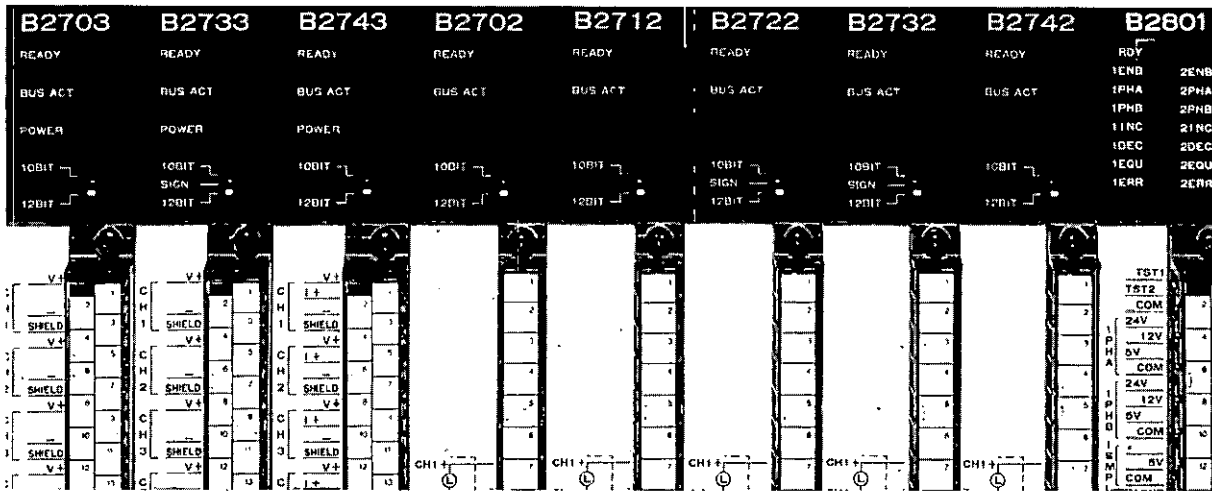# MEMOCON-SC 2000 SERIES I/O
ANALOG MODULES
DESCRIPTIVE INFORMATION

APPLICABLE PROGRAMMABLE CONTROLLER
MEMOCON-SC GL20, GL40S, GL60S, GL60H, GL70H
MODELS JAMSC-B27☐3, -B27☐2

NOTES FOR SAFE OPERATION

Read these manuals thoroughly before use of MEMOCON-SC. In these manuals, NOTES FOR SAFE OPERATION are classified as "WARNING" and "CAUTION."

⚠ **WARNING** : Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

⚠ **CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

Even items described in ⚠**CAUTION** may result in a vital accident in some situations. In either case, follow these important notes.

The following shows the symbols of prohibition and mandatory action.

⊘ **PROHIBITION** : Specifies prohibited handling.

① **MANDATORY ACTION** : Specifies actions that must be taken.

After reading these manuals, keep them readily available for those using the equipment.

1 INSTALLATION

⚠ CAUTION

- The installation environment must meet the environmental conditions given in the product catalog and manuals.
  Using the MEMOCON-SC in environments subject to · high temperatures, high humidity, excessive dust, corrosive gases, vibration, or shock can lead to electric shock, fire, or faulty operation.

  ――――― Do not use the MEMOCON-SC in the following locations. ―――――

  - Locations subject to direct sunlight or ambient temperatures not between 0 and 55℃.
  - Locations subject to relative humidity in excess of 95%, rapid changes in humidity, or condensation.
  - Locations subject to corrosive or flammable gas.
  - Locations that would subject the MEMOCON-SC to direct vibration or shock.
  - Locations subject to contact with water, oil, chemicals, etc.

- Do not remove the cover of the connector where a Module is not mounted.
  Foreign matter can cause fires, product failure, or malfunctions.

- All screws for installation should be securely tightened and checked for loosening.
  Malfunctions in the MEMOCON-SC may occur as a result of loose screws.

2 WIRING

⚠ CAUTION

- Connect a power supply complying with the rated specifications.
  A power supply that does not comply with the rating may cause a fire.
- Wiring must be performed by qualified personnel.
  Mistakes in wiring can cause fires, product failure, or malfunctions.
- When wiring, do not allow foreign matters such as wire chip to enter the mounting base or the module.
  Foreign matter can cause fires, product failure, or malfunctions.

⏚ MANDATORY ACTION

- Ground the protective ground terminal to a resistance of 100 Ω max.
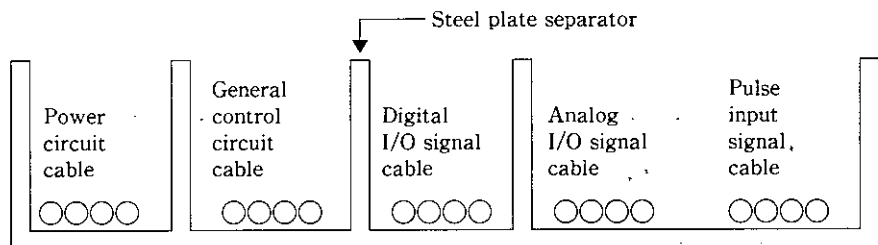 Failure to observe this instruction may result in electric shock or malfunction.

NOISE REDUCTION MEASURES

- When noise from external power supply lines causes problems, install an insulated transformer or noise filter for effective noise prevension.
  Insufficient noise reduction measure may cause malfunctions in the Analog Modules.

⚠ SEPARATE WIRING PROPERLY

- I/O lines connecting external devices to the Analog Modules must be selected based on the following considerations :
  mechanical strength, resistance to noise, wiring distance, signal voltage, etc.

- I/O lines must be separated from power lines both within and outside of the control panel to minimize the affects of noise. Faulty operation can result if I/O lines are not sufficiently separated from power lines.

(Example of External Wiring)

Steel plate separator

| Power circuit cable | General control circuit cable | Digital I/O signal cable | Analog I/O signal cable | Pulse input signal, cable |

3 OPERATION

⚠ WARNING

- Do not touch Module terminals under current conditions.
  There is danger of electric shock.

- Provide an emergency stop circuit, interlock circuit, etc. at the exterior of MEMOCON-SC.
  Failure to observe this instruction may result in injury or damage to equipment.

--- Provide an Emergency Stop Circuit at the exterior of MEMOCON-SC. ---

Do not install emergency stop circuit as part of the MEMOCON-based ladder program. Install an emergency stop relay to an external relay as shown below.

Use a NC contact (mechanical contact) to connect the emergency stop switch. The emergency stop switch should cut OFF the main power supply when depressed.

If these steps are not followed, the emergency switch will not engage even if input circuits are damaged or cables are cut. Failure to follow these instructions may cause damage to machines and injury to personnel.
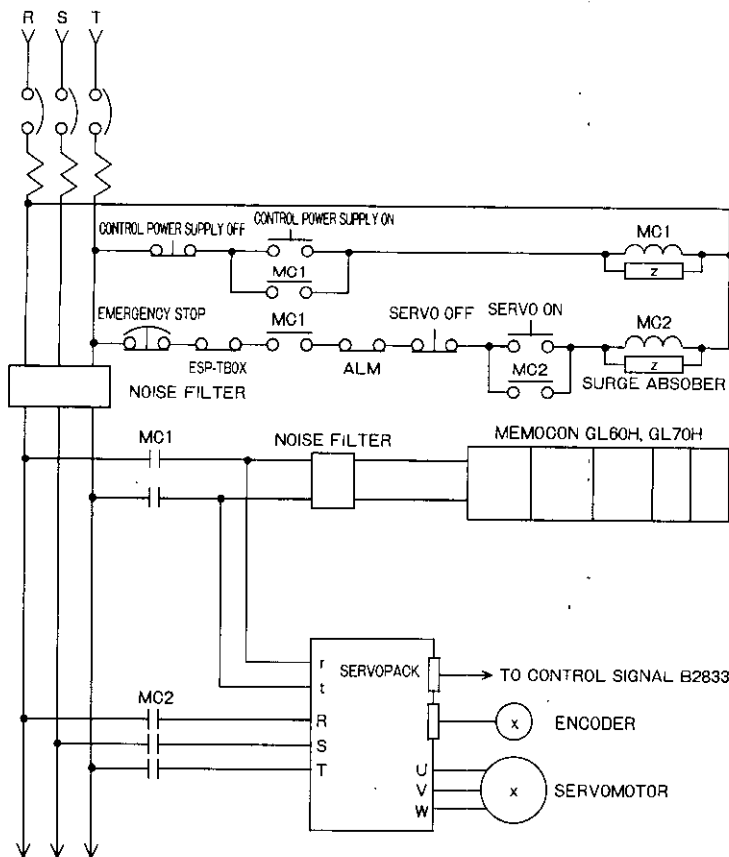
4 MAINTENANCE

🚫 PROHIBITION

- Do not attempt to disassemble or modify the MEMOCON-SC in any way.
  Doing so can cause fires, product failure, or malfunctions.

⚠ CAUTION

- Attaching, installing or removing Analog Modules is only to be made after the power is turned OFF.
  Otherwise, electric shock, malfunction or breakdown will result.

5 GENERAL PRECAUTION

- MEMOCON-SC was not designed or manufactured for use in devices or systems that concern peoples' lives.
  Users who intend to use the product described in this manual for special purposes such as devices or systems relating to transportation, medical, space aviation, atomic power control, or underwater use must contact YASKAWA representatives beforehand.

- This product has been manufactured under strict quality control guidelines. However, if this product is to be installed in any location in which a failure of MEMOCON-SC involves a life and death situation or in a facility where failure may cause a serious accident, safety devices must be installed to minimize the likelihood of any accident.

- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all product to which this manual is applicable.

- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
  A new version of the manual will be re-released under a revised document number when any changes are made.

- Contact your YASKAWA representative listed on the back of this manual to order a new manual whenever this manual is damaged or lost.
  Please provide the document number listed on the front cover of this manual when ordering.

- Contact your YASKAWA representative listed on the back of this manual to order new nameplates whenever a nameplate becomes worn or damaged.

- YASKAWA cannot make any guarantee for products which have been modified.
  YASKAWA assumes no responsibility for any injury or damage caused by a modified product.

OVERVIEW OF MANUAL

• This manual describes the functional specifications of the 2000-series I/O Modules used for the MEMOCON-SC GL40S, GL60S, GL60H and GL70H Programmable Controllers. Read this manual carefully in order to use the 2000-series I/O Modules properly. Also, keep this manual in a safe place so that it can be used whenever necessary.

• Refer to the following manuals for related Peripheral Devices and Modules.

Document Tittle	Document Number	Content
MEMOCON-SC GL60S DESCRIPTIVE INFORMATION	SIE-C815-14.1	Describes system configuration devices and their functions, specifications, application methods, etc., for the GL60S.
MEMOCON GL40S DESCRIPTIVE INFORMATION	SIE-C815-15.1	Describes system configuration devices and their function specifications, application methods, etc., for the GL40S.
MEMOCON-SC GL60H/GL70H DESCRIPTIVE INFORMATION	SIE-C815-17.1	Describes system configuration devices and their functions, specifications, application methods, etc., for the GL60H, GL70H.
MEMOCON-SC GL60S P150 PROGRAMMING PANEL DESCRIPTIVE INFORMATION	SIE-C815-14.2	Describes functions, specifications, application methods, etc. for the P150 Programming Panel.
MEMOCON-SC GL60S, GL60H, GL70H P150 PROGRAMMING PANEL DESCRIPTIVE INFORMATION	SIE-C815-14.3	Describes the SFC functions, specifications, application methods, etc. for the P150 Programming Panel.
MEMOCON-SC GL40S, GL60S, GL70H 2000 Series I/O Modules DESCRIPTIVE INFORMATION	SIE-C815-13.3	Describes functions, specifications, application methods, etc., for the 2000 series digital I/O Modules.

• Thoroughly check the specifications and conditions or restrictions of the product before use.
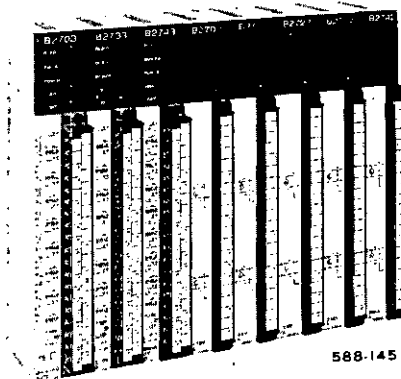
USING THIS MANUAL

This manual is written for those who already have a basic knowledge of MEMOCON PCs.
We recommend reading the MEMOCON-SC GL40S, GL60S and GL60H, GL70H Descriptive
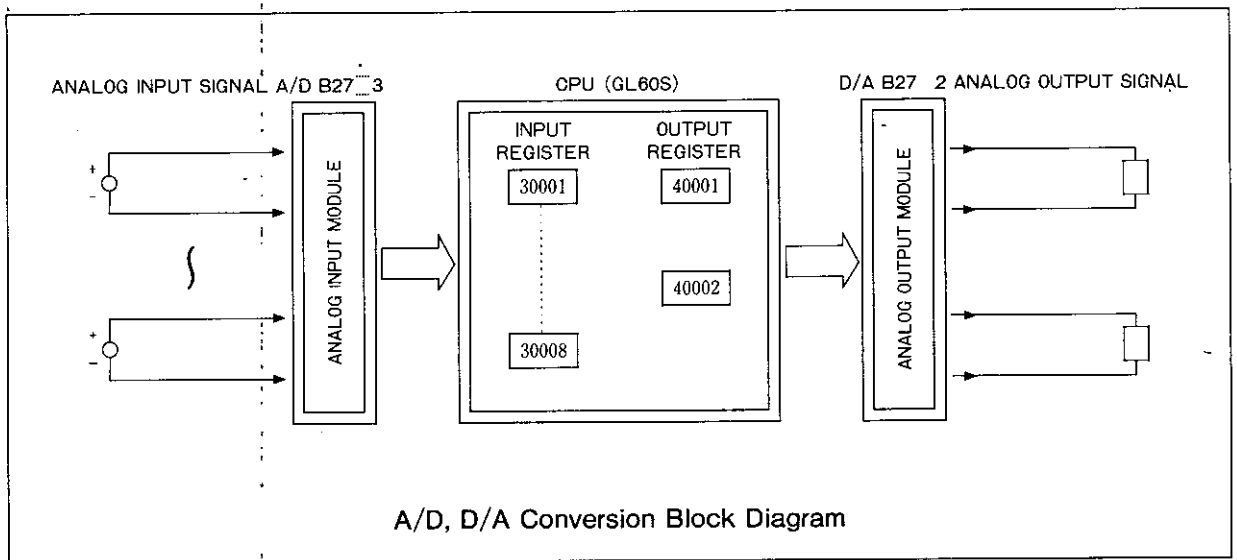Information before reading this manual.

・Meaning of Basic Terms

In this manual, the following terms indicate the meanings as described below, unless
otherwise specified.

・PC = Programmable Controller
・GL40S, GL60S = MEMOCON-SC GL40S, GL60S, GL60H, GL70H Programmable
  Controllers GL60H, GL70H

588-145

2000 Series Analog Modules

ANALOG INPUT SIGNAL A/D B27 3   CPU (GL60S)   D/A B27 2 ANALOG OUTPUT SIGNAL

INPUT REGISTER   30001

OUTPUT REGISTER   40001   40002

30008

ANALOG INPUT MODULE

ANALOG OUTPUT MODULE

A/D, D/A Conversion Block Diagram

CONTENTS

NOTES FOR SAFE OPERATION

1. TYPES

Table I Types of Analog Input Modules

Analog Modules	Type JAMSC-	Input	Input Register		
			12 BIT Mode	SIGN Mode	10 BIT Mode
A／D Couversion Module	B2703	0 to +10V	0 to 4000	—	0 to 1000
	B2733	−10 to +10V	0 to 4000	−2000 to 2000	0 to 1000
	B2743	4 to 20mA (1 to 5V)*	0 to 4000	—	0 to 1000

*Current／voltage selection requires external terminal use (See Fig. 9).

Table 2 Types of Analog Output Modules

Analog Modules	Type JAMSC·	Output	Output Register		
			12 BIT Mode	SIGN Mode	10 BIT Mode
D／A Couversion Module	B2702	0 to +10V	0 to 4000	—	0 to 1000
	B2712	0 to +5V	0 to 4000	—	0 to 1000
	B2722	−5 to +5V	0 to 4000	−2000 to 2000	0 to 1000
	B2732	−10 to +10V	0 to 4000	−2000 to 2000	0 to 1000
	B2742	4 to 20mA	0 to 4000	—	0 to 1000

Note :
1. For mode selection, mode switch on the module is used.
2. Input／output register value is 4000 maximum for easy calculation.

2. GENERAL SPECIFICATIONS

Table 3 General Specifications

Items	Specifications
Ambient Temperature	0 to +55℃*
Storage Temperature	−20 to +85℃
Humidity	10 to 90% RH (non-condensing)
Vibration Resistance	In compliance with JIS† C0911 (Range : 10 to 55 Hz, amplitude : 0.075mm, No. of liftings : 10 times)
Shock Resistance	In compliance with JIS† C0912 (10G max.)
Environmental Condition	Free from explosive, inflammable and／or corrosive gases.
Grounding	Grounding resistance : 100Ω or less
Dimensions in mm (inches)	37.5 (1.48)W × 250 (9.84)H × 104 (4.10)D
Approx. Mass	0.5kg for B27- 3, 0.6kg for B27 ·2

*B2742 (4 to 20mA output) must be utilized at less than 50℃ ambient temperature under the following condition :
· Total output current in two circuits − 25 mA or more continuous flow.
†Japanese Industrial Standard

3. ANALOG INPUT MODULES (JAMSC-B27□3)

3.1 SPECIFICATIONS

Table 4 Analog Input Module Specifications

Items		Specifications
Type JAMSC- (Input Range)		● B2703 (0 to +10V) ● B2733 (−10 to +10V) ● B2743 (4 to 20mA, 1 to 5V)
No. of Circuits (I/O Allocation)		8 per module (8 registers max in binary)
Indicators		● "READY" : Lit in normal module ● "BUS ACT" : Lit or blinking while communicating with CPU ● "POWER" : Lit at external power ON
Mode Switches*		10-BIT−SIGN−12-BIT, (SIGN for only B2733) (GL20) (GL60S)(GL60S)
External Power Supply		● +15.00VDC±0.5V, 200mA, ripple 150mVp-p or less per module ● −15.00VDC±0.5V, 50mA, ripple 150mVp-p or less per module
Fuse		Not provided
Electrical Characteristics	Input Characteristics	See Tables 5 to 7.
	Max Resolution (at 12 BIT mode)	● B2703 : 2.5mV (10V/4000) ● B2733 : 5mV (20V/4000) ● B2743 : 4μA (16mA/4000)
	Accuracy	Less than 0.5% of full scale
	Input Impedance	1MΩ or more (normal input) except for current input type of 250Ω
	Max Allowable Input	±15V or ±30mA
	Conversion Speed	1 ms per channel (every CPU scan for data communication with CPU)
	Isolation	Optical coupler isolation between external and internal circuits (no isolation between input circuits)
	Isolation Voltage	500VDC for one minute
	Internal Consumed Current	0.15A_TYP

* Apply 12-BIT and SIGN modes when using GL60S, 40S, 60H, 70H.

Table 5 Input Characteristic List of B2703 (0 to +10V)

Analog Input	Input Register Value	
	12 BIT Mode (GL60S)	10 BIT Mode (GL20)
≦0.000V	0000	000
1.000V	0400	100
2.000V	0800	200
3.000V	1200	300
4.000V	1600	400
5.000V	2000	500
10.000V	4000	1000*

*In the case of the GL20, "INV" will be displayed for input register 1000 or more if monitoring is performed by programming panel P180.
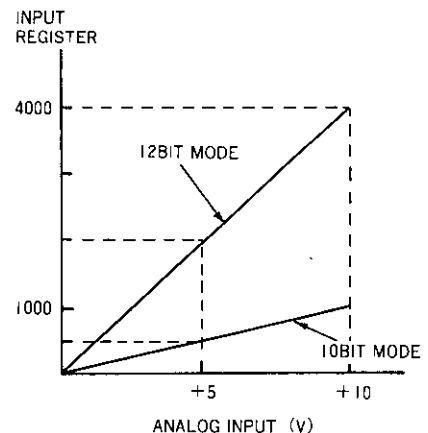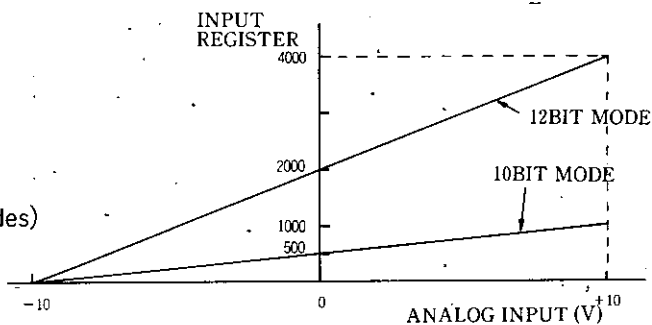

Fig. I B2703 Input Characteristics

- 5 -

Table 6 Input Characteristic List of B2733 (−10V to +10V)

Analog Input	Input Register Value		
	12BIT Mode (GL60S)	SIGN Mode (GL60S)	10BIT Mode (GL20)
−10.000V	000	−2000	000
−5.000V	1000	−1000	250
±0.000V	2000	0000	500
+5.000V	3000	1000	750
+10.000V	4000	2000	1000*

*In the case of the GL20, "INV" will be displayed for input register 1000 or more if monitoring is performed by programming panel P180.

Fig. 2 B2733 Input Characteristics
(for 12 BIT and 10 BIT Modes)

Fig. 3 B2733 Input Characteristics
(for SIGN Mode)
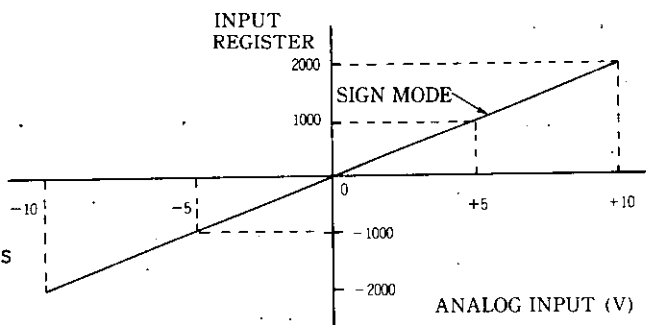
Fig. 4 Input Register Format

SIGN BIT
1 = − (NEGATIVE)
0 = + (POSITIVE)

INPUT DATA
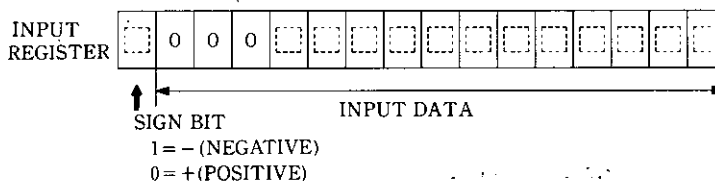
Table 7 Input Characteristic List of B2743 (4 to 20mA, I to 5V)

Analog Input	Input Register Value	
	12 BIT Mode (GL60S)	10 BIT Mode (GL20)
≦4.00mA (1.00V)	0000	000
8.00mA (2.00V)	1000	250
12.00mA (3.00V)	2000	500
16.00mA (4.00V)	3000	750
20.00mA (5.00V)	4000	1000*

*In the case of the GL20, "INV" will be displayed for input register 1000 or more if monitoring is performed by programming panel P180.
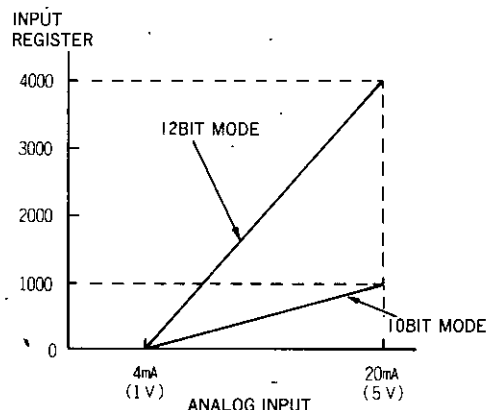

Fig. 5 B2743 Input Characteristics

3.2 FUNCTIONS

Conforming to the characteristics shown in Tables 5 to 7 and Figs. 1 to 3, the B27□3 sequentially converts 8 analog inputs (voltage signals) to digital numerical values. The converted numerical values are sent to the processor and are presented in up to 8 consecutive input registers. The Number of numerical values sent to the processor and the input register numbers is determined by the I/O allocation table.

3.3 USAGE

· B27□3 can be installed in one slot space on 2000 series I/O mounting base.

· For B27□3 I/O allocation, binary should be used.

　Up to 8 is available for setting. (GL60S I/O allocated only in binary.)

· B27□3 needs ±15V from external power supply.

　If excessive ripple or noise exists in the power supply, eliminate them using a device such as a capacitor.

· When GL20 is used as CPU, set the mode switch to 10-BIT mode.

· Depending on the input voltage, data of 0 to 1023 will be stored in the input register. It is usually necessary to transfer the contents of the input register into the holding register in order to perform a scale conversion, etc. In this case, R84H should employ subtraction. If addition is used and the data are more than or equal to 1000, the amount of difference (over 1000) will be placed in the holding register, so that correct transfer cannot be made.

　The program as shown below should be made if necessary.

SAME HOLDING REGISTER
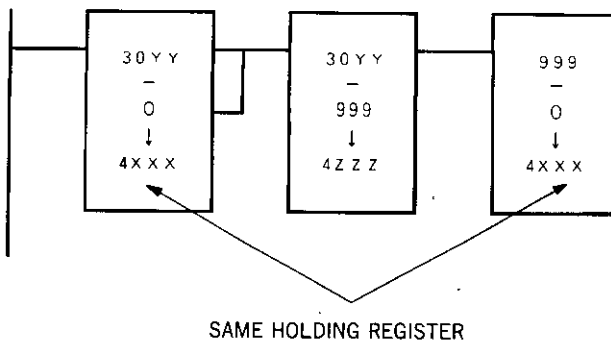
This program transfers the content of the input register 30YY to a holding register 4XXX (4XXXX). When the content of 30YY is more than or equal to 1000, the contents of 4XXX is fixed at 999.
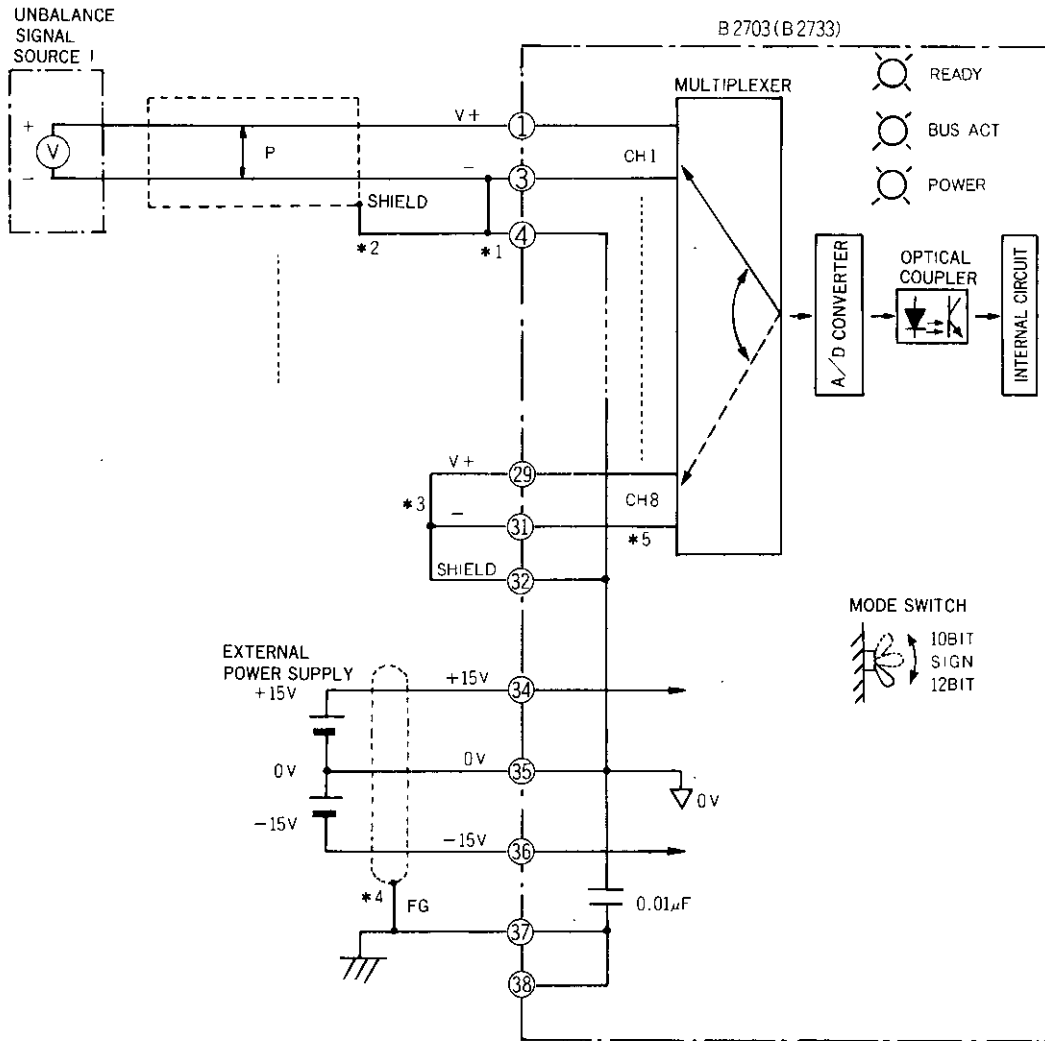
3.4 CONNECTIONS

Fig.6 Block Diagram of B2703 (B2733) Balanced Connection
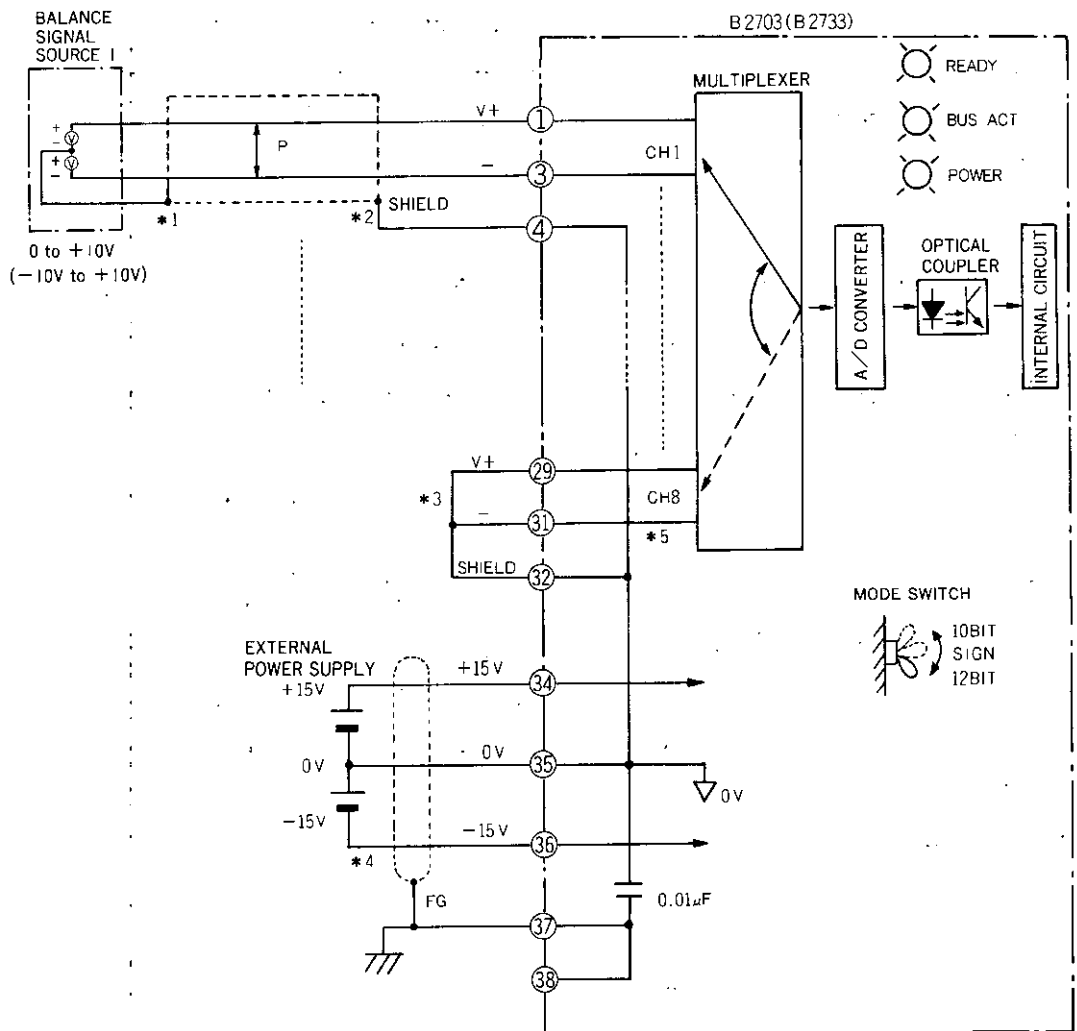
*1 Be sure to connect 0V side of signal line to SHIELD terminal.

*2 Use 2-core twisted shielded cable and connect the cable shielding to the SHIELD terminal.

*3 An unused circuit should have its input terminals shorted and connected to the SHIELD terminal.

*4 As power line between external power supply (±15V) and module, use twisted cables larger than 1.25mm². The wiring distance should be as short as possible. Do not run the power line and other control lines in the same duct. It is recommended that a shielded cable be used for easy connection.

*5 Not isolated between input signals.

Note : For signal line protection, take corrective action so as to interrupt noise or surge influence.

3.4 CONNECTIONS (Cont'd)

Fig. 7 Block Diagram of B2703 (B2733) Unbalanced Connection

*1 Be sure to connect either side of signal line to SHIELD terminal.

*2 Use 2-core twisted shielded cable and connect the cable shielding to the SHIELD terminal.   If noise level is high, it is recommended to connect the cable shielding to external grounding, together with FG terminal.

*3 An unused circuit should have its input terminals shorted and connected to the SHIELD terminal.

*4 As power line between external power supply (±15V) and module, use twisted cables larger than 1.25mm². The wiring distance should be as short as possible.   Do not run the power line and other control lines in the same duct.   It is recommended that a shielded cable be used for easy connection.

*5 Not isolated between input signals.

Note : For signal line protection, take corrective action so as to interrupt noise or surge influence.

Fig. 8 B2703／B2733 Connection

3.4 CONNECTIONS (Cont'd)
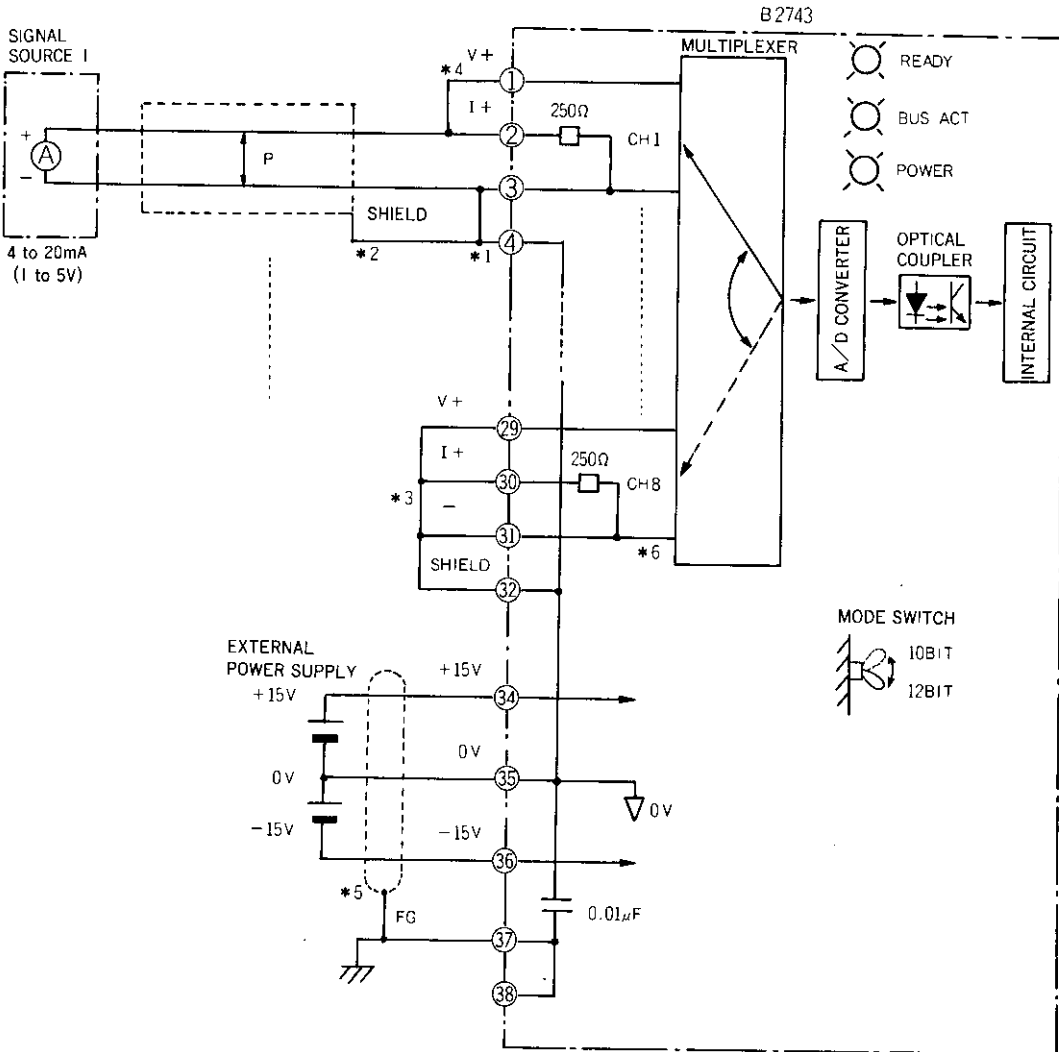

Fig. 9 B2743 Block Diagram

*1　Be sure to connect either one of signal line to SHIELD terminal.

*2　Use 2-core twisted shielded cable and connect the cable shielding to the SHIELD terminal.　If noise level is high, it is recommended to connect the cable shielding to external grounding, together with FG terminal.

*3　An unused circuit should have its input terminals shorted and connected to the SHIELD terminal.

*4　For current input, shortcircuit across V+ terminal and I+ terminal.
　　For voltage input, open I+ terminal.

*5　As power line between external power supply (±15V) and module, use twisted cables larger than 1.25mm². The wiring distance should be as short as possible.　Do not run the power line and other control lines in the same duct.　It is recommended that a shielded cable be used for easy connection.

*6　Not isolated between input signals.

Note :　For signal line protection, take corrective action so as to interrupt noise or surge influence.
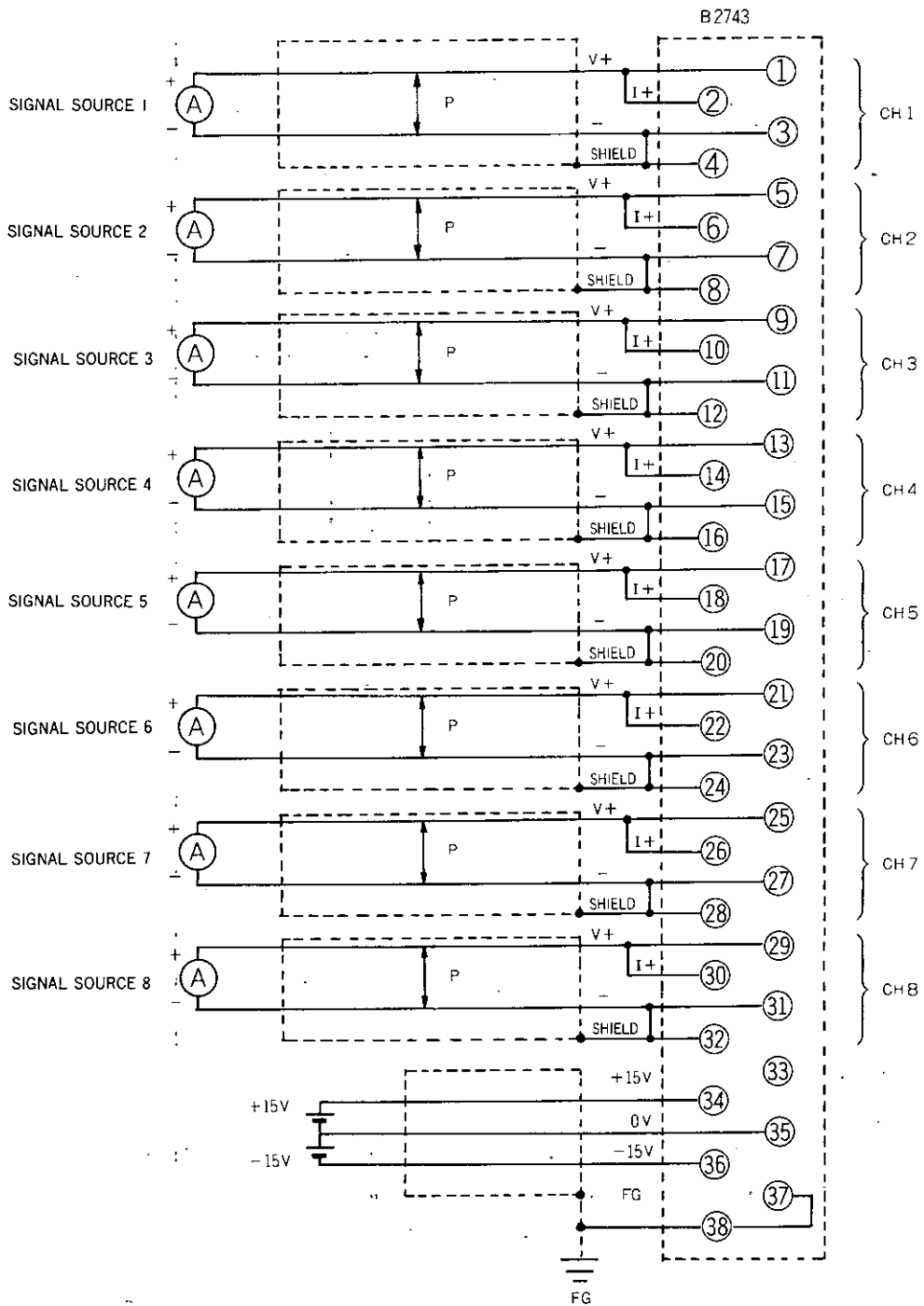
Fig. 10 B2743 Connection

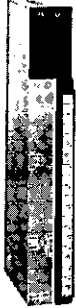## 3.5 TROUBLESHOOTING OF B27□3

Table 8 B27□3 Troubleshooting

Items	Symptoms	Likely Causes	Corrective Action
1	"READY" LED is not ON.	Internal power loss	Check the power supply module.
		Malfunction of the module	Replace the module.
2	"READY" LED is ON but "BUS ACT" LED is OFF.	No service from CPU	· Check I/O allocation table. · Check CPU, I/OP and base.
3	"POWER" LED is OFF.	No external ±15V power supply	Check external power supply.
4	Input register accepts only "0".	Incorrect I/O allocation	Check I/O allocation table.
		Same as items 1 and 3	Same as items 1 and 3
5	Values of input register vary widely.	Input signal itself is varying widely, or interfered with by noise.	· Check signal source. · Check wiring route and cables.
		±15V external power supply is not up to specs, or interfered with by ripple current or noise.	· Check external power supply. · If ripples are small enough insert capacitors of multiples of ten μF or higher between ±15V and 0V.
6	"READY" LED is ON, but "BUS ACT" LED blinks.	Normal	Continue to operate (every time CPU service is received it blinks.)
7	Signals in 4 to 20mA are not correctly converted.	V+ terminal and I+ terminal are not interconnected.	Connect V+ and I+ terminals.
8	Input register values are not correct in relation to analog input values.	Incorrect type module is used.	Use a correct module.
		Mode switch setting is wrong.	Check mode switch setting and turn the internal power on and then off again.

3.6 DIMENSIONS in mm (inches) AND FRONT VIEWS

Fig. 11 Analog Input Module

Fig. 12 Front Views of Analog Input Modules

4. ANALOG OUTPUT MODULES (JAMSC-B27☐2)

4.1 SPECIFICATIONS

Table 9 Analog Output Module Specifications

Items		Specifications
Type JAMSC- (Output Range)		· B2702 (0 to +10V) · B2732 (−10 to +10V) · B2712 (0 to +5V) · B2742 (4 to 20mA) · B2722 (−5 to +5V)
No. of Circuits (I/O Allocation)		2 per module (2 registers max in binary)
Indicators		· "READY" : Lit in normal module. · "BUS ACT" : Lit or blinking while communicating with CPU.
Mode Switches		10-BIT−SIGN−12-BIT. (SIGN for only B2733 and B2732) (GL20) (GL60S)(GL60S)
External Power Supply		Not required.
Fuse		Not provided
Electrical Characteristics	Output Characteristics	See Tables 10 to 14.
	Max Resolution (at 12 BIT mode)	· B2702 : 2.5mV (10V/4000) · B2732 : 5mV (20V/4000) · B2712 : 1.25mV (5V/4000) · B2742 : 4μA (16mA/4000) · B2722 : 2.5mV (10V/4000)
	Accuracy	Less than 0.2% of full scale
	External Load Resistance	2KΩ or more (B2702 to B2732) 200 to 600Ω (B2742)
	Sampling Cycle	Every scan of CPU
	Conversion Speed	500μs or less (B2702 to B2732) 5ms or less (B2742)
	Isolation	The following isolated with pulse transformer : · Every circuit · Between external and internal circuits
	Isolation Voltage	500VDC for one minute
	Internal Consumed Current	0.5A$_{TYP}$ (B2702 to B2732) 0.6A$_{TYP}$ (B2742)

Table 10 Output Characteristic List of B2702

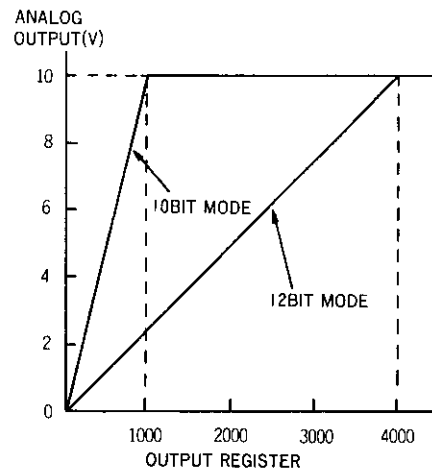| Output Register Value	Analog Output	
	12 BIT Mode (GL60S)	10 BIT Mode (GL20)
0000	0.000V	0.000V
0500	1.250V	5.000V
1000	2.500V	10.00V
2000	5.000V	10.00V
4000	10.00V	10.00V

ANALOG
OUTPUT(V)

Fig. 13 B2702 Output Characteristics

Table 11 Output Characteristic List of B2712 (0 to +5V)

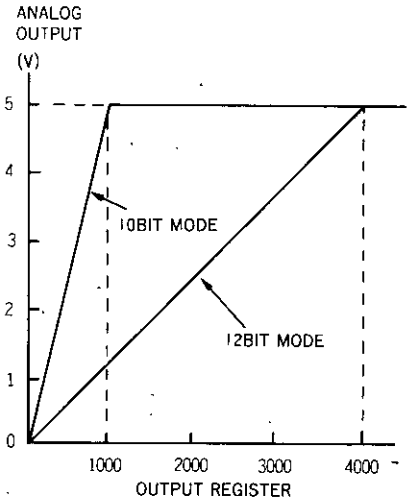| Output Register Value	Analog Output	
	12 BIT Mode (GL60S)	10 BIT Mode (GL20)
0000	0.000V	0.000V
0500	0.650V	2.500V
1000	1.250V	5.000V
2000	2.500V	5.000V
4000	5.000V	5.000V

Fig. 14 B2712 Output Characteristics

Table 12 Output Characteristic List of B2722 (−5V to +5V)

Output Register Value	Analog Output		
	12BIT Mode (GL60S)	SIGN Mode (GL60S)	10BIT Mode (GL20)
0000	−5.000V	0.000V	−5.000V
0500	−3.750V	+1.250V	0.000V
1000	−2.500V	+2.500V	+5.000V
2000	0.000V	+5.000V	+5.000V
4000	+5.000V	+5.000V	+5.000V
−1000* (83E8 Hex.)	+5.000V	−2.500V	+5.000V
−2000* (87D0 Hex.)	+5.000V	−5.000V	+5.000V

*Sign "−" shows MSB bit "1" in output register contents.
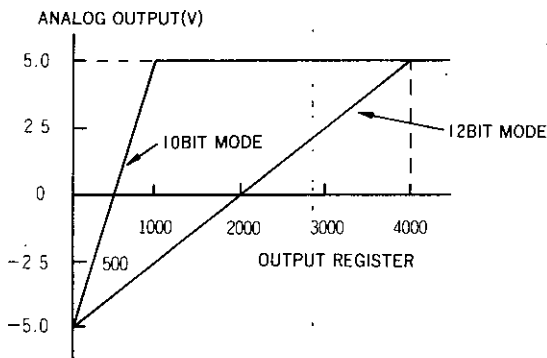

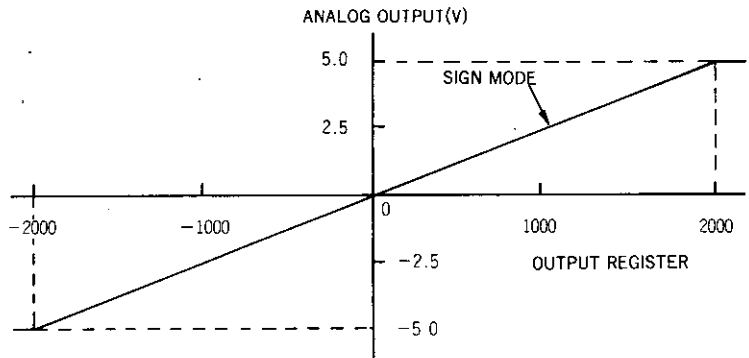Fig. 15 B2722 Output Characteristics
(for 12 BIT and 10 BIT Modes)
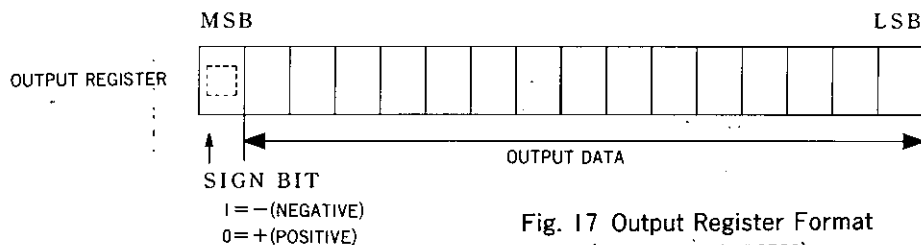

Fig. 16 B2722 Output Characteristics
(for SIGN Mode)

MSB   LSB

OUTPUT REGISTER

SIGN BIT
1 = − (NEGATIVE)
0 = + (POSITIVE)

OUTPUT DATA

Fig. 17 Output Register Format
(B2702, B2712, B2722)

Table 13 Output Characteristic List of B2732 (−10V to +10V)

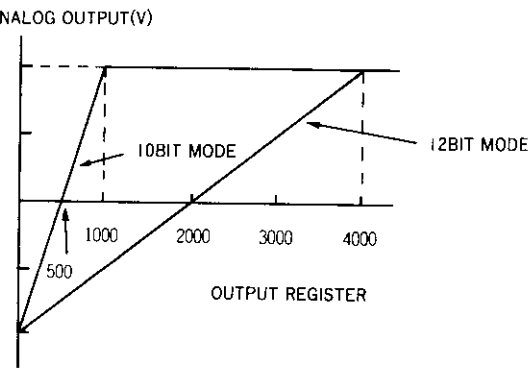| Output Register Value	Analog Output		
	12BIT Mode (GL60S)	SIGN Mode (GL60S)	10BIT Mode (GL20)
0000	−10.00V	0.000V	−10.00V
0500	− 7.500V	+ 2.500V	0.000V
1000	− 5.000V	+ 5.000V	+10.00V
2000	0.000V	+10.00V	+10.00V
4000	+10.00V	+10.00V	+10.00V
−1000* (83E8 Hex.)	+10.00V	− 5.000V	+10.00V
−2000* (87D0 Hex.)	+10.00V	−10.00V	+10.00V

*Sign "−" shows MSB bit "1" in output register contents.

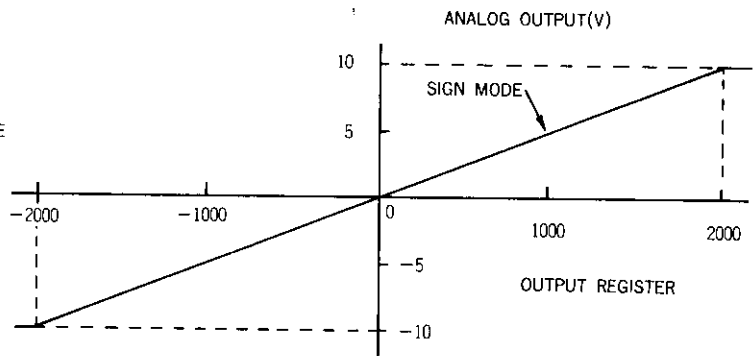Fig. 18 B2732 Output Characteristics
(for 12 BIT and 10 BIT Modes)
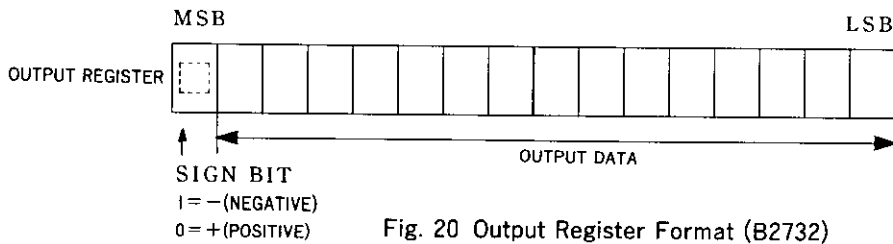

Fig. 19 B2732 Output Characteristics
(for SIGN Mode)

SIGN BIT
1 = −(NEGATIVE)
0 = +(POSITIVE)

Fig. 20 Output Register Format (B2732)

Table 14 Output Characteristic List of B2743 (4 to 20mA)

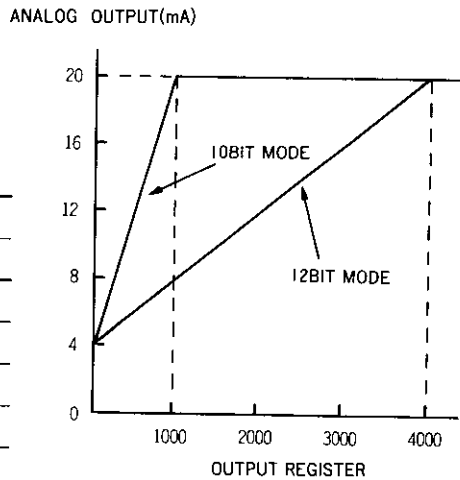| Output Register Value	Analog Output	
	12 BIT Mode (GL60S)	10 BIT Mode (GL20)
0000	4.00mA	4.00mA
0500	6.00mA	12.00mA
1000	8.00mA	20.00mA
2000	12.00mA	20.00mA
4000	20.00mA	20.00mA

Fig. 21 B2743 Output Characteristics

− 17 −

4.2 FUNCTION

Conforming to the characteristics shown Tables 10 to 14 and Figs. 13 to 21, B27_2 converts the contents of 2 output registers in the processor to analog signals (voltage/current signals). The number of the output register being connected to the B27 2 is determined by the I/O allocation table.

4.3 USAGE

· B27 2 can be installed in one slot space on 2000 series I/O mounting base.

· For B27 2 I/O allocation, binary should be used.   Up to 2 is available for setting. (GL60S I/O allocated only in binary.)

· B27_2 does not require external power supply.

· The first circuit and the second circuit are isolated inside the module.

· Ambient temperature changes should be kept to a minimum, especially for work where high accuracy is required.

· If service from CPU to B27_2 is stopped midway by CPU stop, etc., B27 2 continues to output finally-served D/A values.   Because, B27 2 renews D/A output value every service from CPU.

NOTE

B2742 (4 to 20mA output) must be utilized at less than 50°C ambient temperature under the following conditions :

· Total output current
  in two circuits :   25mA or more continuous flow.
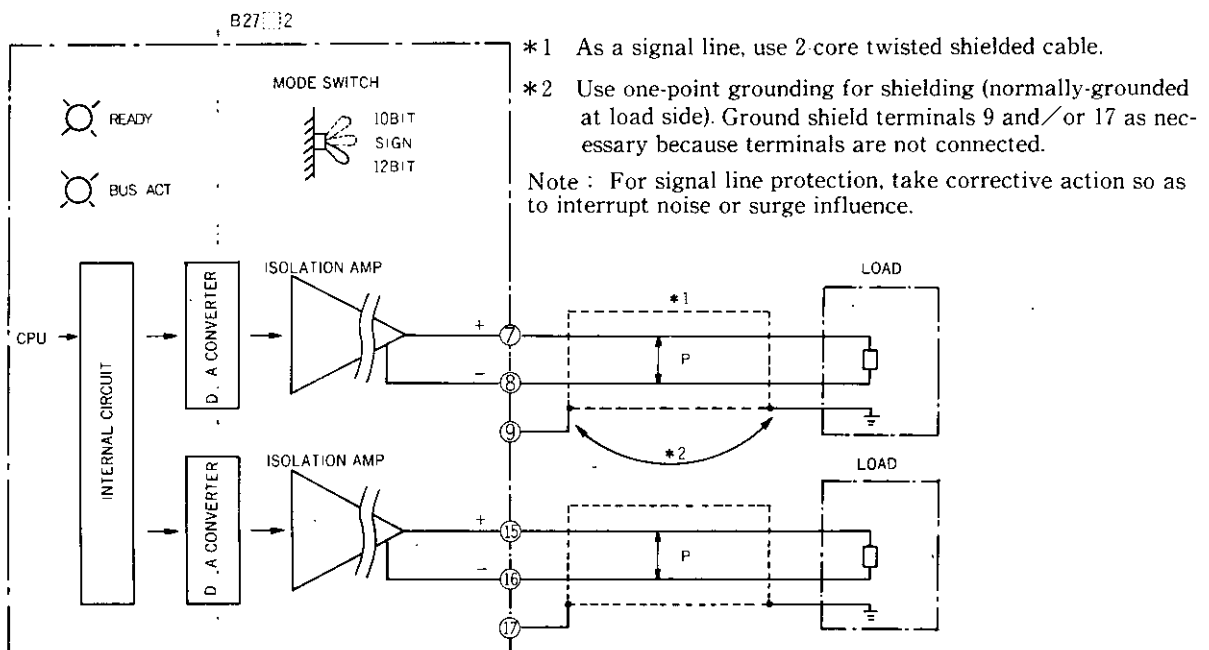
4.4 CONNECTIONS

*1   As a signal line, use 2-core twisted shielded cable.

*2   Use one-point grounding for shielding (normally-grounded at load side). Ground shield terminals 9 and/or 17 as necessary because terminals are not connected.

Note : For signal line protection, take corrective action so as to interrupt noise or surge influence.

Fig. 22 B27 2 Block Diagram

4.5 TROUBLESHOOTING OF B27 2

Table 15 B27 2 Troubleshooting

Items	Symptoms	Likely Causes	Corrective Action
1	"READY" LED is out.	Internal power loss	Check the power supply module.
		Malfunction of the module	Replace the module.
2	"READY" LED is ON but "BUS ACT" LED is OFF.	No service from CPU	Check I/O allocation table.
3	Analog output values remain minimum.	Incorrect I/O allocation	Check I/O allocation table.
		Same as item 1	Same as item 1
		Load is out of specs.	Check load impedance.
4	Analog output values do not match calculations.	Appropriate module is not used.	Use a correct module.
		Output register value is wrong.	Check ladders.
		Load is out of specs.	Check load impedance.
		Mode switch setting is wrong.	Check mode switch setting and turn the internal power on and then off again.
5	Analog output values vary widely.	Output register value is changed in ladders.	Check ladders.
		Output signal cable is interfered with by noise.	Check wiring route and cables.
		Malfunctions of the module	Replace the module.
6	"READY" LED is ON, but "BUS ACT" LED blinks.	Normal	Continue to operate (every time CPU service is received it blinks.)
7	Analog output values do not become maximum.	Load is out of specs.	Check load impedance.

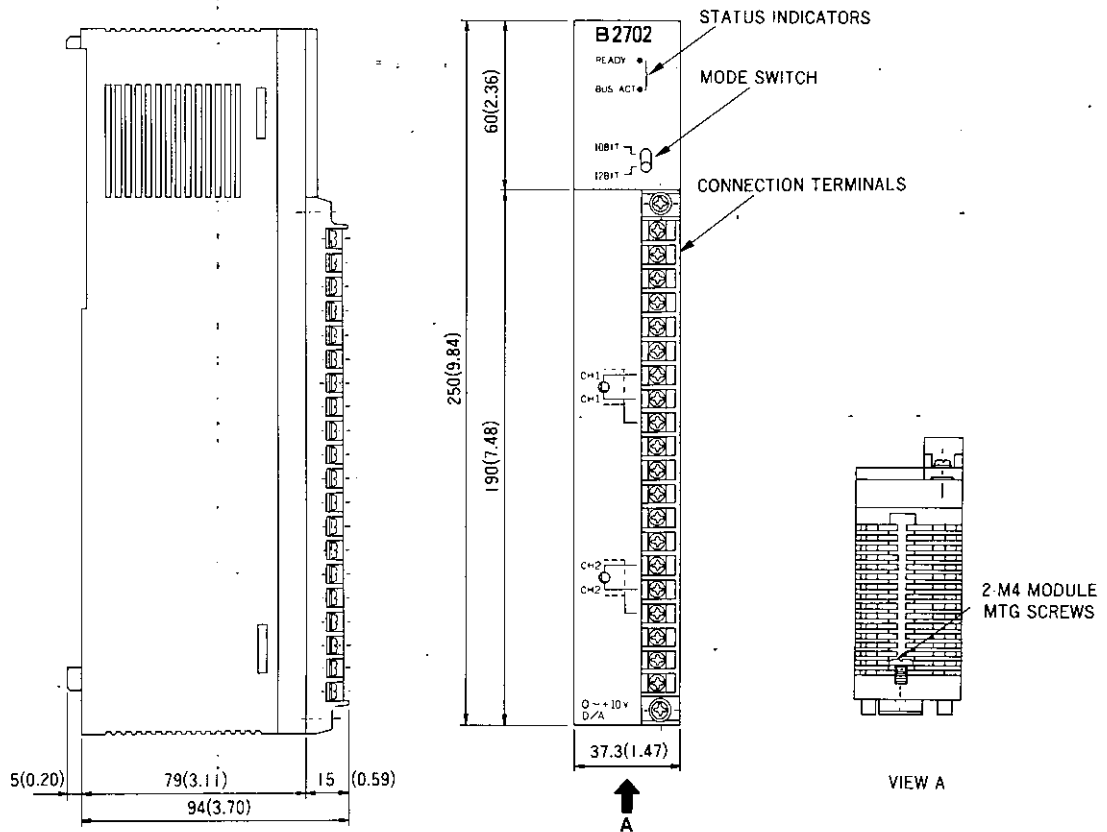## 4.6 DIMENSIONS in mm (inches) AND FRONT VIEWS

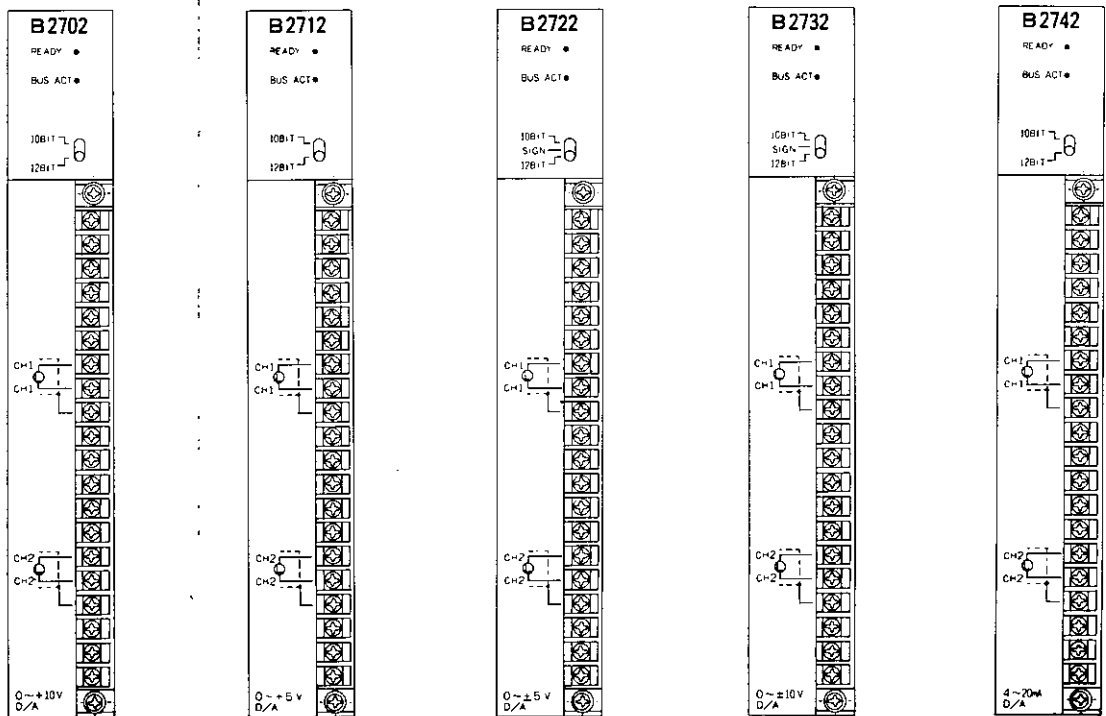Fig. 23 Analog Input Module

Fig. 24 Front Views of Analog Output Modules

MEMOCON-SC 2000 SERIES I/O
ANALOG MODULES
DESCRIPTIVE INFORMATIO

IRUMA BUSINESS CENTER
480, Kamifujisawa, Iruma, Saitama 358-8555, Japan
Phone 81-42-962-5696 Fax 81-42-962-6138

YASKAWA ELECTRIC AMERICA, INC.
2121 Norman Drive South, Waukegan, IL 60085, U S A.
Phone 1-847-887-7000 Fax 1-847-887-7370

MOTOMAN INC. HEADQUARTERS
805 Liberty Lane West Carrollton, OH 45449, U S.A.
Phone 1-937-847-6200 Fax 1-937-847-6277

YASKAWA ELÉTRICO DO BRASIL COMÉRCIO LTD.A.
Avenida Fagundes Filho, 620 Bairro Saude-Sao Paulo-SP, Brazil CEP: 04304-000
Phone 55-11-5071-2552 Fax 55-11-5581-8795

YASKAWA ELECTRIC EUROPE GmbH
Am Kronberger Hang 2, 65824 Schwalbach, Germany
Phone 49-6196-569-300   Fax 49-6196-569-398

Motoman Robotics Europe AB
Box 504 S38525 Torsås, Sweden
Phone 46-486-48800 Fax 46-486-41410

Motoman Robotec GmbH
Kammerfeldstraße 1, 85391 Allershausen, Germany
Phone 49-8166-90-100   Fax 49-8166-90-103

YASKAWA ELECTRIC UK LTD.
1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, United Kingdom
Phone 44-1236-735000 Fax 44-1236-458182

YASKAWA ELECTRIC KOREA CORPORATION
Kfpa Bldg #1201, 35-4 Youido-dong. Yeongdungpo-Ku, Seoul 150-010, Korea
Phone 82-2-784-7844 Fax 82-2-784-8495

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.
151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, Singapore
Phone 65-6282-3003 Fax 65-6289-3003

YASKAWA ELECTRIC (SHANGHAI) CO., LTD.
No.18 Xizang Zhong Road. Room 1805, Harbour Ring Plaza Shanghai 20000, China
Phone 86-21-5385-2200 Fax 86-21-5385-3299

YATEC ENGINEERING CORPORATION
4F., No 49 Wu Kong 6 Rd, Wu-Ku Industrial Park, Taipei, Taiwan
Phone 886-2-2298-3676 Fax 886-2-2298-3677

YASKAWA ELECTRIC (HK) COMPANY LIMITED
Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong
Phone 852-2803-2385 Fax 852-2547-5773

BEIJING OFFICE
Room No. 301 Office Building of Beijing International Club, 21
Jianguomenwai Avenue, Beijing 100020, China
Phone 86-10-6532-1850 Fax 86-10-6532-1851

TAIPEI OFFICE
9F, 16, Nanking E. Rd., Sec. 3, Taipei. Taiwan
Phone 886-2-2502-5003 Fax 886-2-2505-1280

SHANGHAI YASKAWA-TONGJI M & E CO., LTD.
27 Hui He Road Shanghai China 200437
Phone 86-21-6553-6060 Fax 86-21-5588-1190

BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD.
30 Xue Yuan Road, Haidian, Beijing P.R. China Post Code: 100083
Phone 86-10-6233-2782 Fax 86-10-6232-1536

SHOUGANG MOTOMAN ROBOT CO., LTD.
7, Yongchang-North Street, Beijing Economic Technological Investment & Development Area,
Beijing 100076, P.R. China
Phone 86-10-6788-0551 Fax 86-10-6788-2878

YASKAWA ELECTRIC CORPORATION

YASKAWA