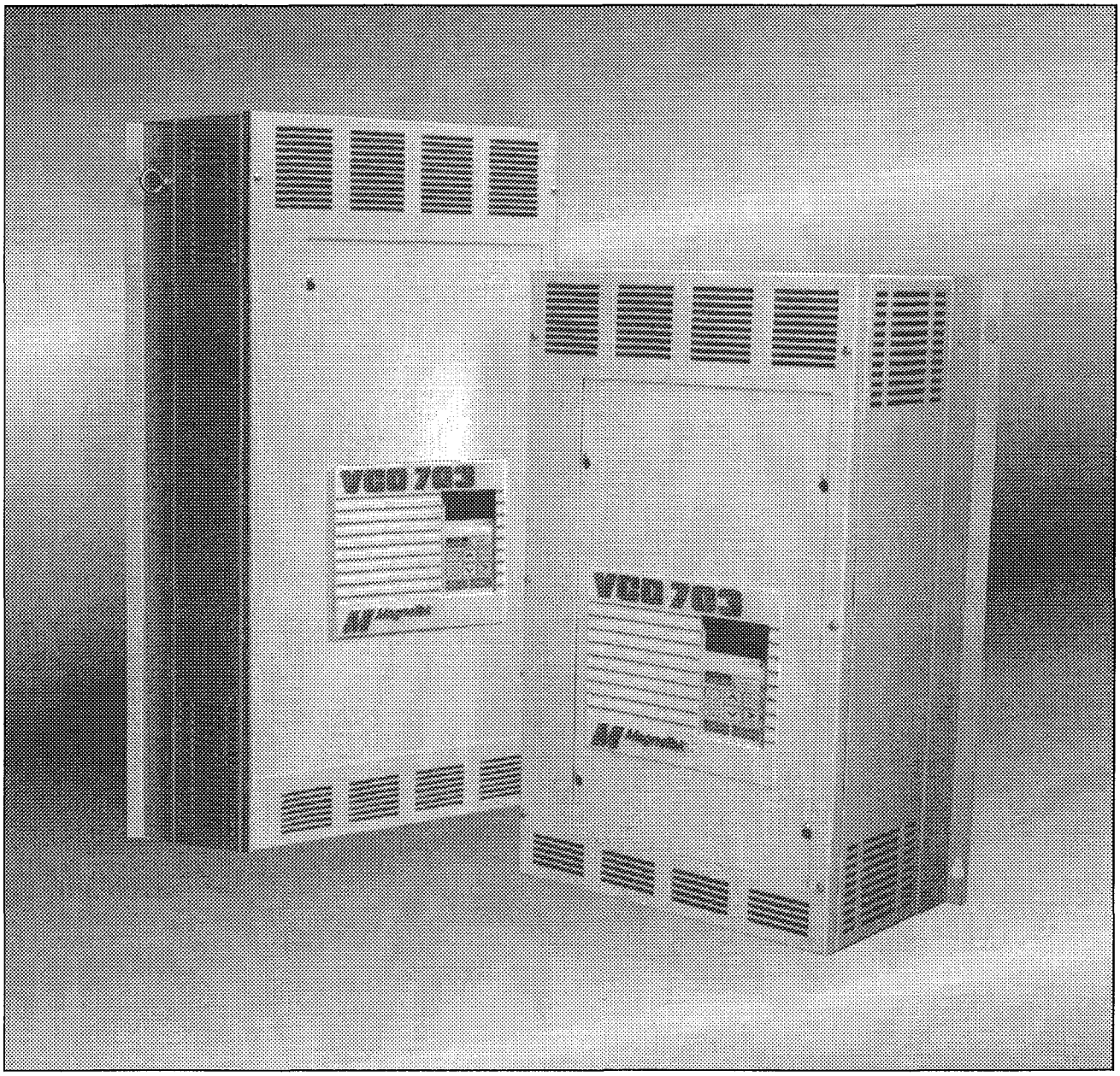
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MagneTek

Vector Support Tool Operation Manual

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Vector Support Tool (VST)

The VST program disk contains two main control functions, one is an Upload/Download function used to read/write drive parameters, the second function is the Autotuning program, which is used to tune the motor/drive combination for improved torque control and dynamic response characteristics.

The upload/download function can be used on all existing EPROM versions; however, to run the autotuning portion of the VST, a revised version of the software is required. Below is a list of EPROM's which support the autotuning function. UN-10 on the monitor display can be used to verify software revision.

Note: A TRQ-A option card (DS399) is required to run the Autotuning program. The card can be removed after completion of test unless the application requires a TRQ-A card for accurate torque control. The Upload/Download does not require the TRQ-A card.

For other features of the VST, refer to the Support Tool Operation (TM 4735).

Source Code No.	MagneTek P/N
NSW670008 [L&H] or greater	N/A
NSW670032 [L&H] or greater	N/A
NSW670021 [L&H] or greater	97SA1310-0011 97SA1311-0011

Order P/N: 97SA1310-0011 & 97SA1311-0011 for the Autotuning function.

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SUPPORT TOOL INSTRUCTION MANUAL

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Precautions on Use or Application of Auto-tuning

(1) When auto-tuning is performed by using this program, the motor repeats acceleration and deceleration automatically to rotate at a high speed. Since the machine may be damaged when it is connected, auto-tuning must be performed in the motor single-unit status.
(2) There is limitation for combination of inverter and motor. Motor rated current must be used in the range of 50 to 100% of the drive rated current; motor capacity must be less than the maximum inverter applicable motor capacity.
(3) A version (P-ROM) which is not applicable for auto-tuning is also available.

Precautions

(1) It is legally prohibited to copy a part or all contents of this program and/or instruction manual without notice.
(2) The specifications of this program may be changed without notice.
(3) Should you find unclear, wrong or missing points in the contents, contact your MagneTek representative.
(4) We cannot guarantee any accident caused by operation in spite of item (3).

MS-DOS is a trademark of MICRO SOFT CO., LTD., USA.

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1. INTRODUCTION

1-1. On arrival of the support tool package

The support tool package includes the following.

(1) Support tool FD (floppy disk) (3.5-inch FD, 2HD type)
(2) Communication cable for RS-232C
(3) Operation manual

The support tool software will not operate without being incorporated by the customer. According to the procedures described in APPENDIX 1, incorporate the MS-DOS. Activate the support tool after connecting the cable in the procedures described in APPENDIX 2.

1-2. Function of support tool

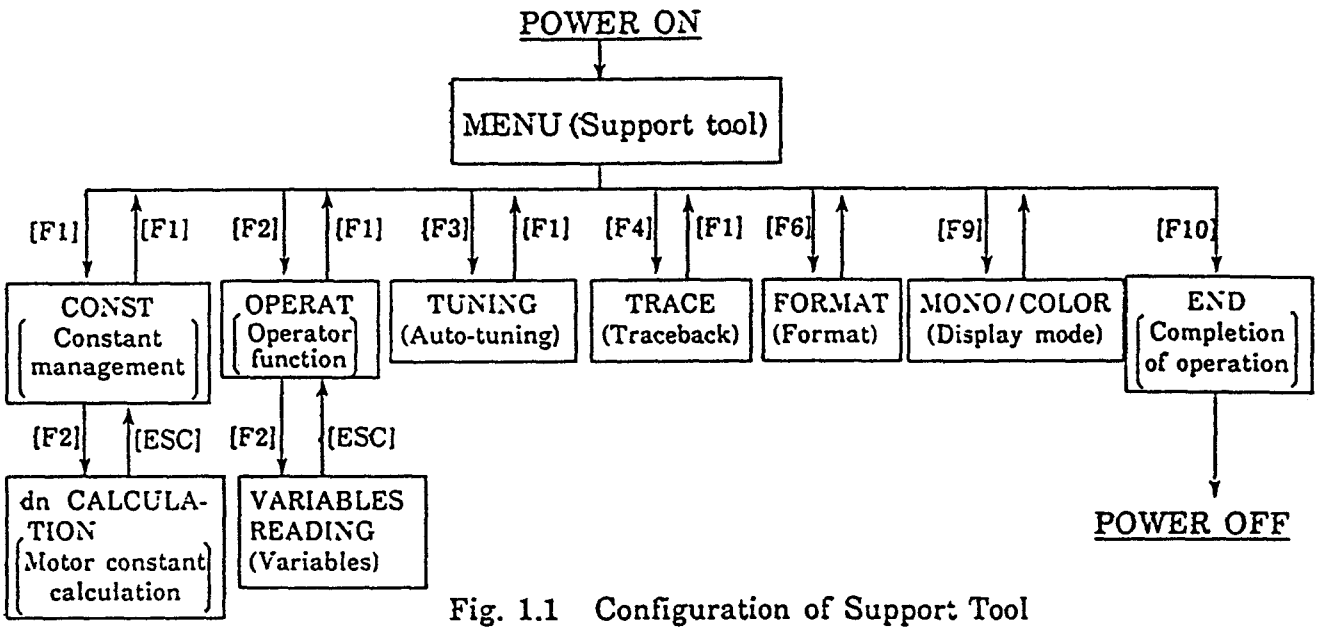


Fig. 1.1 Configuration of Support Tool

Table 1.1 Function of Support Tool

Key	Display	Function
[F1] page3	CONST (Constant management)	· Read-in / write-out of constants · Storing constant in floppy disk · Printing constants · Storing / printing motor data
[F2] page4	OPERAT (Operator function)	· Display and change of constants · Operation procedures from personal computer · Display of drive faults · Display of drive memory contents
[F3] page7	TUNING (Auto-tuning)	· Auto-tuning of motor constants (Automatic adjustment)
[F4] page9	TRACE (Traceback)	· Read-in of trace data in inverter · Change of trace condition setting
[F5]	----	----
[F6]	FORMAT (Format)	· Initialization of floppy disk for data storing
[F7]	----	----
[F8]	----	----
[F9]	MONO /COLOR (Display mode)	· Changing display mode of personal computer display unit (CRT) (Selection of color/monochrome display : Effective with CRT for color output
[F10]	END (Completion of operation)	· Completion of support tool operation

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1-3. Floppy Disk for Data Save

Some data can be saved in the support tool system FD. It is recommended to create a floppy for data save when it is necessary to save the data. Do not fail to format (initialize) the file for data save by the [F6] (Format). There are same data types: constant data, motor data and trace data. One file sizes of the data are 3k-, 1k- and 10k-bytes, respectively.

2. CONSTANT [F1] (Constant management)

2-1. Read-in and Write-in of All Inverter Constants

How to read in a constant from a inverter

(1) Select [CONSTANT READ-IN] by [↓] or [↑] key.
(2) Depress [ENTER] key after [W] key input.
(3) Check that "Complete" is displayed. (Completion of read-in)

Note: To read in a constant from the constant file, input the file No. to be read in instead of [W] key.

How to write in a constant to constant file

(1) Select [CONSTANT WRITE-IN] by [↓] or [↑] key.
(2) Depress [ENTER] key after selecting the file No. to be written in by numerical keys.
(3) Check that "Complete" is displayed. (Completion of write-in)

Note: To write in a constant to the drive, input [W] key instead of numerical key input in (2). However, On-17 to 20 and 22 are not changed since these constants are set per the drive rating.
To change any of them, refer to "OPERAT [F2]".

How to edit/reference constants on personal computer

(1) Input [F4] (Edit) key.
(2) By [ESC] key input after editing, the previous display is returned.

Note: By pressing [F7] key in the status of (1), fault display is enabled.

How to compare constant file and drive constants

(1) Select [CONSTANT COMPARISON] by [↓] or [↑] key.
(2) Select the No. to be compared by the numerical keys and press [ENTER] key.

Note: Only constants with different constant data selected in (2) from the constant data read in on the personal computer.

How to print out constant data by printer

(1) Select [CONSTANT PRINT] by [↓] or [↑] key.
(2) Select the printing mode by [←] or [→] key.
Standard: Printing constant name, value and unit.
Reduction: Printing all constant in one A4 size sheet of paper.
(3) Press [ENTER] key after checking for printer connection.

How to input comment to constant file

(1) Input [F5] (Memo) key.
(2) Input [ESC](Completion of editing) after editing the comment.

How to delete constant file

(1) Select [CONSTANT FILE DELETE] by [↓] or [↑] key.
(2) Press [ENTER] key after selecting the file No. to be deleted by the numerical keys.
(3) Check that "Complete"is displayed. (Completion of deletion)

Note: It is necessary for constant data to be read in on the personal computer in the following four types of operation.

(1) Write-in to constant file or drive
(2) Editing/referencing constants on personal computer
(3) Print-out of constant data to printer
(4) Comment input to constant file

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2-2. Calculation / Write-in of Motor Constants (dn-XX)

How to calculate motor constant

(1) Input [F2] (dn calculation) key.
(2) Input the motor test data according to the displayed instruction.
(3) Press [F1] (Calculation) key to calculate motor constants.
(4) By pressing [F2](Print) key, printer printing is enabled.
(5) By [ESC] key input, the previous display is returned.

Note: Motor test data must be prepared in advance since they are needed at motor test input in (2).

How to write in motor data to drive

(1) Select [MOTOR CONSTANT WRITE-IN] by [↓] or [↑] key.
(2) Press [W] key, and only inverter motor (dn) constant section is changed.

Note: To write in data to the constant file, after reading in the constant file to the personal computer, input [M] key instead of [W] key. After changing the constants on the personal computer, it is necessary to write in the data to the constant file again.

How to print out motor data by printer

(1) Input [F2] (dn calculation) key.
(2) Press [F2] (Print) key after checking for printer connection.
(3) By [ESC] key input, the previous display is returned.

Note: It is necessary for the constants data to be read in on the personal computer in the following types of operation.
·Write-in to drive
·Print-out of motor data by printer

Remarks: Motor data read-in / write-in to motor data file or file deletion can be performed as well as "constant file".

3. OPERAT [F2] (Operator function)

3-1. Individual Setting / Reading of constants and Monitor Variables

Each constant set in the inverter can be read or set individually. Monitor variables can be also read.

Procedures

(1) Since "MODE=" is displayed by pressing the [ESC] key, input the constant to be read and then input the No. of the constant so that it can be read. (Example: Assuming that Sn-15 is to be read. Input [S], [ENTER] key, [1], [5], [ENTER] key in this order. [S] indicates the first character of the constant name; [A] key for An constants, [b] for bn constants. Either capital or small letters are acceptable.)
(2) Then the setting can be changed by inputting the data to be changed.

Remarks

(1) By pressing [<] or [>] key, the next or previous constant can be displayed.
(2) By pressing the space key, the constant which was displayed and set is displayed again.
(3) After inputting the [!] key following the variable item No. and pressing [ENTER] key, the specified variables can be displayed continuously. (Stopped by [ENTER] key.)
(4) A fault ([F4] key input) and the fault before the power supply was turned off in the previous operation ([P] key input) can be also displayed.

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3-2. Operation from Personal Computer

The drive can be operated by key operation from the personal computer.

Procedures

(1) Input [P], [C] and [ENTER] keys when "MODE=" is displayed. The personal computer operation mode (hereinafter, called PC mode) is entered.
(2) When the operation signal appears in the function key, operation is enabled by the key input. (For the details of the keys, refer to Table 3.1 .)
(3) By inputting [P], [C] and [ENTER] keys again when "MODE=" is displayed, the PC mode is released. (Personal computer operation becomes disabled.)

Notes

(1) Motor must be stopped at external fault (external terminals ③-①ON) when operating in the PC mode. (Otherwise, operation may be disabled when a communication error occurs.)
(2) Do not turn off the inverter power supply or insert/remove the RS-232C cable during operation in the PC mode.
(3) When the inverter is operated by communication card (SI-A, SI-B) command after operation in the PC mode, turn off the drive power supply and then turn it on again.

Table 3.1 Description of Key Function at Operation in PC Mode

Key	Display	Meaning
[f1]	MENU	Menu
[f2]	VARIABLE	Variable reading
[f3]		
[f4]		
[f5]	SREF	Speed reference
[f6]	RUN	Run command
[f7]	REV	FWD/REV change
[f8]	B.B	Baseblock signal
[f9]	EXE	Initial excitation
[f10]	RESET	Fault reset

[TAB] key →

Key	Display	Meaning
[f1]	SFSSEL	Accel/decel time change
[f2]	HOLD	Accel/decel stop
[f3]	EFO	External fault
[f4]	IRESET	Integral reset
[f5]	IHOLD	Integral hold
[f6]	SFSCAN	SFS cancel
[f7]		
[f8]		
[f9]		
[f10]		

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3-3. Continuous Display of Variables

Current values of up to 6 types of variables can be displayed continuously.

Procedures

(1) By pressing the [TAB] key after the [F2] (Variable) key input, the names of variables are displayed in the function keys. Then select the name of the variable to be displayed. The [F1] key starts / stops the current value display of the variable. The name of the variable can be selected only when the display is halted.
(2) By pressing the [ESC] key, the previous display is returned.

Table 3.2 Unit of Monitor Variables
(Listing only those different from drive instruction manual)

Monitor Variables	Value Described in Inverter Instruction Manual	Support Tool
Un-03	A	% (100% : motor rated current)
Un-04	V	% (100% : no-load voltage)
Un-07, 08, 12~18	BIT unit	HEX unit
Un-30	%(100% : rated slip frequency)	Hz

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4. TUNING [F3] (Auto-tuning)

Tuning (adjustment) of the motor characteristic value which is essential for vector control is performed by drive automatic operation. Perform auto-tuning according to the following and the instruction displayed in the personal computer. (For the recommended procedures, refer to APPENDIX 3.)

Note

(1) Constant for Auto-tuning:
dn-06, dn-07, dn-08, dn-10, dn-11, dn-12
dn-16, dn-17, On-10, On-11, Sn-09 (1st digit)

(2) P-ROM Nos. applicable for auto-tuning:
① NSW670*** (***:008 and above)
② NSW671*** (***:002 and above)
③ NSW672*** (***:009 and above)
④ NSW673*** (***:002 and above)
⑤ NSW67501* (*:1 and above)

4-1. Precautions

Since the motor repeats acceleration and deceleration automatically, rotating up to the maximum revolutions (increased by 30% when dn-01=dn-02), pay enough attention to safe operation. The precautions displayed on the screen and the following items must be observed strictly.

(1) For auto-tuning, a high-accurate torque controller (TRQ-A) is needed.
(2) If any fault is found during auto-tuning, cancel tuning by using any emergency stopping measures provided by the customer. It is possible to cancel tuning by [F10] (Cancel) key input in the normal communication status. In addition, when a fault occurs in the inverter, tuning is automatically canceled and the fault contents are displayed. In this case, take a corrective action described in the APPENDIX 6.

Precautions on constant change

(1) Do not change Sn-02 (motor selection) after completion of tuning. Otherwise, the motor (dn) constants will be changed.
(2) Unless drive input power supply voltage is changed, do not change Sn-09 (at the first digit) setting.
(3) Selection of drive external terminal ③ function: Initial set value, NO contact, coasting to stop
It can be changed by Sn-12 or Sn-28 (at the second digit).
(Refer to the instruction manual of the drive instruction manual)

Precautions on tuning in the machine connected status

(1) Perform auto-tuning with the motor single-unit, if possible.
If the motor cannot be separated from the machine, determine the motor rotating direction, considering the machine construction.
(2) By tuning when the motor is connected to the machine, the motor machine loss (dn-11) is set to the value including the machine.
Subtract the machine value from the set value of (dn-11) at completion of tuning.

Others

(1) Input power supply voltage on site for drive input power supply voltage. It is not input power supply voltage at the tuning site. [With DC input (battery), a value obtained by dividing DC voltage by 1.35 is input.]
(2) When initial data are sent from the personal computer to the drive, a fault may occur temporarily but it is reset automatically. With such a sequence that turns off the power supply when a fault occurs, remove the fault contact output terminal.

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Note: Corrective action when motor hunts at operation after completion of auto-tuning.
- Decrease bn-05 (ASR proportional gain). If this action does not solve the problem, decrease the machine system backlash as small as possible and increase Cn-07 (ASR output lag time) little by little.

4-2. Auto-tuning Mode

Select the tuning mode among the auto-tuning setting items according to Table 4.1 .

Table 4.1 Tuning Mode

Mode		Description	Data Required
1	Mode with motor constant in drive as initial value	Mode with motor constant in drive as auto-tuning initial value	None
2	Motor constant input mode	Mode where auto-tuning is performed after each motor constant (dn-XX) input	Each motor constant value calculated according to motor test report
3	Motor nameplate value input mode	Mode where auto-tuning is performed after motor nameplate described value input	Motor nameplate value
4	Motor test data input mode	Mode where auto-tuning is performed after motor test data input	Motor test report (describing no-load or locking test data)

Note

(1) Do not use mode 1 unless the VCM standard motor is used and Sn-02 (motor selection) was set before activation of tuning software or unless the resultant auto-tuning has been already set to the drive.
(2) Select mode 3 if proper information on the motor characteristics are not available.
(3) Input the nameplate value, referring to APPENDIX 4 when mode 3 is selected.

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5. TRACEBACK [F4] (Traceback)

After the trigger conditions (for example, in case that a drive fault occurs), the contents of the specified address can be displayed at every sampling cycle.

5-1. How to Set and Start the Trace Conditions

How to set and start the trace conditions
(1) Select 1.[Change sampling item] by using [↓] or [↑] key. (2) Set the sampling time, pre-trigger (how many points among 128 points are taken for pre-trigger) and trigger conditions by using [←] or [→] key. (Trigger conditions; Refer to the following supplement) (3) Set the address and label of trace items 1 to 4. (For address for trace items, refer to APPENDIX 5.) (4) Press the [F2] (Start). Sampling starts and a sound "beep" is heard. Note: By trigger, the trace data are read in on the memory automatically. When the data are read in normally, [Complete Press any key] is displayed. Note: Being away from the trace condition setting display before triggering, read in the data to the personal computer following Par. 5.2 "How to Read in Trace Data". Note: Tracing is enabled for 128 points for every sampling item. To increase the tracing time, set the sampling time longer. Note: Tracing can be canceled by the [ESC] key input.

How to set trigger conditions (Supplement)
Conditions to trigger: When the bit specified by the trigger condition changes (0—1, or 1—0) for the first time in trace item 1. (Trigger condition is regarded in binary and displayed in hexa-decimal notation. 0001H for triggering when only bit0 of trace item 1 changes; FFFFH when any bit changes.) Example: To trace fault contents, speed feedback (80BEH) and torque reference (814AH) at fault occurrence: Trace condition: 8000H Trace item 1 : 80BCH (status) Trace item 2 : 8142H (alarm) Trace item 3 : 80BEH (speed feedback) (10000/100%) Trace item 4 : 814AH (torque reference) (10000/100%) Trigger ON when only bit that indicated a major fault, the upper-most digit bit (bitF) of trace item 1 80BCH (status), changes. Note: To trigger when a drive fault occurs, check that the drive is currently under normal status.

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5-2. Trace Data Read-in and File Function

How to read in trace data

Select 2.[Trace data read in] by using [↓] or [↑] key, and the data that the drive has already traced can be read in on the personal computer.

Note: If a drive fault occurs, connect the personal computer, and the trace data can be read in.
When the drive power supply is turned on, trace sampling is started automatically with the data described in the example of "How to set trigger condition (supplement)".

Note: When the data are read in normally, "Complete. Press any key." is displayed.

How to display trace data

① Graph display is enabled by [F3](Graph) key input.
- Range can be changed by the space key.
The range set by [F9] (Level) key input and that determined with the maximum value as max and minimum value as min can be switched to each other.

② Data display is enabled by [F4] (Data) key input.
- The contents of the display can be scrolled by [↓], [↑], [ROLL-UP] or [ROLL-DOWN] key.

Trace data filing function

(1) Select a function by using [↓] or [↑] key.
- To read in data from trace data file:
  Select 3.[File data read in].
- To write in data to trace data file:
  Select 4.[File data save].
- To delete trace data file:
  Select 5. [File delete].

(2) Input the file No. and name according to the displayed instruction.

Note: When the data are read in normally, "Complete. Press any key." is displayed.

How to print out trace data by printer

(1) Select 6.[Trace data print] by using [↓] or [↑] key, and the trace data on the personal computer can be printed out by the printer.

Note: When the data are read in normally, "Complete. Press any key." is displayed.

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APPENDIX 1. INSTALLATION (Incorporation of MS-DOS)

(Referenced from Page 2)

APPENDIX 1-1. Preparation and Precautions on Installation

Preparation

(1) Personal computer -- IBM compatible
[Personal computer must contain the display unit.
It must be able to drive 3.5-inch FD.]
(2) MS-DOS system (Ver. 3.30 or higher)
(3) 3.5-inch FD (2HD type) initialized as system floppy.
(4) Printer (Not needed when the data are not to be printed.)

Note

(1) Verify that the following 17 files (Table 1) have been written in to support tools FD (floppy disk) purchased by the customer.

Table 1 File Names in Purchased FDs

AUTOEXEC	BAT	CONFIG	SYS
INSTALL	BAT	KVA	TBL
AUTOTUN	EXE	MSG	TBL
ME	EXE	MON	TBL
ME1	EXE	VAR	TBL
ME3	EXE	CONST	TBL
ME5	EXE	FLT	TBL
FMAKE	EXE	MOTOR	TBL
		CHKDRY	COM

(2) For installation, set FD write-protect as shown in Table 2.

Table 2 Setting of FD write - protect

FD	Write - protect
MS-DOS system FD	ON
Support tool FD (purchased FD)	ON
Customer's supplied FD (for installation)	OFF

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(3) Since the installation method differs depending on the customer's supplied personal computer type, perform the following procedures for installation (APPENDIX 1-2). Verify that the following 23 files (Table 3) have been written in to the support tool system after completion of installation.

Table 3 File Names in FDs after Installation

COMMAND	COM	ME1	EXE
PRINT	SYS	ME3	EXE
FORMAT	EXE	ME5	EXE
FD		CONFIG	SYS
FC		KVA	TBL
FM		MSG	TBL
FT		MON	TBL
COMMON	DAT	VAR	TBL
VAR	DAT	CONST	TBL
AUTOEXE	BAT	FLT	TBL
AUTOTUN	EXE	MOTOR	TBL
ME	EXE		

(4) Use the support tool in such a way that the personal computer can be started up by the drive where the support tool system FD is inserted after installation when the power supply of the personal computer is turned on (Refer to the explanation of the first drive setting in the instruction manual of the personal computer.)

APPENDIX 1-2. Procedure for Installation

This product does not activate without installation. Do not fail to install it (incorporate MS-DOS) in the following steps.

At this time, pay enough attention to the following points.

Note

(1) How to insert FD

A 3.5-inch FD is provided with a shutter. Insert the FD from the shutter side.

(2) Write-protect

Use the customer supplied MS-DOS system disk and support tool FD with write-protect ON (writing prohibited). It prevents the data from being destroyed by mistake at execution of installation.

Set write-protect OFF for an FD supplied by customer for support tool system floppy disk creation.

(3) How to remove FD

Press the eject button on the disk drive.

If the FD is removed while the disk drive LED lights, the FD data may be damaged.

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Installation procedures are different depending on the type of the customer supplied FDs. Install them in either procedure (A) or (B).

(A) PC is provided with hard disk and available capacity exceeds 1Mbyte.

Note: When a directory named WK already exists in drive C, change WK to a certain name.

(1) Prepare an MS-DOS system disk.
Use Ver 5.00 for MS-DOS system disk.
Insert "MS-DOS system disk" to the disk drive.

(2) Turn on the PC power supply.

(3) By inputting the underlined section of A>FORMAT B:/S[Enter], the following message is displayed.

```
Insert new diskette for drive B:
and press ENTER when ready ···
```

(4) Insert the customer supplied FD and press the [Enter] key, and the disk is formatted.

When formatting is completed, the following massage is displayed. Complete formatting by inputting N[Enter].

```
Format another (Y/N)?
```

(5) Since the following message is displayed, insert "MS-DOS system disk" into the disk drive and input [Enter].

```
Insert diskette for drive A: and press any key when
ready
```

(6) By inputting the underlined section, the file (FORMAT. COM) is copied to the customer supplied FD.
A>COPY FORMAT.COM B:[Enter]

(7) Since the following message is displayed, insert the customer supplied FD into the disk drive and input [Enter].

```
Insert diskette for drive B: and press any key when
ready
```

(8) After completion of copy, the following message is displayed. Insert "MS-DOS system disk" into the disk drive and input [Enter].

```
Insert diskette for drive A: and press any key when
ready
```

(9) Replace the disk in the disk drive with "support tool FD".

(10) By inputting the following underlined sections in this order, the support tool is copied to the hard disk.

A>C:[Enter]
C>MD WK [Enter]
C>CD WK [Enter]
C>COPY A:*.* C:[Enter]

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(11) After completion of copy, replace the disk in the disk drive with the customer supplied FD.

(12) By inputting the following underlined section, the support tool is installed on the customer supplied FD.

C>INSTALL B: [Enter]

When this command process is completed, the customer supplied FD in drive A becomes support tool system floppy.
At completion of the process, [' SUPPORT TOOL " has been installed completely.] is displayed.

After installation, delete the WK directory in the hard disk by inputting as shown below.

C>CD\ [Enter]
C>DEL WK [Enter]

The following message is displayed.
Input Y [Enter].

```
All files in directory will be deleted!
Are you sure (Y/N)?
```

C>RD WK [Enter]

(B) PC is not provided with hard disk.

(1) Prepare an MS-DOS system disk.
Use Ver 5.00 for MS-DOS system disk.
Insert "MS-DOS system disk" to the disk drive.

(2) Turn on the PC power supply.

(3) By inputting the underlined section of A>FORMAT B: /S [Enter], the following message is displayed.

```
Insert new diskette for drive B:
and press ENTER when ready ···
```

(4) Insert the customer supplied FD and press the [Enter] key, and the disk is formatted.
When formatting is completed, the following message is displayed.
Complete formatting by inputting [Enter].

```
Format another (Y/N)?
```

(5) Since the following message is displayed, insert "MS-DOS system disk" into the disk drive and input [Enter].

```
Insert diskette for drive A: and press any key when
ready
```

(6) By inputting the underlined section, the file (FORMAT.COM) is copied to the customer supplied FD.

A>COPY FORMAT.COM B: [Enter]

(7) Since the following message is displayed, insert the customer supplied FD into the disk drive and input [Enter].

```
Insert diskette for drive B: and press any key when
ready
```

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(8) After completion of copy, the following message is displayed. Insert "MS-DOS system disk" into the disk drive and input [Enter].

> Insert diskette for drive A: and press any key when ready

(9) Replace the disk in the disk drive with "support tool FD".

(10) By inputting the following underlined section, the support tool is installed on the customer supplied FD.

A>INSTALL B: [Enter]

Replace the floppy according to the displayed instruction during installation.

Indication as drive A means "support tool FD" and drive B means the customer supplied FD.

When this command process is completed, the customer supplied FD in drive B becomes support tool system floppy.

At completion of the process, [" SUPPORT TOOL " has been installed completely.] is displayed.

Note: Pay attention to the following points disregarding the types of PCs.

(1) Verify that the following 23 files have been written in to the support tool system floppy after installation.

COMMAND	COM	ME1	EXE
FMT	TXT	ME3	EXE
FORMAT	COM	ME5	EXE
FD		CONFIG	SYS
FC		KVA	TBL
FM		MSG	TBL
FT		MON	TBL
COMMON	DAT	VAR	TBL
VAR	DAT	CONST	TBL
AUTOEXEC	BAT	FLT	TBL
AUTOTUN	EXE	MOTOR	TBL
ME	EXE		

(2) After installation, the original "support tool FD" must be stored for backup.

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(Referenced from Page 2)

APPENDIX 2-1. Procedures of Cable Connection

Connect the cable in the following procedure when the drive power supply is turned off.

(1) Remove the cover of the VCD 703 by using a screw driver.

(2) Remove the digital operator from connector CN1 on the control card.

(3) Connect one end of the attached RS-232C cable to 1CN and the other to the RS-232C port mounted at the rear side of the personal computer.

(4) Mount the face plate on the drive for safe operation.

To return to the former status, mount the digital operator on 1CN in the procedure opposite to that at cable connection when the drive power supply is turned off.

APPENDIX 2-2. Procedures of Support Tool Activation

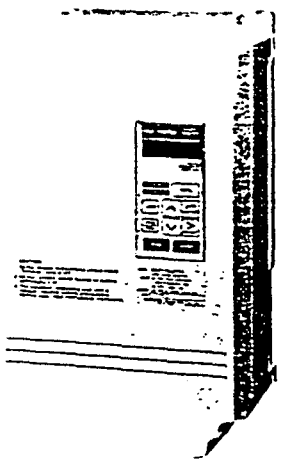
After connecting the cable, activate the support tool in the following steps.

(1) Turn on the drive power supply.

(2) Insert the installed support tool FD into the personal computer first drive.

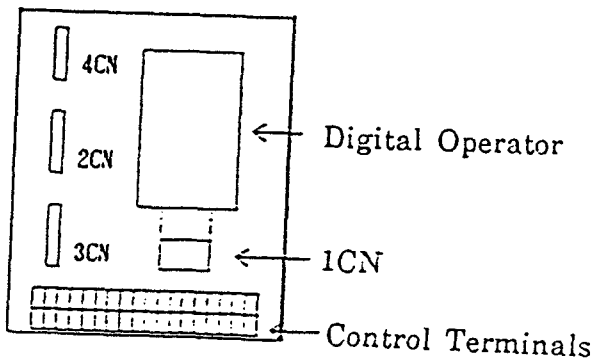
(3) Turn on the personal computer POWER switch.

(4) Verify that the menu display of "SUPPORT TOOL" is displayed.



DRIVE

[Example VCD703-A7P5
230V, 7.5HP]



CONTROL CARD

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APPENDIX 3. RECOMMENDED PROCEDURES OF AUTO-TUNING

(Referenced from Page 7)

The recommended procedures of auto-tuning are as described below.

(1) Write in the current constants in the drive to the constant file. (See page 3)

① Input [F1] (Constant) key when the support tool menu display appears to read in the constants from the inverter.

② Write in the constants which are read in to the personal computer to the constat file.

(2) Press [F1] key to return to the menu display and input [F3] (Tuning) key.

(3) Perform auto-tuning according to the displayed contents.

(4) Print out the resultant tuning if necessary. (See page 3)

① Write in the constants in the drive after tuning to the constant file in the same way as (1).

② Input [F5] (Memo) key to input the comment to the constant file. (Person in charge, date, order No., drive type, motor type(RPM, P, kW, A, V, INS), etc.)

③ Print out the contents of the constant file (with comment, in the reduction mode).

When the printer is not currently connected, perform "write-in to floppy" of "constant file" once. After that, when the printer is available, activate the support tool (at this time, it is not necessary to connect the drive to the printer) and print out the drive constants which have been written in to the constant file by the printer.

Note

If a tuning communication fault or momentary power loss occurs during auto-tuning, or if the RS-232C cable is disconnected during tuning, write in the data which have been written in to the constant file in (1) to the drive .

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APPENDIX 4. PRECAUTIONS ON MOTOR NAMEPLATE DATA INPUT

(Referenced from Page 8)

Use the nameplate value where "RATING: CONT." is described.

(1) When the following value is described only in one way:

① Rated output : Input the value where kW is described. (Multiply the value by 0.746 to input when it is described with HP.)

② Rated (base) r/min : Input the value where rpm, RPM or r/min is described.

What is rated (base) r/min ?

Number of revolutions at the boundary of the constant torque area and constant output area. (From zero-speed to rated (base) r/min: rated torque area)

③ Maximum r/min : Input the same value as the rated (base) r/min.

What is maximum r/min ?

The maximum number of revolutions allowable for the motor. When used only in the rated torque area, it becomes the same value as the rated (base) r/min. (r/min between rated (base) r/min and maximum r/min : constant output area)

④ Number of poles : Input the value where POLES is described.

⑤ Rated voltage : Input the value where V or VOLTS is described.

⑥ Rated current : Input the value where A or AMPS is described.

⑦ Rated frequency : Input the value where HZ is described.

⑧ Insulation class : Input the alphabet where INS. is described.

⑨ Exciting current : Input the value where MAGNETIZING CURRENT, EXCITATION CURRENT or Im is described. (Setting not needed when none of them is described.)

What is exciting current ?

Current flowing in an induction motor can be divided into two; current to contribute to torque (torque current) and current to create magnetic flux. The latter is called exciting current. Exciting current is also considered to be current flowing when the motor is in no-load (output torque is 0) status.

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(2) When power supply voltage, power supply frequency, current and r/min are described in more than one way (general-purpose (commercial-purpose) motor) :

Select and input only one group of which value is the most closed to the maximum r/min of the motor rotation of the customer.

The discrepancy of both values can be adjusted by setting the ratio to the application constant (bn-10 : rated speed adjustment), if necessary. (For the details of bn-10, refer to the section describing the constants in the instruction manual for the VCD 703.

Note

Do not use the motor exceeding the range of its specifications.

(3) When a group of output, voltage, frequency, current and r/min is described in more than one way (motors for inverters) :

① Same output value described in two ways (constant output motor)

Select and input the values of the group with the smaller r/min.
At this time, for only setting of the maximum r/min, input the values of the group which has not been selected (or with the larger r/min).

② Different output values described in two ways

The group with the smaller output and r/min can be considered to have the characteristic values at the minimum r/min where the motor can operate continuously. The values of this group are not used as nameplate input values for auto-tuning. Select and input the values of the other group.

Note

Do not use the motor exceeding the range of its specifications.

③ Same and different output values described together

The above two ways of combination can be considered. Exclude the group with the smaller output and r/min and select and input the value of the group with smaller r/min.
At this time, use the larger value of r/min for setting of the maximum r/min.

★★★ For further information, contact the motor manufacturer directly. ★★★

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APPENDIX 5. LIST OF TRACE ITEM ADDRESS

(Referenced from Page 9)

Table 4 VCD 703 Trace Item Address

Address	Byte	Data Name	Abbr.	Range	Remarks
80BC	2	Status Signal	STATUS	bit0: FWD run input (terminal 1) status bit1: REV run input (terminal 2) status bit2: External fault input (terminal 3) status bit3: Fault reset (terminal 4) status bit4: Multifunction input 1 (terminal 5) status bit5: Multifunction input 2 (terminal 6) status bit6: Multifunction input 3 (terminal 7) status bit7: Multifunction input 4 (terminal 8) status bit8: During running bit9: During zero speed bitA: During reverse running bitB: During fault reset inputting bitC: During speed coincidence bitD: Inverter ready bitE: Minor fault bitF: Major fault	
8142	2	Alarm Signal	ARMX	bit0: Overcurrent bit1: Overvoltage bit2: Drive overload bit3: Drive overheat bit4: Overspeed or Estimate speed error bit5: Fuse blown bit6: Load open phase bit7: External fault bit8: Hardware fault bit9: Motor overload bitA: Motor overheat bitB: Regenerative braking resistor or regenerative transistor fault bitC: Power loss (PUV,CUV,MCOFF) bitD: Excessive speed deviation bitE: PG or thermistor disconnection bitF: Cooling fan fault	
80BE	2	Speed Feedback	NFB	10000/100%	
814C	2	Output Current	I1BW	10000/100%	Un-03 Motor rated primary current = 100%
814E	2	Output Voltage Reference	VRC	10000/100%	Un-04 dn-04 = 100%
815C	2	Main Circuit DC Voltage	VDCW	10000/100%	Un-05 400V = 100% (200V class) 800V = 100% (400V class)
8154	1	Sequence Input Status	INRLYW		UN-07 External terminals 1to 8 correspond to bits 0 to 7.

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Table 4 VCD 703 Trace Item Address (Cont'd)

Address	Byte	Data Name	Abbr.	Range	Remarks
8042	2	Sequence Output Status Reference	OUTRLY		Un-08 bit0: Multifunction contact (terminals 9.10) bit1: PHC1 (terminals 25.27) bit2: PHC2 (terminals 26.27) bit3: PHC3 (terminals 28.27) bit4: PHC4 (terminals 29.27) bit5: bit6: Fault contact (terminals 18.20) bit7:
D000 D002	1 1	DI-16H Input Status L DI-16H Input StatusH	DIXRD1 DIXRD2		Un-12 Un-13
80AA	1	DO-08 Output Status	DO08M		Un-14
8140	2	Status Signal	STSX	Un-17,18 bit0: Running bit1: Zero-speed bit2: REV running bit3: Reset signal input bit4: Speed coincidence bit5: Inverter ready (holding during momentary power loss) bit6: Minor fault bit8: Reference fault bit7: Major fault bit8: Reference fault bit9: Recovery from power loss / momentary power loss (Recovery from power loss = 1) bitA: Operation mode (0:Local. 1:Remote) bitB: Initial data receiving end bitC: Multifunction input 1 (terminal 5) bitD: Multifunction input 2 (terminal 6) bitE: Multifunction input 3 (terminal 7) bitF: Multifunction input 4 (terminal 8)	
8400	2	Soft Starter Input	SREFSC	30000/100%	Un-21
8144	2	Speed Reference (Soft Starter Output)	NREFX	30000/100%	Un-22
8148	2	Speed Feedback	SPEDX	30000/100%	Un-23
80AE	2	Torque Reference Input	TREFC	8192/100%	Un-24
80B0	2	Torque Compensation Input	TCMPC	8192/100%	Un-25
814A	2	Torque Reference	TROW	10000/100%	Un-26
8174	2	Torque Feedback	TFBW	10000/100%	Un-27
8406	2	Speed Controller(ASR) Input (Speed Deviation)	SPDEVC	30000/100%	Un-28

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Table 4 VCD 703 Trace Item Address (Cont'd)

Address	Byte	Data Name	Abbr.	Range	Remarks
8054	2	Speed Controller(ASR) Output (After Filter)	I2RS	8192/100%	Un-29
840E	2	Slip Frequency Reference	SFRXC	100 / Hz	Un-30
8146	2	Primary Frequency Reference	F1RXW	10000/100%	Un-31 top frequency = 100%
80A8	2	Motor Temperature	MTEMP2	128/°C	Un-32
8420	2	No of Moving Pulses (at zero servo)	GAPC	-9999~9999	Un-33
8150	2	Inverter Main Speed A/D Converted Value	ADSRFF	0000~03FF (0V~+10V)	Un-34
8152	2	Inverter Aux. Speed A/D Converted Value	ADSCMP	0000~03FF (0V~+10V)	Un-35
8036	2	AI-14B Input (ch1)	AI14CH1	0000~3FFF (-10V~+10V)	Un-36
8038	2	AI-14B Input (ch2)	AI14CH2	0000~3FFF (-10V~+10V)	Un-37
803A	2	AI-14B Input (ch3)	AI14CH3	0000~3FFF (-10V~+10V)	Un-38
80C0	2	Magnetic Flux Feedback (α phase)	PHIAX	8192/100%	Un-39
80C2	2	Magnetic Flux Feedback (β phase)	PHIBX	8192/100%	Un-40
8086	2	ACR Compensation Amount	DLI1	8192/100%	Un-41
8070	2	Magnetic Flux Feedback(Amplitude)	PHIFB	8192/100%	Un-42
8076	2	Exciting Current Compensation Amount	IAMR	8192/100%	Un-43
80C4	2	Motor Power Output	POWER	8192/100%	Un-44
00B8	2	Primary Frequency Reference	F1	100 / Hz	
8074	2	Exciting Current Reference (after compensation)	IMP1	8192/100%	
8080	2	Slip Frequency Reference	SF1	30000/100%	
8062	2	Secondary Current Reference (after torque limit)	I2REF	8192/100%	
8064	2	Secondary Current Feedback	I2FB	8192/100%	
806C	2	Magnetic Flux Reference	PHIREF	8192/100%	

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APPENDIX 6. LIST OF MAIN ERROR MESSAGES

(Referenced from Page 7)

Table 6 Support Tool Main Error Messages and Description

Error Message	Description
No sampling data entered	An attempt to read in the trace data was made although the trace item had not been set.
No read-in data	Save, print or graphic/data display was selected although the trace data had been read in.
File write-in disabled	Write-protect is set to the floppy disk.
File delete disabled	Write-protect is set to the floppy disk.
Wrong data disk drive designated	The data disk is not set in the specified drive. A floppy disk which has not been formatted for data disk is set.
Wrong set value	Impossible motor data are input. (An imaginary number or zero-division occurs during calculation.)
No data entered	Motor data have not been read in, or motor data write-in or motor constant write-in was selected although the motor data had not been input.
Can not be format. Format another disk? (Y or N)	Write-protect is set to the floppy disk. A floppy disk is no set to the specified drive. An attempt to format was made without a system disk. An attempt to format a system disk was made.
Program Mode	An attempt to enter the PG mode in the Program mode (OPERAT). (Change the mode to the Drive mode by the Digital Operator.)
Set value fault: XX	Data out of the upper/lower limit range were sent to the drive (CONST).
Setting disabled: XX	A constant was sent to the drive during UV (CONST).
Auto-Tuning cannot proceed-Constant setting error.	Improper setting exists in the drive constants (oPEXX) (TUNING). • Since the number of the wrong constant is displayed, refer to the paragraph of troubleshooting in the instruction manual for the VCD 703.
Auto-Tuning cannot proceed - Operation error.	An operation error (oPX) occurs in the inverter (TUNING). • Connect the Digital Operator to the drive once and check the error No. by the Digital Operator. Then refer to the instruction manual for the VCD 703.

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Table 6 Support Tool Main Error Messages and Description (Cont'd)

Error Message	Description
Transmission error has occurred.	An error occurs in communication between the inverter and personal computer (TUNING). • Check the communication cable. • provide some noise preventive actions. Note : Since the drive constants are not returned to the values obtained before tuning, set the drive to the values which were written down before tuning or values written in to the constant file.
Speed Agree timer is exceeded··Auto-Tuning process is canceled.	The motor r/min does not coincide with the commanded r/min. • Since the number of the wrong constant is displayed, refer to Par. 7.1 (3) "Motor does not rotate at set speed." of the paragraph of troubleshooting of the in the instruction manual for the VCD 703.
XX is out of range. Auto-Tuning cannot continue.	Tuning cannot be performed within the setting range (TUNING). Check the following items in this order. • Wiring between the drive and motor • Connection of drive connectors • Proper mounting of torque controller (TRQ-A) Replace the following boards if the above checking does not correct the fault. • Torque controller (TRQ-A) • Control card
Wrong set value. Please press any key to continue.	Some of data items input by the customer are out of the range (TUNING). • Input the displayed faulty setting data again. • Verify combination of drive and motor concerning capacity.
Fault has occurred··Auto-Tuning process is canceled.	Refer to the instruction manual for the VCD 703 (for corresponding fault) (TUNING). Especially when ES (speed estimation error) occurs, check the following items. • Motor constant input value is proper. • Tuning mode selection is proper (refer to Par. 4.2 "Tuning Mode".) • Wiring around the high-accurate torque controller (TRQ-A) • Replacement of the high-accurate torque controller (TRQ-A)
Insufficient disk space.	Although constant data, etc. are to be written in to the floppy disk, there is not enough capacity left in the floppy disk (refer to Par. 1.3 "Floppy for Data Save.)

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VST

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