Technical Description: Canon FTb

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1 Brief

The Canon FTb, depicted in **Fig. 1**, is a fully manual analog 35mm single-lens reflex (SLR) camera. “Fully manual” refers to the absence of mechanisms to automatically set exposure settings. “Analog” refers to the use of photographic film in lieu of digital storage formats. “35mm” refers to the specific format of film that the camera consumes. “Single-lens reflex” refers to the way in which the viewfinder is linked through mirrors to the main lens; this will be covered in greater detail in *2.3 Viewfinder*. The camera was manufactured by Canon in Japan between 1971 and 1976, when it was replaced by the more sophisticated Canon AE-1.

Fig 1. Canon FTb Camera

1.1 Overview

The body measures 144 x 93 x 43 mm with a weight of 750 g (Canon FTb, n.d.). It is made of unpolished aluminum and has black trim on the front and back. The lens measures 55 x 75.7mm with a weight of 150 g. It has a glossy black finish with vibrant white, orange, and green printing on it indicating the aperture setting and focusing distances.

1.2 Purpose

Like other cameras, the Canon FTb is used to capture photographs. Once the photo is taken, the film can be developed at a specialized store and then viewed on prints or digitally.

2 Components

2.1 Film Compartment

The film compartment, depicted in **Fig. 2**, stores the film as the camera is used and contains mechanisms to advance the film to the next frame when a photograph is taken. The key components of the compartment are the sprocket gears, take-up spool, and film door.

- The **sprocket gears** are two white gears that are keyed to mesh with the sprocket holes on a roll of 35mm photographic film. They ensure that the film is properly aligned and advanced consistently to maintain even spacing between photos.
- The **take-up spool** is a round cylinder that attaches to and pulls the film as photos are taken; it is connected to a lever at the top of the camera in order to advance the film once a photo is taken.
- The **film door** is a large hinged panel on the back of the camera that ensures that the film compartment is not exposed to light while the camera is used; it also applies pressure on the film to press it flat against the inner panel of the film compartment.

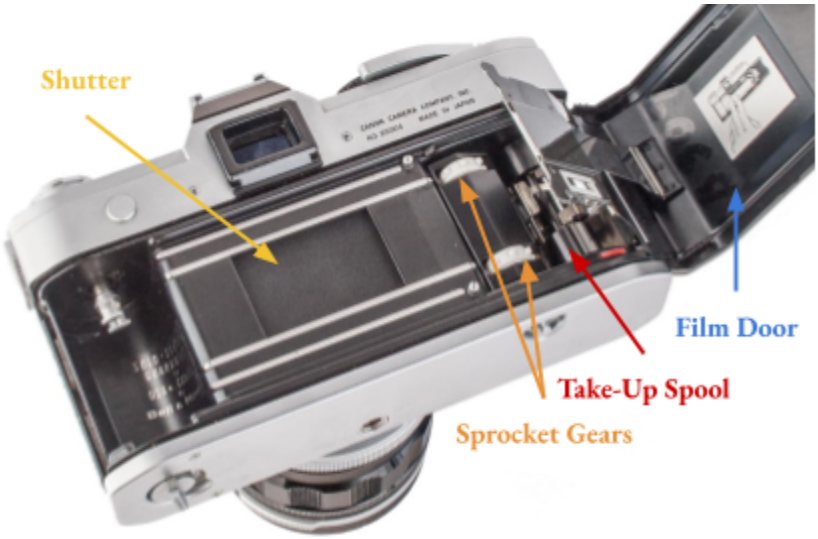

Fig 2. Film Compartment w/ Canon Quick Load System

The Canon FTb features Canon's Quick Load (QL) system, which simplifies the film-loading process. In traditional film cameras, the user must interweave the end of the film with the take-up spool and ensure that it is securely attached before closing the film door. With the QL system, the user needs only to align the end of the film with a red marker, as depicted in **Fig. 3**, and then secure the film by closing a metal plate.

Fig 3. Quick Load Alignment Marker

2.2 Shutter

The shutter is a light-blocking piece of fabric that can be seen in the middle of the film compartment in **Fig 2**. The shutter is usually closed to ensure that light does not leak into the film compartment and prematurely expose the film. The shutter opens for a brief period of time when a photograph is taken to expose the film. The shutter speed, measured in fractions of a second, is how long the film is exposed to light and controls how bright or dim the resultant image appears. This can be controlled using the shutter speed dial on the top of the camera.

2.3 Viewfinder

The viewfinder is a small window on the back of the camera that allows the user to preview the image they are about to take. The viewfinder is connected to the primary lens of the camera through a series of mirrors and reflective prisms, shown in **Fig. 4**, which earns it the "single-lens reflex" designation.

This arrangement allows the user to see the exact image that will be projected onto the film and allows for better composition and focus.

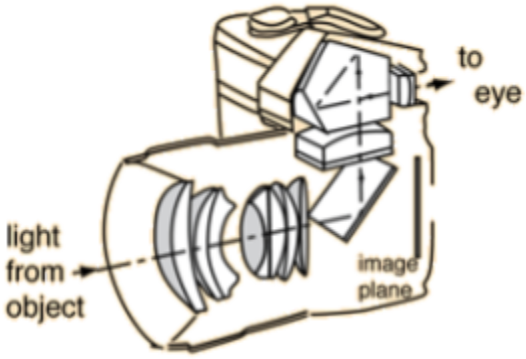

Fig 4. Single-Lens Reflex System

Fig. 5 shows what the user would see when looking through the viewfinder. Along the right side are indications from the light metering system that assist the user in taking a well-focused, well-exposed photograph. There is a thin needle that travels up and down as the camera is pointed at brighter or darker scenes and a ring that travels up and down as the aperture of the lens is increased or decreased. For a well-exposed photograph, the two should be overlapping one another. There is also an indication in the bottom right of the viewfinder that displays the current shutter speed in fractions of a second.

Fig 5. View Through the Viewfinder

2.4 Lens

The Canon FTb has a Canon FD lens mounting system and will support any lens that is labeled as an "FD" lens. The lenses come in a variety of focal lengths, which determine how wide a field of view the lens will capture. A comparison of focal lengths from 18mm to 300mm is shown in **Fig. 6**, with 18mm being the "widest" and 300mm being the "narrowest."

Fig. 6 Focal Length Comparison

The lens contains multiple pieces of concave and convex glass. Together, the glass focuses incoming light onto the shutter and film. The positioning of the glass can be controlled using the focusing ring, allowing the user to adjust the focus of the photo to ensure it is sharp. The lens also has a ring called the aperture ring, as seen in **Fig. 7**, that constricts or expands in order to control how much light enters the lens.

Fig 7. Canon FD 50mm f1.2

3 Explanation

To take a photograph, film must first be loaded into the film compartment as described in *2.1 Film Compartment*. Using the film advance lever, the film can be wound to advance to the next frame. A photo is taken by pressing the shutter release button, after which the film must be advanced to prepare for the next photo. The frame counter displays how many photos have been taken, and a roll of film generally allows for 36 photos, also called "exposures." Once all 36 photos have been taken, the film can be wound back into the container using the film rewind crank, and then taken to a photo laboratory for processing.

Fig. 8 Top-Down View

Since the camera is fully manual, the user is responsible for choosing the correct settings to take a photo that is neither too bright nor too dark. There are three ways of controlling the brightness of the photo: film ISO, shutter speed, and aperture (Photography Basics 101: Aperture, Shutter Speed, and ISO, 2013). The balance of these three settings can be achieved using the light meter mentioned in *2.3 Viewfinder*.

- **Film ISO** is the "sensitivity" of the film and is determined by the specific type of film used. It cannot be changed, meaning the type of photography (nighttime vs. daytime) often necessitates different film. More sensitive film has a higher ISO (i.e. 3200) and less sensitive film

has a lower ISO (i.e. 160). An increase by a factor of two represents a doubling in the relative sensitivity of the film.

- **Shutter speed** is how long the film is exposed to light when a photo is taken. It is controlled using the shutter speed dial and is measured in fractions of a second. The Canon FTb supports speeds from 1000 (one-thousandth of a second) to 1 (one second), with an additional "bulb" mode that exposes the photo as long as the shutter release button is held. An increase by a factor of two represents a doubling in the amount of light hitting the film.
- **Aperture** is the measure of the relative diameter of the opening in the lens to the total diameter of the lens. It is controlled using the aperture ring and denoted by an *f* followed by the "*f*-stop" (i.e *f*/16). The values vary from lens to lens, but in **Fig. 8** they range from *f*/1.4 to *f*/16. The larger the number, the smaller the opening and the less light enters the lens. Each number on the lens represents a doubling in the amount of light that will enter the lens, and they are referred to as *f*-stops.

4 Considerations

While the camera is fully manual and does not require a battery to operate, the light meter does. The meter is meant to be powered with a 625-type mercury cell battery, though due to their hazardous nature, they are no longer sold and replacements are hard to find. Zinc-air can be used in lieu of the mercury-cell batteries, and they are readily available in pharmacies and photography stores (Bailey, 1995). Though the zinc-air batteries are an apt replacement, users should keep in mind their relatively short lifespan of only one to two months.

Though the camera is no longer produced, second-hand Canon FTbs can be found in physical stores selling used camera equipment or on online marketplaces such as eBay. The prices vary based on condition, but they are generally around $150 to $200 together with a lens.

5 References

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