

# DSLR Film Scanner, 6x9 (DFS69)

## Assembly Instructions



# What is the DFS69?

The DFS69 is a device for digitizing (or “scanning”) analog film using a DSLR or mirrorless camera with a macro lens. The acronym, DFS69, is derived from **D**SLR **F**ilm **S**canner, **6x9**.

The DFS69 was developed as a companion to the MP120TC 3D printed 120 film technical camera. The idea is, once you have the camera printed and you’re using it, you’ll likely want a way to get the images you shot into a computer for editing. The DFS69 allows you to do this.

# Features

- It's designed to be 3D printed on virtually any 3D printer, without supports and without heat-set threaded inserts.
- It uses an inexpensive VIJIM VL120 LED video light by default (95+ CRI, 3 hours on a full charge, adjustable color temperature and brightness).
- It can support any format: 35mm, 6x4.5, 6x6, 6x7, 6x8, and 6x9. You just need to print the correct carrier and top plate for your format.
- It holds your film firmly (but not too firmly). The top plate is held to the carrier using mini magnets, and the film rides in a 0.16mm deep channel. That's roughly the same thickness as average roll film. The film isn't squashed between the plates, but is held flat enough that depth of field can accommodate any residual film curl.
- The carrier assembly is positioned on the light spacer using 4 pins, so you can quickly and easily adjust your film position and dust it.
- The light has a mixing box and extra diffuser to ensure even lighting and evenly distributed color
- It can easily be used with a different light source. If you have a good light panel/box already, you can just print the spacer and the carriers you need. Or, you can redesign the lighting base to use whatever light source you want.
- It's FREE! You can get STL or STEP files from <https://williamskg6.wixsite.com/mp120tc/about-4>

# Supplies Needed

## **To build a DFS69, you will need the following:**

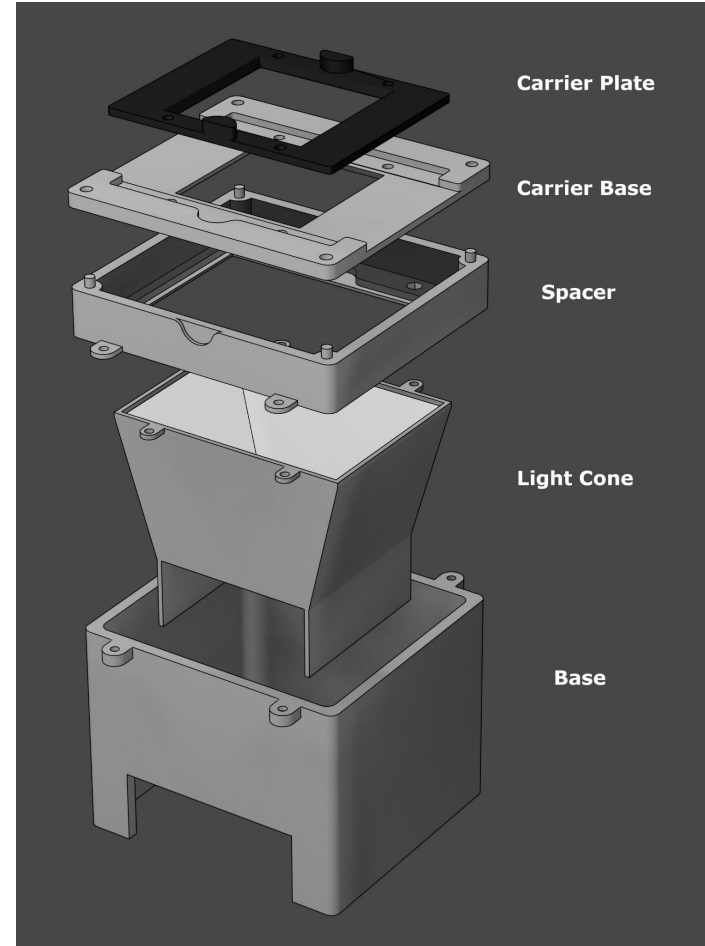
- A well-calibrated 3D printer capable of printing 120mm x 120mm x 100mm. An example might be a Creality Ender 3 or clone.
- At the least, neutral grey filament. You may want to use black filament for some parts, and in fact the whole assembly can be made of black filament if desired. Some parts, such as the base, can be any color you wish.
- 8X mini disc magnets for each film carrier, 4mmx2mm in size
- 8X M3 nuts and 8X M3x8mm screws
- A piece of 100mm x 75mm x 3mm translucent (not transparent) acrylic for the secondary diffuser
- A VIJIM VL120 light
- Flat Black and Flat White paint

# Parts - Carrier

The film carrier consists of **2 parts**: the **base** and the **plate**. The plate affixes to the base using 4 mini magnets. For any specific film size, you will need to print the appropriate carrier plate and matching carrier base.

The carrier assembly mounts on the spacer via 4 pins on the corners of the carrier base. This way the carrier can be easily removed for positioning and dusting the film.

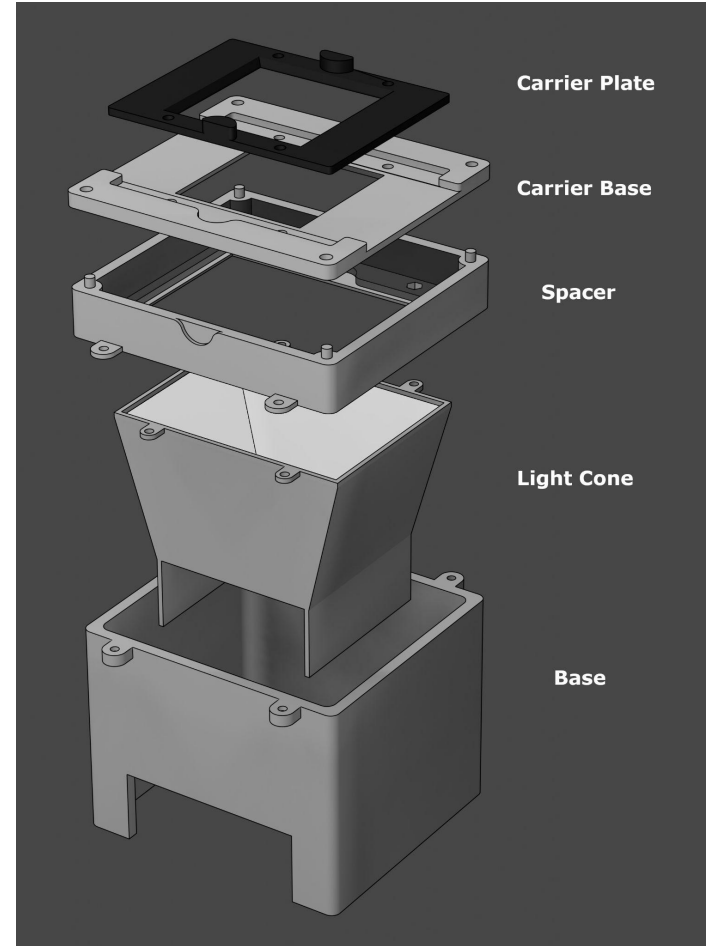
Carrier files for 35mm, 6x4.5, 6x6, 6x7, 6x8, and 6x9 are provided.



# Parts - Spacer

The spacer positions the carrier up away from the light source so that dust/scratches and surface texture of the light source is far enough away from the film to be out of focus. In the default configuration, it also holds the translucent acrylic secondary diffuser, which sits in an inset, but is easily removed for cleaning/dusting.

The spacer includes 4 insets for captive M3 nuts to allow screwing the light cone to the bottom of the spacer. It also includes 4 external tabs for the purpose of attaching the base with M3 screws.

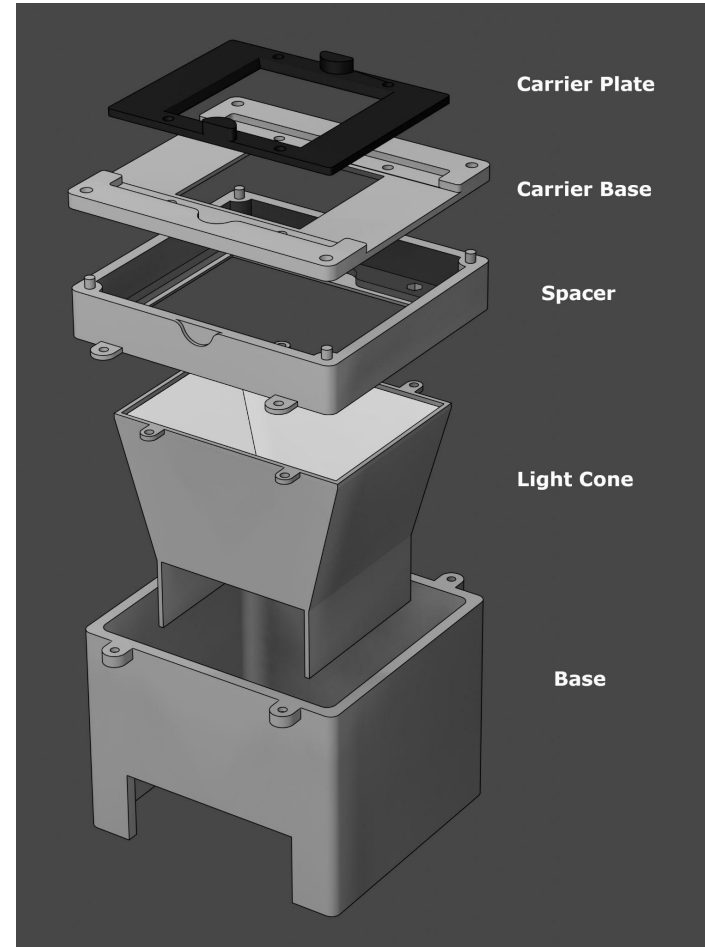


# Parts - Light Cone

The VIJIM VL120 is a LED video light, which is quite bright and has a built in diffuser. Unfortunately the built-in diffuser is insufficient for use in film scanning since you can still make out the individual warm and cool LEDs in the array.

The light cone serves three purposes:

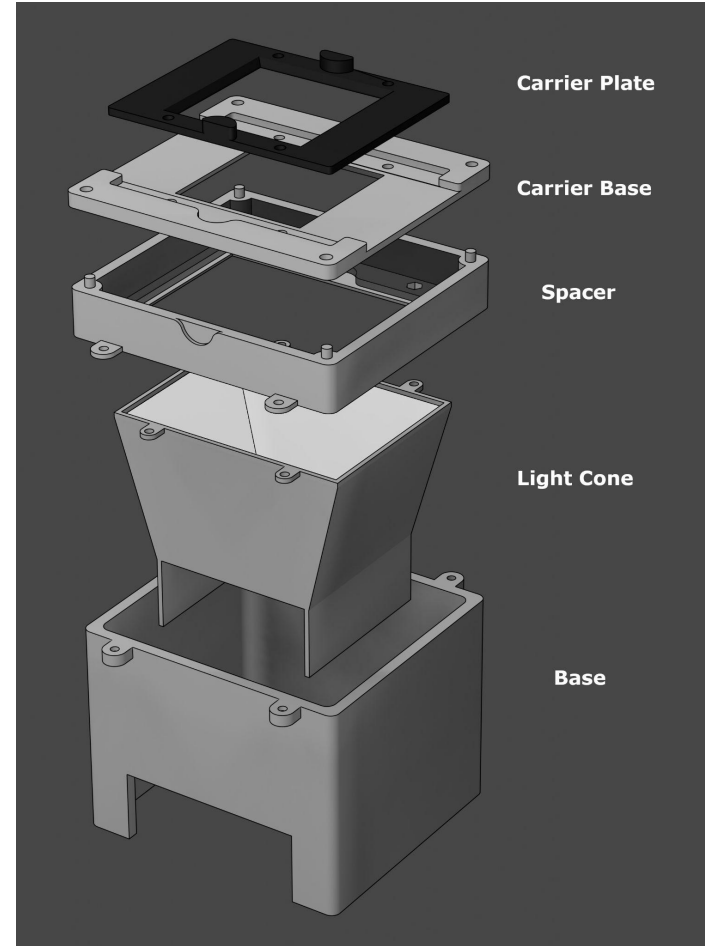
1. It positions the light, centered beneath the film opening
2. It puts enough distance between the secondary diffuser and the light such that the light evenly covers the required area and that the color variations are no longer visible
3. It performs some reflection/mixing to further even out color variations



# Parts - Base

The base is a mostly decorative, but also partly structural component. It makes the assembled device more stable, holds the spacer orthogonal to the surface upon which the scanner is placed, and makes it look nicer.

If desired, you can choose to print this part in another color for customizing the appearance.





# Print Settings

All parts can be printed without supports, provided you orient them properly.

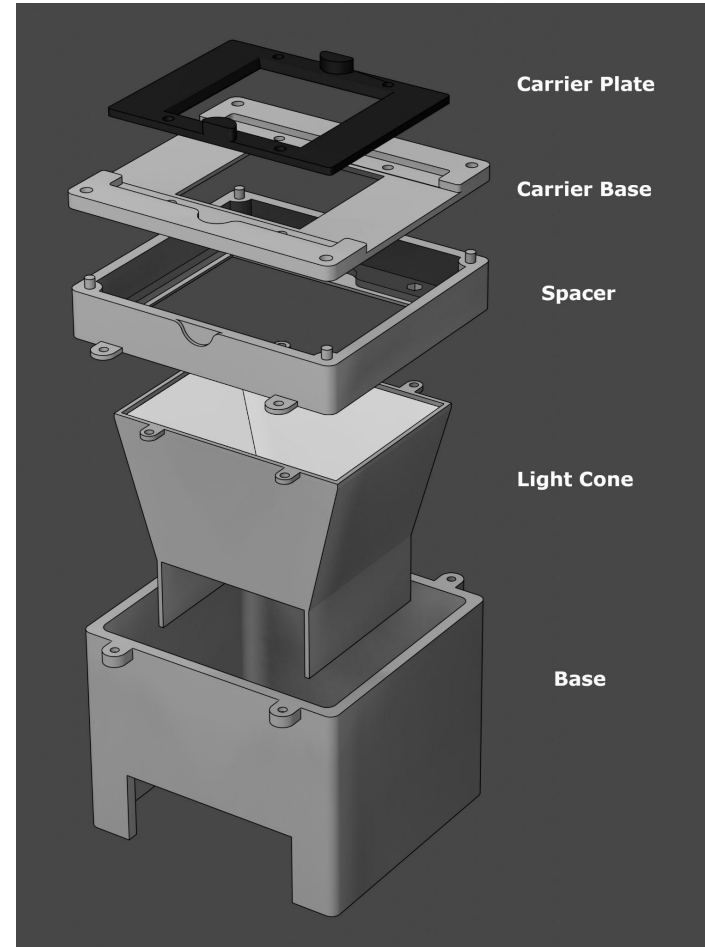
Part	Settings
Carrier Plate	Use any printing settings you wish. Black filament is recommended.
Carrier Base	Use black or grey filament. <b>You must print this at a layer height of 0.16mm!</b> This is so that the film channel will be properly printed. It is only 1 layer thick where the carrier plate sits, so if you do not see this layer in your slicer print preview, adjust your settings.
Spacer	Use any printing settings you wish. You may print this in any color you like, but if you use anything that isn't neutral, make certain you uniformly paint all interior surfaces matte black
Light Cone	Use any printing settings you wish. You should print this in grey or black. The interior surface should be uniformly painted in matte white paint.
Base	Use any printing settings you wish. You may print this in any color you wish.

# Painting

When scanning film, it is imperative that any part that can influence color balance or reflect light be properly treated. Even if you choose to use black filament, it is recommended that you do some painting.

1. The interior surface of the light cone should be painted flat white. You should make this as uniform as possible.
2. The interior surfaces of the spacer should be painted flat black. You should make this as uniform as possible. If you used black filament, this is probably not necessary, but still recommended.
3. The bottom surface of the carrier base should be painted flat black, but make sure you do NOT paint the surfaces of the carrier base or carrier plate that come in contact with film!
4. The top surface of the carrier plate should be painted flat black to minimize reflections between the carrier and your camera lens. If you used black filament to print this part, you probably don't need to paint this, but it is still recommended.

**NOTE:** it is recommended to insert the mini magnets prior to performing any painting of the carrier base or carrier plate.



# Assembly

After finishing printing and painting the parts, perform the following to assemble the scanner:

1. Insert the 4 mini magnets into the carrier base. Pay special attention to make sure you install them all with the same polarity. Press them in from the upper surface and make certain that they are completely flush or even sitting slightly below the surface. You may choose to wick some thin super glue into each magnet's hole from the back side.
2. Insert the 4 mini magnets into the carrier plate. Pay special attention to make sure you install them all with the same polarity, and that the polarity attracts them to the carrier base. Press them in from the bottom surface and make certain that they are completely flush or even sitting slightly below the surface. You may choose to wick some thin super glue into each magnet's hole from the top side.
3. Insert M3 nuts into all 8 captive insets. The fit should be tight - you may need to press them into place with some force
4. Screw the light cone to the spacer using 4 M3 screws
5. Screw the base to the spacer using 4 M3 screws
6. Drop the 100mm x 75mm x 3mm translucent acrylic secondary diffuser into the spacer

# Customization

STL and STEP files are provided for this device. You may choose to customize the device as you see fit.

Some configurations do not require all parts. If, for example, you already have an even, diffused light panel for a light source, you may omit printing the base and light cone, and can probably even omit the secondary diffuser.

The light cone and base may be altered to use any light source you wish. Users have expressed interest in adapting flashes or halogen bulbs with the spacer and carrier parts. The STL and STEP files have been provided to allow this.

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