FIM 1801 - FUNDAMENTALS OF CINEMATOGRAPHY

Lenses

A lens is a device that transfers the light to the film. Most lenses have three basic features that will be used by the cinematographer during the process of shooting a film.

1. **Focal Length**
2. **Focus**
3. **F-Stop**

A wide-angle lens is often called a “short lens” and a telephoto lens is often called a “long lens.”

In general, when shooting in the 16mm film format a 25mm lens is considered a normal lens and when shooting in the 35mm film format a 50mm lens is considered a normal lens. Using these numbers we come up with the following table.

<table>
<thead>
<tr>
<th></th>
<th>Wide Angle</th>
<th>Normal</th>
<th>Telephoto</th>
</tr>
</thead>
<tbody>
<tr>
<td>16mm Film</td>
<td>Less than 25mm</td>
<td>25mm</td>
<td>More than 25mm</td>
</tr>
<tr>
<td>35mm Film</td>
<td>Less than 50mm</td>
<td>50mm</td>
<td>More than 50mm</td>
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See the illustration on the next page for the characteristics of lenses.

**Focus**

Every shot you film must be in focus. If not it will appear blurry when viewed on the screen. The first assistant cameraman turns a focus ring on the barrel of the lens to keep the shot in correct focus. The focus ring will be calibrated in either feet or meters or both. The focus may be determined by looking through the lens and turning the focus ring until the image looks sharp. This is referred to as focusing by eye. The focus may also be determined by measuring to the subject or object from a point on the camera known as the film plane. The film plane is where the image comes into focus on the film. The figure to the right is the symbol for the film plane and it can usually be found on most professional motion picture cameras.

When focusing by eye you must be sure that the f-stop ring of the lens is wide open so that you have the clearest view of the subject you are focusing on. Once you have determined your eye focus, be sure to return the f-stop to its proper setting for shooting.

When focusing a zoom lens by eye you must be sure that the f-stop ring is wide open and also that the zoom is at its most telephoto point. This will allow you to get the best possible eye focus. Both of these procedures should be clearer after the discussion of depth of field.
CHARACTERISTICS OF LENSES

Wide angle and telephoto lenses have special characteristics, which can be summarized as follows:

- Includes a larger area than the normal lens at the same distance – good for cramped quarters where you can’t move the camera back any farther.
- Subject is smaller in the frame than with the normal lens at the same distance.
- Exaggerates depth—makes elements appear farther apart than normal.

- Includes a smaller area than the normal lens at the same distance—good for distant subjects where you can’t move the camera closer.
- Subject is larger in the frame than with the normal lens at the same distance.
- Compresses depth—makes elements appear closer together than normal.

- Because of exaggerated distances, movements toward and away from the camera seem faster than normal. Move 6 inches toward the camera and it looks like you’re moving 18 inches.
- Because of smaller image size, camera jiggles are less noticeable. Good for handholding the camera.

- Because of compressed distances, movements toward and away from the camera seem slower than normal. Move 18 inches toward the camera and it looks like you’re moving 6 inches.
- Because of larger image size, camera jiggles are more noticeable. Bad for handholding the camera.
**Focus Effects**
If you have ever watched a movie or television show you know that usually not everything in the shot is in sharp focus. There are almost always some areas of the frame that will be soft or out of focus. You can use focus in many ways to draw the viewer’s attention to certain parts of the frame.

**Deep Focus**
*Deep focus* is when all objects in the frame are in sharp and in focus. A great example of this can be seen in the film *Citizen Kane*.

**Shallow Focus**
*Shallow focus* is when there are several planes of focus in the image. The foreground may be in focus while the background is soft and out of focus. Or the background may be in focus while the foreground is soft and out of focus. By using shallow focus you are able to draw the viewer’s attention to a particular character or part of the frame.

**F-Stop**
The f-stop is a number that represents the amount of light striking the film and creating an exposure. The lens contains an f-stop ring which controls a small diaphragm within the lens. You will determine your exact f-stop by using a light meter or exposure meter and measuring the amount of light. The standard series of f-stop numbers are as follows:

... 1, 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, 22 ...

The smaller the number, the larger the opening in the lens. The larger the number, the smaller the opening in the lens.
Zoom Lenses
10-100, 20-100, 12-120, 25-250, 25-275, 150-600, are examples of zoom lenses.

Breathing
With some zoom lenses you will encounter a phenomenon called breathing. When racking focus on some film camera zoom lenses it gives the appearance of zooming which can be distracting to the viewer.

Lens Mounts
Lens mounts is a term used to indicate how the lens is mounted to the camera. Different models of cameras have different lens mounts. Some types of lens mounts include Arri Mount, Bayonet Mount, C-Mount, and PL Mount. You must be sure that you use the correct lens on the camera because many of them are not interchangeable from one camera to the next.

Care of Lenses
Whenever a lens is not being used it should be capped on both the front and rear elements and placed in a padded case. The padding will help to cushion the lens and protect it from shocks and vibrations during transportation. The internal elements of the lens can become loosened very easily if the lens is not protected or handled properly.

All professional lenses have a coating on the front element and should only be cleaned when absolutely necessary. Clean a lens first with compressed air to remove and dirt or dust particles. If there are no smudges or fingerprints on the lens you don’t need to clean it beyond blowing off the dirt and dust. However, if the lens does have smudges or fingerprints then it should be cleaned with lens cleaner and lens tissue. After the dirt and dust have been blown away, moisten a piece of lens tissue with lens cleaning fluid. Carefully wipe the surface of the lens in a circular motion. While the lens is still damp from the lens solution, use another piece of tissue to finish the cleaning and remove the remaining lens fluid.

Do not put lens cleaning solution directly on the element of the lens. Because of the curvature of the glass element the fluid can travel along the element of the lens and actually get behind the element where you will be unable to remove it.

The important thing to remember is to never use a dry piece of lens tissue on a dry lens. Small particles of dirt and dust may still be on the coating and will cause scratches. Also, never use any type of silicone-coated lens tissue or cloth to clean professional camera lenses.
**What is the right lens for a shot?**

If you know the effects of various lenses, you can select the correct lens for each shot in your film. Some typical situations when filming are as follows;

**Close-ups**

In most situations a close-up of the leading actor or actress is intended to make them look as attractive as possible. Telephoto or long lenses will make them appear much more attractive than a wide angle lens for a close up. Wide angle lenses create something called wide angle distortion and so are not appropriate for close up shots. A telephoto or long lens will keep the background out of focus, thereby drawing more attention to the actor or actress, giving much better close-ups.

**Establishing Shots**

Many times you want to show a broad view of the location or set so that the viewer knows where you are. Wide angle lenses are best suited for establishing a location or making a small set appear larger than it actually is.

**Hand Held Shots**

Not all shots in a film are taken from a tripod or dolly. The director may desire a moving shot of the action within a scene. By placing the camera on the operator’s shoulder you get what is referred to as a hand held shot. In order to minimize the bumps and motion of the camera while walking, a wide angle lens is best suited for hand held shots. They help to reduce the effects of motion and sudden movements.

**Dangerous Shots - Fires, Explosions and Stunts**

In many action films, the actors appear to be right in the middle of some dangerous situations such as explosions, fires and car stunts. The primary concern when filming these types of shots is to make it look as real as possible while keeping it safe for the actors. By using long, telephoto lenses for these types of shots, the fire, explosion or stunt looks as if it is very close to the actor when in fact they are a safe distance from it. Because telephoto lenses compress distance and make objects appear closer than they actually are, they are recommended for these types of shots.

**Models and Miniatures**

When filming models and miniatures it is best to use a wide angle lens because of the distortion which is caused by the lens as well as greater depth of field. The increased depth of field helps to fool the audience into believing that the model is a full size object.
### KEY LENS TERMS FROM VOICE & VISION

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<td>Plane of Critical Focus</td>
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