

For the Utmost in Photographic Versatility

Canon F-1 MOTOR DRIVE SYSTEMS

Jointly Used with Film Chamber 250, Servo EE Finder, Interval Timer, Extension Cord,
Self Timer E, Timer Lapse Programmer, and Tandem Control Unit · Two Synchronous
Motors Activate Film Advance and Shutter Release

English Edition



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" for Electric Eye control of exposure, and "M" for Motor Drive. Metering then is, performed by TTL, exposure by EE, and film advance by the Motor Drive. Yet, the backbone of the TEM is the Motor Drive, thanks to which the whole ensemble works in creating a suitable instrument for even the most demanding photographic tasks.

The Motor Drive was originally planned to emphasize the variety of all possible applications of the F-1, since it had a device which makes recording of scientific observation possible. However, the designers of the Motor Drive Unit did not stop 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, after which came the new MF system.

The High Speed Motor Drive Camera was born out of the F-1's Motor Drive System, and may accurately be considered as the very summit of technological excellence. The MF is a component Motor Drive System designed for maximum flexibility. It developed from the simplest possible form of motor drive photography with the F-1, and with the addition of the wide range of accessories, went on to become the present Motor Drive System, of which it is now the central figure. 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 insure its interchangeability.

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

Top Quality Operation

The inner mechanism is quite compact, though it duplicates the design of the previous 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, the needs that arise in sports news coverage were taken into consideration and 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 fit perfectly in the hand; and the grip is detachable, so that the Film Chamber 250 may be used. It also can serve as the external source of power with the coiled extension cord, in cold climates.

Wide Coupling Range of Shutter Speeds

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. As a rule, this mechanism is for high speed photography. Shooting at low speeds requires an adjustment and has to be limited accordingly. However, the MF has a unique mechanism to make the operation of the Motor Drive agree with the shutter speed automatically even in continuous photography. 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 the MF is used together with the Servo EE Finder. The motor drive system of the MF has a



Time Lapse Programmer

mechanism that consists of 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 market accessories designed for standard photography, but also supply special order accessories for individual requests.

External control is undertaken by connecting the various accessories to the remote control socket on the lower right side of the body.

Development of the System

Many accessories are being developed simultaneously with a view to expanding the MF system, with attention always paid to the fact that main accessories already developed may be used without change.

The Connection of the Film Chamber 250, Connection 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. However, since the MF grip is in the front of the F-1 body, the two cannot be directly attached to the camera body at the same time. To solve this physical problem, remove the grip and connect one end of the grip's special cord to the lower right side of the camera body, and the other to the bottom end of the Grip MF. This cord is used when the chamber is attached and also serves to keep the equipment ready for immediate use in cold climates by providing an external power source. Yet, the length of this cord is limited, since remote control entails excessive battery consumption when long connections are used. Therefore, a long extension cord for remote control is supplied separately.

Connection with the Servo EE Finder

The Servo EE Finder is connected to the special socket on the front of the Motor Drive. When the camera is mounted in this way, EE photography with the Motor Drive can be performed at any time.

Interval Timer L

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

While time intervals could be set at one frame per minute with the conventional Motor Drive Unit, this range is now extended to intervals of 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 as long as 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 MF. The timer possesses a very high precision due to its compact size.

Once the timer is attached, operation can be started with the button, and just by holding it in the shutter release button on the grip will be freed. This timer can be inserted into the socket of the Extension Cord E1000 for remote control. It can also be attached to the Motor Drive MF by inserting its plug into the socket on the lower right side. The timer scale is graded into 10 stages and its relation with the shutter release speed is as follows:

	T. OFF	0.5	1	2-5-10-30-60-120-180
Shutter Release	1/60-1/2000	1/4-1/2000	1/2-1/2000	1-1/2000

The timer is screwed into the socket on the side of the motor drive unit.



Canon F-1 with Motor Drive MF, Servo EE Finder, Film Chamber 250 and Extension Cord E1000.



Interval Timer L

Remote Switch 60 MF

To use the Remote Switch 60 MF, insert its 60cm cord into the socket that is also used to attach the Timer and the Extension Cord E1000. This switch releases the shutter when pressed. To lock the shutter button for time lapse photography, slide it to "Lock."

A Light Emitting Diode (LED) serves to verify this operation.

Extension Cord E1000

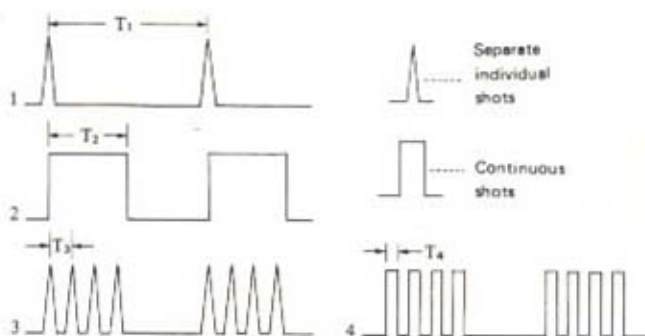
This connection cord is 10 meters long and has a socket which is used for the Remote Switch 60 MF and the Interval Timer L.

Time Lapse Programmer

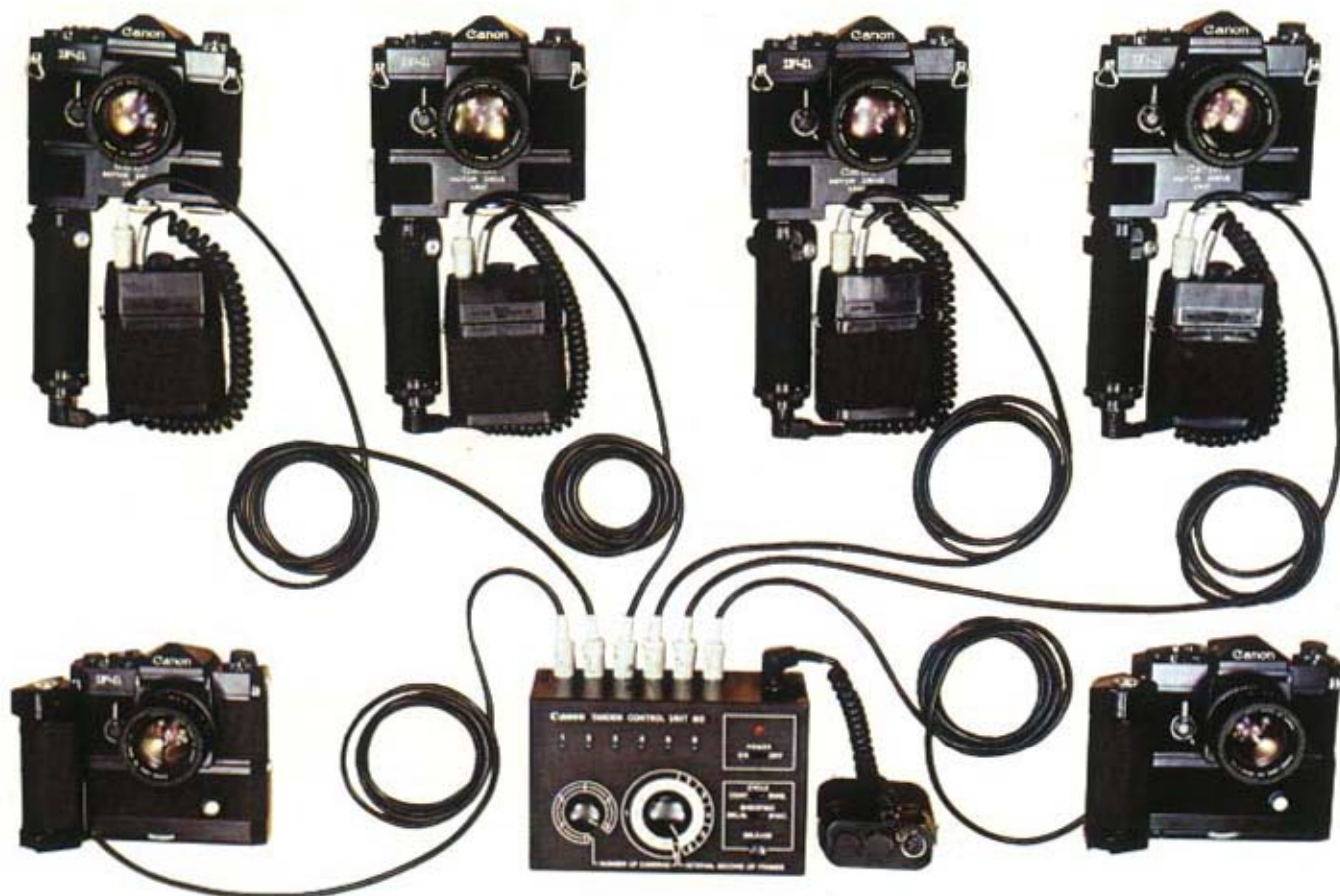
This Programmer is provided with a circuit to regulate time from half a second to 24 hours, and is capable of a variety of combinations of length of shooting time and intervals. It was designed for both still cameras and 8mm movie cameras, and is used in performing single frame photography as well as for recording the stages of motion.

Time can be set as follows:

T1	0.5	1	2	4	8	15	30	seconds
		1	2	4	8	15	30	minutes
		1	2	3	6	12	24	hours
T2		0.5-60 seconds						
T3		0.5-30 seconds						
T4		0.1-15 seconds						



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.



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 provides complete control over up to 6 sets of motor driven cameras at the same time. The Tandem Control Unit can either fire all cameras simultaneously or can fire each camera in succession with an adjustable time interval between cameras. Three unique programs of photography can be created using this unit. They are as follows:

1) Ultra-High Speed Photography

Up to 18 frames per second is possible by operating six motor driven cameras (each at 3 fps) located at basically the same position but slightly out of phase with each other. This method is suitable for analyzing fast-moving subjects which remain in the same spot, such as a golfer teeing-off or a baseball player hitting a ball.

2) High Speed Photography in Series

A moving subject is photographed by motor driven cameras which are physically separated or equipped with lenses of different focal lengths and which shoot in succession. This method may be used to analyze the movement of a sprinter or a pole-vaulter.

3) Multiple Angle Observation Photography

Fast-moving action can be photographed with motor driven cameras firing simultaneously, yet located at different vantage points. Appropriate sports might include boxing and gymnastic events.

All controls of the Tandem Control Unit are located on the front control panel. There is a dial for the number of cameras in use and a second dial to control the interval between the firing of each camera. There is an On/Off switch, a Continuous/Single Frame switch, and a Delay/Synchronization switch. Also, there is a separate light to confirm the operation of each camera.

Camera No. 1



2



3



4



5



6



Six Cameras Shooting with the Tandem Control Unit

Canon Motor Drive Unit with 7-Stage Timer Built-in

This Motor Drive Unit with a built-in timer was developed simultaneously with the F-1 camera and can be used for all sorts of purposes. Thanks to its complete interchangeability, the unit can be used with any F-1 by simply attaching it to the camera in place of the bottom cover.

The Film Chamber 250 has the same interchangeability. It is a unique apparatus in which not only different motors are used respectively for film winding and shutter release for more reliable and stable performance, but with which also time control is possible.

The operation is divided into continuous and single-frame photography. In case of continuous photography, the driving speed is graded into seven stages, from 3 frames per second to 1 frame per minute. Thus the timer is designed for a wide performance range, from high-speed photography for action analysis to photography for recording experiments, and it is possible to perform long-time photography for more than 4 hours at 1 frame per minute using the Film Chamber 250 and a super-long roll of 250 exposure film.

The Servo EE Finder can be left without attendance during long time photography. The unit can also be remote controlled with the Remote Switch MD. As well as the new Motor Drive MF, it can be used with several other attachments for various interesting types of photography.

Features

1. Complete interchangeability. Attachable without adjustments.
2. Stable drive with 2 motors.
3. A wide range timer is built-in.
4. Shoots 3 frames per second at the highest speed.
5. Any shutter speed except "B" can be used.
6. Remote control is possible by means of the Remote Switch MD.
7. Unmanned EE photography is possible when used together with the Servo EE Finder.
8. Automatically stops when film winding is finished.
9. With trouble-free and stable electronic apparatus.
10. Various kinds of accessories for remote control are being developed.



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

Battery Case

The Battery 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 for accessories are connected, a T-type terminal, should be tightened by screwing in the attaching ring after plugging in. To attach the Remote Switch to the Battery Connector MD (which fits onto the top of the Battery Case), simply plug it in.

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 penlight batteries into the Battery Magazine 15V, load them according to the $\oplus \ominus$ marks. Insert the $\ominus$, then the $\oplus$ end of the battery into the battery hold.

When loading penlight batteries into Battery Magazine 12V, loosen the two tightening screws to remove the cover and load them according to the $\oplus \ominus$ marks. When replacing the cover, fix its position properly by inserting the three pins in place.

Loading Power Source into Battery Case

Remove the bottom cover of the Battery Case by sliding it either to the left or right.

Magazine 12V should be loaded according to the explanation inside the battery case. It cannot be loaded if facing in the wrong direction.

Magazine 15V should be loaded by matching the green mark on the battery case and the one inside the magazine. After loading, slide the bottom cover back into place.

Battery Case D

The Battery Case D was developed for continuous photography with a hand-held camera and is directly connected to 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 use with the Motor Drive Unit. Used together with the Film Chamber 250, photography is possible holding the camera by hand. Battery loading is performed in the same way as with the Battery Case.

Attaching Battery Case D to Motor Drive Unit

Loosen the safety screw of the shoe on top of the battery case, and from the back of the motor drive unit, insert it into the corresponding bracket, and lock by turning the safety screw. The case should not be attached from the front side of the Motor Drive Unit, since if attached in this way, a short circuit will consume the batteries.

Capacity

Ten Penlight Batteries (Size AA):

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.



Battery Case D

Specifications 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 relay circuit control system.

Photographing speed: 3.5 frames per second at maximum speed.

Photographing mode: S (single frame), C (continuous). Changes by means of a switch.

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

Frame counter: Manually set. Indicates remaining number of frames. Automatically stops at 0. When setting 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 to the Motor Drive with a special cord, when the Film Chamber 250 is attached.

Power source: Ten penlight (Size AA) batteries.

Shooting capacity: More than 80 rolls of 36 exposures with alkaline or manganese batteries.

Battery check: Built into the grip with lamp indicator.

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

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

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

Dimensions: Body, 153 x 51 x 23mm.

(6" x 2" x 15/16").

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

Weight: Body, 650g. (1 lb. 7 ozs.) Grip, 1,070g. (2 lbs. 3 ozs.) including ten penlight batteries.

Specifications of the Motor Drive Unit

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

Shooting intervals: 1/3 sec. to 60 sec./frame.

Timer scale: 7-stage. "T.OFF", 0.5, 1, 2, 5, 10, 60 sec.

Time allowance: ±12%.

Power source: DC 15V. 10 penlight batteries. Loaded in Battery Case and connected with Battery Connector MD.

Battery check: By Battery Checker MD.

Photographing capacity: Penlight batteries: Alkaline, 36 frames x 80 rolls or more. Manganese: 36 frames x 50 rolls or more.

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

Remote control: Connect the Remote Switch MD to the terminal on the Battery Connector. Length of cord is 5 meters. An extension cord (10 meters) is available.

Unmanned photography: By coupling with the Servo EE Finder.

Shutter button: With cable release socket.

Size: 150 x 170 x 34mm

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

Weight: 720 grams (1 lb. 9 - 1/2 ozs.)

Accessories: Battery Case, Battery Connector MD, Remote Switch MD, Film Chamber 250, Film Loader 250, Film Magazine 250, Extension Cord MD, Case, Battery Magazine 15V, Battery Checker MD.

Subject to change without notice.

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