

CANON REPAIR GUIDE

CANON SCOOPIC 16-M
(REF. NO. 3-70202)

CANON INC. JAPAN

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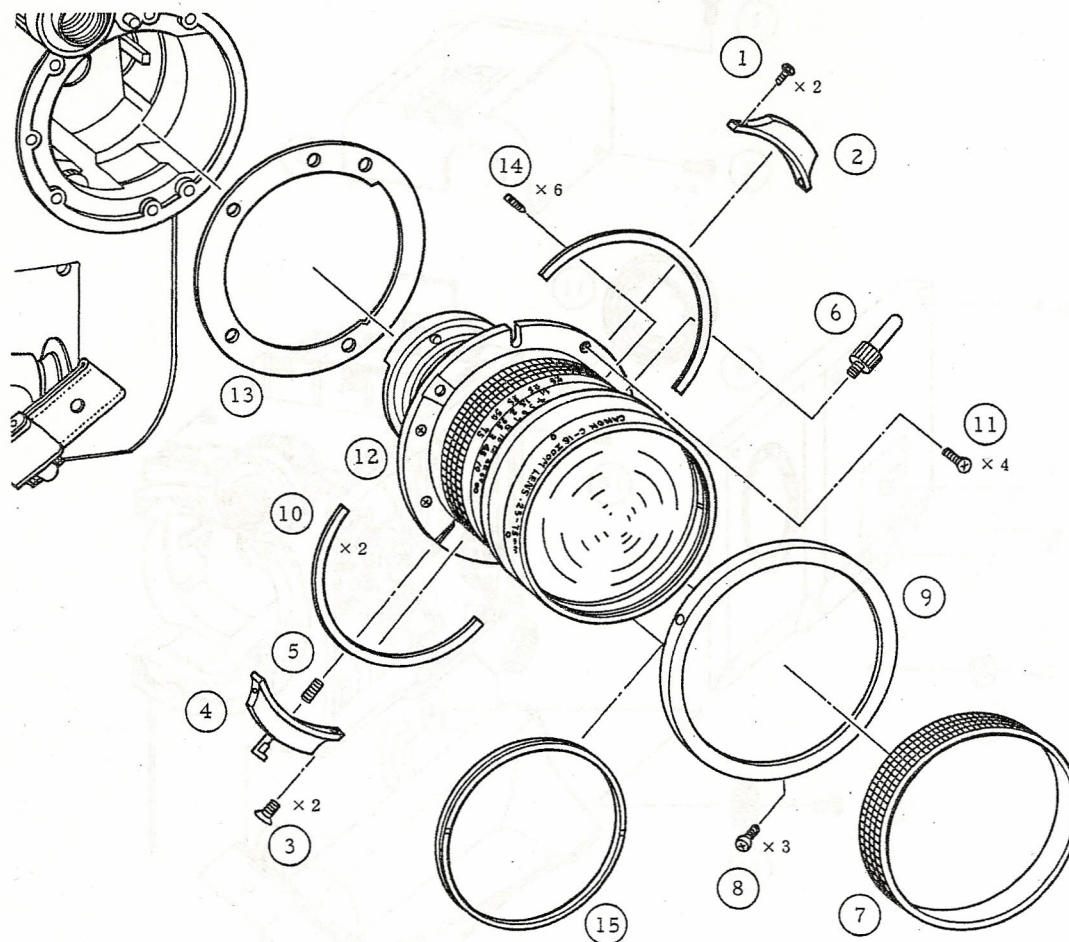
Introduction

The Canon Scoopic 16-M is a high quality 16mm cine camera designed for professional and advanced amateur use. It is designed to meet the current market demands for high quality, versatility and ease of operation in a compact package.

It provides all the features of the original Scoopic 16 such as built-in zoom lens, automatic exposure control (EE), automatic film threading, 100 ft. film load, and "human engineering" body and grip shape. New features of the Scoopic 16-M are provision for single frame photography, macro focusing lens, and the adoption of the true transmission "T" number marking system for the aperture rather than the theoretical "F" number marking.

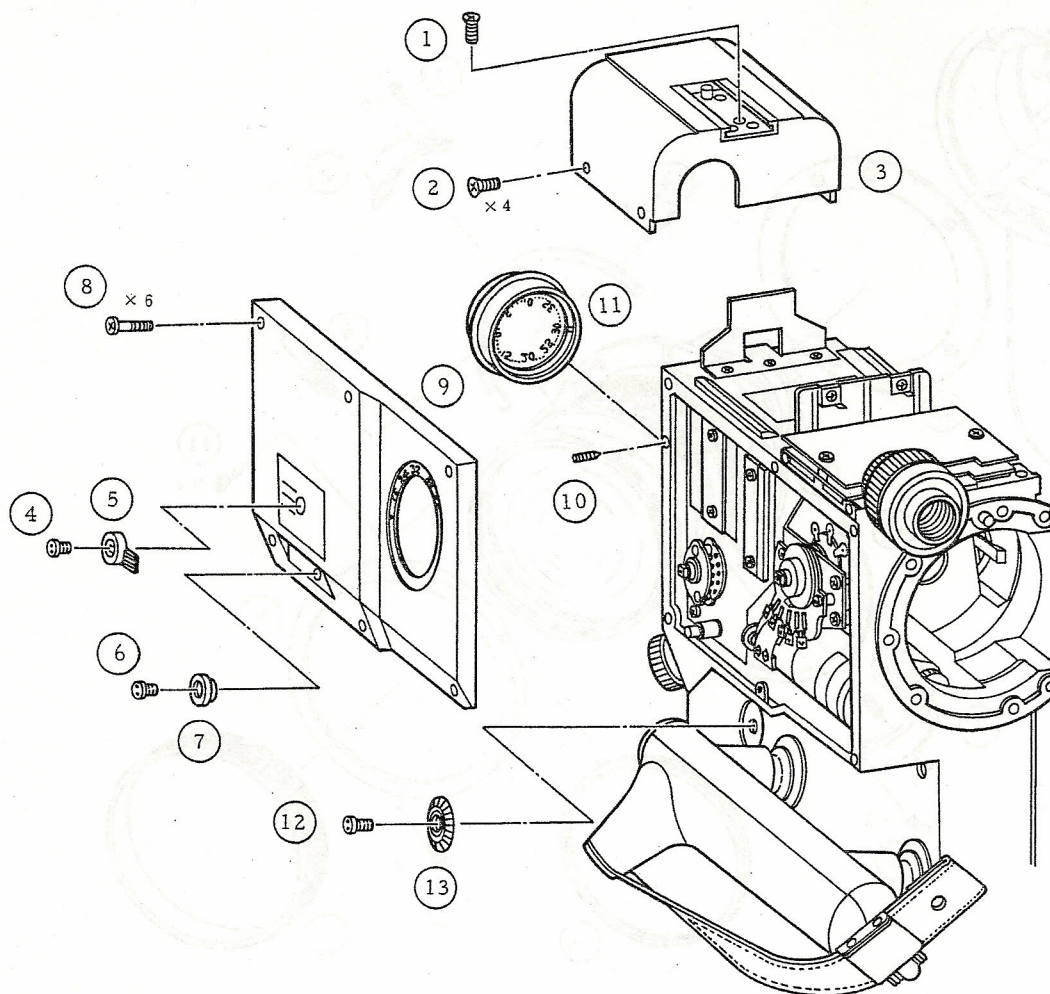
The camera has also been designed for easy maintenance. Most adjustments can be made from the outside without major stripdown.

DISASSEMBLY



1. Lens Unit

- | | | |
|--|---|-----------------------------------|
| ① <u>Screw</u>
X19-200458 x 2 | ② <u>Macro Lever</u>
33-9587 | ③ <u>Screw</u>
X19-200458 x 2 |
| ④ <u>Macro Knob</u>
33-9590 | ⑤ <u>Lock Spring</u>
33-9597 | ⑥ <u>Zooming Lever</u>
33-9621 |
| ⑦ <u>Rubber Ring</u>
33-9602 | ⑧ <u>Screw</u>
X19-170308 | ⑨ <u>Front Cover</u>
33-9574 |
| ⑩ <u>Front Cover Washer</u>
33-9575 x 2 | ⑪ <u>Screw</u>
X18-260408 x 4 | |
| ⑫ <u>Zoom Lens Unit</u>
38-0422 | ⑬ <u>Focusing Washer</u>
27-9757 x N | |
| ⑭ <u>Screw</u>
X10-170258 x 6 | ⑮ <u>Assembly Collar</u>
33-9639 | |



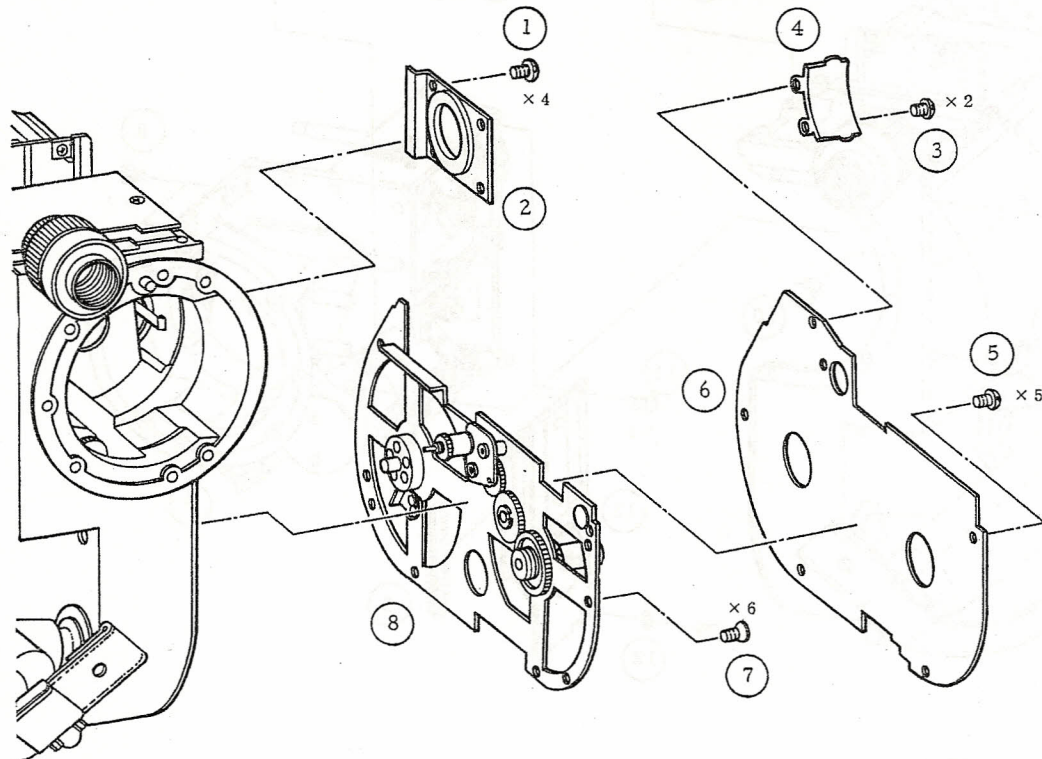
2. External Parts

2.1. Top Cover: (1) Screw
33-9440 (2) Screw x 4 (3) Top Cover
33-9449 39-8005

2.2. Side Cover: (4) Pin Face Screw
33-9310 (5) Switch Knob
33-9309 (6) Pin Face Screw
33-9310 (7) Single Frame Knob
33-9235 (8) Screw x 6
33-9435 (9) Side Cover
39-8004

2.3. Speed Dial Unit: (10) Screw
X10-200258 (11) Speed Dial Unit

2.4. Indicator Knob (12) Pin Face Screw
33-9327 (13) Indicator Knob
33-9365



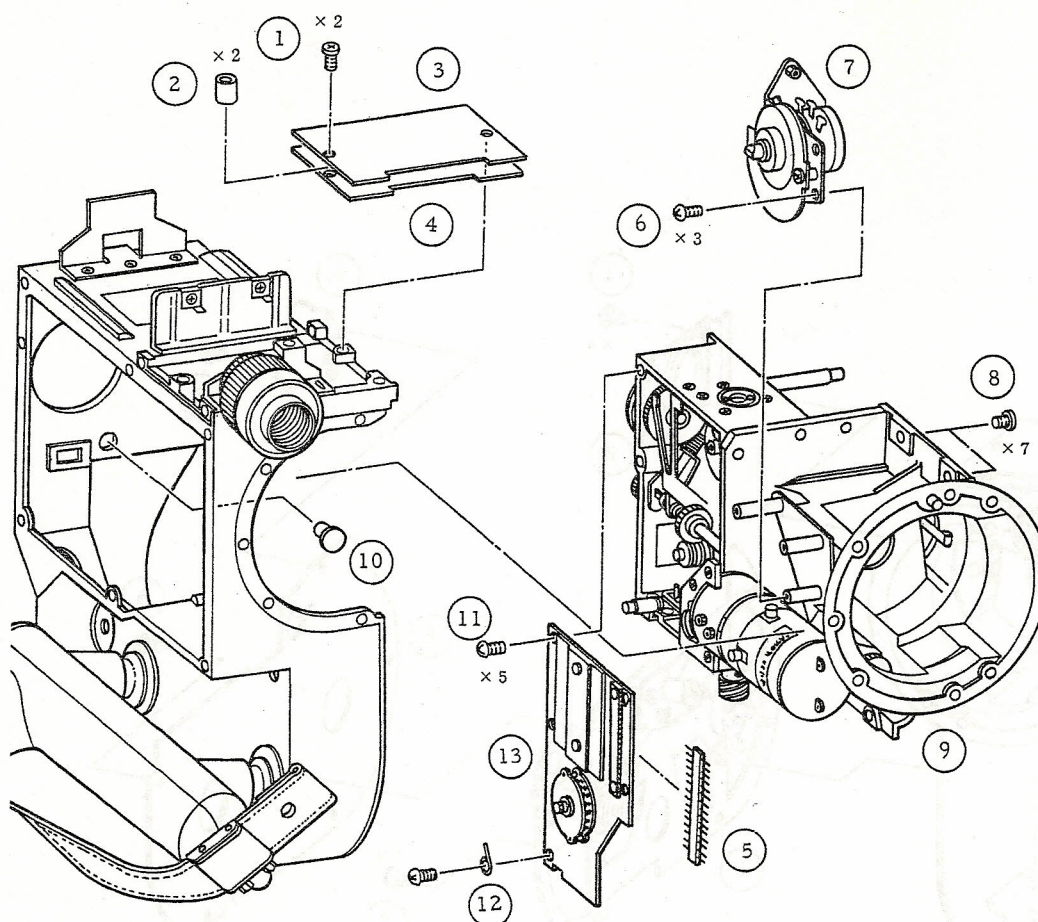
3. Finder Mask and Base Plate

3.1. Finder Mask Cover: ① $\frac{\text{Screw}}{\text{X16-200358}} \times 4$ ② $\frac{\text{Finder Mask Cover}}{39-8107}$

3.2. Threading Plate: ③ $\frac{\text{Screw}}{\text{X16-200208}} \times 2$ ④ $\frac{\text{Filming Guide}}{33-9300}$

⑤ $\frac{\text{Screw}}{\text{X16-200208}} \times 5$ ⑥ $\frac{\text{Threading Plate}}{33-9545}$

3.3. Base Plate Assembly: ⑦ $\frac{\text{Screw}}{\text{X18-260808}} \times 6$ ⑧ Base Plate Assembly



4. Drive Unit

4.1. Electric Parts Units (EPU): ① $\frac{\text{Screw}}{33-9434} \times 2$ ② $\frac{\text{Collar}}{33-9337} \times 2$

③ $\frac{\text{EE EPU}}{38-0417}$ ④ $\frac{\text{Motor EPU}}{38-0418}$ ⑤ Connector

4.2. Shutter Speed Switch Unit: ⑥ $\frac{\text{Screw}}{\text{X16-260608}} \times 3$

⑦ $\frac{\text{Shutter Speed Switch Unit}}{38-0419}$

4.3. Drive Unit: ⑧ $\frac{\text{Screw}}{33-9452} \times 7$ ⑨ Drive Unit

⑩ $\frac{\text{Checker Button}}{33-3249}$

4.4. Drive Unit Cover: ⑪ $\frac{\text{Screw}}{\text{X16-200508}} \times 5$

⑫ $\frac{\text{Cord Retainer}}{33-0917}$ ⑬ Drive Unit Cover

1. Film Chamber

1-1 Spool Winding Torque

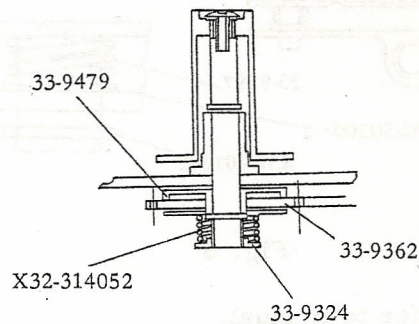


Fig. 1

Disassembly: Refer to Drawing, Page 4, No. 8.

Adjustment:

- (1) Set the filming speed to 24 Fps.
- (2) Adjust the Coil Spring (33-9376) by turning the Nut (33-9324).

Requirement: The drive torque should be within 100 ~ 120g/cm.

Note: The Winding Gear (33-9362) should be lubricated at the friction surface with "Astro" oil.

1-2 Pressure of Side Load Spring

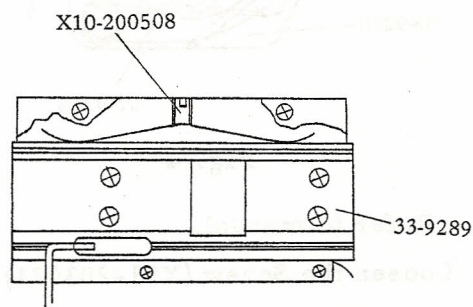


Fig. 2

Disassembly: Refer to manual.

Adjustment: Make adjustment by means of the Screw (X10-200508)
(see Fig. 2)

Requirement: The pressure should be within 40 ~ 50g/cm on both the upper and lower sides.

1-3 Pressure of Pressure Plate

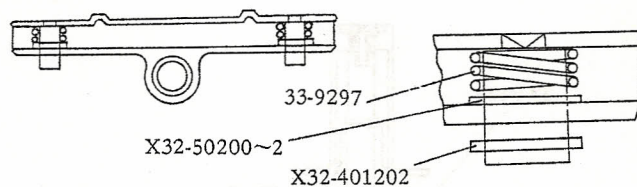


Fig. 3

Disassembly: Refer to manual.

Adjustment: Remove the Washer (X32-401202) and adjust the pressure by increasing or decreasing the number of Washers (X32-50200-2) (see Fig. 3).

Requirement: The pressure should be within 40 ~ 50g/cm.

1-4 Gap of Film Stopper

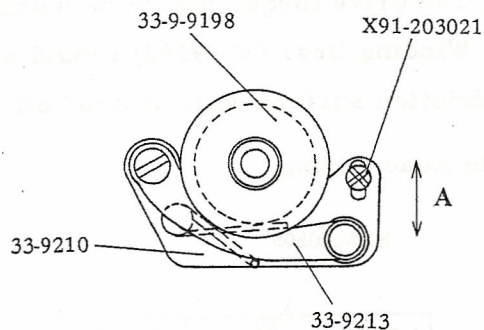


Fig. 4

Disassembly: Refer to manual.

Adjustment: Loosen the Screw (X91-203021) and slide the Adjusting Plate (33-9210) in the direction of the arrow "A".

Requirement: The gaps of the 1st and 2nd film stoppers should be within 0.2 ~ 0.3mm (corresponding to a double thickness of Ektachrome EF film).

1-5 Positioning of Film Guide

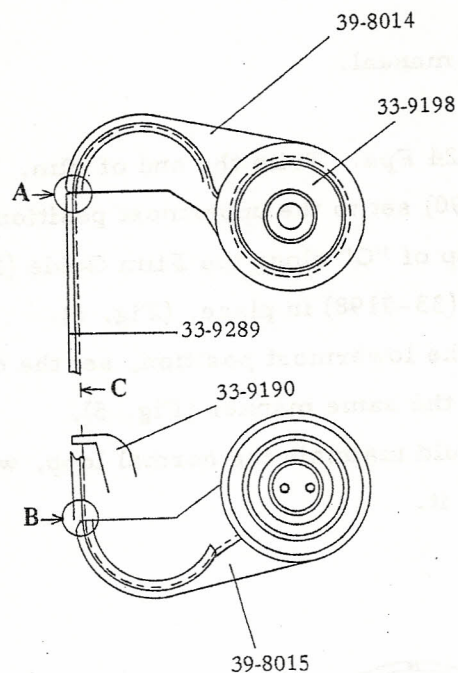


Fig. 5

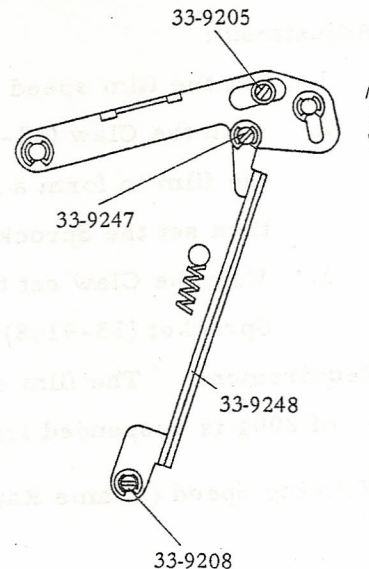


Fig. 6

Disassembly: Refer to the manual (Fig. 5) and Drawing, Page 5, No. 3. (Fig. 6).

Adjustment: (1) Adjust the position of the 1st film guide by turning the Eccentric Screw (33-9205) (Fig. 6).

(2) Adjust the position of the 2nd film guide by turning the Eccentric Screws (33-9247 and 33-9208) (Fig. 6).

Requirement: Both the 1st and 2nd film guides should be in contact with the "A" and "B" sections of the Film Gate (33-9289)(Fig. 5).

Note: The operating shafts of the film guides should be lubricated with "Astro" oil.

2. Film Transport

2-1 Auto-loading

Disassembly: Refer to the manual.

Adjustment:

1. Set the film speed to 24 Fps. Trim the end of film.
2. With the Claw (33-9190) set to the uppermost position, arrange the film to form a loop of "C" along the Film Guide (39-8014), then set the Sprocket (33-9198) in place. (Fig. 5).
3. With the Claw set to the lowermost position, set the other Sprocket (33-9198) in the same manner (Fig. 5).

Requirement: The film should maintain the normal loop, when a weight of 200g is suspended from it.

2-2 Filming Speed (Frame Rate)

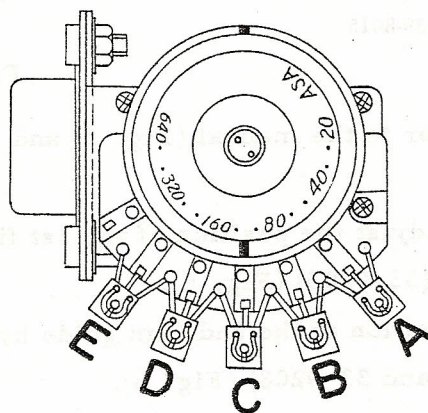


Fig. 7

Disassembly: Refer to Drawing, Page 3, No. 9.

Adjustment: Adjust the filming speeds by the respective variable resistors A - E (Fig. 7).

Requirement:

Filming Speed	Resistance	Adjustment	Limit (Std. Temp.)
16 Fps	5.0K Ω	A	± 1 frame
24	1.0	B	± 1
32	1.0	C	± 2
48	1.0	D	± 2
64	2.0	E	± 2

Note: When changing the variable resistors, use $\pm 5\%$ tolerance resistors.

2-3 Drop of Filming Speed (Frame Rate)

Requirement: When the operating voltage drops from 12V to 11V at room temperature (20°C), the drop of the filming speed should be less than 1 frame at 24 Fps.

Note: If the drop of the filming speed exceeds the above limit, check the amplifier and the drive unit.

2-4 Motor Driving Current

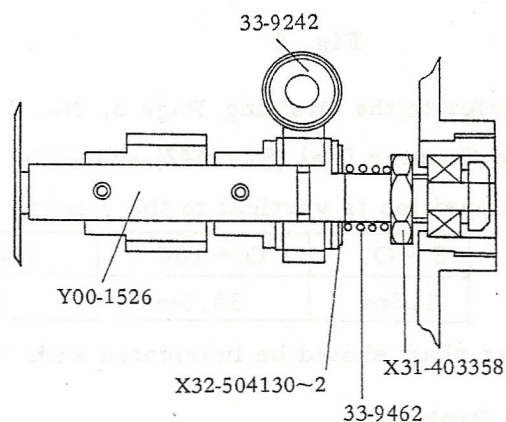


Fig. 8

Disassembly: Refer to the, Drawing Page 5, No. 13.

Adjustment: To adjust the motor slip current, increase or decrease the number of the Washers (X32-504130 ~ 2) (Fig. 8).

Requirement:

Current Consumption at Standard Temperature (20°)	
Without load	Less than 150mA
With load	Less than 450mA
Slip current	1600 ~ 2000mA

Note: Both the Gear Unit (Y00-1526) and the friction surface should be lubricated with low temperature grease.

2-5 Frame Stability

Requirement: At each filming speed, the frame centering error should be less than 0.03mm in vertical direction and less than 0.02mm in horizontal direction.

Note: The frame centering should be checked by means of a measuring instrument or projector.

2-6 Footage Counter

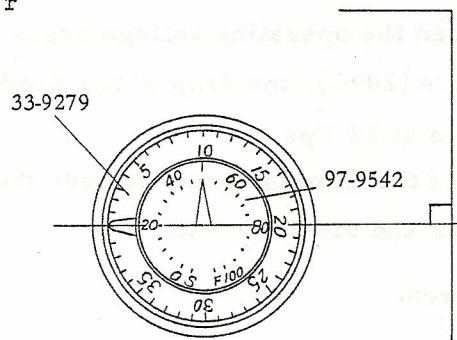


Fig. 9

Disassembly: Refer to the Drawing Page 3, No. 11.

Adjustment: The Counter Dial (97-9542) should be mounted correctly so that the 50ft position is vertical to the camera (Fig. 9).

Requirement:

S ~ O	O ~ 100	100 ~ F
1.5m	30.5m	1.5m

Note: The counter shaft should be lubricated with "Astro" oil.

2-7 Film Supply Shaft Brake

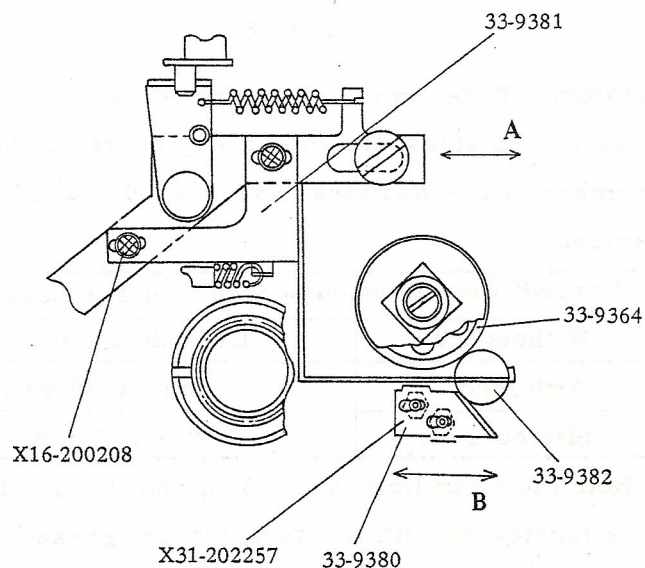


Fig. 10

Disassembly: Refer to the Drawing, Page 4, No. 6 & 8.

Adjustment:

1. To adjust, loosen the Screw (X16-200208) and slide the Brake Plate (33-9381) in the direction of the arrow "A" (Fig. 10).
2. Loosen the Screw (X31-202257) and slide the Brake plate (33-9380) in the direction of the arrow "B".

Requirement: The brake should exert the largest possible force when the shutter button is not pressed.

Note: The shutter button should return completely.

3. Selector Switch

3-1 Main Switch Function Table

O = Operative
X = Inoperative

Main Switch	Film Transport	Automatic Exposure (EE)	Aperture Opening Button	Battery Checker
OFF	X	X	X	O
AUTO	O	O	X(During Filming) O(Film Stopped)	O
MANUAL	O	X	X	O

3-2 Single Frame Switch

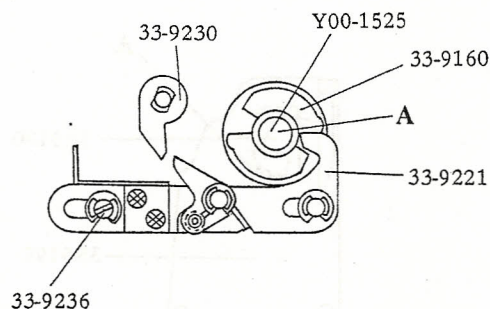


Fig. 11

Disassembly: Refer to Drawing, Page 5, No. 13.

Adjustment:

1. Set the switch for the single frame mode.
2. Adjust the Eccentric Screw (33-9236) so that the Interlock Claw (33-9230) is disengaged at the press of the shutter button (Fig. 11).

Requirement: The interlock claw should be disengaged at the position of $-0.2 \sim -0.4\text{mm}$ from the maximum "A".

3-3 Positioning of Microswitch

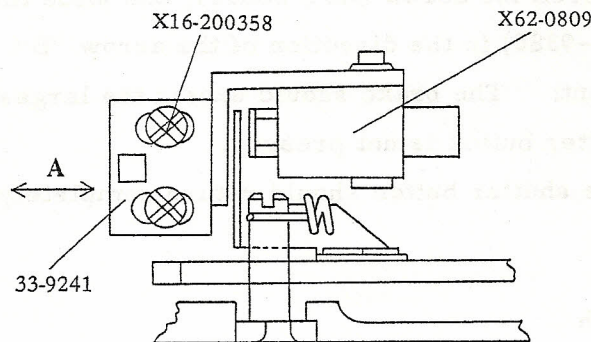


Fig. 12

Disassembly: Refer to Drawing, Page 5, No. 13.

Adjustment: Loosen the Screw (X16-200358) and slide the Microswitch Holder (33-9241) in the direction of the arrow "A" (Fig. 12).

Requirement: The microswitch should be activated at the position of $-1.2 \sim -1.4\text{mm}$ from the maximum "A" when the shutter button is pressed (Fig. 11).

3-4 Positioning of Feed Claw Stopper

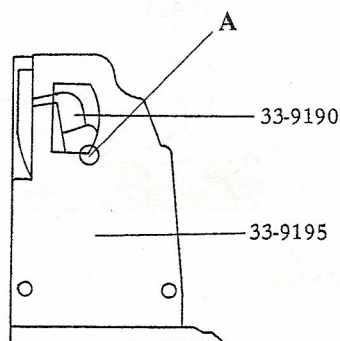


Fig. 13

Disassembly: Refer to Drawing, Page 5, No. 9 & 13.

Adjustment:

1. Set the Feed Claw (33-9190) to the Claw Cover (33-9195) as shown in Fig. 13.

2. Loosen the Screw (X18-200508) and adjust the engagement "B" of the Shaft (Y00-1525) so that it comes in contact with the stopper (Fig. 11 and Fig. 14).

Requirement: Make a visual check.

3-5 Positioning of Shutter Blade

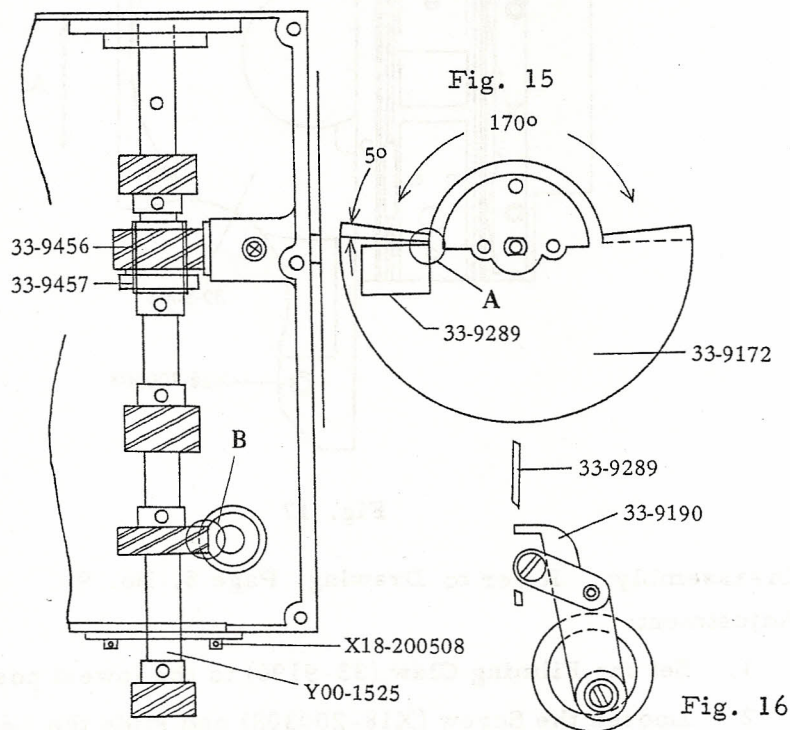


Fig. 14

Fig. 16

Disassembly: Refer to Drawing, Page 5, No. 9 & 13.

Adjustment:

1. Set the Filming Claw (33-9190) to the lowest position (Fig. 16).
2. Set the shutter blade as shown. (Fig. 15).
3. Fix the Gear (33-9456) with the Nut (33-9457) (Fig. 14).

Requirement: The shutter blade should be positioned within 5° with respect to the Aperture (33-9289).

- Note:
1. The open angle of the shutter blade is 170°, so it must be positioned within the limit of 5° to assure correct timing.
 2. The gears related to the Main Shaft (Y00-1525) should be lubricated with low temperature grease.

3-6 Perforation

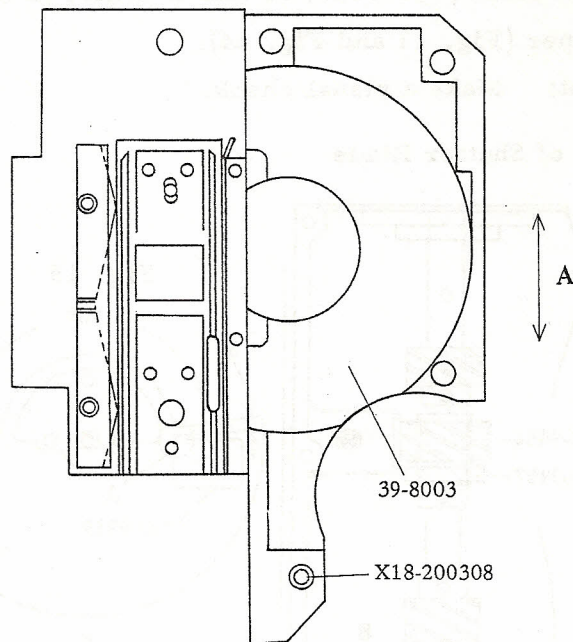


Fig. 17

Disassembly: Refer to Drawing, Page 5, No. 9.

Adjustment:

1. Set the Filming Claw (33-9190) to the lowest position (Fig. 16).
2. Loosen the Screw (X18-200308) and slide the Lens Holder (39-8003) in the direction of the arrow "A" (Fig. 17).
(Adjustment should be made by using proper tools and positioning instrument, or by using a transparent film)

Requirement: The Filming Claw should be $19.65 \pm 0.2\text{mm}$ below the center of the aperture.

Note: Do not move the film gate, as it will cause the optical axis to be shifted.

4. Electrical Parts

4-1 Contact Resistance

Requirement: The contact resistance between switch connectors should be less than 0.03Ω when measured with a tester.

4-2 Insulation Resistance

Requirement: The insulation resistance between the battery terminals should be more than $10M\Omega$, when measured with a tester during the AUTO condition.

Note: The battery should be removed. DO NOT use a high voltage "Insulation Breakdown Checker" (megger) to check any circuit containing solid state devices.

4-3 Battery Checker

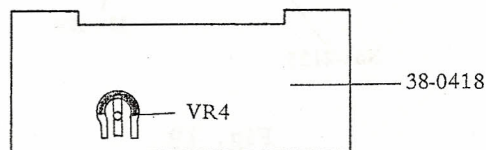
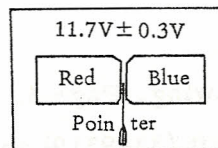


Fig. 18

Disassembly: Refer to Drawing, Page 3, No. 3.

Adjustment: Set the DC power supply to 11.7 V and adjust VR4 of the Motor Electric Parts Unit 38-0418 so that the pointer is at the interface between the red and blue areas.

Requirement:



4-4 Others

Adjustment: For soldering work, refer to the circuit diagram.

5. EE Unit

5-1 Meter Torque

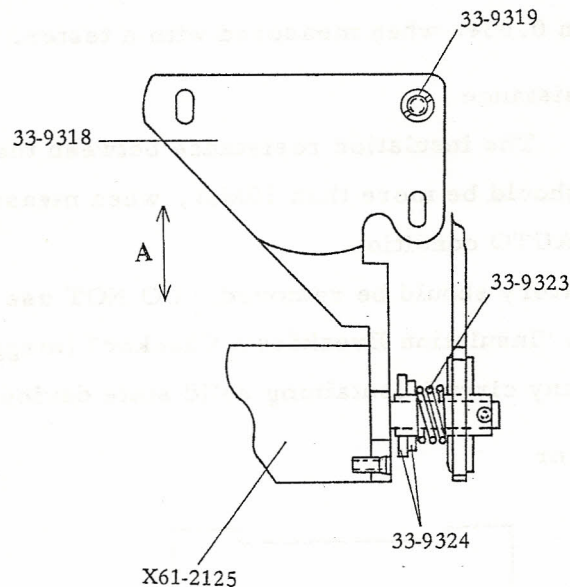


Fig. 19

Disassembly: Refer to Drawing, Page 5, No. 7.

Adjustment: Adjust the strength of the Friction Spring (33-9323) by the Nut (33-9324) (Fig. 19).

Requirement: The slip current should be less than 70mA.

Note: The friction surface of the Gear (33-9321) should be lubricated with "Astro" oil.

5-2 Engagement of EE Gear

Disassembly: Refer to Drawing, Page 5, No. 7.

Adjustment: Loosen the Shaft (33-9319) and slide the EE Base Plate (33-9318) in the direction of the arrow "A" (Fig. 19).

Requirement: The back-lash of the gear engagement should be 0.1 ~ 0.2mm.

5-3 CdS Aperture

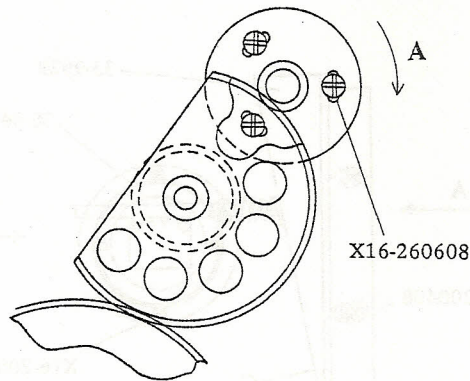


Fig. 20

Disassembly: Refer to Drawing, Page 3, No. 3.

Adjustment:

1. Open the lens aperture.
2. Open the CdS aperture.
3. Adjust the gear so that the back-lash moves toward the direction of the arrow "A", and fix it with the Screw (X16-260608) (Fig.20).

Requirement: The back-lash should be kept minimum.

5-4 EE Adjustment

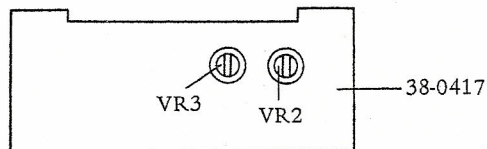


Fig. 21

Disassembly: Refer to Drawing, Page 3, No. 3.

Adjustment:

1. Adjust the meter accuracy with VR3 of the EE Electric Parts Unit (38-0417).
2. Adjust the left/right rotational balance with VR2 (Fig. 21).

Requirement: The meter accuracy should be within 0.3T.

The left/right rotational balance should be checked visually.

- Note:
1. The adjustment of hunting and insensitive range is possible only when R14 and R16 are changed at the same time (no adjustment is available in normal case).
 2. Do not use ND filters in front of the CdS.

5-5 Meter Needle

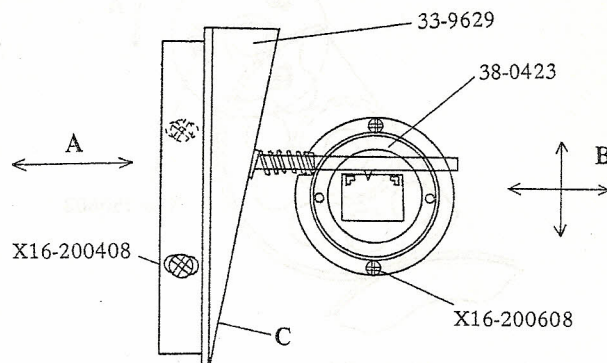


Fig. 22

Disassembly: Refer to Drawing, Page 4, No. 2.

Adjustment: Loosen the Screw (X16-200408) and slide the Aperture Index Cam (33-9629) in the direction of the arrow "A" (Fig. 22).

Requirement: Should be within $\pm 1/3T$, when checked at both T2.5 and T22.

Note: Use LTSH at "C".

6. Lens Unit

6-1 Focusing

Disassembly: Refer to Drawing, Page 2, No. 12.

Adjustment:

1. Adjust the "wide" focusing by the Focusing Washer (27-9757).
2. To adjust the "Tele" focusing, remove the Assembly Collar (33-9639) and loosen the Screw (X10-170258), then turn the front lens.

Requirement: Center of "wide" $+0.02\text{mm}$, Limit $\pm 0.02\text{mm}$

Center of "Tele" 0.00mm , Limit $\pm 0.02\text{mm}$

6-2 Lens Resolution (on film)

Requirement:

	Center	Edge
Wide	60 lines/mm	30 lines/mm
Tele	50 lines/mm	25 lines/mm

6-3 Macro

Requirement: Macro should focus to 75mm from the front element of the lens.

6-4 Focusing Scale Adjustment

Disassembly: Refer to Drawing, Page 4, No. 2.

Adjustment: Remove the Screw (X16-200608) and adjust by placing the Focusing Washer (33-9356) under the Finder Mask Unit (38-0423) (Fig. 22).

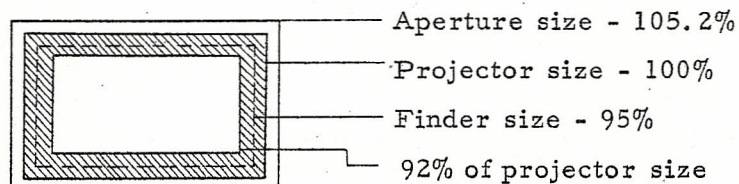
Requirement: Should be within 1 line at 5.0m position of the distance barrel.

6-5 Parallax

Disassembly: Refer to Drawing, Page 4, No. 2.

Adjustment: Loosen the Screw (X16-200608) and slide the cam in the direction of the arrow "B" (Fig. 22).

Requirement: The finder should be positioned in the shaded area (use parallax testing instrument).



6-6 Viewfinder Focus

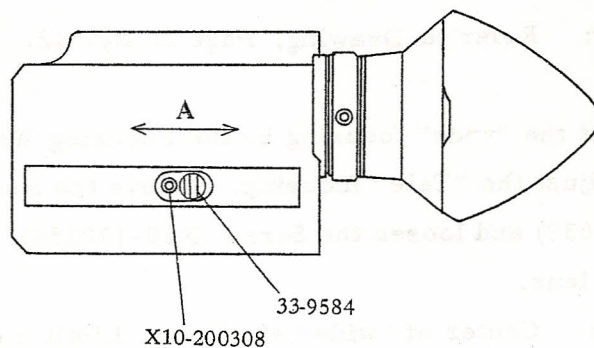


Fig. 23

Disassembly: Refer to the manual.

Adjustment: Remove the name plate "CANON SCOOPIC 16", loosen the screw (X10-200308) and slide the Lens Barrel (33-9584) in the direction of the arrow "A" (Fig. 23).

Requirement: The eyepiece should be adjustable from +2 to -4 diopter.

7. Others

7-1 Grease

Adjustment:

1. The drive units not mentioned in "Note" should be lubricated with Moil Grease LT-F.
2. The grease used for the lens unit is a mixture of JL-4 and JL-5. FX706 oil resistant paint is used to prevent the grease from spreading.

CANON SERVICE TOOLS LIST

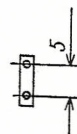
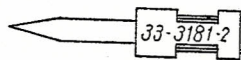
CANON SCOOPIC 16 M
(REF.NO. 3-70202)

TEST EQUIPMENT

<u>Use</u>	<u>Name of Test Equipment</u>
Focus	1. Universal Dual Focal Length Collimator 100 & 600mm or Universal Two Axis Collimator 130 & 300mm 2. Mirror for Motor Zoom
Shutter	3. Cine Shutter Tester
Field of View	4. Universal Range-viewfinder Collimator (600mm) or Universal Parallax Collimator-1 5. 3-70303 Prism for Field of View-1 (Common to Sound Scoopic 200) 6. 3-305 Parallax Collimator Stand-1S (Common to DS-8)
Exposure Meter	7. Canon Light Source-4 or -1 8. Standard Checker-2 (CdS) 9. Ohm Meter 10. 3-70202 Adjusting Tool for Diaphragm-1S
Torque	11. Torque Gauge 20~200 gcm (clockwise) 12. SZ14-3-70201-1Z (Torque Gauge Head) (Common to Scoopic 16, DS-8)
Adjustment	13. D.C Connector Supplied to Agents Who Have a Regulated D.C Supplies 14. Inspection Tool for Height of Feeding Claw & Position-1S

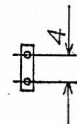
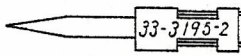
SPECIAL SCREWDRIVERS

Tightening Charge Switch
Lever, Single Frame
Knob, Finder, Shutter
Lever & Side Cover
Lock Knob Stopper



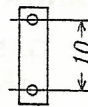
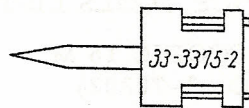
T0631-33-3181-2
(Common to DS-8)

Tightening ASA Dial,
Film Manual Knob (Inside
& Outside)



T0631-33-3195-2
(Common to Scoopic 16)

Tightening Belt



T0631-33-3375-2
(Common to Scoopic
16, DS-8)