

Table of Contents

	page
1. INTRODUCTION -----	5
2. SPECIFICATIONS -----	5
2.1 Fundamental Specifications -----	5
2.2 Specifications by a type -----	6
2.3 Function and Characteristics -----	7
2.4 Applicable connectors -----	8
2.5 Outline -----	9
3. CONNECTION -----	10
3.1 Connection Example of Input and Output signals ----	10
3.2 Connection for Motor and Power Supply -----	11
3.3 Operational Application on Two Drivers for One Shaft(Re-generation level) -----	12
4. INPUT AND OUTPUT SIGNALS -----	13
4.1 Input Signal -----	13
4.2 Output Signal -----	16
4.3 Input Circuit -----	17
4.4 Output Circuit -----	19
5. FUNCTION -----	20
5.1 Setting a Parameter -----	20
5.2 Setting a Mode -----	20
5.3 Setting a Frequency Division -----	20
5.4 Operating a P Control -----	20
5.5 Feed-Forward -----	20
5.6 External Encoder Input -----	20
5.7 Acceleration Limiter -----	20
5.8 Zero Clamp Function -----	20
5.9 Dynamic Break -----	21
5.10 Recovery Function -----	21
5.11 Speed Limit -----	21
5.12 Current Limit -----	21
5.13 Setting an IN-POSITION -----	21
5.14 Control Filter -----	21
6. PROTECTION FUNCTION -----	22
7. LED INDICATION -----	24
7.1 Alarming Indication -----	25

	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
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Table of Contents(continued)

	page
8. MONITOR SIGNAL -----	26
9. SETTING A PARAMETER -----	26
9.1 How to Set a Parameter -----	28
9.2 Parameter List -----	29
9.3 Setting a Control Mode -----	30
9.4 Setting a Position Loop Gain -----	31
9.5 Setting a Speed Loop Gain -----	31
9.6 Setting an Integration Gain in Speed Loop -----	31
9.7 Setting a Feed-Forward Value -----	31
9.8 Setting a Speed Limit -----	31
9.9 Setting a Current Limit -----	32
9.10 Setting an Inposition Range -----	32
9.11 Setting a Filter Constant -----	32
9.12 Setting an Analog Input Scale -----	32
9.13 Setting an Analog Input Offset -----	33
9.14 Setting an Accerelation Limit -----	33
9.15 Setting an Excess Speed Alarm Level -----	33
9.16 Setting a Zero Clamp Voltage -----	33
9.17 Setting a Frequency Division and Multiplication ---	34
9.18 Setting a CTRLSW -----	35
9.19 Setting a Monitor Address -----	37
9.20 Setting an Over-Load Detection Level -----	37
9.21 Setting an External Encoder Resolution -----	37
10. TRIAL OPERATION -----	38
10.1 Trial Operation for a Position Control -----	38
10.2 Trial Operation for a Speed Control -----	38
11. ADJUSTMENT PROCEDURE -----	39
11.1 Control Block Diagram -----	39
11.2 Adjusting a Speed Loop Gain, Kv -----	40
11.3 Adjusting an Integration Gain, Kr in a Speed Loop -	41
11.4 Adjusting a Filter Constant, τ_F -----	42
11.5 Adjusting a Postion Loop Gain, Kp -----	42
11.6 Setting a Feed-Forward Value, Kf -----	42
11.7 Setting an Analog Input Scale -----	42
11.8 Adjusting an Analog Input Offset -----	43
11.9 Memorizing the Set Data -----	43

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
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Table of Contents(continued)

	page
12. DIAGNOSIS AND COUNTERMEASURE AGAINST TROUBLES -----	44
12.1 Diagnosis by Indicating Status -----	44
12.2 Diagnosis against Troubles for Alarming -----	46
12.3 Other Troubles -----	48
13. STANDARD TYPE LIST -----	49
13.1 How to identify a Type Symbol -----	49
13.2 Driver Types List for TBL-i Motors -----	50
13.3 Driver Types List for TBL-s Motors -----	51
14. CONNECTION CABLES -----	52
15. ATTACHMENT -----	53

	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
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1. INTRODUCTION

TBL Drivers, AU6550 Series are small and high precision AC servo motor drivers with installation of high speed DSP and TSC original ASIC exclusively used for drivers, which can control location, speed and current by changing a mode.

This manual shall cover how to handle. Those drivers are already set to various kinds of setting corresponding to the controlled motor and the attached resolver to the motor on delivery.

They are controlled by an I/O software. So a program for responding to a special control demand is also available. Because of this, there is a case when an operation works differently even if a basic type is similar. So "E" number following after the basic type is annexed to identify each other exclusively by preparing an individual specification.

It is surely important to confirm a driver type name completely for use. Besides these, you should confirm that a motor type is the same as the one described in an individual specification.

Refer to para 13, STANDARD TYPE LIST on how to see a driver type symbol.

2. SPECIFICATIONS

2.1 Fundamental Specifications

DRIVER TYPE	AU6550N***
controlling	AC servomotor driver for controlling position, speed and current(Any one of those controls shall be selected by setting a mode)
motor driving method	sinusoidal driving by a transistor PWM
angular sensor	incremental encoder(line driver output) wire-saved incremental encoder(line driver output) (allowable to select in accordance with a motor angular sensor)
ambient temp. and humidity	0 to 50°C, less than 90% RH (no dewing)
construction	rack-mounting type

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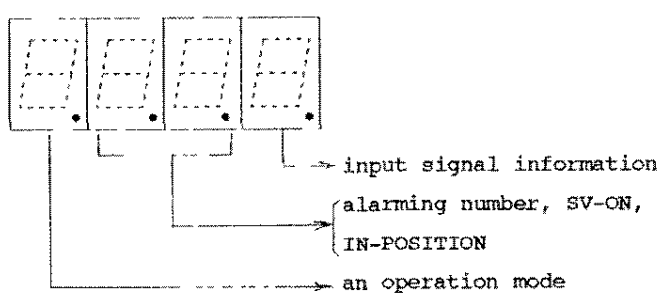
2.2 Specification by a type

"N" NUMBERS	N101	N102	N104	N106	N201	N202	N204	N206
AC power supply	100/110VAC±10%, 50/60Hz				200/220VAC±10%, 50/60Hz			
I/F voltage	input signal: 5V							
rated output current(Arms)	1.25	2.1	4.2	6.4	1.25	2.1	4.2	6.4
instantaneous maximum current (Arms)	3.75	6.3	12.6	19.2	3.75	6.3	12.6	19.2
motor output (reference) (W)	(50)	(125)	(300)	(400)	(100)	(300)	(600)	(800)

"N" NUMBERS	N181	N182	N184	N186	N281	N282	N284	N286
AC power supply	100/110VAC±10%, 50/60Hz				200/220VAC±10%, 50/60Hz			
I/F voltage	input signal: 24V(5V for a command pulse only)							
rated output current(Arms)	1.25	2.1	4.2	6.4	1.25	2.1	4.2	6.4
instantaneous maximum current (Arms)	3.75	6.3	12.6	19.2	3.75	6.3	12.6	19.2
motor output (reference) (W)	(50)	(125)	(300)	(400)	(100)	(300)	(600)	(800)

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
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2.3 Function and Characteristics

protection function	over current, over load, excess speed, deviation counter overflow, abnormal IGBT, abnormal encoder, and abnormal driving power supply
LED indication	 <p>input signal information alarming number, SV-ON, IN-POSITION an operation mode</p>
setting parameters	set by the pushing button switch on the panel of the driver a setting range: 0 to 7FFF hex(32768 steps)
positioning accuracy	± 1 pulse or less
speed control range	1 : 1000
frequency division and multiplication	A position control is done by dividing and multiplying an encoder signal. division selected: 1/1 to 1/32 and 2/2 to 2/32 multiplication selected: multiplied by one, by two, and by four
P control operation	Integrating compensation in speed control line is turned off by inputting a P Control Command (PCTRL).
feed-forward	The Command pulse is added to the speed command in speed loop converting a frequency to a voltage. (note 1)
external encoder input	A position control can be done by an external encoder except for an encoder annexed to the motor
acceleration limit	An increase or decrease speed for a speed control mode is controlled to the one less than the set value. (note 2)
zero clamp function	A speed(current) command is set to "0" when an analog command is set to the one less than the set value.

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8 0 1 3 0 0 5 7 9 I 4 0											7

standard load inertia	$J L \leq 30 J M$
dynamic break	The dynamic break is turned on 100msec later after turning off the power supply.(note 3)
recovery function	including a recovery circuit and a recovery resistor
rotating direction	a positive direction for CCW when viewed from the motor shaft end

(note 1) valid only for a position control

(note 2) valid only for a speed control

(note 3) "The dynamic break is turned on for alarming occurred" is acceptable by setting.

2.4 Applicable Connectors

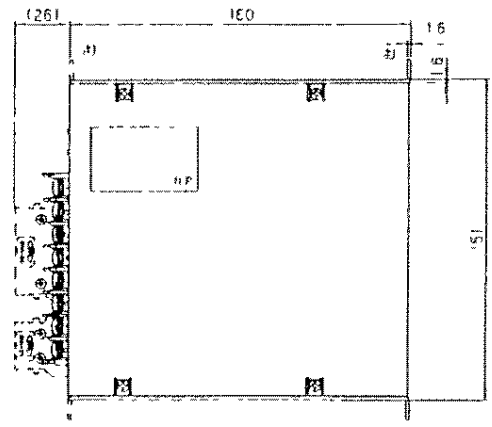
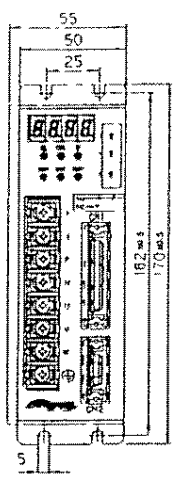
2.4.1 CN1 for input/output signals: 10250-52A2JL(3M) or equivalent

2.4.2 CN2 for connecting an encoder:10220-52A2JL(3M) or equivalent

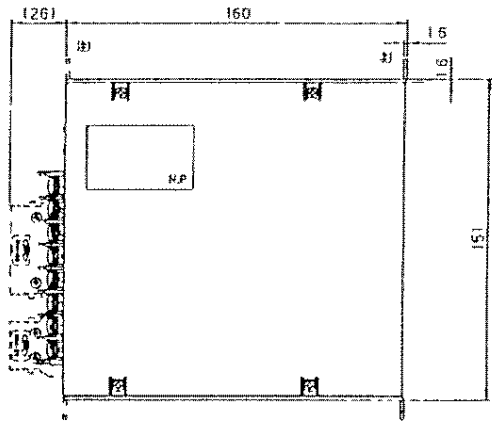
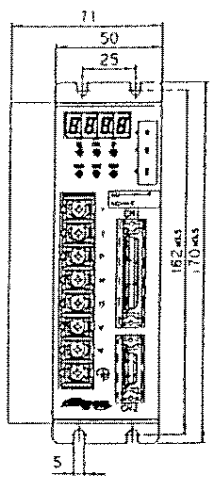
	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
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2.5 Outline

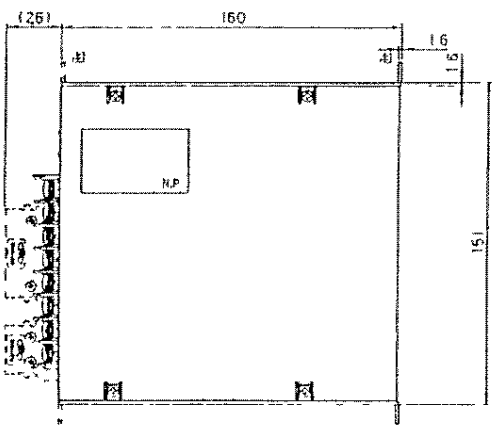
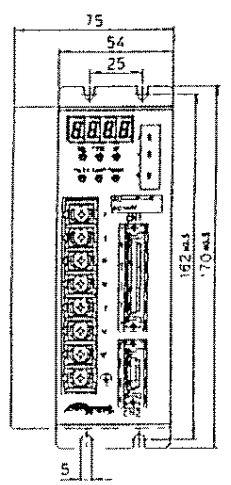
AU6550 N101 N102 N104 N181 N182 N184 N201 N202 N281 N282



AU6550 N106.186.N204 N284



AU6550 N206.N286

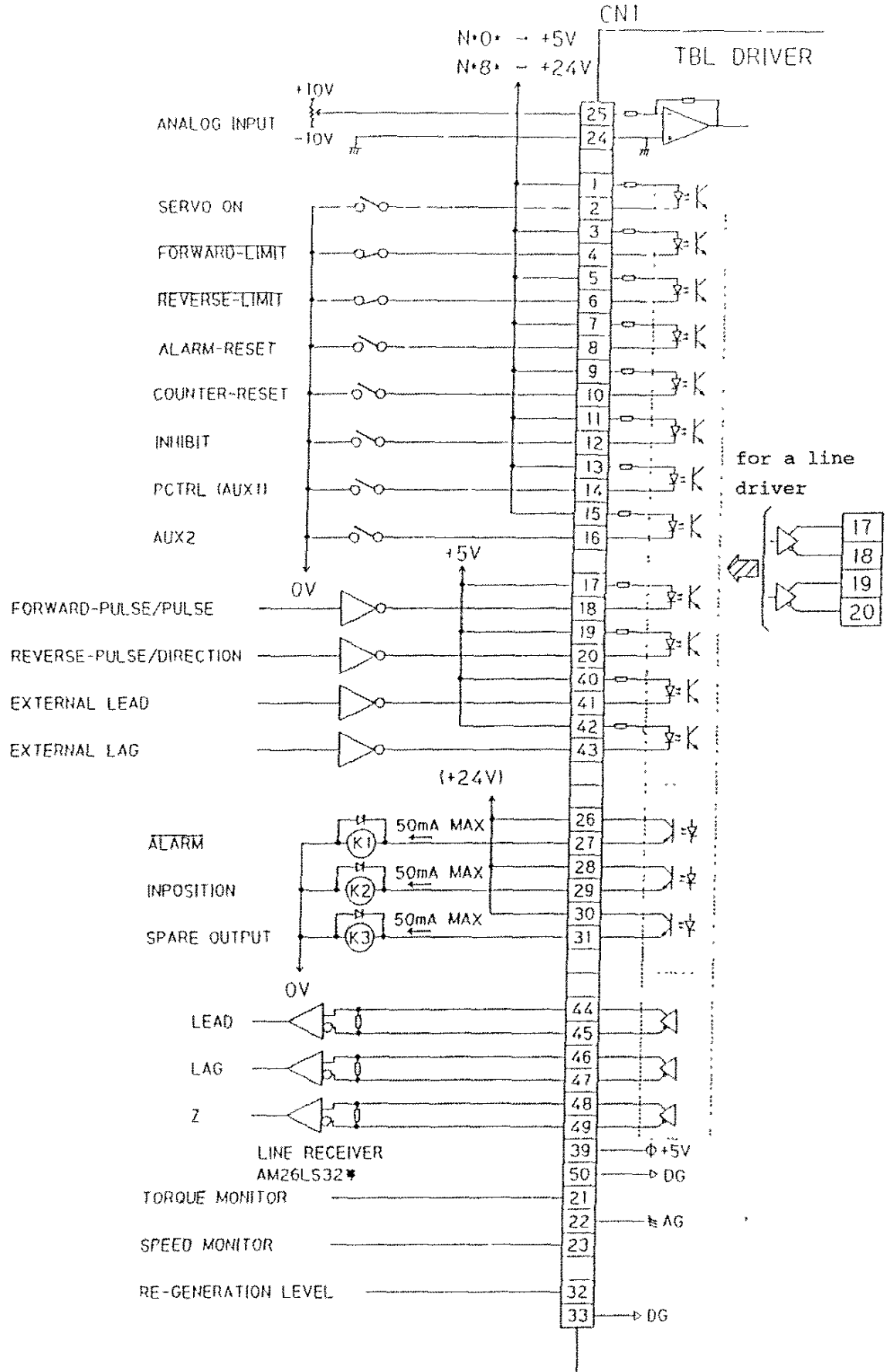


note: It is possible to mount the driver on the front panel by moving the mounting hardware(L type's).
 A dimension allowance to the number not to be defined is +/- 1mm.

	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	9 /

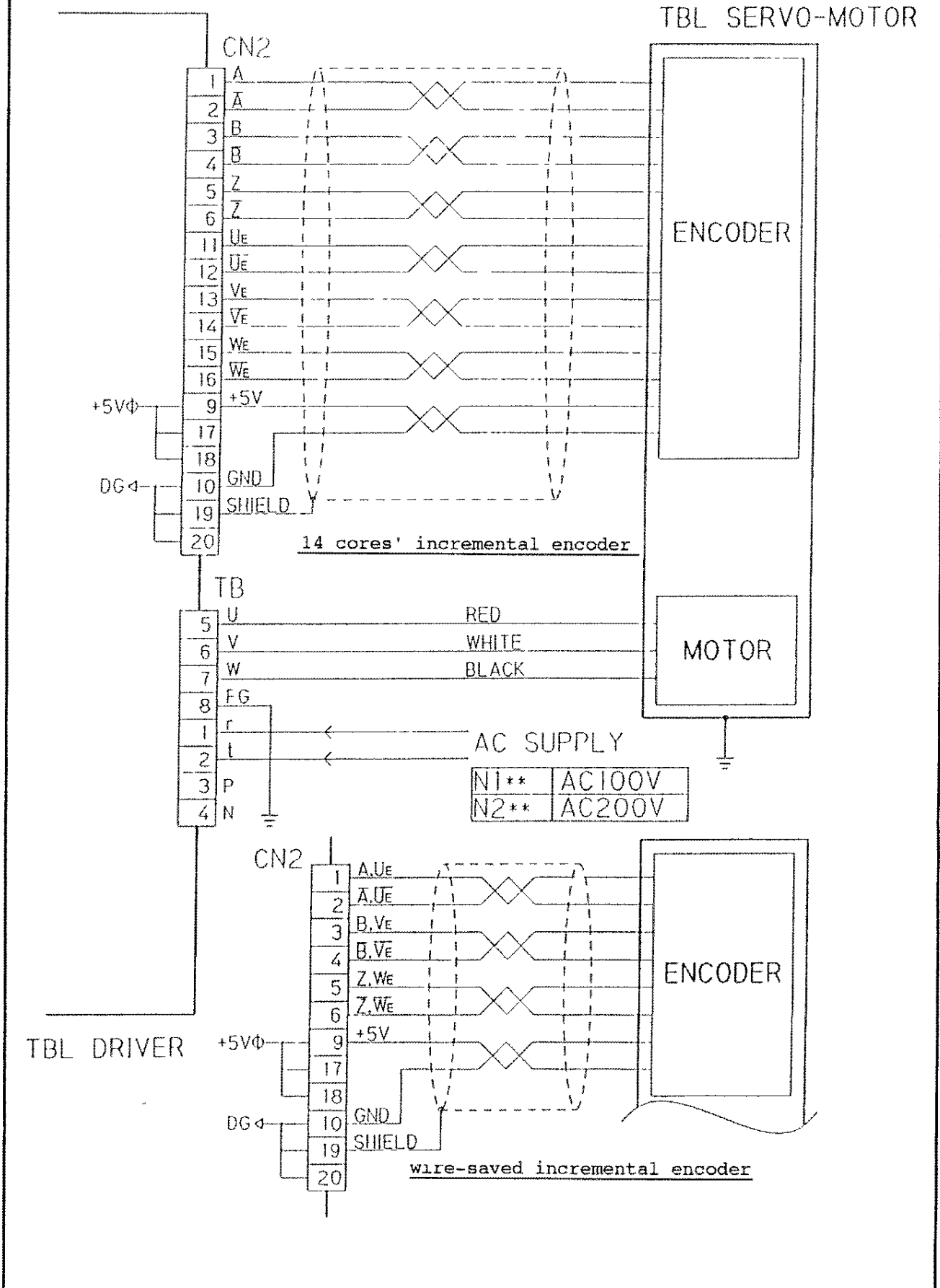
3. CONNECTION

3.1 Connection Example of Input and Output Signals



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801300579I40											10

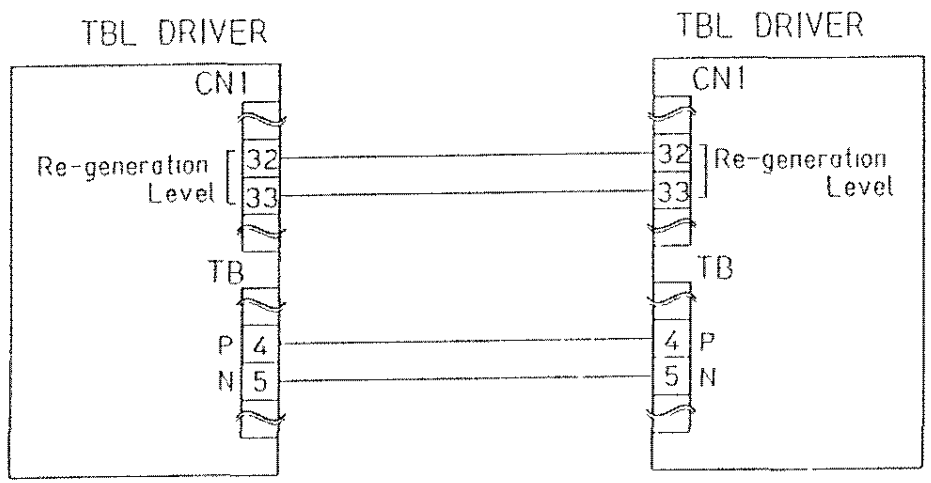
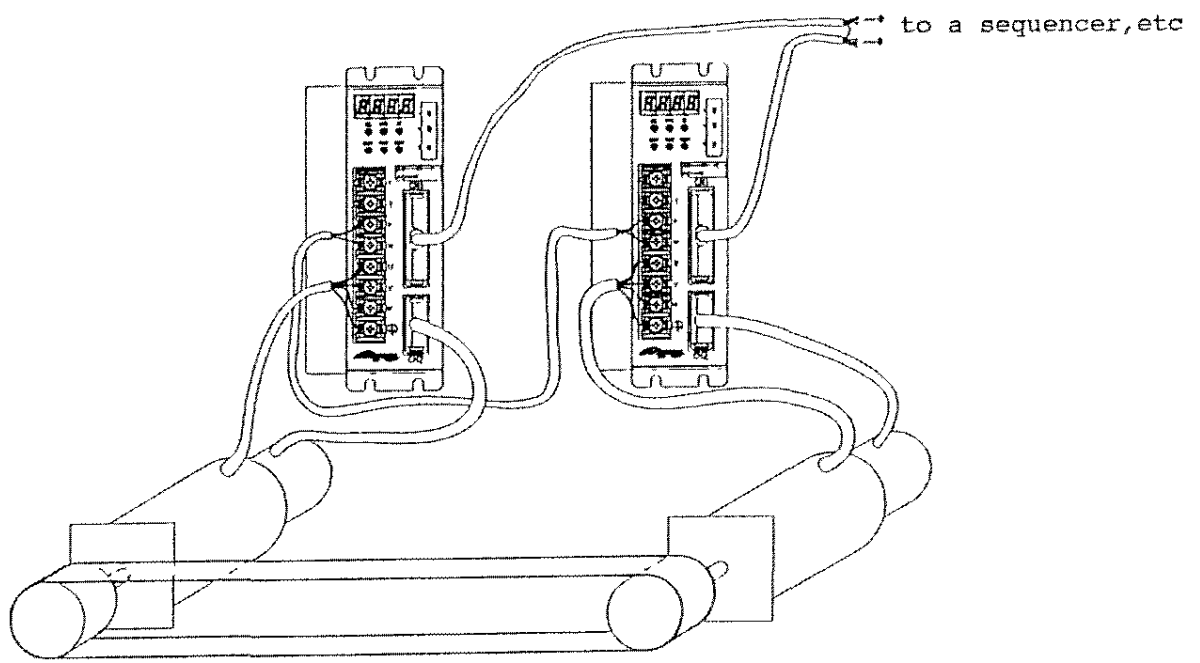
3.2 Connection Example for Motor and Power Supply



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
801300579I40											14/1

3.3 Operational Application on two drivers for one shaft(Re-generation level)

When one shaft as shown on the following is driven by two drivers, you may have such an occurrence that a recovery alarming is produced a lot because of one driver for driving and the other for recover.



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											12/

4. INPUT AND OUTPUT SIGNALS

4.1 Input Signal

Input signals are completely isolated with photo couplers except for analog inputs. In the following description, "ON" means "turning on the photo couplers", and "OFF" means "turning off the photo couplers".

4.1.1 SERVO-ON

SERVO is in the off-state for OFF with the freed motor shaft. The servo starts operating for ON.

4.1.2 FORWARD-LIMIT

When this signal is OFF, the motor shaft controlled by a zero speed is not operated even if the command of CCW rotation is provided. The motor shaft is not operated by the command of CW rotation. Normally, set FORWARD-LIMIT ON state.

4.1.3 REVERSE-LIMIT

When this signal is OFF, the motor shaft controlled by a zero speed is not operated even if the command of CW rotation is provided. The motor shaft is not operated by the command of CCW rotation. Normally, set REVERSE-LIMIT ON state.
(note)

To change the logics of FORWARD-LIMIT and REVERSE-LIMIT, provide "1" with the third bit of CTRLSW(No.F parameter).

4.1.4 ALARM-RESET

The alarm memory is reset by turning on ALARM-RESET. When the ALARM-RESET is inputted for the alarmings of counter overflow and abnormal command pulse, the deviation counter is reset. It is not allowed to reset the deviation counter by the ALARM-RESET for other alarmings.

4.1.5 PCTRL(AUX1)

Integration compensation in the speed control line is turned off when PCTRL(AUX1) is turned on. The step response of controlling speed and current can be executed by use of PCTRL(AUX1).

4.1.6 AUX2

The step response of controlling speed and current can be executed by AUX2.

	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	13

4.1.7 FORWARD-PULSE/PULSE

In the case of a position control mode, by inputting a pulse to FORWARD-PULSE/PULSE, the motor is rotated by the angle equivalent to the pulse number.

When the first bit of CTRLSW(No.F parameter) is set for zero, this signal becomes the command pulse input signal of CCW rotation. When the first bit of CTRLSW(No.F parameter) is set for "1", this signal becomes the command pulse input signal and the rotating direction is determined by the signal of step 4.1.8.

A rotating value per one pulse is $1/(N \cdot X \cdot D)$ turn.

Where, N: encoder resolution

X: multiplication setting(1,2,4)

D: division ratio(1/1 to 1/32 and 2/2 to 2/32)

A pulse is counted at a changing point from OFF to ON of the signal.

4.1.8 REVERSE-PULSE/DIRECTION

When the first bit of CTRLSW(No.F parameter) is set for zero, this signal becomes the command pulse input signal of CW rotation.

When the first bit of CTRLSW(No.F parameter) is set for "1", this signal becomes the command of a rotating direction.

ON: the command of CW rotation

OFF: the command of CCW rotation

4.1.9 INHIBIT

When INHIBIT is turned on, input command pulse is not accepted.

4.1.10 COUNTER-RESET

When COUNTER-RESET is turned on, the deviation counter is cleared.

4.1.11 EXTERNAL-LEAD, LAG

When a position control is executed by an external encoder except for the encoder annexed to the motor, the signal of the external encoder is inputted. Selecting an encoder for controlling a position is done by the second bit of CTRLSW(No.F parameter). Input LEAD signal to EXTERNAL-LEAD and LAG to EXTERNAL-LAG.

	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	14/

4.1.12 Analog input

For a speed control mode:

The speed command signal is inputted.

input voltage range: $-10V < V_{in} < +10V$

scaling: set by parameter No.9(7500rpm/10V set for delivery)

rotating direction: set by parameter No.F(CCW for plus input set for delivery)

For a current control mode:

The current command signal is inputted.

input voltage range: $-10V < V_{in} < +10V$

scaling: set by parameter No.9

rotating direction: set by parameter No.F(CCW for plus input set for delivery)

(note) It is not required to connect an analog input signal for a position control mode. It is also not required to connect the signals of step 4.1.7 to 4.1.11 for a speed control mode or a torque control mode.

DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
8	0	1	3	0	0	5	7	9	I	4	0	15

4.2 Output Signal

4.2.1 ALARM

The output circuit of ALARM signal consists of open-collector outputs coupled with photo couplers. When ALARM is set to ON, the unit is normal. When the unit is in the state of alarming, this signal is turned off.

(note)

The logic of this signal can not be changed even if the parameter set is changed. It is required to change the hardware for changing a logic. When you have to change the logic, please contact with us.

4.2.2 INPOSITION

When the yield-pulse of the deviation counter is in the range of the set value, INPOSITION is turned on. The output circuit of this signal consists of open-collector outputs coupled with photo couplers. When INPOSITION signal is turned on, the second LED's D.P. from the right on the panel is simultaneously lit.

(note)

Setting the range of INPOSITION is done by No.7 parameter.

4.2.3 SPARE-OUTPUT

SPARE-OUTPUT signal is an auxiliary signal output. The output of this signal is not programmed in a standard program. The output circuit of this signal consists of open-collector outputs coupled with photo couplers.

4.2.4 LEAD and LAG

The signals of LEAD and LAG which can be obtained by dividing an encoder signal are produced. The output circuit consists of line drivers(AM26LS31 or equivalent). Receive those signals with line receivers(AM26LS32, etc) or photo couplers.

4.2.5 Z

The Z phase signal of the encoder is produced. This signal is not affected by setting a frequency division. So this is Z phase signal itself of the encoder.

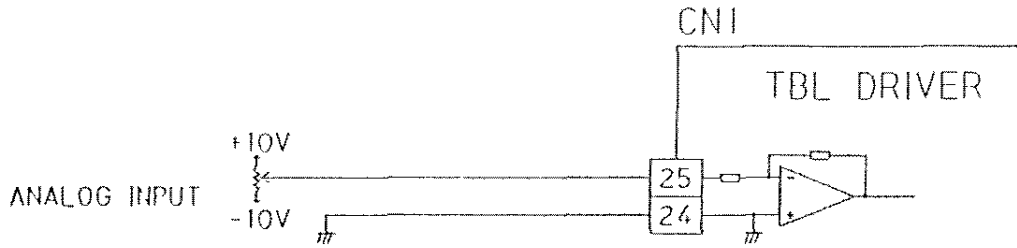
	DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8	0	1	3	0	0	5	7	9	I	4	0	16

4.3 Input Circuit

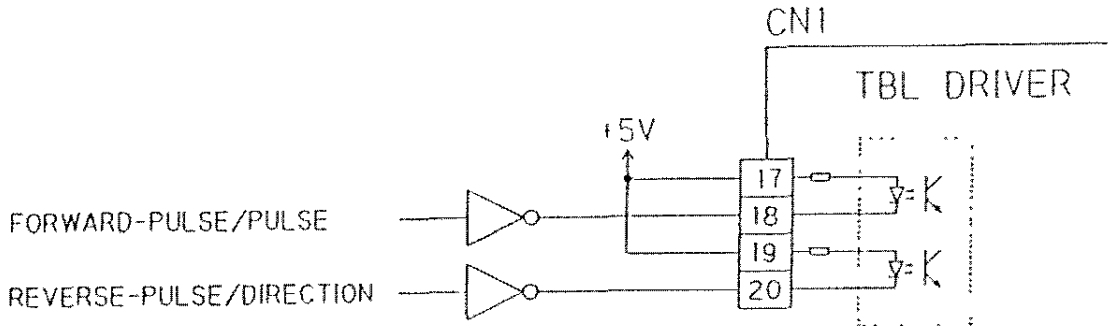
Input circuits consist of non-contact point circuits isolated with the photo couplers except for analog input signals.

Connect the signals as shown on the following:

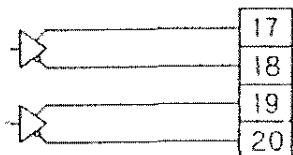
4.3.1 For analog input signal



4.3.2 For FORWARD-PULSE and REVERSE-PULSE

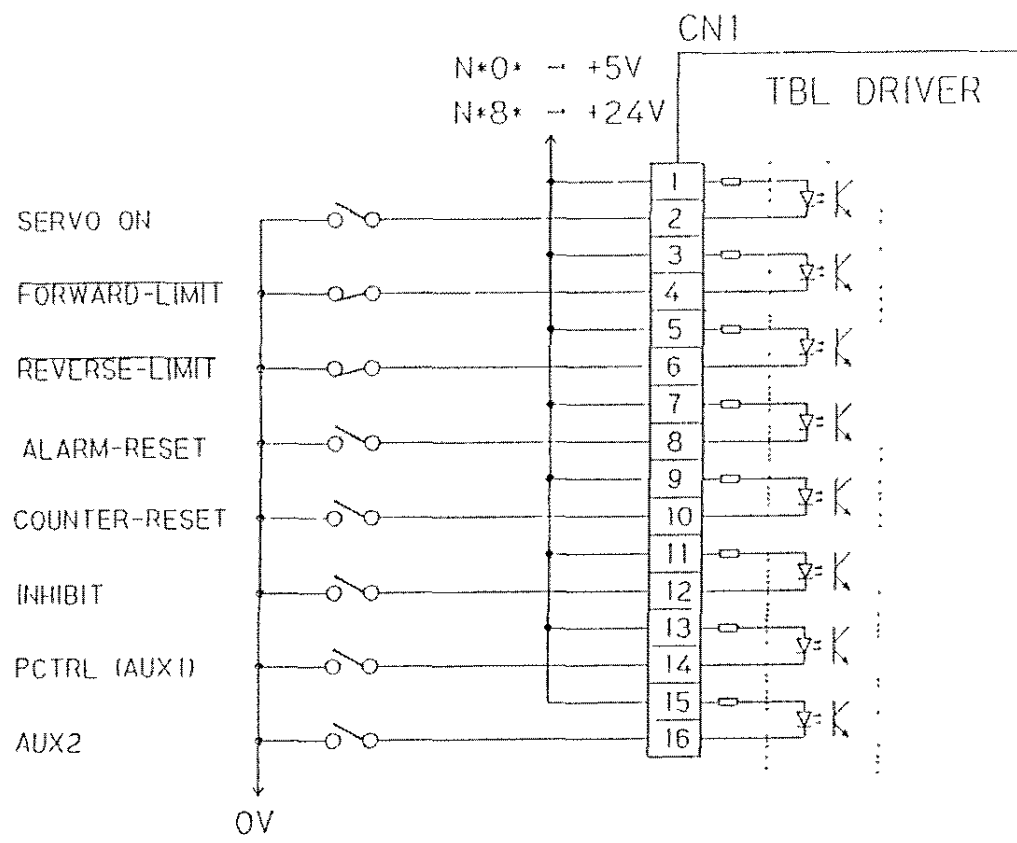


for a line driver command



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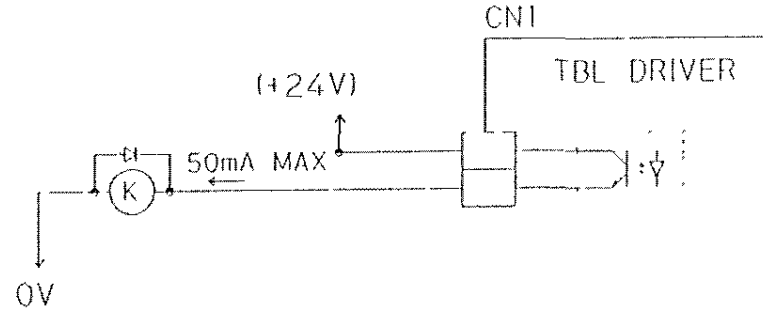
4.3.3 For other input signals



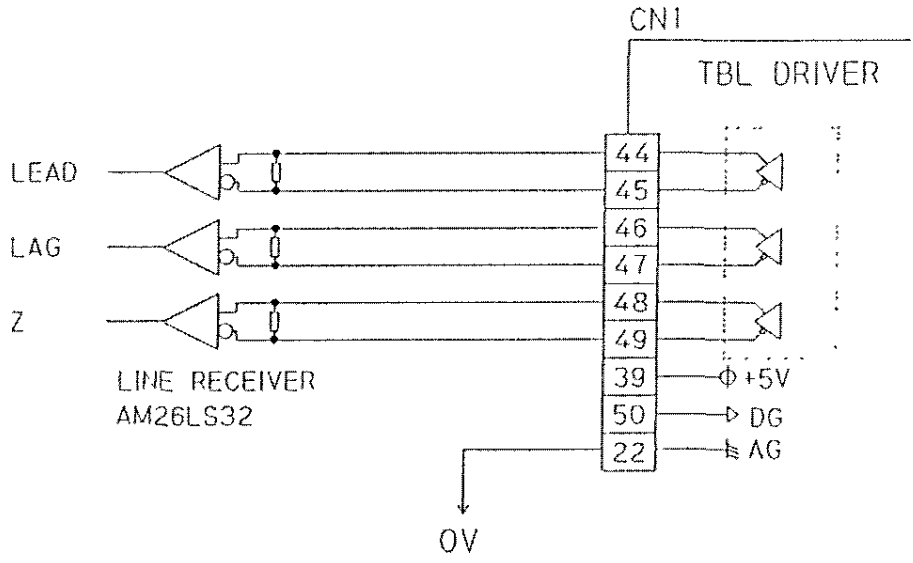
DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											18

4.4 Output Circuit

4.4.1 For the signals of ALARM, INPOSITION, and SPARE-OUTPUT,
 Receive output signals by use of an external power supply
 because of photo coupler outputs as shown on the following:



4.4.2 For the signals of LEAD, LAG, and Z
 Receive with line receivers, etc because the signals of LEAD,
 LAG, and Z are line driver outputs.



DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											19

5. FUNCTION

5.1 Setting a Parameter

Setting a servo gain or a servo condition in AU6550 is done by the setting switch on the panel of the driver. Refer to para 9, SETTING A PARAMETER.

5.2 Setting a Mode

A control mode can be selected(No.0 parameter)

- mode 0: a position control
- mode 1: a speed control
- mode 2: a current control
- mode 3: a step response in speed control
- mode 4: a step response in current control
- mode 5: a rated repeating operation(for aging)
- mode 6: a repeating pattern operation(for demonstration)

5.3 Setting a Frequency Division

The resolution of the position control pulse can be set for the expected resolution by dividing an encoder signal frequency (parameter No.E). The encoder signal also can be produced through CN1 after dividing the frequency into the set ratio.

5.4 Operating a P Control

The integration compensation in the speed control line can be turned off by turning on PCTRL signal.

5.5 Feed-Forward

Feed-Forward functions a motor control as a speed command converting a command pulse with a F/V conversion. Feed-Forward is used for higher follow-up characteristic to a command pulse. Feed-Forward value is set by parameter No.4.

5.6 External Encoder Input

A position control can be done by an external encoder except for an encoder annexed to the motor. Selecting an encoder used for a position control is executed by the second bit of parameter No.F. For selecting an external encoder, provide parameter No.13 with the resolution of the external encoder.

5.7 Acceleration Limiter

For a speed control mode, an increase or a decrease in speed can be controlled to the one less than the set value. To turn on this function, provide the seventh bit of parameter No.F with "1". While, provide parameter No.b with a maximum acceleration.

5.8 Zero Clamp Function

For speed control and current control modes, this functions as a zero voltage input when an analog input command is less than the set voltage. To turn on this signal, provide No.6 bit of parameter No.F with "1". Also, provide parameter No.d with a zero clamp voltage.

	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	20

5.9 Dynamic Break

The driver is in the state of SERVO-OFF for the occurrence of abnormality with the freed motor. So the motor is unlikely to stop when a problem is occurred for a higher rotation. In such a case, a higher speed decrease for the motor can be obtained by use of a dynamic break because a decrease current proportional to the induced voltage of the motor is flowed through the coil.

To turn on this function, provide the eighth bit of parameter No.F with "1".

5.10 Recovery Function

When the motor under rotating is decreased in speed or a load is pulled down toward gravity, the driver plays a role to absorb an energy. Because of this, a motor driving voltage for the driver may increase. When an increased voltage goes more than the defined, it is necessary to release the energy through the resistor. AU6550 has this function as a standard installation.

5.11 Speed limit

The limit value of the motor rotating number can be set (parameter No.5). Because of this, the motor can be controlled lower than the set speed.

5.12 Current Limit

The maximum current flowing through the motor can be set (parameter No.6). The current limit can be set at random as the

5.13 Setting an IN-POSITION

When the yield-pulse of the deviation counter is less than the set value, IN-POSITION signal is produced.

The range of IN-POSITION is set to parameter No.7.

5.14 Control Filter

There may be cases when a control is in the vibrated state if you try to increase a gain in a servo line for the reason of mechanical resonance of the motor or the load. In this case, a filter is provided into the control line to restrain the consonant.

The Time Constant of the filter is set for parameter No.8.

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	8 0	1	3	0	0	5	7	9	I	4	0	21

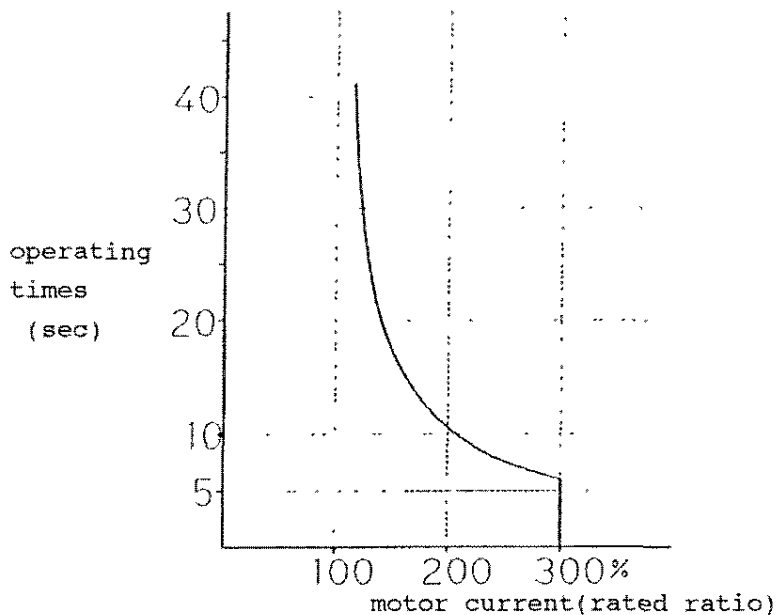
6. PROTECTION FUNCTION

When the following abnormalities are detected, the alarming signals are produced and the driver is turned off.

(1) over load: alarm No.20

If the excess current more than the rated continuously should flow because an over load is provided to the motor shaft, this alarm signal is detected. The detecting level of the over load can be changed by parameter No.11.

Over load detecting characteristic(When the detecting level of an over load is set for 1.15 times the rated current of the motor)



(2) excess speed: alarm No.30

This excess speed signal is detected when the motor rotates more than the allowable maximum rotating number which is decided by the motor itself. The detecting level of the excess speed is set for parameter No.C. The motor is set for 5100rpm at delivery.

(3) counter overflow: alarm No.41

When the yield-pulse of the deviation counter is 32768 pulses or more, this signal is detected.

(4) abnormal command pulse: alarm No.42

When the command pulse is inputted in the modes of FORWARD-PULSE and REVERSE-PULSE, this alarm signal is detected when two command pulses are simultaneously inputted and the deviation counter is irregularly counted.

(5) abnormal IPM: alarm No.50

When the power element is mal-functioned, this signal is detected.

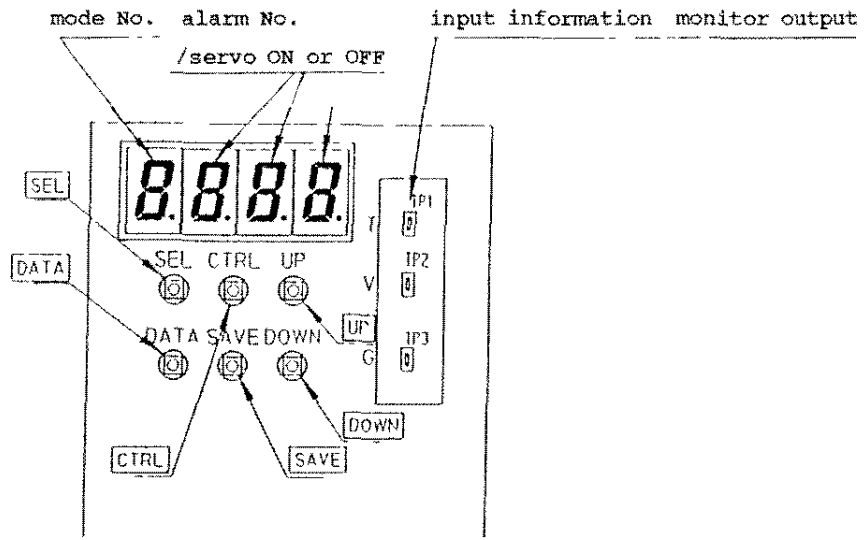
	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	22/

- (6) abnormal encoder: alarm No.61
 The cut-off wiring for LEAD/LAG signals of the encoder is detected.
 When this alarm signal is detected for a wire-saved type's encoder, it is required to turn on the power again to reset the alarm signal.
- (7) abnormal commutation signal: alarm No.62
 Logic abnormality of an encoder commutation signal is detected.
- (8) abnormal external encoder: alarm No.63
 When a position control encoder is set for an external encoder, and disagreement between the counting number of the external encoder and the inner encoder exists, this alarm signal is detected.
- (9) abnormal encoder: alarm No.64
 In a wire-saved type's encoder, this alarm signal is detected when a commutation signal normally can not be received. It is required to turn on the power again to reset the unit.
- (10) abnormal recovery: alarm No.71
 This alarm signal is detected when a recovery is not normally performed, or a recovery action exceeds the capacity of a recovery resistance.
- (11) turned-off input power supply: alarm No.72
 This alarm signal is detected when the input power supply is decreased or instantaneously turned off(50msec or more).
- (12) abnormal EEPROM: alarm No.90
 This alarm signal is detected for abnormal EEPROM at an application of power.
- (13) abnormal CPU
 Abnormal CPU is detected when a CPU freely runs for the reason of a variation in voltage.

	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	23/

7. LED INDICATION

The controll status of the driver is indicated with 7 segments' LED(four digits) on the panel.



control mode No.	8	indication of a hexadecimal number of 0 to F
alarm No. SV-ON/OFF	88.⑦	indication of a hexadecimal number of 00 to FF, ①IN-POSITION
input status indication		①Servo-On ②alarm-reset ③CCW-LMT ④CW-LMT ⑤INHBIT ⑥C-RST ⑦AUX1 ⑧AUX2
















When the push button switch is not pushed, the LED at left side indicates a control mode No., two LEDs in the middle an alarm No., and the LED at right side an input status. When an IN-POSITION signal is turned on for a position control, D.P. at second LED from right side is lit. Parameter No. is indicated by pushing down "SEL" button. Parameter data indicated when SEL button is pushed is indicated by pushing down "DATA" button.

When CPU runs away and is forced to be out of control, the LED at left side indicates " ".

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											24/

7.1 Alarming Indication

When the push button is not pushed, two LEDs in the middle indicates the content of alarm or Servo-ON or OFF as shown on the following list:

INDICATION	CONTENTS
	servo-off status
	normally controlled for servo-on
	over-load alarm detected
	excess-speed alarm detected
	an overflow in the deviation counter detected
	abnormal command pulse detected
	abnormality and over-current at driver power section detected
	cut-off wire of an encoder signal detected
	abnormal encoder commutation signal detected
	cut-off external encoder signal detected
	wire-saved type's encoder signal detected
	over-voltage and abnormal recovery detected
	abnormal input power supply detected
	abnormal EEPROM
 (note)	freely run CPU

(note) 7 segments' LED at left side indicates as shown above for abnormal CPU.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											25/

8. MONITOR SIGNAL

Motor output current and the rotating speed are produced as a monitor signal through the pins of 21 and 23 of CN1. The monitor signal is also produced through the checking terminals of V and T on the front panel of the driver.

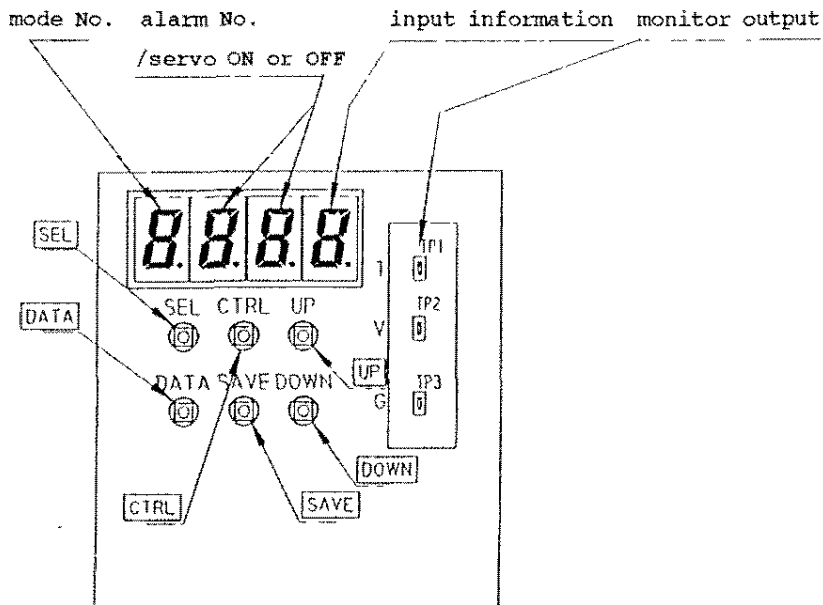
The scaling is as follows:

- * speed monitor: 4V/3000rpm (CCW:+)
- * torque monitor: \approx 8V/4.2A rms (N**1)
- \approx 8V/7.1A rms (N**2)
- \approx 8V/14.1A rms (N**4)
- \approx 8V/21.2A rms (N**6)

(note) Those signals consist of operational amp outputs.
The output current should be provided with 4mA or less.

9. SETTING A PARAMETER

Each parameter as shown on para 9.2 can be set by the setting switches on the panel of the driver.



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											26/

Pushing Buttons	Operating Contents
SEL	A parameter number is indicated.
SEL + CTRL	The digit which a parameter No. is changed is shifted.
SEL + UP	The designated digit for a parameter No. is set to "+1"(The digit number is continuously changed if the buttons are keeping on pushing).
SEL + DOWN	The designated digit for a parameter No. is set to "-1"(The digit number is continuously changed if the buttons are keeping on pushing).
DATA	Data for parameter No. is indicated.
DATA + CTRL	The digit which a parameter data is changed is shifted.
DATA + UP	The designated digit for a parameter data is set to "+1"(The digit number is continuously changed if the buttons are keeping on pushing).
DATA + DOWN	The designated digit for a parameter data is set to "-1"(The digit number is continuously changed if the buttons are keeping on pushing).
DATA + SAVE	The parameter data as shown on now for Servo-Off is written into EEPROM. (Data is not disappeared even if the power supply is turned off)

(note)

Changing a control mode or saving data can not be executed except when SV-ON signal is turned off.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	27/

9.1 How to Set a Parameter

- (1) Provide the driver the power supply.
The control mode No., alarm no., servo on/off, and input information of the driver are indicated on the LED.
- (2) When SEL switch is pushed down, the parameter No. as set now is indicated on the LED (four digits of a hexadecimal number)
The parameter No. which you want to set is indicated on the LED by pushing down the switches of UP or DOWN while pushing down SEL switch. Then, the digit which is up or down is the one which D.P. is lit. Changing the digit which is up or down can be done by pushing down CTRL switch while pushing down SEL.
- (3) When DATA switch is pushed down, the data of the set parameter No. is indicated on LED (four digits of a hexadecimal number).
The parameter No. which you want to set is indicated on the LED by pushing down the switches of UP or DOWN while pushing down SEL switch. Then, the digit which is up or down is the one which D.P. is lit. Changing the digit which is up or down can be done by pushing down CTRL switch while pushing down DATA.
- (4) After newly set, the parameter data value indicated on the LED is newly set to CPU with an inner EEPROM which is not saved.
To save data, push down SAVE switch while pushing down DATA switch. When data is read into EEPROM, an indication is flashed. For no flashing, repeat above steps again.
- (5) Repeat steps of (2) to (4) if you have a parameter which you want to change more.

(note)

Setting or changing a new data can be done whenever the power supply is added to the driver. Saving data only can be done in the state of servo-off. So save data surely after turning off Servo-On signal.

Setting a mode or changing a frequency division and multiplication only can be done for turning off Servo-On signal.

	DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8	0	1	3	0	0	5	7	9	I	4	0	<i>LS</i>

9.2 Parameter List

parameter No.	description	set for delivery
0000	control mode	0000
0001	position loop gain, Kp	0064
0002	speed loop gain, Kv	an adjusting value
0003	integration gain, KI in speed loop	ditto
0004	feed forward value, Kf	0000
0005	speed limit, VLMT	0FA0
0006	current limit, TLMT	rated motor current x 3
0007	inposition range	0001
0008	filter constant, τ_f	7FFF
0009	analog input scale	1D4C
000A	analog input off-set	0000
000b	acceleration limit	2710
000C	speed alarm, VALM	13EC
000d	zero clamp voltage	0000
000E	setting a frequency division & multipli- cation	0000
000F	CTRLSW(a changing SW of control operation)	0000
0010	setting a monitor address	0030
0011	over load alarm level	rated motor current x 1.15
0012	external encoder resolution	resolution of motor encoder
0013 to 001d	pecially specified parameter	
0020 to 002F	system parameter	
0030 to 007F	control data	

(note) The parameters which users can set are ranged from "00 to 1d".
It is not always necessary to set all the parameters. Set the
parameter only required in the using control mode.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
801300579I40											29/

9.3 Setting a Control Mode

The control mode can be set by parameter No.0.

- (1) For setting a control mode for "0":
a position control mode: A position is controlled by the pulse train command.
- (2) For setting a control mode for "1":
a speed control mode: A speed is controlled by the analog input command.
- (3) For setting a control mode for "2": ☆
a current control mode: A current is controlled by the analog input command.
- (4) For setting a control mode for "3":
a speed step mode:
 - * The motor is rotated CCW at the speed set by the speed limit (parameter No.5) by turning on AUX1 signal.
 - * The motor is rotated CW at the speed set by the speed limit when AUX1 signal is turned off and AUX2 signal on.
 - * The motor is controlled to a zero speed when both signals of AUX1 and AUX2 are turned off.
- (5) For setting a control mode for "4":
a current step mode:
 - * The motor is rotated CCW at a motor current set by the current limit(parameter No.6) by turning on AUX1 signal.
 - * The motor is rotated CW at a motor current set by the current limit when AUX1 signal is turned off and AUX2 signal on.
 - * The motor is controlled to a zero speed when both signals of AUX1 and AUX2 are turned off.
- (6) For setting a control mode for "5":
a repeating rated operation mode(for aging):
The increase or decrease operation is repeated between 3000rpm and -3000rpm at the rated current.
(note) A speed can be changed by the speed limit, VMAX (parameter No.5). Refer to para 9.8 (For 3000rpm, set the data of "0bb8")
- (7) For setting a control mode for "6":
a repeating pattern operation mode(for demonstration):
The motor is repeatedly shifted at the speed between three points set.

The control mode is set for "0000" on delivery.

	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	30/

9.4 Setting a Position Loop Gain

The position loop gain, KP is set by parameter No.1.
 The physical unit of the position loop gain is 1/sec. The position loop gain which you want to set is set after converting the gain(1/sec) into the hexadecimal number. The position loop gain is usually set for about 100(1/sec).

EX: For setting KP for 100(1/sec), the setting value is equal to 100(64 HEX). So set data for 64.

9.5 Setting a Speed Loop Gain

The speed loop gain, KV is set by parameter No.2.
 You can set KV for "0000" to "7FFF". The speed loop gain is usually required to set larger in proportion to a load inertia. Refer to

9.6 Setting an Integration Gain in Speed Loop

The integration gain, KI in speed loop is set by parameter No.3.
 The relation between an integration gain, KI and an integration time, τ_i is as shown on the following equation:

$$KI = 13.1072 / \tau_i$$

Normally, set τ_i so that it will become "20msec < τ_i < 200msec".

EX: For setting τ_i for 80msec,
 the setting value is equal to $13.1072 / 80 \times 10^{-3} = 163.84 = A4_{HEX}$
 So set data for A4.

9.7 Setting a Feed-Forward value

The feed-forward value, KF is set by parameter No.4 in the unit of percent.

EX: For setting KF for 50(%) ,
 the setting value is equal to 50=32HEX .
 So set data for 32.

9.8 Setting a Speed Limit

The speed limit, VLMT(rpm) is set by parameter No.5.
 The speed limit set here becomes the maximum speed for a position control and a speed control.

EX: For setting VLMT for 5000rpm,
 the setting value is equal to 5000=1388HEX.
 So set data for 1388.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	31

9.9 Setting a Current Limit

The current limit, TLMT is set by parameter No.6.
 The current limit is set by the maximum current flowing through the motor in the unit of 0.1A. Normally, set TLMT for three times the rated current of the motor.

(note) You can not set more than three times the current.

EX: For setting TLMT for 5A rms,
 the setting value is equal to $5 \times 10 = 50 = 32\text{HEX}$.
 So set data for 32.

9.10 Setting an In-Position Range

The In-Position range is set by parameter No.7.
 The inposition range is set by changing an In-Postion range to a hexadecimal number.

EX: For setting an In-Position range for 10 pulse,
 $10 = A \text{ HEX}$. So set data for A.

9.11 Setting a Filter Constant

The low pass filter's Time Constant, τ_F to the current command is set by parameter No.8. The setting value is set by converting the value obtained in the following equation into a hexadecimal number.

The setting value = $6.5534 / \tau_F$

EX: For setting τ_F for 1msec,
 The setting value is equal to $6.5534 / 1 \times 10^{-3} = 6553.4 = 1999\text{HEX}$
 So set data for 1999.

9.12 Setting an Analog Input Scale

The analog input command scale is set by parameter No.9.

- (1) For a speed control mode,
 The rotating speed for 10V inputted is set.

EX: For setting the analog input scale for 7500rpm/10V,
 the setting value is $7500 = 1d4\text{CHEX}$.
 So set data for 1d4C.

- (2) For a current control mode,
 The current for 10V inputted is set in the unit of 0.1A.

EX: For settting the analog input scale for 5.5A rms/10V,
 the setting value = $5.5 \times 10 = 55 = 37\text{HEX}$.
 So set data for 37.

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	32/

9.13 Setting an Analog Input Offset ☆

The analog input command offset is set by parameter No.A.
 When the motor is operated by setting analog input voltage for zero in a speed control mode, it rotates at a low speed because of an offset voltage. Because of this, increase or decrease the parameter so that it can not be rotated. Setting a minus value is only accepted in this parameter. The parameter can be set ranging from 8000HEX (-32768) to 7FFFHEX(+32767). When an offset voltage is adjusted, surely set the zero clamp invalid by means of CTRLSW(parameter No.F).

9.14 Setting an Accerelation Limit

The accerelation limit is set by parameter No.b.
 The setting unit is rpm/sec.

EX: For setting the accerelation limit for 7500rpm/sec,
 the setting value is equal to 7500=1d4CHEX.
 So set data for 1d4C.

9.15 Setting an Excess Speed Alarm Level

The excess speed alarm level, VALM is set by parameter No.C.

EX: For setting the excess speed alarm level for 5100rpm,
 the setting value is equal to 5100=13ECHEX.
 So set data for 13EC.

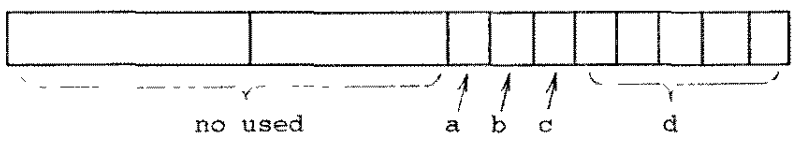
9.16 Setting a Zero Clamp Voltage

The zero clamp voltage is set in the unit of mV by parameter No.d. If the zero clamp is set valid by means of CTRLSW(parameter No.F), all the analog inputs less than the voltage set by this parameter are treated as zero. Set the zero clamp voltage as well as others after converting to a hexadecimal number.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	33

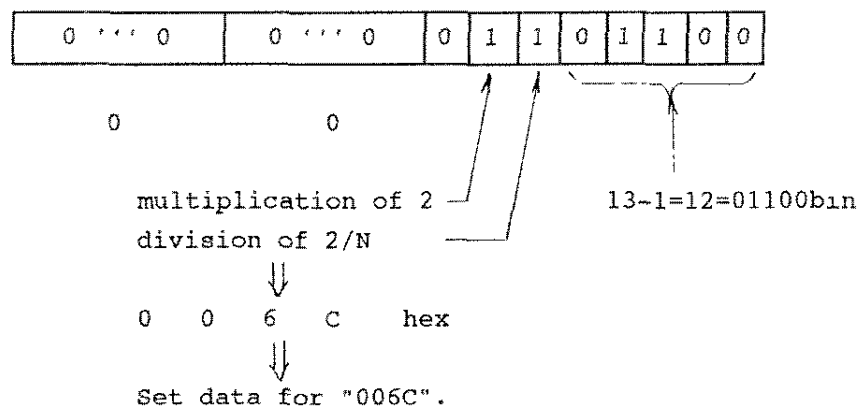
9.17 Setting a Frequency Division and Multiplication

The frequency division and multiplication of an encoder signal is set by parameter No.E. Decide each bit of data set by parameter No.E and set the data after converting to a hexadecimal number as shown on the following figure:

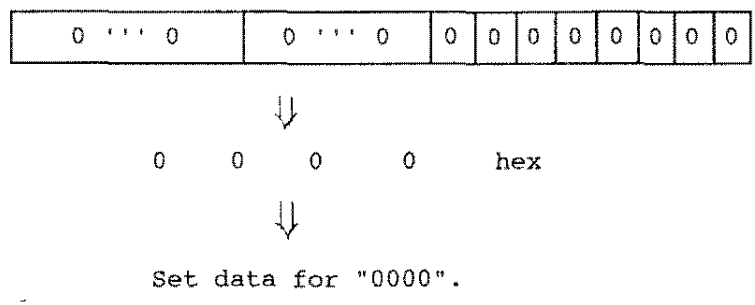


- a: Set for "1" for the multiplication of 4
- b: Set for "1" for the multiplication of 2
- c: Set for "1" for the division of 2/N
- d: Set for "N-1" for the division of 1/N or 2/N

EX: For setting this for the division of 2/13 and the multiplication of 2,



EX: For setting this for the division of 1/1 and the multiplication of 1,



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	34/

9.18 Setting a CTRLSW

The parameter No.F is the conditional switch of the control operation. Decide each bit of data set by parameter No.F and set the data after converting to a hexadecimal number as shown on the followings:

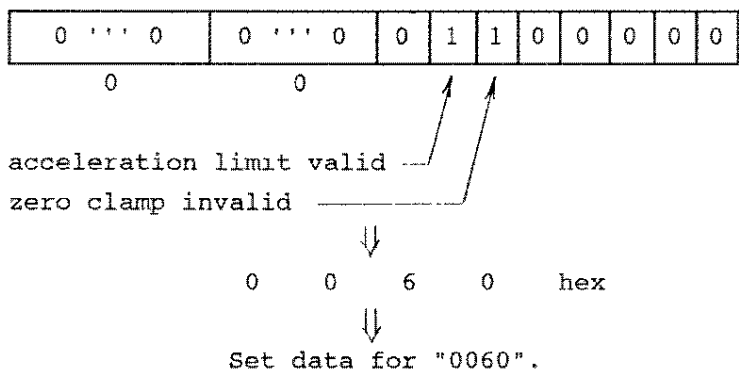
- (1) pulse input mode selection:
 The input mode of pulse command is set in the first bit.
 0: input mode for F-PULSE and R-PULSE
 1: input mode for PULSE and DIRECTION
- (2) selection and setting of position control encoder:
 The encoder used for position control is selected in the second bit.
 0: an encoder annexed with the motor
 1: an external encoder
- (3) limit signal logic:
 The limit signal input logic of F-LMT and R-LMT is set in the third bit.
 0: normal for ON and limited for OFF
 1: normal for OFF and limited for ON
- (4) analog input signal polarity:
 The analog input signal polarity is selected in the fifth bit.
 0: CCW rotation for (+) and CW rotation for (-)
 1: CCW rotation for (-) and CW rotation for (+)
- (5) zero clamp valid/invalid:
 0: zero clamp turned off
 1: zero clamp turned on
- (6) acceleration limit valid/invalid:
 Turning on or off of acceleration limit is selected in the seventh bit.
 0: acceleration limit turned off
 1: acceleration limit turned on
- (7) an operation condition of a dynamic break:
 The operation condition of a dynamic break is set in the eighth and the ninth bits.

DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
8	0	1	3	0	0	5	7	9	I	4	0	35

ninth bit	eighth bit	operation condition of dynamic break
0	0	The dynamic break is turned on only for turning off the power supply.
0	1	The dynamic break is turned on for turning off the power and alarming.
1	*	The dynamic break is turned on for turning off the power, alarming, and SERVO-OFF.

- ※ When the power supply is turned off, the dynamic break is not turned on because the voltage for driving the motor is not discharged. (7 segments' LED is turned off for discharging)
- ※ If the dynamic break is wanted to be turned on for turning off the power supply, you may have a case when an over-current alarm is detected because of a dynamic break current.

EX: For setting zero clamp and acceleration limit for valid:



DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	36 /

9.19 Setting a Monitor Address

A random data of the driver can be produced as an analog signal at the torque monitor terminal by changing the monitor address setting in parameter No.10. The monitor address is set for "torque command" on delivery.

address setting	contents
0030	torque command
0031	speed command
0032	speed feedback
0033	deviation counter value

Contact with us on other address settings.

9.20 Setting an Over-Load Detection Level

The motor current value for detecting an over-load alarm is set by parameter No.11. The detecting level is set 1.15 times the rated current on delivery.

EX: For setting the over-load detection level for 3.5A rms, the setting value is equal to $3.5 \times 10 = 35 = 23\text{HEX}$
So set data for "23".

9.21 Setting an External Encoder Resolution

When an external encoder is used as an encoder for controlling a position, surely set the resolution(a pulse number per one turn of the motor) of the external encoder for parameter No.12. Then, it is required to set the basic resolution of the encoder regardless of a frequency division and multiplication.

EX: For the resolution of the external encoder which is 1000 counts/rev, the setting value is equal to $1000 = 3E8\text{HEX}$.
So set data for "3E8".

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											37

10. TRIAL OPERATION

For a trial operation, operate the motor without a load at the motor shaft to protect the motor against an unpredictable accident. Set the driver parameter as it is on delivery.

10.1 Trial Operation for a Position Control

- (1) Turning on the power

When the power is turned on, 7 segments' LED indicate "*0F*" with the state of servo-off.

- (2) Set the mode for "0".

- (3) starting a control

When SV-ON signal is turned on, 7 segments' LED indicate "00n*". Input the signal of F-LMT and R-LMT.

- (4) rotating command

Input a command pulse. The motor is rotated at a speed in proportion to the frequency of the command pulse. Be sure that a rotating direction is as commanded.

- (5) treatment for abnormality

When above operations are not normally executed, refer to para 12, DIAGNOSIS AND COUNTERMEASURE AGAINST TROUBLES.

10.2 Trial Operation for a Speed Control

- (1) turning on the power supply

- (2) Set the mode setting for "1".

- (3) Starting control

When SV-ON signal is turned on, 7 segments' LED indicate "00n*". Input the signal of F-LMT and R-LMT.

- (4) rotating command

Input analog input command voltage. The motor is rotated at a speed in proportion to input voltage. Be sure that a rotating direction is as commanded.

- (5) treatment for abnormality

When above operations are not normally executed, refer to para 12, DIAGNOSIS AND COUNTERMEASURE AGAINST TROUBLES.

	DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8	0	1	3	0	0	5	7	9	I	4	0	38

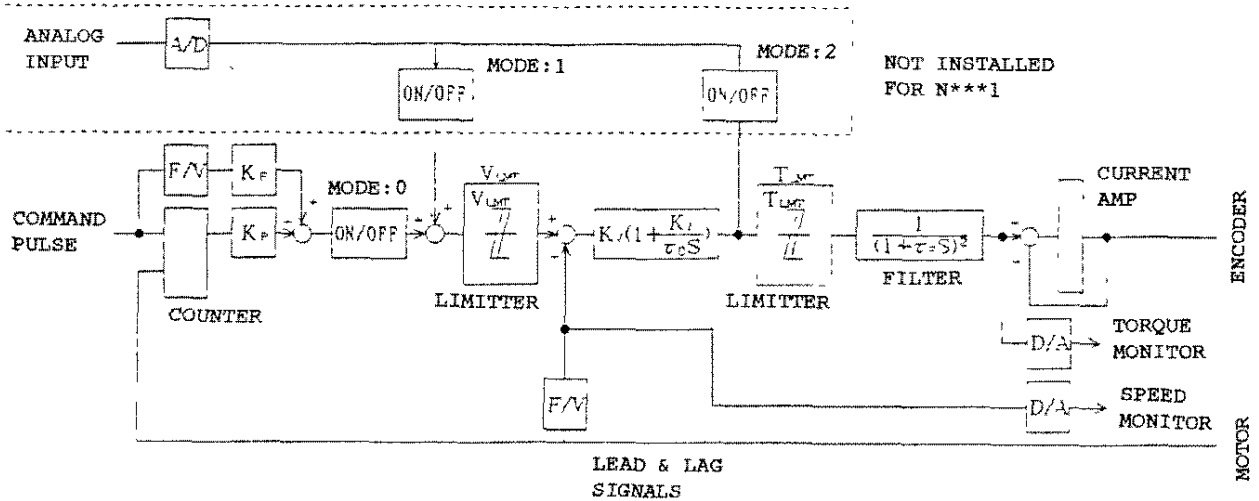
11. ADJUSTMENT PROCEDURE

Adjust a control gain of the driver in accordance with the procedure described in this paragraph attaching the motor to the unit. Refer to the following list on parameters which should be adjusted against each control mode.

No.	description	position control	speed control	current control
1	position loop gain, K_P	○		
2	speed loop gain, K_V	○	○	
3	integration gain in speed loop, K_I	○	○	
4	feed forward value, K_F	○		
8	filter constant, τ_F	○	○	
9	analog input scale		○	○
A	analog input offset		○	○

11.1 Control Block Diagram

The control content of AU6550 is as follows:



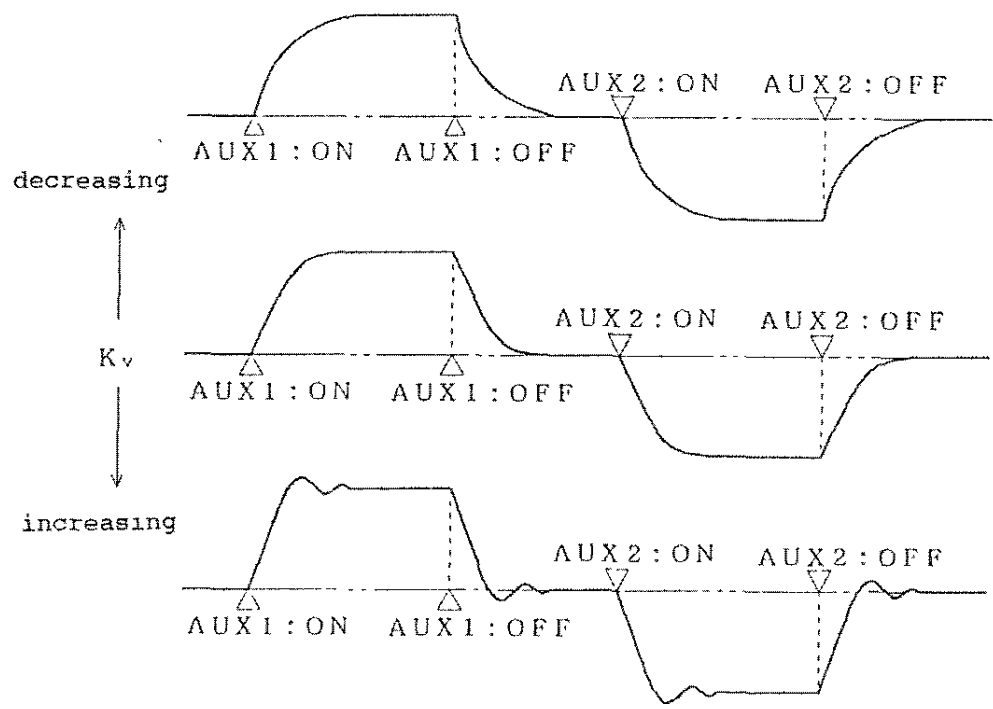
- K_P : Position Loop Gain
- K_V : Speed Loop Gain
- K_I : Integration Gain in Speed Loop
- K_F : Feed Forward Value
- V_{LMT} : Speed Command Limit
- T_{LMT} : Torque Command Limit
- τ_F : Filter Constant

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											37

11.2 Adjusting a Speed Loop Gain, Kv

Turn on the power, and turn off integration setting an integration gain in speed loop, K_I for zero (Set data of parameter No.3 for zero in the setting board). Set a speed limit for the rated rotating number of the motor. Then, set mode setting (parameter No.0) for "0003" (speed step). Turn on the signal of SV-ON, F-LMT and R-LMT and then turn on AUX1. The motor rotates CCW and stops for turning off AUX1.

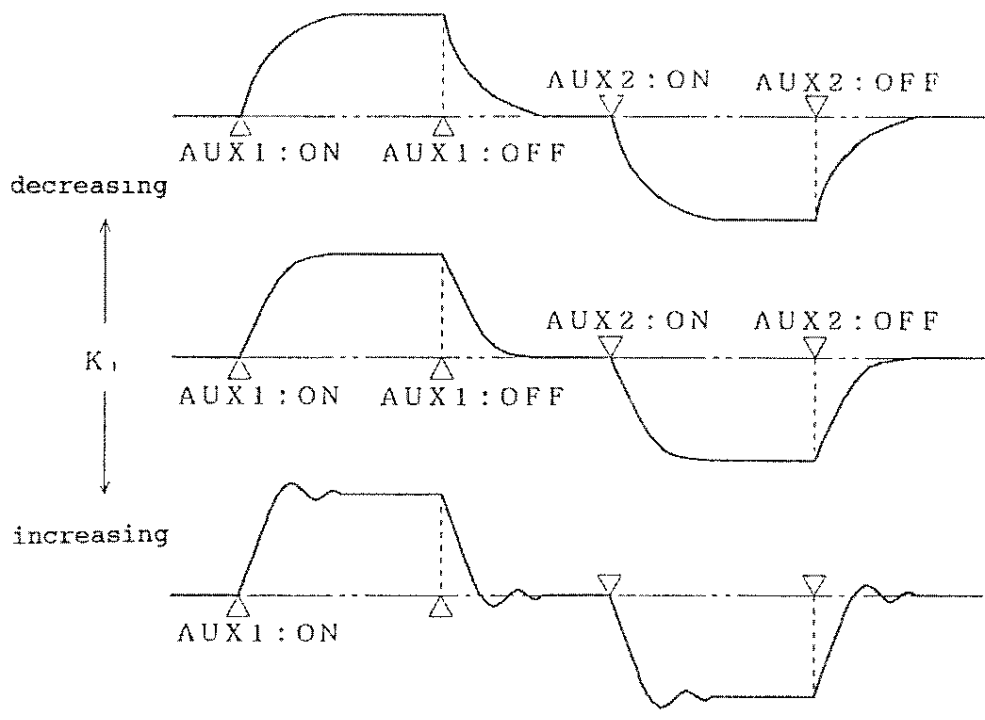
While, the motor rotates CW for turning on AUX2 and stops for turning off AUX2. The motor at this time rotates at the rotating number set in the speed limit. If necessary, set the speed limit again. Observe this phenomena with an oscilloscope. Connect the probe of the oscilloscope to the checking terminal, V on the driver panel. (Connect Ground to the checking terminal, G). So you can monitor the rotating speed of the motor with the oscilloscope. When K_v (parameter No.2) is changing from a small value to a big one, the speed wave of step response changes from smooth to angular as shown on the followings. If K_v is increased more, overshooting occurs and there maybe cases when the unit is vibrated. K_v should be set so that an overshooting is not occurred and the value is bigger as possible as you can.



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											46

11.3 Adjusting an Integration Gain, K_I in a Speed Loop

Then, adjust the intergration gain, K_I (parameter No.3).
If the integration gain, K_I is bigger, a quicker response and strong rigid control line can be obtained. When K_I is changed from a small value to a big one, the following overshooting wave can be obtained. Set K_I so that its value is bigger as possible as you can within the range of no overshooting.



DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											4/1

11.4 Adjusting a Filter Constant, τ_F

Adjust the filter constant, τ_F (parameter No.8).
 Normally, the filter constant is set for "7FFF" in the setting board so that filtering is not active as possible as you can. However, there may be cases when a control is vibrated on increasing a servo gain for the reason of the mechanical resonance of motor or load.

Then, to restrain the resonance, a low-pass filter can be inserted into the control line by reducing the value of parameter No.8. Observe V monitor(speed monitor) in the state of vibration with an oscilloscope. Measure a vibration period by speed wave. A vibration can be stopped by setting the filter constant, τ_F aligning with this vibration period. The proper setting of the filter constant, τ_F allows Kv and Ki to be set much bigger.

(note) If you have a weak rigid in mechanical line combined to the motor shaft, it is impossible to increase a gain. So make the rigid in mechanical line stronger to advance a servo performance. Specially, use the coupling which has a strong rigid as possible as you can.

11.5 Adjusting a Position Loop Gain, KP

In the case of an application in a position control mode, adjust the position control gain, KP in succession (parameter No.1). Adjust KP after setting the mode setting(parameter No.0) for "0000" (a position control) with Servo-On signal turned off. The strong rigid control line can be obtained by providing a bigger value KP as possible as you can and also a settling time becomes short. Normally, KP is set for about 100(1/sec).

11.6 Setting a Feed-Forward Value, KF

If you need to have a good followable operation against command pulse, a Feed-Forward function is applicable. This function is that with F/V conversion of command pulse, the speed command signal obtained by the conversion is computed to the speed command of speed loop by the volume set in KF and controlled. Normally, there is no problem even if Feed-Forward value, KF is set for zero.

11.7 Setting an Analog Input Scale

When the unit is used in the mode of speed control or current control, set an analog input scale(parameter No.9) in accordance with para 9.12.

	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	44

11.8 Adjusting an Analog Input Offset

In the case of use in a speed control mode, adjust an analog input offset(parameter No.A) as follows:

In the case of use in a current control mode, set the offset for zero. Set the mode setting(prameter No.0) for "0001" (a speed control) with Servo-On signal turned off. Input 0V(zero speed command) to the analog input command and turn on Servo-On signal. Then, the motor is rotated at low speed for the reason of an offset voltage.

Increase or decrease this parameter so that the motor can not be rotated. In the case of adjusting the offset voltage, make sure that zero clamp should be set for invalid in CTRLSW(parameter No.F).

11.9 Memorizing the Set Data

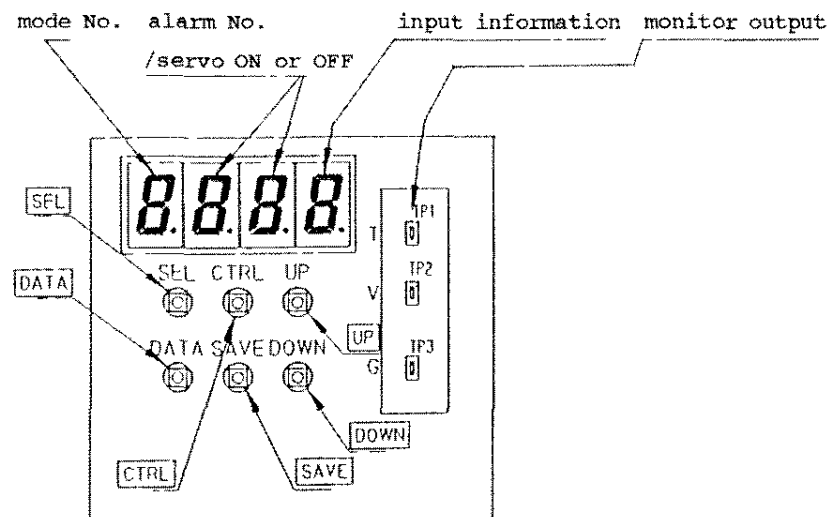
After completion of above adjustment, make sure that all the set data should be memorized into the EEPROM of the driver inside. Refer to para 9.1, "How to set a parameter".

	DWG	NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8	0	1	3	0	0	5	7	9	I	4	0	43

12. DIAGNOSIS AND COUNTERMEASURE AGAINST TROUBLES

12.1 Diagnosis by Indicating Status

In the case of abnormal operation, first of all, check 7 segments LED on the panel.



control mode No.	8	indication of a hexadecimal number of 0 to F
alarm No. SV-ON/OFF	88.①	indication of a hexadecimal number of 00 to FF, ①IN-POSITION
input status indication		①Servo-On ②alarm-reset ③CCW-LMT ④CW-LMT ⑤INHBIT ⑥C-RST ⑦AUX1 ⑧AUX2

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	44

(1) control mode indication

Confirm that LED at left side is the number of the set control mode.

(2) input status indication

The LED at right side indicates "ON/OFF" of an input signal. Confirm an input signal for a normal inputting in accordance with the following list:

status of each segment	diagnosis contents
① LED is not lit.	SV-ON signal is not inputted. The driver is mal-functioned.
② LED is lit.	Alarm-Reset is inputted. Turn off Alarm-Reset for safety for normal.
③ LED is not lit.	CCW-LIMIT is not inputted. The motor is not operated for the rotating command of CCW.
④ LED is not lit.	CW-LIMIT is not inputted. The motor is not operated for the rotating command of CW.
⑤ LED is lit.	INHIBIT is inputted. The pulse command input is not accepted.
⑥ LED is lit	COUNTER-RESET is inputted. The motor is not rotated even if the pulse command is inputted because the deviation counter is always set.
⑦ LED is lit.	Compensating integration is turned off in the case of position control and speed control modes.

(3) indicating alarm number

After confirming the alarm numbers of two LEDs in the middel, execute diagnosis against troubles in accordance with para 12.2.

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	45/

12.2 Diagnosis against Troubles for Alarming

LED	status for lighting	cause	countermeasure
20	Lit for SV-ON The motor shaft is in the state of vibration.	mal-adjusting	Adjust a gain again.
	Lit for increasing or decreasing a speed	a bigger load inertia	Checking an inertia
	Lit for rotating	The motor shaft is locked.	Check a load torque.
		The brake is not released.	Release the brake.
	Lit for SV-ON	Miss-wiring of motor circuit	Check a lead wiring.
30	lit for starting the motor or decreasing a speed	Step response is overshooted.	Adjust a gain again. Check an inertia.
41	Lit when a pulse command is inputted.	CCW-LMT and CW-LMT are not inputted.	Input a LMT signal.
		SV-ON signal is not inputted.	Input SV-ON signal.
	Lit for increasing or decreasing a speed.	a bigger load inertia	Check an inertia.
		Setting a current limit is small.	Check the setting value.
42	Lit when a pulse command is inputted	F-PULSE and R-PULSE are simultaneously inputted.	Check a lead wiring. Check the pulse output circuit of the controller.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											45/

LED	status for lighting	cause	countermeasure
50	Lit only for power insertion	abnormal driver power section, abnormal driver control circuit	Replace the driver.
	Lit for SV-ON	Motor coils are short.	Replace the motor.
		abnormal driver power amp	Replace the driver.
	Lit for starting a motor or decreasing a speed	mal-adjustment of driver	Replace the driver.
	Lit after executing a control operation for a while	heated driver inside	Provide the driver a heatsink.
61	power insertion	A and B phases of an encoder which leads are cut off.	Check a lead wiring.
		wire-saved type's encoder	Replace the motor.
62	Lit after rotating for a while after power insertion and SV-ON	cut-off wire of U, V, and W phases of encoder and miss-wiring	Check a lead wiring.
		abnormal encoder signal	Replace the motor.
63	Lit after rotating for a while.	External encoder signal is not inputted.	Check input.
		miss-setting of the resolution of external encoder	Set properly
		little driving current through photo couplers of external encoder	Check an input voltage.

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											47/

LED	status for lighting	cause	countermeasure
64	Lit for power insertion	cut-off wire of an encoder signal	Check a lead wiring.
		no saved-wire type of encoder	Replace the motor.
71	Lit for decreasing a speed	a lack of recovery capability of the power board	Contact with TSC engineers.
72	Lit for SV-ON	Instantaneous input power voltage drop is occurred for 50msec or more	Check an input power supply.
90	Lit for power insertion	mal-functioned EEPROM	Replace the driver.
=	Lit for power insertion	abnormal driver control circuit	Replace the driver.
	Lit for operating	miss-operating caused by noise	Provide the power a line filter.

12.3 Other Troubles

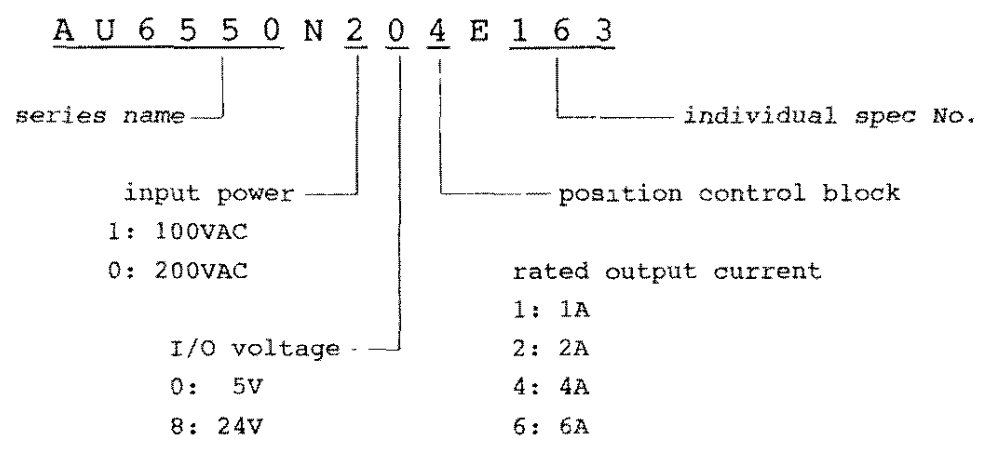
abnormal contents	cause	countermeasure
The motor is not rotated by the value of command pulse. (position sifted)	miss-setting of a pulse input mode	Check the first bit of CTRLSW.
	mal-functioned frequency division and multiplication	Check the setting of parameter No.E
	a little driving current through photo couplers of command pulse	Check the pulse input voltage.
	Noise is superimposed on the cable of the encoder signal.	Check the shield. Check the ground line.
Vibrated for rotating at low speed	a mal-adjusting gain	Readjust the gain.
	Noise is superimposed on the cable of the encoder signal.	Check the shield. Check the ground line.

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	48/

13. STANDARD TYPE LIST

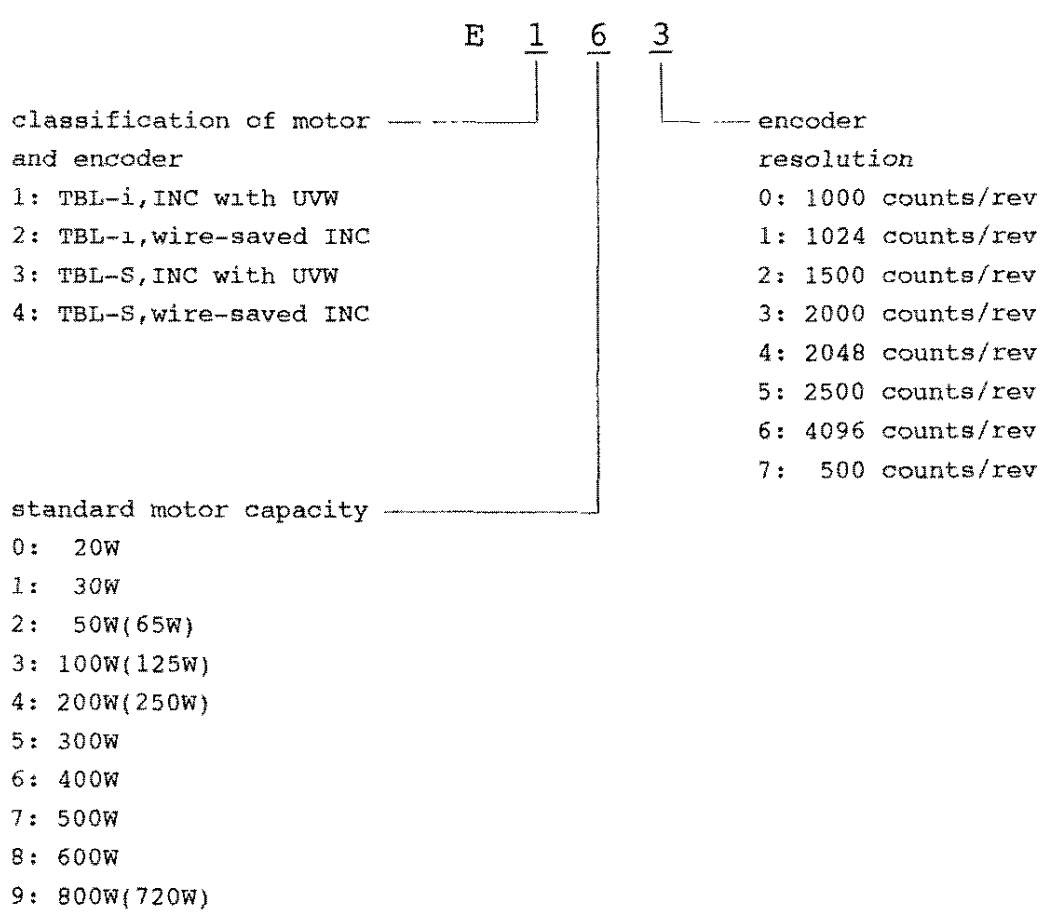
13.1 How to identify a Type Symbol

The type symbol of the included driver is as follows:



(How to see individual spec No.)

How to see individual spec No. for Standard Spec. and Standard motor is as follows:



	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	49

13.2 Driver Types list for TBL-i Motors

power supply	motor capacity	encoder	motor type	driver type
100VAC	30W	2000 C/R with UVW	TS4501N10**E100	AU6550N101E113
		2000 C/R, wire-saved	TS4501N20**E100	AU6550N101E213
	50W	2000 C/R with UVW	TS4502N10**E100	AU6550N101E123
		2000 C/R, wire-saved	TS4502N20**E100	AU6550N101E223
	100W	2000 C/R with UVW	TS4503N10**E100	AU6550N102E133
		2000 C/R, wire-saved	TS4503N20**E100	AU6550N102E233
	200W	2000 C/R with UVW	TS4507N10**E100	AU6550N104E143
		2000 C/R, wire-saved	TS4507N20**E100	AU6550N104E243
	400W	2000 C/R with UVW	TS4509N10**E100	AU6550N106E163
		2000 C/R, wire-saved	TS4509N20**E100	AU6550N106E263
200VAC	30W	2000 C/R with UVW	TS4501N10**E200	AU6550N201E113
		2000 C/R, wire-saved	TS4501N20**E200	AU6550N201E213
	50W	2000 C/R with UVW	TS4502N10**E200	AU6550N201E123
		2000 C/R, wire-saved	TS4502N20**E200	AU6550N201E223
	100W	2000 C/R with UVW	TS4503N10**E200	AU6550N201E133
		2000 C/R, wire-saved	TS4503N20**E200	AU6550N201E233
	200W	2000 C/R with UVW	TS4507N10**E200	AU6550N202E143
		2000 C/R, wire-saved	TS4507N20**E200	AU6550N202E243
	400W	2000 C/R with UVW	TS4509N10**E200	AU6550N204E163
		2000 C/R, wire-saved	TS4509N20**E200	AU6550N204E263
	600W	2000 C/R with UVW	TS4513N10**E200	AU6550N206E183
		2000 C/R, wire-saved	TS4513N20**E200	AU6550N206E283
	800W	2000 C/R with UVW	TS4514N10**E200	AU6550N206E193
		2000 C/R, wire-saved	TS4514N20**E200	AU6550N206E293

- ※ A motor type is described with the type of no brake.
A driver type is not changed even for the one with a brake.
- ※ Please designate a driver type except that an encoder resolution is 2000 C/R after referring to the previous page.
- ※ Above driver type is the one for 5V I/O. Please designate a driver type for 24V spec after referring to the previous page.

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	50

13.3 Driver Types list for TBL-S Motors

power supply	motor capacity	encoder	motor type	driver type
100VAC	30W	1000 C/R with UVW	TS3272N500E11	AU6550N101E310
	65W	1000 C/R with UVW	TS3273N500E14	AU6550N101E320
	125W	1000 C/R with UVW	TS3275N500E12	AU6550N102E330
	200W	2000 C/R with UVW	TS4702N19E12	AU6550N104E343
	300W	2000 C/R with UVW	TS4073N11E14	AU6550N106E353
200VAC	30W	1000 C/R with UVW	TS3272N509E24	AU6550N201E310
	65W	1000 C/R with UVW	TS3273N528E29	AU6550N201E320
	125W	1000 C/R with UVW	TS3275N504E29	AU6550N202E330
	200W	2000 C/R with UVW	TS4072N20E31	AU6550N202E343
	300W	2000 C/R with UVW	TS4073N9E31	AU6550N202E353
	500W	2000 C/R with UVW	TS3279N210E33	AU6550N204E373
	800W	2000 C/R with UVW	TS3280N210E33	AU6550N206E393

※ Above driver type is the one for 5V I/O. Please designate a driver type for 24V spec after referring to para 13.1.

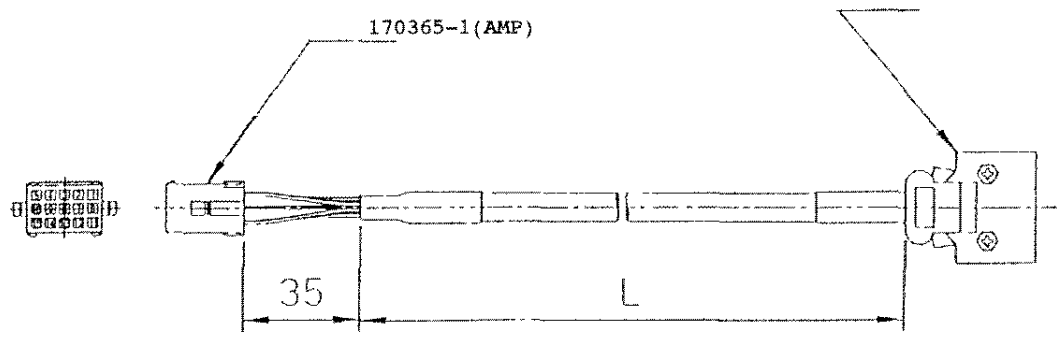
DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
8 0	1	3	0	0	5	7	9	I	4	0	51 /

14. CONNECTION CABLE

The following cables are available as the connection cables of this drivers.

EU6092, connection cable for incremental encoders with U, V and W

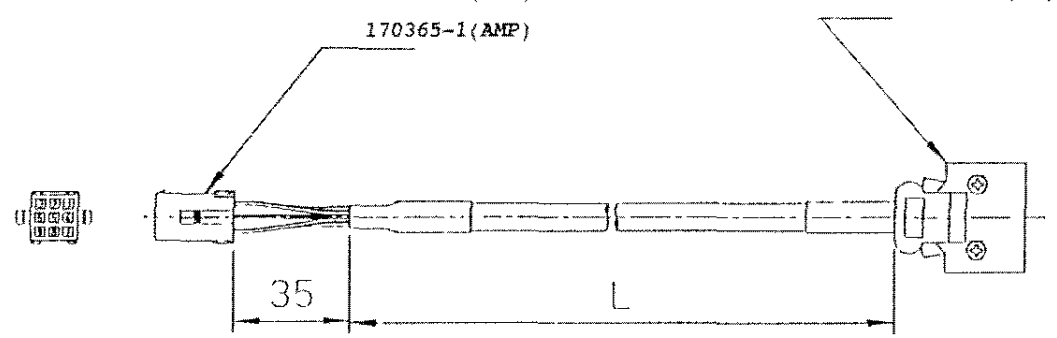
CAP :172163-1(AMP) PLUG :10120-3000VE(3M)
 SOCKET:170361-1(AMP) or SHELL :10320-52F0-008(3M)



形式	L (mm)
EU6092 H 30	3000
EU6092 N 50	5000
EU6092 H100	10000
EU6092 H150	15000
EU6092 H200	20000

EU6093, connection cable for saved-wire incremental encoders

CAP :172161-1(AMP) PLUG :10120-3000VE(3M)
 SOCKET:170361-1(AMP) or SHELL :10320-52F0-008(3M)



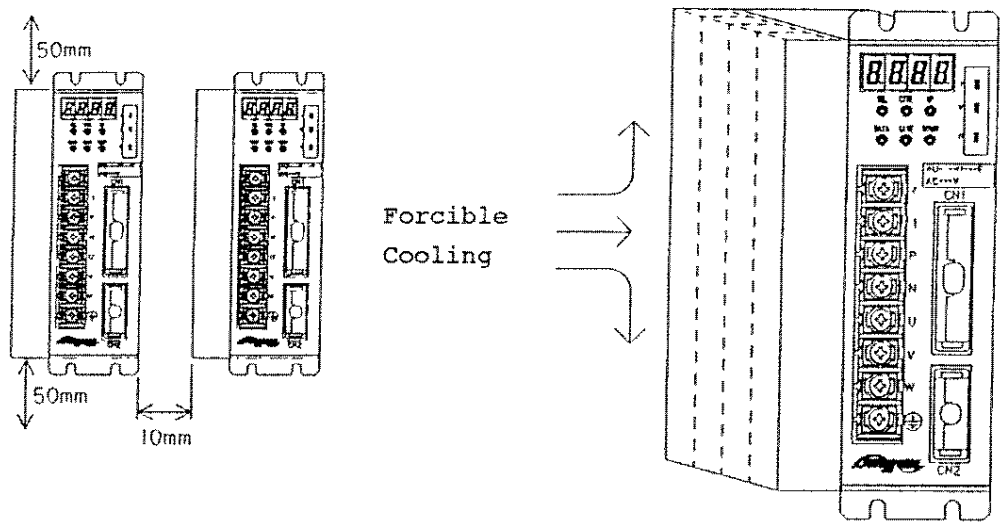
形式	L (mm)
EU6093 N 30	3000
EU6093 H 50	5000
EU6093 H100	10000
EU6093 H150	15000
EU6093 H200	20000

DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
8 0 1 3 0 0 5 7 9 I 4 0											54

15. ATTACHMENT

Attaching area and how to attach:

- * Make a space to ventilate vertically for holding the driver. To attach a few drivers, make the distance of more than 10mm from the both side and less than 50mm from the upper and the lower to cool them.
- * Place the unit under the atmosphere of ambient condition of 0 to 50°C and humidity of 90% RH or less(no dewing).
- * Make use of the holes for attaching. Attaching the front or the rear is allowable by changing the attaching plate.
- * It is necessary to mount a fan for cooling if you use the the motor under 400W or more and near the rated operation.



	DWG NO	3	4	5	6	7	8	9	10	11	12	SHEET
	8 0	1	3	0	0	5	7	9	I	4	0	53