◎ Interrupt Return

FNC(03)	16 bits: IRET - 1 Steps			J1n	J2n--
IRET					

Operand: None

◎ Enable Interrupt

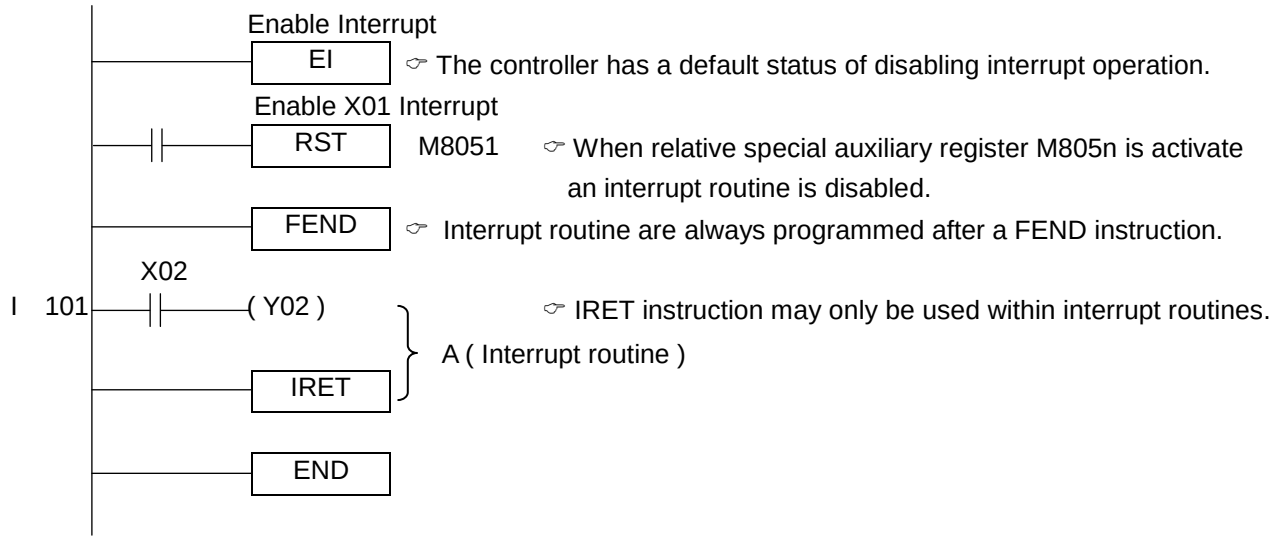
FNC(04)	16 bits: EI - 1 Steps			J1n	J2n--
EI					

Operand: None

◎ Disable Interrupt

FNC(05)	16 bits: DI - 1 Steps			J1n	J2n--
DI					

Operand: None



Number of Interrupt pointer

I 0 Interrupt Input Relay 6 points

0 : Falling Edge Trigger, 1 : Rising Edge Trigger.

No. of Input Relay X0 ~ X5 (0 ~ 5) (Can't duplicate)

I Timer interrupt 1 points

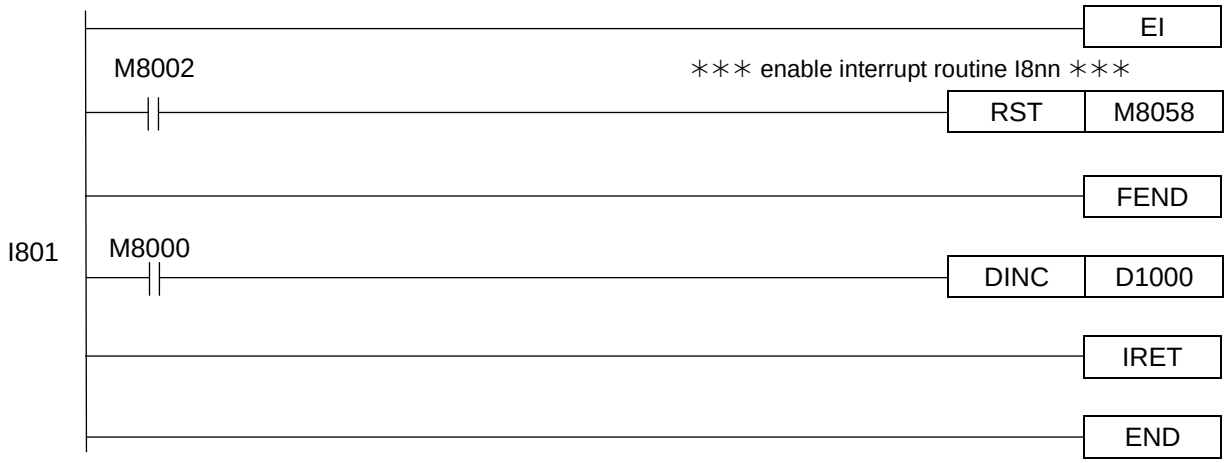
01 ~ 99 ms

8

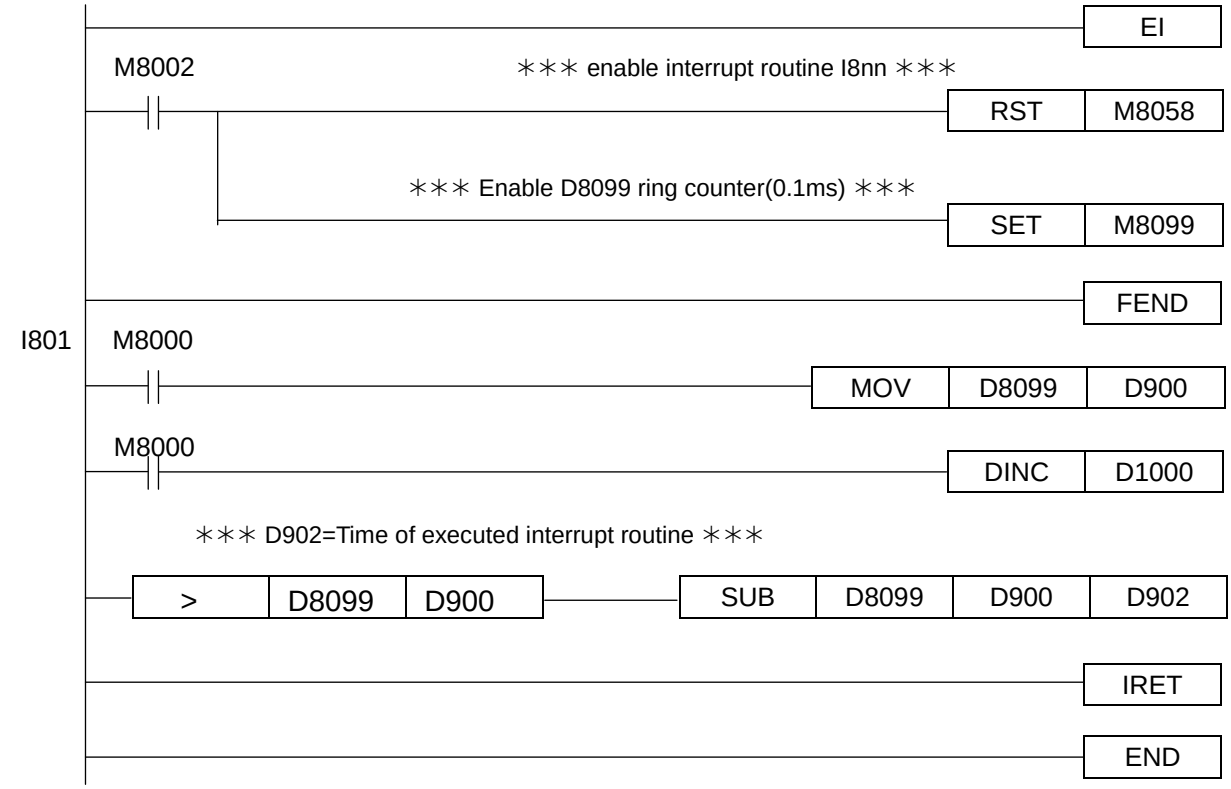
<< Note >>

- ♦ When an interrupt program execute, other Interrupt Call is ineffective.
- ♦ If Interrupt occur within the range of Disable Interrupt (DI~EI), this interrupt request signal is stored temporarily, and execute until within the range of Enable Interrupt (EI~DI).
- ♦ When Disable Interrupt flag M805Δ act, the corresponding Interrupt input will not be executed.
- ♦ In interruption program, FNC(50) REF command can not be used. (Ex: section A in above sample program)

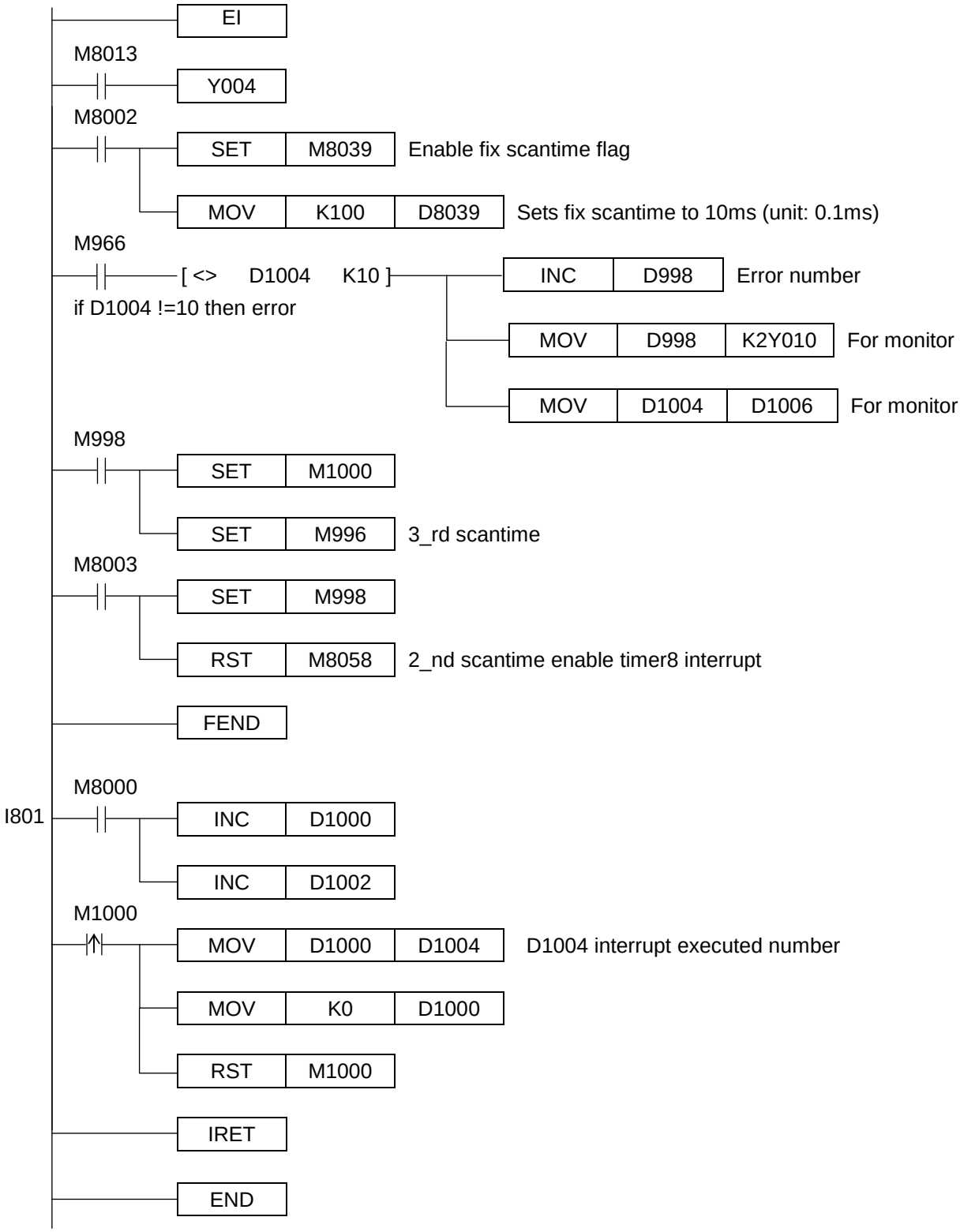
◎ Timer Interrupt program



◎ Caculated Interrupt routine executed time



◎ Used FixScanTime Test Timer Interrupt



◎ Reset by High Speed Counter

FNC(54)		
D	HSCR	

32 bits: HSCR - 13 Steps

		J1n	J2n--

Operands: [S1.]

K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

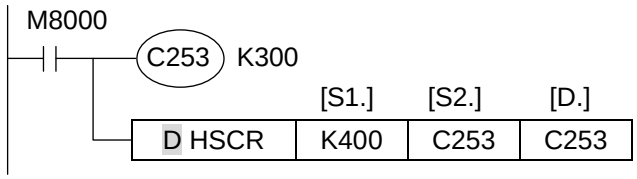
[S2.] : C235~C255

Operands:

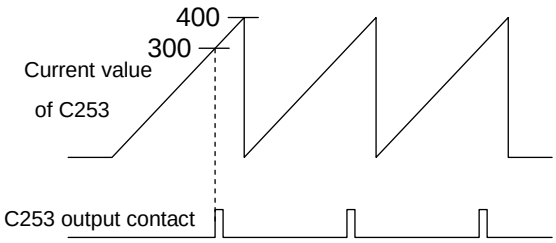
X	Y	M	S

[D.] Can assign [D.] and [S2.] are the same High Speed Counter.

Flag:



♦ When current value of C253 is 400, C253 will be cleared immediately. Current value will become 0, and output contact will not act.



♦ This command is specialized instruction of 32 bits, so have to use D HSCR.

◎ Zone Compare For High Speed Counter

FNC(55)		
D	HSZ	

32 bits: HSZ- 17 Steps

Operands: [S1.][S2.]

K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

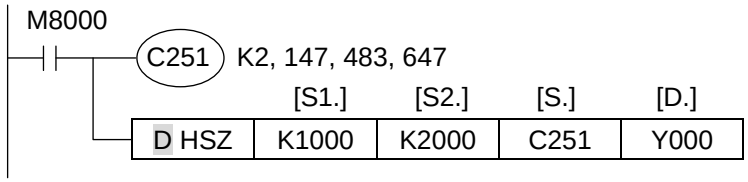
[S.] : C235~C255

Operands:

X	Y	M	S

[D.]

Flag:



<Compare action of input>

K1000>C251 current value	Y000	ON
K1000≦C251 current value≦K2000	Y001	ON
K2000<C251 current value	Y002	ON

♦ This command is specialized instruction of 32 bits, so have to use D HSZ.

♦ Content of [S1.] and [S2.] is according to [S1.] ≦ [S2.] .

♦ When use FNC55, operate external output by Interrupt. Output will act without effect by scan-cycle.

◎ Speed Detect

FNC(56)			16 bits: SPD - 7 Steps
	SPD		

		J1n	J2n--

Operands: (S1.): X000~X005. When C251 is used, X02 and X03 can not be used.

Operands: ←— [S2.] —→

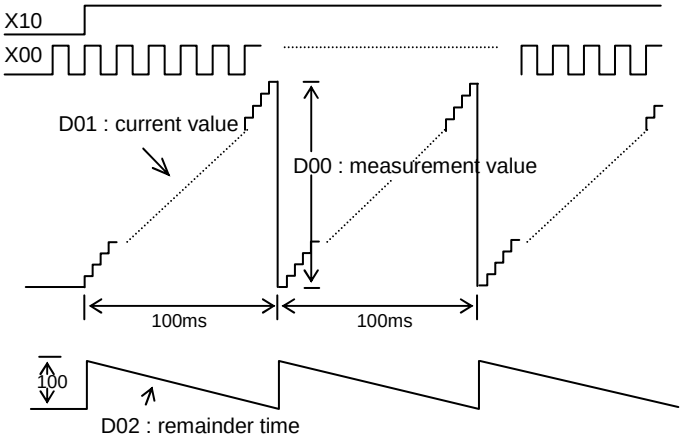
K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

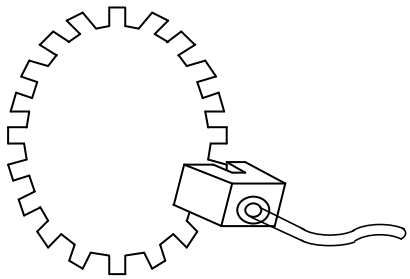
Flag:M8029 ←— [D.] —→

	[S1.]	[S2.]	[D.]
SPD	X00	K100	D00

- ♦ The input pulse assigned by [S1.], and the [S2.] assign measurement time, the result will be stored at [D.].
- ♦ This will automatic occupy 3 word devices from the head address of [D.]. (D00~D02)
- ♦ This example D01 count up the pulse number of X00 (OFF→ON), and put the result into D00 at 100msec after. Then reset D01to “0” and start counting again.
- ♦ D02 is used to measurement remainder time.
- ♦ The counting pulse amount of the assign time can’t be more than 65535
- ♦ Following formula can calculated RPM
  RPM : N = (D00×60) × 1000 / n × t
  n: (pulse/revolution), t: (measurement time).
- ♦ The pulse frequency of (X00-X05) is same with HSC.
- ♦ If input relay (X00-X05) is assigned by the SPD, they can’t be used to other purpose or interrupt input point.
- ♦ If pulse output assign Y00, then X00 can’t be used; if assign Y01, then X01 can’t be used.
- ♦ V1.45 or more, add complete flag M8029, easily reach many data of continuous measurement, then count an average value.

(i) measure frequency mode





(ii) measure pulse width mode

- ♦ The content of [S2.]=”0” only one pulse width then can measurement speed N pps(pulse/second) 。
- ♦ This example speed N store at D01,D00 。

◎ Pulse Output

FNC(57)			32 bits: (D)PLSY- 13 steps
D	PLSY		

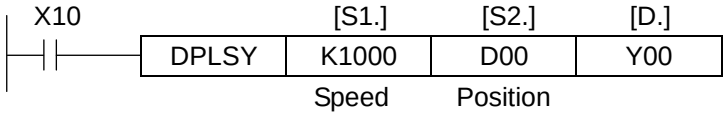
		J1n	J2n--

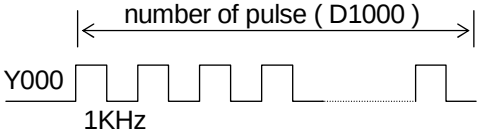
Operands: [S1.]

K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

[D.] : Y00 – Y03 [S2.]

Flag: M8029





- ♦ This instruction is pulse output without slope.
- ♦ [D.] assign pulse output point
  [S1.] assign output frequency (10~200,000Hz).
  [S2.] it will occupy continuous 100 words from assigned [S2.]. In this example, it occupies D1000~D1099.
  [S2.]+1, [S2.]+0 : number of output pulses [S2.]+3, [S2.]+2 : system reserved
  [S2.]+5, [S2.]+4 : start address [S2.]+7, [S2.]+6 : absolute address(for monitor)
  [S2.]+9, [S2.]+8 : increment address(for monitor)
- ♦ DPLSY is used to output a consecutive pulse. 32 bits range: 1 ~ 2,147,483,647 pulses.
- ♦ If [S2.]+1, [S2.]+0 are assigned to “0”, it will continue to generate pulse.
- ♦ It is fixed to 32 bits operation. If it is assigned to 16 bits operation, then error 6509 will be occurred.
- ♦ The pulse duty cycle is 50% ON 50% OFF.
- ♦ Value of [S2.]+1, [S2.]+0 can be changed during execution, but the new will not be effective until current operation has been completed, and complete flag M8029 set to ON .
- ♦ This instruction can be used once, and only the transistor module can be selected.

◎ Pulse Width Modulation

FNC(58)			16 bits: PWM - 7 steps
	PWM		

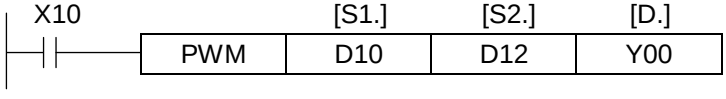
		J1n	J2n--

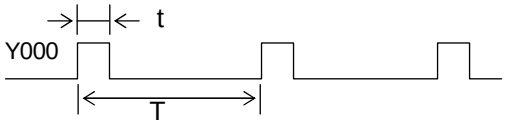
Operands: [S1.][S2.]

K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

[D.] : Y00 – Y07

Flag: None





- ♦ [S1.]: ON duty width (t). Y00 - Y01 range (0 - 32,767) x 0.01ms; Y02 - Y07 range: (0 - 32,767 msec)
- ♦ [S2.]: (T). Y00 - Y01 range (0 - 32,767) x 0.01ms ; Y02 - Y07 range: (0 - 32,767 msec)
- ♦ [D.]: Output point (Y). (by interrupt handing)
- ♦ If value of [S1.] is more than value of [S2.], then error occurred.
- ♦ This instruction is applicable for transistor module.

◎ PULSE OUTPUT WITH SLOPE

FNC(59)		
D	PLSR	

32 bits: (D)PLSR- 17 steps

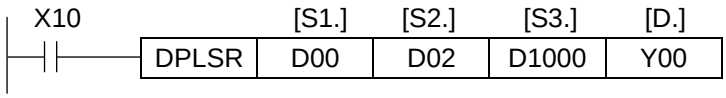
		J1n	J2n--

Operands: ⟵ [S1.] ⟶

K.H.	KnX	KnY	KnM	KnS	T	C	D	V,Z

[D.] : Y00 – Y03 ⟷ [S2.][S3.]

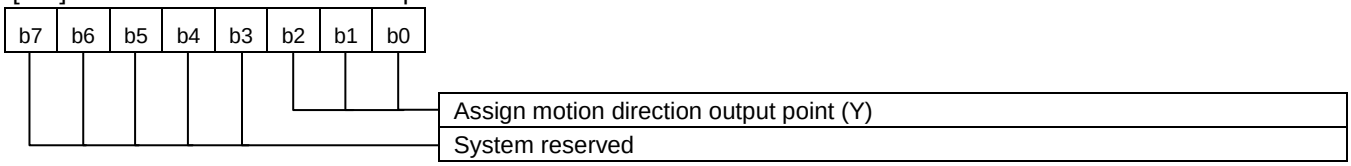
Flag: M8029



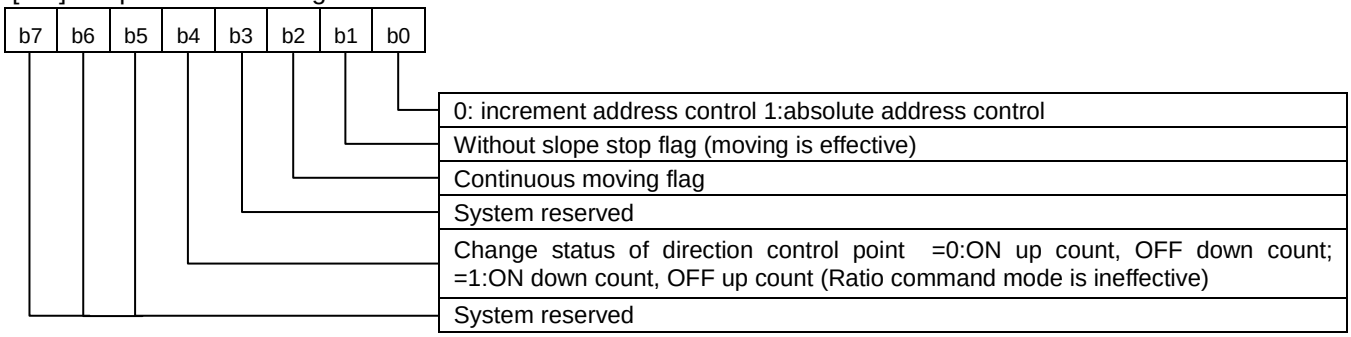
♦ [D.] assign pulse output point. Assign to Y04=pseudo axis (no real pulse output)
[S1.] assign output frequency.(10 ~ 200,000pps)
[S2.] assign number of output pulse. It will occupy continuous 8 words start from assigned [S2.]. In this example, it occupies D02~D09
[S3.] It will occupy continuous 100 words start from assigned [S3.]. In this example, it occupies D1000~D1099.
[S3.]+0 : motion mode: command value 0~99 as well as G00~G99

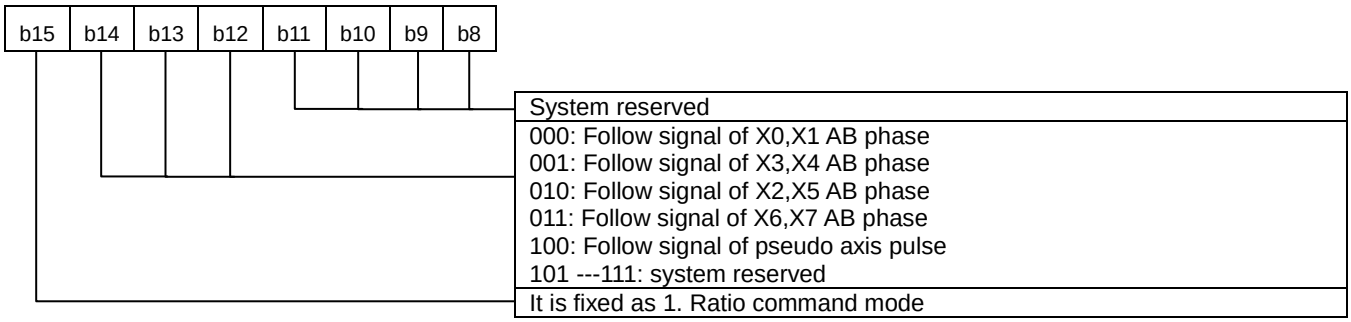
Command value	Content
00	Single position motion
01	Linear interpolation (J2nB only) n=2,4
02	Circular interpolation CW (J2nB only) n=2,4
03	Circular interpolation CCW (J2nB only) n=2,4
06	Ratio command(electronic gear must be fraction. numerator< denominator) (J2nB only) n=2,4
28	Zero Return

[S3.]+1 : motion direction control point: Y02~Y07



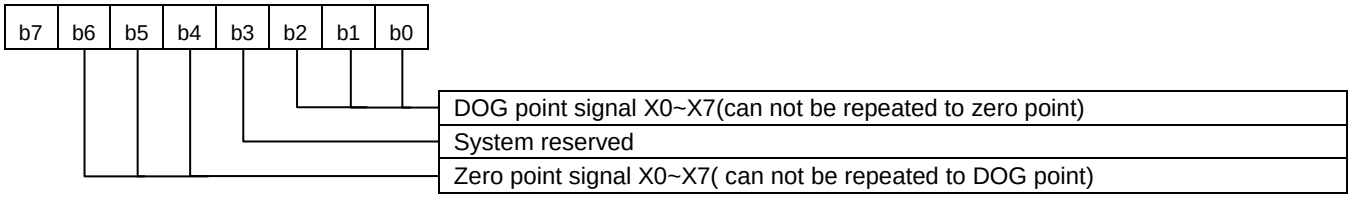
[S3.]+2 : parameter setting

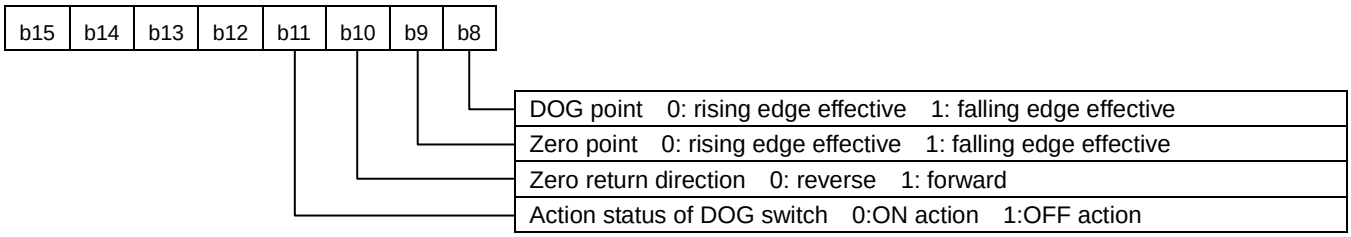




♦ MultiAxis moving : drive on the pseudo axis first, set the other axis to G06 ratio follow mode and assign to signal of pseudo axis pulse.

[S3.]+3 : system reserved
[S3.]+5, [S3.]+4 : start address(for monitor)
[S3.]+7, [S3.]+6 : absolute address(for monitor)
[S3.]+9, [S3.]+8 : increment address(for monitor)
[S3.]+11, [S3.]+10 : the rest of pulses(for monitor)
[S3.]+13, [S3.]+12 : target address(for monitor)
[S3.]+15, [S3.]+14 : current speed(for monitor)
[S3.]+17, [S3.]+16 : maximum speed
[S3.]+19, [S3.]+18 : system reserved
[S3.]+20 : bias speed(pps)
[S3.]+21 : system reserved
[S3.]+22 : acceleration time(ms)
[S3.]+23 : deceleration time (ms)
[S3.]+24 : DOG point signal

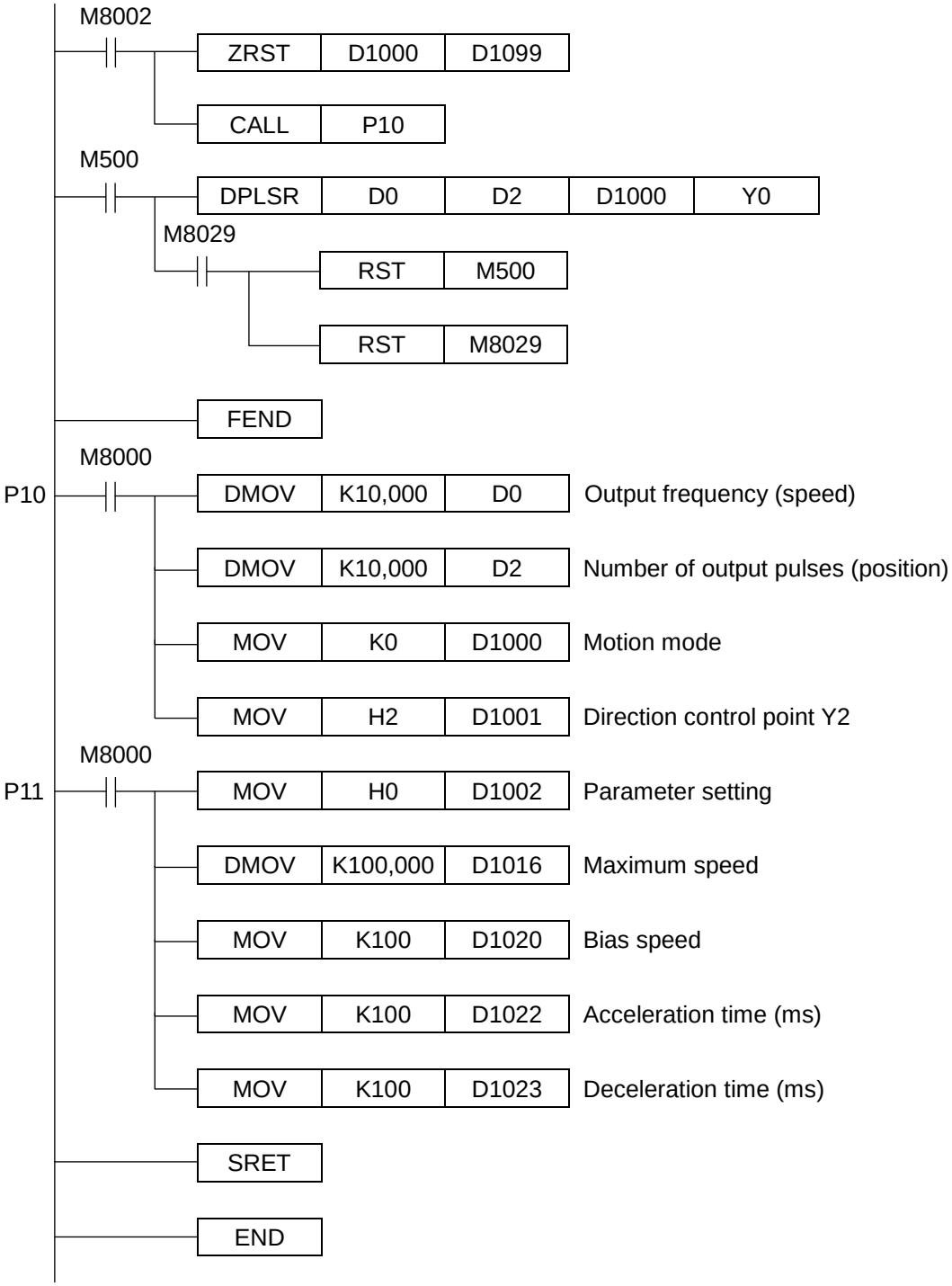




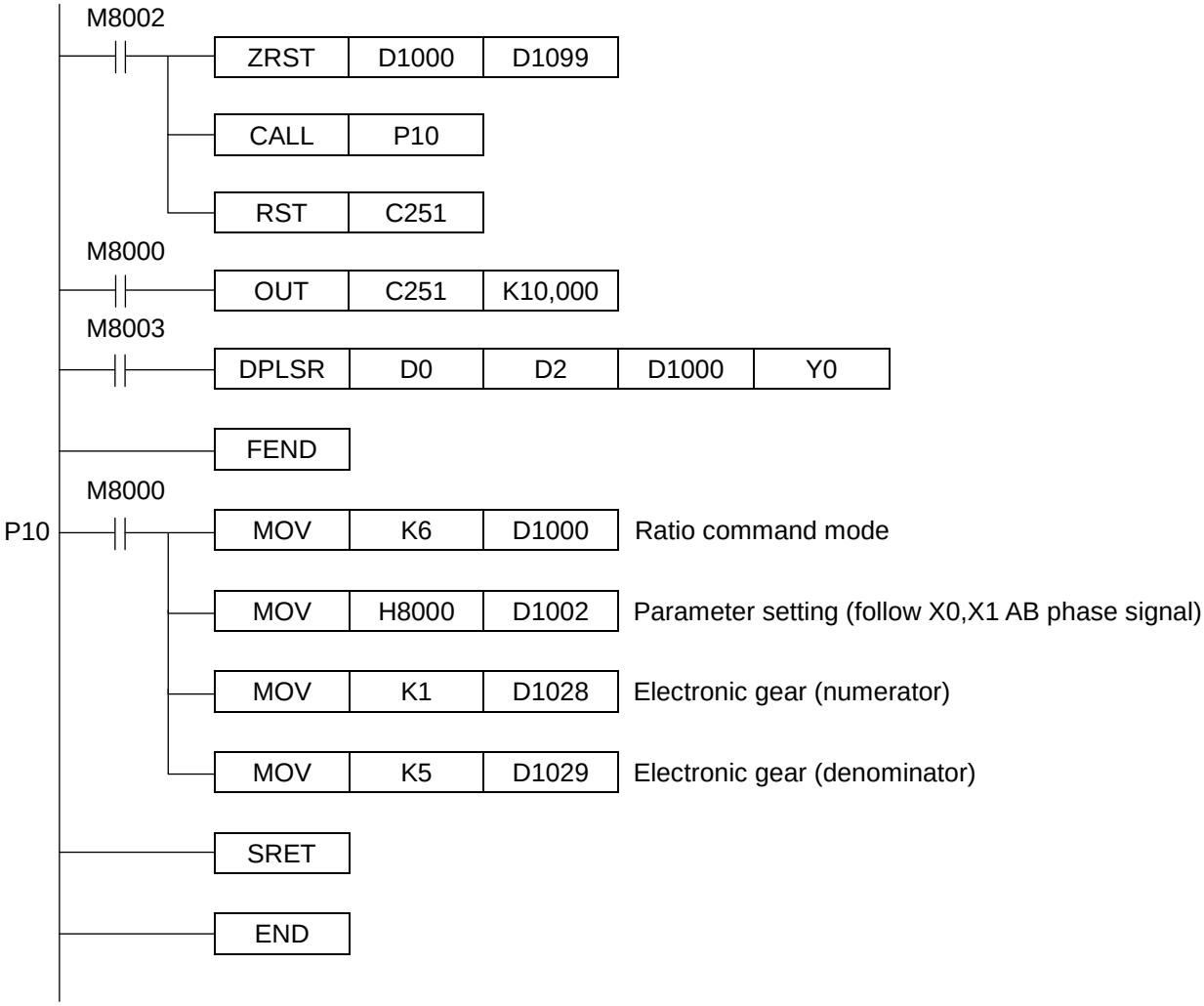
[S3.]+25 : zero-point signal setting value. If there is not zero-point signal (for stepping motor) when it turns to zero-point, then user would set number of search zero-point as “0”.
[S3.]+26 : zero-point signal count value (for monitor)
[S3.]+27 : system reserved
[S3.]+28 : electronic gear(numerator)
[S3.]+29 : electronic gear(denominator)
[S3.]+30 : system reserved
[S3.]+32 : system reserved
[S3.]+41, [S3.]+40 : PLSV number of output pulses. If value is 0, it is as without target operation.

♦ When this instruction is used, increment distance or absolute address has to be converted to pulses, then stored to [S2.].
♦ When pulse output, X10 OFF, pulse is stopped outputting according to setting status of stop flag [S3]+2,b1.
♦ The pulse duty cycle is 50% ON, 50% OFF
♦ During instruction is under operation, it is ineffective to change content of [S2.]
♦ This instruction for Y00 or Y01 only can be used once (total twice), and has to select transistor output type.
♦ It is fixed to 32 bits operation. If user assigns 16 bits operation mode, then error 6509 will be occurred.
♦ There is only one kind of pulse output type in this instruction (Negative Logic Type, Pulse & Sign) can be controlled step or servo motor.

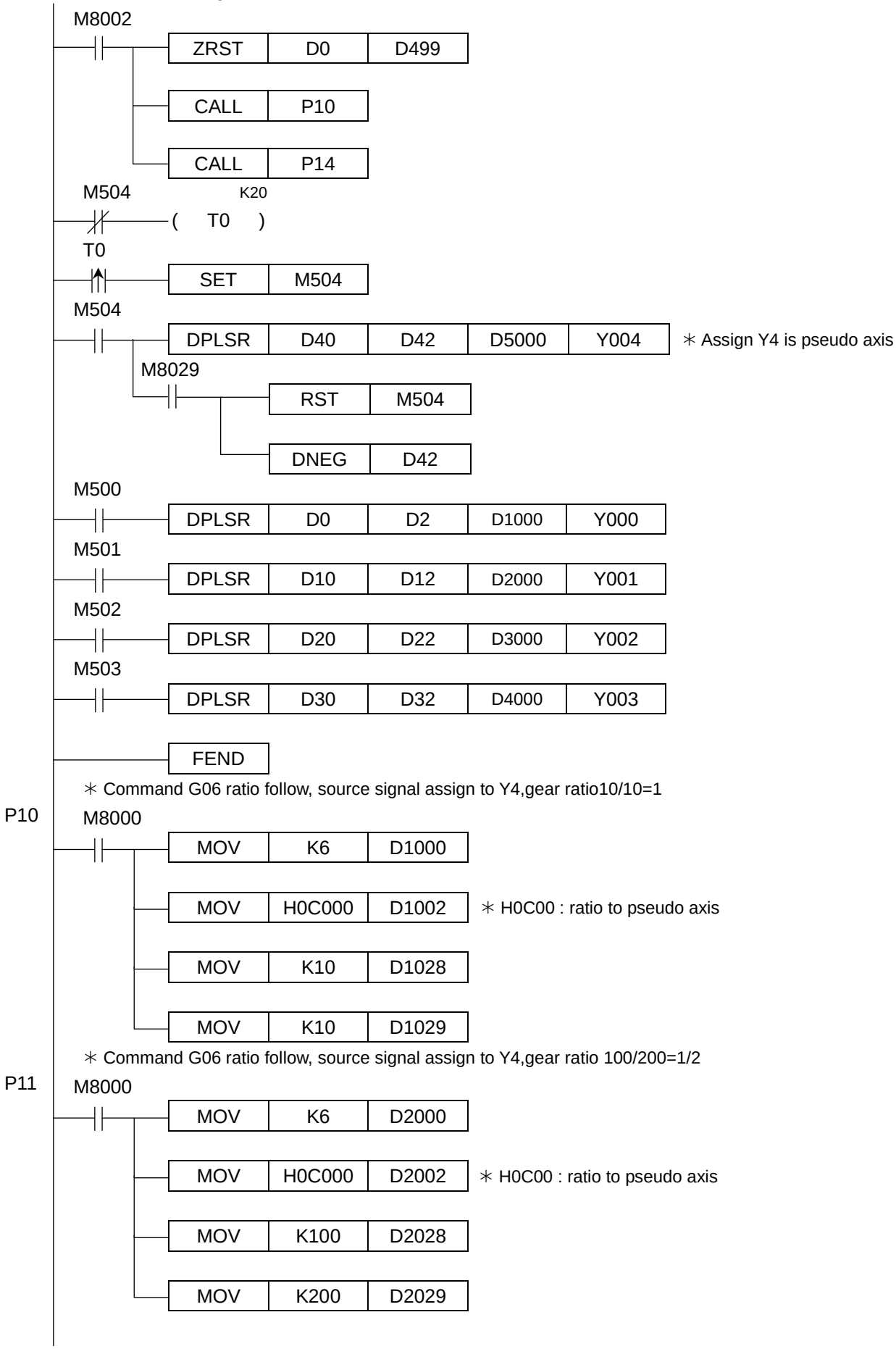
- Command value 00 [G00] Single position

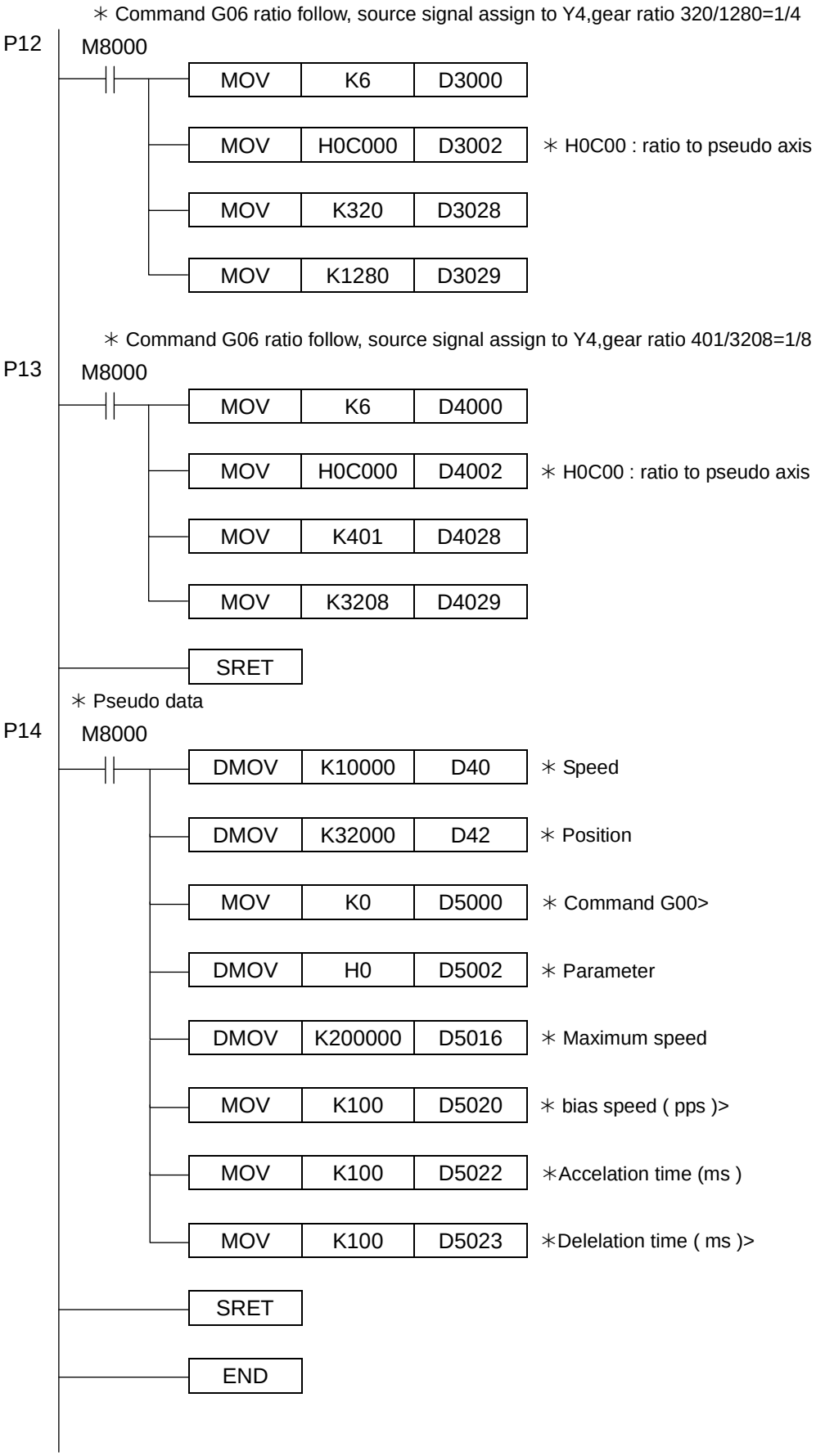


- Command value 06 [G06] Ratio command (direction of Y0 axis is fixed as Y2; direction of Y1 is fixed as Y3)



- MultiAxis Moving

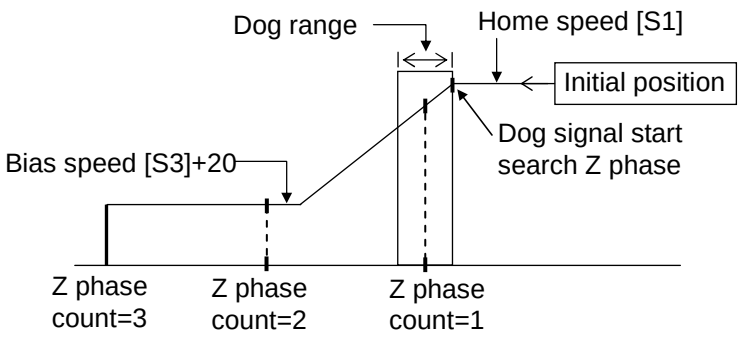



∗ Command G06 ratio follow, source signal assign to Y4,gear ratio 320/1280=1/4
P12
M8000
MOV K6 D3000
MOV H0C000 D3002
∗ H0C00 : ratio to pseudo axis
MOV K320 D3028
MOV K1280 D3029
∗ Command G06 ratio follow, source signal assign to Y4,gear ratio 401/3208=1/8
P13
M8000
MOV K6 D4000
MOV H0C000 D4002
∗ H0C00 : ratio to pseudo axis
MOV K401 D4028
MOV K3208 D4029
SRET
∗ Pseudo data
P14
M8000
DMOV K10000 D40
∗ Speed
DMOV K32000 D42
∗ Position
MOV K0 D5000
∗ Command G00>
DMOV H0 D5002
∗ Parameter
DMOV K200000 D5016
∗ Maximum speed
MOV K100 D5020
∗ bias speed (pps)>
MOV K100 D5022
∗Accelation time (ms)
MOV K100 D5023
∗Delelation time (ms)>
SRET
END

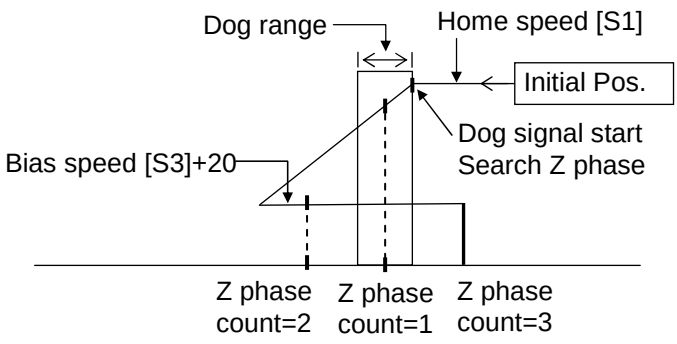
- Command value 28 [G28] Zero return (number of search for Z phase is not as 0)

```
M8002
 ||  ZRST  D1000  D1099
 ||  CALL  P10
M500
 |↑|  RST   M510    Clear zero return complete flag
M500
 ||  DPLSR  D0  D2  D1000  Y0
     M8029
      ||  RST   M500
      ||  SET   M510   Set zero return complete flag. This uses M510 (user can appoint M register)
      ||  RST   M8029
 ||  FEND
M8000
P10
 ||  DMOV  K10,000  D0    Output frequency (speed)
 ||  DMOV  K10,000  D2    Number of output pulses (position)
 ||  MOV   K28      D1000 Zero return mode
 ||  MOV   H0002    D1001 Direction control point Y2
 ||  MOV   H0043    D1024 DOG signal X3 rising edge effective. Zero-point signal X4
 ||                       rising edge effective. Initial operation direction as reverse
 ||  MOV   K3       D1025 Set number of search Z phase. Speed of search Z phase is as
 ||                       same as bias speed
P11
 ||  [ ]   As same as example of DPLSR signal position
 ||  SRET
 ||  END
```

< MODE0 > D1024=H0043 Same direction search search zero point signal



< MODE1> D1024=H1043 different direction search zero point signal



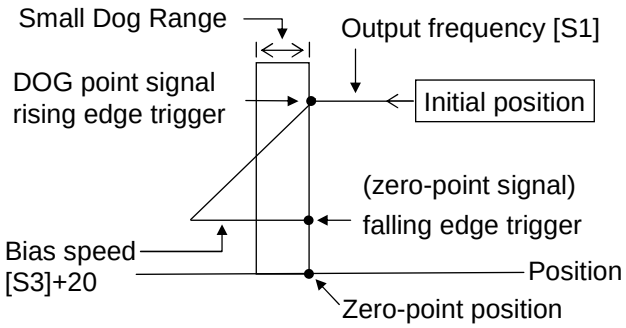
Command value 28 [G28] Zero return

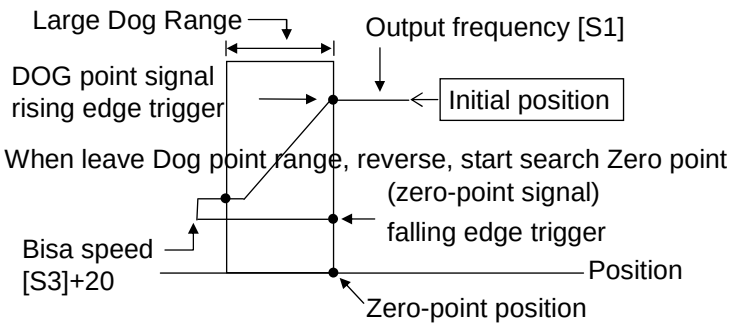
(number of search for Z phase is 0. DOG point signal and Zero point signal have to be set as the same point)

<< MODE0 >> First confirm DOG point and then decrement speed to Bias speed and need leave DOG effective range, reverse rotation and start searching ZERO point signal

D1024 = H0133 (DOG point signal X3 rising edge effective，Zero-point signal X3 falling edge effective，Initial operation direction as reserve direction)

D1025 = K0 (number of Z phase = 0)

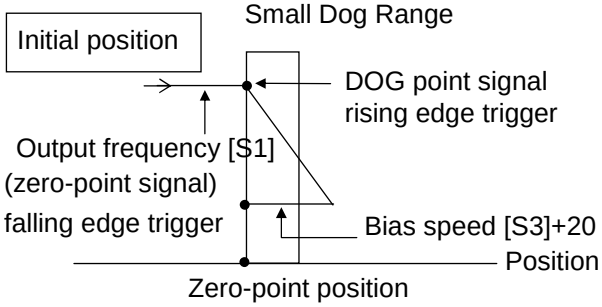


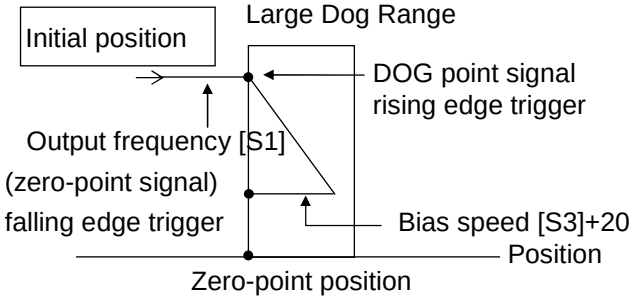


<< MODE1 >> First confirm DOG point and then decrement speed to Bias speed and don’t need leave DOG effective range, reverse rotation and start searching ZERO point signal

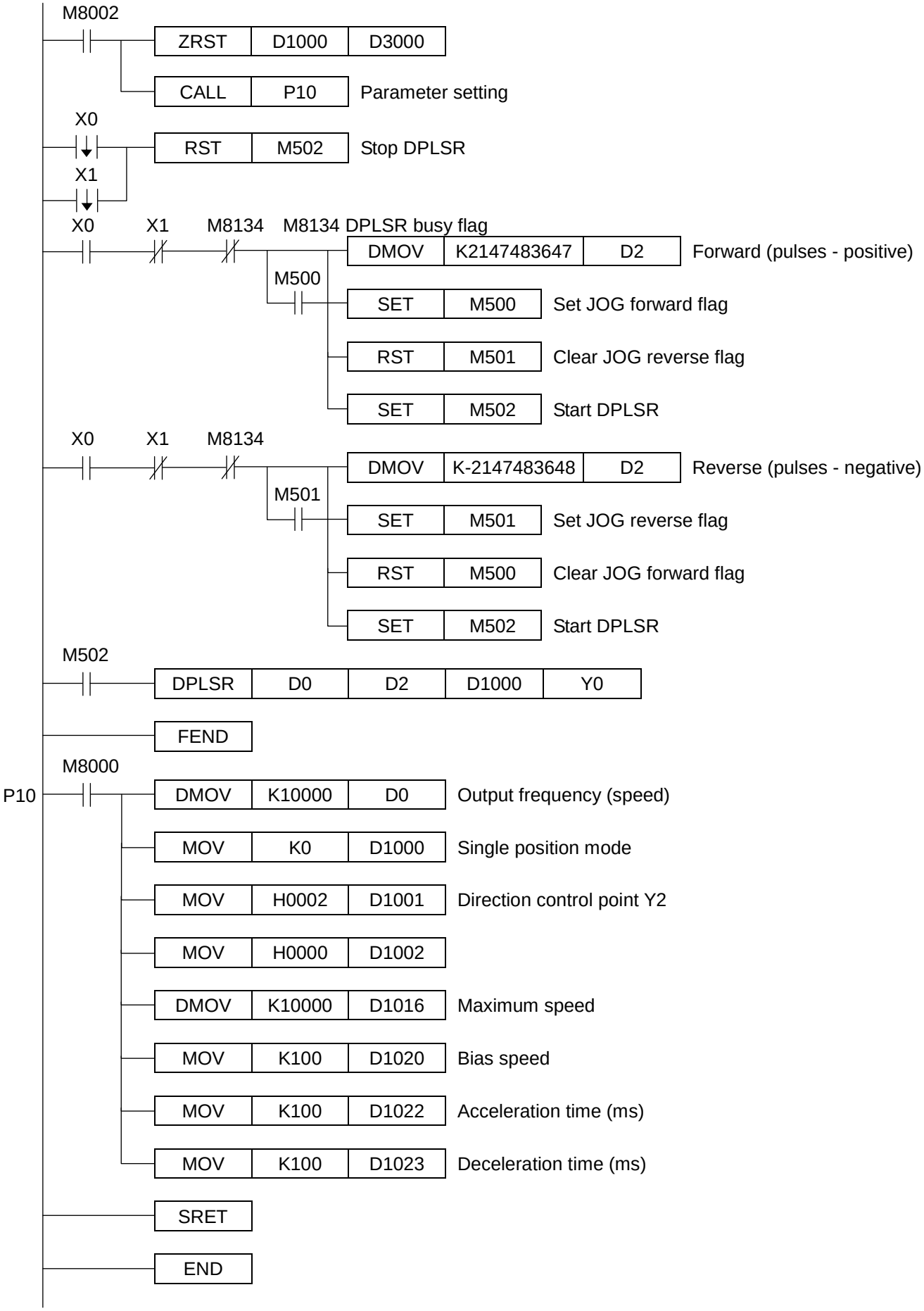
D1024 = H0133 (DOG point signal X3 rising edge effective，Zero-point signal X3 falling edge effective，Initial operation direction as forward direction)

D1025 = K0 (number of Z phase = 0)



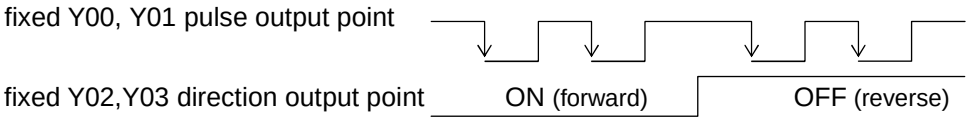


- Sample program of DPLSR : JOG +/-



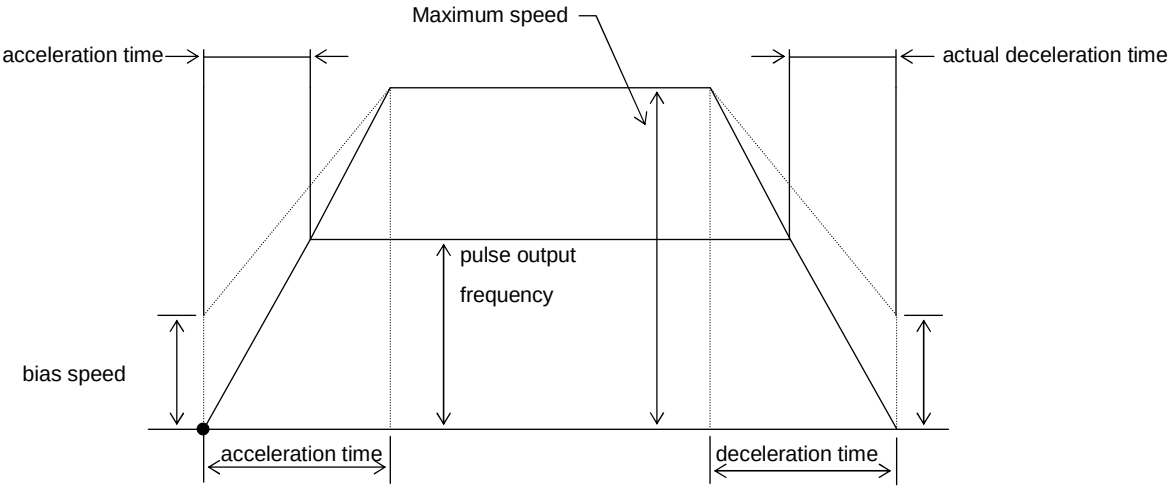
◎ FNC150 – 159 Position Control

♦The Ex series of controller pulse output signal: pulse (negative logic) + sign, as following drawing



♦ The pulse duty cycle is 50% ON, 50% OFF

♦ Single position control. The curve condition of controller and relative device.



◎ Absolute current value read

FNC(155)			16 bits:ABS - 7 steps
D	ABS		32 bits:(D)ABS - 11 steps

Operands:

[S.]

K,H	KnX	KnY	KnM	KnS	T	C	D	Z

Operands:

X	Y	M	S

Flag: M8029

Reserved

◎ Zero return

FNC(156)		
D	ZRN	

32 bits:(D)ZRN - 17 steps

		J1n	J2n--

Operands: [S1.]

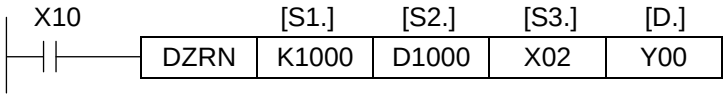
K,H	KnX	KnY	KnM	KnS	T	C	D	Z

[S2.]

Operands: [S3.] [D.]

X	Y	M	S

Flag: M8029



♦ [D.] assign pulse output point

[S1.] assign speed of zero-return search for DOG point (Home Speed) 10 ~ 200,000 pps。

[S2.] it will occupy continuous 100 words from assigned [S2.]. In this example, it occupies D1000~D1099.

[S2.]+0 : speed of search for zero-point 10~32,767 pps

[S2.]+1 : operation direction control point Y2~Y7

b7	b6	b5	b4	b3	b2	b1	b0	
								Assign operation direction output point (Y)
								System reserved

[S2.]+2 : parameter setting

b7	b6	b5	b4	b3	b2	b1	b0	
								System reserved
								Without slope stop flag (X10 OFF stop effective)
								Continuous motion flag
								System reserved
								Change status of operation control point 0:ON Up OFF Down; 1:ON Down OFF Up
								System reserved

[S2.]+3 ~ [S2.]+99 : as same as FNC(59) PLSR 的[S3.]+3 ~ [S3.]+99

[S3.] assign DOG point input signal. Effective range X00~X07 (pulse catch signal M8170~M8177)。

Zero-return signal is set by [S2.]+24.

♦ When ZRN command is executed, zero-return point busy flag M8154~M8157 will be set automatically to avoid drive DRVI, DRVA at the same time.

♦ This command Y00 ~ Y03 can be used once and has to select transistor output module.

♦ It is fixed to 32 bits operation. If user assigns 16 bits operation mode, then error 6509 will be occurred.

Pulse V

FNC(157)			
D	PLSV		32 bits:(D)PLSV - 13 steps

		J1n	J2n--

Operands: |< [S.] >|

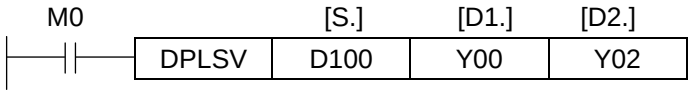
K,H	KnX	KnY	KnM	KnS	T	C	D	Z

Operands: |<[D2.]>|

X	Y	M	S

|<[D1.]>|

Flag: M8029



♦ [D1.] assign operation pulse output point. (It is fixed to Y00~Y03 as output point)
[D2.] assign operation direction output point.. (It is fixed to Y02~Y07 as output point)
[S.] It will occupy continuous 100 words start from assigned [S.]. In this example, it occupies D1000~D1099.
[S.]+1, [S]+0 : assign output frequency. [32bits]:10 ~ 200,000 Hz
[S.]+2 : Parameter setting

b7	b6	b5	b4	b3	b2	b1	b0

System reserved
Without slope stop flag (M0 OFF stop effective)
Continuous motion flag
System reserved
Chang status of operation control point 0:ON Up OFF Down; 1:ON Up OFF Down
System reserved

[S.]+41, [S.]+40 : PLSV number of output pulses. Value = 0 is without target operation.
[S.]+52 : Mark signal

b7	b6	b5	b4	b3	b2	b1	b0

Mark signal X0~X7
0:upper effective 1:lower effective
0:without target function 1:with target function

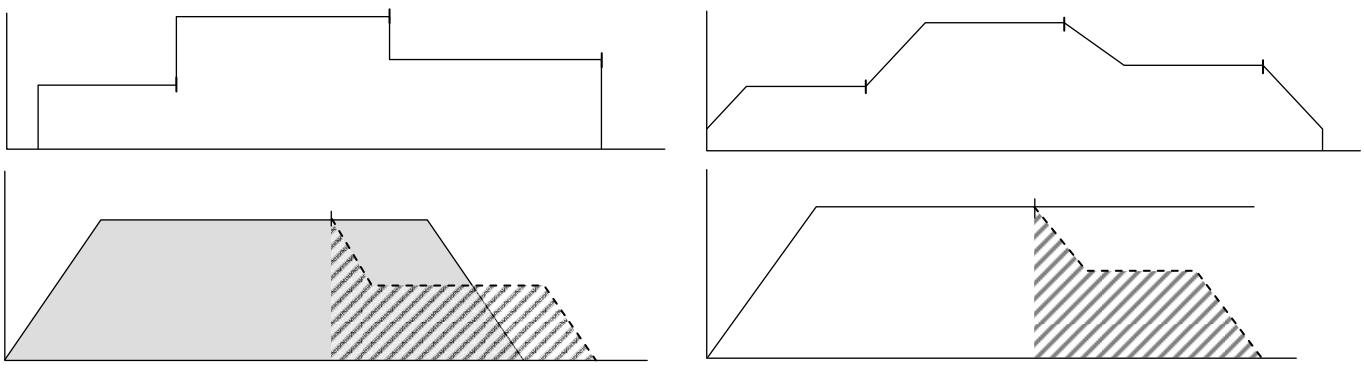
[S.]+3 ~ [S.]+99 : as same as FNC(59) PLSR [S3.]+3 ~ [S3.]+99

♦ When PLSV command is executed, busy flag M8142~M8145 will be set automatically.

♦ Value of [S.] can be changed during pulse output, but symbol (+,-) can not be changed. If drive contact OFF, then decelerate to bias speed stop directly.

♦ It is fixed to 32 bits operation. If user assigns 16 bits operation mode, then error 6509 will be occurred.

♦ Following modes can be achieved,



◎ Drive to increment

FNC(158)		
D	DRVI	

32 bits:(D)DRVI - 17 steps

		J1n	J2n--

Operands: [S1.]

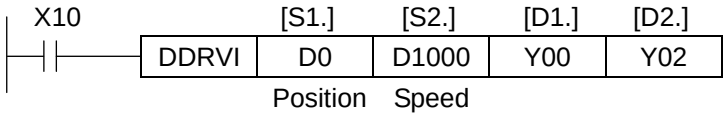
K,H	KnX	KnY	KnM	KnS	T	C	D	Z

[S2.]

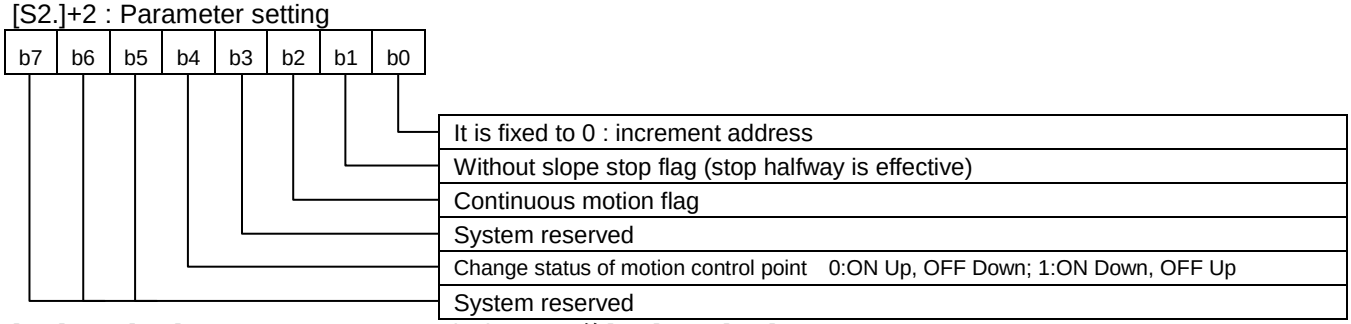
Operands: [D1.] [D2.]

X	Y	M	S

Flag: M8029

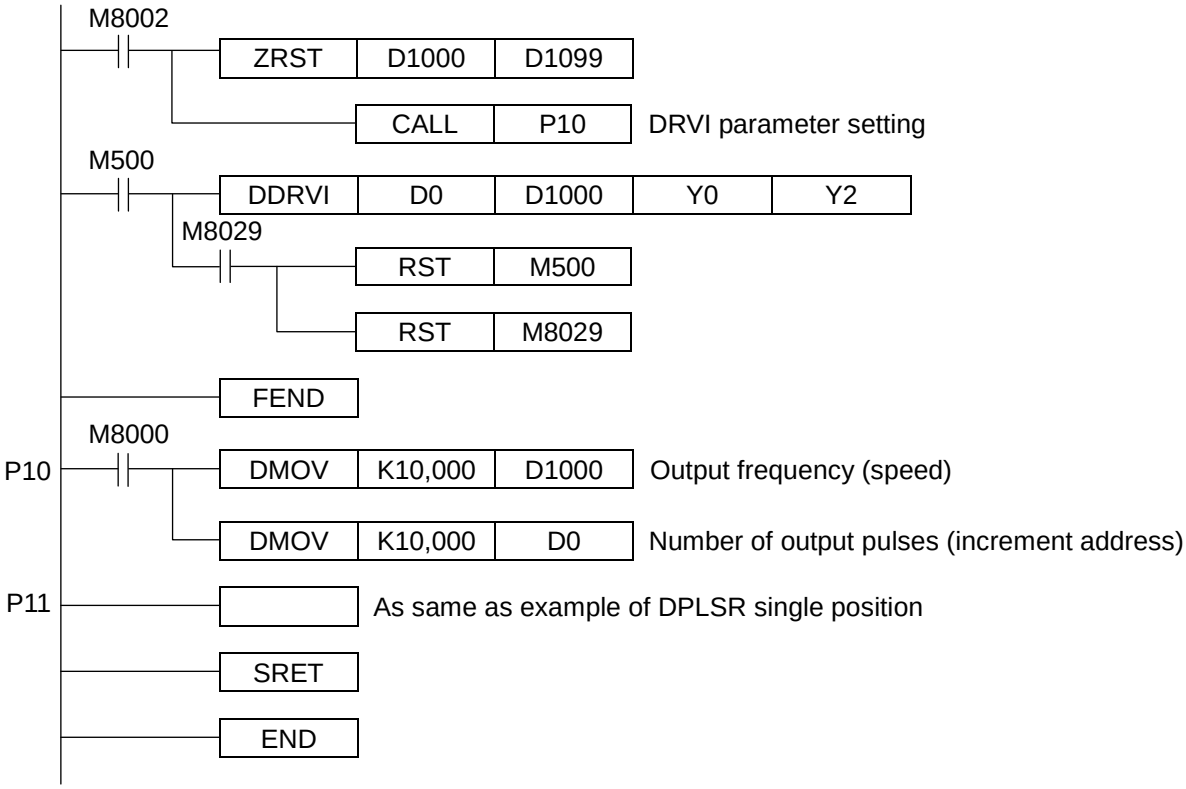


- [D1.] assign operation pulse output point. (only Y00~Y03).
  [D2.] assign operation direction output point. (only Y02~Y07).
  [S1.] assign number of output pulses for increment address. (positive value: forward; negative value: reverse)
  [S2.] It will occupy continuous 100 words start from assigned [S2.]. In this example, it occupies D1000~D1099.
  [S2.]+1, [S2]+0 : assign output frequency. [32bits]:10 ~ 200,000 Hz.
  [S2.]+2 : Parameter setting



  [S2.]+3 ~ [S2.]+99 : as same as FNC(59) PLSR 的[S3.]+3 ~ [S3.]+99

- This instruction for Y0~Y3 only can be used once, and has to select transistor output module.
- When DDRVI are executed, busy flag M8146~M8149 will be set automatically by system.
- During output pulse, to modify value of [S1], [S2]+1, [S2]+0 is ineffective.
- It is fixed to 32 bits operation. If user assigns 16 bits operation mode, then error 6509 will be occurred.



◎ Drive to absolute

FNC(159)			32 bits:(D)DRVA - 17 steps
D	DRVA		

		J1n	J2n--

Operands: [S1.]

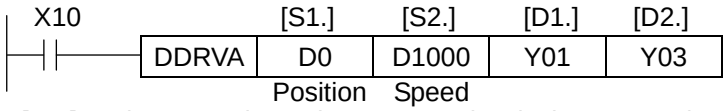
K,H	KnX	KnY	KnM	KnS	T	C	D	Z

[S2.]

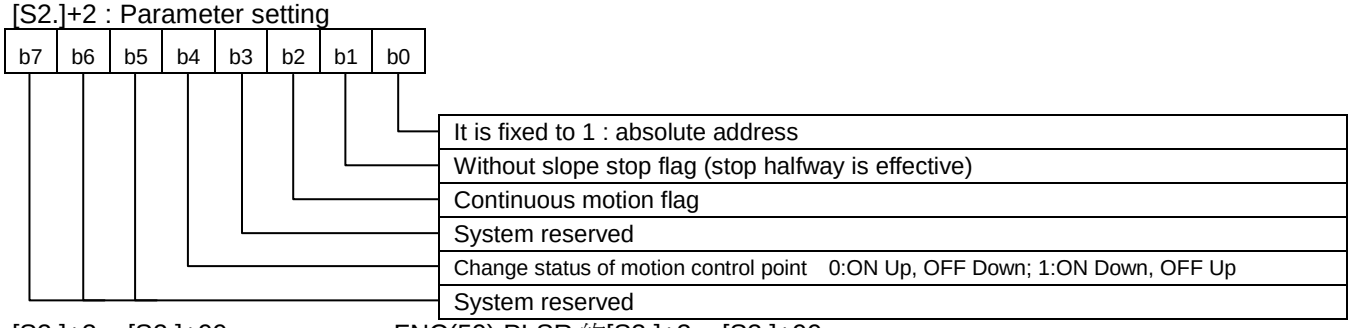
Operands: [D1.] [D2.]

X	Y	M	S

Flag: M8029



♦ [D1.] assign operation pulse output point. (only Y00~Y03).
[D2.] assign operation direction output point. (only Y02~Y07).
[S1.] assign number of output pulses for absolute address. (compare with bias address to decide forward or reverse)
[S2.] It will occupy continuous 100 words start from assigned [S2.]. In this example, it occupies D1000~D1099.
[S2.]+1, [S2]+0 : assign output frequency. [32bits]:10 ~ 200,000 Hz.
[S2.]+2 : Parameter setting



[S2.]+3 ~ [S2.]+99 : as same as FNC(59) PLSR 的[S3.]+3 ~ [S3.]+99

♦ This instruction for Y0~Y3 only can be used once, and has to select transistor output module.
♦ When DDRVA are executed, busy flag M8150~M8153 will be set automatically by system.
♦ During output pulse, to modify value of [S1], [S2]+1, [S2]+0 is ineffective.
♦ It is fixed to 32 bits operation. If user assigns 16 bits operation mode, then error 6509 will be occurred.