# OPERATION MANUAL

```
CHART PANEL
TCP-2000
```

40-90000.02

TOMEY

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# CONTENTS

Operation  Manual

# 1. INTRODUCTION

Ophthalmic chart panel used for testing sharpness of patients view, refraction state and stereo vision of human eyes. Also for testing color recognition problems.

This OPERATION MANUAL describes the purpose, overall view and user maintenance of the TCP-2000 LCD CHART PANEL. This manual is intended for medical and technical personnel who will perform tests on patients.

If during operating the Chart Panel you have encountered problems which you can not solve, or LCD Chart Panel parameters are changed, please, in all these cases contact the manufacturer.

WARNING !  Only manufacturer's authorized personnel may carry out the technical servicing of the Chart Panel!

HINT !  When during normal operation TCP-2000 device responds to your remote control command with 1 (beep) signal, it means that you try to execute not allowed operation!

## 1.1 Safety precautions

Power connections
- Before connecting the power cord to the mains outlet, check if the local voltage and frequency ratings correspond with the ratings of the Chart Panel.
- Connect panel to a three-wire, grounded receptacle. Do not remove the grounding prong from the power plug.
- Use intact power cord. Replace the cord if it is cracked, frayed, broken or otherwise damaged.
- Do not apply tension to the power cord. The cord may get broken.
- Do not use extension cords or adapters of any type.

External connection
- Do not connect any external devices to the Chart Panel other than specified by the manufacturer.

Explosion Hazard
- Do not use the Chart Panel in the presence of flammable moistures.

Patient Safety
- Do not perform any testing or maintenance of the Chart Panel while it is being used on a patient.

Cleaning and Service
- Unplug power cord before cleaning or service. Get rid of moisture completely before reconnecting to the mains outlet.
- Do not use ammonia-, phenol- ,or acetone- based cleaners. These cleaners may damage the panel surface.
- Do not immerse panel in any liquid. Do not allow liquid to enter the panel housing.

Installation

- Leave space under and over Chart Panel to allow proper ventilation.

- Do not put any objects on top of the TCP-2000 Chart Panel.

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- Do not put Chart Panel in horizontal position because it can not work in this position.

The manufacturer is responsible for the safety, reliability and performance of the panel only if:

- Only people authorized by manufacturer have carried out all the operation or assembly extensions, adjustment, modification or repairs.

- The electric plant of the room complies with the electric standards.

- The instrument is utilized in compliance with Operational Manual.

The manufacturer accepts no responsibility for any modifications made to the Chart Panel outside the factory.

## 2. TECHNICAL DATA

- Power off function: adjustable from 1h to 4h
- CP type: TCP-2000
- Power supply:  110 –230 VAC ±10%, 50/60 Hz.
- Power consumption: 23 W max.
- Classification: Class I
- Operating temperature range: +5°C to + 40°C
- Storage temperature range: 0°C to + 40°C
- Air pressure: 70 to 106 kPa.
- Relative humidity: 90% max., without condensation (operation and storage).
- Dimensions: 374 x 299 x 107 mm (L/W/H).
- Weight: 3 kg.
- No application part
- IR remote battery type : 2 x AAA LR6

# 3. INSTALLATION AND USE

## 3.1. Package Content

- LCD CHART PANEL TCP-2000
- Red-green glasses
- Power cord
- Remote control
- Battery AAA 2 pcs.
- Wall mount accessories
- Operation manual
- Children picture card 3 pcs.

| TEST TYPE | TCP-2000 |
|---|---|
| Letters: Sloan, Snellen | X |
| Pictures | X |
| Numbers (4 types) | X |
| Snellen E | X |
| Landolt rings | X |
| Allen pre-school | X |
| HOTV | X |
| HYVA | X |
| Hands | X |
| Symbols | X |
| Red-green tests | X |
| Contrast tests | X |
| Astigmatism test | X |
| Fixation Point | X |
| Cross cylinder | X |
| Minute stereo test | X |
| Horizontal and Vertical Coincidence | X |
| Masks - vertical, single, horizontal, underlining | X |
| Red-Green Mask | X |
| Ishihara Tests | X |
| Hearing Impaired Mode | X |
| Crowding Bars | X |
| Animations | X |
| Amsler tests | X |
| ETDRS Chart | X |
| Standard Snellen Chart | X |
| Bailey-Lovie Chart | X |
| SIRDS - Single Image Random Dot Stereogram - Autostereograms | X |
| Colour Pictures For Children | X |
| 3D images (Red-Green) | X |
| Anatomy of EYE and EYE diseases | X |
| Fixation disparity | X |
| Four dots test | X |
| Low vision option | X |

**Table 1.** TCP-2000 available tests.

## 3.2. Installation

To assure proper test conditions TCP-2000 Chart Panel should be mounted on the wall perpendicularly to patient's line of sights. The distance from panel to patient's eye can be adjusted from 2 to 7 meters, depending on test room conditions. There is possibility to change distance units from meters to feet (6,5 to 23,5 feet). For information on how to adjust the distance please refer to chapter 4.1.

Mounting instruction for TCP-2000 panel is presented below:

1)  Disassemble wall mount kit from the display unit by removing 4 screws.
2)  Mount wall mount kit to the wall with 3 screws (included in package).
3)  Attach display unit to the wall mount kit.

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## 3.3. How to operate chart panel with remote control.

All functions of Chart Panel are controlled via IR remote control. Picture 2 describes functions of remote control buttons.
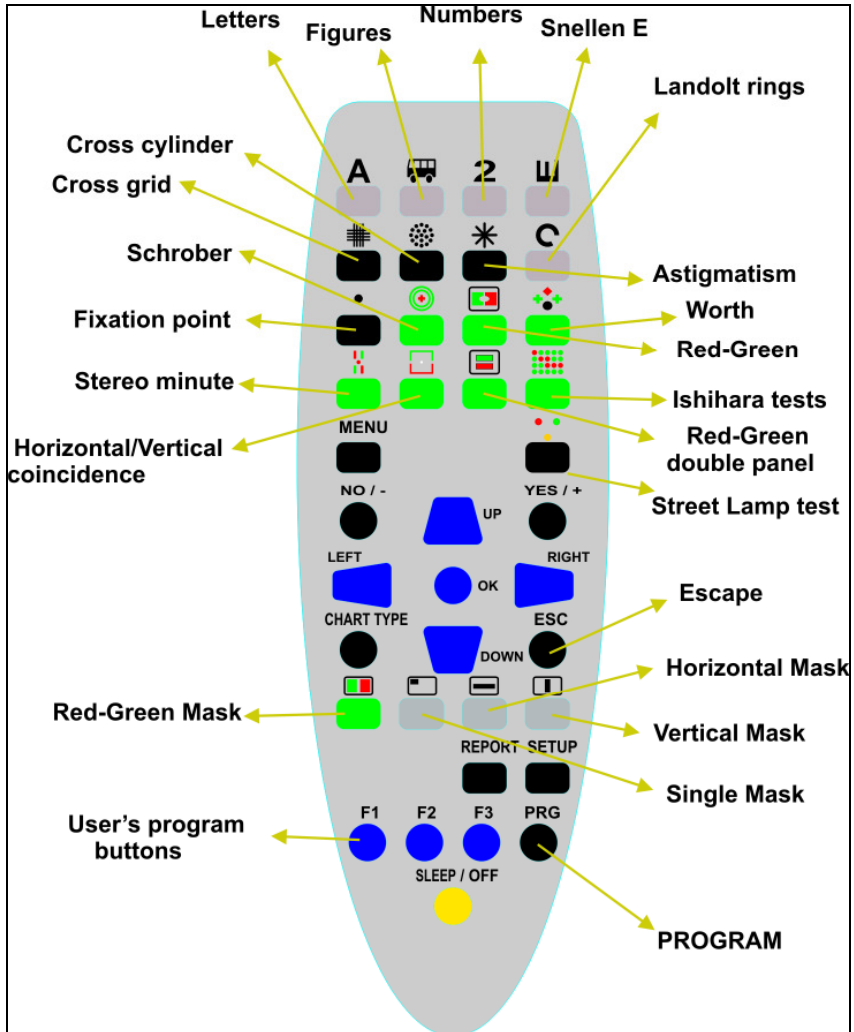


**Pic. 1.** IR remote control.

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## 3.4. Changing remote control channel.

When two or more units of the TCP-2000 systems are used in the same room, a device failure may occur due to interference if the same remote control channels are used.  In such case, set different channels for each remote control. There are 3 remote control channels available.

The remote control channel must be set for both the remote and the main unit.

To change remote control channel please press following buttons at one time. Please keep button pressed until main unit will confirm channel change with three beeps.

>                     PRG + LAMP/OFF + F1 to select channel no 1.
>                     PRG + LAMP/OFF + F2 to select channel no 2.
>                     PRG + LAMP/OFF + F3 to select channel no 3.


WARNING !  Removing batteries from remote control will reset its current channel setting. It will be automatically set to channel no 1. If different channel was used before please perform channel selection procedure. Otherwise main unit will not respond to remote control commands.

WARNING !  Remote control channel is immediately changed when three buttons are pressed at one time. Main unit will change its channel only if you keep those buttons until you get three beeps conformation.

WARNING !  Channel 1 is Default factory setting.

# 4. CHART PANEL CONFIGURATION.

If TCP-2000 Chart Panel is securely installed in its operating position, connect the power cord to the panel first, then the plug power cord to the power outlet. Chart Panel will start automatically. Flashing LED in bottom right corner will indicate start-up process. The panel requires approximately 30 seconds for initialization. When the LED stops flashing and turns into green and the welcome screen is displayed, the Chart Panel is ready to use. Install battery into remote control unit and enter Configuration MENU to set-up Chart Panel options.

| WARNING ! | Before you start tests on patient you have to configure TCP-2000 properly. To acquire reliable test results it is necessary to set proper distance between patient and the Chart Panel. Please refer to chapter 4.1. |
|---|---|

## Configuration MENU

To enter Configuration MENU press **SETUP** button.

Following options are available:

```
                          MENU

  Distance                    5.0 [m]
  Low Vision Mode
  Optotypes Config
  Chart type
  Visus units
  Keep Parameters
  Randomize
  Mirror
  Snellen background
  Phoropter
  Program 1
  Program 2
  Program 3
  Auto Off
  Service
  Exit (MENU)
  Shutdown



                                          Time: 2007-08-18 22:04:41  SW v.win32 test
```
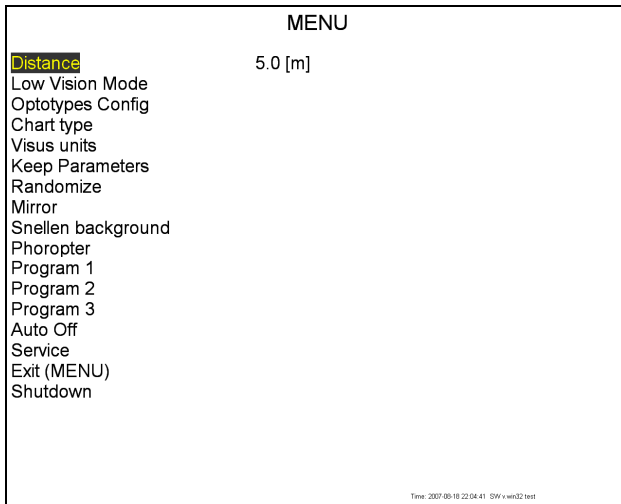
**Pic. 2.** Configuration MENU

## 4.1. Distance

This option allows user to set proper distance between patient and TCP-2000 Chart Panel. It is crucial that this parameter is correctly set before first use of the Chart Panel.

1. Enter '*Distance*', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enable distance edit mode.
3. Use Up and Down Arrow to set required distance.
4. To store value press Left Arrow.

## 4.2. Low Vision Mode

Optotypes available in this option are much bigger than standard ones, of visus units up to ft 20/3200

1. Enter '*Low Vision Mode*', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to set edited parameter to '*Yes*' or '*No*' value.
4. Press Left Arrow to apply changes.

Example:
1. Enable *Low Vision* option.
2. Exit '*Menu'*
3. Press '*A'* button.
4. Press Arrow Up until you reach the biggest optotype. You will see a message:
   '*Enabling Low Vision Mode. Move patient to 0,6m (2,3 ft).*
   *Press any key to continue*.'
5. Move the patient to 0,6m (2,3 ft).
6. Press Arrow up, in top-left corner of the screen info '*LowVis*' will show. This info indicates that the patient has to be 0,6m (2,3 ft) from the chart panel.

WARNING !     Low Vision Mode is not available in ETDRS and Standard Snellen Charts

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## 4.3. Optotypes Config

This option allows to choose optotype kind: letters/children/numbers.

1. Choose *'Optotypes Config'* using Arrow Up or Arrow Down button.
2. Press right Arrow to enter *'Optotypes Config'*
3. Press Arrow Up or Arrow Down to choose optotype kind.
4. Press Arrow Up or Arrow Down button to select your favourite optotype kind.
5. Press Left Arrow to apply changes.
6. Select 'Previous Menu' using Arrow Up or Arrow Down to exit from *'Optotypes Config'*.

HINT !   You can also Exit from '*Optotypes Config*' by simply pressing '*Setup'* button.

## 4.4. Chart type – display mode (Snellen, LogMar Modified, Snellen Modified, Snellen Contrast chart type)

Option `*Chart type*` allows the user to work with Snellen Chart, LogMar Chart Modified, Snellen Chart Modified or Snellen Contrast (please refer to chapters 5.2.1. , 5.2.2., 5.2.3. and 5.2.4.).

1. Enter '*Chart type*', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to select parameter '*Snellen Chart*', '*LogMar Chart Modified*', *'Snellen Chart Modified'* or '*Snellen Contrast*'.
4. Press Left Arrow to apply changes.

HINT !   **Chart Type can be changed directly from IR remote. You can select chart type using 'CHART TYPE' button.**
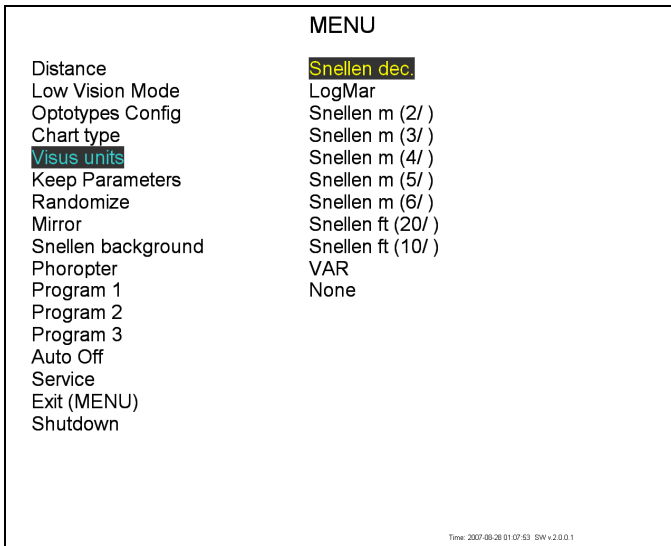
WARNING !   Changes made only with the IR remote are not stored. After restart of the chart panel chart type selected in the '**Menu'** will be active.

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## 4.5. Visus units

Option Visus units allows selecting optotype description unit which is displayed right to the optotype chart.

1. Enter '*Visus units*', using Arrow Up or Arrow Down button.
2. Press right Arrow, to display list of available units.
3. Press Arrow Up or Arrow Down button to select your favourite chart description unit.
4. Press Left Arrow to apply changes.

```
                        MENU

Distance             Snellen dec.
Low Vision Mode      LogMar
Optotypes Config     Snellen m (2/ )
Chart type           Snellen m (3/ )
Visus units          Snellen m (4/ )
Keep Parameters      Snellen m (5/ )
Randomize            Snellen m (6/ )
Mirror               Snellen ft (20/ )
Snellen background   Snellen ft (10/ )
Phoropter            VAR
Program 1            None
Program 2
Program 3
Auto Off
Service
Exit (MENU)
Shutdown



                              Time: 2007-08-28 01:07:53  SW v.2.0.0.1
```

**Pic. 3.** Visus units

| HINT ! |
|---|

Information about currently selected visus scale is continuously displayed on the left top part of the screen. Set '*Visus unit*' to '*None*' to hide this information.

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## 4.6. Keep Parameters

When you activate this option, visus values (size), contrast, masks will not change when you switch to other chart types or tests.

**Example:**

> Activate '***Keep Parameters***' option.
> Press button '*A*' to select Letter chart.
> Press two times Arrow Down to display smaller size of Letters chart.
> Press '*2*' to select Number chart. Optotype size will not change to
> the biggest one but will stay at the same size level.

1. Enter '***Keep Parameters***', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to set edited parameter to '*Yes*' or '*No*' value.
4. Press Left Arrow to apply changes.

## 4.7. Randomize

1. Enter '***Randomize***', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to set edited parameter to '*Yes*' or '*No*' value.
4. Press Left Arrow to apply changes.

| HINT ! | You can randomize any optotype by pressing Right or Left Arrow. |
|---|---|

## 4.8. Mirror

Option `*Mirror*` allows to display all tests in mirror presentation.

.
1. Enter '***Mirror***', using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to set edited parameter to '*Yes*' or '*No*' value.
4. Press Left Arrow to apply changes.

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## 4.9. Snellen background

Option *'Snellen background'* allows to select black or white background for stripe with sharpness size.

1. Enter *'Snellen background'*, using Arrow Up or Arrow Down button.
2. Press Right Arrow to enter edit mode.
3. Use Up and Down Arrows to set edited parameter *''Black'* (black stripe) or *''White'* (white stripe).
4. Press Left Arrow to apply changes.
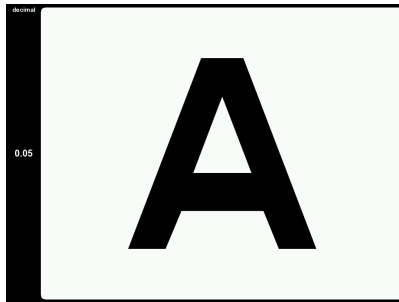


**Pic. 4.** Screen with black background
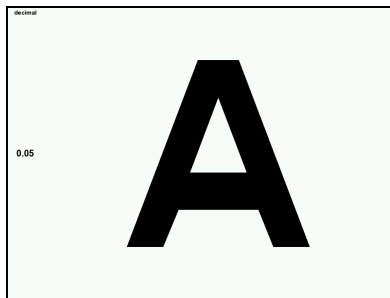


**Pic. 5.** Screen with white background

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## 4.10. Phoropter

Set this option to 'Yes' when you use TCP-2000 Chart Panel together with phoropter. Adjust colours ( see chapter 4.13.5. ) to assure interpretability with the phoropter colour filters.

1.  Select '***Phoropter***', using Arrow Up or Arrow Down button.
2.  Press Right Arrow to edit mode.
3.  Use Up and Down Arrows to set edited parameter to '***Yes***' or '***No***' value.
4.  Press Left Arrow to apply changes.

## 4.11. User defined programs - PROGRAM 1, PROGRAM 2, PROGRAM 3.

TCP-2000 Chart Panel allows the user to define his own programs. Each program is a sequence of up to 20 steps of charts, tests or eye anatomy pictures available from the panel. Masks and colour filters can be used in combination with charts. You can store 3 programs, each 20 steps long.

### 4.11.1. Programming Mode

To define your own program follow step 1 to 4:

1.  Choose program you would like to edit using Arrow Up or Arrow Down.
2.  Press Right Arrow, to enter Programming Mode.

Now you can start building your program sequence. Select test you want to add to current program (picture, tests or masks). To confirm your selection and add step to the program press '**F1**' button. Device will signal with message ' *Item added to program, Press any key to continue*' each properly added step of the program.

3.  Press '**F2**' after program step has been stored to end programming process and store selected test into the memory of the chart panel.

Device will signal end of programming sequence with message '*Programming finished*'.
You can enter Menu at any moment and change settings, e.g. children tests, chart type, etc.

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## 4.11.2. Executing user's program

To execute user-defined program stored in device memory simply press 'F1', 'F2' or 'F3' button. Chart Panel will automatically display first test chart of the program you selected.

In the left bottom corner of the screen a letter 'A' is displayed to inform that user program mode is executed.

Use right Arrow to move to the next chart of the program, left Arrow to return to the previous chart.

To switch to other program or to restart selected program press respectively 'F1', 'F2' or 'F3' button.

To enter normal operating mode press any other button than 'F1', 'F2', 'F3'.

## 4.12. Auto-Off

This function allows user to preset time after which Chart Panel enters stand-by mode. You can set this time from 4 to 10 minutes.

1.  Enter '*Auto-Off*' using Arrow Up or Arrow Down button.
2.  Press Right Arrow to edit time for automatic auto off.
3.  Use Up and Down Arrows to set required time.
4.  To store selected value press Left Arrow.

> NOTE !   Power OFF – new power saving feature.

TCP-2000 Chart Panel will turn itself off when not used after preset time. This time is set in factory to 4 hours. Service personnel can adjust it during installation to 30min, 1h, 2h, 3h and 4h depending on the customer needs. If TCP-2000 is in off-mode LED on the front panel is also off.
To restart TCP-2000 simply press any key on the remote control. Time needed for startup is approximately 45sec.

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## 4.13. Service mode ( Service )

1.  Select '*Service* ', using Arrow up or Arrow down button.
2.  Press right Arrow. Message '*Enter Access Code*' will be displayed.

From the remote control type following sequence:

# A A A A

If the incorrect sequence has been entered, message '*Invalid service code. Press any key*' appears. To repeat password entering operation press any button and repeat procedure.

**Service menu options:**

1.  Language
2.  Distance units: meter, feet
3.  Program
4.  Demonstration mode (Demo)
5.  Colour adjustment
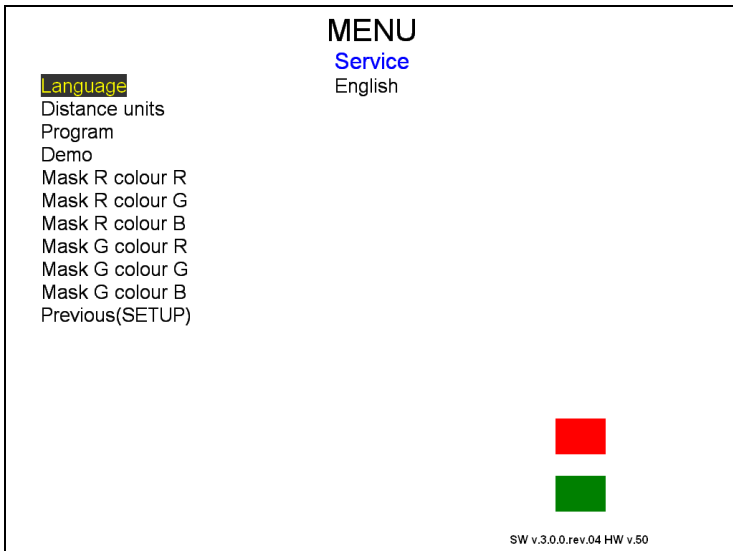


**Pic. 6.** Service menu options

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### 4.13.1. Language

From the *Language* menu you can select one of available languages for displaying messages.
1. Select '*Language*' from the list.
2. Press right Arrow, to display list of available languages.
3. Press Arrow Up or Arrow Down button to move over language list.
4. Press Left Arrow to accept changes.

### 4.13.2. Distance units: meters, feet

1. Select '*Distance units'* from the list.
2. Press right Arrow, to enter distance units.
3. Press Arrow Up or Arrow Down to select '*meters*' or '*feet*'.
4. Press Left Arrow to accept changes.

### 4.13.3. Program

1. Select '*Program'* from the list.
2. Press right Arrow, to change 'Program'.
3. Press Arrow Up or Arrow Down to select program.
4. Press Left Arrow to accept changes.
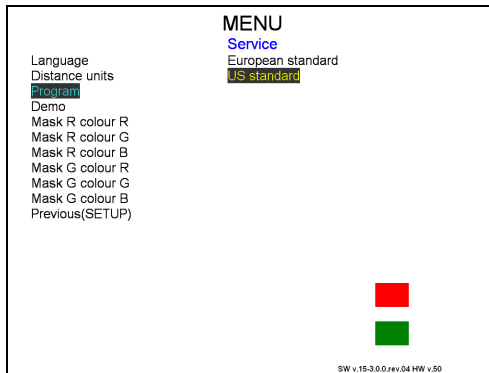


**Pic. 7.** Programs

There are 2 types of programs with different visus size and with different set of optotypes.

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| DECIMAL | LOGMAR | 20/ft | 10/ft | 6/m | 5/m | 4/m | 3/m | 2/m | VAR |
|---|---|---|---|---|---|---|---|---|---|
| 0.006 | 2.20 | 3200 | 1600 | 950 | 800 | 630 | 480 | 320 | -10 |
| 0.008 | 2.10 | 2500 | 1250 | 750 | 630 | 500 | 380 | 250 | -5 |
| 0.010 | 2.00 | 2000 | 1000 | 600 | 500 | 400 | 300 | 200 | 0 |
| 0.013 | 1.90 | 1600 | 800 | 480 | 400 | 320 | 240 | 160 | 5 |
| 0.016 | 1.80 | 1250 | 625 | 380 | 320 | 250 | 190 | 125 | 10 |
| 0.020 | 1.70 | 1000 | 500 | 300 | 250 | 200 | 150 | 100 | 15 |
| 0.025 | 1.60 | 800 | 400 | 240 | 200 | 160 | 120 | 80 | 20 |
| 0.032 | 1.50 | 630 | 315 | 190 | 160 | 125 | 95 | 63 | 25 |
| 0.040 | 1.40 | 500 | 250 | 150 | 125 | 100 | 75 | 50 | 30 |
| 0.050 | 1.30 | 400 | 200 | 120 | 100 | 80 | 60 | 40 | 35 |
| 0.063 | 1.20 | 320 | 160 | 95 | 80 | 63 | 48 | 32 | 40 |
| 0.080 | 1.10 | 250 | 125 | 75 | 63 | 50 | 38 | 25 | 45 |
| 0.100 | 1.00 | 200 | 100 | 60 | 50 | 40 | 30 | 20 | 50 |
| 0.125 | 0.90 | 160 | 80 | 48 | 40 | 32 | 24 | 16 | 55 |
| 0.160 | 0.80 | 125 | 63 | 38 | 32 | 25 | 19 | 12.5 | 60 |
| 0.20 | 0.70 | 100 | 50 | 30 | 25 | 20 | 15 | 10 | 65 |
| 0.25 | 0.60 | 80 | 40 | 24 | 20 | 16 | 12 | 8 | 70 |
| 0.32 | 0.50 | 63 | 32 | 19 | 16 | 12.5 | 9.5 | 6.3 | 75 |
| 0.40 | 0.40 | 50 | 25 | 15 | 12.5 | 10 | 7.5 | 5 | 80 |
| 0.50 | 0.30 | 40 | 20 | 12 | 10 | 8 | 6 | 4 | 85 |
| 0.63 | 0.20 | 32 | 16 | 9.5 | 8 | 6.3 | 4.8 | 3.2 | 90 |
| 0.70 | 015 | 29 | 14 | 9 | 7.5 | 6 | 4.5 | 3 | 92 |
| 0.80 | 0.10 | 25 | 13 | 7.5 | 6.3 | 5 | 3.8 | 2.5 | 95 |
| 0.90 | 0.05 | 22 | 11 | 7 | 6 | 4.5 | 3.5 | 2.25 | 98 |
| 1.00 | 0.00 | 20 | 10 | 6 | 5 | 4 | 3 | 2 | 100 |
| 1.10 | -0.05 | 18 | 9 | 5 | 4.5 | 3.5 | 2.5 | 1.75 | 102 |
| 1.25 | -0.10 | 16 | 8 | 4.8 | 4 | 3.2 | 2.4 | 1.6 | 105 |
| 1.60 | -0.20 | 12.5 | 6.3 | 3.8 | 3.2 | 2.5 | 1.9 | 1.25 | 110 |
| 2.00 | -0.30 | 10 | 5 | 3 | 2.5 | 2 | 1.5 | 1 | 115 |

**Table 2.** Available sharpness degrees ( European Standard program )

| DECIMAL | LOGMAR | 20/ft | 10/ft | 6/m | 5/m | 4/m | 3/m | 2/m | VAR |
|---|---|---|---|---|---|---|---|---|---|
| 0.006 | 2.20 | 3200 | 1600 | 950 | 800 | 630 | 480 | 320 | -10 |
| 0.008 | 2.10 | 2500 | 1250 | 750 | 630 | 500 | 380 | 250 | -5 |
| 0.010 | 2.00 | 2000 | 1000 | 600 | 500 | 400 | 300 | 200 | 0 |
| 0.013 | 1.90 | 1600 | 800 | 480 | 400 | 320 | 240 | 160 | 5 |
| 0.016 | 1.80 | 1250 | 625 | 380 | 320 | 250 | 190 | 125 | 10 |
| 0.020 | 1.70 | 1000 | 500 | 300 | 250 | 200 | 150 | 100 | 15 |
| 0.025 | 1.60 | 800 | 400 | 240 | 200 | 160 | 120 | 80 | 20 |
| 0.032 | 1.50 | 630 | 315 | 190 | 160 | 125 | 95 | 63 | 25 |
| 0.040 | 1.40 | 500 | 250 | 150 | 125 | 100 | 75 | 50 | 30 |
| 0.050 | 1.30 | 400 | 200 | 120 | 100 | 80 | 60 | 40 | 35 |
| 0.063 | 1.20 | 320 | 160 | 95 | 80 | 63 | 48 | 32 | 40 |
| 0.080 | 1.10 | 250 | 125 | 75 | 63 | 50 | 38 | 25 | 45 |
| 0.100 | 1.00 | 200 | 100 | 60 | 50 | 40 | 30 | 20 | 50 |
| 0.125 | 0.90 | 160 | 80 | 48 | 40 | 32 | 24 | 16 | 55 |
| 0.160 | 0.80 | 125 | 63 | 38 | 32 | 25 | 19 | 12.5 | 60 |
| 0.20 | 0.70 | 100 | 50 | 30 | 25 | 20 | 15 | 10 | 65 |
| 0.25 | 0.60 | 80 | 40 | 24 | 20 | 16 | 12 | 8 | 70 |
| 0.32 | 0.50 | 63 | 32 | 19 | 16 | 12.5 | 9.5 | 6.3 | 75 |
| 0.40 | 0.40 | 50 | 25 | 15 | 12.5 | 10 | 7.5 | 5 | 80 |
| 0.50 | 0.30 | 40 | 20 | 12 | 10 | 8 | 6 | 4 | 85 |
| 0.63 | 0.20 | 32 | 16 | 9.5 | 8 | 6.3 | 4.8 | 3.2 | 90 |
| 0.80 | 0.10 | 25 | 13 | 7.5 | 6.3 | 5 | 3.8 | 2.5 | 95 |
| 1.00 | 0.00 | 20 | 10 | 6 | 5 | 4 | 3 | 2 | 100 |
| 1.25 | -0.10 | 16 | 8 | 4.8 | 4 | 3.2 | 2.4 | 1.6 | 105 |
| 1.60 | -0.20 | 12.5 | 6.3 | 3.8 | 3.2 | 2.5 | 1.9 | 1.25 | 110 |
| 2.00 | -0.30 | 10 | 5 | 3 | 2.5 | 2 | 1.5 | 1 | 115 |

**Table 3.** Available sharpness degrees ( US Standard program )

| NOTE ! | US program is the standard one. |
|--------|--------------------------------|

| NOTE ! | Regardless of program type, in LogMar Modified Chart there are the same visus sizes. |
|--------|--------------------------------|

| WARNING ! | The chart panel has to be restarted after you have changed program. |
|-----------|--------------------------------|

### 4.13.4. Demonstration mode ( Demo ).

Purpose of this mode is to present all TCP-2000 charts and tests at random cycle. This feature is mostly used during exhibitions and etc.

1. Select '*Demo*', using Arrow Up or Arrow Down button.
2. Press Right Arrow to run demonstration mode.
3. To exit demonstration mode press any button.

### 4.13.5. Colour adjustment ( Masks )

Wavelength of red and green filters used in equipment like phoropter or set of test lenses vary depending on the manufacturer. *Colour adjustment* function is designed to enable interpretability of TCP-2000 with devices purchased from different vendors.

Colour can be adjusted for phoropter and colour test filters or glasses independently. To adjust colour to test filters/glasses *Phoropter option* should be disabled, please refer to chapter 4.10. To adjust panel colours to the phoropter, *Phoropter option* should be enabled.

TCP-2000 allows setting colours to any required colour by modification of red/green/blue compound.

R - RED
G - GREEN
B - BLUE

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| WARNING ! | • Colour modification effect is visible on two square polygons displayed in bottom right corner of the screen. |
| --- | --- |

- Colour modification effect is visible on two square polygons displayed in bottom right corner of the screen.
- It is recommended to adjust only RED compound value for the red polygon (colour mask) and only GREEN compound for the green polygon.
- Depending on Phoropter setting in the configuration menu you are adjusting panel colours for phoropter or colour glasses only.

To adjust colour intensity to the required level select with Arrow up/down button required colour compound, then press right Arrow to begin edition of the intensity. To modify colour value use up and down Arrow button. To accept and store the value press Arrow left.

## 4.14. Exiting  Menu

Select '*Exit (SETUP)*' using Arrow Up or Arrow Down button.

1. Press Right Arrow to exit Service Menu. TCP-2000 will return to the last displayed test. Changes implemented will be saved after Chart Panel is turned off.
2. You can exit Service mode by simply pressing '*SETUP'* button. TCP-2000 will return to the last displayed test. Changes implemented will be saved after  Chart Panel is turned off.
3. You can also exit from MENU using '*ESC'* button. In this case changes implemented will be saved only until Chart Panel is turned off.

Each time you would like to return to higher level of Configuration Menu please select „*Exit (SETUP)*" and press the right Arrow or at any time *SETUP* button.

## 4.15. Shutdown system

Select '*Shutdown system*' using Arrow Up or Arrow Down button.

1. Press Right Arrow. Following screen will appear :
   - Press '*OK'* button to restart application.
   - Press '*F3'* button to shut down system.
   - Press '*ESC'* button to cancel.
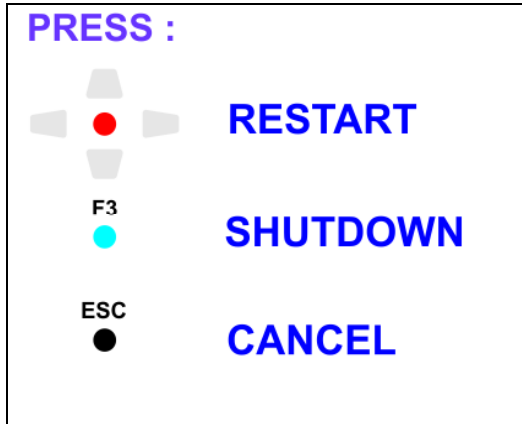
**Pic. 8.** Shutdown system

If you Press '*SLEEP/OFF*' button for about 6 seconds, above screen will also appear.

To start TCP-2000 simply press '*SLEEP/OFF*' button on the remote control.

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# 5. TESTS

This chapter includes all detailed information regarding charts and tests available in TCP-2000 Chart Panel.

## 5.1. Standard optotypes

> **HINT !**
>
> When working with optotype charts you can at any time change contrast of the optotype. Use '**YES/+**' or **'NO/-**' buttons to set contrast level. Information about contrast used is permanently displayed on the right side of the screen. If there is no information about contrast displayed, it means it is set to 100%.

Navigating through optotype charts:

1. Press one of five top buttons on the remote control to display the biggest optotype chart possible of the selected type:

   A. letters

   B. pictures

   C. numbers

   D. Snellen E

   E. Landolt rings

## 5.1.1. Optotype sizes

1. After required chart has been selected, 20/400 ft ( 0,050 decimal ) size of that optotype is displayed ( unless option Keep Parameters is ON).
2. To display charts with optotypes of different sizes use Up and Down Arrows (Down Arrow – smaller optotypes, Up arrow – bigger optotypes).

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## 5.2. Chart types

There are 4 types of chart type presentations:

1. Snellen chart type
2. LogMar Modified chart type
3. Snellen Modified chart type
4. Snellen Contrast chart type

## 5.2.1. Snellen type chart presentation

The Snellen chart remains the most popular chart design among clinicians. A range of different optotypes can be displayed in Snellen. A single row or column can be shown and a range of masks is available to isolate specific letters or rows.
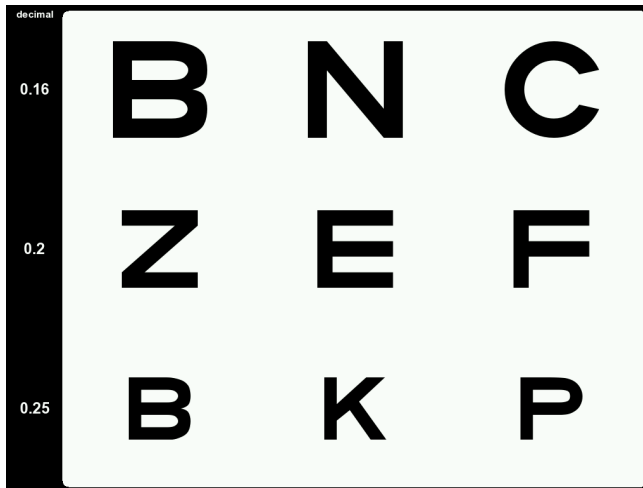


**Pic. 9.** Example of Snellen type chart

NOTE !

TCP-2000 Chart Panel always starts with 20/400 visus ( 0,050 decimal ). The maximum size of the visus depends on distance setting.

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## 5.2.2. LogMar Modified type chart presentation

The LogMar Modified chart is a superior design to the Snellen chart. A wide range of optotypes can be displayed in LogMar Modified format.



**Pic. 10.** Example of LogMar Modified type chart.

## 5.2.3. Snellen Modified type chart presentation

A wide range of optotypes can be displayed in Snellen Modified format.
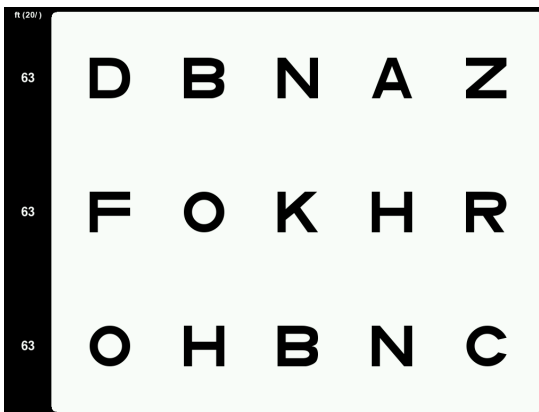


**Pic. 11.** Example of Snellen Modified type chart.

All  signs  on the screen have the same sharpness degree.
When you press contrast adjustment buttons then contrast
changes in  the same way for all rows.

More than one version of every stimulus displayed on the screen
is always available. To view all available optotypes of a specific
size, please use right and left Arrows.

## 5.2.4. Snellen Contrast type chart presentation

Same as 'Snellen modified' but each line is displayed in different contrast level.

All  charts on single screen have the same sharpness degree.

## 5.3. Black-white tests

To display one of black-white charts simply press button corresponding to its picture on IR remote. This will directly display selected chart.

| Test name | Key description |
|---|---|
| Cross grid | ⧉ |
| Cross cylinder | ⬡ |
| Fixation point | ● |
| Astigmatism | ✳ |

Cross grid test has three presentations. To change from one presentation to another press again ⧉ button or *Right/Left Arrow.*

Cross cylinder test has two presentations – with white or black background. To change from one presentation to another press again ⬡ button or *Right/Left Arrow.*

Astigmatism test has three presentations – one with hour description and two with angle description. To change from one presentation to another press again ✳ button

or *Right/Left Arrow*

## 5.4. Red-green tests

To display one of red-green charts simply press button corresponding to its picture on IR remote. This will directly display selected chart.

| Test name | Key description |
|---|---|
| Schrober |  |
| Red-Green panel |  |
| Worth / Four dots / red-green balance |  |
| Stereo minute ( red-green ) |  |
| Vertical / Horizontal Coincidence |  |
| Red green duoble panel |  |

➢ Schrober test has two presentations (colours reverse). To change from one presentation to another press again  button or *Right/Left Arrow*

➢ Worth test has few presentations (four dots test, red-green balance). To change from one presentation to another press again  button or *Right/Left Arrow*

## 5.5. Other Tests

To enter **'Other Tests'** press  MENU button.
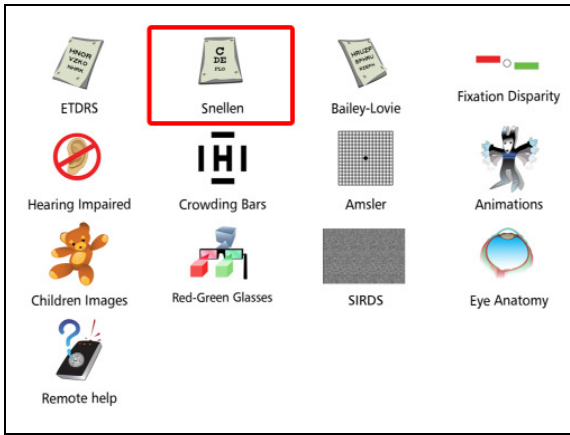


    **Pic. 12.** Other tests

- ETDRS Chart
- Standard Snellen Chart
- Bailey-Lovie Chart
- Fixation Disparity Test
- Hearing Impaired Mode
- Crowding Bars
- Amsler Tests
- Animations
- Colour Pictures For Children
- Stereo image red-green
- SIRDS
- Images of an eye.
- Description of the IR remote

## How to navigate in 'Other Tests'?

1. Use Arrows to highlight one of  available tests.
2. Press 'OK' button to enter the test that is selected.
3. To exit  **'Other Tests'**, press any other test button.
4. To return to higher level press 'ESC' button**.**
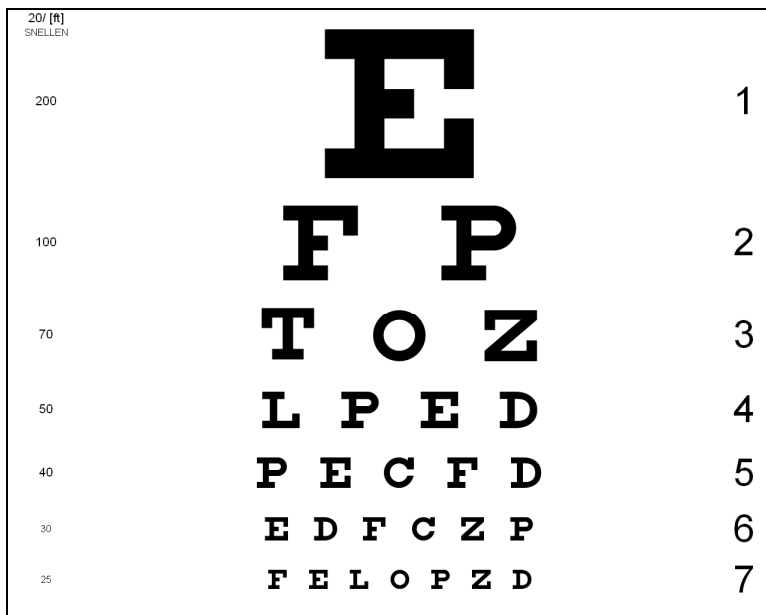
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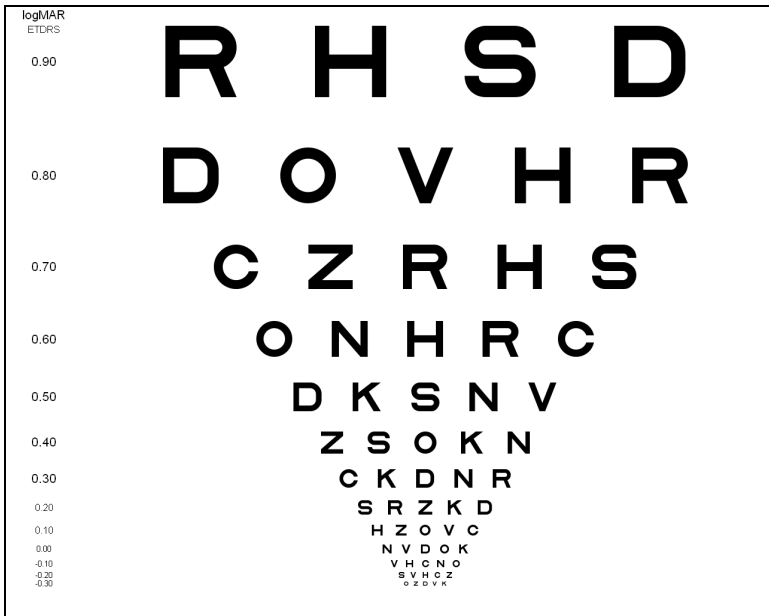
## 5.5.1. ETDRS Chart



**Pic. 13.** ETDRS Chart

| HINT ! | In ETDRS Chart single and horizontal underlining, red-green mask are available |
|---|---|

| WARNING | In ETDRS Chart Low Vision Mode is not available |
|---|---|

## 5.5.2. Standard Snellen Chart



**Pic. 14.** Standard Snellen Chart

| HINT ! | In Standard Snellen Chart single and horizontal underlining, red-green mask are available |

| WARNING | In Standard Snellen Chart Low Vision Mode is not available |

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### 5.5.3. Bailey-Lovie Chart

HINT !  In Bailey-Lovie Chart single and horizontal underlining, red-green mask are available

WARNING  In Bailey-Lovie Chart Low Vision Mode is not available

## 5.5.4. Fixation Disparity Test

Press '*OK'* button to enter Fixation Disparity Test.

1. Press Arrow right or Arrow down to move the red bar right/down.
2. Press Arrow left or Arrow up to move the red bar left/up.
3. Press '*OK'* button to rotate red-green bars 90° clockwise.

## 5.5.5. Hearing and Speaking Impaired Tests

The Chart Panel allows for communicating with hearing and speaking impaired patients not only during a regular examination, but also when they are being refracted. This mode is designed to enable giving instructions and asking questions of deaf patients. It also allows a proper examination of mute patients.

By displaying green and blue bars at the top and bottom of the display, the Smart Chart makes it a simple task to deliver questions and instructions to the patient. The meanings of these bars can be adapted by each practitioner, according to their needs and the level of patients' disability. Below, we present one way of asking questions and giving instructions. However, if it does not fit your style of examination, change and modify it to make it more useful for you. We also suggest you write down your instructions and present them to the patient before conducting any tests.

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Tests available in Hearing and Speaking Impaired Mode:

| | | | |
|---|---|---|---|
| ABC | 689 | ШЕП | ᴄᴏᴄ |
| ★🚌♥ | | HOTV | |
| | | | |
| | | | |

**Pic. 15.** Hearing and Speaking Impaired Tests

- Sloan letters
- Numbers
- Snellen E
- Landolt Rings
- Standard pictures
- Allen
- HOTV
- Hands
- Symbols
- HYVA

**Sample instructions for hearing and speaking impaired patients:**

## I. Instructions for patients being presented with: Sloan Letters, Numbers and Standard Pictures:

- When two bars, blue at the top and green at the bottom of the display are presented, the examiner is indicating to you that you are going to see two new choices.
- After you have seen both choices, you should decide which one seems clearer and better by pointing with your hand in the direction of the bar which represents the better choice (up or down). It may happen that neither choice seems perfectly clear. That is OK, simply choose which one seems better.
- If neither choice seems better than the other, indicate to both directions.
- The rest of the test will be conducted in this way.

| NOTE ! | With patients able to speak: When the optotype is presented, the examiner is asking you to read it (Letters and Numbers) or name it (Pictures). |

## II. Instructions for patients being presented with: HOTV test:

- When two bars, blue at the top and green at the bottom of the display are presented, the examiner is indicating to you that you are going to see two new choices.
- If you recognize choice one, you are asked to point to an appropriate letter from the chart received from the doctor.
- If you do not recognize choice one, point with your right hand to the side.

| NOTE ! | Professional charts are available from many distributors of visual acuity equipment. The chart can be simply a handout with big letters HOTV printed on it. |

| NOTE ! | . | To obtain more reliable results, matching technique can be applied also to Pictures and Numbers, as there are not many optotypes to choose from. |

The examiners are free to apply to HOTV test the same procedure as with Letters, Numbers and Pictures, but matching technique seems to provide more precise answers.

- If you recognize choice two, you are asked to point to an appropriate letter from the chart received from the doctor.
- If you do not recognize choice two, point with your right hand to the side.
- The rest of the test will be conducted in this way.

### III. Instructions for patients being presented with: Landolt Rings, Snellen E or Hands:

- When two bars, blue at the top and green at the bottom of the display are presented, the examiner is indicating to you that you are going to see two new choices.
- You are asked to point in the direction to which it is 'open' (9 directions in case of Landolt Rings, 4 directions in Snellen E, 4 directions in 'Hands').

e.g. if you see , point to the right.

- You are asked to point in the direction to which it is 'open' (9 directions in case of Landolt Rings, 4 directions in Snellen E, 4 directions in 'Hands'.
- The rest of the test will be conducted in this way.

## 5.5.6. Crowding Bars

There are 24 options of tests with crowding bars:
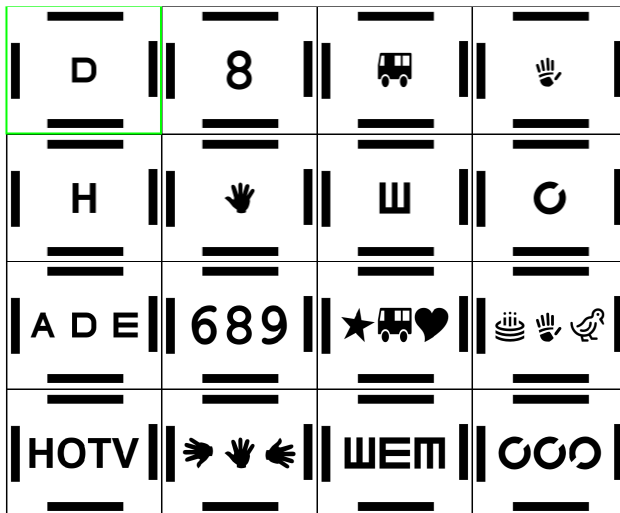


**Pic. 16.** Crowding Bars

1.  To enter a test with crowding bars,  choose one and press 'OK' button.
2.  To display charts with optotypes of different sizes use Up and Down Arrows (Down Arrow – smaller optotypes, Up arrow – bigger optotypes).

•   16 options of tests with crowding bars  are visible on the screen. To move to the remaining 8 tests, go to test in the right-bottom corner and press Arrow Down or Right.

### 5.5.7. Amsler test

There are four options of Amsler test:

- Black bars on white background
- White bars on black background
- Red bars on black background
- Green bars on black background

Use left and right arrows to proceed from one test to another.

### 5.5.8. Animations

There is a wide choice of animations to enable testing children.

- Use left and right arrows to proceed from one animation to another.

### 5.5.9. Colour Pictures For Children

There is a wide range of colour pictures (showing different animals) to enable testing pre-school children. Animals appearing in the test are the most popular ones, to make testing of the youngest children possible.

- Use left and right arrows to proceed from one picture to another.

### 5.5.10. Stereo Images Red-Green

There are installed a few of stereo tests:
- 3D images (seen through red-green glasses)

### 5.5.11. SIRDS – Single Image Random Dot Stereograms
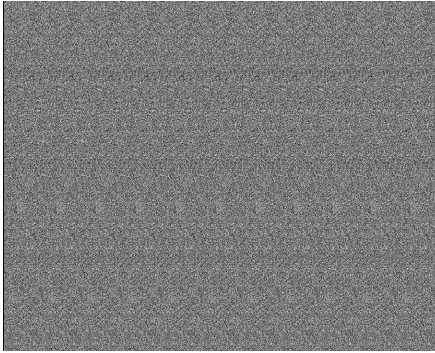


**Pic. 17.** SIRDS Image

Single Image Random Dot Stereograms (*SIRDS, sometimes called Autostereograms*) allow the viewer to perceive three dimensional information using one image.

Autostereograms represent one of the latest approaches to creating the illusion of three dimensions.

# How to view Autostereograms ?

Most Stereogram pictures are usually generated so that if you look at (converge your eyes on) a position twice as far away as the picture, and focus on the picture, generally after a few minutes you see a surprising 3D image.

Most people find this extremely difficult for the first time. You have to focus on a point which is different from where you are looking. This is known as "de-coupling" your vision process. Instinctively people focus at the same point they are looking at, and this is the main obstacle in seeing images of this type.

There are many ways to teach this de-coupling to either yourself or to others, including (in almost no particular order):

NOTE !

It is generally easier to see Stereograms under bright light because your eye relies less on focus under harsh conditions. Another point, to see stereo images, you need to have "passable" use of both eyes. If you wear glasses try with and without them on. Some short-sighted people can see them easier without their glasses on ( if they get closer to the picture ).

### METHOD 1 -  The pull-back

Hold the picture (or move your face) so your nose is touching the picture. Most people can not possibly focus with something this close to their eyes, and they will be content with their inability to focus. With the picture up close, pretend that you are looking straight ahead, right through it. Now slowly pull the picture (or your face) away while keeping your eyes pointed straight ahead. If you do this slow enough, an image usually appears when the picture is at the correct distance.

### METHOD 2 -  The reflection

As mentioned above, with a reflective surface it is sometimes a lot easier to converge your eyes in the correct position. You simply focus on your nose or some central reflection in the picture, and wait until you focus on the image.

### METHOD 3 -  The wall, or the finger

Hold the picture so that it is half between you and a wall. Look over the top of the picture towards the wall, and focus on something such as a picture hook or mark. While keeping this "gaze" either slowly lift the picture or lower your eyes while keeping them converged on the wall.
A similar approach (but for cross-eyed viewing) is to stand arm's length away from the picture and put your finger on the picture. While slowly pulling your finger towards your face, keep looking at your finger, you will notice the picture becoming blurry, and at an intermediate position you will see the 3D image.

### METHOD 4 -  The see-through

If it is possible, photocopy the picture onto a transparency. Then focus through the transparency onto something twice as far away. This is similar to the above method except now you don't need to change the position of your gaze.

## You can't see anything, what now ??

If you don't manage to see the amazing pictures hidden inside  the autostereograms immediately, don't let it get you down. Your brain needs time to switch between 'NORMAL' vision to that of stereoscopic vision. Try not to force your eyes when focusing.

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### 5.5.12. Eye pictures

As a standard there are installed only few Eye images.

### 5.5.13. Description of the IR remote functions

Enter this option to see a clear description of all buttons on the IR remote
.

## 5.6. Ishihara tests

1. Press ⠿ to display first Ishihara test.
2. Press Right Arrow to display next test.
3. Press Left Arrow to display previous test.
4. Press Up Arrow to jump 10 tests forward.
5. Press Down Arrow to jump 10 tests backward.
6. Press ⠿ again, to display test hint.

## 5.7. Street lamp test

1. Press ∴ to display Street lamp test.

2. Press Right Arrow or again ∴ button to display next presentation of Street lamp test.

3. Press Left Arrow to return to previous presentation.

# 6. MASKS

The TCP-2000 Chart Panel allows you to select vertical, horizontal, single optotype, red-green over selected chart of optotypes. Masks are available only for optotype charts with more than one optotype for all Snellen type charts (Snellen, Snellen Modified, Snellen Contrast), Standard Snellen, ETDRS, and Bailey-Lovie Chart.

| HINT ! | Masks can be used with optotype charts only. |

Information that TCP-2000 is in the mask mode is continuously displayed in the left bottom corner of screen. Depending which mask type you are using different shapes are displayed:

- square – single mask
- horizontal rectangle – horizontal mask
- vertical rectangle – vertical mask

To switch off mask simply press button that corresponds to mask type you are currently using.

You can switch from one mask type to another without need of switching off current mask.

## 6.1. Single mask

Allows you to select single mask over selected chart of optotypes.

1.  Press [ ] to activate.

2.  Use Arrows to move mask to the other optotype.

3.  Press [ ] again to deactivate.

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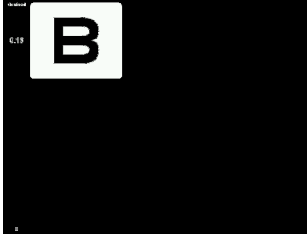
**Pic. 18** Single mask

## 6.2. Horizontal mask

Allows you to select horizontal mask over selected chart of optotypes.

1. To activate press ▬ .

2. Use Arrows to move mask up and down.
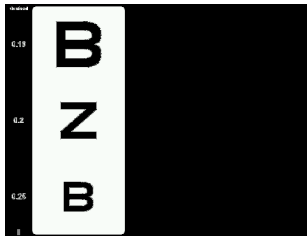
3. Press again ▬ to deactivate.



**Pic. 19** Horizontal mask

## 6.3. Vertical mask

Allows you to select vertical mask over selected optotype chart.

1. To activate press [■] .

2. Use Arrows to move mask in any direction.

3. Press again [■] to deactivate.



**Pic. 20** Vertical mask

WARNING !      Masks are not available for LogMar Modified type chart, ETDRS chart and Standard Snellen chart (in 'Other Tests'). Instead there is an option of underlining:

- a single optotype (with [□] button)

- a line (with [▬] button)

## 6.4. Red-green mask

Select any optotype chart.

1. Press [icon] to activate mask.

2. If you have red-green mask active you can still use Arrows to change optotypes.

3. Press again [icon] button to change the colour of the mask.

4. Press [icon] again to deactivate mask.

WARNING !     Red-green mask can be used only with optotype charts.

WARNING !     You can not display red-green mask over chart with only one optotype.



**Pic. 21** Red-green mask

# 7. SOFTWARE VERSION

Information about current version of chart panel software is displayed in right bottom part of Configuration Menu screen.

# 8. TROUBLESCHOOTING

All possible failures are listed in table.

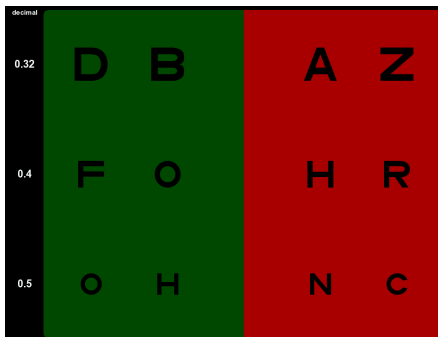| No | Failure | Cause | Action |
|---|---|---|---|
| 1 | TCP-2000 Fails to operate when connected to the mains ( Power LED is OFF, no BEEP sound after power ON ) | Power cord broken or power cord not connected or no voltage in mains. | -Check power cord<br>-Check power cord connection<br>-Check main voltage in wall socket. |
| | | -Mother board or power supply defective. | - Call service. |
| 2 | Device fails to operate ( Power LED is flashing durin power-up process and then stays ON ) | -LCD backlight broken<br><br>-LCD screen broken or control electronics broken | - Call service.<br><br>- Call service. |
| 3 | IR remote fails to operate | - Faulty battery<br><br>- IR remote broken<br><br>- IR receiver faulty<br><br>- Mother board broken | - Check and replace battery<br><br>- Replace IR remote<br><br>- Call service.<br><br>- Call service. |
| 4 | Message:<br>Failed to start | | Turn off Chart Panel by pulling of power plug. Wait two seconds and plug in power cord. If problem remains – call service. |
| 5 | Message:<br>Fatal error | | Turn off Chart Panel by pulling of power plug. Wait two seconds and plug in power cord. If problem remains – call service. |
| 6 | Message:<br>ERROR - FIRMWARE UPDATE FAILED | | -Call service |
| 7 | Message:<br>Removable not opened | -Broken Usb Pen Drive<br><br>-Mother board or power supply defective. | -Check or replace USB Pen Drive<br><br>-Call service |

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# 9. WARNINGS

- Exercise care to locate the Chart Panel away from any hazardous sources.

- It has been tested to the following specification: EN 60601-1-2:2001+A1:2006 Medical electrical equipment. General requirements for basic safety and essential performance.

- Excessive interference may affect the Chart Panel operation. If it occurs the failure cause shall be removed.

- Fix the Chart Panel securely. If the Chart Panel falls down, do not use it because the absence of external damages does not mean there is no damage inside.

- Do not immerse in water.

- Do not sterilize or autoclave the Chart Panel.

- Do not expose the Chart Panel to direct sunlight.

- Do not place near heat source.

- Do not cover ventilation holes.

- Do not allow entry of fluids in the panel.

- External electromagnetic interference may cause the device to stop working. If above situation occurs during patient examination, this is not a threat to patient safety. Device should be restarted and examination must be conducted from the beginning.

# 10. CHART PANEL MAINTENANCE

## 10.1. Cleaning

• When carrying out cleaning, the CHART PANEL shall be switched off and disconnected from mains. After cleaning wait at least one minute before switching on the chart panel. Cleaning shall be carried out using a piece of cloth moistened with cleaning solution. Do not use organic solvents for the external cleaning of the Chart Panel such as petrol, alcohol etc.

• The Chart Panel shall not be turned over because the cleaning solution can enter it.

• The Chart Panel shall not be autoclaved.

• This Chart Panel is a high-precision optical instrument, which is made up of many electrical parts, therefore it is absolutely necessary that all care is taken during cleaning.

WARNING !     When any liquid is spilled onto the Chart Panel the device shall be immediately cleaned using a pad of gauze. After cleaning, check for the absence of liquid in the mains socket. The presence of liquid can cause shortening of the contacts. Clean the main socket using a dry pad of gauze and then reconnect the Chart Panel to the mains.

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## 10.2. Repairs

• In order to ensure long life time of Chart Panel, it is necessary to check periodically its status and replace the parts if damaged.

• In the case on any fault of the Chart Panel immediately consult the Manufacturer or the dealer.

• Repairs of the Chart Panel or periodical part replacements must be done according to this Operation Manual.

• Disposal of the device, or parts of it, should be done according to local environmental and waste disposal regulations. Do not dispose to the nature. Do not send back to the manufacturer. Chart Panel components do not pose hazard to environment and can be safely disposed in accordance with hospital protocol.

## 10.3. Checking

• Manufactures recommend periodical checks, at least one a year, which entails a check up on the electrical safety parameters (leakage current, resistance of the earth terminal, etc.).

• Functional check – not less than once a year. It should be performed by biomedical technicians of the hospital.

## 11. WARRANTY

• The Manufacturer warrants the high-quality workmanship of the Chart Panel for a period of 12 month after the purchase date.

• The Manufacturer or its authorized representatives takes obligation to carry out the warranty repair of the Chart Panel or to replace it with an operational one in case the Manufacturer or its authorized representatives determines that the cause of Chart Panel's failure was related to the manufacturing process.

• If the Buyer find a defect in the Chart Panel during the Warranty period, he must report it and inform Manufacturer or its authorized representative within 30 days.

• A Chart Panel sent for testing, repair or replacement shall be submitted to Manufacturer or its authorized representative in its original or equivalent packaging. The Chart Panel is sent for repair and back at Buyer's expense.

• If no defect is found during testing, the Manufacturer or its authorized representative reserves the right to submit the invoice to the Buyer for the work carried out.

• This Warranty is not applicable to Chart Panel when failure was caused by violations of requirements of this Operation Manual, by mains voltage non-conformity to the requirements of IEC, by spills of liquid, by mechanical damages caused by shock or a Chart Panel being dropped, by Chart Panel damages during transportation, or when packaging is damaged.

# APENDIX A

## PACKAGE CONTENTS

| No | Spare part | Picture ANNEX/LETTER | Part Number |
|---|---|---|---|
| 1 | IR remote | Not shown | 40-21108.02 |
| 2 | AC Power cord 2m | Not shown | 06-49011 |
| 3 | Red – Green glasses | Not shown | 33-07012.01 |
| 5 | Battery for remote control | Not shown | 06-35002 |
| 6 | Operating manual English | Not shown | 40-90000.02 |
| 7 | Children picture card ALLEN/HYVA | Not shown | 96-74938.01 |
| 8 | Children picture card HANDS/FREY | Not shown | 96-74936.01 |
| 9 | Children picture card LEA/HOTV | Not shown | 96-74934.01 |

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