Focus test chart

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The latest version is always available at http://FocusTestChart.com

What is back focus?
Back focus is when you shoot a pic like this one, expecting to get the result shown on the left but, instead, you get the result on the right.

That's back focus. Your focus is set to a distance further back than your subject. You're focused behind, or to the back of, your subject. (Front focus is simply where everything's the other way around.)

It's VERY annoying to shoot your pic of the day of your wife/husband/child/friend and then find out that their face is out of focus but their ears are tack sharp. Not nice.

There are many things that can cause this problem and almost all of them can be chalked up to operator error. Occasionally though, the camera and/or lens is to blame and that's what this test is for.

The D70
Although this test was originally devised in response to the back focus issue that manifest in some Nikon D70 cameras, it can be used to check any camera.

Human nature is such that when we're happy with a new toy we tend to simply enjoy it quietly but, if our new toy gives us grief, we want to tell everyone who'll listen. And some who won't.

So, in evaluating Internet discussions on the back focus issue, one has to be careful not to be misled into believing that every D70 suffers from back focus just because it's a hot topic.

The truth is that only a minority of D70s have been faulty in this regard. The majority work just fine.

Why this test then?
Well, if you're a new D70 owner and have read all about the trials and tribulations of other D70 owners who have the dreaded back focus then you probably want to know if YOUR new baby suffers from it or not.

Most people who think their D70 has back focus are mistaken. (Please note that I said *"most"*, not *"all"*.)

In other words, they're in a tizz for no reason. If they're having problems then, usually, it's operator error.

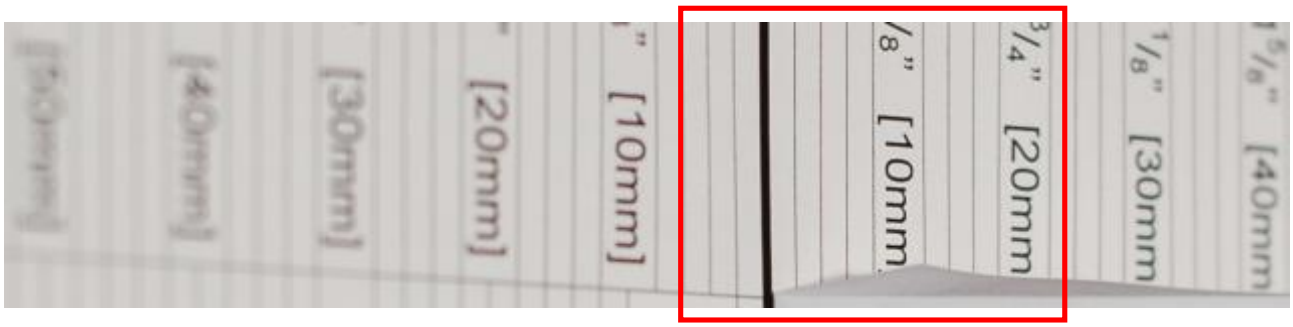
This test is intended to help any curious D70 owners check their cameras in order to either heave a sigh of relief that their D70 is fine or to arm themselves with the info needed to return their D70 for exchange or recalibration.

Interpreting your results
Once you've read this all through, assembled your test chart, and have taken a bunch of pics you'll want to know what they mean.

When you view your test pic/s, you should be able to *clearly* see that part of the chart is in focus, and that it gets obviously and progressively more out of focus as you move away from the in-focus part, to the left and to the right, as in this example:

If the area that's in focus is more or less centred around the focal plane of the chart, as in the above pic, then all is well.

It's quite normal, particularly with longer focal lengths, to see the focused area, or depth of field, shifted slightly rearward, as in this next pic. This is not a problem and is quite normal, as long as the focal plane is still within the area that's in focus.



However, if it's extreme, and the focal plane itself is out of focus, as in this next pic, then you have a back focus problem:

If you get what you see in this next pic, then you have a front focus problem.

Ok, now you know! So go get snippy with those scissors, get your chart assembled and take some test pics.

Read on.

Instructions

WARNING!
There are many factors that can lead to erroneous and misleading results when doing this test. Make sure you **read the instructions carefully** and follow them in detail.

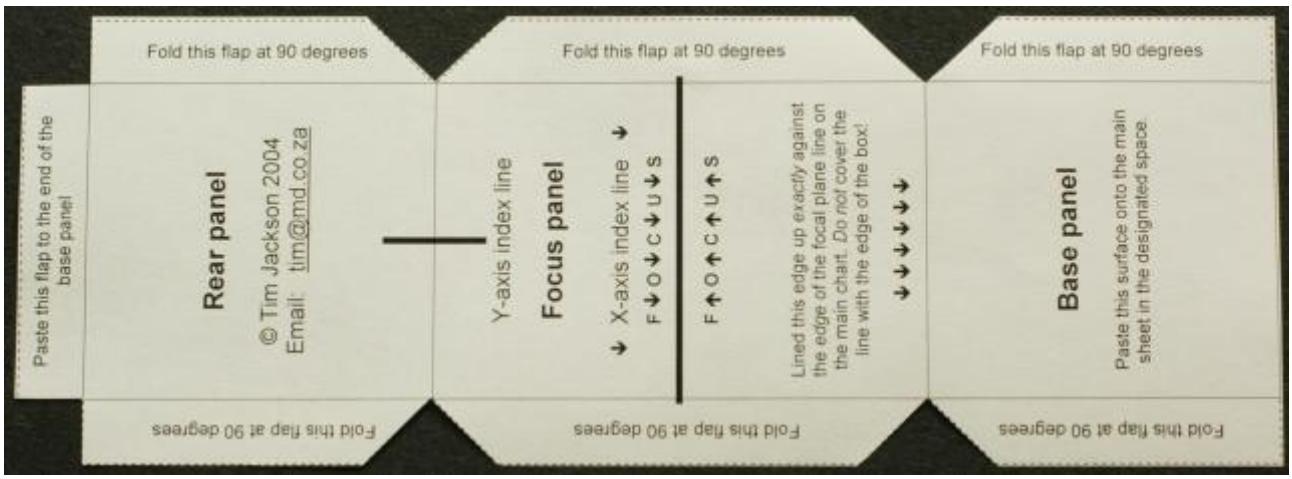
Pay particular attention to the points dealing with the setup and positioning of the chart and camera. Failure to do this will render the test less than meaningful.

1. Print out this document.

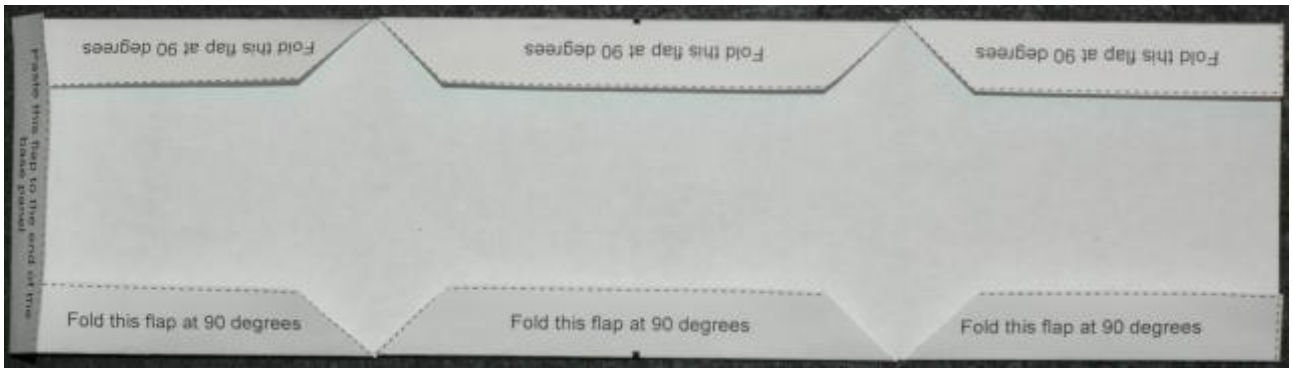
2. You should then have:
   a. These instructions.
   b. The test chart.
   c. The focus box cut-out template.

3. Additionally, you will need:
   a. A pair of scissors.
   b. Glue / paste.

4. Cut out the focus box (the last page of this document), and snip off the corners of the fold-down flaps at more or less 45 degrees, as shown in the following picture:



5. Crease all the fold lines by first folding over the side flaps like this:



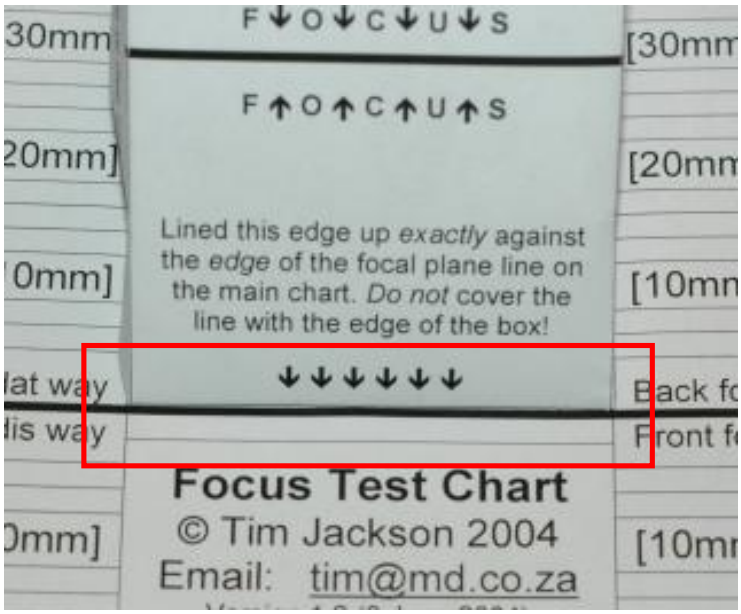
6. Then fold over the rear panel and the base panel.

7. Now you can open it all up, apply glue to the end flap and finish off your focus box.

   The side flaps should be at right angles to the panel they're attached to.

   They are there purely to provide a bit of rigidity to the box so that it isn't all floppy.

8. Now you need to apply glue to the area on the chart where the focus box will be attached and then fit the focus box in position. Pay special attention to lining up the front edge of the focus box against the edge of the focal plane line. The edge of the box just touches the edge of the line. Do not cover the line. It should look like this:

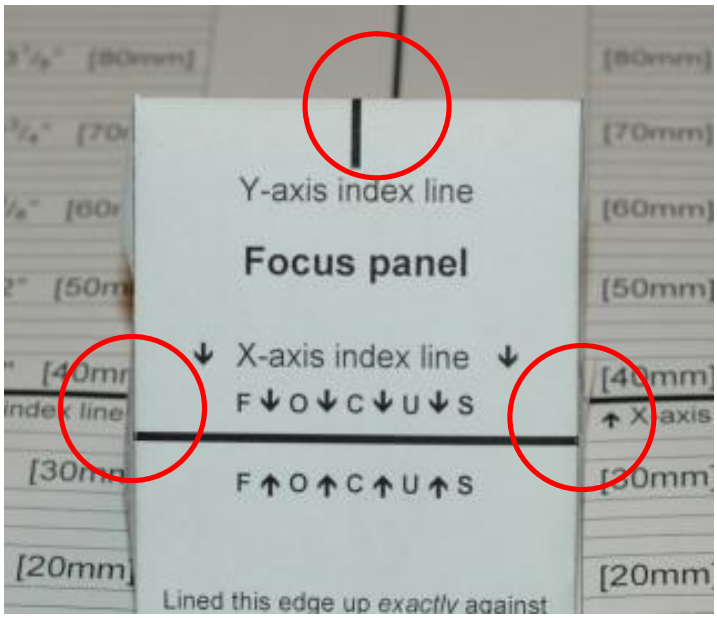


9. Your test chart is ready to go! Attach it to a vertical surface. A door is good and provides an easy way to adjust the angle by simply opening or closing the door a small amount.

10. Position your camera on a tripod so that the lens is at exactly the same height as the focus box. I suggest moving the tripod as close to the focus box as you can get it and adjusting the height of the tripod until your lens is at the same height as the focus box.

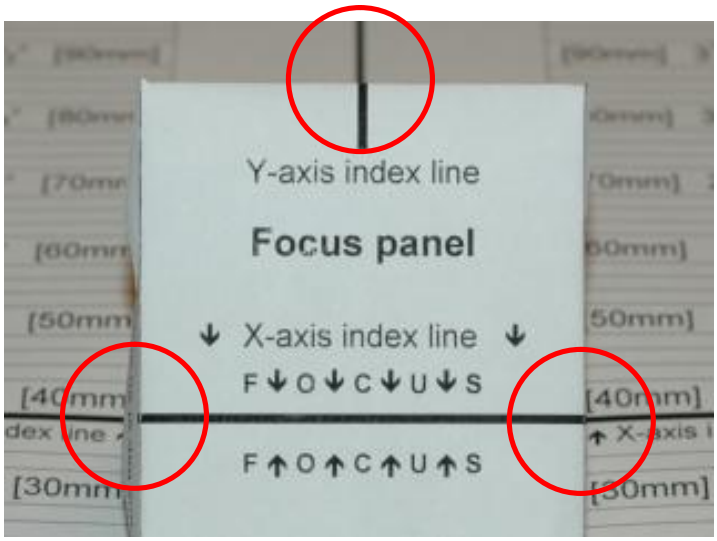
11. Now move your tripod back a bit, to where you expect to shoot from. The exact distance will be determined by how close you need to be so that you get a nice large view of the test chart and how close your lens will allow you to get while still being able to focus.

12. In order to ensure that your camera is positioned square-on to the focus panel, the focus panel and the test chart behind it are equipped with alignment index lines for both the X and Y axes.



The upper picture shows where the index lines are and what they look like when not aligned.

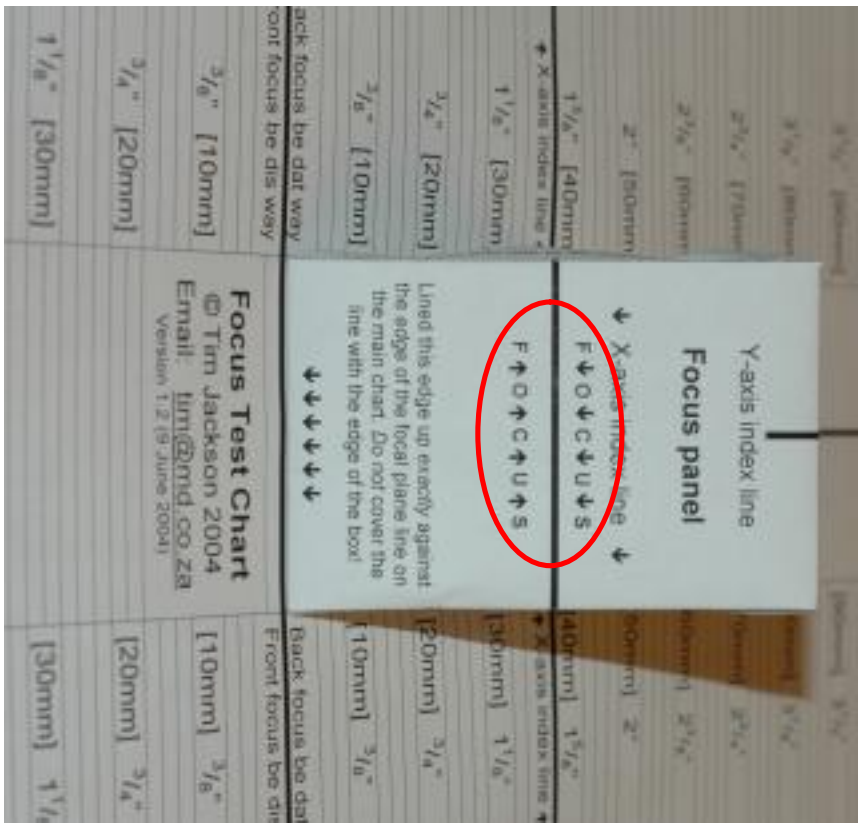
The lower picture shows them lined up correctly.



You need to adjust the horizontal and vertical position of your camera until you get both the X and Y axis index lines aligned correctly.

This will ensure that you are square-on to the focus panel and that the chart is at 45 degrees to your camera.

13. Focus on the centre of the focus panel, on the X-axis index line.



14. When shooting your test pics, you need to be close enough that the test chart somewhat more than fills the frame.

    Don't be afraid of getting close.

    N.B. Ensure that you are not so close that the auto focus system is unable to focus due to you being at the limit of the range of focus of your lens.

    You can check this by moving your camera closer and closer to the image and testing when it is no longer able to focus and then making sure that you are set up at least a few inches back from this point.

15. Set your camera to aperture priority mode ("**A**" on the rotary dial) and adjust the aperture setting as wide as it will go (lowest f-stop number) for the lens you have on the camera. This gives you the shallowest depth of field, which is crucial to this test.

16. Set the Autofocus system to "AF-S" mode (CSM Menu item 2).

17. Set the AF-area mode to "Single area" (CSM Menu item 3).

18. Metering mode and centre weighting is not critical. As long as you're getting a well lit, bright image out of the camera then it's fine.

19. Ensure that you have the centre focus area selected. If not then adjust this using the multi selector button (up/down/left/right). The focus selector lock switch (just below the multi selector button) must be unlocked in order to change/select the appropriate focus area.

20. If you have extra lighting available, use it to light up the test chart. The chart must be lit more or less from the front. I like to use a bright constant light source, like a halogen flood or similar, but the flash seems to work just fine too. If you're going to depend on the flash then make sure there's enough ambient light for the auto focus system to work reliably.

21. Look at the pics you get. Make sure they're bright and white. Adjust your white balance and exposure compensation settings to get a nice bright, white image.

22. Use either the remote control (if you have one) or the camera's self timer to trigger the shutter release in order to avoid any camera shake.

23. Test away! If you need more info on the whole subject and how to interpret the results then trawl the D70 forum at DP Review, searching for "back focus" or "backfocus" and you'll be deluged with info.

You're also welcome to email me at: tim@FocusTestChart.com.
I'm happy to look at your test pics and to offer an opinion.

By the way: If you happen to measure the spacing of the lines on the chart you'll notice that they are further apart than the markings suggest. This is deliberate. When the chart is at 45 degrees to your camera, the spacing becomes correct. This is done so that when you see those markings in the resultant image you can read them as-is without having to make extra calculations. They're pre-compensated.

Tim

4” [100mm]		[100mm] 4”
$3^1/_2$” [90mm]		[90mm] $3^1/_2$”
$3^1/_8$” [80mm]		[80mm] $3^1/_8$”
$2^3/_4$” [70mm]		[70mm] $2^3/_4$”
$2^3/_8$” [60mm]	Y-axis index line Align this with the Y-axis index line at the top of the focus panel.	[60mm] $2^3/_8$”
2” [50mm]	X-axis index line Align with X-axis index line on focus panel.	[50mm] 2”
$1^5/_8$" [40mm]	↓↓↓↓↓↓↓↓↓↓	[40mm] $1^5/_8$"
↑ X-axis index line ↑	↑↑ Rear panel of focus box ↑↑ goes here	↑ X-axis index line ↑
$1^1/_8$” [30mm]		[30mm] $1^1/_8$”
$^3/_4$” [20mm]	Attach focus box here	[20mm] $^3/_4$”
$^3/_8$” [10mm]		[10mm] $^3/_8$”
↑↑↑↑ Back focus be dat way	Focal plane ↓↓↓↓↓↓↓↓↓↓	Back focus be dat way ↑↑↑↑
↓↓↓↓ Front focus be dis way	**Focus Test Chart** © Tim Jackson 2004 Email: tim@FocusTestChart.com Version 1.2 (9 June 2004)	Front focus be dis way ↓↓↓↓
$^3/_8$” [10mm]		[10mm] $^3/_8$”
$^3/_4$” [20mm]		[20mm] $^3/_4$”
$1^1/_8$” [30mm]		[30mm] $1^1/_8$”
$1^5/_8$" [40mm]		[40mm] $1^5/_8$"
2” [50mm]		[50mm] 2”

Cut out around the outside, following the dotted lines.

The flaps down the sides should be folded at ninety degrees to the panels to give the box extra rigidity. Alternatively you can paste the whole thing onto a piece of card before cutting it out and folding it.

A little snipping of the corners at each end of each flap will be required to prevent them snagging on each other when you fold the box.

Take special care when making the folds. They need to be straight and sharp. The final box should have perfectly straight edges and flat surfaces. A sloppily made, wonky box is not good.

When you attach the focus box to the chart, make sure you have glue all around the edges to ensure that the box doesn't pull away from the chart.

The fit and finish is all important. Remember that we're measuring millimetres here and the details matter!

When you attach the completed chart to a vertical surface, such as a door, you need to "stretch" the chart and put adhesive tape around all sides to make sure it sits flat against the door with no bumps or bulges.

Everything must be smooth, sharp, even, square etc.