Nikon

- Introduction to Single Lens Reflex Cameras -

Part 3 : "Film is a Light-Recorder"

Despite technology, you still need film to take pictures with most (non-digital still) cameras.
The most commonly used film is 35mm(135) format film. However, you can have fun by shooting pictures with different types of film on different occasions and by using films that create special effects.

In this part of our series, we'll discuss the basics of choosing different kinds of film. We'll also introduce some unique types of films.

Written by KUMON, Yasushi

Note : Names of products in this article were being used in Japan (Nippon) at the time of writing.

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1. The basics of using 35mm(135) format film

The most widely used film, 35mm(135) format film is used by amateurs and professionals alike.
It was first used for taking still pictures in 1913, though it was originally designed for use in movies.

The first real breakthrough in 35mm photography occurred in 1925, when Leica, a 35mm(135) format precision camera, was released.
Its introduction was the catalyst for the spread of 35mm film; it was the beginning of a new era in photography.
Even today, some older Japanese call 35mm(135) format film "Leica format film", a reflection of just how influential and widespread its use was.

Unlike contemporary films, Leica was not packaged in a "patrone", the metallic cylinder familiar to all photographers (also known as a "cassette", "magazine" or "cartridge"). People who took pictures bought long rolls of film that came in a flat metal canister. In the darkroom, the photographer had to cut the roll into strips and then load them into the camera's "magazine".
It was during the same period that Herr.(Mr.) Oskar BARNACK cut this type of film to the length of his outstretched arms and loaded it into a "Leica cassette" that contained approximately "36" frames.

Even after Eastman Kodak introduced the "patrone", the older bulk film was cheaper and remained popular for years to come.
To this day, 100-ft.(approx. 30.5 m) bulk film is still available for people who prefer to load film into patrones themselves.

Those of us who took up photography more than 20 years ago or anybody who was in a photography club with limited resources might remember working in the darkroom with monochrome film that was first cut then loaded into a patrone.
This configuration is still used by people who want to take 250 consecutive frames (using models such as the Nikon **F**, **F2**, **F3**, **F4**).

1.1. Disassembling the 35mm-format (135) film "patrone"

Film is ruined if it comes into direct contact with light, thus the need for darkrooms and the "patrone".
Because of this basic picture-taking tenet(= rule), most photographers never actually see the film that is inside their cameras.
Though it may sound odd, it follows that many people may not really understand what "film" is.

Being a little imprudent, let's disassemble a 35mm(135) format film "patrone" and examine its interior.
Obviously, this will ruin the film, so use a patrone you don't really need.
Although its design is simple, you'll be surprised to find how it's constructed to prevent light from entering.

Photo 1.a.

Use a bottle opener to open the lid of the patrone, which is tightly sealed.

Photo 1.b.

Remove the film from the "patrone"

Photo 1.c.

The film is rolled.
The non-glazed side has been treated with photosenstive emulsion.

Many times, film is accidentally rewound all the way into the patrone, making it hard to extract.
By using a tool called a "film picker" (available at most camera stores), you can easily pull out the film leader.

Photo 2.a.

Even if you rewound the film leader...

Photo 2.b.

By using a "film picker",...

Photo 2.c.

You can pull it out.

1.2. Loading the film and setting its sensitivity

There are many auto-winding 35mm (135) format cameras on the market that automatically load the film (auto-loading) and set the sensitivity (DX-compatible).
Still, if you load the film in direct sunlight, the light will most likely not penetrate the light trap and ruin the film. Nevertheless, it is always best to load film out of direct sunlight.

Note also that some special films must be loaded in a darkroom and require that film sensitivity be set manually.

Photo 3.a.

With this camera, by positioning the film leader at the marker and closing the camera back, the film will automatically load and the sensitivity be set.

Photo 3.b.

The DX code (in black and silver), which automatically sets film sensitivity, and the camera terminal which reads the code (electrical tangent point).
Some special films and film produced in developing countries do not have the DX code on the "patrone". Thus, you have to set the sensitivity manually.

Photo 3.c.

With a manual film-winding camera, insert the film leader into the take-up spool and wind it by hand.

Photo 3.d.

One type of camera that requires setting sensitivity manually (set at ISO 100 here).
By setting the sensitivity correctly, you can achieve appropriate exposure values.

1.3. Reading and understanding the film package

The box film package comes in is loaded with information (though a lot of information is not included on regular color-negative film).
Reading your film's packaging is a good idea, especially if you are a beginner.

It might come in handy some day, even if at first much of what you read is difficult to understand.

Photo 4.a.

Expiration date and product (emulsion) number :
From my (= Mr. KUMON's) experience, when correctly preserved, film can be used after its expiration date, though it is always best to use

Photo 4.b.

Exposure chart :
Use this as a reference for cameras without exposure meters.
Using this chart as a guide, try taking

and develop the film as soon as possible.
The films with the same product (emulsion) number should have the same quality and characteristics.

Photo 4.c.

Caution :
Avoid storing film at high temperatures.
Excessive heat can damage film quality and cause other troubles, even if the film's expiration date has not passed.
Storing professional film and other special film in a freezer or refrigerator is a basic standard practice."

pictures manually — You'll be surprised how close these measurements are !

Photo 4.d.

How to use :
Specific informations are indicated on reversal films and for professional films.
Even though you might not understand everything it says, it is always a good idea to read the information on the film packaging.

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2. Film varieties

There are many types of film available today. Because there are so many, it is sometimes difficult and confusing to make a purchase decision.
In principle, if film is 35mm (135) format, it can be used in 35mm (135) SLR cameras.
It also seems to be widely held that films of the same type and sensitivity, made by well-known companies, are basically the same.

There are minor differences, though, that will be noticeable when pictures of the same object taken in the same conditions, but on different films, are printed using identical processes. Therefore, do not hesitate to use different types of film. It is better to experiment with different films and notice its versatility.

2.1. Advanced Photo System™ (IX240) and 35mm

(135) format film

In 1996, a new type of photography debuted that was jointly developed by five(5) Japanese and American film and camera makers : the Advanced Photo System™ (IX240) camera and Advanced Photo System™ (IX 240) film.
The difference between the standard 35mm(135) format system and this new system is that the latter is easier for everyday photographers to use. Why *?*

- Easier film loading,
- You can choose from three(3) print types :
  [**C**] Standard (Vertical-Horizontal Ratio 2 : 3),
  [**H**] Wide Vision (9 : 16) and
  [**P**] Panorama (1 : 3),
- It is difficult to touch or otherwise come into contact with the film, so you can prevent scratches, mold and other common problems.
- Depending on the camera, various data are recorded on a magnetic track on the film surface for better print results. With some cameras, you can also change film if the roll is unfinished and you're still taking pictures (Mid-Roll Film Change or "**MRC**"),.
- Since the film is a bit smaller, it can, theoretically, result in a smaller lens and camera.

At the time of writing, there were different Advanced Photo System™ SLR cameras available from japanese five(5) companies. There are high expectations for this system in the future.
There are three(3) makers of lens-interchangeable Advanced Photo System™ (IX240) AF SLR cameras sold in Japan.

Of those three, two of them including Nikon who makes "**PRONEA** *S*" and **PRONEA 600i**, make Advanced Photo System™ (IX240) AF SLR cameras that are compatible with its

company's interchangeable lens for 35mm(135) AF SLR cameras.

As for the other one company, it can attach a particular company's interchangeable lens for one of its AF SLR cameras to that company's Advanced Photo System™ (IX240) AF SLR camera, using a "converter". (The "converter"s are sold only at service centers in japan.)
In this configuration, Stop-Down AE (Auto Exposure) and focusing becomes manual.

This proves that companies have compatibility with the current 35mm (135) format system in mind.
Thus, use the two types of film format depending on the occasion : For example, use an Advanced Photo System™ film for leisure and use a 35mm(135) format film for hobby use or use at work.

Photo 5.a. **Nikon PRONEA** *S*

This Advanced Photo System™ (IX240) AF SLR camera has functions similar to a 35mm-format (135) AF SLR camera.
A small and lightweight **IX Nikkor** lens series designed exclusively for Advanced Photo System™ cameras can be attached.
The **PRONEA** *S* can also use the **Ai AF Nikkor** lens series, commonly used with 35mm (135) format AF SLR cameras.
As an aside, almost 40 percent of this camera's users are women (in japan).

Despite the advantages of Advanced Photo System™ (IX240) , the types of Advanced Photo System™ film are limited at present.

To enjoy different effects using special films, it might be better to use a 35mm(135) format camera and film.

Photo 5.b. Advanced Photo System™ film

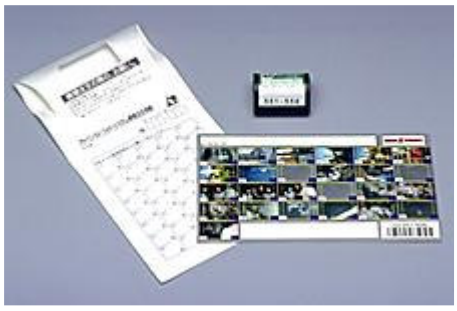

Photo 5.c. Advanced Photo System™ film and "Index print"

The window on the top of the

Special form is used for ordering

cartridge allows you to check film status.

reprint.

2. 2. Color reversal film, color negative film, monochrome film, and Newtype Monochrome film

2.2.1. Color reversal film

Also referred to as color slide film or color positive film, this is most commonly known as the film for slide presentations.
It show positive image and accurately reproduces the brightness and colors of an object.
Images are projected via light transmission.

The exposure and filter adjustment at the time of shooting is directly reflected upon the film.
You can also enjoy a picture without printing : It can be scanned with a **film scanner** (ex. Nikon **SUPER COOLSCAN 2000)** and converted to manuscript form for color printing.
Thus, it is popular with commercial photographers.

These features call for accurate exposure and color adjustment settings, such as the color temperature.
Printing is time-consuming and expensive, whether you choose to make intermediate negatives or do a direct-printing.
These features make it unsuitable for everyday users.
Still, this is one type of film you should try because the colors when printed will approach professional quality.
When purchasing the film, be sure to choose the "daylight" type.

Photo 6.a.

Apart from "Kodachromes", reversal films are usually developed using a method called "**E-6**".

Photo 6.b.

Finished sample.

Photo 6.c.

Though color reversal film can be made into a print, it requires time and is expensive.

Photo 6.d.

Samples of daylight-type reversal films.
Most films are this type. They reproduce accurate colors when used under sunlight or speedlight.

Photo 6.e.

Samples of tungsten-type reversal films.
There are only a few types, usually used when shooting under a photoflood lamp (tungsten terminal lamp), which has a lower color temperature than sunlight (= red).

2.2.2. Color negative film

The most popular film type, color negative film records images as black-and-white negatives, meaning the colors become supplementary.
The print process — shooting the image on the negative film onto a sensitized printing paper — brings out the correct colors and brightness.
Brightness and color, therefore, can be adjusted during printing.
So, even if the exposure or filter adjustment was not right at the time of shooting, it can be altered.

Because of this ability to alter the image during the development process, there is actually little point to setting the exposure or adjusting the filter prior to taking the picture.

A more detailed discussion of printing will appear in the August issue (Part 7.) of "Introduction to Printing."
For now, all you need to understand is that most of the reasons for being dissatisfied with the brightness and colors from color negative film stem from the adjustments made during the print process.
Your skill, the camera and the lens do not affect the results.

Photo 7.a.	Photo 7.b.	Photo 7.c.
Modern color negative film is developed by a process called "**C-41**".	The blacks and whites of an object are reversed, while the colors are complementary. The film base is orange because of a method called masking, which reproduces colors better.	A print of a color negative. Developing costs range from cheap to very expensive. For the more expensive prints, you're paying for a developing process conducted by a skilled technician.

2.2.3. Monochrome film

A decade ago, it was believed that monochrome film was the cornerstone of film.
Now, however, monochrome film is outmoded. Japanese Newspapers use color negative film, but alter it to monochrome at the time of printing.

Because most people do not use this type of film, the DPE system has embraced color negative film processing ("**C-41**") and made it quicker and cheaper.
DPE processing for monochrome films has been passed over, so to speak, and that is why it is surprisingly expensive and takes time to process monochrome films.
In fact, you could say using monochrome films has become a bit of a luxury.

Regardless, the durability and stability (preservation) of

monochrome film are far greater than that of color film.
There are also the artistic and atmospheric values that only monochrome film can deliver.
And compared to color film, monochrome film is easier to develop and print, and therefore perhaps better suited for serious photo hobbyists.

Photo 8.a.

The basic developing process is shown on a monochrome film's package.
It is quite easy to develop monochromes on your own.

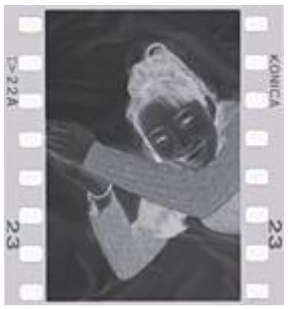

Photo 8.b.

Sample of a monochrome negative, in which blacks and whites are reversed.
The object's colors are reproduced so that light and shade appear as when seen with the naked eye.

Photo 8.c.

Sample of a monochrome print.
The black-and-white medium affords opportunities for experimentation and creativity.

2.2.4. Newtype monochrome film

This film was very popular in Japan(Nippon) a few years ago, spurring a boom of "sepia-type" prints (actually a variation of color negative film).
This film does not register colors; it is a single-color negative film.

The developing process is the same as "**C-41**", so time and cost are roughly the same as color negative film processing.

Logically, this type of film cannot make full-color prints. It produces monotone color, "sepia" or black-and-white prints, yet is not limited to strictly black-and-white prints. In principle, new monochrome film can make any single-color print. More details will appear in the August issue (Part 9).

Photo 9.a.

Sample of new monochrome-type (sepia type) film

Photo 9.b.

The base color can be "normal," like monochrome film.

Photo 9.c.

Sample of a "sepia"-type print. "Sepia" prints can be made in a variety of single colors, depending on a store's developing capabilities and time.

2. 3. What is ISO sensitivity ?

Film has sensitivity, indicated by a number on its package (100, 400, 800, 1600, 3200 etc.). **ISO** No. indicates that the film meets **I**nternational **S**tandardization **O**rganization standards.

In a film marked "ISO 100 / 21°", the "100" and the "21°" have the same meaning.
The "100" was previously indicated as "ASA," a standard that originated in The United States ; the "21°" is the old German industry standard, previously indicated as "**DIN**."
The only number you need to worry about is the one that follows "ISO" [or the number that appears before the slash (/)].

The higher this number, the higher the film's light sensitivity.

This value is significant. Film sensitivity standards should be set according to daylight conditions during times of the year that are neither very hot nor very cold (i.e. spring and fall).
In general, film is designed to be used at these settings :

1) with the lens aperture set at f/16,
2) taken at shutter speed of "one divided by the value of sensitivity",
3) with these conditions resulting in accurate exposures.....

Keeping this in mind, if you cannot refer to an exposure meter, film package or product manual, you can

1) set the lens aperture at f/16,
2) choose shutter speeds of 1/100 sec. (if the film is ISO 100) or 1/400 sec. (if the film is ISO 400),
3) expect reasonably accurate exposures.

NOTE : If your camera cannot set the shutter speed at 1/3 step (as with the Nikon **F5** or **F100**), then set the shutter speed at 1/125 sec. for ISO 100 positive film and at 1/500 for ISO 400 positive film.

Remember that higher film sensitivity is not always a good thing. Normally, film sensitivity increases as the diameter of a film's emulsion particles increases.
When film sensitivity increases, particle quality decreases and results in a photo with high contrast and rough features.
Conversely, when film sensitivity decreases, particle quality improves and photos turn out more delicate and refined.

Also remember if you use a film with high sensitivity in daylight conditions, you might exceed the shutter speed range or limit the available aperture, factors not conducive to effective picture.
Just consider shooting conditions when selecting film sensitivity. Here are some general guidelines that will help you choose your film :

- ISO 400 ~ ISO 800 film is suited to just about any circumstance. (ISO 800 color negative film is becoming popular among "film with lenses," also called "one-time-use

cameras".)

- Choose ISO 50 ~ 200 if you want a sharper, finer photo.
- Choose ISO 1600 ~ 3200 for taking photos in dark places without the aid of a speedlight.

Keep in mind also that the quality of high-sensitivity film has improved dramatically and can achieve very nice results with regular-size prints.
Particularly when used with a high shutter speed, it gives you sharp pictures.
Also, there are several types of film on the market today for which you can specify any sensitivity at the time of developing.

Photo.10.a.

Sample picture using ISO 50 film :

Photo.10.b.

Enlarged picture.
Notice that it is very smooth and delicate.

Photo.11.a.

Sample picture using ISO 3200 film :

Photo.11.b.

Enlarged picture.
Enlarged this much, roughness and graininess will become visible.

Film sensitivity and **Shooting conditions**

Generally, standard exposure can be obtained in the following conditions :
White --- If you have a steady hand, a tripod is not necessary.
Red--- Lens and camera selection can influence over-exposure.
Yellow--- Be careful of shaking the camera when using telephoto lenses or when taking close-ups.
Orange--- Camera shake or image blur caused by subject movement is a common problem.

ISO Sensitivity	Bright sunny day	Sunny day	Slightly cloudy	Shade / Cloudy	Indoor (daytime)	Indoor (night)
50	f/11 1/125 sec.	f/8 1/125 sec.	f/5.6 1/125 sec.	f/4 1/125 sec.	f/2.8 to 4 1/8 sec.	f/2.8 to 4 1/2 sec.
100	f/16 1/125 sec.	f/11 1/125 sec.	f/8 1/125 sec.	f/5.6 1/125 sec.	f/2.8 to 4 1/15 sec.	f/2.8 to 4 1/4sec.
200	f/16 1/250 sec.	f/11 1/250 sec.	f/8 1/250 sec.	f/5.6 1/250 sec.	f/2.8 to 4 1/30 sec.	f/2.8 to 4 1/8 sec.

400	f/16 1/500 sec.	f/11 1/500 sec.	f/F8 1/500 sec.	f/5.6 1/500 sec.	f/4 to 5.6 1/30 sec.	f/2.8 to 4 1/15 sec.
800	f/16 1/1000 sec.	f/16 1/500 sec.	f/11 1/500 sec.	f/8 1/500 sec.	f/4 to 5.6 1/60 sec.	f/2.8 to 4 1/30 sec.
3200	f/22 1/2000 sec.	f/22 1/2000 sec.	f/16 1 /1000 sec.	f/16 1/500 sec.	f/5.6 to 8 1/125 sec.	f/2.8 to 4 1/125 sec.

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3. Using unique films

There are several special films for 35mm(135) format cameras available at most large stores and pro shops.
Using these films can be tricky, so be sure to read any instructions carefully.
When used correctly, these films can make taking pictures with 35mm-format (135) SLR cameras more enjoyable and interesting.

3.1. Infrared (IR) film (monochrome)

This film is sensitive to infrared (IR) light, and color between blue to green light so attach an appropriate red filer to the lens before shooting.

The exposure varies depending on the amount of infrared light, rendering the exposure meter not all that helpful.
Focus adjustment will also be necessary.
The films should be loaded into the camera in a darkroom.

Likely results ? Blue skies will come out black, light green will appear brighter and distant landscapes will become sharper.

Photo 12. **Konica Infrared 750** (Konica) :
The "750" does not indicate film sensitivity.
It indicates a frequency value of 750 nm (nanometers), the highest frequency for this film's infrared sensitivity.

3. 2. Infrared(IR) film (color reversal)

This is a film with a unique take on the

world.
Blue becomes black, green becomes blue, red becomes green, and anything sensitive to infrared becomes red.
A dark yellow filter should be used when shooting.
This film is very delicate and should be handled with extreme care.
It should be loaded in a darkroom and must be stored at below 18 °C (-4 °F).

Photo 14. **Ektachrome Professional Infrared EIR** (Eastman Kodak)

3. 3. Monochrome reversal film

This is a monochrome reversal film.
These days it is being used for inputting monochrome images into a computer.
For example, scanning the film and using it for digital pre-pressing manuscript.
The sensitivity is ISO 200. It can be developed only at certain places, so bear in mind that it might take long time to get your photos back.

Photo 15. **Scala 200X Professional** (Agfa)

3. 4. 35mm(135) format Polaroid® film

This film can be used with 35mm(135) format cameras with manual exposure.
Speed is this film's forte : Color slides (**Polachrome CS**) or monochrome slides (**Polapan CT**) can be obtained a few minutes after shooting, though you will need to purchase a special processor and make the slides yourself. (A simple process, actually.)

Photo 16. **Polachrome CS** (Polaroid®)

Film, something a lot of us take for granted, is complex and interesting.
A complete discussion would fill volumes, so we'll end our discussion here, but you've learned some basics.

In the next article (Part 4.), we'll take a tour of the focusing.

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