Stepchart: Applied Image and ISO charts

In addition to linear reflective and transmission step charts, Stepchart (in Imatest Master) can analyze the tonal response and noise of a number of additional charts, all but one of which are available from Applied Image. These charts are described below.

QA-61	**REFLECTIVE SCANNER TEST CHART** (ISO-16067-1)	
Data:	Size 100mm x 152mm (4in x 6in); Designed to ISO-16067-1 specifications. Includes Landolt Ring, alphanumeric resolution and slant edge charts; grey step patches, horizontal, vertical and slanted ronchi patterns (6 – 40 c/mm) plus the APPLIED T-100 Digital Electronic Pixel target.	
Notes:	Used for determining reflective light resolution & imaging characteristics of digital scanning systems. For full description, see QA-61 Product specifications.	
	Part No. QA-61-ISO-16067-1-P-RP	**Overall Size** 102 x 152mm (4 x 6in)	**Material** **R**eflective **M**aterial

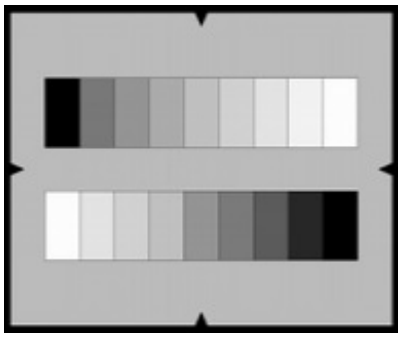
QA-62

QA-62	**SLANT EDGE TARGET** Slant Edge Scanner Target with Grayscale SFR & OECF #2 Ideal for evaluation response of digital systems to the slanted sharp edge function and used for MTF analysis.
Data:	Size 75mm x 75mm (3in x 3in) 25mm dark grey square rotated (5 degree) on a light grey background; surrounded by 20 nine-mm square grey scale patches.
Notes:	Ideal for evaluation response of digital systems to the

slanted sharp edge function and used for MTF analysis. For full description, see QA-62 Product specifications.

Part No.	Overall Size	Materia
QA-62-SFR-P-RP	95 x 76mm (3.75 x 3in)	RP – photo paper

ST-51 EIA Grayscale



ST-51	EIA HALFTONE GRAY SCALE

Data: The EIA grayscale pattern is a standard 2″ square projection slide. It contains two parallel gray scales. The upper scale has nine nominally equal transmission steps while the lower contains the same numbe of nominally equal density steps The transmission values range from 3% to 60%, corresponding to density values of 1.52 and 0.22 respectively. The slide is chrome on glass and densities are achieved by a fine halftone pattern. Densities can be found here.

Part No.	Overall Size	Material
ST-51-CG	50mm x 50mm	Reflective Material

ST-52

ISO-14524 12-patch

ST-52	ISO DIGITAL CAMERA CONTRAST CHART

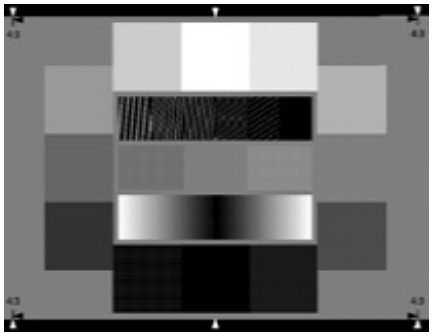
OECF target (circular)

Data: This Camera Contrast Chart conforms to International Standard ISO-14524, *Photography – Electronic Still Picture Cameras – Methods for Measuring Opto-Electronic Conversion Functions (OECF)*.

Notes: Chart features 12 gray levels on a durable material. Densities range from 0.10 to 2.30.

Part No.	**Overall Size**	**Material**
ST-52-RM	356mm x 200mm	**R**eflective **M**aterial

ISO-15739 Noise target

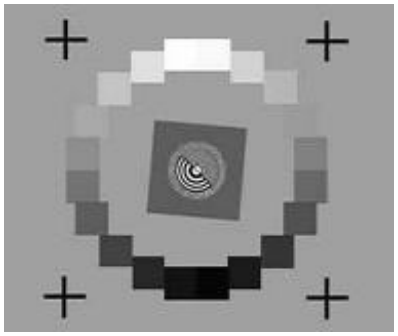


This is a 15-patch grayscale step chart with 1 of the patches in a somewhat elliptical arrangement on the periphery and three in ar inside row. Nominal patch densities are 0.1, 0.19, 0.3, 0.41, 0.53, 0.66, 0.81, 0.97, 1.17, 1.39, 1.66, 2.0 for the 12 peripheral patches and 0.77, 0.90, 1.05 for the three central patches. The relatively large patches are especially good for measuring noise. All Stepchart measurements are supported. Available at the Imatest Store.

There is some additional information on the I3A.org Resources page.

Portion of proposed low-contrast ISO 12233 chart

20-patch OECF targets (circular)

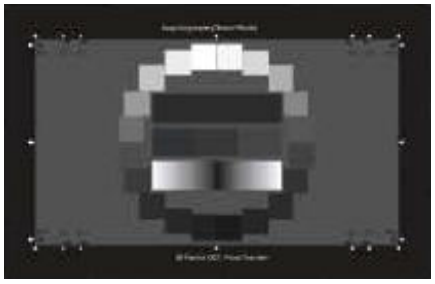


Several charts use this 20-patch arrangemer

(upper) Portion of proposed low-contrast ISC 12233 chart

When **OECF 20-patch circular** is selected i the input dialog box (below), one of the following chart contrasts should be selected i the box just below the **OECF 20-patch** radio button.

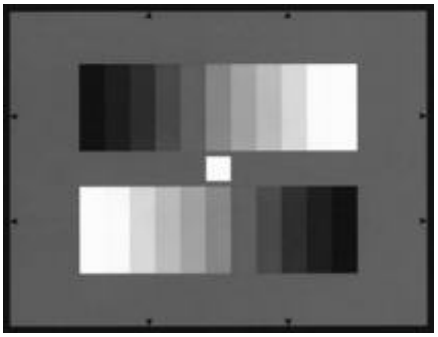
TE241



TE 241	Available from Image Engineering/Esser Test Charts. Transmissive chart. 12600:1 contrast ratio. 0 ≤ density ≤ 4.1
Low contrast 20:1	From ISO/DIS 14524, Table A3. 0.1 ≤ density ≤ 1.4
Standard reflection 80:1	From ISO/DIS 14524, Table A3. 0.1 ≤ density ≤ 2.0
Normal contrast 160:1	From ISO/DIS 14524, Table A3. 0.1 ≤ density ≤ 2.3
High contrast 1000:1	From ISO/DIS 14524, Table A3. 0.1 ≤ density ≤ 3.1

(lower) Esser Test Charts TE241

ITE Grayscale



Comes in two versions: Type I: gamma = 0.4 and Type II: gamma = 1.0. Available from DN (Japan), Zonetech (Korea), and Image Engineering/Esser Test Charts(Germany), where it is designated TE 83 and TE 84.

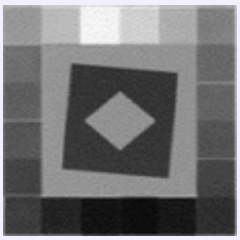
When **ITE Grayscale** is selected in the input dialog box (below), either **ITE Grayscale I: gamma = 0.45** or **ITE Grayscale II: gamma 1.0** should be selected in the box just above ITE Grayscale radio button.

Instructions for Applied Image/ISO charts

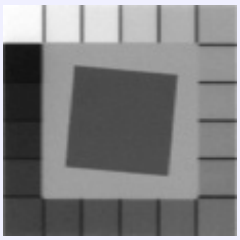
Run Stepchart in the usual manner by clicking on in the Imatest main window.

Select the approximate crop region, which should include the grayscale patches and no more. Ignore any crop or selection marks. The crop does not have to be accurate; a find adjustment dialog box will appear later. If the crop aspect ratio is less than 3:1, Stepchart recognizes the chart as one of the Applied Image/ISO charts.

Cropping illustration for the five targets
The initial crop should include the grayscale patches and no more. It does not have to be accurate: selected,a fine adjustment dialog box appears.



QA-61 ISO-16067-1 Scanner



QA-62

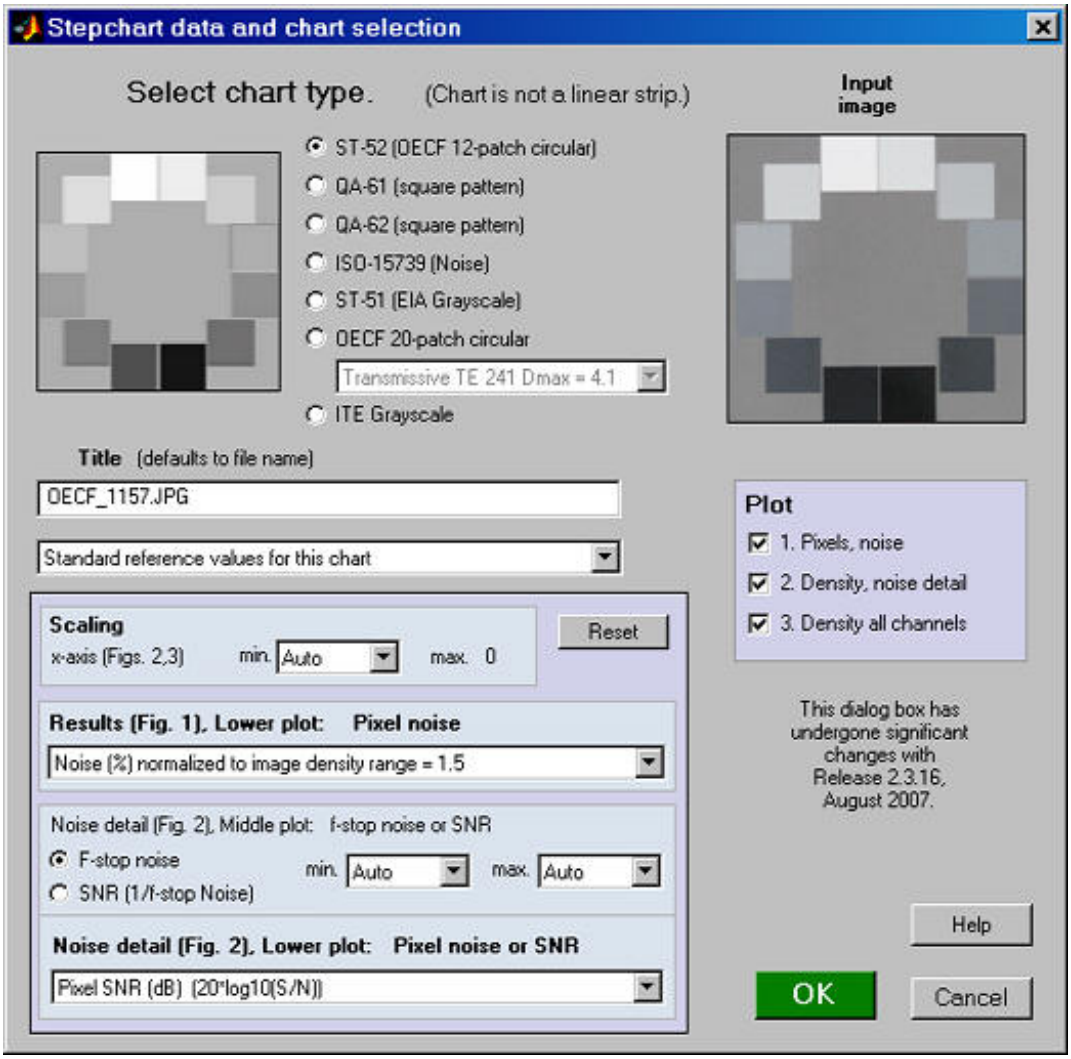
ST-51
EIA Grayscale

ST-52
ISO-14524
12-patch OECF target

20-patch OECF targets

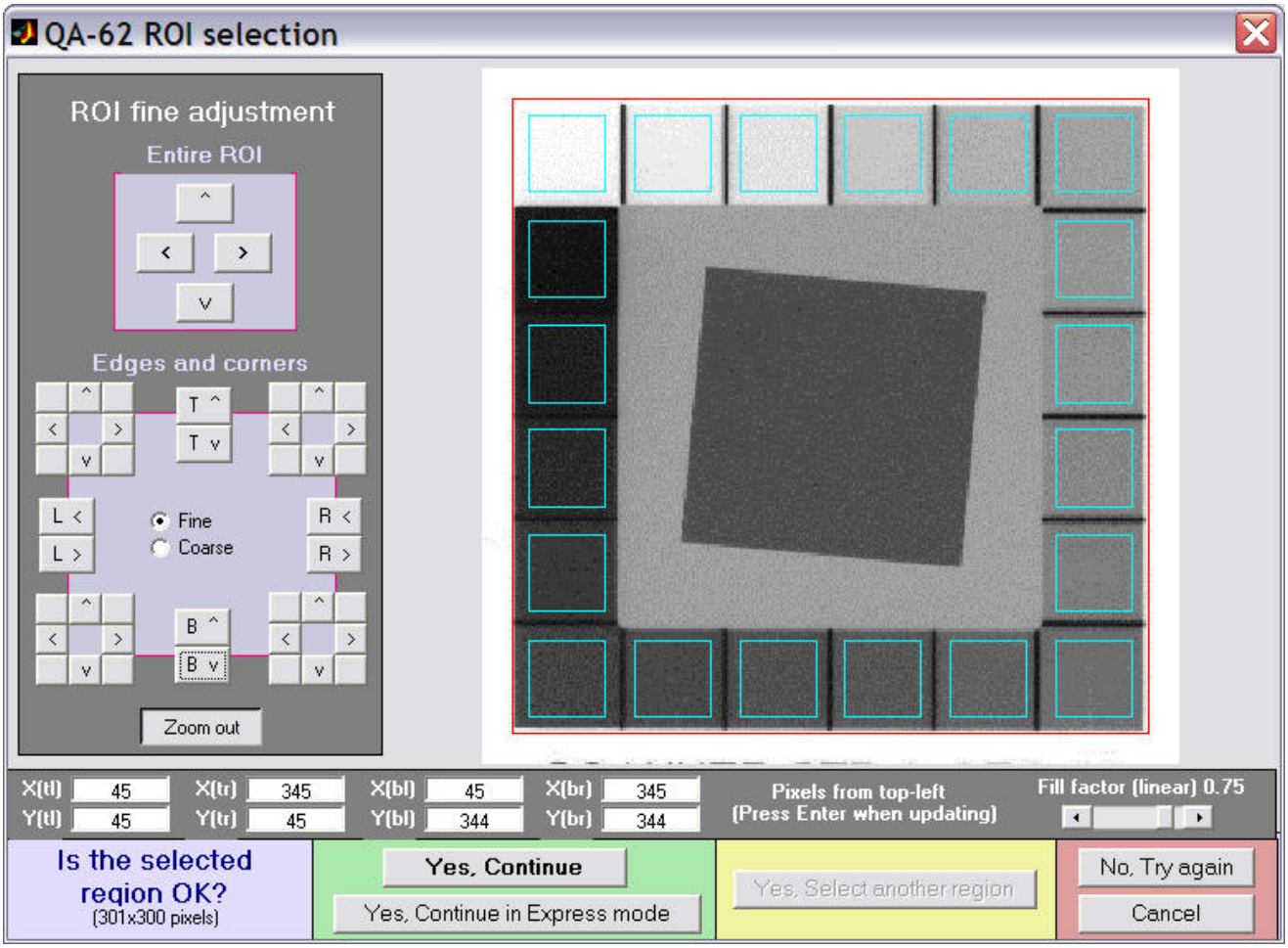
ITE Grayscale

The dialog box shown below appears. The cropped input image is shown on the right. Select the appropriate chart type using the radio buttons in the middle. The image on the left illustrates the chart type: the patches should match the input image on the right.



You can change the title if needed. You can select a file for reference density values if you choose not to use the standard values. The file should contain patch densities, one per line. The patch order is given below. The scaling box affects the x-axis and noise plots in Figures 2 and 3. It is identical to the standard Stepchart input dialog box. If you choose OECF 20-patch circular, choose one of the contrast settings listed in the above table.

If you click , the fine ROI selection box, shown below appears. You can move the entire ROI using one of the buttons on the top left: , , , or . You can move the top margin with or , the bottom margin with or , etc. Corners can also be adjust individually: useful in the presence of perspective or lens distortion. ***Author's note:*** I would have liked to be able to click and drag on lines or corners, but the limitations of the Matlab interface didn't allow this.



You can enter X and Y values for the corners (tl = top left, etc.): be sure to press Enter for each value if you do. The size of the selection is shown on the lower left. **Fill factor (linear)** (on the lower right, just above) sets the size of the squares. It defaults to 0.7. It can be increased to obtain more samples for noise analysis, but it may need to be reduced if the image is tilted or distorted. The Distortion slider allows highly distorted (barrel or pincushion) images to be analyzed. Fill factor may have to be reduced in the presence of extreme distortion.

When the squares have been adjusted, click , , or .

The Output is the same as for standard linear step charts.

Patch order for the five targets

The table below shows the patch order for the targets. Use this order when creating a custom density file.

Orientation and numbering of patches for monochrome targets			
1 2 3 4 5 6 7 20 8	1 2 3 4 5 6 20 7 19 8	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	1 2 3 4 5

19 8 18 9 17 10 16 15 14 13 12 11	18 9 17 10 16 15 14 13 12 11		6 7 8 9 10 11 12
QA-61 ISO-16067-1 Scanner	**QA-62**	**ST-51 EIA Grayscale**	**ST-52 ISO-14524 OECF target**
3 1 2 5 4 7 6 9 8 11 12 10	3 1 2 4 5 6 7 8 9 10 11 12 13 14 15 16 17 19 20 18	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	
ISO-15739 Noise target	**20-patch OECF targets**	**ITE Grayscale**	