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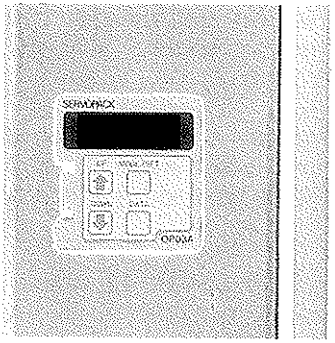
Find the *Yaskawa SGDA-02BS* at our website: ***Click HERE***

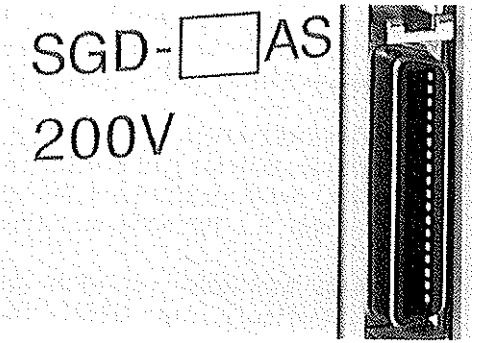
YASKAWA

DIGITAL OPERATOR
OPERATION MANUAL

MOUNT TYPE FOR AC SERVOPACK TYPE SGD

TYPE : JUSP-OP03A





Before initial operation, read these instructions thoroughly, and retain for future reference.

MANUAL No. TOE-S800-15.4B

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NOTES

(1) Gains have been set to the value when load inertia is three times the motor inertia. When motor is rotated as a single unit, or when load inertia is less than three times motor inertia, set user constant Cn-04 to less than 40 to prevent oscillation.

(2) The encoder has been preset to incremental encoder 2048P/R at the factory prior to shipping. When another encoder is used, set bit E of user constants Cn-11 and Cn-01.

(3) AC SERVOPACK (type SGD) has two control types; speed control (torque control) and position control. Since each has different operations, make sure of your SERVOPACK type and read the section stated in Table 1.1 for each operation.

(4) Handy type digital operator (type JUSP-OP02A-1) is also available for SERVOPACK (type SGD). For handy type, refer to the instruction manual (TOE-S800-15.3).

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CONTENTS

1. OUTLINE OF THIS MANUAL 4

2. OPERATION METHOD FOR SERVOPACK SGD-□□S
FOR SPEED CONTROL (TORQUE CONTROL) 5
2.1 SWITCH OPERATION 5
2.2 FUNCTION OF DIGITAL OPERATOR 6
2.3 STATUS INDICATION MODE 7
2.4 SETTING MODE 9
2.4.1 User Constant (Data) Setup and Monitor 9
2.4.2 User Constant (Memory Switch) and Monitor 12
2.4.3 Digital Operator Jog Operation Mode
Selection and Operating Procedure 16
2.4.4 Speed Reference Offset Adjustment 18
2.4.5 Clearing Fault Traceback Data 19
2.4.6 Speed Reference Offset Manual Adjustment 20
2.4.7 Check of Motor Parameters 22
2.4.8 Auto Tuning 24
2.4.9 Check of Software Version 26
2.5 MONITOR MODE 28
2.6 FAULT TRACEBACK MODE 30

3. OPERATION METHOD FOR SERVOPACK SGD-□□P
FOR POSITION CONTROL 32
3.1 SWITCH OPERATION 32
3.2 FUNCTION OF DIGITAL OPERATOR 33
3.3 STATUS INDICATION MODE 34
3.4 SETTING MODE 36
3.4.1 User Constant (Data) Setup and Monitor 36
3.4.2 User Constant (Memory Switch) and Monitor 39
3.4.3 Digital Operator Jog Operation Mode
Selection and Operating Procedure 42
3.4.4 Clearing Fault Traceback Data 44
3.4.5 Check of Motor Parameters 45
3.4.6 Auto Tuning 47
3.4.7 Check of Software Version 49
3.5 MONITOR MODE 51
3.6 FAULT TRACEBACK MODE 54

APPENDIX 1 SGD USER CONSTANT LIST FOR SPEED
CONTROL (TORQUE CONTROL) 56
APPENDIX 2 SGD USER CONSTANT LIST FOR POSITION
CONTROL 58

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1. OUTLINE OF THIS MANUAL

AC SERVOPACK (type SGD) has two control types ; speed control (torque control) and position control. Since each has different operations, make sure of your SERVOPACK type and read the section stated in Table 1.1 for each operation.

Table 1.1 Outline of This Manual

SERVOPACK type SGD	Digital Operator	Section	Page
For Speed Control (Torque control) [type: SGD-□□□□ S]	Mount Type [type: JUSP-OP03A]	2	5 to 31
For Position Control [type: SGD-□□□□ P]	Mount Type [type: JUSP-OP03A]	3	32 to 55

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2. OPERATION METHOD FOR SERVOPACK SGD-□□S FOR SPEED CONTROL (TORQUE CONTROL)

This section explains the operation method when SERVOPACK (type SGD) for speed control (torque control) is operated using a mount type digital operator.

2.1 SWITCH OPERATION

Fig. 2.1 shows the digital operator. The digital operator has various functions as listed by modes in Par.2.2, "Digital Operator Function"(p.6).

Notes:

1. The digital operator constant setup data retained even after the power is turned off.
2. Even if the power is turned off after abnormal occurrence, the abnormal data are retained in memory. Therefore, it is possible to check the abnormal data after the power is turned back on.
3. The monitor mode can be changed even during operations.

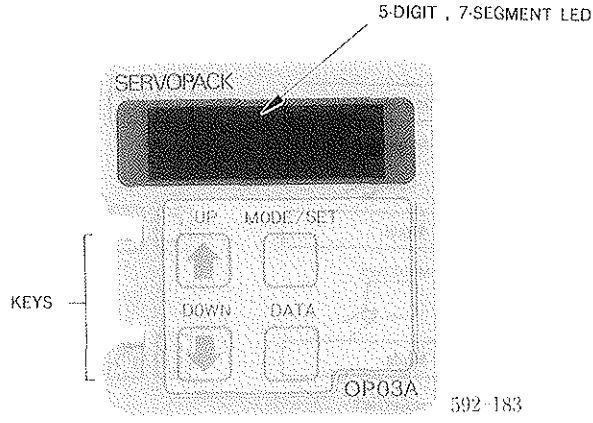


Fig. 2.1 DIGITAL OPERATOR (MOUNT TYPE)

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2.2 FUNCTION OF DIGITAL OPERATOR

Table 2.1 shows the digital operator functions. Note that the status display mode prevails when control power is turned ON. To change the mode, use MODE/SET key as shown in Fig. 2.2

Table 2.1 Digital Operator Functions

Mode	Function
Status Indication Mode	Various State Indications • Base Block • On Operation (See Par.2.3) • Trouble
Setting Mode	Refer to "User Constant Setting." (See Par.2.4.1) • Operation (JOG) from digital operator (See Par.2.4.3) • Speed Reference / Torque Reference Offset Adjustment (See Par.2.4.4) • Clearing Fault Traceback Data (See Par.2.4.5) • Check of Motor Parameters (See Par.2.4.7) • Auto Tuning (See Par.2.4.8) • Check of Software Version (See Par.2.4.9)
Monitor Mode	Various Monitoring • Speed • Speed Reference • Torque Reference • Number of Pulses from Origin (Phase-U) • Electrical Angle • Interior Status Bit (See Par.2.5)
Fault Traceback Indication Mode	Fault History (See Par.2.6)

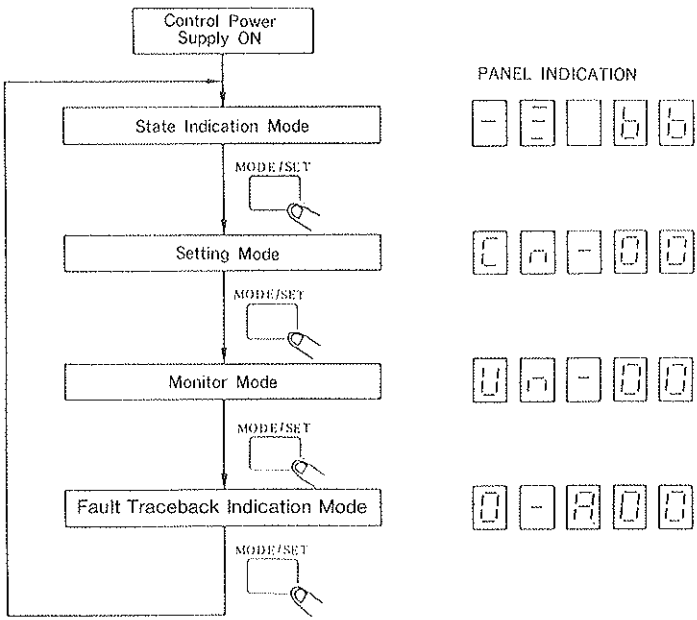


Fig. 2.2 Mode Changeover

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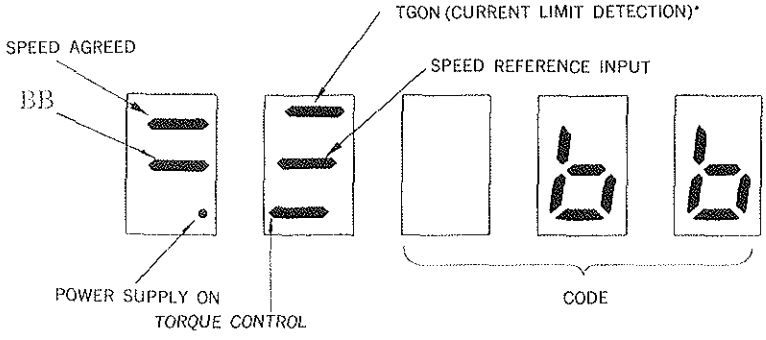
2.3 STATUS INDICATION MODE

When this mode is selected, the condition of SERVOPACK is indicated with bits and codes as shown in Fig. 2.3. Table 2.2 shows the bit data contents. Table 2.3 shows the codes and conditions.

UP DOWN : *Alarm reset switch*

MODE/SET : Changes state indication mode into setting mode.

Panel Display



* TGON or current limit detection is displayed according to bit 4 of user constant Cn-01.

Fig. 2.3 Status Indication

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2.3 STATUS INDICATION MODE (Cont'd)

Table 2.2 Bit Data Contents

Bit Data	Contents	Remarks
Power Supply ON	Light goes ON with power supply ON.	
BB	Light goes ON with base block, and goes OFF with servo ON.	
Speed Agreed	Light goes ON when motor rotating speed reaches internal speed reference set by a speed reference or parameter.	
TGON	Light goes ON with motor rotating speed higher than TGON level.	Selected by bit 4 of user constant Cn-01.
Current Limit Detection	Light goes ON when torque reference reaches the torque limit value.	
Speed Reference Input	Light goes ON with speed reference input equal to or higher than TGON level.	
Torque Reference Input	Light goes ON with torque reference input less than 10% of rated torque.	Only at torque control

Table 2.3 Codes and Status

Code	Status
bb	Base Block
run	On Operation
Pot	Forward Running Prohibited
not	Reverse Running Prohibited
A.00	Ararm Status Refer to Table 2.9.

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2.4 SETTING MODE

In this mode, the following operations can be performed.

- User constant setup and monitor
- Jog operations from the digital operator
- Offset adjustment
- Fault traceback data clearing
- Check of motor parameters
- Auto tuning
- Check of software version

2.4.1 USER CONSTANT (DATA) SETUP AND MONITOR (Cn−03 to Cn−23)

Panel Display

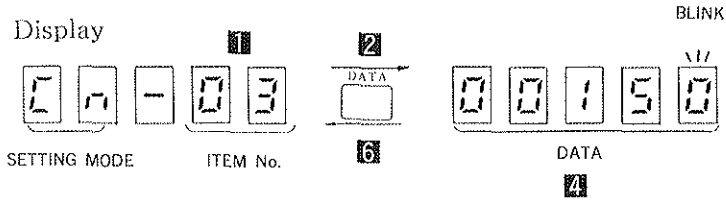


Fig. 2.4 User Constant Setting

1 Set up the item number with the UP ⇧ or DOWN ⇩ key.

While the key is held down, the numerical value increases or decreases successively by one.

2 With the DATA key, display the data related to the selected item number.

3 With the UP ⇧ or DOWN ⇩ key, set up the data. (The same operation as stated in 1 .)
While the key is held down, the numerical value increases or decreases successively by one.

4 Retain the data with the MODE/SET key.

5 Repeat steps 1 through 4 as needed.

6 With the DATA key, return to the item No. display state.

7 Using the MODE/SET key, switch from the setting mode to the monitor mode.

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2.4.1 USER CONSTANT (DATA) SETUP AND MONITOR (Cont'd)

Table 2.4 shows user constants (Constant Setting).

Table 2.4 User Constants Cn-03 through Cn-23 (Constant Setting) List

	User constant	Symbol	Name	Unit	Lower Limit	Upper Limit	Setting Prior to Shipping	Remarks
Gain Constants	Cn-03	VREFGN	Speed Reference Gain	(r/min)/V	0	2162	500	
	Cn-04	LOOPHZ	Speed Loop Gain	Hz	1	2000	80	
	Cn-05	PITIME	Speed Loop Integration Time Constant	ms	2	10000	20	
	Cn-1A	POSGN	Position Loop Gain*	1/S	1	500	40	
Torque Constants	Cn-06	EMGTRQ	Emergency Stop Torque	%	0	Max. Torque	Max. Torque	OT Made
	Cn-08	TLMTF	Forward Running Torque Limit	%	0	Max. Torque	Max. Torque	
	Cn-09	TLMTR	Reverse Running Torque Limit	%	0	Max. Torque	Max. Torque	
	Cn-13	TCRFGN	Torque Reference Gain	$\frac{1}{10}$ V/Rating	10	100	30	
	Cn-14	TCRLMT	Speed Limit with Speed Control 1	r/min	0	Max. Speed	Max. Speed	
	Cn-17	TRQFIL	Torque Reference Filter Time Constant	100 μs	0	250	4	
	Cn-18	CLMIF	Forward External Current Limit	%	0	Max. Torque	100	
	Cn-19	CLMIR	Reverse External Current Limit	%	0	Max. Torque	100	
Sequence Constants	Cn-07	SFSACC	Soft Start Time (Accel)	ms	0	10000	0	
	Cn-23	SFSDEC	Soft Start Time (Decel)	ms	0	10000	0	
	Cn-0B	TGONLV	Zero-speed Level	r/min	1	Max. Speed	20	
	Cn-0F	ZCLVL	Zero-clamp Level	r/min	0	Max. Speed	10	
	Cn-22	VCMPLV	Speed Agreed Signal Output Width	r/min	0	100	10	
	Cn-12	BRKTIM	Delay Time from Braking Command to SVOFF	10ms	0	50	0	
	Cn-15	BRKSPD	Brake Timing at Motor Rotation (speed level at which brake command is output.)	r/min	0	Max. Speed	100	
	Cn-16	BRKWAI	Brake Timing at Motor Rotation (waiting time from SVOFF to brake command output.)	10ms	10	100	50	
Encoder Pulse Constants	Cn-0A	PGRAT	PG Division Ratio	pulses/rev	16	32768	2048	
	Cn-11	PULSNO	Number of Encoder Pulses	pulses/rev	513	32768	2048	

*: Cn-1A Position Loop Gain is required when zero-clamp function is used.

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Table 2.4 User Constants Cn-03 through Cn-23 (Constant Setting) List (Cont' d)

	User constant	Symbol	Name	Unit	Lower Limit	Upper Limit	Setting Prior to Shipping	Remarks
Other Constants	Cn-0C	TRQMSW	Mode Switch (Torque Reference)	%	0	Max. Torque	200	
	Cn-0D	REFMSW	Mode Switch (Speed Reference)	r/min	0	Max. Speed	0	
	Cn-0E	ACCMSW	Mode Switch (Motor Acceleration Detection)	10(r/min)/s	0	3000	0	
	Cn-10	JOGSPD	JOG Speed	r/min	0	Max. Speed	500	
	Cn-1F	SPEED1	1st Speed	r/min	0	Max. Speed	100	
	Cn-20	SPEED2	2nd Speed	r/min	0	Max. Speed	200	
	Cn-21	SPEED3	3rd Speed	r/min	0	Max. Speed	300	

Note:
Do not adjust the factory setting value. When adjusted, normal operation does not be performed.

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2.4.2 USER CONSTANT (MEMORY SWITCH) SETUP AND MONITOR (Cn-01 to Cn-02)

User constants Cn-01 and Cn-02 can be set up or monitored as memory switch bits. The procedures for item number setup and data display are the same as indicated in Par.2.4.1 1 and 2 .

Panel Display

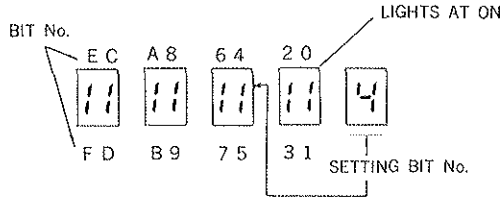


Fig.2.5 Bit Data Display

1 With the UP ⇧ or DOWN ⇩ key, enter the setup memory switch bit No. at the far right end of the panel.

2 With the MODE/SET key, set the memory switch to ON or OFF. The panel indication comes on when the switch is ON, and goes off when the switch is OFF.

3 Repeat steps 1 and 2 as needed.

4 Retain the data with the DATA key.

5 With the DATA key, return to the item No. display state.

6 Using the MODE/SET key, switch from the setting mode to the monitor mode.

Table 2.5 shows memory switches of user constant Cn-01, and Table 2.6 those of user constant Cn-02.

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Table 2.5 User Constant Cn-01 (Memory Switch)

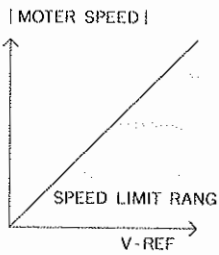
Selection	Bit No.	Setting	Conditions	Standard
Sequence Input Selection	0	0	Servo ON / OFF by external input (SV-ON).	0
		1	The servo is ON at all times.	
	1 (ABSO. PG only)	0	The external input (SEN) is used.	0
		1	Regardless of the SEN signal presence, the SERVOPACK automatically concludes that the "H" level prevails.	
	2	0	The P-OT signal prohibits forward running.	0
		1	Forward running is permitted at all times.	
	3	0	The N-OT signal permits reverse running.	0
		1	Reverse running is permitted at all times.	
Sequence Output Signal Changeover (TGON)	4	0	TGON signal is used as a signal output when rotating is detected. (TGON)	0
		1	TGON signal is used as a signal when current limit is detected.	
Treatment of Momentary Power Loss Reset	5	0	Maintains the servo alarm status at momentary power loss reset.	0
		1	Releases the servo alarm status automatically at momentary power loss reset.	
Abnormal Stop Selection	6	0	<DB stop> The dynamic brake stops the motor.	0
		1	<Coasting to a stop> The motor is freed and brought to a stop.	
	7	0	<DB OFF after DB stop> The dynamic brake is turned OFF after the motor is stopped.	1
		1	<DB continuously ON after DB stop> The dynamic brake remains activated after the motor is stopped.	
	Note 1 8	0	The overtravel state stop method agrees with bit 6.	0
		1	<Overtravel zero speed stop> In the overtravel state, the motor is stopped at the torque setting defined by user constant Cn-06.	
	Note 2 9	0	In the overtravel state, base blocking (BB) is implemented after zero speed stop.	0
		1	In the overtravel state, zero clamping is effected after zero speed stop.	
Mode Switch Selection	Note 3 D • C	0 • 0	<Torque reference> Based on the torque reference level defined by user constant Cn-0C.	0
		0 • 1	<Speed reference> Based on the speed reference level defined by user constant Cn-0D.	
		1 • 0	<Acceleration> Based on the acceleration level defined by user constant Cn-0E.	
		1 • 1	<None> The mode switch function is not provided.	
Encoder Selection	E	0	Incremental encoder	0
		1	Absolute encoder	
	F		Don't change.	0

Notes:
1. The fault stop method in the torque control mode complies with bit 6.
2. Selects the state prevailing when the zero speed stop method has been selected for the overtravel state (bit 8).
3. Selects the mode switch operating condition. When the mode switch operates, the speed control mode changes from P•I control to P control.

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2.4.2 USER CONSTANT (MEMORY SWITCH) (Cn-01 to Cn-02) AND MONITOR (Cont'd)

Table 2.5 User Constant Cn-01 (Memory Switch) List (Cont'd)

Selection	Bit No.	Setting	Description	Reference Input	Sequence Signal Input	Standard
Control Mode Selection	B • A	0 • 0	<Speed control> • Regular speed control • The $\overline{\text{P-CON}}$ signal (1CN-15) is used to effect P/PI control changeover	Speed reference (V-REF)	$\overline{\text{P-CON}}$ OFF: PI control ON : P control	0 • 0
		0 • 1	<Zero clamp speed control> • After the motor is stopped (ZCLVL), the speed reference is disconnected to execute the zero speed stop function. After this, maintains the servo lock status. • The $\overline{\text{P-CON}}$ signal (1CN-15) is used to turn the zero clamp function ON and OFF.		$\overline{\text{P-CON}}$ OFF: Zero clamp function OFF ON : Zero clamp function ON	
		1 • 0	<Torque control I> • The motor output torque is controlled by the torque reference (T-REF). • The V-REF cannot be used.	Torque reference (T-REF)	None	
		1 • 1	<Torque control II> • The $\overline{\text{P-CON}}$ signal (1CN-15) is used for torque / speed control mode changeover. Troque control mode • The motor output torque is controlled by the torque reference (T-REF). • The speed limit can be entered from outside (V-REF). The V-REF voltage (+) limits both the forward and reverse running speeds.  Speed control mode • The speed reference is entered from the V-REF. • The T-REF cannot be used.		$\overline{\text{P-CON}}$ OFF: Torque control ON : Speed control	

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Table 2.6 User Constant Cn-02 (Memory Switch) List

Selection	Bit No.	Setting	Description	Standard
Reverse Rotation Mode	Note 0	0	CCW:Forward Running	0
		1	CW:Forward Running	
Home Position Error Mask	1 (ABSO. PG only)	0	Home position error is detected.	0
		1	Home position error is not detected.	
Contact Reference Mode	2	0	Contact inputs P-CL and N-CL are used as power supply limit ON / OFF reference inputs. Contact input $\overline{\text{P-CON}}$ is used as a signal specified in bit A or B of user constant Cn-01.	0
		1	Contact inputs P-CL and N-CL are used as speed input reference selection (1st to 3rd speed) signals.	

Note : Turn OFF the power supply once after setting.

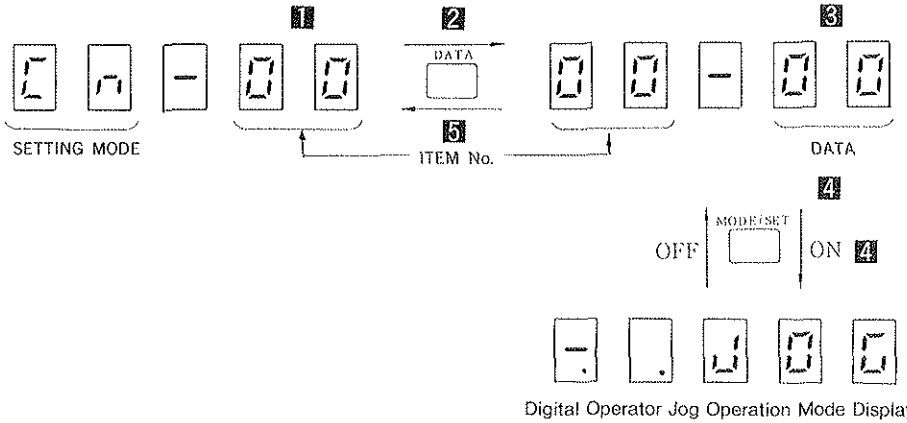
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2.4.3 DIGITAL OPERATOR JOG OPERATION MODE SELECTION AND OPERATING PROCEDURE

(1) Digital Operator Jog Operation Mode Selection

When user constant Cn-00 is set to 00, the operations are to be controlled from the digital operator.

Panel Display



Digital Operator Jog Operation Mode Display

Fig.2.6 Digital Operator Jog Operation Mode

1 Select the item number 00 with the UP ⇧ or DOWN ⇩ key.

2 With the DATA key, display the data related to the selected item number.

3 With the UP ⇧ or DOWN ⇩ key, select the number 00.

4 With the MODE/SET key, turn ON or OFF the monitor panel jog operation mode.

5 With the DATA key, return to the item No. display state.

6 Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Digital Operator Jog Operation Procedure

For speed reference adjustment, use user constant Cn-10 (see Table 2.4).

1. With the DATA key, effect SVON / SVOFF changeover.
2. The motor runs in the forward direction while the UP key is held down.
3. The motor runs in the reverse direction while the DOWN key is held down.

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2.4.4 SPEED REFERENCE OFFSET ADJUSTMENT

When user constant Cn-00 is set to 01, the system enters the speed reference offset adjustment mode.

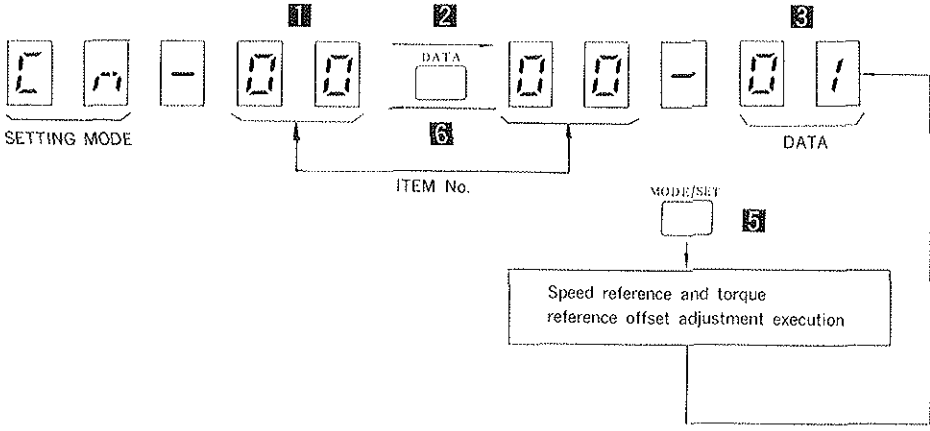


Fig. 2.7 Speed Reference Offset Adjustment

1. Select the item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 01.
4. Apply the desired zero speed reference voltage with speed reference input. Apply the desired zero torque reference voltage with torque reference input.
5. With the MODE/SET key, make speed reference offset adjustment and return to the user constant Cn-00 data display state.
6. With the DATA key, return to the item No. display state.
7. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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2.4.5 CLEARING FAULT TRACEBACK DATA

When user constant Cn-00 is set to 02, fault traceback data are cleared.

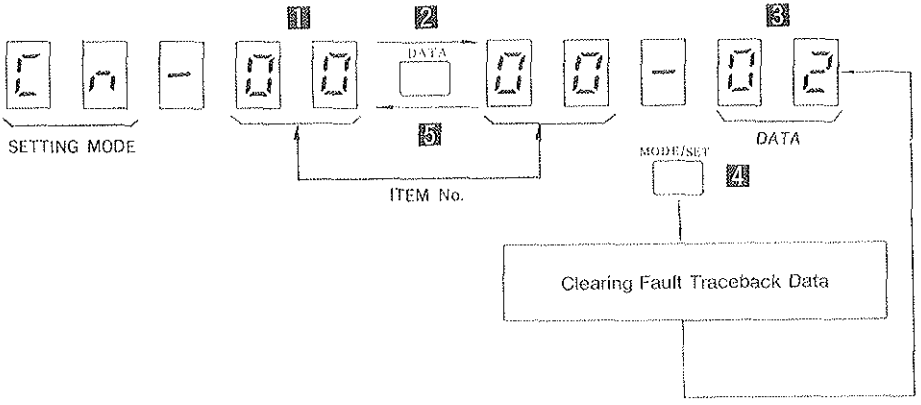


Fig. 2.8 Clearing Fault Traceback Data

1. Select the item number 00 with the UP or DOWN key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP or DOWN key, select the number 02.
4. With the MODE/SET key, clear fault traceback data and return to the user constant Cn-00 data display state.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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2.4.6 SPEED REFERENCE OFFSET MANUAL ADJUSTMENT

(1) Mode Setting in Speed Reference Offset Manual Adjustment

When user constant Cn-00 is set to 03, the system enters the speed reference offset manual adjustment mode.

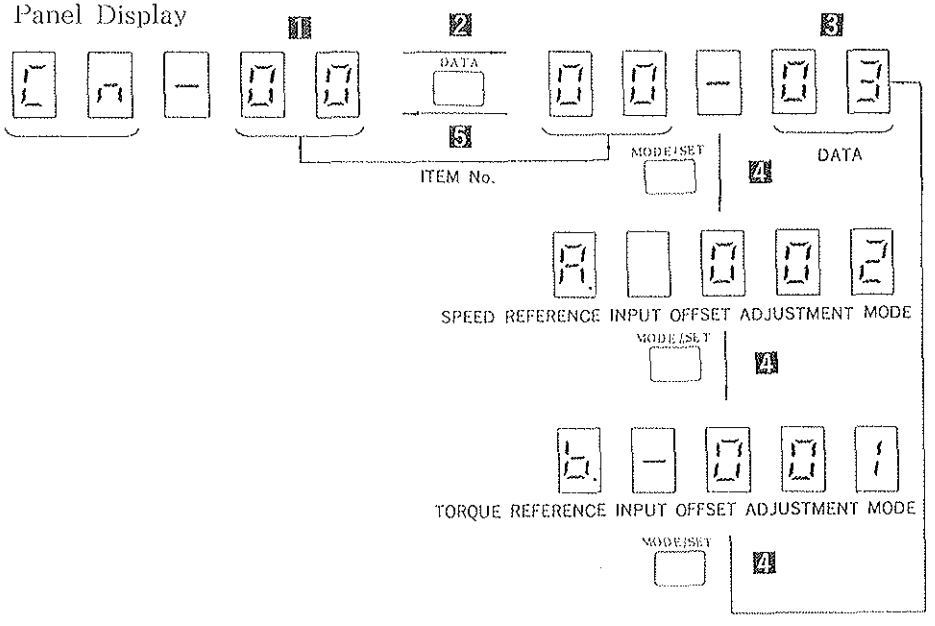


Fig. 2.9 Speed Reference Offset Manual Adjustment Mode

1. Set up item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 03.
4. With the MODE/SET key, switch the adjustment mode.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Speed Reference Offset Manual Adjustment

Input a voltage that will obtain zero speed reference to the speed reference input. Input a voltage that will obtain zero torque reference to the torque reference input. (Normally 0V)

1. While the UP key is held down, the offset is added to the forward running side.
2. While the DOWN key is held down, the offset is added to the reverse running side.
3. Using the MODE/SET key, store offset data, then enter the monitor mode.

Offset adjustment is performed so that the LED indication may basically become zero; however, the perfect zero state of indication does not always offer optimum adjustment. Therefore, adjust the offset carefully, taking actual motor rotation into consideration.

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2.4.7 CHECK OF MOTOR PARAMETERS

(1) Check Method of Motor Parameters

When user constant Cn-00 is set to 04, the system enters the motor parameter check mode.

Panel Display

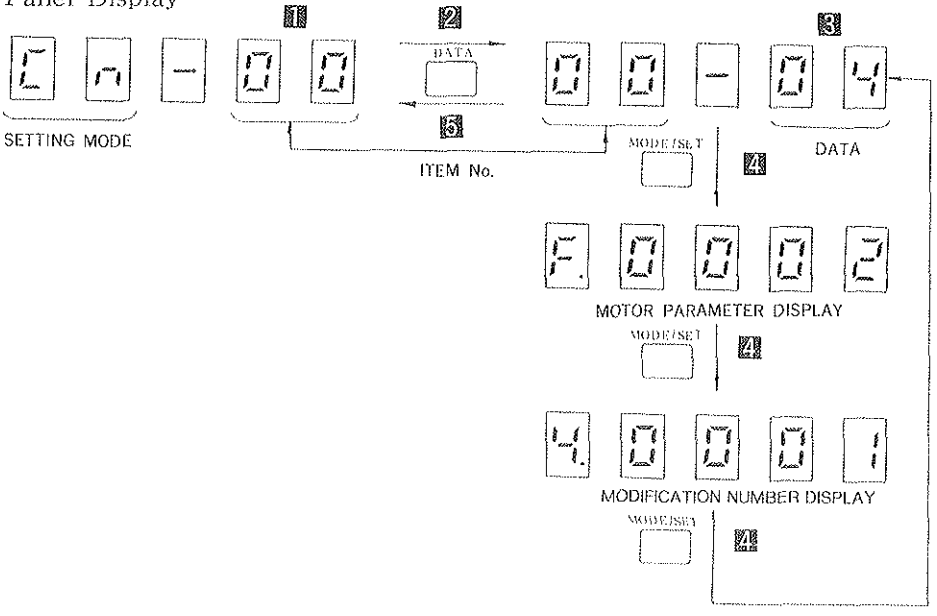


Fig. 2.10 Switch Functions in Motor Parameter Check

1. Set up item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 04.
4. With the MODE/SET key, check the motor parameter.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Parameter Display

Motor Parameter



Motor Capacity

9E : 30W (0.04HP)
b2: 50W (0.07HP)
01: 100W (0.13HP)
02: 200W (0.27HP)
04: 400W (0.53HP)
08: 750W (1.01HP)

Motor Type

0: Σ Series, 200V
1: Σ Series, 100V

Modification Index



Modification No. (Hexadecimal display)

$(a \times 16^3 + b \times 16^2 + C \times 16 + d) = Y$ Specification No.

Nos. Corresponding to Alphabets

A = 10
b = 11
C = 12
d = 13
E = 14
F = 15

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2.4.8 AUTO TUNING

(1) Mode Setting in Auto Tuning

When user constant Cn-00 is set to 05, the system enters the auto tuning mode.

Panel Display

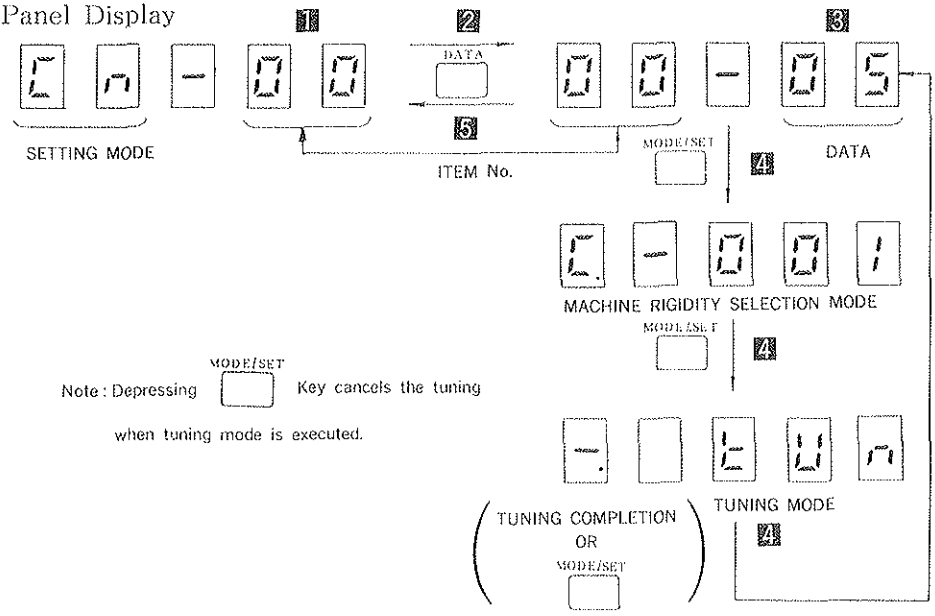


Fig. 2.11 Auto Tuning Mode

1. Set up item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 05.
4. With the MODE/SET key, switch to the machine rigidity selection mode or tuning mode.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Machine Rigidity Selection

According to the machine rigidity, select the following:

1 : Low-speed Response
2 : Middle-speed Response
3 : High-speed Response

1. Select 1, 2 or 3 with the UP ⇧ or DOWN ⇩ key.
2. With the MODE/SET key, switch to the tuning mode.

(3) Tuning

Set up the maximum speed reference by user constant Cn-10 (See Table 2.4).

1. With the DATA key, effect SVON / SVOFF changeover.
2. The motor runs in the forward direction while the UP ⇧ key is held down.
3. The motor runs in the reverse direction while the DOWN ⇩ key is held down.
4. Repeat 2 and 3 several times and adjust the gain by changing the value of user constants Cn-04 (Speed Loop Gain) and Cn-05 (Speed Loop Integration Time Constant).
5. With the tuning completion, return to the [0][0]–[0][5].
   When MODE/SET key is depressed, the tuning mode is canceled.

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2.4.9 CHECK OF SOFTWARE VERSION

(1) Mode Setting in Software Version Check

When user constant Cn-00 is set to 06, the system enters the software version check mode.

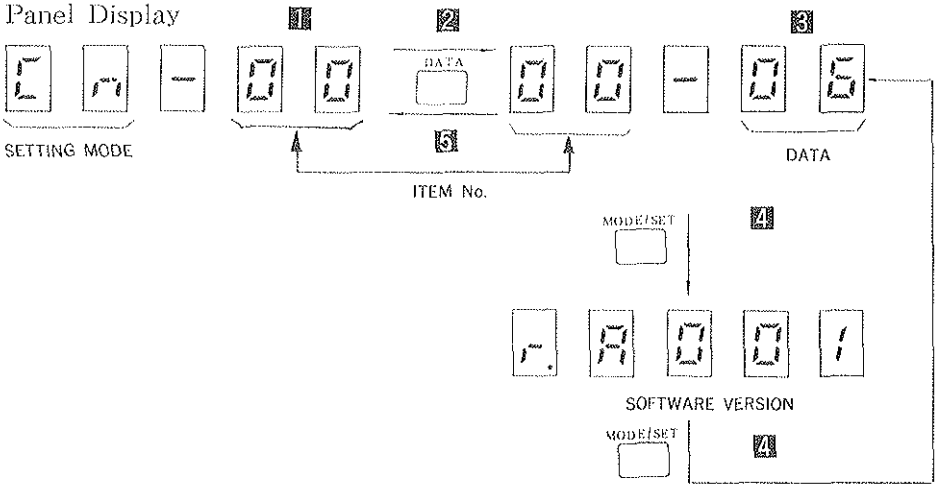
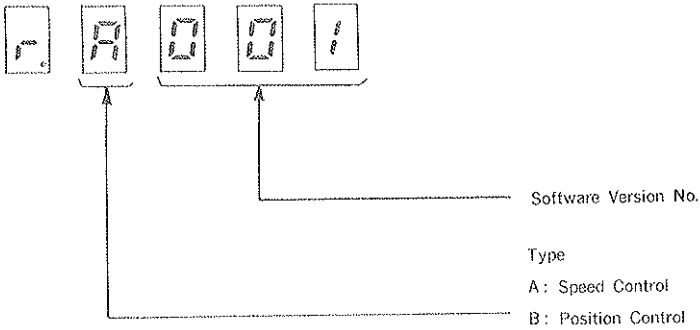


Fig.2.12 Software Version Check Mode

1. Set up item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 06.
4. With the MODE/SET key, display the software version.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Software Version Display



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2.5 MONITOR MODE

In this mode, the speed reference, torque reference, and other data can be observed on the digital operator.
Table 2.7 lists the data that can be monitored.

Table 2.7 Data Monitored

Monitor No.	Date Monitored	
0 0	Feedback Speed	(r/min)
0 1	Speed Reference	(r/min)
0 2	Torque Reference	(%)
0 3	No. of Pulses from Phase-U edge	(Phase-U)
0 4	Electrical Angle	(deg)
0 5	Internal Status Bit Display 1	(Refer to Table 2.8.)

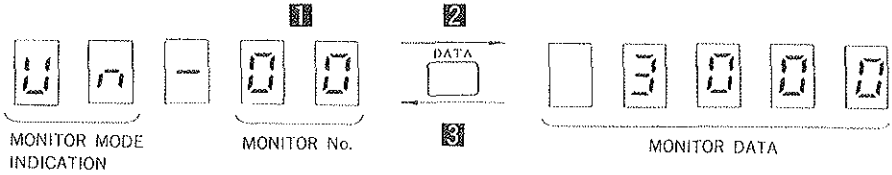


Fig.2.13 Switch Functions in Monitor Mode

1 With the UP ⇧ or DOWN ⇩ key, select a desired monitor No.

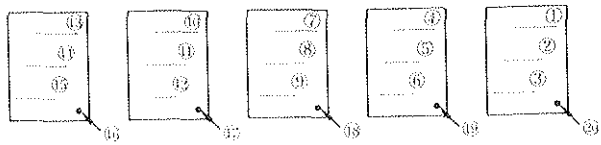
2 With the DATA key, initiate monitor display.

3 Using the DATA key, return to the monitor No. selection state.

4 With the MODE/SET key, switch from the monitor mode to the abnormal traceback mode.

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Table 2.8 Bit Indication of Monitor Mode Un-05 Internal Status



Bit No.	Symbol	Contents	Remarks
①	SVALM	Servo Alarm	
②	DBON	Dynamic Braking	
③	DIR	Reverse Run Mode	
④	TGON	Motor Running (Motor speed is TGON level or higher)	Select by setting of bit 4 of user constant Cn-01.
	CLT	Current Limit	
⑤	V-CMP	Speed Agreed	
⑥	MSON	Mode Switch ON	
⑦	P-CL	Forward Current Limit	
⑧	N-CL	Reverse Current Limit	
⑨	B-ON	Motor under Present Condition	
⑩	PA	Phase-A	
⑪	PB	Phase-B	
⑫	PC	Phase-C	
⑬	PU	Phase-U	Incremental encoder only
⑭	PV	Phase-V	Incremental encoder only
⑮	PW	Phase-W	Incremental encoder only
⑯	SVON	Servo ON	
⑰	P-CON	P Operation Input	Select by setting of bit A or B of user constant Cn-01 or bit 2 of user constant Cn-02.
	ZCLMP	Position Loop Operation at Stopping	
	DR	Rotating Direction Input by External Setting Speed (ON at reverse, OFF at forward)	
⑱	P-OT	Forward Running Prohibit Input	
⑲	N-OT	Reverse Running Prohibit Input	
⑳	SEN	SEN Signal Input	Absolute encoder only

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2.6 FAULT TRACEBACK MODE

In this mode, information on past fault occurrences can be displayed.
- Information on up to 10 past fault occurrences can be stored.
- When a fault is reset or the control power is turned ON, traceback data A.99 is saved. (These data are also counted as one of a total of 10 stored items of fault information.)
- For the relationship between traceback data and fault descriptions, refer to Table 2.9.



Fig.2.14 Fault Traceback Mode

■ With the UP ⇧ or DOWN ⇩ key, increase or decrease the fault occurrence number. The fault information related to the selected number is then displayed. (The higher the fault occurrence number, the older the fault occurrence.)

■ With the MODE/SET key, switch from the fault traceback mode to the status display mode.

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Table 2.9 Error Displays With Digital Operator and Traceback Data

Digital Operator (Traceback Data)	Detection	Remarks
A.00	Absolute Encoder Data Error	Only when absolute encoder is used.
A.02	Parameter Breakdown	
A.04	Parameter Setting Error	
A.10	Overcurrent	
A.40	Overvoltage	
A.51	Feedback Overspeed	Detected at 110% of max. speed.
A.52	Overspeed Reference Input	Detected at 110% of max. speed.
A.71	Overload	Momentary overload
A.72	Overload	Continuous overload
A.80	Encoder Error	Only when absolute encoder is used.
A.81	Encoder Backup Alarm	Only when 12-bit absolute encoder is used.
A.82	Encoder Check sum Error	Only when 12-bit absolute encoder is used.
A.83	Encoder Battery Alarm	Only when 12-bit absolute encoder is used.
A.84	Encoder Absolute Error	Only when 12-bit absolute encoder is used.
A.85	Encoder Overspeed	Only when 12-bit absolute encoder is use.d
A.b1	Reference Input Read Error	
A.C1	Overrun	
A.C3	PA-, PG-phase Disconnection of PG Signal Line	
A.C4	PC Disconnection	
A.99	Not Applicable to Alarm	
CPF00	Digital Operator Transmission Error 1	Digital operator error Not detected as traceback data.
CPF01	Digital Operator Transmission Error 2	

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3. OPERATION METHOD FOR SERVOPACK SGD-□□P FOR POSITION CONTROL

This section explains the operation method when SERVOPACK (type SGD) for position control is operated using a mount type digital operator.

3.1 SWITCH OPERATION

Fig. 3.1 shows the digital operator. The digital operator has various functions as listed by modes in Par.3.2, "FUNCTION OF DIGITAL OPERATOR"(p.33).

Notes:

1. The digital operator constant setup data retained even after the power is turned off.
2. Even if the power is turned off after abnormal occurrence, the abnormal data are retained in memory. Therefore, it is possible to check the abnormal data after the power is turned back on.
3. The monitor mode can be changed even during operations.

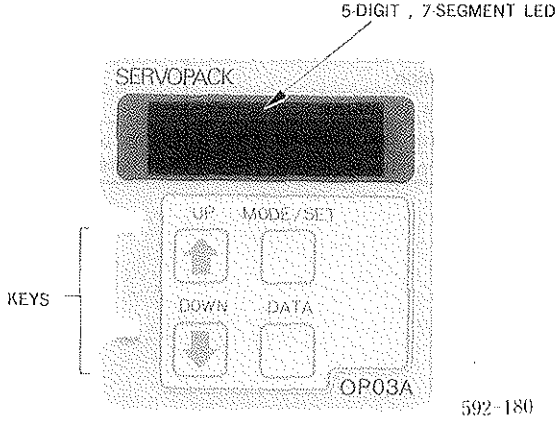


Fig. 3.1 DIGITAL OPERATOR (MOUNT TYPE)

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3.2 FUNCTION OF DIGITAL OPERATOR

Table 3.1 shows the digital operator functions. Note that the status display mode prevails when control power is turned ON. To change the mode, use MODE/SET key as shown in Fig. 3.2

Table 3.1 Digital Operator Functions

Mode	Function	
Status Indication Mode	Various State Indications • Base Block • On Operation • Trouble	(See Par. 3.3)
Setting Mode	Refer to "User Constant Setting."	(See Par. 3.4.1)
	• Operation (JOG) from digital operator	(See Par. 3.4.3)
	• Clearing Fault Traceback Data	(See Par. 3.4.4)
	• Check of Motor Parameters	(See Par. 3.4.5)
	• Auto Tuning	(See Par. 3.4.6)
	• Check of Software Version	(See Par. 3.4.7)
Monitor Mode	Various Monitoring • Speed • Speed Reference (At external setting speed control) • Torque Reference • Number of Pulses from Origin (Phase-U) • Electrical Angle • Interior Status Bit • Reference Pulse Speed Indication • Positioning Deviation	(See Par. 3.5)
Fault Traceback Indication Mode	Fault History	(See Par. 3.6)

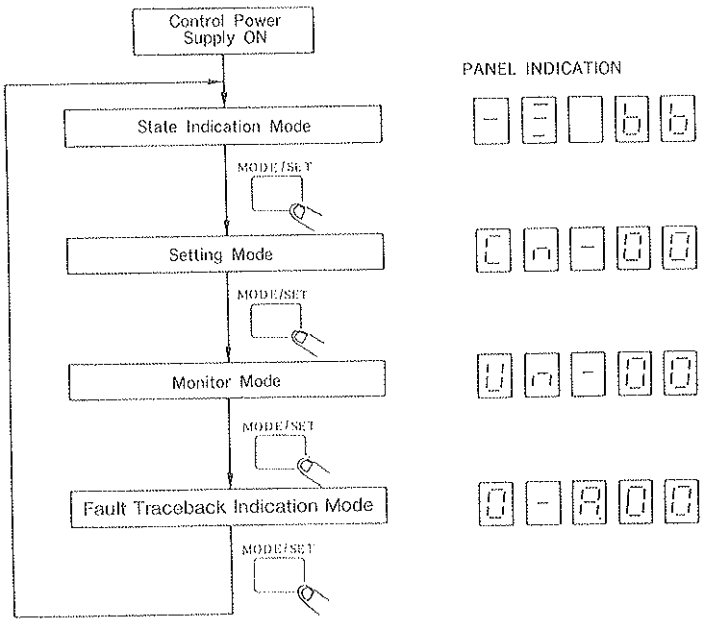


Fig. 3.2 Mode Changeover

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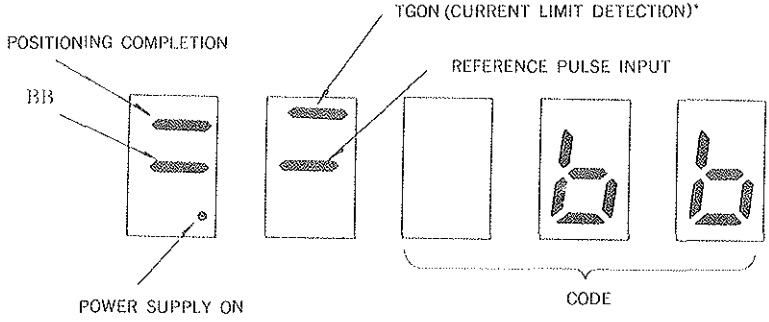
3.3 STATUS INDICATION MODE

When this mode is selected, the condition of SERVOPACK is indicated with bits and codes as shown in Fig. 3.3. Table 3.2 shows the bit data contents. Table 3.3 shows the codes and conditions.

UP DOWN : Alarm reset switch

MODE/SET : Changes state indication mode into setting mode.

Panel Display



* TGON or current limit detection is displayed according to bit 4 of user constant Cn-01.

Fig. 3.3 Status Indication

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Table 3.2 Bit Data Contents

Bit Data	Contents	Remarks
Power Supply ON	Light goes ON with power supply ON.	
BB	Light goes ON with base block, and goes OFF with servo ON.	
Positioning Completion	Light turns ON when lag pulses of error counter reach the position completion width range set in user constant Cn-1B.	
TGON	Light goes ON with motor rotating speed higher than TGON level.	Selected by bit 4 of user constant Cn-01.
Current Limit Detection	Light goes ON when torque reference reaches the torque limit value.	
Reference Pulse Input	Light goes ON at reference pulse input.	

Table 3.3 Codes and Status

Code	Condition
bb	Base Block
run	On Operation
Pot	Forward Running Prohibited
not	Reverse Running Prohibited
A.00	Alarm Status Refer to Table 3.10.

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3.4 SETTING MODE

In this mode, the following operations can be performed.

- User constant setup and monitor
- Jog operations from the digital operator
- Offset adjustment
- Fault traceback data clearing
- Check of motor parameters
- Auto tuning
- Check of software version

3.4.1 USER CONSTANT (DATA) SETUP AND MONITOR (Cn−03 to Cn−27)

Panel Display

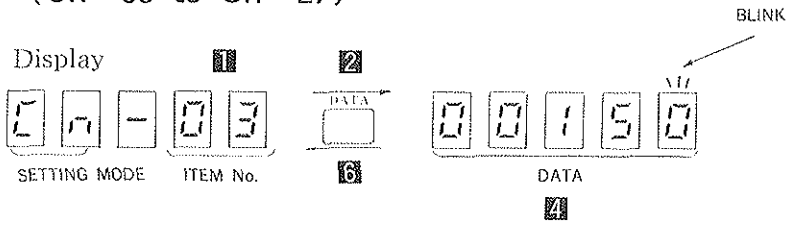


Fig. 3.4 User Constant Setting

1 Set up the item number with the UP ⇧ or DOWN ⇩ key.

While the key is held down, the numerical value increases or decreases successively by one.

2 With the DATA key, display the data related to the selected item number.

3 With the UP ⇧ or DOWN ⇩ key, set up the data. (The same operation as stated in 1 .)
While the key is held down, the numerical value increases or decreases successively by one.

4 Retain the data with the MODE/SET key.

5 Repeat steps 1 through 4 as needed.

6 With the DATA key, return to the item No. display state.

7 Using the MODE/SET key, switch from the setting mode to the monitor mode.

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3.4.1 USER CONSTANT (DATA) SETUP AND MONITOR (Cont' d)

Table 3.4 shows user constants (Constant Setting).

Table 3.4 User Constants Cn-04 through Cn-27 (Constant Setting) List

	User constant	Symbol	Name	Unit	Lower Limit	Upper Limit	Setting Prior to Shipping	Remarks
Gain Constants	Cn-04	LOOPHZ	Speed Loop Gain	Hz	1	2000	80	
	Cn-05	PITIME	Speed Loop Integration Time Constant	ms	2	10000	20	
	Cn-1A	POSGN	Position Loop Gain*	1/S	1	500	40	
	Cn-1C	BAISLV	Bias	r/min	0	450	0	
	Cn-1D	FFGN	Feed Forward	%	0	100	0	
Torque Constants	Cn-06	EMGTRQ	Emergency Stop Torque	%	0	Max. Torque	Max. Torque	
	Cn-08	TLMTF	Forward Running Torque Limit	%	0	Max. Torque	Max. Torque	
	Cn-09	TLMTR	Reverse Running Torque Limit	%	0	Max. Torque	Max. Torque	
	Cn-17	TRQFIL	Torque Reference Filter Time Constant	100 μs	0	250	4	
	Cn-18	CLMIF	Forward External Current Limit	%	0	Max. Torque	100	
	Cn-19	CLMIR	Reverse External Current Limit	%	0	Max. Torque	100	
Sequence Constants	Cn-26	ACCTME	Position Reference Accel / Decel Time Constant	0.1ms	0	640	0	
	Cn-27	FFFILT	Feed Forward Reference Filter	0.1ms	0	640	0	
	Cn-0B	TGONLV	Zero-speed Level	r/min	1	Max. Speed	20	
	Cn-12	BRKTIM	Delay Time from Braking Reference to SVOFF	10ms	0	50	0	
	Cn-15	BRKSPD	Brake Timing at Motor Rotation (speed level at which brake Reference is output.)	r/min	0	Max. Speed	100	
	Cn-16	BRKWAI	Brake Timing at Motor Rotation (waiting time from SVOFF to brake reference output.)	10ms	10	100	50	
Encoder Pulse Constants	Cn-0A	PGRAT	PG Division Ratio	pulses/rev	16	32768	2048	
	Cn-11	PULSNO	Number of Encoder Pulses	pulses/rev	513	32768	2048	
	Cn-24	RATB	Electronic Gear Ratio (molecule)		1	65535	4	$0.01 \leqq B/A \leqq 100$
	Cn-25	RATA	Electronic Gear Ratio (denominator)		1	65535	1	

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Table 3.4 User Constants Cn-04 through Cn-27 (Constant Setting) List (Cont' d)

	User constant	Symbol	Name	Unit	Lower Limit	Upper Limit	Setting Prior to Shipping	Remarks
Other Constants	Cn-0C	TRQMSW	Mode Switch (Torque Reference)	%	0	Max. Torque	200	
	Cn-0D	REFMSW	Mode Switch (Speed Reference)	r/min	0	Max. Speed	0	
	Cn-0E	ACCMSW	Mode Switch (Motor Acceleration Detection)	10(r/min)/s	0	3000	0	
	Cn-0F	ERPMSW	Mode Switch (Lag Pulse)	Reference Unit	0	10000	10	
	Cn-10	JOGSPD	JOG Speed	r/min	0	Max. Speed	500	
	Cn-1B	COINLV	Position Completion Width	Reference Unit	1	250	7	
	Cn-1E	OVERLV	Overflow	×256 Reference Unit	1	32767	1024	
	Cn-1F	SPEED1	1st Speed	r/min	0	Max. Speed	100	
	Cn-20	SPEED2	2nd Speed	r/min	0	Max. Speed	200	
	Cn-21	SPEED3	3rd Speed	r/min	0	Max. Speed	300	

Notes:

1. Do not adjust the factory setting value. When adjusted, normal operation does not be performed.
2. $0.01 \leqq \frac{\text{Cn-29 (RATB)}}{\text{Cn-2A (RATA)}} \leqq 100$

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3.4.2 USER CONSTANT (MEMORY SWITCH) SETUP AND MONITOR (Cn-01 to Cn-02)

User constants Cn-01 and Cn-02 can be set up or monitored as memory switch bits. The procedures for item number setup and data display are the same as indicated in Par.3.4.1 1 and 2

Panel Display

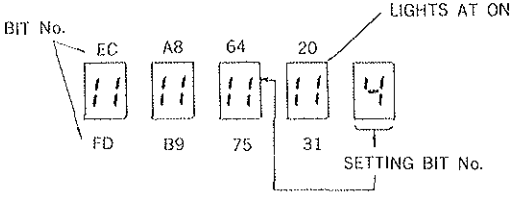


Fig. 3.5 Bit Data Display

1 With the UP ⇧ or DOWN ⇩ key, enter the setup memory switch bit No. at the far right end of the panel.

2 With the MODE/SET key, set the memory switch to ON or OFF. The panel indication comes on when the switch is ON, and goes off when the switch is OFF.

3 Repeat steps 1 and 2 as needed.

4 Retain the data with the DATA key.

5 With the DATA key, return to the item No. display state.

6 Using the MODE/SET key, switch from the setting mode to the monitor mode.

Table 3.5 shows memory switches of user constant Cn-01, and Table 3.6 those of user constant Cn-02.

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Table 3.5 User Constant Cn-01 (Memory Switch)

Selection	Bit No.	Setting	Conditions	Standard
Sequence Input Selection	0	0	Servo ON / OFF by external input (SV-ON).	0
		1	The servo is ON at all times.	
	1		Do not adjust.	0
	2	0	The P-OT signal prohibits forward running.	0
		1	Forward running is permitted at all times.	
	3	0	The N-OT signal permits reverse running.	0
		1	Reverse running is permitted at all times.	
Sequence Output Signal Changeover (TGON)	4	0	$\overline{\text{TGON}}$ signal is used as a signal output when rotating is detected. (TGON)	0
		1	$\overline{\text{TGON}}$ signal is used as a signal when current limit is detected.	
Treatment of Momentary Power Loss Reset	5	0	Maintains the servo alarm status at momentary power loss reset.	0
		1	Releases the servo alarm status automatically at momentary power loss reset.	
Abnormal Stop Selection	6	0	<DB stop> The dynamic brake stops the motor.	0
		1	<Coasting to a stop> The motor is freed and brought to a stop.	
	7	0	<DB OFF after DB stop> The dynamic brake is turned OFF after the motor is stopped.	1
		1	<DB continuously ON after DB stop> The dynamic brake remains activated after the motor is stopped.	
	8	0	The overtravel state stop method agrees with bit 6.	0
		1	<Overtravel zero speed stop> In the overtravel state, the motor is stopped at the torque setting defined by user constant Cn-06.	
	Note 1 9	0	In the overtravel state, base blocking (BB) is implemented after zero speed stop.	0
		1	In the overtravel state, zero clamping is effected after zero speed stop.	
Position Deviation at Base Blocking	A	0	Clears.	0
		1	Does not clear.	
Mode Switch Function	B	0	The mode switch function is provided. The mode switch operation agrees with bit C and D.	0
		1	The mode switch function is not provided.	
Mode Switch Selection	Note 2 D • C	0 • 0	<Torque reference> Based on the torque reference level defined by user constant Cn-0C.	00
		0 • 1	<Speed reference> Based on the speed reference level defined by user constant Cn-0D.	
		1 • 0	<Acceleration> Based on the acceleration level defined by user constant Cn-0E.	
		1 • 1	<Deviation pulse> Based on the deviation pulse level defined by user constant Cn-0F.	
Encoder Selection	E	0	Incremental encoder	0
	F	1	Absolute encoder	
			Do not change.	0

Notes: 1. Selects the state prevailing when the zero speed stop method has been selected for the overtravel state (bit 8).
2. Selects the mode switch operating condition. When the mode switch operates, the speed control mode changes from P•I control to P control.

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Table 3.6 User Constant Cn-02 (Memory Switch) List

Selection	Bit No.	Setting	Description	Standard
Reverse Rotation Mode	0	0	CCW:Forward Running	0
		1	CW:Forward Running	
Home Position Error Mask	1 (ABSO. PG only)	0	Home position error is detected.	0
		1	Home position error is not detected.	
Contact Reference Mode	2	0	Contact inputs $\overline{\text{P-CL}}$ and $\overline{\text{N-CL}}$ are used as power supply limit ON/OFF reference inputs.	0
		1	Contact inputs $\overline{\text{P-CL}}$ and $\overline{\text{N-CL}}$ are used as speed input reference selection (1st to 3rd speed) signals.	
Reference Pulse Mode	3.4.5	000	Sign+Pulse	000
		001	CW+CCW	
		010	Phase-A+Phase-B(×1)	
		011	Phase-A+Phase-B(×2)	
		100	Phase-A+Phase-B(×4)	
Monitor Changeover (TRQ-M)	6	0	Torque monitor (0.5V/100%)	0
		1	Speed reference monitor (0.5V/1000 r/min)	
Monitor Changeover (VTG-M)	7	0	Speed monitor (0.5V/1000 r/min)	0
		1	Lag pulse monitor (3V/100 pulses)	
Spare	8.9		Do not adjust.	0
Deviation Counter Clear	A	0	Solid (High level signal)	0
		1	Differential (Rising edge)	
	B		Do not adjust.	0
	C		Do not adjust.	0
Reference Pulse Reversal	D	0	Normal operation	0
		1	Reverse operation	
Monitor Output Level Changeover	E	0	Changes the value of lag pulse monitor output level to 3V/100 reference unit.	0
		1	Changes the value of lag pulse monitor output level to 3V/10000 reference unit.	
	F		Do not change.	0

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3.4.3 DIGITAL OPERATOR JOG OPERATION MODE SELECTION AND OPERATING PROCEDURE

(1) Digital Operator Jog Operation Mode Selection

When user constant Cn-00 is set to 00, the operations are to be controlled from the digital operator.

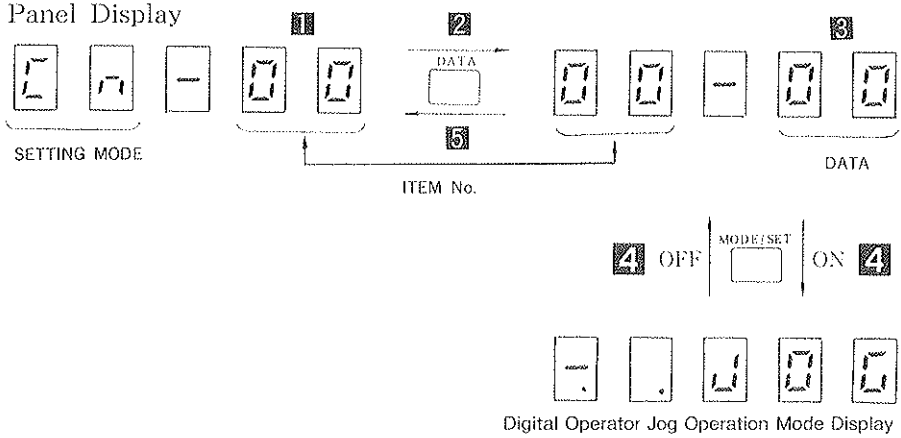


Fig.3.6 Digital Operator Jog Operation Mode

1. Select the item number 00 with the UP ⇧ or DOWN ⇩ key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP ⇧ or DOWN ⇩ key, select the number 00.
4. With the MODE/SET key, turn ON or OFF the monitor panel jog operation mode.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Digital Operator Jog Operation Procedure

For speed reference adjustment, use user constant Cn-10 (see Table 3.4).

1. With the DATA key, effect SVON / SVOFF changeover.
2. The motor runs in the forward direction while the UP key is held down.
3. The motor runs in the reverse direction while the DOWN key is held down.

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3.4.4 CLEARING FAULT TRACEBACK DATA

When user constant Cn-00 is set to 02, fault traceback data are cleared.

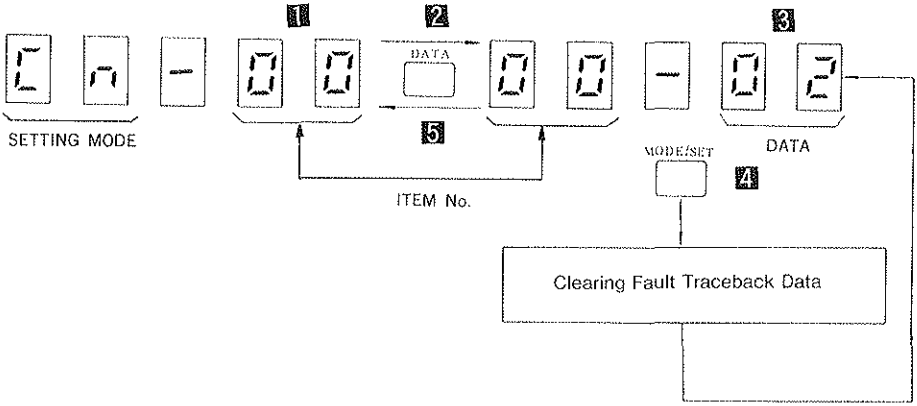


Fig.3.7 Clearing Fault Traceback Data

1. Select the item number 00 with the UP key or DOWN key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP key or DOWN key, select the number 02.
4. With the MODE/SET key, clear fault traceback data and return to the user constant Cn-00 data display state.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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3.4.5 CHECK OF MOTOR PARAMETERS

(1) Check Method of Motor Parameters

When user constant Cn-00 is set to 04, the system enters the motor parameter check mode.

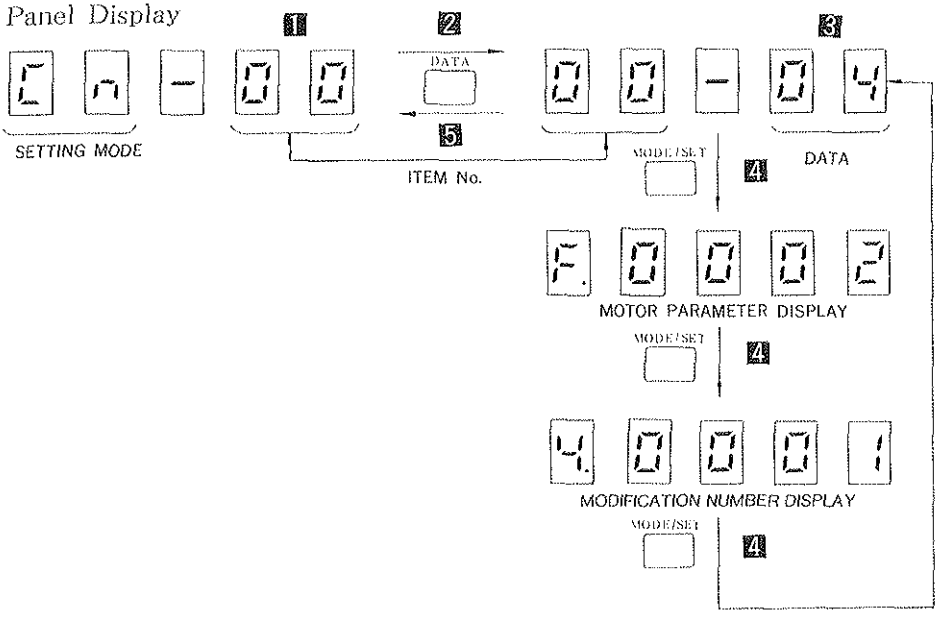


Fig. 3.8 Switch Functions in Motor Parameter Check

1. Set up item number 00 with the UP key or DOWN key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP key or DOWN key, select the number 04.
4. With the MODE/SET key, check the motor parameter.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Parameter Display

Motor Parameter



Motor Capacity

9E : 30W (0.04HP)
b2: 50W (0.07HP)
01: 100W (0.13HP)
02: 200W (0.27HP)
04: 400W (0.53HP)
08: 750W (1.01HP)

Motor Type

0 ·····Σ Series, 200V
1 ·····Σ Series, 100V

Modification Index



Modification No. (Hexadecimal display)

$(a \times 16^3 + b \times 16^2 + C \times 16 + d) = Y$ Specification No.

Nos. Corresponding to Alphabets

A = 10
b = 11
C = 12
d = 13
E = 14
F = 15

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3.4.6 AUTO TUNING

(1) Mode Setting in Auto Tuning

When user constant Cn-00 is set to 05, the system enters the auto tuning mode.

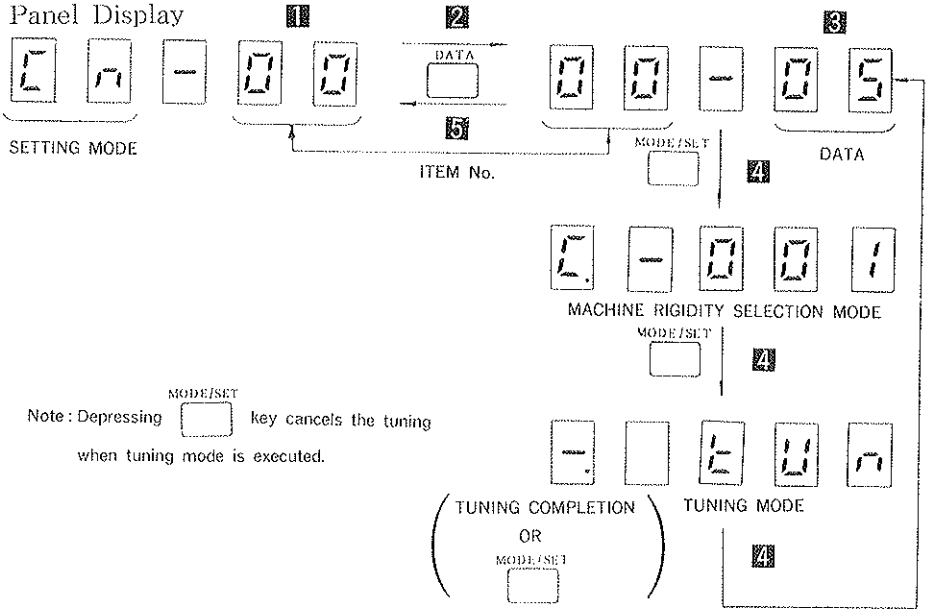


Fig. 3.9 Auto Tuning Mode

1. Set up the item number 00 with the UP or DOWN key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP or DOWN key, select the number 05.
4. With the MODE/SET key, switch from the setting mode to the monitor or tuning mode.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, swich from the setting mode to the monitor mode.

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(2) Machine Rigidity Selection

According to the machine rigidity, select the following:

1 : Low-speed Response
2 : Middle-speed Response
3 : High-speed Response

1 Select 1, 2 or 3 with the UP ⇧ or DOWN ⇩ key.

2 With the MODE/SET key, switch to the tuning mode.

(3) Tuning

Set up the maximum speed reference by user constant Cn-10 (See Table 3.4).

1 With the DATA key, effect SVON / SVOFF changeover.

2 The motor runs in the forward direction while the UP ⇧ key is held down.

3 The motor runs in the reverse direction while the DOWN ⇩ key is held down.

4 Repeat 2 and 3 several times and adjust the gain by changing the value of user constants Cn-1A (Position Loop Gain), Cn-04 (Speed Loop Gain) and Cn-05 (Speed Loop Integration Time Constant).

5 With the tuning completion, return to the 00–06.
When MODE/SET key is depressed, the tuning mode is canceled.

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3.4.7 CHECK OF SOFTWARE VERSION

(1) Mode Setting in Software Version Check

When user constant Cn-00 is set to 06, the system enters the software version check mode.

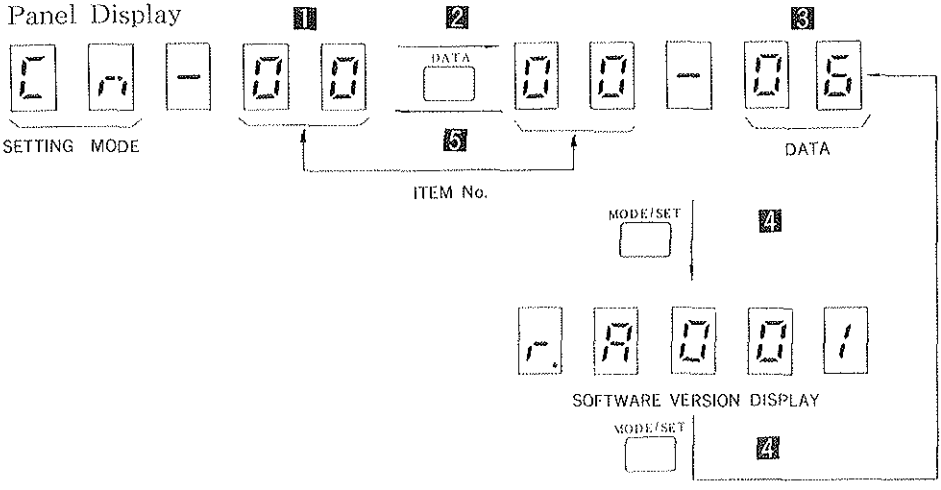
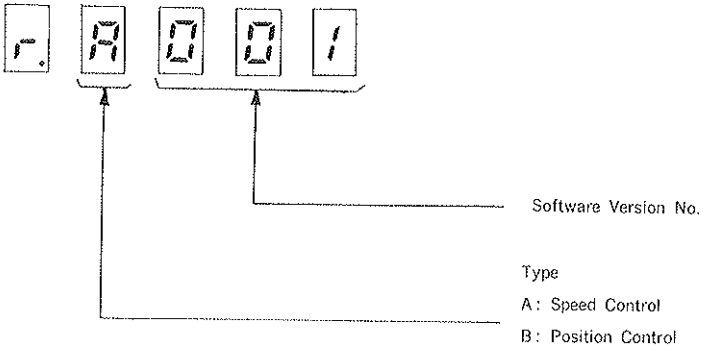


Fig. 3.10 Software Version Check Mode

1. Set up the item number 00 with the UP or DOWN key.
2. With the DATA key, display the data related to the selected item number.
3. With the UP or DOWN key, select the number 06.
4. With the MODE/SET key, display the software version.
5. With the DATA key, return to the item No. display state.
6. Using the MODE/SET key, switch from the setting mode to the monitor mode.

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(2) Software Version Display



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3.5 MONITOR MODE

In this mode, the speed reference, torque reference, and other data can be observed on the digital operator.
Table 3.7 lists the data that can be monitored.

Table 3.7 Data Monitored

Monitor No.	Date Monitored	
0 0	Feedback Speed	(r/min)
0 1	Speed Reference (at external setting speed control)	(r/min)
0 2	Torque Reference	(%)
0 3	No. of Pulses from Phase-U Edge	(Phase-U)
0 4	Electrical Angle	(1/10deg)
0 5	Internal Status Bit Display 1	(Refer to Table 3.8.)
0 6	Internal Status Bit Display 2	(Refer to Table 3.9.)
0 7	Speed Display of Reference Pulse	(r/min)
0 8	Position Deviation	(Pulse)

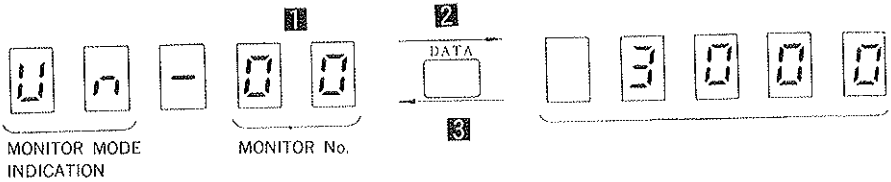


Fig. 3.11 Switch Functions in Monitor Mode

1 With the UP ⇧ or DOWN ⇩ key, select a desired monitor No.

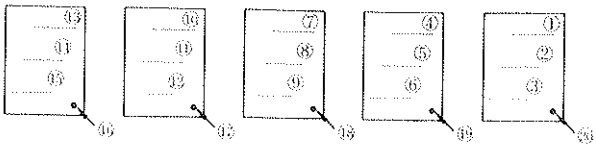
2 With the DATA key, initiate monitor display.

3 Using the DATA key, return to the monitor No. selection state.

4 With the MODE/SET key, switch from the monitor mode to the abnormal traceback mode.

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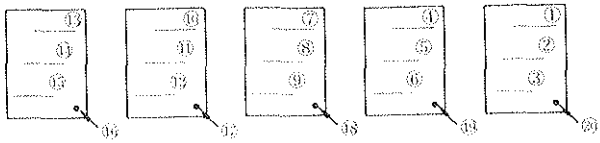
Table 3.8 Bit Indication of Monitor Mode Un-05 Internal Status



Bit No.	Symbol	Contents	Remarks
①	SVALM	Servo Alarm	
②	DBON	Dynamic Braking	
③	DIR	Reverse Run Mode	
④	TGON	Motor Running (Motor speed is TGON level or higher)	Select by setting of user constant Cn-01.
	CLT	Current Limit	
⑤	COIN	Position Completion	
⑥	MSON	Mode Switch ON	
⑦	P-CL	Forward Current Limit	
⑧	N-CL	Reverse Current Limit	
⑨	B-ON	Motor under Present Condition	
⑩	PA	Phase-A	
⑪	PB	Phase-B	
⑫	PC	Phase-C	
⑬	PU	Phase-U	Incremental encoder only
⑭	PV	Phase-V	Incremental encoder only
⑮	PW	Phase-W	Incremental encoder only
⑯	SVON	Servo ON	
⑰	P-CON	P Operation Input	Select by setting of bit 2 of user constant Cn-02.
	DR	Rotating Direction Input by External Setting Speed (ON at reverse, OFF at forward)	
⑱	P-OT	Forward Running Prohibit Input	
⑲	N-OT	Reverse Running Prohibit Input	
⑳	NONE		

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Table 3.9 Bit Indication of Monitor Mode Un-06 Internal Status



Bit No.	Symbol	Contents	Remarks
①	PUL	Reference Pulse Input	
②	SIGN	Sign Input	
③	CLR	Deviation Counter Clear Input	
④ to ⑳	NONE		

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3.6 FAULT TRACEBACK MODE

In this mode, information on past fault occurrences can be displayed.
- Information on up to 10 past fault occurrences can be stored.
- When a fault is reset or the control power is turned ON, traceback data A.99 is saved. (These data are also counted as one of a total of 10 stored items of fault information.)
- For the relationship between traceback data and fault descriptions, refer to Table 3.10.

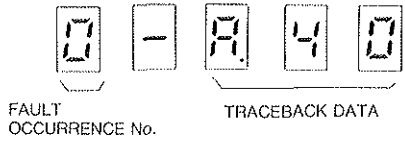


Fig.3.12 Fault Traceback Mode

1. With the UP ⇧ or DOWN ⇩ key, increase or decrease the fault occurrence number. The fault information related to the selected number is then displayed. (The higher the fault occurrence number, the older the fault occurrence.)
2. With the MODE/SET key, switch from the fault traceback mode to the status display mode.

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Table 3.10 Error Displays with Digital Operator and Traceback Data

Digital Operator (Traceback Data)	Detection	Remarks
A. 00	Absolute Encoder Data Error	Only when absolute encoder is used.
A. 02	Parameter Breakdown	
A. 04	Parameter Setting Error	
A. 10	Overcurrent	
A. 30	Overflow	
A. 40	Overvoltage	
A. 51	Feedback Overspeed	Detected at 110% of max. speed
A. 52	Overspeed Reference Input	Detected at 110% of max. speed
A. 71	Overload	Momentary overload
A. 72	Overload	Continuous overload
A. 80	Encoder Error	Only when absolute encoder is used.
A. 81	Encoder Backup Alarm	Only when 12-bit absolute encoder is used.
A. 82	Encoder Check Sum Error	Only when 12-bit absolute encoder is used.
A. 83	Encoder Battery Alarm	Only when 12-bit absolute encoder is used.
A. 84	Encoder Absolute Error	Only when 12-bit absolute encoder is used.
A. 85	Encoder Overspeed	Only when 12-bit absolute encoder is used.
A. C1	Overrun	
A. C3	PA-, PG-phase disconnection of PG Signal Line	
A. C4	PC Disconnection	
A. 99	Not Applicable to Alarm	
CPF 00	Digital Operator Transmission Error 1	Digital operator error Not detected as traceback data.
CPF 01	Digital Operator Transmission Error 2	

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APPENDIX 1 SGD USER CONSTANT LIST FOR SPEED CONTROL (TORQUE CONTROL)

Table 1.1 User-setup User Constant for Speed (Torque) Control Memorandam

User Constant	Bit No.	Contents / Standard Setting / Date of Change	Current									
Cn-01	0	SV-ON Mask	0									
	1	SEN Signal Mask	0									
	2	P-OT Mask	0									
	3	N-OT Mask	0									
	4	TGON Signal Changeover	0									
	5	Treatment of Momentary Power Loss Reset	0									
	6	Coasting to a Stop / DB Stop	0									
	7	DB ON / OFF after Stop	1									
	8	OT Zero Speed Stop	0									
	9	Zero Clamp after OT Stop	0									
	A B	Control Mode Selection	0									
	C D	Mode Switch Selection	0									
	E	Encoder Selection	0									
Cn-02	0	Reverse Rotation Mode	0									
	1	Home Position Error Mask	0									
	2	Contact Reference Mode	0									

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Table 1.1 User-setup User Constant for Speed (Torque) Control Memorandam (Cont' d)

User Constant	Contents	Standard Setting / Date of Change	Current									
Cn-03	Speed Reference Gain	[(r/min)/v]	500									
Cn-04	Speed Loop Gain	[Hz]	80									
Cn-05	Speed Loop Integral Time Constant	[ms]	20									
Cn-06	Emergency Stop Torque	[%]	Max. Torque									
Cn-07	Soft Start Time (Acceleration)	[ms]	0									
Cn-08	Forward Torque Limit	[%]	Max. Torque									
Cn-09	Reverse Torque Limit	[%]	Max. Torque									
Cn-0A	PG Frequency Dividing Ratio Setting	[P/R]	2048									
Cn-0B	Zero-speed Level	[r/min]	20									
Cn-0C	Mode Switch (Torque Reference)	[%]	200									
Cn-0D	Mode Switch (Speed Reference)	[r/min]	0									
Cn-0E	Mode Switch (Motor Acceleration Detection)	[10(r/min)/s]	0									
Cn-0F	Zero-clamp level	[r/min]	10									
Cn-10	JOG Speed	[r/min]	500									
Cn-11	Number of Encoder Pulses	[P/R]	2048									
Cn-12	Delay Time from Brake Reference to SVOFF	[10ms]	0									
Cn-13	Torque Reference Gain	[1/10V/Rated Torque]	30									
Cn-14	Speed Limit at Torque Control I	[r/min]	4500									
Cn-15	Brake Timing Speed	[r/min]	100									
Cn-16	Brake Timing Time	[ms]	50									
Cn-17	Torque Reference Filter Constant	[μs]	4									
Cn-18	Forward External Current Limit	[%]	100									
Cn-19	Reverse External Current Limit	[%]	100									
Cn-1A	Position Loop Gain	[1/S]	40									
Cn-1F	1st Speed	[r/min]	100									
Cn-20	2nd Speed	[r/min]	200									
Cn-21	3rd Speed	[r/min]	300									
Cn-22	Speed Agreed Signal Output Width	[r/min]	10									
Cn-23	Soft Start Time (Deceleration)	[ms]	0									

Note:
User constants Cn-1B, -1C, -1D and -1E are not used. Do not adjust them.

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APPENDIX 2 SGD USER CONSTANT LIST FOR POSITION

Table 2.1 User-setup User Constant for Position Control Memorandam

User Constant	Bit No.	Contents / Standard Setting / Date of Change	Current									
Cn-01	0	SV-ON Mask	0									
	1	Not Used (Do not abjust)	0									
	2	P-OT Mask	0									
	3	N-OT Mask	0									
	4	TGON Signal Changeover	0									
	5	Treatment of Momentary Power Loss Reset	0									
	6	Coasting to a Stop / DB Stop	0									
	7	DB ON / OFF after Stop	1									
	8	OT Zero Speed Stop	0									
	9	Zero Clamp after OT Stop	0									
	A	Position Deviation Clear at Base Blocking	0									
	B	Mode Switch Function With or Without	0									
	C	Mode Switch Selection	0									
	D		0									
	E	Encoder Selection	0									
Cn-02	0	Reverse Rotation Mode	0									
	1	Home Position Error Mask	0									
	2	Contact Reference Mode	0									
	3	Reference Pulse Mode	0									
	4		0									
	5		0									
	6	Not used.	0									
	7	Not used.	0									
	8	Not Used (Do not abjust)	0									
	9		0									
	A	Deviation Counter Clear	0									
	B	Not Used (Do not abjust)	0									
	C		0									
	D	Reference Pulse Reversal	0									
	E	Monitor Output Level Changeover	0									

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Table 2.1 User-setup User Constant for Position Control Memorandam (Cont'd)

User Constant	Contents	Standard Setting / Date of Change	Current									
Cn-04	Speed Loop Gain	[Hz]	80									
Cn-05	Speed Loop Integral Time Constant	[ms]	20									
Cn-06	Emergency Stop Torque	[%]	Max. Torque									
Cn-08	Forward Torque Limit	[%]	Max. Torque									
Cn-09	Reverse Torque Limit	[%]	Max. Torque									
Cn-0A	PG Frequency Dividing Ratio Setting	[P/R]	2048									
Cn-0B	Zero-speed Level	[r/min]	20									
Cn-0C	Mode Switch (Torque Reference)	[%]	200									
Cn-0D	Mode Switch (Speed Reference)	[r/min]	0									
Cn-0E	Mode Switch (Motor Acceleration Detection)	[10(r/min)/s]	0									
Cn-0F	Mode Switch (Deviation Pulse)	[r/min]	10									
Cn-10	JOG Speed	[r/min]	500									
Cn-11	Number of Encoder Pulses	[P/R]	2048									
Cn-12	Delay Time from Brake Reference to SVOFF	[10ms]	0									
Cn-15	Brake Timing Speed	[r/min]	100									
Cn-16	Brake Timing Time	[ms]	50									
Cn-17	Torque Reference Filter Time Constant	[μs]	4									
Cn-18	Forward External Current Limit	[%]	100									
Cn-19	Reverse External Current Limit	[%]	100									
Cn-1A	Position Loop Gain	[1/S]	40									
Cn-1B	Position Completion Width	[Reference Unit]	7									
Cn-1C	Bias	[r/min]	0									
Cn-1D	Feed Forward	[%]	0									
Cn-1E	Overflow	[×256 Reference Unit]	1024									
Cn-1F	1st Speed	[r/min]	100									
Cn-20	2nd Speed	[r/min]	200									
Cn-21	3rd Speed	[r/min]	300									
Cn-24	Electronic Gear (Molecule)		4									
Cn-25	Electronic Gear (Denominator)		1									
Cn-26	Reference Pulse Accel/Decel Time Constant	[ms]	0									
Cn-27	Feed Forward Reference Filter	[ms]	0									

Note:
User constants Cn-03, -07, -13, -14, -22 and -23 are not used. Do not adjust them.

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OPERATION MANUAL

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