

Data Transmission Program for DMD02.1 AC Servo Drives

Applications

DOK-MINIDR-DMD02*PC***-ANW1-EN-P

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	DOK-MINIDR-DMD02*PC***-ANW1-EN-P	Nov.98	1 st Release

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1 General Information

We thank you at this point for purchasing our MiniDrive DMD series and its matching MINITERM PC software.

Even though programming and commissioning is not difficult, any incorrect handling could lead to undesirable error reactions which could shorten the service life of your system and impair performance. It is therefore absolutely necessary to read these instructions before starting the installation up to ensure a long life and trouble-free use.

This manual should always be handy.

This manual must be given to the end user.

This manual is updated on a regular basis for the purpose of including all changes and updates.

1.1 Prior to Commissioning

Drive controllers of the DMD02 series are equipped with an RS-232C interface which makes communications with a PC possible. The "Miniterm" DOS program enables either the transmission of information to a drive via a PC or information can be called up from the drive. For example, parameters or positioning block data can be changed and drive states queried.

For further information, please see Applications Manual: „DOK-MINIDR_DMD/MMD*POS_ANW1_EN,, material number 282102.

To ensure that data transmission runs smoothly it is necessary to enter the American standard interface driver (ANSI.SYS) into Config.SYS.

It generally suffices to enter the following text line:
DEVICE=C:\WINDOWS\COMMAND\ANSI.SYS

Attention!!

- This software may only be used for commissioning purposes and copied with the express permission of INDRAMAT.

1.2 Hardware and Software

Possible Drive Controllers

The data transmission program MINITERM enables communications with drive controllers of the series DMD02.1

Usable Types of PCs

The software runs on the following PC types. The connection to the drive controller is only possible via a COM1 port.

- PC-98 serie (NEC) or a compatible unit.
- AT(IBM) or a compatible unit.
- DOS/V

Usable Operating Software

Prerequisites for an efficient data transmission are the following operating systems:

- PC98 series MS-DOS version 3.0 or higher
- IBM AT MS-DOS version 6.2 (J)
- DOS/V MS-DOS version 6.2/V

Note:	An efficient functioning of the data transmission program is not guaranteed with any other software and hardware combination than the one specified above. If some other operating system has to be used, then be sure to check that all is functioning properly.
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2 Basic Functions

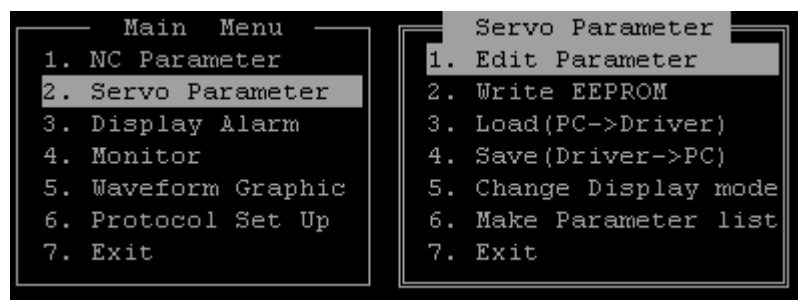
2.1 Keyboard

The table below specifies the function of each key.

Key	Function
Cursor	These keys are for up/down, right/left movements. They can be used to select the different menu items. The selected menu items are illustrated inversely.
Numbers 0 to 9	For inputting information and selecting various menu items.
ESC	Use the Esc key to scroll back to the previous menu item.
ENTER	This confirms the selected menu item or numeric input.
BKSP	Clears an incorrect input.

2.2 Select Menu

Selecting a menu with the use of the CURSOR key or by inputting the displayed selection number. Selecting a submenu on the display that appears or calling up the inversely illustrated menu item with the „Enter key“.



2.3 Closing the Selected Menu

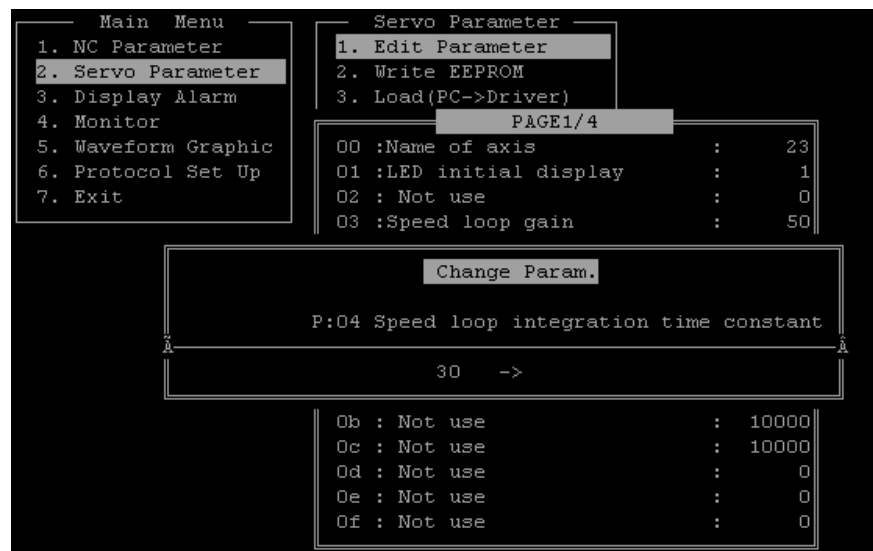
If EXIT is listed in the current display, then it is possible to leave or close the menu by activating this function (arrow key + enter or numeric input). The ESC key could also be used to end or close the menu.

2.4 Numeric Input

Parameter and position block data are entered either as decimal or hexadecimal numbers.

When inputting letters, it is not relevant whether they are upper or lower case.

Any input can be terminated with the ESC key.

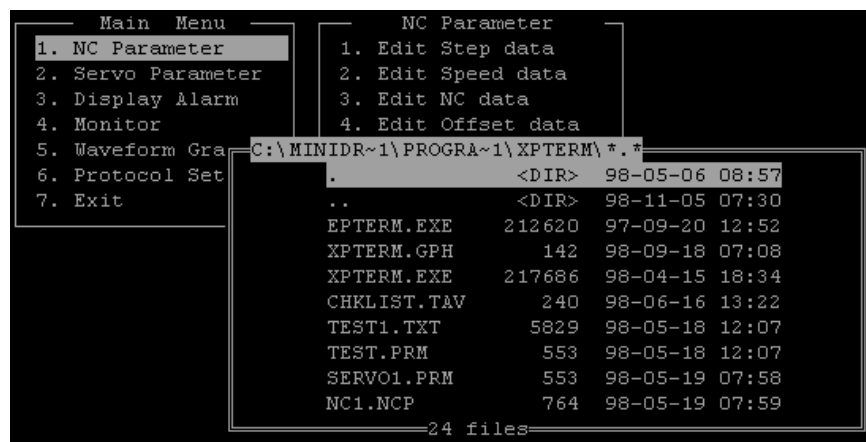


2.5 Selecting a File

This can allocate a file for either storing or loading parameters. File select is available for either „Load parameters,, or „Secure parameters,,.

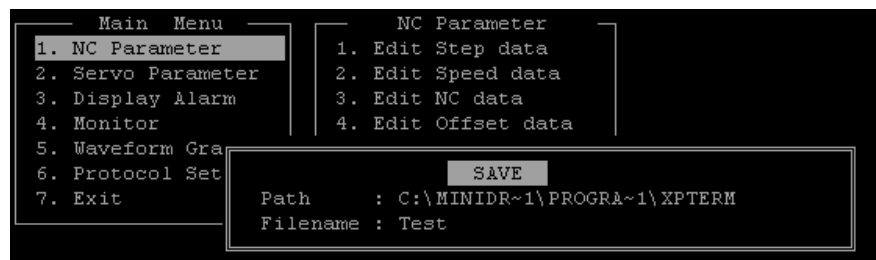
Load File (Load PC – Driver)

This mode displays the current drive and directory. The file name stored in the current directory can now be entered. If the file name is unknown, then, by pressing the „Enter key,, all files stored in this directory will be displayed. The arrow key can now be used to select a file which is then confirmed with „ENTER,,. The file selected is now loaded. „ESC,, scrolls the user back to the previous display.



Saving a File (Save Driver – PC)

This mode displays the current drive and directory. At this point, enter a directory and a file name under which the parameter is to be saved.



3 Starting and Ending the Transmission Program

3.1 Start Procedure

- (1) RS232C communications cable connection

Switch both the drive controller and the PC off and connect with the optionally available transmission cable IKS 199. For details, please see applications document DOK-Minidr-DMD/MMD, material number 282102.

- (2) Starting the transmission program

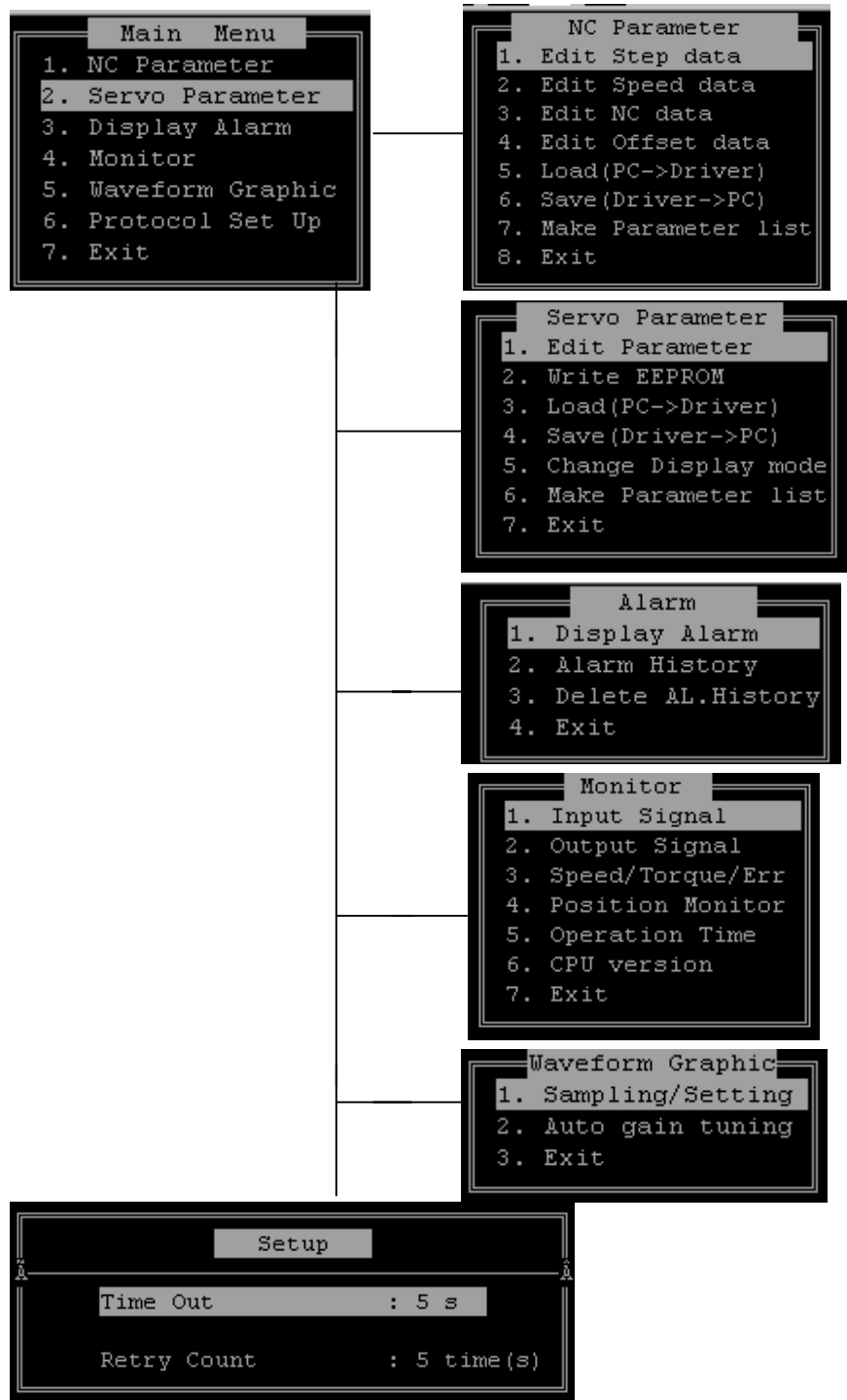
1. Switch computer and drive controller on.
2. Start MS-DOS.
3. Select drive on which Miniterm is to be installed.
4. Start transmission program with Miniterm.exe.
5. The PC model is automatically recognized.
6. Now select the controller type used and the parameters are read out of the drive controller.
7. As soon as the parameter are read, the selection menu appears.

3.2 Ending Data Transmission

1. Select EXIT using the key in the main menu and press the „ENTER,, key. Otherwise, press the „ESC,, key to reach the main menu.
2. The question is asked "Close MINITERM? (YES/NO?)"
3. End MINITERM with "Y" or continue with „N,,.
4. „Y,, brings you back to the MS-DOS display.

4 Details of the Individual Menu Items

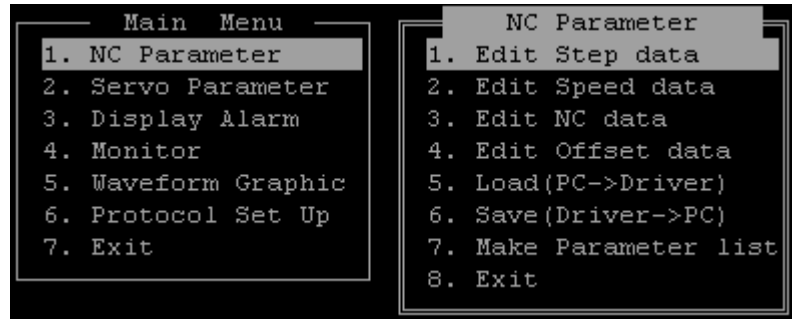
4.1 Overview of the Menu Items



Select the individual menu items with the cursor with numeric input. „ESC,, brings the user back to the previous menu item.

4.2 NC Parameters

The following illustration is meant to assist if "1st NC Parameter" in the main menu is selected.



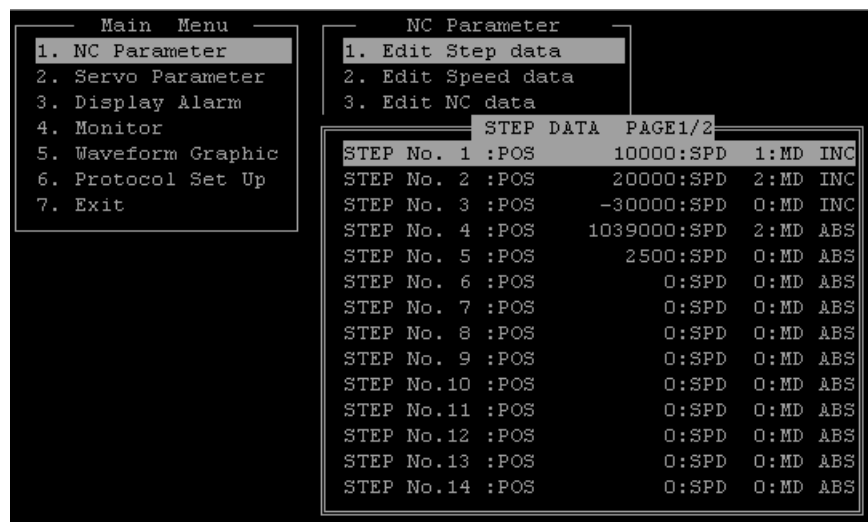
Note: If menu item „1st NC parameter,„ is activated, then drive functions will not run.

Selecting Positioning Blocks

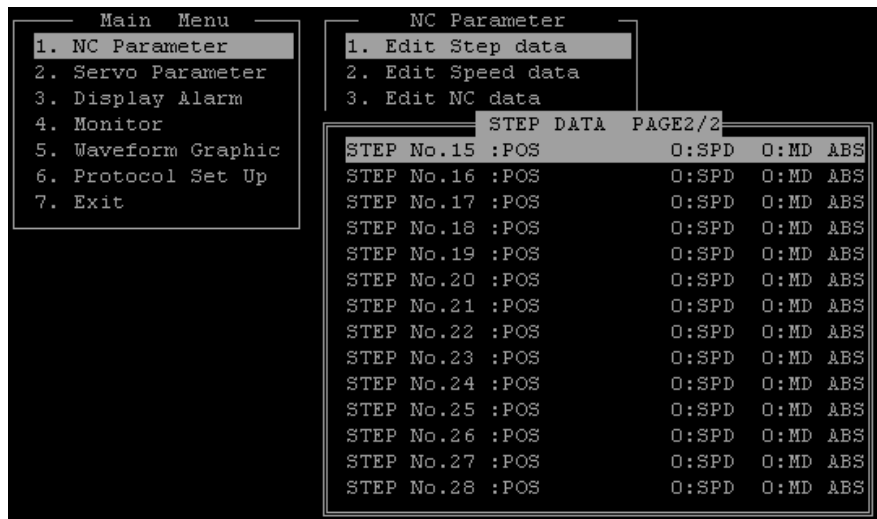
Traversing distances or positions can be allocated at this point to the individual positioning blocks.

That positioning block which is to be processed is selected with the cursor and confirmed with „Enter,„

The page can be changed using the „RIGHT/LEFT,„ key.

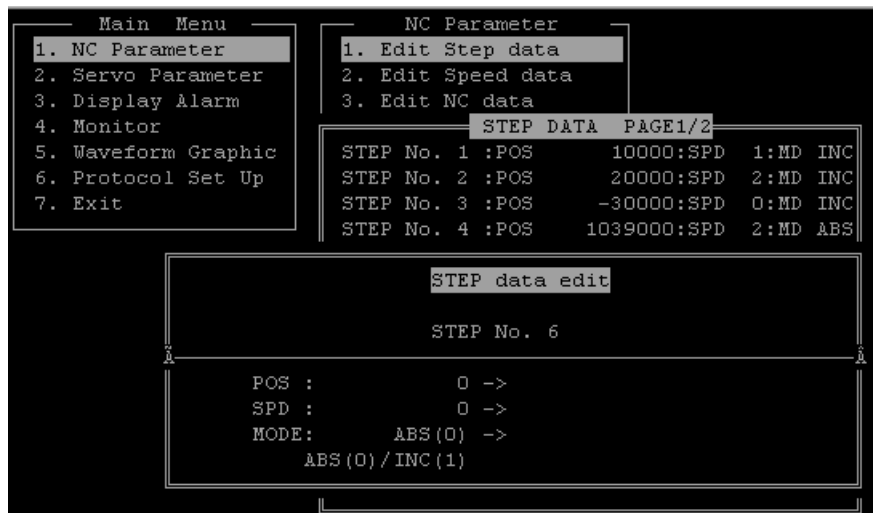


This is how the display reads after the page has been changed with the „Right/left,„ key.



Select the positioning block with the cursor „Select" or leave the menu item with the „ESC,, key.

Inputting Positioning Block Data



After the data has been entered, it is accepted with the „Enter key,, bringing the user to the next piece of information which can be changed.

If the data, e.g., position is not be changed, then press the „Enter key,, without previously changing the data.

Inputting Speed Data

Jogging and homing velocities as well as ten different positioning block speeds can be entered here.

Select that speed which is to be changed using the „Cursor,, and confirm with „ENTER,,. Now enter the data and also confirm with „ENTER,,.

```

Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform Graphic
6. Protocol Set Up
7. Exit

NC Parameter
1. Edit Step data
2. Edit Speed data
3. Edit NC data

SPEED DATA PAGE1/1
SPEED No. 0 :ORIGIN Speed : 10
SPEED No. 1 :STEP Speed 1 : 500
SPEED No. 2 :STEP Speed 2 : 300
SPEED No. 3 :STEP Speed 3 : 0
SPEED No. 4 :STEP Speed 4 : 0
SPEED No. 5 :STEP Speed 5 : 0
SPEED No. 6 :STEP Speed 6 : 0
SPEED No. 7 :STEP Speed 7 : 2
SPEED No. 8 :STEP Speed 8 : 0
SPEED No. 9 :STEP Speed 9 : 0
SPEED No.10 :STEP Speed 10 : 0
SPEED No.11 :JOG Speed(Low) : 10
SPEED No.12 :JOG Speed(High) : 100

```

The menu can be exited with the „ESC key,,.

Inputting NC Data

Acceleration, traversing direction, jerk limit and input logic can be changed here.

Whichever NC data the user wants to change must be selected with the cursor and then confirmed with the „ENTER key,,.

New data can be entered as soon as the data block has been selected. For this purpose, use either the „ENTER,, or „SPACE keys,,.

```

Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform Graphic
6. Protocol Set Up
7. Exit

NC Parameter
1. Edit Step data
2. Edit Speed data
3. Edit NC data

NC DATA PAGE1/1
DATA No. 0 :STEP Acc Time : 100
DATA No. 1 :JOG Acc Time : 10
DATA No. 2 :ORG Acc Time : 10
DATA No. 3 :JOG dir : 0
DATA No. 4 :ORG dir : 0
DATA No. 5 :PLS dir : 0
DATA No. 6 :Teaching Pulse : 0
DATA No. 7 :S-Curve rate : 10
DATA No. 8 :INPUT Logical : 0
DATA No. 9 :Option : 0

```

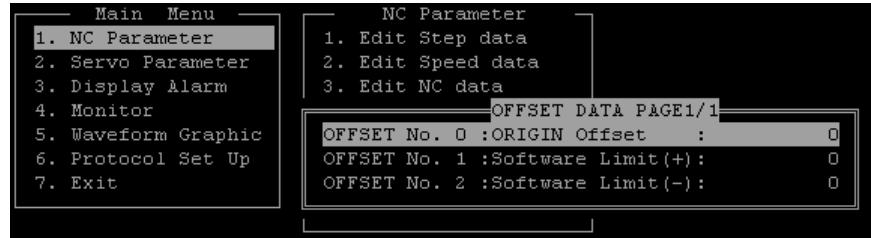
Select data block with the „Cursor,, and confirm with „Enter,,. Exit the menu item with „Esc,,.

Inputting Offset Data

Exit the menu with „ESC,,. Both the zero point offset and the software limits can be changed.

Select the data block with „Cursor,, and confirm with „Enter,,.

The new data can be entered as soon as the user has made a selection. All entries must be confirmed with „Enter,,.



Loading and Saving Parameters

Loading: Parameter data can be loaded off of a disk or a PC drive to the drive controllers.

Storing: The NC parameter data is secured from the drive onto a disk or PC drive.

If something goes wrong with the loading procedure, then the message "Selected file faulty" appears. Press any key. The file suffix for an NC parameter is ".NCP".

Generating a Parameter List

This is for outputting an NC parameter list in the form of a text file. This can be used when a list of the NC parameters is needed. The file suffix is "TXT".

An example of a parameter list (excerpt)

Date 09/21/98; Time 15:15:32

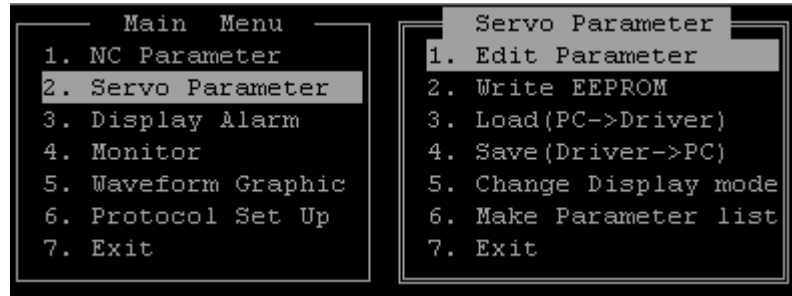
```

=====
STEP No. 1 :POS      0:SPD  1:MD ABS
STEP No. 2 :POS    50000:SPD  1:MD ABS
STEP No. 3 :POS   100000:SPD  1:MD ABS
STEP No. 4 :POS   150000:SPD  1:MD ABS
STEP No. 5 :POS   200000:SPD  1:MD ABS
STEP No. 6 :POS   250000:SPD  1:MD ABS
STEP No. 7 :POS   415000:SPD  1:MD ABS
STEP No. 8 :POS   465000:SPD  1:MD ABS
STEP No. 9 :POS   515000:SPD  1:MD ABS

```

4.3 Servo Parameters

Select menu item with cursor or numeric key and confirm with „Enter„.



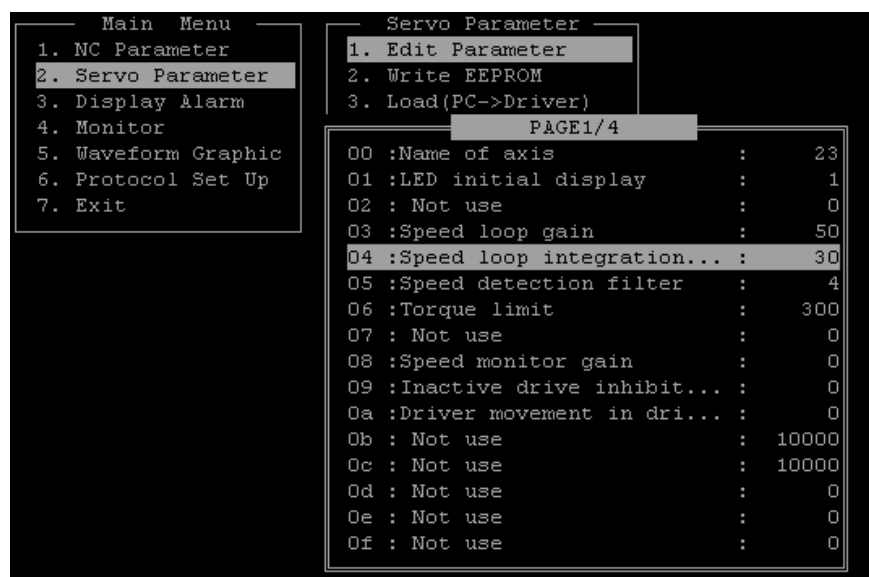
Changing Parameters

In this mode it is possible to change and display any parameter. Using the „ENTER key„, the parameter previously selected with the cursor can be activated.

The page can be changed with the „RIGHT/LEFT„ key.

Note 1) System parameters cannot be changed. Please use the „ENTER key„ when selecting these parameters.

Note 2) Some parameter changes can cause unwanted movements of the motor. Please make sure that the drive enable is removed when changing these parameters.



„ESC„ brings the user back to the previous menu.

Parameter picture after scrolling with the arrows.

```

Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform Graphic
6. Protocol Set Up
7. Exit

Servo Parameter
1. Edit Parameter
2. Write EEPROM
3. Load(PC->Driver)

PAGE4/4
30 :2nd. Speed loop gain      : 100
31 :2nd. Speed loop integr... : 50
32 :2nd. Position loop gain  : 20
33 :2nd. Gain setting        : 0
34 :Delay time for 2nd gai... : 0
35 : Not use                 : 10000
36 :Smoosing Filter Setting  : 3
37 : Not use                 : 0
38 : Not use                 : 0
39 :Pos. err limit setting... : 1000
3a : Not use                 : 0
3b :Analog monitor select    : 0
3c : Not use                 : 0
3d :Alarm movement          : 0
3e :Servo off movement       : 0
3f : Not use                 : 0

```

Storing Parameters in the EEPROM

For parameter changes to remain effective even after the voltage supply has been switched off, it is necessary to write the servo parameters into the EEPROM. This is done by selecting the menu item „Write EEPROM,, and then confirming with „Enter,,.

Loading and Storing Servo Parameters

Loading: Servo parameters are stored on the drive from disks or a PC drive.

Storing: The servo parameters are stored on a disk or PC drive.

If something goes wrong with the loading procedure, then the message "Selected file faulty" appears. Press any key. The file suffix for a servo parameter is ".PRM".

Changing the Parameter Display

It can be selected here whether the parameters are displayed as decimals or hexadecimals. Select the corresponding parameter with the cursor and by pressing the "Enter" key, the display format will be changed. The format can be entered separately for each parameter.

Generating a Parameter List

This generates a servo parameter list in the form of a text file. It can be used to print out the parameters.

The file type for the servo parameter list is ".TXT".

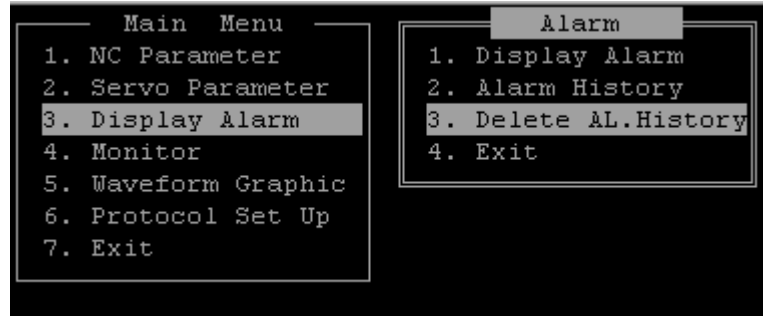
Example of a servo parameter list (excerpt)

Date 05/18/98; Time 12:07:17

Parameter name	Parameter
driver 00 :Name of axis:	0
driver 01 :LED initial display:	1
driver 02 : Not used:	0
driver 03 :Speed loop gain:	500
driver 04 :Speed loop integration time constant:	10
driver 05 :Speed detection filter:	4
driver 06 :Torque limit:	300
driver 07 : Not used:	0
driver 08 :Speed monitor gain:	0
driver 09 :Inactive drive inhibit input:	0
driver 0a :Driver movement in drive inhibit input:	0
driver 0b : Not used:	10000
driver 0c : Not used:	10000
driver 0d : Not used:	0
driver 0e : Not used:	0
driver 0f : Not used:	0
driver 10 :Power on delay:	1
driver 11 : Not used:	0

4.4 Error Message Displays

Any occurring or pending error messages can be displayed on the PC. The display for "3rd Alarm display", if selected in the main menu, is shown below.

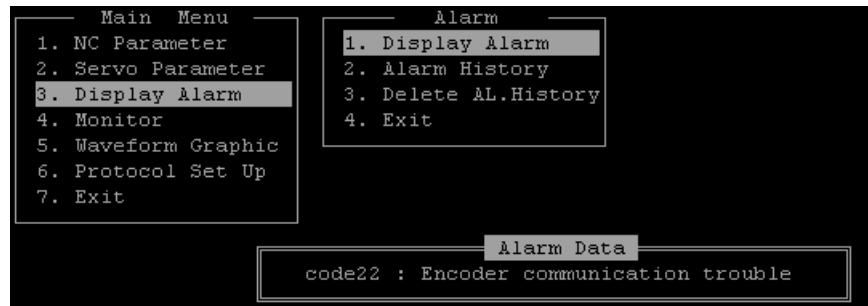


Select menu with „Cursor,, or exit with „ESC,,.

Pending Error

If menu item "1st alarm display" is selected, then pending error messages are displayed. Current errors are pending if the 7-segment display on the drive controller is blinking.

With ESC, the user can exit the alarm menu.



Current alarm display.

List of Possible Errors

If the menu "2nd Alarm History" is called up, then the eight most recent errors will be displayed.

```

Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform Graphic
6. Protocol Set Up
7. Exit

Alarm
1. Display Alarm
2. Alarm History
3. Delete AL.History
4. Exit

Alarm history
-1 time: 121h30m code022 Encoder communication trouble
-2 time: 114h 0m code022 Encoder communication trouble
-3 time: 105h30m code024 Error caused by POS.error
-4 time: 105h30m code053 Emergency error
-5 time: 105h30m code053 Emergency error
-6 time: 105h30m code053 Emergency error
-7 time: 105h30m code053 Emergency error
-8 time: 105h30m code053 Emergency error

```

The menu can be exited with „ESC„.

Note: The display does not change with a new error. To get the current error sequence it is necessary to call up the display again.

4.5 Monitoring Drive States

It is possible to query the drive here about, e.g., input/output states, speeds, position, torque and so on.

```

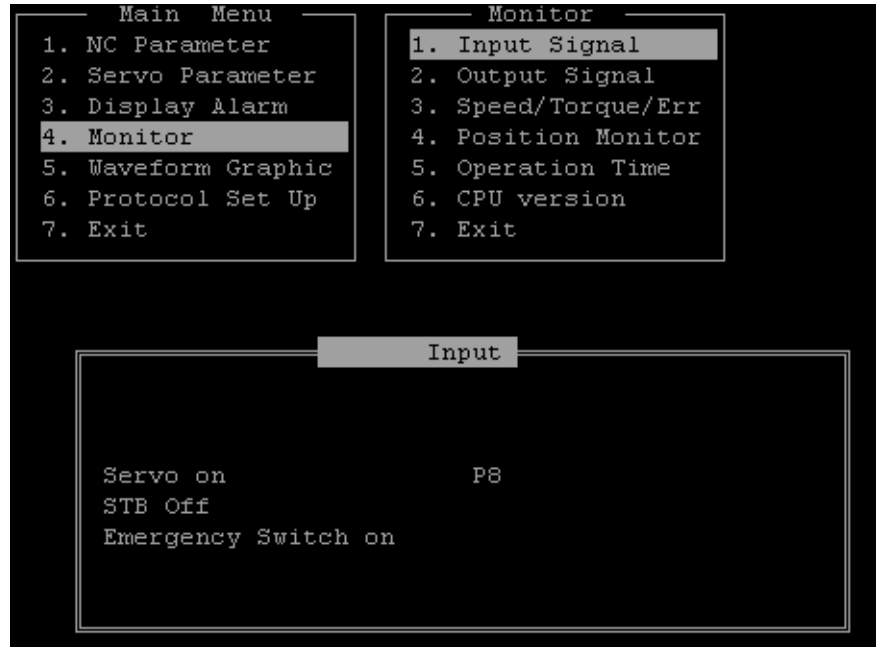
Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform Graphic
6. Protocol Set Up
7. Exit

Monitor
1. Input Signal
2. Output Signal
3. Speed/Torque/Err
4. Position Monitor
5. Operation Time
6. CPU version
7. Exit

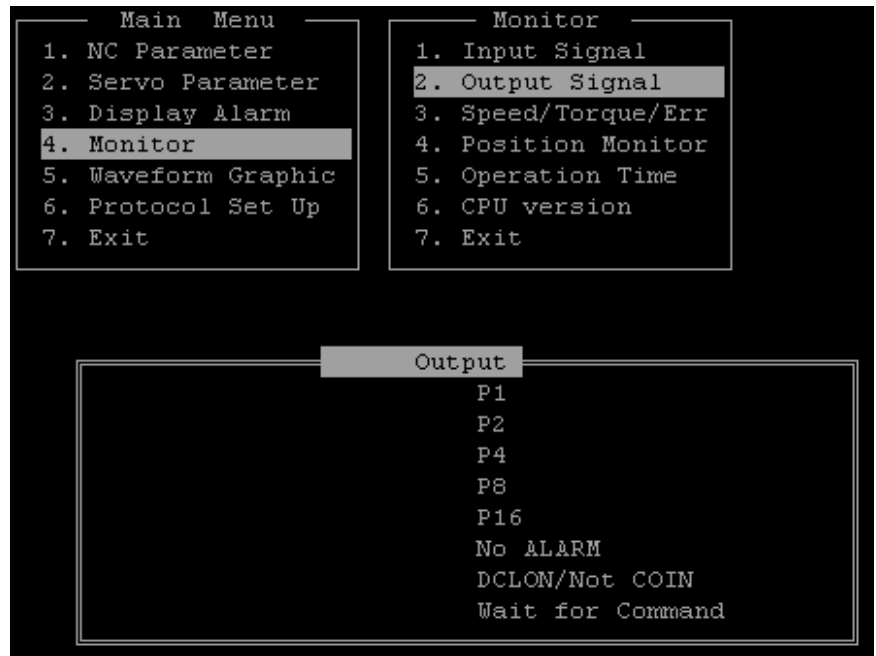
```

Input / Output States

Note: The signals to and from the servo drive can be controlled. This function simplifies the search for errors and when checking the wiring. The display can be closed with "ESC".



Displaying the inputs (pending input signals are displayed)



Drive controller outputs are displayed (outputs set by the controller are displayed)

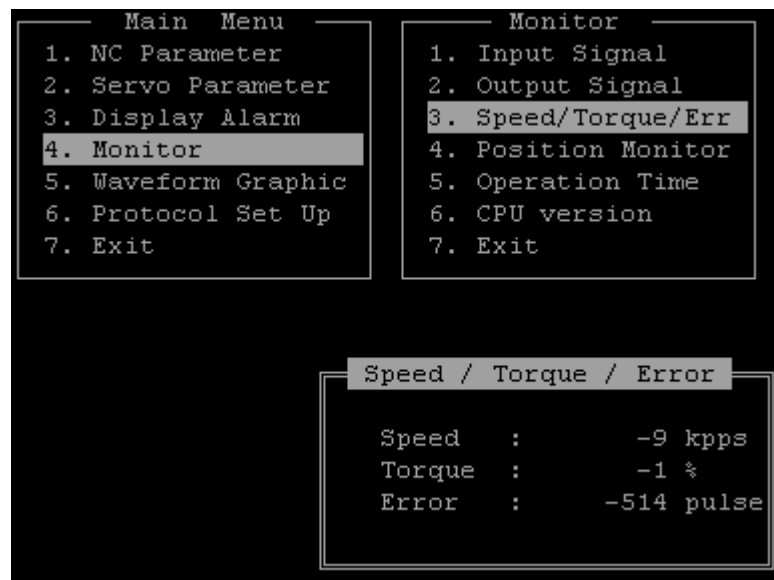
Exit these menu items with „ESC“.

Note: The current state and the displayed state are different due to the temporal delay of serial data communications.

Displaying Speed / Torque / Lag Distance

The following states can be monitored:

- Speed:** current motor speed
unit (rpm)
polarity: (+) counterclockwise / (-) clockwise
- Torque:** current torque
This displays the percent ratio (%) in contrast to the nominal torque.
polarity: (+) counterclockwise / (-) clockwise
- Lag distance:** pulse stored in the deviation counter
unit (pulse)
polarity: (+) counterclockwise / (-) clockwise

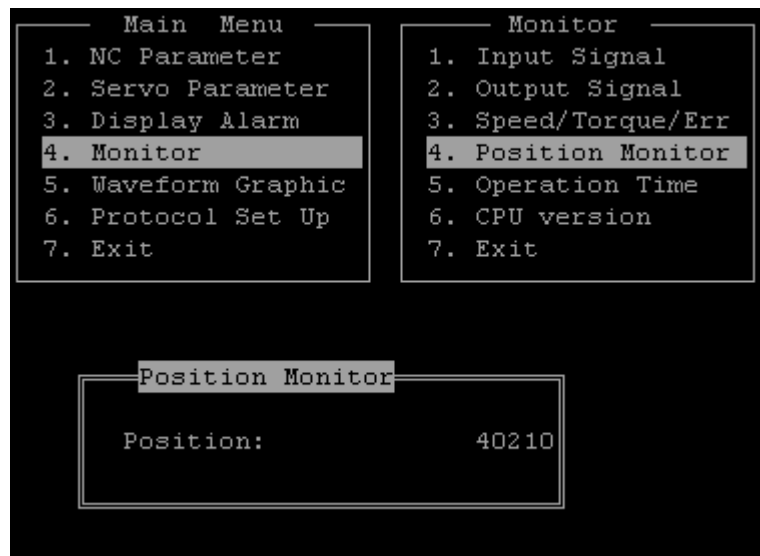


Use the ESC key to return to the main menu.

Current Position Monitoring

Note: It is possible to display the current position by selecting "4th position monitor". Return to the monitor menu with ESC.

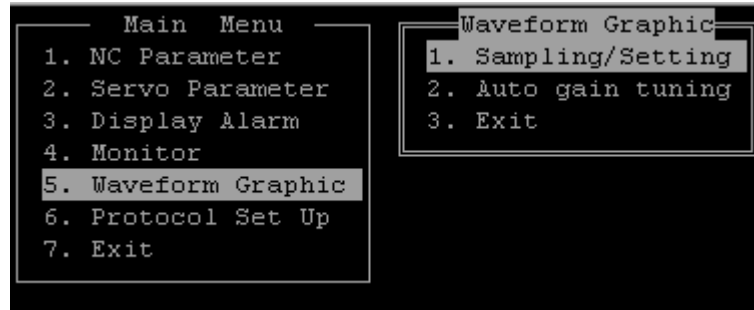
Note: The currently displayed position remains at "0" as long as the homing run has not been completed.



Close with ESC.

5 Oscilloscope Function

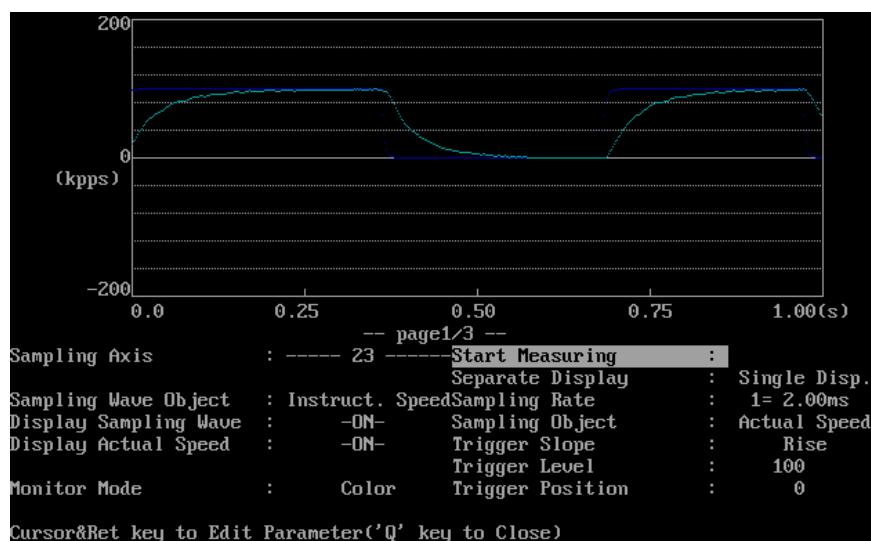
Note: The automatic gain tuning can be run and drive behavior recorded if "5th oscilloscope function", as displayed below, is selected.



5.1 Measuring / Changing Settings

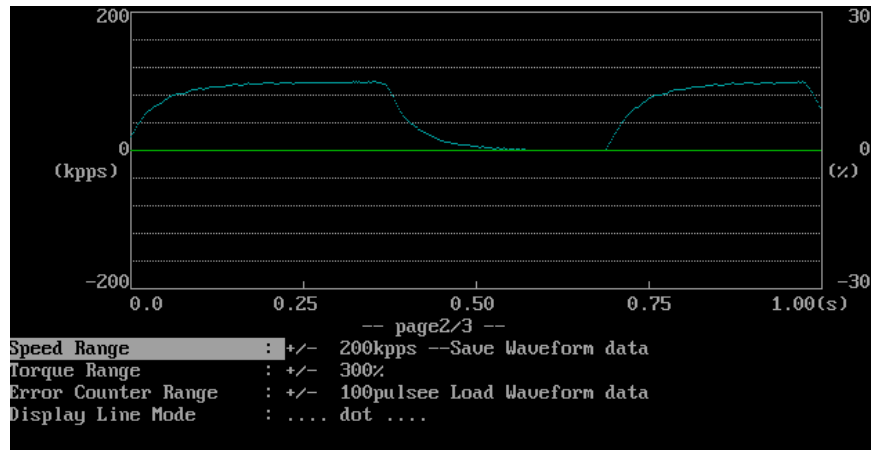
Note: Drive optimization can be conducted here and the results of the measurement stored.

1. The page can be changed with the cursor.
2. The measuring procedure is started by selecting „Start Measuring,, with the cursor and pressing „Enter,, or the „Space key,,.
3. Exit this menu with the ESC or "Q" key. The "Q" key stores the altered settings in the form of "XPTERM.GPH". The ESC key does not store the altered contents.



Sampling Axis:	Displays the selected axis.
Sampling Wave Object:	Select here which information in addition to the current speed is to be displayed. Such are, for example, command value speeds, lag distance or output torque. Use the ENTER key to switch the displayed information.
Display Sampling Wave	:The display can be switched on or off here with the „Enter key“.
Display Actual Speed:	The display of the current speed can be switched on or of here with the „Enter key“.
Monitor mode:	Select monitor display (b/w or color) here with the „Enter key“.
Start Measuring:	Measuring can be started here with „Enter,“ or „Space,“ key.
Separate Display:	With the „Enter key,“ select here whether the measured data is to be displayed in a single or two separate pictures.
Sampling Frequency:	Enter record duration (1-127 x 2.56ms) here.
Sampling Object:	The trigger signal can be selected here. By pressing the „ENTER key,“ it can be set whether triggering takes place at the current speed or not.
Trigger Slope:	The „Enter key,“ is used to select whether there is a triggering at the rising or falling edge.
Trigger Level:	The speed value at which triggering is to take place can be set here (trigger level –32768 – 32768 rpm).
Trigger Position	If no trigger point is set here, then it is not necessary to input anything. If triggering is to take place at a signal, then the start position of the recording procedure can be moved with the „Enter key,“ between 0, ¼ or ½.

Use the arrow key to switch to the next display.

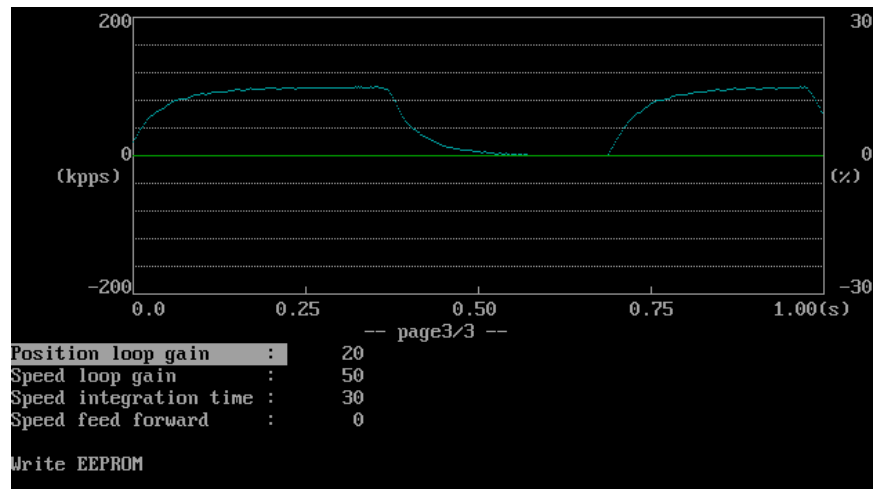


- Speed Range: The range of the measured speed can be entered here. Input 1 to 500 kilo pulses per second (6 to 3000 rpm).
- Torque Range: The torque range to be recorded is set here. Input 1 to 500%.
- Error Counter Range: The range of the deviation to be recorded is entered here in pulses. Input 0 to 1000.
- Display Line Mode: Using the "enter" key it can be fixed here whether the recorded information is to be displayed as lines or dots.
- Save Waveform Data: The measuring results can be stored in the form of a file. The file suffix is ".WAV".
- Load Waveform Data: Stored data can be read here.

Note: The following default values are preset for scaling, speed, torque and deviations:

500 rpm	speed range
100%	torque range
500 pulse	lag distance

Pressing the arrow key „right,, brings the user to the menu to execute drive optimization.



- Position Loop Gain: Use this to change position amplification (parameter 20).
- Speed Loop Gain Use this to enter a value for speed control gain (parameter 3).
- Speed Integration Time. Use this to change speed control integral action time (parameter 4).
- Speed Feed Forward: This activates the speed optimum value function (parameter 21) or changes it.
- Write EEPROM: The determined parameter values can be written onto the EEPROM with this. This is the same function as the menu item „EEPROM Write-In" in the parameter menu.

It takes about 10 to 20 seconds to send the information which has been called up to the PC. The transmission can be aborted any time with the „ESC key,,.

Note: When optimizing the drive, please see the applications document „DOK-MINIDR-DMD,,.

5.2 Automatic Gain Tuning

The automatic gain settings can be conducted by calling up menu item "2nd auto gain tuning", as shown on the monitor.

Before starting the automatic gain tuning, read the applications document and note the precautionary notes and conditions specified there.

```

Main Menu
1. NC Parameter
2. Servo Parameter
3. Display Alarm
4. Monitor
5. Waveform
6. Protocol
7. Exit

Waveform Graphic
1. Sampling/Setting
2. Auto gain tuning
3. Exit

<< WARNING!! >>
1. Applicable motor and load for this
   auto-gain tuning function is limited.
   Please refer this manual for the detail.
2. Max. motor output torque will be limited to
   the present max.
   Torque setting through the parameter and CW
   and CCW drive prohibition input become
   invalid.
3. Depending on this status, machine may cause
   the oscillation.
   In this case, turn to Servo-OFF immediately
   and return the following gain to the
   factory setting through parameter.
4. Please read this manual carefully.

Start to Automatic gain tuning?('Y'es/'N'o)

```

After you have read the above referenced safety guidelines and noted them, the auto gain tuning can be started with „Y,, or terminated with „N,,.

First, the user must enter the type of optimization (hard or soft). The higher the number the more dynamic the machine.

Once the entered number (1 to 9) has been confirmed with „Enter,, auto gain tuning begins. The drive begins to turn.

The results must now be written into the EEPROM. Write with „Y,, or terminate with „N,,.

6 Communications Settings

The serial data transmissions between your PC and the servo drive controller can be set by selecting the "6th protocol set up" in the main menu.

Note: This setting only applies to your PC.

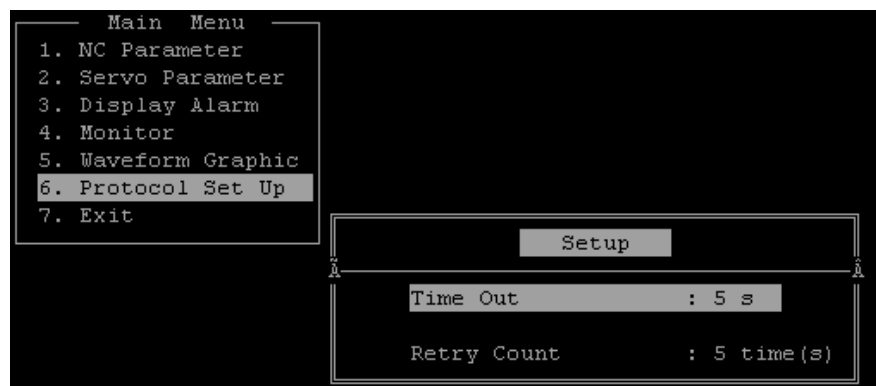
The settings look like this:

Communications timeout (setting range 1 to 255 seconds)

Communications repetition (setting range 1 to 10 times)

The value to be changed must be selected with the arrows „UP/DOWN“, a number must be entered and accepted with „ENTER“.

The output setting generally does not change.



Exit the menu with „ESC“.

7 Concluding the Transmission Program

Call up item 7 in the main menu (7. EXIT) using the arrows or by inputting a numeric value.

The question is now posed as to whether the transmission program is to be concluded or not.

By inputting „Y,, the program is concluded, an „N,, continues the program.

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