

CONTROL COMMAND FOR VK-S934 SERIES

[REV. 1.1]

This manual applies following models:

<NTSC>	VK-S934
<PAL>	VK-S934E

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ONE

- **EXTERNAL CONTROL**

1. Communication protocol

Communication between the microcomputer of the camera and the PC is available by using the RS-232C protocol. The microcomputer receives each control command given by the PC and echoes it back to the PC.

2. Connect condition

Data length	8 bit
Stop bit	1 bit
Parity	even
Baudrate	4800 bps

3. Communication data format

All communication data consists of eight or ten ASCII characters (8 bytes or 10 bytes).

Communication data starts with the character ":" (colon).

The format of the communication data is shown in Fig. 1.

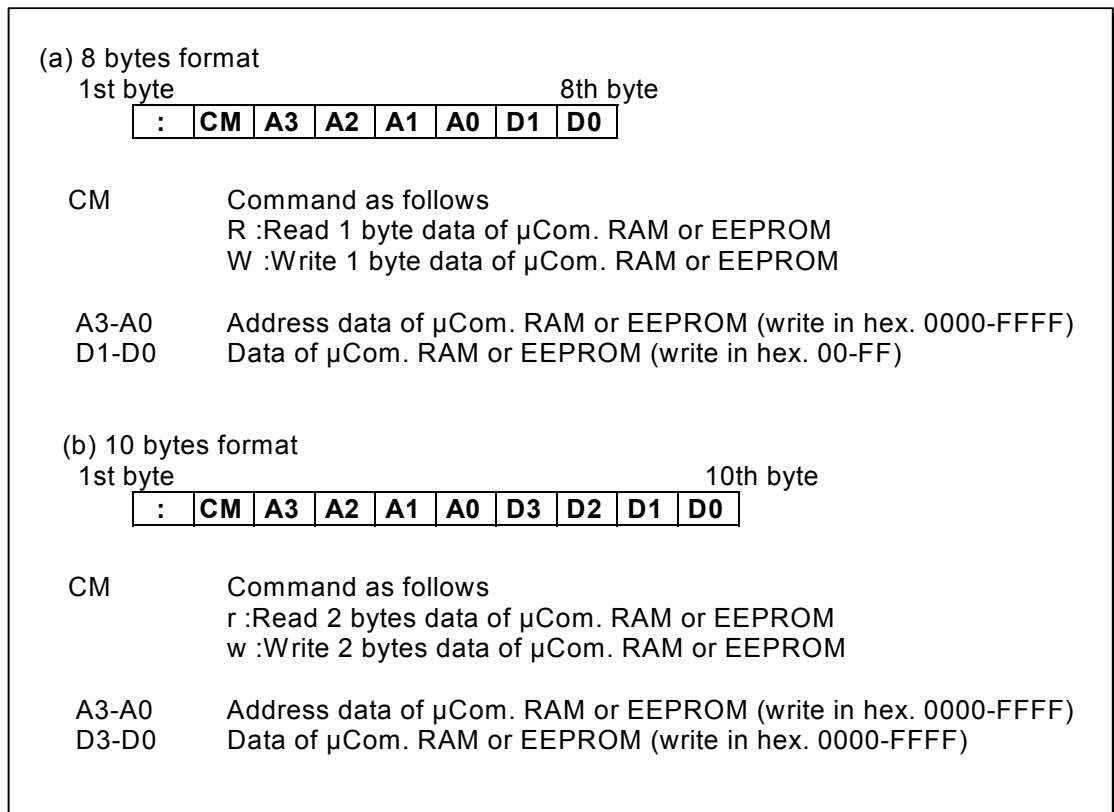


Fig. 1 Communication data format

[Note]: is difference of data between VK-S914 series and VK-S934.

4. Control commands

- a) Switch the auto focus / manual focus

```
:RFF0E00
:WFF0EX1X0
      bit 3 of X1X0 : 0-Auto 1-Manual
```

or

```
:WFCBBA8      ;Change
:WFCBBFE      ;Neutral
```

- b) Move focus to FAR in manual focus mode

```
:WFCBBA9      ;Start
:WFCBBFE      ;Stop
```

- c) Move focus to NEAR in manual focus mode

```
:WFCBBAA      ;Start
:WFCBBFE      ;Stop
```

- d) Move zoom to TELE

```
:WFCBB99      ;Start
:WFCBBFE      ;Stop
```

- e) Move zoom to WIDE

```
:WFCBB9B      ;Start
:WFCBBFE      ;Stop
```

- f) Select the zoom speed of optical zoom

```
:RFDFC00
:WFDFCX1X0
      Super HIGH SPEED (1.9 sec) * ;
      X1X0 : Set bit 3 of echo back data to "0".
              Set bit 2 of echo back data to "1".
      HIGH SPEED (3.6 sec);
      X1X0 : Set bit 3 of echo back data to "0".
              Set bit 2 of echo back data to "0".
      NORMAL SPEED (6.0 sec);
      X1X0 : Set bit 3 of echo back data to "1".
              Set bit 2 of echo back data to "0".
```

*[Note]: Super HIGH SPEED (1.9sec) for **Zoom Trace Preset Mode** only

g) Get the status of zoom position

:RFC9100

If echo back data is not "FF", zoom position is calculated by following equation.

$$\text{zoom position} = 16 \times 256 / (XX + 1)$$

XX; echo back data

If echo back data is "FF", then following commands should be sent.

:rF7200000

Echo back data shows zoom position.

[Please refer to the attached Table.1.]

Table.1 Zoom position data table (reference value)

Zoom position	X1	X2	X3	X4	X5	X6	X7	X8	X9
Echo back data	14C0 or less	2EF0 or less	3C60 or less	44F0 or less	4B30 or less	4FE0 or less	53B0 or less	56E0 or less	5990 or less
Zoom position	X10	X11	X12	X13	X14	X15	X16		
Echo back data	5BF0 or less	5DE0 or less	5FA0 or less	6110 or less	6250 or less	6360 or less	6360 or more		

h) Switch the continuous digi. zoom ON/OFF

:RFCCB00

:WFCCBX₁X₀

X₁X₀=00 ; OFF X₁X₀=01 ; ON

Please attached Continuous digi. zoom flow chart.

i) Set the maximum mag. tuning value in continuous digi. zoom ON mode

:WFDF0X₁X₀

$$X_1X_0(\text{hex}) = \{256 - (256/MM)\}(\text{dec})$$

MM; maximum mag.

[EX. mag.1; MM=1 X₁X₀=00

mag.2; MM=2 X₁X₀=80 ; max.]

j) Switch the instant digital zoom ON/OFF

:RFF0F00

:WFF0FX₁X₀

bit 7 of X₁X₀ : 0-OFF 1-ON

k) Set the instant mag. tuning value in instant digi. zoom ON mode

:WFDE6X₁X₀

$$X_1X_0(\text{hex}) = IM \times 10(\text{dec})$$

IM; instant mag.

(more than 1.0 and 0.1 step)

[EX. mag.1; IM=1.0 X₁X₀=0A

mag.2; IM=2.0 X₁X₀=14 ; max.]

l) Switch the auto / manual shutter speed

Please attached Program AE command sheet.

m) Set the shutter speed tuning value in manual shutter mode

Please attached Program AE command sheet

n) Switch the auto / manual exposure

Please attached Program AE command sheet.

o) Set the brighter exposure tuning value in manual exposure mode

Please attached Program AE command sheet.

p) Set the darker exposure tuning value in manual exposure mode

Please attached Program AE command sheet.

q) Switch the auto gain control (AGC) ON/OFF

:RFB7F00

:WFB7FX₁X₀

bit 7 of X₁X₀ : 0-ON 1-OFF

r) Set the fixed AGC level tuning value in AGC OFF mode

:wFB38X₃X₂X₁X₀

X₃X₂X₁X₀ : tuning value

(X₃X₂X₁X₀=0000~03C0 ; 0.03125dB/step)

[X₃X₂X₁X₀=0000 ; 0dB ,

X₃X₂X₁X₀=03C0 ; 30dB]

s) Switch the auto / manual white balance

:RFBFF00

:WFBFFX₁X₀

bit 3 of X₁X₀ : 0-Auto 1-Manual

t) Set the white balance (R gain) tuning value in manual white balance mode

:wFBBCX₃X₂X₁X₀

X₃X₂X₁X₀ : tuning value

(min. H'0080, max. H'03FF)

X₃X₂X₁X₀: H'0080~H'00FF, H'0180~H'01FF,

H'0280~H'02FF, H'0380~H'03FF

u) Set the white balance (B gain) tuning value in manual white balance mode

:wFBEX₃X₂X₁X₀

X₃X₂X₁X₀ : tuning value

(min. H'0080, max. H'03FF)

X₃X₂X₁X₀: H'0080~H'00FF, H'0180~H'01FF,

H'0280~H'02FF, H'0380~H'03FF

5. Others

[Note]: * mark : Changes are effective after power reset.

Default values in EEPROM area are subject to change without notice.

a) Get the camera type

[EEPROM area]

:RE1EDX₁X₀

:RE1EEX₁X₀

X₀ = Camera Version Number

	Type data (X ₁ X ₀ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area "E1ED"	30	30				
EEPROM area "E1EE"	0X ₀	1X ₀				

b) Set the minimum focus length tuning value in zoom-wide

[EEPROM area] *

:WE139X₁X₀

(X₁X₀=00 ; 1cm (approx.) ; default

X₁X₀=F9 ; 10cm (approx.)

X₁X₀=F8 ; 30cm (approx.)

X₁X₀=F7 ; 1m (approx.) ; max.)

c) Set the auto iris control level tuning value in auto exposure mode

i) Iris offset (average) level

[RAM area]

:WFD9EX₁X₀ (X₁X₀=00~FF ; 256 step)

[EEPROM area] *

:WE09EX₁X₀ (X₁X₀=00~FF ; 256 step)

	default value (X ₁ X ₀ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area "E09E"	42	39				

ii) Iris offset (peak) level

[RAM area]

:WFD9FX₁X₀ (X₁X₀=00~7F ; 128 step)

[EEPROM area] *

:WE09FX₁X₀ (X₁X₀=00~7F ; 128 step)

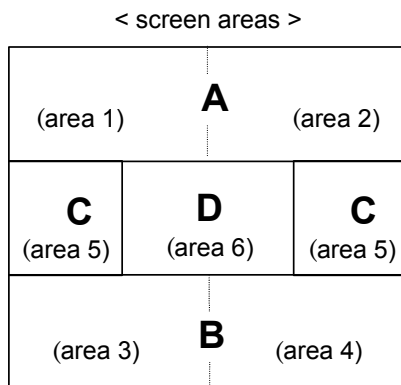
	default value (X ₁ X ₀ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area "E09F"	08	10				

d) Get the luminance data for the 6 screen areas

[RAM area]

area 1 :RFAE0000000 ; data length 3Byte
 area 2 :RFAE3000000 ; data length 3Byte
 area 3 :RFAE6000000 ; data length 3Byte
 area 4 :RFAE9000000 ; data length 3Byte
 area 5 :RFAEC000000 ; data length 3Byte
 area 6 :RFAEF000000 ; data length 3Byte

[Note] This is the average data per one field.



< weighting areas >

A= area 1 + area 2
 B= area 3 + area 4
 C= area 5
 D= area 6

< default weighting-ratio >

A:B:C:D = (K_a+1): (K_b+1): (K_c+1): (K_d+1)
 = (4+1): (6+1): (9+1): (F+1)
 = (5): (7): (10): (16)

e) Set the luminance weighting data tuning value

[RAM area]

:wFDA0X₃X₂X₁X₀
 (X₃=X₂=X₁=X₀=0~F ; 16 step)
 (X₃: K_a , X₂: K_b , X₁: K_c , X₀: K_d)

[EEPROM area] *

:wE0A0X₃X₂X₁X₀
 (X₃=X₂=X₁=X₀=0~F ; 16 step)
 (X₃: K_a , X₂: K_b , X₁: K_c , X₀: K_d)
 [X₃X₂X₁X₀=469F ; default]

- f) Switch the back light compensation (BLC) ON/OFF

[RAM area]
 :RFECE0
 :WFECEX₁X₀
 X₁X₀=00 ; OFF X₁X₀=02 ; ON

- g) Set the BLC level tuning value in BLC ON mode

[RAM area]
 :WFD8EX₁X₀ (X₁X₀=00~FF ; 256 step)

 [EEPROM area] *
 :WE08EX₁X₀ (X₁X₀=00~FF ; 256 step)

	default value (X ₁ X ₀ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area "E08E"	10	10				

- h) Set the burst ON/OFF

[EEPROM area] *
 :WE198X₁X₀ (X₁X₀=00~FF ; 256 step)
 :WE199X₁X₀ (X₁X₀=00~FF ; 256 step)
 :WE19AX₁X₀ (X₁X₀=00~FF ; 256 step)
 :WE19BX₁X₀ (X₁X₀=00~FF ; 256 step)

	default value (X ₁ X ₀ =)		
MODEL	VK-S934	VK-S934E	
FORMAT	NTSC Hi-BAND	PAL Hi-BAND	NTSC / PAL
	burst ON		OFF
EEPROM area			
"E198"	64	6C	00
"E199"	80	96	00
"E19A"	00	6C	00
"E19B"	00	96	00

[Note] no address "E059 - E05C" on EEPROM

- i) Set the chroma suppression level tuning value in AGC range

[RAM area]			
AGC gain		AGC ON	:WB790X ₄ Y ₄
AGC gain	AGC ON	1/3 maximum AGC level	:WB791X ₃ Y ₃
AGC gain	1/3 maximum AGC level	2/3 maximum AGC level	:WB792X ₂ Y ₂
AGC gain	2/3 maximum AGC level	maximum AGC level	:WB793X ₁ Y ₁
AGC gain	maximum AGC level		:WB794X ₀ Y ₀
(X ₇ X ₇ =00~FF ; 256 step)			
darker (H'00) < center (H'7F) < brighter (H'FF)			
[Note] maximum AGC level setting at page 15 - item m)			
chroma suppression level tuning values at Fig. 1			

[EEPROM area] *			
AGC gain		AGC ON	:W1340X ₄ Y ₄
AGC gain	AGC ON	1/3 maximum AGC level	:W1341X ₃ Y ₃
AGC gain	1/3 maximum AGC level	2/3 maximum AGC level	:W1342X ₂ Y ₂
AGC gain	2/3 maximum AGC level	maximum AGC level	:W1343X ₁ Y ₁
AGC gain	maximum AGC level		:W1344X ₀ Y ₀
(X ₇ X ₇ =00~FF ; 256 step)			
darker (H'00) < center (H'7F) < brighter (H'FF)			
[Note] maximum AGC level setting at page 15 - item m)			
chroma suppression level tuning values at Fig. 1			

	default value (X ₇ X ₇ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area						
"1340"	7F	7F				
"1341"	7F	7F				
"1342"	76	68				
"1343"	52	42				
"1344"	40	40				

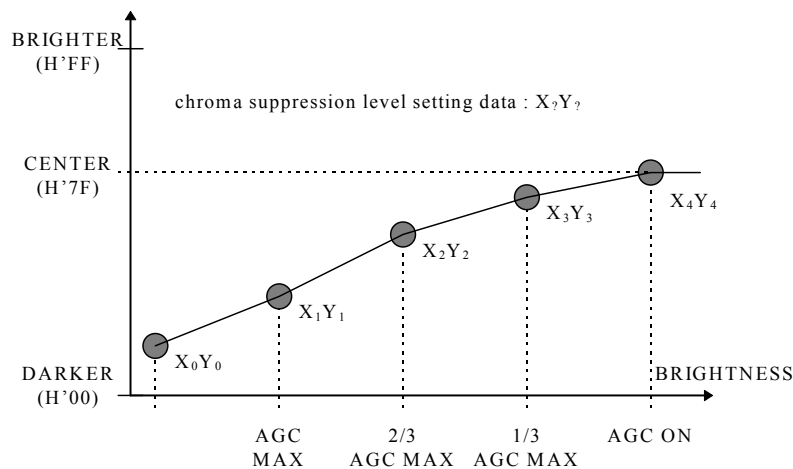


Fig. 1 Chroma suppression level

j) Select the manual aperture mode

[RAM area]

:RFBFF00

:WFBFFX₁X₀

X₁X₀ : Set bit 1 of echo back data to "1".

[bit 1 of X₁X₀ : 0-Auto 1-Manual]

k) Set the horizontal aperture level tuning value

:WFBF6X₁X₀ (X₁X₀=00~1F ; 32 step)

[EEPROM area] *

AGC gain		AGC ON	:W1350X ₄ Y ₄
AGC gain	AGC ON	1/3 maximum AGC level	:W1351X ₃ Y ₃
AGC gain	1/3 maximum AGC level	2/3 maximum AGC level	:W1352X ₂ Y ₂
AGC gain	2/3 maximum AGC level	maximum AGC level	:W1353X ₁ Y ₁
AGC gain	maximum AGC level		:W1354X ₀ Y ₀

(X₂X₇=00~1F ; 32 step)

[Note] maximum AGC level setting at page 15 - item m)
horizontal aperture level tuning values at Fig. 2

	default value (X ₂ X ₇ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area						
"1350"	1A	1A				
"1351"	18	18				
"1352"	15	15				
"1353"	0A	0A				
"1354"	08	08				

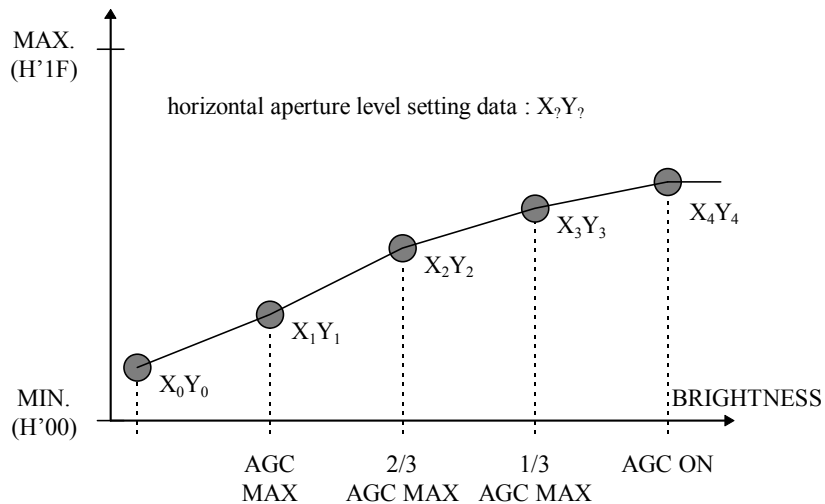


Fig. 2 horizontal aperture level

l) Set the vertical aperture level tuning value

:WFBF9X₁X₀ (X₁X₀=00~1F ; 32 step)

[EEPROM area] *

AGC gain		AGC ON	:W13A0X ₄ Y ₄
AGC gain	AGC ON	1/3 maximum AGC level	:W13A1X ₃ Y ₃
AGC gain	1/3 maximum AGC level	2/3 maximum AGC level	:W13A2X ₂ Y ₂
AGC gain	2/3 maximum AGC level	maximum AGC level	:W13A3X ₁ Y ₁
AGC gain	maximum AGC level		:W13A4X ₀ Y ₀

(X₇X₇=00~1F ; 32 step)

[Note] maximum AGC level setting at page 15 - item m)
vertical aperture level tuning values at Fig. 3

	default value (X ₇ X ₇ =)				
MODEL	VK-S934	VK-S934E			
FORMAT	NTSC Hi-BAND	PAL Hi-BAND			
EEPROM area					
"13A0"	1A	1A			
"13A1"	15	15			
"13A2"	12	12			
"13A3"	08	08			
"13A4"	03	03			

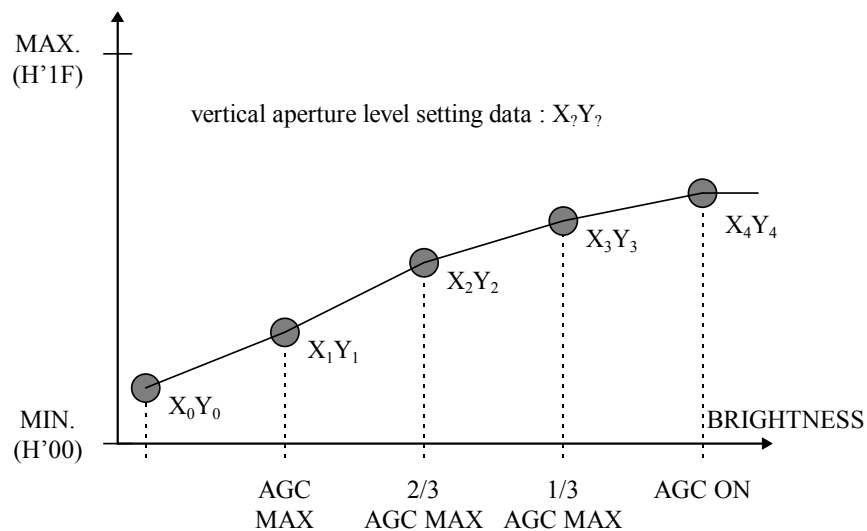


Fig. 3 vertical aperture level

m) Set the maximum AGC gain tuning value in AGC ON mode

[RAM area]

:wFD46X₃X₂X₁X₀

:WB5B6Y₁Y₀

:WB5BCY₁Y₀

(X₃X₂X₁X₀=0000~0500 ; 0.03125dB/step)

[Note] condition between X₃X₂X₁X₀ and Y₁Y₀

Y₁Y₀ = X₃X₂X₁X₀ / 8

[X₃X₂X₁X₀=0000, Y₁Y₀=00 ; 0dB ,

X₃X₂X₁X₀=0500, Y₁Y₀=A0; 40dB]

[EEPROM area] *

:wE046X₃X₂X₁X₀

:W1166Y₁Y₀

:W116CY₁Y₀

(X₃X₂X₁X₀=0000~0500 ; 0.03125dB/step)

[Note] condition between X₃X₂X₁X₀ and Y₁Y₀

Y₁Y₀ = X₃X₂X₁X₀ / 8

[X₃X₂X₁X₀=0000, Y₁Y₀=00 ; 0dB ,

X₃X₂X₁X₀=0500, Y₁Y₀=A0; 40dB]

	default value (X ₃ X ₂ X ₁ X ₀ =)					
MODEL	VK-S934	VK-S934E				
FORMAT	NTSC Hi-BAND	PAL Hi-BAND				
EEPROM area						
"E046"	0320	0400				
"1166"	64	80				
"116C"	64	80				
maximum AGC Gain	25.0dB	32.0dB				

n) Change Communication Baudrate

[EEPROM area] *

:WE05EX₁X₀

(X₁X₀=80 or 00

; 4800 bps , even Parity ; default

X₁X₀=B0 ; 9600 bps , even Parity

X₁X₀=C0 ; 4800 bps , non Parity

X₁X₀=F0 ; 9600 bps , non Parity)

o) Set RAM initialize

[RAM area]

:WFF0A00

:WFCAC00

6. Other useful commands

a) Preset Mode

(MF, No-Trace, Zoom Speed ; **1.6sec**)

- Preset mode - Flow chart

See an annexed document "Document 1".

Document 1: **s934_pp1.doc**

b) Zoom Trace Preset Mode

(MF, Trace, Zoom Speed ; **1.9sec**)

- Zoom trace preset mode - Flow chart

See an annexed document "Document 2".

Document 2: **s934_zt1.doc**

c) Program AE (Digital Slow Shutter, Shutter / Exposure Priority)

- Digital slow shutter control command
- Shutter priority control command
- Exposure priority control command

See document "PART TWO"

PART TWO: PROGRAM AE CONTROL COMMAND

d) Continuous Digital Zoom

- Continuous Digital Zoom Control - Flow chart

See document "PART THREE"

PART THREE: CONTINUOUS DIGITAL ZOOM CONTROL COMMAND

e) Control Command Timing

- Control command timing

See document "PART FOUR"

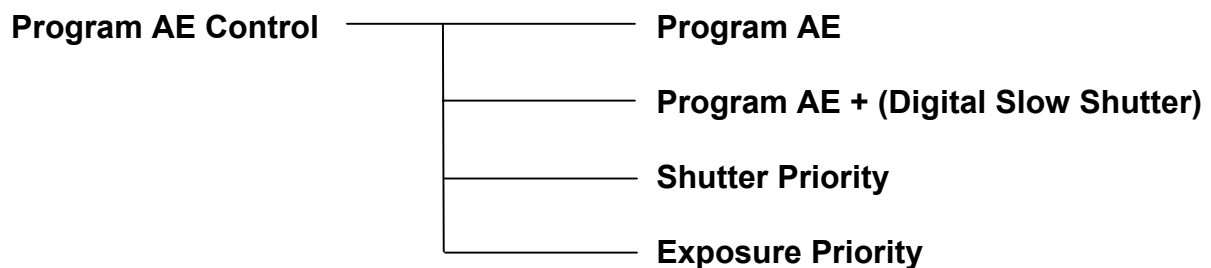
PART FOUR: CONTROL COMMAND TIMING

PART TWO

• PROGRAM AE CONTROL COMMAND

1. Program AE mode

The following Control Commands are Program AE Commands added to VK-S934.



VK-S934 Program AE Control

2. Program AE
a) Mode switch

:RFCC800
:WFCC8X₁X₀
X₁X₀=00

3. Program AE + (Auto digital slow shutter)
a) Mode switch

:RFCC800
:WFCC8X₁X₀
X₁X₀=01; [default]

- b) digital slow shutter status

:RFCC700
Echo back data is digital slow shutter status.

[Please attached Table. 1.]

Table. 1 Digital slow shutter table

X ₁ X ₀ (echo back data)	Shutter Speed (s)	
	NTSC	PAL
01	- 1/60	- 1/50
02	1/60 - 1/30	1/50 - 1/25
04	1/30 - 1/15	1/25 - 1/13
08	1/15 - 1/ 8	1/13 - 1/ 6
10 [default]	1/8 - 1/ 4	1/6 - 1/ 3
20	1/4 - 1/ 2	1/3 - 1/ 1.5

- c) Auto digital slow shutter limit

:R11E500
:W11E5X₁X₀

X ₁ X ₀ (echo back data)	Shutter Speed (s)	
	NTSC	PAL
01	1/60	1/50
02	1/30	1/25
04	1/15	1/13
08	1/ 8	1/ 6
10 [default]	1/ 4	1/ 3
20	1/ 2	1/ 1.5

4. Shutter priority
a) Mode switch

:RFCC800
:WFCC8X₁X₀
X₁X₀=07

- b) Set the shutter speed tuning value

:RFCC900
:WFCC9X₁X₀
X₁X₀ ; tuning value

[Please refer to the attached Table.2.]

Table. 2 Shutter speed data table in shutter priority mode

X ₁ X ₀ (setting data)	Shutter Speed (s)	
	NTSC	PAL
00	1/2	1/1.5
01	1/4	1/3
02	1/8	1/6
03	1/15	1/13
04	1/30	1/25
05	1/60	1/50
06	1/120	1/100
07	1/180	1/150
08	1/250	1/250
09	1/500	1/500
0A	1/1000	1/1000
0B	1/2000	1/2000
0C	1/4000	1/4000
0D	1/10000	1/10000
0E	1/30000	1/30000

5. Exposure priority

a) Mode switch

:RFCC800
:WFCC8X₁X₀
X₁X₀=08

b) Set the exposure tuning value

:RFCC900
:WFCC9X₁X₀
X₁X₀ ; tuning value

[Please refer to the attached Table.3.]

Table. 3 Exposure data table
in exposure priority mode

F-value	X ₁ X ₀ (setting data)
F1.4	00
F2.0	01
F2.8	02
F4.0	03
F5.6	04
F8.0	05
F11	06
F16	07
F22	08
F32	09

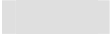
**PART
THREE**

• CONTINUOUS DIGITAL ZOOM CONTROL COMMAND**1. Continuous Digital Zoom Control**

Table 1 shows the difference between the previous series and the DSS series.

Table 1

Zoom moving area	Zoom direction	Type
Optical	Wide → Tele	Same as previous
Optical	Tele → Wide	Same as previous
Digital	Wide → Tele	New
Digital	Tele → Wide	New

[Note]:  shows the difference between the previous series and the DSS series.

The following flow chart (Fig. 1) is Continuous Digital Zoom control.

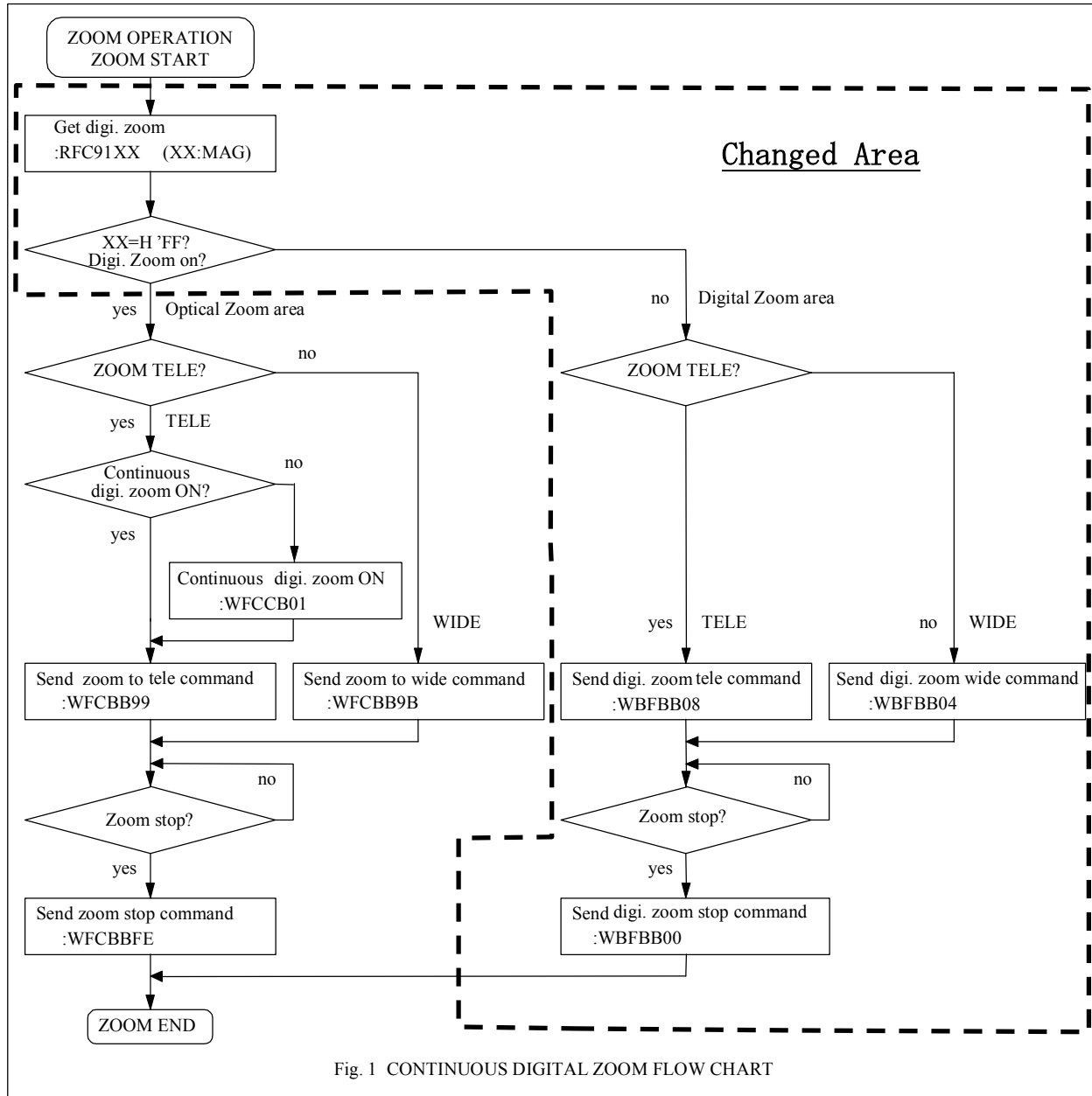


Fig. 1 CONTINUOUS DIGITAL ZOOM FLOW CHART

PART
FOUR

- **CONTROL COMMAND TIMING**

1. Timing table - Program AE commands
(Fig. 1)

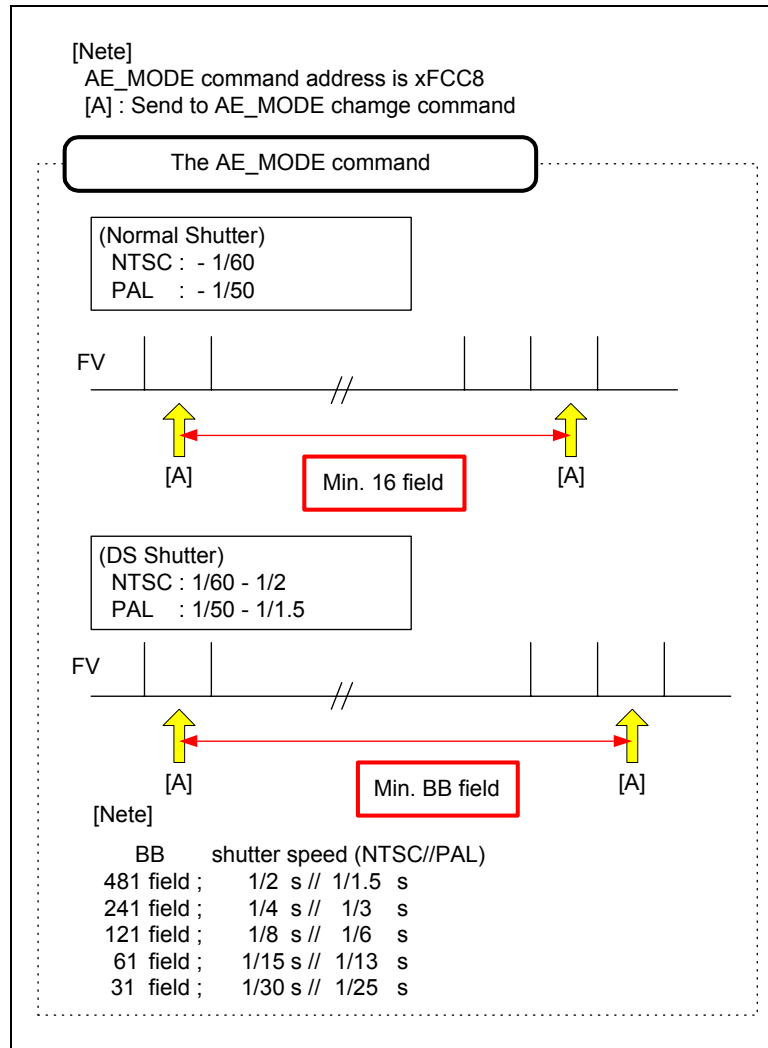


Fig. 1 Change AE_MODE timing

2. Timing table - After ZOOM commands (Digital Slow Shutter mode only)
(Fig. 2)

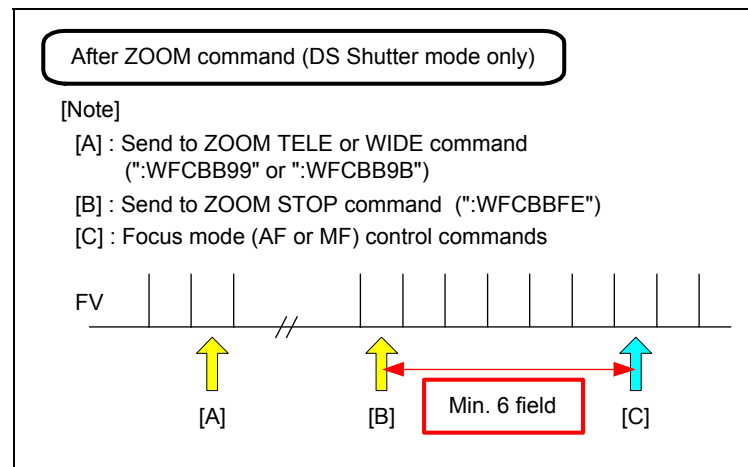


Fig. 2 After ZOOM commands timing

3. Timing table - Other commands
(Fig. 3)

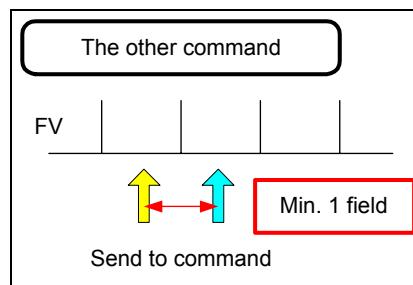


Fig. 3 Other command timing

PART FIVE

• FOCUS MODE IN DIGITAL SLOW SHUTTER

1. Focus and Zoom modes during Digital Slow Shutter
(Table 1)

Table 1

Shutter Speed		Initial Focus Mode	Focus Mode During Zooming	Focus Mode After Zooming	Case Number In Fig. 1
NTSC/EIA	PAL/CCIR				
1/60 - 1/8	1/50 - 1/6	AF	MF	AF	<Case 1>
1/8 - 1/2	1/6 - 1/1.5	MF	MF	MF	<Case 2>
1/60 - 1/2	1/50 - 1/1.5	AF	AF→ MF[*1]	MF	<Case 3>

[*1] Camera enters Digital Slow Shutter mode during zooming

The following Fig.1 is Focus mode while Zooming during Digital Slow Shutter.

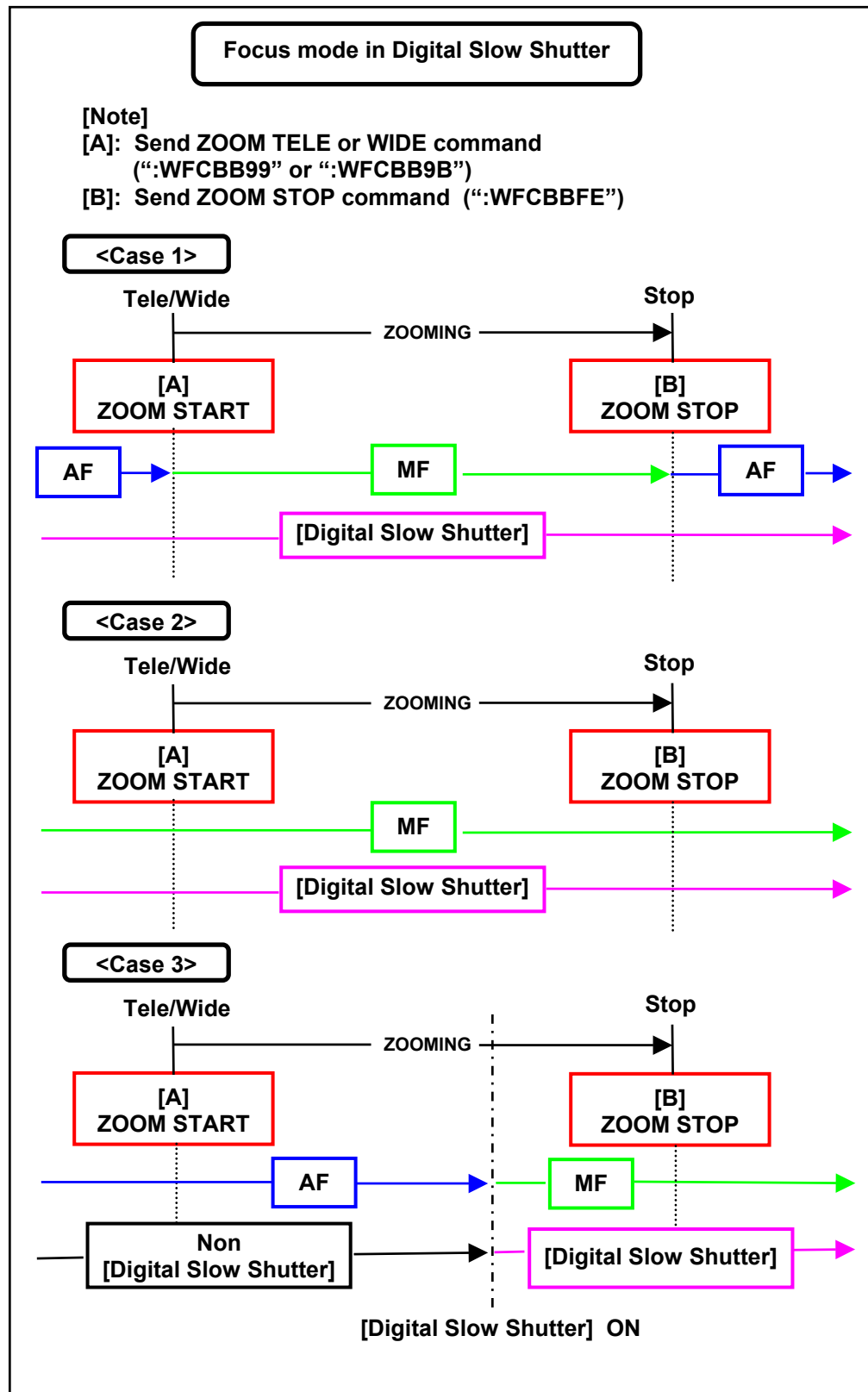


Fig. 1 Focus mode while Zooming during Digital Slow Shutter

PART SIX

• APPENDIX

[REV. 1.0]

99/09/21 * Original Version

[REV. 1.1]

99/11/11 * PART - 4: CONTROL COMMAND TIMING

<refine>

page 24: Timing table - Program AE commands

<addition>

page 25: Timing table - After ZOOM commands (DS Shutter mode only)

* PART - 5: FOCUS MODE IN DIGITAL SLOW SHUTTER

<addition>

pages 26-27: Focus mode in Digital Slow Shutter