Toshiba Vf5x - 4526A optional manual

12-BIT BINARY OPTION MANUAL

VF5X-4526A (Internal)

TOSVERT VF-A5

HIGH PERFORMANCE INVERTER SERIES

NOTICE

1. Please make sure this Instruction Manual is delivered to the end user of the inverter unit.
2. Be sure to read this manual before installing or operating the inverter unit. After reading the manual, store it in a safe place for reference.

TOSHIBA CORPORATION

1997

Preface

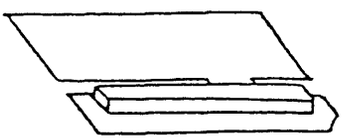
Thank you for purchasing the " 12-bit binary option kit" for the TOSHIBA TOSVERT VF-A5 High-performance Inverter.

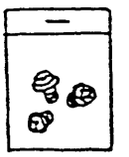
To ensure that this product is used to its maximum potential, please read this manual thoroughly before use, and store it in a safe place near the unit so it can be referred to during future maintenance and inspections.

Accessories

After opening the package, check to make sure the following items are present. If any are missing, please contact the source from which you ordered the product.

(1)	12-bit binary option board (VF5X-4526)	1
(2)	Screws (3 × 6)	1
	(3 × 8)	2
(3)	Wires (red 130mm)	1
	(black 160mm)	1
(4)	ROM board with cover (M6584536G901)	1
(5)	Instruction manual (this manual)	1


12-bit binary option board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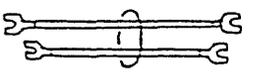
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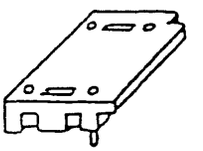
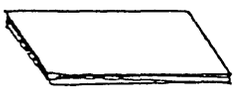

ROM board with cover


Instruction manual

Safety Precautions

To prevent electric shock, ALWAYS observe the following precautions:

1. Do not touch the charging sections on the terminal block, etc. while the CHARGE lamp is lit. As the electrolytic capacitor inside the unit will retain a charge, touching these sections may result in electric shock. Before connecting the wires to the motor terminals, turn off the input power to the inverter, and do not proceed unless the CHARGE lamp is unlit.
2. Do not touch or insert a rod, etc. into the inverter while the power is being supplied. This may result in electric shock or damage to the equipment.

   When the board is being operated with the cover removed, the charging sections will be exposed. In such cases, be sure to mount the board inside the panel to prevent these points from being touched from the outside.
3. Be sure to ground the G/E terminal on the unit. Also ground the motor. (Failure to do this may result in electric shock due to current leakage.)
4. NEVER attempt to modify the unit.

Table of Contents

1 Option Board Layout

Figure 1-1 shows the appearance of the 12-bit binary option board layout and the names of the parts on the board.

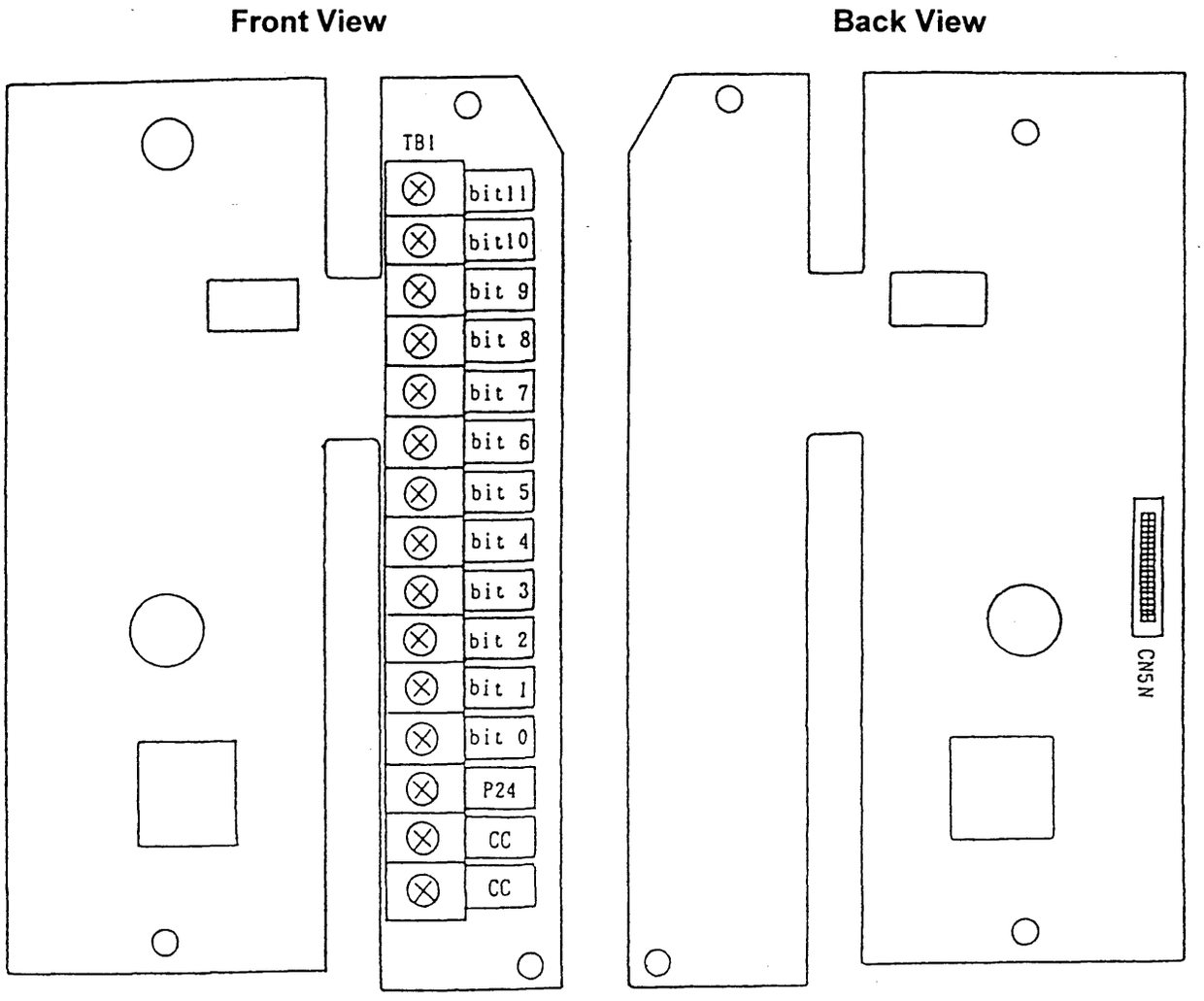


Figure 1-1 VF5X-4526 12-bit Binary Option Board

2 Installation

The 12-bit binary option board is installed onto the control board in the VF-A5 unit. Use the following procedure for installation.

(1) Check to make sure the input power is off (with the switch on the distribution panel set to the OFF position).

(2) Remove the inverter cover.

(3) After the CHARGE lamp on the inverter goes out, wait at least five minutes, then install the board using the following procedure.

(4) Remove the ROM interface window and the control panel. For directions on how to remove these parts, see the VF-A5 Instruction Manual.

(5) Using the following procedure, install the ROM board with cover ① that came with the unit (see Figure 2-1).

1. Remove ROM cover ②. Pull the tab forward to remove the cover.
2. Check to make sure that ROM board connector ③ is attached at the location from which the ROM cover was removed.

   Note: If there is an IC fastened here instead of a connector, the ROM board with cover is incompatible. Contact one of the Toshiba branches, sales offices or dealers listed on the back cover. Also note that it is not necessary to install the accompanying ROM board with cover on inverters with CPU versions 120 or later; do not install the board on these models. The CPU version can be checked with [uCPU] accessed under [Gr.UE]. For example, if the CPU version is 120, " 120" will be displayed for [uCPU].
3. Insert the ROM board with cover into the ROM board connector until it clicks into place.

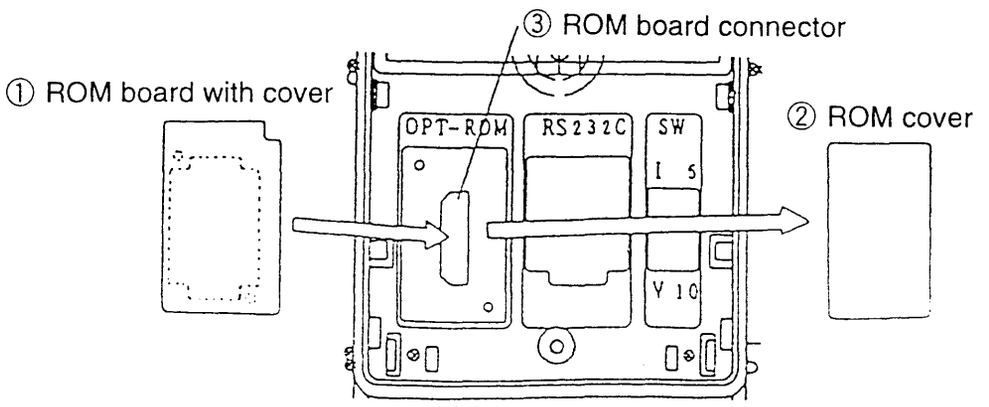


Figure 2-1 Reference Diagram for ROM Board Installation

If [Err4] appears on the display during operation, it may be because the ROM board with cover has not been inserted properly. Turn off the input power and insert the ROM board properly.

(6) Use the following procedure to install the 12-bit binary option board (see Figure 2-2).

1. There are three large holes on the 12-bit binary option board. Insert the board so these holes accommodate control panel connector ④ and RS-232C communications connector ⑤ on the control panel, and control panel fastening stud ⑥ on the support.
2. Insert connector CN5N on the bottom of the 12-bit binary option board into connector CN5 ⑦ on the control board.

(7) Fasten the 12-bit binary option board to the support using the accompanying screws (one 3 × 6 and two 3 × 8) to the three small holes (⑧, ⑨ and ⑩) on the 12-bit binary option board (see Figure 2-2).

Screw hole ⑧.....3 × 6 screw

Screw holes ⑨ ⑩.....3 × 8 screws

(8) Using the accompanying wires, connect the control terminals P24 and CC on the inverter control terminal block board to terminals P24 and CC on the 12-bit binary option board (see Figure 2-2).

Red wire · ⑪.....P24 - P24

Black wire ⑫.....CC - CC

(9) Fasten the ROM interface window and control panel in place. For directions, see the VF-A5 Instruction Manual.

(10) There is a window on the right side of the inverter cover. Break this section to create the wire window and, after connecting the wires, attach the inverter cover.

Note: If there are burrs on the cut ends, remove these burrs before connecting the wires. The wires may be damaged if this is not done.

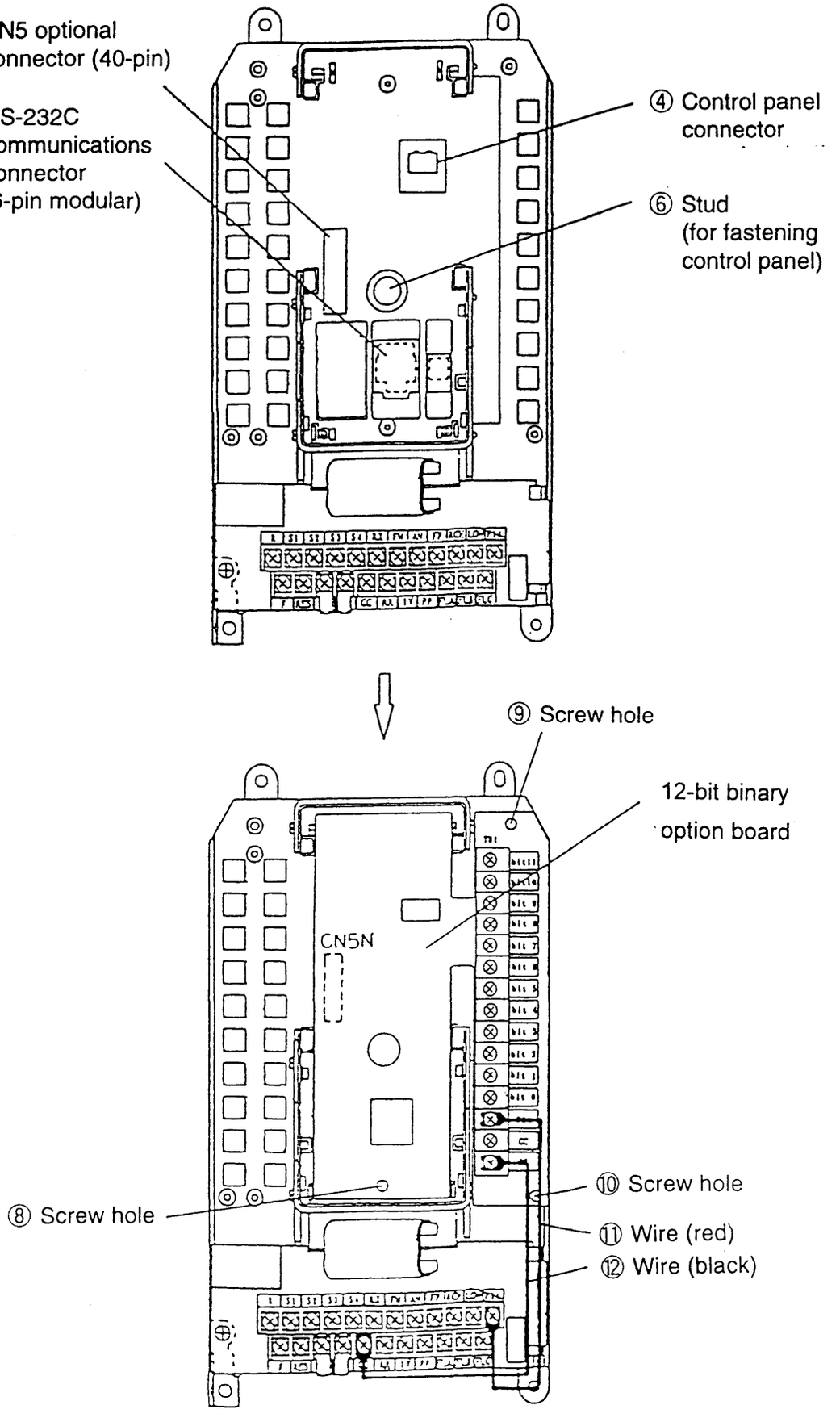


Figure 2-2 Reference Diagram for 12-bit Binary Option Board Installation

3 Functions

3-1 12-bit Binary Input or 3-digit BCD Input

It is possible to set the inverter operating frequency using the external contact signal from a programmable controller or a relay sequence. The operating frequency can be set with a maximum resolution of 1/4095 (for 12-bit binary input) or 1/999 (for 3-digit BCD input).

Using a read timing terminal enables the operating frequencies for two or more inverters to be set in sequence using a single bit setting circuit.

3-1-1 Specifications

Item	Specification
Applicable Model	VF-A5
Input Specifications	12-bit binary input or 3-digit BCD input

3-1-2 Connection

(1) Connect the 12-bit binary input or 3-digit BCD input line between terminal bit 0 - bit 11 and CC on the binary option board (see Figure 3-1-1).

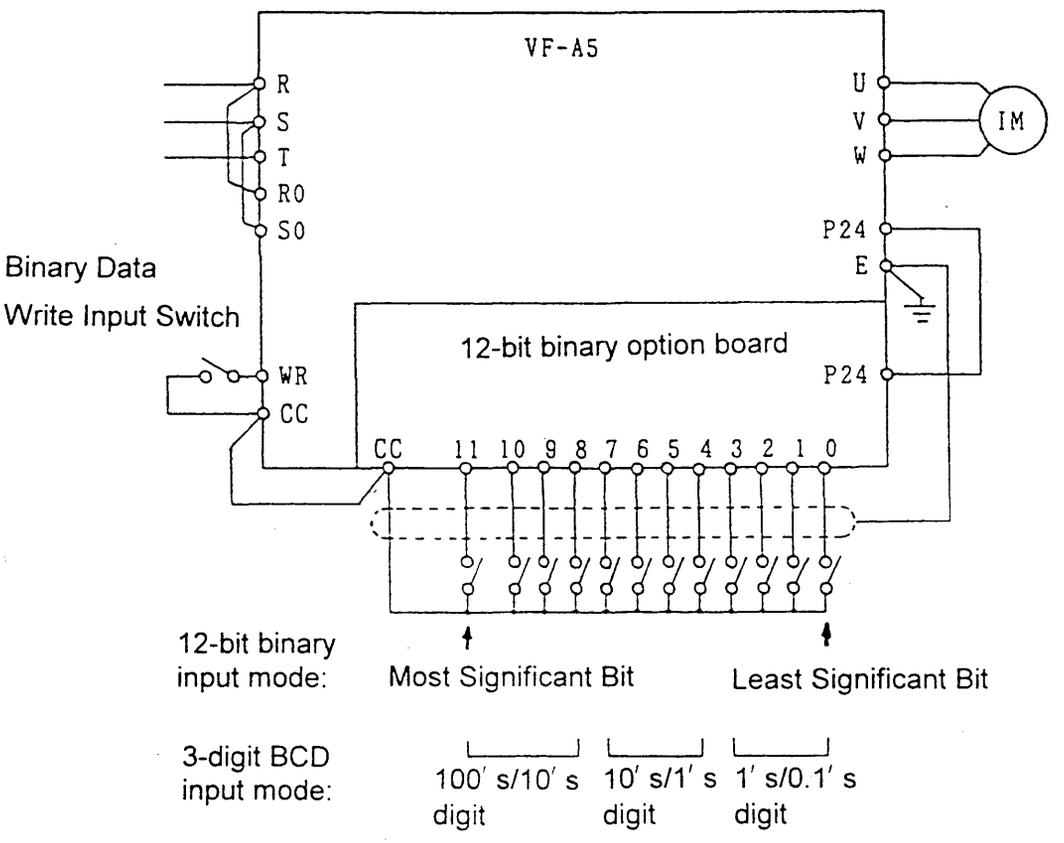


Figure 3-1-1 Connection Diagram

(2) A write input switch may also be used.

Connection Method

- Use a shielded wire for the signal wire.
- NEVER bind the signal and main circuit lines together.
- Use of a wire of diameter 0.75mm^2 is recommended.

3-1-3 Input Method

(1) Use the contact signal to set the inverter operating frequency.

(2) Figure 3-1-1 shows the bits and the number of digits for 12-bit binary input and 3-digit BCD input.

(3) The contact is on when the bit is set to 1 and off when the bit is set to 0.

(4) Figure 3-1-2 shows an example of contact input for 12-bit binary input.

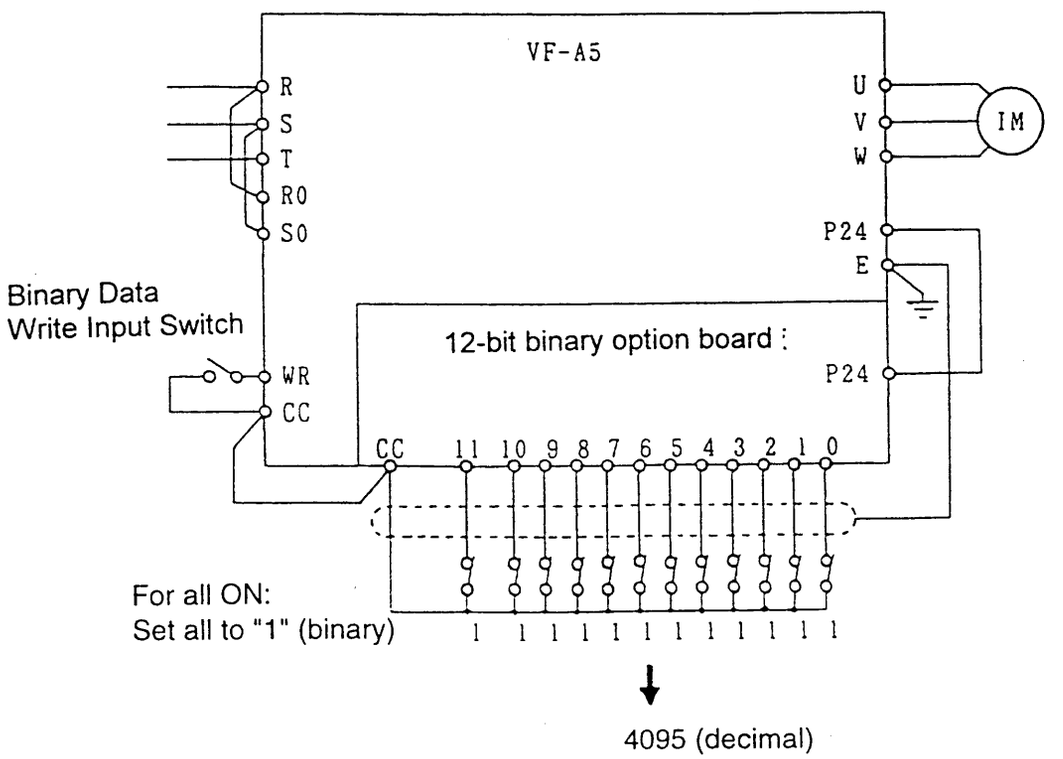


Figure 3-1-2 Sample Contact Input for 12-bit Binary Input

(5) Figure 3-1-3 shows an example of contact input for 3-digit BCD input.

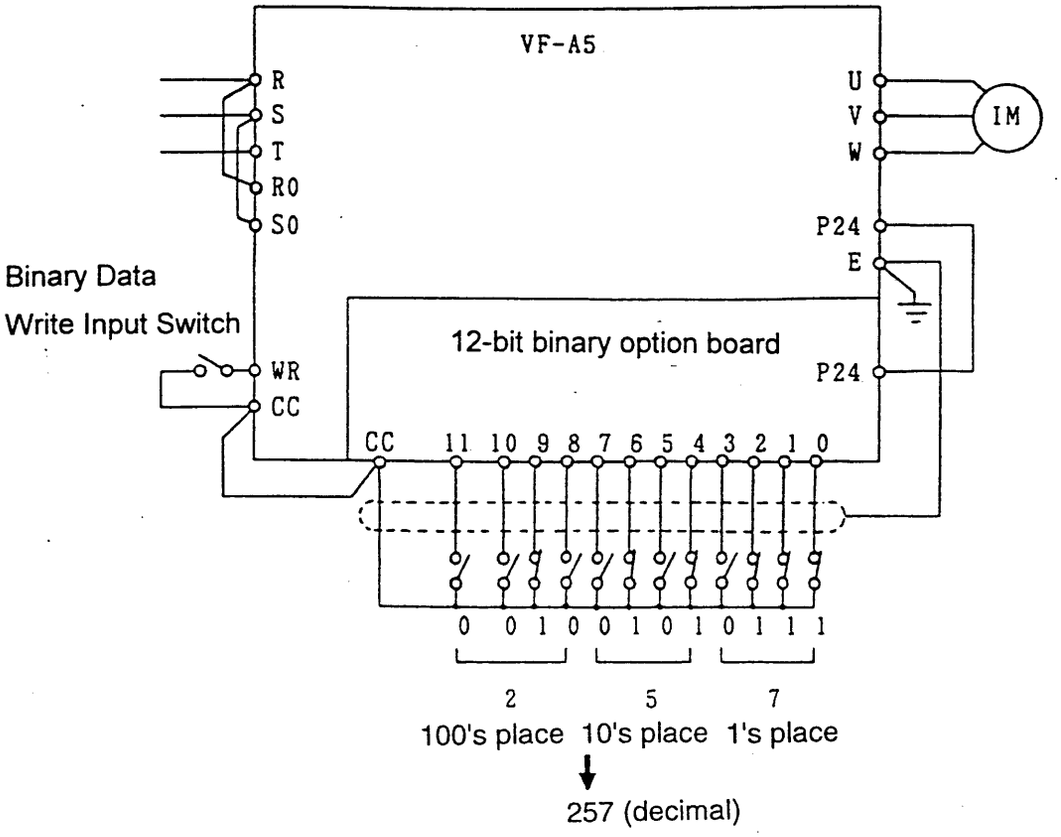


Figure 3-1-3 Sample Contact Input for 3-digit BCD Input

(6) Figure 3-1-4 shows a diagram of binary data write input timing.

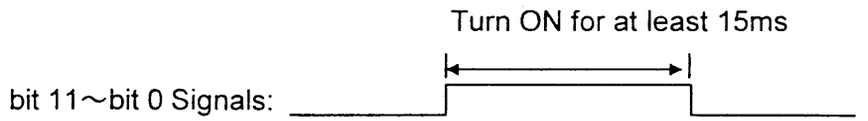


Figure 3-1-4 Write Input Timing (when a binary data write input switch is notused)

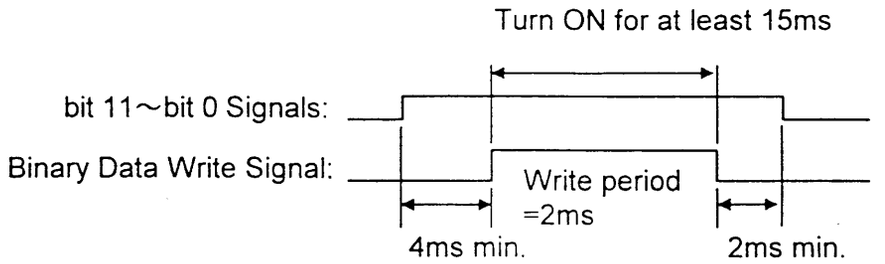


Figure 3-1-5 Write Input Timing (when a binary data write input switch is used)

Note: The minimum hold time needed for reading is approximately 15ms when [1tF] (input terminal response time selection) under [Gr.5t] is set to [1].

The minimum hold time for reading is proportional to the input response time selection ([1tF] under [Gr.5t]).

(7) Sample Connection (when a binary data write input switch is used)

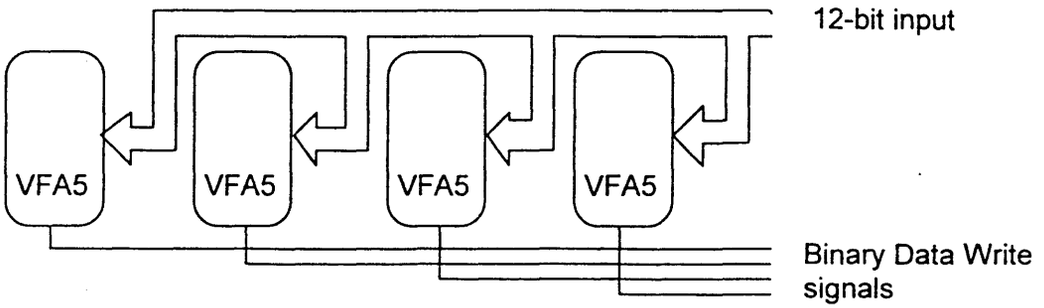


Figure 3-1-6 When Performing 12-bit Input for Multiple Inverters (setting different frequencies for two or more inverters)

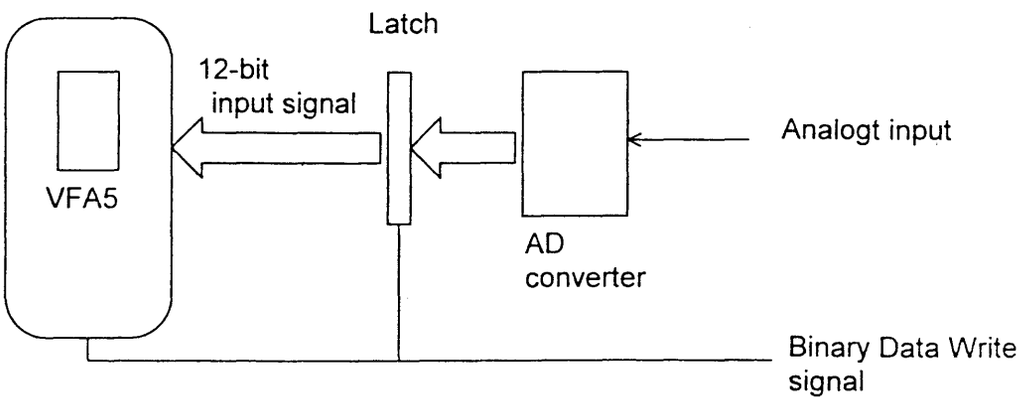


Figure 3-1-7 Using an AD Converter for 12-bit Input

Note: When there are frequent fluctuations in the digital output from an AD converter or the like, connect a latch circuit and use a binary data write input switch to secure the minimum hold time for reading.

3-1-4 Adjustment

When using the 12-bit binary option board (VF5X-4526), be sure to set the following parameter value:

[FNOd] under [Gr.UE] (select frequency setting mode) =[3]

(1) Adjusting the 12-bit binary input

- Setting the inverter's frequency command with a maximum output frequency of 4095

1. The VF-A5 uses a blind function to conceal the parameters, so it is necessary to cancel the blind function for the parameter groups that are needed. For directions on canceling the blind function, see "Selecting Blind Cancel" on page 14.

   Necessary parameter groups [Gr.SE]

   [Gr.tr]

2. When a binary data write input switch is not used, set [IE] (input terminal selection) under [Gr.SE] to [0] (standard terminal function).

   When a binary data write input switch is being used, set [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting).

   Setting [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting) enables the △ and ▽ keys on the panel to be used to read out parameters [IE 0] (input terminal 0 (R) function selection) through [IE 11] (input terminal 11 virtual terminal function).

   Parameters [IE 0] (input terminal 0 (R) function) through [IE 11] (input terminal 11 virtual terminal function) correspond to the inverter terminals as described below:

Inverter standard terminal name	LED display code	Function and default setting	
R	[IE 0]	[0]	(Reverse operation)
S1	[IE 1]	[1]	(SS1:15-step multispeed operation)
S2	[IE 2]	[2]	(SS2:15-step multispeed operation)
S3	[IE 3]	[3]	(SS3:15-step multispeed operation)
S4	[IE 4]	[4]	(SS4:15-step multispeed operation)
F	[IE 5]	[5]	(Forward operation)
RES	[IE 6]	[6]	(Failure reset)
ST	[IE 7]	[7]	(Gate ON/OFF)
S5	[IE 8]	[8]	(Change JOG)
S6	[IE 9]	[9]	(Change AD2)
S7	[IE 10]	[10]	(Emergency stop)

Virtual terminal (normally closed) [IE 11] [33] (Uncontrolled)

Unused terminals from [IE 10] to [IE 11] are set to [42] (write binary data).

3. Set [OPE] (select optional board) under [Gr.Er] to [4] (12-bit binary input).
4. The inverter's frequency command can now be set according to the following equation:

$$\text{Frequency Command} = \frac{\text{12-bit binary data}}{4095} \times \text{maximum output frequency(Hz)}$$

- Setting operation to match actual inverter's frequency command
  1. The VF-A5 uses a blind function to conceal the parameters, so it is necessary to cancel the blind function for the parameter groups that are needed. For directions on canceling the blind function, see the VF-A5 Instruction Manual.

     Necessary parameter groups [Gr.SE]
     [Gr.Er]
  2. When a binary data write input switch is not used, set [IE] (input terminal selection) under [Gr.SE] to[0] (standard terminal function).

     When a binary data write input switch is being used, set [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting).

     Setting [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting) enables the △ and ▽ keys on the panel to be used to read out parameters [IE 0] (input terminal 0 (R) function selection) through [IE 11] (input terminal 11 virtual terminal function).

     Parameters [IE 0] (input terminal 0 (R) function) through [IE 11] (input terminal 11 virtual terminal function) correspond to the inverter terminals as described below:

Inverter standard terminal name	LED display code	Function and default setting
R	[IE 0]	[0] (Reverse operation)
S1	[IE 1]	[1] (SS1:15-step multispeed operation)
S2	[IE 2]	[2] (SS2:15-step multispeed operation)
S3	[IE 3]	[3] (SS3:15-step multispeed operation)
S4	[IE 4]	[4] (SS4:15-step multispeed operation)
F	[IE 5]	[5] (Forward operation)
RES	[IE 6]	[6] (Failure reset)
ST	[IE 7]	[7] (Gate ON/OFF)
S5	[IE 8]	[8] (Change JOG)

S6	[IE 9]	[9]	(Change AD2)
S7	[IE 10]	[10]	(Emergency stop)
Virtual terminal (normally closed)	[IE 11]	[33]	(Uncontrolled)

Unused terminals from [IE 0] to [IE 11] are set to [42] (write binary data).

3. When [Er. In] (bias and gain settings for 12-bit binary input) under [Gr.Er] is set to [1] (YES), the parameters that determine the input points will appear.

   Set [PL] (point 1 setting signal) to[0]

   Set [F-PL] (point 2 frequency) to [0.0]

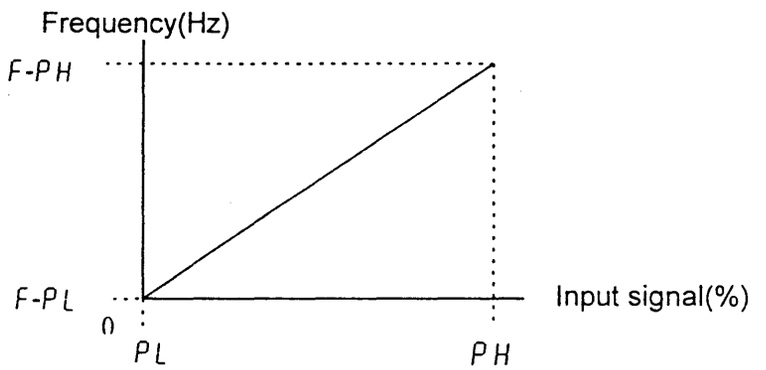
   Set [PH] (point 2 setting signal) to [50]

   Set [F-PH] (point 1 frequency) to [204.8]

   Note: The maximum frequency for [F-PH] should be set to the same value as [FH] (maximum frequency) under [Gr.F].

4. The inverter's frequency command can now be set according to the following equation:

Frequency Command = 12-bit binary data × 0.1 (Hz)



(2) Adjusting the 3-digit BCD input

- Using the BCD code to set the frequency in 0.1Hz increments

1. The VF-A5 uses a blind function to conceal the parameters, so it is necessary to cancel the blind function for the parameter groups that are needed. For directions on canceling the blind function, see the VF-A5 Instruction Manual.

   Necessary parameter groups [Gr.5E]
   [Gr.Er]

2. When a binary data write input switch is not used, set [IE] (input terminal selection) under [Gr.5E] to [0] (standard terminal function).

   When a binary data write input switch is being used, set [IE] (input terminal selection) under [Gr.5E] to [1] (individual setting).

Setting [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting) enables the △ and ▽ keys on the panel to be used to read out parameters [IE 0] (input terminal 0 (R) function selection) through [IE 11] (input terminal 11 virtual terminal function).

Parameters [IE 0] (input terminal 0 (R) function) through [IE 11] (input terminal 11 virtual terminal function) correspond to the inverter terminals as described below:

Inverter standard terminal name	LED display code	Function and default setting	
R	[IE 0]	[0]	(Reverse operation)
S1	[IE 1]	[1]	(SS1:15-step multispeed operation)
S2	[IE 2]	[2]	(SS2:15-step multispeed operation)
S3	[IE 3]	[3]	(SS3:15-step multispeed operation)
S4	[IE 4]	[4]	(SS4:15-step multispeed operation)
F	[IE 5]	[5]	(Forward operation)
RES	[IE 6]	[6]	(Failure reset)
ST	[IE 7]	[7]	(Gate ON/OFF)
S5	[IE 8]	[8]	(Change JOG)
S6	[IE 9]	[9]	(Change AD2)
S7	[IE 10]	[10]	(Emergency stop)
Virtual terminal (normally closed)	[IE 11]	[33]	(Uncontrolled)

Unused terminals from [IE 0] to [IE 11] are set to [42] (write binary data).

3) Set [OPE] (optional board selection) under [Gr.tr] to [5] (3-digit BCD input in 0.1Hz increments).

4) The inverter's frequency command can now be set according to the following equation:

Frequency Command = BCD data × 0.1 (Hz)

- Using the BCD code to set the frequency in 1Hz increments

1. The VF-A5 uses a blind function to conceal the parameters, so it is necessary to cancel the blind function for the parameter groups that are needed. For directions on canceling the blind function, see the VF-A5 Instruction Manual.

   Necessary parameter groups [Gr.SE]
   [Gr.tr]

2. When a binary data write input switch is not used, set [IE] (input terminal selection) under [Gr.SE] to [0] (standard terminal function).

When a binary data write input switch is being used, set [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting).

Setting [IE] (input terminal selection) under [Gr.SE] to [1] (individual setting) enables the △ and ▽ keys on the panel to be used to read out parameters [IE 0] (input terminal 0 (R) function selection) through [IE 11] (input terminal 11 virtual terminal function).

Parameters [IE 0] (input terminal 0 (R) function) through [IE 11] (input terminal 11 virtual terminal function) correspond to the inverter terminals as described below:

Inverter standard terminal name	LED display code	Function and default setting	
R	[IE 0]	[0]	(Reverse operation)
S1	[IE 1]	[1]	(SS1:15-step multispeed operation)
S2	[IE 2]	[2]	(SS2:15-step multispeed operation)
S3	[IE 3]	[3]	(SS3:15-step multispeed operation)
S4	[IE 4]	[4]	(SS4:15-step multispeed operation)
F	[IE 5]	[5]	(Forward operation)
RES	[IE 6]	[6]	(Failure reset)
ST	[IE 7]	[7]	(Gate ON/OFF)
S5	[IE 8]	[8]	(Change JOG)
S6	[IE 9]	[9]	(Change AD2)
S7	[IE 10]	[10]	(Emergency stop)
Virtual terminal (normally closed)	[IE 11]	[33]	(Uncontrolled)

Unused terminals from [IE 0] to [IE 11] are set to [42] (write binary data).

3. Set [OPE] (optional board selection) under [Gr.Er] to [6] (3-digit BCD input in 1Hz increments).
4. The inverter's frequency command can now be set according to the following equation:

Frequency Command = BCD data × 1 (Hz)

4 Blind function selection

Related parameters

[bLnd] Blind function selection [bLF2] ~ [bLNt] Group blind selections

It is possible to not display the parameter groups other than [Gr.F], [UEt] and [U] when they are not necessary.

[bLnd] setting value	Function
[0]	Blind
[1]	Selective unblinding

★The parameters [bLF2] ~ [bLNt] will be displayed when [bLnd] is set to [1]. Cancel the blind function for the desired parameter group by setting its corresponding parameter value to [1] ([bLEr] for [Gr.Er]).

Example) To cancel the blind function for parameter group [Gr.Er]

Key operation	Display	Explanation
	[0.0]	Frequency display (stopped condition)
(1) PRG	: [Gr.U]	Enter the parameter setting mode from standard monitor mode. The name of the first group [Gr.U] will be displayed.
(2) △▽ ENTER	: [Gr.U] ↓ : [Gr.UE]	Select the group with the △▽ keys. Display [Gr.UE] ,and press ENTER .
(3) △▽ ENTER	: [APL] ↓ : [bLnd] ↓ : [0]	Select the parameter with the △▽ keys . Display [bLnd], and press ENTER .
(4) △▽ ENTER	: [1] : [bLnd] ⟷ [1] : [bLnd]	Change the data with the △▽ keys. Cancel the blind function. (set to [1]) Press ENTER. The parameter name and data will be alternately displayed , and then the parameter name will be displayed .

(5) △ ▽ ENTER	: [bLnd] ↓ : [bLtr] ↓ : [0]	Parameters [bL] + the group name will appear after the [bLnd] parameter. Select the group which is to be unblinded. Display the group to be unblinded, and then press [ENTER] .
(6) △ ▽ ENTER	: [1] : [bLtr] ⟷ [1] : [bLtr]	Change the data with the △▽ keys. Unblind the group. (Set to [1]) The parameter name and data will be alternately displayed , and then the parameter name will be displayed .