



Canon
F-1

An Introduction to the Canon F-1



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Professional Photography Enters a New Realm with Canon's Incomparable F-1 System



Canon F-1

The F-1 is a camera that traces inroads into the future. It is the starting point of a system of photography that continues to be developed and renewed incessantly out of a never ending search for new technology in all fields. The ultimate objective of the Canon F-1 is to obtain the highest quality images.

The backbone concept of the Canon F-1 is versatility together with reliability, which means that the F-1 can work in any field under any conditions. The F-1 system consists of more than two hundred accessories including interchangeable lenses, with perfect interchangeability. Therefore, it will reveal its high reliability to the full through the various combinations.

Furthermore, many difficult problems of precision in coupling and operation were solved. The concept of a system was strictly obeyed not only as starting point, but also in the many technical aspects of the camera and its related optical equipment. This is the way this ideal system was born. With new optical materials, with the application of the most precise manufacturing techniques and the most advanced electronics, Canon surpassed conventional technology to produce a whole new realm of photographic devices.

The F-1 Photographic System

The F-1 aims at gathering all photographic functions for all kinds of photography in a system camera with its accessories. Its fundamental features are the following in the widest range of photographic purposes:

1. Perfect grasp of the picture
2. Automatic photography
3. Automatic exposure decision
4. Wider metering range
5. Increased information
6. Longer recording time

Myriad System Planning

Future developments and needs in photography have been anticipated by Canon from the very beginning of the conception of the F-1, while at the same time, consideration was duly given to the accessories needed at the present moment. As many as 10,000 different parts were planned to begin with. The effort spent on the F-1 was, indeed, enough to make ten quality cameras. A new system of planning for the future was to replace the customary practice of repeatedly renewing the design to cope with future developments.

This was only possible through a huge accumulation of scientific history and technical innovations that Canon has gathered from its contributions to the image industry since 1937.

Coupling Points in the F-1

To use the abundant accessories available to suit the different photographic purposes, the method

of coupling them should be given careful consideration.

Coupling should be done in a short time and without difficulty, and the coupling functions should be maintained at the highest level of accuracy. Moreover the ease of operation must be maintained after any accessory is attached.

The Canon F-1, as the mainstay of the system, has up to 24 joining parts with the standard lens.

There are five mounting parts, eight attaching parts, and eleven coupling parts, and all of them must have the most perfect degree of interchangeability.

The position, the form and the method of coupling underwent minute research and then production was decided with perfect interchangeability and extreme ease of operation in mind.

Completion of System Accessories

The faultless performance of any photographic activity requires that a whole system be rigorously studied in all its aspects. Basic research showed that the camera should be planned for all kinds of information recording. The following four main accessories were indispensable within this trend:

1. The Motor Drive for automatic photographing.
2. The Servo EE Finder for automatic exposure control.
3. The Booster T Finder to meter available darkness.
4. The Film Chamber 250 for the maximum effect in recording events continuously.

Use of the Motor Drive made unmanned photography, which is a special function of the F-1, possible. The whole concept of it

called TEM, from the initials of TTL, EE and Motor Drive.

Top Quality, Excellent Reliability

Improving accuracy in the construction of each part is essential for perfect interchangeability of body and accessories, and only top quality ensures durability and smooth performance. Therefore, reliability in all aspects was pursued at all times from the beginning.

Basic studies in planning, material analysis and manufacturing processes were conducted extensively. Only the very best material is chosen and is used abundantly wherever needed.

A new standard, much more demanding than the already strict and meticulous Canon standards was decided upon in setting this camera's degree of quality.

Environmental testing was conducted under severe temperatures of +60°C to -30°C for many hours. Also tests for vibration, shock and operation proved that the camera lasts for 100,000 exposures.

The factory standards of production accuracy, assembly and control of mechanisms have also been

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raised. The whole process, from the preparation of a part to shipping, is controlled by computers. The F-1 is an extremely reliable camera. All accessories will fit easily to any F-1 body. As absolutely no adjustments are necessary, the F-1 is always ready for use.

Research on ease of operation based on the physical characteristics of the human body and the best operational touch

Through the years Canon has done research on how a camera is held and operated as well as the optical nature and activities of the viewfinder. Furthermore, we have scrutinized the operational touch and conducted innumerable experiments such as shutter release or film winding before achieving the final form.

Canon is constantly striving to improve the standards of its higher products in order to project an even better image in the eyes of users and dealers, as well as the knowledgeable people in the industry all over the world.

To secure the quality of the body, the following has been achieved:

1. Stability of the film surface.
2. High quality performance on the focusing surface.
3. Improvement of the shutter mechanism.
4. The shock preventing mechanism of the mirror.
5. Less noise during operation.
6. Trouble free operation.
7. Perfect finish.
8. Prevention of light leakage.
9. Specially high quality materials chosen on the basis of extremely strict criteria.

Incorporating a Shutter Speed of 1/2000 of a Second and Improvement of the Shutter Mechanism

To incorporate a high shutter speed of 1/2000 of a second and to achieve such endurance as to be able to withstand being used 200,000 times, structural changes have been made in various parts in the light of Canon's traditional focal plane shutter techniques, thus improving both quality and durability. For example, to make the driving part operate smoothly, the bearing was checked carefully and a special alloy was chosen. The high speed revolving part is supported by means of ball bearings. Minute research was done on details such as reducing the weight of the drum or choosing the suitable lubricant. A two-shaft structure was adopted to avoid the mutual interference of first and second curtains during operation. As for the finish, the surface of the shutter gear's teeth was carefully ground and the socket was varnished for smoother operation. The shutter screen is made of extremely thin titanium, 14μ thick. A pre-requisite for choosing this screen was that it could withstand being used 100,000 times, and that it is adaptable to different environments. The above

innovations increased the speed of the screen and set the synchronization of an electronic flash at 1/60 contact. The incorporation of a shutter speed of 1/2000 of a second is an advantage for the use of high-sensitivity film in general and in high speed photography.

Lens Mount

Canon's world famous breech lock mount was introduced on the original Canonflex in 1959. Lenses and accessories designed for earlier Canon SLR's can be used on the F-1.

Canon's breech lock lens mount has been hailed as the finest in the world by many photographic experts. Lenses can be changed in 1/3 the time required for a screw mount lens. It has a large diameter, so it places no restrictions on lens design, and it is extremely durable. The distance from the lens mount to the film plane is probably the most critical dimension in an interchangeable lens camera. In Canon's breech mount the matching surfaces that determine this dimension do not turn against each other so there is no friction and consequently no wear.

The parts are made from double-plated brass with nickel and hard chromium. In most other screw or bayonet type mounts the matching surfaces turn against each other and consequently wear can eventually change the critical "Flange Back" or "Back Focus" dimension.

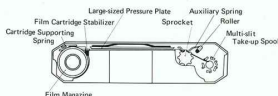
Interchangeability of the Back Cover and the Bottom Cover

The back cover can be replaced by the Film Chamber 250, and the bottom cover can be replaced by the Motor Drive Unit. Both are easily attached or

detached, and, since these materials have been carefully selected, they are very strong.

Stabilization of the Film Surface

Because the F-1 has been designed so that the Film Chamber 250 may be attached to it in place the back cover, the unique QL mechanism could not be used. Yet, in order to find a way to load film easily and surely, the



multi-slit take-up spool and the method of winding film on the spool in the same direction as on the cartridge are used. Thus, not only has the problem of film loading operation been settled but also improved by keeping the film flat and making it more resistant to cold. To keep the film flat, a device for stabilizing the cartridge has been added with the fundamental idea of pulling the film out from the cartridge smoothly and winding it on the spool with minimum resistance to its tendency to curl. In the cartridge compartment, a cartridge holder and a spring to keep the cartridge immobile have been provided to advance the film straight along the rail. And on the spool side, an auxiliary spring and a film stabilizing roller are provided to wind even hard film with no trouble. In addition to the system of winding in the same direction and the stabilizing devices, a large pressure plate is used so that it may be resistant to a wide range of temperatures and humidity and to eliminate the fluctuations caused by the tendency of the film to curl. Therefore, even in high speed motor drive photography, a constant film advance for the best picture quality can be expected.

The system of winding in the same direction is applied to avoid cracking of the emulsion in cold climates, caused by winding in the opposite direction. This is another victory over the challenge of the environment.

When these devices are coupled to the high quality FD lenses, the best picture quality can be obtained.

The accuracy of the focusing mechanism together

with the efficacy of the method of keeping the film flat are absolutely important factors for obtaining optimum picture quality. Therefore, the focusing screen, too, is designed for stability against environmental changes and for perfect interchangeability.

Viewfinder Mount

The pentagonal viewfinder can be replaced by any of the other viewfinders for the F-1. The mechanism for mounting the viewfinder consists of attachment rails of high precision with a minimum of error.

Mirror with Shock Absorber

Through observation of the movements of the mirror conducted by means of high speed photography, knowledge was obtained to give a high degree of durability to the mirror's mechanism.

Smoothness of Operation and Design

With the intention of minimizing the camera's usual noise, careful analysis has been carried out using high speed photography. As a consequence of this analysis, the motion of operating parts has been integrally combined. At the same time, the camera mechanism has been designed with a special braking structure which absorbs operation noise as well as shock.

The torque of the shutter release button, and the motion of shutter and mirror are considerably smoother, and, as a whole, the entire camera creates a feeling of special quality. When this camera was designed, its adaptability to the human functions and actions involved was always taken into consideration.

All controls are logically arranged for ease of operation. Therefore, just by holding it you can feel the sense of security only a camera like the F-1 can arouse. Finishing is in black throughout the system to create a uniform image.

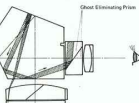
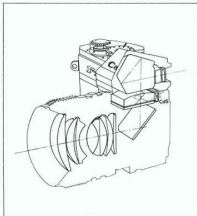
Large-Size Ghost Eliminating Pentaprism

The pentaprism part has a large size prism which shows over 97% of the field of view. A small prism is attached on its side to introduce meter information. Since the meter window is adjacent to the field of view, the information can be read without moving the position of the eye which, of course, means it is easier to adjust exposure. At the same time, in order to have

a clear field of view, the various surface provide the highest reflection ratio for more brightness by means of the vapor-deposit of the silver, the eyepiece has two built-in prisms so that the total reflection may remove the ghost which inevitably appears in an SLR camera, in the lower part of the field of view seen through the viewfinder.

High Precision Focusing Screens

The interchangeable focusing screens include the focusing screen and condenser lens built into a precision metal frame, and through its material and construction it has secured a high quality



focusing surface and minimized fluctuations caused by environmental changes. The main feature of these focusing screen is a half-mirror for metering, placed in the center of the condenser. Moreover, the amount of light the CdS receives is constant so that correct metering may be performed with any other screen. Therefore, although this screen is interchangeable, no exposure compensation is needed. The adoption of the high sensitivity CdS cell reduced the necessary reflection ratio of the half-mirror. From the 30% it has in the FT QL, it is reduced to 15% in the F-1 and eliminates incongruity of the surroundings. The standard A type is provided with a micropism center. Since the prisms have a pitch and an angle suitable to the characteristics of the eye, it is easy to determine when the subject is in the sharpest focus. The prisms become almost invisible when focusing is correct.

Universal Exposure Metering System

In full aperture metering, stopped down metering, EE system, dim light metering, unmanipulated photography and automatic flash photography, TTL metering in the F-1 with the FD lenses and various

kinds of accessories has a few special characteristics. The structure of this system is as follows:

1. With the FD lenses, full aperture metering is possible.
2. With the FL lenses, stopped down metering is possible.
3. Using the FD lenses together with the Servo EE Finder full aperture metering with automatic exposure control and shutter priority automatic exposure control can be performed.
4. Using the FD lenses and the Booster T Finder the metering function is further expanded to stopped down metering in dim light.
5. Using the FD lenses and the Servo EE Finder together with the Motor Drive Unit system absolutely unmanipulated TEM photography is possible.
6. With the lenses that have a coupling pin for the CAT system together with Canon's exclusive electronic flash, automatic flash photography of the matching needle type can be performed.

Central Area Metering System

Metering is performed by means of the central area metering system, with the aperture fully opened or stopped down.

The F-1 exposure metering system, from the point of view of accuracy and of the soundness of its theoretical foundations, may be considered as nearly perfect.

This metering system is built into the camera body as a starting point for the system idea, and is, consequently, a fundamental part no matter what

developments ensue or what changes the viewfinders undergo, because it is always kept in mind within the system by designers and planners.

The method of the central area metering consists in taking the light to the rear part of the CdS cell by means of a half mirror in the middle of the condenser on the surface of the focusing glass. There is little possible error with this advantageous method which measures the light coming in the center of the frame where its amount is almost the same as the light that exposes the photograph. The F-1's full aperture system is based on this method and is an ideal form of light measurement because it provides a coupled device to decide exposure and perceive errors, together with a device to correct errors in the camera body and in the lenses.

The F-1 full aperture system uses the mechanism of the matching needles to decide exposure. The meter needle, first of all, moves in accordance with shutter speed, film speed, and amount of light, that is to say, it moves by the aperture and light intensity, and the needle position indicates the f/stop for the particular situation.

Secondly, the matching needle is designed to move in coordination with the lens aperture ring, and appropriate f/stop is set by turning the ring until the needles match.

The position of the aperture signal lever is set in a way as to maintain the starting position of the needle constant, no matter what lens is used. The amount of vibration of meter needle changes according to lens speed so that it is possible to manipulate the matching needle from its starting position with all lenses. This structure, therefore, makes the correction and transmission of the correct F values totally unnecessary. Manipulation by means of a diaphragm with the same interval gauge is also improved.

The errors in exposure metering with this camera are caused mainly by large aperture values, due to the amount of meter deflection, and is, therefore, a problem concerning practically only those lenses faster than F 2.8. This problem is also tackled by the metering system which absorbs error completely and corrects the needle position at the time lenses are mounted or dismounted. The F value correcting pin makes the correction automatically. This coordinated action is all completed automatically at the time a lens is attached, and does not need any adjustment.

Meter Information

Meter and focusing glass information can be seen in the viewfinder. Meter information consists of a meter needle, an incorrect exposure warning mark, a mark both for stopped down metering and for battery check, and a shutter speed indicator. Besides, the window turns red to warn that the

selected shutter speed is outside the coupling range of the meter. This information is visible outside of the viewfinder and consequently does not the field of view hinder the operation while composing a scene. It will not get dark when using stopped down metering and, even if you move the eye, the information shall not disappear.

As the circle of the aperture needle is equivalent to one f/stop, exposure adjustment of half an f/stop is easily obtained using this circle as a scale. The half mirror in the condenser used for metering takes in 11% of the picture area (12 x 8mm). The Canon FT and the Pellix proved that this central area metering system is far better than the average metering system for photography against the light.

Stopped Down Metering

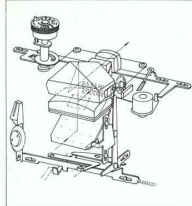
With an FL lens, stopped down metering is performed by turning the lever towards the lens, the same as with the FT. The matching needle will then disappear from view and only the meter needle will remain. This needle has to be adjusted by turning either the shutter speed or the aperture dial until the fixed point coincides.

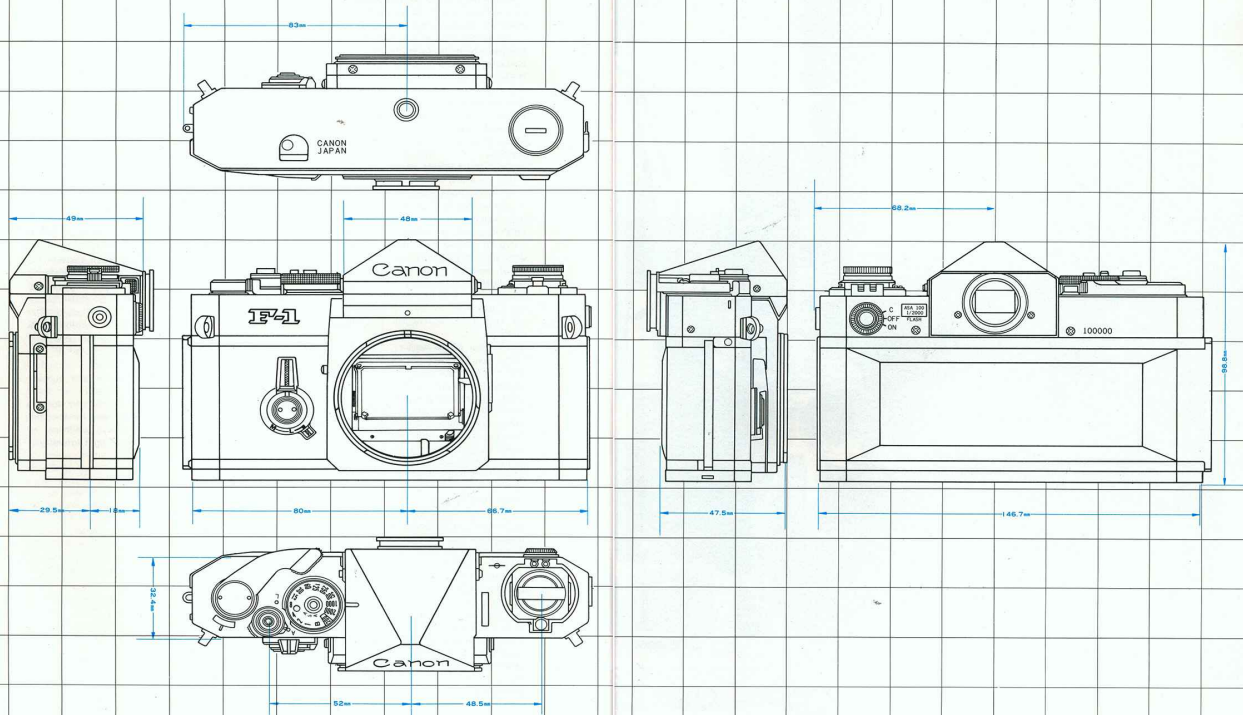
Warning When Outside the Coupling Range of Metering

Both in full aperture and stopped down metering, the meter information window will turn red to indicate that shutter speed is too slow and therefore out of the coupling range.

Main Switch and Battery Check

There are switches for ON and OFF and for checking the battery condition regardless of light intensity.







The Canon FD Lenses

When the F-1 was conceived, Canon had set about not only the development of a new camera but also the creation of a complete system such as would anticipate and embrace future needs arising from new discoveries in the sciences related to photography or a major breakthrough in optical technology. This explains why the Canon F-1 system has in it the ability to anticipate new photographic accessories or attachments yet to be developed, because the backbone of the system idea is precisely that adaptability. This is the reason why, one after the other, all the components that up to this date have come to integrate the system are completely interchangeable. Extreme care, as well as a great deal of forethought concerning future developments, went into the design of all attachable and detachable parts.

The F-1 system has 10,000 parts and a standard of accuracy of 1/100th of a millimeter was faithfully observed in building each and every one, in order to assure not only the long-term interchangeability that the system demanded, but also a degree of reliability, automation of operation, and improved image delineation that no other camera could boast of.

The series of interchangeable FD lenses play a major role in the F-1 system. To maintain its superiority in the field of lens performance in the extremely competitive 1970's, Canon has brought forth a series of lenses produced under the same 1/100th of a millimeter standards of accuracy as the body of the F-1.

What is now known as the F-1 system was the result of mobilizing the efforts and cooperation of the departments in charge of design, research, production, and survey, and the computer department. High quality and performance were basically the main goals, and specifically the following:

1. A wide range of interchangeable lenses.
2. Compact lens design.
3. Image sharpness throughout the entire focusing range.
4. The adoption of a newly designed mechanism (Floating System).
5. New techniques for processing.
6. Practical application of the newest materials.
7. Development of special lenses.
8. Practical use of multilayer anti-reflection coating.
9. High resolving power and extremely high contrast.

The challenge that these goals meant was most successfully overcome with the series of FD lenses, opening the way for still newer and better lenses which are under constant testing, planning and research.

Motor Drive System

Canon's Motor Drive System solved the problem of reducing to a minimum the need of attendance in photography, and has made continuous and high speed photography a reality. It is attached in place of the bottom cover of the F-1.

The perfect interchangeability of this Motor Drive System is one of the outstanding features of the

incomparable F-1 camera, the same as its wide range metering function. Moreover, when used together with the Film Chamber 250 it can do a variety of recording tasks. With the Servo EE Finder, metering is performed with automatic exposure control, and shutter release and film winding by the motor. It extends its resourcefulness to the realm of unmanned photography. The idea of expanding the range of possible applications of the F-1 camera is always safeguarded by the high quality system design.

The Viewfinder System

The viewfinder is the salient feature of Single Lens Reflex cameras. The F-1 has the most flexible viewfinder system of any 35mm SLR. Viewfinders can be chosen freely for any purpose, such as close-up photography, macrophotography, copying, photography of moving subjects, telephotography, long-time recording, or dim-light photography. There are four viewfinders, two attachments, four focusing screens and seven dioptic adjustment lenses available for the above. The most outstanding features of the viewfinders are that they have been developed with the metering mechanism as a central idea, and the fact that they give abundant information. They are completely interchangeable with the greatest ease.

Abundant Photographic Information

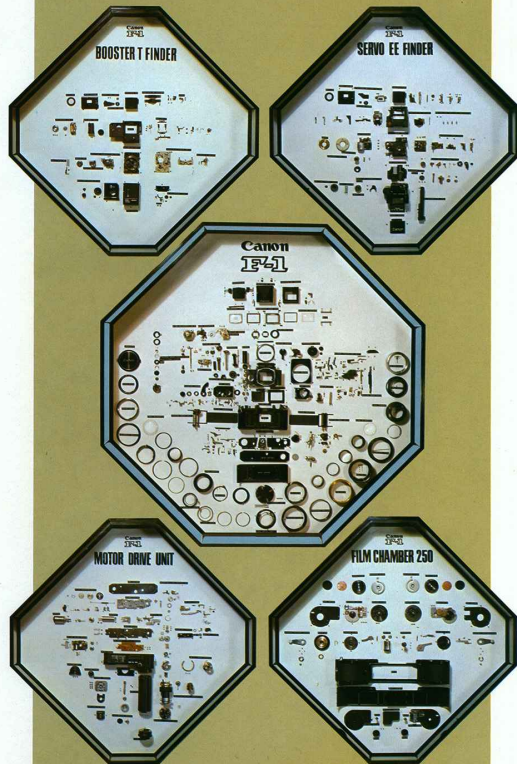
Much effort has been made to include as much as possible all information necessary in photography, for the convenience of users.

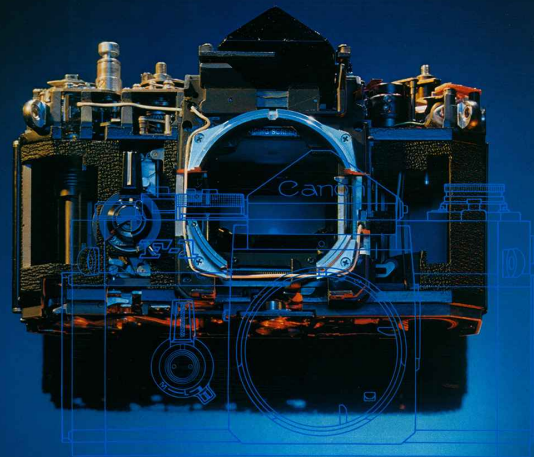
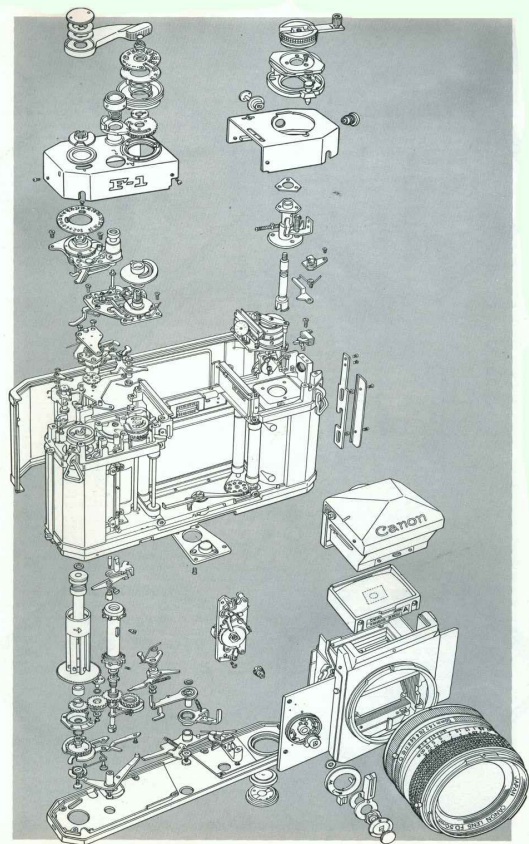
This information is gathered in the viewfinder for you to be able to judge at a glance. Moreover, extreme care was taken to ensure that the information could be read easily.

A unique feature of the F-1 is the fact that this principle still holds even when viewfinders and focusing screens are interchanged.

Automatic Flash Mechanism

The mechanism that couples metering to the electronic flash is built in the F-1. It is the Canon Auto Tuning System (CAT System). It has been developed within the concept of automatic flash with EE such as was introduced in the New Canonet in 1969. It is a mechanism to decide exposure by matching needles and uses a special flash unit. In flash photography, in order to decide exposure, it is generally required to make a calculation to determine the proper aperture, and this must be calculated every time shooting distance changes. However, with the F-1, since shooting distance and the charged voltage of the electronic flash enter into the meter circuit as signals, the proper f/stop can be decided by turning the Preset Aperture Ring to align the aperture needle with the meter needle. Therefore, flash photography is now as easy as exposure metering. The contact for this system is located in the base of the accessory shoe. The electronic flash unit to be used is the Canon Speedlite 133D which was developed exclusively for it. There are four lenses which are applicable, and they are the FD 50mm F 1.4 S.S.C., F 1.8 S.C., the FD 35mm F 2 S.S.C., and F 3.5 S.C.





Performance of the Utmost Precision

Performance

Type

35mm Single Lens Reflex camera with focal plane shutter.

Explanation

Since its establishment in 1937, Canon has produced the finest 35mm cameras. Now, after a long line of achievements and technical innovations, it has developed the world's best Single Lens Reflex system camera. This camera fully meets the demands of photographers everywhere and satisfies all possible photographic needs.

Picture Size

24mm x 36mm.

This is the ideal size which was adopted by Oskar Barnack for the camera that Leitz Co. would later use as prototype for the Leica. It is the size most widely in use all over the world.

Lenses

FD standard lens, FD series of interchangeable lenses, FL interchangeable lenses, and special lenses.

By using a new type of glass adequately and abundantly, and through unique coating processes, an incomparably high transmission factor and delineation power is achieved. A fully equipped interchangeable lens system ranges from the 7.5mm fisheye lens to the FL 1200 F11 S.S.C. telephoto with extremely long focal distance. The 2000mm and the 5200 mirror lens can also be used.

Standard Lens

Canon FD 55mm F1.2 S.S.C.

Mount: Canon FD mount (bayonet type).

Mount Signal: Preset aperture lever, automatic aperture lever, full aperture signal pin, EE switch pin, reserve signal pin.

Light Metering Function: Both full aperture and stopped down.

Lens Composition: 5 components and 7 elements. Picture Angle: Diagonal 43°, horizontal 36°, and perpendicular 25°.

Coating: Super Spectra.

Aperture Scale: 1.2, 2, 2.8, 4, 5.6, 8, 11, 16.

Distance Scale: 0.6 to 10 meters (2 to 30 feet).

Hood: S-58.

Filter Diameter: 58mm.

Length x Maximum Diameter/Weight: 52.5mm x 75.8mm (2-1/16" x 3")/560 grams (1 lb. 4 oz.).

This extra large aperture lens has the highest speed available in the world today, with the clearest delineation. It prevents flare at full aperture and eliminates spherical aberrations almost to perfection. Thus, it always ensures pictures with high contrast, and has an extraordinary resolving power.

This lens is the most suited for dim light conditions, for shooting at night outdoors, and for indoor photography. It is also effective when high speed film cannot be used.

Mount signal and aperture metering are the same in all FD lenses, with a very few exceptions. There is a reserve signal pin to be used with future developments now under way.

Canon FD 50mm F1.4 S.S.C.

Lens Composition: 6 components, 7 elements.

Picture Angle: Diagonal 46°, horizontal 39°, and perpendicular 26°.

Coating: Super Spectra.

Aperture Scale: 1.4, 2, 2.8, 4, 5.6, 8, 11, 16.

Distance Scale: 0.45 to 10 meters (1.5 to 30 feet).

Hood: S-55.

Filter Diameter: 55mm.

Length x Maximum Diameter/Weight: 49mm x 66.2mm (1-15/16" x 2-5/8")/360 grams (13 oz.).

This is a standard lens of the reformed Gauss type and four of its elements have been made out of a new type of glass. It enjoys a reputation for excellence in the whole world.

It assures high contrast and excellent resolution under all lighting conditions.

Canon FD 55mm F1.2AL S.S.C.

Lens Composition: 6 components, 8 elements.

Picture Angle: Diagonal 43°, horizontal 36°, and perpendicular 25°.

Coating: Super Spectra.

It is the only extra large aperture lens with an aspherical optical system in Japan. It eliminates spherical aberrations and coma completely, and is also effective for preventing flare at full aperture, which is used to haunt large aperture lenses. At full

Performance

Aperture Scale: 1.2, 2, 2.8, 4, 5.6, 8, 11, 16.
Distance Scale: 0.6 to 10 meters (2 to 30 feet).
Hood: S-58.
Filter diameter: 58mm.
Length x Maximum diameter/weight: 55mm x 75.7mm (2-3/16" x 3")/605 grams (1 lb. 7 oz.).

Viewfinder

Eye-Level Finder, removable pentagonal dach prism (roof prism) viewfinder.

Interchangeable Viewfinders: Servo EE Finder, Booster T Finder, Speed Finder, Waist-Level Finder.

Attachments: Angle Finder, Magnifier, Dioptic Adjustment lenses, Eyecup.

Focusing Screen: With Fresnel lens, the standard focusing screen has a micropism screen range-finder, and three other interchangeable kinds.

Half-Mirror Condenser: A beam-splitting condenser with half-mirror for exposure metering (indicates the exposure metering area).

Meter Information: Meter needle and aperture needle, red mark to warn of improper exposure, fixed-dot for stopped down metering and battery checker, shutter speed and signal to warn that one has gone beyond the range within which the meter functions (Meter information is outside of the viewfinder frame).

Magnification: 0.77 times (≈) with the standard 50mm lens.

Visual Field: 97% of the actual picture.

Diopter: Up to 7 kinds of interchangeable lenses for dioptic adjustment: +3, +2, +1, 0, -2, -3, -4 diopters.

Explanation

aperture it provides clear images in pictures even under dim light conditions, in night photography with artificial light and many reflections, or when shooting subjects that have a natural reflection. This was not possible before with spherical lenses.

Thanks to the development of the pentagonal optical system, 24 years ago, the left-to-right inverted image waist-level finder was successfully improved. It was a single lens reflex camera made in Hungary, the Duflex, whose mirrors formed a pentahedron. VER's Kontax S in 1950 was the first camera to use an eye-level finder with a pentaprism. Now, the F-1's pentaprism has been made out of glass with a very high transmission factor, and issues from the finest precision technology. Between the pentaprism and the eye lens, two prisms are connected so that the field of view is cleared through total reflection, thus eliminating the ghosts that usually appear in the lower part. An interchangeable system of viewfinders is available to cope with any photographic conditions. They are as easy to operate as they are to interchange.

Finder information includes a micropism screen rangefinder, extraordinary exposure metering area, a meter needle and an aperture needle, shutter speed, aperture scale, red marks to warn of improper exposure, and signal warning that the field of view has been exceeded. It provides all information likely to be needed.

Mirror

A mirror that quickly springs back into position, with a shock absorber mechanism. It can be fixed in the upper position (in such cases, manual aperture is used).

A new shock absorber eliminates mirror vibration. The mirror moves swiftly to ensure smooth photography at low shutter speeds and in continuous shooting.

Lens mount

Bayonet type FD mount on which the FD, the FL, and the R lenses may be mounted.

Lenses may be quickly mounted or dismounted thanks to Canon's breech lock mount, built with the utmost precision, and which does not lose any of its properties through friction or wear.

Shutter

Focal plane shutter with a super-thin titanium screen (15/1000ths of a millimeter). Lockable shutter release button.

Shutter Speed Dial: With shutter and ASA film speed scales. Two pins are provided for attachments.

Shutter Speeds: B, 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000, 1/2000 sec., multiple series, equivalent index, X contact at 60.

Film Speed Scale:

ASA 25, 50, 100, 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200, 102400, 204800, 409600, 819200, 1638400, 3276800, 6553600, 13107200, 26214400, 52428800, 104857600, 209715200, 419430400, 838860800, 1677721600, 3355443200, 6710886400, 13421772800, 26843545600, 53687091200, 107374182400, 214748364800, 429496729600, 858993459200, 1717986918400, 3435973836800, 6871947673600, 13743895347200, 27487790694400, 54975581388800, 109951162777600, 219902325555200, 439804651110400, 879609302220800, 1759218604441600, 3518437208883200, 7036874417766400, 14073748835532800, 28147497671065600, 56294995342131200, 112589990684262400, 225179981368524800, 450359962737049600, 900719925474099200, 1801439850948198400, 3602879701896396800, 7205759403792793600, 14411518807585587200, 28823037615171174400, 57646075230342348800, 115292150460684697600, 230584300921369395200, 461168601842738790400, 922337203685477580800, 1844674407370955161600, 3689348814741910323200, 7378697629483820646400, 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Performance	Explanation
Self-Timer Shutter release button activates the built-in self-timer, with a time lag of approximately 10 seconds. The self-timer lever is also used for stopped down metering.	
Exposure Adjusting Mechanism It is coupled to shutter speed, film speed, and f/stop. TTL full aperture metering mechanism with matching needles, automatic full aperture adjusting mechanism, CdS photocell with specially high sensitivity, central area metering system placed in the rear of the beam-splitting condenser, are added to a metering range of 12% of the picture area. Stopped down metering is possible with FL and R lenses. Fixed-dot type metering by means of the lever for stopped down metering. This lever can be locked in position.	The full aperture mechanism has a new adjusting device to ensure the utmost in performance efficiency. This has been possible due to the unique Canon system of central area metering. The exactness with which it aims and the accuracy with which it meters the main subject are unmatched by any other such device. Not only does it catch the subtle changes of intensity in the subject (which is not possible in average metering), but it also performs metering to meet the photographer's intention. This explains its reputation for metering under all sorts of conditions.
Exposure Meter Coupling Range From ASA 100 EV 2.5 (f/1.2 at 1/4 of a second) to EV 18 (f/11 at 1/2000th of a second), the meter information turns red when out of the coupling range.	Its wide coupling range enables it to meet any conditions surrounding the subject.
Exposure Meter Power Source One H-D type mercury battery of 1.3 volts JIS (Japanese Industrial Standards), equivalent to the U.S. Mallory PX-625 and the Eveready EPX 625.	A standard type of battery that may be bought at any store.
Battery Checker Built in. Checks at ASA 100 and 1/2000th of a second.	
TTL Full Aperture Metering EE It combines the use of a Servo EE Finder and the Canon Battery Case. EE with shutter priority at full aperture metering with FD lenses. Operating range: ASA 100 EV 2.5 to EV 18.	This EE is really a dream come true. It brings to life the highest performance conceivable with Canon's electronic servo device, the Servo EE Finder. Put it in place of the viewfinder and it will automatically preset the aperture. With the Film Chamber 250 and the Motor Drive Unit it has made absolutely automatic unmanned continuous shooting possible for the first time in the history of photography.
Metering With Insufficient Light Metering is possible from ASA 100 EV 15 (f/22 at 1/600th of a second) to EV -3.5 (f/1.2 at 15 seconds) using the exclusive Booster T Finder.	It performs perfect TTL metering of subjects that do not have sufficient light. It is an extraordinary accessory for long time exposures by means of the electronic timer and may be attached to the Finder Box.
Synchronized Flash FP and X contact. It automatically adjusts time lag.	
Flash Socket It is on the side of the camera body, and is a JIS (Japanese Industrial Standards) B type socket. Two contacts on the film rewind knob serve to couple the flash unit and the Canon Auto Tuning System. The CAT System involves the control of	Canon, out of its own initiative and with its own resources, has aimed at the development of a completely automatic flash. The CAT System was conceived in this light. When the exclusive Speedlite 133D is used, it is as easy to operate, as

Performance	Explanation
the diaphragm by means of a recharge signal and a focusing distance signal. Proper aperture is set by the combined action of the Speedlite 133D, the Flash Coupler L, the Flash Auto Ring A ₂ or B ₂ , and an FD lens that automatically links to the flash. Together, they activate the matching needles.	the usual metering with the matching needles in the viewfinder.
Flash Synchronizing Range FP class flash bulbs, 1/2000th to 1/125th of a second, and 1/30th of a second or under. Electronic flash, 1/60th of a second or under. M, MF class, 1/30th of a second or under.	
Film Winding Lever Short-stroke winding is possible. Single operation lever winding 180°, with 15° play. The play angle can be adjusted at any of Canon's Service Facilities throughout the world.	
Film Rewinding Is carried out by means of the rewind button and crank.	
Double Exposure Is possible by rewinding the film.	
Back Cover Opened by means of the Rewind Crank Release, and has a Safety Lock. When removed, the Film Chamber 250 can be installed in its place.	The safety lock must be pushed to pull up the Rewind Crank. Depress a hinge pin to remove the back cover.
Bottom Cover When removed, the Motor Drive Unit can be installed.	
Frame Counter When the back cover is opened, it is activated to reset itself.	
Accessory Shoe Either the Flash Coupler L or the D can be mounted and then other accessories can be mounted on the coupler.	
Size and Weight 146.7mm (5-3/4") wide, 98.7mm (3-7/8") high and 43mm (1-11/16") deep. Body only: 820 grams (1.8 lbs.). With FD 50mm F1.4 lens: 1,180 grams (2.6 lbs.).	

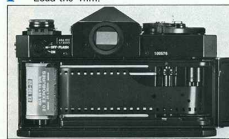


Canon F-1

Follow these simple steps
for normal photography:

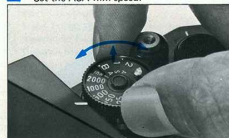
1

Load the film.



2

Set the ASA film speed.



3

Wind the film advance lever.



4

Remove the lens cap.



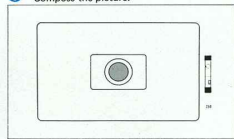
5

Look through the viewfinder and focus.



6

Compose the picture.



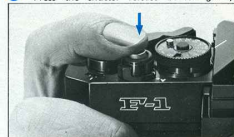
7

Determine the exposure with built-in meter.



8

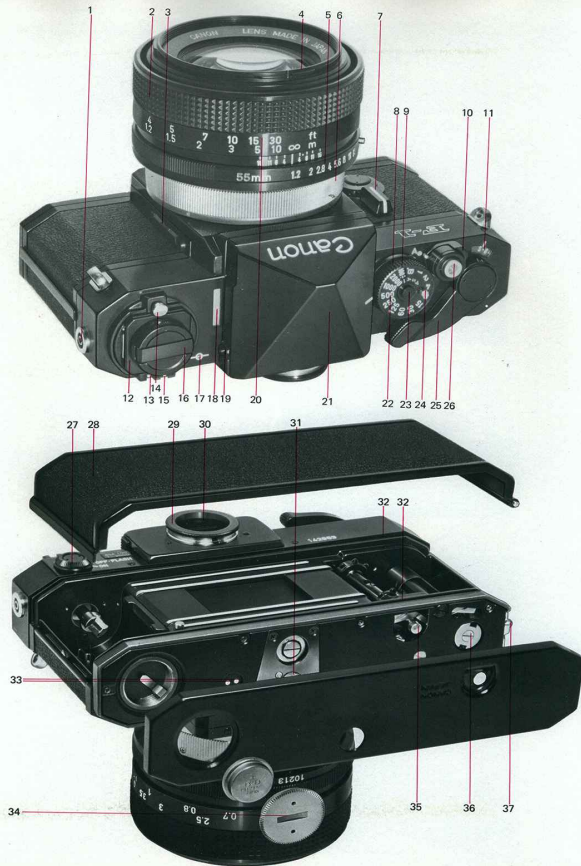
Press the shutter release button gently.



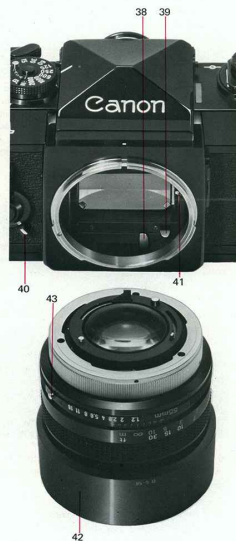
9

Rewind the film after all the frames are exposed.





1. Flash Socket
2. Focusing Ring
3. Servo EE Finder Coupling Socket
4. Bayonet Ring for Cap and Hood
5. Preset Aperture Ring
6. Bayonet Mount Ring
7. Stopped-down/Self-Timer Lever
8. Film Speed Set Ring
9. ASA Film Speed Scale
10. Time Lock/Shutter Lock Lever
11. Frame Counter
12. Accessory Shoe
13. Contact for Flash Unit
14. Safety Stopper
15. Contact for Flash-Auto Control
16. Film Rewind Crank
17. Film Plane Indicator
18. Light-Taking Window for Meter Information
19. Viewfinder Release Button
20. Distance Scale
21. Eye-level Finder
22. Shutter Speed Dial
23. Guide Pin
24. Shutter Speed Coupling Pin
25. Film Advance Lever
26. Shutter Release Button
27. Meter Switch
28. Back Cover
29. Eyepiece Ring
30. Viewfinder Eyepiece
31. Tripod Socket
32. Back Cover/Film Chamber Attaching Guide Groove
33. Contacts for Controlling Motor Drive
34. Battery Compartment
35. Film Rewind Button
36. Film Winding Coupler for Motor Drive Unit
37. Bottom Cover Safety Stopper
38. Stopped-down Coupling Lever
39. Lens Speed Adjustment Pin
40. Lever Lock/Mirror Lock Lever
41. Aperture Signal Coupling Lever
42. Hood
43. EE Lock Pin



Operation of the Camera

Cameras of the same type and category fundamentally have something in common as regards shape and functions. But according to the objectives in pursuit of which the camera was developed, their operation may be quite different. For instance, there are cameras with a lock device in the back cover so that you will not be able to open it, no matter what efforts, unless you unlock the safety device, and there are cameras that do not have such a device.

Besides, the simple appearance of a camera will not be enough to allow you to know whether its lens mount is of the screw-in type or a bayonet one, nor which direction it must be turned to for mounting and dismounting, because each camera requires a particular way of handling, in accordance with the objectives their designers had in mind. Unless you are a very specialized professional cameraman who has used many cameras and is quite familiar with them, or unless your work in a camera shop or the like has given you a similar degree of familiarity with most of the models and brands, you had better operate your camera, in this case the F-1, once you have tried and mastered its mechanical aspects fully.

Strap Attached to the Camera Body

Take the ends of the strap and put them through the triangular metal fittings on the camera body and fold the tip so that the short end goes on the inside. Then align the pin in the center of the strap holes and fasten firmly.

When a strap is folded with the short end to the outside, it may slip out and the camera may fall.

Lens Cap

When you take a lens cap off, push the locks on both sides of the lens in, since there is a stopper device to hold the thread of the ring.

Do the same when you put the cap on the lens. It can also be used on filters with front thread.

Lens Hood

When attaching a lens hood, align it with the bayonet ring on the lens and turn it clockwise.

Turn the hood in the opposite direction and place it on the lens. Then align it to the bayonet ring and turn it clockwise until it is firmly attached. Most lens hoods can be so stored inside the camera case with a lens cap on.

Eyecup

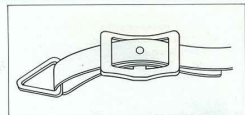
As a rule, cameras come with an eyecup attached to the eyepiece. The eyecup is easily taken off by pulling it slightly, or by unscrewing the eyepiece ring.

You are most likely to make mistakes, some of which may cause serious damage to a camera, if you operate it under the assumption that you have enough knowledge and that you need not know the particular details of the operation as they may be shown to you by an expert or as they appear in instruction manuals.

We also consider a most annoying possibility that someone may come to the conclusion that this camera is difficult only because he has tried to use it without the previous knowledge necessary to the full understanding of its capabilities.

It is, then, extremely important that you operate every aspect after you are completely satisfied with your mastery of it, so that you may come to use the F-1 to the utmost of its resourcefulness and reliability, as your favorite camera for many years to come.

This booklet, whose purpose is to guide you into the wonderful characteristics that have made the reputation of the F-1, contains all the basic information necessary to its handling. You are kindly requested to refer to the instruction manual for any further details.



Power Source for Light Metering

Into the bottom part of the camera body, insert one 1.3 V H-D type mercury battery, equivalent to the US Mallory PX 625 or the Eveready EPX 625. Do not use higher voltage (over 1.4 V) mercury batteries, such as Mallory RM 625 or Eveready E 625 E, since they will cause the meter to read too high and will result in underexposure.

This is the camera's power source for exposure metering. The battery chamber can be opened by unscrewing it with a coin. Be sure to place the battery with the ⊕ and ⊖ poles in the correct position. A new battery will work for about a year.

Battery Check

Set the ASA film speed scale at ASA 100 and the shutter speed at 1/2000 of a second. Then check the position of the meter needle in the viewfinder while at the same time you turn the switch of the power source battery to "C".

When you set the film speed scale, lift and turn the corresponding ring around the shutter speed dial. To set the dial at a shutter speed of 1/2000 of a second, turn it clockwise until it stops and cannot be turned any more.

Film Advance Lever

A single stroke of 180° is possible as well as a series of short strokes.

When film advances, shutter release and mirror operation are activated. When shutter release button is pressed and a frame is exposed, it is ready to wind for another film advance.

Film Winding and Shutter Release Button Lock

When the mark on the lock ring is not turned to the "A" position, it is impossible to proceed to press the shutter release button.

This device is useful when carrying the camera around. Shutter release button lock should be turned to the "L" position to avoid accidental tripping of the shutter.

Viewfinder

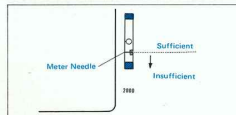
The power of the viewfinder's optical system is 1.2 diopters which suits most people. There are several diopter adjustment lenses to replace the eyepiece available for those who need them.

The following information will be obtained through the viewfinder.



Focusing

Turn the focusing ring while looking through the viewfinder. When the image in it becomes sharper and clearer it is in focus, and it is out of focus when otherwise. When in focus, the image on the microprism rangefinder is sharp and the microprism almost disappears.



Film Speed Setting

The ASA film speed scale is coupled to the meter and correct exposure cannot be determined if the scale is not correctly set.

Set the film speed correctly every time you load a new roll. When you wish to check the battery power source, set the film speed at ASA 100 regardless of the type of film you are using, but be sure to set the film speed correctly afterwards. Lift the shutter speed scale and turn it to the correct film speed.

The film speed scale cannot be turned clockwise beyond 25 nor counterclockwise beyond 2000.

The corresponding index is as follows:

ASA 25 1/50 1/100 1/200 1/400 1/800 1/1600 1/3200 1/6400 1/12800 1/25600 1/51200 1/102400 1/204800 1/409600 1/819200 1/1638400 1/3276800 1/6553600 1/13107200 1/26214400 1/52428800 1/104857600 1/209715200 1/419430400 1/838860800 1/1677721600 1/3355443200 1/6710886400 1/13421772800 1/26843545600 1/53687091200 1/107374182400 1/214748364800 1/429496729600 1/858993459200 1/1717986918400 1/3435973836800 1/6871947673600 1/13743895347200 1/27487790694400 1/54975581388800 1/109951162777600 1/219902325555200 1/439804651110400 1/879609302220800 1/1759218604441600 1/3518437208883200 1/7036874417766400 1/14073748835532800 1/28147497671065600 1/56294995342131200 1/112589990684262400 1/225179981368524800 1/450359962737049600 1/900719925474099200 1/1801439850948198400 1/3602879701896396800 1/7205759403792793600 1/14411518807585587200 1/28823037615171174400 1/57646075230342348800 1/115292150460684697600 1/230584300921369395200 1/461168601842738790400 1/922337203685477580800 1/1844674407370955161600 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Film Loading

This camera accepts only 35mm film roll in standard cartridges. The following steps show the procedure for film loading.

Pull the film rewind crank out while pressing the safety stopper. The back cover will then rise slightly. Take the film cartridge so that it faces the way the illustration shows, and insert it in the cartridge compartment.

Push the film rewind crank back into its original position.

The crank fork will slip into the axis of the film cartridge. In case the crank does not return completely, turn it a little right and left until it does. Pull film out of the cartridge and insert its tip into the slit of the take-up spool about two perforations from the end.

Turn the film advance lever and wind film around the take-up spool.

Engage the sprockets of the take-up spool and the teeth of the film advance sprocket with the perforations on the film. And then, close the back cover.

If the film is slack, the cartridge will rise and the back cover cannot be closed.

Leave the lens cap on and make two blank shots. The frame counter will advance from the "S" mark to "0".

If you advance film once more, the camera will be ready for the first shot.

If the film rewind crank rotates when you wind the film advance lever, film is loaded properly. When the film is slack, the rewind crank does not rotate, and in such case turn it clockwise to verify. Once you have finished loading film, set the ASA film speed scale. Even if you do not intend to use a meter, you should not forget the ASA setting. The film speed is marked on the package of film.

Film Rewinding

When all the film has been exposed and the film advance lever stops, rewind the film into the cartridge as soon as possible. Be sure not to open the back cover before rewinding it, otherwise the entire roll will be exposed and ruined.

Press the film rewind button. Then raise the film rewind crank, turn it clockwise and rewind film into the cartridge. When resistance to rewinding film becomes slight, stop rewinding and open the back cover. Pull the rewind crank fully out and remove the cartridge.

Shutter Dial

This dial controls the exposure time, and its indications are the denominators of the fractions of a second. For example, 2000 means 1/2000 of a second, and 2 means 1/2 a second. When exposure time is set one graduation faster, exposure time is halved. The shutter dial cannot make a full turn. The extremes of its possible movements are 2000 and "B". When it reaches either of these, you can



only move it in the opposite direction.

The "60" index is used for synchronizing the electronic flash. It is identified by a different color.

"B" indicates bulb exposure and is used when making exposures of more than one second. When the shutter speed dial is set at "B", the shutter will remain open as long as the shutter release button is being pressed down.

Time exposures are possible using "B" and the shutter lock. First, set the shutter speed dial at "B". With the shutter release button pressed down, turn the shutter lock lever to the "L" position. The shutter remains open even after you have withdrawn the pressure of your finger from the release button. When the lever is set at "A" once more, the shutter closes.

The "2000" index is most suitable for taking pictures of moving subjects.

Cable Release

When using a tripod, or when time exposure is required, a cable release is also necessary in order to prevent vibrations when shutter release is pressed. It also makes the whole operation easier.

This is a very important instrument in telephoto, copying, close-ups, enlarging, and in photomicrography. It can be attached by screwing it into the thread in the hole of the center of the shutter release button.

Once attached, it is possible to wind for film advance and the shutter will operate even when it is locked. When a cable release with a lock device is used, you can continue "T" exposures by locking the cable release.

Mirror Lock

In photomicrography or macrophotography, the mirror can be locked in its upward position after the picture is composed in the viewfinder, in order to eliminate mirror vibration. To lock it up, push down the stopped-down functioning lever lock to "M". Aperture is then stopped down and can be controlled manually. In this position, manual control is performed with FD and FL lenses. The mirror can be locked independently from the operations of film advance and shutter speed.

The mirror can be locked up with the lens attached. The only exception is the FL 19mm F3.5 lens with which the mirror must be locked up before it is attached and a special viewfinder is used because this lens is a standard wide angle lens, not a retrofocus type.

Canon's mirror lock is designed to avoid wasting even a single frame of film, and also to make its handling easy. When the mirror is locked, keep the lens covered always until just before you are going to take a picture. Light may affect film if left without the lens cap.

When you set the self-timer, the mirror is unlocked. Therefore, lock the mirror after setting the self-timer. The 1/2000 of a second shutter speed should not be used because in a single lens reflex camera exposure is coupled to the mirror, to the shutter, and to the diaphragm. Consequently, when shutter speed is set at 1/2000 of a second,



the proper balance may be lost, and even though it is only a fraction of an instant, differences in timing may not be neglected. This phenomenon rarely occurs, but there is no possible guarantee against it.

When the lock lever is returned to its original position, the mirror is unlocked.

Self-Timer

This is Canon's exclusive Self-Timer. It is activated by pressure on the shutter release button and is used both as a self-timer and a stopped-down lever. Once having given a full 180° turn to it, you only have to press the shutter release button, but make sure to wind film beforehand. When the shutter release button is depressed and the self-timer lever makes a full 180° turn, the shutter will be activated about 10 seconds later. The time when the shutter shall be activated can be adjusted according to your needs, with 2/3 of a turn of the self-timer or more. This time interval will be between 7 and 10 second.

There is a certain point at which neither self-timer nor shutter is activated. This is a position at 60° from the normal position, and you should turn the self-timer more than 60°, just enough to activate the mechanism. You should not think that there is something wrong or that the part is not operating correctly. This self-timer lever can still be used as stopped-down lever once the self-timer has been set.

When using the mirror lock, adjust the mirror lock device after setting the self-timer.

Double Exposures

Although, in principle, the camera is designed to prevent double exposures caused by mistakes or carelessness, double exposures can be made intentionally by rewinding and then winding a little bit. This camera is so designed as to allow double exposure photography with precision and no frame discrepancy.

When taking a double exposure, rewind the film until the green mark on the film rewind button makes a 1/2 turn.

Rewinding is done the usual way, and multiple exposures on the same frame are possible if the above process is repeated as many times as desired.

Frame Counter

When the back cover is opened, the frame counter automatically returns to the starting position "S", and it begins to count after film has been loaded. The frame counter is only coupled to film winding and not to rewinding. Consequently, in case of multiple exposures, the counter indicates a greater amount of pictures taken than the ones that actually have used film, because the frame counter continues to advance with each winding and each exposure.

Dioptic Adjustment Lenses

As it is very difficult to have a built-in dioptic adjustment instrument in a 35mm single lens reflex camera, the F-1 compensates for this lack most satisfactorily, with attachable dioptic adjustment lenses.

The power of the viewfinder's optical system is -1.2 diopters, which means that those who see objects clearly at distances between 83cm and 1 meter do not have to use the others. The same applies to those who wear glasses and keep them on. But those whose sight is weak, or who use a camera after taking off their glasses, should attach



dioptic adjustment lenses.

In this case, they can select the dioptic adjustment lens that has the same diopter as their glasses, but they are advised to try the lenses until they find the one through which they can see objects most clearly.

Dioptic adjustment lenses are screwed into the eyepiece. A magnifier may also be attached on the eyepiece. After the adjustment lens is removed, the Angle Finder B may be attached.

Changing Viewfinders

The pentagonal viewfinder can be removed by pulling it towards the rear while pressing the two stopper buttons on both of its sides. When attaching a viewfinder, slide it in from the rear side of the camera body so that its attachment rails are inserted. Push it all the way in and it will lock with a clicking sound.

The other viewfinders can be attached in the same way.

Waist Level Finder

This is the simplest form of interchangeable viewfinder with a collapsible hood, and is used for waist level viewing. The principle of this viewfinder is to look directly at the focusing screen. On it, the right of the image becomes left and vice versa. Focusing can be confirmed through a 5X magnifier. Since this is a simplified hood without a pentaprism, the meter information window cannot be seen. Consequently, light metering must be conducted previously with the Eye-level Finder.

The hood can be opened by pressing the rear button, and the magnifier can be lifted by pushing the corresponding device down and then the central area of the field of view is magnified. It can be folded after returning the magnifier to its original position.

Speed Finder

The Canon F-1's viewfinder system has been developed to meet the increasing diversification of photography and to make more abundant information available. The metering function will not be lost by replacing the viewfinder with the Speed Finder. It is designed with the eyepoint 60mm behind the viewfinder. The entire frame is visible at 60mm. This makes the viewfinder very suitable for photography in sports coverage since it can be used by a photographer wearing a helmet with a wind vane or shield to protect the glasses. The most outstanding feature in this viewfinder is its revolving head. With it, the level can be changed easily from waist to eye and the position of the camera can be chosen freely. This extremely versatile viewfinder is easy to operate and will cause less fatigue when objects are seen from high altitudes with the camera held upside down, or when checking the field of view for copy work, or when photographing from a low angle.

Type: Used at both eye level and waist level.

Eyepoint: 60 mm from the rear lens of the eyepiece.

Diopter: -0.84D

Magnification: 0.54X at infinity with 50mm lens.

Dioptic adjustment lenses:

+3, +2, +1, 0, -2, -3, -4

• Numbers show diopter values

• + means a convex lens (for farsightedness)

• - means a concave lens (for near-sightedness)



1. The angle of the viewfinder can be changed in accordance with the circumstances for all kinds of copy work, photomicrography, copying, close-up photography, and macrophotography. Besides, as it can be used with the eye away from the eyepiece, it causes less fatigue in photography over extended periods of time.
2. With this viewfinder, meter information can be read easily and metering can also be performed.
3. Only this viewfinder has the attaching button on its bottom part.

Changing the Focusing Screens

There are 4 interchangeable focusing screens. To remove the focusing screen, first detach the pentaprism and insert your finger nails into the two notches on the rear end of the screen, lift it upwards until the rear end comes up, and remove it by picking it up from the metallic edges. When inserting the focusing screen, the guide bar should face toward the lens. Insert it under the metallic holder in the mirror box and then press down on the rear end of the focusing screen until it reaches the bottom.

The interchangeable focusing screens are:

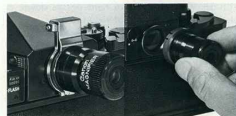
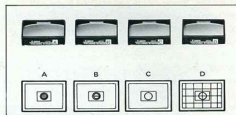
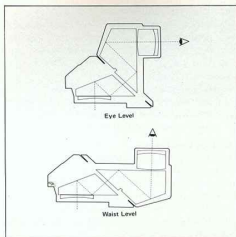
- A. Microprism
- B. Split-image
- C. All-mat
- D. Section-mat

Angle Finder

The Angle Finder is a viewfinder attachment to permit photography from low camera angles or in copy work. Depending on the subject, it can be rotated, so that the camera can be used vertically or horizontally. It can be attached onto the eyepiece of the Eye-level Finder, the Servo EE Finder and the Booster T Finder in place of the eyepiece ring. There are two types of Angle Finders, the popular type A2 and the high quality type B. With the former, the image is upright but left is right and viceversa as the reflection on a mirror. But the type B, with its pentaprism gives a completely correct image. The diopter can be adjusted and all meter information can be seen through either of the Angle Finders.

Magnifier R

This is an attachable magnifier which serves for precision focusing in close-up photography, copying, and wide-angle photography. With this magnifier, the center of the field of view can be seen with a magnification of 2.5X. It can be fixed on the eyepiece by means of the eyepiece ring. Since not all of the field of view can be seen with the magnifier attached, it is raised on its hinges to make the whole field of view visible through the viewfinder. However, since it cannot be raised up when attached to the Servo EE Finder or the Booster T Finder, the clip-on attachment ring should be used instead of the Magnifier Adapter R.



Canon Interchangeable FD Lenses

These lenses are highly efficient with an extraordinary resolving power and contrast, and are the backbone of the interchangeable lenses for Canon's SLR. Their design, both optical and mechanical, is outstanding. The full aperture metering signal was added to these lenses with the development of the F-1. The hood is bayonet type or built in.

Use of Interchangeable Lenses

1. Although the FD lens series has been developed to perform full aperture metering when attached to the F-1 or FTb, they may also be used for stopped down metering when attached to the FT or the Pellix.
2. Also, when the lens of the FL series is attached to the F-1 it performs stopped down metering.
3. Stopped down metering must be performed when the special lenses such as a Fisheye lens or a lens with Tilt and Shift adjustment which do not have a full aperture metering signal are attached either to the F-1, FTb, FT or Pellix.
4. The lens cap is of the clip-on type and is attached or detached after pushing down the two buttons on both sides. The cap can also be attached on the front of screw in filters.
5. Hoods for wide-angle lenses and standard lenses have also been changed to the bayonet type. Align the lens and hood bayonet, then turn clockwise till it stops. The hood can be stored on the lens if reversed. To do so, turn clockwise and put the lens cap on. The Eveready can be used with the hood reversed.

6. To mount and dismount a lens the procedure is the same as before. The lens may be dismounted by turning the bayonet mount ring counter-clockwise until the red dot comes to its highest position.
7. Lens signal couplings and body signal couplings are as the picture shows.
8. The preset aperture lever does not move when lenses are dismounted and it is not stopped down by turning the automatic aperture lever. When the bayonet mount ring is turned to the attaching position, they are ready to operate and the preset aperture lever moves to match the aperture ring. The aperture is stopped down when the automatic aperture lever is moved.
9. When the automatic aperture lever is turned counterclockwise all the way, it is locked and the aperture is controlled manually. Then the diaphragm will be closed down as the aperture ring is turned. In this case, too, unless the bayonet mount ring is in the attaching position, the diaphragm does not move.
10. The FD 50mm F 1.8 S.C. has a lock lever to lock the aperture lever in the manual position.
11. Manual aperture is used when bellows or an extension tube are attached between the body and the lens. Cameras like the F-1 or the FTb, which have a stopped-down lever built in, have no problem because the aperture may be stopped down by pressing this lever. However, in the FX and earlier cameras, without stopped-down lever, it is necessary foremore the lens and lock the aperture lever.

11. When using the macrophoto coupler, the bayonet mount ring should be turned to the attaching position or the aperture will not function. This is because the safety mechanism is working as explained above.
12. When the Servo EE Finder is used, the aperture ring is set at the EE index green mark, to allow it to control the aperture.
13. The lens cannot be mounted on camera other than the F-1 if the aperture ring is set at the green (EE) mark.
14. The infrared mark replaces the R mark on previous lenses.
15. The cin on the focusing ring of the standard 50mm F 1.4 S.S.C., 50mm F 1.8 S.C., the wide angle 35mm F 2 S.S.C., and the 35mm F 3.5 S.S.C. lenses serves for photography with the Speedlite 133D of the CAT System.

Note: Do not mount the lens when the stopped-down lever is pushed down, because the automatic aperture will not function.

Names and Functions of Body and Mount

The FD 50mm F 1.4 S.S.C. is taken here as a representative example for the following explanation. Since the aperture can be operated only when the lens is mounted, the various parts cannot be operated before turning the bayonet ring into position.

Aperture Ring

This is the ring to determine the size of the aperture. When the graduation on this ring increases by one, incoming light is reduced to half.

But there are some lenses in which this principle does not hold as far as the first graduation step increase is concerned.

The click stops are provided at intermediate positions between graduations.

This green mark, dotted at the end of the scale, is not used in ordinary photography. It is used only together with the Servo EE Finder.

If ordinary photography is performed with the ring setting at this mark, the diaphragm will always close to the minimum aperture.

The preset aperture remains fully open for maximum viewing brightness until the shutter is released. Aperture then closes as preset and returns to the open position as soon as exposure is completed.

Automatic Aperture Lever

This lever closes the diaphragm during the instant the shutter is being released.

This function is normally called automatic aperture.

On the other hand, this lever is also used as a clamp for operating the aperture manually. Namely, by turning the aperture ring independently of the automatic functions of the body.

In order to control the diaphragm manually, the

aperture lever should simply be held to the opposite position. But with the 50mm F 1.8 S.C. lens, a lock lever is used for clamping.

Aperture Signal Lever

This is the signal lever which determines the f/stop in TTL light metering. This lever functions in different ways according to whether light metering is performed by the camera or when the Servo EE Finder is being used.

When light metering is performed by the camera, the f/stop value given when you turn the preset aperture ring is transmitted to the body which will indicate the value by means of the aperture needle. In this operation, when the aperture ring is turned, this lever couples with the lever in the body to move the needle.

Since the starting position of the aperture needle is designed to be always definite, when a lens of different f/stop is mounted, full opening f/stop values do not have to be transmitted.

Another of the functions of this lever is that it is used with the Servo EE Finder to enable the F-1 to perform automatic exposure control and, thus, extend its range of applications.

With this lever, the performance of the F-1 has been extended up to unmanned photography in combination with the motor drive.

When metering is performed by the Servo EE Finder, the Servo EE Finder determines the position of the aperture setting lever.

In order to transmit the value from the body to the lens, the aperture signal lever must be moved lightly through the whole range of the aperture values.

Due to the mechanism which frees the lever, its position can be easily set. And when the shutter is released, the diaphragm is closed down to the position set by the body. This is a peculiar mechanism which only Canon can provide. The Servo EE Finder is one of the accessories with which the camera controls the f/stop.

The Green Mark and EE Switch Pin

This mark must be set when using the Servo EE Finder.

When the preset aperture ring is set at the green mark, the EE switch pin comes out.

This interlock pin prevents incorrect operation such as when the lens is mounted on a camera other than the F-1.

Full-Aperture Compensation Pin

This pin completely corrects the metering error which will occur with a large aperture lens due to the position of the CdS cell. It pushes in the full-aperture compensation coupling lever attached to the body to compensate the needle position mechanically in case of deviations. It has no effect whatsoever upon apertures smaller than f/2.8.

Consequently, proper exposure can be obtained with any of the FD lenses.



1. Stopped-down Coupling Lever
2. Aperture Signal Coupling Lever
3. Lens Speed Adjustment Pin
4. Automatic/Manual Aperture Lever
5. Full Aperture Signal Pin
6. Aperture Signal Lever
7. EE Switch Pin
8. Pin (reserved)
9. Positioning Pin
10. Red Dot
11. EE Lock Pin
12. Green Mark
13. Coupling Pin to Flash-Auto Ring

Using the Manual Aperture Lock

In close-ups or macrophotography with the Extension Tube M or when using the macrophoto coupler in which the lens is reversed, it is necessary to operate the aperture manually.

In these cases, the lens should be mounted on the body after the automatic aperture lever is locked in the position for manual aperture.

In case the lens is attached to the macrophoto coupler, the bayonet ring should be turned to the position in which the lens is mounted on the body. Otherwise, no aperture operation can be performed.

Distance Signal Pin for the CAT System

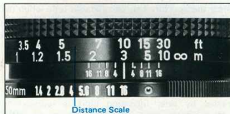
This is a coupling pin to transmit the focused distance when using the automatic electronic flash of the matching needles type, the Canon Speedlite 133D.



Distance Scale

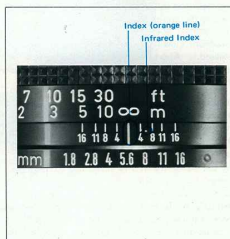
This scale indicates the distance between the focused subject and the film plane. So, a film plane mark is shown on the top of the camera body. When focusing is done by actual measurement as required in close-up photography, the distance should be measured as from this indicator. Although it is not so common nowadays, this indicator is also used to show the depth of field for a given F number, for refocusing in infrared photography, and for the necessary calculations when shooting with common types of flash or electronic flash unit.

The correct position of the distance scale is in the center of each value. In other words, the correct position of a one figure value is the center of that figure; with a two figure value it is in the middle of the two figures, and with a three figure value it is in the center of the figure in the middle.



Infrared Mark

In infrared photography, since the wave length of the infrared light is longer than that of the visible light, the focal point is behind the film plane. Therefore, it is necessary to correct the deviation by moving the lens slightly forward. The mark for this correction is the infrared index, which substitutes the distance index. The position of the mark assumes that film with the highest sensitivity to wave lengths of around 800mμ and the infrared filter are being used. For example, the Kodak IR film and the Wratten 87 filter.



Depth of Field

Depth of field is a complicated subject with many variable factors, but by limiting the discussion to the 35mm format, several simple rules can be stated.

The image of a point is never a point but a disk of limited diameter. At some point this disk becomes apparent to the eye.

When it does, the picture no longer appears sharp. The depth of field is the area in front of and behind the subject that still appears sharp to the human eye.

Depth of field increases as focal length or aperture decreases and as subject distance increases. Depth of field decreases as focal length or aperture increases and as subject distance decreases.

For a given fixed focal length lens the two variables are subject distance and aperture.

The depth of field for each aperture is marked on each side of the focus index on the lens, so it is possible to read the depth of field after focusing on the subject.

In an SLR camera the depth of field can be seen in the viewfinder by stopping down the lens to the aperture that will be used. This is one of the major advantages of a single lens reflex camera.

Using the FD, the FL and the R Lenses

All the FL and R lenses can be mounted on the F-1 camera.

The FLP 38mm F. 2.8 lens which was developed for the Pellix cannot be used on the F-1.

The light metering mechanisms of the lenses are as follows.

FL lens: Stopped down metering. Coupled with automatic aperture.

R lens: Stopped down metering. Manually operated aperture. Light metering lever used.



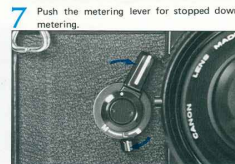
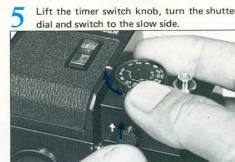
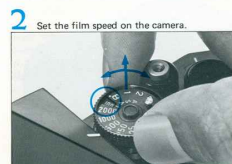
Combinations of cameras and lenses

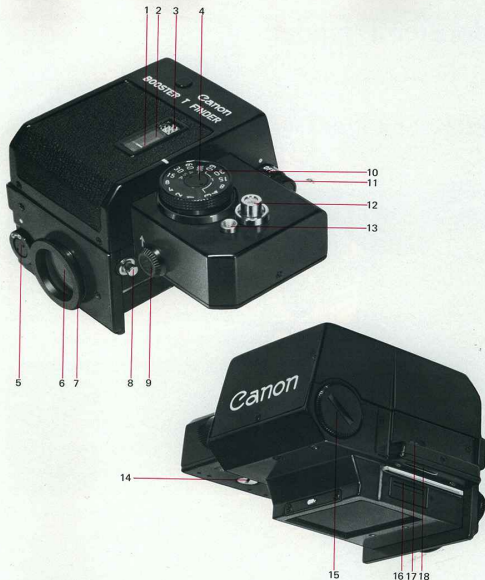
	FD	FL	R
F-1	Full aperture metering	Stopped down metering	Stopped down metering
FTb	Automatic aperture	Automatic aperture	Manually operated aperture
FT	Stopped down metering	Stopped down metering	Stopped down metering
PX	Automatic aperture	Automatic aperture	Manually operated aperture
FX	External light metering	External light metering	External light metering
	Automatic aperture	Automatic aperture	Manually operated aperture
RM R2000	External light metering	External light metering	External light metering
RP R	Manually operated aperture	Manually operated aperture	Automatic aperture



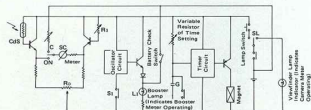
Booster T Finder

Outline of its Operation





1. Battery Check Mark
2. Booster Meter Reading Window
3. Booster Lamp Window
4. Shutter Speed Dial
5. Eyepiece Shutter Knob
6. Eyepiece
7. Eyepiece Ring
8. Attachment Stopper
9. Timer Knob
10. Film Speed Scale
11. Main Switch
12. Shutter Release Button
13. Cable Release Socket
14. Connecting Section of Shutter Speed Dial
15. Battery Chamber/Outside Power Socket
16. Meter Information Transmission Window
17. Viewfinder Lamp Indicator (Indicates Metering on Camera Side)
18. Viewfinder Lamp Chamber (For Illuminating Meter Reading Window)



Booster T Finder

Provided with the Electronic Timer is the Booster T Finder to expand metering to low light levels. The CdS cell built in the camera body is limited in metering ability, and is not sufficient to perform light metering under dark conditions. In order to solve this problem, the Booster T Finder was developed to replace the pentaprism. Since the viewfinder of the FT and FTb cameras is not interchangeable, an attachment type Booster is also available.

There are two kinds of darkness. One is when illumination is dim, that is, the absolute amount of light is small as at night, early in the morning, and at dusk. The other is when although sufficient illumination is available, little illumination reaches the film plane because of lens extension in close-up, macrophotography and photomicrography. The Booster T Finder extends metering ability under darker conditions so that exposure can be set by TTL in either of the above cases. An example of the darkness expressed as -3.5 EV with film of ASA 100 is that under ordinary moonlight. Under the light of the full moon, the EV value is -1 . When the exposure is set by light metering with the Booster T Finder, a surprising effect is gained and the picture that shows the night scene is as bright as daytime. Since they are necessary factors for dim-light photography, the shutter speed ranges from 1/60 to 60 seconds and ASA setting is possible up to 12800 with the Booster T Finder. And for long-time exposures of more than 3 seconds, the electronic timer automatically controls exposure time by holding the shutter release button during exposure. Another feature is that the operation with the Booster T Finder can be extended from dark conditions to bright ones. This is accomplished automatically by switching the metering to the camera body. This mechanism makes the operation very easy.

Metering Mechanism

This viewfinder adopts the average method system with two CdS cells placed on each side of the eyepiece and gives priority to the central area, though the F-1 body adopts the central area metering method. The Metering range is from EV 15 to EV -3.5 , the exposure range being from 1/60 second at F 22 to 15 seconds at F 1.2 using ASA 100 film. The metering automatically switches between the camera and the Booster T Finder. The camera covers from EV 15 to EV 3, and the Booster covers from EV 10 to EV -3.5 . This results in the overlapping of some areas which makes it more convenient. Light metering by the camera for bright areas is the same as in the ordinary full aperture metering system with aperture fully opened for the FD lenses and stopped down for the FL lenses.

When light metering is conducted by the Booster side, the aperture must be stopped down to maintain the quality of operation, and to preserve the characteristics of the CdS. The window for reading the outside meter is used with the zero method to regulate the diaphragm and the shutter

speed. When metering is conducted by the Booster, the electronic timer, considered as the main feature, functions to lock long-time exposures from 3 to 60 seconds in the low light range. While the timer is operating, a small lamp blinks at intervals of 1 second until exposure ends. This long-time exposure setting will control the Booster when the shutter dial on the camera body is set at B.

The eyepiece shutter is provided to prevent the light coming through the eyepiece from affecting the meter. When this shutter is opened, the Booster T meter will not function.

Viewfinder Information

This viewfinder has a pentagonal prism, the same as the eye-level viewfinder, and its field of view and magnification are also the same as those of the eye-level viewfinder.

However, the light metering mechanism is designed to work either from the camera body or from the Booster T Finder according to which way it is switched. The contents of the viewfinder information will vary depending on where the light metering is performed.

In light metering from the camera body, as it is the ordinary full aperture metering, meter information built in the F-1 body is designed to be read off with illumination provided by a lamp built in the Booster T Finder.

When switched to light metering from the Booster T Finder, the meter information window will not be visible without the lamp which stops illuminating because the camera meter is not needed.

On the other hand, a different lamp, located at the top of the pentagonal viewfinder, to read information for light metering from the Booster, lights up.

Power Source

At normal temperatures, the Booster T Finder works continuously for some four hours with the No. 544 6V silver oxide battery.

However, in low temperatures power will decrease, and as an external electric source is needed, the battery case which contains the Battery Magazine 12V, the exclusive 6V 2B Cord, is provided.

When using the Booster T Finder for a long time in cold climates, these batteries are highly recommended.



Loading the Battery

One 6V silver battery No. 544 is used. Screw the cover of the battery chamber off and load the battery with the ⊕ side facing towards you.

Checking the Battery

Turn the main switch to the "C" side and check the position of the needle in the Booster's meter window. When the needle swings to the blue mark, the battery has sufficient voltage. Otherwise, replace the battery with a new one.

Attachment

- When attaching, set the same film speed on both the camera and the Booster.
- Set the shutter speed on the camera side at a speed of less than 1/30 of a second. Then attach the Booster T Finder.
- Once attached, turn the shutter speed dial of the Booster to either left or right to couple it with the camera body.

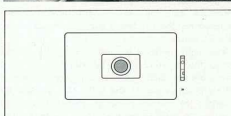
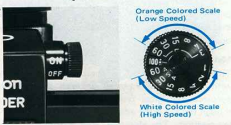
Metering with the Booster

Metering with the Booster is used when long-time exposures of 3 seconds or longer are required for dimly lit subjects, or when the aperture is opened and the shutter speed is increased in order to shoot a subject without sufficient light.

The orange-color scale on the shutter speed dial is used for long-time exposures from 3 to 60 seconds set by the timer. Switching is performed at the position of 3 seconds by pulling the switch knob. At this time, the shutter speed dial on the camera is set at "B". The timer starts working when the shutter release button is depressed, and exposure is decided automatically even after withdrawing the finger from the button. The white-colored scale is set to match the scale on the camera side.

Operation for Metering

- Set the meter switch at "ON".
- Turn the shutter speed dial to the orange-colored side so that it stops at the position corresponding to 3 seconds.
- When it is turned beyond that while pulling the timer switch knob, it may be set on the extended time scale.
- Adjust focusing through the viewfinder with aperture fully opened to decide the composition.
- Start metering by turning the knob of the eyepiece shutter to the "C" side. Then the eyepiece shutter will close and the switch will be set at the side of the Booster. Do not forget to turn the knob or it will not be possible to perform metering because the switch serves also to prevent errors caused by light entering through the eyepiece.
- At the same time, the lamp on the meter window lights up to indicate that metering is performed by the Booster.



- Push the metering lever of the camera down to lock it at stopped down metering.
- Turn the shutter dial on the aperture ring and regulate the meter needle to set it at the black index. The ⊕ side indicates overexposure and ⊖ side indicates underexposure.
- When metering with the Booster, the speed of response is slightly slower than ordinary metering due to the low volume of light. Therefore, it is necessary to wait until the needle has stopped moving. Under extremely dim light conditions under EV 0, it takes two or three minutes, and with sufficient light it takes from 10 to 30 seconds.
- Depress the shutter release button after exposure is decided. Then the button is locked and the timer works according to the shutter speed. Exposure is automatically set after removing the finger from the button.
- The meter lamp blinks at intervals of about one second to indicate exposure is in process.
- When exposure ends, the shutter release button returns to its former position.



Metering with the Camera

Metering with the camera is performed when the subject is brighter than the Booster's metering range.

- Turn the shutter speed dial to the white-colored scale of the high speed side. When it goes over 3, the dials on the Booster and the camera automatically lock together.
- When the metering range comes within that of the camera, the lamp of the meter window goes out and the finder lamp on the Booster T Finder lights up to indicate that the camera is doing the metering.
- This lamp is placed to illuminate the meter window on the right-hand side in the field of view of the finder to be able to see the information.
- Turn the knob of the eyepiece shutter, and return the metering lever for full aperture metering.
- Proper exposure can be obtained with ordinary full aperture metering by matching the aperture needle and the meter needle in the field of view of the viewfinder.
- Shutter speeds up to 1/60 of a second can be used.

Using the External Power Source

In low temperatures of 0°C or below, the quality of the battery's performance decreases and its consumption becomes excessive. Therefore, it is recommended to use the battery case as an external power source for more efficiency. Load the Battery Magazine 12V (with 8 penlight batteries) on the battery case. Use the Canon Cord 6V 2B for connecting the battery case to the Booster T Finder.

Attaching the Cord

1. Take the silver battery out of the Booster T Finder, and screw the cord's terminal in its stead.
2. Plug the 6V2B Cord in the battery case and screw it tight with the ring.

Coupling Range of Booster T Finder

Film Speed ASA	Usable Shutter Speeds		Coupling Range of Aperture
	Metering by the Booster	Metering by the Camera	
25	60–3	1–1/60	f/1.2–22
50	30–1	1/2–1/60	f/1.2–22
100	15–1/2	1/4–1/60	f/1.2–22
200	8–1/4	1/8–1/60	f/1.2–22
400	4–1/8	1/15–1/60	f/1.2–22
800	3–1/15	1/30–1/60	f/1.2–22
1600	1–1/30	1/60	f/1.2–22
3200	1/2–1/60	—	f/1.2–22
6400	1/4–1/60	—	f/1.2–22
12800	1/8–1/60	—	f/1.2–22

Metering with High Film Speed

Film speeds up to ASA 2000 can be used with the camera, but with the Booster it can accept up to 12800 film. When film speed is slower than ASA 2000 and both the camera and the Booster are set at the same speed, metering can be performed by either side. When the ASA is over 2000 and can only be set at the Booster side, metering must be performed by the Booster only.

Notice

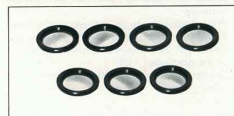
1. When the shutter release button is depressed at the timer scale position before winding, the button locks and the count starts. Do not mistake this for an exposure.
2. If the shutter release button is depressed when the main switch is at "OFF", the button locks. However, it will be released by turning the dial to the high speed side.
3. Since the silver battery is consumed rather fast, cut the switch off every time the operation ends.

Magnifier R

The Canon Magnifier R can be attached to the eyepiece. It magnifies the rangefinder section for accurate focusing. Because the Magnifier R can be swung up and clamped, the entire field of view can be viewed after focusing.

Dioptric Adjustment Lenses

The screw-in type dioptric adjustment lenses, which can be attached to the viewfinder eyepiece, are available as optional attachments.



Technical Data

Meter: Highly sensitive pivot meter.

Metering element: 2 CdS photocells.

Circuit construction: 9 transistors, 2 diodes, 3 condensers, 2 variable resistors, 3 semiconductors, 21 fixed resistors, 2 lamps, 1 thermistor.

Metering system: Low illumination side (orange colored scale): Zero method stopp-down metering. Centrally-weighted average system. High illumination side (white colored scale): Full aperture metering by camera.

Metering range: ASA 100, EV 10 (f/22 at 1/2 sec.) — EV — 3.5 (f/1.2 at 15 sec.) with booster element.

ASA 100, EV 15 (f/22 at 1/60 sec.) — EV 3 (f/1.4 at 1/4 sec.) with camera element.

Film speed scales: ASA 25-12800.

25 • 50 • 100 • 200 • 400 • 800 • 1600 • 3200 • 6400 • 12800
(32/40) (64/80) (125/160) (250/320) (500/640) (1000/1250) (2000/2500) (4000/5000) (8000/10000)

Shutter speed scales: Low speed (orange): 60, 30, 15, 8, 4, 3 sec. High speed (white): 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60 sec. Coupled to Booster Timer on low speed side and to shutter speed of camera on high speed side.

Timer: Low speed: 60-3 seconds continuous use possible. Exposure control by electronic timing device.

Timer lamp: Blinks to indicate exposure is in progress.

Meter reading: Zero method, with illumination lamp and battery check index mark.

Viewfinder: Eye-level using pentaprism.

Dioptric adjustment lens interchangeable. Magnifier usable.

Viewfinder information: Rangefinder, metering range.

Meter information: When between 1/4 and 1/60 sec. at ASA 100, the camera side information appears illuminated on right side.

Power: One 6V No. 544 silver oxide battery. Use exterior power at low temperatures. Connect battery chamber and Battery Case with Cord 6V 2B. Battery Magazine 12V is used.

Battery checker: Built in.

Shutter release socket: Built in.

Eyepiece shutter: For retroincandescent light cutoff. Coupled to meter switch. Booster lamp lights up when eyepiece shutter is closed.

Safety devices: Eyepiece shutter, timer knob, etc.

Size: 87mm x 52mm x 69mm (3-5/16" x 2-1/16" x 2-11/16").

Weight: 350 grams (12-3/8 oz).

Accessories: Case, silver oxide battery No. 544, Battery Magazine 12V, Cord 6V 2B, Battery Case, Finder Dust Cover.

Subject to alterations.





The Cathedral, both Day and Night, Mexico City
Canon F-1, FD 50mm F1.4 S.S.C. with Booster T Finder at 15 minute intervals, ASA 64.



Eiffel Tower at Night, Paris
Canon F-1, FD 35mm F3.5 S.C. with Booster T Finder, 30 seconds, at f/11, ASA 25.



Night in Nagasaki
Canon F-1, FD 28mm F3.5 S.C. with Booster T Finder, 15 seconds, at f/11, ASA 25.



Servo EE Finder

Outline of its Operation

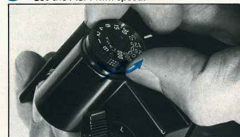
- 1 Set the aperture ring of the lens at the green mark.



- 2 Attach the viewfinder to the camera.



- 3 Set the ASA film speed.



- 4 Connect the power source. Battery Case and Cord 12V 2E.



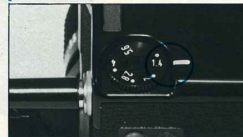
- 5 Set the main switch of the Finder to the "M" position.



- 6 Attach the EE Coupler.



- 7 Set the maximum F number of the lens to be used.



- 8 Set the shutter speed.

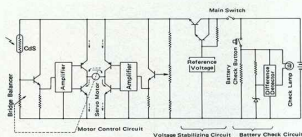


- 9 "L" is for continuous metering with shutter priority.





1. Shutter Speed Dial
2. Finder Information Illumination Window
3. Lens Speed Adjustment Dial
4. Power Terminal
5. EE Coupler Attachment Screw
6. Servo Coupling Pin
7. Attachment Pin
8. Attachment Screw Socket for EE Coupler
9. Servo Operation Pin
10. Attachment Pin Hole for EE Coupler
11. Signal Pin Coupling Lever
12. Attachment Stopper
13. Lever Switch
14. Power Level Indicator
15. Battery Check Button
16. Eyepiece Shutter Knob
17. Eyepiece
18. Dioptric Adjustment Adapter
19. Attachment Rail
20. Shutter Speed Dial Connecting Section
21. Main Switch
22. Cord 12V 2E
23. EE Coupler



Full Aperture Metering EE

Servo EE Finder

The Servo EE Finder is a viewfinder provided with an automatic exposure control which works by means of an electronic circuit powering a servo motor. One of the features of the F-1 system is the practical application of electronic technology. By the way, it can be said that the Servo EE Finder is an improvement of the full aperture metering mechanism of the Canon F-1 to be able to decide exposure with EE at full aperture. This product is Canon's exclusivity. It has been done out of a completely new idea of its capabilities. Each function of the original metering and the additional EE device are interdependent. This viewfinder is truly effective only when both functions are mutually combined as a whole.

The F-1 system includes a Motor Drive Unit for power-driven photography, and the Film Chamber 250 for extending the capabilities of the Motor Drive Unit. Together with the timer, this system relies completely on electric control, as do the various other accessories for remote control. Fully automatic photography is possible through the combination of these accessories.

Aperture Control

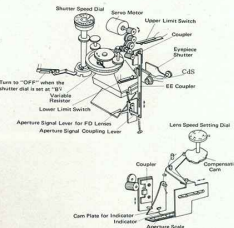
The EE coupler controls the preset aperture positions of the FD lens from the body of the F-1 because the mechanism of the diaphragm of the FD lens is completely cut off from the preset aperture ring on the outside of the camera. When the ring is set at the green (EE) mark. The servo motor drives the aperture signal lever to preset correct exposure while the diaphragm remains fully open. This motor has no galvanometer and is extremely resistant to vibration and shock. Since the servo motor is quite powerful, a very smooth operation is achieved. The Servo EE has a center weighted average-method meter since this type is best suited for automatic aperture control.

The CdS photocells are located on both sides of the eyepiece. The highly sensitive photocells are independent from the built-in exposure meter of the F-1 body, and are connected directly to the servo circuit. This viewfinder has its own shutter speed dial coupled to the F-1 body. It employs the shutter priority method to set correct exposures automatically according to shutter speed and ASA film speed.

This viewfinder's metering range is the same as the camera's from EV 2.5 to EV 18, with the ASA set at 100. Every shutter speed except "B" is possible. Since one of the characteristics of the EE automatic system is that exposure settings are automatically decided to meet the light intensity of the subject, this viewfinder ensures absolute efficiency for continuous photography of subjects whose light intensity is particularly unstable and for unmanned photography with remote control.

Furthermore, since metering control can be adjusted by means of a switch for continuous shots, single shots, locking and manual setting, this serves to make the most effective use of the EE. In single-shot metering, for example, if the switch is

turned off after metering, the automatic exposure mechanism is locked. This is ideal for close-up readings against the light when full automation would give incorrect exposure. Exposure can also be decided by manual aperture control.



Viewfinder Information

As the pentaprism is identical to the eye-level viewfinder, its field of view and magnification ratios are the same as those of the eye-level viewfinder. However, since the metering information differs from that of the matching needle system, a special information window is incorporated in order to see the f/stop, meter needle, and the exposure warning mark. By setting the maximum aperture index, the f/stop value and the warning mark in the information window move up and down to indicate the proper exposure range. This viewfinder's needle is not an ordinary one, but serves as an indicator coupled with the motor-driven mechanism so that you can read the f/stop value with a glance at the information window.

Stable Circuit

This structure consists of the bridge circuit which has a CdS photocell and the servo circuit. The constants, film speed and shutter speed are set in the bridge circuit. When the amount of light changes and the balance of the bridge circuit is broken, a voltage signal is added to the electronic circuit to drive the servo motor. This moves the EE signal plate up and down by means of the gear train. It also moves the aperture lever of the lens through the EE coupling arm. When the bridge is balanced again, all operations stop and the lens is set to the correct aperture. The operation is switched off when beyond the metering range to avoid unnecessary power consumption. A constant-voltage circuit is used to increase stability with an unchanging supply of 5V, although the operation can be faithfully performed even when the voltage is changed. Thus this circuit features a long-time operation that is not affected by the voltage fluctuations.

Power Source

When using the Servo EE Finder alone, load the Magazine 12V with 8 penlight batteries. When it is used together with a Motor Drive Unit, the Magazine 15V with 10 penlight batteries should be used instead of the Magazine 12V. When the Motor Drive MF is used, the Finder shares the power source in the MF's grip. In each case a voltage of 9V is supplied by means of the constant-voltage circuit for stable operation.

Contact Point of the Servo EE Control

The contact point is visible in the center when the bottom cover of the camera is removed. It serves as the terminal to supply the power source when the Finder is used together with the Motor Drive Unit, and is connected to the Servo EE circuit

switch in the F-1 body. This switch interrupts the power going to the Servo EE during exposure. If the power is not turned off, the servo motor would change the aperture during long exposures because the light cannot reach the CdS cell when the mirror is up. The power is interrupted when the diaphragm is stopped down, so the Servo EE will not function if the stopped-down lever is pushed. This circuit only functions when the Motor Drive Unit and Battery Connector MD are used, so if the Servo EE Finder is used alone, it must be connected directly to the battery case. If the Battery Connector MD is used, the Motor Drive Unit must be connected or the Servo EE Finder will not function.

Canon F-1 Servo EE Finder

The green mark on the aperture ring of the lens should be set to match the index mark before attaching it.

1. The Servo EE Finder is attached to the camera in place of the eye-level finder. Set the shutter speed dial of the Camera to 1/30 of a second or slower before attaching. Slide the Servo EE Finder into the camera from the back.



2. Once it is attached, turn the shutter speed dial of the finder to join it to the shutter speed dial of the camera.
3. Set the Finder's ASA Film speed. There is no need to match it to the ASA scale of the camera.
4. Then connect the power source. Load the Battery Magazine 12V with 8 penlight batteries into the battery case. Then the cord can be connected to the Servo EE Finder by inserting it into the jack but on the battery case, it must be plugged in and screwed tight with the ring.
5. To check the battery press the button on the back of the viewfinder. When the lamp lights, the battery has sufficient voltage.
6. Set the main switch of the Finder at "M".
7. The coupling lever in the Servo EE Finder descends to the attaching position. If the EE coupler is attached before power is applied and the switch set to "M", it will end up incorrectly attached and the viewfinder cannot operate. Therefore, be sure to follow the above procedure.



7. Open the cover of the connecting socket on the side of the camera mirror box. Fit the EE Coupler and screw it tightly.
8. Turn the Lens Speed Adjustment Dial to the speed of the lens that is going to be used. This changes the meter window indicator to be able to read the coupling range.

Basic Metering Operation

Since this metering is the center weighted average method with the two CdS photocells, the metering area rectangle in the viewfinder should be ignored.

1. Set the ring switch at the red dot.
2. Decide the shutter speed.
3. Aim the camera at the subject, adjust the focus, and decide the composition.
4. When the lever switch is depressed, metering starts and a buzzing sound is heard. This sound stops when set at the proper aperture.
5. Remove the finger from the switch.
6. Then, when the shutter release button is pressed, the proper exposure can be obtained.



How to Use the Switches

There are two switches, the ring one and the lever one and their functions are the following:

1. When the ring switch is set at the 'M' position, photography can be performed with manual aperture control, and aperture can be regulated by the aperture ring. However, in this case, the electronic circuit remains on, and the battery will be consumed.
2. When the ring switch is set at the red dot position, the circuit is turned OFF. However, it will be switched on by depressing the lever switch at this point and temporary metering can be performed. When the finger is withdrawn from the switch, the meter needle is clamped and the proper exposure can be set.
3. When the ring switch is turned to the L position, it is locked for continuous metering to be able to decide proper exposure every time the shutter release button is depressed. However, with a low shutter speed, of more than 1/8 second, light will be cut off from the CdS cell when the mirror is raised, and the Servo EE will begin to open the diaphragm. As a result, proper exposure will not be obtained. Therefore use shutter speeds of 1/15 second or faster. When using a speed of 1/8 of a second or slower, change to the lever switch metering as described in number 2 above.
4. When the Servo EE Finder is used together with the Motor Drive Unit for continuous photography, all shutter speeds excluding B can be used for continuous metering.



Exposure Warning

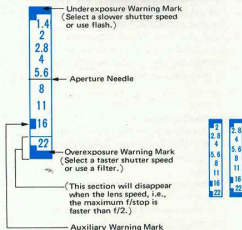
As for the f/stop of the meter window, turn the Lens Speed Adjustment Dial and then the aperture scale plate slides to set the full aperture f/stop on the upper part (of the meter window). The upper warning mark is fixed, but the lower warning mark moves up and down together with the scale plate to be able to see the metering range. When the meter needle moves to the upper warning zone it means under-exposure and when it moves to the lower warning zone it means overexposure.

In both cases, change the shutter speed.

The auxiliary mark in the meter window is an exceptional mark when f/22 is indicated in the meter window, once the F number has been compensated. It serves as a warning mark for lenses with f/stops down to f/16 only. These lenses are the following five:

Fisheye FD 15mm F 2.8 S.S.C.
FD 24mm F 2.8 S.S.C.
FD 28mm F 3.5 S.C.
FD 35mm F 2.5 S.C.
FD 35mm F 3.5 S.C.

Note: The lower mark and the number 22 can be seen in the meter window when set at F 2.



Technical Data

Circuit construction: 19 transistors, 7 diodes, 6 condensers, 5 variable resistors, 31 fixed resistors, 1 motor, 1 lamp.

Metering element: 2 CdS photocells. Situated on both sides of the pentaprism eyepiece.

Metering system: Centrally-weighted average method with full aperture metering.

Metering range: With ASA 100 film, EV 2.5 (f/1.2 at 1/4 sec.)—EV 18 (f/11 at 1/2000 sec.).

Film speed: ASA 25—2000.

25 . . 50 . . 100 . . 200 . . 400 . . 800 . . 1600
(32)(40)(64)(80)(125)(160)(250)(320)(500)(640)(1000)(1250)(2000)

EE system: Shutter speed priority, controlled by Servo Motor. Preset to proper f/stop.

Shutter speed: 1/2000—1 sec., B. (EE circuit is disconnected at "B".)

Manual aperture control: Possible by setting switch to "M".

Viewfinder: Eye-level using pentaprism. Eyesight correction adapter interchangeable. Eyecup, Angle Finder, and Magnifier attachable. With eyepiece shutter, Magnification, 0.77 x with 50mm lens at infinity.

Meter information: f/stop scale, aperture needle, warning marks.

Maximum aperture f/stop correction: By lens speed adjustment dial. Indicated inside viewfinder.

Power source: 8 or 10 penlight batteries. Connected with Cord 12V 2E. Use Battery

Connector MD when Motor Drive Unit is attached. With built-in battery checker.

Attaching: By removing the Eye-level Finder of the camera. EE Coupler used.

Size: 75mm x 65mm x 68mm (3" x 2-1/2" x 2-5/8").

Weight: 417 grams (14-3/4 oz.), with EE Coupler.

Accessories: EE Coupler, Battery Case, Battery Magazine, Eyecup, Cord 12V 2E, Case, Pentaprism Cover, Battery Connector MD (for Motor Drive Unit).

Subject to alterations.



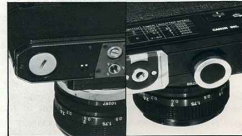
Children in a Park, Stockholm
Canon F-1, FD 135mm F3.5 S.C. with Servo EE Finder, 1/125 of a second, at f/5.6, ASA 25.



Motor Drive Unit

Outline of its Operation

- 1** Remove the bottom cover and attach the Motor Drive Unit.



- 2** Prepare the electric source by inserting the Battery Magazine 15V.



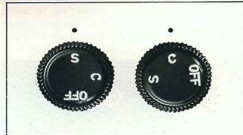
- 3** Turn the main switch of the Motor Drive Unit to "OFF" and connect the Cord.



- 4** Set the Motor Drive Unit's frame counter at the number of frames to be taken.



- 5** "C" is for continuous photography, and "S" is for single frame photography.



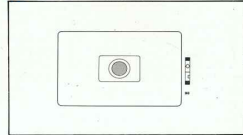
- 6** The timer can be used for continuous photography.



- 7** Choose the proper shutter speed from the chart.

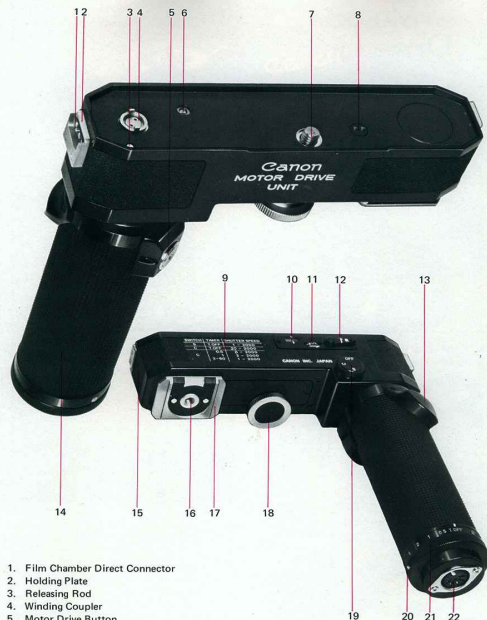
SWITCH	TIMER	SHUTTER SPEED
S	T.OFF	1 - 2000
C	T.OFF	30 - 2000
	0.5	8 - 2000
C	1	2 - 2000
	2-60	1 - 2000

- 8** Determine the proper exposure.



- 9** Press the release button gently.





1. Film Chamber Direct Connector
2. Holding Plate
3. Releasing Rod
4. Winding Coupler
5. Motor Drive Button
6. Film Rewind Functioning Pin
7. Camera Attachment Screw
8. Contacts for Controlling Servo EE Finder
9. Timer Chart
10. Frame Counter
11. Frame Counter Setting Gear
12. Film Rewind Lever
13. Slide Stopper
14. Grip
15. Holding Plate
16. Tripod Screw Socket
17. Battery Case Attachment Bracket
18. Camera Attachment Knob
19. Main Switch
20. Timer Lock Pin
21. Timer Ring
22. Connecting Socket

Canon Motor Drive Unit with 7-Step Timer and Two Stable Motors Built in

This motor drive unit with a built-in timer was developed simultaneously with the F-1 camera and can be used for many purposes. Thanks to its complete interchangeability, the unit can be attached to any F-1. No modification or adjustment is necessary.

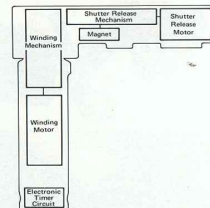
It is a unique apparatus with two motors for film winding and shutter release for most reliable performance, and it also has a built-in intervalometer.

Both continuous and single frame photography are possible. In continuous photography, seven different intervals, from 3 frames per second to 1 frame per minute can be used. Thus the timer is designed for a wide performance range from high-speed photography for action analysis to photography for recording experiments. It is possible to perform long-time photography for more than 4 hours at 1 frame per minute with long-roll film of 250 frames.

The Servo EE Finder is available so that the unit can be left without attendance during long-time photography. Remote control of the unit is also possible.

Features

1. Complete interchangeability requiring no adjustment
2. Stable drive with 2 motors
3. A built-in wide range timer
4. Shoots 3 frames per second at the highest speed
5. Continuous photography with any shutter speed except "B"
6. Remote control with Remote Switch MD
7. Unmanned EE photography when used together with the Servo EE Finder
8. Long-roll film photography when used together with the Film Chamber 250
9. Automatically stops when film is finished
10. Reliability in frequent use
11. Expanded photographing system applying accessories for remote control



Stable Operation with Two Motors

Generally, the shutter release operation uses the power of the winding motor. But in the Canon system, shutter release operates with its own motor for more stability and durability.

An elastic return joint, designed by Canon, is used as switch for circuit changeover. When winding is completed, the switch comes to the release circuit. When release is completed, the switch returns to the winding side.

How to Know when Winding is Completed

In a focal plane shutter camera, normally the shutter cannot be released if winding is not completed. Also if the power of the wind-up coupler is not eliminated after winding is completed, excessive power is loaded on the connecting section of the shutter charge mechanism. This also interferes with shutter release.

It was most important for the Motor Drive to have some device to detect the completion of winding and at the same time eliminate the remaining torque that goes into the releasing mechanism. Use of an elastic joint solved this problem and the operation has become very reliable. This is a unique Canon feature.

Single Mode and Consecutive Mode Photographing

In a single mode photography, when the button is pressed, the shutter is released. When the button is released, the motor winds the film and stops.

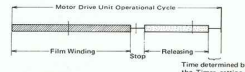
In the consecutive mode, the operation cycle is as follows. It will go on releasing and winding all the time while the button is pressed. When the button is released, it winds up and stops. Either way, it will always stop after winding is completed. This is a very useful mechanism.

Photographing Speed and Shutter Speed

Approximately 333 ms (thousandths of a second) are necessary for the Motor Drive to complete one cycle of operation, from winding to shutter release, including the necessary time for exposure.

Releasing time is 135ms. This includes the shortest exposure time, too.

For the time of shutter operation of the camera, consideration must be given to the time spent for automatic aperture operation and for the coming and going of the curtain. Approximately 1/15 of a second will be the limit for shutter operation. If the speed is faster than 1/15 of a second, it is possible to take three frames per second. If slower than 1/15 of a second, the maximum motor drive speed cannot be used.



Timer Mechanism

This is a unique Canon mechanism. The circuit is built into the bottom of the grip.

Photographing intervals can be set up in seven steps. It will photograph one frame after each interval.

Attaching the Motor Drive Unit

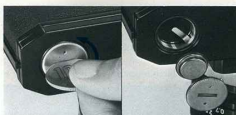
1. After removing the mercury battery from the bottom part of the camera, remove the bottom cover. Then, return the mercury battery to its chamber and fit the cover back on the battery.
2. Attach the Motor Drive Unit on the bottom part of the camera and tighten it with the attachment screw. The functions of film advance, the mechanical coupling of the shutter release function and the electrical connection to the Servo EE Finder's control circuit are all done at the same time.
3. The main switch of the Motor Drive Unit has to be set at "OFF" before the power cord is connected.
4. A loaded Battery Magazine 15V should be installed in the Battery Case.
5. The Battery Case and the Motor Drive Unit are connected by the Battery Connector MD. Attach the Connector MD to the Battery Case on its upper part, and tighten them together with the tightening screw.



6. Checking the battery's power level cannot be done once the Battery Case and the Motor Drive Unit are connected by the Battery Connector MD. When the Battery Checker MD is connected to the connector cord's terminal, the position in which the pointing needle vibrates when the button is pushed indicates the state of the battery.
7. Plug the cord of the Battery Connector into the socket located at the bottom of the grip of the Motor Drive Unit.
8. The Battery Case may be carried either over the shoulder or clipped to the belt. It has both shoulder straps and a belt with a metal hook.

How to Handle

1. When the main switch of the Motor Drive Unit is set at "OFF", the power circuit is disconnected.
2. After loading, make two blank exposures and advance one more with the film advance lever and, then, release.
3. The number of frames to be taken is set on the Motor Drive Unit. The frame counter setting works by turning its gear and it counts down, always showing the number of unexposed frames. As the Unit stops operating when the counter reaches "0", if you set the frame counter at "20" when using a film of 36 exposures, the Unit will stop at the 20th exposure. If you set the frame counter at "36" when using a film of 20 exposures, the Unit will begin to idle after the 20th exposure and stop when it reaches "0". "F.C." on the frame counter disconnects the automatic stop switch.



the Film Chamber 250. This "F.C." position should not be used when the back cover is on.

4. Setting the Selector Switch "S" is for single frame photography and "C" is for continuous photography. They can both be used with the Timer Ring.
5. The Timer's scales are T, OFF and from 0.5 second to 60 seconds, divided into 7 scales. The Timer Ring is turned and set with the Stopper Pin pushed in.
6. How to Operate the Setting
7. Shutter release is performed by pressing the shutter release button on the Motor Drive Unit. For single-frame photography, the next unexposed frame is set in the shooting position when the finger is removed from the release button. For continuous photography, shooting continues as long as the release button is depressed, and shooting stops when the finger is withdrawn and the next frame is left in the shooting position.

8. For continuous shooting, when a lockable cable release is attached to the shutter release button on the Motor Drive Unit, and the release button is locked, continuous photography may go on unattended.

9. Remote Control

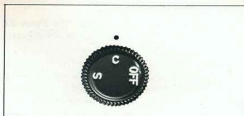
When the cord of the Remote Switch MD is connected to the remote control terminal of the Battery Connector, the Motor Drive Unit is controlled by the Remote Switch Button. When using the Remote Switch MD, the main switch of the Motor Drive Unit can be either at "S" or "C" but not at "OFF".

10. The Remote Switch MD has an "S" position and a "C" position which work the same as the main switch of the Motor Drive Unit. Depress the button of the Remote Switch first, and slide the release knob in the direction of the arrow. Then the release knob is locked and shooting may be continued. The proper operation of the Motor Drive can be confirmed from a distance by the Light Emitting Diode indicator on the Remote Switch.

11. When shooting with a shutter speed slower than 1/15 of a second, and having set the S-C switch of the Remote Switch at "S", the Timer of the Motor Drive Unit has to be set at 0.5 and the release knob of the Remote Switch has to be pressed until the shutter operation is finished.
12. When the frame counter of the Motor Drive Unit reaches "0", the Motor Drive stops automatically.

13. The film is rewound the ordinary way with the film rewind crank on the camera after having turned the film rewind lever of the Motor Drive Unit upwards.

14. There may be improper exposure if the shutter speed is slower than the speed of the chart or if it is set at "B".
15. Start the self-timer with the shutter release button on the camera side when using it with the Motor Drive Unit attached to the camera.
16. When shooting in temperatures below -10°C, as the battery capacity decreases, the battery case should be kept warm.

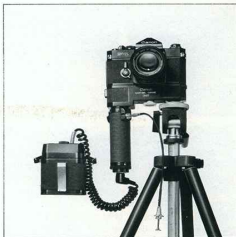


Photography	Single Frame Photography	Continuous Photography			
Main Switch	"S"	"C"			
Timer Scale	T, OFF	1, OFF	0.5	1	2-5-10-60
Shutter Speed	1/2000-1	1/2000-1/30	1/2000-1/8	1/2000-1/2	1/2000-1
Number of Photographs	1 exposure	2 exposures per sec.	2 exposures per sec.	1 exposure per sec.	1 exposure per sec.
Shutter Release Button	Pushed down until the exposure time is over	Continuous release			



Joint Use with Servo EE Finder

Cord 12V 2E is used to connect the Servo EE Finder to the socket of the Battery Connector MD. The selection of shutter speed is made according to the setting of the Motor Drive Unit. When the light metering switch of the Servo EE Finder is set at continuous metering, continuous EE shooting is performed with the operation of the shutter release button on the Motor Drive. If the shutter release button is locked either by the Remote Switch MD or by the lockable cable release, then unmanned continuous EE photography can be performed.



Power Source

The circuit of the timer is incorporated in the unit, and there are two kinds of power source available: the external power source, connected by the cord; and the power source which is directly attached to the bracket on the Motor Drive.

The battery case is used for photography with the Servo EE Finder or for remote control. The Battery Case D that is directly connected serves when only the Motor Drive Unit is used.

Battery Case

The case can house the battery magazine 15V with 10 penlight batteries or the 12V with 8 penlight batteries. It is connected to each accessory by a connection cord suited to the power level. The part of the battery case where the cord is connected, a T-type terminal, is used by plugging the cord and tightening it by screwing the attaching ring. The terminal for the remote control switch, which is used by only inserting the plug, is an exception.

Battery Connector MD

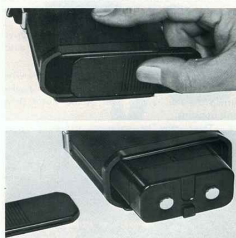
The Battery Connector MD connects the motor drive unit with the battery case. With its sockets for the Servo EE Finder and its remote control switch it makes unmanned photography possible.

Loading Batteries

When loading ten penlight batteries into the Battery Magazine 15V, load them according to ⊕ ⊖ marks. Press the ⊖ side and load them. When loading eight penlight batteries into Battery Magazine 12V, loosen the two tightening screws to remove the cover and load them according to ⊕ ⊖ marks. When replacing the cover, fix its position properly by inserting the three pins in place.

Loading Batteries into Battery Case

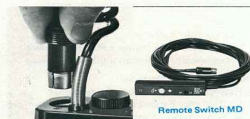
Remove the bottom cover of the battery case by sliding it either to left or right. Magazine 12V should be loaded according to the explanation inside the battery case. They cannot be loaded if facing the wrong direction. Magazine 15V should be loaded by matching the green mark on the battery case and the one on the



magazine.

Slide the bottom cover back in place.

Unit	Cord	Power Source	Remarks
Booster T Finder	6V 2B 1.2m	Magazine 12V	Connector MD not needed
Servo EE Finder	12V 2E 1.2m	Magazine 12V Magazine 15V	Magazine 15V not needed
Motor Drive Unit	Battery Connector MD 1m	Magazine 15V	Remote Switch MD 5m
Motor Drive Unit Film Chamber 250	Battery Connector MD 1m	same as above	Extension Cord 10m can be connected with Connector MD
Servo EE Finder	12V 2E 1.2m	same as above	same as above



Remote Switch MD

The Remote Switch MD has a 5m cord and is connected to the socket in the Battery Connector MD. It has the same changeover switch as the main switch of the Motor Drive Unit, to control changes between continuous and single frame photography.

The switch works by depressing it. It can be slid in and locked for continuous operation. During the photographer can stay away from the camera and still confirm its operation by watching the lamp turning on every time the shutter operates. It is possible to connect the Extension Cord (10m) to the Remote Switch MD. But when the temperature is low, the battery power tends to weaken and, as extending the cord will increase resistance in the power source circuit, this must be taken into consideration when using the extension cord. It is essential to check the voltage before use.

Battery Checker MD

This is an accessory of the Motor Drive Unit. It is used for checking the power level of the battery. When checking, connect the Battery Connector MD to the Battery Case and plug the tip of the cord into the checker. If the Battery Connector MD and the Servo EE Finder are used jointly, make sure that accessories being used, except the Motor Drive Unit, are connected to the battery case.

The battery is checked by pressing the button and reading the position of the needle. If the meter needle points to the blue mark, the battery has sufficient power. If it points to the red mark, the battery must be changed.

Battery Case D

The Battery Case D was developed for continuous photography with hand-held camera and is a directly-connected power source for the Motor Drive Unit. Although it is similar in type to the battery case, its power source is limited to the Battery Magazine 15V since it is exclusively for the Motor Drive Unit. The power source is loaded the same way into the battery case. Used together with the Film Chamber 250, hand held photography is possible.

Attaching Battery Case D to Motor Drive Unit

Loosen the safety screw on the metal device that attaches Battery Case D, and, from the back of the motor drive unit, insert it into the corresponding bracket, and then lock it with the safety screw. The case should not be attached from the front side of the Motor Drive Unit. If attached in this way, a short circuit will consume the battery.

Capacity

Ten Penlight Batteries

- Alkaline: 36 frames x 80 rolls or more
- Manganese: 36 frames x 50 rolls or more

Changing Penlight Batteries

1. Replace all the batteries with new ones.
2. Change the batteries after shooting the prescribed number of rolls.
3. Choose batteries of the same brand.



Technical Data of the Motor Drive Unit

Circuit construction: 5 transistors, 5 condensers, 2 diodes, 1 SCR.

Photographing speed: Maximum 3 exposures per second to one exposure per minute.

Timer scale: 7-stage.

"T. OFF" 0.5, 1, 2, 5, 10, 60 sec.

Power source: 10 penlight batteries.

Loaded in Battery Case and connected by Battery Connector MD.

Battery check: With the Battery Checker MD

Photographing capacity:

10 penlight batteries:

Manganese: 36 frames x 50 rolls or more

Alkaline: 36 frames x 80 rolls or more

Frame counter: Counts down and shows the number of unexposed frames. Automatically stops at "0".

Remote control: A Remote Switch MD connected to the Remote Control Terminal of the Battery Connector, with a cord 5m. long. The Extension Cord MD (10m) is available. By using the Tandem Control Box, continuous photography with up to 6 cameras is possible.

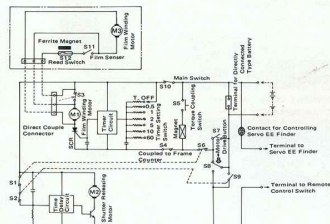
Shutter release button: With a cable release socket.

Dimensions: 150mm x 170mm x 34mm.

(5-15/16" x 6-11/16" x 1-5/16").

Weight: 720 grams (1 lb. 10 oz.).

Subject to alterations.



(Note)

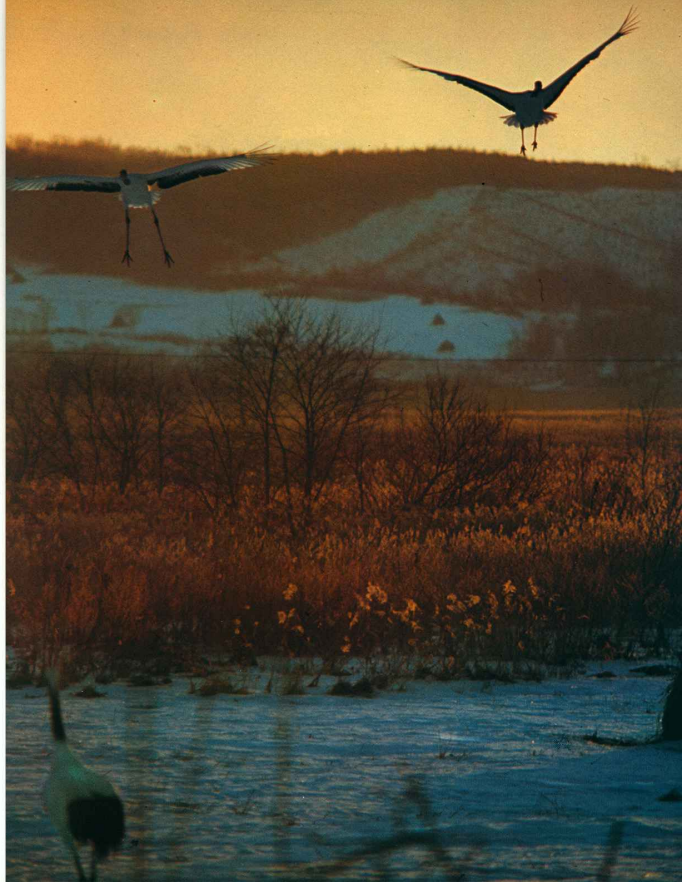
- S3 Automatically turns to "OFF" when attaching Film Chamber 250.
- S1, S6 Simultaneously "ON" or "OFF" by coupling device.
- S2, S9 Alternately "ON" or "OFF" by coupling device.



Continuous Photography of Formation Flying
 Canon F-1, FD 135mm F3.5 S.C. with Motor Drive Unit, 1/125 of a second, at f/11, ASA 64.



Japanese Cranes in the Sunset
 Canon F-1, FD 300mm F5.6 S.C. with Motor Drive Unit, 1/125 of a second, at f/5.6, ASA 64.





Film Chamber 250

Outline of its Operation

1

Remove the back cover.



2

Lift the Camera Holding Lever, turn to the outside, and open the Camera Holder.



3

Attach the body to the Film Chamber 250.



4

Attach the Motor Drive Unit in place of the bottom cover.



5

Connect the power source to the Motor Drive Unit.



6

To load film into the magazine use the Film Loader and do it in the darkroom.



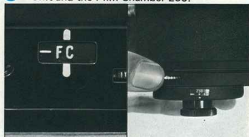
7

Load film into the Film Chamber 250.



8

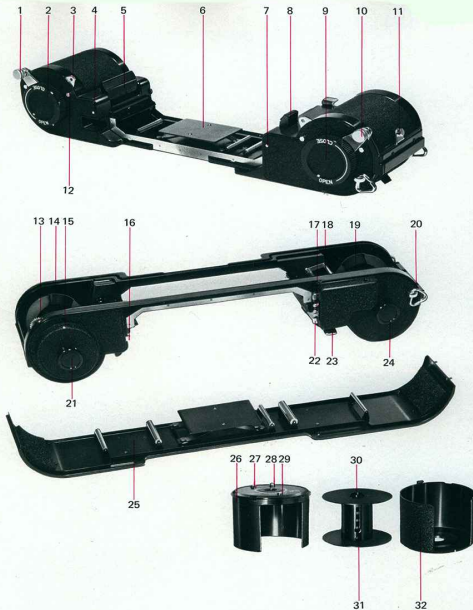
Set the frame counter of the Motor Drive Unit and the Film Chamber 250.



9

After metering, press the release button to photograph.





1. Camera Holding Lever
2. Open/Close Knob
3. Lever Lock Holder
4. White Dot
5. Camera Holder
6. Pressure Plate
7. White Dot
8. Camera Holder
9. Open/Close Knob
10. Camera Holding Lever
11. Back Cover Lock
12. Open/Close Index
13. Frame Counter Setting Gear
14. Supply Magazine Chamber
15. Frame Counter
16. Claw
17. Direct Connector Pins
18. Film Guide Roller
19. Take-Up Magazine Chamber
20. Strap Attachment Ring
21. Magazine Attachment Knob
22. Claw
23. Connector Release Lever
24. Magazine Attachment Knob
25. Back Cover
26. Inner Case
27. Projection
28. Release Button
29. Projection
30. Spool Shaft
31. Film Insertion Slit
32. Outer Case

Film Chamber 250

After the Motor Drive made high speed photography and the use of timers possible, together with the system of viewfinders, the Film Chamber 250 made 250 frames of continuous photography possible; a useful feature when recording documents. Thus, the range of high speed photography and the use of timers is considerably enlarged. This new accessory surely improves the work of copying large amounts of documents, recording experiments, and the coverage of news and sports. It is a rather simple task to mount this unit on the camera. Just put it in place of the back cover of the F-1 and it will be connected to the Motor Drive by means of a contact that couples directly,

and it will couple the winding mechanism, too. Perfect interchangeability in the photographic system, which is the basis of Canon's design policy, is once more successfully realized here. Besides, various safety devices are provided to control any error of operation in the various mechanisms.

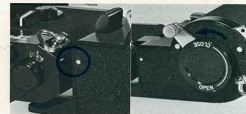
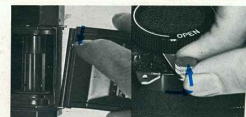
Features:

1. Interchangeable with the F-1's back cover.
2. It couples directly with the Motor Drive.
3. Safety device for circuit connection that works when the back cover of the Film Chamber is opened or closed.
4. It stops automatically when the film runs out.
5. Trouble-free operation.

Attaching the Film Chamber

1. The Film Chamber is attached to the camera in place of the back cover. When removing the back cover, push the pin of the hinge down so that then the cover may be easily removed.
2. The holder knobs for opening and closing, located at the top of the Chamber, are both pulled up after unlocking them. Then they must be turned to the outside to be able to open the body holder.
3. Fit the Chamber into the groove where the back cover is attached and push the camera body towards the Chamber to align the index mark of the camera to the white dot of the Chamber.
4. After putting the strap fittings out of the way, turn the holder knobs inward and fix the Chamber securely on the camera body.
5. When attaching the Motor Drive Unit, it is easier to do so after attaching the Film Chamber. When removing the Motor Drive Unit, it is more convenient to remove it before the Chamber.
6. When attaching the Film Chamber to the camera assembled already with the Motor Drive Unit, fit the Chamber from an angle so that the metal lock of the Motor Drive Unit may be caught at the pawls located on the opposite side of the Chamber connector.
7. When removing the Chamber from the camera while the Motor Drive is attached, pull the Chamber Coupling Connector Lever to uncouple it and then the Chamber may be removed.

Without attaching the Motor Drive to the Camera, the Film Chamber 250 by itself can supply film to be advanced by hand. In this case, because there is no power to drive the film, it is required to wind the film into the take-up Chamber by turning the knob under the take-up magazine.



How to Handle the Film Magazine 250 and the Film Loader 250

The Film Magazine 250 consists of an inner and outer case and a spool. It can contain a maximum of 250 film frames cut from long-roll film. It is recommended to use the Film Loader 250 to load the film into the magazine since it stops automatically at zero after the number of frames set on the dial has been loaded. Luminous paint on the frame counter makes it easily visible in the darkroom.

The Magazine is to be used exclusively with the Loader both for the supply and the take-up sides.

1. Removal of the Spool

Turn the outer and inner case in opposite directions while depressing the unlock button located at the top of the inner case. Align the openings of the cases and then the spool may be removed from the inner case.

2. Film Loading

Film Loading must be conducted in the darkroom. Prepare a long roll of film and fit it to the feeding shaft of the Film Loader. There are four different ways to fit it because wound-cores of film vary according to the different types.

a) For film with a small wound-core:

After fitting the wound-core to the shaft as it is, put the supplemental spool (supplied as an accessory) on the shaft so that its rim faces towards the film and holds it.

b) For film having a larger wound-core:

After fitting the wound-core to the supplemental spool, insert it on the shaft so that the rim faces outwards.

c) For film on ordinary spools with stopper discs at each end:

Fit on the shaft as it is.

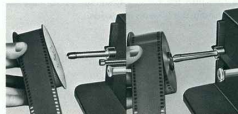
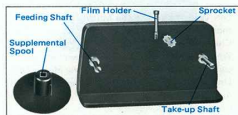
d) For film without wound-core:

Thrust on the shaft after fitting it to the supplemental spool. In this case, be careful that the film does not slacken, otherwise its surface may be scratched.

3. After cutting a little off the end of the film at an angle insert it into the slit of the take-up spool so that the emulsion surface of the film faces in and then wind the film round the spool a few times. When inserting do not crimp the end of the film as this may become an obstacle for the film to come out of the spool at the end of a photographic task, and the switch for automatic stop will not function when the film is used up. The spool has two vertical slits on opposite sides and either one can be used.

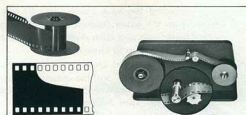
4. Before fitting the film to the sprocket shaft located at the center, raise the film holder up and confirm whether the sprocket is meshed into the film perforations, or not. Then replace the film holder. The revolutions of this sprocket are coupled with the film frame counter.

5. Set the required number of film frames to be taken on the scale of the counter dial. The scale of the counter is calibrated every ten frames and marked at every fifty frames.



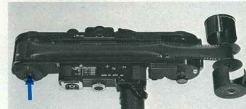
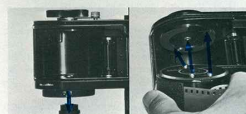
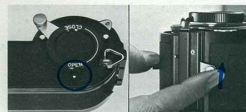
Allowance for sufficient leader is built into the calibration of the loader so no extra allowance is necessary or advisable.

- Turn the film take-up handle clockwise until it stops. When the scale is at zero, the loader stops automatically.
- Cut the film and take the spool out. Then put it into the magazine.
- To put the spool with film into the magazine first you hold the spool containing film with the end still unwound and is about 10cm in length, so that the emulsified surface faces to the inside and covers the inner case. Put the inner case with the spool into the outer case while aligning the openings of both tubes. Turn the inner case clockwise then the stopper will be engaged to complete loading. Turning the inner case counterclockwise will cause difficulties in retaining film in the magazine. Cut the end of the film at an angle.
- Cut the end of the film at an angle.
- Put the remainder of the film back in its container.



Loading Film into the Film Chamber

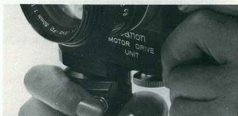
- After turning both end knobs to "OPEN", pull the film chamber back cover locks and the cover may be removed.
- After pulling down the magazine-attachment knob, put a feeding magazine into the magazine chamber so that one of the unlock buttons on the top of the magazine fits into a hole provided in the upper-rear side of the compartment, and then push the magazine attachment knob back. Subsequently, before turning the magazine open/close knob to "CLOSE", make sure that a white dot located at the lower part of the magazine is aligned with the white mark on the compartment, because if the magazine is not placed in the right position, it may open and ruin the film.
- Pull out approximately 30cm of film.
- Get the spool of the take-up magazine ready and insert the film end into its slit, and then wind a few turns around the spool.
- After confirming that film does not come loose from the spool, lock the inner case by turning it counterclockwise. Thus, it comes in exactly the opposite relationship with the feeding side.
- Put the magazine into the film take-up chamber and push each magazine attachment knob in.
- Turn the magazine-attachment knob of the film take-up chamber side to correct any slackening of the film and put the back cover in place again after confirming that the sprockets of the take-up spool are firmly engaged with the perforations.



8. When replacing the back cover, first fit one end of it on the guide grooves of the feeding compartment side and then press both ends of the back cover down to close it.
9. Turn the opening and closing knobs of the magazine to "CLOSE" and the mouth of each magazine will be opened, to complete the preparations for film advance.
10. Be sure to place each knob in the "CLOSE" position or the circuit of the Film Chamber 250 will not operate.

Photographic Procedures

1. Set the frame counter on the Motor Drive Unit to "F.C.".
2. Take six blank exposures with the Motor Drive Unit's release, and advance the seventh frame.
3. Set the film frame counter of the Film Chamber. When counting film frames, the counter of the Motor Drive Unit side has priority over that of the Film Chamber. For example, when the counter of the Motor Drive Unit is set at 36 frames, it stops automatically after 36 shots. The "F.C." position is provided in order to prevent such an automatic stop.
4. When setting the counter of the Film Chamber, turn the counter while pressing the gear down. But, even when the counter registers zero, the automatic stop will not work. Accordingly, if a mistake is made, the remaining film frames cannot be counted.
5. When photography is completed and also the tail end of the film has been entirely taken up into the take-up magazine, the circuit will open and activate the automatic stop.
6. Open the back cover and take the film magazine out.
7. If the loaded film breaks during operation take the film magazine out and repeat the film loading procedures mentioned above. In this case, the first shot should be performed also after having taken six blank exposures and advanced the seventh.
8. When the Film Chamber 250 is removed from the camera body, be sure to place the magazine knobs for opening and closing in the "OPEN" position.



delupe Festival, Mexico
1. FD 17mm F4 S.S.C. with Motor Drive Unit and Film Chamber 250, 1/60 of a second, at f/5.6, ASA 25.

Technical Data

Circuit composition elements: One motor, one reed switch.

Shooting capacity: A maximum of 250 frames.

Film loading: Provided with two special magazines to feed and take-up film respectively.

Film is loaded into the magazine by Film Loader 250.

Magazine: Specially designed, it can hold a maximum of 250 frames (10m or 33ft in length).

Frame counter: Manual. It counts down and shows the number of frames left.

Driving system: Film advance by electric Motor Drive and synchronized take-up driven by a built-in micromotor.

An automatic stop functions when all film is used up.

Connection: 3-way plug connector system.

Safety device: A safety device closes the magazine automatically when the back cover of the Film Chamber is removed.

The Motor Drive has a stop mechanism.

Dimensions: 333mm x 63mm x 100mm.

(1'1" x 2-1/2" x 3-15/16").

Weight: 1,170grs. (2 lb. 9 oz.).

Subject to alterations.



Lion's Family, Kenya

Canon F-1, FD 50mm F1.4 S.S.C., unmanned EE photography, 1/250 of a second, ASA 25.



Antelopes, Nairobi

Canon F-1, FD 100mm F2.8 S.S.C., unmanned EE photography, 1/125 of a second, ASA 25.



Motor Drive MF

Outline of its Operation

- 1 Attach the grip to the Motor Drive MF.



- 2 Turn the switch of the Motor Drive MF to "OFF".



- 3 Insert 10 penlight batteries in the grip.



- 4 Check the battery charge.



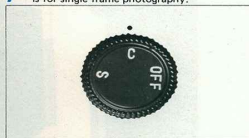
- 5 Remove the bottom cover of the body and attach the Motor Drive MF.



- 6 Set the frame counter to the number of frames to be taken.



- 7 "C" is for continuous photography and "S" is for single frame photography.

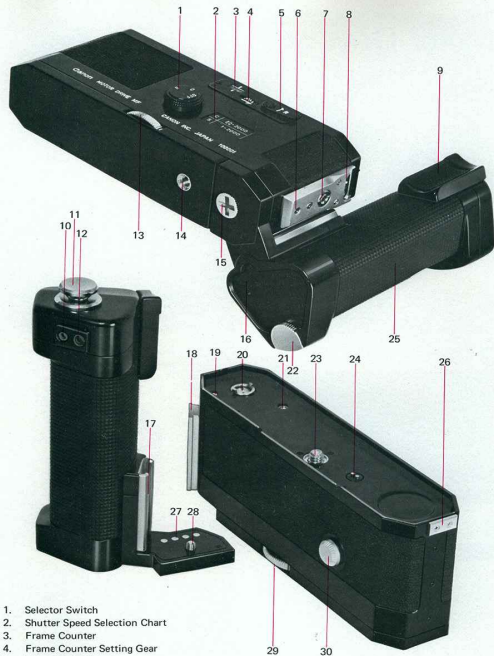


- 8 Set the shutter speed according to the chart.



- 9 Determine the exposure and press the shutter release button.





1. Selector Switch
2. Shutter Speed Selection Chart
3. Frame Counter
4. Frame Counter Setting Gear
5. Film Rewind Lever
6. Alignment Hole
7. Direct Connector for Attachment
8. Film Chamber Direct Connector
9. Thumb Rest
10. Battery Check Button
11. Motor Drive Button
12. Battery Check Lamp
13. Camera Attachment Knob
14. Tripod Socket
15. Connecting Screw to Motor Drive
16. Battery Chamber Cover
17. Motor Drive Mounting Shoe
18. Grip Mounting Rail
19. Shutter Release Rod

20. Winding Coupler
21. Film Rewind Functioning Pin
22. Battery Chamber Cover Lock
23. Camera Attachment Screw
24. Contacts for Controlling Motor Drive
25. Grip MF
26. Supporter for Film Chamber 250
27. Direct Contacts
28. Connecting Screw to Motor Drive
29. Attachment Screw to Motor Drive
30. Socket for Servo EE Finder

The New Motor Drive MF System

TEM is a concept of the ideal single lens reflex camera, a dimension into which the F-1 is a true pioneer. "T" stands for through the lens metering. "E" stands for Electric Eye control of exposure. And "M" stands for Motor Drive. Metering is, then, performed by TTL, exposure by EE, and film advance by the Motor Drive Unit. Yet, the backbone of the TEM is the Motor Drive Unit, thanks to which the whole ensemble works to create a suitable instrument for the most demanding photographic tasks.

Now, when the F-1 appeared, the Motor Drive was planned to emphasize the variety of its possible applications, since it has a device to make recording of scientific observation possible. However, the quest for new developments did not end there. Two further achievements of the Motor Drive System were developed one after the other. A unit to be used exclusively for high speed photography was the first to follow, and then came the new MF system.

The high speed Motor Drive Camera was born out of the F-1's Motor Drive System, and may be considered as an issue of the very summit of technological excellence.

The MF is a component Motor Drive System designed for maximum flexibility. It was designed after going all the way back to the simplest possible form of motor drive photography with the F-1, and, then, from that simplest form it went on acquiring greater and greater versatility through the addition of the various accessories into the Motor Drive System, of which the axis is the MF. It is possible to use it with the Film Chamber 250 or with the Servo EE Finder, or with both, and the highest degree of precision has been preserved to ensure its interchangeability.

The MF can be divided into two parts: the drive unit and the grip inside which the battery case is enclosed. The driving part is screwed on in place of the bottom cover of the camera, and the grip is inserted into the bracket on the side of the Motor Drive and is fastened with the screw that tightens the bottom of the grip. The grip is provided with a shutter release button, and film is fed at a speed of up to 3.5 frames per second.

Top Quality Operation

The inner mechanism is quite compact though it consists of the conventional Motor Drive with two synchronous motors, one for film advance and the other for shutter release in order to increase stability of performance. At the same time, taking into consideration the needs that arise in sports news coverage, the grip with the battery chamber was placed in front on the right hand side to make it easier to hold the unit either vertically or horizontally. The shutter button was conceived in such a way as to adapt perfectly to the hand, and the grip is detachable, so that the Film Chamber 250 may be used. In cold climates it can also serve as the external source of power with the coiled extension cord.

Wide Coupling Range of Shutter Speed

Automatic film advance and shutter release makes continuous photography possible at up to 3.5 frames per second with shutter speeds of 1/60 of a second or faster. When used together with the Interval Timer L, automation is extended to photography as slow as 1 frame every 3 minutes.

A Complete System of Remote Control

One of the main features of the Canon F-1 System is its ability to perform fully automatic, unmanned photography when a Motor Drive is used together with the Servo EE Finder. The Motor Drive MF has a mechanism that includes a small relay whose circuit controls the motor. The application range of remote control has been considerably widened because it is based on the operation of this relay. Therefore, not only do we meet the demand for accessories destined to standard service conditions but also for a method of control based on special application of the specifications. External control is undertaken by connecting the various accessories to the remote control jack on the side of the body.

Development of the System

Many accessories are being developed simultaneously with a view to expanding the MF system, but always paying attention to the fact that accessories developed up to date may be used without change.

The Connection of the Film Chamber 250, Connecting Cord and Grip MF

The Film Chamber 250 is attached in place of the back cover of the F-1 camera in the conventional way, and to attach the MF to it no adjustment or change is necessary.

However, since the grip MF is in the front of the F-1 body and, therefore, obstructs the attachment of the chamber, it should be removed, and the cord connected. This cord is used when the chamber is attached and also serves to keep the equipment ready for immediate use in cold climates by means of the external power source. Yet, the length of this cord is limited, since remote control entails excessive battery consumption when long connections are used. A long extension cord for remote control is also available.

Connection with the Servo EE Finder

The Servo EE Finder is connected to the special socket on the front of the motor drive unit's body. The connection cord is also specially designed.

Interval Timer L

The Interval Timer L is an important accessory for increasing the TEM's range, since the ability to regulate photography time in unmanned photography is indispensable for scientific observation.

While time could be set at one frame per minute with the conventional Motor Drive Unit, this range is now extended to intervals from half a second to 3 minutes, and the shutter release button can be locked under the Interval Timer L's control. Therefore, without any attendance, automatic photography can be performed for an hour and 48 minutes at intervals of 3 minutes with a 36-exposure roll of film.

Power for this electronic timer is supplied by the motor drive unit. The timer features a very high precision in its compact size.

Once the timer is attached, operation can be started with the button, and just by holding it the shutter release button on the grip will be freed. This timer is inserted into the socket of the Extension Cord E1000. The timer scale is graded into 10 stages and its relation with the shutter release speed is as follows:

Interval Time (sec.) T, OFF	0.5	1	2-5-10-30-60-120-180
Shutter Release Speed	1/15-1/2000	1/4-1/2000	1/2-1/2000 1-1/2000

This timer is screwed into the socket on the side of the Motor Drive MF.



Interval Timer L

Remote Switch 60 MF

To use the Remote Switch 60MF connect its 60cm cord to the socket that is also used to attach the Timer or into the Extension Cord E1000's socket. This switch when pressed releases the shutter, and by sliding it the shutter release button is locked. The Light Emitting Diode (LED) serves to verify the operation.

Extension Cord E1000

This connection cord is 10 meters long and has a socket for the Remote Switch 60 MF and the Interval Timer. It serves to extend the range of remote control.

Time Lapse Programmer

This Programmer is provided with a circuit to regulate time from half a second to 24 hours, and is capable of a variety of combinations of length of continuous shooting time and intervals. It was designed for both a still camera and an 8mm movie camera, and is used in order to perform single frame photography of the separate stages of movement, and for work sampling, indented and otherwise.

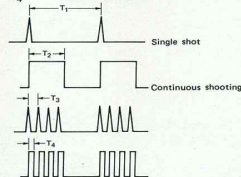
With this programmer, long-time photography for nature observation can be automatically performed at the rate of one picture per day as the longest interval. It is possible to increase the number of shots to record changes by the hour.

This product will be manufactured upon receipt of a special order.

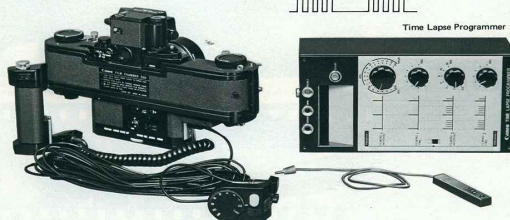


Time can be set as follows:

T ₁	0.5	1	2	4	8	15	30 seconds
		1	2	4	8	15	30 minutes
T ₂			1	2	3	6	12 24 hours
T ₃							0.5-60 seconds
T ₄							0.5-30 seconds
							0.5-15 seconds



Time Lapse Programmer



Technical Data of the Motor Drive MF

Type: Power drive system interchangeable with the bottom cover of the F-1.

Construction: Built-in two-motor system for film drive and shutter release respectively. Adopts a relay circuit control system.

Sequence rate: 3.5 frames per second at maximum speed.

Mode of operation: S(single frame), C(continuous run). Changed by means of a switch.

Coupling range of the shutter: S; all of the shutter speeds except B(bulb). C; 1/2000-1/60 sec.

Frame counter: Manually set. Indicates the remaining number of frames. Automatically stops at 0. When set at F.C., the frame counter mechanism is released. It is used when Film Chamber 250 is attached.

Grip: Contains battery chamber. Detachable. Removed from the Motor Drive and connected again with an exclusive cord to the Motor Drive, when the Film Chamber 250 is attached.

Power source: Ten penlight (Size AA) batteries. Shooting capacity: More than 80 rolls of 36-exposure film, with alkaline or manganese batteries.

Battery tester: Built into the grip with lamp indicator.

Shutter release button: At the upper part of the grip. With the cable release socket.

Film loading: Ordinary loading is possible when the Motor Drive is attached to the camera body.

Remote control: Exterior control devices are available which are connected by means of the remote control socket.

Dimensions:

Body, 153 x 51 x 23mm.
(6" x 2" x 9").

Grip, 179 x 120 x 63mm.
(7" x 4-3/4" x 2-1/2").

Weight: Body, 650gr. (1 lb. 7 oz.).

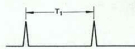
Grip, 1,070grs. (2 lb. 3 oz.) including ten penlight batteries.

Subject to alterations.



Steam Locomotive, Hokkaido, Japan
Canon F-1, FD 300mm F5.6 S.C., with Motor Drive MF, 1/500 of a second, at f/5.6, ASA 64.





Single shot

Lilies
Canon F-1, Bellows Lens FLM 100mm F4 with Bellows FL at 30 minute intervals, 1/60 of a second, at f/11, ASA 64.

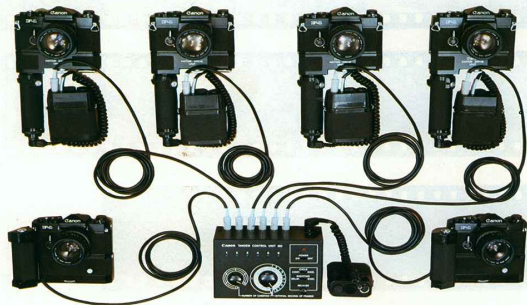


Continuous shooting

Sunset at Tuman Beach, Guam
Canon F-1, FL-F 300mm F5.6 with Motor Drive MF and Time Lapse Programmer,
3 frames per second, at 2 minute intervals, ASA 64.



Tandem Control Unit



Tandem Control Unit

This is the control system for multiple angle observation photography which played such an important role at the Sapporo Olympics. This system has complete control over up to 6 sets of motor drive at the same time. Basically, it has two methods of control: a separate control for continuous photography and a parallel control for simultaneous photography. Since the timer is provided to control intervals of operation, this control unit can be used for various programs of photography.

1. Simultaneous High Speed Photography in Series
High speed photography of 18 frames per second is possible driving 6 cameras at the same time. This method is suitable for analysis of subjects moving at high speeds, but not changing position such as photographing a golfer's swing.
2. Sequential High Speed Photography in Series
The moving subject is caught by cameras which shoot in succession. This method is used for analyzing motion of a moving subject such as a runner.
3. Multiple Angle Parallel Photography
An object is taken from various directions simultaneously. This method is used for multiple angle observation in long time recording.

Operation for the above-mentioned complex aspects of photography can be performed by manipulation of the buttons. The control unit panel is provided with a set of dials for the cameras to be used, the switches for series or parallel photography and for single frame or continuous photography, and an interval timer dial with a range of intervals up to 1 minute. An indicator dial to confirm the operation of each camera is also incorporated. Each motor drive unit uses its own power source.

This product will be manufactured upon receipt of a special order.

mera No.1



No.2



No.3



No.4



No.5



No.6



Continuous Photography of Driver
Canon F-1, FD 50mm F1.4 S.S.C., with Motor Drive and Tandem Control Unit, 18 frames per second, 1/1000 of a second, at f/2.8, ASA 64.

High Speed Motor Drive Camera



Based upon the F-1 body and Motor Drive, a High Speed Motor Drive Camera was developed exclusively for taking rapidly moving subjects. It provides a shooting speed of four to nine frames per second.

To make it even more useful, it was designed to be able to take single frame exposures.

This camera was first developed for reporting the Olympic Games at Sapporo in 1972, and became the talk of the photographic world on account of its dramatic photographs. This camera operates almost the same as the F-1, and it accepts FD and FL lenses.

Though specially made and conceived as a reformed type of the F-1, body accuracy and durability were highly improved with the requirements of high speed operation in mind.

An outstanding feature that distinguishes this Canon camera from any other is a viewfinder where one is able to see the subject all the time. In shooting at high speed in order to catch the fleeting process of motion, it is inconvenient to have the viewfinder black out because of the action of the mirror at the very time of shooting. This problem has been solved by means of a fixed pellicle mirror.

This is in addition to its high speed function with a capacity to shoot as many as nine frames per second.

Technical Data

Type: 35mm single lens reflex camera with focal plane shutter.

Picture size: 24mm x 36mm.

Interchangeable lenses: Canon FD and FL lenses.

Viewfinder: Removable pentaprism viewfinder.

Focusing screen: Using Fresnel lens, focusing glass with split-image rangefinder. Without beam splitting mirror in the condenser lens.

Finder attachments: Angle Finder B, Magnifier R, Dioptic Adjustment Lenses, Eyecup.

Field of view: 97% of actual picture area or more.

Diopter: -1.2, with standard ring.

Mirror: Fixed pellicle mirror.

Shutter: Focal plane shutter with super-thin-titanium curtains.

Shutter speed: 1/60, 1/125, 1/250, 1/500, 1/1000 sec.

Shutter release: By means of the shutter release button on the camera body. Cable release can be attached.

Diaphragm adjustment: Manually set by locking stopped-down lever.

Film driving: Power driven by means of a direct current motor with voltage stabilizing circuit.

Power source: 20 penlight (Size AA) batteries in battery case, connected with cord.

Shooting capability: More than 30 rolls of 36-exposure film at normal temperature.

Frames per second and shutter speed:

4 fps; 1/60-1/1000 sec.

4-7 fps; 1/125-1/1000 sec.

7-9 fps; 1/1000 sec.

Film loading: With multi-slit film spool. By opening back cover.

Frame counter: Set in Motor Drive, automatically stops at O. Manually reset count down type.

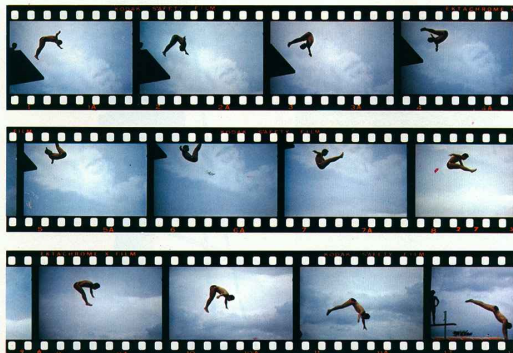
Dimensions:

146.7mm x 136.8mm x 43mm.

(5-3/4" x 5-3/8" x 1-15/16").

Weight: 1,100grs. (2 lb. 3 oz.) body only.

Subject to alterations.



Continuous Photography of Diving

High Speed Motor Drive Camera, FD 100mm F2.8 S.S.C., 9 frames per second, 1/1000 of a second, at 1/4, ASA 64.

Electronic Remote Control System



Electronic Remote Control System

To expand the shooting capability of the F-1 system, an electronic remote control system has been developed.

An electronic eye is added to the TEM shooting system, with the Motor Drive Unit and Servo EE Finder attached to the F-1 body.

The Pan-Tilt Head, the Focusing Unit and the Zooming Unit are combined to complete a perfect remote control shooting system. Using this system, the following operations can be performed from a remote location while looking at the Monitor screen of the electronic finder.

1. Composition: panning, tilting and zooming.
2. Focus.
3. Automatic exposure control: Servo EE Finder.
4. Film Transport: Motor Drive Unit.
5. Shutter release: Motor Drive Unit.

That is to say, all operations necessary in photography can be remotely controlled by this remote control system.

One of the outstanding advantages of this system of photography is that high quality pictures can be obtained since they are taken directly with the F-1.

Technical Data

1. Camera
Canon F-1, Motor Drive MF (the conventional Motor Drive Unit can also be used), Servo EE Finder.
Electric power supply comes from the Control Unit.
Film Chamber 250 is attachable.
2. Lens
FD 85-300mm F 4.5 S.S.C. Zoom Lens.
Other FD lenses can be interchanged.
3. Pan-Tilt Head
Designed to make panning and tilting possible. (Simultaneous panning and tilting are possible.)
Panning: functioning range; 340°
speed; 6°/sec.
Tilting: functioning range; 45° up and down respectively.
speed; 3°/sec.
4. Focusing and zooming unit
Focusing Ring and Zooming Ring of FD 85-300mm lens are driven by belt driven connected to a compact motor.
Mounting position can be adjusted to the lenses.
Zooming speed: 5 sec.
Focusing speed: 5 sec.
5. Electronic finder
2/3" Vidicon tube.
It consists of the Vidicon Unit attached to the eyepiece of the Servo EE Finder and the Monitor TV built into the Control Unit.

6. Control unit

It consists of a 7" Monitor TV and the following controls:

- 1) Power switch
Puts the power on and off.
- 2) Stand-by switch
At OFF: Only the heater of the CRT is on.
At ON: The entire Control Unit is ready for use.
- 3) Power source
100V, 50Hz.
- 4) Brightness adjustment knob
For Monitor.
- 5) Contrast adjusting knob
For Monitor.
- 6) Zooming switch
Controls zooming motor.
- 7) Focusing switch
Controls focusing motor.
- 8) Panning switch
Controls panning motor of the Pan-Tilt Head.
- 9) Tilting switch
Controls tilting motor of the Pan-Tilt Head.
- 10) Shutter release button
Indicates the number of frames exposed by means of a light emitting diode.
Resetting is possible with the reset button.
- 11) Frame counter
Indicates the number of frames exposed by means of a light emitting diode.
Resetting is possible with the reset button.

Subject to alterations.

This product will be manufactured upon receipt of a special order.





The CAT System

CAT stands for Canon Automatic Tuning.

This system eliminates the need to calculate guide numbers which are essential to decide exposure in flash photography with an ordinary electronic flash.

It couples the electronic flash with the meter circuit to maintain the proper f/stop at all times. Therefore, flash photography can be performed in the same light metering way as during daytime.

Generally, with the ordinary electronic flash, since charging time varies according to battery consumption, it is difficult to know when voltage is at its peak level or what the true guide number is.

One is never sure when deciding exposure in flash photography with an ordinary electronic flash, but now, the Canon's CAT System has solved this problem completely.

In the CAT System, the amount of charged voltage is transmitted from the electronic flash to the meter, and the focused distance is electrically transmitted from the lens to the meter through the Flash-Auto Ring and both signals transmitted to the meter are calculated by an electronic circuit and converted into the correct exposure may be established by turning the aperture ring to match the needles. A characteristic of the CAT System is that the meter needle moves when the charged voltage reaches a certain level and at any intermediate level between that and the peak level, proper exposure can be obtained by matching the needles. The CAT System, in other words, can be said to be an automatic system with none of the limitations of the ordinary electronic flashes.

Features

1. Since any change of the guide number is transmitted to the meter, the flash can be used before charged voltage reaches the peak level.
2. The CAT System eliminates the following calculation:
guide number \div focusing distance = f/stop
3. Photographers do not have to check the neon lamp, focusing distance, f/stop, etc.
4. All operations can be checked in the viewfinder.
5. Since the electronic flash can be used at less than full voltage, it consumes less battery and shortens the recycling time.
6. The range of distance in which photography can be performed can be seen from the position of the meter needle (using the warning marks).

Flash Photography

Two different connection for flash photography are built in. One is the 133D automatic electronic flash, and with it flash photography can be performed by the matching needle system. The other is a P.C. connector.

Since this camera's pentagonal viewfinder is de-

signed so that it may be changed by other viewfinders, the accessory shoe is not on the viewfinder but on the base of the film rewind crank, to which an adapter with a hot shoe can be inserted to attach the flash unit to the body.

Two types of couplers are applicable to this camera, namely, the D for general flash units, and the L for the CAT System.

The direct contact for the ordinary flash unit and the automatic flash control contact for the CAT System are located at the base of the film rewind crank and they are used respectively when connecting the direct-coupling type of electronic flash, and when connecting the CAT System.

The socket for an ordinary flash unit is on the side of the camera body.

The CAT System can be used with several specified lenses, the Canon Speedlite 133D, the Flash Coupler L to attach the 133D to the body, and the Flash-Auto Rings A, B, A₂, or B₂ for transmitting the focus distance from the lens to the meter.

The voltage of the main capacitor in the flash and the distance focused on are monitored by the camera meter, and the meter needle moves accordingly. By aligning the aperture needle to the meter needle, proper exposure is assured even before the capacitor is fully charged.

Looking at the camera from the rear, the automatic flash control contact is on the right and the direct contact for the ordinary flash unit is on the left side.

The combinations of the specified lenses and the Flash-Auto Rings are shown in the following table.

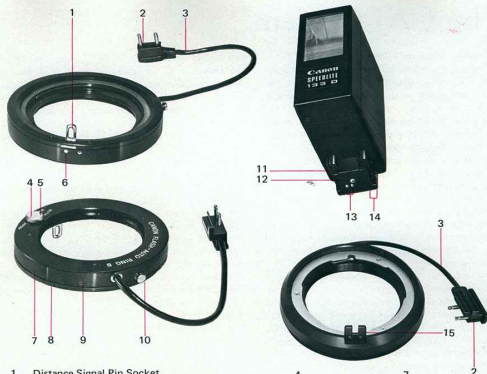
Combination of the Flash-Auto Ring and the Specified Lenses

Lenses Used	Flash-Auto Ring	Coupling Range (In case of ASA 100)
FD 50mm F 1.8 S.C.	A ₂ or A	Approx. 1–10m
FD 50mm F 1.4 S.S.C.	B ₂ or B	Approx. 1–11m
FD 35mm F 2 S.S.C.	A ₂ , B ₂ , A or B	Approx. 1–9m
FD 35mm F 3.5 S.C.	A ₂ or B ₂	Approx. 0.9–5m

The Speedlite 133D Set is composed of the Flash Coupler L and one of the Flash-Auto Rings A, B, A₂ or B₂. Consequently it may be considered that there are four sets.

The letter suffix of the Flash-Auto Ring is used to distinguish the sets.

The A₂ and the B₂ have been recently developed so that the FD 35mm F3.5 S.C. lens may be used.



1. Distance Signal Pin Socket
2. Plug
3. Connecting Cord
4. Lens Setting Knob
5. Black Dot
6. White Index
7. Fastening Ring
8. Adjusting Ring
9. Red Index
10. Lock Release Button
11. Attachment Leg
12. Direct-coupled type Synchronizing Contact
13. Automatic Flash Control Contact
14. Connecting Socket for Auto-Ring
15. Distance Signal Pin Holder
16. Index
17. Distance Coupling Ring

How to Use the CAT System

1. Flash Coupler L

Load one 1.3V HD mercury battery for the signals of the CAT System and one 1.3V HP mercury battery to illuminate the meter information window.

The cover can be removed by simply pulling in the direction of the arrow.

The illumination battery will last for 40 hours in continuous use at normal temperatures.

The voltage of the mercury battery for the signals of the CAT System can be checked when the coupler is attached to the F-1 body. When attaching the Coupler L to the camera, first release its stopper lever putting it down, attach the coupler to the accessory shoe, and then lock the lever putting it back in place to fix the coupler.



2. Speedlite 133D

Load four penlight 1.5V batteries in the battery chamber as illustrated and insert into the accessory shoe with the power switch at OFF.

3. Flash-Auto Rings A and B

Choose the A or the B Ring according to the lens you are going to use and turn the lens selector to match the lens.

When attaching the ring to the lens at the front, make the white index on the ring match the distance signal pin socket.

Set the focusing ring to 1.2m with a 50mm lens and in the middle of 0.5 and 0.6m with a 35mm lens.

Insert the distance signal pin of the lens into the socket of the Flash-Auto Ring matching the red index on the ring to the groove of the bayonet that serves to determine the position of the lens, and then turn the Flash-Auto Ring clockwise to lock it in position.

Insert the plug of the cord into the socket of the 133D.

When detaching the Flash-Auto Ring, remove the connecting cord and turn it counter-clockwise while depressing the lock release button, and pull it out when the distance signal pin socket is matching the red index.

4. Preparing for photography

Set the meter switch of the camera at OFF-FLASH.

Set the shutter speed at 1/60 sec.

Switch the light of the coupler on if the meter information in the viewfinder can not be seen clearly.

Set the switch of the 133D at AUTO.

5. Photographing

Focus the subject after the meter needle moves. Then align the aperture needle with the meter needle by turning the aperture ring and depress the shutter release button.

Note that before the meter needle moves into the proper exposure range, no proper exposure can be obtained due to improper shooting distance or insufficient voltage. But it is possible to focus before the needle moves.

When detaching the Flash Coupler L, first disconnect the cord of the Flash-Auto Ring, then the coupler by pushing the stopper lever down, and slipping the coupler off.



Attaching the Flash Auto Rings A₂ and B₂
1. Attach the ring after setting the distance scale of the lens moving it from 1 to infinity. In order to couple the pin it is better to set the scale beyond 1m.

2. Insert the ring after adjusting its red mark to the groove of the bayonet mount ring and lock by screwing the ring clockwise. Then the ring in the rear part, which is the automatic flash ring's distance coupling device must be turned left or right so that the pin holder matches the distance signal pin. When the distance scale of the lens is set at less than 1m, the rotating angle of the automatic flash ring is too narrow. Therefore, the distance scale ring must be turned towards infinity.

3. All other operations are the same as for the original Flash Auto Rings A and B.

4. When removing the automatic flash ring, push the metallic lock device down and give a slight counter-clockwise turn to the ring to release the lock, and then turn the ring a little further until the red dot reaches the uppermost position. Then the ring is ready to be easily removed by just pulling it.

Canon Speedlite 133D

Although it was originally developed for use exclusively in the CAT System, it can also be used with other lenses by switching to the manual position. In the manual position, the ready lamp does not light until the capacitor is fully charged to prevent underexposure.

For your convenience when calculating, a corresponding table of focusing distances and F-numbers is attached.

Moreover, an adapter to fix it firmly in place and to prevent any loosening is available for those instances when the 133D is not used for the CAT System.

Flash Coupler L

This is the flash coupler with a CAT System accessory shoe which is exclusively for the CAT System. Since it can be coupled with the meter, a lamp is provided to illuminate the meter window so that meter information can be read under dark conditions. Therefore, this can be utilized for photography inside a theater, indoors, where the light is insufficient to illuminate the meter information window.

Table for Flash Synchronization

Type of Bulb	Shutter Speed														
	200	1000	500	250	125	60	30	15	8	4	2	1	1/2	1/4	1/8
FP	O	O	O	O	O	X	X	X	O	O	O	O	O	O	O
M - MF circuit	X	X	X	X	X	X	X	X	O	O	O	O	O	O	O
Speedlite	X	X	X	X	X	X	X	X	O	O	O	O	O	O	O

Flash Coupler D

This flash coupler has an ordinary accessory shoe and is inserted into the special accessory shoe coupler in the F-1. Since it has a contact in the center for direct coupling, the circuits of the flash can be connected only by inserting into the contact. In the case of the flash without a hot shoe, the cord is connected to the flash terminal on the side of the F-1 after attaching the flash.



Synchronizing an Ordinary Flash Unit

The ordinary flash unit can be connected to the accessory shoe by means of the Flash Coupler D with a hot shoe.

When using the flash unit without a hot shoe the cord should be connected to the terminal located on the side of the camera body. With an electronic flash, shutter speed must be 1/60 sec. or slower. When using the flash bulbs, shutter speed will vary according to the type of flash bulb used. With FP class any speed can be chosen except 1/60 and 1/30 of a second, and with the M and MF, a shutter speed of 1/15 sec. or lower must be used.

Exposure can be decided by the following formula: $\text{guide number} \div \text{focusing distance} = \text{f/stop}$. Consequently, the f/stop can be obtained after focusing the subject.

In this calculation, be sure not to confuse meters with feet.

Even when using the 133D, if a lens without a coupling pin, this is necessary to obtain the f/stop. The guide numbers shown are applicable only after the neon lamp turns on. For your reference, a comparative table of apertures is attached. The switch should be set at the MANUAL position. With the CAT System, flash photography can be performed when the charged voltage is at a low level. However, when the switch is at MANUAL, the neon lamp turns on at a higher voltage than the minimum required for the CAT System. For this reason, separate switches are provided for automatic and manual operation.

Technical Data

Type: Direct-coupled, clip-on type CAT System.
Guide number: 18 meters (60 feet) at ASA 100.

For both monochrome and color.

Color temperature: 6000°K, Correction with green filter.

Flash beam angle: 55° vertical and horizontal.

Fashing intervals: When using new batteries:

Manganese battery: Approx. 7 seconds

Alkaline battery: Approx. 5 seconds

Flashing time: 1/1000 sec.

Number of flashing:

Manganese battery: Approx. 80 times

Alkaline battery: Approx. 300 times

Power source: 4 penlight batteries.

Pilot lamp: Built in.

Contacts: Direct-coupled type synchronizing contact, automatic flash control contact, socket for connecting to Flash-Auto Ring.

Size: 90 x 74 x 35mm. (3-9/16" x 2-15/16" x 1-3/8")

Weight: 170g. (6 oz.).



Close-up Photography

The System of Close-Up Photography

Any lens can be positioned as close as one likes to the subject by simply expanding it. However, it is mechanically difficult to put the lens too close to the subject.

The closest the standard lens is designed to focus is 0.6 meter from the subject. Nevertheless, for close-up photography, close-up lenses and extension tubes, as well as other accessories are provided to obtain close-up images of the subjects without any difficulty.

Generally, photography in which the ratio of the size of the subject and the size of the negative is 1:1 is called life-size photography; photography with higher magnification is called macrophotography; and that with lower magnification is called close-up photography.

The extension Tube M Set which protrudes the lens by means of the tube, and the screw-in close-up lens are provided as accessories for close-up photography.

Both can be used separately or combined to perform various low magnifications of close-up photography including the standard life-size photography.

Photomacrography

For photography with magnifications higher than life-size, the Bellows, which support the lens firmly and can continuously change the shooting distance, are provided to simplify the shooting operation and at the same time obtain a picture image with higher magnification.

By attaching the Bellows to the standard lens,

Close-Up Lenses

These are positive supplemental lenses, which are used by screwing them in the front of the lens just as the filters are.

These lenses are used only to alter the focusing point and have no effect on the speed of the lens. However, it is best to use moderate apertures when using the close-up lenses.

In accordance with the development of the FD lenses, the close-up lenses of a 55mm screw diameter as used in the standard lens, have been produced particularly of the achromatic type for better performance.

In naming the close-up lenses, for example the 55mm close-up lens 240 or 450, the prefix figure represents the screw diameter size and the suffix figure represents the closest subject distance. The shorter the shooting distance, the higher the magnification of the lens. Therefore, when choosing a lens, both figures should be taken into consideration.

photography from 1X to 3X can be performed. To avoid loss of image quality the Macrophoto Couplers, which reverse the lens, are available. Moreover, when used in combination with the Extension Tube M, these devices serve to obtain pictures with higher magnification.

The attachments described so far can be used with the ordinary lenses but the macro lenses, that is to say, the 50mm F 3.5 lens and the 100mm F 4 lens, are most suitable for shooting in the macro range. They are recommended to persons who are serious about close-up photography.

In close-ups and photomacrography the quantity of light is less than in general photography. Therefore, exposure compensation is normally required, but with the F-1's TTL metering compensation is completely automatic and the meter can be used the usual way.

However, in photomicrography or in case of very dim light conditions, light metering by means of an exposure meter is impossible. In this case, the use of the Booster T Finder is preferable.

Since a longer exposure time is required, the copying device and the cable release are indispensable.

Moreover, the interchangeable viewfinders and the camera holders for performing close-up photography easily are provided, too.

The accessories related to close-up photography are introduced below.



The closest possible shooting distance is measured from the film plane indicator. It is recommendable to use a lens whose focal length ranges between 35mm and 135mm.

Close-up lenses can also be used in combination with the Extension Tube.

Smallest Object-Field in Close-Up Lenses

Lens Used	450		240	
	Closest Possible Shooting Distance	Smallest Object-Field (in mm)	Closest Possible Shooting Distance	Smallest Object-Field (in mm)
FD 35mm F3.5 S.C.	395	120x139	241	70x140
FD 35mm F2.5 S.C.	250	95x143	225	70x114
FD 50mm F1.8 S.C.	341	110x116	267	70x113
FD 50mm F1.4 S.C.	205	86x141	252	68x103
FD 50mm F1.2M S.C.	345	104x156	270	71x107
FD 100mm F2.8 S.C.	422	64x96	313	41x61
FD 135mm F2.5 S.C.	490	53x80	357	32x48
FD 135mm F2.5 S.C.	493	50x84	357	33x50

Extension Tube M Set

Its mechanical function is limited to increasing the distance between the lens and the focal plane to allow the lens to focus on very close objects.

As the length can't be adjusted with just one tube, tubes of three different lengths are provided: 5mm, 10mm, and 20mm.

The total length of one set is 55mm, as it is composed of a 5mm tube, a 10mm tube, and two 20mm tubes.

When the 55mm standard lens and these tubes are used in combination, close-up photography and life-size photography can be performed.

When the tubes are attached, speed is reduced due to alteration of the aperture ratio, however, since the TTL light metering system is used, exposure correction is automatic.

Magnification will differ according to the length of the tube and the focal length of the lens used, but the approximate size of the negative can be estimated by the following formula:

$$\text{Magnification} = \frac{\text{Tube Length}}{\text{Focal Length of the Lens}}$$

For example, in case the 20mm tube is attached to the 50mm lens,

$$M = \frac{20}{50} = 0.4 = 1/2.5$$

Thus, the size of the image on the negative is estimated to be about 1/2.5 of the size of the subject.

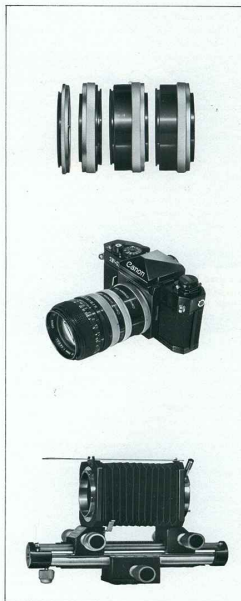
This means that when using a tube of the same length as the focal length of the lens, the subject image will be life-size.

The tubes are attached and detached in the same way as the lens so it can be done very easily.

Bellows FL

In the case of the Extension Tube, the draw-out length is fixed and the shooting distance is limited to the range where the subject can be focused by rotating the focusing ring.

The Bellows FL, as opposed to the extension tubes, is completely adaptable from its minimum to its maximum extension.



When it is used with the standard lens, photomicrography with a magnification from 1X to 3X can be performed.

Picture area and other factors related to the various lenses are shown in the Table on page 107. A semi-automatic aperture mechanism which automatically closes the diaphragm makes the Bellows FL almost as easy to use as a fully automatic lens.

Attaching and detaching the Bellows is the same as the lens.

The Bellows FL is a column type bellows with both front and rear adjustment as well as overall adjustment. Minute adjustments can be made, and it is seldom necessary to move the tripod.

The Slide Duplicator can be attached to the tip of the Bellows. Moreover, since the strut for preventing blur is built in, it is convenient to perform shooting with the Bellows attached to the copy stand.

When using the Bellows, it is desirable to use the macro lens which is especially designed for close focusing, however, since the wide angle and the standard FD lenses have been far improved over conventional lenses, when the FD lens is used, very satisfactory results can be expected and magnification ratios can be read directly from the Bellows scale.

In addition to the FL, a simplified model, the Bellows M, is also available: It is a single track manual bellows with front extension.

Macrophoto Coupler FL

General photographic lenses are designed for maximum performance at normal photographic distances and, as a rule, the closer to the subject, the lesser the image quality. This tendency is particularly remarkable in life-size photography or in higher magnifications. On the other hand, when the lens is positioned at a close distance from the subject, photographic conditions, including illumination, will worsen.

In order to minimize these defects, the lens can be reversed. The accessory for reversing the lens is called the Macrophoto Coupler.

There are two types of Macrophoto Couplers: one is attached to the screw type extension tube and the other to the bayonet mount.

The Macrophoto Coupler for the tube can be attached directly to the screw type Extension Tube, however, since it is not equipped with the focusing device, focusing must be done with the focusing ring of the lens. But when the Bellows is used jointly, focusing can be performed freely with the Bellows.

The number of the Macrophoto Coupler denotes the front screw diameter (Filter Screw) of the lens. There are four sizes: 40mm, 48mm, 55mm, and 58mm.

The Macrophoto Coupler FL 55 has a helicoid mount and can protrude 13mm. Focusing is possible without a Bellows.

It can be attached directly to the Extension Tube M, the Bellows FL, and the camera body. Besides, when attaching it only to the standard lens, it is capable of magnifications of 1.3X to 1.5X, and is



The FL 100mm F4 short mount lens is a high resolution lens for photomicrography. The lens is attached to the Bellows and can be focused continuously from infinity to actual life-size (1:1 ratio). It is convenient in close-up photography, as the focal length is twice as long as the 50mm. For the same magnification, lens to subject distance is greater than with the 50mm lenses for photomicrography.

240	192	144	120	96	72	230	Photographic Distance	208	230	320
360	288	216	180	144	108	48	Size of the Subject (mm)	24	12	6
	1.25×	1.35×	1.44×	1.56×	1.78×	72	Exposure Factor	36	18	9
						225×	Magnification	4×	9×	25×
1:10	1:8	1:6	1:5	1:4	1:3	0.5		1:1	2:1	4:1
0.1			0.2					1.0	2.0	4.0

FD Standard Lens

FD Standard Lens
FD Standard Lens Bellows FL

FD 55mm F1.2 S.S.C. Lens·Bellows FL

Macro Lens·Extension Tube·Bellows FL

Micro Lens·Extension Tube M·Bellows FL

FD Standard Lens·Extension Tube M

FD Standard Lens in Reversed Direction·Macrophoto Coupler·Bellows FL



Close-Up Lens·FD Standard Lens

Slide Duplicator·FD Standard Lens·Bellows FL

FD Standard Lens in Reversed Direction·Macrophoto Coupler FL·Extension Tube FL·Extension Tube M·Bellows FL

FD Standard Lens in Reversed Direction·Macrophoto Coupler FL

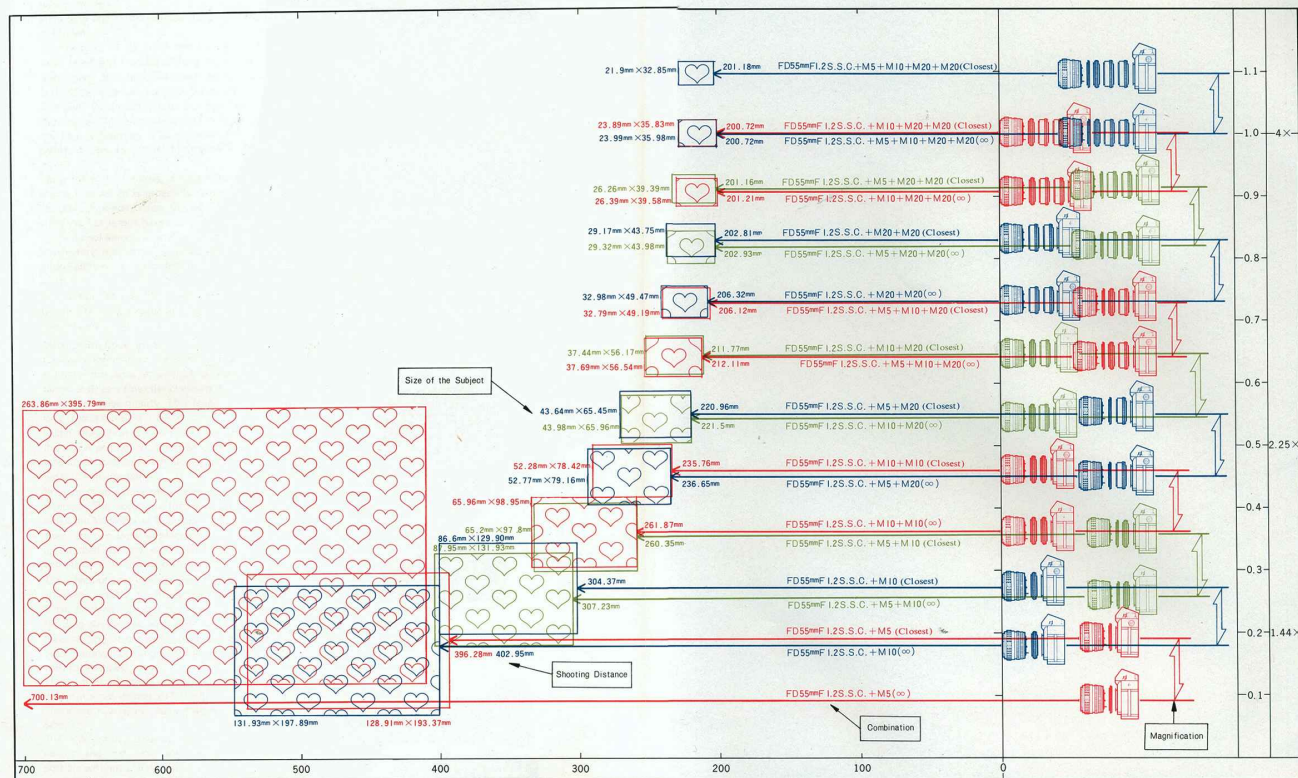
Retrofocus FD Standard Lens·Macrophoto Coupler·Extension Tube Lens Mount Converter A·Bellows FL

Macro Lens

Macro Lens·Life-size Adapter

Photomicro Unit F·Microscope

Combination of the FD 55mm F1.2 S.S.C. and the M Tubes



indeed very useful.

The 55mm Macrophoto Coupler is designed for use with the standard FD 50mm F 1.4 S.S.C. and 1.8 S.C. lenses.

Screw-In Type Extension Tube

These are intermediate tubes that are screwed together. They were initially made for Canon's rangefinder cameras but can also be used on the single lens reflex cameras.

The tubes in this category are a set of the Extension Ring A, B, C, 6mm, 9mm, and 12mm and also six tubes for macrophotography with lengths from 25mm to 200mm. However, as these tubes are of the screw-in type, when joining them to the bayonet type of mount, it is necessary to use Mount Converter A or B.

The Mount Converter A is used when the tube is connected to the camera body and the B is used when the tube is connected to the Macrophoto Coupler FL.

Lens Mount Converter A

This is an adapter used when the screw-in type of accessories are attached to the single lens reflex camera mount. It is also used when the screw-in type of lens for the rangefinder camera is connected to the single lens reflex camera.

Lens Mount Converter B

This is an adapter used when the accessories equipped with a bayonet ring for single lens reflex cameras and the FD and FL lenses are connected to the screw-in type of tube.

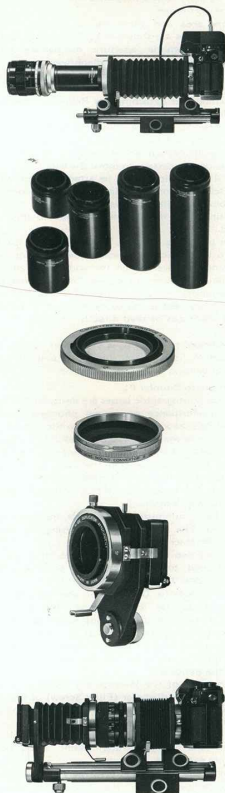
Slide Duplicator FL

This unit for duplicating slides can photograph both film strips and lantern slides.

Subjects may be trimmed with this duplicator because it is screwed into the tip of the bellows located between the sliding rails and the lens mounting section. In order to ensure an even illumination of the slides, the unit has a dispersion glass on the back of its film holder. In light metering, correct exposure can be read through the built-in meter of camera. But, when the central area to be measured is covered with a black shadow, shift film back and forth a little and then read the meter information. When duplicating slides, pay careful attention to the light source. Apply the flood lamp to tungsten film and natural light to daylight film. Whenever the situation makes selection of the correct light impossible, it may be necessary to use a filter. It is important to use small lens apertures of less than F 5.6 for duplicating photography, because its depth of field is extremely shallow.

The following table shows relations among light sources, filters and types of film.

	Light Source	Flood Lamp	Natural Light (Light through dispersion glass)
Film			
Daylight Type	+CCB (12)	possible	
Tungsten Type	possible	+CCA (12)	



Other Accessories for Macrophotography

Whenever close-up and macrophotography or copywork photography are performed indoors or outdoors it is very convenient to use the Copy Stand and the Finders that best suit the particular case. An outline of these accessories appears below.

Copy Stand 4

It is used to have a perfect hold on the camera while duplicating photographs with professional-like results, or to take close-ups continuously. This is an indispensable accessory particularly for photography in which a number of bellows and tubes are required. It is also effective to improve your hold on the equipment to perform better photomicrography.

Speed Finder

Any sudden need to change from waist-level to eye-level viewing and vice versa can be coped with by a simple touch. It is not required to place your eye close to this Finder. Objects can be viewed with it in all positions. It can be conveniently used together with the copy stand.

Angle Finder A₂ and B

These finders are mounted on the viewfinder eyepiece and can easily be moved from a vertical position to a horizontal one.

Waist-Level Finder

This Finder has a magnifying power of 5X, and with it objects are viewed from above through the hood. It is collapsible so as to make it easy to carry.

Magnifier R

Used together with the Eye-level Finder, it enables you to confirm precise focusing of the object. A magnification of 2.5X is provided to make it suitable for copy work or photography with a wide angle lens. It swings out of the way so the entire screen can be seen.

Focusing Screen D

This screen is of the mat-section type and it is useful for duplication photography with precision.

Camera Holder F

It is used to fix the camera to a tripod or a copy stand for telephoto, copywork or close-up photography. It can be applied to all the Canon SLR cameras which have been produced succeeding to the FX Model, only by adjusting the position for the fixing screw. It is possible to adjust the mounting position of the camera from a vertical position to a horizontal one and viceversa.

Booster T Finder

It is used for photomicrography or close-up photography under low illumination conditions. Light metering with a weak light becomes possible and it, therefore, enables to determine the exact exposure with no difficulty at all.



Copy Stand 4

This is the Copy Stand used for Canon's single lens reflex cameras. It makes operation easy when copying printed matter in general, documents, drawings, and pictures. Moreover, since it can be used together with the accessories for close up and macrophotography, it can be widely applied to this sort of photography. It can also be used as a stable stand for photomicrography. It is composed of base board, stanchion, and carrying arm.

Specifications

Camera and lens used: Canon single lens reflex camera and the lens for the single lens reflex camera.

Picture area: 420mm x 240mm (1'4-1/2" x 9-7/16") or smaller.

Magnification: 1/12 or greater.

Distance between subject and film plane:

640mm x 83mm (2'1-3/16" x 3-1/4").

Stanchion height: 617mm (2'5/16").

Dimensions of the base board:

450mm x 420mm (1'5-11/16" x 1'4-1/2").

Weight: 3.5kg (7 lb. 11 oz.).

*The 8mm rangefinder camera can be attached by its tripod socket to the Stand.

How to Assemble the Stand

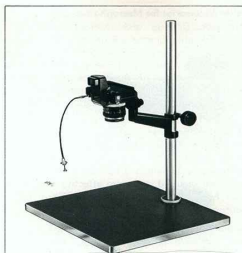
1. Screw the stanchion into the base board, and put the arm on the stanchion from the top.
2. It is better for the camera body to support the camera with the camera holder than to support it with the Stand only. In case the subject is small, use the Bellows instead of the holder.

In macrophotography performed with both the Bellows and the Extension Tube, this device firmly supports the camera. It makes operation easy, and its use is recommended. In case of photomicrography, it is difficult to decide the position of both the subject and the camera. Therefore, to support the camera body when shooting indoors, this device is preferable to a tripod. In outdoor photography, a tripod is more convenient.

Handy Stand F

It is a simplified device for copy work to be used on a desk. It is small and lightweight. And can be disassembled for storage. Use a standard lens to copy subjects of about B4 to B6 sizes.

There are line marks on the legs for added convenience. The stand consists of legs, pedestal, F Ring to fit the lens, and Extension Tube M5.



Photography with Copy Stand 4

Close-up lenses should be used in accordance with the magnification. The smallest object field in close-up lenses is shown below:

55mm Close-Up Lens 450 and 240 (with the FD 50mm Lens)

Type	Distance from Lens to Focusing Ring	Distance Film Plane/ Subject	Smallest Object Field	Remarks (Size)
450	535mm	314x210mm	A4	
	0.6m (F1.8 lens)	340	165x110	Cabinet
240	0.45m (F1.4 lens)	306	140x95	Post Card
	0.6m (F1.8 lens)	260	110x75	Quarter Plate
	0.45m (F1.4 lens)	253	103x69	

Distance Scale	Distance Film Plane/ Subject	Smallest Object Field	Magnification	Remarks (Size)
0.7	700mm	420x280mm	1/12	A3
0.8	600	345x230	1/8	A4-B5

Bellows Scale	Smallest Object Field	Magnification	Distance 50mm F1.8 lens/Subject	Distance 50mm F1.4 lens/Subject
34.5 (14.2) (longest)	36x56mm	0.67	206mm	198mm
	8.7x13mm	2.76	255mm	240mm

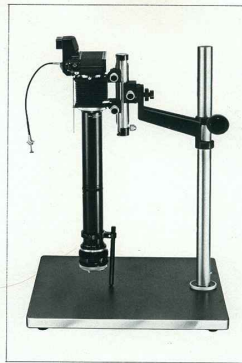
Choose accessories according to the subject size, and set the camera at a distance more or less like one of the above, then, while focusing the subject, decide the smallest object field.



Macrophoto Strut

When the overall extension is more than 75mm after joining several tubes of the screw-in type even the faintest vibration affects the picture plane. In case of very high magnification, there is the possibility of the subject diverging from the picture plane.

This Strut is used to eliminate these problems by firmly supporting the Extension Tube so that it cannot move. This accessory is composed of a holder which supports the Extension Tube and a strut by which the holder can be positioned up and down. At the end of the strut a piece of rubber is provided for better support.



Data about FD lenses attached to the Bellows FL in standard direction

Lens	Bellows Scale	34.5	50	100	142.5	(mm)
FD 35mm F2 S.S.C.	Distance	166	170	207	246	
	Magnification	0.96	1.39	2.79	3.97	
FD 50mm F1.4 S.S.C.	Distance	250.2x37.5	173.2x25.8	16.4x12.9	6.1x4.1	
	Exposure Factor	3.8	5.7	14.3	24.7	
FD 55mm F1.2 S.S.C.	Distance	198	189	213	247	
	Magnification	0.67	0.97	1.84	2.76	
FD 135mm F2 S.S.C.	Distance	35.9x53.9	24.8x37.2	12.4x18.6	8.7x13.0	
	Exposure Factor	2.8	3.9	9.6	14.1	
FD 200mm F4 S.C.	Distance	213	201	221	255	
	Magnification	0.63	0.91	1.62	2.59	
FL 50mm F3.2	Distance	38.2x57.4	26.4x40.6	13.2x19.8	9.3x13.9	
	Exposure Factor	2.6	3.6	7.9	12.9	
FD 250mm F5.6 S.C.	Distance	805	607	525	514	
	Magnification	0.26	0.37	0.74	1.06	
FD 280mm F5.6 S.C.	Distance	93.7x140.6	64.7x97.0	32.3x48.5	22.7x34.0	
	Exposure Factor	1.6	1.9	3.0	4.2	
FD 300mm F5.6 S.C.	Distance	1544	1306	963	888	
	Magnification	0.17	0.25	0.50	0.72	
FD 350mm F5.6 S.C.	Distance	138.0x207.0	95.2x142.8	47.6x71.4	33.4x50.1	
	Exposure Factor	1.4	1.4	2.3	3.0	
FD 400mm F5.6 S.C.	Distance	216	208	231	266	
	Magnification	0.67	0.97	1.84	2.76	
FD 450mm F5.6 S.C.	Distance	35.9x53.8	24.8x37.2	12.4x18.6	8.7x13.0	
	Exposure Factor	2.8	3.9	9.6	14.1	

Data about lenses attached to the Bellows FL in reversed direction using the Macrophoto Coupler FL (the helicoid of the Macrophoto Coupler is not extended at this time)

Lens	Bellows Scale	34.5	50	100	142.5	(mm)
FD 35mm F2 S.S.C.	Distance	211	225	253	313	
	Magnification	2.91	3.34*	4.18	5.92	
FD 50mm F1.4 S.S.C.	Distance	8.2x12.4	7.2x10.8	5.7x8.6	4.1x6.1	
	Exposure Factor	15.3	18.9	26.8	47.9	
FD 55mm F1.2 S.S.C.	Distance	214	226	251	308	
	Magnification	1.97	2.27	2.85	4.06	
FD 135mm F2 S.S.C.	Distance	12.2x18.3	10.6x15.9	8.4x12.6	5.9x8.9	
	Exposure Factor	8.8	10.7	14.8	25.6	
FD 200mm F4 S.C.	Distance	221	233	257	314	
	Magnification	1.82	2.11	2.6	3.79	
FD 250mm F5.6 S.C.	Distance	13.2x19.8	11.4x17.1	9.1x13.6	6.3x9.5	
	Exposure Factor	8.0	9.6	13.3	22.9	
FD 300mm F5.6 S.C.	Distance	224	236	271	324	
	Magnification	1.74	2.04	3.01	4.34	
FD 350mm F5.6 S.C.	Distance	13.8x20.7	11.7x17.6	8.0x12.0	5.6x8.4	
	Exposure Factor	7.5	9.3	16.1	29.4	

Data about the Bellows Lens FLM 100mm FL attached to the Bellows

Lens	Bellows Scale	40 (w)	50	100	140	(mm)
FLM 100mm F4	Distance	—	1216	427	400	
	Magnification	—	0.10	0.60	1.00	
FD 35mm F2 S.S.C.	Distance	—	240.8x36.1	40.1x60.2	24.1x36.1	
	Exposure Factor	—	1.2	2.6	4.0	

Lens	Bellows Scale	34.5	50	100	142.5	(mm)
FD 35mm F2 S.S.C.	Distance	166	170	207	246	
	Magnification	0.96	1.39	2.79	3.97	
FD 50mm F1.4 S.S.C.	Distance	250.2x37.5	173.2x25.8	16.4x12.9	6.1x4.1	
	Exposure Factor	3.8	5.7	14.3	24.7	
FD 55mm F1.2 S.S.C.	Distance	198	189	213	247	
	Magnification	0.67	0.97	1.84	2.76	
FD 135mm F2 S.S.C.	Distance	35.9x53.9	24.8x37.2	12.4x18.6	8.7x13.0	
	Exposure Factor	2.8	3.9	9.6	14.1	
FD 200mm F4 S.C.	Distance	213	201	221	255	
	Magnification	0.63	0.91	1.62	2.59	
FD 250mm F5.6 S.C.	Distance	38.2x57.4	26.4x40.6	13.2x19.8	9.3x13.9	
	Exposure Factor	2.6	3.6	7.9	12.9	
FD 300mm F5.6 S.C.	Distance	805	607	525	514	
	Magnification	0.26	0.37	0.74	1.06	
FD 350mm F5.6 S.C.	Distance	93.7x140.6	64.7x97.0	32.3x48.5	22.7x34.0	
	Exposure Factor	1.6	1.9	3.0	4.2	
FD 400mm F5.6 S.C.	Distance	1544	1306	963	888	
	Magnification	0.17	0.25	0.50	0.72	
FD 450mm F5.6 S.C.	Distance	138.0x207.0	95.2x142.8	47.6x71.4	33.4x50.1	
	Exposure Factor	1.4	1.4	2.3	3.0	
FD 500mm F5.6 S.C.	Distance	216	208	231	266	
	Magnification	0.67	0.97	1.84	2.76	
FD 550mm F5.6 S.C.	Distance	35.9x53.8	24.8x37.2	12.4x18.6	8.7x13.0	
	Exposure Factor	2.8	3.9	9.6	14.1	

Lens	Bellows Scale	34.5	50	100	142.5	(mm)
FD 35mm F2 S.S.C.	Distance	211	225	253	313	
	Magnification	2.91	3.34*	4.18	5.92	
FD 50mm F1.4 S.S.C.	Distance	8.2x12.4	7.2x10.8	5.7x8.6	4.1x6.1	
	Exposure Factor	15.3	18.9	26.8	47.9	
FD 55mm F1.2 S.S.C.	Distance	214	226	251	308	
	Magnification	1.97	2.27	2.85	4.06	
FD 135mm F2 S.S.C.	Distance	12.2x18.3	10.6x15.9	8.4x12.6	5.9x8.9	
	Exposure Factor	8.8	10.7	14.8	25.6	
FD 200mm F4 S.C.	Distance	221	233	257	314	
	Magnification	1.82	2.11	2.6	3.79	
FD 250mm F5.6 S.C.	Distance	13.2x19.8	11.4x17.1	9.1x13.6	6.3x9.5	
	Exposure Factor	8.0	9.6	13.3	22.9	
FD 300mm F5.6 S.C.	Distance	224	236	271	324	
	Magnification	1.74	2.04	3.01	4.34	
FD 350mm F5.6 S.C.	Distance	13.8x20.7	11.7x17.6	8.0x12.0	5.6x8.4	
	Exposure Factor	7.5	9.3	16.1	29.4	



Dandelion
Canon F-1, FL 50mm F3.5 Macro Lens with Bellows FL, 1/30 of a second, at f/5.6, ASA 25.



Nature Revealed through Macrophotography
Canon F-1, FL 50mm F3.5 Macro Lens with Bellows FL, 1/2 of a second, at f/22, ASA25.





Photomicrography

The expansion of possibilities in close-up photography and macrophotography is, of course, effective in creating new photographic interests in people because of their usefulness in recording observation of various phenomena and because of the attractive compositions obtainable and the colorful potentials they have. Particularly close-ups delight photographers because of their characteristic value in revealing the secrets and wonders of nature which are usually hidden from sight. But, the maximum photographic magnification possible in general photomicrography is 10:1, because there are difficulties beyond that ratio due to limitations in performance of the equipment or because suitable photographic materials are not available.

To satisfy the needs for higher magnification in observation photography, the easiest and most

reasonable approach is to use the microscope, which enables to magnify even 2,000 times the actual size of objects, in combination with photographic equipment. As a matter of fact, photomicrography has been the object of research for a long time and many optical systems with various illumination devices, as well as exclusive photographic accessories, have been developed.

On the other hand, many conventional cameras including the Canon SLR cameras have also been applied to photomicrography. Canon has provided two types of connection hood to facilitate photomicrography. One is the Photomicro Unit F for which the camera section is fixed in position, and the other is a Macrophoto Hood designed so that the position of the camera may be adjusted. It is used together with the bellows and copy stands so that magnification may be changed.

Canon Photomicro Unit F

The unit has a hood to connect the camera body to a microscope and it is convenient to use as a handy accessory in photomicrography with a fixed camera distance. The unit is applicable to any microscope, biological as well as metallographical, whose sleeve has an outside diameter of 25mm, with or without eyepiece. The Photomicro Unit F consists of four parts: an outer and an inner hood tube, a light-shielding tube for the eyepiece sleeve and a clamp ring for mounting.

Technical Data

Applicable microscope: General and metallographical microscopes with a 25mm outside diameter sleeve.

Camera distance (1): 108.4mm (4-5/16").

Distance between the main point of the eyepiece and the position of film.

Photograph magnification: Approximately 1/2 of the microscope's magnification

Size: 107.5 x 59mm (4-1/4" x 2-5/16").

Weight: Approx. 320gr. (11 oz.).

Mounting

1. Release the screw that fastens the hood and remove the inner tube from the outer tube.
2. Remove the microscope eyepiece, then fit the inner tube and fix it by turning the knob.
3. Insert the eyepiece into the inner tube.
4. Put the outer tube over the inner tube and fasten with the knob.
5. Mount the camera with the outer tube bayonet following the same procedure as for mounting the lens.
6. Just insert the light-shielding tube into the inner tube instead of the eyepiece when it is not being applied.



7. For microscopes whose stages can not be focused, fix the ocular section with the clamp ring so that it may be secured in the right position against the weight of the camera.

Magnification

The unit is designed to provide a photographic magnification approximately half as much as microscopic magnification. The precise magnification, however, shall be calculated as follows,

1. When the unit is associated with the objective lens and the eyepiece, the exact photographic magnification shall be obtained by the following equation.

Photographic Magnification = Magnification of Objective Lens x Magnification of Eyepieces x $1/250$,

where $l = 108.4\text{mm}$

The microscopic magnification is an apparent one resulting from a virtual image projected at a visual distance of 250mm from the ocular position, and the real photographic magnification, therefore, should be determined by multiplying the apparent magnification with a quotient obtained through dividing the camera distance by the visual distance.

2. When the unit is associated with objectives only, the exact magnification shall be calculated by the following formula.

Photographic Magnification = Magnification of Objective Lens x $108.4/250$

With objective lenses, in order to obtain high quality pictures in macrophotography, too high a ratio of magnification is undesirable. Field of view shrinks in these cases.

Focusing

With a slender beam of light travelling through the optical system under magnifications as high as 20 times or more, it may be difficult to focus through the finder prism screen. In such cases, try to focus through the mat surface. Since this unit's hood length is constant, adjustment for focusing must be conducted by moving the microscope's objective lens.

Protection from Camera Shake

Even the slightest camera shake has considerable effect on photomicrography with a high ratio of magnification. It is, therefore, essential to protect the equipment from the slightest vibration so that distinct pictures may be obtained. It is, of course, preferable to protect the photomicrographic system from any possible shake. But even when such perfect protection is not possible, select mounting so as to prevent the extension of any vibration caused by the equipment, and prepare a rigid mounting foundation. Furthermore, it is also recommendable to use a cable shutter release for the camera and to fix the mirror upwds specially after focusing and metering, so that the performance of no mechanism may have an influence on the photomicrography. In addition, a rubber cushion on the foundation and the use of a rubber mat 10 to 20mm thick under the microscope are also required.

Determining Correct Exposure

Because of the shake caused by the shutter at a speed of more than $1/30$ of a second or less than $1/2$ a second, it is better to select shutter speed, and then arrange the other conditions such as adequate film and illumination to meet the requirements of such shutter speed. The built-in meter of the camera can be used for metering under bright conditions, and stopped down metering must be performed. In case of slow shutter speeds, it is recommendable to use the metering system in association with the Booster T Finder. Anyway, correct exposure must be decided by adjusting the intensity and distance of light sources so that the meter needle may indicate the proper exposure.

Illumination

In photomicrography, different light sources according to the type of material to be copied and the magnification have been devised. Some of them are exclusively designed for photomicrography and they may be selected according to their applications. Also, the conventional slide projector light sources and photographic lamps are generally applied to photomicrography with lower magnifications.

When intensive light sources are required for photomicrography with higher magnifications or when the materials to be copied need protection from the heat generated by the illumination system, a special device must be provided. The Koehler illumination may be one of the best for such requirements so far as light transmission is concerned. The selection of a specific filter to fit the film is also important for better photomicrography.

Since the photographic brightness decreases in an inverse proportion to the square of the magnification, magnification must be limited to the availability of sufficient light for better photomicrographs. Meanwhile, photographers should confirm details of light sources in special works about this subject.

Film and Filter

In general, image contrast of photomicrographs is liable to be inferior. Accordingly, in cases of monochrome photomicrography, fine grain panchromatic film with high image contrast is preferable in order to produce photographs with a better image contrast. Since the achromatic objective lens is corrected for green and yellow, distinct photomicrographs are produced using a G-1 Filter. Furthermore, the filter must be chosen to meet the colors of materials to be copied so that image contrast may be improved. In case of color film, it is desirable to use blue light for daylight film and flood lamps for tungsten film, because the colors of photomicrographs are affected by the type of light source. When the light source does not agree with the type of film it is necessary to use a filter for color compensation. Some illumination devices and microscopes are provided with a filter pocket. When there is no such filter pocket, some means must be found to fit the filter in front of the light source.

Film Type	Light Source	Filter
Daylight	Blue Light	Nil
Daylight	Artificial Flood Light	CCB12
Tungsten	Blue Light	CCA12
Tungsten	Artificial Flood Light	Nil

Lens

In photomicrography, it is necessary not only to achieve a high magnification but also a clear definition and high resolving power. On the other hand, the higher the magnification, the more will the picture image break down, and the more difficult it will be to focus the corners of the picture area, so it is very important to select a suitable lens. Taking these into consideration, use an apochromatic or a plan lens as objective and a complanate or a wide field lens as eyepiece. It is preferable to use an objective and an eyepiece from the same manufacturer. An objective with a power lower than 20X should be used.

How to decide the exposure in photomicrography (For guidance)

In order to decide the exposure not using the TTL meter, the following formula is used:

$$T' = T \left(\frac{NA}{NA'} \right)^2 \left(\frac{B'}{B} \right)^2$$

where T = Exposure Time
 B = Magnification
 NA = Aperture Opening

The prime (') stands for value after alteration, which is obtained by a calculation based on exposure as from the above formula.

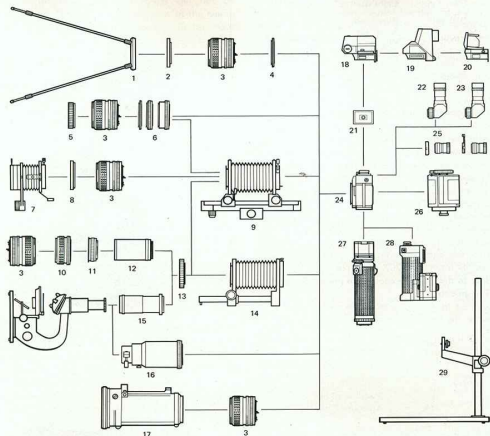
Canon Microphoto Hood

This hood has been designed to expand or contract and alter magnification accordingly. It cannot be used alone and has to be combined with the Bellows and the Copy Stand to support it.

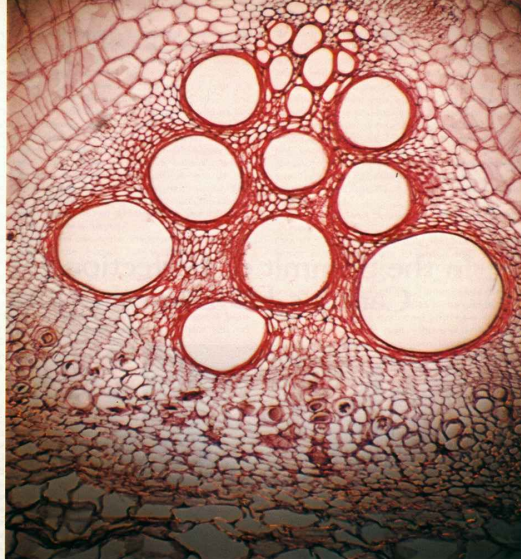
The Bellows and the Hood are connected by the Lens Mount Converter A. Focusing can be done by the objective microscope and by protruding the Bellows. Overall length of the camera when the Bellows and the Hood are connected is 115mm at its minimum and 260mm at its maximum. The magnification that can be obtained by this combination is approximately from 0.5 to 1.0 that of the microscope. The data required for photography using the Hood is the same as shown in the explanation of the Photomicro Unit F. The combination is made in the following manner:

Camera Body
 ↓
 Bellows FL or M
 ↓
 Lens Mount Converter A
 ↓
 Microphoto Hood
 ↓
 Microscope

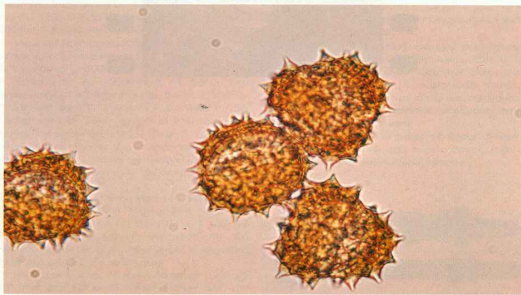




1. Handy Stand F
2. Handy Stand Attachment
3. FD 50mm F 1.4 S.S.C. Lens
4. Extension Tube M 5
5. 55mm Close-up Lens 240mm, 450mm
6. Extension Tubes M 5, M 10, M 20
7. Slide Duplicator
8. Slide Duplicator Attachment
9. Bellows FL
10. Macrophoto Coupler FL 55
11. Lens Mount Converter B
12. Extension Tube
13. Lens Mount Converter A
14. Bellows M
15. Microphoto Hood
16. Photomicro Unit F
17. Photo-oscilloscope Unit
18. Booster T Finder
19. Speed Finder
20. Waist-level Finder
21. Focusing Screen
22. Angle Finder A2
23. Angle Finder B
24. F-1
25. Magnifier R
26. Film Chamber 250
27. Motor Drive Unit
28. Motor Drive MF
29. Copy Stand 4



Pumpkin Stem
Canon F-1 with Photomicro Unit F attached to microscope.



Chrysanthemum
Canon F-1 with Photomicro Unit F attached to microscope.

In the Summit of Perfection: Canon's FD Lenses



Lens' quality should be considered from various points of view—resolving power, image contrast, aperture range, lack of aberrations, focusing accuracy, handling ease, etc.

Canon FD lenses have been designed to meet the most stringent requirements for quality lens design. The following is an impartial report on Canon FD lenses' superb quality.

One of Japan's leading camera magazines, the "Camera Mainichi", in its annual supplement called "White Paper on Camera Lenses", establishes what is generally accepted as one of the most important basis for judging lens quality. The 1971 "White Paper" gave top marks to the Canon series of lenses out of 375 lenses of the different Japanese makes surveyed.

The publishers asked the Department of Applied Physics of the Faculty of Engineering of the National University of Chiba to conduct this study, and to examine the quality and performance of the lenses, classifying them into 14 categories according to the focal lengths. In this entirely independent survey, Canon's lenses were first in 8 out of 13 categories. (There was no Canon entry in the 85mm focal length category.)

1) A wide range of interchangeable lenses

To the distortion-free FD 17mm F 4 S.S.C. super wide angle lens at the top of the list, the outstanding new FD 24mm F 2.8 S.S.C. the FD 35mm F 2 S.S.C. and F 3.5 S.C. were added so that the series of wide angle and super wide angle would be equipped for approximately every 10 degrees of angle of view.

Lenses are available for every 100mm of focal length in the telephoto range including the popular group which comprises the FD 100mm F2.8 S.S.C., the FD 135mm F 2.5 S.C. and F 3.5 S.C., the FD 200mm F 4, and the FD 300mm F 5.6 S.C. Added to these are four compact telephoto lenses of the convertible front element type, the FL 400mm F 5.6, the FL 600mm F 5.6, the FL 800mm F 8, and the FL 1200mm F 11 S.S.C. Two lenses made of artificial fluorite, the FL-F 300mm F 5.6 and the FL-F 500mm F 5.6 have further strengthened the Canon system of interchangeable lenses. The aspherical lens FD 55mm F 1.2 A.L. was developed to serve as the ultimate standard lens, and special lenses include the fisheye 7.5mm F 5.6 S.S.C. and the tilt and shift TS 35mm F 2.8 S.S.C. lens.

Besides, there is the Canon Macro FL 50mm F 3.5 Lens, the Bellows FLM 100mm F 4 Lens, and three zoom lenses, the FL 55-135mm F 3.5, the FD 100-200mm F 5.6 S.C. and the FD 85-300mm F 4.5. The series of zoom lenses is scheduled to be expanded in the near future.

In the present series of about 40 lenses there are FD ones and FD ones, however, they will ultimately all be FD lenses since the FL in the series are systematically being replaced by FD ones.

2) Compact lens design

The Canon SLR cameras have a short back focus and because of this it has been possible to design lenses with the advantage of being more compact while having a higher quality of performance. The adoption of new lens material has further contributed to the development of excellent compact lenses from super wide angle to super telephoto.

These are the fisheye 7.5mm F 5.6 with which it is not necessary to lock the mirror up, and four telephoto lenses of the front component convertible type, the FL 400mm F 5.6 S.S.C., the FL 600mm F 5.6, the FL 800mm F 8, and the FL 1200mm F 11.

3) Image sharpness throughout the entire focusing range

One of the most outstanding features of the FD lenses is the sharpness of image they maintain throughout the entire focusing range, from minimum subject distance to infinity. As a rule, with ordinary photographic lenses, during close distance photography, aberration tends to be greater. This defect could not be overcome until now, specially in the case of wide angle and special lenses. In telephoto lenses, too, aberration tends to increase at close distance.

These problems, however, have been overcome completely in Canon's new FD lens series.

4) The adoption of a newly designed mechanism (Floating System)

Photographic lenses usually produce spherical aberration in close distance photography, and this is particularly true of the reversed type of lenses. To cope with this, the Floating System was adopted in the FD series telephoto type of wide angle lenses, and the FD 55mm F 1.2 A.L. S.S.C. standard aspherical lens which makes shooting at a short distance aberration free.

In this system, focusing changes the distance between front and rear components. Due to its construction, the spherical aberration that occurs in the front component is satisfactorily compensated by that which occurs in the rear component, thus preventing any additive aberration when focusing at a short distance.

Consequently, the FD series of lenses deliver a high resolving power and high contrast, even in copy work or in close-up photography.

Canon
FD
LENSES



5) New techniques for processing

A margin of error of less than one micron in manufacturing precision is necessary to be able to add an aspherical surface to the composition of a lens. For this reason, it had been extremely difficult to achieve such a surface up to now.

Canon, however, has succeeded in designing and manufacturing an original apparatus for the measurement of aspherical lenses and has perfected a unique method for polishing aspherical surfaces. Thanks to these, Canon was able to introduce a lens system including an aspherical surface, the large aperture standard FD 55mm F1.2 A.L.S.S.C. lens. The aspherical lenses are now playing an important role in improving image delineation at minimum subject distance, and are very effective to prevent flare. Canon is now planning the application of the aspherical lens for use in wide angle, zoom and large aperture lenses.

6) Practical application of the newest materials

In order to achieve revolutionary developments in lens performance, extensive research in new materials had to be done. This led to the revolutionary development of the artificial fluorite lens whose most outstanding feature is its ability to compensate for chromatic aberration and secondary spectrum. It greatly increases the performance standards of the telephoto lenses. Also, the telephoto ratio of these lenses has been reduced greatly to make them more portable and easy to operate.

Examples of the use of artificial fluorite lenses are the FL-F 300mm F 5.6 and the FL-F 500mm F 5.6 telephoto lenses which were awarded the International Camera Special Award in 1969 and went on to secure recognition all over the world.

7) Development of special lenses

In addition to the aspherical lenses and the artificial fluorite ones, Canon has developed two other special lenses: a fisheye lens which can be attached to the camera without having to lock the mirror up, and a tilt and shift lens with special functions to allow tilting and shifting. Canon, of course, shall continue to develop special lenses to meet growing demands for a more diversified lens performance as well as to make use of major scientific discoveries in the future.

8) Practical use of multilayer anti-reflection coating

Around the middle of the 1950's color photography suddenly began to increase in popularity. To meet ever-growing needs, a high performance lens with an excellent color balance was required. Canon undertook, then, still more intensive studies of the relationship between the light transmission factor of the lens and the chromatic characteristics of film. As a result, the theory of Spectra coating,

and its techniques of application, were developed. This theory is based on the fact that when the thickness of the coating of any of the lens elements varies the color balance will change. This was the basic principle out of which the outstanding color effectiveness of the lens was developed, to be acclaimed later on throughout the world.

Although Spectra Coating is a single layer coating, it has such a stable nature that its light transmission factor is approximately the same as that of ordinary multilayer coatings.

Also at that time, Canon took the initiative in research concerning multilayer anti-reflection coatings for TV zoom lenses in order to increase the light transmission factor in lenses composed of many elements. This became a reality in the 1960's and Canon applied it to TV zoom lenses as well as large aperture zoom lenses for 8mm cine cameras.

9) High resolving power and extremely good contrast

The FD lenses obtain a high resolving power of 100 lines per millimeter at full aperture opening or when closed down by one f/stop. They also obtain high contrast up to the corner areas. They satisfactorily compensate for various aberrations, and eliminate ghosts and flares. With these lenses, image delineation is thus assured throughout the entire focusing range.

10) Full use of the computer

Canon's optical and design techniques involve computer processing of huge amounts of data concerning design, original optical theories, and performance appraisals. These resources were a great help in the process of developing the new lenses.



Signal Transmission and Function of the FD Lenses

Automatic/Manual Aperture Lever

This is the conventional coupling lever for stopped down metering which automatically resets the full aperture opening position after shutter release. This lever also couples with the stopped-down and self-timer lever on the camera body. Stopped down metering can be performed after turning the stopped-down lever.

Full Aperture Signal Pin

This pin is used to compensate metering errors at large apertures when a large aperture lens is used. To correct this error, the full aperture signal pin plays a role in adjusting the position of the aperture needle.

Aperture Signal Lever

This is a coupling lever that plays three important roles in full aperture metering.

It is coupled with the preset aperture ring and transmits the preset f/stop position to the exposure meter on the camera body.

As soon as the shutter is released, the aperture closes down to the preset f/stop due to this lever, and proper exposure is obtained. Its second function is to transmit the automatic aperture setting to the exposure meter.

When a lens is mounted on the camera body, the aperture is transmitted to the exposure meter and the aperture needle is set. Therefore, aperture adjustment is automatic.

The third function is automatic aperture control for servo EE photography with the F-1. When the preset aperture ring is set at the green circle, this lever is automatically disconnected from the preset aperture ring and can move freely. When the Servo EE Finder is attached, it is coupled to the aperture signal lever. The Servo EE Finder, then, controls its position for fully automatic exposure control.

Unmanned EE photography is possible by using the Servo EE Finder and Motor Driver Unit.

Manual Aperture Control

When the automatic/manual aperture lever is turned all the way, it clamps and stops. When the lens is mounted under these circumstances, the aperture can be operated manually. This function is used when an extension tube or another accessory is connected between the camera body and the lens. However, in normal photography with an F-1, this function is not required, since the aperture of the lens can be closed down with the stopped-down lever.



Table of Interchangeable Lenses

Lens	Type	Angle of View	Aperture System	Manually Operated Aperture	Magnification	Construction Components	Elements	Min. Apert.	Distance meters	Scale In feet	Attachment Filter	Cap	Hood	Case	Coating	Length (mm)	(in.)	Weight (g)	(lb.-oz.)
Fisheye 7.5mm F 5.6 S.S.C.	Special	180°	Manual	—	0.15x	8	11	22	—	—	Built-in	Exclusive	—	D	Super Spectra	62	2 1/2	380	13 3/4
Fisheye FD 15mm F 2.8 S.S.C.	Special	180°	Automatic	Possible	0.3x	9	10	16	3-0.3	10-1	Built-in	Exclusive	Built-in	I	Super Spectra	60.5	2 1/2	485	1-1 1/4
FD 17mm F 4 S.S.C.	Super-wide-angle	104°	Automatic	Possible	0.34x	9	11	22	3-0.25	10-0.9	72	75	—	I	Super Spectra	56.0	2 1/4	450	15 3/4
FD 20mm F 2.8 S.S.C.	Super-wide-angle	94°	Automatic	Possible	0.4x	9	10	22	3-0.25	10-0.9	72	75	—	I	Super Spectra	58.0	2 1/4	345	12 3/4
FD 24mm F 2.8 S.S.C.	Super-wide-angle	83°	Automatic	Possible	0.48x	8	9	16	3-0.3	10-1	55	C-55	1BW-55B	C	Super Spectra	52.5	2 1/4	330	11 1/4
FD 28mm F 3.5 S.C.	Super-wide-angle	75°	Automatic	Possible	0.56x	6	6	16	3-0.4	10-1.5	55	C-55	1BW-55B	C	Spectra	43.0	1 1/2	290	8 3/4
*FD 35mm F 3.5 S.C.	Wide-angle	64°	Automatic	Possible	0.7x	6	6	16	3-0.4	10-1.5	55	C-55	1BW-55A	C	Spectra	49.0	1 1/2	280	9 3/4
TS 35mm F 2.8 S.S.C.	Special (Tilt & Shift)	64°/79°	Manual	—	0.7x	8	10	22	3-0.3	10-1	58	C-58	1BW-58	Exclusive	Super Spectra	74.5	2 3/4	545	1-3 1/4
*FD 35mm F 2 S.S.C.	Wide-angle	64°	Automatic	Possible	0.7x	8	9	16	3-0.3	10-1	55	C-55	1BW-55A	C	Super Spectra	60.0	2 1/4	370	13 1/4
**FD 50mm F 3.5 S.S.C.	Macro	46°	Automatic	Possible	1x	4	6	22	23.2(cm)	10-9.1(in)	55	C-55	—	Exclusive	Super Spectra	—	2 1/2	—	—
*FD 50mm F 1.8 S.C.	Standard	46°	Automatic	Possible	1x	4	6	16	10-0.6	30-2	55	C-55	1BS-55	C	Spectra	44.5	1 1/4	255	9
*FD 50mm F 1.4 S.S.C.	Standard	46°	Automatic	Possible	1x	6	7	16	10-0.45	30-1.5	55	C-55	1BS-55	C	Super Spectra	49.0	1 1/2	330	11 1/4
FD 55mm F 1.2 S.S.C.	Standard	43°	Automatic	Possible	1.1x	5	7	16	10-0.6	30-2	58	C-58	1BS-58	I	Super Spectra	52.5	2 1/4	510	1-2
FD 55mm F 1.2AL S.S.C.	Standard	43°	Automatic	Possible	1.1x	6	8	16	10-0.6	30-2	58	C-58	1BS-58	I	Super Spectra	55.0	2 1/4	575	1-4 1/4
***FD 85mm F 1.8 S.S.C.	Telephoto	29°	—	—	1.7x	—	—	16	—	—	55	C-55	—	—	Super Spectra	—	—	—	—
FLM 100mm F 4	Macro	24°	Manual	—	2x	3	5	22	—	—	48	50	—	C	Spectra	43	1 1/4	220	7 1/4
FD 100mm F 2.8 S.S.C.	Telephoto	24°	Automatic	Possible	2x	5	5	22	10-1	30-3.5	55	C-55	1BT-55	D	Super Spectra	57.0	2 1/4	360	12 1/4
FD 135mm F 3.5 S.C.	Telephoto	18°	Automatic	Possible	2.7x	3	4	22	30-1.5	100-5	55	C-55	1BT-55	E	Spectra	83.0	3 1/4	465	1-3 1/4
FD 135mm F 2.5 S.C.	Telephoto	18°	Automatic	Possible	2.7x	5	6	22	30-1.5	100-5	58	C-58	Built-in	E	Spectra	91.0	3 1/2	630	1-6 1/4
FD 200mm F 4 S.S.C.	Telephoto	12°	Automatic	Possible	4x	5	6	22	30-2.5	100-8	55	C-55	Built-in	J	Super Spectra	133.0	5 1/4	675	1-7 1/4
FD 300mm F 5.6 S.C.	Super-telephoto	8°	Automatic	Possible	6x	5	6	22	50-4	200-13	58	C-58	Built-in	Exclusive	Spectra	173.0	6 3/4	1125	2-7 1/4
***FD 35-70 F 2.8-3.5 S.S.C.	Zoom	64°-31°	—	—	0.7-1.4x	10	10	22	10-0.3	30-3.5	58	Exclusive	—	—	Super Spectra	—	4 1/2	—	—
FD 100-200mm F 5.6 S.C.	Zoom	24°-12°	Automatic	Possible	2-4x	5	8	22	30-2.5	100-8	55	C-55	Built-in	K	Spectra	173.0	6 3/4	765	1-11
***FD 85-300mm F 4.5 S.S.C.	Zoom	29°-8°	—	—	1.7-6x	11	15	22	30-2.5	100-8	Series IX	Exclusive	—	—	Super Spectra	—	9 3/4	—	—
FL-F 300mm F 5.6	Super-telephoto	8°	Automatic	Possible	6x	6	7	22	50-4	200-13	58	60	Built-in	Exclusive	Spectra	168.0	6 3/4	850	1-13 1/4
FL-F 500mm F 5.6	Super-telephoto	5°	Automatic	Possible	10x	5	6	22	30-10	600-33	95	106	Built-in	Exclusive	Spectra	300.0	11 3/4	2700	5-15 1/4
**FL 400mm F 5.6	Super-telephoto	6.2°	Automatic	Possible	8x	5	††† 7	32	30-4.5	100-15	††48	90	Exclusive	Exclusive	Spectra	338.0	13 1/4	3890	8-9 3/4
**FL 600mm F 5.6	Super-telephoto	4.1°	Automatic	Possible	12x	5	††† 6	32	30-10	300-35	††48	125	Built-in	Exclusive	Spectra	448.0	17 1/2	5000	11-3 1/4
**FL 800mm F 8	Super-telephoto	3.1°	Automatic	Possible	16x	5	††† 7	32	30-18	300-60	††48	125	Built-in	Exclusive	Spectra	508.0	19 3/4	5360	11-13 1/4
**FL 1200mm F 11 S.S.C.	Super-telephoto	2.1°	Manual	—	24x	5	††† 7	64	30-40	1000-130	††48	125	Built-in	Exclusive	Super Spectra	853.0	27 1/2	6200	13-10 1/4

* Equipped with a coupling pin for the Canon Automatic Tuning System.

** Front component interchangeable type. Focusing Unit (1-component, 2-element, FL automatic diaphragm, with A-M ring).

*** Will be marketed in the near future.

■ The Canon FL 520mm F 1.4 is available by special order.

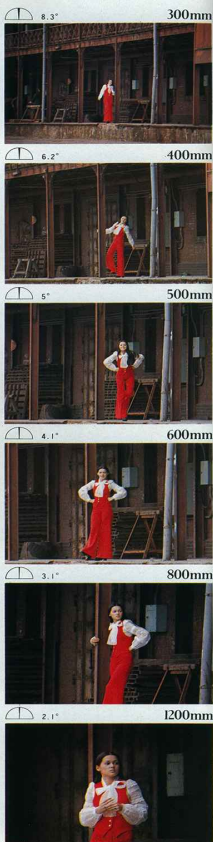
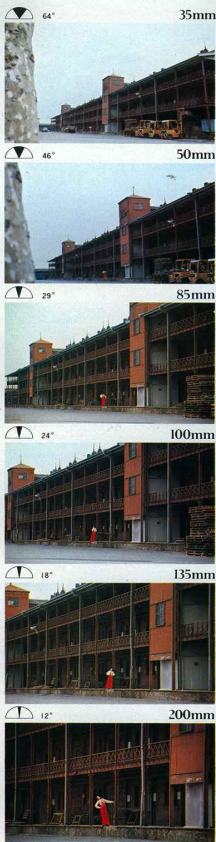
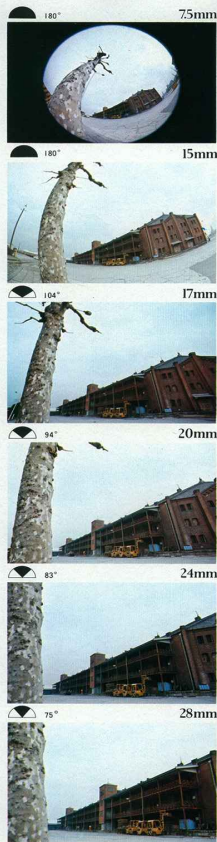
† FD lens hoods have a bayonet mount.

†† Filters are insertion type with holder.

††† The number of elements in the chart are totals.



Change in Angle of View



Angle of View and Perspective

When different kinds of interchangeable lenses are used, photographic differences arise mostly due to their focal lengths. This difference is usually understood to mean a change in the angle of view and a change in perspective.

A wide angle lens covers a wider angle of view, and exaggerates perspective, while telephoto lenses cover a narrower angle of view and provide the telephoto effect of blurring the background.

When shooting a subject from the same distance, there is no difference in the perspective between a wide angle lens and a telephoto lens. However, if the photographic distance changes, the perspective will also change, if the same lens is being used. In this case, the subject will sometimes be partly cut off and the degree of the blurring in the background will also change.

When an interchangeable lens is used and shooting distance is changed, the same size of the main subject is obtained with perspective in the background.



Smaller f/stop

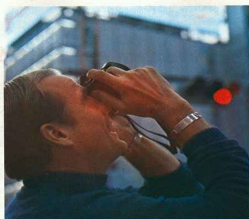
Larger f/stop



Depth of Field

The specific range when everything is in sharp focus behind and in front of the subject is called the depth of field. The depth of field behind the subject is longer than in front of the subject. This range varies in accordance with subject distance, f/stop and focal length.

Depth of field is greater with smaller apertures, shorter focal lengths and longer focused distance, and it is less with larger apertures, larger focal lengths and shorter focused distance.



Super Wide and Wide Angle Lenses

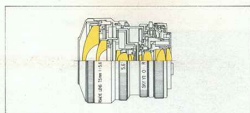
Super wide and wide angle lenses have a shorter focal length than standard lenses. Their angle of view covers more than 46° , which gives a much wider field of view. Their great depth of field makes these lenses indispensable for snapshots, for sports events and news, and for shooting in places with very limited space, as well as for photographing large groups of people, and for taking pictures of tall buildings. Super wide and wide angle lenses exaggerate perspective, but this can be used to advantage for special effects.

The FD super wide and wide angle lenses are the following:

The Fisheye 7.5mm F 5.6 S.S.C. special lens, the Fisheye FD 15mm F 2.8 S.S.C., the FD 17mm F 4 S.S.C., the FD 20mm F 2.8 S.S.C., the FD 24mm F 2.8 S.S.C., the FD 28mm F 3.5 S.C., the FD 35mm F 3.5 S.C., the FD 35mm F 2 S.S.C., and the TS 35mm F 2.8 S.S.C. tilt and shift lens. The FD super wide and wide angle lenses were designed to give superior image delineation throughout the entire focusing range. To eliminate field curvature at all distances, the optical design features a mechanism called the Floating System, which is particularly significant in the distortion free FD 17mm F 4 S.S.C. lens.

The Fisheye 7.5mm F 5.6 S.S.C. lens has an effect that differs from the wide angle lenses. The TS 35mm F 2.8 S.S.C. has controls for adjusting perspective and depth of field.

With all the FD wide angle lenses, the entire field of view may be seen through the viewfinder without having to fix the mirror up, because they are of the retrofocus type.

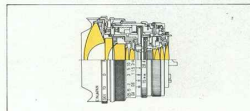


The Canon Fisheye 7.5mm F 5.6 S.S.C. Lens

This is a fisheye lens of the equidistant projection type, which extends the range of uses of the FD series of lenses and the Canon F-1 system. An angle of view of 180° is taken in a circle with a 23mm diameter in the 24mm x 35mm picture frame. With 11 elements in 8 components, it has six built-in filters and its size is the same as that of the standard lenses.

Because of its equidistant projection mechanism, it is ideal for photographing astronomical and azimuth phenomena, and when applied to ordinary photography it is particularly useful for special effects.

Field of view can be seen through the viewfinder without having to lock the mirror up.



The Canon Fisheye FD 15mm F 2.8 S.S.C. Lens

This is a fisheye lens for general photography developed to follow the 7.5mm one. It is the smallest fisheye lens in the world.

It was developed as one of the FD lenses and consequently it has an extremely high quality of performance. It covers a diagonal angle of 180° .

Because of its retrofocus design, the mirror does not have to be locked up. From the point of view of light metering, as well as photography in general, it operates as well as a standard lens.

Its F 2.8 brightness ranks well above the best, and it has full compensation of every aberration in the total 180° area. Special effort was made to enable it to avoid the aberration of magnification, and it has a sharp delineation up to the corner areas.

Furthermore, in order to solve the problem of ghost and flare which tend to occur with this type of lens, multiple coating was employed. A fixed flower-shaped hood raises its capability to intercept light and shut out that which may be detrimental.

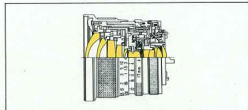
Since great importance was attached to the quality of pictures, and to a simplified operation, though it has, for instance, 4 types of built-in filters, it is very easy to handle, which is a remarkable asset in the eyes of the user.



Fisheye FD 15mm F 2.8 S.S.C.

Fisheye 7.5mm F 5.6 S.S.C.

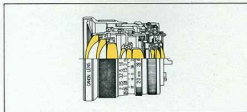
Hong Kong Street Caught with a Fisheye Lens
Canon F-1, Fisheye 7.5mm F 5.6 S.S.C., 1/60 of a second, at f/8, ASA 25



The Canon FD 17mm F 4 S.S.C. Lens

Generally, lenses of this focal length are of the fisheye type. However, this lens is a super wide angle lens with normal delineation.

Since astigmatism is compensated, image delineation is uniform from the center to the corner areas. The Floating System was adopted to prevent field curvature, which is likely to occur in the center of the lens when shooting at close distance. Therefore, there is no additive aberration during focusing, and, in spite of the angle of view of 104° , extremely sharp pictures are obtained through the entire focusing range. The usefulness of this feature is immediately evident in copy work because of the quality of results.

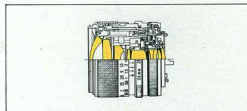


The Canon FD 20mm F 2.8 S.S.C.

Despite its short focal length of only 20mm, it is a typical wide angle lens with a brightness of F 2.8 which is the highest available anywhere.

This lens is of the retrofocus type and has been developed in compliance with the basic conception of the FD lenses that they must be able to render a sharp image from minimum subject distance to infinity. The floating mechanism has been used for focus control and the design of the lens as a whole is very compact.

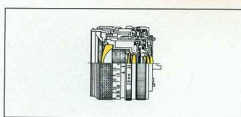
It has the normal delineation power of the wide angle lenses in general and its distortion is satisfactorily compensated, but, on the other hand, due to its large aperture, when its angle of view of 94° is used effectively, it shows its remarkable quality in wide angle photography whether it be indoors or shooting buildings. It can also be applied successfully to photography in which perspective is emphasized.



The Canon FD 24mm F 2.8 S.S.C. Lens

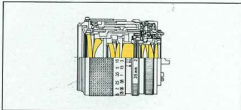
For a super wide angle lens, it has a very high speed. The front component of the FD 24mm F 2.8 S.S.C. lens has two large diameter elements. They serve to prevent reductions in light in the corners, to eliminate coma and astigmatism, and to completely compensate for distortion. The built-in Floating System makes shooting at minimum subject distance aberration free.

Its fast speed of F 2.8 is effective in focusing with low light levels, and it provides pictures with high contrast and resolution even at full aperture.



The Canon FD 28mm F 3.5 S.C. Lens

Though this is an reversed telephoto type of lens, its overall length is only 43mm. It is quite compact and easy to operate. This lens was designed to prevent decrease in light transmission to the corners.

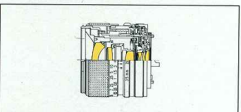


The Canon FD 35mm F 2 S.S.C. Lens

This is Canon's fastest wide angle lens, and it achieves outstanding image delineation at full aperture. It can be used as frequently as the ordinary standard lenses. Thorough compensation has been provided to eliminate various aberrations including the spherical and coma.

This lens features a minimum of flare and color balance is superior. The Floating System plays an important role in making it ideal for shooting subjects at close distance.

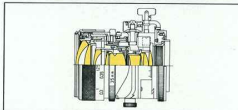
The FD 35mm F 2 S.S.C. has a distance coupling pin to use with the Speedlite 133D and the CAT system of automatic flash control.



The Canon FD 35mm F 3.5 S.C. Lens

This wide angle lens is quite compact, easy to use, and wonderful for snapshots. It provides a high resolving power and strong image delineation which it achieves through the use of a new type of glasses and due to its particular optical design. Its performance is further enhanced by the fact that it compensates a number of aberrations. Therefore, it offers sharp images throughout the entire focusing range even at full aperture opening.

This lens also has a distance coupling pin to use with the Speedlite 133D and the CAT system of automatic flash control.



The Canon TS 35mm F 2.8 S.S.C. Lens

The tilt and shift adjustment mechanism alters the optical axis of the lens to obtain special effects.

The tilt adjustment device sets the lens adlant to the film surface, and alters the focusing plane on the subject, so the depth of field is increased.

The shift adjustment device consists in moving the optical axis of the lens while it remains perpendicular to the film surface to compensate perspective.

The tilt adjustment is used when walls or trains are shot obliquely and the shift adjustment is used for shooting a tall building without perspective distortion.

These devices can be used in any direction by adjusting the lens with the camera in a fixed position.

The image circle has been increased from 43mm to 58mm to cover the entire negative at maximum tilt and shift.



FD 24mm F 2.8 S.S.C.

FD 20mm F 2.8 S.S.C.

FD 17mm F 4 S.S.C.



TS 35mm F 2.8 S.S.C.

FD 35mm F 3.5 S.C.

FD 35mm F 2 S.S.C.

FD 28mm F 3.5 S.C.

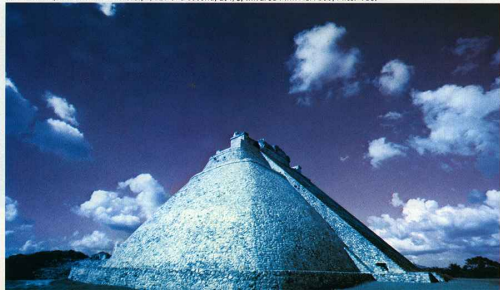
Speakers' Corner at dusk
 Canon F1, FD 28mm F3.5S.C., 1/60 of a second, at f/5.6, ASA 25.



Ice-covered Pines on the Famous Shirane Mountains, Japan
 Canon F1, FD 17mm F4S.S.C., 1/125 of a second, at f/16, ASA 25.



The Pyramid of Uxmal, Mexico
 Canon F1, FD 20mm F2.8S.S.C., 1/125 of a second, at f/8, Infrared Film ASA 100, Filter Y10.

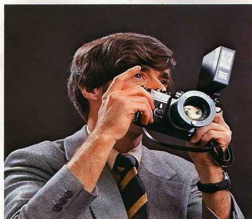




Morning at Hyde Park, London
Canon F-1, FD 28mm F3.5 S.S.C., 1/125 of a second, at f/8, ASA 25.



A view of the Kasumigaseki Building in downtown Tokyo.
Canon F-1, Canon Lens TS 35mm F 2.8 S.S.C., 1/30 of a second, at f/8,
ASA 64. (Left, ordinary; Right, shifting)



Standard Lenses

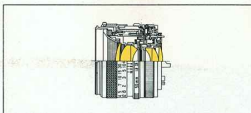
Standard lenses have a focal length of 50mm or 55mm, and cover an angle of view of 43° to 46°. They have the widest range of applications because they deliver natural perspective.

They are ideal not only for snapshots of people and scenery, but also for photography under low levels of light because of their large apertures.

The standard lenses include the FD 50mm F 1.8 S.C., the FD 50mm F 1.4 S.S.C. and the FD 55mm F 1.2 S.S.C. An advanced group of special lenses includes the FD 55mm F 1.2 AL S.S.C. aspherical lens and the Macro FD 50mm F 3.5 S.S.C.

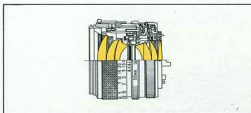
When lenses have large apertures, they produce a clear and sharp image even under dim light conditions. The FD 55mm F 1.2 S.S.C. and the FD 55mm F 1.2 AL S.S.C. lenses are the most suited for shooting at night or indoors. The FD 55mm F 1.2 AL S.S.C. is a large aperture standard lens specially developed with an aspherical element. It provides the highest contrast over the entire area. Close distance photography such as copy work may be accomplished with any standard lens, but there is one specially designed for this type of work, the Macro Canon FD 50mm F 3.5 S.S.C. lens for photomacrography. Together with accessories in the Canon system, it extends the possibilities of photography.

Furthermore, the popular FD 50mm F 1.8 S.C. and the FD 50mm F 1.4 S.S.C. lenses have a distance coupling pin for a Flash-Auto Ring which, when used with the Speedlite 133D, automatically controls the flash.



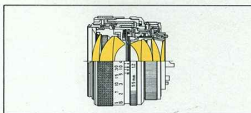
The Canon FD 50mm F 1.8 S.C. Lens

This standard lens is an advanced adaptation of the optical system in Canon's most popular standard FL 50mm F 1.8 lens. It has superior contrast and high image delineation qualities, from the center to the corner areas, particularly at medium apertures. It is a lens for all purposes with a stable delineation power in close distance photography. It has a distance coupling pin for the CAT system.



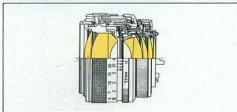
The Canon FD 50mm F 1.4 S.S.C. Lens

It is an advanced type of standard lens based on the highly reputed FL 50mm F 1.4 lens design. Clear images are obtained both stopped down and at full aperture. It has a distance coupling pin for the CAT system.



The Canon FD 55mm F 1.2 S.S.C. Lens

This is a standard large aperture lens based on the optical arrangement of the FL 55mm F 1.2. Notwithstanding its large aperture, it has a splendid reputation for high contrast and stabilized image delineation at full aperture opening. Because of its fast lens speed of F 1.2, it provides high image quality in low light levels. Its optical performance is similar to the FD 50mm F 1.4 S.S.C. but it is more advanced and has a faster speed. Moreover, Canon has achieved compensation for various aberrations in it, such as spherical aberration and coma. Its evenness of illumination is outstanding.



The Canon FD 55mm F 1.2 AL S.S.C. Lens

This is a large aperture standard lens with an aspherical surface, which provides the highest image delineation even at full aperture opening under dim light conditions. Besides, this lens incorporates the Floating System which makes shooting at short distances aberration free. Thus, a stabilized image is obtained throughout the entire focusing range, and the image focused in the viewfinder can be recorded exactly as it is seen.

In order to assure even more perfection, Super Spectra Coating was applied to this lens to prevent ghosts.

Canon calls it "the perfect lens" because of the sharpness it provides under any photographic conditions.

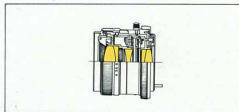


The Canon FD 50mm F 3.5 S.S.C. Macro Lens

This lens has extremely high resolving power and is used for photography at very close distance. It will replace the conventional FL 50mm F 3.5 Macro lens.

By means of a newly designed optical system, its performance has been considerably improved. Also it will be possible to couple it to Canon's new Macro Speedlite 120A.

This lens is certain to fulfill all serious photographer's expectations for a truly incredible macro lens.



The Bellows FLM 100mm F 4 Lens

The FLM 100mm F 4 lens is a short mount lens with automatic aperture designed to be used exclusively with BellowsFL, and then it expands possibilities from general photography to close-ups and macrophotography. It focuses continuously from infinity to macro distances.

It has 5 elements in 3 components which give it a high resolving power. It corrects aberration most satisfactorily and its color balance truly perfect, with high contrast and sharpness throughout the entire image plane. It has double the focal length of a standard lens, so there is more space available for lighting, etc., without disturbing the shooting operation. Besides, its 100mm focal length delivers natural perspective.



Last Minute Preparations
 Canon F-1, FD 50mm F1.4 S.S.C., 1/250 of a second, at f/8, ASA 25.



Christmas in Mexico
 Canon F-1, FD 55mm F1.2 S.S.C. with Booster T Finder, 30 seconds, at f/8, ASA 25.



Nature Revealed through Macrophotography ▶
 Canon F-1, FL 50mm F3.5 Macro Lens, 1/125 of a second, at f/5.6, ASA 25.



Telephoto Lenses

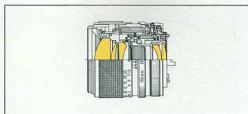
The angle of view of a telephoto lens is somewhat narrower than standard lenses and the focal length is longer. There are many different ones and Canon classifies them in two categories: Those that have a focal length of 300mm or less are telephoto lenses, and those of 400mm or more are super telephoto lenses.

There are six lenses in the telephoto category, the FD 100mm F 2.8 S.S.C., the FD 135mm F 3.5 S.S.C., the FD 135mm F 2.5 S.S.C., the FD 200mm F 4 S.S.C., the FD 300mm F 5.6 S.C., and the FL-F 300mm F 5.6.

Because of their narrow angle of view, these lenses clearly delineate distant scenes, which makes them ideal for shooting subjects difficult to approach, for mountains, sports and news events. Because of their natural perspective, telephoto lenses are widely used for portraits and commercial photography. They have been made quite compact in order to make hand-held shooting easy, yet they maintain a high performance quality. This, of course, increases their mobility.

By means of telephoto lenses, backgrounds can be deliberately blurred to emphasize subject sharpness.

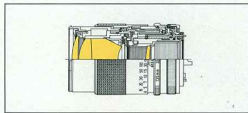
The versatility of the FD lenses has become greater still with the addition of FL-F 300mm F 5.6 and the 500mm F 5.6 artificial fluorite lenses whose outstanding features include compensation of chromatic aberration, elimination of secondary spectrum, and low telephoto ratio. (For information on the FL-F series of lenses, refer to p.144.)



The Canon FD 100mm F 2.8 S.S.C. Lens

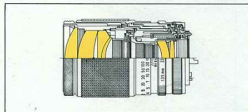
Developed from the FL 100mm F 3.5, this is a large aperture telephoto lens with a fast speed of F 2.8. Its telephoto ratio is 1:0.93, so that its overall length is 57mm, or the same as standard lenses.

It is one of the easiest lenses to shoot with, and has the added advantages of compactness and lightweight construction.



The Canon FD 135mm F 3.5 S.C. Lens

This telephoto lens has superior effects and is very popular. In spite of its 135mm focal length, it is only 83mm long, and is, therefore, very compact and convenient. Its high resolving power provides clear images from the center to the corner areas, and is ideal for shooting sports events, portraits, and mountain scenes.

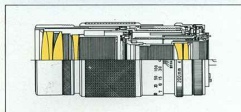


The Canon FD 135mm F 2.5 S.C. Lens

Among the FD telephoto lenses, this one has the highest speed. It is very compact and has a short telephoto ratio of 1:0.98. It is approximately twice as fast as the FD 135mm F 3.5 S.C.

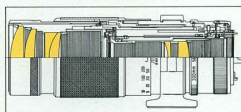
Aberrations arising from the photographic distance have been greatly reduced to improve its performance, and flare correction is almost perfect since the secondary spectrum of the chromatic aberration is greatly reduced.

Furthermore, image delineation at full aperture opening has been improved considerably by allowing only a minimum of curvature of field.



The Canon FD 200mm F 4 S.S.C. Lens

In spite of its 200mm focal length, its short telephoto ratio of 1:0.86 accounts for the fact that it is the shortest telephoto lens with an F 4 speed. Its chromatic aberration, and particularly its secondary spectrum, as well as other aberration fluctuations have been optically solved in order to obtain high contrast and stable image delineation throughout the entire focusing range.



The Canon FD 300mm F 5.6 S.C. Lens

This lens has been designed in such a way that a 300mm focal length could be made into a compact lens with excellent performance.

Its telephoto ratio has been reduced to 1:0.72, using ordinary optical glasses. With the exception of the FL-F 300mm F 5.6, this lens is the shortest in its class, and is approximately the same as an ordinary 200mm lenses.

A tripod attachment holder and a lens hood have been built in for added convenience. In order to compensate the movement of the focal point due to temperature changes, allowance was made in the helicoid so that correction can be made down to -30°C (-22°F).



New Lens: FD 85mm F1.8





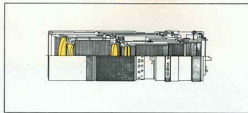
Morning at Lake Patzcuaro, Mexico
Canon F-1, FD 100mm F2.8S.S.C., 1/125 of a second, at f/8, ASA 25.



Zoom Lenses

Due to changes in conditions during actual shooting, there are times when a longer or shorter focal length is suddenly needed, or a increased depth of field is required, or a certain telephoto effect, such as blurring, is desired, or an exaggeration of perspective may be of importance. Because of their flexible focal lengths, some lenses are most convenient for making these changes. The Canon Zoom lenses include the FD35-70mm F2.8-3.5, the FD100-200mm F5.6 S.C., and the FD85-300mm F4.5.

Zoom lenses are particularly suited for improvising shots, for moving subjects, or when overall shots and close-ups are wanted one after the other.

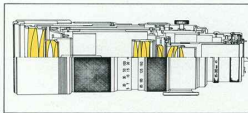


The Canon FD 100-200mm F 5.6 S.C. Lens

It is a small and lightweight zoom lens for shooting scenery and for snapshots.

It renders image delineation of a superior quality because it compensates various aberrations, such as distortion and spherical aberration.

Its zoom ratio has been adjusted to 1:2 to make it easier to operate and more convenient.



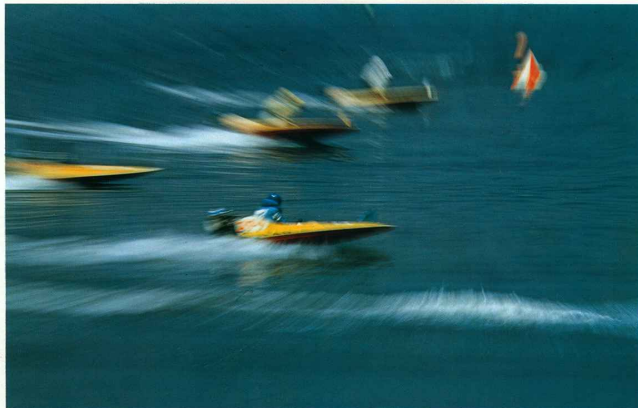
The Canon FD 85-300mm F 4.5 Lens

This is a telephoto zoom lens developed in which special stress was laid in compactness and high resolving power.

It is a descendent of the FL 85-300mm F 5 but it is a completely redesigned lens with full FD coupling.

In order to solve the problem of making the maximum aperture larger, a new zoom system was introduced. Therefore, while giving it a bright f/stop, its overall length has been shortened 26mm from the original FL lens.

Since the minimum subject distance has been reduced to 2.5 meters compared to the conventional one's 4 meters, it has become the easiest lens to use in close-up photography, portraits, and the like.



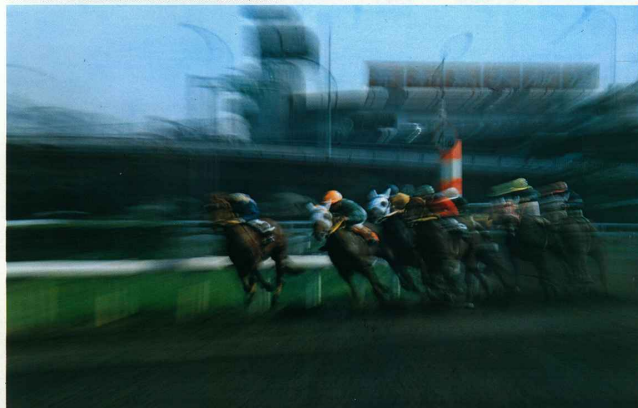
Zooming a Boat Race
Canon F-1, FD 85-300mm F4.5 S.C., 1/8 of a second, at f/16, ASA 25.



FD 85-300mm F 4.5

FD 100-200mm F 5.6 S.C.

New Lens: FD 35-70mm F 2.8-3.5



Zooming a Horse Race
Canon F-1, FD 100-200mm F5.6 S.C., 1/15 of a second, at f/16, ASA 25.

New Lens: FL-F 300mm F 2.8 and Tele Converter 2x

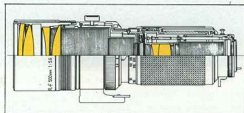
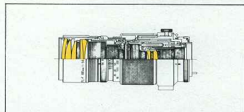


This product will be manufactured upon receipt of a special order.



FL-F 300mm F 5.6

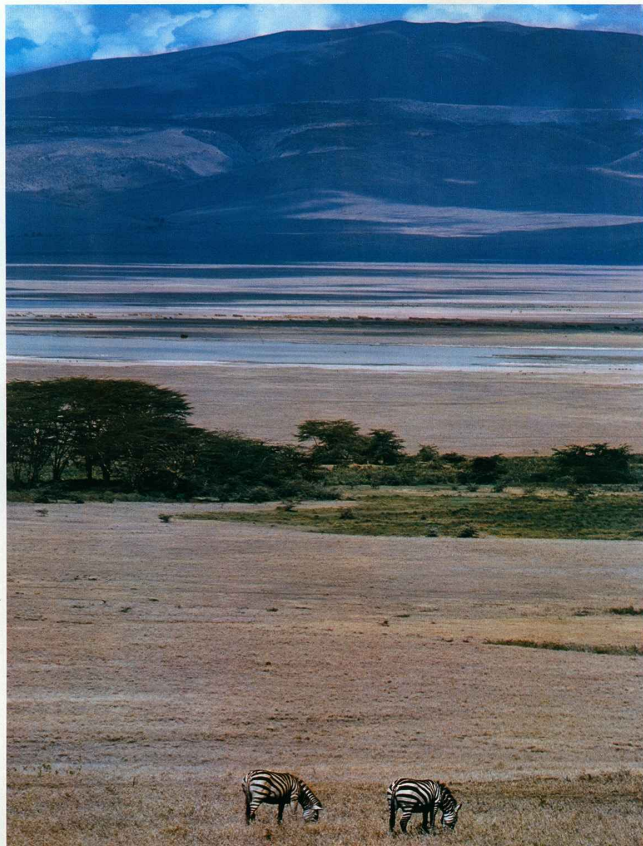
FL-F 500mm F 5.6



The Canon FL-F 300mm F 5.6 and the FL-F 500mm F 5.6 Lenses

These two FL-F lenses, the 300mm F 5.6 and the 500mm F 5.6, have an artificial fluorite single crystal in their optical systems. This lens material eliminates the secondary spectrum completely. Artificial fluorite lenses have a number of high performance characteristics which can never be found in conventional lenses. Chromatic aberration and secondary spectrum are absolutely eliminated so that color photography is really superb. On the other hand, these lenses also provide an extraordinary apochromatic quality which in its turn assures a high resolving power and excellent contrast. Furthermore, the telephoto ratio has been considerably reduced in these lenses to be able to make them extremely portable and easy to operate.

They open the way, indeed, to new shooting experiences in super telephoto photography.



Telephoto Shot in Kenya
Canon F-1, FL-F 300mm F5.6, 1/250 of a second, at f/5.6, ASA 25.

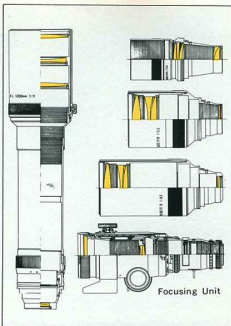


Super Telephoto Lenses

The ultimate purpose behind the use of a super telephoto lens is to be able to photograph subjects at great distances in close-up, and to have a sharp image delineation in every detail of the subject. Super telephoto lenses are indispensable to shoot sports and news events, as well as for photographing wild life and subjects one cannot very easily approach. As a rule, lenses with focal lengths of 400mm or more tend to be rather long, which makes them less portable and not so easy to operate. To do away with this disadvantage, Canon has systematically developed 4 super telephoto lenses, the FL 400mm F 5.6, the FL 600mm F 5.6, the FL 800mm F 8, and the FL 1200mm F 11 S.S.C. which are of the convertible front component type.

By extensively using a computer for analyzing enormous amounts of data on research and experiments, it was possible to achieve the ease of operation, the reduced size and the portability that Canon had been aiming at. These super telephoto lenses provide a high resolving power and splendid image delineation because they compensate aberrations such as chromatic aberration, secondary spectrum, and curvature of field.

The FL-F 500mm F 5.6 lens is also included in the above category of super telephoto lenses.



The FL 400mm F 5.6, the FL 600mm F 5.6, the FL 800mm F 8, and the FL 1200mm F 11 S.S.C. Lenses

The newest addition to the Canon super telephoto series are the FL 400mm F 5.6, the FL 600mm F 5.6, the FL 800mm F 8, and the FL 1200mm F 11 S.S.C. These lenses are all of the convertible front component type, and are front component units. The rear components, automatic aperture diaphragm mechanism and focusing adjusting device are built in the Canon Focusing Unit.

Therefore, by simply changing the front component, focal length can be adjusted to 400mm, 600mm, 800mm and 1200mm.

The FL 800mm F 8, by the way, has the shortest overall length of telephoto lenses that exist in its class in the whole world. It provides high contrast even in pictures taken at long distances, since chromatic aberration is completely eliminated.

The FL 1200mm F 11 S.S.C. has the longest focal length among the super telephoto lenses.

Its design has successfully shortened the telephoto ratio to 1:0.73, and therefore it is very compact. Besides, it compensates every kind of aberration almost to perfection, and particularly the chromatic aberration it was conceived to put an end to, and which seems to haunt all telephoto lenses. It obtains high contrast and resolving power.

Added to the 400mm, the 600mm, and the 800mm lenses, it completes a system of four telephoto lenses, in order to expand photographic possibilities in sports, news, and many others.



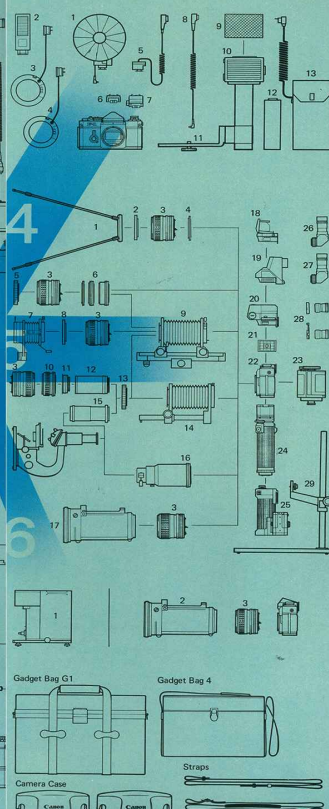
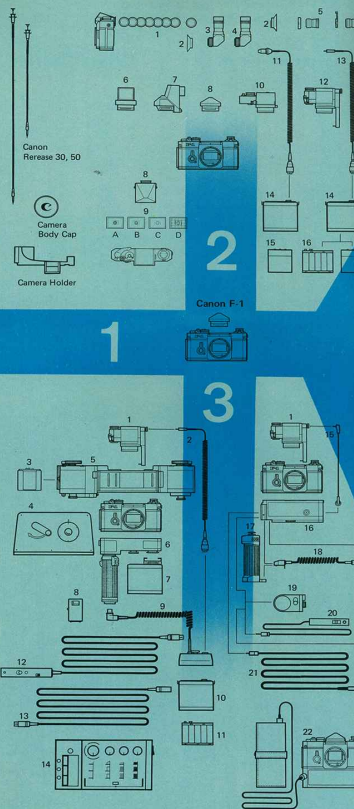
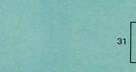
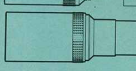
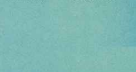
Hawaiian Sunset
Canon F-1, FL 800mm F8, 1/30 of a second, at f/8, ASA 64.



Canon F-1 SYSTEM



Soft Case Hard Case



Canon F-1... with Ultra Wide Versatility

1. Lenses

1. Fisheye 7.5mm F 5.6 S.S.C.
2. Fisheye FD 15mm F 2.8 S.S.C.
3. FD 17mm F 4 S.S.C.
4. FD 20mm F 2.8 S.S.C.
5. FD 24mm F 2.8 S.S.C.
6. FD 28mm F 3.5 S.S.C.
7. FD 35mm F 3.5 S.S.C.
8. FD 35mm F 2.5 S.S.C.
9. TS 35mm F 2.8 S.S.C.
10. FD 50mm F 3.5 Macro S.S.C.
11. FD 50mm F 1.8 S.S.C.
12. FD 50mm F 1.4 S.S.C.
13. FD 55mm F 1.2 S.S.C.
14. FD 55mm F 1.2 AL S.S.C.
15. FD 85mm F 1.8 S.S.C.
16. FD 135mm F 2.5 S.S.C.
17. FLM 100mm F 4
18. FD 100mm F 2.8 S.S.C.
19. FD 135mm F 3.5 S.S.C.
20. FD 200mm F 4 S.S.C.
21. FD 300mm F 5.6 S.S.C.
22. FD 35-70mm F 2.8-3.5 S.S.C.
23. FD 100-200mm F 5.6 S.S.C.
24. FD 85-300mm F 4.5 S.S.C.
25. Focusing Unit
26. FL 400mm F 5.6
27. FL 600mm F 5.6
28. FL 800mm F 8
29. FL 1200mm F 11 S.S.C.
30. FL-F 300mm F 5.6
31. FL-F 500mm F 5.6

* Newly developed lenses

2. Viewfinders

1. Dioptric Adjustment Lenses R
2. Eye Cup 3R
3. Angle Finder A2
4. Angle Finder B
5. Magnifier R
6. Waist-Level Finder
7. Speed Finder
8. Eye-Level Finder
9. Focusing Screen A,B,C,D
10. Booster T Finder
11. Cord 6V 2B
12. Servo EE Finder
13. Cord 12V 2E
14. Battery Case
15. Battery Magazine 12V
16. Battery Magazine 15V

3. Electronic Film Drive and Unmanned Photography

1. Servo EE Finder
2. Cord 12V 2E
3. Film Magazine 250
4. Film Leader 250
5. Film Chamber 250
6. Motor Drive Unit
7. Battery Case D
8. Battery Checker MD
9. Battery Connector MD
10. Battery Case
11. Battery Magazine 15V
12. Remote Switch MD
13. Extension Cord MF
14. Time Lapse Programmer
15. Connecting Cord MF for Servo EE Finder
16. Motor Drive MF
17. Grip MF
18. Connecting Cord for Grip MF
19. Interval Timer L
20. Remote Switch 60 MF

4. Flash Photography

1. Flash V-3
2. Speedlite 133D
3. Flash-Auto Ring A3
4. Flash-Auto Ring B3
5. Synchro Cord C
6. Flash Coupler D
7. Flash Coupler L
8. Synchro Cord S
9. Wide Mirror
10. Speedlite 500A
11. One Touch Bracket S
12. Battery Magazine S
13. Laminated Battery Pack S

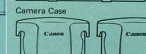
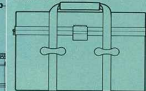
5. Close-Up, Macrophotography and Photomicrography

1. Handy Stand F
2. Handy Stand Attachment
3. FD 50mm F 1.4 S.S.C. Lens
4. Extension Tube M 5
5. Close-up Lens 15mm, 240mm, 450mm
6. Extension Tube M 5, M 10, M 20
7. Slide Duplicator
8. Slide Duplicator Attachment
9. Bellows FL
10. Macrophoto Coupler FL 55
11. Lens Mount Converter B
12. Extension Tube
13. Lens Mount Converter A
14. Bellows M
15. Microphoto Hood
16. Photomicro Unit F
17. Photo Oscilloscope Unit
18. Waist-Level Finder
19. Speed Finder
20. Booster T Finder
21. Focusing Screen D
22. F-1 Body
23. Film Chamber 250
24. Motor Drive Unit
25. Motor Drive MF
26. Angle Finder A2
27. Angle Finder B
28. Magnifier R
29. Copy Stand 4

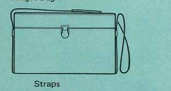
6. Oscilloscope

1. Continuous Recorder Model 3
2. Photo Oscilloscope Unit
3. FD 50mm F 1.4 S.S.C. Lens

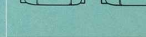
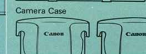
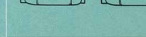
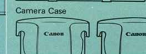
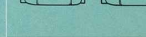
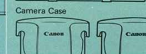
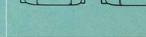
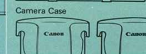
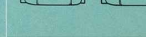
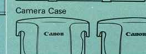
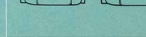
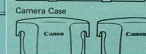
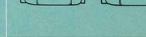
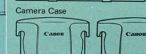
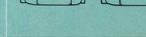
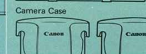
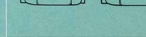
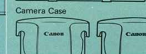
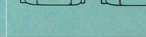
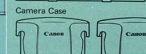
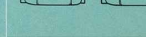
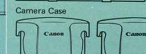
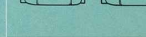
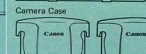
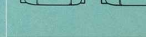
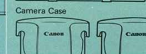
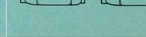
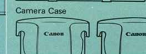
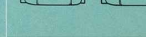
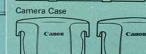
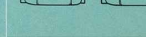
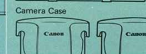
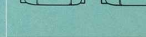
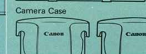
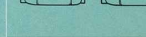
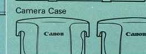
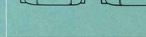
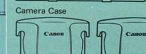
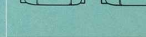
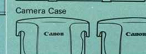
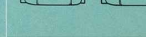
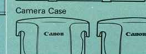
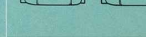
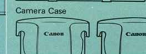
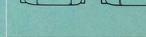
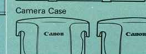
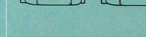
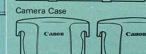
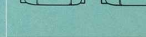
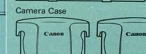
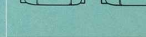
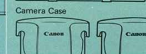
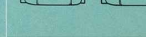
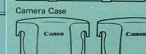
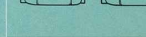
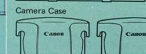
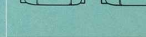
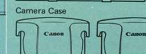
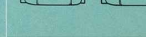
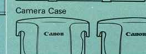
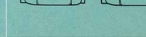
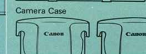
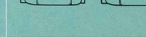
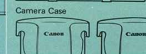
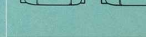
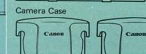
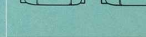
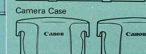
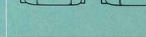
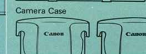
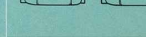
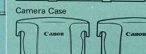
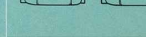
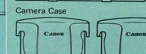
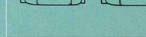
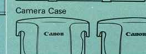
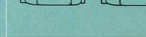
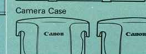
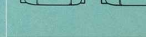
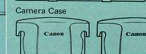
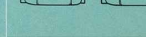
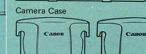
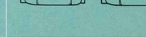
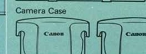
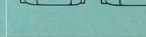
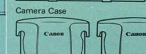
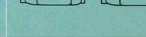
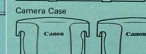
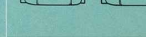
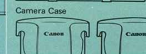
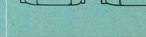
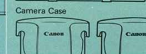
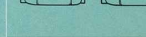
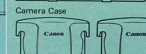
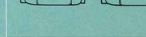
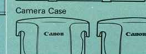
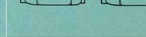
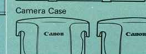
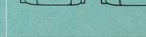
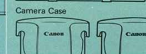
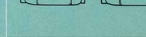
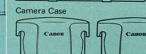
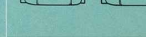
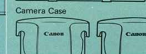
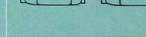
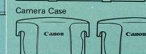
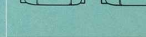
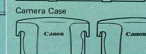
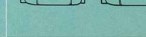
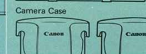
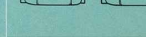
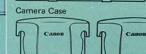
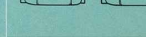
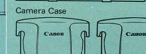
Gadget Bag G1



Gadget Bag 4



Straps



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The information contained herein about the F-1 System is correct up to the 20th of June, 1973.

However, the possibility of changes in the future is conceivable.

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