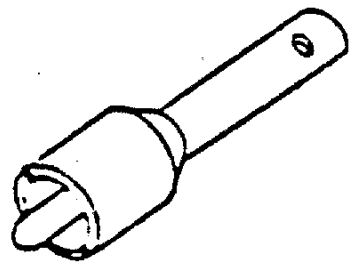
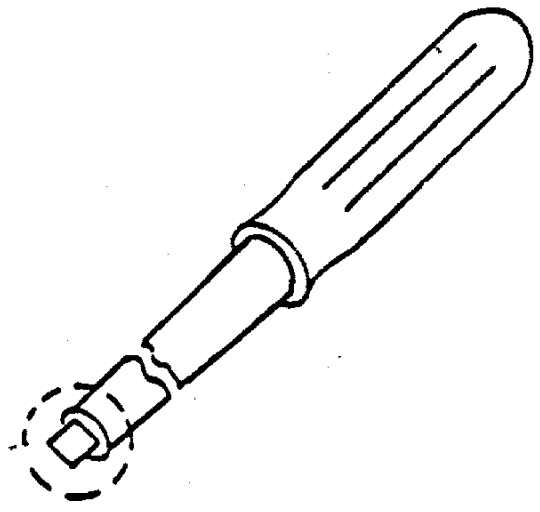
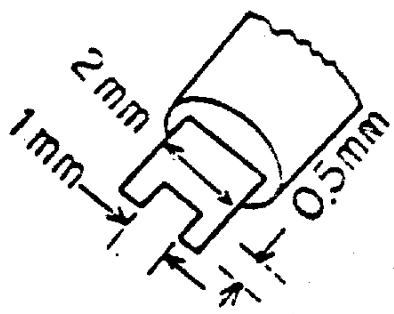
H. LIST OF SPECIAL JIGS AND TOOLS

Name of tool	Application	Remarks
1. KC-CE5648 Lever nut wrench	For tightening Lever nut CE564800	Incompatible with the lever nut having a narrow slit which was manufactured at the initial production stage.
2. KC-CE5683 ASA cover holder wrench	For tightening ASA Cover holder stopper CE568300	
3. OT1057 high-frequency screwdriver	For adjusting variable resistor	Machine tip of the high-frequency screwdriver with a file as shown below:







Depth of groove equal to plate thickness (t 0.5 mm)

I. DESCRIPTION OF MECHANISM

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I. OUTLINE

Though OM-4 is designed basically on the basis of the preceding Model PM-2, it can exhibit far higher performance and features the chief meris mentioned below:

1. Spot light measurement is possible in both the auto and manual modes.
2. Spot light measurement is possible at multiple points.
3. Exposure values can be stored for a long time.
4. HI LIGHT and SHADOW modes are prepared for photographing.
5. The viewfinder adopts a liquid crystal cell assuring legible indications.
6. The view finder is equipped with a dioptmetric corrector.
7. A mechanical shutter speed of 1/60 sec. is available.
8. The shutter can provide high speeds up to 1/2000 sec.

Owing to these features, Model OM-4 permits freely controlling exposure for photographing in rear light and depending on difference in brightness of background.

Further, the viewfinder is so designed as to facilitate focusing even for short-sighted and long-sighted persons. In addition, the mechanical shutter time is prepared so as not to lose shuttering change should the battery becomes exhausted. Therefore, Model OM-4 has opened a far wider photographing range. In order to achieve this purpose, Model OM-4 adopts sophisticated circuits mentioned below:

1. Auto circuit of direct light measurement type.
2. Auto circuit of light measurement memory type (SPOT)

Further, the instrument incorporates two unique exposure control EE mechanisms.

Moreover, manual circuit, high light circuit, shadow circuit, strobe circuit, memory and so on are built in to compose the high-grade circuit of Model OM-4.

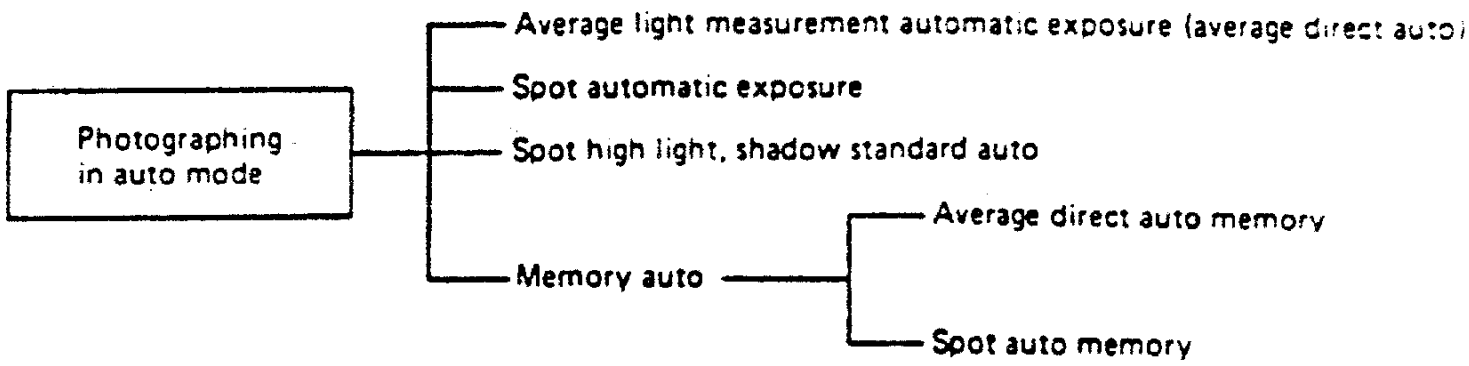
The most advanced 4-bit microcomputer and bipolar IC have been developed as the main components of the electrical circuits.

In addition, OM-4 is equipped with specially developed high performance mechanisms such as shutter mechanism featuring high accuracy, high speed travelling stability, high speed of 1/2000 sec. as well as mechanical speed of 1/60 sec., electromagnetic shutter lock mechanism, mechanism to prevent film winding during exposure time, dioptric correction mechanism and large legible liquid crystal display.

II. PHOTOGRAPHING MODES

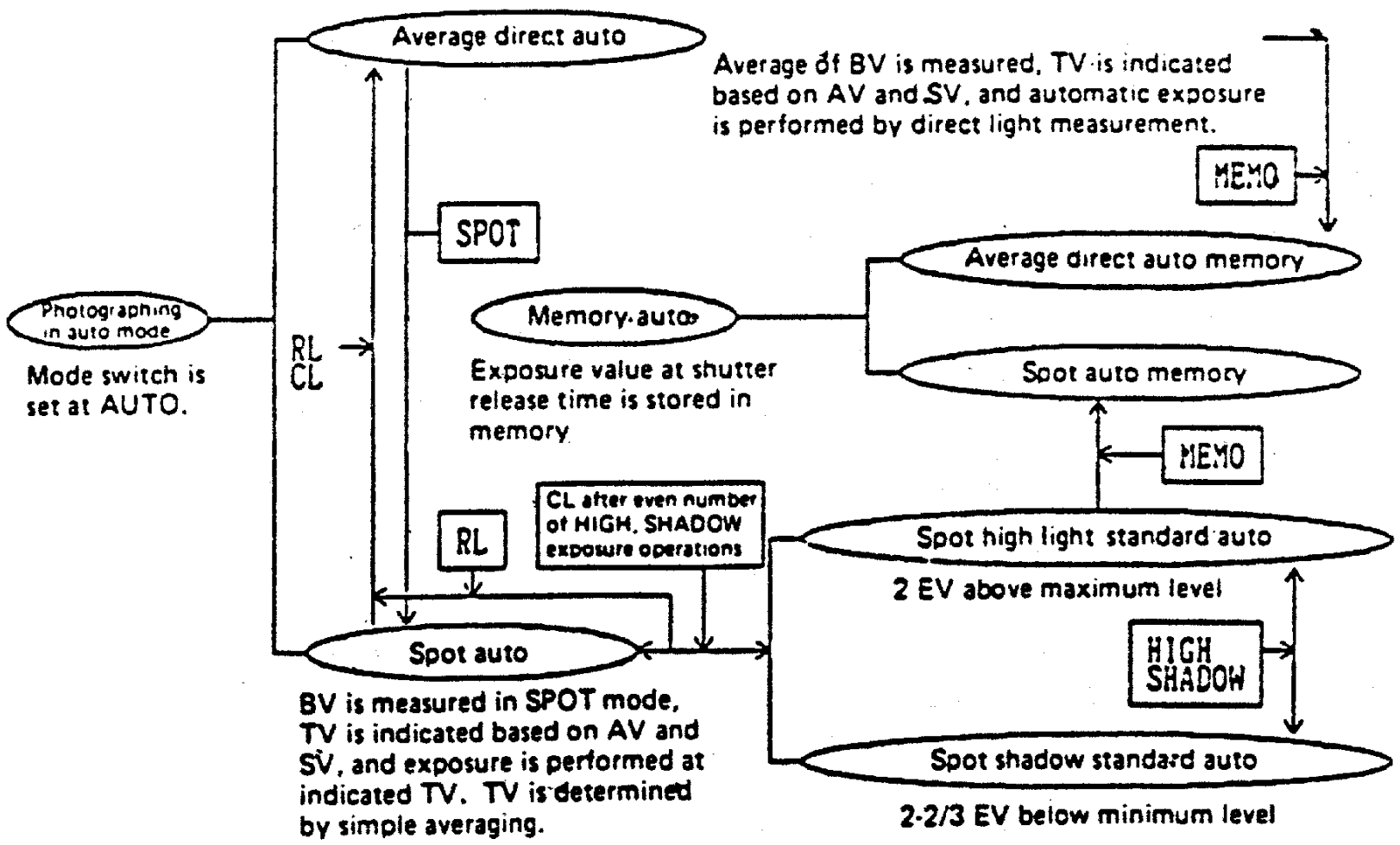
Model OM-4 is designed basically for four photographing modes: auto mode, manual mode, strobe mode and spot mode.

1. Classification of Photographic Modes

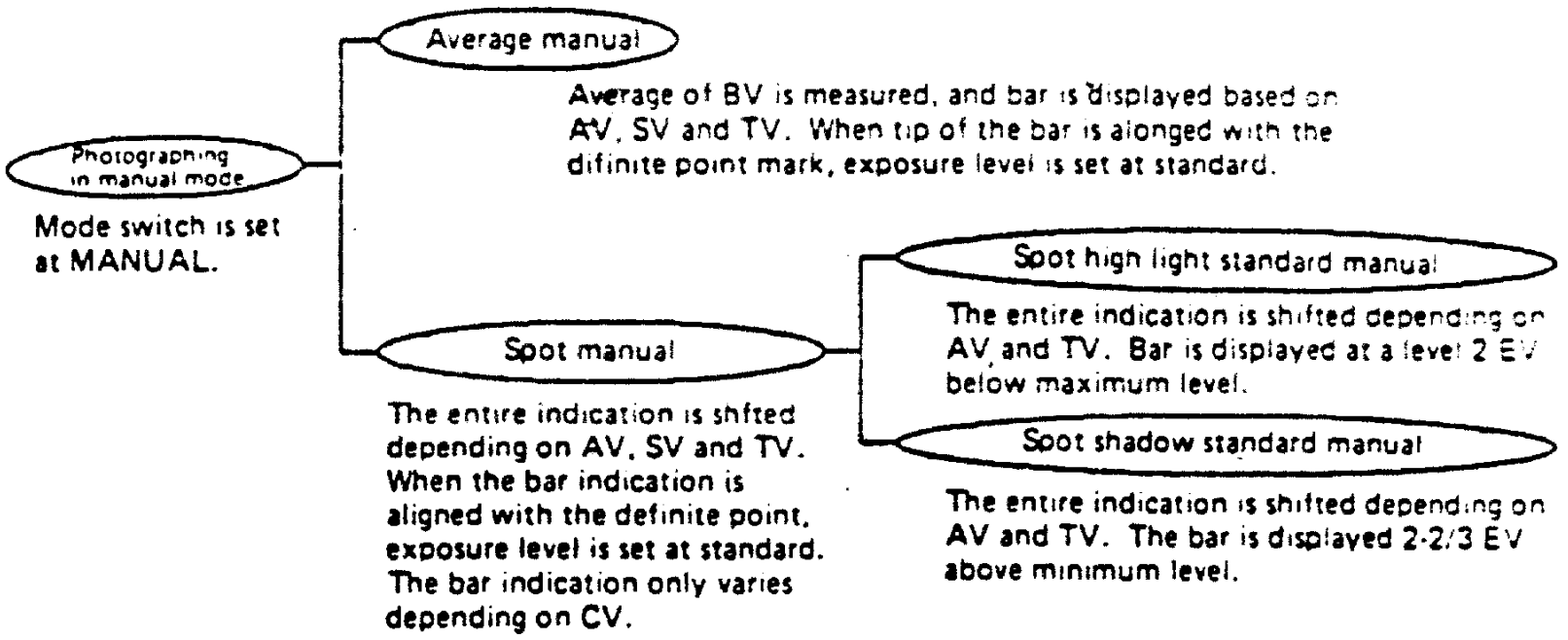


RL: Release
CL: Clear

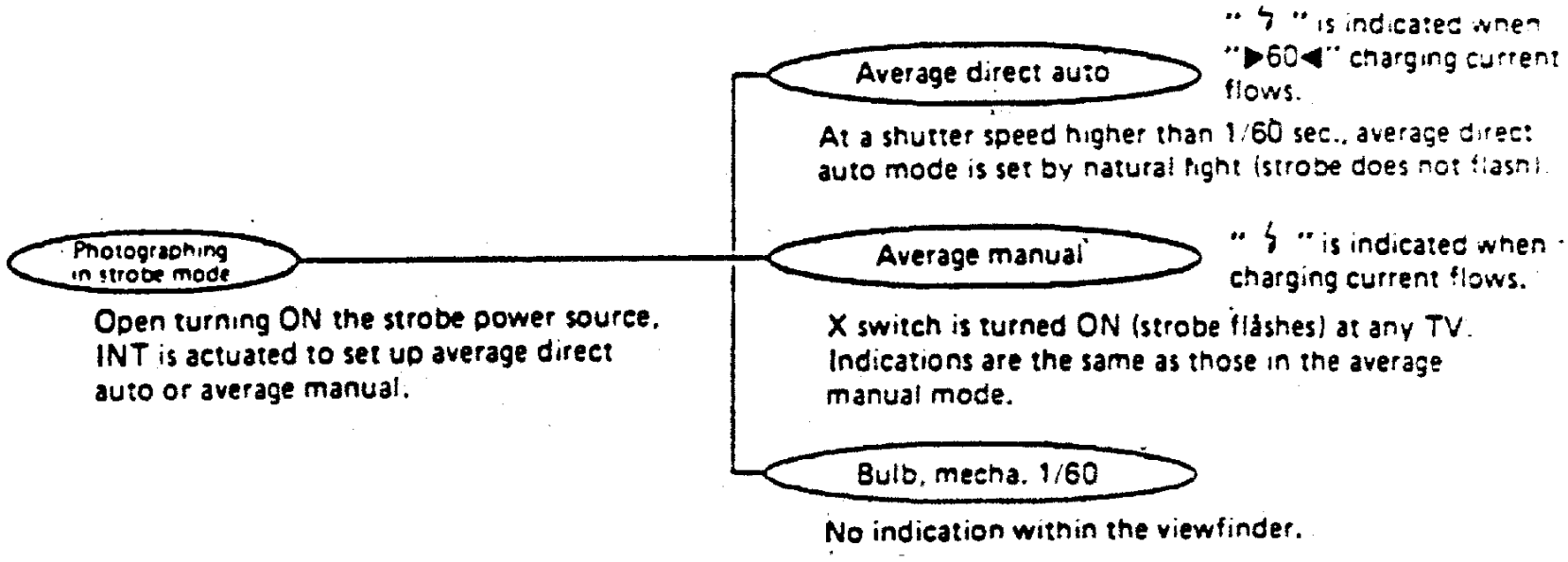
TV: Shutter speed
AV: Aperture value
SV: ASA value
BV: Brightness of object to be photographed



- After the shutter is released in the spot multi-point auto mode, the camera is set in the average direct auto mode.
  Once the shutter is operated with the memory set in position, the exposure value is memorized for one hour (then it is cleared and the camera is set in the average direct mode).



- CV: Corrected exposure value



2. Application of Photographic Modes

2-1. Auto Mode

1. Automatic exposure by average light measurement (average direct auto)
   - Average of BV (brightness of object to be photographed) is measured, and a bar is displayed on LCD as a shutter speed (TV) to be adopted as standard exposure level based on AV (aperture value), SV (ISO) and CV (corrected exposure value).
   - When the main switch is turned ON, the mirror is raised to set up the stop down condition, and automatic exposure is perfomed in the direct light measurement mode in which reflection light from the shutter blind and film surface is measured.
   - The average direct mode is kept even after the shutter is released.

2. Automatic exposure by spot light measurement (spot auto)
   - The spot auto mode is set up by turning ON the SPOT key in the average direct auto mode.
   - In this mode, BV (brightness of object to be photographed) is measured at a spot and the measured value is entered. A dot and a bar are displayed on LCDs as a shutter speed to be adopted as standard exposure level based on AV and SV.
   - The bar only is shifted for correcting exposure.
   - When the SPOT key is turned ON in the spot auto mode, a new spot measurement value is entered. A shutter speed determined based on the value is indicated by a dot and another shutter speed determined by simply averaging the entered spot measurement value is indicated by a bar.
   - 8 spot measurement values can be stored at a time. Old values are cleared to enter new values.
   - In each spot mode, brightness of object to be photographed is always measured at a spot, and a shutter speed determined based on the measured value is indicated by a dot.
   - When the main switch is turned ON in the spot mode, film is exposed at the shutter speed indicated by the var.
   - Once the shutter is operated, the spot mode and all the spot input values are cleared, and the camera is set in the average direct mode.

3. Spot auto (HILIGHT, SHADOW CONTROL)
   - In the spot auto mode, photographing conditions are switched as follows:
     1. HILIGHT CONTROL mode is set up by turning ON the HILIGHT key in the SPOT SHADOW mode.
     2. SHADOW CONTROL mode is set up by turning ON the SHADOW key in the SPOT HILIGHT mode.
     3. SPOT AUTO mode is set up by turning ON the HILIGHT key in the HILIGHT CONTROL mode.
     4. SPOT AUTO mode is set up by turning ON the SHADOW key in the SHADOW CONTROL mode.
   - In the HILIGHT CONTROL or SHADOW CONTROL mode, entry of the spot input and dot indication are the same as those in the SPOT mode.
   - In the HILIGHT CONTROL mode, the bar indicates a shutter speed 2 EV higher than the maximum brightness of the spot input values.
   - In the SHADOW CONTROL mode, the bar indicates a shutter speed 2-2/3 EV lower than the minimum brightness of the spot input values.
   - When the main switch is turned ON in these modes, film is exposed at the shutter speed indicated by the bar.
   - Once the shutter is operated, the spot mode (including HILIGHT CONTROL and SHADOW CONTROL) and all the spot inputs are cleared, and the camera is set in the average direct auto mode.

4. Memory auto

(1) Average direct auto memory

- When the main switch is turned ON with the memory set (by turning ON the MEMO key) in the average direct auto mode, film is exposed in the average direct auto mode and the exposure value is stored in the memory.
- The stored exposure value is stored for 60 minutes after the shutter is operated. Then the memory is cleared and the camera is set in the average direct auto mode.
- In the memory hold mode, the bar indicates a shutter speed to be adopted as standard level based on BV (brightness of object to be photographed), VS (ASA value), AV (aperture value) and CV (corrected exposure value).
- When the main switch is turned ON in the memory hold mode, film is exposed at the shutter speed indicated by the bar.

(2) Spot auto memory

- When the main switch is turned ON in each spot auto mode (SPOT, HILIGHT or SHADOW), film is exposed at the shutter speed determined in the set mode and the exposure value is stored in the memory.
- The stored exposure value is stored for 60 minutes after the shutter is operated. Then, the memory and spot mode are cleared, and the camera is set in the average direct mode.
- In the memory hold condition of the spot auto mode, the conditions for the AVERAGE, HILIGHT CONTROL and SHADOW CONTROL as well as indications are kept the same as those before turning ON the main switch.
- In the memory hold condition, the SPOT, HIGH and SHADOW keys are ineffective. (A new key input is invalid so long as the memory is reset.)
- When the main swtich is turned ON in the memory hold condition, film is exposed at the shutter speed indicated by the bar.

5. Auto strobe

- The strobe photographing mode is set up by turning ON the strobe power source in each auto mode.
- When the strobe power source is turned ON even in the spot auto memory (set or hold condition), it is cleared automatically and the camera is set in the average direct auto mode.
- In the auto strobe photographing mode, the bar indicates a shutter speed determined based on average of BV (brightness of object to be photographed), AV (sperture value) and CV (corrected exposure value) in the same manner as in the average direct auto mode.
- When the main switch is turned ON while a shutter speed of 1/60 or lower is indicated, the strobe is flashed and its light is subjected to TTL auto control.
  Shutter speed is set at 1/60 sec. in this condition.
- When the main switch is turned ON while a shutter speed higher than 1/60 sec. is displayed, the strobe is not flashed and automatic film exposure to natural light is performed under the TTL direct light measurement control.
- When the strobe power source is turned OFF in the auto mode, the camera is set in the average direct auto mode.
- For 2 seconds after photographing in the strobe mode, the following indications are provided:
  1. The UNDER LCD flickers with strobe LED extinguished if strobe light intensity is too low.
  2. The OVER LCD flickers with strobe LED extinguished if strobe light intensity is too high.
  3. The strobe LED flickers when light control is proper.

2-2. Manual Mode

1. Average manual mode
   - Average of BV (brightness of object to be photographed) is measured, standard exposure time is determined based on AV, SV, CV and TV, and deviation from the standard level (positive or nagative EV value) is indicated by the bar.
     In this case, the standard exposure level is reached when tip of the bar is aligned with definite point mark "▶|◀".
   - When the main switch is turned ON in this mode, film is exposed at the set shutter speed.
   - The camera is kept in the average manual mode even after the shutter is released.

2. Spot manual mode
   - The spot manual mode is set up by turning ON the SPOT key in the average manual mode.
   - In the spot manual mode, BV (brightness of object to be photographed) is measured at a spot and entered. The dot and bar indicate deviation from the standard exposure level based on AV, SV and TV.
   - The bar only indicates corrected value when exposure is corrected.
   - When the SPOT key is turned ON in the spot manual mode, a new spot light measurement value is entered and the dot indicates an exposure level determined based on the new value.
     Simultaneously, the bar indicates an exposure level determined based on an average of spot inputs at two or more points.
   - 8 spot inputs max. can be stored at a time. New data are entered while discarding the old data.
   - In each spot mode, brightness of object to be photographed is always measured at a spot and the scanning dot indicates an exposure level determined based on the measured value.
   - When the main switch is turned ON in this mode, film is exposed at the set shutter speed.
   - The camera is set in the average manual mode after the shutter is released.

3. Spot manual mode (HILIGHT, SHADOW CONTROL)
   - In this spot manual mode, photographing conditions are switched as follows:
     1. The HILIGHT CONTROL mode is set up by turning ON the HILIGHT key in the SPOT SHADOW mode.
     2. The SHADOW CONTROL mode is set up by turning ON the SHADOW key in the SPOT HILIGHT mode.
     3. The SPOT MANUAL mode is set up by turning ON the HILIGHT key in the HILIGHT CONTROL mode.
     4. The SPOT MANUAL mode is set up by turning ON the SHADOW key in the SHADOW CONTROL mode.
   - In the HILIGHT CONTROL or SHADOW CONTROL mode, entry of spot inputs and indication by the dot are the same as those in the SPOT MANUAL mode. (The dot indication does not vary.)
   - In the HILIGHT CONTROL mode, tip of the bar is located 2 EV on the negative side of the maximum brightness value of the spot inputs.
   - In the SHADOW CONTROL mode, tip of the bar is located 2-2/3 EV on the positive side of the minimum brightness value of the spot inputs.
   - When the main switch is in this mode, film is exposed at the set shutter speed.
   - The camera is set in the average manual mode after the shutter is released.

4. Manual strobe
   - The strobe photographing mode is set up by turning ON the strobe power source in each manual mode.
   - The spot mode is automatically cleared by setting up the manual strobe mode.
   - The bar indication in the manual strobe mode is the same as that in the average manual mode.
   - When the main switch is turned ON in the manual strobe mode, the strobe flashes and film is exposed at the set shutter speed.
   - When the strobe power source is turned OFF in the manual mode, the camera is set in the average manual mode.
   - The memory function is unusable in the manual mode.

2-3. Bulb Mode

- ○ The bulb mode is set up when shutter speed is set at B.
- ○ The bulb mode is set up regardless of mode switch setting.
- ○ When the strobe power source is turned OFF:
  - · The LCDs provide no indication in this mode.
  - · The magnet is ineffective for control when the main switch is turned ON in this mode.
  - · The battery check function is operative in this mode.
- ○ When the strobe power source is turned ON:
  - · The LCD provides no light measurement indication but strobe mark " ϟ " only is displayed.
  - · MG1 and MG2 are inoperative for control even when the main switch is turned ON in this mode.
  - · The battery check function is operative in this mode.

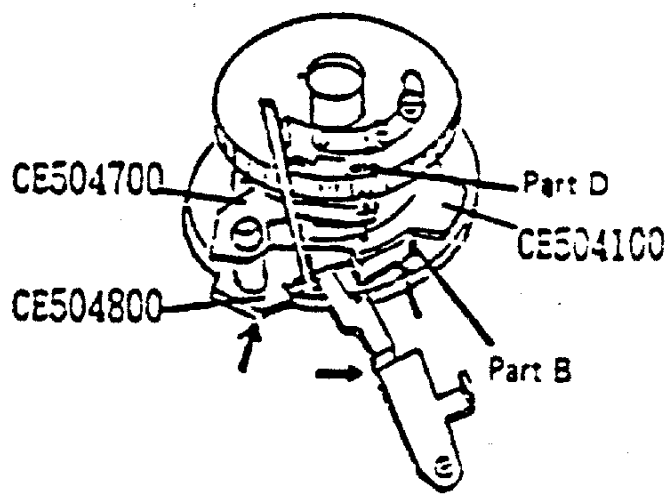
2-4. Battery Check Mode

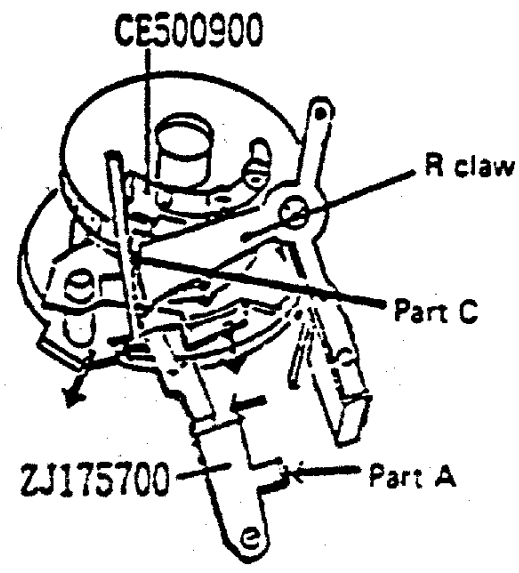
- ○ The battery check function is operative in all the modes so long as the battery check switch (BAT. SW) is kept ON.
- ○ However, the function is inoperative only during shutter release operation.
- ○ · When power supply voltage exceeds the warning level (2.75 ±0.05V):
  - · The battery check LED lights and PCV sounds.
- ○ · When power supply voltage is below the warning level:
  - · Teh battery check LED flickers and PCV sounds intermittently.
- ○ Power supply voltage is judged based on current consumed while the battery check LED stays lit.
- ○ When the battery voltage is blow the lock level (2.65 ±0.05V), the LED and PCV are inoperative.
- ○ The PCV can be stopped by manipulating the self-timer level.

III. DESCRIPTION OF MECHANISM

1. Mechanical 1/60 Sec. Mechanism

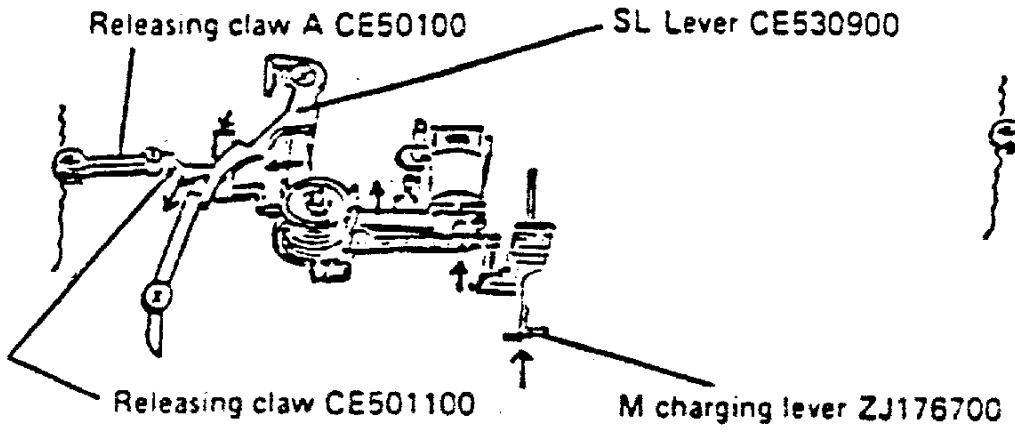
When the SD is set at 1/60 sec., the BU Lever ZJ175700 moves rightward.
Then, K Lever 2 CE504800 is brought into contact with K Cam CE504100 of gear A. Simultaneously, R Claw 2 CE504700 is engaged with convexity D of Gear plate B CE500900 to stop rotation of gear B. Further, the bulb plate holds the R claw to prevent it from going to the convexity of gear plate B.
(Part C)
When the 1st shutter blind is turned, the K cam of gear A is brought into contact with K lever 2 to push part B of the K lever outside. Therefore, the R claw disengages from the gear plate B and the 2nd shutter blind starts.
When the SD is set at 1 ~ 2000 sec., the bulb lever is pushed leftward (part A). Since the R claw and K lever 2 are pushed leftward by the bulb lever, it is impossible to stop the gear B. Since a gap is formed in part C, the R claw is capable of controlling the 2nd shutter blind.



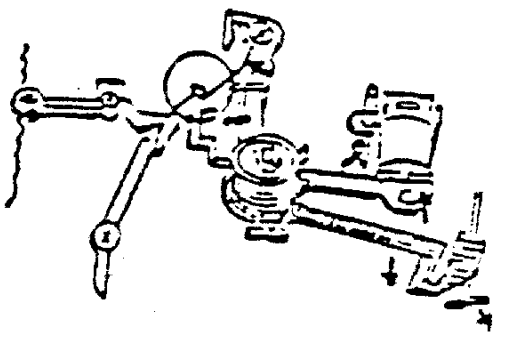


2. Electromagnetic Shutter Lock Mechanism

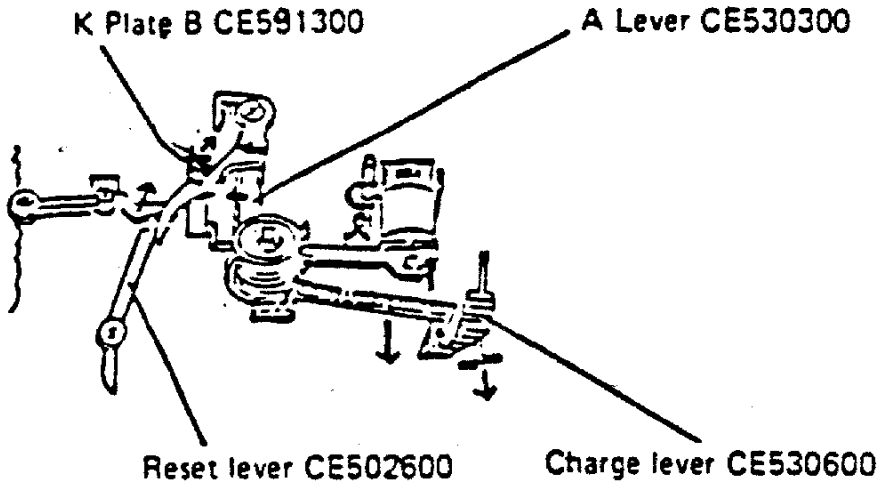
Before film winding



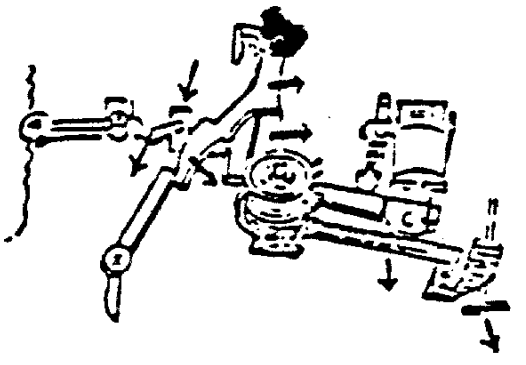
Shutter lock



After film winding

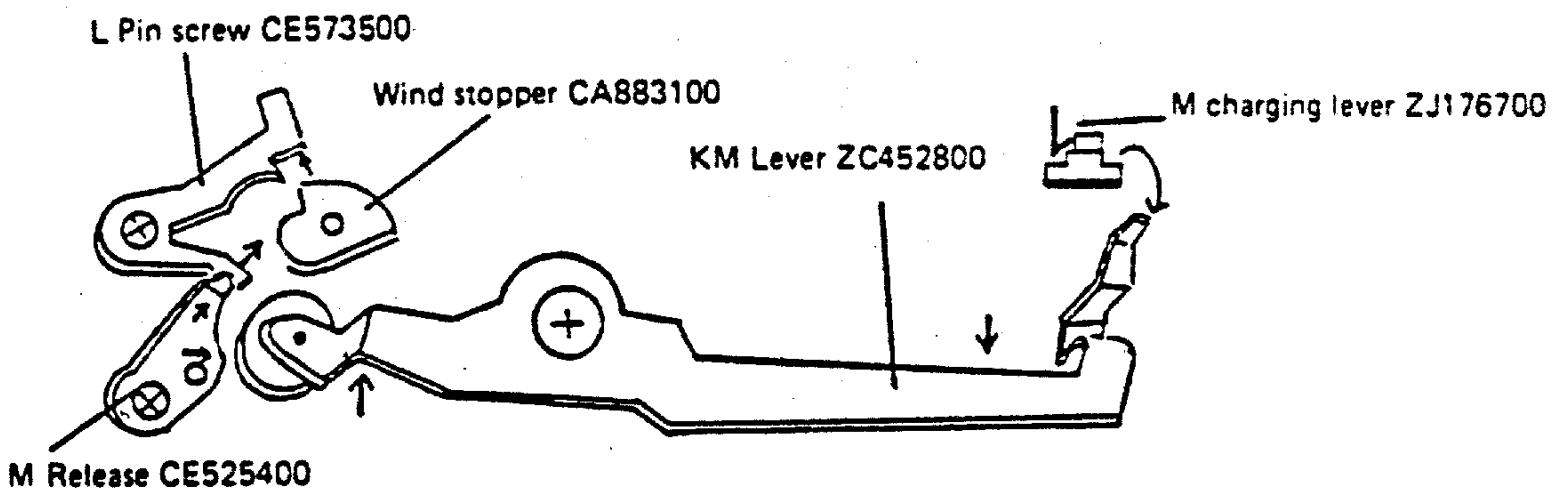


Releasing shutter lock

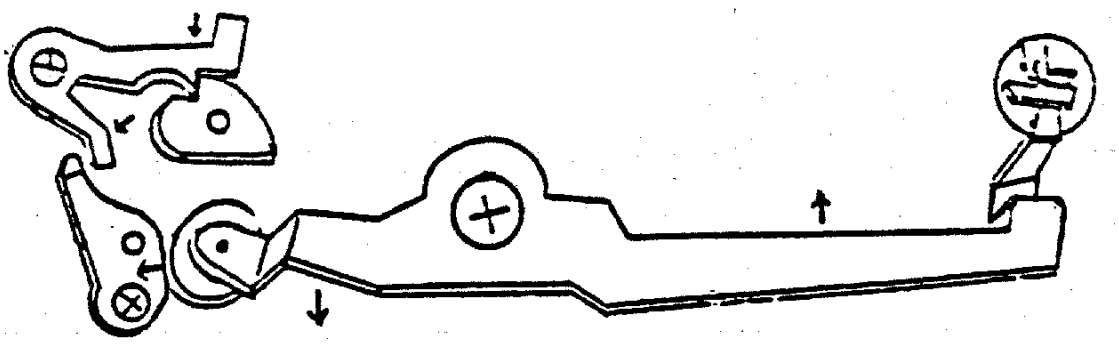


3. Mechanism to Prevent Film Winding during Exposure Time

Before film winding

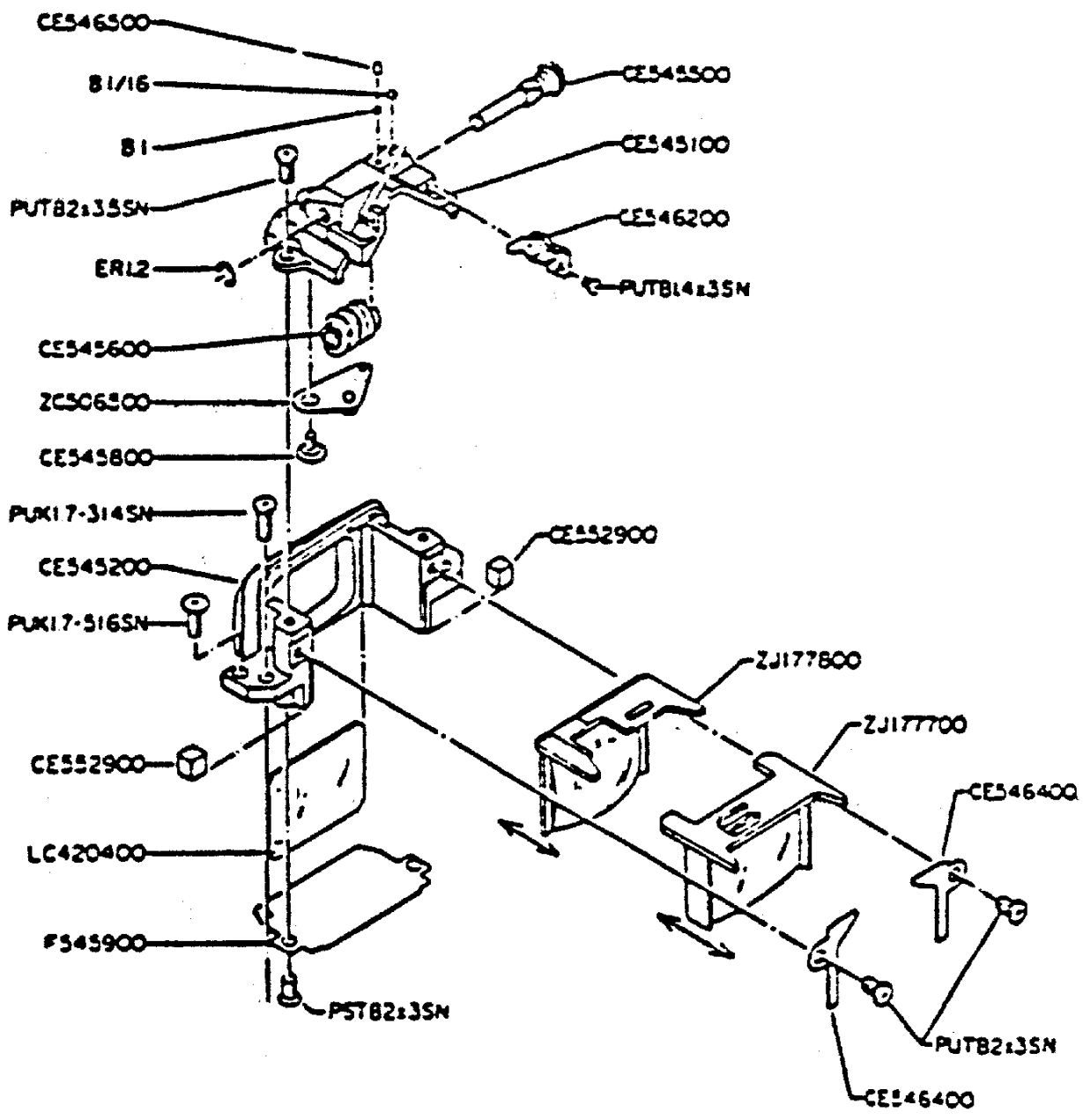


After film winding



4. Dioptry Adjusting Mechanism

By turning F Shaft CE545500, FO Frame ZJ-177700 and FT Frame ZJ177800 are shifted for dioptry adjustment.

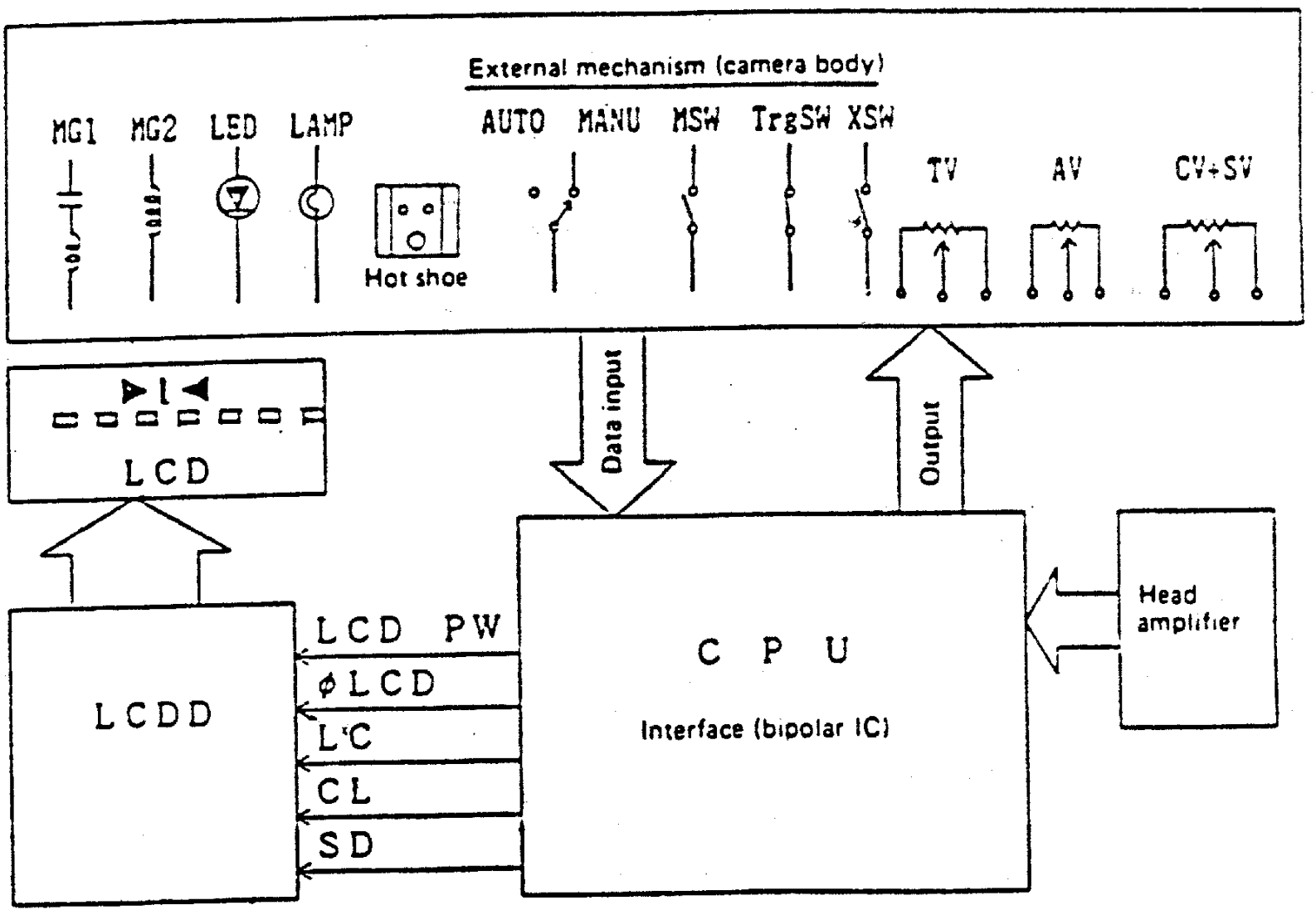


IV. DESCRIPTION OF ELECTRIC CIRCUITS

The electric circuit of Model OM-4 consists of microcomputer (IC101), bipolar IC (IC102) head amplifier (IC103) and LCD (IC104) and external circuits.

1. Basic Operations for Indication within Viewfinder

1-1. Conception of Each Circuit

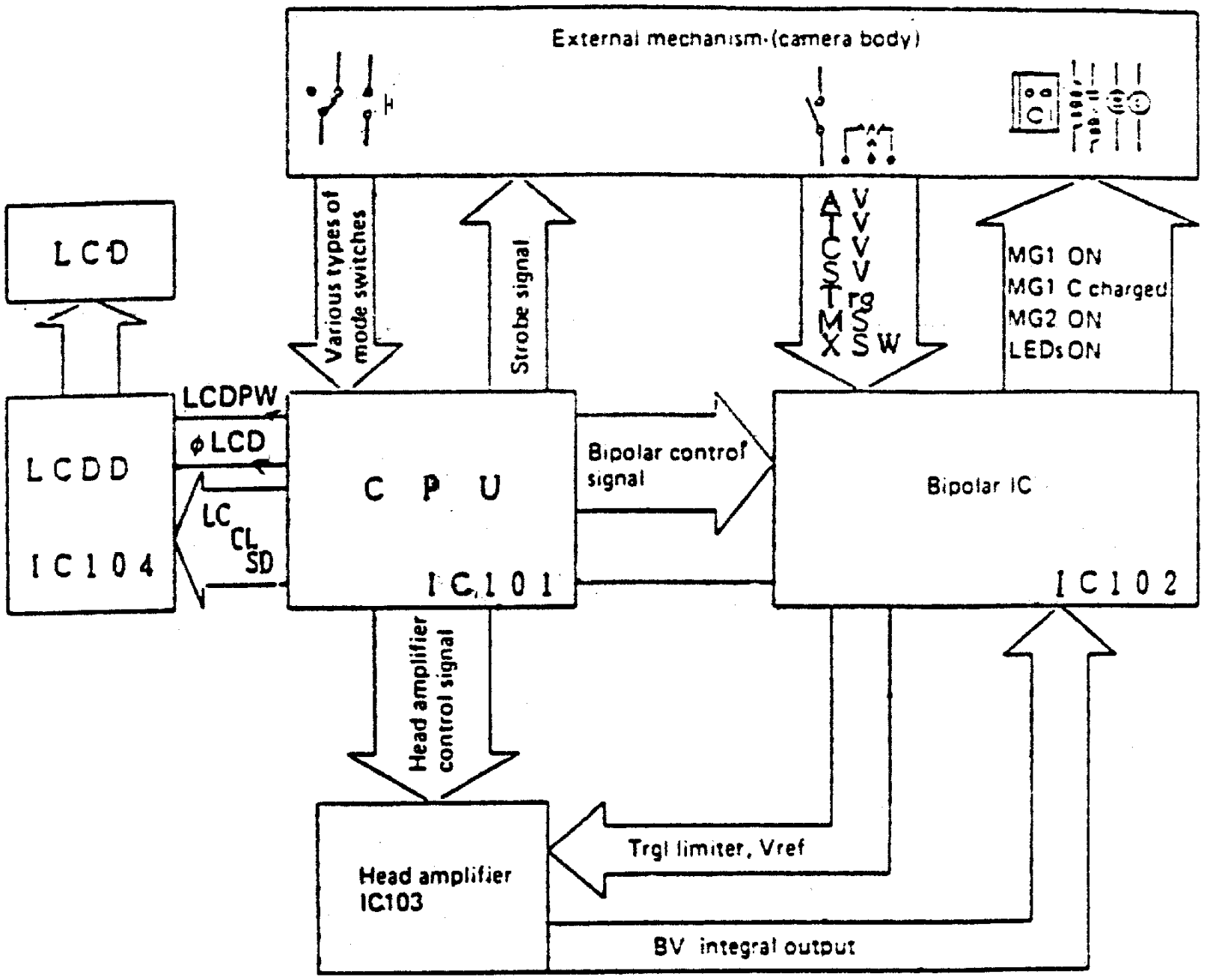


- Data from the external mechanism are collected into the CPU through the interface for arrangement and judgement, whose results are outputted to the display section of the external mechanism.
- The interface (bipolar IC) is
  "ear" to transmit data from the external mechanism to the CPU; and
  "hands and feet" to transmit judgement results from the CPU to the external mechanism.

  The CPU is
  "brain" to arrange and judge the data trnasmitted from the CPU.

  The head amplifier is
  "eyes" to allow the CPU to sense external brightness.

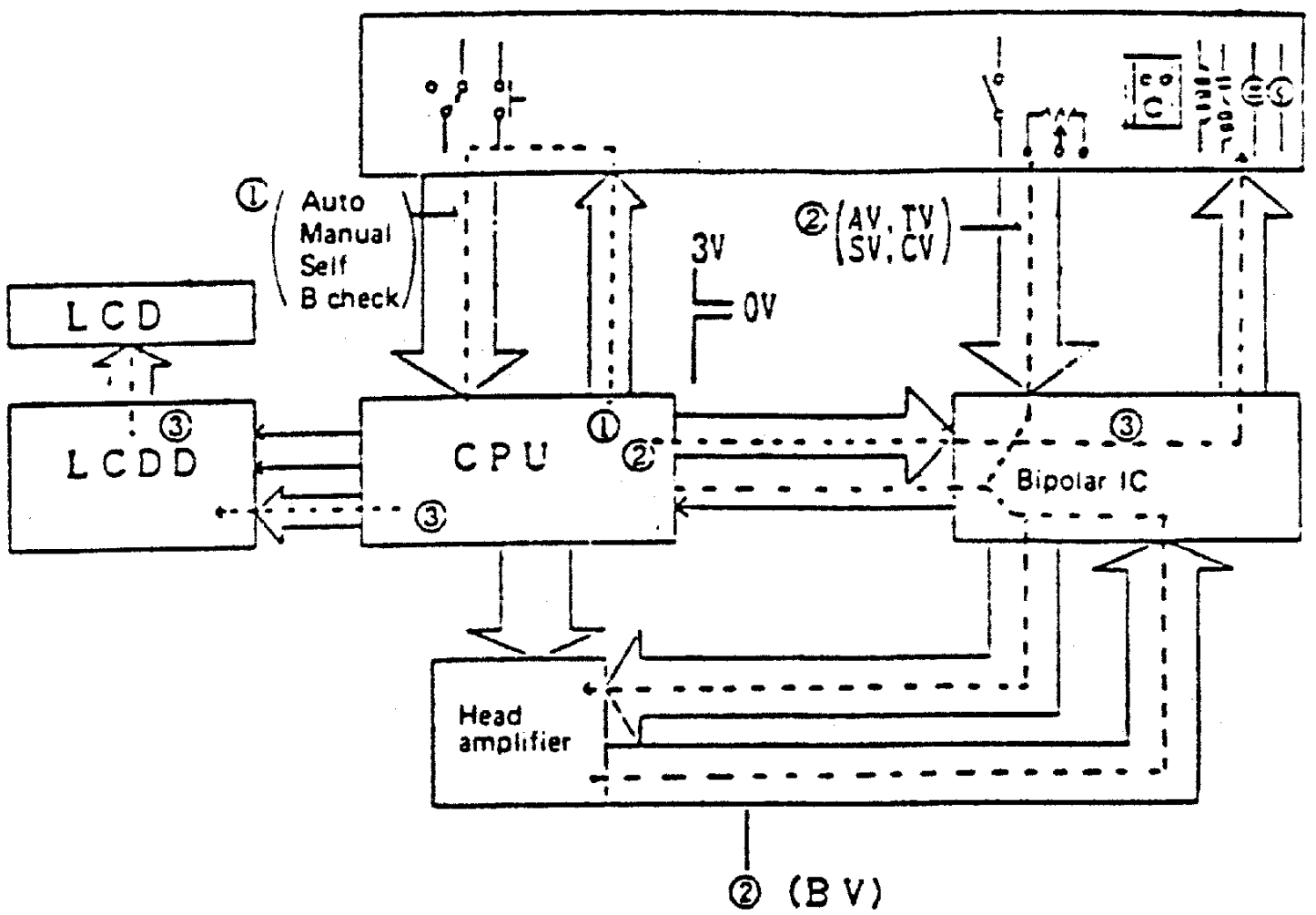
1-2. Block Diagram



- Description of signals

Head amplifier contro signal	:	Used for switching among the average, spot and direct light measurement modes.
Trg 1	:	Integration start signal to the head amplifier
Limiter	:	Signal for restricting shutter time
Bipolar control signal	:	Signal for switching various circuit blocks used by the bipolar IC
α	:	Answer signal from the bipolar IV to question from the CPU
LCDPW	:	Power control line of LCDD. The CPU turns ON and OFF the power supply through this line for power saving.
φLCD	:	Clock of LCDD. Data processing for indication on the PCD is performed in synchronization with this clock. Frequency is set at 32.8 kHz.
LC	:	Synchronous signal used for indication data transfer from the CPU
CL	:	Clock signal for transferring indication data
SD	:	Serial data signals used directly as indication data.

1-3. Operating Sequence for Light Measuremtn Indication



c Operating sequence

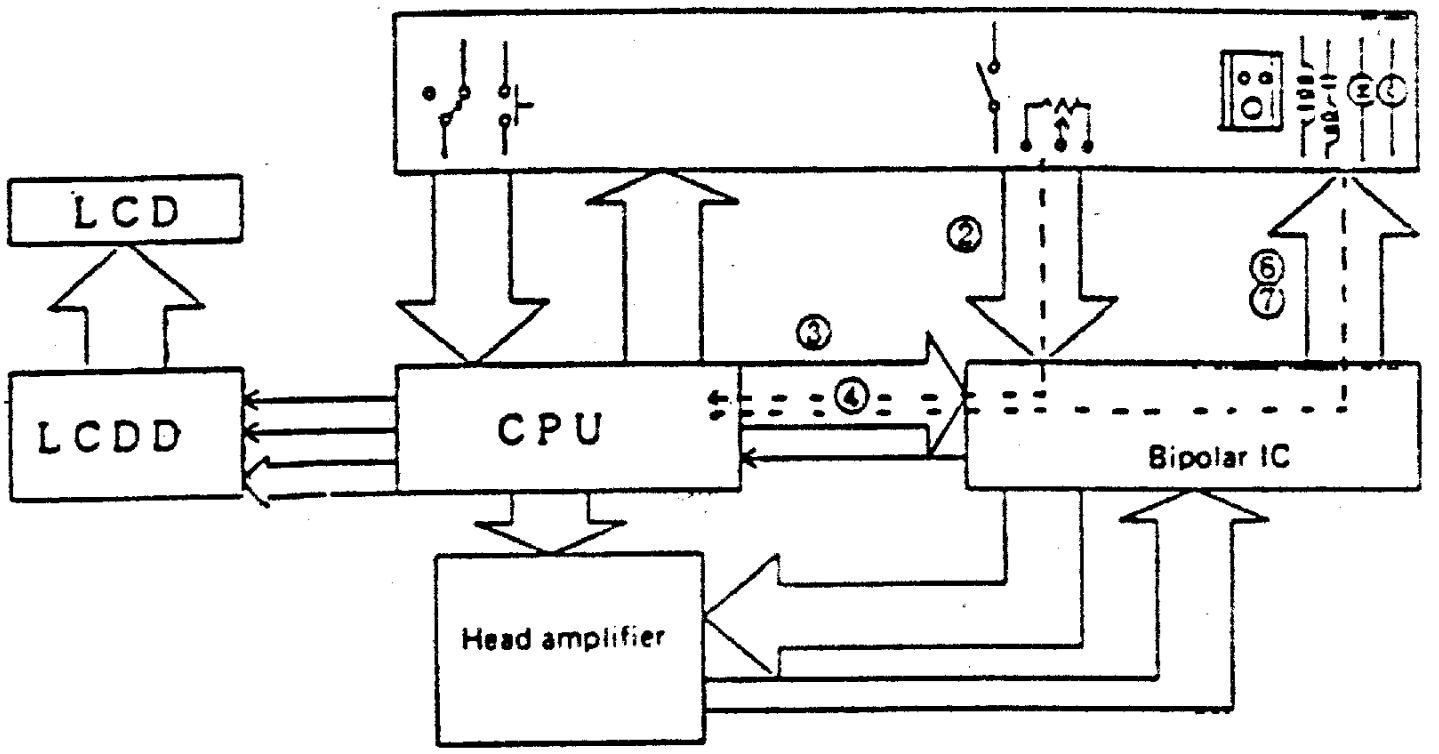
(1) CPU check for key mode:
The CPU checks for a depressed (ON) switch to nudge manual or auto mode.
The CPU emits a strobe signal to locate a depressed key (switch) and sets the camera in the mode corresponding to the depressed key (switch). This CPU starts in the set mode.

(2) CPU reads external data:
The CPU uses the bipolar IC control signal to turn ON the power supply only for the components to be used for photographing, and poses questions to the components.
Answers to the questions are returned as α to the CPU.
In this way, the CPU knows aperture value, ASA sensitivity and so on.

(3) CPU displays the results:
The CPU makes judgements based on read data, and indicates judged results on LCD and lights LEDs.

In spot auto, auto manual or memory auto mode

※ The regeneration time circuit of the bipolar IC is used.

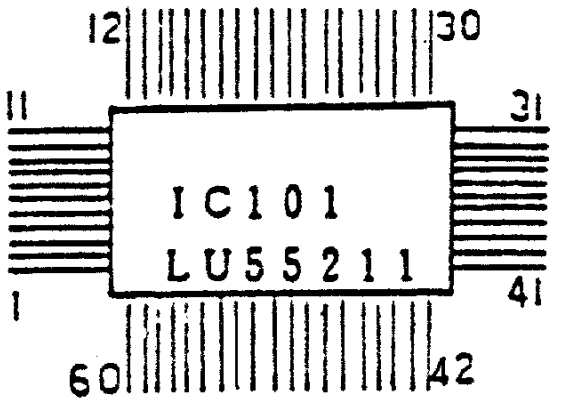


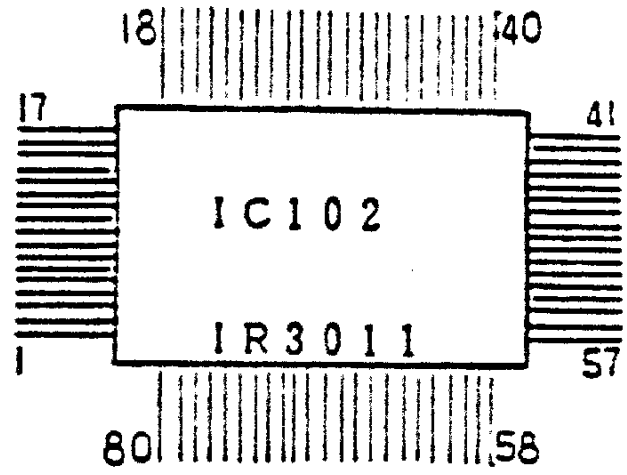
○ Operating sequence

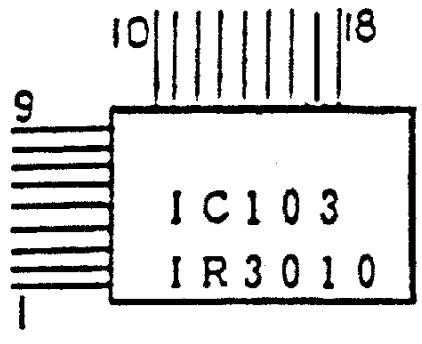
(1) The Trg switch is turned OFF when the 1st shutter blind travels.
(2) This switch operation is detected and an input signal is fed into the trigger adjusting circuit of the bipolar IC. (a delay time is reserved at this stage.)
(3) The trigger adjusting circuit outputs Trg OFF signal to the CPU.
(4) The CPU calculates the shutter time set by the Trg OFF signal.
(5) Upon completing the calculation, the CPU inverts the M comparator.
(6) Upon inversion of the M comparator, MG2 is deenergized and the 2nd shutter blind travels to complete the exposure.
(7) Simultaneously, the CPU detects the completion of exposure and starts charging the capacitor for driving MG1.
(8) After the capacitor for driving MG1 is charged up, the CPU returns to the initial program for indication.

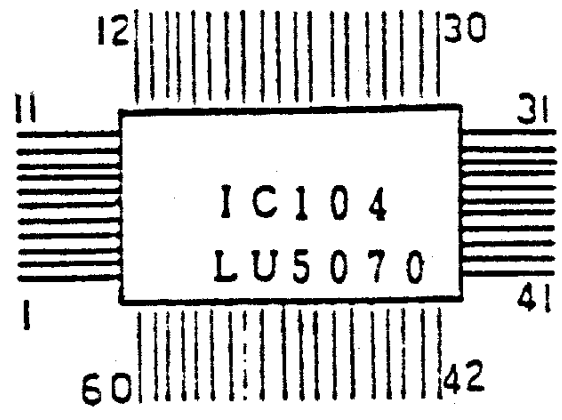
2. Description of Electric Parts

2-1. ICs









1. IC101 (LU55211)
   CPU
   Performs centralized processing of all types of data and controls the camera through the bipolar IC.

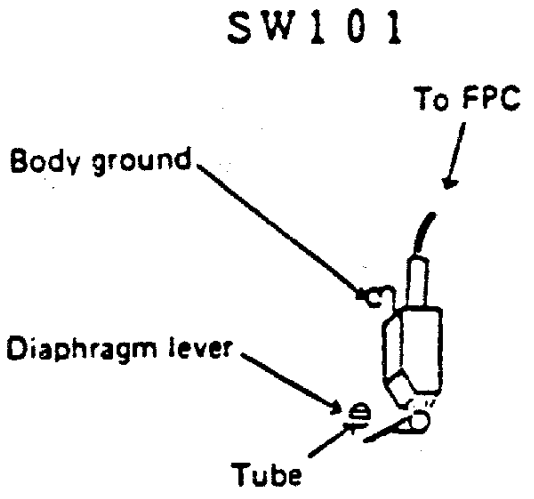
2. IC102 (IR3011)
   Bipolar IC
   Functions as an interface between external data inputs and CPU.

3. IC103 (IR3010)
   Head amplifier IC
   Performs light measurement in the AUTO or MANUAL mode and integration in the AUTO mode, and provides results to the bipolar IC.

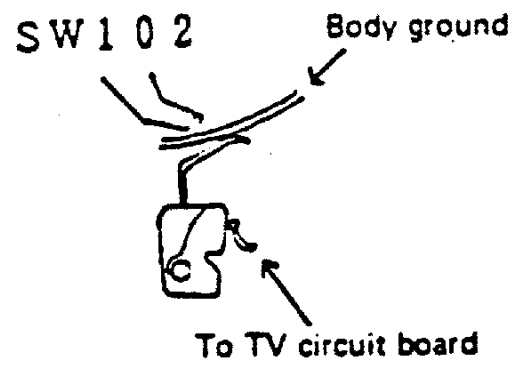
4. IC104
   LCDD
   Indicates all types of data collectively on the LCD.

2-2. Switches

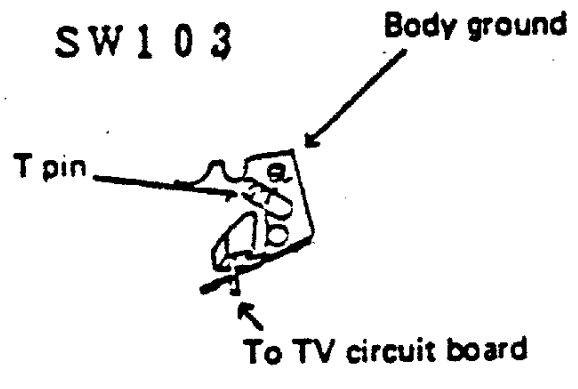
1. SW101 Main switch
   Emits an interrupt signal to the control ICs (CPU and bipolar IC) of the camera, and also serves to supply power to a part of the bipolar IC.



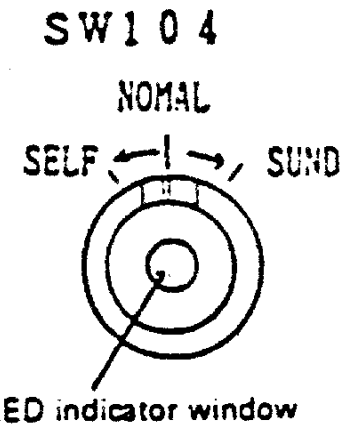
2. SW102 X switch
   For flashing the strobe.
   It is turned ON immediately after the 1st shutter blind completes travelling and the shutter is fully opened (1/60).



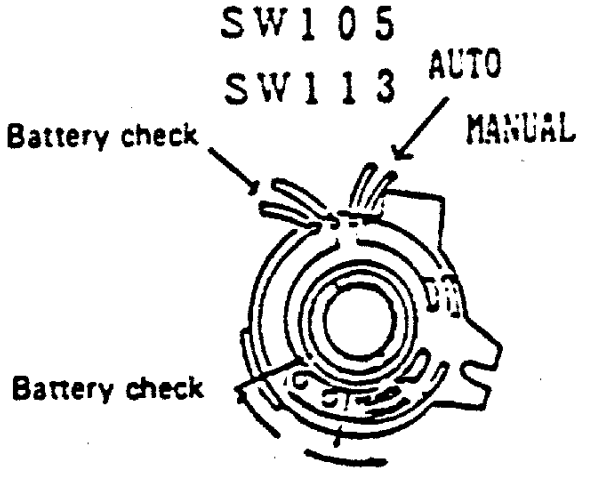
3. SW103 Trigger switch
   For starting calculation of exposure time in the AUTO or MANUAL mode.
   It is turned ON when film is wound (shutter is charged).
   It is turned OFF when the 1st shutter blind starts travelling for starting film exposure.



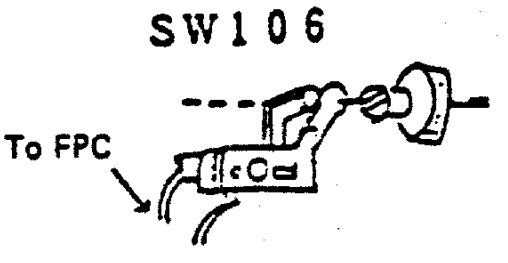
4. SW104 Self-timer switch
   When this switch is turned to the left position from the neutral position, it functions as the self-timer switch after shutter release.
   When it is turned to the right position, the PCV stops sounding.



5. SW105 Battery check switch
   SW113 Mode switch
   These switches are used for setting up the battery check mode and switching between the AUTO and MANUAL modes respectively.



6. SW106 Lamp switch
   For inputting lamp ignition signal



7. SW107 SPOT switch
   For inputting spot signal.

8. SW108 HILIGHT switch
   For inputting HILIGHT CONTROL signal.

9. SW109 SHADOW switch
   For inputting SHADOW control signal.

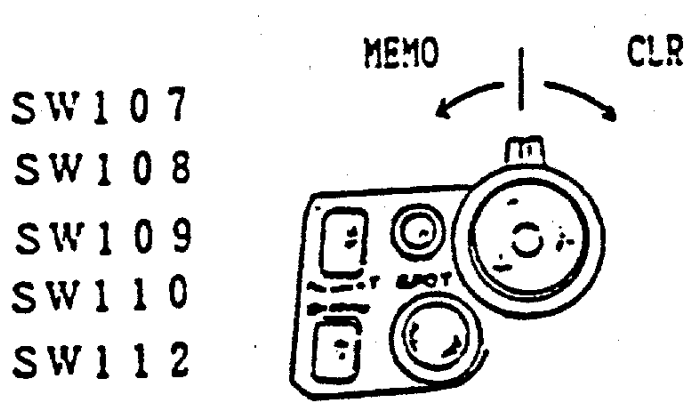
10. SW110 CLR, mount CLR switch
    For clearing the SPOT input or MEMO input which has been inputted at the stage of lens mounting or dismounting.
    (The CLR and mount CLR switch circuits are connected in series.)

11. SW111 Display switch
    For starting light measurement.

12. SW112 MEMO switch
    For inputting MEMO signal.

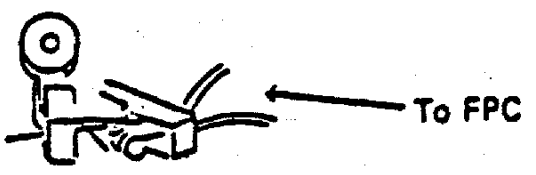
13. SW113 Mode switch
    For selecting the MANUAL or AUTO mode.

14. SW114 Reset switch
    For automatically resetting the camera in switching from the MANUAL to AUTO mode or vice versa.



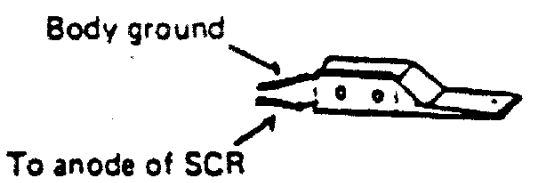
SW110 Mount CLR switch

SW111



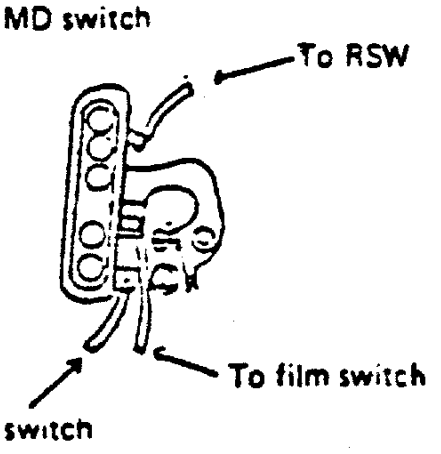
15. FP switch
    When a strobe (especially one offered by a manufacturer other than OLYMPUS) is used in combination with the synchronous socket, a high voltage is generated at the shoe input terminal during charging. This switch is turned OFF to prevent electrical shock hazard while the mirror is lowered.

FP switch



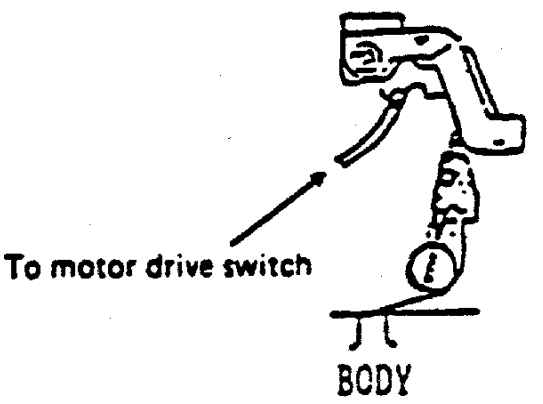
16. MD switch (Motor drive switch)
    For interlocking the motor drive or film winder with the camera.

MD switch

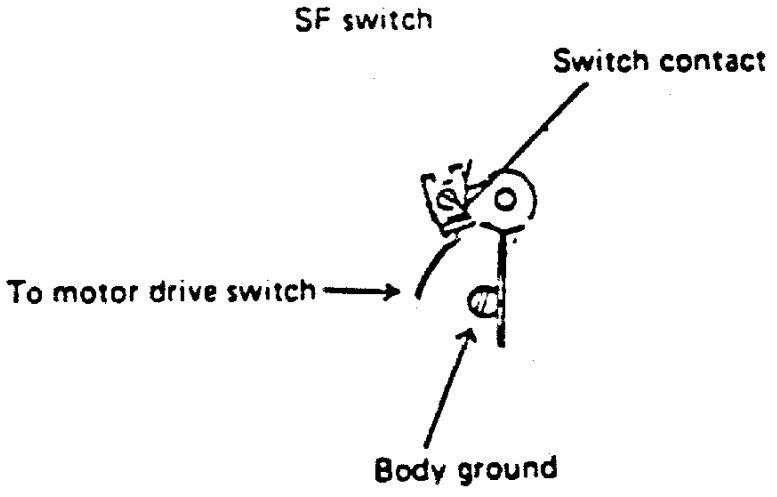


17. U switch (rear cover switch)
    Turned ON and OFF to detect conditions of the rear cover.

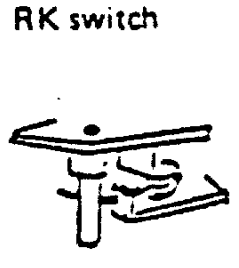
U switch



18. SF switch (film switch)
Turned ON and OFF to detect film loaded conditions.



19. RK switch
Turned ON and OFF to transmit film rewinding ready signal to the motor drive.



2-3. Transistors

1. Q101 Thyristor drive transistor
For transmitting a signal to gate of thyristor to make it conductive and flash the strobe.

2. Q102 TTL control thyristor
For TTL control of T Series strobe.

3. Q103 CPU interrupt transistor
To set the INTA terminal of the CPU at the L lever (to make an interrupt).

4. Q104 MEMO LED drive transistor
Functions as a switch for MEMO LED ON ⟷ OFF.

5. Q105 LAMP drive transistor
Functions as a switch for LAMP ON ⟷ OFF

6. Q201 MG1 drive transistor
Functions as a switch for MG1 ON ⟷ OFF.

7. Q202 MG2 drive transistor
Functions as a switch for MG2 ON ⟷ OFF.

8. Q301 LCD driver transistor
For controlling power to LCD D according to signal from the CPU.

9. Q401 BC, SELF LED drive transistor
Functions as a switch for BC, SELF LED ON ⟷ OFF.

10. Q901 Reset transistor
For discharging capacitor C901.

11. Q902 Reset transistor
For turning OFF Q903 at GO = H.

12. Q903 Reset transistor
For supplying power to LED and lamp.

13. Q904 MS transistor
For turning ON bipolar MS input.

2-4. Diodes

1. D101
For isolating the data back side from the camera side.

2. .D102 Protective diode
Protective means to prevent the batteries from setting in the reverse direction.

3. D701 Protective diode
For protecting the L terminal.

4. D901 Noise preventive diode
For preventing noise from the MS input.

5. D902 Noise preventive diode
For preventing noise from the MS input.

2-5. Resistors

1. R101 Regeneration adjusting resistor
Cooperates with RV101 for adjusting regeneration time.

2. R102 Trg adjusting resistor
Cooperates with C101 to prepare delay time for triggering.

3. R103 Iref adjusting resistor
For matching RV104 with the reference current in the data control current generator circuit of bipolar IC.

4. R104 BV adjusting resistor
Cooperates with RV105 for adjusting BV level.

5. R105 BV SPOT adjusting resistor
Cooperates with RV106 for adjusting BV spot level.

6. R106 TV/AV adjusting resistor
Cooperates with RV107 for matching DAC entry levels between TV and AV.

7. R107 Lock adjusting resistor
Cooperates with RV109 for adjusting lock voltage.
2.65V for locking and 2.90V for unlocking.

8. R108 Lock adjusting resistor
Cooperates with RV109 for adjusting lock voltage.
2.65V for locking and 2.90V for unlocking.

9. R109 Thyristor gate pull-down resistor
Cooperates with C102 to prevent thyristor from functioning erroneously due to unwanted surge noise, etc.

10. R110 Gate trigger resistor
Cooperates with C103 to turn ON thyristor.

11. R111
For reducing impedance of the negative terminal of C103 while Q101 is made non-conductive, and maintaining the terminal at sufficient potential while Q101 is made conductive.

12. R112 Current control resistor
For limiting base current of Q401.

13. R113 Current limiting resistor
For limiting base current of Q103.

14. R114 Clock resistor
For creating system clock of the CPU.

15. R115 Current limiting resistor
For limiting base current of Q106.

16. R116 current limiting resistor
For limiting base current of R105.

17. R117 Current limiting resistor
For limiting base current of Q104.

18. R118 Current limiting resistor
For limiting collector current of R104.

19. R119 Current limiting resistor
For limiting collector current of Q105.

20. R120 Current limiting resistor
For limiting collector current of Q106.

21. R121 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

22. R122 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

23. R123 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

24. R124 Filter resistor
Cooperates with C108 to composed a low-frequency filter.

25. R125 Bias resistor for temperature compensation diode
To minimize drift from temperature of the offset circuit.

26. R126
For reducing impedance by preliminary pulling-down to prevent Q103 from operating erroneously due to noise.

27. R127
To minimize variation of impedance in the Trg 1 output.

28. R128
For compoensating insufficient output from the CV + SV operation amplifier.

29. R129
For compensating insufficient output from the DAC operation amplifier.

30. R130
To erase blinking of about 3 segments in the bar indication.

31. R132
To prevent the strobe from flashing at its maximum speed.

32. R301, R302, R303 and R304 Dividing resistors
To divide the LCD driving standard voltage for preparing bias voltage.

33. R305 TEST terminal pulling-down resistor
To reduce impedance of the TEST terminal for preventing the TEST mode from being set up by accident.

34. R306
To linearize rise waveform of ϕ LCD.

35. R307
To linearize fall waveform of ϕ LCD.

36. R401 Current limiting resistor
To limit collector current of Q401.

37. R701
To protect the L terminal.

38. R901 Current limiting resistor
To limit base current of Q901.

39. R902 Current limiting resistor
To limit collector current of Q901.

40. R903 Current limiting resistor
To limit collector current of Q902.

41. R904 Discharging resistor
For discharging C903.

42. R905 Current limiting resistor
For limiting base current of Q904.

43. R906 Current limiting resistor
For limiting base current of Q103.

44. R907 Discharging resistor
For discharging C902.

45. R133 Carry resistor
For adjusting "+" and "–" indications.

46. R201 Noise preventive resistor
For preventing noise from the MSW input.

2-6. Capacitors

1. C101 Trg adjusting capacitor
For adjusting mechanical advance or delay of the time from turning OFF the Trg switch to start of actual film exposure.

2. C102 Surge absorbing capacitor
For absorbing noise other than the ON signal.

3. C103 Gate trigger capacitor
For turning ON gate of thyristor to establish electrical continuity between its anode and cathode.

4. C104 Regeneration capacitor
For creating shutter time (1 ~ 1/2000) in regeneration manual mode.

5. C105 AUTO RESET capacitor
For resetting the CPU when the circuit is reset from the locked condition.

6. C106 Phase adjusting capacitor
Performs fine adjustment of oscillating frequency and phase adjustment.

7. C107 Phase adjusting capacitor
Performs fine adjustment of oscillation frequency and phase adjustment.

8. C108 Filter capacitor
To reduce noise to be mixed with the integral output.

9. C109 Integration capacitor
Used in combination with C110 and C111 for functioning as an integration capacitor at low ASA level.

10. C110 Integration capacitor
Used in combination with C110 and C111 for functioning as an integration capacitor at medium ASA level.

11. C111 Integration capacitor
Functions independently as an integration capacitor at high ASA level.

12. C112 phase compensation capacitor
For adjusting frequency at amplifier gain level of 0 dB.

13. C113 Bypass capacitor
To reduce noise entering the standing voltage line.
(1.8/1 V switching output)

14. C114 Bypass capacitor
For stabilizing standard voltage. Output 1.8V

15. C116 Strobe-malfunction preventive capacitor
For preventing the strobe from flashing erroneously due to bound while the M switch is turned OFF.

16. C201 MG1 capacitor
For accumulating energy required to make MG1 repulsive.

17. C202 Surge absorbing capacitor
For absorbing surge voltage in turning off MG2.

18. C203
For preventing the strobe from flashing erroneously while MG2 is deenergized.

19. C301 Boosting capacitor
For generating voltage (6 V) required to drive the LCD.

20. C302 Boosting capacitor
For generating voltage (6 V) required to drive the LCD.

21. C303 Bypass capacitor
For reducing noise entering the ϕ (clock: 32.768 kHz).

22. C401 Bypass capacitor
For reducing noise entering the HA (mode selector signal).

23. C402 Bypass capacitor
For reducing noise entering the HB (power supply bias signal).

24. C404 Bypass capacitor
For reducing noise entering the power lines related to the CPU.

25. C901 Delay capacitor
To make Q903 by reserving a delay time of 20 ms min. when the CPU reset is released.

26. C902 CPU reset capacitor
For preventing the CPU from being left in reset condition.

27. C903 Delay capacitor
For reserving time after the main switch is turned ON on the CPU until the main switch is turned ON on the bipolar IC.

2-7. Variable Resistors

1. RV101 Regeneration adjusting variable resistor
Cooperates with R101 for adjusting regeneration time.

2. RV102 Trg adjusting variable resistor
Cooperates with R102 for adjusting Trg.

3. RV103 OFFSET adjusting resistor
For adjusting offset of the main comparator.

4. RV104 Iref adjusting variable resistor
Cooperates with R103 for adjusting the standard voltage.

5. RV105 BV average adjusting variable resistor
Cooperates with R104 for adjusting BV level.

6. RV106 BV SPOT adjusting variable resistor
Cooperates with R105 for adjusting BV SPOT level.

7. RV107 TV/AV adjusting variable resistor
Cooperates with R106 for matching DAC entry levels between TV and AV

8. RV108 DAC adjusting variable resistor
For adjusting DAC to 18 V per stage (at 25°C)

9. RV109 Lock adjusting variable resistor
Cooperates with R107 for adjusting lock voltage.

10. RV110 EE adjusting variable resistor
For adjusting EE.

11. RV111 Head amplifier offset adjusting variable resistor
For adjusting offset of the head amplifier

2-8. Thyristors

- Q904 strobe flashing thyristor

2-9. LEDs

1. P101 BC SELF LED
   Functions as a mark in the BC and SELF modes.

2. P102 MEMO LED
   Functions as a mark in the MEMO and MEMO HOLD mode.

3. P103 LAMP
   Lights for 10 seconds for illuminating the LCD.

2-10. Control Magnets

1. RY101 MG1
   The releasing claw is disengaged by repulsive force of a combination of magnets.
   MG1 is energized for unlocking the shutter.

2. RY102 MG2
   Controls the end shutter blind to determine exposure time.

2-11. Connectors

1. J101 Rubber connector
   For transmitting output signal from LCD, D to the LCD.

2. J102 Hot shoe
   For connecting the strobe to the camera and signal line.

3. J103 5-pin connector
   For connecting the strobe to the camera and signal line.

2-12. Crystal Oscillator

- DZ101
  Functions as a standard clock for ϕLCD for the LCDD, PCV and regeneration time.

2-13. LCD

- LD101 Liquid crystal display
  For displaying data processed by the CPU.

2-14. PCV

- SP101 (PCV)
  Sounds for warning.

3. Description of Electric Circuits

3-1. CPU (IC101)

LU55211 is combined with the bipolar IC (IR3011) and LCD driver (LH5070) to compose CMOS LSI for controlling the mechanisms of the camera, LCD and other indicators.
Features of the camera using LU55211 are described below:

1. Photographing modes
   Average direct mode
   Manual mode
   Spot mode (average, high light control and shadow control)
   Strobe mode
   Memory mode

2. Display items on LCD
   Shutter time (OVER, 1/2000 ~ 1 S)
   Light measurement level (+5 EV ~ −61/3 EV manual mode)

3. Indicator LEDs
   Battery check LED
   Strobe LED
   Lamp LED
   Memory LED

4. PCV output
   Key input time
   Self-timer actuation time
   Battery check time
   Shutter time too long in auto mode

1. Mode Switching and Key Inputs

1. Mode switching
   MANUAL:
   The camera is set in the manual mode when the mode switch is set at MANUAL.
   AUTO:
   The camera is set in the auto mode when the mode switch is set at AUTO.

2. SLEF switch
   (1) When the main switch is turned ON with the SELF switch set at ON preliminarily, the self-timer actuates and then the camera is set in a photographing mode. — Self time 12 sec. (except when the camera is set in the BU mode or the shutter is set for mechanical time of 1/60 sec.).

(2) When the SELF switch is turned ON during operation of the slef-timer, the camera is set in the photographing mode immediately.

3. BAT switch
   (1) When the BAT switch is turned ON, the camera is set in the battery check mode and power supply voltage is compared with the standard voltage.
   (2) The battery check mode is cancelled by turning OFF the BAT switch.

4. LAMP key
   (1) This key is effective in the AUTO and MANUAL modes (except when the camera is set in the BY mode or the shutter is set for mechanical time of 1/60 sec.).
   When this key is depressed, the LAMP LED stays lit for 10 seconds.
   (2) The LAMP key is effective every other time it is depressed.

5. SPOT key
   (1) This key is effective in the AUTO, MANUAL and SPOT modes. It is used for entering SPOT input. When it is depressed in the average direct light measurement mode, the camera is set in the SPOT mode.
   (2) 8 SPOT inputs max. can be stored at a time. New data can be entered by discarding the old inputs.
   (3) The SPOT key is effective in both AUTO and MANUAL average light measurement modes. Upon depressing the key, the camera is set for spot light measurement mode.

6. HILIGHT key
   (1) This key is effective in the AUTO and MANUAL SPOT modes.
      o When the key is depressed in the average spot or shadow control mode, the camera is set in the HILIGHT CONTROL mode.
      o When the key is depressed in the HILIGHT CONTROL mode, the camera is set in the SPOT AVERAGE mode.

7. SHADOW key
   (1) This key is effective in the AUTO and MANUAL SPOT modes.
      o When the key is depressed in the AVERAGE SPOT or HILIGHT CONTROL mode, the camera is set in the SHADOW CONTROL mode.
      o When the key is depressed in the SHADOW CONTROL mode the camera is set in the SPOT AVERAGE mode.

8. MEMO key
   (1) This key is effective in the AUTO AVERAGE DIRECT light measurement mode and SPOT mode. When the key is depressed in either of these mode, the camera is set in the MEMO mode.
   (2) The MEMO key is ineffective once the memory is set.

9. CLEAR key
   (1) This key is effective in the AUTO and MANUAL modes (except when the camera is set in the BU mode or strobe mode). When the key is depressed, the bar and spot inciations are erased, and the camera is set in the AVERAGE DIRECT light measurement mode.
      o In the AUTO mode, SPOT, MEMO and MEMO HOLD settings are cleared.
      o In the MANUAL mode, SPOT setting is cleared and the camera is set in the AVERAGE MANUAL mode.

10. DISP key
   (1) This key is effective for starting indications on the LCD in each of the AUTO and MANUAL modes.
   (2) When the LCD has already started indication, display time (2 min.) is updated by depressing the DISP key.

2. LCD

1. Display function

(1) The LCD displays light measurement and memory regeneration in the AUTO and MANUAL modes as well as OVER and UNDER in the STROBE mode.

- Start of display
  (1) When the mode switch is turned to AUTO or MANUAL.
  (2) In the AUTO or MANUAL mode:
    - When the STROBE signal is turned ON or OFF.
    - When photographing operation complates.
    - When a valid key input (CLEAR, SPOT, HILIGHT, SHADOW or MEMO) is received (the LCD restarts when it receives a new input during display.)
    - When the DISP key is depressed (1st stage of the release button).

- Display time
  (1) Light measurement and memory regeneration are displayed for 2 minutes.
  (2) When the LCD receives a new input during display, it restarts display for another 2 minutes.

- Stop of display
  (1) When 2 minutes lapses after start of display.
  (2) When the camera is set in the BU mode.
  (3) When the shutter is set for mechanical 1/60 sec.

  Note: When the LCD display is stopped in the SPOT or MEMO mode, the mode setting is cleared automatically

2. Display patterns

(1) " ϟ " mark
This mark is displayed when the STROBO signal is turned ON and erased when the signal is turned OFF in any mode.

(2) "+" mark
This mark flickers during exposure correction in the AUTO or MANUAL mode.

(3) "MEMO" mark
This mark is displayed in the memory set condition and flickers in the memory hold condition in the AUTO mode.

(4) "SPOT" mark
This mark is displayed in the SPOT mode (SPOT AUTO, SPOT MEMORY AUTO or SPOT MANUAL) of the AUTO or MANUAL mode.

(5) "HILIGHT" mark
This mark is displayed in the HILIGHT CONTROL condition when the camera is set in the SPOT mode of the AUTO or MANUAL mode.

(6) "SHADOW" mark
This mark is displayed in the SHADOW CONTROL condition while the camera is set in the SPOT mode of the AUTO or MANUAL mode.

(7) "UNDER" mark
This mark flickers for 2 seconds after completing photographing operation if exposure is insufficient in photographing in the STROBE mode of the AUTT mode.

(8) "OVER" mark
This mark flickers for 2 seconds after completing photographing operation if exposure is excessive in (1) STROBE mode of the AUTO mode.

(9) "OVER" mark
This mark flickers when shutter speed (indicated on the bargraph) exceeds 1/2000 sec. in the AUTO mode.

(10) " ▶◀ " mark (at the lower stage)
This mark is displayed to indicate shutter time of the auto strobe (1/60 sec.) when the strobe power supply is turned ON in the AUTO mode.

(11) Index "+ II ▶I◀ II −"
This mark is displayed in each of the AUTO modes.

- Shutter time lamps "2000, 1000, 500, 250, 125, 60, 30, 15, 8, 4, 2, 1"
  (1) All the lamps light in the AUTO mode.
  (2) Only one lamp corresponding to the selected TV value lights in the MANUAL mode.

Bargraph

(1) Shutter time is displayed on a bargraph in the AUTO mode.
Shutter time of 1 to 1/2000 sec. is displayed in 1/3 FV steps.
- ○ In the AVERAGE DIRECT AUTO mode, shutter time is calculated from light measurement value (BV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.
- ○ In the MEMO AUTO mode, shutter time is calculated from MEMO set value, ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.

(2) In the MANUAL mode, exposure level for the set shutter time (TV) is indicated by the bar. −6 1/3 EV to +5 EV is indicated in 1/3 EV steps.
- ○ In the AVERAGE MANUAL mode, exposure level is calculated from light measurement value (BV), shutter time (TV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.
- ○ In the SPOT MANUAL mode, exposure level is calculated from spot light measurement value (BV), shutter time (TV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.

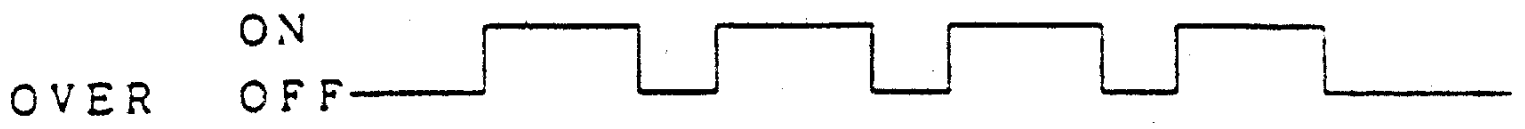
(3) Light measurement value and calculated spot value are indicated by tip of the bar.

(4) In the SPOT mode, maximum or minimum brightness point is displayed and then the predetermined value is indicated when maximum brightness in the HI-LIGHT CONTROL mode or minimum brightness in the SHADOW CONTROL mode is newly inputted for recalculation (when the camera is newly set in the HILIGHT CONTROL or SHADOW CONTROL mode, or when maximum or minimum brightness varied by overflowing spot input).

- Spot secanning point

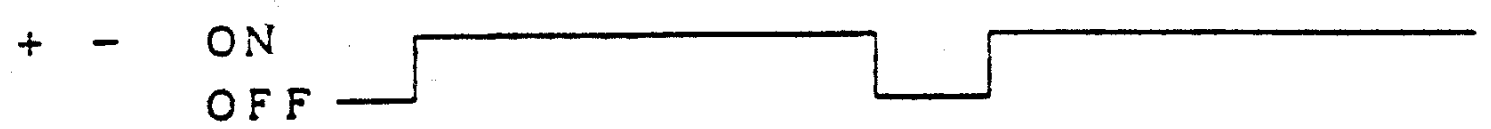
(1) Spot scanning point is indicated in the SPOT mode of the AUTO or MANUAL mode.
- ○ In the AUTO mode, spot input value, spot light measurement value of object to be photographed (BV), ASA value (SV), and aperture value (AV) are calculated to indicate shutter time to be used as standard exposure level.
(Indication in the same 1/3 EV steps as those for bar indication.)
- ○ In the MANUAL mode, spot input value, spot light measurement value of object to be photographed (BV), ASA value (SV), aperture value (AV) and shutter speed (TV) are calculated to indicate exposure level by the dot.
(Indication in the same 1/3 EV steps as those for the bar indication.)
- ○ For shifting all the indications due to variations of AV, SV and TV during multi-point indication, spot input value is shifted directly to a new point.
- ○ The dot indicating spot light measurement value of brightness of object to be photographed is shifted while lighting the intermediate segments in the same manner as that for the bar indication.

- Flickering cycle
  The segments for flickering indication are switched in the cycles shown below:
  (1) Over-exposure in the AUTO mode.



(2) UNDER/OVER indication in strobe mode

(3) Exposure correction

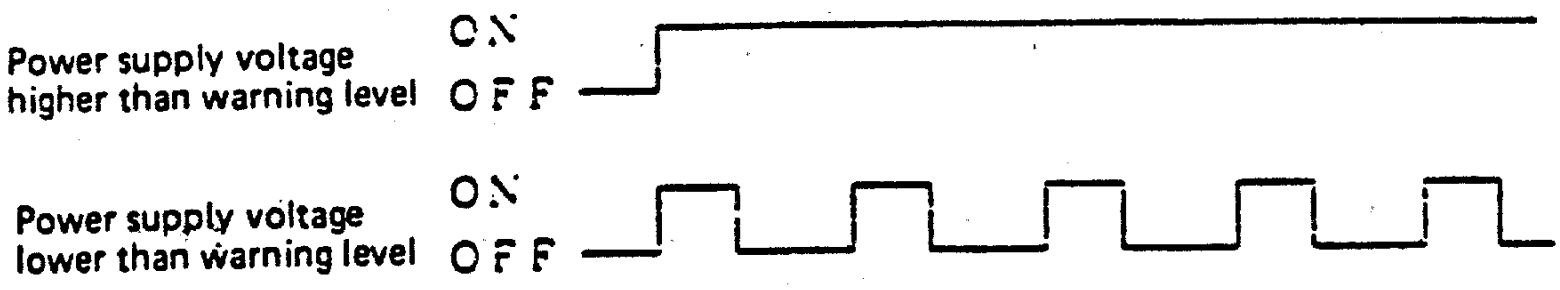


(4) Memory hold

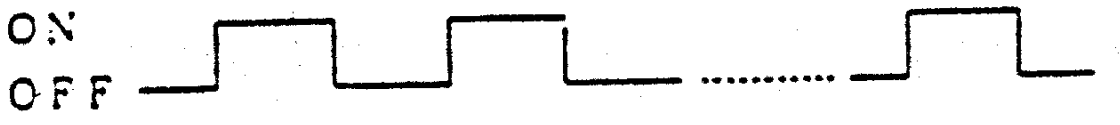
Note: Indication remains unchanged for a period of time after the main switch is turned ON till lapse of 100 ms after completion of integration. For this time, the memory hold lamp stays lit and UNDER/OVER lamp goes out if the OVER+ and −MEMO lamps are flickering.

3. LED indications

1. SELF and B. check LEDs
   (1) The B. check LED flickers when power supply voltage is lower than the warning voltage level in the B. CHECK mode.

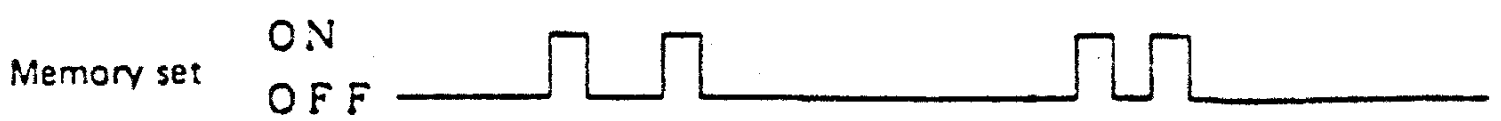


(2) The SELF LED flickers during operation of the self-timer.

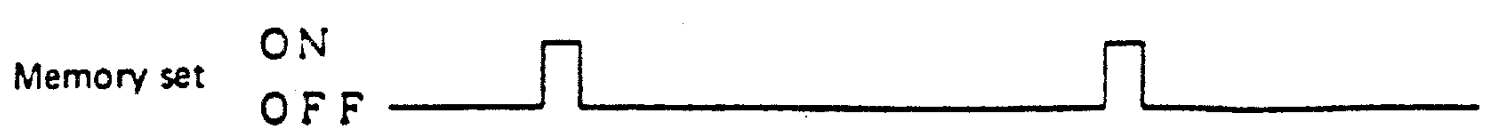


2. Strobe LED
   (1) The strobe LED lights upon completion of strobe charging (CHARGE signal at L level) while "⚡" marks is indicated on the LED (STROBE signal at H level) in all the modes.
   (2) The strobe LED goes out 2 sec. after completing photographing in the strobe mode. It flickers when light control is proper after flashing in the AUTO mode.

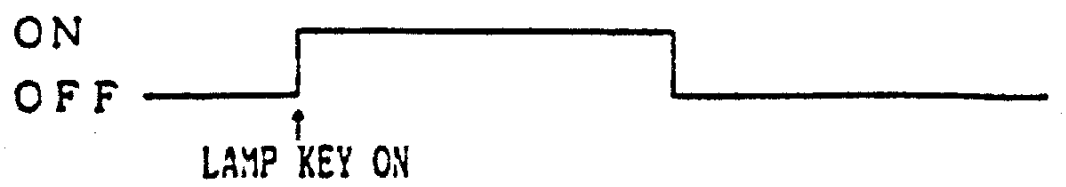
3. MEMO LED
   (1) The MEMO LED flickers in the memory set condition in the AUTO mode.



   (2) The MEMO LED flickers in the memory hold condition in the AUTO mode.



4. LAMP LED (indicator illuminator LED)
   This LED stays lit for 10 seconds when the LAMP key is depressed during LCD indication in the AUTO or MANUAL mode. The LAMP key is inoperative while the LAMP LED stays lit. When the LCD indication stops in lit condition of the LAMP LED, it is also extinguished.



When the main switch is turned ON while the LAMP LED stays lit, it is extinguished and kept so even after completion of photographing.

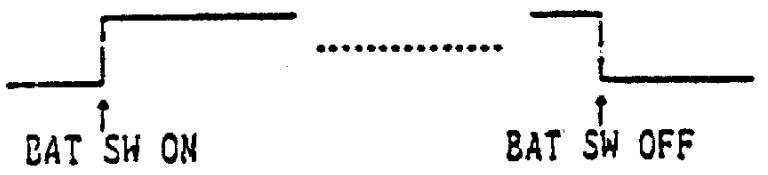
4. PCV Output

1. Key input (valid)
   The PCV sounds when CLEAR, SPOT, HILIGHT, SHADOW, MEMO or key input is entered.

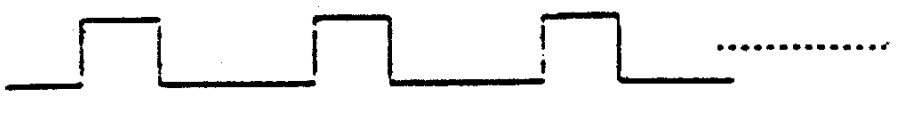
2. Self-timer actuation time

3. Battery check time

(1) Battery voltage higher than warning level



(2) Battery voltage lower than warning level

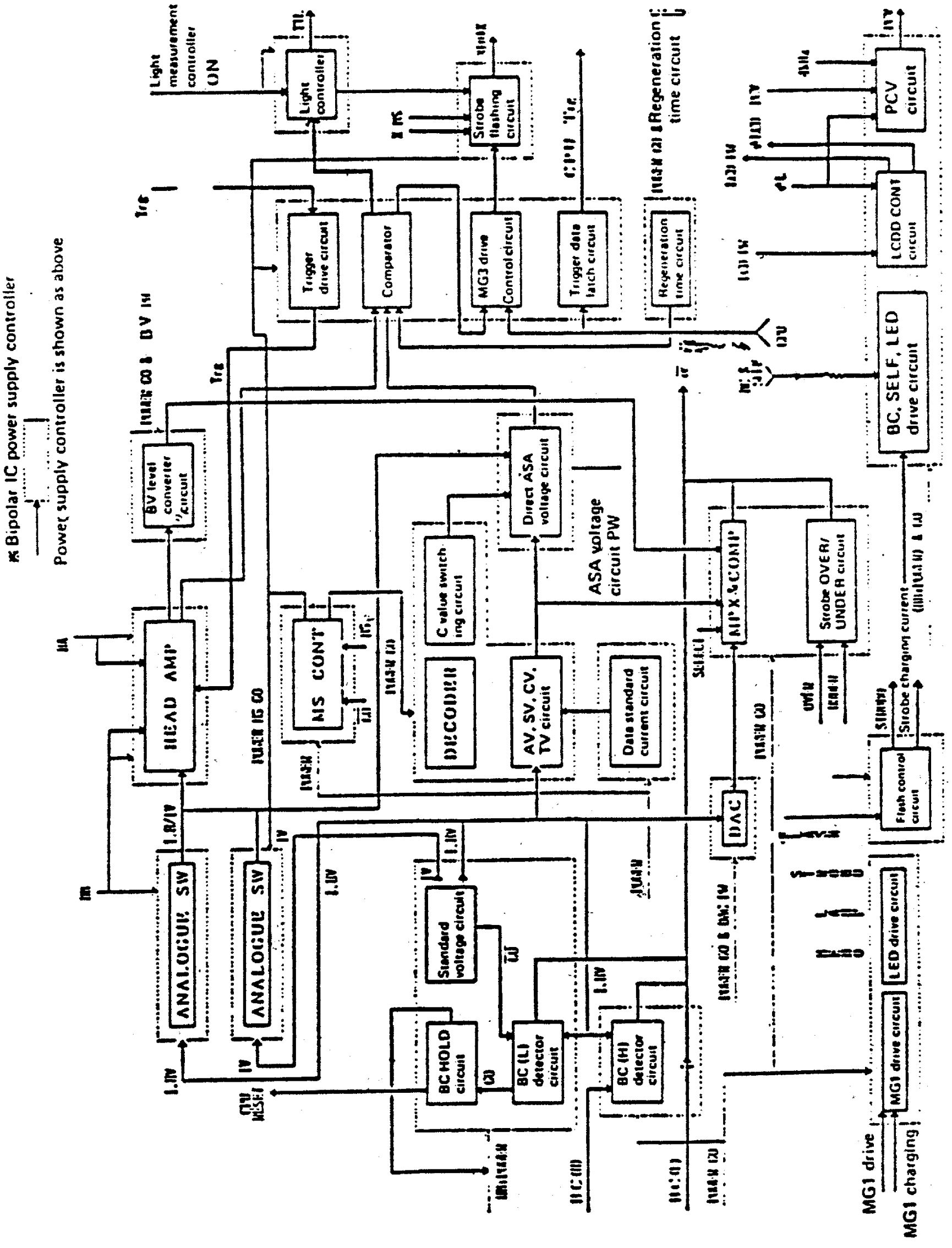


4. Shutter time too long in AUTO mode

3-2. Bipolar IC

The bipolar IC consists of the blocks shown below:

- Block diagram



- Description of bipolar IC circuit

1. BC (H) detector circuit
   The power supply voltage is judged in three stages.
   (1) At Vcc > 2.75V, the PCV sounds intermittently and LED stays lit.
   (2) At 2.75V ≥ Vcc > 2.65V, the PCV sounds intermittently and LED flickers.
   (3) At Vcc ≤ 2.65V, the PCV stops sounding and LED is entinguished.
   The BC (H) circuit judges whether Vcc is higher or lower than 2.75V.
   According to command from the CPU, the judgement result is outputted to α (terminal No. 38) and processed by the CPU.
   According to the processing result, the CPU judges whether battery OK or warning is to be indicated.

2. BC (L) detector circuit
   This circuit operates quite independently from the CPU for judging whether power supply voltage is higher or lower than 2.65V. When power supply voltage is lower than 2.65V, it forcibly turns OFF all the indicators other than those within the viewfinder, stops power from combination magnet MG1 and locks the shutter to prevent the camera from abnormal operation or indication regardless of the low CPU voltage.

3. BC HOLD circuit
   Even when power supply voltage becomes lower than 2.65V at a low temperature, battery voltage is gradually restored to the required level as temperature rises. The BC HOLD circuit is a power supply voltage judging circuit which applies reset pulse to the CPU and has a hytersis width for restarting operations when battery voltage is restored to 2.90V or higher after it becomes lower than 2.65V to stop all the functions of the circuits. Restoration voltage is set at approx. 2.90V.

4. Standard voltage generator circuit
   This circuit generates two voltages of 1.8V and 1V. Battery check is performed by comparing power supply voltage with these voltages.

5. Decorder
   This circuit decodes digital signals transmitted from the CPU and generates control signals for each block.

6. AV, SV, CV, TV circuit
   This circuit generates analog outputs as aperture data AV, ASA data SV, exposure correction data CV and manual time data TV.

7. C value switching circuit
   Since Model OM-4 has a wide dynamic range of ASA 6 to 3200, integral voltage judgement level in the direct light measurement mode is too high for the ordinary method and impossible with a power supply of 3V.
   Therefore, direct light measurement capacitors and judgement levels are simultaneously switched at three stages of low ASA, medium ASA and high ASA. The wide dynamic range and high ASA judgment level makes Model OM-4 highly resistant to noise.
   The C value switching circuit selects judgment levels and integrating capacitors according to commands emitted from the CPU depending on SV values read into the CPU.

8. DAC
   This is a D/A converter circuit composed of 8 bits in an irregular format.
   Generated at the output stage of the DAC are analog voltages corresponding to levels in the 8 input bits connected to the output ports of the CPU. Analog data such as SV and CV are compared with the DAC output voltages by a comparator described later for converting the analog values into digital signals.

9. MPX & COMP
   This system performs A/D conversion by consecutive comparison.
   Data to be subjected to the A/D conversion are SV, CV, TV, AV and BV. However, these data cannot be converted simultaneously, and subjected to A/D conversion on a time base as commanded by the CPU.
   MPX & COMP selects one of these analog data as commanded by the CPU, and compares it with the DAC output by a comparator.
   A comparator is provided for each type of analog data.

10. Data standard voltage circuit
Each analog data generator circuit basically consists of a standard current flowing through data resistors and proportional to absolute temperature.
This circuit generates the standard current described above.

11. Direct ASA voltage circuit
This circuit judges level of integral voltage in the direct light measurement mode.
It switches levels irregularly depending on CV value.

12. BV level converter circuit
Data on brightness of object to be photographed is converted into an analog voltage by the head amplifier. However, the head amplifier. However, the head amplifier output cannot be subjected directly to A/D conversion, and it is necessary to shift level about 300mV.
Further, the spot receiving area is narrower than the average area. It is therefore necessary to compensate the difference between the average BV spot and spot BV of the head amplifier output even when brightness of objects to be photographed are on the similar level. The BV level converter circuit has such a compensating function.

13. Trg adjusting circuit
This circuit consists of CR and compartor, and performs trigger adjustment with variable resistors.

14. Compartor
This circuit compares integral voltage with judgment standard voltage in the direct and manual light measurement modes.

15. MG2 drive control circuit
MG2 is controlled not only by the comparator described in item 14 above but by the high-speed limiter signal outputted from the CPU and trigger data latch circuit described later. The controls must be performed differently in the individual modes.
This circuit composes the high-speed limiter signal, output from the trigger data latch circuit and compartor output for driving MG2.

16. Trg data latch circuit
This circuit transmits pulses indicating exposure time to the CPU.

17. Regeneration time circuit
This circuit creates manual time.

18. Strobe flashing circuit
The strobe is flashed at full speed in the manual mode and only at 1/60 or lower speed in the auto mode.
This circuit determined whether or not the strobe is to be flashed, and generates gate signal for triggering SCR when the strobe is to be flashed.

19. Light control circuit
This circuit generates TTL control signal.

20. Flash control circuit
The strobe TTL control is performed when the power supply is turned ON for the strobe designed for use with Model OM-4.
Further, the LED lights in the viewfinder when the strobe is charged up.
These controls are performed by discriminating levels of the current flowing from the strobe to the L terminals and judging the signal from the discriminator circuit by the CPU. The flash control circuit detects current levels on the two terminals.

21. Strobe OVER/UNDER circuit
Strobe OVER is judged when judgment level is 1 EV higher than the correct level, whereas strobe UNDER is judged when judgment level is 0.6 EV lower than the correct level.
The strobe OVER, UNDER circuit compares integral of direct light measurement value with the correct level.

22. MG1 drive circuit
This circuit consists of a circuit for the capacitor for driving combination magnet MG1 with a constant current and another circuit for discharging electric charges accumulated in this capacitor to MG1 in a moment.

23. LED drive circuit
This circuit prevents the LEDs from lighting erroneously when power supply voltage becomes lower than the lock level.

24. BC, SELF LED drive circuit
This circuit drives the LED serving both for the battery check and self-timer actuation.

25. LCD control circuit
This is a gate circuit which prevent the LCD from providing erroneous indications due to malfunction of the CPU when power supply voltage becomes lower than the lock level. If forcibly turns OFF the LCD when power supply voltage is lower than the lock level.

26. PCV circuit
This circuit controls sounding of the PCV. It prepares PCV sounding frequency of 2 kHz and 4 kHz by dividing chiefly 32.768 kHz.

27. Analog switch
Used for switching the standard voltage between 1.8V and 1V.

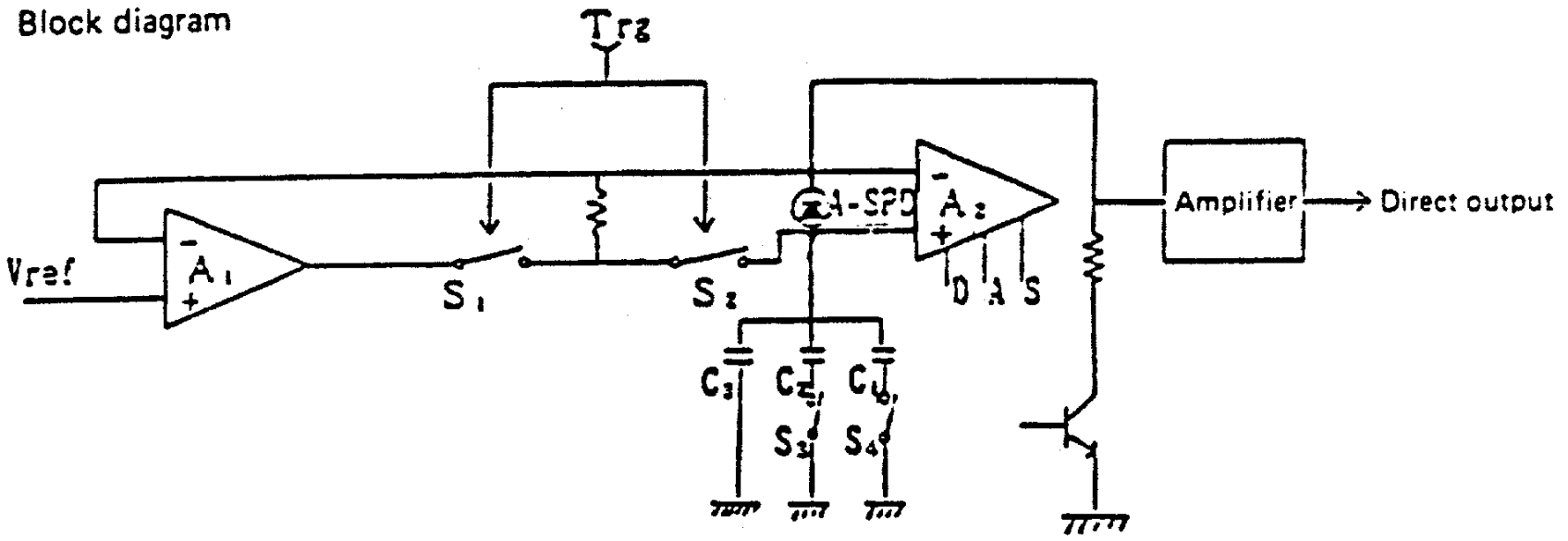
28. MS CONT circuit
This circuit controls power supply for each block when the main switch is turned ON.

3-3. Head Amplifier IC

The head amplifier functions as an integration circuit in the direct light measurement mode.
It generates compression voltage (average BV) and compression voltage of spot brightness (spot BV) during indication and light measurement.

- Circuit for direct light measurement

- Block diagram

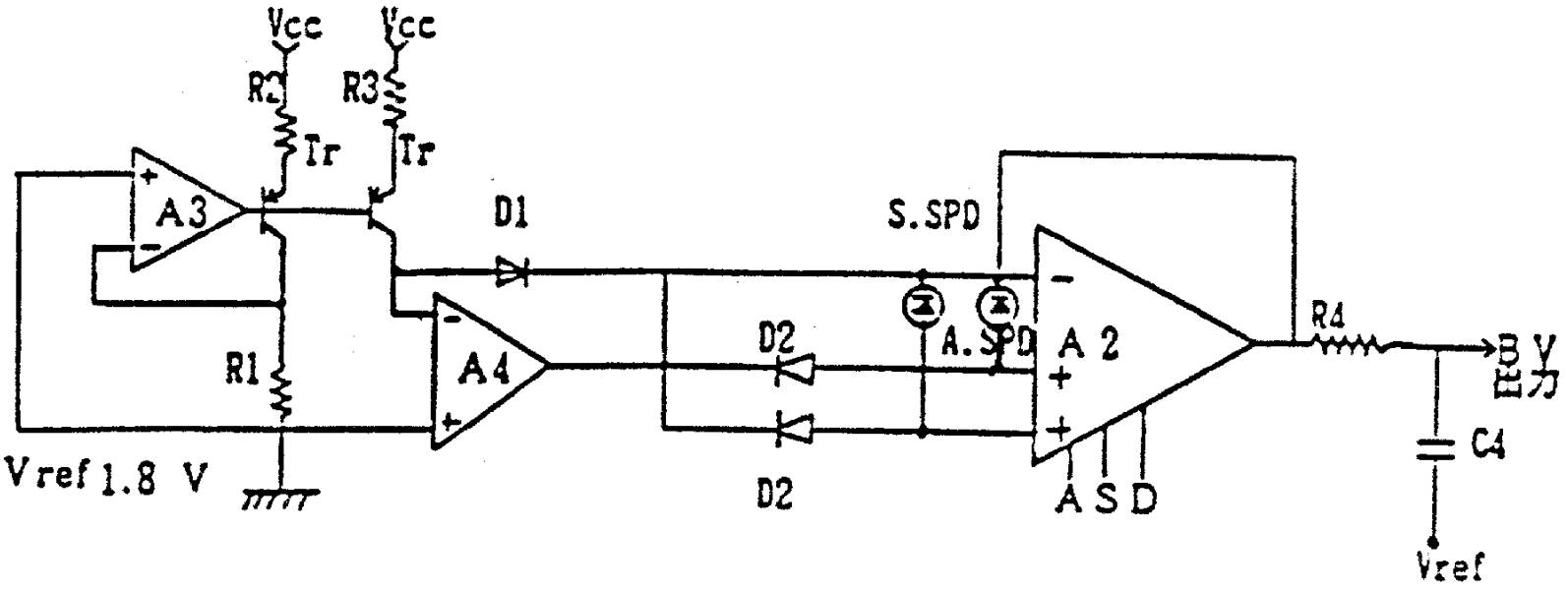


- Description of block diagram

Ulike the integration system of Model OM-2, integration system of Model OM-4 amplifies input capacitor charging voltage of the OP amplifier to operate the comparator of the biopolar IC.
C_1, C_2 and C_3 are integrating capacitors which are used selectively depending on ASA level since Model OM-4 has a wjde dynamic range of ASA6 to 3200.

(1) When film is wound and shutter is released at the initial stage, the main switch, S_1 and S_2 are turned ON.
(2) When S_1 and S_2 are turned ON, A_1 is actuated and its output Vref (standard voltage of 1V) is applied to "+" of A_2. Simultaneously, the capacitors (combination of C_1, C_2 and/or C_3) are charged.
Depending on ASA value, C_1, C_2 and/or C_3 are made conductive and grounded by a certain combination determined by command from the CPU. (Only the grounded capacitors are charged.)
(3) When the 1st shutter blind travels and Trg is turned ON integration is started.
When Trg is turned OFF, S_1 and S_2 are turned OFF, and the capacitors are chaged with photocurrent from the SPD.
(4) The charging voltage is detected by A_2 and outputted to the amplifier arranged at the next stage.
(5) The amplified integral voltage is fed into the comparator of the bipolar IC and compared with the ASA judgment voltage.
(6) When the correct exposure level is reached, the comparator of the bipolar IC is inverted, the magnet is deenergized, the 2nd shutter blind starts and the shutter is closed to complete the photographing operation.

- Circuit for indication and light measurement (average light measurement and spot light measurement)
- Block diagram



- Description of block diagram

This block diagram shows the object brightness detector circuit for indication within the viewfinder (corresponding to CdS of Model OM-2). Light is measured in the average mode or spot mode for indication. Brightness measured in the average mode is indicated for photographing in the direct mode, whereas brightness measured in the spot mode is indicated for photographing in the spot measurement exposure mode.

In the spot measurement exposure mode, film is exposed for the time set with the SPOT switch.

According to mode selection, A_2 is set for direct light measurement, spot light measurement or average light measurement, and the SPD is selected by a command from the CPU.

Though photoelectromotive force of the SPD reaches scores of thousand as high at high brightness, such large variation of SPD output is reduced to a low level, detected by A_2 and fed into the bipolar IC.

(1) A constant current determined by R1 and standard voltage Vref (1.8V) flows to R3.

(2) The constant current flowing through R3 circulates to temperature compensating diode D1.
Since D1 composes a negative feedback circuit, potential is equal at the "+" input and "—" input terminals of A4.
Therefore, A4 provides an output voltage equal to voltage drop of Vref — D1.

(3) Connected to the input stage of A2 are SPOT SPD and average light measurement SPD.
Either of the SPDs is used according to select signal A, S or D for A2.

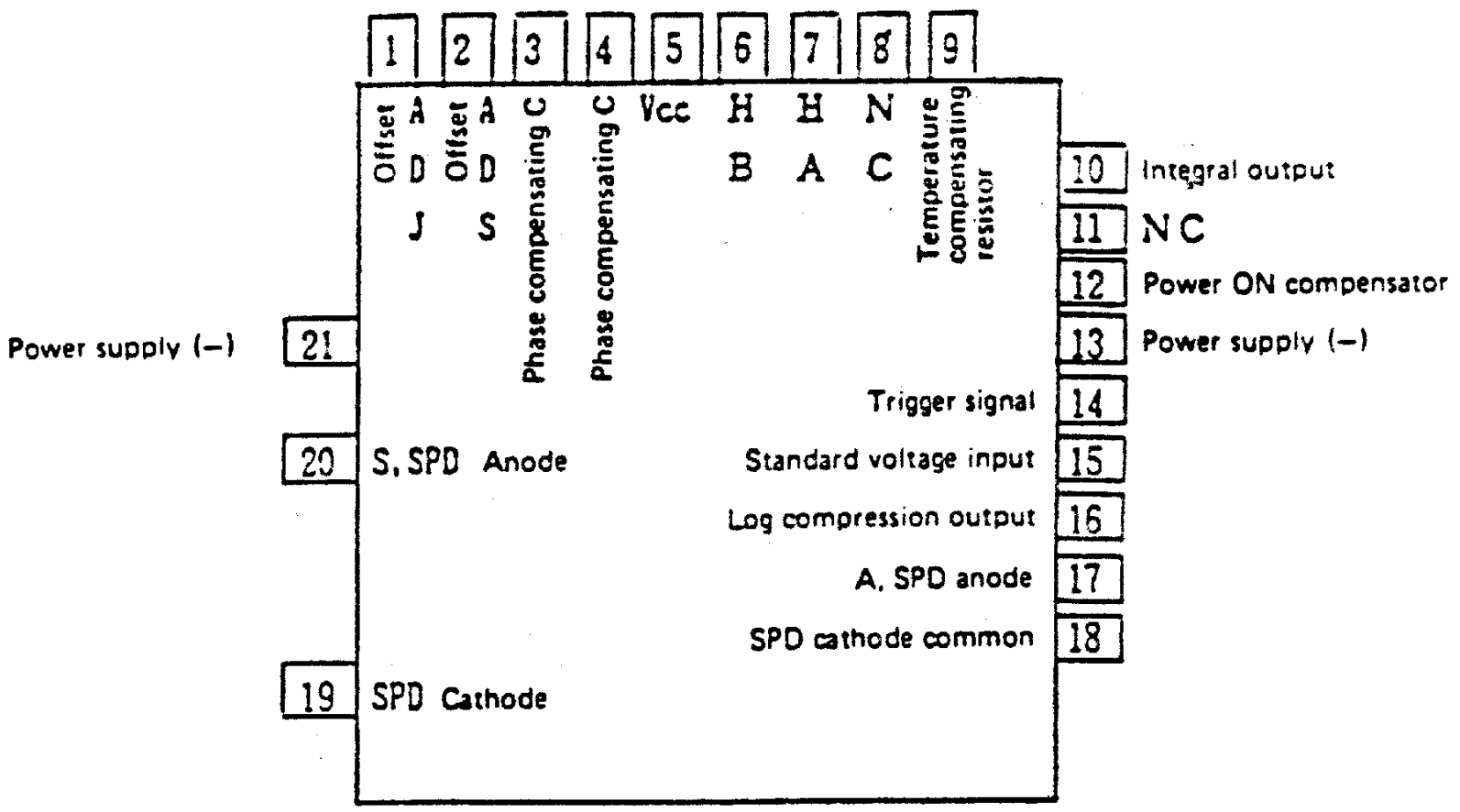
(4) Let us now assume that the average light measurement SPD is selected. The photocurrent flowing through this SPD circulates through the compression diode D2 into the output stage of A4.
D2 is used for converting the photocurrent varying at a ratio of 1/scores of thousand into a voltage having a low variation ratio.

(5) A2 is a buffer amplifier having a gain level of 1, and potential is the same between the "+" and "—" terminals at the output stage.

(6) The input voltage to the "—" terminal of A2 is equal to voltage drop Vref — D1, whereas input voltage to "+" terminal is equal to voltage drop Vref — D1 + voltage drop due to photocurrent from D2.
Therefore, A2 detects voltage drop sue to the photocurrent from D2 and provides BV output. SPD output is obtained in this way.

(7) D2 is a silicon diode having a certain temperature coefficient which is cancelled by connecting D1 and D2 to each other. For this reason, D1 is called "temperature compensating diode.

- Functions of IO ports of head amplifier



- Functions of main terminals

(1) Log compression output No. 16
BV output terminal. Connected to BVIN of the bipolar IC through a filter for absorbing noise.

(2) Power ON compensation No. 12
Limiter connected to the limiter output terminal No. 1 of the bipolar IC.

(3) Integral output No. 10
Integral output terminal for direct light measurement. Provides integral output taking Vref (1.8/1 V) as standard after Trg 1 is turned from L of H.

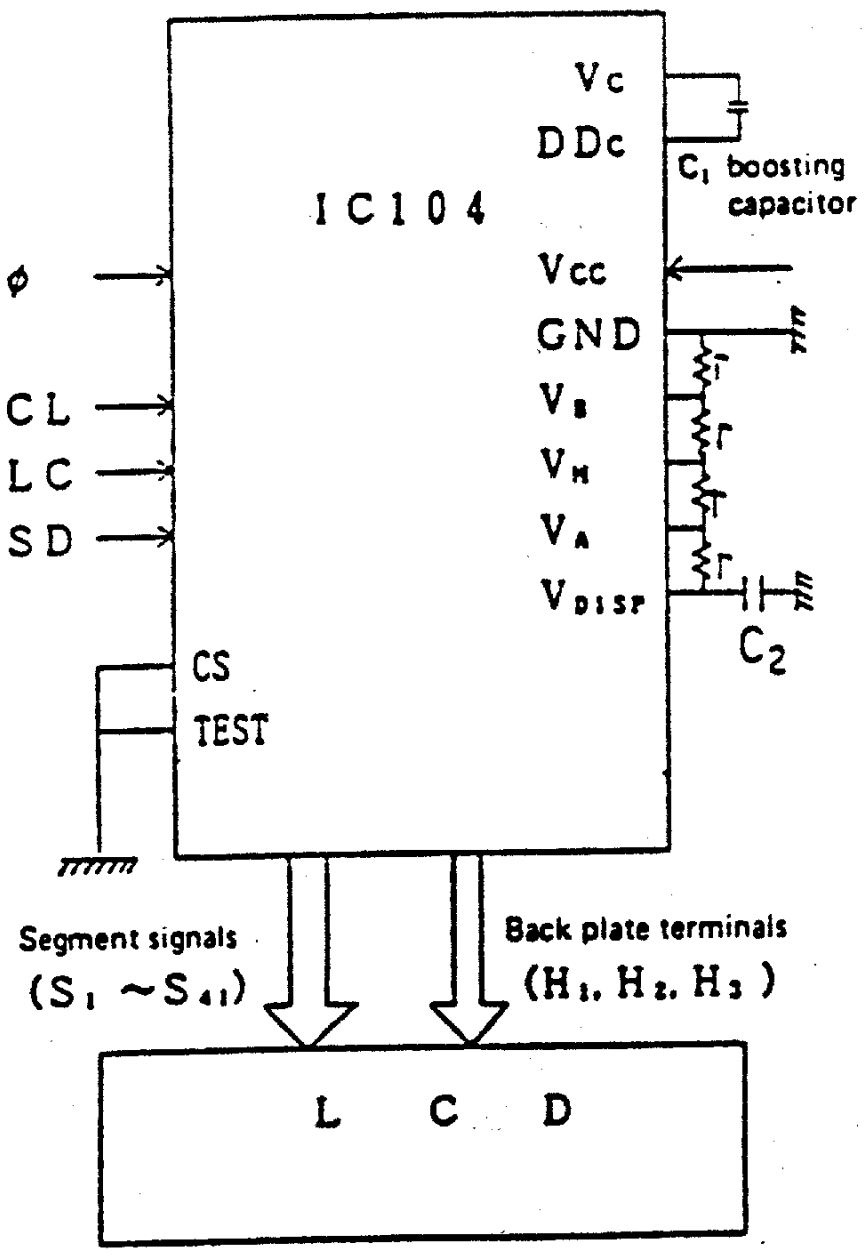
(4) Temerature compensating resistor No. 9
BV termperature compensating resistor. BV output is enhanced when this resistor has higher value, and vice versa.

(5) Phase compensating capacitors No. 3 and No. 4
Adopted for preventing outputs Nos. 10, 16 and 18 from oscillating.

3-4. LCD Driver

IC104 is a liquid crystal cell driving element manufactured by CMOS silicon gate process. It prepares an indication voltage twice as high as the power supply voltage by an internal booster, and drives the liquid crystal cell at 1/3 bias and 1/3 duty. It is equipped with 3 back plate terminals and 41 segment terminals, and capable of driving 123 segments max.

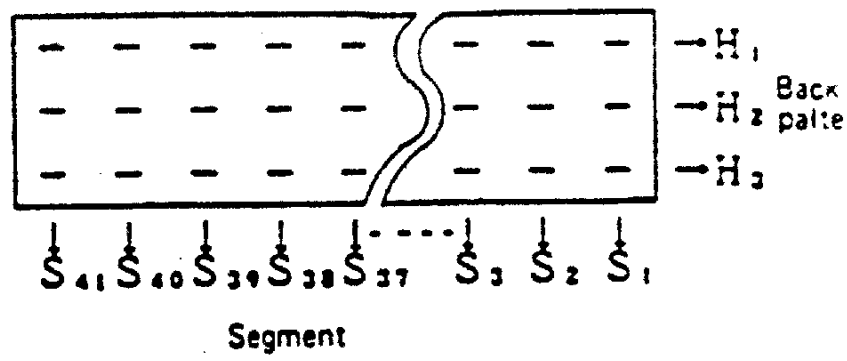
○ System configuration



○ Description of system

(1) Data transfer to IC104 is performed with serial transfer clock (CL), synchronous signal (LC) and serial data (SD).
(2) At LC = 0, the IC is set in standby condition.
(3) At LC = 1, data are entered upon reception of clock CL.
(4) Voltage is increased to 6V by the boosting capacitor, etc.
(5) The standard voltage for driving the LCD is prepared by dividing the boosted voltage by resistor r.
(6) Arranged in IC104 is a RAM for storing segment and back plate indication data.
(7) 1 bit of the RAM corresponds to 1 segment on the LCD.
(8) Addresses and data are set in the RAM by external serial data.
(9) The address is increased automatically by setting data into the RAM.

○ LCD display



The LCD display has segments in 41 horizontal rows and back plates in 3 vertical rows. Voltages at three stages of 2, 4 and 6V obtained by dividing the boosted voltage are inputted into the segments and back plates.

○ Ignition of LCD display

(1) A voltage of 2, 4 or 6V is inputted to a horizontal segment to be ignited and a vertical back plate respectively.
(2) Voltage is inputted so as to produce a voltage difference of at least 4V between the vertical and horizontal directions.
(3) Segments having voltage difference of at least 4V between the vertical and horizontal directions are ignited. When 2V is inputted to a horizontal segment and 6V is inputted to a vertical back plate, for example, the segment is ignited. When 2V and 4V are inputted, however, the segment is not ignited.

Segment igniting sequence

(1) The CPU selects a segment to be ignited depending on conditions for operating the camera.
(2) A combination of vertical and horizontal voltages is calculated to ignite the segment of interest.

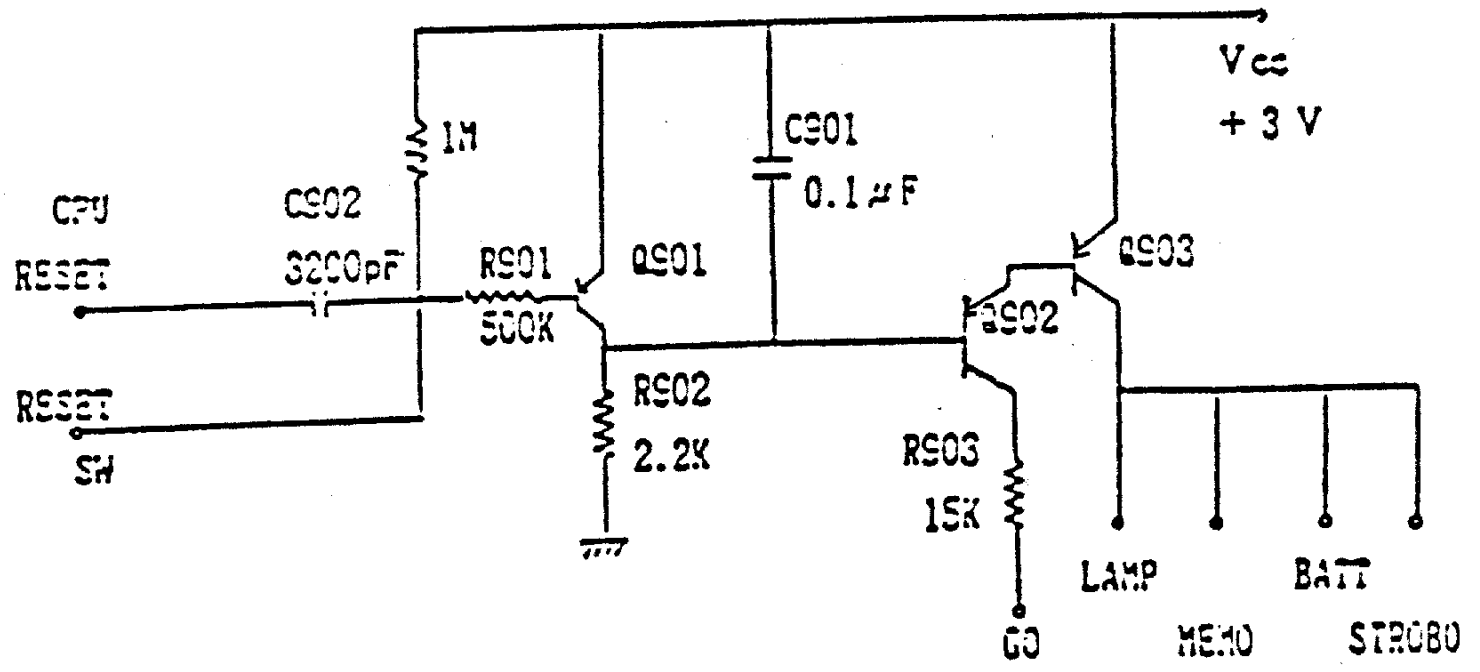
(3) The address of the segment to be ignited, voltage for the vertical back plate and voltage for the horizontal segment are transmitted as serial data from the CPU to IC104 LCD driver.

(4) IC104 LCD driver stores the data in its internal RAM.

(5) Simultaneously, segment of the LCD display is selected and ignited.

3-5. RS Circuit Board

o Reset circuit



• Description of cirucit

- This circuit is adopted for preventing the circuits from becoming inoperative when the CPU is set in ACL condition where all the LEDs and lamps are lit, current consumption increases and the mirror lock is actuated.
- While the CPU is reset or for 30 ms after the CPU is released from the reset condition, the LEDs (LAMP, MEMO, BATT and STROBE) are deenergized.
- C902 is a reset pulse width limiter and C901 is used for deenergizing the LEDs by reserving a delay time of at least 30 ms.

(1) When the CPU is reset, Q901 is made conductive for the time required to charge C902, Q902 is made non-conductive, Q903 is made non-conductive, the LAMP, MEMO and other LEDs are extinguished.

(2) Upon completing charging of C902, the reset pulse is switched from L to H level. Q901 is made non-conductive accordingly.

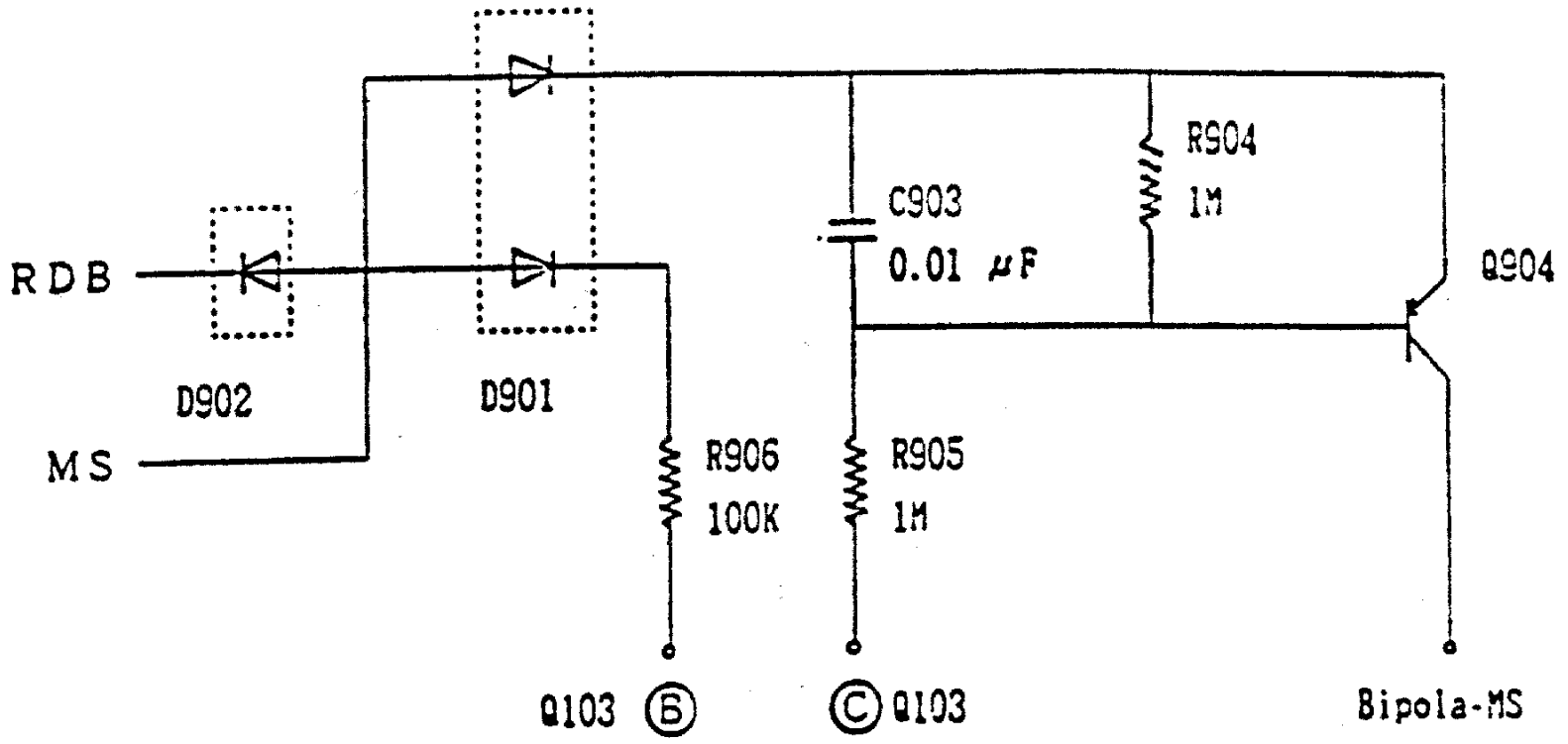
(3) When Q901 is made non-conductive, charging of C901 starts. Until the voltage reaches a certain level, Q902, Q903, LAMP, MEMO and other LEDs are turned OFF.

(4) About 30 ms after C901 is charged up, base voltage of Q902 is lowered to make it conductive. Q902, Q903, LAMP, MEMO and other LEDs are turned ON.

(5) When the reset switch is turned ON for changing mode, Q901 is made conductive, whereas Q902, Q903, LAMP, MEMO and other LEDs are turned OFF.

(6) When the reset switch is turned OFF, Q901 is made non-conductive and charging of C901 starts. For 30 ms after the reset switch is turned OFF, the LAMP, MEMO and other LEDs are turned OFF. Then the LEDs are lit.

○ Strobe misjudgment preventive circuit



• Description of circuit

- The strobe is flashed only at a shutter time of 1/60 or shorter in the direct auto strobe mode. A time calculated based on BV value obtained by average light measurement is used for judging the shutter time.
- The CPU may perform A/D conversion of the BV value even after the main switch is turned ON.
- When A/D conversion of the BV value is performed, the head amplifier provides standard voltage of 1.8V. It is switched to 1V when the main switch is turned ON.
- In such a case the A/D conversion is performed taking 1V as standard, thereby flashing the strobe at a shutter speed higher than 1/60. This circuit prevents such erroneous flashing of the strobe.
- The bipolar IC main switch is turned ON upon lapse of 2 to 3 ms after the CPU main switch is turned ON, and turned OFF within 0.4 ms.
- mzmzmz

(1) When the main switch is turndd ON, charging of C903 is started and Q904 is made non-conductive. After charging for 2 to 3 ms, Q904 is made conductive and the bipolar IC main switch is turned ON.

(2) When the main switch is turned OFF, C904 discharges. Upon lapse of about 0.4 ms, Q904 is made non-conductive.

3-6. External Circuits for IC

1. Mode switch and key input

(1) MANUAL mode
When pin No. 19 is connected to pin No. 13 on the CPU, it is energized and runs to the MANUAL program.

(2) AUTO mode
When pin No. 19 is freed on the CPU, it runs to the AUTO mode program.

(3) SPOT key (SW107)
When pin No. 17 is connected to pin No. 16 on the CPU, it is energized and runs to the SPOT mode program.

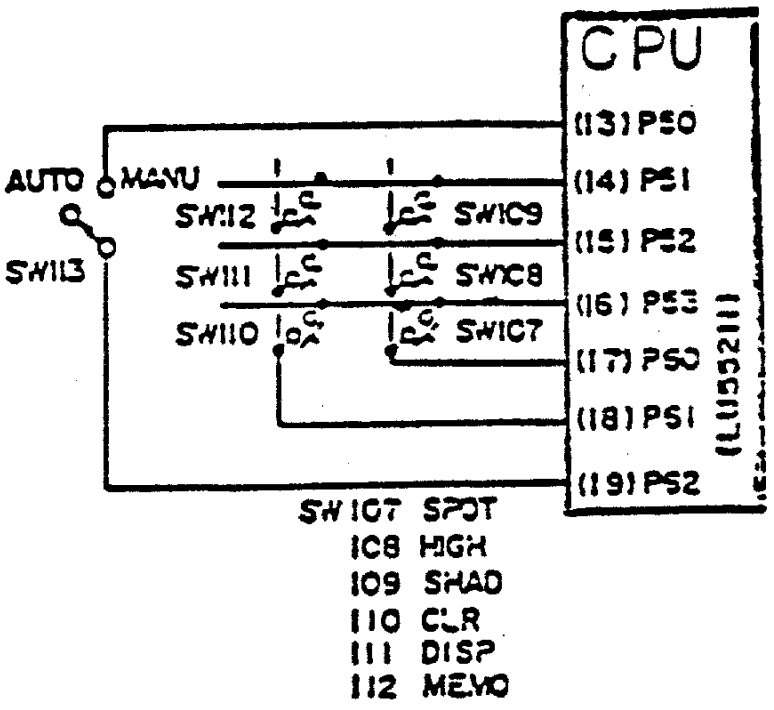
(4) HILIGHT key (SW108)
When pin No. 17 is connected to pin No. 15 on the CPU, it is energized and runs to the HILIGHT program.

(5) SHADOW key (SW109)
When pin No. 17 is connected to pin No. 14 on the CPU, it is energized and runs to the SHADOW program.

(6) CLEAR key (SW110)
When pin No. 18 is connected to pin No. 16 on the CPU, it is energized and runs to the CLEAR program.

(7) DISP key (SW111)
When pin No. 18 is connected to pin No. 15 on the CPU, it is energized and runs to the DISP program.

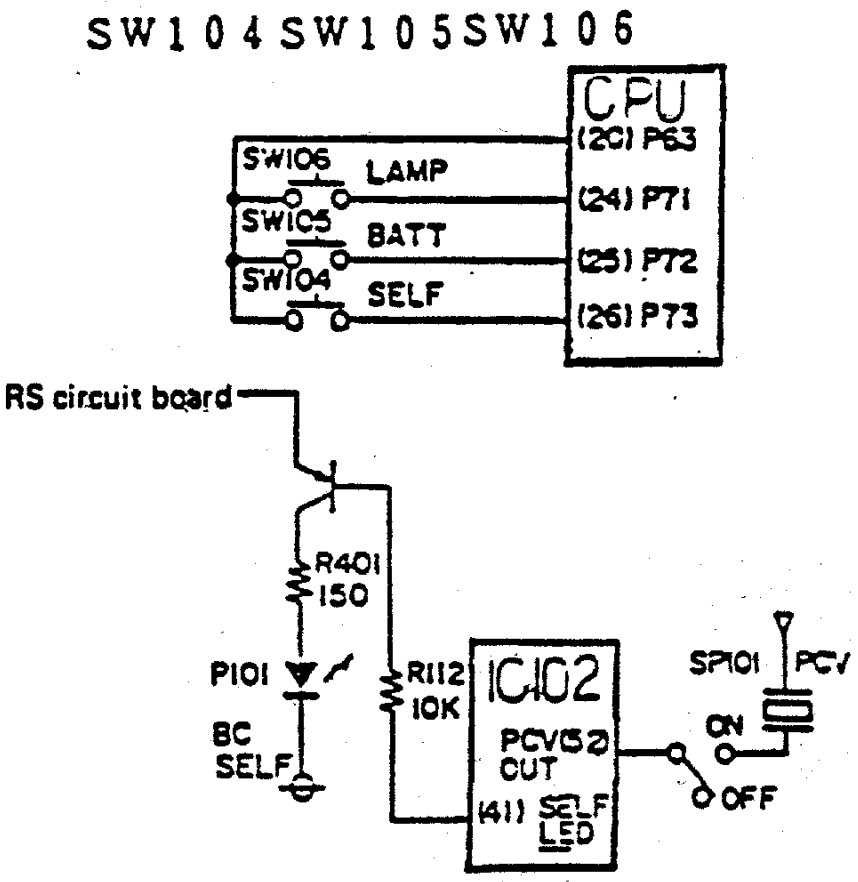
(8) MEMO key (SW112)
When pin No. 18 is connected to pin No. 14 on the CPU, it is energized and runs to the MEMO program.
The CPU flickers P102 by applying H and L signals to terminal No. 31.

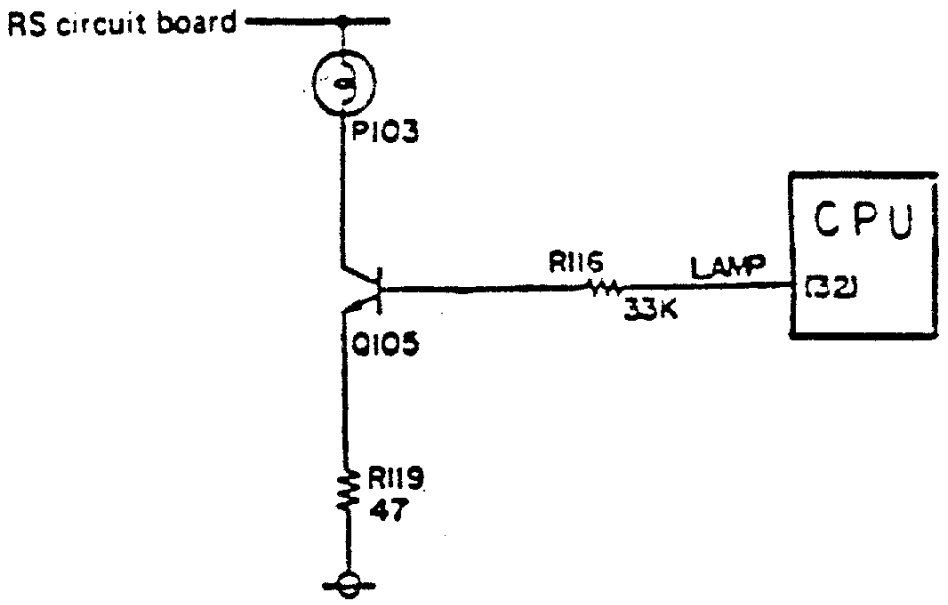


(9) SELF switch (SW104)
When pin No. 20 is connected to pin No. 26 on the CPU, it is energized and runs to the SELF program.
After the shutter is released, MG is kept deenergized. During this while, pulse signals are emitted from pins No. 41 and No. 52 of the bipolar IC to flicker LED P101 and sounds PCV SP101.
12 seconds later, pins No. 41 and No. 51 stop providing the output, pin No. 61 of the bipolar IC is set at L voltage, MG1 is driven and the shutter starts exposure.

(10) Battery switch (SW105)
When pin No. 20 is connected to pin No. 25 on the CPU, it is energized and runs to the battery check program.
The CPU transmits a battery check command to the bipolar IC. The CPU judges the answer and gives a command to the bipolar IC to determine whether or not pulse signal is to be transmitted from it.
The bipolar IC provides pulse signal or not to pins No. 41 and No. 52 according to the command.
LED P101 and PCV SP101 are actuated.

(11) Lamp switch (SW106)
When pin No. 20 is connected to pin No. 24 on the CPU, it is energized and runs to the LAMP program.
The CPU set pin No. 32 at H level and lights P103 for 10 seconds.





2. MG1 drive circuit

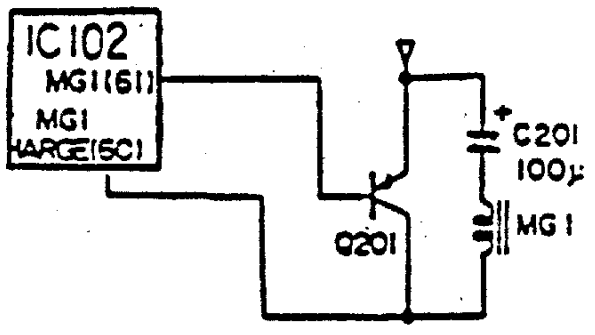
When power supply voltage exceeds the lock level or approx. 15 ms elapses after the main switch is turned ON, pin No. 61 is set at L level and Q201 is made conductive.

When Q201 is made conductive, C201 discharges and MG1 is energized. (The shutter is not locked.)

C201 is charged with a constant current of about 4 mA for 10 ms after completing photographing operation.

When power supply voltage is lower than the lock level, pin No. 61 is set at H level, MG1 is deenergized and the shutter is locked.

MG1 drive circuit

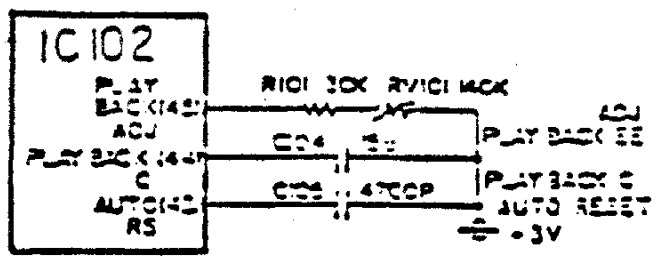


3. Regeneration EE adjusting regeneration C AUTO RESET circuits

- Regeneration C (C104)
  This is an integrating capacitor for regeneration time (manual or spot).
- Regeneration EE adjusting circuit
  For adjusting regeneration time
- AUTO RESET (C105)

A capacitor for oereating CPU RESET signal. When power supply voltage becomes lower than the lock level, the bipolar IC stops operating, but starts operating again when battery voltage restores to about 2.9V. It is therefore necessary to start the program again from the clear start. This circuit outputs reset signal to the CPU for initializing.

Regeneration EE adjusting, regeneration C and AUTO RESET circuit



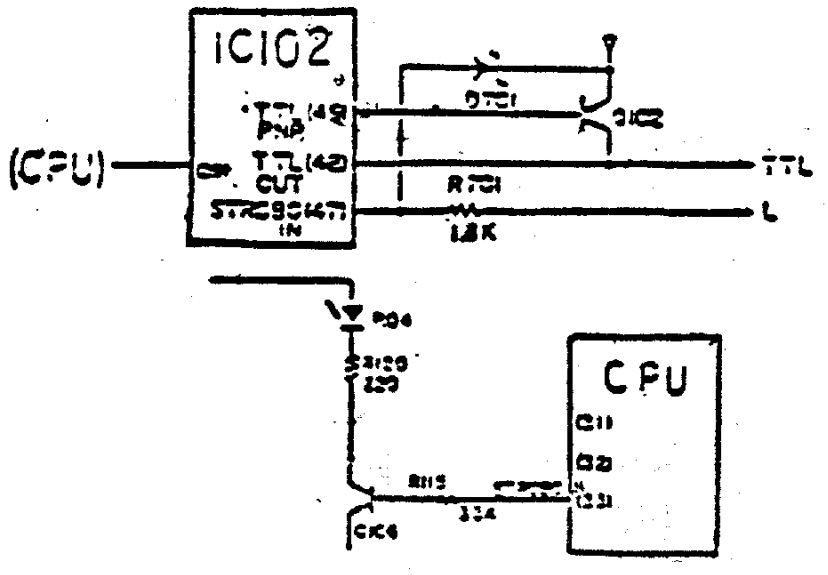
4. Strobe circuit

- STROBIN (L terminal), flash control

(1) When the strobe is energized, the camera is switched to the strobe mode through the L terminal.

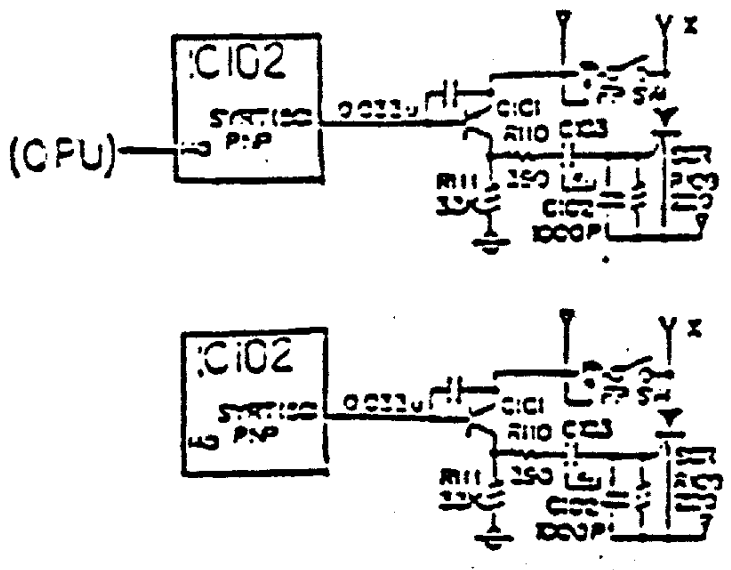
(2) When the strobe is charged up, pin No. 39 is set at L level. The CPU detects the L level, judges completing of the charging, sets pin No. 33 at H level and lights LED P104. (Lighting upon completing of charging.)

STROBIN (L terminal)
flash control



- SYRT PNP (flashing signal), flashing circuit
  Signal for driving strobe flashing thyristor
  (1) When a shutter speed of 1/60 or higher is indicated in the DIRECT AUTO STROBE mode, pin No. 50 is set at H level to prevent the strobe from flashing.
  (2) When a shutter speed lower than 1/60 is indicated and the X switch is turned ON, pin No. 50 is set at L level, Q101 is made conductive, C103 discharges through C102 (R109), (camera body), Q101 and R110 and the thyristor is made conductive to flash the strobe.
  (3) When the strobe flashes, current from the L terminal stops and pin No. 40 of the bipolar IC is set at L level. The CPU detect the L level and knows the flashing of the strobe.
  (4) When the main switch is turned OFF after completing exposure, pin No. 50 of the bipolar IC is set at H level, Q101 is made non-conductive and C103 is charged through (body), R109, C103, R111 and R111.

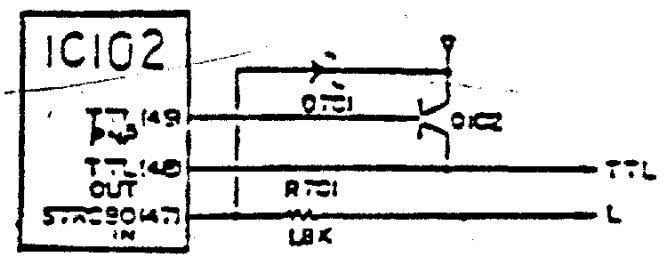
Flashing circuit



- TTL out (TTL output)
  When a shutter speed of 1/60 or lower is indicated immediately before shutter release and integral output does not exceed the judgment level in the DIRECT AUTO STROBE mode, pin No. 48 is set at H level and does not prevent the strobe from flashing.
  When the output exceeds the judgment level, pin No. 48 is set at L level to prevent the strobe from flashing.

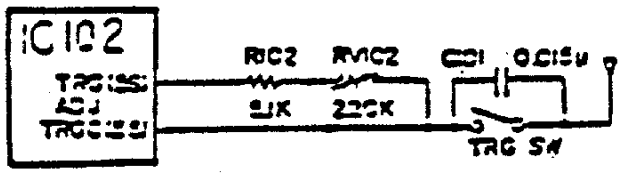
- TTL out PNP
  A PNP transistor for creating TTL signal. When pin No. 48 is set at H level, pin No. 49 is set at L level and Q102 is made conductive to apply voltage of H level to the strobe.

TTLout (TTL output)
TTLout PNP



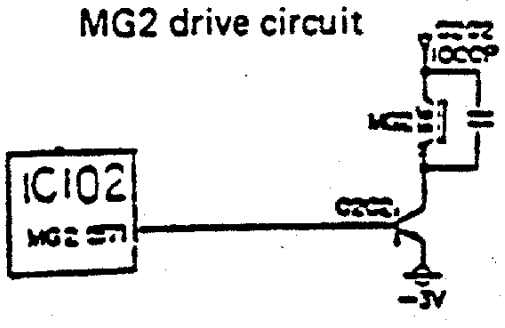
5. Trigger adjusting circuit
   The trigger switch is turned on at the initial stage. When the shutter is released, the trigger switch is turned OFF and integration start signal is fed to pin No. 55 of the bipolar IC. However, C101 serves to apply the voltage to pin No. 55 to prevent integrating operation from starting even after the trigger switch is turned OFF. Upon completing charging of C101, pin No. 55 is deenergized to start the integrating operation.
   Trigger timing can be created by varying charging time of C101.
   RV102 is arranged as the trigger timing adjusting resistor

Trigger adjusting circuit



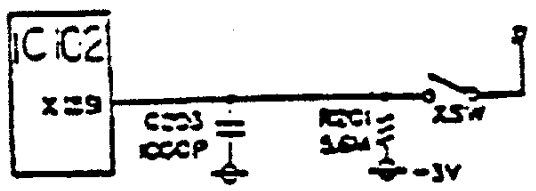
6. MG2 drive circuit
   When the comparator circuit of the bipolar IC is inverted at the correct exposure level, pin No. 57 is set at H level, Q202 is made conductive and MG2 is energized to elese the 2nd shutter blind.

MG2 drive circuit



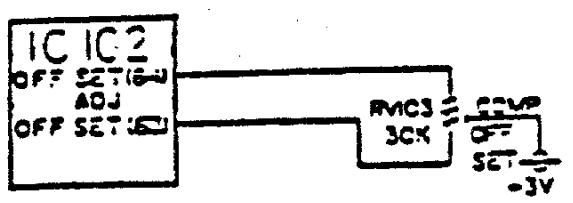
7. Synchronous switch (X SW)
When the synchronous switch (X) is turned ON, pin No. 59 is set at H level to make the flashing thyristor conductive and flash the strobe.

Synchronous switch



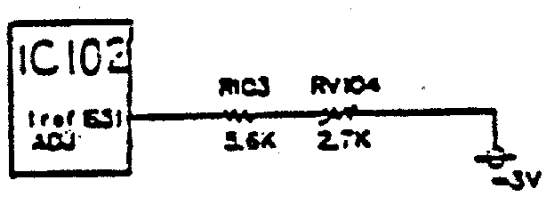
8. Offset adjusting circuit
This circuit is arranged for offset adjusting for the comparator of the bipolar IC.

Offset adjusting circuit



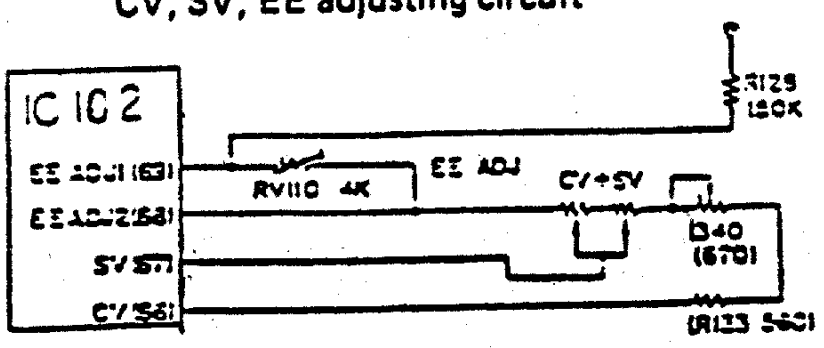
9. Standard current adjusting circuit
Since the BV output varies with temperature, it is necessary to adjust the standard current accordingly. This circuit is adopted for this adjustment.

Standard current adjusting circuit



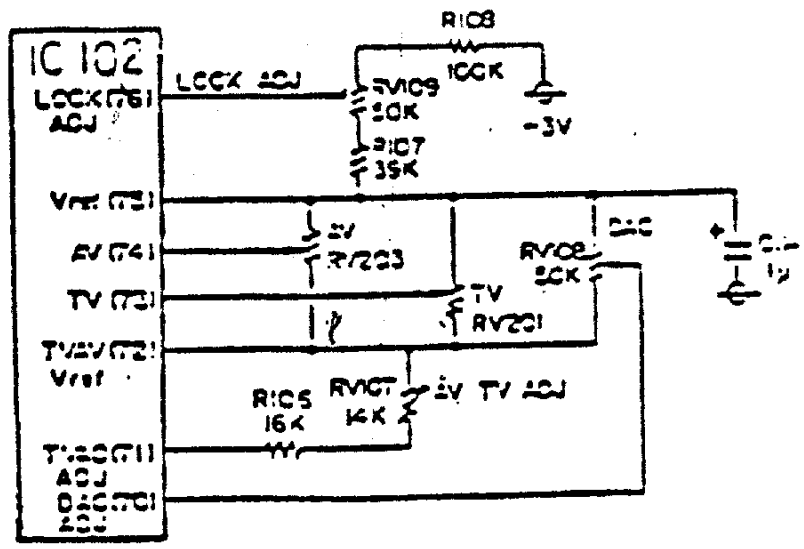
10. CV, SV, EE adjusting circuit
CV: Standard voltage for VC
SV: Standard voltage for CV and CV output
EE adjustment:
(1) For adjusting CV + SV output and direct EE
(2) For adjusting direct EE output (pin No. 69)

CV, SV, EE adjusting circuit



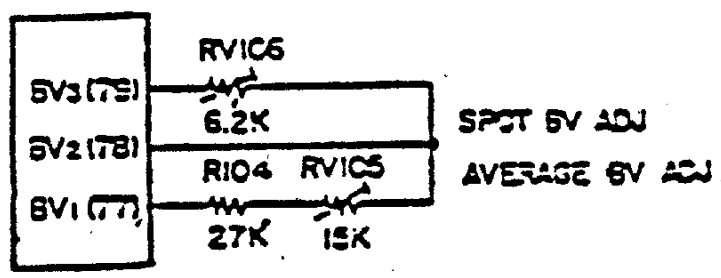
11. DAC, AV, TV, Lock adjusting circuit
DAC adjustment:
Circuit for adjusting D/A converter
TV/AV adjustment:
Circuit for generating standard voltage for TV/AV.
TV/AV Vref circuit:
Circuit for generating standard voltage for TV/AV.
TV, AV:
TV output and AV output
Lock adjusting circuit:
Circuit for adjusting lock voltage level.

DAC, AV, TV, Lock adjusting circuit

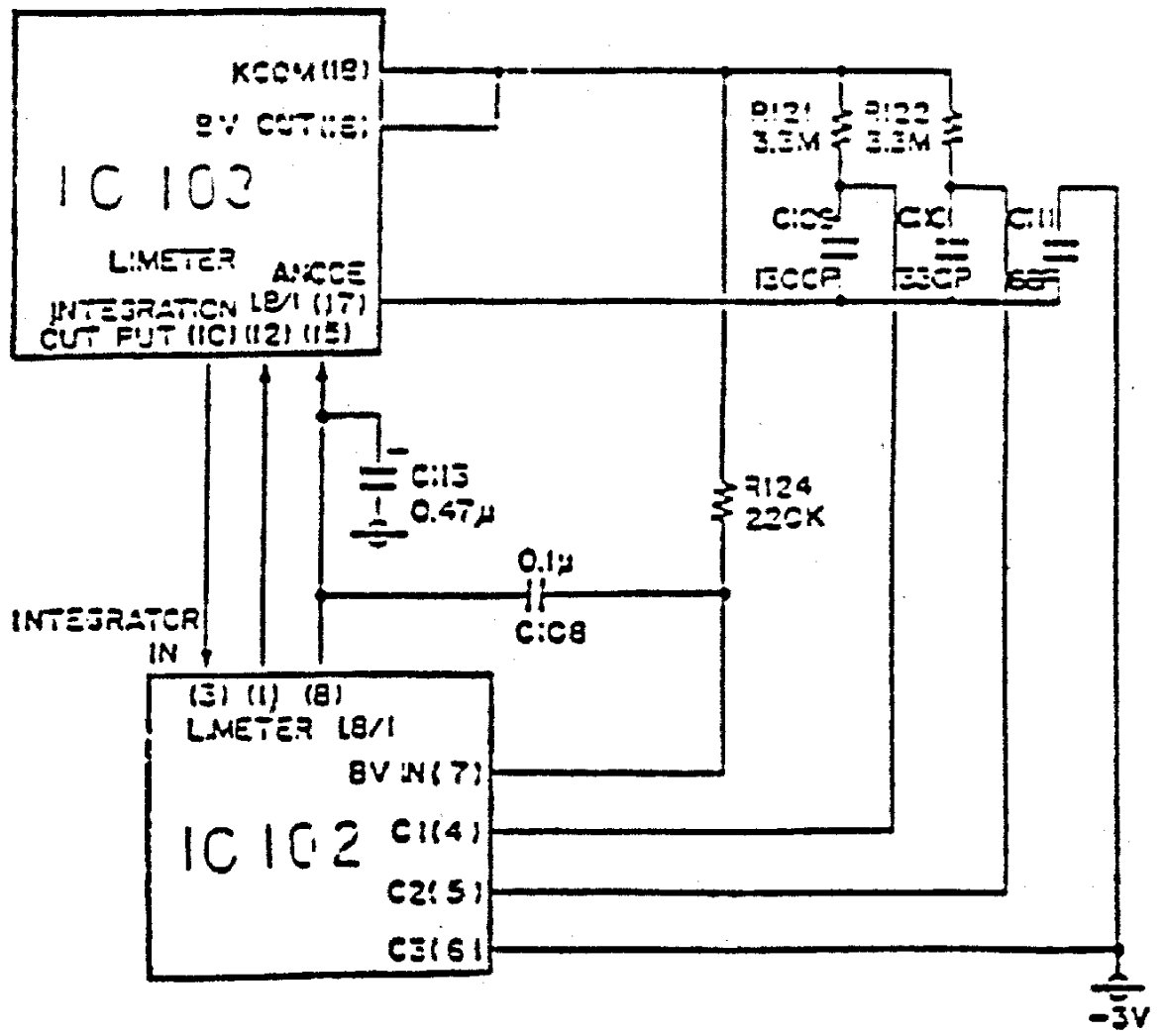


12. Spot BV adjusting & average BV adjusting circuit
BV_1: Resistor for adjusting indication BV
BV_2: Average BV output (from BV_3)
BV_3: Spot BV output

Average BC adjusting, Spot BV adjusting circuit



13. Direct integrating capacitor circuit
Integrating capacitor for the direct light measurement mode
- At high ASA levels from 320 to 3200
  C111 (69 pF) is selected.
- At medium ASA levels from 40 to 250
  C110 + C111 (398 pF) are selected.
- At low ASA levels from 6 to 30
  C109 + C110 (1630 pF) are selected.



V. DESCRIPTION OF PHOTOGRAPHING OPERATION

Operations for photographing in the MANUAL, AUTO, SPOT and other modes will be described below with reference to the CPU, bipolar IC, head amplifier, etc.

1. Difference between Indication Light Measurement and Exposure Light Measurement

1-1. Light Measurement for Indication

(1) Average light measurement
- Photosensors A and SPD are used selectively.
- Exposure time is indicated based on direct light measurement.
- The time is not used for actual exposure.
- The light measurement indication corresponds to that on the CdS meter in Model OM-2N.
- The indication is provided for manual exposure.

(2) Spot light measurement
- Photosensor elements S and SPD are used selectively.
- Brightness is measured in the SPOT mode.
- Film is actually exposed for the indicated time.
- Indication is provided for exposure in the manual spot mode.

1-2. Light Measurement for Actual exposure

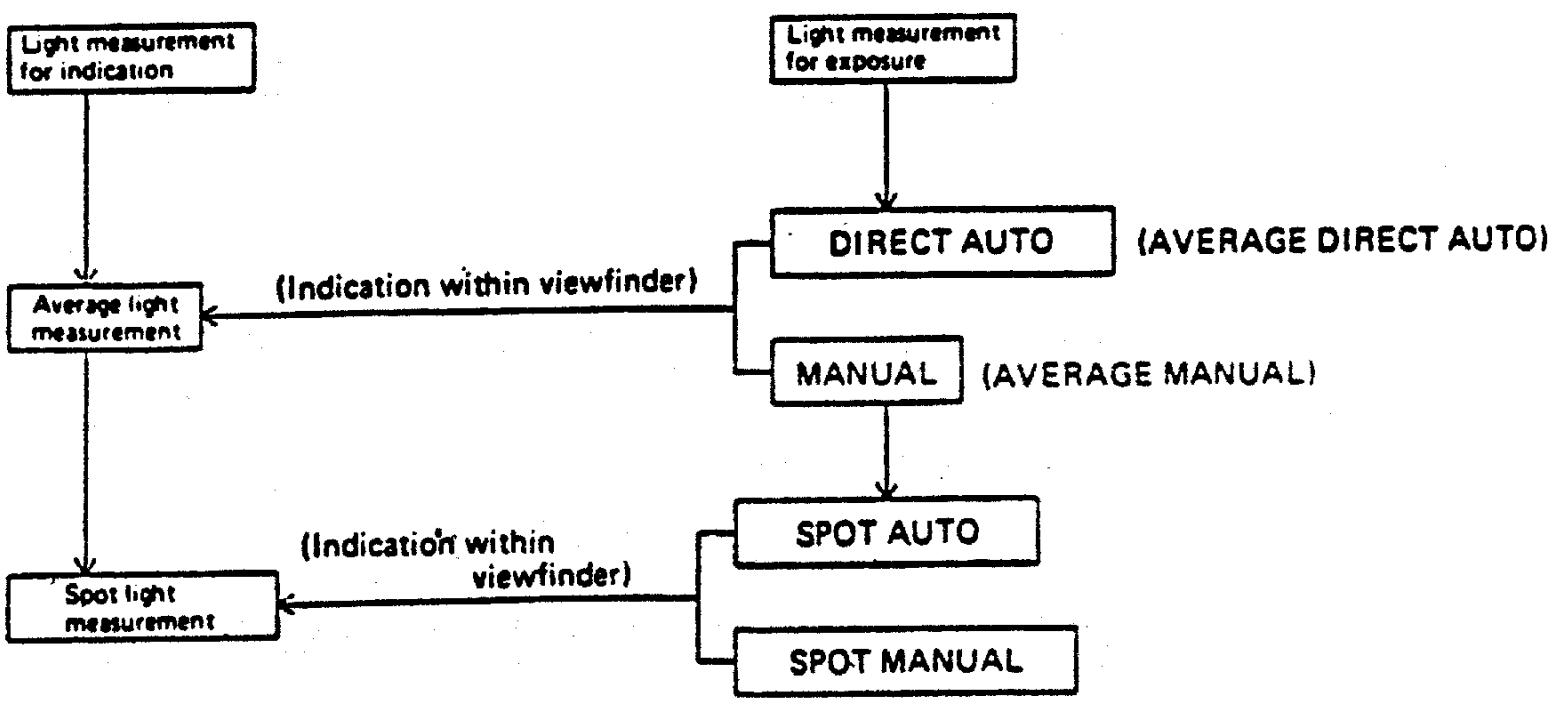
(1) Direct light measurement (called AVERAGE DIRECT AUTO mode)
- Photosensors A and SPD are used selectively.
- Brightness is measured in the AVERAGE DIRECT mode.
- Film is exposed actually in the indicated time.

(2) SPOT AUTO light measurement (SPOT AUTO)
- Measured brightness is stored into memory.
- Film is exposed actually in the indicated time.

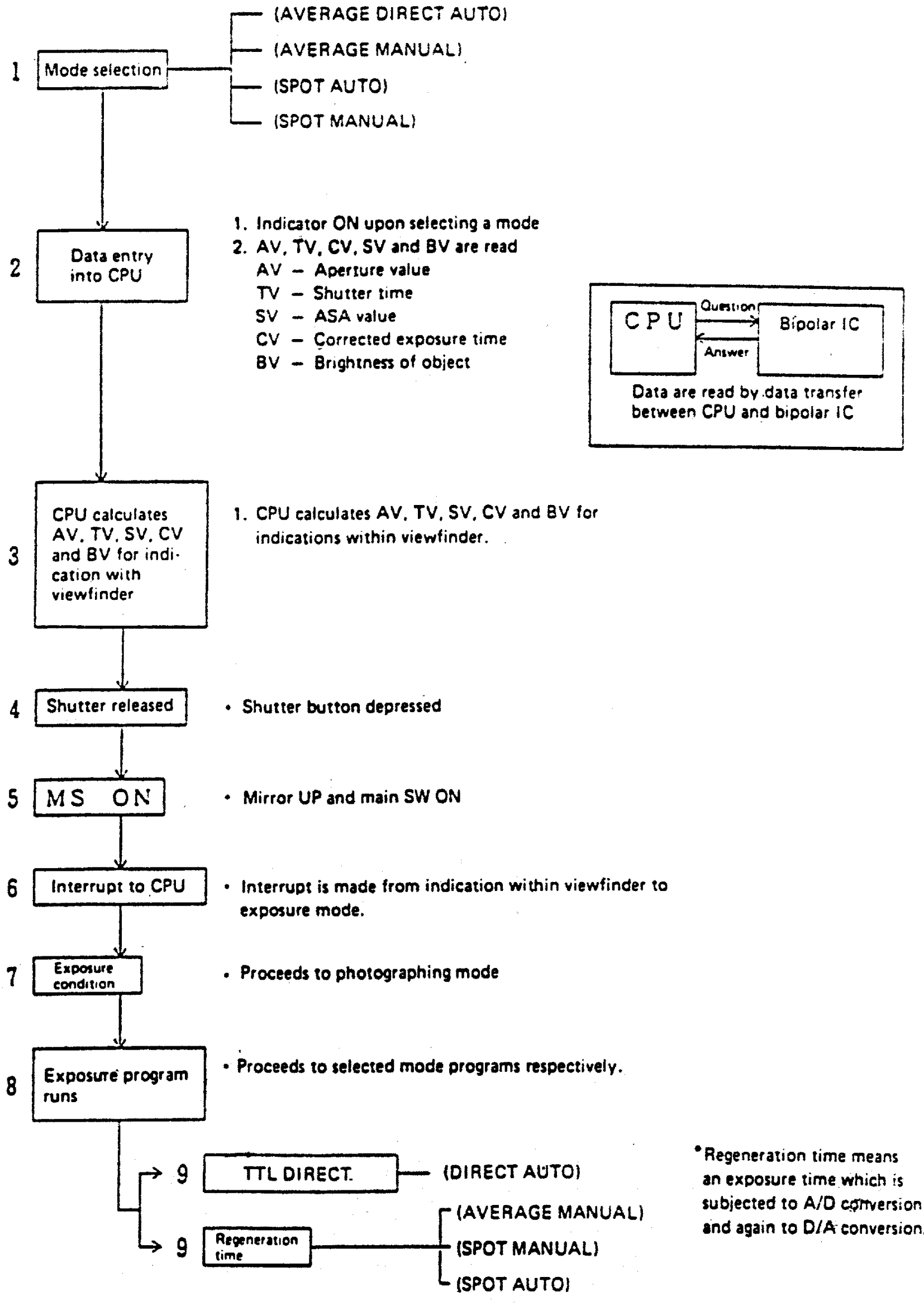
(3) MANUAL (AVERAGE MANUAL)
- Manual exposure time is indicated for average determined by light measurement for indication.

(4) SPOT MANUAL
- Spot exposure time in the MANUAL mode is determined by spot light measurement for indication.

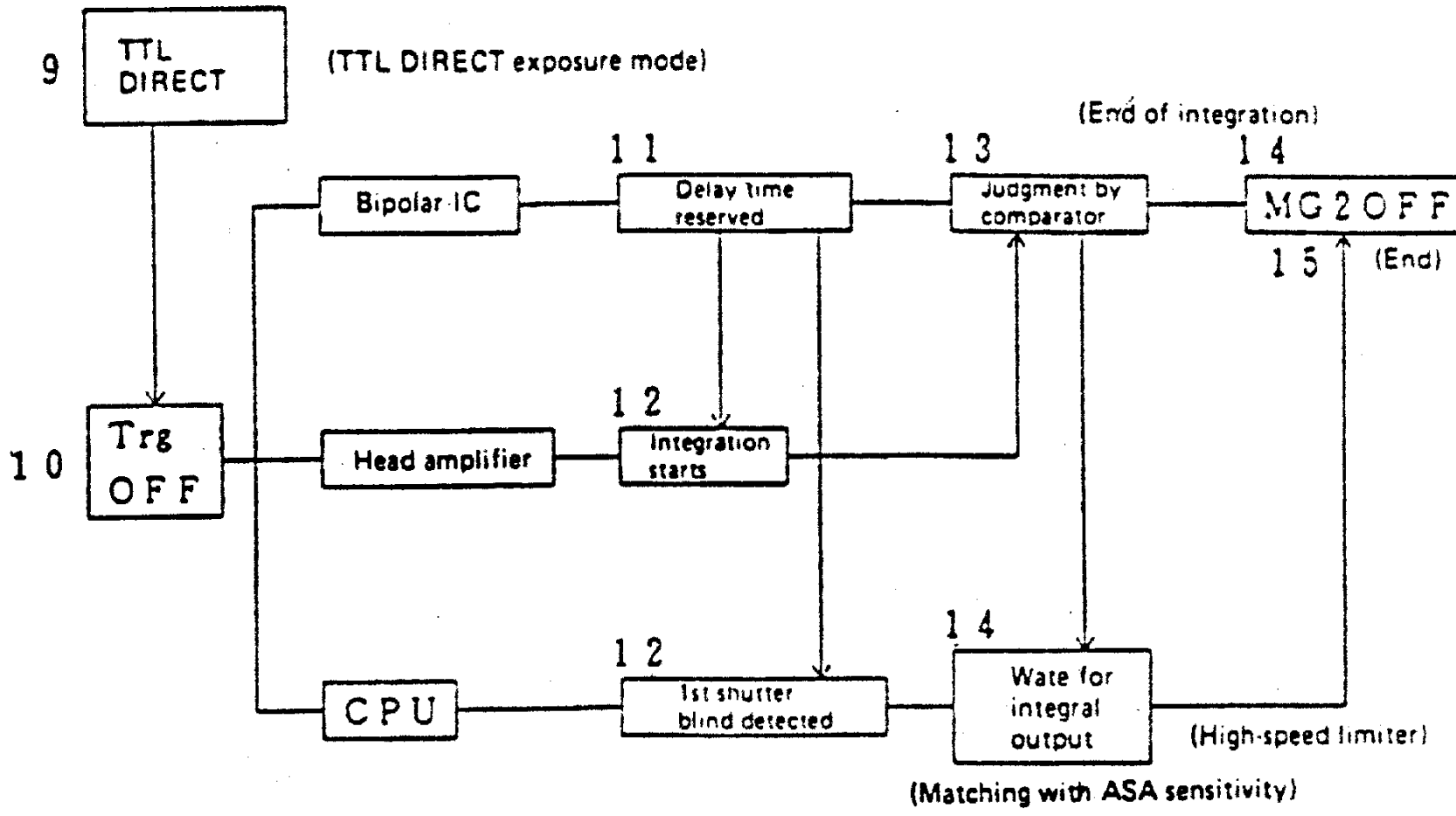
1-3. Relationship between Light Measurement for Indication and Light Measurement for Exposure

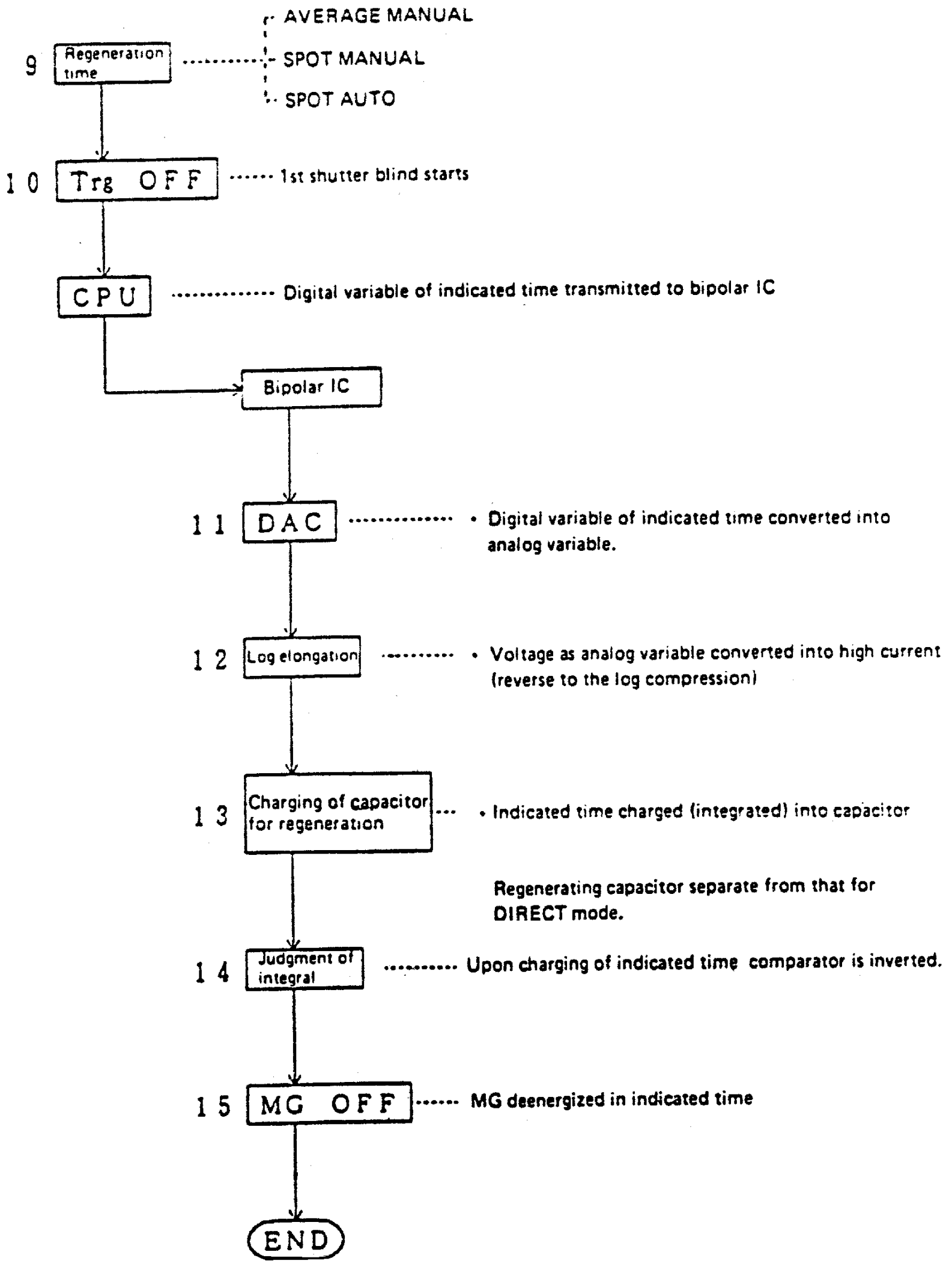


2. Sequence of Photographing Operations

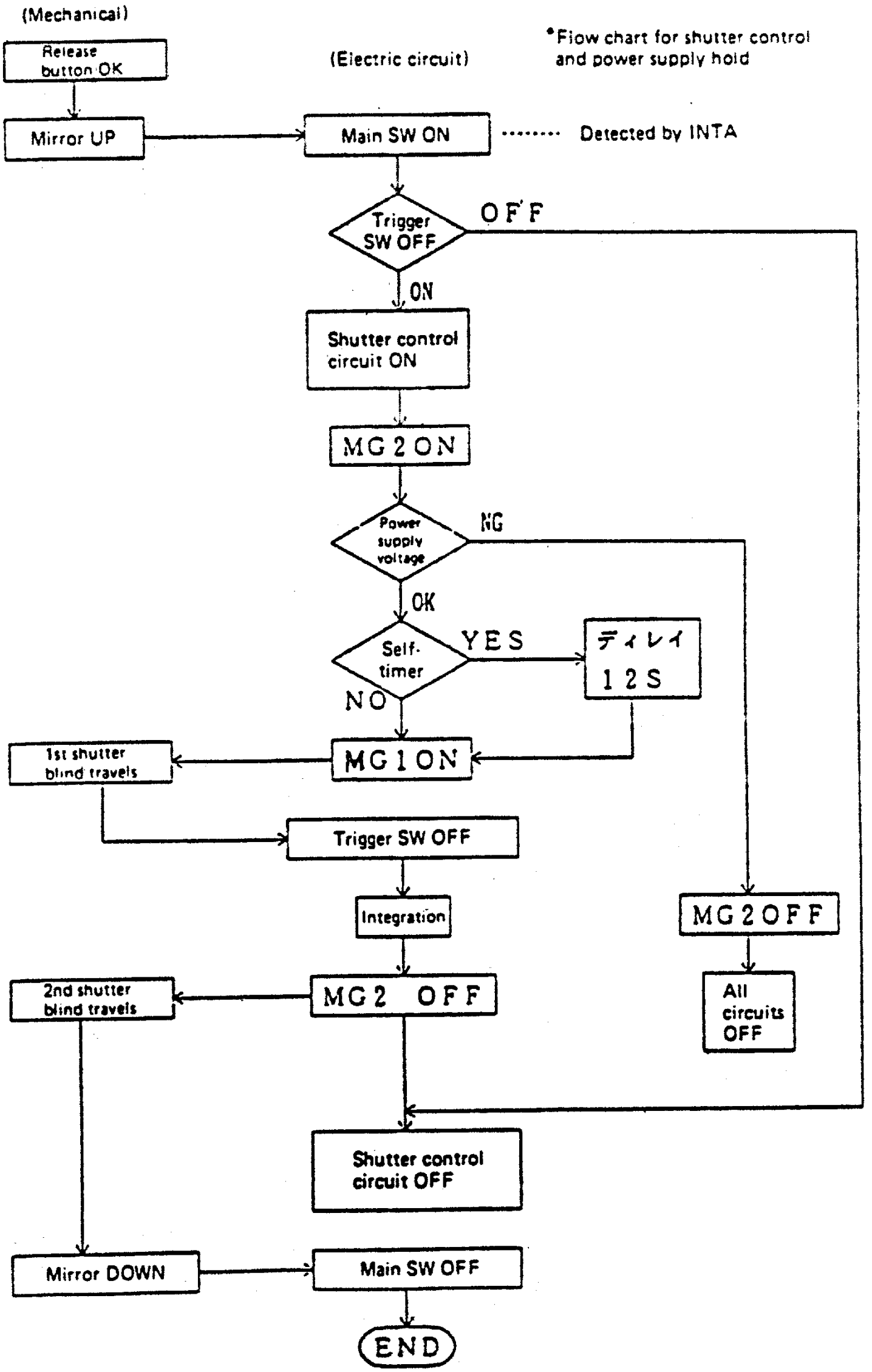


*Regeneration time means an exposure time which is subjected to A/D conversion and again to D/A conversion.

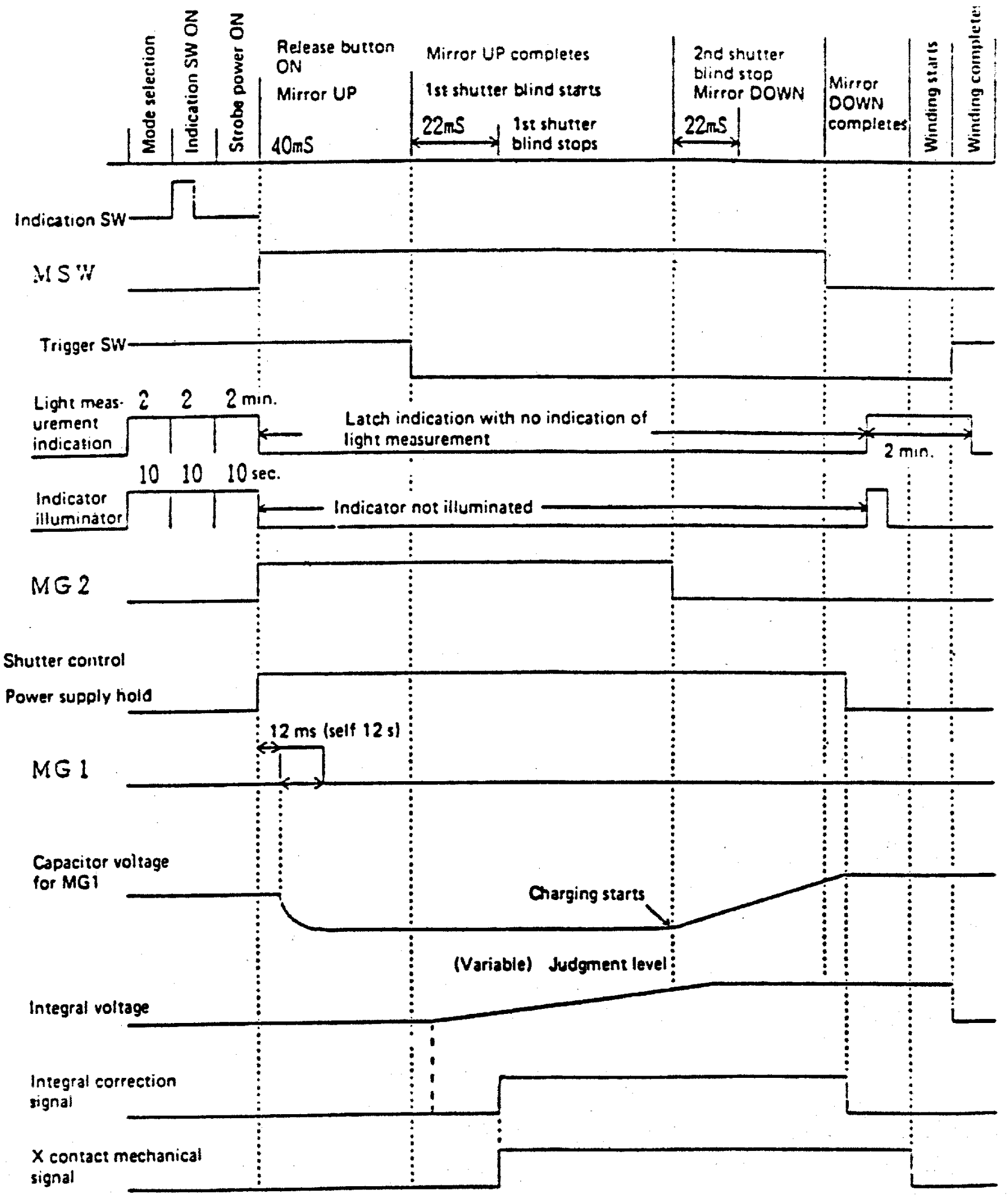

9
TTL DIRECT
(TTL DIRECT exposure mode)
(End of integration)
11
13
14
Bipolar IC
Delay time reserved
Judgment by comparator
MG2OFF
15
(End)
12
10
Trg OFF
Head amplifier
Integration starts
14
12
CPU
1st shutter blind detected
Wate for integral output
(High-speed limiter)
(Matching with ASA sensitivity)


AVERAGE MANUAL
9
Regeneration time
SPOT MANUAL
SPOT AUTO
10
Trg OFF
1st shutter blind starts
CPU
Digital variable of indicated time transmitted to bipolar IC
Bipolar IC
11
DAC
• Digital variable of indicated time converted into analog variable.
12
Log elongation
• Voltage as analog variable converted into high current (reverse to the log compression)
13
Charging of capacitor for regeneration
• Indicated time charged (integrated) into capacitor
Regenerating capacitor separate from that for DIRECT mode.
14
Judgment of integral
Upon charging of indicated time comparator is inverted.
15
MG OFF
MG deenergized in indicated time
END

3. Exposure Program Flow Chart



4. Indication & Exposure Time Chart



Z. OTHERS

CONTENTS

I. INFORMATION OF SHUTTER

1. Shutter locked by selecting MANUAL mode while shutter is opened in AUTO mode. Z-1

II. INFORMATION ON USE OF STROBE

1. OVER indication within viewfinder with strobe flickering Z-1
2. OVER often indication within viewfinder in use of T-series strobe Z-1
3. How many strobes can be attached simultaneously? Z-1
4. Strobe usable at mechanical shutter time (1/60) without battery Z-1
5. Strobe flashing synchronized at manual time of 1/125 ~ 1/2000? Z-1

III. INFORMATION ON SPOT LIGHT MEASUREMENT AND EXPOSURE

1. How is exposure affected by changing F No., ASA and ± correction after spot light measurement? Z-2
2. How is exposure affected by using preset for spot light measurement? Z-2
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IV. OTHERS

1. All OM system compatible? Z-2
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I. INFORMATION OF SHUTTER

Question	Answer
1. Shutter is closed by selecting MANUAL mode while shutter is opened in AUTO mode, and shutter is locked upon depressing shutter button in MANUAL mode.	Mode change is inhibited during photographing operation. When it is desired to close shutter while it is opened in AUTO mode, select the B. check mode before closing the shutter. This phenomenon occurs in the products manufactured at the initial stage (August to October) but is no sign of a trouble. In case of the products manufactured after October, shutter is not closed and AUTO operation continues even when MANUAL mode is selected while shutter is opened in the AUTO mode.

II. INFORMATION ON USE OF STROBE

1. Lamp flickers in operation with T-series strobe but OVER indicated within viewfinder	Indication within the viewfinder reliable. Change F No. or photographing distance. When T-series strobe is deenergized during flashing, it flickers the lamp as indication of strobe light control. At short photographing distance, however, correct exposure may not be obtained by stopping flashing. In such a case, OVER is indicated within the viewfinder. It is suggested to answer that the conflicting indications are due to the high performance of the camera.
2. Exposure is apparently controlled to the correct level in TTL AUTO mode but OVER is indicated within viewfinder in operation with T-series strobe (filmy surface paper loaded)	Filmy surface paper having reflectance higher than that of film is apt to cause OVER to be indicated. Use paper having reflectance similar to that of film should be used for demonstration.
3. How many strobe can be attached simultaneously?	Nine strobes can be attached simultaneously by using the direct contact, TTL auto synchro socket and TTL auto multi-connector.
4. Strobe usable at mechanical shutter time without battery?	Unusable. Since the strobe is flashed with the thyristor, it cannot be used without battery.
5. Strobe flashing synchronized at manual time of 1/125 ~ 1/2000?	The strobe flashes at all the manual times. However, note that it is not synchronized as 1/125 ~ 1/2000. In the AUTO mode, the strobe flashes at the brightness corresponding to 1/60 sec. or longer. It does not flash at the brightness corresponding to longer exposure times.

III. INFORMATION OF SPOT LIGHT MEASUREMENT AND EXPOSURE

Question	Answer
1. How is exposure affected by changing F No., ASA and ± correction after spot light measurement?	When F No., ASA and/or ± correction is modified, shutter speed is varied correspondingly to EV value in the spot light measurement. When F No. is changed, shutter speed is varied in correspondence to EV value and becomes equal to the exposure time in the SPOT mode. When ± correction is modified, exposure time is set at a level corresponding to EV value in the SPOT mode. (Shutter speed is varied.)
2. How is exposure affected by using present in spot light measurement?	Misoperation to result in over-exposure. Since exposure degree is determined based on the light intensity reduced by the preset, over-exposure results in to a degree corresponding to the number of steps from open to stop-down position. NOTE: Exposure degree is unaffected in light measurement other than the SPOT mode (direct light measurement).
3. Shutter is not opened for 4 min. in spot light measurement.	Use 50 mm F1.4 lens. The shutter is opened for about 4 minutes by releasing it in the dark at ASA 100, F1.4 and spot F16. The camera is controlled by the microcomputer so that exposure time determined at F1.4 in the SPOT mode is set at 0 EV at F16. Since light measurement in the SPOT mode at F16 cannot determine brightness accurately in the dark, the shutter is not opened for 4 minutes.

IV. OTHERS

1. All OM systems compatible?	Recodata Back 1 and 2 are incompatible with Model OM-4. 250 film back is compatible if partially modified. POL filter is unusable in the multi-spot mode.
2. How is diopter lens 5 usable?	Model OM-4 is designed for dioptric control within a range of +1 to −3.0. When a lens deviating from this range is combined with Model OM-4, diopter should be adjusted by using an eye cup.