

IMPORTANT NOTICE

[Classification under the provision of 93/42/EEC(MDD)] Class I

The UDR-800 is classified as Class I device

[Form of protection against electric shock] Class I

The UDR-800 is classified as Class I.

This product is always protected when you connect the power supply must be connected to ground included. Class I is a product in which the protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of the product to the protective (ground) conductor in the fixed wiring of the installation in such a way that accessible metal parts cannot become live in the event of a failure in the basic insulation. Use a power outlet which is equipped with a grounding terminal.

[Degree of protection against electric shock] Type B Applied Part

The UDR-800 is classified as a device with a Type B Applied Part

[Degree of protection against ingress of liquids] IPX0

The UDR-800 is classified as IPX0

[Degree of protection against flammability]

The UDR-800 is classified as a device not suitable to be used in a potentially flammable environment. Do not use near flammable materials

[Method(s) of sterilization or disinfection recommended by the manufacturer]

The forehead rest and chinrest should be wiped using a cloth dampened with soapy water as necessary

[Mode of operation]

Classification of UDR-800 : continuous operation

Electromagnetic waves discharged from mobile phones, radiotelegraphs, wireless toys can cause malfunction of this product. Please keep away any device that can influence this digital Refractor.

It is a compulsory obligation to learn the operating manual thoroughly, before install, use, repair, wash or adjust the auxiliary parts of this equipment. For user's safety, please use this equipment only after reading all the instructions included in this manual.

Pay a special attention to the word "WARNING" or "CAUTION," which are on all manuals for users and managers.

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UNICOS Co., Ltd.

Deajeon, Korea

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SAFETY INFORMATION

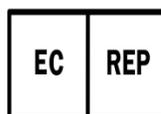
Accessory equipment connected to the analog and digital interfaces must be certificated according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipments).

Furthermore all configurations shall comply with the system standard EN 60601-1-2:2007. Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of the system standard EN 60601-1-1:2001.

If in doubt, consult the technical service department or your local representative.

For EU Countries

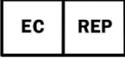
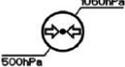
- The following mark, the name & address of the EU Representative shows compliance of the instrument with Directive Council Directive 93/42/EEC of 14 June 1993 as amended by Directive 2007/47/EC concerning medical devices.



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SYMBOLS

Symbol	Descriptions
	TYPE B EQUIPMENT
	Protective earth (ground)
	Alternating current
	Off (power: disconnect to the mains)
	On (power: connection to the mains)
	Do not throw away the waste to inappropriate place
	Risk of electric shock
	Crushing hazard sign
	Hand hazard sign
	Instruction for user manual
	General mandatory action sign
	General prohibition sign
	General warning, caution sign
	Keep dry symbol
	DO NOT Hand Hooks symbol
	Fragile symbol
	Recycling symbol
	Handle with care symbol

	Do not build up more than 2 boxes
	Manufacture
	Europe Representative
	Manufacture Date
	Only one unit in the box
	Temperature between - 40°C ~ 70°C
	Humidity between 10%RH ~ 95%RH
	Air pressure between 500hPa ~ 1060hPa

Shape Of Plug

Country	Voltage/frequency	Shape of plug
Mexico	110V/50Hz	Type C&E
Argentina	220V/60Hz	Type A
Peru	220V/60Hz	Type A
Venezuela	110V/50Hz	Type C&E
Bolivia & Paraguay	220V/60Hz	Type A(Most common) / Type H(Infrequently)
Chile	220V/60Hz	Type A
Colombia	110V/50Hz	Type C
Brazil	220V/60Hz 127V/60Hz	Type A Type C
Ecuador	110V/50Hz	Type C&E
USA	120V/60Hz	Type A(Hospital Grade)
Canada	120V/60Hz	Type A(Hospital Grade)

General Safety Information

Safety is the obligation responsibility of human. Safe use of this device is related with everyone ; installer, user, operator and device manager. It's enforced to read and understand this manual before installing, using, cleaning and repairing this unit and accessories. Please be well acquainted with the label regarding safety in special. If not follow the safety instruction in this manual, it may cause injury or accident while operate it.

Please do use this unit after reading this well and understanding enough
Keep at the place easy to find this.

Warning for safety


“CAUTION, WARNING” is to inform of the disaster which may cause a private severe injury or great loss of property in case of carelessness

“MANDATORY ACTION SIGN” is to inform of the compulsory obligation which should follow before use

Prohibition Sign” is to show the general prohibited matters related with installation, operation and management. It may cause a human/physical loss in case of carelessness.
NOTE
“Note” is to explain the important information related with installation, operation and management. It may be linked with disaster in case of carelessness.

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1. Characteristics

- All the machines such as ACP-700, UDR-800, and PCs could be connected with and used by one cable, using RS-485 network method.
- By maximizing compatibility among Unicos products, you can deal with the information about Visual Acuity Test easily. S/C/A information tested by UDR-800 and URK-800 automatically comes out, and you can save this information in Digital Refractor body, only by pressing [LOAD] button.
- A wider and clearer screen on 8" TFT COLOR LCD improves data recognition, so that allowing more accurate visual test possible.
- Lens operation is speedy, and consecutive operation of jog shuttle does not skip any data, allowing more accurate and prompt vision test possible.
- To minimize interruption for control power, an auto-shielding function works, when a lens more than $\pm 0.5D$ operates.
- You can run complicated functions easily with SHIFT keys, and it is convenient to execute various options for test.
- It supports short distance PD (45 ~ 75mm) and short distance work (35 ~ 70cm) to make a reliable near-distance Convergence Test.
- Help files and real-time guide help a fast and easy unit-test.
- By installing a printer in the operation panel, you can print the test result promptly.
- It inputs eye-test information without lens operation, and offers PRESET function that put in the lenses at once.
- New programs are always available through easy and fast update of the programs with USB and P/C.

2. Notice for Use

	<ol style="list-style-type: none"> 1. To avoid a danger by electric shock, this device must be connected to the power supply with a protection ground.(Class I) 2. It's recommended to install this onto unit table with a proper ground to reduce a shock. If install this with unit table without a proper ground, do separate a junction box and converter box from exterior case and then install 3. Be cautious not to give an excessive shock or vibration to the unit. Shock may cause a damage 4. Do use this unit within power specification indicated on name plate. Otherwise, may cause a fire or an electric shock. 5. Please never disassemble or modify. Otherwise, may cause a fire or an electric shock. 6. When smog, odor or noise happen in use, please unplug and then consult the maker Please contact the maker or the distributor in case exchange parts (Battery, Fuse and others)
	<ol style="list-style-type: none"> 1. It could affect the precise measurement if the unit is exposed to a direct sunray or the bright indoor illumination. It's recommended to use under the proper optometry room. 2. It may gather dew on lens for a patient or optic parts if heat indoor suddenly in a cold region. If is's so, please wait until it disappear and then use the unit. 3. Do use the unit only when lenses are clean. It may affect a measurement if lenses are dirty. Before use, please make sure if lenses are clean. 4. Please consult the distributor when move the unit or connect with other devices. Install the unit on a flat space not to be inclined. 5. Do keep the following for a normal operation <ul style="list-style-type: none"> - Operating circumstance Temperature:+10℃ ~ +40℃, Humidity:30% ~ 80% Atmosphere pressure : 70 ~ 106 kpa - Storage and movement circumstance Temperature:-10℃ ~ +55℃, Humidity:10% ~ 90% Atmosphere pressure : 70 ~ 106 kpa

	<ol style="list-style-type: none">1. Don't clean the surface with organic solvent such as alcohol, thinner and benzene so that it may damage2. Do not keep or install at the place which there is risk of explosion or at the place which there are flammable substances such as alcohol, thinner and other chemicals3. Don't switch off until the unit runs completely to avoid Motor error.4. It's desined to use only indoor. Please don't use the unit outdoor.5. Don't use at a place with high humidity or many dust6. Don't disassemble or modify at one pleases7. Do let only a skilled one use the unit .8. Must connect or disconnect power cable only after switching off9. Don't operate the unit with wet hands. Otherwise, may cause an electric shock.10. Do turn off the power when not in use for a long time .11. Electromagnetic waves discharged from mobile phones, radiotelegraphs, wireless toys may cause malfunction of the unit. Please keep away any device that could influence the uint.
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At the time of publishing, the information in this manual is carefully checked and has been judged to be correct. However, we, at UNICOS CO., LTD. are not responsible for mistakes, omissions and the results occurred by using information in this manual.

General Purpose Use

It may judge the abnormal condition of the eye and may give specific figures for prescriptions that subjective refractometry may not be able to offer, for example, it is not sure to check red/green charts by the patient and he may not say what specific base-in prisms are given for his spectacles etc.....

3. Prerequisite for safety

It's compulsory to use the device according to manual for safety.

Please read and understand the instructions of the manual fully before powering on

For more information regarding the unit please contact your dealer.

3.1. Preparation before use

- Do not use the device under the direct sunlight or under bright indoor lighting.
- Do not place inflammables such as paint thinner and other chemicals, etc. near the device.
- Check if a printing paper is enough.
- Check if there is dust near Lens and then remove dust

3.2. Precautions for use

- Install the device at a flat place not to be inclined.
- Do not put any object on top of this equipment.
- Do not disassemble or modify as one likes.
- In case the device is kept at lower temperatures, please and then use the device after waiting about 40 minutes after power on
- Do not let use the device besides a skilled people
- Make sure to turn off the unit if do not use for a long time.
- Do not turn off the device before the device runs fully.(Prohibiting power off on loading)

3.3. How to store and handle after use

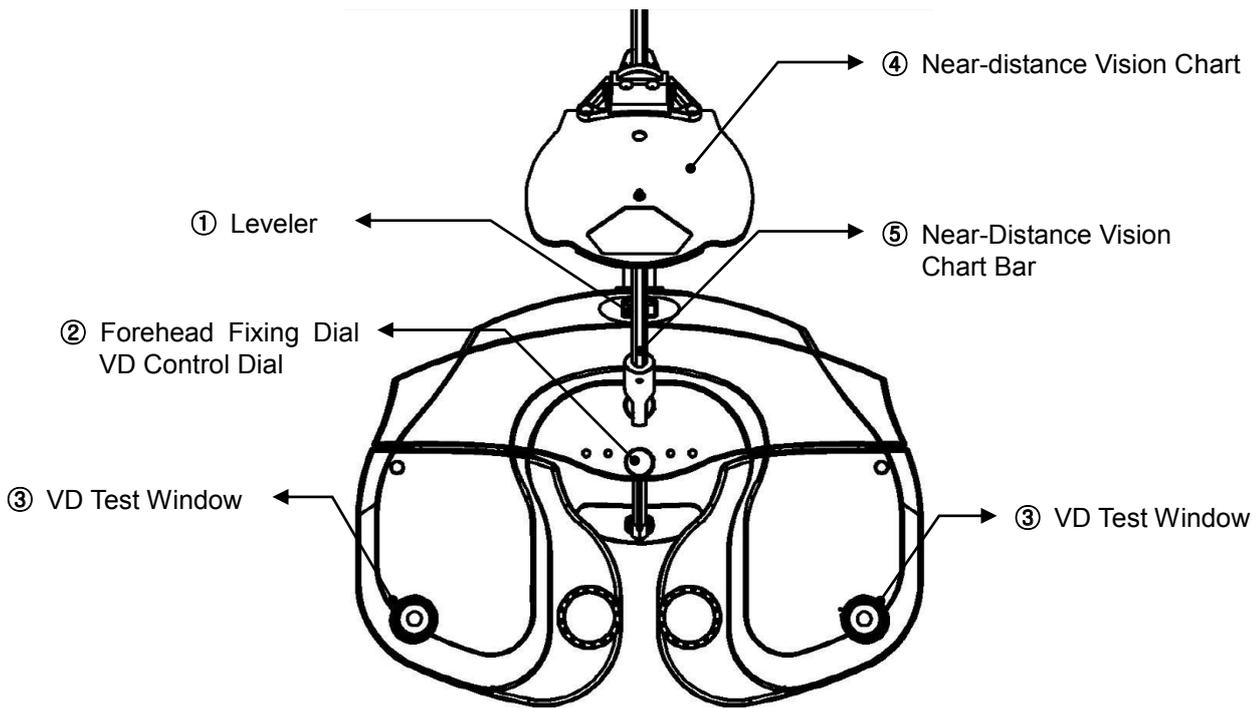
- This device is designed to be used only indoors. Do not use outdoors.
- Disconnect the power and keep the dust cover to store if do not use for a long time.
- If cleaning is required, wet a soft cloth with a little soapy water, squeeze it and then wipe out
- When clean Lens or Glass, remove dirt or other ingredient on the surface of lens with compressed air and then wipe out with a soft dry cloth.
- Please be cautious when store the device
 - a. Store where there is no moisture
 - b. Store where the water do not reach
 - c. Store where there is not much dust and where there is not any bad influence due to dirty air containing salt or sulfure
 - d. Store at a flat space not to be inclined.
 - e. Store where there is no risk of vibration or shock
 - f. Avoid a storage space for chemicals and avoid a space where gas arise
 - g. Store where there is no direct sunlight
- Arrange accessories and cables clean not to affect the following use

4. Designations and Functions of Each Parts

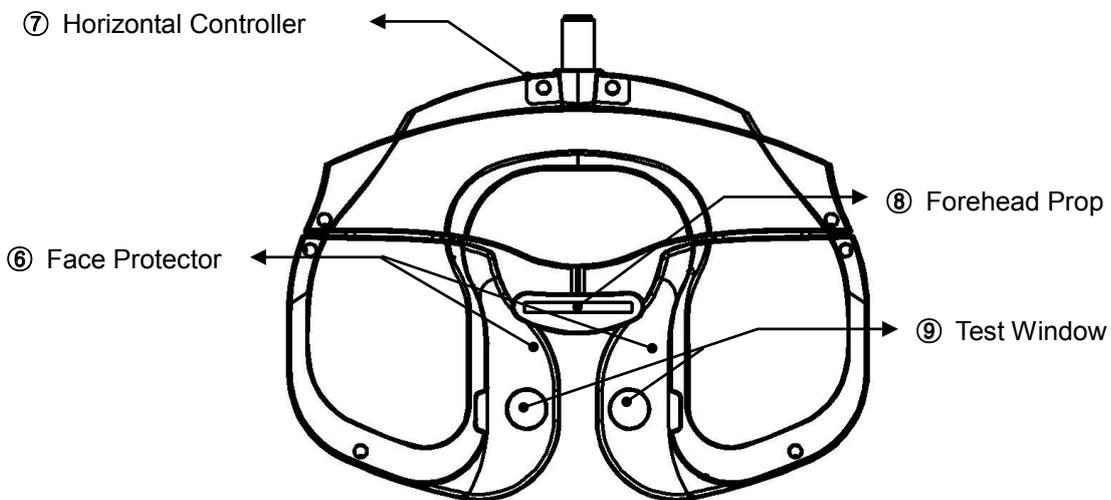
Basic components of UDR-800 are 4 parts, Ref.Body, Junction box, Operation Pane, and Converter box. Explanation about each components and functions are as followings here.

4.1 Body of UDR-800 (Ref.Body)

UDR-800 body is the most important part of the Digital Refractor, and is installed in the unit table.



[Figure 4-1] Digital Refractor Ref. Body (For Tester)



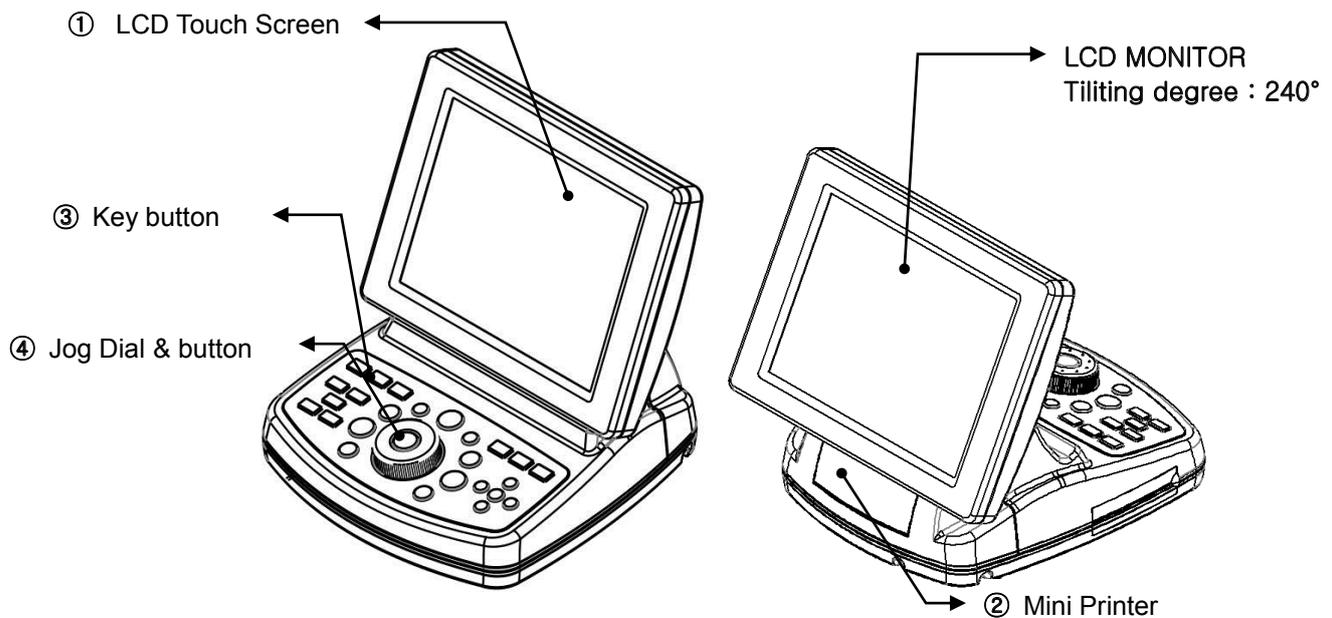
[Figure 4-2] Digital Refractor Ref.Body (For Patient)

Nomination	Function
① Leveler	Inform if UDR-800 may maintain level
② Forehead Fixing Dial VD Control Dial	Fasten your forehead to forehead rest, You can adjust VD with dial.
③ VD Test Window	Confirm the patient's VD (Distance: 1mm, Baseline: 12.0mm, Range: 11.0mm~15.0mm)
④ Near Vision Chart	A table for near vision test.
⑤ Near-distance vision chart Bar	A bar used to fix near- distance vision chart.
⑥ Face Protector	Treated softly for a human face. It could be detachable
⑦ Horizontal Controller	Level out the equipment by rotating the dial.
⑧ Forehead Prop	A plate to prop patient's forehead.
⑨ Test Window	The patient can view the chart through the lens.

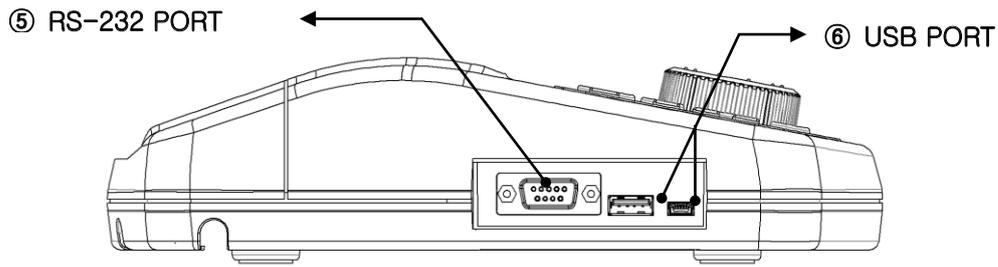
[Table 4-1] Ref. Body

4.2 Operation Panel

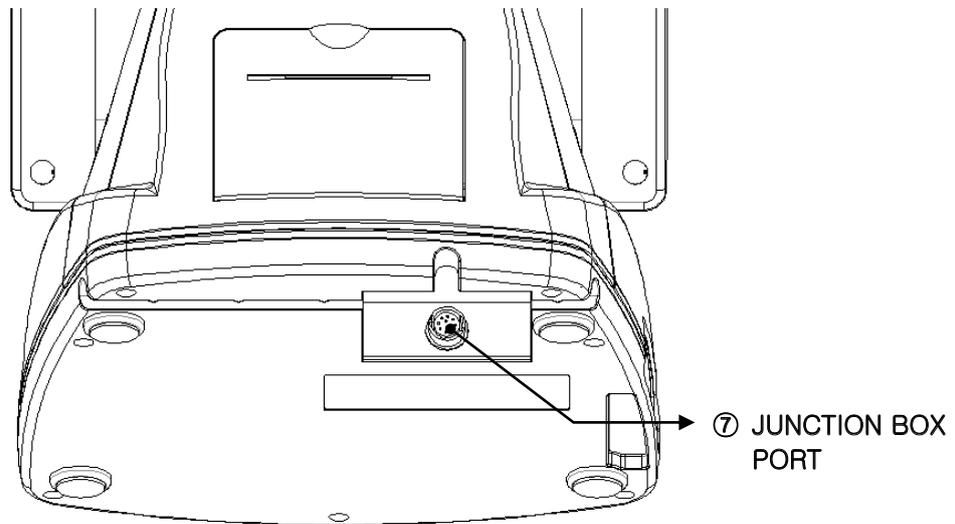
It controls the products such as ACP-700, URK-800



[Figure 4-3] Operation Panel (front side and Reversed side)



[Figure 4-4] Operation Panel (Left-side)



[Figure 4-5] Operation Panel (Back side)

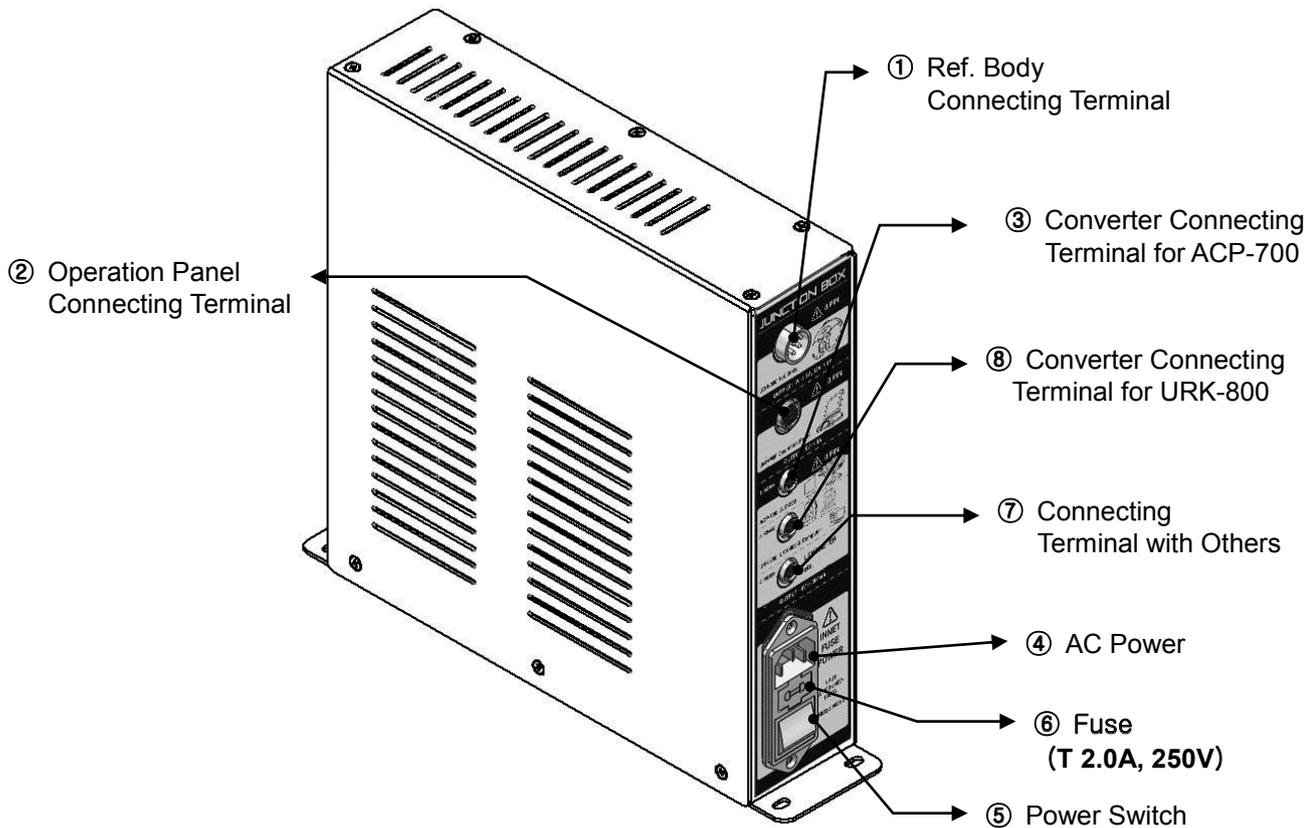
Screen to inform the tester of the information required
 It could serve Touch interface to select chart or lens on screen.
 It could tilt by 240°

Nomination	Function
① LCD Touch Screen	Screen to inform the tester of the information required It could serve Touch interface to select chart or lens on screen and tilt by 180°
② Mini Printer	Print test results.
③ Keypad Button	Choose various tests and charts by pressing the button.
④ Jog Dial & button	Change the lenses' value by turning it to (+),(-),(Left) and (Right)
⑤ RS-232 PORT	Used to communicate with PC.
⑥ USB PORT	Used to upgrade the product General USB Type : S/W upgradd Mini USB Type : used to connect to PC
⑦ JUNCTION BOX PORT (Connecting Terminal)	Connect it with 10pins of the Junction Box.

[Table 4-2] Operation Panel

4.3 Junction Box

Junction Box connects the Ref. Body with the Operation Panel, communicates with panels, and supplies each device with power.



[Figure 4-6] Junction Box

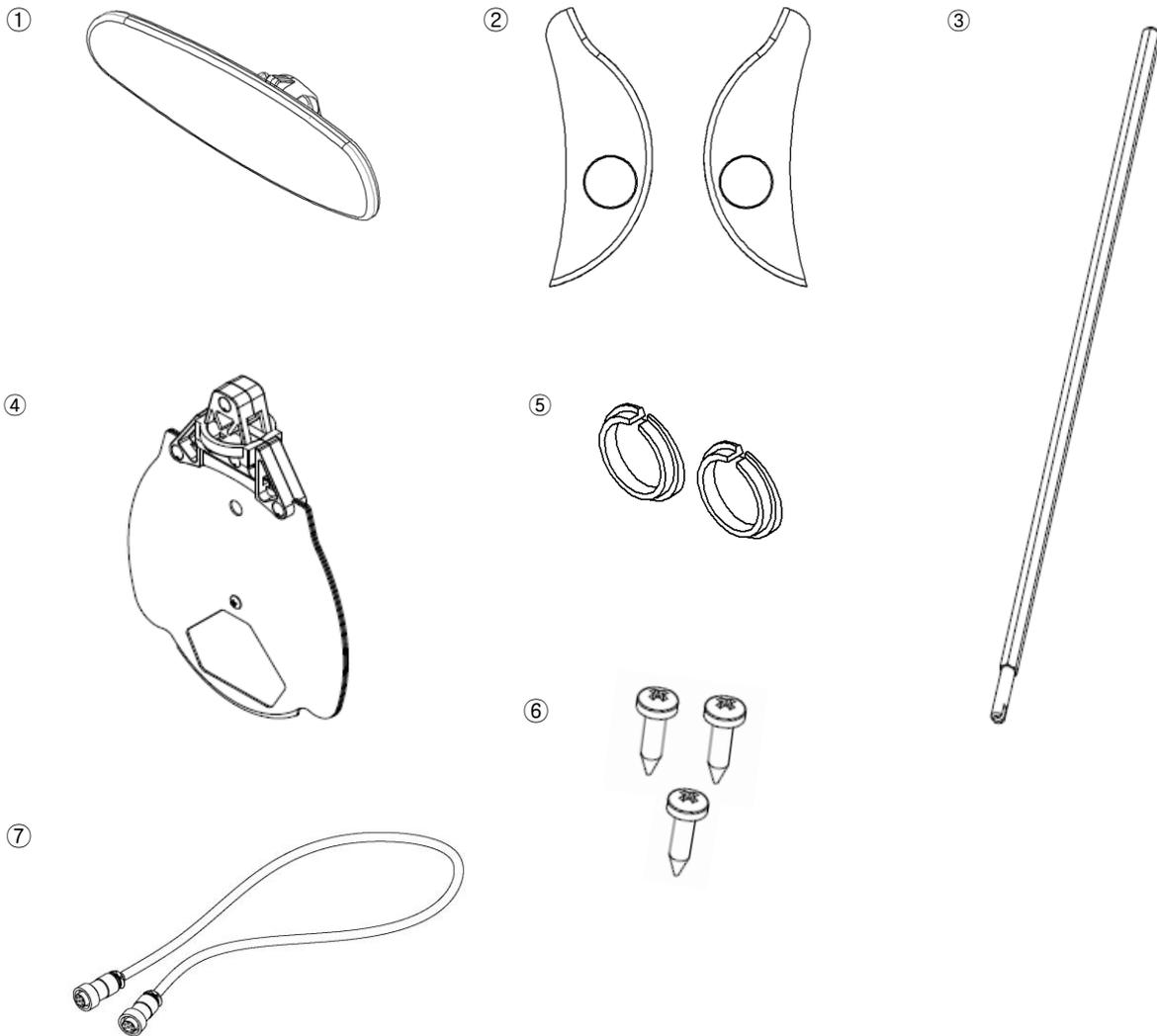
Nomination	Function
① Ref. Body Connecting Terminal	A terminal to connect 8pins cables of Ref.BODY.
② Operation Panel Connecting Terminal	A terminal to connect 10pins cables of the Operation Panel.
③ Converter Connecting Terminal for ACP-700	A terminal to connect the ACP-700 converter and 4 pins cables.
④ AC Power	A terminal to connect outer power with this equipment.
⑤ Power Switch	A switch to power on or off the UDR-800.
⑥ Fuse (T 2.0A, 250V)	A device to protect this equipment from excessive currents.
⑦ Connecting Terminal for Others	A terminal to connct this product with other devices.
⑧ Converter Connecting Terminal for URK-800	A terminal to connect URK-800 converter and 4 pins cables.

[Table 4-3] Junction Box

4.4 Accessories

Those are various accessories offered by UDR-800.

4.4.1 Ref. Body

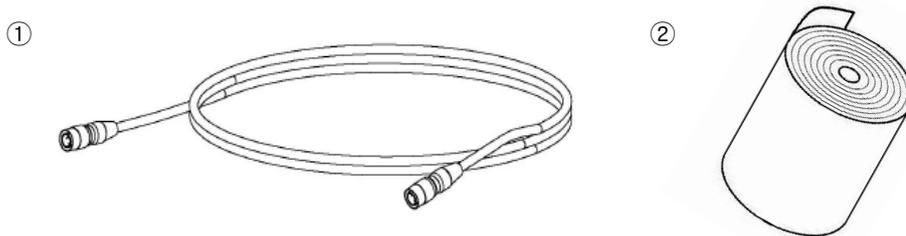


[Figure 4-7] Ref. Body Accessories

Nomination	Function	Q'ty
① Forehead Prop	A prop to fix the patient's forehead.	1
② Face Protector (2EA)	Softly touched for a human face. Can be attached and detttached.	2
③ A Bar for Near Vision Chart	A bar to fix Near Vision Chart.	1
④ Near Vision Chart	Chart for Near Vision test.	1
⑤ Bolt Cover (2EA)	Bolt Covers in reserve	2
⑥ Screw Bolt (2EA)	Bolts for the cover of the leveler.	2
⑦ A Cable to connect with the Junction Box	A cable to connect the Junction Box and the Ref. Body. Cable is manufactured to 1M, 2M, 3 M. Is offered to basis 3 M at product shipping.	1

[Table 4-4] Ref. Body Accessories

4.4.2 Operation Panel



[Figure 4-8] Operation Panel Accessories

Nomination	Function	Q'ty
① Interface Cable	A cable to connect Operation Panel and Junction Box. (10 pins) Cable is manufactured to 1M, 2M, 3 M. Is offered to basis 3 M at product shipping	1
② Print Papers	Print papers in reserve.	1

[Table 4-5] Operation Panel Accessories

4.4.3 JUNCTION BOX

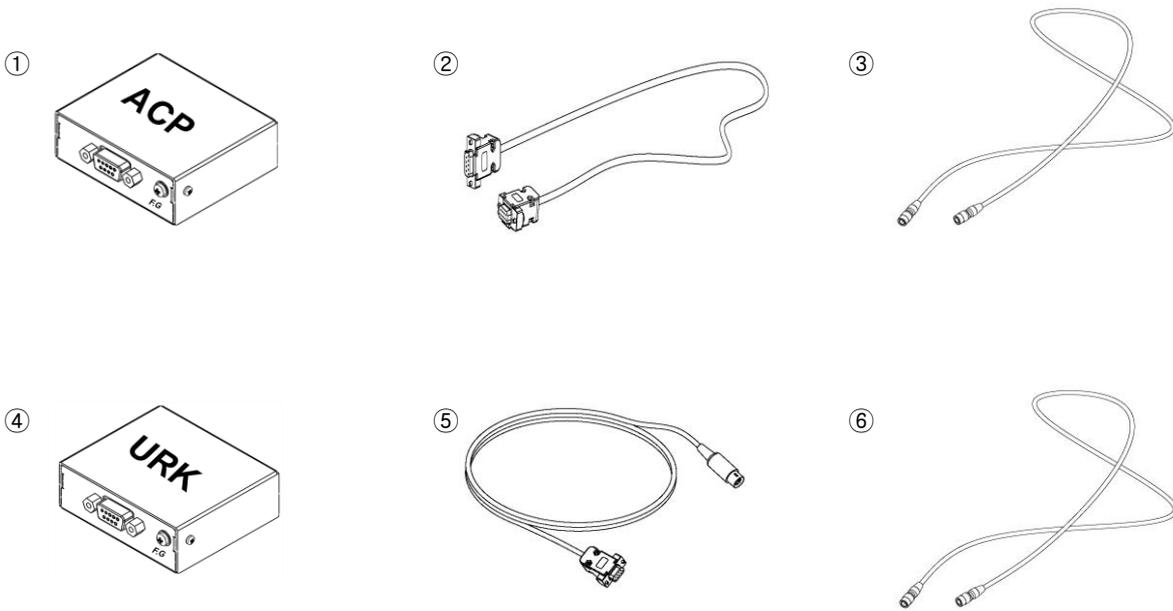


[Figure 4-9] Junction Box Accessories

Nomination	Function	Q'ty
① Power Cable	A terminal to connect with the outer power.	1
② Fuse (T 2.0A, 250V)	A device to protect this equipment form excessive currents.	2

[Table 4-6] Junction Box

4.4.4 Converter Box



[Figure 4-10] Converter Box Accessories

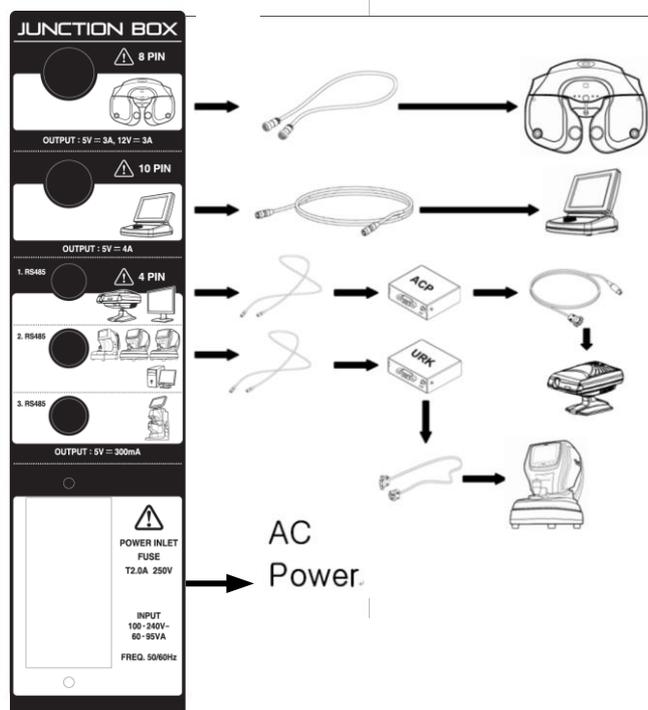
Nomination	Function	Q'ty
① URK-800 Converter Box	A Converter Box for URK-800	1
② URK-800 Serial Cable	A cable to connect the Converter Box and URK-800 Serial Port.	1
③ URK-800 Serial Cable	A cable to connect the Converter Box and the Junction Box.(4 pins)	1
④ ACP-700 Converter Box	A converter Box for ACP-700.	1
⑤ ACP-700 Serial Cable	A cable to connect the Converter Box and ACP-700 Serial Port.	1
⑥ ACP-700 Serial Cable	A cable to connect the Converter Box and the Junction Box.(4 pins)	1

[Table 4-7] Converter Box

4.5 How to install UDR-800

Follow the below directions to install the most basic system.

- 1) Check out whether all the basic components are.
- 2) Connect the Ref. Body to the Junction Box by 8 pins cable. The Junction Box must be powered off.
- 3) Connect the Operation Panel to the Junction Box by 10 pins cable.
- 4) Connctet ACP-700. Refer to the article 5.1 to see the process.
- 5) Connect UDR-800. Refer to the article 5.2 to see the process.
- 6) Connect the power cable of the Junction Box and then check out whether all cables are connected properly.
- 7) Power on ACP-700.
- 8) Power on UDR-800.
- 9) Power on the Junction Box.
- 10) After power on, the Ref. Body gets initialized, and the Logo comes out on the LCD screen of the Operation Panel. And then, the initializing screen appears on time.
- 11) Start vision test after initialization of the Ref. Body and the Operation Panel.
- 12) Please refer to the chapter 7~9 for various options for the test and its applications.



[Figure 4-11] UDR-800 Connection Diagram

4.5.1 Notice to install UDR-800

- Checkpoint before installing UDR-800
 - Check out if there is a Leakage current or Voltage into the interior case of UNIT TABLE with a tester. It may cause a damage of instrument if used under the condition of a Leakage current or Voltage.
 - Check the condition of connection for the cable when use in case of utilizing A/C of UDR-800 separately.
- Warnings when install UDR-800 to UNIT TABLE
 - Do separate the part on which JUNCTION BOX and CONVERTER BOX is layed not to be touched dirtectly against the exterior case of UNIT TABLE. If not separated, it may cause a damage of device.
 - Stick a insulator(for example, insulation sheet or Styrofoam) to the bottom of JUNCTION BOX.
 - Stick a insulator(for example, insulation sheet or Styrofoam) to the bottom of CONVERTER BOX.
 - Need to arrange the surrounding cable. Do separate and arrange each cable such as A/C cable and other communication cable so that they may be not mixed up.
 - Check out if there is a Leakage current in JUNCTION BOX and CONVERTER BOX
- Method to check a leakage current by means of Tester
 - Set a tester toward A/C terminal, touch the ground of A/C terminal and the head of bolt of JUNCTION BOX or CONVERTER BOX with tester and then check the measurement value.
 - Need to check the condition of connection if measured as "V" unit.



1. Must connect or disconnect power cable only after switching off and furthermore don't operate the unit with wet hands. Otherwise, may cause an electric shock.
2. Ref. body may hurt a patient in the process of initialization. Please measure only after the initialization is over fully.

5. Basic operation

UDR-800 is designed to operate the necessary functions by means of Dials on Operation panel, Key pad button and the buttons on touch screen. It's minimized the button which is overlapped between Keypad and Buttons on touch screen so that it could supply users with circumstances to operate the device easily. Let's see the name of Key pad and Button on touch screen and how to operate them.

5.1 How to control Key pad button on OP PANEL

The scope of Key pad on Operation panel is Operation Panel is grouped by function for user's convenience.



[Figure 5-1] Key pad

- [MENU] Button
 - It serves a series of functions such as Confirmation of Measurement result, System config, Custom definition program, Custom definition unit test and editing message. It could do color blindness test and supply various near chart, images, S/W version, Chart Projector device and homepage.
- [PRINT] Button
 - Print out the measurement value and it is valid to print out the measurement value along with the data to be loaded from the exterior devices.
 - It could set the measurement value to be saved into DATABASE and initialize the measurement value automatically.
- [RESET] Button
 - Initialize all the data on measuring (NORMAL)
 - It could be initialized as SOFT booting if press [SHIFT] and [RESET] together.
- [LOAD], [FIN] Button
 - Select one data among the group of RK data(40 data), LM data(40 data) and subjective measurement data (40 data) and search to bring the past data of patients with specific ID of patients in a group
 - With [FIN] button, can change test mode to the final prescription mode
- [LAMP] Button
 - Turn off the lamp of Chart Projector. The lamp of Chart Projector would be on when you press "Chart Selection Button" or [LAMP] button.
 - Control the Nead LED brightness of Ref.Body.

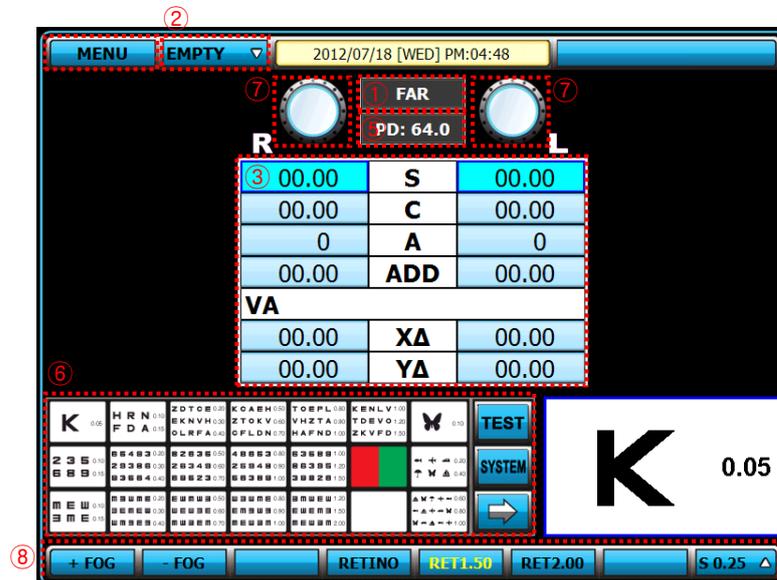
- Rotate dial or Press any button on OP PANEL to escape.
- [SHIFT] Button
 - Extend the function of the button
 - As explained before, It could be initialized on the same plan as booting if press [SHIFT] and [RESET] together and OP PANEL is under compulsory sleep mode when you press [SHIFT] button and [LAMP] button together.
- [LOCK] Button
 - It serves lock function for device not to run even though press touch-screen. Press [LOCK] Button once again to escape. This function could be used helpfully for Tester to explain the measurement value to Patients
- [OPEN], [CLOSE] Button
 - Open and Close the measurement windows
- [R], [L], [BIN] Button
 - Right / Left / Binocular : Select the eyes to be measured
- [+] / [-], Dial button
 - Alter the chosen field value according to the applied step unit by rotating dial or pressing [+] / [-] Button. It could be moved to S -> C -> A field with Dial button.
- [1] / [2] Button
 - Execute Cross Cylinder Test. Cross Cylinder Test is executed as same as the mode to be designated on "System Configuration"
 - In case of "JACKSON MODE", whenever press [1] / [2] Button Cross Cylinder is to be turned over
- [PROG.], [PREV], [NEXT] Button
 - If press [PROG] , execute the program to be designated on "System Configuration"
 - If press [SHIFT] and [PROG] together , select and execute one program on program list
 - [NEXT] button is to pass to the next process and [PREV] button is to go back to the previous process
- MASKING Button
 - Execute masking function to show a part of chart when using Letter, Number, Snellen and picture charts
 - Move the mask to Up-Down and Right/ Left
 - If touch one character among Letter, Number, Snellen and picture chart on touch screen, masking function is applied on it.



[Figure 5-2] Masking Function

5.2 How to control touch screen monitor

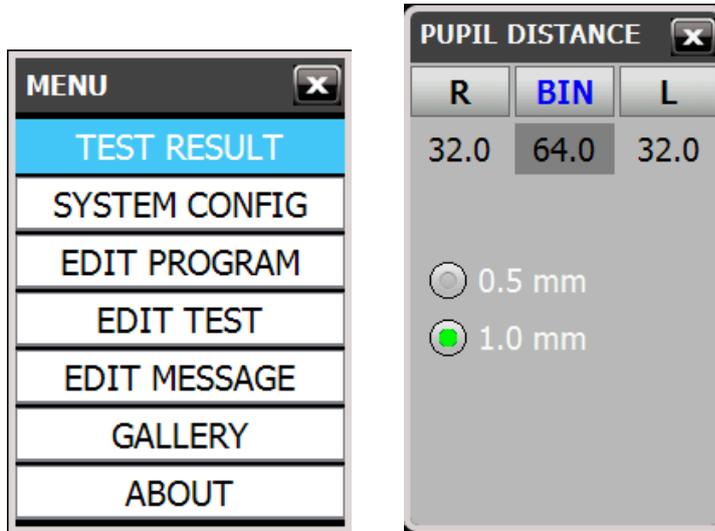
Here is the explanation of features and functions for touch button on touch screen monitor



[Figure 5-3] Main Screen

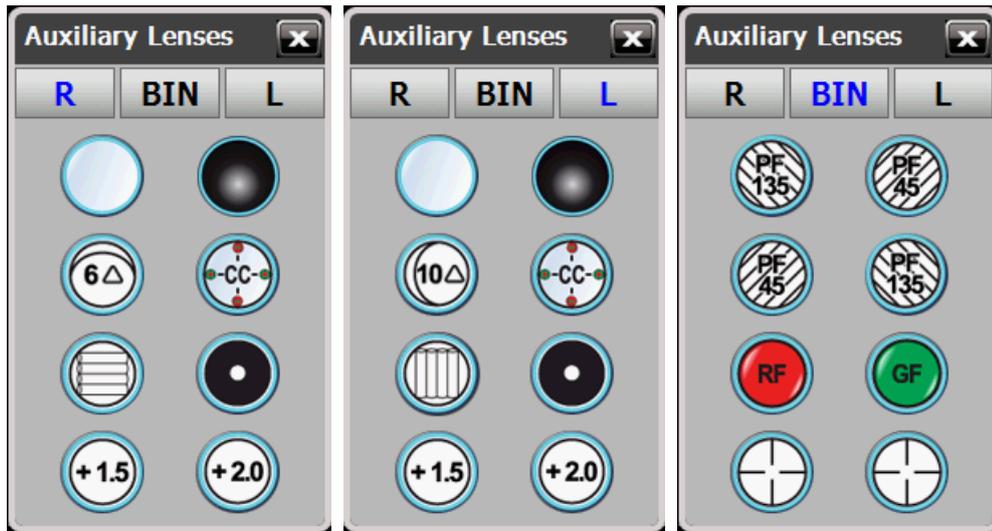
- ① Near/Far distance mode change button
 - It turns Far distance mode and Near distance mode when press the button . On near distance mode, tilting is done automatically.
- ② Selection button for test mode
 - [EMPTY] : It spread list to change test mode when press one time and you can select one mode among [UA], [URK], [ULM], [SUB], [FIN]
 - [UA] button : Unaided acuity test mode
 - [URK] button : Auto Ref/Keratometer mode
 - [ULM] button : Auto Lensmeter mode
 - [SUB] button : Subjective vision test mode
 - [FIN] button : Prescription mode
- ③ FIELD selection button
 - Can select the field(R/L/BIN) which want to amend a value on touch screen
 - [S] button : Select the field for Sphere power(SPH)
 - [C] button : Select the field for Cylinder power(CYL)
 - [A] button: Select the field for Axis(AX)
 - [ADD] button : Select the field for Addition
 - [VA] button : Select the field for Visual acuity
 - [XΔ] button : Select the field for horizontal prism
 - [YΔ] button : Select the field for vertical prism
- ④ [MENU] button
 - It functions same as [MENU] button on key pad
 - It serves a series of functions such as Confirmation of Measurement result, System config, Custom definition program, Custom definition unit test and editing message. It could do color blindness test and supply various near chart and images. It could be updated automatically be means of USB memory

- ⑤ Button to input PD value
 - It shows a window to amend single PD value on the top of left side on screen when press the button and at the same time LED to check VD would be on
 - Press the applicable button to adjust single PD(R/L) value and rotate jog dial to adjust



[Figure 5-4] MENU selection screen and window to input PD

- ⑥ Chart selection Button, Test Button and SYSTEM Button
 - It performs unit test
 - It could be done unit test after selecting the item which want to use on pressing [TEST] button
 - Only chart images are changed to do VA test when press button with [SHIFT] button
 - List to use a special type of chart would alter when press  button, but list to use a normal type of chart would alter when press  button
 - If want to begin customized unit test, press [SYSTEM] button to change list into CUSTOM chart list and then select the chart to be used among the registered items. On the registered chart C(Custom) show but on the non-registered chart N(Nothing) show.
- ⑦ AUX. LENSES
 - If select Lens button on touch screen, window for Auxiliary lens appear. There are 3mode such as R, L and BIN to select auxiliary lens but the selected lens is inserted without warning if press the lens on touch screen.
 - Can change the mode into Right eye, Left eye and Binocular eye to press [R], [L], [BIN] button each and select and alter lens directly.
 -



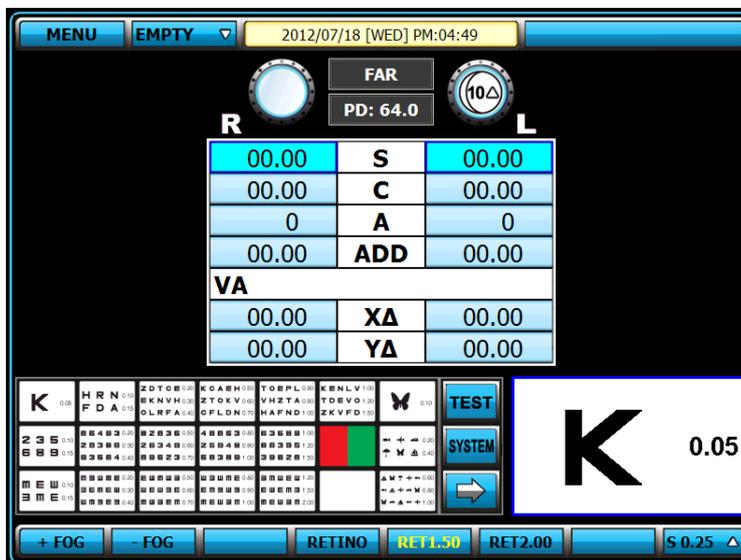
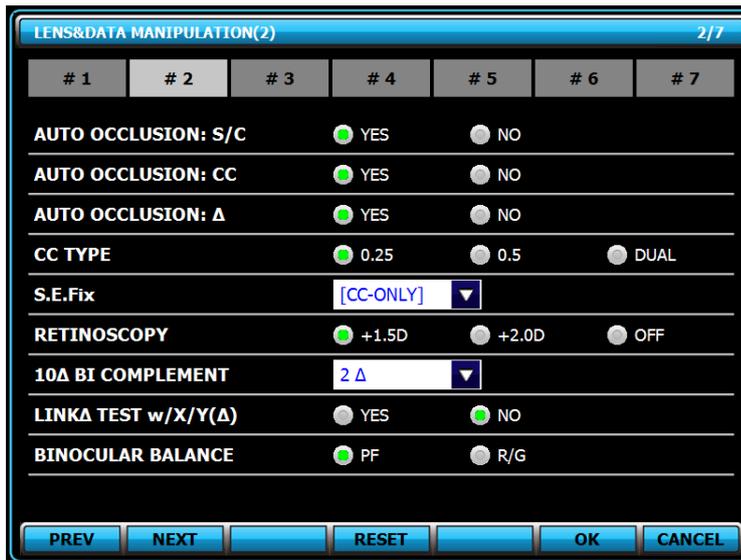
[Figure 5-5] Auxiliary lens for right eye, Left eye and Binocular eye

[UDR-800 List of Auxiliary lens]

Lens	Application	Description	Lens	Application	Description
	R/L	Window Open		R/L	Window Close
	R/L	Polarized light 45 degrees		R/L	Polarized light 135 degrees
	R	10ΔBI		L	6ΔBU
	R	Vertical Maddox		L	Horizontal Maddox
	R/L	Pin Hole		R/L	Jackson Cross Cylinder
	R	Red Filter		L	Green Filter
	R/L	PD check		R/L	Retinoscopy Lens (Test distance 67cm)
	R/L	Retinoscopy Lens (Test distance 50cm)			

[Table 5-1] List of Auxiliary lens

※ 10Δ BI lens is changeable from 0Δ to 5Δ according to the value designated on SYSTEM CONFIG page 2, '10Δ BI COMPLEMENT.' In case the lens is installed already, the supplementary prism degrees appear on the left eye lens mark.



[Figure 5-6] Choosing Option of 10ΔBI Prism Lens and Installation

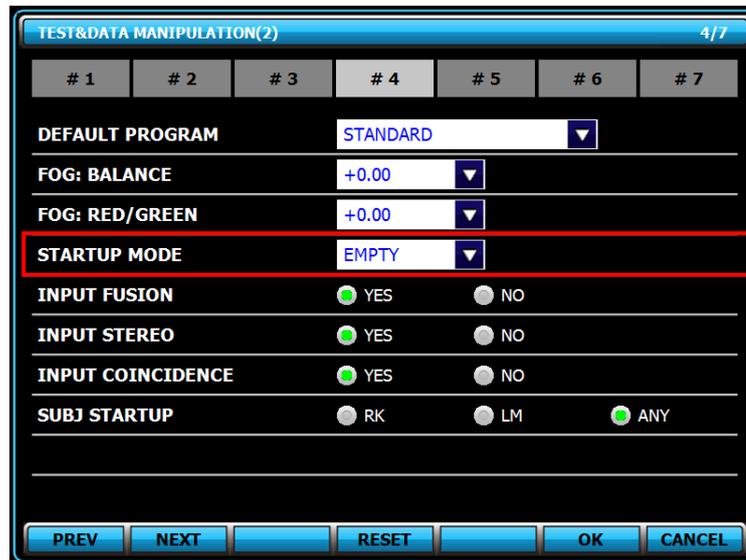
⑧ FUNCKEY button

- It is used to execute the function of FUNKEY or to select increase and decrease unit when change field value
- Different meaning and function are designated on a button per each mode and it'd be used helpfully on each test process.

6. Test Mode

UDR-700 offers 6 kinds of test modes to directly compare objective test result with the subjective test result.

You can designate the test mode you want, according to the startup mode of 'SYSTEM CONFIG - page 4.'



[Figure 6-1] Startup Mode of 'SYSTEM CONFIG - page 4

- Empty Mode (Vision Test Startup Mode): It is a startup mode to do vision test of UDR-700. It is a temporary mode on which you cannot check the result after the mode is changed. Changing it into SUB mode is recommended, after the vision test got started.
- UA Mode (Unaided Vision Test Mode): It is an unaided vision test mode. By pressing [UA] button, you can change other modes into UA mode.
- RK Mode (Auto Ref/Keratometer Test Mode): It is a mode to save the test results of the auto ref/keratometer. After receiving information from the auto ref/keratometer, press [LOAD] button to save the test results. You can change others into RK mode by pressing [URK] button.
- LM Mode (Auto Lensmeter Mode): It is a mode to save test results of auto lensmeter. After receiving information from the lensmeter, press [LOAD] button to save the test results of lensmeter. Press [ULM] button to change others into LM mode (estimated to be offered.)
- SUB Mode (Subjective Vision Test Mode): It is a kind of test mode of UDR-700. Different from the Empty Mode, the results are shown after the mode is changed. Press [SUB] button to change others into SUB mode.
- FIN mode (Mode of Vision Test Prescription): On this mode, you can show the resulted prescription following the vision test. Press [FIN] to change others into FIN mode.

Separated with the test modes, 'PRESET Mode' and 'OFFSET Mode' are offered, in relation to putting in lenses.

- PRESET Mode: When the mode is setup, the lenses put into the UDR-700 Ref. If the mode is on, the inserted lens are not changed, although the field value is changed. When the mode is off, it prevents not to intervene any accommodation force to patients according to changing lens, by putting in all the lenses at once. The mode is on and off by pressing [SHIFT] and Masking  button at the same time.
- OFF Mode: Removing auxiliary lenses that are inserted (Addition, Prism, and Auxiliary lenses,) ,it helps to explain and compare to the patient

6.1 Why does need Test Mode?

The patient can directly experience and compare objective test result (obtained from Ref/Keratometer and Lensmeter) and subjective test result obtained from UDR-700.

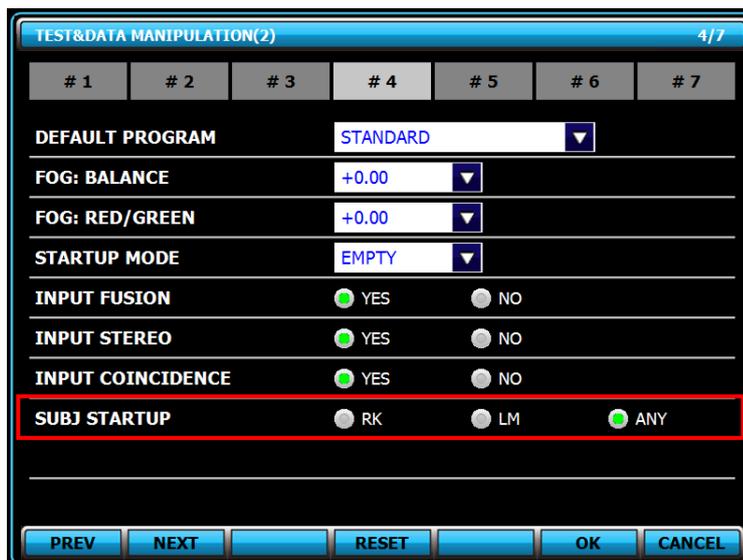
In other words, the patient can compare directly objective test results with subjective test results, through mode changes. Beside it could compare and analyze the information of the patient from various aspects, make complementary correction between them and allow the proper prescription for the patient.

6.2 Test Mode and Results Copy

On every mode except UA mode, the pre-existing mode value is duplicated into new mode one time only when mode is changed

In case of UA mode, different from other modes, the information is not copied because it operates independently. Moreover, since it copies to use the results of UA mode whenever mode is changed, so that you may avoid inconvenience to reset and save the test time.

You can restrict copy of the results on SUB mode by SUBJ startup of 'SYSTEM CONFIG – page 4.'



[Figure 6-2] SUBJ Startup of SYSTEM CONFIG – page 4

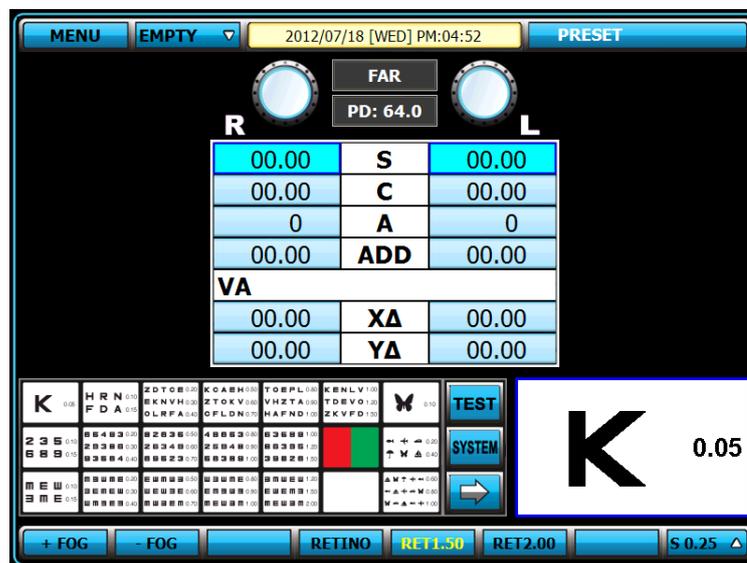
6.3 Use of PRESET and AUX OFF Mode

- PRESET Mode

On PRESET Mode, the lenses are not changed while values of field(S, C, A, VA, ADD, PRISM) are changed. So, the patient does not feel any discomfort while the information for objective test value is set in the system without any network. Furthermore, the intervene of accommodation force could be restricted.

Press [SHIFT] and Masking  button together to begin PRESET mode, then 'PRESET' mode appears on the upper right part of the screen. Set the filed value by selecting the field,

and lift PRESET mode by pressing [SHIFT] and Masking  button together. Lenses are inserted at once according to the determined value of field.

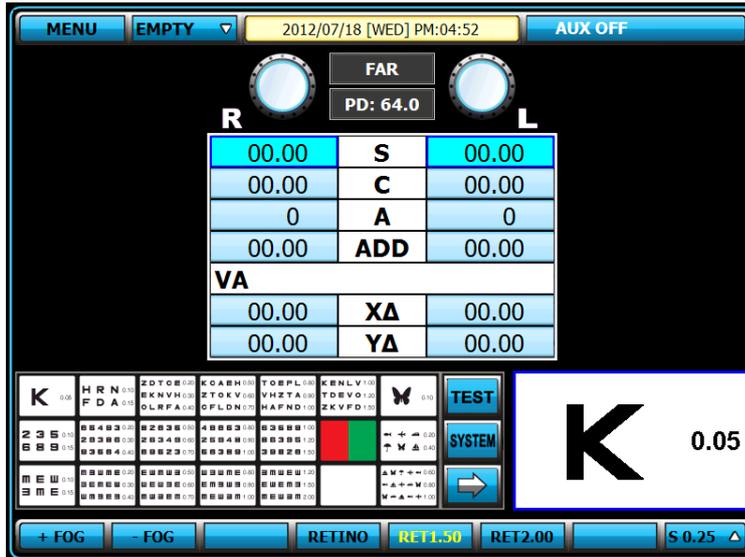


[Figure 6-3] PRESET Mode

- AUX OFF Mode

AUX OFF Mode temporarily removes auxiliary lenses (Polarized Light, Red/Green, Fixed Cross Cylinder Lenses, 6Δ BU Lenses and 10Δ BI Lenses,) which are put in during vision test.

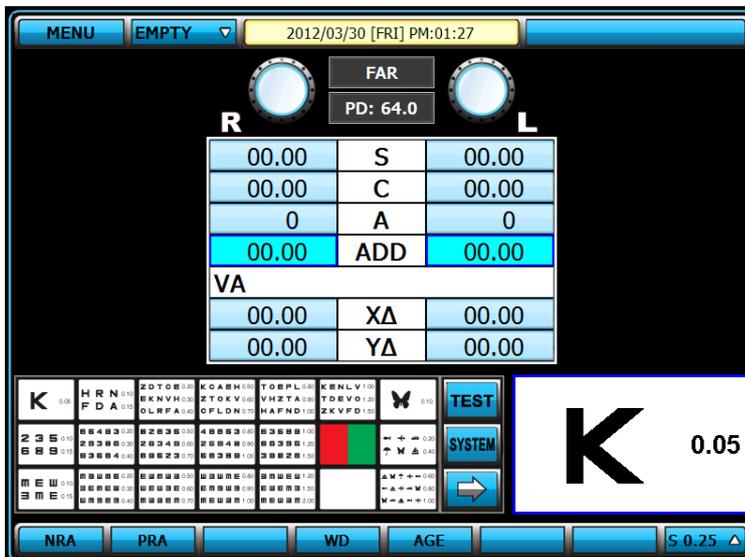
By pressing [SHIFT] and [OPEN/CLOSE] button together, the AUX OFF mode is activated, showing 'AUX OFF' mode on the upper right part of the screen. And then, the auxiliary lenses are temporarily removed. Again by pressing [SHIFT] and [OPEN/CLOSE] button together, lift AUX OFF mode, and the removed auxiliary lenses would be put in again.



[Figure 6-4] AUX OFF Mode

6.4 Test of Far Vision and Near Vision

- There are two vision such as Far vision and Near vision. Generally, vision means Far vision, and actually this manual also treats Far vision test throughout the most part. However, as the problems of Near vision are growing recently, UDR-800 serves both Far vision and Near vision.
- To do Near vision test, change the mode by pressing [FAR/NEAR] button on touch screen, or adjust Addition only, while maintaining Far vision mode by pressing [ADD] button. If a patient has even presbyopia with nearsightedness(myopia), it's recommended to test on [ADD] mode by pressing [ADD] button.
- On each method, the Ref. Body of UDR-800 is tilted to the opposite side of the patient, and input the information about the work distance and the patient's age for an accurate test when you do Near vision test.



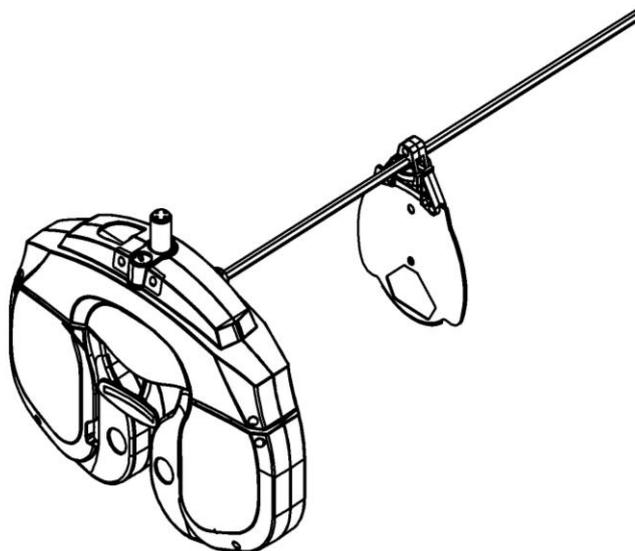
[Figure 6-5] ADD Mode

- Set up the working distance
You can adjust the tilting degree while continuously checking it by pressing [WD] button on range of Function key below of screen
- Set up patient's eye
Can alter age by pressing [AGE] button and furthermore, Add per age is automatically applied if ADD ESTIMATION on SYSTEM CONFIG – page 3 is set into "YES"



[그림 6-6] Applying addition per age

On Near vision test mode, hang up th near vision chart to test how far the patient can see the chart, and put Addition if necessary.



[Figure 6-7] Hang up the Near Vision Chart

7. Communication with Various Vision Test Devices

URK-800 could be connected a various optometry devices with a single network. Lensmeter has not yet been connected because it'd be applied in the near future. Here is the list to be connected.

- Chart Projector: ACP-700, ULC-800
- Auto Ref / Keratometer: UDR-800, URK-800

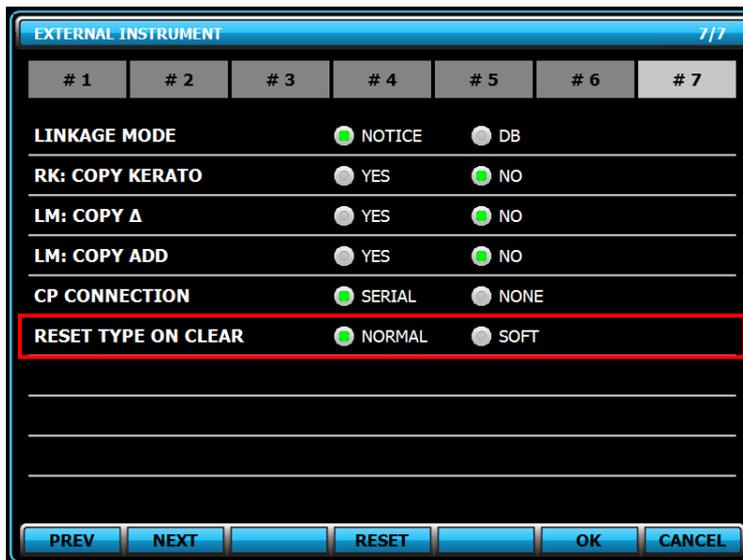
7.1 Option setting for Chart Projector (ACP-700)

To use UDR-800 proper, Chart Projector (ACP-700) must be installed. In case Chart Projector is installed, just follow as below to choose the options

SYSTEM CONFIG – page 7 - [EXTERNAL INSTRUMENTS]

- CP CONNECTION: Must choose SERIAL. If choose NONE, ACP-700 does not run.

To set up the above option, enter the [SYSTEM CONFIG] mode through [MENU] mode, and move on to page 7 by pressing [#7] button. Then press [OK] button to save it after setting all



[Figure 7-1] Chart projector setup on SYSTEM CONFIG – page 7

7.2 Option setting for Auto Ref/Keratometer (URK-800)

It's recommended to install URK-800 to make full use of the function of UDR-800

Although there is 'RK: COPY KERATO' menu at [EXTERNAL INSTRUMENTS] on SYSTEM CONFIG - page 7 -, it's useless now because URK-800 does not transmit KERATO data. It is only for later use when it is available.

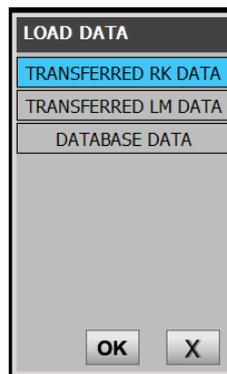
7.3 Load and Save the data of Auto Ref / Keratometer (URK-800)

- Transmit the test results of the Auto Ref / Keratometer (URK-800) to UDR-800
 - ① Measure the patient's eye by auto ref/keratometer
 - ② The test results are transmitted to UDR-700 from UDR-800, by pressing PRINT button on URK-800.
 - ③ Press [LOAD] button on UDR-800, and insert the lenses to meet the information received

from URK-800. (value of S, C, A, and PD)

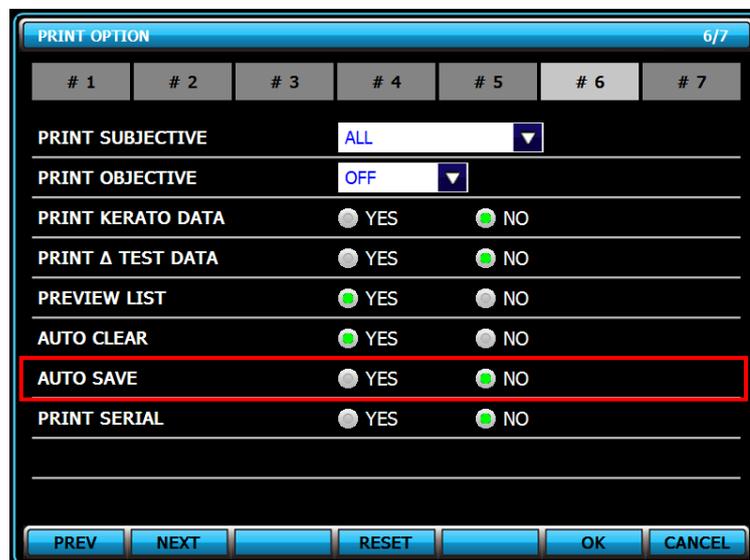
After receiving the data of the Auto Ref / Keratometer (URK-800), "RK DATA " appears on the top of right side of operation panel.

- Save the test results of the Auto Ref / Keratometer (URK-800) or the measurement data of UDR-700 into the database of UDR-700
 - ① Transmit the test results of the Auto Ref / Keratometer to UDR-800. The data that is transmitted into the DATABASE is saved automatically.
 - ② When the vision test is finished by pressing [PRINT] button, the data is saved automatically into DATABASE. It's possible to save the measurement data only without printing out if press [ALT] and [PRINT] button together.



[Figure 7-2] LOAD DATA List

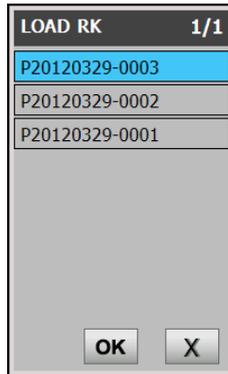
To save the measurement data of UDR-800, the 'AUTO SAVE' menu of SYSTEM CONFIG - page 6 must be set as 'YES' so that the measurement data may be saved automatically.



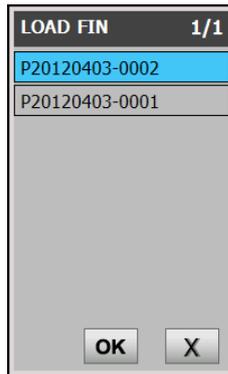
[Figure 7-3] Set up the AUTO SAVE menu, on SYSTEM CONFIG – page 6

7.4 Make Use of Built-In Database

UDR-800 can save the past results of 120 patients at most (or Maximum 40 results for each data). The data that receive from other device or the test results after printing out are saved automatically into the memory of UDR-700, on a basis of first-come-first-go. To pull out the results of the built in database, choose the necessary menu by pressing [LOAD] button, and then check out the past results that are arranged according to the patients' IDs. The lenses also can be put in automatically.



[Figure 7-4] List of RK data which is transmitted



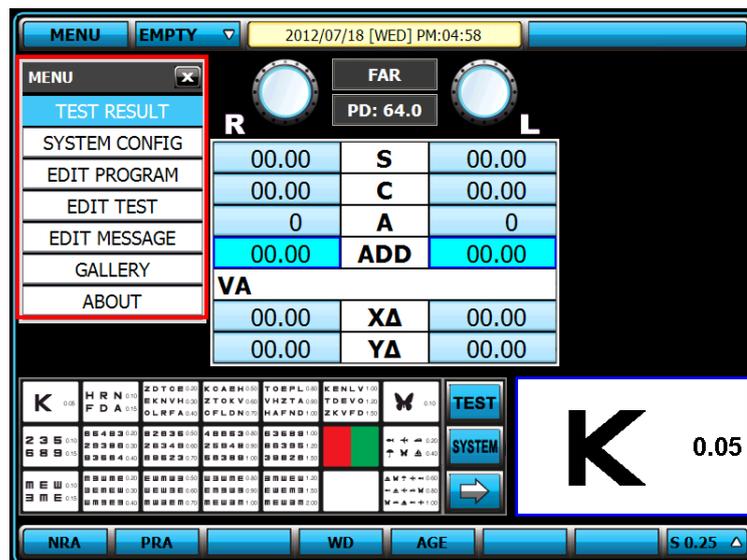
[Figure 7-5] List of FIN measurement data

8. Choose Menu

UDR-800 serves a various function through 'MENU' choice mode. Enter Menu mode by pressing [MENU] button on operation panel or by touching [MENU] on the screen.

Use Dial to choose the required menu on the 'MENU' choice mode, and execute the chosen menu by pressing the dial button or by touching the chosen list on the screen.

- TEST RESULT: Show the test results through the screen. Can check out the test result before printing through 'SYSTEM CONFIG'.
- SYSTEM CONFIG: Set up a various options related with system
- EDIT PROGRAM: Edit Custom Program.
- EDIT TEST: Edit Custom Test.
- EDIT MESSAGE: Edit Custom Program Name, Custom Test Name, Various messages, and Print Footer.
- GALLERY: Serve color blindness test and supply various charts and images for near vision test
- ABOUT: Serve SW version, Chart Projector device type and homepage address.



[Figure 8-1] MENU Selection

8.1 TEST RESULT

On TEST RESULT, can check 4 measurement result for each far vision mode and near vision mode. Can change far vision mode and near vision mode alternately by pressing [F/N] on Funtion key area below the screen and check each measurement data by pressing [LIST1], [LIST2], [LIST3], [PRISM] button.

'-----' would appear on the cell which is not applicable but it shows "0" or blank on the cell which is applicable but not yet measured to protect any confusion.

Here is the list per each

- LIST1 : SPH, CYL, AXIS, ADD, VA test result

FAR		SPH	CYL	AXIS	ADD	VA
UA	R	-----	-----	-----	-----	
	L					
LM	R	00.00	00.00	0	00.00	
	L	00.00	00.00	0	00.00	
URK	R	00.00	00.00	0	00.00	
	L	00.00	00.00	0	00.00	
SUB	R	00.00	00.00	0	00.00	
	L	00.00	00.00	0	00.00	
FIN	R	00.00	00.00	0	00.00	
	L	00.00	00.00	0	00.00	

[Figure 8-2] LIST1

- LIST2 : ADD VA, X Δ , Y Δ , NPC, NPA, Fusion, Minute Stereo, Aniseikonia test result

FAR		ADD VA	X Δ	Y Δ	Dominant Eye : NPC : 0 cm / 0 cm NPA BIN : 0 cm (R) : 0 cm (L) : 0 cm
UA	R		-----	-----	
	L				
LM	R		00.00	00.00	
	L		00.00	00.00	
URK	R		00.00	00.00	
	L		00.00	00.00	
SUB	R		00.00	00.00	
	L		00.00	00.00	
FIN	R		00.00	00.00	
	L		00.00	00.00	

[Figure 8-3] LIST2

- LIST3 : BLUR, BREAK, RECOVERY, NPC, NPA, Fusion, Minute Stereo, Aniseikonia test result

FAR		BLUR	BREAK	RECOVERY	Dominant Eye : NPC : 0 cm / 0 cm NPA BIN : 0 cm (R) : 0 cm (L) : 0 cm
NRC		00.00	00.00	00.00	
PRC		00.00	00.00	00.00	
	OU	00.00		00.00	
NRA	R	00.00	-----	00.00	
	L	00.00		00.00	
PRA	OU	00.00		00.00	
	R	00.00	-----	00.00	
	L	00.00		00.00	

[Figure 8-4] LIST3

- PRISM : SCHOBER, VON GRAFE, COINCIDENCE, PHORIA, PHORIA WITH FIXATION, MADDOX, NRC, PRC

FAR	X Δ		Y Δ	
	R	L	R	L
SCHOBER	00.00	00.00	00.00	00.00
COINCIDENCE	00.00	00.00	00.00	00.00
MADDOX, ROD	00.00	00.00	00.00	00.00
PHORIA	00.00	00.00	00.00	00.00
PHORIA WITH FIXATION	00.00	00.00	00.00	00.00
VON GRAFE	00.00	00.00	00.00	00.00
NRC-DIV, (BLUR / BREAK / RECOVERY)		00.00	00.00	00.00
PRC-CON, (BLUR / BREAK / RECOVERY)		00.00	00.00	00.00

[Figure 8-5] PRISM

- Can print out the test result by pressing [PRINT] button or [OK] button on the screen.

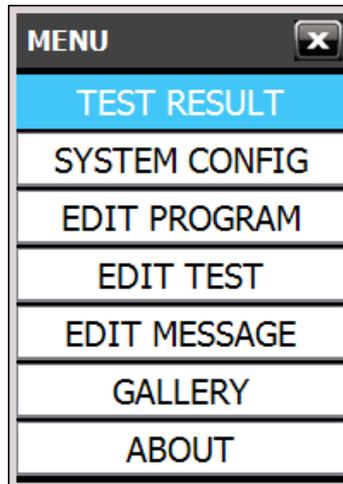
Can enter 'TEST RUSULT' without printing if 'PREVIEW LIST' on 'PRINT OPTION' - 6page of [SYSTEM CONFIG] is set as 'YES'

If want to print out directly, set 'PREVIET LIST' as 'NO'

[Figure 8-6] PREVIEW LIST on 6page of [SYSTEM CONFIG]

8.2 SYSTEM CONFIG

UDR-800 can realize the optimal test environment through menus of the 'SYSTEM CONFIG'. To enter, you can press 'MENU' button on operation panel or press [MENU] button on the screen and then select [SYSTEM CONFIG]



[Figure 8-7] SYSTEM CONFIG

8.2.1 How to control the button key

Here is the explanation how to handle the button to do [SYSTEM CONFIG]

- Changing pages: There are 7 pages, and you can move to the next page in order, by touching [#1] ~ [#7] on the screen.
- Changing value of each item : Select the button on the screen for each item and can change each value
- RESET : Can restore each value to the original state by pressing [RESET] on the screen but this function is valid only before saving
- SAVE : Save by pressing [OK] on the screen when finish setting and then exit.
- CANCEL : On the process of setting, can exit by pressing [CANCEL] on the screen without saving

8.2.2 Introducing each page

- PAGE 1(LENS & DATA MANIPULATION(1))

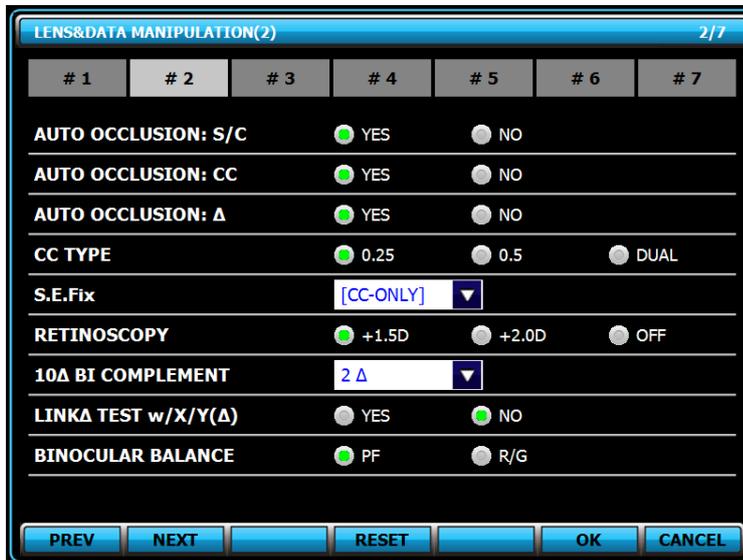
Set up the information related with lens control which is necessary in the process of test.

[Figure 8-8] LENS & DATA MAINPULATION (1)

- ① SPH STEP: Designate the increased or decreased value of SPH. You can choose one among 0.12D, 0.25D, and 0.50D, but the initial value is 0.25D
- ② CYL FORM: Designate the CYL mark. You can choose one between + and –, and – is the initial one. If press [+/-] on the screen at CYL mode, CYL mark change + or – temporarily.
- ③ CYL STEP: Designate the increased or decreased value of CYL. You can choose one among 0.25D, but the initial value is 0.25D
- ④ AXS STEP: Designate the increased or decreased value of AXS. You can choose one among 1°, 5°, 15°, 30° and 45° bu the initial value is 5°.
- ⑤ STEP: Desginate the increased or decreased vaule of Prism. You can choose one among 0.1Δ, 0.2Δ, 0.5Δ , 1.0Δ and 2.0Δ but the initial value is 0.5Δ

- PAGE 2(LENS & DATA MANIPULATION(2))

Set up the information related with lens control which is necessary in the process of test.



[Figure 8-9] LENS & DATA MAINPULATION (2)

- ① AUTO OCCLUSION: S/C: Determine whether to occlude the lenses automatically for the patient, in case SPH and CYL lens are changed drastically. You can choose YES or NO, and the initial value is YES.
- ② AUTO OCCLUSION: CC: Determine whether to occlude the lenses automatically for the patient, in case Cross Cylinder lens is changed drastically. You can choose YES or NO, and the initial value is YES.
- ③ AUTO OCCLUSION: Δ: Determine whether to occlude the lenses automatically for the patient, in case Prism is changed drastically. You can choose YES or NO, and the initial value is YES.
- ④ CC TYPE: Designate the type of Cross Cylinder. You can choose one among Jackson Cross Cylinder 0.25 or 0.50, and DUAL(Dual Cross Cylinder). but the initial value is Jackson Cross Cylinder 0.25
- ⑤ S.E. Fix: Determine whether to fix the SPH. You can choose one among OFF (SPH is fixed all the time,) CYL MODE (SPH is fixed only on CYL mode,) CC-ONLY (SPH is fixed only on Cross Cylinder mode,) and ALWAYS (SPH is not fixed, all the time,) but the initial value is CC-ONLY.
- ⑥ RETINOSCOPY: Designate the degree of the lens for Retinoscopy. You can choose one among +1.5D, +2.0D and OFF but the initial value is +1.5D.
- ⑦ 10ΔBI COMPLEMENT: Designate additional degree to add on 10Δ BI separate prism. You can choose one between 0~5Δ. But the initial value is 2Δ
- ⑧ LINK ΔTEST w/X/Y(Δ): Determine whether to synchronize the value of prism after Heterophoria with the value of prism in the main area. You can choose YES or NO, but the initial value is NO.

- PAGE 3(TEST & DATA MANIPULATION(1))

Set up the items related with the test and data control which is necessary in the process of test.

# 1	# 2	# 3	# 4	# 5	# 6	# 7
Δ DISPLAY	<input checked="" type="radio"/> X/Y	<input type="radio"/> r/θ				
BLUR/BREAK/RECOVERY	<input checked="" type="radio"/> YES	<input type="radio"/> NO				
VA AUTO SET	<input checked="" type="radio"/> ON	<input type="radio"/> OFF				
ALLO[-] ADDITION	<input type="radio"/> YES	<input checked="" type="radio"/> NO				
ADD ESTIMATION	<input type="radio"/> YES	<input checked="" type="radio"/> NO				
WORKING DISTANCE	<input type="text" value="40 cm"/>					
F<->N DATA LINK	<input type="radio"/> SPH+ADD	<input type="radio"/> SPH	<input checked="" type="radio"/> OFF			
PD AUTO SET	<input checked="" type="radio"/> URK	<input type="radio"/> LM	<input type="radio"/> OFF			

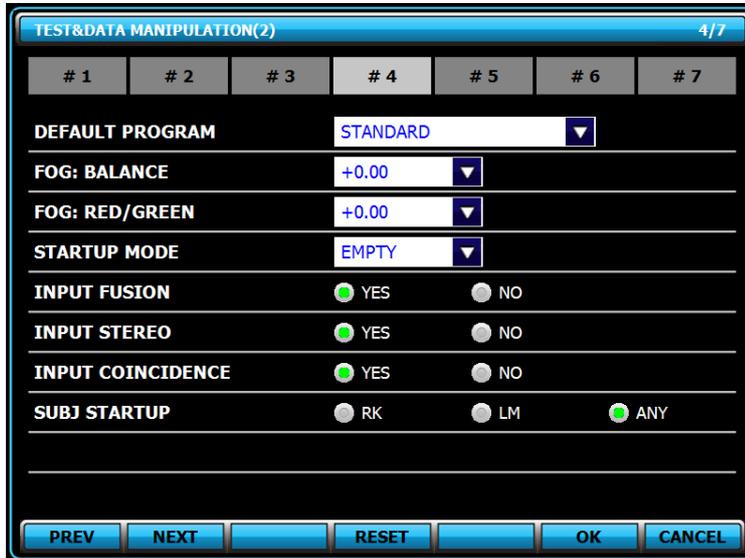
PREV NEXT RESET OK CANCEL

[Figure 8-10] TEST & DATA MANIPULATION(1)

- ① Δ Display: Designate marking method of Δ. You can choose X/Y or r/θ, but the initial value is X/Y.
- ② BLUR/BREAK/RECOVERY: Determine whether to setup the value of BLUR / BREAK / RECOVERY. You can choose YES or NO, but the initial value YES.
- ③ VA AUTO SET: Determine whether to apply the value of VA by Chart Mask, in the process of Visual Acuity test. You can choose ON of OFF, but the initial value ON.
- ④ ALLOW [-] ADDITION: Determine whether to allow the minus value of Addition You can choose YES or NO, but the initial value NO.
- ⑤ ADD ESTIMATION: Determine whether to designate presumptuous Addition according to ages. You can choose YES or NO, but the initial value NO.
- ⑥ WORKING DISTANCE: Designate the working distance on Short Distance Mode. You can choose from 35cm to 70cm, but the initial value is 40cm.
- ⑦ F<->N DATA LINK: Designate the applying method of ADD value, when it is transferred between Long Distance Mode and Short Distance Mode. You can choose one among SPH+ADD (apply added ADD to SPH), SPH (apply only SPH), and OFF (do not apply,) but the initial value is OFF.
- ⑧ PD AUTO SET: Designate the method to set up automatic PD value. You can choose RK, LM, or OFF, but the initial value is RK.

- PAGE 4(TEST & DATA MANIPULATION(2))

Set up the items related with the test and data control which is necessary in the process of test.



[Figure 8-11] TEST & DATA MANIPULATION(2)

- ① **DEFAULT PROGRAM:** Designate basic programs for vision test. Can choose one among 12 Custom Program including STANDARD but the initial value is STANDARD.
- ② **FOG: BALANCE:** Designate the value of Fogging for the Balance Test of Binocular. You can choose one from +0.00D to +1.00D but the initial value is +0.00D.
- ③ **FOG: RED/GREEN:** Designate the value of Fogging for the Red/Green Test. You can choose one from +0.00D to +1.00D but the initial value is +0.00D.
- ④ **INPUT FUSION:** Determine whether to put in the test value of Worth-4-Dots. You can choose YES or NO but the initial value is YES.
- ⑤ **INPUT STEREO:** Determine whether to put in the test value of Stereo Test. You can choose YES or NO, but the initial value is YES.
- ⑥ **INPUT ANISEIKONIA:** Determine whether to put in the test value of Aniseikonia. You can choose YES or NO, but the initial value is YES.
- ⑦ **STARTUP MODE:** Designate the start mode when the system was initialized by [CLEAR] button. You can choose one among EMPTY, UA, LM, RK, and SUB, but the initial value EMPTY.
- ⑧ **SUBJ STARTUP:** Designate the mode on which the information is copied, when you entered SUB mode by pressing [SUB] button. You can choose RK, LM, or ANY, but the initial value is ANY.

- PAGE 5(TEST ENVIRONMENT)

Set up the options about Test Environment.

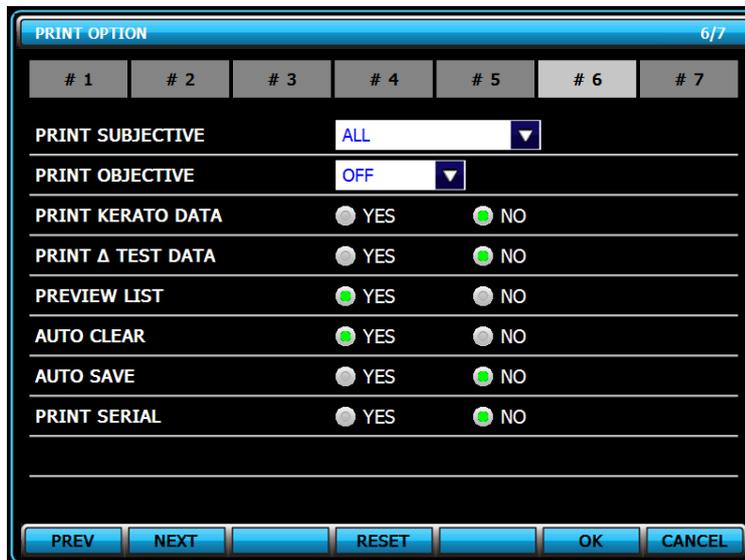


[Figure 8-12] TEST ENVIRONMENT

- ① BEEP SOUND: Determine whether to use the button sound and sound effects. You can choose ON or OFF, but the initial value is ON.
- ② LANGUAGE: Choose the language. ENGLISH is only available at present.
- ③ SCREEN OFF: Designate the waiting time for the power saving mode. You can choose the time that SCREEN OFF function is not activated from 0 to 60 minutes per every 5 minutes. But the initial value is 10 minutes.
- ④ TEST TIME: Designate the beginning time of the test to calculate the whole time of the test. You can choose ENTERING SUBJ (the time that SUBJ mode starts) or BEGINNING TEST (the time that the test starts,) but the initial values is ENTERING SUBJ.
- ⑤ DATE DISPLAY: Designate the expression type for the date and time appear on the upper right part of the screen. You can choose one among DD/MM hh:mm (12H), DD/MM hh:mm (24H), Y/M/D hh:mm (12H) and Y/M/D hh:mm (24H), but the initial value is DD/MM hh:mm (12H). 'DD' or 'D' means day, 'MM' or 'M' means month, 'Y' means year, 'hh' means hour, 'mm' means minute, and 'ss' means second.
- ⑥ DATE[YY/MM/DD] : Designate the present date.
- ⑦ TIME[hh/mm/ss] : Designate the present time.

- PAGE 6(PRINT OPTION)

Set up the options related with printing.



[Figure 8-13] PRINT OPTION

- ① **PRINT SUBJECTIVE:** Designate the items of subjective test result to be printed. You can choose one among ALL (print all the date) W/O UNAIDED VA (print except the unaided Visual Acuity Test result), W/O BIN VF (print except the vision functions test result), SUBJ & FIN ONLY (print only SUBJ mode result and FIN mode result), and OFF (do not print any data,) but the initial values is ALL.
- ② **PRINT OBJECTIVE:** Designate the items of objective test result to be printed.. You can choose one among ALL (print all data), RK ONLY (print RK data only), LM ONLY (print LM data only), and OFF (do not print any data,) but the initial value is OFF.
- ③ **PRINT KERATO DATA:** Determine whether to print the value of KEAROMETRY (Radius of corneal curvature). You can choose YES or NO, but the initial value is NO.
- ④ **PRINT Δ TEST DATA:** Determine whether to print the value of Prism for each Heterophoria Test. You can choose YES or NO, but the initial values is NO.
- ⑤ **PREVIEW LIST:** Determine whether to use preview function.You can choose YES or NO, but the initial value is YES
- ⑥ **AUTO CLEAR:** Determine whether to initialize the test result when press [PRINT] button. You can choose YES or NO, but the initial value is YES.
- ⑦ **AUTO SAVE:** Determine whether to save the test result when press [PRINT] button. You can choose YES or NO, but the initial value is NO.
- ⑧ **PRINT TO SERIAL:** Determine whether to transmit the data through SERIAL. You can choose YES or NO, but the initial value is NO.

- PAGE 7(EXTERNAL INSTRUMENT)

Set up the items related with external instrument.

# 1	# 2	# 3	# 4	# 5	# 6	# 7
LINKAGE MODE		<input checked="" type="radio"/> NOTICE	<input type="radio"/> DB			
RK: COPY KERATO		<input type="radio"/> YES	<input checked="" type="radio"/> NO			
LM: COPY Δ		<input type="radio"/> YES	<input checked="" type="radio"/> NO			
LM: COPY ADD		<input type="radio"/> YES	<input checked="" type="radio"/> NO			
CP CONNECTION		<input checked="" type="radio"/> SERIAL	<input type="radio"/> NONE			
RESET TYPE ON CLEAR		<input checked="" type="radio"/> NORMAL	<input type="radio"/> SOFT			

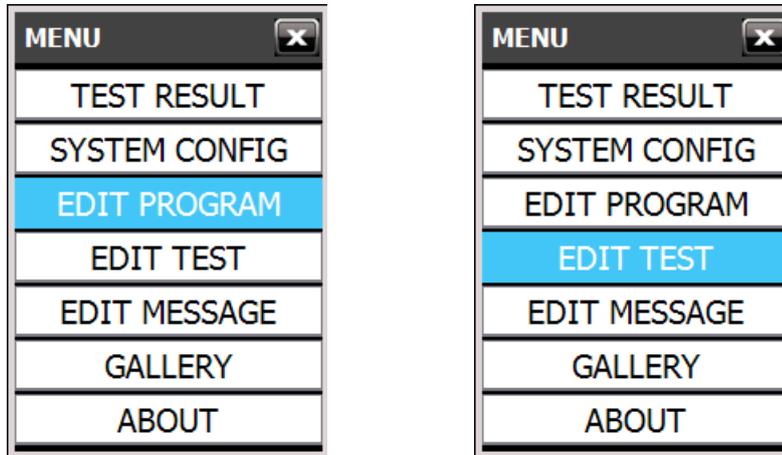
PREV NEXT RESET OK CANCEL

[Figure 8-14] EXTERNAL INSTRUMENT

- ① **LINKAGE MODE:** It means the manner to receive the test results of other device and there are ALONE & [NETWORK]. The initial value is ALONE
 - ALONE : While the test results is saved in the RK Database, it shows on screen at the same time.
 - NETWORK : Just only save the test results in the RK Database.
- ② **RK: COPY KERATO:** Determine whether to bring Keratometry data from RK. You can choose YES or NO, but the initial value is YES.
- ③ **LM: COPY Δ:** Determine whether to bring the Prism data from LM. You can choose YES or NO, but the initial value is NO.
- ④ **LM: COPY ADD:** Determine whether to bring the Addition data from LM. You can choose YES or NO, but the initial value is NO.
- ⑤ **CP CONNECTION:** Designate how to connect Chart Projector. You can choose one among SERIAL (serial communication) or NONE (no connecting,) but the initial value is SERIAL.
- ⑥ **RESET TYPE ON CLEAR:** Designate how to initialize the test. You can choose one between NORMAL which runs for HardWare-like operation (operated as the same way with BOOTING), FAST (operated faster than BOOTING), and SOFT for SoftWare operation, and NORMAL is the default value.

※ It is recommended to change the SYSTEM CONFIG little by little, after getting familiar with the system.

8.3 EDIT PROGRAM and EDIT TEST



[Figure 8-15] EDIT PROGRAM and EDIT TEST

UDR-800 supports programs (1 System Program and 11 Custom Programs) and Unit Test functions (30 System Test and 36 Custom Programs) to establish a measurement circumstances to meet the goal and preference of User

Unit Test(System test) is a function to set up a various option (such as Chart, choice of long distance, short distance mode, data component and auxiliary lenses) that are required to the vision test automatically at once and it's a function combining many unit test to be used in order

It is helpful to test accurately, easily and promptly if it's set up System test and Programs according to the individual's test purpose and preference in advance.

8.3.1 Edit Custom program

Enter program choice mode by pressing 'EDIT PROGRAM' menu after pressing [MENU] button or touching [MENU] on the screen.

The program list would appear on the left side. You can choose and edit one of 11 programs, except 'STANDARD.' . If the name of a selected program is written with dark black, it means it's already to be set up so user can execute the program in the measurement process

Go into program edit mode by pressing [OK] after choosing 'CUSTOM PROGRAM-A' through menu move button or dial

- Delete / Copy / Paste Programs

- Delete: Press  button to delete the selected program.
- Copy: Press  button to copy the selected program. If the program is out of the list, the copied contents is deleted.
- Attach: Press  button after selecting the program to paste a copied program



[Figure 8-16] List of program selection

The number shown on the right upper side on the program edit screen does mean the number of current step and the quantity of all steps. One program can include totally 32 steps.

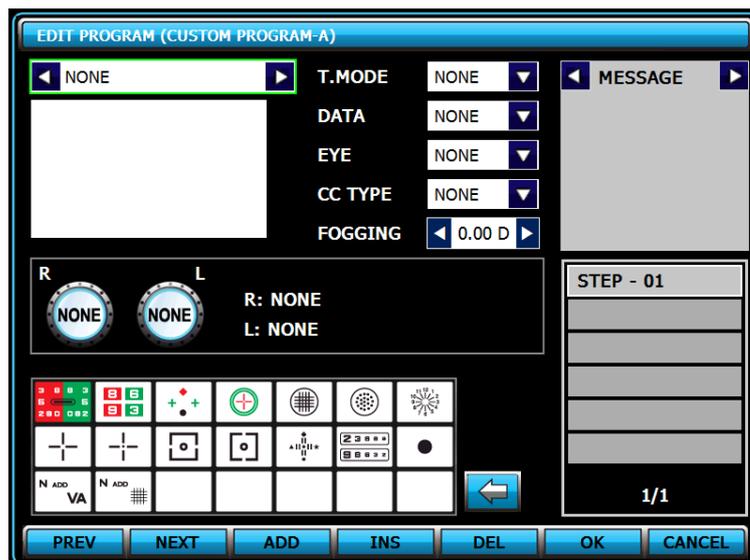
On the upper side of the screen, the name and value of each components appears and on the below, there are chart buttons.

On the below side of the screen, it shows the list of each step for Custom program.

On the bottom of the screen it shows function keys so that check the previous contents and the next contents for the perpared step by pressing [PREV] and [NEXT]

[ADD] is to add new step on the last step in the process of editing and [INS] is to add new step on the right previous step against the current step in the process of editing and [DEL] is delete the current step in the process of editing.

Press [OK] to save all the step. Press [CANCEL] to cancel the program edit and then exit.

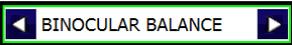


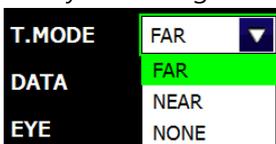
[Figure 8-17] Program edit

-  TEST: It's a name of unit test. CHART, DATA, EYE, CC TYPE, FOGGING and R/L Lens are all changed if select one. It's activated when you press chart button or rotate dial.
- T. MODE : Select TEST MODE, Far distance mode and Near distance mode. Select distance mode and Near distance mode by pressing the combo box on the screen
- DATA : Select DATA ELEMENT. Select data element to need by pressing one among [SPH], [CYL], [AXS], [ADD], [VA], [BIBO], [BDBU], [ADD VA] button in the combo box
- EYE: Select eyes to measure. Select one among [RIGHT], [LEFT], [BIN]
- CC TYPE: Select DUAL CROSS CYLINDER (0.25 or 0.50). Select one between them by pressing the combo box on the screen
- FOGGING: Select a necessary fogging value from 0.00D to +1.00D. Adjust a value by pressing  or  button
-  AUXILIARY LENS: Select a necessary auxiliary lens. Choose lens directly among auxiliary lenses on window by selecting lens on the touch screen
- MESSAGE.: Select help or message to utilize at the current program step. Select a message to need by pressing  or  button on the touch screen
- MOVE STEP
 - [PREV] button : Move to the previous step
 - [NEXT] button : Move to the next step
- ADD STEP
 - [ADD] button : Add a new step to the last step.
 - [INS] button : Add a new step to the current step.
- DELETE STEP
 - [DEL] button : Delete the curreunt step, and move the latter steps forward one by one.

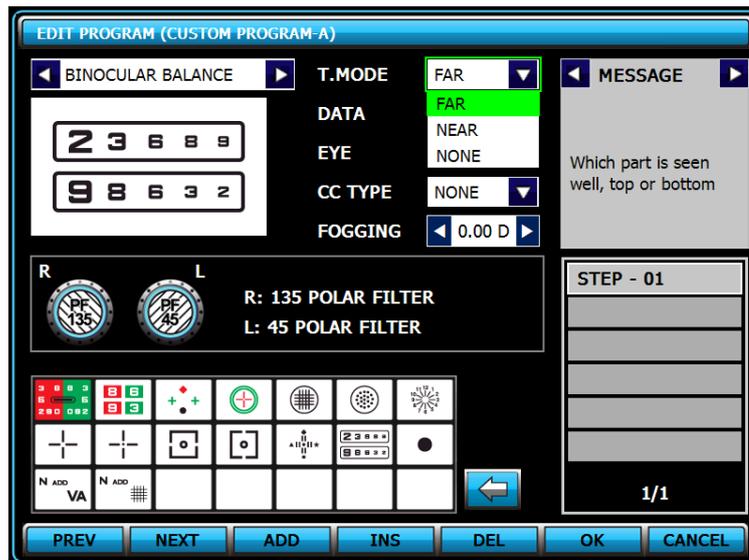
Here is one sample for Cusoms program. Total step is 3 and the order is as below;
 [STEP - 01] Polarized Binocular Balance Test -> [STEP - 02] Schober Test -> [STEP - 03] Confirm Binocular visual acuity

① [STEP - 01] - Polarized Binocular Balance Test

After choosing  select chart by rotating jog dial or select chart on the screen directly. At the right side of combo box of TEST MODE



Select FAR mode.

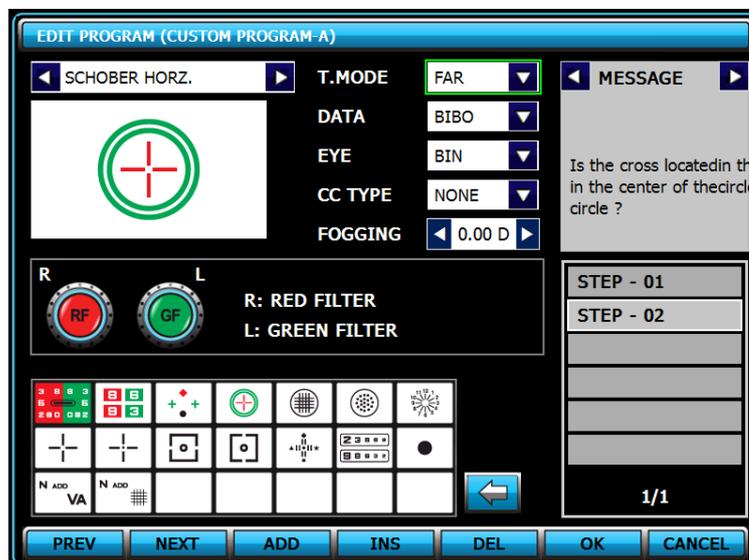


[Figure 8-18] STEP – 01 Polarized Binocular Balance Test

② [STEP - 02] Schober Test

Add new step by pressing [INS] button.

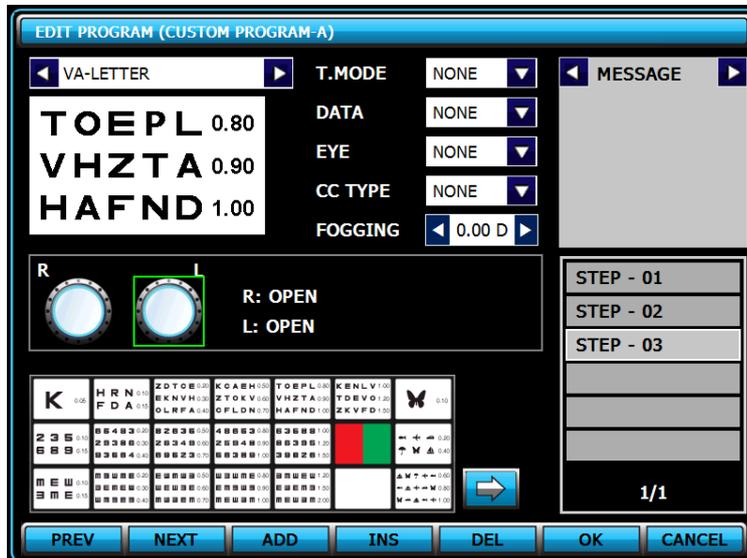
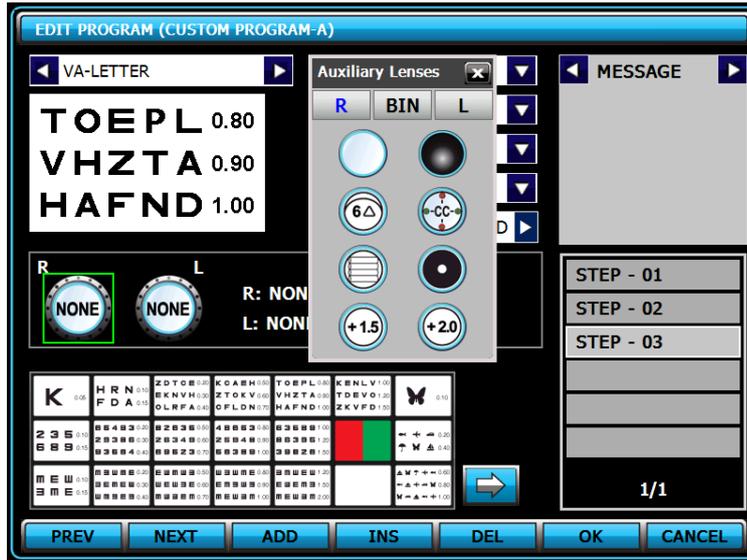
After choosing **◀ SCHOBER HORZ. ▶**, select chart by rotating jog dial or select chart on the screen directly. Select FAR mode at the right side of combo box of TEST MODE



[Figure 8-19] STEP – 02 Schober Test

③ [STEP - 03] Confirm Binocular visual acuity

After choosing **◀ VA-LETTER ▶**, change chart by rotating jog dial or select a chart among normal charts directly by touching **◀ ▶**. And then select FAR MODE for T-MODE, SPH for DATA, ELEMENT, BIN for EYE on combo box. And then choose open-lens at lens selection window for R/L



[Figure 8-20] STEP – 03 Confirming binocular visual acuity

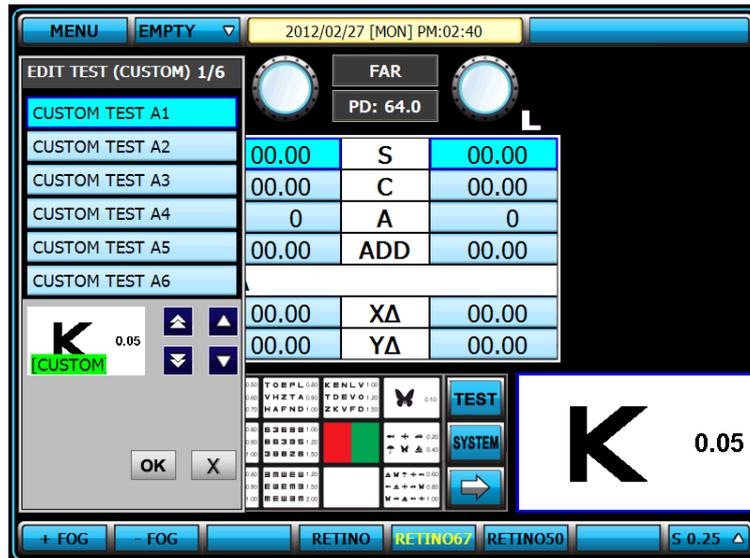
Lastly press [OK] button to save and then exit.

After pressing [SHIFT] button and [PROG.] button together, select [CUSTOM PROGRAM-A] to implement. It would shows the saved step in order.

8.3.2 Edit Custom Test

Edit of Custom Test function shares very similar process with a edit of Custom Programs.

Enter Custom Test selection mode by pressing [MENU], [EDIT TEST] and **OK** in order. It would appear a list of Custom Test. Select one among 35 Custom test and edit it, too. If the name of a selected test is written with dark black, it means it's already to be set up so user can execute the test in the measurement process

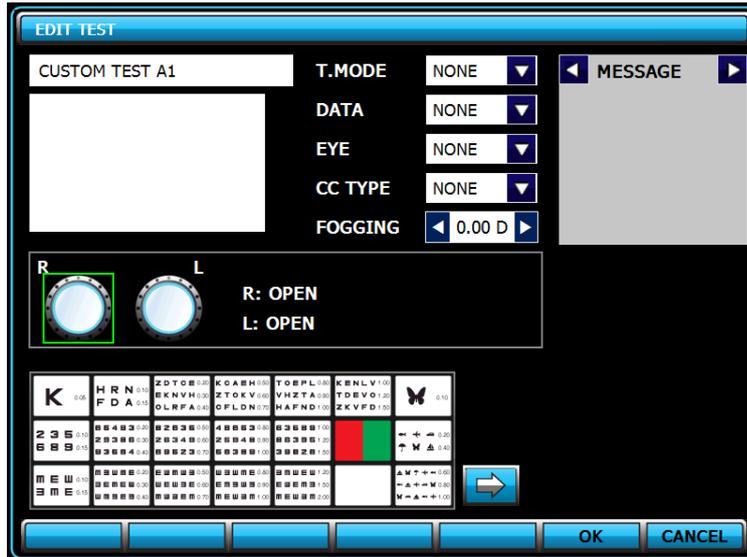


[Figure 8-21] List of Custom Test

Enter edit custom test mode by pressing [CUSTOM TEST A1] and then **OK**

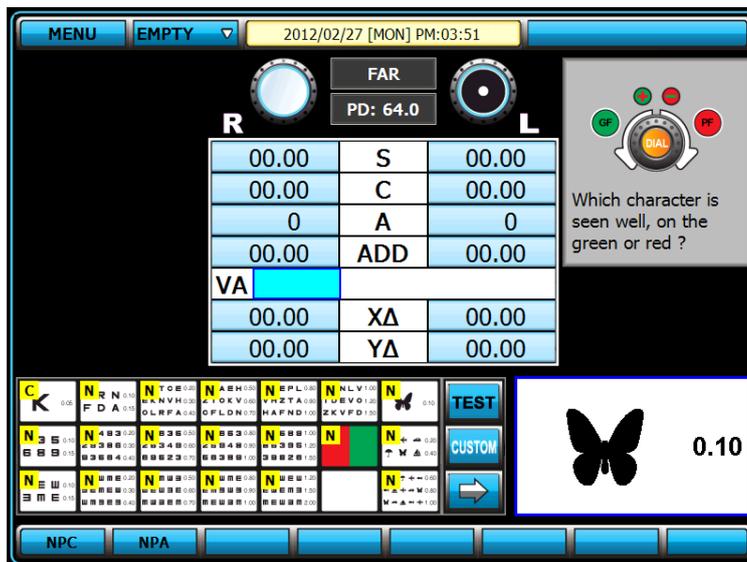
The beginning component to edit custom test consist of CHART. Test name could not be changed on edit custom test

Change the value for each item with same process as Edit Customs program and press **OK** to save.



[Figure 8-22] Edit Custom Test

To do Edit Custom Test, press  to alter into Custom chart list and select a necessary chart among the registered items

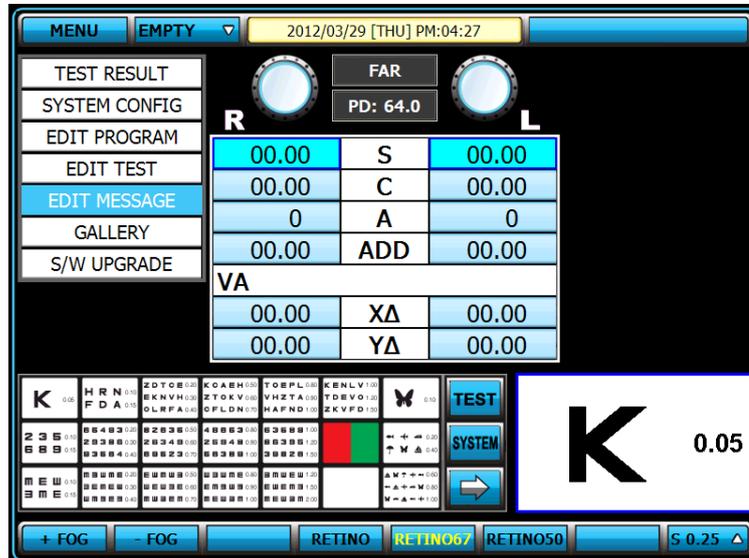


[Figure 8-23] Chart List for Custom Test

It shows "C" ; Custom on the left top of the registered chart but on non registered chart it shows "N" ; Nothing

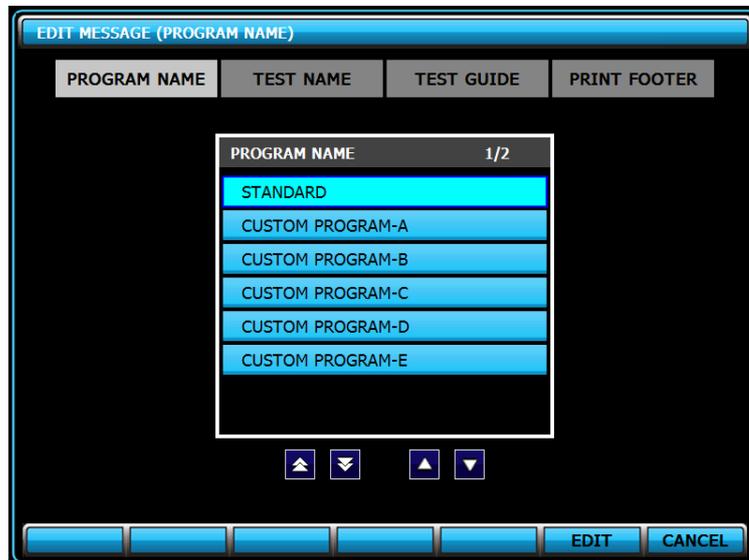
8.4 EDIT MESSAGE

Can edit the name of Custom Program, the name of Custom Test, Guide message and company name with a imaginary keyboard.



[Figure 8-24] EDIT MESSAGE

Select message group on running EDIT MESSAGE. If touch the test name on the screen, move to the message group. In succession, select a message to edit and then enter edit mode by pressing [EDIT] on function key area



[그림 8-25] Select EDIT MESSAGE group

In case of PRINTER FOOTER, can enter edit mode directly without selecting a message per group Buttons on imaginary keyboard is arranged in order and can edit a message by pressing button on the screen

[Characteristic of each MESSAGE group]

- PROGRAM NAME : Only 1line (19 letters per a line) is editable, and STANDARD is not available to edit.
- TEST NAME : Only 1line (19 letters per a line) is editable.
- GUIDE MSG. : 3lines (20 letters per a line) are editable, and it is convertible between SYSTEM GUIDE MSG. and CUSTOM GUIDE MSG. by pressing [CUSTOM] button on function key area
- SYSTEM GUIDE MSG. : Copy the contents of the chosen SYSTEM GUIDE MSG. by pressing [COPY] button on function key area
- CUSTOM GUIDE MSG. : Get the contents of CUSTOM GUIDE MSG. to be blank by pressing [ERASE] button on function key area. Copy the contents of SYSTEM GUIDE MSG to the chosen CUSTOM GUIDE MSG. by pressing [PASTE] button.
- PRINT FOOTER : 3 lines (23 letters per line) are editable.

[How to use FAST-EDITOR]

- FAST-EDITOR consist of two windows; one is edit window on the upper side and the other is a imaginary keyboard on the below.
- SAVE : Save the edited contents by pressing 
- CANCEL: Exit without saving by pressing 
- Switch Capital/Small letter: Switch the window for letter into Capital letter or Small letter each other by pressing [SHIFT] button.
- Move cursor on edit window : Move with buttons (Up/ Down/ Right/Left)
- Add letter : Based on the position of Cursor on edit window, Letter is added on the position of cursor if no letter on cursor but Letter is overwritten if any letter on cursor
- Delete letter : Based on the position of Cursor on edit window, can delete the forward letters by pressing [BACKSPACE] button but can delete the letter at present position by pressing [DEL] button. The space to be empty by deletion is filled with blank

8.4.1 Edit the name of Custom program

It could protect any confusion in the process of optometry if change the name of Custom Program after designating Custom program for patients. When many users utilize the unit, it'd be sortable and comprehensible easily if change "CUSTOM PROGRAM-A" into "CHILDREN"

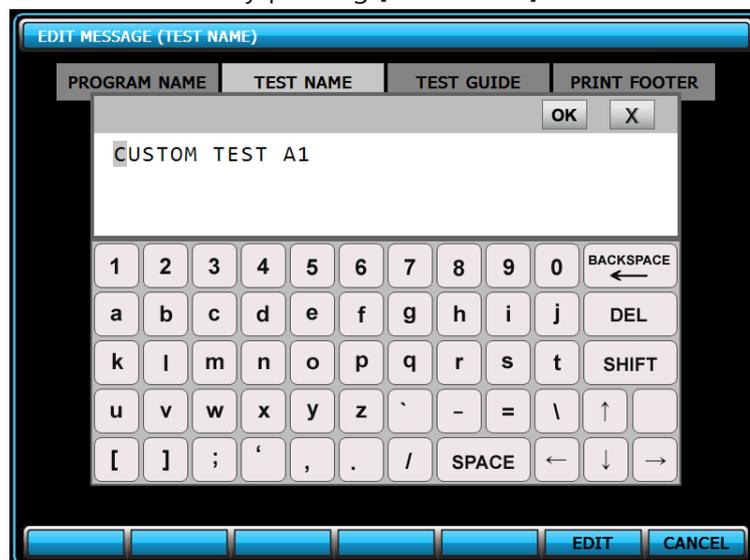
Enter edit mode through imaginary keyboard window if press [EDIT] on function key area after selecting "CUSTOM PROGRAM-A" by pressing [PROGRAM NAME] tab button.



[Figure 8-26] Edit the name of Custom Program

8.4.2 Edit the name of Custom test

Enter edit mode through imaginary keyboard window if press [EDIT] on function key area after selecting "CUSTOM PROGRAM-A" by pressing [TEST NAME] tab button.



[Figure 8-27] Edit the name of Custom Test

8.4.3 Edit Custom Guide Message

Enter edit mode through imaginary keyboard window if press [EDIT] on function key area after selecting a blank area by pressing [TEST GUIDE] tab button.



[Figure 8-28] Edit CUSTOM GUIDE MSG.

8.4.4 Edit shop name

Edit company name, telephone number, web and address to be used to print out properly for each user.

Enter edit mode directly through imaginary keyboard window if press [PRINT FOOTER] tab button.



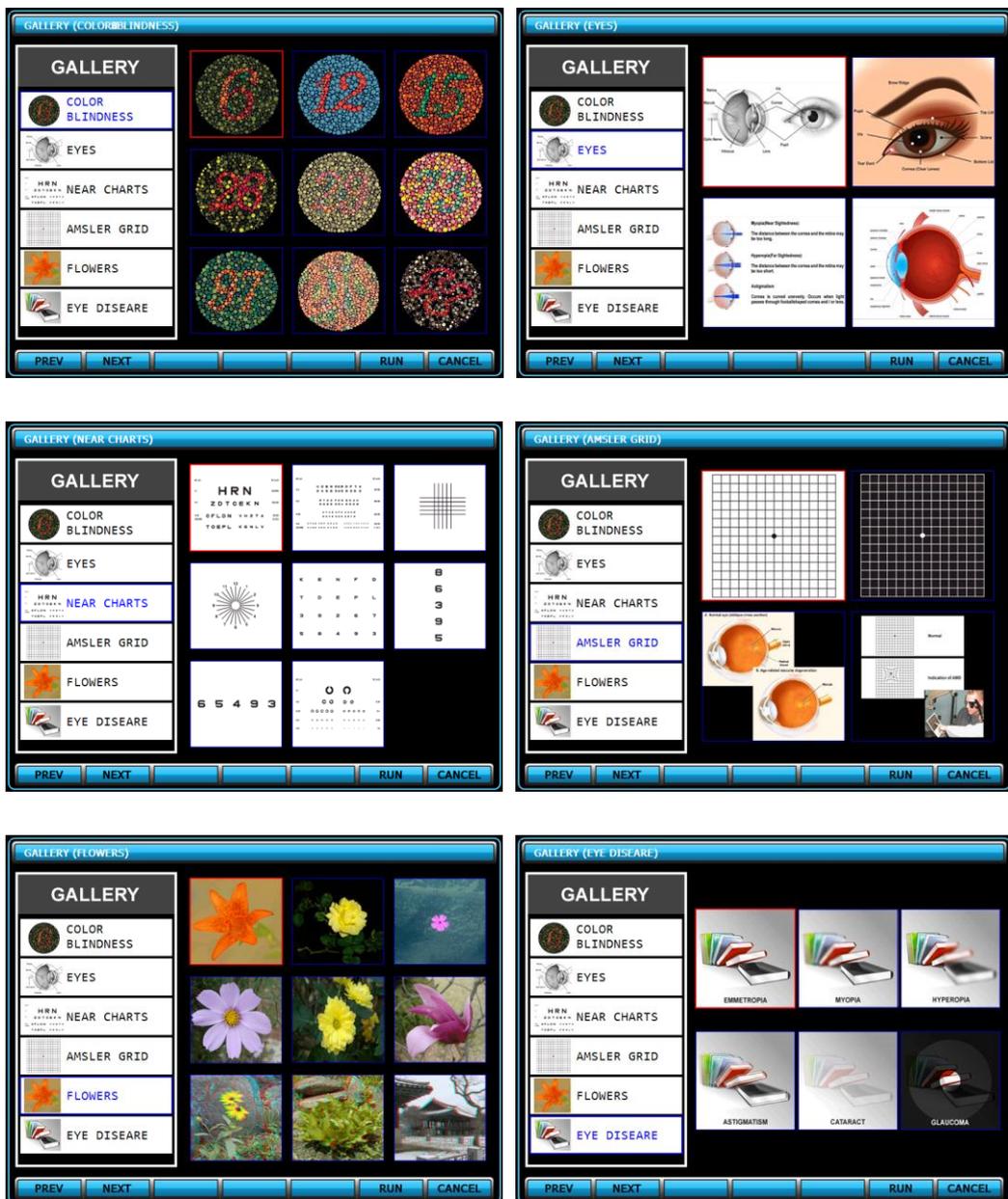
[Figure 8-29] Edit PRINT FOOTER

8.5 GALLERY

UDR-800 serves a color-blindness test and visual function test with Operation panel, furthermore serves near vision test with near vision chart.

And could explain various vision and ophthalmic diseases very easily to the patient

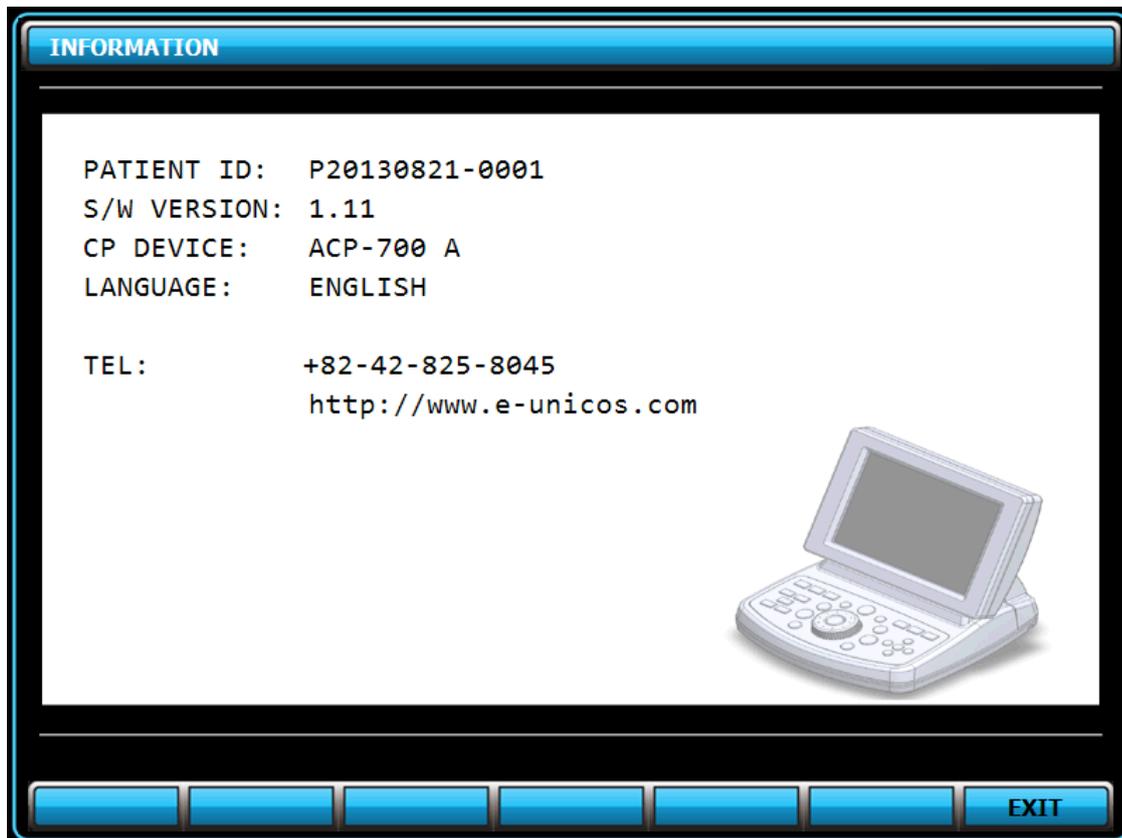
If select the item to be used at the menu of touch screen, the various images appear properly. The image become big if press [RUN] button on function key area after selecting one among the right images. Move to previous image or next image if press [PREV] or [NEXT] button.



[Figure 8-30] Main Screens of GALLERY

8.6 ABOUT

UDR-800 serves Patient ID, S/W version, Chart Projector device type, Language and the information of the company with 'ABOUT' mode.



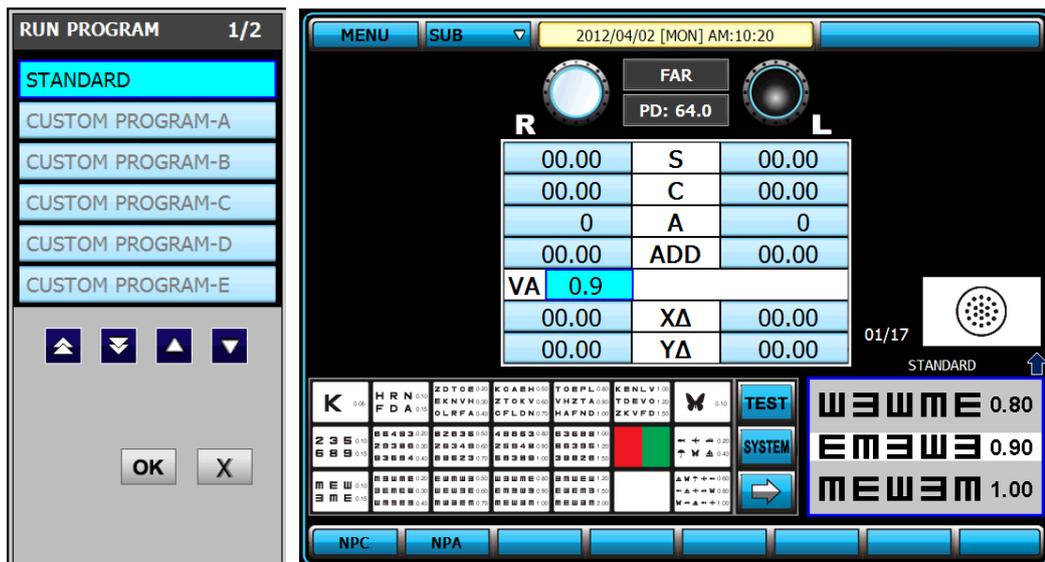
[그림 8-31] ABOUT running

9. Basic Programs Operation

UDR-800 allows a more convenient and more prompt visual acuity test with 1 System-Defined Program and 11 User-Defined Programs. When you use System-Defined Program, various tests offered by UDR-800 are available. Therefore, on this chapter, let's go through the System-Defined Program from beginning to end, and grasp UDR-800 basic operation and its running method at the same time.

9.1 Start System-Defined Basic Program

Power on the junction box of UDR-800 and wait until the system initialization is over. For a convenient test, let's start after changing it into [SUB] mode on main screen. Press [PROG] key to operate the System-Defined Program. Press [SHIFT] and [PROG] keys at the same time to float program choice menu on the left side, or you can choose STANDARD here and press [OK] key to operate as same. When the System-Defined Program starts, you would see the name and step mark of the current program, which is "STANDARD" and "1/17" at the moment, on the lower part of the right screen.



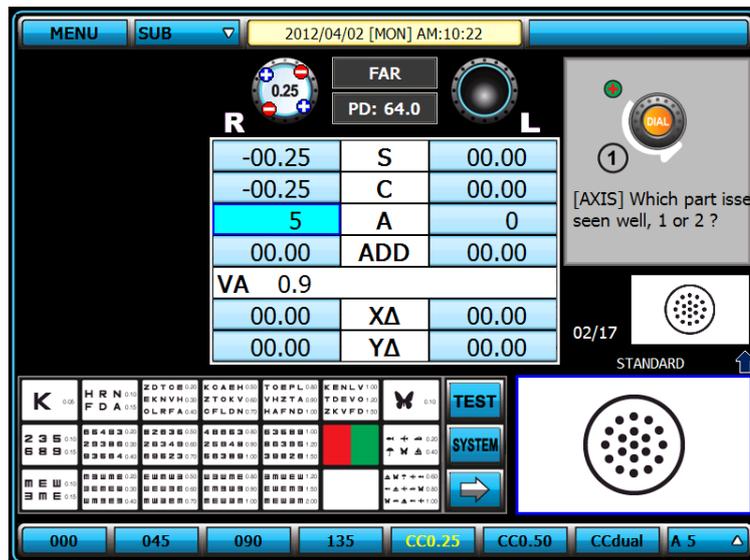
[Figure 9-1] Choice and Operation of the STANDARD Program

9.1.1 Adjustment of the SPH-CYL-AXIS Value

Step 1 of the System-Defined Program is basically to adjust the value of SPH-CYL-AXIS for right eye. Early data field is setup as SPH Binocular. Press [R] or [L] to shift to the Monocular mode, and adjust SPH fit for the patient's status. Move on to press [Distorted Vision Clock Dial] button to shift on the Distorted Vision Mode. Then adjust the value of AXIS and CYL fit for the patient's status. After all the adjustment is over and the best vision of the patient's Monocular comes out, go on to the next step.

9.1.2 Cross Cylinder Test using Dots Chart (AXIS)

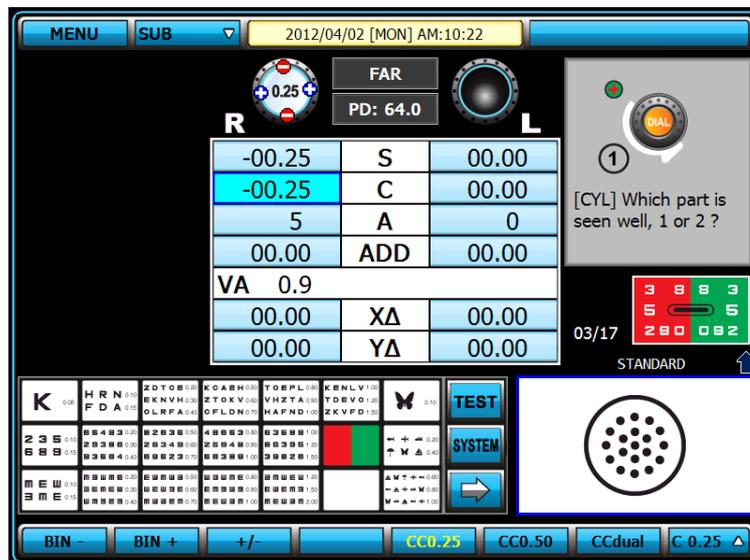
The 2nd step of the System-Defined Program is to revise the value of AXIS for the right eye more elaborately, based on the result of 1st step SPH-CYL-AXIS test. In case of Jackson Cross Cylinder Test, ask the patient with which eye he looks more clearly, while pressing number [1] and [2] buttons alternately. When he says number [1], turn the dial in + direction (counterclockwise,) while number [2] in – direction (clockwise.) Continue this until the patient answers that he sees both with similar clarity.



[Figure 9-3] 2nd step Cross Cylinder Test (Axis)

9.1.3 Cross Cylinder Test using Dots Chart (CYL)

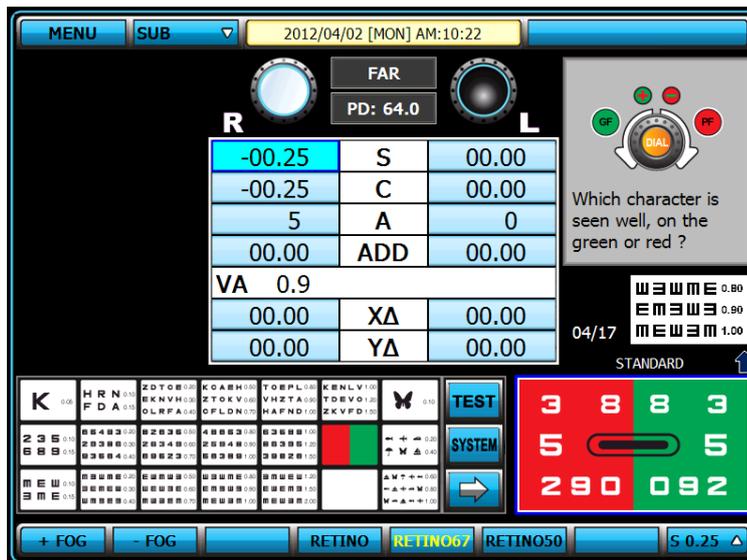
The 3rd step of the System-Defined Program is to revise the value of CYL for the right eye more elaborately, based on the result of 1st step SPH-CYL-AXIS test. In case of Jackson Cross Cylinder Test, ask the patient with which eye he looks more clearly, while pressing number [1] and [2] buttons alternately. When he says number [1], turn the dial in + direction (counterclockwise,) while number [2] in – direction (clockwise.) Continue this until the patient answers that he sees both with similar clarity.



[Figure 9-4] 3rd step Cross Cylinder Test (CYL)

9.1.4 Red/Green Balance Test for single eye

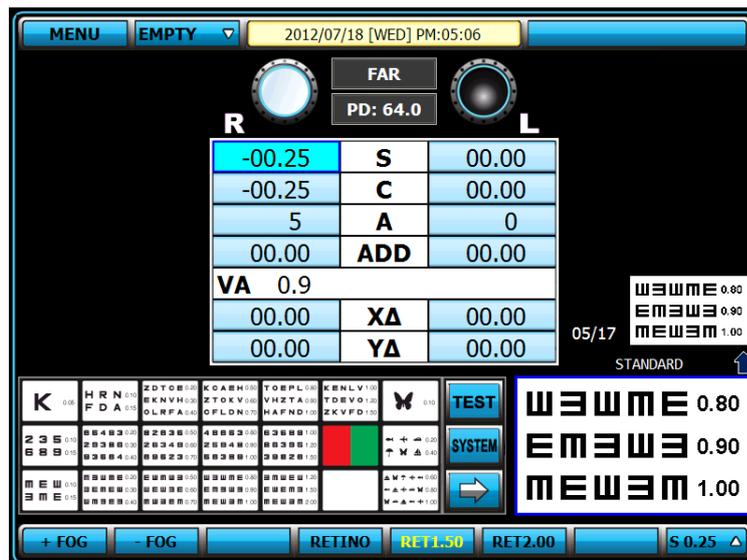
The 4th step of the System-Defined Program is to revise the value of SPH for the right eye more elaborately, based on the result of 1st step SPH-CYL-AXIS test. After questioning the patient with which letter does he sees more clearly, between the letter in green background and red background respectively. When he says the letter in green background is clearer, turn the dial in + direction (counterclockwise,) while one in the red background in – direction (clockwise,) because that is not revised. Continue this until the patient says that he sees both letters with similar clarity.



[Figure 9-5] 4th step Red/Green Balance Test for Monocular

9.1.5 Check the Power of Glasses for Right Eye

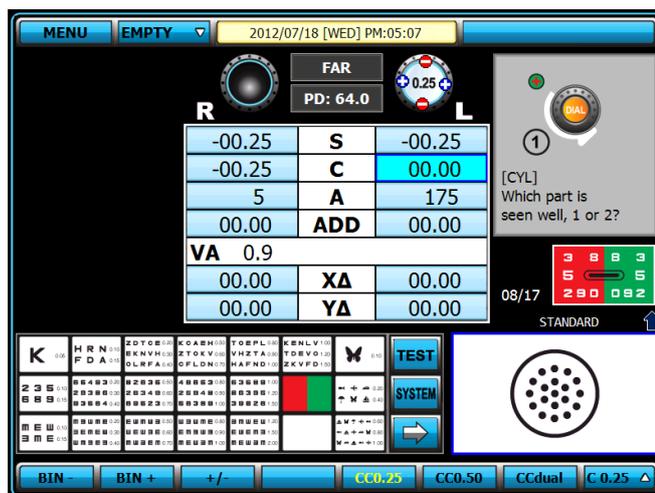
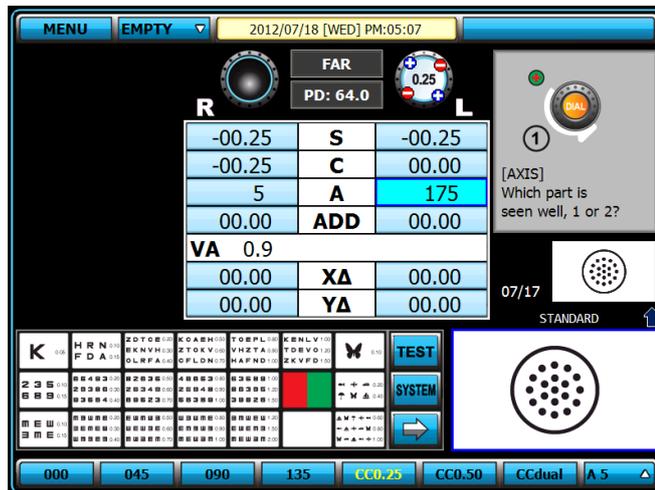
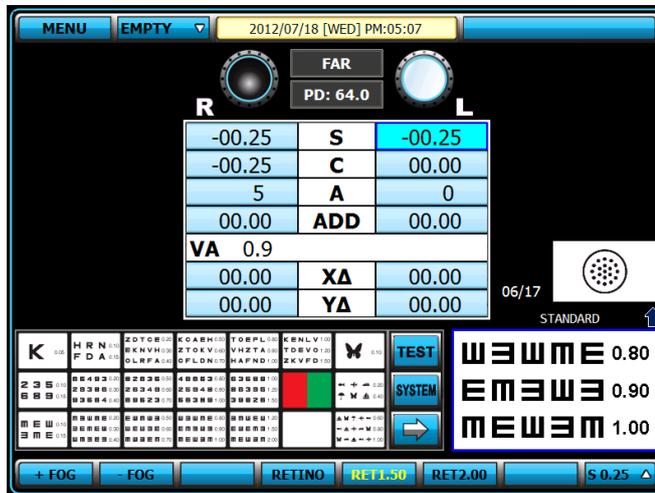
After the test of right eye is finished, check the power of glasses for right eye again. If necessary, use a mask for the test.



[Figure 9-6] 5th step Check the Power of Glasses for Right Eye

9.1.6 Adjustment of the SPH-CYL-AXIS Value

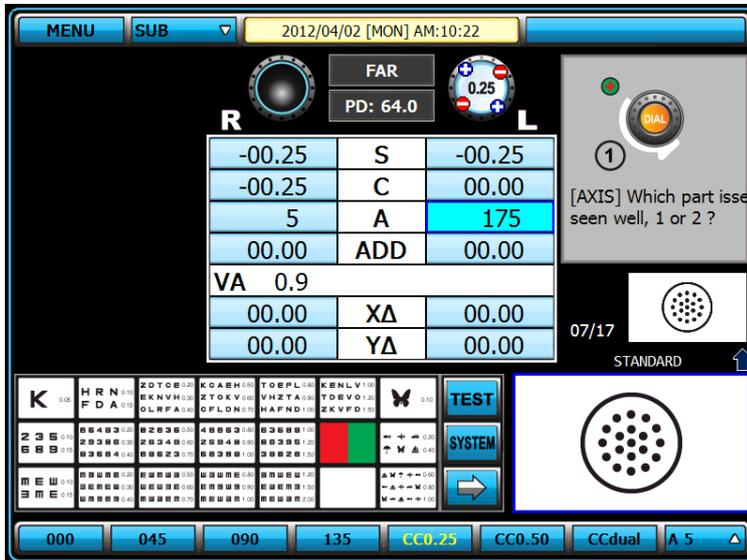
6th step of the System-Defined Program is basically to adjust the value of SPH-CYL-AXIS for left eye.



[Figure 9-7] Adjustment of the S-C-A Value

9.1.7 Cross Cylinder Test using Dots Chart (AXIS)

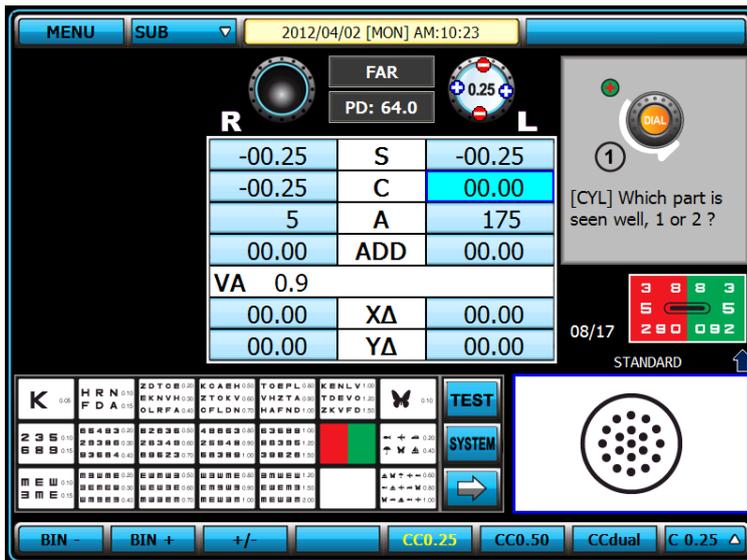
7th step of the System-Defined Program is to revise the value of AXIS for the left eye more elaborately, based on the result of 6th step SPH-CYL-AXIS test. For a detail explanation, please refer to the article 9.1.2 Cross Cylinder Test using Dots Chart (AXIS).



[Figure 9-8] Cross Cylinder Test (AXIS)

9.1.8 Cross Cylinder Test using Dots Chart (CYL)

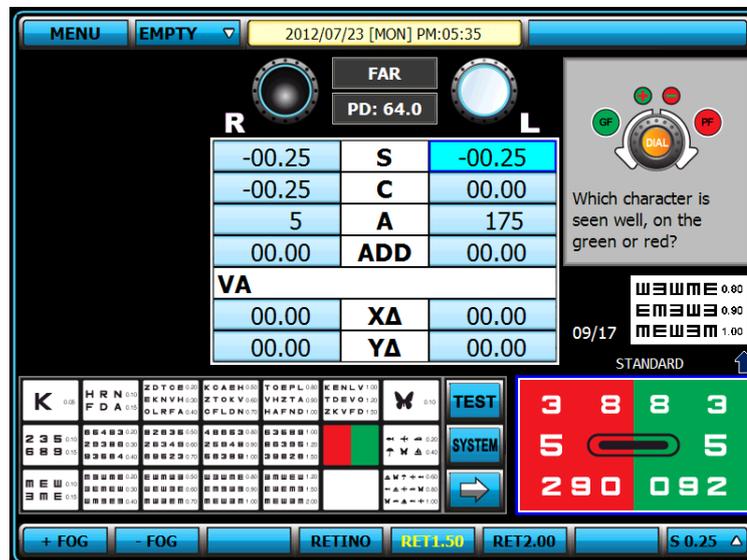
8th step of the System-Defined Program is to revise the value of CYL for the left eye more elaborately, based on the result of 6th step SPH-CYL-AXIS test. For a detail explanation, please refer to the article 9.1.3 Cross Cylinder Test using Dots Chart (CYL).



[Figure 9-9] Cross Cylinder Test (CYL)

9.1.9 Red/Green Balance Test for single eye

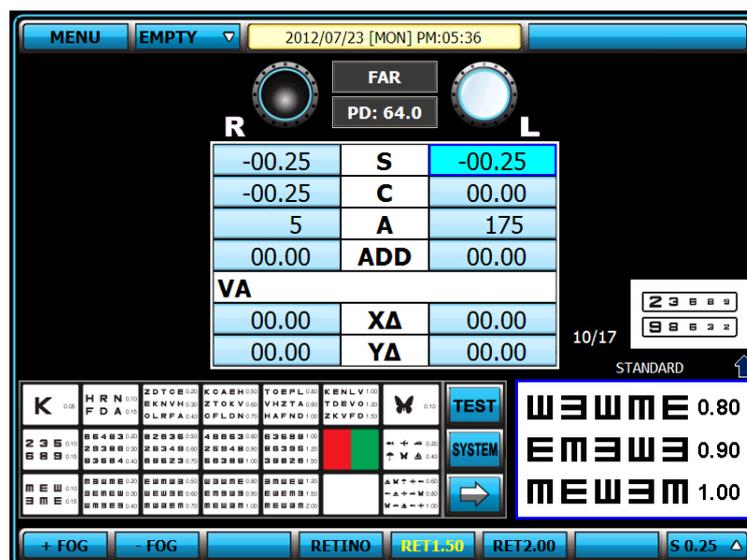
9th step of the System-Defined Program is to revise the value of SPH for the left eye more elaborately, based on the result of 6th step SPH-CYL-AXIS test. For a detail explanation, please refer to the article 9.1.4 Red/Green Balance Test for single eye.



[Figure 9-10] Red/Green Balance Test for single eye

9.1.10 Check the Power of Glasses for Left Eye

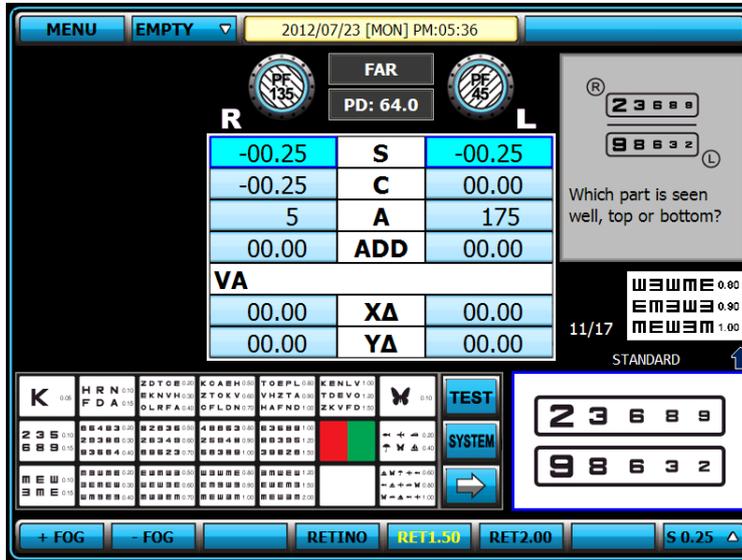
After the test of left eye is over, check the power of glasses for left eye again. If necessary, use a mask for the test.



[Figure 9-11] Check the Power of Glasses for Left Eye

9.1.11 Binocular Balance Test at Polarized Light

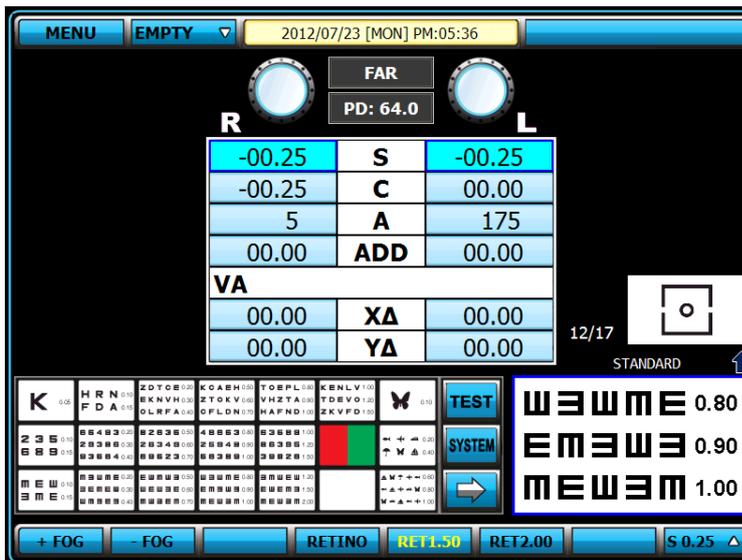
In the middle of binocular vision test, check the binocular balance for corrected monocular value, using Polarized Light Filter (left side with 45 degrees and right with 135 degrees) For more detailed information, please refer to the article 10.17 Binocular Balance Test at Polarized Light.



[Figure 9-12] Binocular Balance Test at Polarized Light

9.1.12 Check the Power of Glasses for both eyes

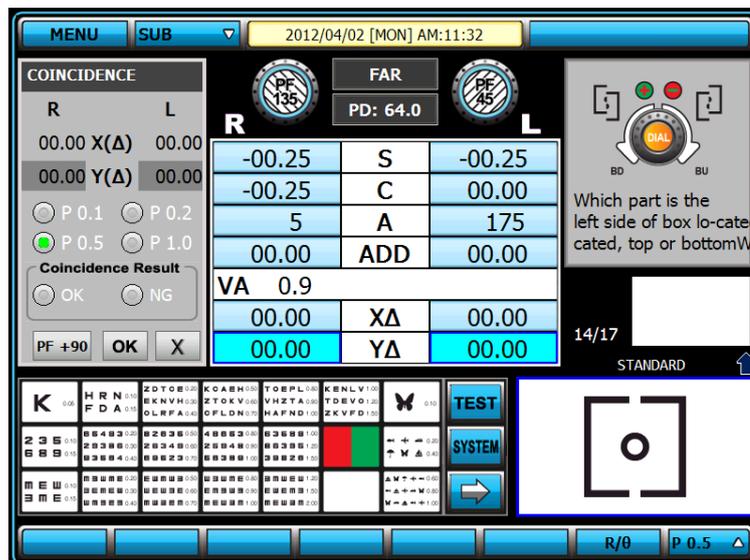
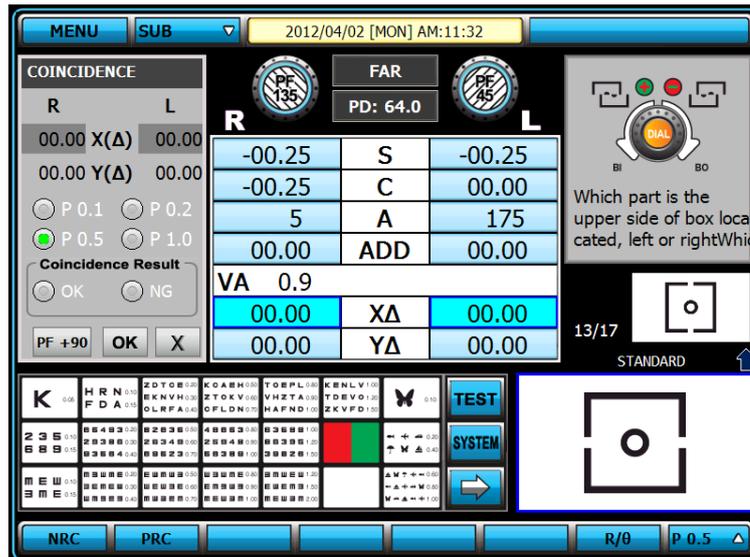
After the test of both eyes is finished, check the power of glasses for both eyes again. If necessary, use a mask for the test.



[Figure 9-13] Check the Spherical Refractive Power for both eyes

9.1.13 Far Distance Horizontality / Vertical Coincidence(Aniseikonia) Test

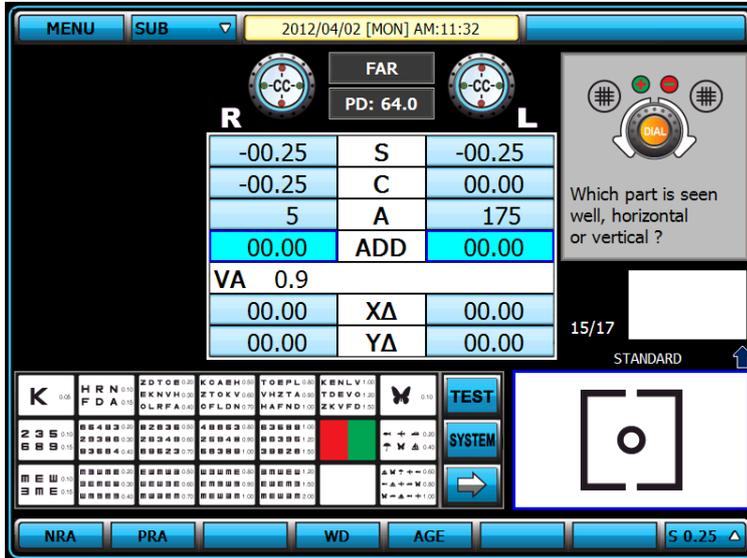
Process a test using Horizontal/Vertical Unequal Coincidence(Aniseikonia) chart in the middle of binocular visual acuity test. Test Heterophoria following the guidance, and do Coincidence(Aniseikonia) Test if necessary, and then record the result. For more detailed explanation, please refer to the article 10.21. Horizontal Coincidence(Aniseikonia) Test and 10.22. Vertical Coincidence (Aniseikonia) Test.



[Figure 9-14] Far Distance Horizontality / Vertical Coincidence(Aniseikonia) Test

9.1.14 Near Distnace Cross Grid Test

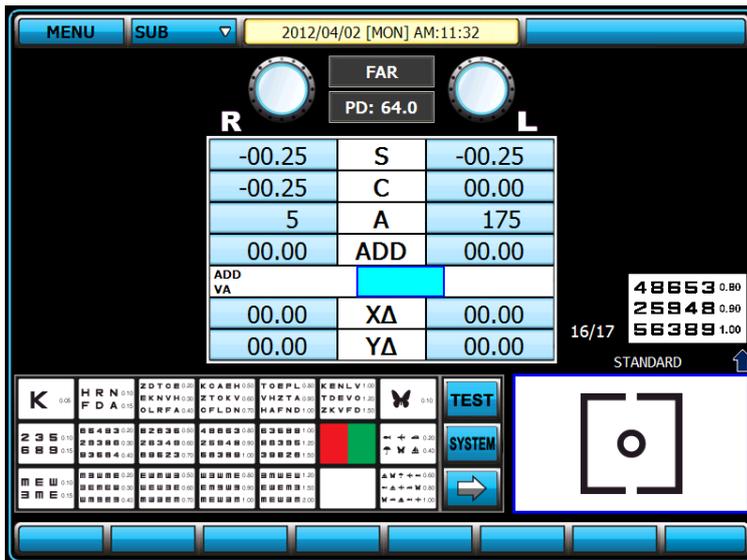
Check the accommodation force on Near Distance Mode by Cross Grid. Add or deduct value of ADD following the guidance. For more detailed information, please refer to the article 10.4 Near Distance Addition Test Using Cross Grid (Near ADD,).



[Figure 9-15] Near Distance Cross Grid Test

9.1.15 Near Vision Test with Addition (Near VA with ADD)

Test the Near Vision with Addition. For more detailed information, please refer to the article 10.1 Near VA with ADD.

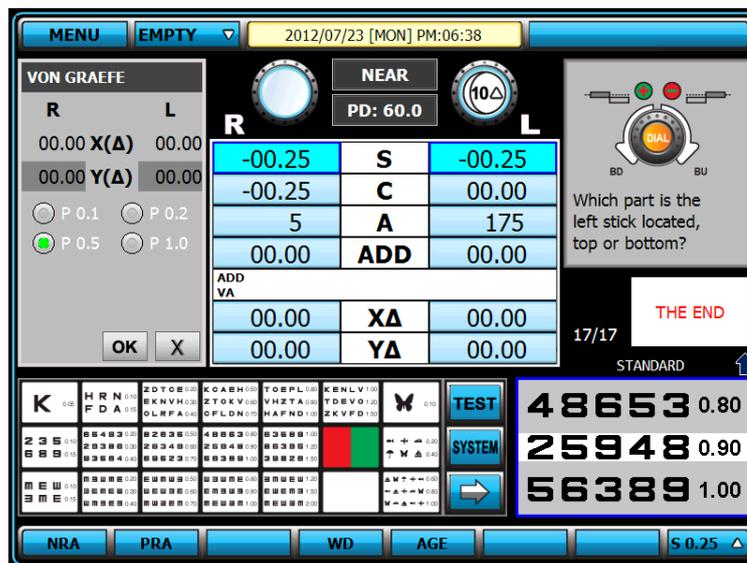
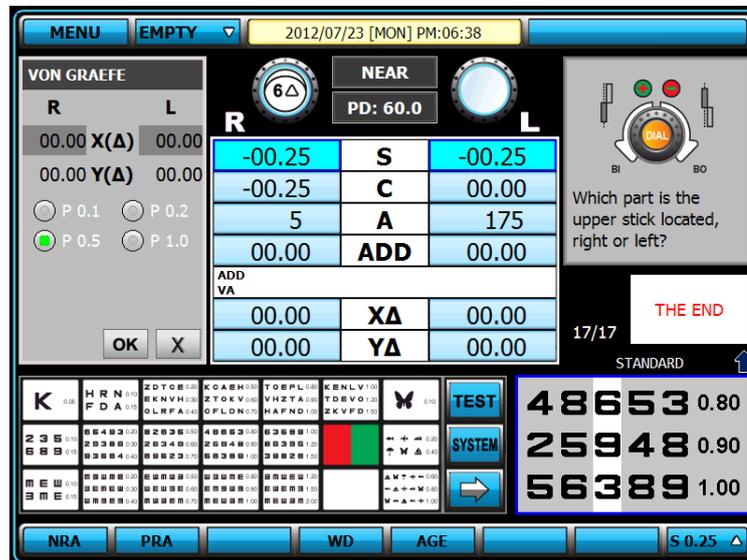


[Figure 9-16] Near Vision Test with Addition

9.1.16 Near Distance Horizontal / Vertical Von Graefe Test

Test using Horizontal / Vertical Von Graefe Chart at Near distance.

Process a Heterophoria test following guidance. For more detailed information, please refer to the article 10.25 Horizontal Von Graefe Test and the article 10.26 Vertical Von Graefe Test.



[Figure 9-17] Near Distance Horizontal / Vertical Von Graefe Test

By following all the above, all standard tests are finished, which are in order of Monocular Refraction(right) → Monocular Refraction(left) → Binocular test → Binocular Vision → Near Distance Test.

	<p>Ref. body may hurt a patient in the process of initialization. Please measure only after the initialization is over fully.</p>
	<p>Do not turn off the power when not in use for a long time.</p>

10. Unit Test

UDR-800 supports 30 system unit tests in total.

The list of system unit tests is available by pressing [TEST] and Direction Key button on its touchscreen display in order, and can be run the system unit test function by pressing [OK] button.

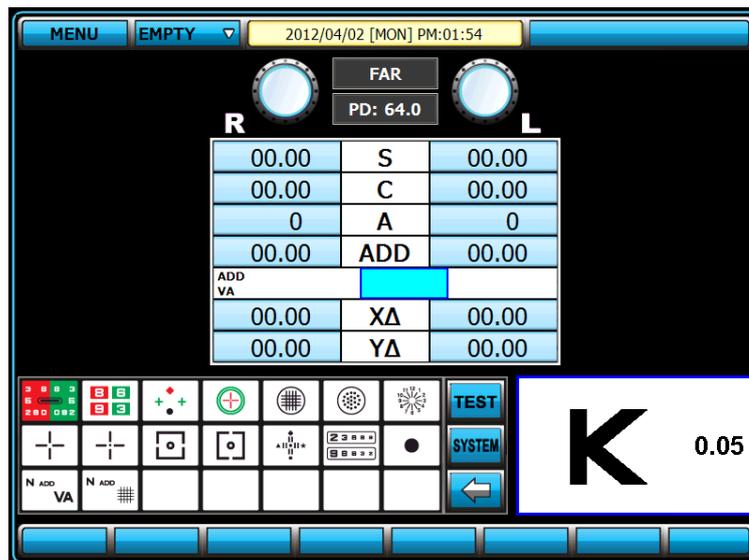
- NEAR VA WITH ADD : Near Vision Acuity with Addition
- NEAR POINT OF CONV. : Near Point of Convergence Test
- NEAR POINT OF ACCO. : Near Point of Accommodation Test
- NEAR ADD : Near Point Addition Test using Cross Grid
- NEGATIVE ACCO. : Negative Relative Accommodation Test
- POSITIVE ACCO. : Positive Relative Accommodation Test
- NEGATIVE CONV. : Negative Relative Convergence Test
- POSITIVE CONV. : Positive Relative Convergence Test
- CYLINDER TEST-POWER : Test of Cylinder Power
- CYLINDER TEST-AXIS : Test of Cylinder Axis
- RED/GREEN TEST : (Monocular) Red/Green Test
- CROSS CYL. TEST-POWER : Cross Cylinder Test-Power Test
- CROSS CYL. TEST-AXIS : Cross Cylinder Test-Axis Test
- CROSS GRID : Cross Grid Test (Ver2.00 and over)
- MADDOX ROD HORZ. : Horizontal Maddox Rod Test
- MADDOX ROD VERT. : Vertical Maddox Rod Test
- BINOCULAR BALANCE : Binocular Balance Test at Polarized Light
- DUOCHROME BALANCE : Red/Green Test at Polarized Light
- WORTH 4 DOTS : Control (Worth 4 Dots) Test
- SCHOBER HORZ. : Horizontal Schober Test
- SCHOBER VERT. : Vertical Schober Test
- COINCIDENCE HORZ. : Horizontal Coincidence(Aniseikonia) Test
- COINCIDENCE VERT. : Vertical Coincidence(Aniseikonia) Test
- PHORIA HORZ. : Horizontal Phoria Test without Fixation
- PHORIA VERT. : Vertical Phoria Test without Fixation
- PHORIA FIX HORZ. : Horizontal Phoria Test with Fixation
- PHORIA FIX VERT. : Vertical Phoria with Fixation
- MINUTE STEREO : Minute Stereo Acuity Test
- VON GRAEFE HORZ. : Horizontal Von Graefe Test
- VON GRAEFE VERT. : Vertical Von Graefe Test

10.1 Near Vision Test with Addition (Near VA with ADD)

- Purpose: Test the Near Vision with Addition.
- Chart: Near Vision Chart
- Auxiliary Lens: None
- Target: Test the Near Vision with Addition, for left, right and Binocular.
- Way of Test



1. On Special Chart clause of touch screen, press [N ADD VA] button to express the Near Vision Chart or you can establish the test mode by pressing [TEST] and choosing [NEAR VA WITH ADD].
2. Press [R] [BIN] [L] to choose the field for test.
3. Record the estimated value of left, right, and both eyes.



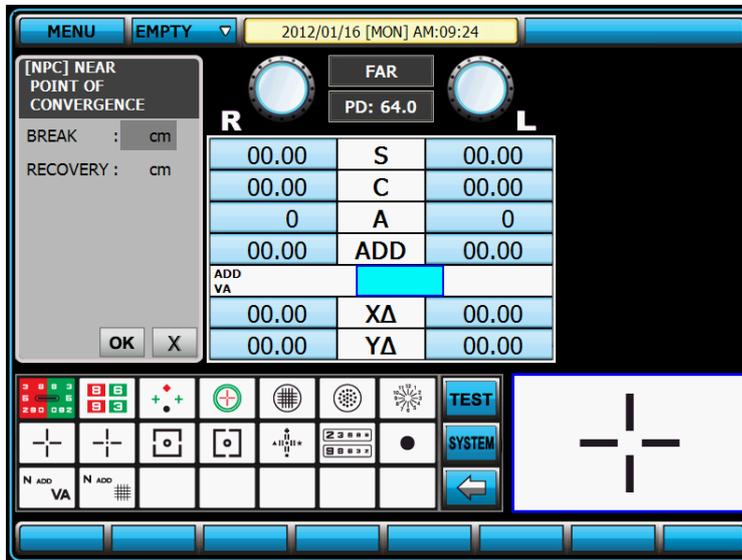
[Figure 10-1] Test of Near Vision with Addition

10.2 Near point of convergence test)

- Purpose: Measure the minimum point on which convergence is available.
- Chart: Near Point Chart
- Auxiliary Lens: None
- Target: Calculate the value of BREAK and RECOVERY.
- Way of Test



1. On Special Chart clause of touch screen, press [N ADD VA] and [NPA] button, to enter the Near Point Convergence Test Mode or You can establish the test mode by pressing [TEST] and choosing [NEAR POINT OF CONVERGENCE].
2. Hang up the Near Vision Chart as much as the patient can check.
3. While bringing the Near Point Chart or a ballpen near the patient, find out the point where the end of the ballpen or the Chart is divided. Record this distance in [BREAK] item.
4. on the contrary, while pulling them away the patient, find out the point where they are united as one. Record this distance in [RECOVERY] item.



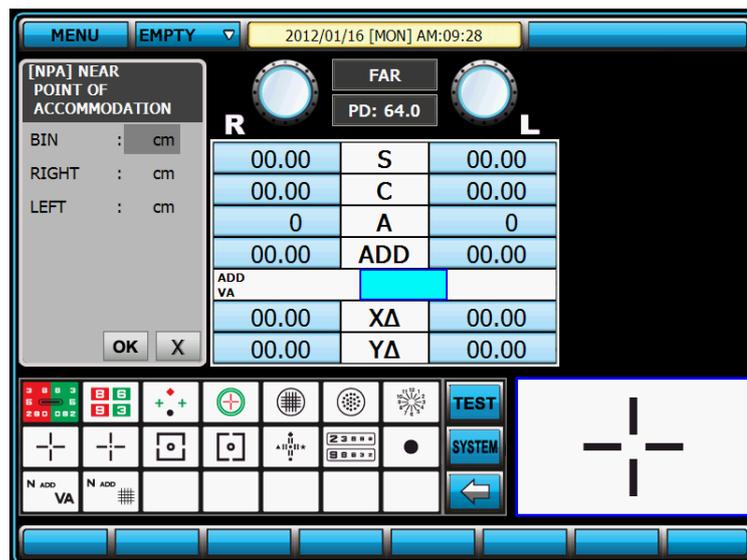
[Figure 10-2] Near Point of Convergence Test

10.3 Near Point of Accommodation Test

- Purpose: Subjective test, measure the accommodatable near point.
- Chart: Near Point Chart
- Auxiliary Lens: None
- Target: Estimate the accommodatable near point for left, right, and both eyes.
- Way of Test



1. On Special Chart clause of touch screen, press [N ADD VA] and [NPA] buttons, to enter Near Vision of Accommodation Test Mode or you can setup the Near Point of Accommodation Test Mode by pressing [TEST] button and choosing [NEAR POINT OF ACCO.].
2. Hang up the Near Vision Chart as much as the patient can check.
3. On the touch screen, press [BIN] [RIGHT] [LEFT] and choose the field for test.
4. While drawing Near Vision Chart or a ballpen near the patient, find out the point where the end of the ballpen or the Chart is blurred. Record the distance in left, right, and both eyes.



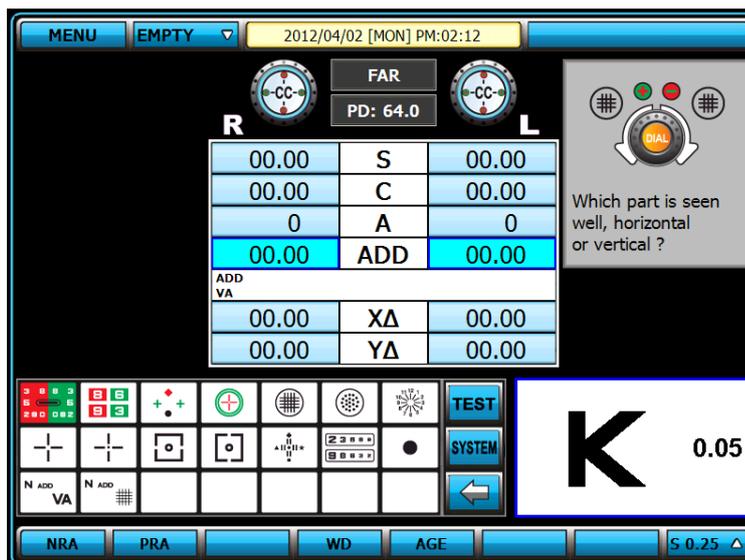
[Figure 10-3] Near Point of Accommodation Test

10.4 Near Addition Test using Cross Grid

- Purpose: Correct Near Addition according to Accommodation, using Cross Grid.
- Chart: Near Vision Chart (Cross Grid)
- Auxiliary Lens: Fixed Cross Cylinder Lens
- Target: Make the clarity and thickness of horizontal/vertical lines equally, similar with Far Vision Cross Grid Test.
- Way of Test



1. On Special Chart clause of touch screen, press [N ADD #] button to drop the Near Vision Cross Grid Chart at a place of about 40cm or press [TEST] button to choose [NEAR ADD].
 2. Press [R] [BIN] [L] to choose the field for test.
 3. Change the ADD value until the thickness or clarity of horizontal or vertical line becomes equal.
 4. Record the estimated value of left, right, and both eyes.
- ▶ When the vertical line is seen clearly, turn the dial clockwise (- direction.)
 - ▶ When the horizontal line is seen clearly, turn the dial counterclockwise (+ direction.)



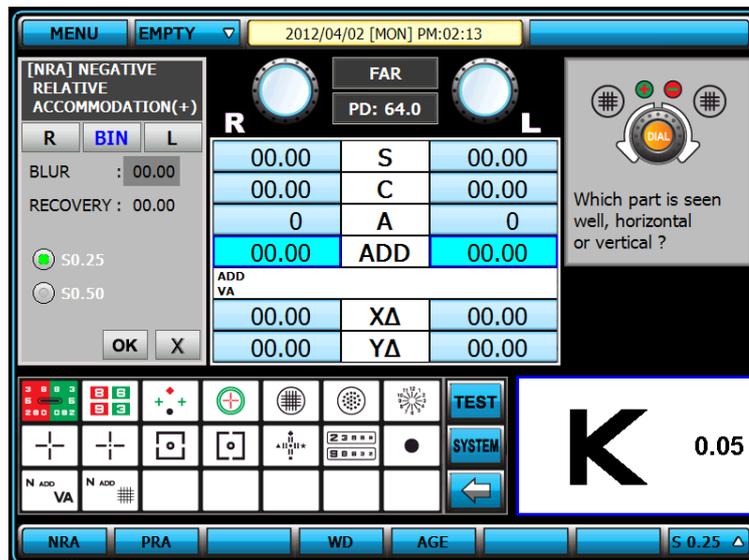
[Figure 10-4] Addition Test Using Cross Grid

10.5 Negative Relative Accommodation test

- Purpose: In subjective test, estimate the negative relative accommodation.
- Chart: Near Vision Chart
- Auxiliary Lens: None
- Target: Calculate the value of BREAK and RECOVERY for left, right and both eyes.
- Way of Test



1. On Special Chart clause of touch screen, press [NADD #] and [NRA] buttons to enter the Negative Relative Accommodation Test Mode or you can setup the Negative Relative Accommodation Test Mode by pressing [TEST] button and choosing [NEGATIVE RELATIVE ACCOM.].
2. Press [R] [BIN] [L] to choose the field for test.
3. Turn the dial counterclockwise.
When the chart is beginning to be blurred, press (RECOVERY) on the left dialog box of touch screen.
4. If recovered point is found turning the dial clockwise, press [OK] button to conclude the test on the left dialog box of touch screen.



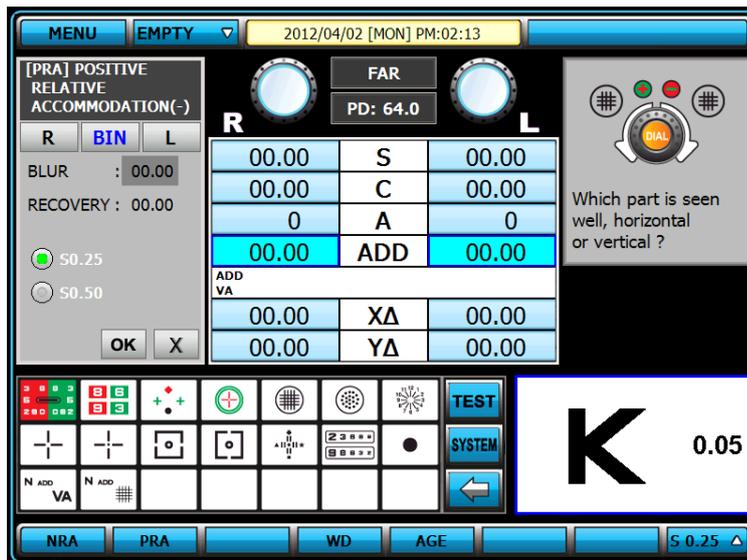
[Figure 10-5] Negative Relative Accommodation Test

10.6 Positive Relative Accommodation

- Purpose: In subjective test, estimate Positive relative accommodation.
- Chart: Near Vision Chart
- Auxiliary Lens: None
- Target: Calculate the value of BREAK and RECOVERY for left, right and both eyes.
- Way of Test



1. On Special Chart clause of touch screen, press [NADD #] and [PRA] buttons to enter the Positive Relative Accommodation Test Mode or you can setup the Positive Relative Accommodation Test Mode by pressing [TEST] button and choosing [POSITIVE RELATIVE ACCOM.].
2. Press [R] [BIN] [L] to choose the field for test.
3. Turn the dial clockwise.
When the chart is beginning to be blurred, press (RECOVERY) on the left dialog box of touch screen.
4. If recovered point is found turning the dial counterclockwise, press [OK] button to conclude the test on the left dialog box of touch screen.



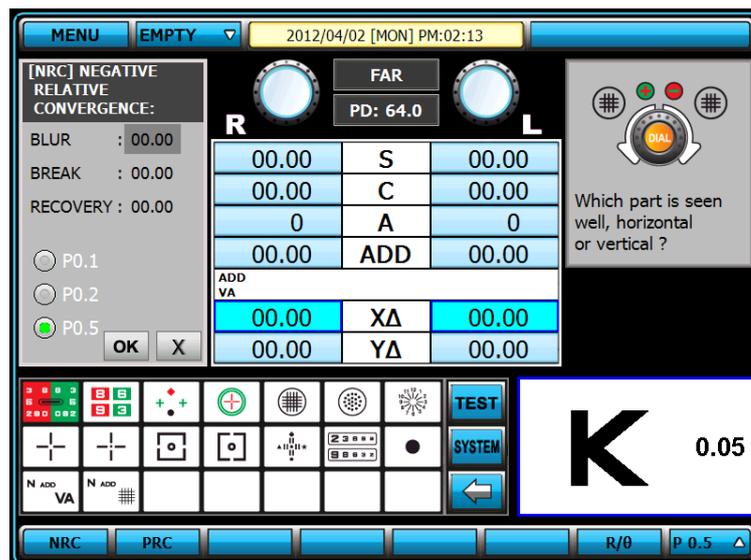
[Figure 10-6] Positive Relative Accommodation

10.7 (Negative Relative Convergence)

- Purpose: In subjective test, process Negative Relative Convergence test.
- Chart: Near Vision Chart
- Auxiliary Lens: None
- Target: Calculate the value of BLUR, BREAK, and RECOVERY.
- Way of Test



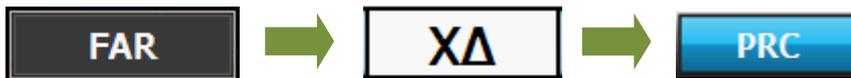
1. On touch screen, press [FAR] to choose FAR Vision Mode or NEAR Vision Mode.
2. On touch screen, press [XΔ] and [NRC] to process test.
3. In case of Far Vision Mode, Horizontal Von Graefe Chart is spread out on the screen automatically. In case of Near Vision Mode, drop the Near Vision Van Graefe Chart at a place of about 40cm, so that the patient would see it.
4. Turn the dial counterclockwise. When the chart is beginning to be blurred, choose (BREAK) on the touch screen.
5. Turn the dial counterclockwise. When the chart is beginning to be separated as two, choose (RECOVERY) on the touch screen.
6. Turn the dial clockwise. When the charts are united as one, press (OK) button to conclude the test.



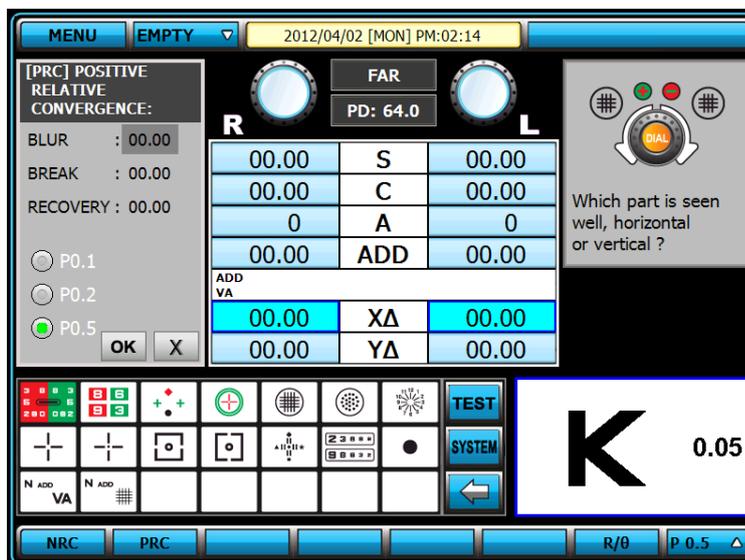
[Figure 10-7] Negative Relative Convergence

10.8 Positive Relative Convergence

- Purpose: In subjective test, process Positive Relative Convergence test.
- Chart: Near Vision Chart
- Auxiliary Lens: None
- Target: Calculate the value of BLUR, BREAK, and RECOVERY.
- Way of Test



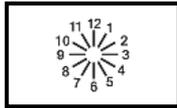
1. On touch screen, press [FAR] to choose FAR Vision Mode or NEAR Vision Mode.
2. On touch screen, press [XΔ] and [PRC] to process test.
3. In case of Far Vision Mode, Horizontal Von Graefe Chart is spread out on the screen automatically. In case of Near Vision Mode, drop the Near Vision Van Graefe Chart at a place of about 40cm, so that the patient would see it.
4. Turn the dial counterclockwise. When the chart is beginning to be blurred, choose (BREAK) on the touch screen.
5. Turn the dial counterclockwise. When the chart is beginning to be separated as two, choose (RECOVERY) on the touch screen.
6. Turn the dial clockwise. When the charts are united as one, press (OK) button to conclude the test.



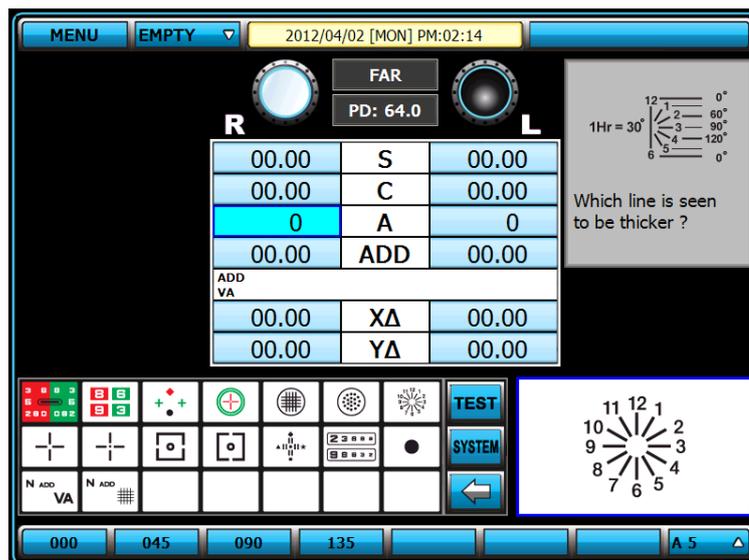
[Figure 10-8] Positive Relative Convergence Test

10.9 Cylinder Power Test

- Purpose: Obtain maximum revised circumference degrees for monocular, using Clock Dial, Subjective test.
- Chart: Clock Dial
- Auxiliary Lens: None
- Target: All the lines must be seen as eally.
- Way of Test



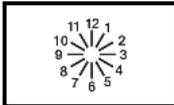
1. This test must be performed only after fixing the cylinder axis.
2. On Special Chart clause of touch screen, press Clock Dial button to change it into distorted vision test mode.
3. Press (R) or (L) button to choose the field for test.
4. On touch screen, press (C) or left/right button to change it into Cylinder Power mode.
5. Turn the dial in (-) direction, until all the lines are seen equily. When the location of the line which is seen the thickest is changed, the axis must be adjusted.
 - ▶ When the thickest seen line moves counterclockwise, deduct the AXIS value.
 - ▶ When the thickest seen line moves clockwise, add the AXIS value.



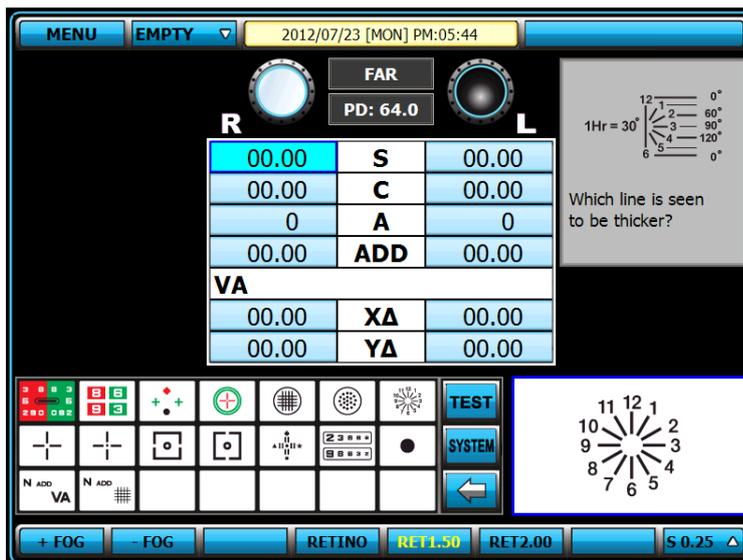
[Figure 10-9] Cylinder Power Test

10.10 Cylinder Axis Test

- Purpose: Obtain maximum revised circumference degrees by 30 degrees' unit for Monocular, using Clock Dial, Subjective test.
- Chart: Clock Dial
- Auxiliary Lens: None
- Target: All the lines must be seen as eaully.
- Way of Test



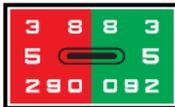
1. On Special Chart clause of touch screen, press Clock Dial button to change it into distorted vision test mode.
2. Press (R) or (L) to choose the field for test.
3. On the touch screen, Press (S) or left/right button to change it to Spherical Power mode, and add Fogging until tll the line of Clock Dial is seen equally.
4. Question the patient like, 'In which hour direction line is seen the thickest and the darkest?'
5. When the patient says all the lines are seen equally, he is determined not to have distorted vision. If a certain bar is seen thicker, multiply 30 by the number seen by that bar, and press [A] or left/right button to fix the distorted vision axis.



[Figure 10-10] Test of Cylinder Axis

10.11 (Monocular) Red/Green Test

- Purpose: Check the maximum revised Spherical Refractive Power for Monocular by Red/Green Test Chart, using the principle of chromatic aberration, Subjective test.
- Chart: Red/Green Chart
- Auxiliary Lens: None
- Target: Letters on Red and Green Charts must be seen equally and clearly.
- Way of Test



1. On Special Chart clause of touch screen, press Red/Green Chart button to change it into Red/Green Test Mode.

2. Press (R) or (L) key to choose the field for test.

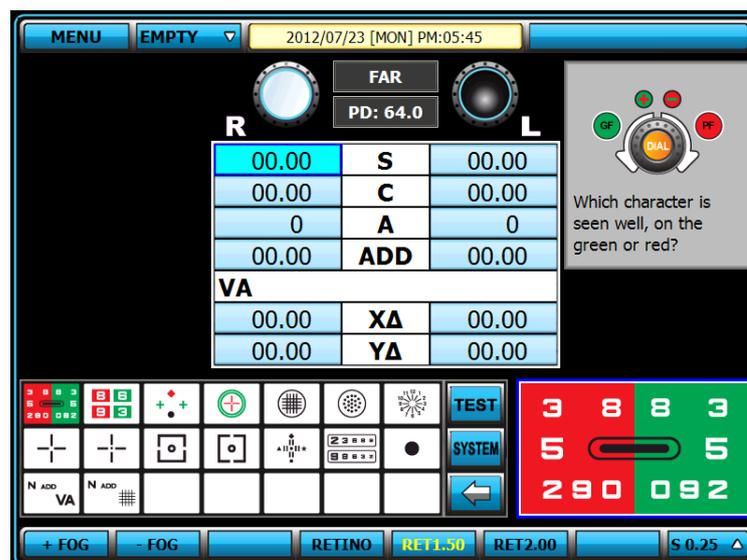
3. Question the patient that which of green and red is seen more clearly or more thickly, and check whether both of them are seen equally.

4. If red one is seen more clearly or both of them are seen clearly, try to add -0.25D and If green one is seen more clearly, try to add +0.25D.

6. Adjust until both are seen equally.

※ Attention

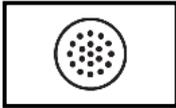
- In case of distorted vision, this test is not available for the normal visual acuity above 1.0 or an accurate visual acuity test.
- In some cases, a patient cannot compare the black letters in red and green background respectively, and cannot react following his preference.
- If a corrected vision of a patient is 1.0, you must ask him whether he is able to see well “29 in red and 92 in green.” In case a corrected vision is low, ask him to read the bigger letter on the upper side.



[Figure 10-11] (Monocular) Red/Green Test

10.12 Jackson Cross Cylinder Test

- Purpose: Subjective test, revise maximum circumference refractive power and axis for Monocular, using Jackson Cross Cylinder
- Chart: Dot-Group Chart
- Auxiliary Lens: Cross Cylinder Lens (0.25 / 0.50)
- Target: The Dot-Group Chart must be seen as same, although the Cross Cylinder is crossed.
- Way of Test



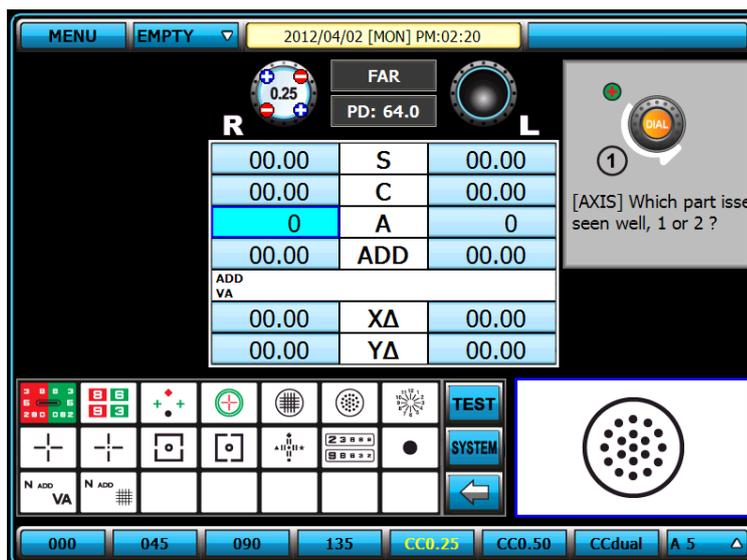
1. On Special Chart clause of touch screen, press Dot-Group Chart to move on to Cross Cylinder Test Mode.
2. Press (R) or (L) to choose the field for test.
3. On the touch screen, press [CC 0.25] [CC 0.50] button to change it into Jackson Cross Cylinder Mode.



4. While pressing number (1) and number (2), ask the patient which side letter is seen more clearly.

- ▶ If number 1 is seen clearly, turn the dial counterclockwise(+ direction).
- ▶ If number 2 is seen clearly, turn the dial clockwise(- direction).

5. To estimate the distorted vision axis, press [A] or left/right button. To estimate circumference power, press [C] or left/right button.



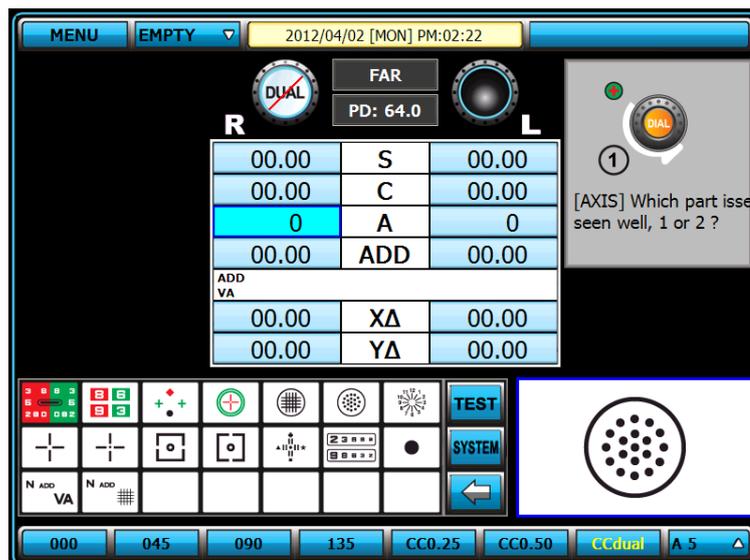
[Figure 10-12] Jackson Cross Cylinder Test (Distorted Vision Axis Test)

10.13 Dual Cross Cylinder Test

- Purpose: In subjective test, revise maximum circumference refractive power and axis for Monocular, using Dual Cross Cylinder
- Chart: Dot-Group Chart
- Auxiliary Lens: Dual Cross Cylinder Lens (DUAL)
- Target: Separated two Dot-Group Chart must be seen samely.
- Way of Test



1. On Special Chart clause of touch screen, press Dot-Group Chart to move on to Cross Cylinder Mode.
2. Press (R) or (L) to choose the field for test.
3. On the touch screen, press [CCdual] to change it into Dual Cross Cylinder Mode.
4. From the patient's view, the Dot-Group Chart is separately shown divided as two.
 - ▶ If the left one is seen clearly, turn the dial counterclockwise (+ direction.)
 - ▶ If the right one is seen clearly, turn the dial clockwise (- direction.)
 - ▶ If the patient says there is no difference, finish the test.
5. Press [A] or left/right button to estimate the distorted vision axis. Press [C] or left/right button to estimate the circumference power.



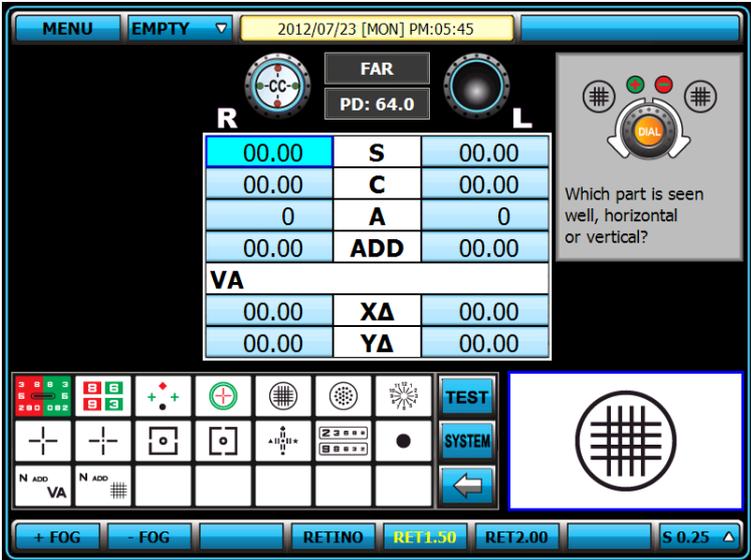
[Figure 10-13] Dual Cross Cylinder Test (Distorted Vision Axis Test)

10.14 Cross Grid Test

- Purpose: Check the maximum revised Spherical Refractive Power, using Far Vision Cross Grid chart.
- Chart: Cross Grid Chart
- Auxiliary Lens: Fixed Cross Cylinder Lens
- Target: Make the clarity and thickness of horizontal/vertical lines equally.
- Way of Test



1. On Special Chart clause of touch screen, enter the Cross Grid Test by pressing [CROSS GRID] button.
2. Press [R] [BIN] [L] to choose the field for test.
3. Adjust the SPH value until thickness or clarity of horizontal or vertical line becomes equal.
 - ▶ When the vertical line is seen clearly, turn the dial clockwise(-direction)
 - ▶ When the horizontal line is seen clearly, turn the dial counterclockwise(+direction)



[Figure 10-14] Cross Grid Test

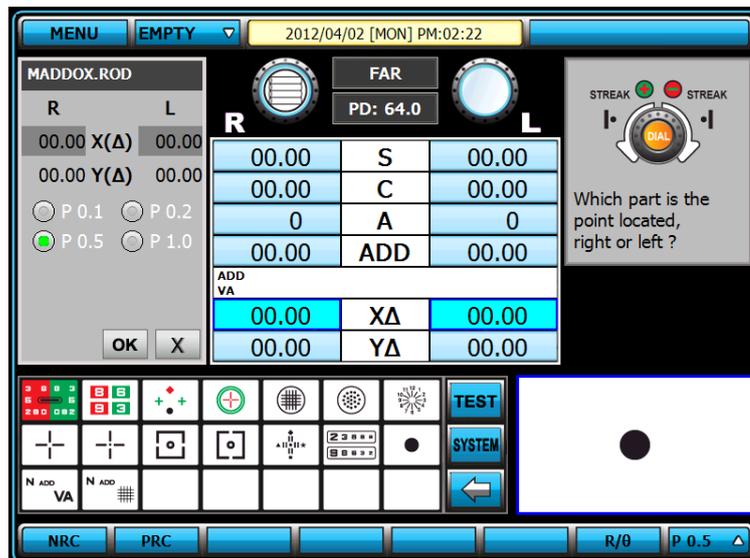
- Before the test, should be set up the Vision Axis & the Cylinder Power so as not to effect to "against the rule astigmatism or Inverse astigmatism" & "with the rule astigmatism or Direct astigmatism". Cross Grid Test is very useful to the patient who got a weak accommodation power.

10.15 Horizontal Maddox Rod Test

- Purpose: In subjective test, do Horizontal Heterophoria in the way of Maddox Rod.
- Chart: Maddox Chart
- Auxiliary Lens: Horizontal Maddox for right eye, Rotating Prism for left eye.
- Target: The vertical bar seen from the right eye and the Maddox Chart seen from the left eye must be united.
- Way of Test



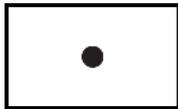
1. On Special Chart clause of touch screen, press Maddox Chart to choose Horizontal Maddox Rod Test Mode. At this time, a guide and prism change window appear on the upper left and upper right part of the screen, respectively.
2. Turn the dial until the line and the dot unite as one.
 - ▶ If the line locates on the right side of the dot, turn the dial clockwise. (- direction.) (Esophoria)
 - ▶ If the line locates on the left side of the dot, turn the dial counterclockwise (+ direction.) (Exophoria)
 - ▶ If the line and the dot are seen unitedly, that is an orthophoria.



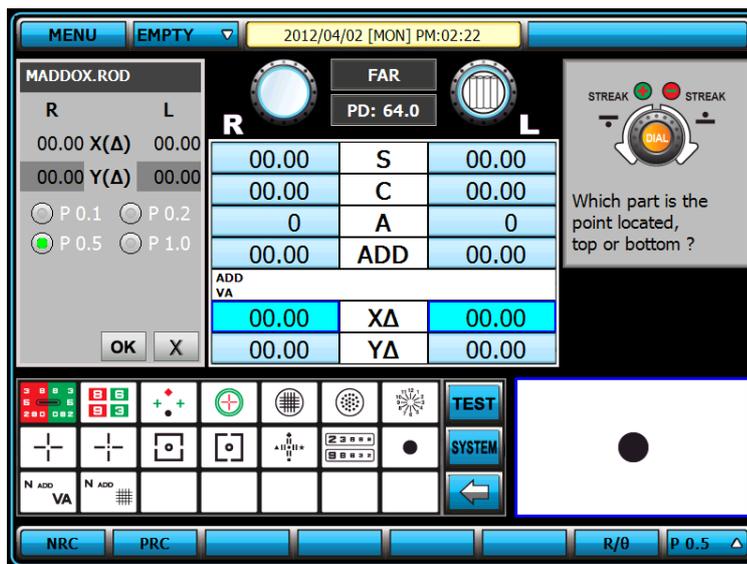
[Figure 10-15] Horizontal Maddox Rod Test

10.16 Vertical Maddox Rod Test

- Purpose: In subjective test, do the Vertical Heterophoria in the way of Maddox Rod.
- Chart: Maddox Chart
- Auxiliary Lens: Rotating Prism for right eye, Vertical Maddox for left eye.
- Target: The horizontal bar seen with the left eye and the Maddox Chart seen with the right eye must be united.
- Way of Test



1. On Special Chart clause of touch screen, press Maddox Chart to choose the Horizontal Maddox Rod Test Mode At this time, a guide and prism change window appear on the upper left and upper right part of the screen, respectively.
2. At this time, on upper left of touch screen, press Vertical Prism button, to change it into Vertical Maddox Rod Test Mode.
3. Turn the dial until the line and the dot are united as one.
 - ▶ If the line locates over the dot, turn the dial clockwise (- direction.) (Hypophoria)
 - ▶ If the line locates under the dot, turn the dial counterclockwise (+ direction.) (Hyperphoria)
 - ▶ If the line and the dot are seen as united, that is an orthophoria.



[Figure 10-16] Vertical Maddox Rod Test

10.17 Binocular Balance Test at Polarized Light

- Purpose: In subjective test, keep the binocular balance against maximum revised value of Monocular
- Chart: Binocular Balance Chart at Polarized Light
- Auxiliary Lens: Polarized Light Filter with 135 degrees for right eye, and with 45 degrees for left eye.
- Target: The upper line seen with the right eye and the lower line seen with the left eye must be seen equi clearly.
- Way of Test



1. On Special Chart clause of touch screen, press the Chart of Binocular Balance Test at Polarized Light, to enter the Binocular Balance Test at Polarized Light Mode.

2. Press Binocular [BIN] button to open Binocular field, and add Fogging to about 0.5D, and then loosen the interrupted accommodation.

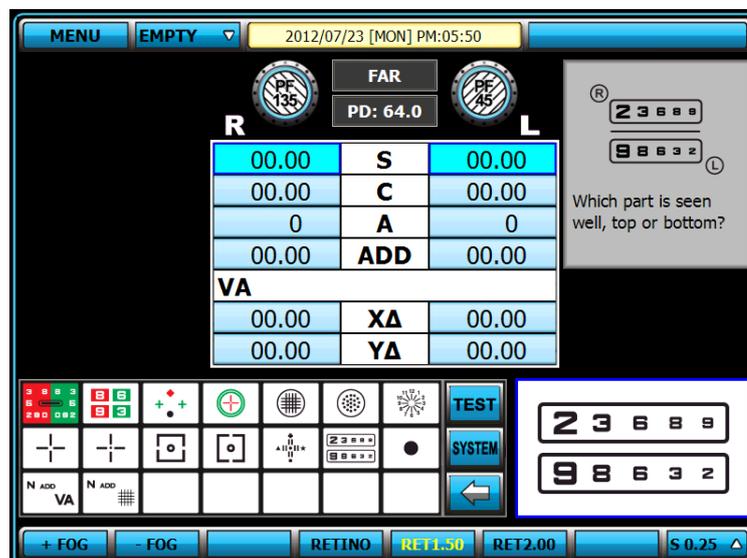
3. Ask the patient which of the upper and lower one is clearer.

- ▶ If the upper line is seen clearly, press [R] button and turn the dial counterclockwise, to increase the right side SPH value.
- ▶ If the lower line is seen clearly, press [L] button and turn the dial clockwise, to increase the left side SPH value.
- ▶ When both of upper and lower sheet are seen as samely clear, finish the test.

※ Attention

- If a corrected vision is below 0.4, sometimes it is hard to discern because the Chart is seen blurred. At this time, cover the more blurry side firstly, and then open it again. If there is any difference in the patient's vision, his Binocular have function, while no difference no function.

- If a patient has a dominant eye and the difference is more than 0.25D, the dominant eye sees well. Therefore, you can skip this test.



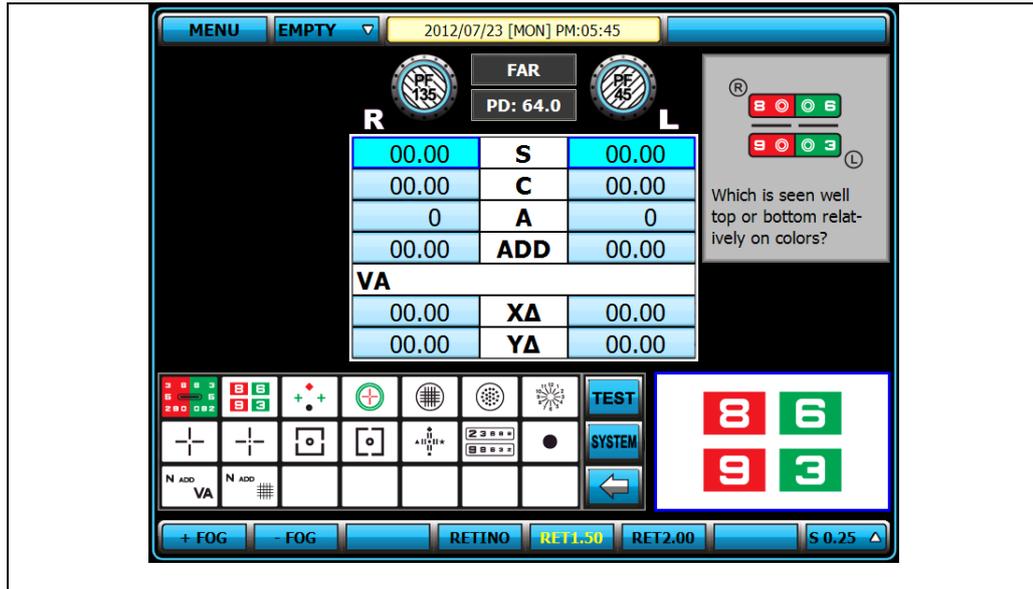
[Figure 10-17] Binocular Balance Test at Polarized Light

10.18 Polarized Light Red/Green Test

- Purpose: Subjective test, keep the balance of Monocular and Binocular simultaneously against the maximum revised value for single.
- Chart: Polarized Light Red / Green Chart
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and with 45 degrees for left eye
- Target: The upper line seen with the right eye and the lower line seen with the left eye must be seen equally well. In addition to, in the upper line seen with the right eye, the letters in red and green background respectively, must be seen as samely, as well as the letters in the red and green backgrounds in the lower line seen with the left eye.
- Way of Test



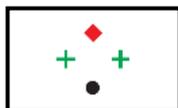
1. On Special Chart clause of touch screen, Enter to the test mode by pressing Polarized Red / Green Test Chart.
2. Question the patient which one he sees more clearly, between the red letter and green letter upside.
3. Press [R] and turn the dial in clockwise (- direction,) if the left letter is clear, while in counterclockwise (+ direction) in case of right one.
4. Press [L] and turn the dial in clockwise (- direction,) if the left letter is clear, while in counterclockwise (+ direction) in case of right one.
5. Question the patient which one he sees more clearly, between the red letter downside and the green letter upside.
6. Press [R] and turn the dial in clockwise (- direction,) if the left letter is clear, while in counterclockwise (+ direction) in case of right one.
7. Press [L] and turn the dial in clockwise (- direction,) if the left letter is clear, while in counterclockwise (+ direction) in case of right one.
8. Balance both eyes.
9. If the upper line is seen clearly, press [R] and turn the dial counterclockwise (+ direction) to increase the value of the right side SPH.
10. If the lower line is seen clearly, press [L] and turn the dial counterclockwise (+ direction) to increase the value of the left side SPH.
11. Repeat this until both of upper and lower lines are seen clearly.



[Figure 10-18] Red / Green Test at Polarized Light

10.19 Worth For Dots Test (Worth 4 dots)

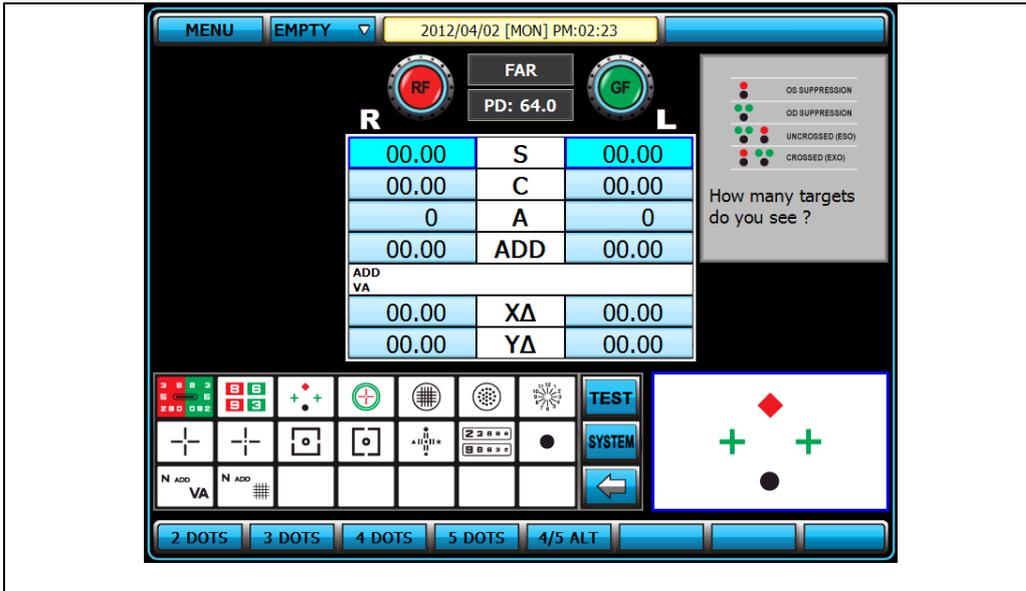
- Purpose: Find out repression Subjective test. You can check out whether there is any internal/external Heterophoria.
- Chart: Worth 4 Dot Chart
- Auxiliary Lens: Red Filter for right eye, and Green Filter for left eye.
- Target: Check up as how many the dots are seen. In normal case, it is 4.
- Way of Test



1. On Special Chart clause of touch screen, press Worth 4 Dot Chart to enter the Repression Test Mode.

2. Question the patient how many lights he sees.

- ▶ If he says 4 dots, the patient's fusio is normal.
- ▶ If he says 2 red dots, the patient is using right eye only, and the Repression is occurring in his left eye.
- ▶ If he says 3 green dots, the patient is using left eye only, and the Repression is occurring in his right eye.
- ▶ If he sees 5 dots, it is Diplophia. If the red dot is right side of the green dot, the patient has internal Strabismus/internal Heterophoria, while the red dot on the left side of the green dot, he has external Strabismus/external Heterophoria.
- ▶ While he see 5 dots and 3 dots and 2 dots appears continuously alternately, it is an Alternate Repression of right/left eyes.



[Figure 10-19] Repression Test

Chart Shape	Meaning	Description
	Fusion	2 green dots on left and right side, a red dot upside, and the downside dot are seen alternatively, or as white, or seen as 4 dots in light red, these cases are normal.
	Right Eye Suppression	Seen 3 green dots only, it is Right Eye Suppression.
	Left Eye Suppression	Seen 2 red dots only, it is Left Eye Suppression.
	Heterophoria	Seen 2 red dots and 3 green dots, it is Heterophoria.
	Alternative Suppression	What the patient sees is unstable and 2 red dots and 3 green dots appear alternatively, it is Alternative Repression.

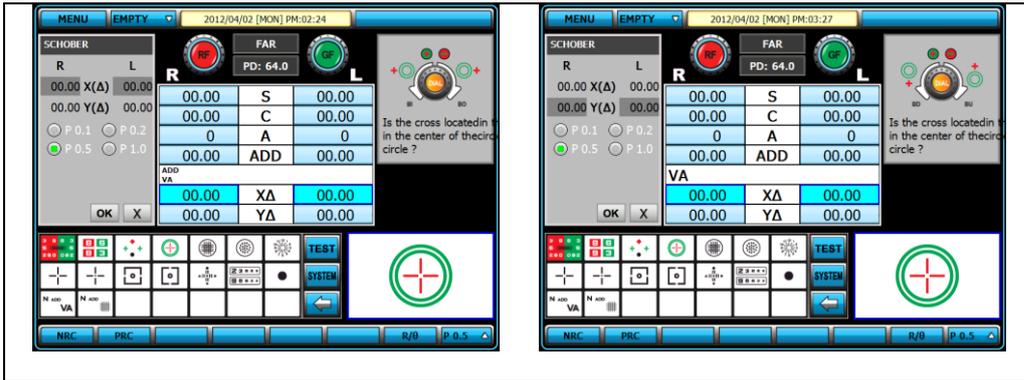
[Table 10-1] Interpretation of Suppression Test Result

10.20 Schober Test

- Purpose: In subjective test, process Heterophoria in a way of Schober.
- Chart: Schober Chart
- Auxiliary Lens: Red Filter for right eye, Green Filter for left eye, and Rotating Prism for both eyes.
- Target: The cross seen with the right eye must be in the middle of the circle seen with the left eye.
- Way of Test



1. On Special Chart clause of touch screen, press Schober Chart and enter Heterophoria test mode.
2. Question the patient like this. "Is the red cross inside the green circle?"
If the answer is "Yes," no Heterophoria. If the answer is "No," it is Heterophoria, so go on to the next test.
3. Question the patient like this.
"Is the cross on the left side or on the right side of the circle?"
 - ▶ On left side: External Heterophoria. Turn the dial counterclockwise (+ direction) to increase the value of BI prism, until the cross locates in the middle of the circle.
 - ▶ On right side: Internal Heterophoria. Turn the dial clockwise (- direction) to increase the value of BO prism, until the cross locates in the middle of the circle.
4. Question the patient like this.
"Is the cross upside or downside the circle?"
 - ▶ Upside: Upside Heterophoria for left eye. Press Vertical Prism button and turn the dial clockwise (- direction) until the cross locates in the middle of the circle.
 - ▶ Downside: Upside Heterophoria for right eye. Press Vertical Prism button and turn the dial counterclockwise(- direction) until the cross locates in the middle of the circle.
5. To save the test result after the test is over, press [OK] button of touch screen. (Heterophoria test is saved automatically so that you can check it out separately.) Otherwise, when you press [X], the result is deleted.



[Figure 10-20] Schober Test

Chart Shape	Heterophoria Type	Correction of Heterophoria
	Esophoria	Turn the dial clockwise (- direction) to increase the value of BO prism, until the cross locates in the middle of the circle.
	Exophoria	Turn the dial counterclockwise (+ direction) to increase the value of BI prism, until the cross locates in the middle of the circle.
	Left Hyperphoria	Press Vertical Prism button and turn the dial clockwise (- direction) until the cross locates in the middle of the circle.
	Right Hyperphoria	Press Vertical Prism button and turn the dial counterclockwise (+ direction) until the cross locates in the middle of the circle.

[Table 10-2] Interpretation of Schober Test Result

10.21 Horizontal Coincidence(Aniseikonia) Test

- Purpose: Subjective test, process Aniseikonia and Horizontal Heterophoria by Coincidence (Aniseikonia) Chart.
- Chart: Horizontal Coincidence(Aniseikonia) Chart
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and 45 degrees for left eye.
- Target: The upper half of the square seen with the right eye and the lower half of the square seen with the left eye must be arranged as a regular square, with the standard of Fixation.
- Way of Test



1. On Special Chart clause of touch screen, press Aniseikonia Chart to enter the Heterophoria Mode.

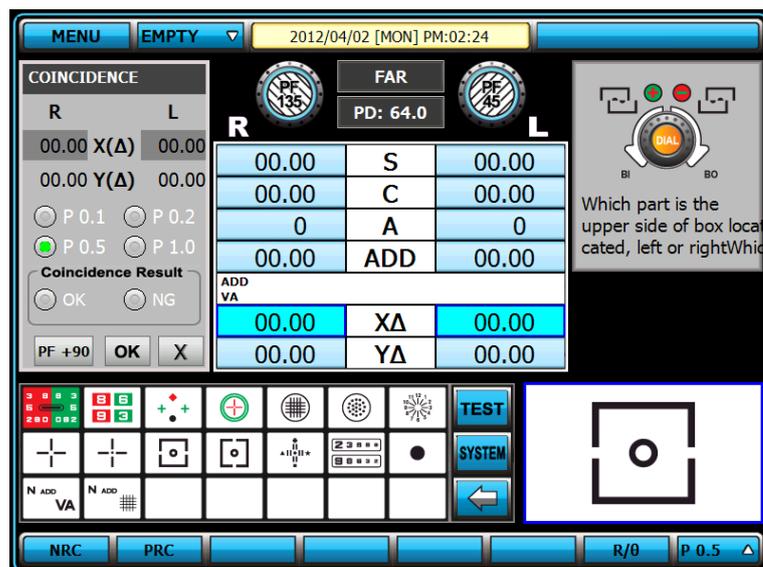
2. Ask the patient whether he sees the squared chart, and if yes, if that chart is tilted towards left side and right side, or is arranged straight.

- ▶ In case the Square Chart is tilted towards left side: Turn the “Exophoria” dial counterclockwise to increase the value of BI prism, until the Square Chart is arranged straight.
- ▶ In case the Square Chart is tilted towards right side: Turn the “Esophoria” dial clockwise to increase the value of BO prism, until the Square Chart is arranged straight.

3. As a final checkout, ask the patient whether he sees the dot in the middle and the Square Chart, and if the sizes of the upper and lower square are same or different.

- ▶ If the sizes of the upper and lower square are the same, press [OK].
- ▶ If the sizes of the upper and lower square are different, press [NG].

4. When the test is over, press [OK] button of touch screen to save the result, or [X] button to delete the result.



[Figure 10-21] Horizontal Coincidence(Aniseikonia) Test

10.22 Vertical Coincidence(Aniseikonia) Test

- Purpose: In subjective test, process Aniseikonia and Vertical Heterophoria by Coincidence (Aniseikonia) Chart.
- Chart: Vertical Coincidence(Aniseikonia) Chart
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and 45 degrees for left eye.
- Target: The right half of the square seen with the right eye and the left half of the square seen with the left eye must be arranged as a regular square, with a standard of Fixation.
- Way of Test



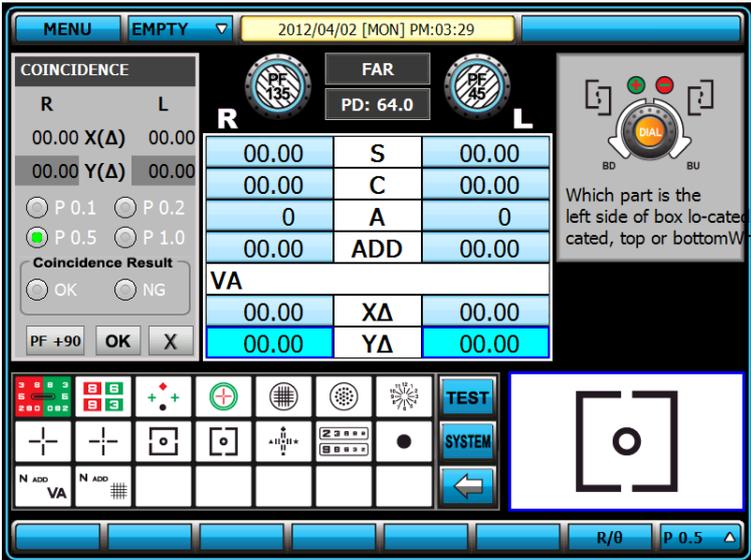
1. On Special Chart clause of touch screen, enter Vertical Heterophoria Mode by pressing Coincidence (Aniseikonia) Chart.

2. Ask the patient if he sees the square chart well, if yes, ask if that square chart is tilted toward up and down, or is arranged straight.

- ▶ When the left square chart is tilted upside: “Upside Heterophoria of right eye.” Turn the dial counterclockwise to increase BD prism, until the square is arranged straight.
- ▶ When the right square chart is tilted toward upside: “Upside Heterophoria of left eye.” Turn the dial clockwise to increase BU prism, until the square is arranged straight.

3. As a final check, ask the patient if he sees the dot in the middle and the square chart, and whether the sizes of upper and lower square are of same.

- ▶ If the sizes of the left and right square are the same, press [OK].
- ▶ If the sizes of the left and right square are different, press [NG].



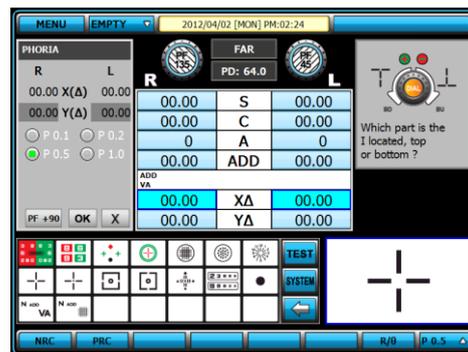
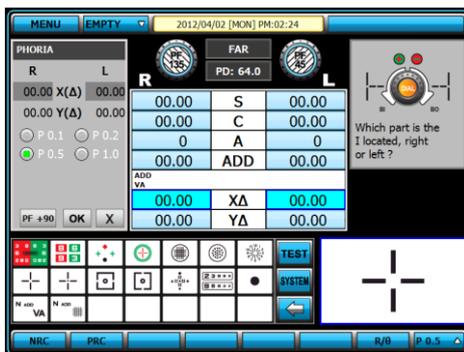
[Figure 10-22] Vertical Coincidence(Aniseikonia) Test

10.23 Phoria Test without Fixation

- Purpose: In subjective test, progress Heterophoria test in a way of Pola Cross without Fixation.
- Chart: Polarized Cross Chart without Fixation
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and 45 degrees for left eye.
- Target: The vertical seen with the right eye and the horizon seen with the left eye are united and seen as cross.
- Way of Test



1. On Special Chart clause of touch screen, enter Heterophoria Mode by pressing Pola Cross Chart without Fixation.
2. Ask the patient, "Does it seem like a cross?"
 - ▶ If the answer is "Yes", there is no Heterophoria. Test done.
 - ▶ If the answer is "No", it is Heterophoria. Process the next test.
3. To start with Horizontal Heterophoria test, ask the patient as following.
4. "Does the letter () locate on the left side of the letter (, or the right side of it?"
 - ▶ Located on left: "Exophoria." Turn the dial counterclockwise to increase BI prism, until the cross is seen well.
 - ▶ Located on right: "Esophoria." Turn the dial clockwise to increase BO prism, until the cross is seen well.
5. To start with Vertical Heterophoria, ask the patient as following.
6. "Does the letter () locate upside of the letter (, or downside of it?"
 - ▶ Located upside: "Left Hyperphoria." Turn the dial clockwise to increase BU prism, until the cross is seen well.
 - ▶ Located downside: "Right Hyperphoria." Turn the dial counterclockwise to increase BD prism, until the cross is seen well.



[Figure 10-23] Phoria Test without Fixation

Chart Shape	Heterophoria Type	Description
	Esophoria	1) Turn the dial clockwise until the Vertical Chart of the Cross becomes a cross shape, to increase BO prism.
	Exophoria	2) Turn the dial clockwise until the Vertical Chart of the Cross becomes a cross shape, to increase BI prism.
	Left Hyperphoria (Right Hypophoria)	3) Press [BDBU]. Turn the dial clockwise until the Horizontal Cross Chart becomes a cross shape.
	Right Hyperphoria (Left hypophoria)	4) Press [BDBU]. Turn the dial counterclockwise until the Horizontal Cross Chart becomes a cross shape.
	Exophoria + Right.Hyperphoria	5) Correct the Horizontal Heterophoria like (2), and correct the Vertical Heterophoria like (4).
	Esophoria + Left.Hyperphoria	6) Correct the Horizontal Heterophoria like (1), and correct the Vertical Heterophoria like (4).

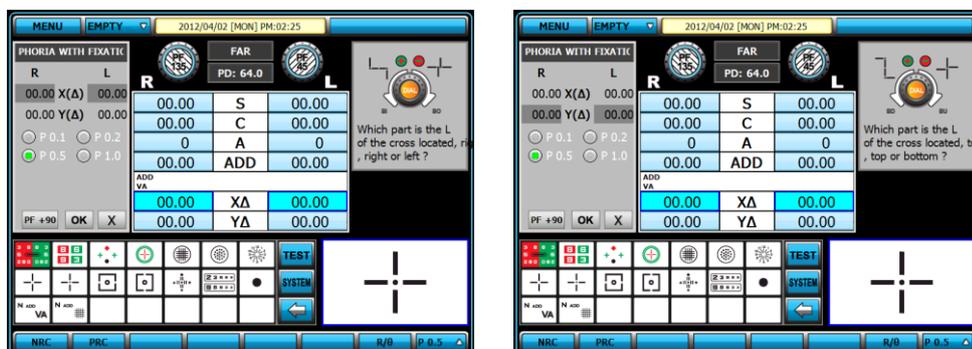
[Table 10-3] Interpretation of Phoria Test

10.24 Phoria Test with Fixation

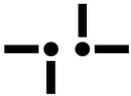
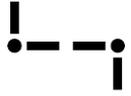
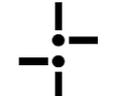
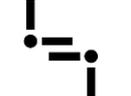
- Purpose: Subjective test, progress Heterophoria in a way of Pola Cross with Fixation.
- Chart: Polarized Cross Chart with Fixation
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and 45 degrees for left eye.
- Target: The cross on the right upper side in 2 directions seen with the right eye and the cross on the left lower side in 2 directions seen with the left eye are united and seen as one.
- Way of Test



1. On Special Chart clause of touch screen, enter Heterophoria Mode by pressing Pola Cross Chart with Fixation.
2. Ask the patient, "Does it seem like a cross?"
 - ▶ If the answer is "Yes," there is no Heterophoria. Test done.
 - ▶ If the answer is "No," it is Heterophoria. Process the next test.
3. First of all, to start with Horizontal Heterophoria, ask the patient as following.
4. "Does the letter (⌊) locate on the left side of the letter (⌋), or the right side of it?"
 - ▶ Located on left: "Exophoria" Turn the dial counterclockwise to increase BI prism, until the cross is seen well.
 - ▶ Located on right: "Esophoria" Turn the dial clockwise to increase BO prism, until the cross is seen well.
5. To start with Vertical Heterophoria, ask the patient as following.
6. "Does the letter (⌊) locate upside of the letter (⌋), or downside of it?"
 - ▶ Located upside: "Left Hyperphoria" Turn the dial clockwise to increase BU prism, until the cross is seen well.
 - ▶ Located downside: "Right Hyperphoria" Turn the dial counterclockwise to increase BD prism, until the cross is seen well.



[Figure 10-24] Phoria Test with Fixation

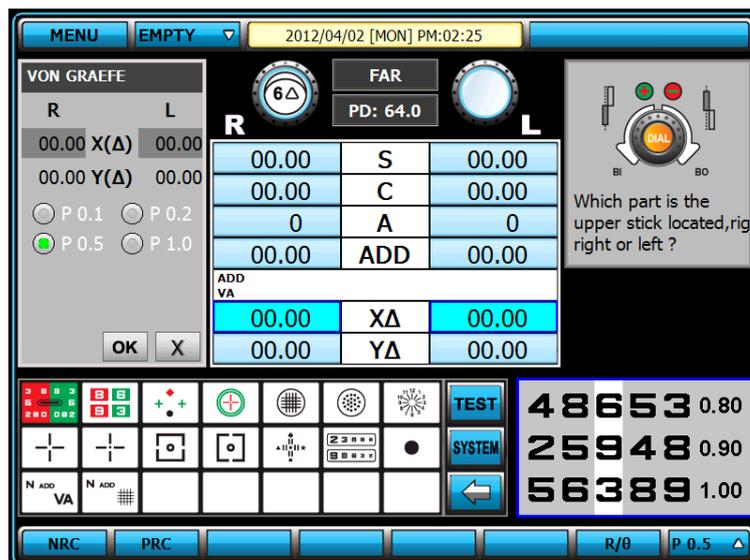
Chart Shape	Heterophoria Type	Description
	Esophoria	1) Turn the dial clockwise until the Vertical Chart of the Cross becomes a cross shape, to increase BO prism.
	Exophoria	2) Turn the dial clockwise until the Vertical Chart of the Cross becomes a cross shape, to increase BI prism.
	Left.Hyperphoria	3) Press [BDBU]. Turn the dial clockwise until the Horizontal Cross Chart becomes a cross shape.
	Right.Hyperphoria	4) Press [BDBU]. Turn the dial clockwise until the Horizontal Cross Chart becomes a cross shape.
	Esophoria + Right.Hyperphoria	5) Correct the Horizontal Heterophoria like (1), and correct the Vertical Heterophoria like (4).
	Esophoria + Left.Hyperphoria	6) Correct the Horizontal Heterophoria like (1), and correct the Vertical Heterophoria like (4).
	Exophoria + Right.Hyperphoria	7) Correct the Horizontal Heterophoria like (2), and correct the Vertical Heterophoria like (4).
	Exophoria + Left.Hyperphoria	8) Correct the Horizontal Heterophoria like (2), and correct the Vertical Heterophoria like (3).

[Table 10-4] Interpretation of Phoria Test

10.25 Horizontal Von Graefe Test

- Purpose: In subjective test, process Heterophoria in a way of Von Graefe.
- Chart: Numbers Chart
- Auxiliary Lens: 6△BU prism for right eye, and Rotating Prism for left eye
- Target: Be a state in which the upper vertical line and the lower vertical line are arranged in a row.
- Way of Test

1. Press [TEST] button of touch screen and choose [VON GRAEFE HORZ.] to process this test.
2. Ask the patient if the horizontal bars are located on one straight line.
 - ▶ “Yes,” no Heterophoria. Test done.
 - ▶ “No,” it’s Heterophoria. Process the next test.
3. Of 2 of horizontal bar, which bar is the left side.
 - ▶ In case of upside vertical bar on left side: Turn the “Esophoria” dial clockwise to add BO prism, until the vertical bars are arranged on one straight line.
 - ▶ In case of downside vertical bar on left side: Turn the “Exophoria” dial counter clockwise to add BI prism, until the vertical bars are arranged on one straight line.
4. When the test is over, press [OK] button to save the result, or press [X] button to not save result.

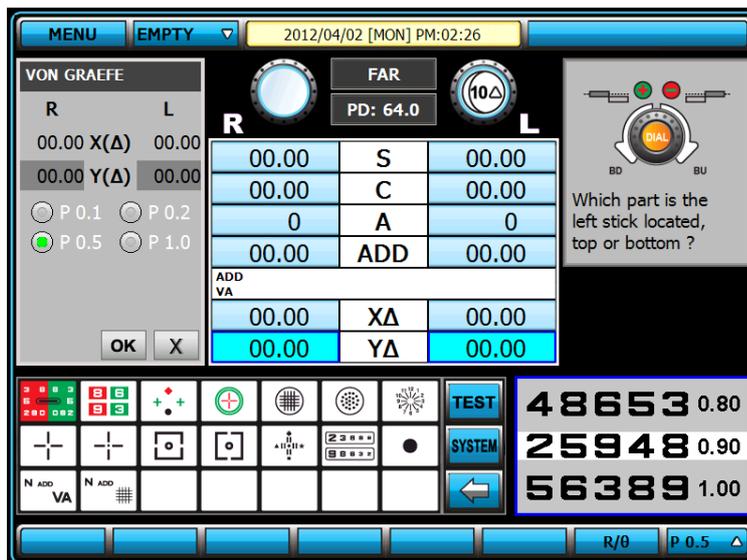


[Figure 10-25] Horizontal Von Graefe Test

10.26 Vertical Von Graefe Test

- Purpose: Subjective test, process Heterophoria in a way of Von Graefe.
- Chart: Numbers Chart
- Auxiliary Lens: Rotating Prism for right eye, and 10△BI Prism for left eye
- Target: Be the state in which the left horizontal line and the right horizontal line are arranged on one straight line in the middle.
- Way of Test

1. Press [TEST] button of touch screen and choose [VON GRAEFE VERT.] to process this test.
2. Ask the patient if the vertical bars are located on one straight line.
 - ▶ “Yes,” no Heterophoria. Test done.
 - ▶ “No,” it’s Heterophoria. Process the next test.
3. Of 2 of vertical bar, which bar is the upside.
 - ▶ In case of right bar on downside: Turn the “R.Hyperphoria” dial counter clockwise to add BD prism, until the 2 horizontal bars are arranged on one straight line.
 - ▶ In case of left bar on downside: Turn the “L.Hyperphoria” dial clockwise to add BU prism, until the 2 horizontal bars are arranged on one straight line.
4. When the test is over, press [OK] button to save the result, or press [X] button to not save result.



[Figure 10-26] Vertical Von Graefe Test

10.27 Minute Stereo Acuity Test

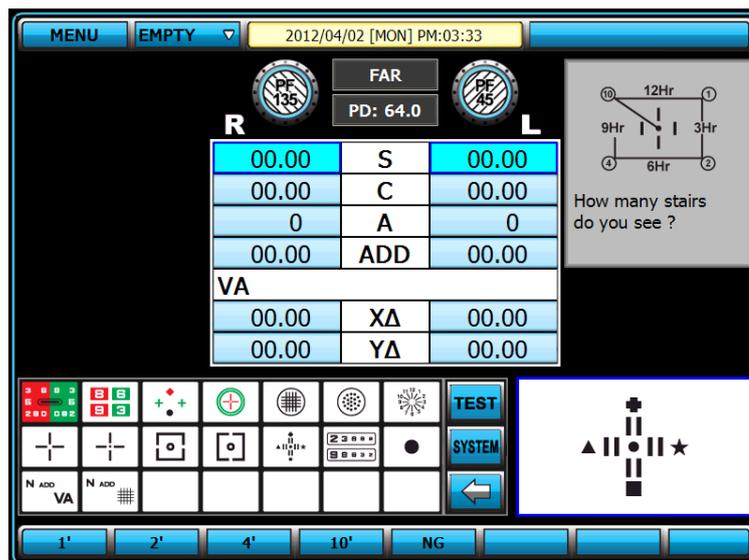
- Purpose: Subjective test, progress a minute stereo Acuity test.
- Chart: Minute Stereo Vision Chart
- Auxiliary Lens: Polarized Filter with 135 degrees for right eye, and 45 degrees for left eye.
- Target: With Fixation as a center, it must be seen as rotating clockwise and as embossed.
- Way of Test



1. On Special Chart clause of touch screen, press Minute Stereo Vision Chart and choose Minute Stereo Vision Test Mode.

2. Ask the patient, “How do you see the bars, with the standard of Fixation, from at 12, 3, 6, to 9 o’clock (clockwise)?”

- ▶ All the bars including central Fixation look like flat: The patient does not have the capability of stereo vision. Choose NG.
- ▶ The bars at 12 and 3 o’clock look like cubic: The patient can perceive to 1 arc minute. Choose [1’].
- ▶ The bars at 3 and 6 o’clock look like cubic: The patient can perceive to 2 arc minutes. Choose [2’].
- ▶ The bars at 6 and 9 o’clock look like cubic: The patient can perceive to 4 arc minutes. Choose [4’].
- ▶ The bars at 12 and central Fixation look like cubic: The patient can perceive to 10 arc minutes. Choose [10’] and setup it.



[Figure 10-27] Minute Stereo Vision Test

11. Etc. Convenient Function

EDR 7800 serves some convenient function with Key pad combination to test easily and promptly.

11.1 Field Selection Shortcut Key

Change a Field mode in order of “S -> C -> A” with Dial button pressing

11.2 SPH Large step value change

You can alter the SPH value with SPH large step value with [SHIFT] button and Dial rotation together.
(In case of SPH field)



[Figure 11-1] SPH+SHIFT step change

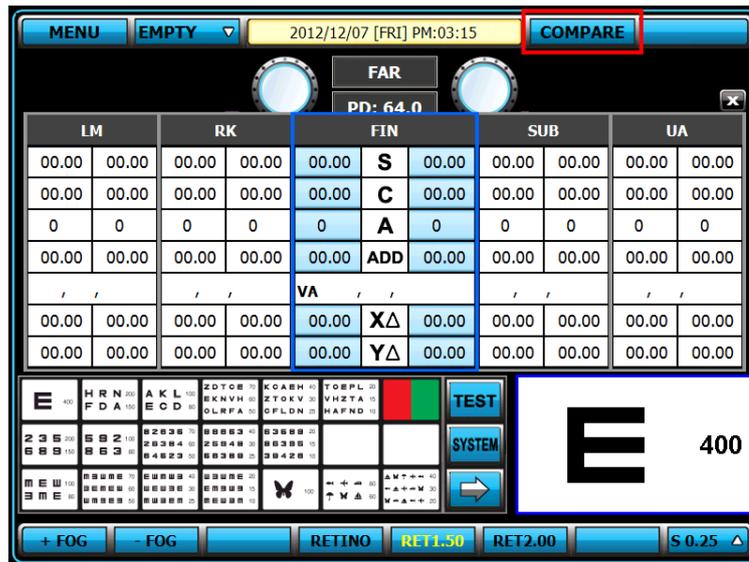
11.3 SOFT Rest compulsively

It could be initialized as SOFT booting if press [SHIFT] and [RESET] button together. It is initialized fastly but can be a burden for the Body's H/W.

11.4 Test Mode Comparison (COMPARE function)

EDR 7800 serves COMPARE Mode to intuitively compare with the result of Subjective Vision Test and Ref/Keratometer, Lensmeter Test Mode

You can select the mode which wants to move the center area on touch screen (When press the mode)



[Figure 11-2] COMPARE mode

11.5 Menu DialogBox Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Menu movement
Dial button	Menu selection
MENU	DialogBox close

11.6 AUX.LENSES DialogBox Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Lens movement
Dial button	Lens selection
RESET	Cancel, Close
R, L, BIN	Right / Light / Binocular Selection(change)

11.7 PD DialogBox Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	PD value change
Dial button	DialogBox close
R, L, BIN	Right / Light / Binocular Selection(change)

11.8 SYSTEM TEST Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Item movement
Dial button	Item selection, DialogBox close
RESET	Cancel, Close

11.9 AGE Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Age value change
Dial button	Save. DialogBox Close
RESET	Cancel, Close

11.10 WD Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	WD value change
Dial button	Save. DialogBox Close

11.11 NRA/PRA Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Selected Field value change
Dial button	Save. DialogBox Close
RESET	Cancel, Close
R, L, BIN	Right / Light / Binocular Selection(change)
↑, ↓	Field Selection / Change

11.12 NRC/PRC Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Selected Field value change
Dial button	Save. DialogBox Close
RESET	Cancel, Close
↑, ↓	Field Selection / Change

11.13 NPC/NPA Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Selected Field value change
Dial button	Save. DialogBox Close
RESET	Cancel, Close
↑, ↓	Field Selection / Change

11.14 VFPrism Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Selected Field value change
Dial button	Save. DialogBox Close
RESET	Cancel, Close
R, L, BIN	Right / Light / Binocular Selection(change)
↑, ↓	Field Selection / Change

11.15 LAMP Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	Brightness control of Body's "Near LED"
Dial button	LCD chart ON/OFF
RESET	Close

11.16 TEST RESULT Shortcut Key

Key pad button	Operation
MENU	FAR / NEAR mode change
PRINT	Print
PREV, NEXT	List movement (LIST1 ~ PRISM)
RESET	Close

11.17 SYSTEM CONFIG Shortcut Key

Key pad button	Operation
PROGRAM	"OK" function. Close after save
PREV, NEXT	List movement (LIST1 ~ PRISM)
RESET	Value Initialization
SHIFT + RESET	Close

11.18 EDIT PROGRAM, EDIT TEST Shortcut Key

Key pad button	Operation
Dial or [+] / [-]	SYSTEM TEST item selection: SYSTEM TEST change (in case of EDIT PROGRAM) Chart item selection: Chart change (in case of EDIT TEST) Lens item selection: Lens change Message item selection: Message change
OPEN / CLOSE	Lens Item selection or change

12. Test Result Display and Print out

The test result of UDR-800 is available on the screen or on papers by printing.

12.1 View the Result Screen

Press [MENU] button or direct button on touch screen and choose the [TEST RESULT] to check test result on the screen. Press [F/N] to see the result as Far Vision Test Result and Near Vision Test Result, and it can be printed directly on papers, by pressing [OK] button. The explanation about this part is done in 'TEST RESULT,' so please refer to that for detail information.

12.2 Print on Papers

Press [PRINT] to print the result on papers. On 'SYSTEM CONFIG', if 'PREVIEW LIST' is setup as YES, the previously mentioned 'TEST RESULT' would be operated. To print the result, press [PRINT] or [OK] button.

If it is supposed to be printed on papers only after all tests are done, it takes so long time and much paper, to complete printing.

Because it offers various options related with 'SYSTEM CONFIG - PAGE 6' print time and paper saving is possible if it is setup to print only designated results.

ID: P20120222-0001

Name: M/F
 Date: 2012/02/22 16:33
 Age : 38
 Dominant Eye: RIGHT
 PD = 64.0 / 60.0(NEAR)
 WD = 40 cm

[Unaided VA]
 ----R----BIN----L----
 FAR : 0.60 0.80 0.80
 NEAR: 0.60 0.80 0.80

[Objective Data]
 --<R>----[R K]----<L>--
 (FAR)
 -01.75 SPH -01.50
 -00.50 CYL -00.50
 175 AXS 5
 00.00 ADD 00.00
 (NEAR)
 00.00 SPH 00.00
 00.00 CYL 00.00
 0 AXS 0

[Subjective Data]
 --<R>----[SUB]----<L>--
 (FAR)
 -01.75 SPH -01.50
 -00.25 CYL -00.25
 0 AXS 0
 00.00 ADD 00.00
 (NEAR)
 00.00 SPH 00.00
 00.00 CYL 00.00
 0 AXS 0

--<R>----[FIN]----<L>--
 (FAR)
 -01.75 SPH -01.50
 -00.25 CYL -00.25
 0 AXS 0
 00.00 ADD 00.00
 (NEAR)
 00.00 SPH 00.00
 00.00 CYL 00.00
 0 AXS 0

[Bin Visual Function]
 NPC
 --BLR-----RCV---
 7 cm 7 cm

NPA
 ---R----BIN----L---
 33 cm 33 cm 33 cm

--BLR----BRK----RCV--
 NRA(BIN) :
 +10.00 / +07.50

Patient ID

Name and Sex of the Patient
 Date and Time of Test
 Age
 Dominant Eye
 Far Vision PD / Near Vision PD
 Working Distance

Naked Visual Acuity Test Information

Auto Ref/Keratometer Results

Subjective Test Data

Final Result for Prescripion

Visual Acuity Test Result for Binocular
 NPC

NPA

NRA

PRA(BIN) :	PRA
-07.00 / -05.50	
(FAR)	Far Vision Test Result for Binocular
--BLR----BRK----RCV--	
NRC(Divergence)	NRC
10.00 12.00 9.00	
PRC(Convergence)	PRC
11.00 12.00 9.00	
(NEAR)	Near Vision Test Result for Binocular
--BLR----BRK----RCV--	
NRC(Divergence)	NRC
9.00 10.00 7.00	
PRC(Convergence)	PRC
7.00 9.00 6.00	
(FAR)	
* SCHOBER	Schober Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* COINCIDENCE	Coincidence(Aniseikonia) Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* MADDOX.ROD	Maddox Rod Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* PHORIA	Phoria Test without Fixation
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* PHORIA WITH FIXATION	Phoria Test with Fixation
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* VON GRAEFE	Von Graefe Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
(NEAR)	
* SCHOBER	Schober Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* COINCIDENCE	Coincidence(Aniseikonia) Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* MADDOX.ROD	Maddox Rod Test
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* PHORIA	Phoria Test without Fixation
B100.50 X△ B000.50	
00.00 Y△ 00.00	
* PHORIA WITH FIXATION	Phoria Test Fixation
B100.50 X△ B000.50	
00.00 Y△ 00.00	

* VON GRAEFE B100.50 X△ B000.50 00.00 Y△ 00.00	Von Graefe Test
(FAR) FUSION(Wroth): 5 Dots STEREO: NG ANISEIKONIA(X/Y): OK/OK	Fusion Minute Stereo Vision Aniseikonia
(NEAR) FUSION(Wroth): 5 Dots STEREO: NG ANISEIKONIA(X/Y): OK/OK	Fusion Minute Stereo Vision Aniseikonia
UNICOS CO., LTD. +82-42-581-0047 http://www.e-unicos.com	PRINT FOOTER

13. Maintenance

13.1 Replacement of Printing Paper

Replace the roll printing paper as soon as possible if the red line appears in the paper.
Make sure to confirm kind and size of the paper.
(kind : thermal paper, size: 58mm in width and 30mm in diameter)

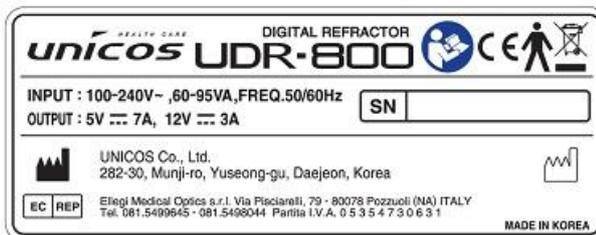
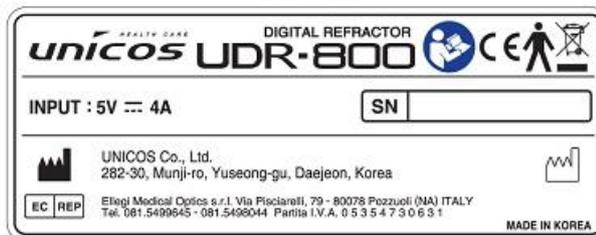
13.2 Cleaning

- Basically, keep this instrument clean. Don't use volatile object, thinner or benzene, etc.
- Polish each part with a dry cloth containing detergent solution.

13.3 Service Information

13.3.1 Repair

- Basically, keep this instrument clean. Don't use volatile object, thinner or benzene, etc.
- Polish each part with a dry cloth containing detergent solution.
- Model of the instrument : UDR-800
- Serial Number : 7-digit characters indicated on the name plate
- Symptom : In detail



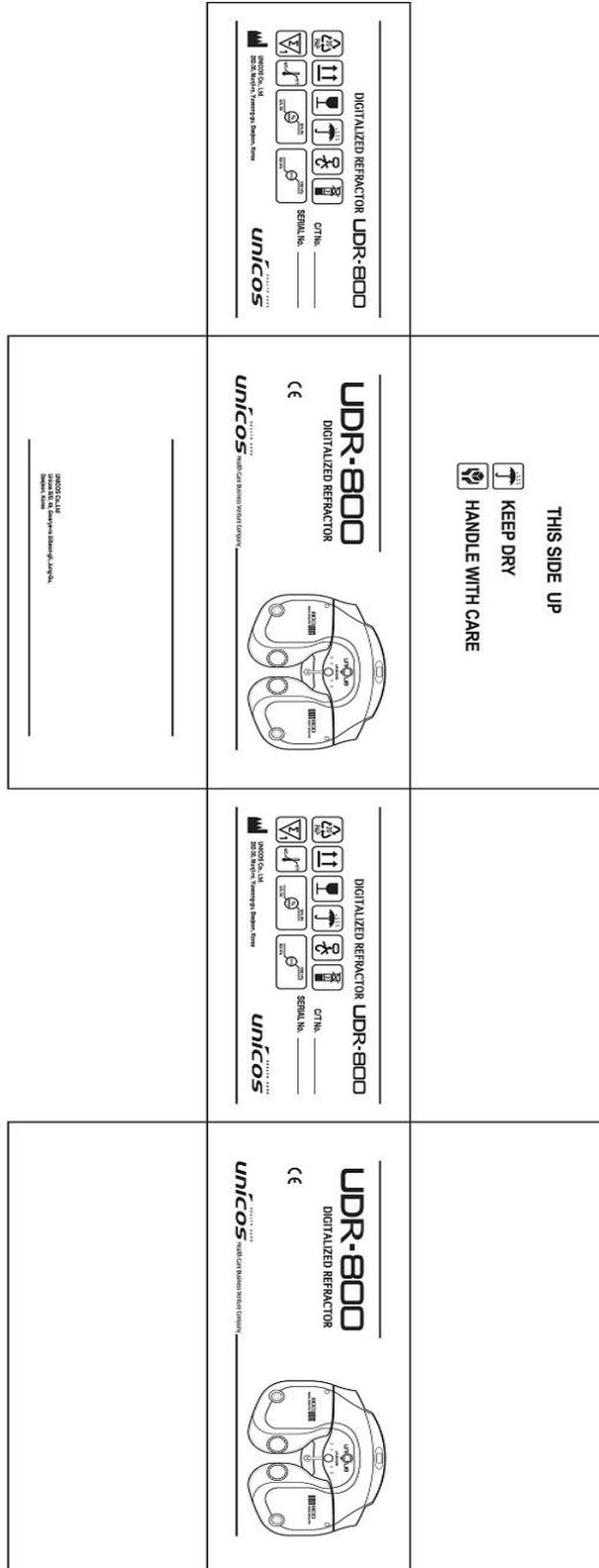
[Figure 12-1] Name plate

[Appendix] Hardware Specifcaton

Measuring Range	
Spherical Lens	-29.00 ~ +26.75D (Regular) -19.00 ~ +16.75D (Cross Cylinder, Prism Test) (Step: 0.12D / 0.25D / 0.5D / 1D / 2D / 3D)
Cylinder Lens	0.00 ~ 8.75D (Step: 0.25D / 0.5D / 1D / 2D / 3D)
Cylinder Axis	0 ~ 180° (Step: 1 / 5 / 15 / 30 / 45°)
Pupil Distance	Far: 48 ~ 80 mm (Step: 0.5 / 1.0 mm) Near: 45 ~ 75 mm (Step: 0.5 / 1.0 mm)
Working Distance	35 ~ 70 cm (Step: 5 cm)
Rotary Prism	0 ~ 20 △ (Step: 0.1△ / 0.2△ / 0.5△ / 1△ / 2△)
Cross Cylinder	Jackson Cross Cylinder ±0.25D Jackson Cross Cylinder ±0.50D Dual Cross Cylinder
Retinoscopy Lens	+1.5D, +2.0D (Test Distance 67cm, 50cm)
Specifications	
Body	362(width) * 83(depth) * 300(height)mm, 3.5 kg
Controller	215(width) * 230 (depth) * 226(height) mm, 1.5 kg
Junction Box	266(width) * 60(depth) * 239(height) mm, 1.0 kg
Power Supply	AC 100 ~ 240V, 50 / 60Hz
Power Consumption	60 - 95VA
Auxiliar Lens	
Open/Close Lens	Open / Close Select
Pin Hole Lens	Φ 1mm
Moddox Rod	Right eye (horizontal red), Left eye (vertical red)
Red/Green Filter	Right eye (red), Left eye (green)
Polarized Light Filter	Right eye (135°, 45°), Left eye (45°, 135°)
Separating Prism	Right eye (6△BU), Left eye (10△BI can be added to 0~5△)
PD Test Lens	On / Off Select
Fixed Cross Cylinder Lens	Jackson Cross Cylinder ±0.50D, Axis fixation 90°
Vision Degrees	32°

14. Packing

14.1 Packing Foam Design



[Drawing 35] UDR-800 Packing Box

14.2 Packaging step

<p>Step 1</p>	<p>Plastic bag packaging Material : PE Size : 0.4Tx750x1300 Color : transparency</p>	
<p>Step 2</p>	<p>Foamed polystyrene packaging Material : poly urethane Top Cushion Size : 658(D)x526(W)x155(H) (pair) Color : Silver</p> <p>Foamed polystyrene packaging Material : poly urethane Bottom Cushion Size : 658(D)x526(W)x157(H) (pair) Color : Silver</p>	
<p>Step 3</p>	<p>Paper box packaging Material : KLB225.CK.K.CK.KLB225 Size : 660(D)x530(W)x295(H) Color : 1 degree black, Yellow</p>	
<p>Step 4</p>	<p>Rope packaging Material : P.P Size : 15mm Color : yellow</p>	
<p>Step 5</p>	<p>Finish packaging</p>	

	<ol style="list-style-type: none"> 1. To move alone, holding a fall or be dropped. 2. Holding the rope packing to move your fingers can get hurt. 3. The product is damaged packaging may be damaged, so you must contact manufacturer or dealer. 4. The product contaminated by rain damage or risk of electric shock, so you must contact the manufacturer or dealer.
	<ol style="list-style-type: none"> 1. Packaging for the dissolution is opened by gloves. 2. The Cutting rope may be put injury keep both the line hold the demolition.
	<ol style="list-style-type: none"> 1. Do not hold or store inside out move. 2. Do not put heavy things over 20Kg. 3. Do not throw it or fall or pick up from high.

15. EMC (ELECTROMAGNETIC COMPATIBILITY)

The Electromagnetic Compatibility Directive sets the essential requirements for electrical and electronic equipment that may disturb or even be disturbed by other equipment. The UDR-800 complies with these requirements as tabled below. Follow the guidance on the tables for use of the device in the electromagnetic environment.

EMC (IEC 60601-1-2: 2007)

Guidance and manufacturer's declaration - electromagnetic emissions		
The UDR-800 is intended for use in the electromagnetic environment specified below. The customer or the user of the UDR-800 should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The UDR-800 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The UDR-800 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class A	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The UDR-800 is intended for use in the electromagnetic environment specified below. The customer or the user of the UDR-800 should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic Discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floor should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage, dips, short Interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0,5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles < 5% UT (> 95% dip in UT) for 5 sec	<5% UT (> 95% dip in UT) for 0,5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles < 5% UT (> 95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the UDR-800 requires continued operation during power mains interruptions, it is recommended that the UDR-800 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE UT is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The UDR-800 is intended for use in the electromagnetic environment specified below. The customer or the user of the UDR-800 should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
<p>Conducted RF IEC 61000-4-6</p> <p>Radiated RF IEC 61000-4-3</p>	<p>3Vrms 150kHz to 80MHz</p> <p>3V/m 80MHz to 2,5GHz</p>	<p>3Vrms (V1=3)</p> <p>3V/m (E1=3)</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the UDR-800, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance $d=1.2 \sqrt{P}$ $d=1.2 \sqrt{P}$ 80MHz to 800MHz $d=2.3 \sqrt{P}$ 800MHz to 2,5GHz</p> <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres(m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range. b Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>NOTE 1 At 80MHz and 800MHz, the higher frequency range applies.</p> <p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			
<p>a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the UDR-800 is used exceeds the applicable RF compliance level above, the UDR-800 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the UDR-800.</p> <p>b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3V/m.</p>			

Recommended separation distances between portable and mobile RF communications equipment and the UDR-800			
The UDR-800 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the UDR-800 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the UDR-800 as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150kHz to 80MHz $d=1.2 \text{ root}(P)$	80MHz to 800MHz $d=1.2 \text{ root}(P)$	800MHz to 2,5GHz $d=2.3 \text{ root}(P)$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.79
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1 At 80MHz and 800MHz, the separation distance for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

16. Disposal of waste products

When disposing of the products below to contact us



This instrument incorporates a lithium battery, which may pollute the environment if the instrument is disposed.

Please ask a professional waste disposal company to handle disposal or your distributor before disposing of the instrument.