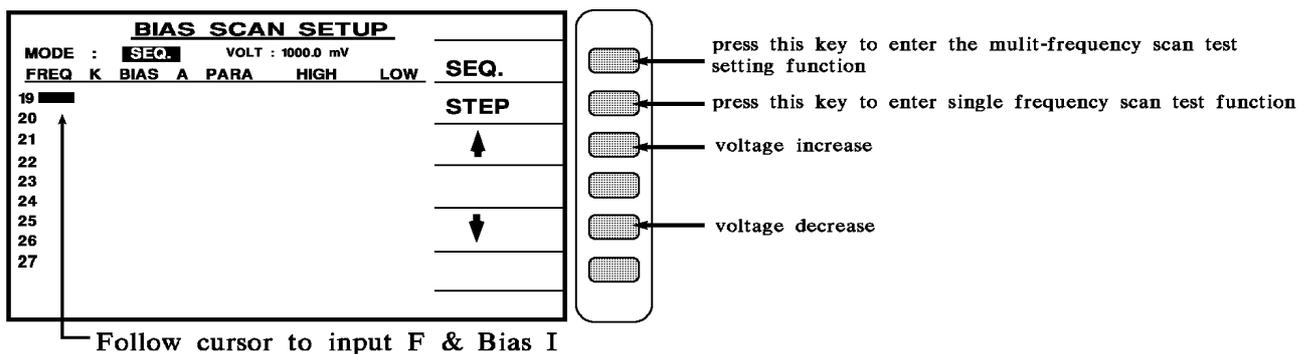


Press X-GRIDs, Y-GRIDs, or VERNIER to enter the PLOT hidden function screen as shown below.



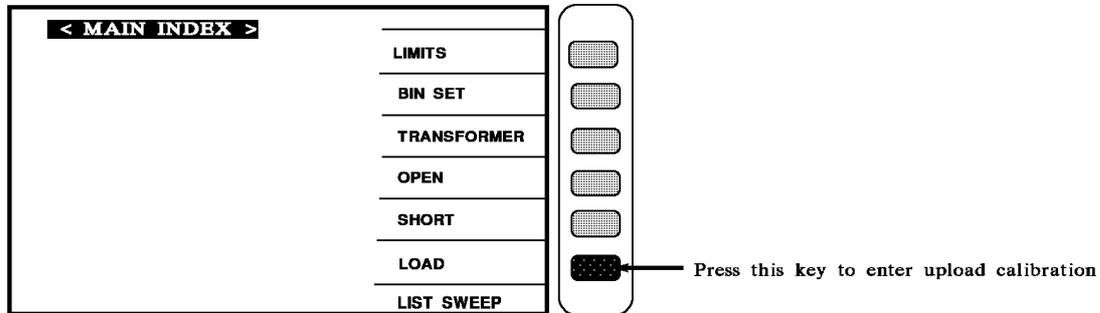
PS: For VERNIER function, the two keys $\leftarrow \rightarrow$ under cursor can be used to select each STEP.

c. When enter [BIAS SCAN] function, the screen shows as below:

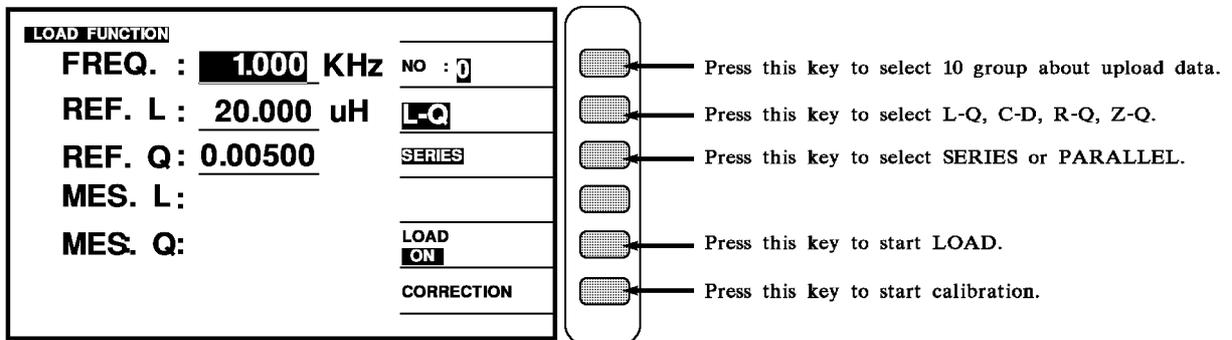


4.4.16 Upload Calibration Explanation (3302 only)

1. Turn the power on, the screen shows everything OK, press [Main Index] to enter the main index. Please press down display LOAD word correspond key, as show:



When press down [LOAD] key, the display as show:



Take upload device to DUT point, and control cursor & number key to enter that device number value and calibrated frequency.

4.4.17 33XX 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

- 1** TEST CONDITION
- 2** TEST SETTING
- 3** MEASUREMENT DISPLAY
- 4** JUDGMENT DISPLAY

TRANSFORMER SCANNING TEST

- 5** TRANSFORMER ID.
- 6** TEST CONDITION
- 7** TEST SETTING
- 8** MEASUREMENT DISPLAY
- 9** JUDGMENT DISPLAY

4.4.18 33XX 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	— press this key to enter the specialized function setting screen
RESET NUMBER : _____ ORDER	NEXT PAGE	

OTHER OPTION SETTING		
TEST WAIT TIME : 0 (SEC/10)	2nd VALVE OFF	— set second valve ON or OFF.
BIAS CURRET : 0.0 (mA)	CURRENT SETTING	— press this key to enter the Bias Current setting.
DUAL FIXTURE : A FIXTURE	A	— press this key to select A and B singly or dualy. (test fixture option)
SELECT BIAS : Lx	Lx	— press this key to select Lx and Zx singly or dualy. (current test model option)
	EXIT	— press this key to exit the specialized function setting screen.

Above diagram operate description as following:

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

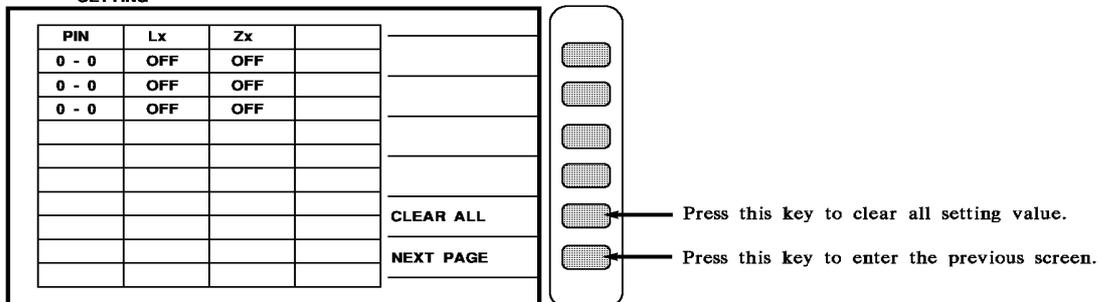
BIAS CURRENT : _____.....DCA setting

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.

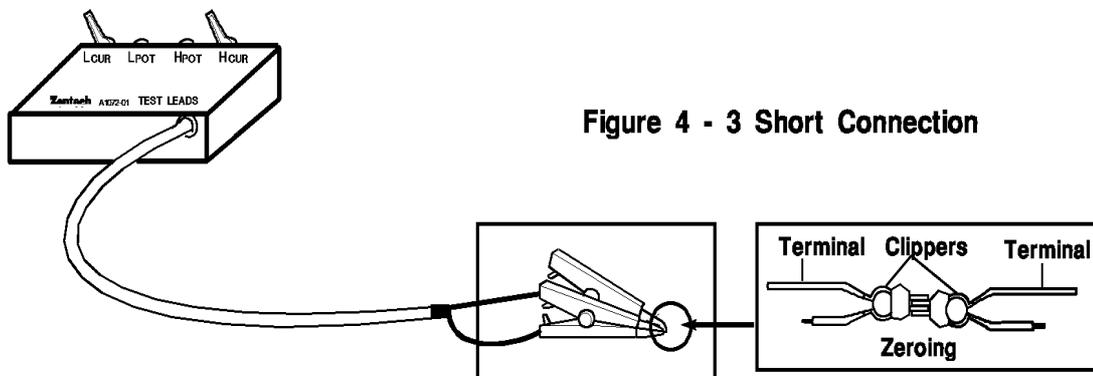
Press  it to enter next screen



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 X_L or X_C , as X_L or X_C less than $100m\Omega$, there are low impedance, now the measurement must be noted two points:

(1) Correct way to short



(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 (μr) 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 33XX 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 33XX rear panel, do not use the other AC source, on the other hand, the signal control lines and test cable should be connected with 33XX, the connecting is as below:

① Notice :

Before connecting the cable or any control line, turn off the power of 33XX.

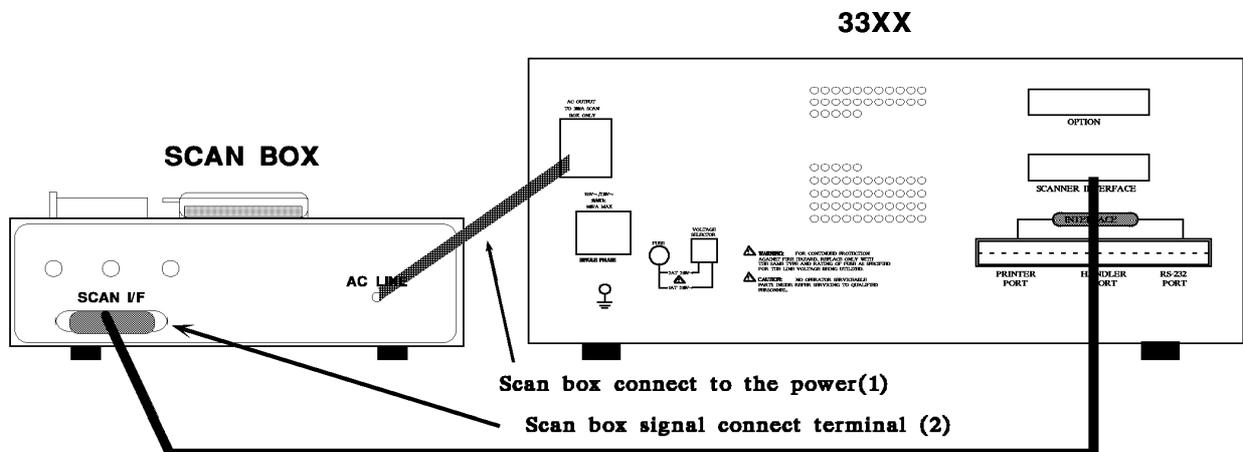
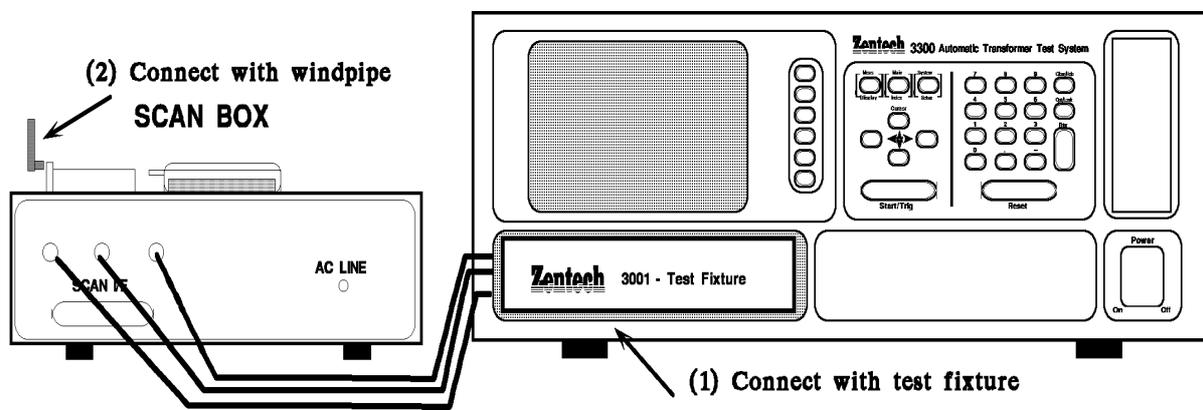


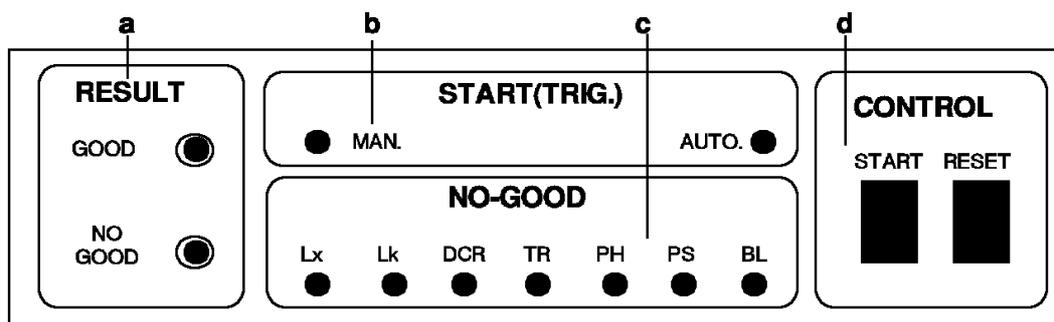
Figure 5 - 1

- a. connect the power cord of 3001A to the AC output of 33XX rear panel as figure 5-1 (1) the arrow head pointed, do not connect to other terminal.
- b. connect the 36 pin twin head cable of the accessory to the 33XX 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. connect the test fixture 3001A to the front panel of Model 33XX and lock tight, as below:
- d. if use the piston to push the test fixture, please connect the air tube.



5.1.3 Scan Box Front Panel Description

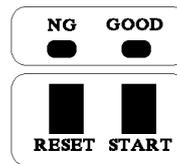
A. 3001 Scan Box



- 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.

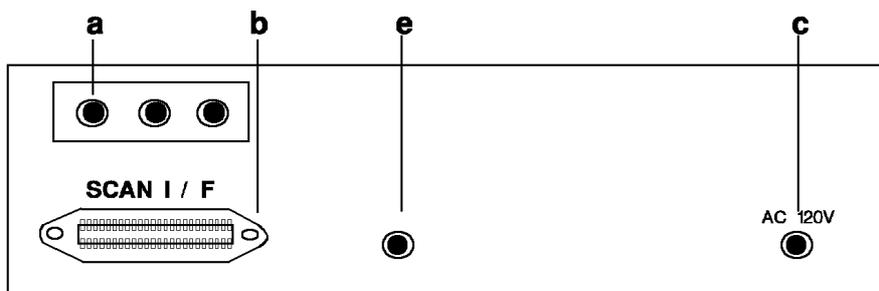
B. 3001A Scan Box



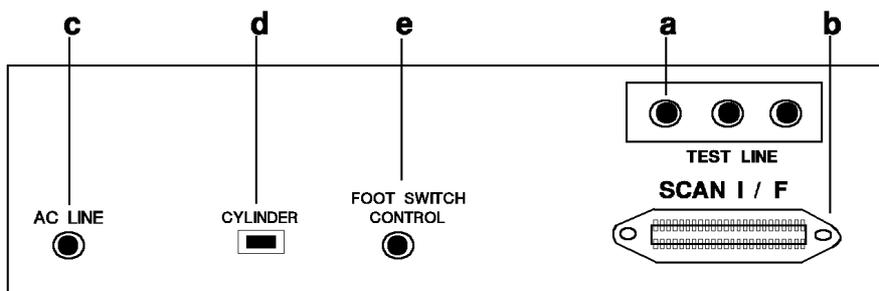
- START** : Trigger control key, when press this key then operate the test acting.
- RESET** : Reset the trigger control key, when press this key then stop all the test to return original preparing test condition.
- GOOD** : Indicative light of the good, when every test item result are good, the LED 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 33XX.

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)

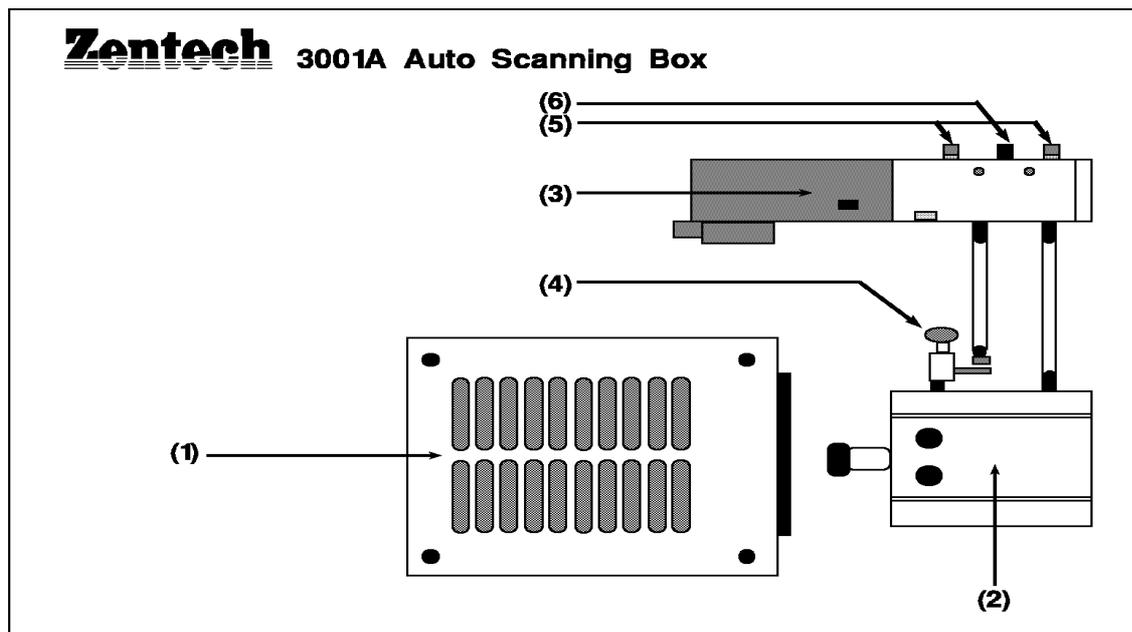
This power cord can be used only for the rear panel of scan box AC 120V of model 33XX, because 3001A use interior power source 120AC, so do not use others.

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 control 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 filter which can filter water 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/cm²**

(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.

- ※ 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.
- ※ 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

※Read the instruction before using※

The sample for setting:

The spec. and pin of the transformer are following:

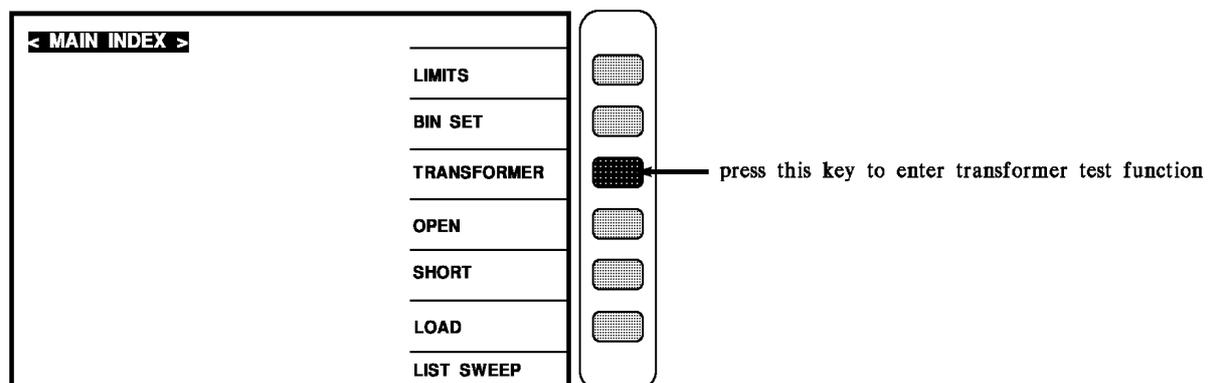
ET-45273-001		PIN No.	TURN	Lx	DCR
1	12	Np	1 - 2	48 T	1.750 mH 0.750 Ω
2	11	N1	3 - 4	48 T	1.750 mH 0.750 Ω
3	10	N2	5 - 6	5 T	65 mΩ
4	9	N3	12 - 11	12 T	120 mΩ
5	8	N4	10 - 9	24 T	0.320 Ω
6	7	N5	8 - 7	2 T	10 mΩ

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

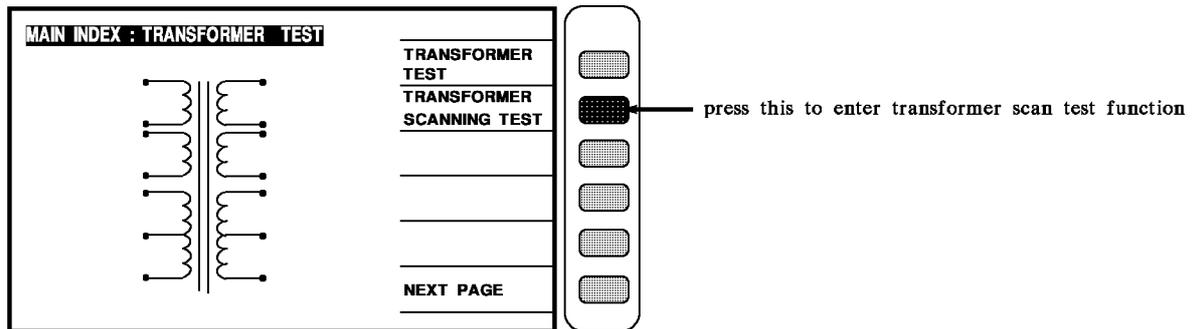
	PIN No.	LK	SHORT PIN
LK1	1 - 2	120 uH	5,6,7,8,9,10,11,12,
LK2	3 - 4	120 uH	5,6,7,8,9,10,11,12,
	Cx.	HI PIN No.	LO PIN No.
Cx1	75pF	1,2,3,4,5,6,	7,8,9,10,11,12,

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

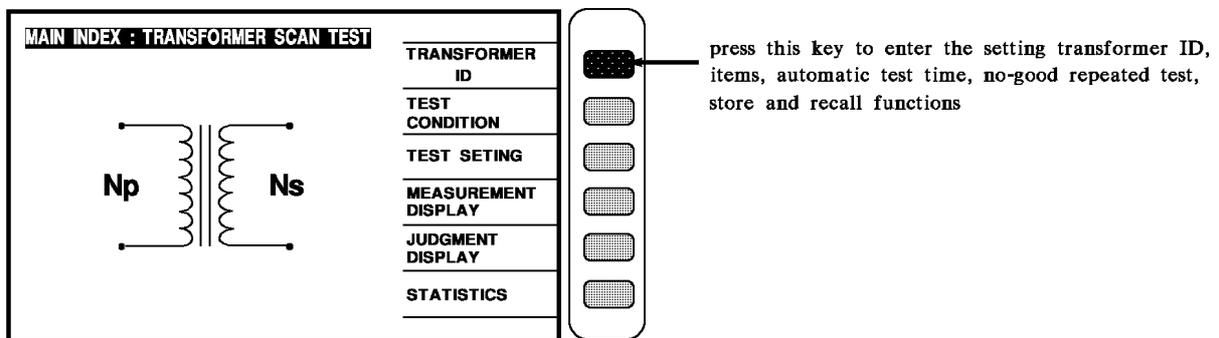
Press the key [Main Index] then show the screen as below.



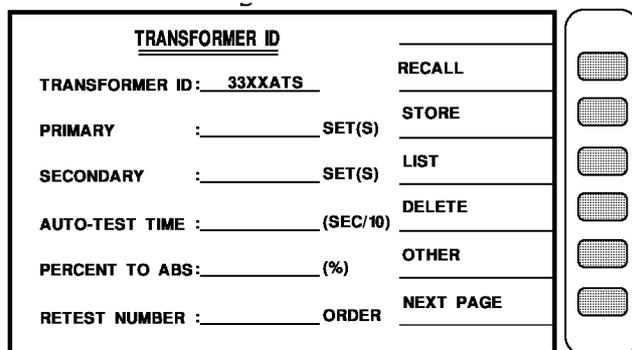
Press the key as above to enter the transformer automatic test function as below.



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 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 key (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]

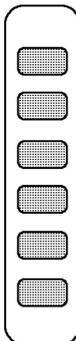
RETEST NUMBER : _____.....Input the no-good repeated test times.

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.

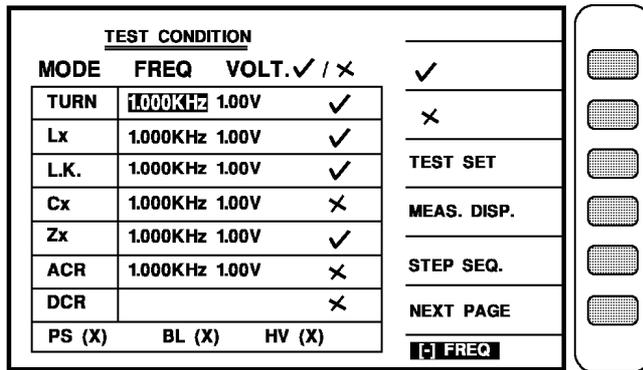
Ex: if not use the no-good repeated test, the set is below: [0] [Enter]

When finish the input, the screen is below:

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



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



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)

✓
✗
TEST SET
MEAS. DISP.
STEP SEQ.
N.P.
[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 0
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			

PRIMARY : 1
ABS %
TURN
CLEAR ROW.
CLEAR ALL
NEXT PAGE

UNIT : TURN (T)

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 back-light.

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 : **I**

ABS %

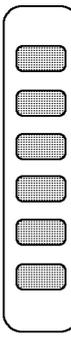
TURN

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 : **I**

ABS %

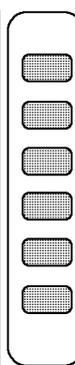
unit : **uH**

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:

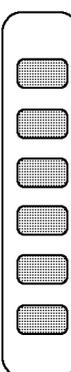
INDUCTANCE TEST SETTING(Q)			
1	NOMINAL	LO LIMIT	
1 - 2	██████		
3 - 4			
5 - 6			
12 - 11			
10 - 9			
8 - 7			

PRI : **I**

Q ✓

CLEAR ALL

EXIT



The setting of Q value is the same as above.

Ex.: the Q value on the each winding of transformer are 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]

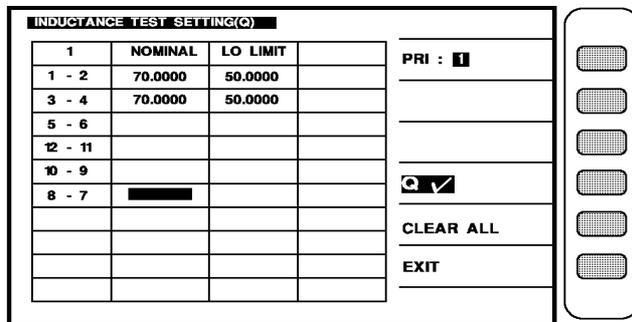
5 - 6 : [Enter]

12-11 : [Enter]

10- 9 : [Enter]

8 - 7 : [Enter]

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



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 back-light.

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%

UNIT : mH

PRIMARY : 1

ABS %

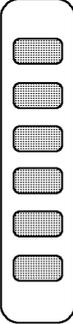
unit : mH

V

CLEAR ALL

NEXT PAGE

SERIES



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		

PRESS [START] KEY TOGGLE MODE

PRI : 1

ABS %

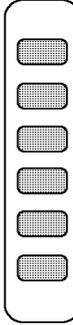
unit : mH

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 %

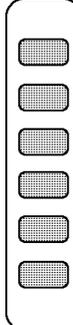
unit : mH

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 ± 10%, PIN 5,6,7,8,9,10,11,12, SHORT.

LK2(3 – 4) = 120 uH ± 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 back-light.

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]

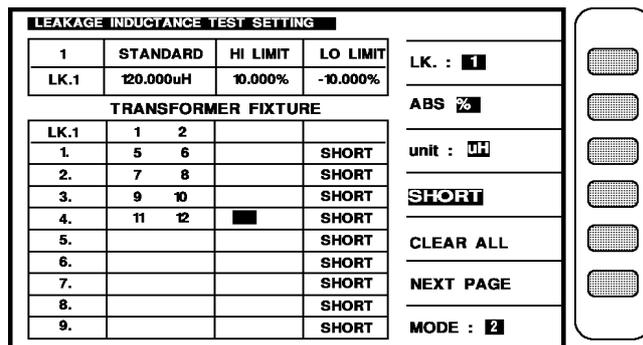
Use the forward key to move the block area to the pin input box of the transformer (3).

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:



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			

PRI :	1
ABS %	
unit :	mΩ
CLEAR ROW	
CLEAR ALL	
NEXT PAGE	

UNIT : m Ω

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 every windings are following:

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

The input is as following:

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

press the unit key [unit : Ω] beside the screen to change the unit to the mΩ 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:

1	STANDARD	HI LIMIT	LO LIMIT
1 - 2	0.750 Ω	0.800 Ω	0.700 Ω
3 - 4	0.750 Ω	0.800 Ω	0.700 Ω
5 - 6	65.000 mΩ	70.000 mΩ	60.000 mΩ
12 - 11	120.000 mΩ	130.000 mΩ	110.000 mΩ
10 - 9	0.320 Ω	0.340 Ω	0.300 Ω
8 - 7	10.000 mΩ	12.000 mΩ	8.000 mΩ

UNIT : m Ω

PRI : 1

ABS %

unit : m Ω

CLEAR ROW

CLEAR ALL

NEXT PAGE

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

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 of the testing transformer pin short are following:

PIN 2 – 3, PIN 4 – 5, PIN 8 – 9, PIN 10 – 11.

Then the input is as below:

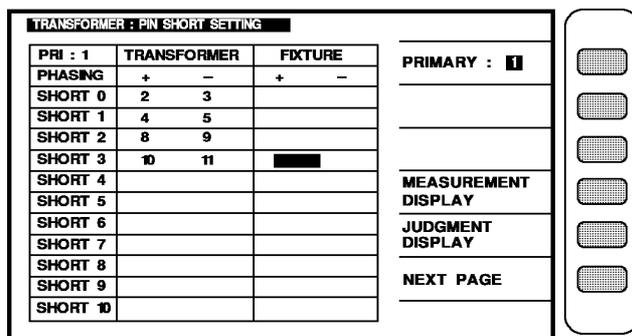
Use the forward key to move the block area to the pin input box of the transformer (Short 0) and input : [2] [Enter] [3] [Enter]

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]

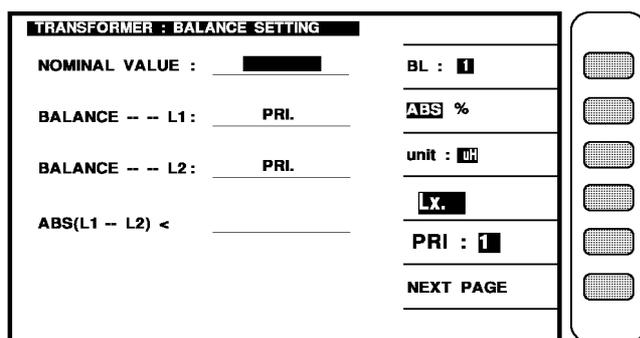
Use the forward key to move the block area to the pin input box of the transformer (Short 2) and input : [8] [Enter] [9] [Enter]

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:



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



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 pin of the testing transformer two items balance are 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.

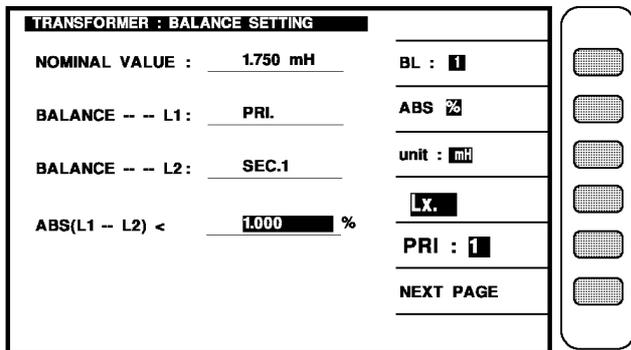
NOMINAL VALUE : [1] [.] [7] [5] [Enter]

BALANCE – L1 : [0] [Enter]

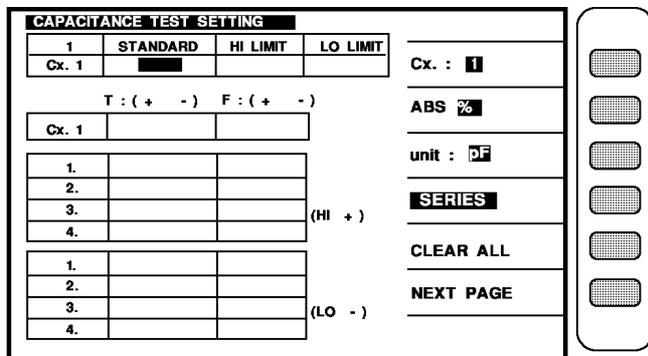
BALANCE – L2 : [1] [Enter]

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

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



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



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]

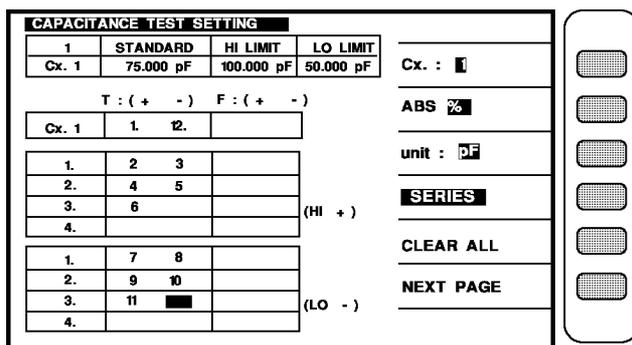
Use the forward key to move the block area to the pin input box of the Hi terminal transformer (3.) and input : HI TERMINAL 3. : [6] [Enter]

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]

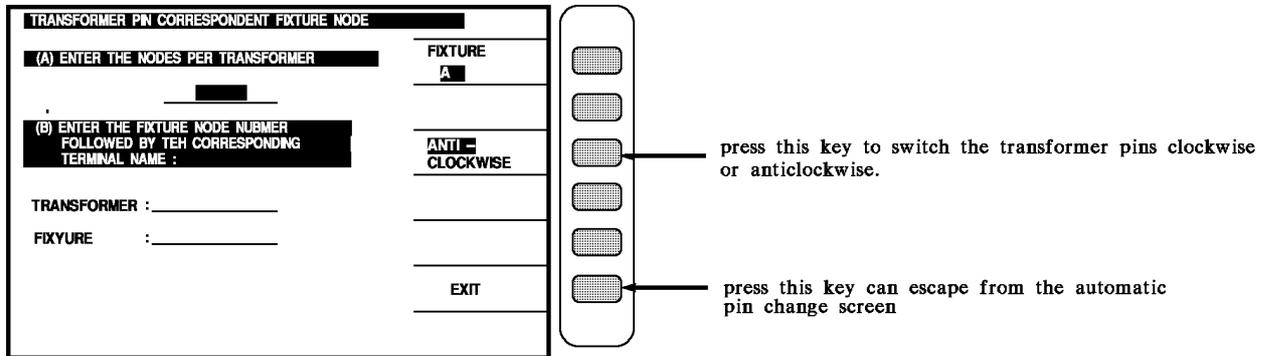
Use the forward key to move the block area to the pin input box of the Lo terminal transformer (2.) and input : LO TERMINAL 2. : [9] [Enter] [1] [0] [Enter]

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:



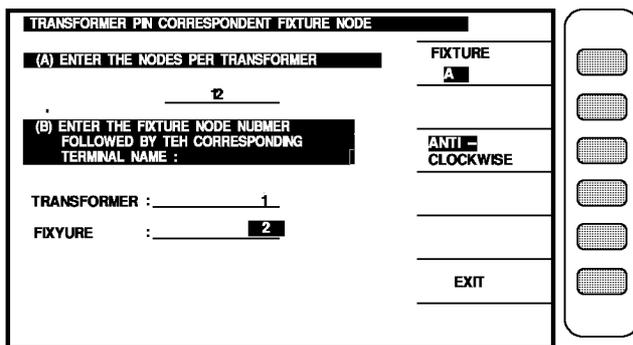
When set till here is finished, but on more the most important parameter has not been set yet, it is the automatic pin number change, please press [MAIN INDEX] to return the scan test setting screen, press [TEST SETTING] key to into the transformer pin setting screen, then press [.] key to enter the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



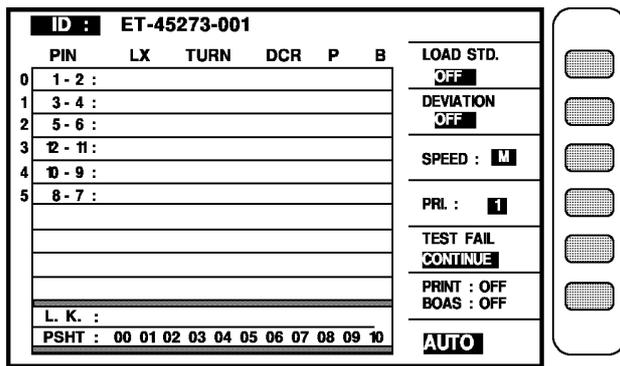
Ex. : The relation of the transformer pin number and test fixture are following :
 there are 12 pin in this transformer
 the pin of the transformer inserts the pin2 of the test fixture
 then the input is:

- (A) : [1] [2] [ENTER]
 (B) TRANSFORMER : [1] [ENTER]
 FIXTURE : [2] [ENTER]

After finish the input, the screen is as below :

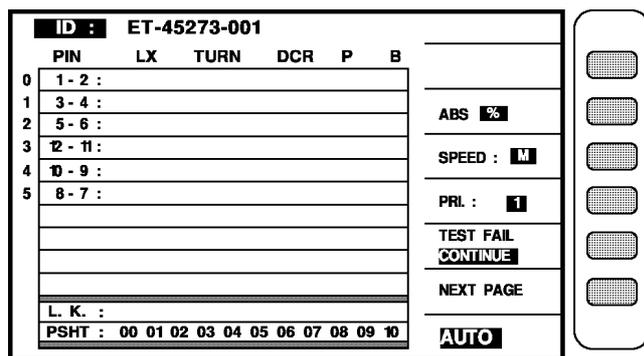


In the above figure, press the key [EXIT] beside the screen to return the test setting screen, then press [MAIN INDEX] to return the scan test setting first screen, press [MEASUREMENT DISPLAY] key to enter the preparing test condition as below:



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.

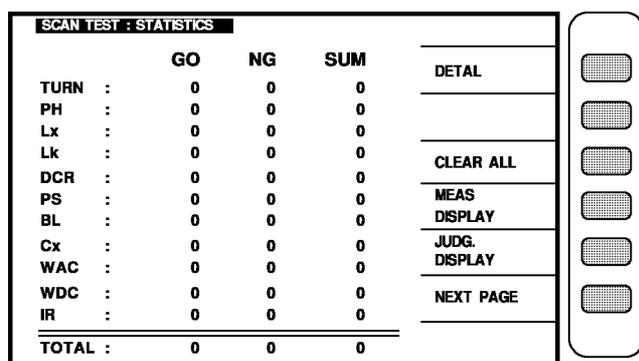
If the judgment of result are shown (pass/fail) as above figure, press [NEXT PAGE] then enter the screen of judgment result as below:



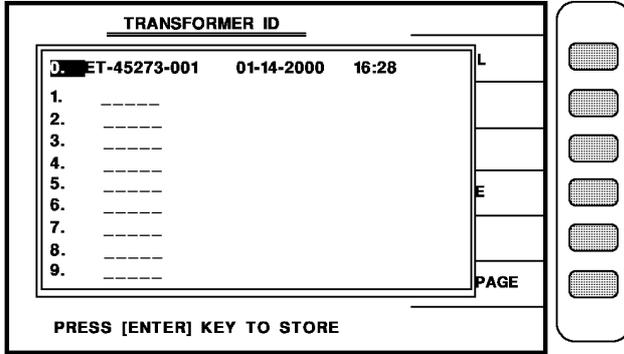
The unknown on the test fixture and press the key [START] on the scan box, then start to scan test, if the good will show "PASS", the no-good will show high or low depend on over or less, and the high or low will be shown by back-light.

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:



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:

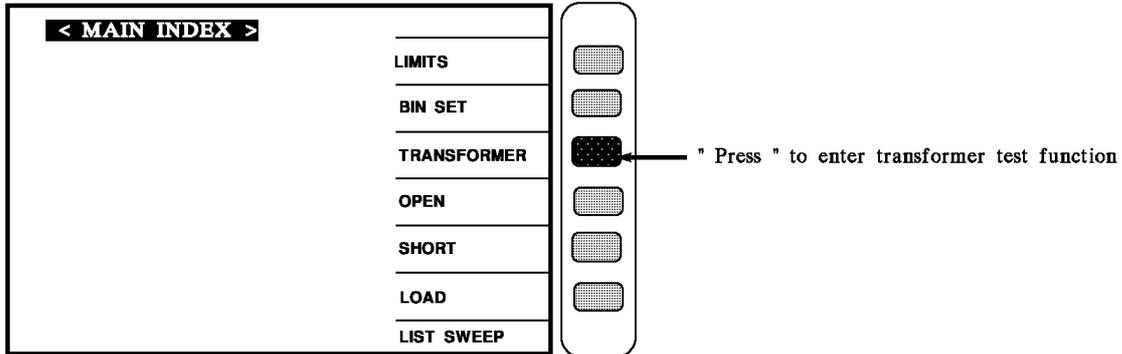


Press [ENTER] key then store finished.

6. PRINT(OPTION) Operational Procedure

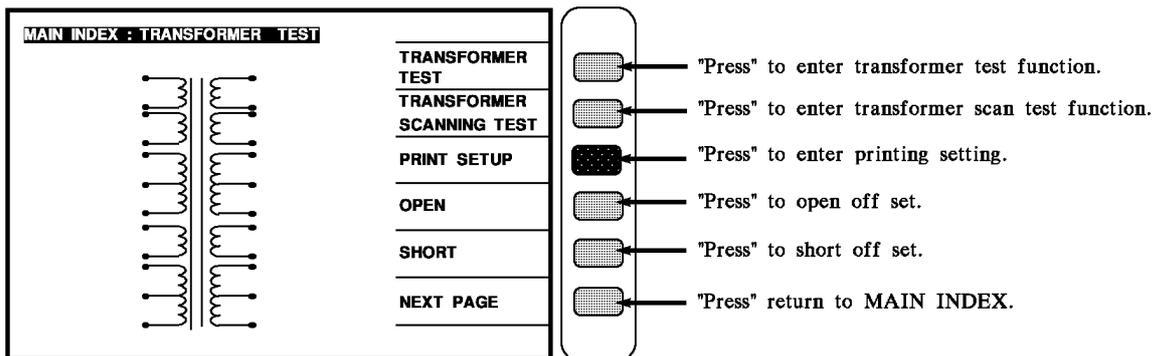
Key in → [] key

Display →



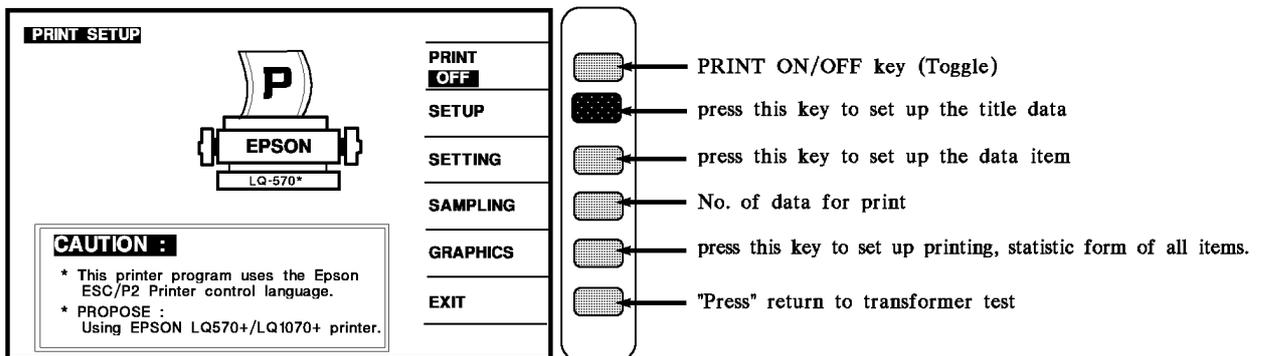
Key in → [TRANSFORMER] key

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 →

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left; padding: 2px;">PRINT TITLE</th> </tr> <tr> <td style="padding: 2px;">TITLE :</td> <td style="padding: 2px;">ZENTECH TECHNOLOGY INC.</td> </tr> <tr> <td style="padding: 2px;">CUSTOMER :</td> <td style="padding: 2px;">PHILIP</td> </tr> <tr> <td style="padding: 2px;">PART NO :</td> <td style="padding: 2px;">A - 123 - 1</td> </tr> <tr> <td style="padding: 2px;">LOT NO :</td> <td style="padding: 2px;">ABC - 123456</td> </tr> <tr> <td style="padding: 2px;">SAMPLE SIZE :</td> <td style="padding: 2px;">W:34x45 H:32x41</td> </tr> <tr> <td style="padding: 2px;">MATERIAL :</td> <td style="padding: 2px;">< PPC-ITQC ></td> </tr> <tr> <td style="padding: 2px;">MATERIAL NO :</td> <td style="padding: 2px;">PPC--123456</td> </tr> <tr> <td style="padding: 2px;">QUANTITY :</td> <td style="padding: 2px;">HI GOOD</td> </tr> <tr> <td style="padding: 2px;">TEMPERATURE :</td> <td style="padding: 2px;">25(C)</td> </tr> </table>	PRINT TITLE		TITLE :	ZENTECH TECHNOLOGY INC.	CUSTOMER :	PHILIP	PART NO :	A - 123 - 1	LOT NO :	ABC - 123456	SAMPLE SIZE :	W:34x45 H:32x41	MATERIAL :	< PPC-ITQC >	MATERIAL NO :	PPC--123456	QUANTITY :	HI GOOD	TEMPERATURE :	25(C)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">PRINT OFF</td> </tr> <tr> <td style="padding: 2px;">SET FIELD</td> </tr> <tr> <td style="padding: 2px;">UNKILL</td> </tr> <tr> <td style="padding: 2px;">CLS. ALL</td> </tr> <tr> <td style="padding: 2px;">PRINT</td> </tr> <tr> <td style="padding: 2px;">NEXT PAGE</td> </tr> </table>	PRINT OFF	SET FIELD	UNKILL	CLS. ALL	PRINT	NEXT PAGE
PRINT TITLE																											
TITLE :	ZENTECH TECHNOLOGY INC.																										
CUSTOMER :	PHILIP																										
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QUANTITY :	HI GOOD																										
TEMPERATURE :	25(C)																										
PRINT OFF																											
SET FIELD																											
UNKILL																											
CLS. ALL																											
PRINT																											
NEXT PAGE																											

- press this key to control PRINT ON/OFF switch.
- press this key to set up the field.
- press this key recover last time the clearance's initial value.
- press this key to clear all initial setting value.
- "press" to data print.
- "press" jump to next page of <PRINT SETTING> status

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 →

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left; padding: 2px;">SET FIELD</th> </tr> <tr> <td style="padding: 2px;"> <table border="1" style="width: 100%; border-collapse: collapse; font-family: monospace;"> <tr><td>■ ! " \$ % ' () * + , - . / 0</td></tr> <tr><td>1 2 3 4 5 6 7 8 9 ; : < = > ? @</td></tr> <tr><td>A B C D E F G H I J K L M N O P</td></tr> <tr><td>Q R S T U V W X Y Z [\] ^ _ ` .</td></tr> <tr><td>a b c d e f g h i j k l m n o p</td></tr> <tr><td>q r s t u v w x y z { } ° θ</td></tr> </table> </td> <td style="padding: 2px;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">BACKSPACE</td> </tr> <tr> <td style="padding: 2px;">EXIT</td> </tr> </table> </td> </tr> </table>	SET FIELD		<table border="1" style="width: 100%; border-collapse: collapse; font-family: monospace;"> <tr><td>■ ! " \$ % ' () * + , - . / 0</td></tr> <tr><td>1 2 3 4 5 6 7 8 9 ; : < = > ? @</td></tr> <tr><td>A B C D E F G H I J K L M N O P</td></tr> <tr><td>Q R S T U V W X Y Z [\] ^ _ ` .</td></tr> <tr><td>a b c d e f g h i j k l m n o p</td></tr> <tr><td>q r s t u v w x y z { } ° θ</td></tr> </table>	■ ! " \$ % ' () * + , - . / 0	1 2 3 4 5 6 7 8 9 ; : < = > ? @	A B C D E F G H I J K L M N O P	Q R S T U V W X Y Z [\] ^ _ ` .	a b c d e f g h i j k l m n o p	q r s t u v w x y z { } ° θ	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">BACKSPACE</td> </tr> <tr> <td style="padding: 2px;">EXIT</td> </tr> </table>	BACKSPACE	EXIT	<ul style="list-style-type: none"> Press this key to modify the last setting character. Press this key back to <PRINT TITLE> status
SET FIELD													
<table border="1" style="width: 100%; border-collapse: collapse; font-family: monospace;"> <tr><td>■ ! " \$ % ' () * + , - . / 0</td></tr> <tr><td>1 2 3 4 5 6 7 8 9 ; : < = > ? @</td></tr> <tr><td>A B C D E F G H I J K L M N O P</td></tr> <tr><td>Q R S T U V W X Y Z [\] ^ _ ` .</td></tr> <tr><td>a b c d e f g h i j k l m n o p</td></tr> <tr><td>q r s t u v w x y z { } ° θ</td></tr> </table>	■ ! " \$ % ' () * + , - . / 0	1 2 3 4 5 6 7 8 9 ; : < = > ? @	A B C D E F G H I J K L M N O P	Q R S T U V W X Y Z [\] ^ _ ` .	a b c d e f g h i j k l m n o p	q r s t u v w x y z { } ° θ	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">BACKSPACE</td> </tr> <tr> <td style="padding: 2px;">EXIT</td> </tr> </table>	BACKSPACE	EXIT				
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1 2 3 4 5 6 7 8 9 ; : < = > ? @													
A B C D E F G H I J K L M N O P													
Q R S T U V W X Y Z [\] ^ _ ` .													
a b c d e f g h i j k l m n o p													
q r s t u v w x y z { } ° θ													
BACKSPACE													
EXIT													

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.

ZENTECH TECHNOLOGY INC.			
TRANSFORMER SCAN TEST REPORT			
CUSTOMER :	PHILIP	INSTRUMENT :	Zentech 320x A.C.A
TRANS. ID :	33XXATS	MATERIAL :	< PPC-ITQC >
PART NO :	A - 123 - 1	MATERIAL NO :	PPC--123456
LOT NO :	ABC - 123456	QUANTITY :	HI GOOD
SAMPLE SIZE :	W:34x45 H:32x41	TEMPERATURE :	25(C)
DATE :	09/25/98	TIME :	11 : 32

For INSTRUMENT, DATA, TIME, they are fixed values so user can not 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)	

Items that want to be printer out, can 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 which selected 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

1. SAMPLING NUMBER : The sampling quantity while in statistics process.
2. PRINT 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

TO LIST : 0

MEMORY OFF

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>

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

Lx : 0 1 2 3 4 5 6 7 8 9

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

PS : 0 1 2 3 4 5 6 7 8 9

BL : 0 1 2 3 4 5 6 7 8 9

HV :

PRINT OFF

BAR CHART

PRINT

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

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.

Table 7-1 Handler Interface Key

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. Limit the load to 25mA(max.).

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 $1\mu\text{s}$ (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.

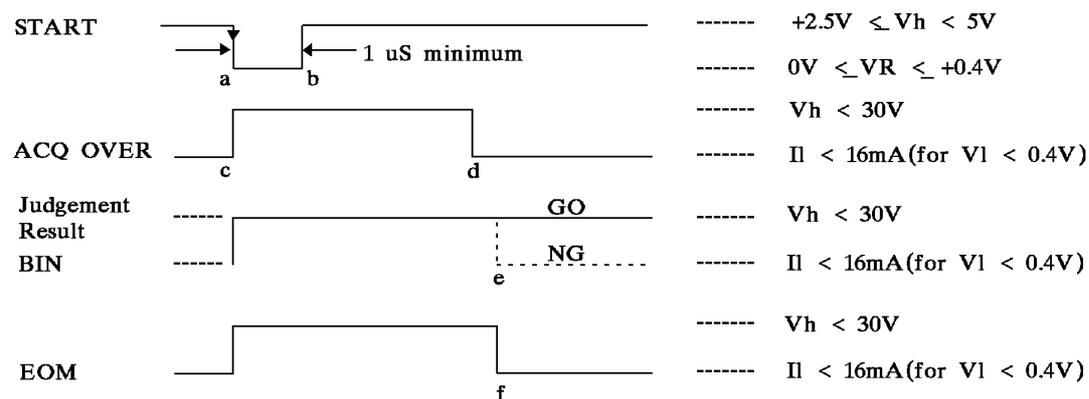


Figure 7-1 Handler interface timing diagram

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 considerably 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.

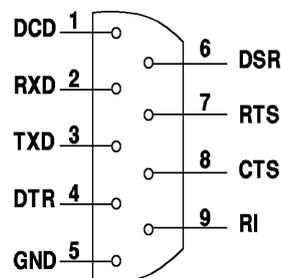
8. RS-232C Control Interface

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 33XX 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-232C
	OFF
	EXIT

8.3.1 Setting BAUD RATE

Move the arrow keys to BAUD RATE and press the ↑ ↓ 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.

ⓘ 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 ↑ ↓ 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 33XX 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 33XX 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 33XX RS-232C Interface

When connecting the 33XX with computer, it can be controlled by computer commands. The commands contain into two parts: LCR Test (for 3302 only as Table 8-2 shows) and Transformer Test (Table 8-3).

Table 8-2 3302 LCR Test Commands

Command	Function	Note
*DDT:[INT]	Select internal trigger mode	
*DDT:[MAN]	Select manual trigger mode	Triggered once when <START> is pressed
*DDT:[EXT]	Select external trigger mode	For linking HANDLER
*IDN?	Inquiry the 33XX model name	

*TRG	Set group trigger	
BIAS:ON	Set BIAS on	Only valid when DCA card is connected
BIAS:OFF	Set BIAS off	
BIAS:N3	Set BIAS test value	N3: 0.0~1000.0 (mA)
BIASE:N3	Set BIAS test value (external)	N3: -100.0~+100.0 (A)
CKIT:PARALLEL, CKIT:PARA	Set to equivalent circuit parallel test mode	
CKIT:SERIES, CKIT:SERI	Set to equivalent circuit serial test mode	
CNST?	Inquiry the current Constant setting	
CNST:OFF	Set Constant OFF	
CNST:320X	Set Constant to 320X	
CNST:106X	Set Constant to 106X	
CNST:107X	Set Constant to 107X	
FREQ:START:N3	Set the start value of internal trigger frequency	N3: 0.02~1000.0 KHz
FREQ:END:N3	Set the end value of internal trigger frequency	N3: 0.02~1000.0 KHz
FREQ:STEP:N3	Set the interval of internal trigger frequency	
FREQ:SCAN:YES	Set the internal trigger to ON	
FREQ:SCAN:NO	Set the internal trigger to OFF	
FREQ:N3	Set frequency	N3: 0.02~1000.0 KHz
VOLT:N3	Set voltage	N3: 0.01~2.00V
PARA:LSD	Set the parameter to Ls-D	Serial inductance and dissipation factor
PARA:LPD	Set the parameter to Lp-D	Parallel inductance and dissipation factor
PARA:LSQ	Set the parameter to Ls-Q	Serial inductance and quality factor
PARA:LPQ	Set the parameter to Lp-Q	Parallel inductance and quality factor
PARA:CSD	Set the parameter to Cs-D	Serial capacitance and dissipation factor
PARA:CPD	Set the parameter to Cp-D	Parallel capacitance and dissipation factor
PARA:CSQ	Set the parameter to Cs-Q	Serial capacitance and quality factor
PARA:CPQ	Set the parameter to Cp-Q	Parallel capacitance and quality factor
PARA:LSRS	Set the parameter to Ls-Rs	Serial inductance and serial resistance
PARA:CSRS	Set the parameter to Cs-Rs	Serial capacitance and serial resistance
PARA:LPRP	Set the parameter to Lp-Rp	Parallel inductance and parallel

		resistance
PARA:CPRP	Set the parameter to Cp-Rp	Parallel capacitance and parallel resistance
PARA:CPGP	Set the parameter to Cp-Gp	Parallel capacitance and parallel conductance
PARA:LPGP	Set the parameter to Lp-Gp	Parallel inductance and parallel conductance
PARA:RSXS	Set the parameter to Rs-Xs	Serial resistance and serial reactance
PARA:RSQ	Set the parameter to Rs-Q	Serial resistance and quality factor
PARA:RPQ	Set the parameter to Rp-Q	Parallel resistance and quality factor
PARA:ZSP	Set the parameter to $Z_s - \theta$	Parallel impedance and phase degree
PARA:YPP	Set the parameter to $Y_p - \theta$	Parallel admittance and phase degree
PARA:DCR	Set the parameter to DCR	DC resistance
PAGE:000,	Switch screen to page '000'	
PAGE:001,	Switch screen to page '001'	
PAGE:002,	Switch screen to page '002'	
PAGE:LIMITS,	Switch screen to LIMITS	
PAGE:BINSET,	Switch screen to BINSET	
PAGE:BINNO,	Switch screen to BINNO	
PAGE:BINCOUNT,	Switch screen to BINCOUNT	
PAGE:TRANSID,	Switch screen to TRANSID	
PAGE:SYSTEM,	Switch screen to SYSTEM	
RANG[N1]	Set range	N1: 1~8
RANG:AUTO,	Set to auto selection mode	
RANG:HOLD	Set to manual selection mode	
RATE:FAST	Set to fast measurement	
RATE:MEDIUM	Set to medium measurement	
RATE:SLOW	Set to slow measurement	
REMO:ON	Set remote control ON	
REMO:OFF	Set remote control OFF	

<Note> If error occurs when executing the command, the 33XX LCD screen will show **COMMAND ERROR**.

Table 8-3 33XX Transformer Test Commands

Command	Function	Note
*IDN	Inquiry the 33XX 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	

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

8.5 Data Output Format for 33XX

8.5.1 Transformer Output Format

The measurement value of transformer has 509 Bytes and 33XX will output it automatically after a measurement cycle is completed. The output format is shown in Table 8-4.

Table 8-4 Output Format for Low Voltage Parameter Measurement

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 [Ω].
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 [Ω].
280~319	Zx1~Zx10	AC absolute impedance. 4 bytes per data with format in floating point and unit in [Ω].
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
480~484	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)

<Note> The floating point used in this table is in INTEL format.

8.5.2 Data Output Format for LCR (3302 only)

The LCR is divided into LCR pure value and BIAS SCAN depending on if there is BIAS SCAN.

8.5.2.1 LCR Pure Value Output Format

Except the SWEEP BIAS DISP menu, all of the rest menus use this format for output. Each data has 32 bytes and outputs in string output.

Byte #	Parameter	Meaning
0~1		Reserved
2	The primary measurement parameter	Display the item of primary measurement parameter (L, C, R, Z, Y, r (DCR)).
3		Reserved
4~5	The unit of primary measurement parameter	Display the unit of primary measurement parameter (ex. mH, k Ω)
6~13	The value of primary measurement parameter	Display the value of primary measurement parameter, which is one digit per byte for 8bytes in total.
14		Reserved
15	The secondary measurement parameter	Display the item of secondary measurement parameter (D, Q, R, G, X, θ).
16		Reserved
17~18	The unit of secondary measurement parameter	Display the unit of secondary measurement parameter (ex. m Ω)
19~26	The unit of secondary measurement parameter	Display the value of secondary measurement parameter, which is one digit per byte for 8bytes in total.
27		Reserved
28	Limits judgment	0: Parameter1, 2 PASS. 1: Parameter 1 LOW.

		2: Parameter 1 HIGH. 3: Parameter 1 PASS, Parameter 2 LOW. 4: Parameter 1 PASS, Parameter 2 HIGH. B: Currently in BIN Scan mode.
29	BIN value	0~9, blank if not in BIN Scan mode.
30		Standard "Return to the beginning" character.
31	Set margin	Standard "Return" character, end of string.

<Note> In BIN Scan mode, HANDLER & SCANNER INTERFACE CARD is required for BIN value output.

8.5.2.2 BIAS SCAN Output Format

The following format is only valid when this function is linked with the 1320 Overlap Current Generator that manufactured by Chroma, and under SWEEP BIAS DISP screen. The data has 52 bytes and outputs in string mode.

Byte #	Parameter	Meaning
0~1		Reserved
2	The primary measurement parameter	Display the item of primary measurement parameter (L).
3		Reserved
4~5	The unit of primary measurement parameter	Display the unit of primary measurement parameter (ex. mH)
6~13	The value of primary measurement parameter	Display the value of primary measurement parameter, which is one digit per byte for 8bytes in total.
14		Reserved
15	The secondary measurement parameter	Display the item of secondary measurement parameter (Q).
16~18		Reserved
19~26	The value of secondary measurement parameter	Display the value of secondary measurement parameter, which is one digit per byte for 8bytes in total.
27		Reserved
28	The center value judgment of measurement parameter	0: PASS 1: LOW 2: HIGH
29		Reserved
30~35	Frequency (incl. unit)	Total 6bytes. Unit is fixed to K.
36		Reserved
37~43	Current (incl. unit)	Total 7bytes. Unit is fixed to A.
44		Reserved
45~49	Voltage (incl. unit)	Total 5bytes. Unit is fixed to V.
50		Standard "Return to the beginning" character.
51	Set margin	Standard "Return" character, end of string.

8.6 Example Programs of RS-232C Interface Control

The following two example programs are written in QBASIC. Example program 1 is for LCR SCAN (3302 only). Example program 2 is for transformer test. Before controlling, this system has to be connected with the RS-232 interface, and set the 33XX RS-232 SETUP to BAUD RATE = 19200, PARITY CHECK = NONE, WORD LENGTH = 8 for on-line control successfully.

Example program 1:

```
100 OPEN "COM2:19200,N,8,1" FOR RANDOM AS #1
110 PRINT #1, "REMO:ON;FREQ100;VOLT1;PARA:LPQ;
    DDT:MAN;*TRG"
120 FOR I = 1 TO 5000 STEP 1
130 NEXT I
140 INPUT #1, DATA$
150 PRINT DATA$
160 END
```

Result: 33XX will be set to FREQ=100KHz, LEVEL voltage = 1V. The primary measurement parameter is Lp and secondary measurement parameter is Q. The measured result will show on the computer after the command is triggered in manual trigger mode.

Description:

```
100      Set the computer COM2 BAUD RATE= 19200, parity check to
        NONE with word length to 8, also set COM2 to random access mode.
110      Set the RS-232 of 33XX to on-line, frequency to 100KHz, voltage to
        1V, primary measurement parameter to Lp (parallel inductance), and
        secondary measurement parameter to Q (quality factor). Select
        manual trigger mode and start to trigger.
120, 130 Set DELAY TIME
140, 150 Read the measurement back from 33XX and display it on the screen.
160      End of program.
```

Example program 2:

```
100 OPEN "COM2:19200,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 33XX will start test after the RS-232 is ON.

Description:

- 100 Set the computer COM2 BAUD RATE = 19200, parity check to NONE with word length to 8, also set COM2 to random access mode.
- 110 Set the RS-232 of 33XX 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 (memory card not included)	Available sets for 2 MB Memory Card	Available sets for 4 MB Memory Card	Notes
512K-Byte	0~15 (16~24 system 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 100th set of data and recall it from a 1M-Byte main board, the data would not be found in the 100th set but in the 125th 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 16th – 25th sets of data, the data cannot be recalled from a 512K-Byte main board.