

CPS SP Configurator 2 Operation Manual

Introduction

Thank you very much for purchasing our Servo press.

This manual describes the hardware scheme, installation procedures, connections, running, operations, communication, status display and daily inspections.

Make sure to thoroughly understand the contents and use the product properly.

Request

We have taken all possible measures to ensure the contents of this instruction manual, however, please contact us if you have any questions or find any errors.

The product names, etc. are generally registered trademarks of various companies.

* To secure safety and quality, never fail to refer to this manual.

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1. Special Feature of System

The special feature of this servo press system is explained briefly.

1.1. Single controller type

The tool to 5-75kN is covered by one kind of controller.

1.2. Correspondence to data collection.

Data collection of a maximum of 31 spindles is possible by CPS SP Configurator which is exclusive application.

1.3. High-speed network

A controller is equipped with Ethernet and data collection is performed quickly.

1.4. FA network

The expansion bus can be equipped with the option card of Anybus standard. Thereby, it can correspond to various FA networks including DeviceNet.

1.5. The substantial monitor function

It has abundant system monitor functions. It is utilizable for systems analysis, such as tool speed, power supply voltage, motor current, regeneration resistance temperature, a regeneration generating state, electronic thermal, and a program execution step.

1.6. Maintenance function

The information about maintenance, such as an exchange date of a backup battery, net backup time, and a cooling fan's total hours worked, is managed inside.

1.7. New program language

Since it corresponded to the various usages, program language was made new. In the former, the impossible fine control is possible.

1.8. Zone judging

A judgment zone is set up in the domain of stroke-load and a continuous judgment of O.K./NG is possible. A zone table can be set up to 32 pieces and can create a zone easily from real operation data.

1.9. Various tables

It has a position, load, and the speed table 32 pieces, respectively. If it describes that a program sets up various parameters on a table, parameter change of a program can be simply performed by edit of a table.

2. Setup

2.1. PC and OS type

PC for installation of this software is IBM PC/AT compatible machine. Moreover, operation is checked by the following OS, Windows XP/Vista/7/8/8.1. In Vista, 7, 8 and 8.1, if installed in Program Files folder, it will not work well. Please be careful.

2.2. Environment of operation

Give the recommendation value of OS as a standard about CPU clock and memory capacity. Hard disk availability 50MB or more is a standard. Moreover, LAN i/f is needed.

2.3. Installation

Please execute SETUP.EXE or CPS_CFG2_En.MSI of a setup disk. When you use together with an old version, please set aside the folder of an installation place. If the same folder is chosen, an old version will be overwritten and it will be impossible to use it.

2.4. Windows Firewall

Windows firewall displays warning about a communicative block at the time of the first starting after installation. Please choose "Unblock". When "Keep blocking" is chosen, the communication with a controller is impossible. In this case, please call the setting screen of Windows firewall from a control panel, and add the executive file -SP_CFG2.EXE of this application to the exceptions.

2.5. Possible operation

The following operations are possible.

- Monitor of sensors, I/O and a result.
- Data collection.
- Tool type setup.
- Edit of various tables and programs.
- Change of the parameter of a part of tool table.
- Proofreading of a load cell.
- Manual operation.
- Management of maintenance information.

2.6. Restriction matter

2.6.1. Operation authority

Restrictions can be hung on a function by setting up operation authority.

| Operation authority | Possible operation |
|---------------------|------------------------------|
| Only monitor | Only monitor is possible. |
| All operations | All operations are possible. |

Operation is restricted by un-displaying of a menu and an operation button. In

the following explanation, the screen in which all operations are possible is used. Please be careful.

2.6.2. Data collection

If CPS-SP-75xB and CPS SP Configurator Ver1.02.xx are used, a product name, a product serial number, etc. can collect as numerical data. License registration is required to use this function. Even if it does not register a license, the conventional numerical data item is collectable.

2.6.3. Data format

Data format differs between CPS SP Configurator Ver1.01.xx and Ver1.02.xx. The file of a different format cannot be displayed mutually. When seeing the data of Ver1.01, we recommend you to use Ver1.01 or to change into CSV file.

2.7. Attachment of a backup battery

The contents of a setting to a controller are held by the backup battery. Although various setup is explained to below, when not equipped with the backup battery, if a control power supply is turned off, the contents of a setting will disappear in some dozens of seconds. Please equip with a backup battery and check normal backup operation first.

2.7.1. The method of equipping

Wearing of a backup battery should be performed in the state of control power supply ON. If it equips with a backup battery in the state of control power supply off, a backup circuit will not carry out normal operation, but superfluous consumption of a battery will be caused.

Please equip CN11 of the front panel lower part with a backup battery. Please equip for a red lead to turn up.

2.7.2. Check of operation

The check with normal backup operation is performed after attaining the communication between a controller and PC. It is explained by the last of a communication setup of Chapter 3.

3. Communication setup

A communication setup with a controller and PC is explained.

3.1. Cable

We recommend you selection of LAN connection. Although connection is possible with a serial port, compared with LAN, it is far inferior in respect of communication speed. Moreover, a serial port may be occupied by other option articles.

Please use a cross cable, when you make direct connection of between a controller and PC using LAN. Please use a straight cable, when you go via a hub.

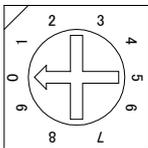
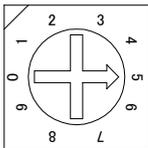
3.2. The IP address by the side of a controller

The IP address of a controller is set up as follows.

192.168 .55. (spindle number)

3.2.1. A spindle number

CPS controller is connectable with the same communication system to 31 sets. In this case, in order to discriminate each controller, it is necessary to set up a spindle number.

| How to set up an spindle number | |
|--|---|
| <p>The front of a controller</p> <p>IDx10</p>  <p>IDx1</p>  | <p>With the left figure, it has set up with the axial number 5.</p> <p>IDx10 is the beam of 10. IDx1 is the beam of 1.</p> <p>Please set up an axial number in one communication system not to overlap. Duplication of an axial number starts a communication error.</p> <p>Please set up the number between 01-31. In the other setup, it becomes an error.</p> |

* When a master number and a spindle number are changed, a new number becomes effective after re-starting of a controller.

3.2.2. Default gateway

The default gateway of the controller is 192.168.1.1.

3.3. The IP address by the side of PC

Please set the IP address by the side of PC as a fixed IP address. Be careful for it not to overlap with the IP address by the side of a controller.

| | | |
|----------------------|-------------|-------------|
| Example of a setting | IP address | 192.168.1.1 |
| | Subnet mask | 255.255.0.0 |

A subnet mask is set up with 255.255.255.0 by the default. This setup can also communicate normally except for a part of function. A part of function means functions which uses broadcasting commands, such as alarm reset and battery reset.

3.4. The IP address by the side of application

It is necessary to specify the controller for communication also by the application side. The setting method is explained.

Selection of a pull down menu Setup-Data collection-Communication setup of a main screen displays a figure 3-1 Communication setup screen.

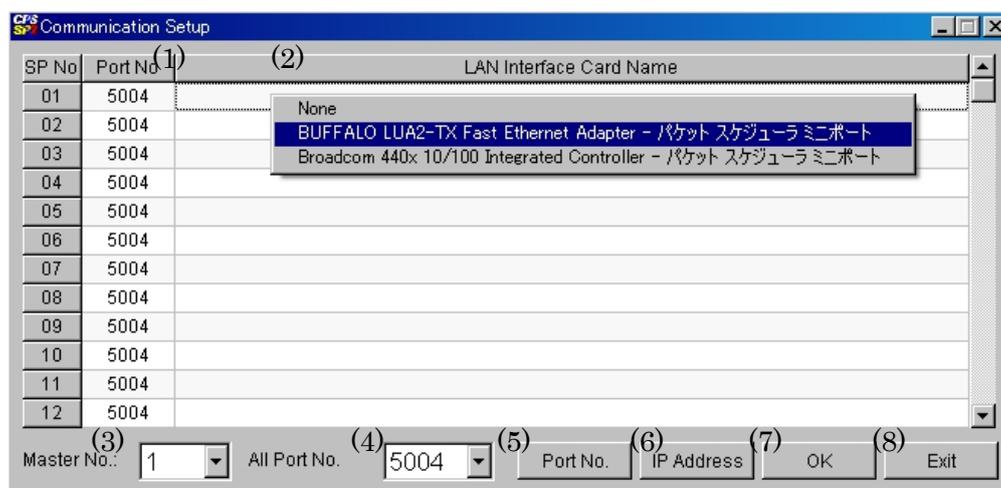


Fig.3-1 Communication setup screen

| No. | Item | Explanation |
|-----|-------------------------|--|
| (1) | Port No. | Please specify LAN port number. A floating window is displayed by a right click. 5004 to 5007 can be set up. |
| (2) | LAN Interface Card Name | The network interface card used for the communication between this application and CPS controller can be specified. The network interface card name is displayed on a floating window by right click. It is convenient if you use this function in PC equipped with two or more network interface cards. |
| (3) | Master No. | An IP address is decided as follows by the master number. 192.168 .(master number +54). (spindle number) Please refer to the IP address by the side of the controller of Chapter 3 [2]. |
| (4) | All Port No. | The port number of all spindles is set up collectively. |
| (5) | Port No. | It is used when setting arbitrary Port No. to a controller. Refer to 7-7-1 for the details about this. |
| (6) | IP Adrs. | It is used when setting arbitrary IP addresses to a controller. Refer to 7-7-1 for the details about this. |
| (7) | OK | A setup is reflected and a screen closes. |
| (8) | Exit | A setup is canceled and a screen closes. |

3.5. Communication check

If a communication setup is completed, it will check that communication is actually performed normally.

Selection of the pull down menu Setup-Data Collection-Receive Filter of a main screen displays a figure 3-2 Receive Filter screen. The object spindle of data collection is set up on the receive filter screen. In order to collect data, polling of the status of an object spindle is carried out at intervals of fixed time. In Fig. 3-2, it is a setup which collects data to the spindle number 1.

The data items collected differs by the software versions of a controller. Please set up the version suitable for the controller of each spindles correctly. When the version is not set up correctly, data collection is not performed normally. The software version of a controller can be checked on the maintenance information screen and the connected spidles list screen.

| Spdl. No. | Numerical | | Wave | | | | CPS |
|-----------|-----------|-------|---------|-------|--------|------|---------|
| | Recive | Judge | Recieve | Judge | PrgNo | Zone | Version |
| 01 | Yes | ALL | 4 | ALL | ALL | Yes | 1.02 |
| 02 | No | ALL | 2 | ALL | Select | No | 1.02 |
| 03 | No | ALL | No | ALL | ALL | No | 1.02 |
| 04 | No | ALL | No | ALL | ALL | No | 1.02 |
| 05 | No | ALL | No | ALL | ALL | No | 1.02 |
| 06 | No | ALL | No | ALL | ALL | No | 1.02 |
| 07 | No | ALL | No | ALL | ALL | No | 1.02 |
| 08 | No | ALL | No | ALL | ALL | No | 1.02 |
| 09 | No | ALL | No | ALL | ALL | No | 1.02 |
| 10 | No | ALL | No | ALL | ALL | No | 1.02 |

Fig.3-2 Receive Filter screen

Next, a check is put into pull down menu Setup-Data Collection-Collection of a main screen. Please refer to Fig. 3-3 Collect. Data collection is started by this setup.

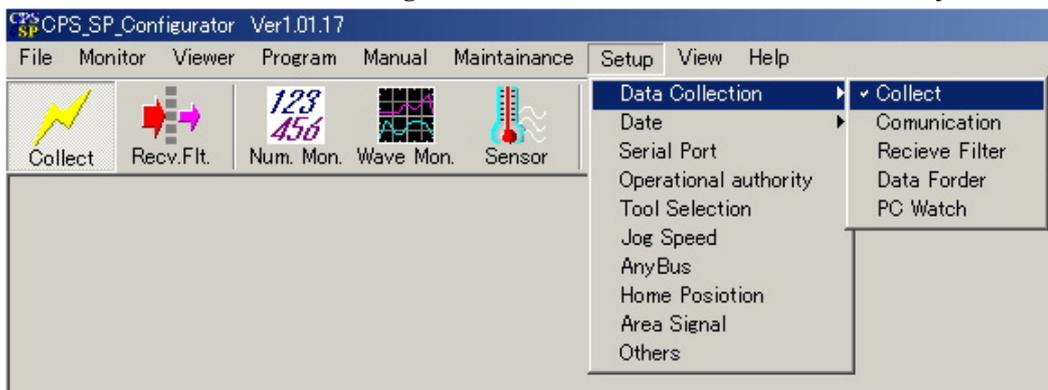


Fig. 3-3 Collect

The state of data collection is displayed on the status bar of the main screen lower part. The status bar is shown in Fig. 3-4.



Fig. 3-4 Status bar

| No. | Item | Explanation |
|-----|-----------------------------|--|
| (1) | Spindle number | The spindle number is shown. |
| (2) | Status | The status of the spindle displayed on (1) is shown. Nothing is displayed when normal. When communication is not normal, it is displayed as "Error." |
| (3) | Existence of numerical data | The existence of the numerical data of the spindle displayed on (1) is shown. |
| (4) | Existence of waveform data | The existence of the waveform data of the spindle displayed on (1) is shown. |
| (5) | Alarm message | The alarm message of the spindle displayed on (1) is shown. |

When communication is not normal, please check the contents of Chapter 3 once again.

3.6. Correspondence to abnormalities

3.6.1. Reset operation

If a power supply is switched on, without setting a tool type etc. to a controller, various errors may come out. Please cancel these by error reset operation. It is reset by Nannual-Alarm reset of the pull down menu. Moreover, when it equips with a backup battery first, it may be in a battery unusual state. This is resettable by Manual-Battery alarm reset of the pull down menu. Battery

alarm remains, unless reset operation is carried out. Trouble is not in operation in the state of battery alarm.

3.6.2. Check of operation

Backup operation is checked by the clock function. A figure 3-5 Date Setup screen is displayed by Setup-Date-Setup Date of the pull down menu. If the spindle number is set up and a Send button is pushed, the time of PC will be set as a controller. Please turn off a power supply and wait 1 minute or more. A power supply is re-switched on after that, and if the time of a controller and the time of PC are in agreement, the backup function will operate normally.

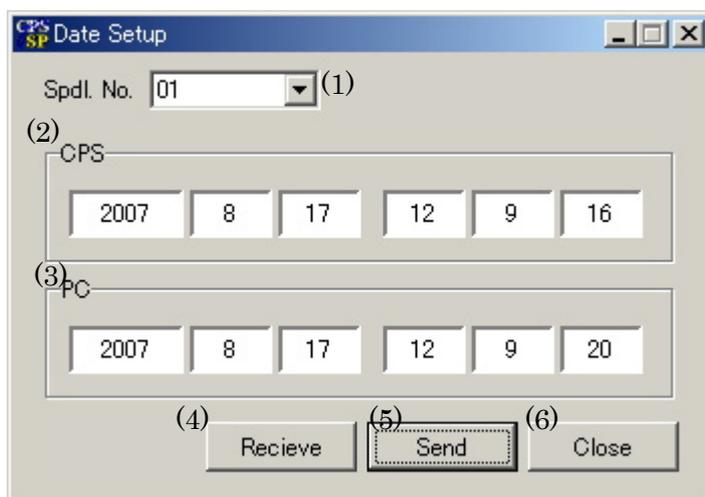


Fig. 3-5 Date Setup screen

| No. | Item | Explanation |
|-----|-----------------|---|
| (1) | Spindle number | The spindle number for communication is chosen. |
| (2) | Controller date | The date of a controller is displayed. |
| (3) | PC date | The date of PC is displayed. * |
| (4) | Recieve | The date of a controller is received. |
| (5) | Send | The date of PC is transmitted to a controller. |
| (6) | Close | The screen is closed. |

* Although a date and the display form of time can be arbitrarily set up with PC, please set it as the following display form in this system. Unless it chooses the right display form, a date cannot be set up to a controller.

Date yy/MM/dd

Time H:mm:ss

4. Operation Procedure

Procedure required in order to work a system is explained. A system is connected correctly and a control power supply is switched on.

4.1. Setup of a clock

Please Refer to chapter 3-6-2 Communication Setup-Correspondence to Abnormalities-Operation Check .

4.2. Setup of a tool type

The figure 4-1 Tool Selection screen opens by Setup-Tool Selection of the pull down menu. Please choose the tool type connected to the controller from the list. Selection of a tool type fixes the numerical value of other items in the screen. These numerical values are read from the tool table on PC. The Max. Stroke, Acceleration Time, and Deceleration Time are correctable on this screen. If a Send button is pushed after changing numerical values if needed, it will be set to a controller.

When a tool type is changed, please turn off a power supply at once. Please switch on a control power supply again, and if you can check that communication has resumed by the status bar of the main screen lower part, push the Recieve button of the Tool Selection screen. If the latest setup is read as it is, a setup is performed normally.

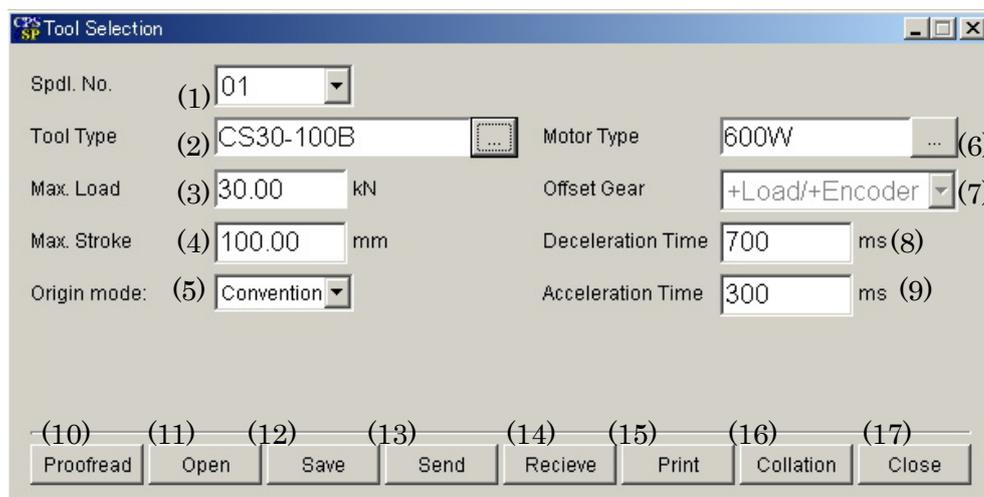


Fig. 4-1 Tool Selection screen

| No. | Item | Explanation |
|-----|-------------|---|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Tool Type | A tool type is chosen. The list of tool types is a list of the tool table in the predetermined folder of PC. Please choose the same form as the tool connected to the controller. |
| (3) | Max. Load | The maximum load which can be used with the tool of (2) is shown. |
| (4) | Max. Stroke | The maximum stroke of the tool of (2) is shown. It can change. |

| | | |
|------|-------------------|---|
| (5) | Origin mode | The sequence of origin is chosen. As for the conventional mode case, the ram goes to +direction at maximum of 20mm from the origin point. As for the contacted mode case, the ram goes to -direction at maximum of 10mm from the origin point. |
| (6) | Motor Type | The motor type of the tool of (2) is shown. |
| (7) | Offset Gear | The offset gear of the tool of (2) is shown. |
| (8) | Deceleration Time | The time required by the time it stops from the maximum speed of the tool of (2) is set up per ms. Since the generating frequency of regeneration electric discharge will go up if a numerical value smaller than initial value is set up, please be careful. |
| (9) | Acceleration Time | Time until it reaches top speed from the stop state of the tool of (2) is set up per ms. If you set it as a numerical value smaller than initial value, load should increase, and since there is a possibility of shortening the life of a system, please be careful. |
| (10) | Proofread | The proofreading screen of a load cell is called. A proofreading screen changes with tool types. |
| (11) | Open | The setting value of a tool can be saved at the file other than the original tool table. It is opened. |
| (12) | Save | The setting value of a tool is saved at the file other than the original tool table. |
| (13) | Send | The parameter about a tool is transmitted to a controller. |
| (14) | Recieve | The parameter about a tool is received from a controller. |
| (15) | Print | The details of the tool currently displayed on the screen are printed. |
| (16) | Collation | A setup of a controller is compared with the contents currently displayed on this screen. |
| (17) | Close | The screen is ended. |

4.3. Proofreading of a tool

Three kinds of tools are connectable with CPS controller. Proofreading screens differ, respectively.

4.3.1. CS series

CS series is the tool of the type with which the microcomputer is carried in load cell amplifier. Tool ID, a tool name, the proofreading value of a load cell, etc. are memorized in the microcomputer. CS series carries out the collation check of the tool name with CPS controller. When it is in agreement, proofreading value is loaded from a tool microcomputer. Therefore, it is not necessary to set up proofreading value by the user side.

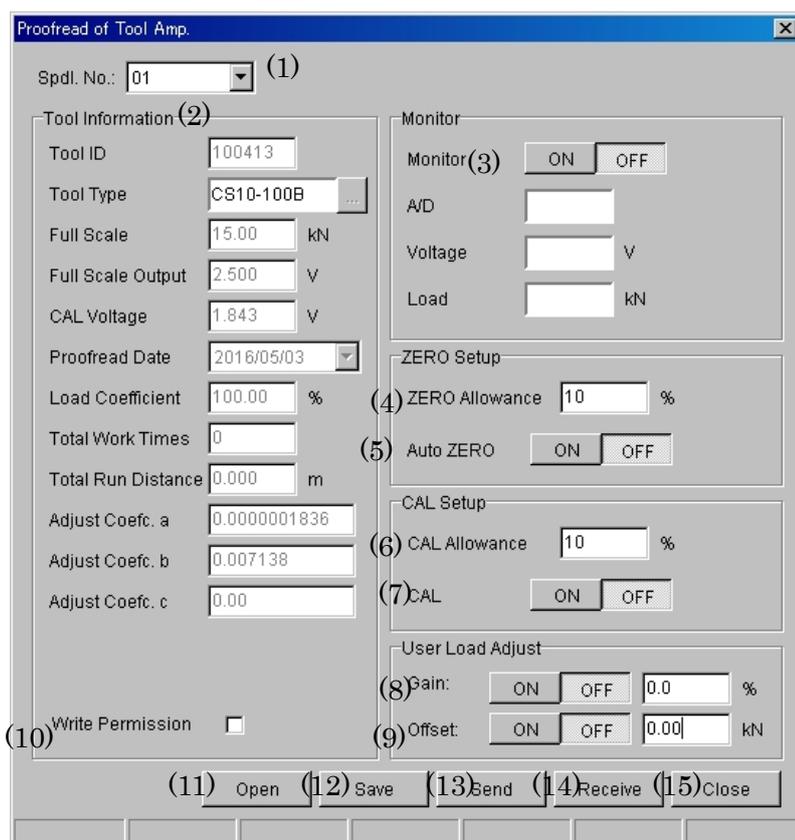


Fig. 4-2 CS series tool proofreading screen

| No. | Item | Explanation |
|------|-------------------------|---|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Tool Information | Various setting value of a tool can be checked. Change is impossible. |
| (3) | Monitor | The monitor of a load cell output is performed. |
| (4) | ZERO Allowance | The error permissible value of the load cell output at the time of no-load is shown. |
| (5) | Auto ZERO | Manual operation of auto ZERO is performed. Offset is added so that the output at the time of turning on may be made into zero. |
| (6) | CAL Allowance | The output error permissible value at the time of a calibration is shown. It is based on CAL voltage of tool information. |
| (7) | CAL | Manual operation of a calibration is performed. Please perform calibration operation after auto ZERO operation. |
| (8) | User Load Adjust-Gain | The full-scale value of tool information is multiplied by the compensation ratio, and full-scale value is rectified. The ON/off control and a compensation ratio are set up. It is equivalent to-less rectifying when 100% is set up. |
| (9) | User Load Adjust-Offset | Offset compensation of load was attained in Ver1.02.54 of CPS controller. The offset value set up here remains even if ZERO adjustment is done. Please be careful. |
| (10) | Write Permission | The range of rewriting of tool data is chosen when (13)Send button is clicked. When a check is put here, the |

| | | |
|------|---------|--|
| | | data of the (2) tool information frames is also rewritten. Proofreading value peculiar to a tool is included in the data of the tool information frames. |
| (11) | Open | The setting value of a tool can save at a file. This button opens it. |
| (12) | Save | The setting value of a tool can save at a file. |
| (13) | Send | The parameter about a tool is transmitted to a controller. |
| (14) | Recieve | The parameter about a tool is received from a controller. |
| (15) | Close | The screen is ended. |

4.3.2. SP series

Information, such as a tool name and proofreading value, is not memorized by load cell amplifier. It is necessary to tune proofreading value finely for every tool. Fig. 4-3 In IPS tool Proofread screen, (2) full scale and (4)CAL voltage are value peculiar to a tool. Since each value is indicated by the main part of a tool, please read it and set it to the Proofread screen. Load accuracy is not guaranteed unless it sets these value to thr Proofread screen correctly. If a check is put into the check box of Write Permission and Send button is pushed, the Full Scale and CAL Voltage will be set to a controller.

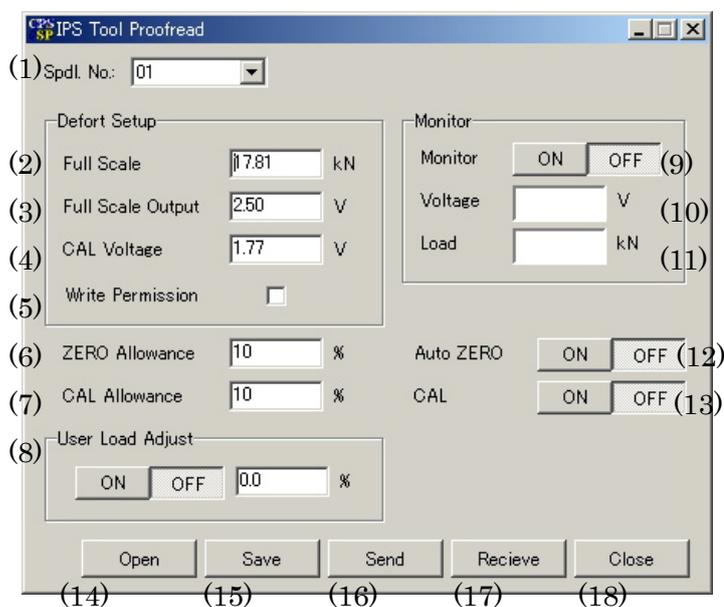


Fig.4-3 IPS Tool Proofread screen

| No. | Item | Explanation |
|-----|-------------------|---|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Full Scale | The full-scale value of a load cell is shown. Since it is value peculiar to a tool, a setup is indispensable. |
| (3) | Full Scale Output | Output voltage is shown at the time of the full scale of load cell amplifier. In IPS type tool, it is 2.5V fixation. |
| (4) | CAL Voltage | The output voltage at the time of a calibration is shown. Since it is value peculiar to a tool, a setup is indispensable. |

| | | |
|------|------------------|---|
| (5) | Write Permission | It is a protection function in the case of setting the item of (2), (3), and (4) to a controller. Even if a Send button is pushed, when there is no check in Write Prmission, the item of (2), (3), and (4) is not rewritten. |
| (6) | ZERO Allowance | The permissible value of the load cell output at the time of no-load is shown. |
| (7) | CAL Allowance | The output permissible value at the time of a calibration is shown. It is based on (4)CAL Voltage. |
| (8) | User Load Adjust | What multiplied (2)Full Scale value by the compensation ratio can be treated as full-scale value. The ON/off control and a compensation ratio are set up. |
| (9) | Monitor | The monitor of a load cell output is controlled. |
| (10) | Voltage | It is the monitor value (voltage) of a load cell output. |
| (11) | Load | It is the monitor value (kN) of a load cell output. |
| (12) | Auto ZERO | Auto ZERO is operated manually. The output at the time of turning on serves as zero. |
| (13) | CAL | Calibration is operated manually. Please operate Calibration after auto ZERO operation. |
| (14) | Open | The setting value of a tool can be saved at the file other than the original tool table. It is opened. |
| (15) | Save | The setting value of a tool is saved at the file other than the original tool table. |
| (16) | Send | The parameter about a tool is transmitted to a controller. |
| (17) | Recieve | The parameter about a tool is received from a controller. |
| (18) | Close | The screen is closed. |

4.3.3. Load-sensor-less type tool

It is the tool of the type which computes load from motor current. The microcomputer is carried for tool ID and tool name discernment. Load accuracy is $\pm 15\%$.

4.4. Setup of a program

A figure 4-4 editor screen opens by Program-Editor-New Editor of the pull down menu. A program is edited on this screen and it transmits to a controller. Please refer to the Chapter 5 program language about the grammar of a program. Two or more editor screens can be opened. The program of 31 is storable in a controller. Within a controller, a program is managed by the program number. The number of the maximum steps of a program is 128.

Please also refer to Chapter 7 [3] program (6) Automatic Generation about creation of a program. A program can be created in simple only by numerical setup.

(1)

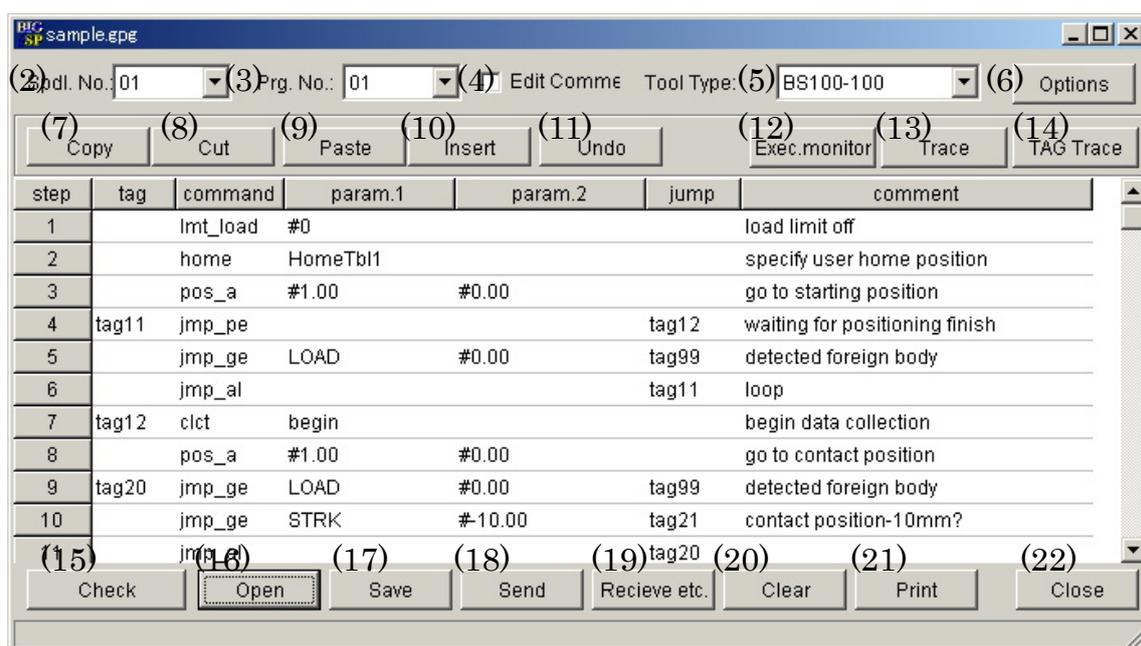


Fig.4-4 Editor screen

| No. | Item | Explanation |
|------|---------------|--|
| (1) | File name | The file name under edit is shown. |
| (2) | Spdl. No. | The spindle number for operation is chosen. |
| (3) | Program No. | The program management number within a controller is shown. |
| (4) | Edit Comment | An input assistant function is turned off in the state of a check. Please change into a check state at the time of the input of a comment. |
| (5) | Tool Type | The tool type for control is shown. It is transmitted also to a controller as header information on a program. |
| (6) | Optoin | This option can cancel restriction of the input range of load. |
| (7) | Copy | A copy function is performed. |
| (8) | Cut | A cut function is performed. |
| (9) | Paste | A paste function is performed. |
| (10) | Insert | An insertion function is performed. |
| (11) | Undo | Undo is effective once. |
| (12) | Exec. monitor | The background color of the step under execution is shown |

| | | |
|------|--------------|--|
| | | by yellow. Since the updating interval of data is 0.2 seconds, although a fine motion cannot be followed, the number of steps does not have restriction. |
| (13) | Trace | An execution monitor's result is reproducible with this function. |
| (14) | TAG Trace | An execution result is traceable by tag number with this function. Only when tag number is updated, tag number is recorded to a trace buffer. Therefore, a loop portion is not recorded. However, performed tag number can be traced, without leaking. |
| (15) | Check | The grammar of a program is checked. When there is an error, the part which has an error as shown in Fig. 4-5 is pointed out. |
| (16) | Open | The program file in PC is opened. |
| (17) | Save | It saves as a file at PC. |
| (18) | Send | A program is sent to a controller. Before sending, a program is surely checked. When there is an error, it cannot send to a controller. |
| (19) | Receive etc. | The program list in a controller is displayed.(Fig. 4-6) |
| (20) | Clear | The contents of an editor screen are all eliminated. |
| (21) | Print | The contents of an editor screen are printed. |
| (22) | Close | The screen is closed. |

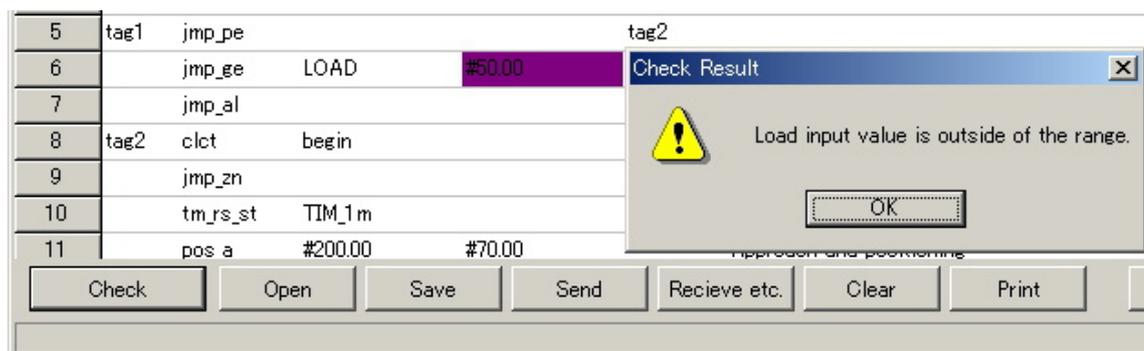


Fig.4-5 Program check result

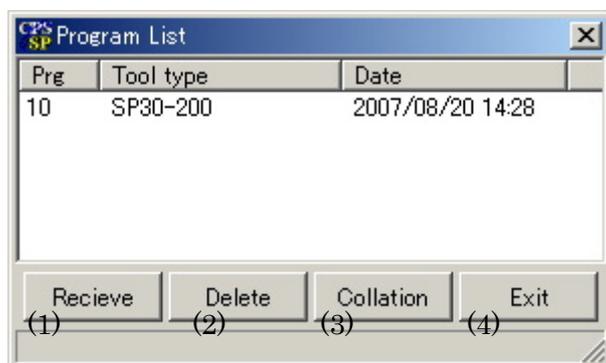


Fig.4-6 Program list

| No. | Item | Explanation |
|-----|---------|---|
| (1) | Recieve | The selected program is received from a controller and it |

| | | |
|-----|-----------|--|
| | | displays on an editor screen. |
| (2) | Delete | The selected program is deleted from a controller. |
| (3) | Collation | The selected program is compared with the program currently displayed by the present editor. When there is disagreement, a collation result is displayed as shown in Fig. 4-7. |
| (4) | Exit | The screen is closed. |

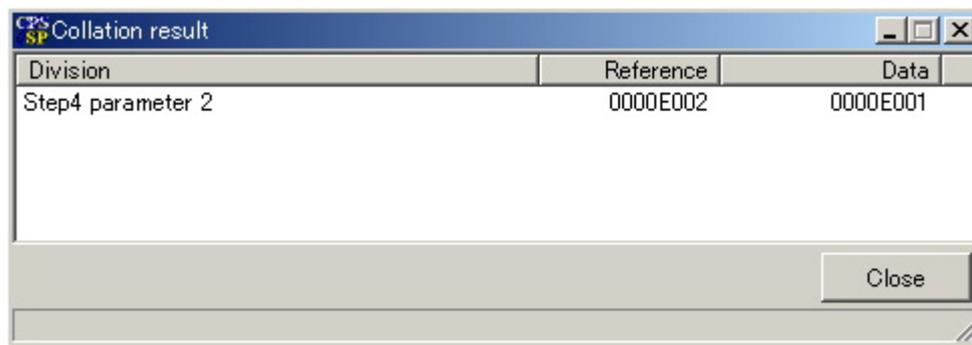


Fig.4-7 Program collation result

4.5. Setup of a result monitor

If a setup about data collection is performed, the monitor of a numerical value and a waveform is possible at the time of program execution. It sets up with the Setup-Data Collection-Receive filter of the pull down menu. Please refer to the figure 3-2 Receive filter screen of 3-5.

4.6. Execution of a program

Although execution of a program is usually controlled by PI/O, if a program execution function is used, even when neither wiring of PI/O nor the sequence by PLC will be completed at the time of system starting, operation with a servo press simple substance can be checked. Fig 4-8 Execute Program screen opens by Program- Execute Program of the pull down menu.

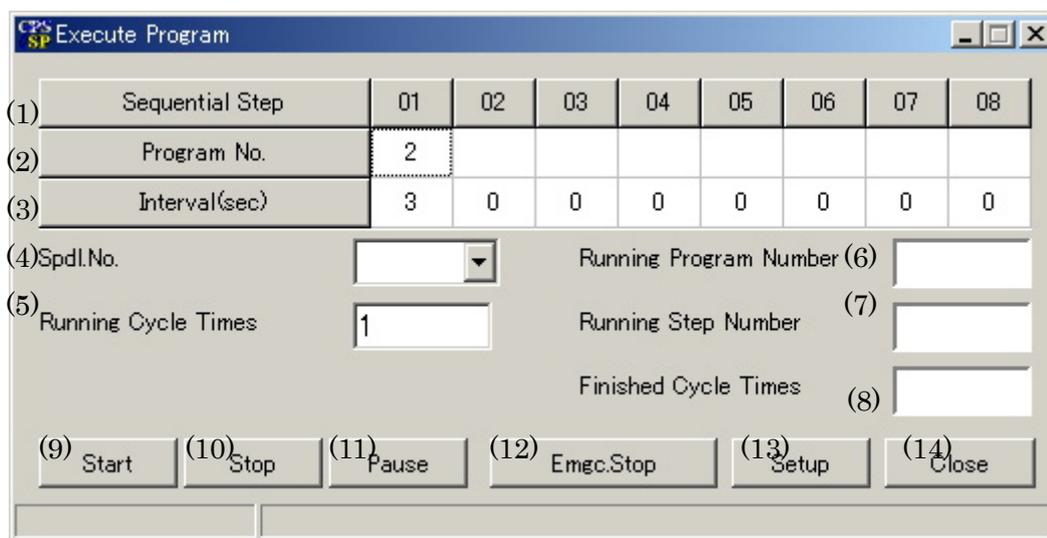


Fig4-8 Execute Program screen

| No. | Item | Explanation |
|------|------------------------|---|
| (1) | Sequential step | Eight programs are controllable within a sequence. |
| (2) | Program No. | The program number performed at each step is shown. |
| (3) | Interval | The execution waiting time between steps is shown. |
| (4) | Spindle No. | The spindle number for control is shown. |
| (5) | Running Cycle Times | The number of cycles to perform is set up. |
| (6) | Running Program Number | The program number currently performed is shown. |
| (7) | Running Step Number | The step number in the program currently performed is shown. |
| (8) | Finishe Cycle Times | The already performed number of cycles is shown. |
| (9) | Start | Execution of a sequence is started. |
| (10) | Stop | Execution of a sequence is stopped per cycle. |
| (11) | Pause | Execution of a sequence is paused per step. Pause button is clicked again or a click of a Start button, then execution of a sequence are resumed. |
| (12) | Emergency Stop | Execution of a sequence is stopped immediately. |
| (13) | Setup | The screen which sets up the disposal in NG judging is opened. |

| | | |
|------|-------|-----------------------|
| (14) | Close | The screen is closed. |
|------|-------|-----------------------|

4.7. Check of a result

If a program is performed in the state of data collection execution, numerical monitors, such as peak load and a peak stroke, and waveform monitors, such as the load of program execution process and a stroke, are possible. Refer to the Chapter 7-2 Monitor for the details about them.

5. Program Language

5.1. Outline

A program consists of a maximum of 128 steps. Each step consists of tag number, a command code, a parameter 1, a parameter 2, and a jump address. A tag number serves as the target address of a jump command. Various commands go into a command code. As a kind of command, there are data preservation control, judgment control, mode specification of operation, a limit value setup, jump control, loading to a register, general-purpose input-and-output control, numerical operation, and timer control. Internal variables, such as speed, a position, and load, and various tables go into parameters 1 and 2. A tag number used as the jump place of a jump command goes into a jump address.

5.2. Internal variable

Numerical values, such as speed, a position, and load, are treated in a program as an internal variable of a peculiar name. All the sizes of an internal variable are 32 bits.

5.2.1. The internal variables by which the contents are updated by real time

| Name | Explanation |
|---------|---|
| SPD | Speed. |
| STRK | It is a position absolutely. |
| LOAD | Load. |
| LDRT | Load rate of change |
| EX_STRK | External position * |
| PINn | General-purpose input ch_n(n=1,2).32 bits is assigned by 1ch. |
| POUTn | General-purpose output ch_n(n=1,2).32 bits is assigned by 1ch. |
| USR_IN | What rearranged the user input in the order of the number. What can be used is only USR_IN.LL. |
| USR_OUT | What rearranged the user input in the order of the number. What can be used is only USR_OUT.LL. |

* Offset calculation of the external position EX_STRK is internally carried out so that it may become equivalent to STRK at the time of CAL execution.

5.2.2. The internal variables by which peak value is held

| Name | Explanation |
|-----------|--------------------------|
| P_STRK | Peak absolute stroke |
| P_LOAD | Peak load |
| P_LDRT | Peak load rate of change |
| P_EX_STRK | Peak external stroke |

A peak can be set as arbitrary value by load command in a program.

5.2.3. The internal variable where the minimum value is saved

| Name | Explanation |
|--------|-------------|
| B_LOAD | Bottom load |

Bottom load can be set as arbitrary value by load command in a program.

5.2.4. The internal variables saved as the final value

| Name | Explanation |
|-----------|-------------------------------|
| F_STRK | The final absolute stroke |
| F_LOAD | The final load |
| F_LDRT | The final load rate of change |
| F_EX_STRK | The final external stroke |

The last value is determined by the thing of the earliest timing of the following case.

1. The end command of data collection was executed in the program.
2. The end command was executed.
3. Program execution was interrupted for the error.

5.3. Ornamentation of I/O

About the unit of treatment of I/O, it corresponds to a bit, a byte, word, and long word. Although discernment is unnecessary since, as for operation of a bit, the command itself turns into a bit operation command, operation of a byte, word, and long word embellishes I/O, in order to discriminate. PIN1 is mentioned as an example and explained.

| Expression | The unit of treatment | Bit range to mean |
|------------|-----------------------|-------------------|
| PIN1 | long word | 0-31 |
| PIN1.H | word | 16-31 |
| PIN1.L | word | 0-15 |
| PIN1.HH | byte | 24-31 |
| PIN1.HL | byte | 16-23 |
| PIN1.LH | byte | 8-15 |
| PIN1.LL | byte | 0-7 |

This ornamentation can be used to general-purpose input and output and I/O register. Please embellish after loading the target variable to I/O register, when it embellishes other variables.

5.4. Internal variable register

The exclusive registers for saving, calculating and outputting an internal variable

are prepared. Those data sizes are 32 bits. Four registers are prepared at a time about all internal variables. It is the range of n=1-4.

5.4.1. Numerical preservation

The register of n= 1 is saved as numerical data. Moreover, only within load and a stroke, the register of n= 2 is also saved as numerical data.

5.4.2. Allotment to a judgment table

The register of n= 1 has the allotment to a judgment table, and is applicable to a judgment of O.K./NG. Moreover, only within load and a stroke, the register of n= 2 also has the allotment to a judgment table.

| Name | Explanation |
|---------|--------------------|
| SPD_Rn | Speed register |
| STRK_Rn | Stroke register |
| LOAD_Rn | Load register |
| LDRT_Rn | Load rate register |
| IO_Rn | IO register |

5.5. Timer

The timer is prepared three kinds. The data size of a timer is 32 bits and is treated without a mark.

| Name | Explanation |
|---------|---------------------------------------|
| TIM_1s | The timer in a cycle of 1 second. |
| TIM_10m | The timer in a cycle of 10 m seconds. |
| TIM_1m | The timer in a cycle of 1 m seconds. |

5.6. Judgment register

It is the register where a judgment result is saved.

| Name | Explanation |
|----------|--|
| JR_TABLE | The judgment result by the judgment table is saved. |
| JR_STRK | The stroke value set to NG by the zone judging is saved. |
| JR_LOAD | The load value set to NG by the zone judging is saved. |

5.6.1. Composition of a judgment register

A corresponding bit is set to 1 when judged as NG by each judgment item.

| Item | Bit position | Explanation | Item | Bit position | Explanation |
|------------|--------------|---------------------------|------------|--------------|---------------------------|
| ZONE_JDG+ | 0 | Zone judging +NG | ZONE_JDG- | 16 | Zone judging -NG |
| P.LOAD+ | 1 | Peak load +NG | P.LOAD- | 17 | Peak load -NG |
| F.LOAD+ | 2 | Final load +NG | F.LOAD- | 18 | Final load -NG |
| B.LOAD+ | 3 | Bottom load +NG | B.LOAD- | 19 | Bottom load -NG |
| P.STRK+ | 4 | Peak stroke +NG | P.STRK- | 20 | Peak stroke -NG |
| F.STRK+ | 5 | Final stroke +NG | F.STRK- | 21 | Final stroke -NG |
| P.LDRT+ | 6 | Peak load rate +NG | P.LDRT- | 22 | Peak load rate -NG |
| F.LDRT+ | 7 | Final load rate +NG | F.LDRT- | 23 | Final load rate -NG |
| R1.LOAD+ | 8 | Load register 1 +NG | R1.LOAD- | 24 | Load register 1 -NG |
| R1.STRK+ | 9 | Stroke register 1 +NG | R1.STRK- | 25 | Stroke register 1 -NG |
| R1.SPD+ | 10 | Speed register 1 +NG | R1.SPD- | 26 | Speed register 1 -NG |
| R1.LDRT+ | 11 | Load rate register 1 +NG | R1.LDRT- | 27 | Load rate register 1 -NG |
| R2.LOAD+ | 12 | Load register 2 +NG | R2.LOAD- | 28 | Load register 2 -NG |
| R2.STRK+ | 13 | Stroke register 2 +NG | R2.STRK- | 29 | Stroke register 2 -NG |
| P.EX_STRK+ | 14 | Peak external stroke +NG | P.EX_STRK- | 30 | Peak external stroke -NG |
| F.EX_STRK+ | 15 | Final external stroke +NG | F.EX_STRK- | 31 | Final external stroke -NG |

5.7. Table

5.7.1. Judgment table

It is the table which sets up the judgment range or specifies the output bit at the time of NG to various internal variables. 32 tables can be set up in a controller. The example of a setting of a judgment table is shown below.

It can set up whether it is used about each judgment item. NG output shows the user bit output position at the time of becoming NG judging. 1-7 are setting ranges.

| Judgment item | Use | Lower limit | | Upper limit | | Explanation |
|---------------|-----|-------------|-----------|-------------|-----------|---|
| | | Value | NG output | Value | NG output | |
| ZONE_JDG | YES | | 1 | | 2 | Zone judging result. A setup of a lower and upper limit value is invalid. When not using a zone judging, a result is always set to OKing. |
| P.LOAD | NO | | | | | Peak load |
| F.LOAD | YES | 20.3 | 3 | 24.8 | 4 | Final load |
| B.LOAD | YES | 10.3 | No | 15.4 | No | Bottom load |
| P.STRK | NO | | | | | Peak stroke |
| F.STRK | NO | | | | | Final stroke |
| P.LDRT | NO | | | | | Peak load rate |
| F.LDRT | NO | | | | | Final load rate |
| R1.LOAD | NO | | | | | Load register 1 |
| R1.STRK | NO | | | | | Stroke register 1 |
| R1.SPD | NO | | | | | Speed register 1 |
| R1.LDRT | NO | | | | | Load rate register 1 |
| R2.LOAD | NO | | | | | Load register 2 |
| R2.STRK | NO | | | | | Stroke register 2 |
| P.EX_STRK | NO | | | | | Peak external stroke |
| F.EX_STRK | NO | | | | | Final external stroke |

5.7.2. Speed table

32 speed value can be set up. It can be used in a program by name called SpdTbln (n=1-32). If it is used for a speed parameter, a motion of a program can be changed by change of a speed table.

5.7.3. Load table

32 load value can be set up. It can be used in a program by name called LoadTbln (n=1-32). If it is used for a load parameter, a motion of a program can be changed by change of a load table.

5.7.4. Position table

32 stroke value can be set up. It can be used in a program by name called PosTbln (n=1-32). If it is used for a position parameter, a motion of a program can be changed by change of a position table.

5.8. Home position

Two home positions are defined. One is a system home (sys_home) common to the whole system. The remainder is the user home (usr_home) specified within a program. The starting point of usr_home is sys_home. Usr_home is specified in a program using a home position table. 32 position data is contained by the home position table. All the position data treated in a program starts from usr_home. Specification of usr_home remains in the effective state also after a program end. Please be sure to specify usr_home at the head of a program.

5.9. Brake

An electromagnetic brake is attached to a tool as an option. The brake is controllable in a program. Even if a command of brake-on is executed in a program, brakes are not applied during servo on. The brake will be applied if the brake-on command is issued when turned to servo off.

This brake is prepared for position maintenance and is not an object for braking. If used for a braking use, it will exhaust for a short time. Please be careful.

At the time of a servo error and an emergency stop, a brake is controlled by the controller side.

5.10. Command description

5.10.1. Data preservation

| | |
|---------------|--|
| Command | clct |
| Meaning | Start or an end of data collection is performed. |
| The example 1 | clct,begin |
| Description 1 | Data collection is started. Moreover, the increment of the index is carried out. |
| The example 2 | clct,end |
| Description 2 | Data collection is ended. |
| Caution | Data is not saved when there is no clct,begin/end in a program. |

5.10.2. Judgment control

| | |
|---------------|--|
| Command | zone |
| Meaning | Start of a zone judging and an end are performed. |
| The example 1 | zone,ZoneTbl2 |
| Description 1 | A zone judging is started using the zone table 2. |
| The example 2 | zone,off |
| Description 2 | A zone judging is ended. When "zone,off" are omitted, a zone judging is ended by "clct,end". |
| Caution 1 | The effective stroke range is set to the zone table. A zone judging |

| | |
|-----------|---|
| | is not performed out of the range. |
| Caution 2 | Start of a zone judging and an end do not have restriction in the number of times of description in a program. However, the number of the zones used for a judgment at once is one. The zone table specified later becomes effective. |
| Caution 3 | When jumping a program at NG processing in the case of zone judging NG, a jump command can describe. Please refer to a jump command. |
| Caution 4 | Although the stroke in the case of zone judging NG and load are saved at the register of exclusive use, an exclusive register is overwritten when execution of a program is continued. |

| | |
|---------------|--|
| Command | judge |
| Meaning | It judges. |
| The example 1 | judge,JT31 |
| Description 1 | It judges using the judgment table 31. |
| Caution | If judge command is executed, the numerical data saved as a result will be decided. Please be sure to describe in a program only once. |

5.10.3. Mode specification

| | |
|---------------|--|
| Command | origin |
| Meaning | Origin is performed. |
| The example 1 | origin |
| Description 1 | The following step is not performed until origin is completed. |
| Caution | |

| | |
|---------------|---|
| Command | spd |
| Meaning | It operates at the specified speed. |
| The example 1 | spd,SpdTbl5,ACC_ON |
| Description 1 | It operates at the speed specified on the speed table 5. It accelerates using the acceleration (acceleration time, deceleration time) specified on the tool selection screen. |
| The example 2 | spd,#10.5,ACC_OFF |
| Description 2 | It operate at 10.5 mm/s. The acceleration (acceleration time, deceleration time) specified on the tool selection screen is not used, but shifts to specification speed immediately. |
| Caution | If a sudden slowdown is carried out in ACC_OFF, excessive regeneration electric power may occur, and regeneration discharging may become impossible. Moreover, since there is a risk of giving a damage also mechanically, please be careful enough. A shock will be eased if lmt_load-load restrictions is used. |

| | |
|---------------|--|
| Command | pos_a |
| Meaning | It positions by position specification absolutely. |
| The example 1 | pos_a,SpdTbl6,PosTbl3 |
| Description 1 | At the speed specified on the speed table 6, it moves to the position specified on the position table 3. |
| The example 2 | pos_a,#20,#56 |
| Description 2 | It moves in position of 56mm by 20mm/s in speed. |
| Caution 1 | About specification of a position, a user home is a starting point. |
| Caution 2 | In positioning, the acceleration (acceleration time, deceleration time) specified on the tool selection screen is surely used. |

| | |
|---------------|--|
| Command | pos_r |
| Meaning | It positions by relative position specification. |
| The example 1 | pos_r,SpdTbl6,PosTbl3 |
| Description 1 | It moves to the position which applied the position specified to be the present position on the table 3 at the speed specified on the speed table 6. |
| The example 2 | pos_r,#20,#56 |
| Description 2 | It is in 20mm/s in speed, and moves in position of 56mm from the present position. |
| Caution 1 | In positioning, the acceleration (acceleration time, deceleration time) specified on the tool selection screen is surely used. |

| | |
|---------------|--|
| Command | srv_off |
| Meaning | A controller will be in a ser vo off state. |
| The example 1 | srv_off |
| Description 1 | A controller will be in a ser vo off state. |
| Caution 1 | In an end of a program, it will not be in a servo off state automatically. |
| Caution 2 | If srv_off is performed while ram operates, it will be in a free run state and there is danger of a collision. |

| | |
|---------------|---|
| Command | zero_cal |
| Meaning | A check of ZERO value and CAL value are performed. |
| The example 1 | zero_cal |
| Description 1 | A check of ZERO value and CAL value are performed. |
| Caution 1 | Usually, although execution of ZERO and CAL is performed before program execution according to a setup of a tool table, it is controllable also within a program. |
| Caution 2 | When you use it, please be sure to describe at the head of a program. |

5.10.4. Setup of limit value, others

| | |
|---------------|---|
| Command | lmt_load |
| Meaning | Output load is restricted. |
| The example 1 | lmt_load,LoadTbl32 |
| Description 1 | An output is restricted to the load specified on the load table 32. Immediate value can also be used for specification of load value. |
| Caution 1 | It is that load restrictions become effective from the mode command after this command description. |
| Caution 2 | If zero are specified with load restrictions, the load computed from the maximum rated torque specified on the motor table will serve as restriction value. |
| Caution 3 | Acceleration of ram may become blunt if load restrictions are set up small. Load restrictions are because it has realized with motor current restrictions internally. |

| | |
|---------------|--|
| Command | lmt_pos+ |
| Meaning | Specify stroke restrictions of + direction. |
| The example 1 | lmt_pos+,PosTbl16 |
| Description 1 | The position specified on the position table 16 is considered as a limit of the direction of +. Specification of a position is possible also at immediate value. |
| Caution 1 | A starting point is a user home position. |
| Caution 2 | Although a setup which exceeds the maximum stroke specified on the tool table is possible, it does not act effectively. |
| Caution 3 | The starting point of the maximum stroke specified on the tool table is a origin sensor. |
| Caution 4 | This setup becomes invalid after a program end. |
| Caution 5 | When it compares with lmt_pos- and inconsistency arises, it becomes an error at the time of mode command execution. |
| Caution 6 | When there is no specification into a program, the maximum stroke specified on the tool table becomes a limit of the direction of +. |

| | |
|---------------|---|
| Command | lmt_pos- |
| Meaning | Specify stroke restrictions of - direction. |
| The example 1 | lmt_pos-,#20 |
| Description 1 | The position of 20mm is considered as a limit of the direction of - from a user home position. A position table is also possible for specification of a position. |
| Caution 1 | A starting point is a user home position. |
| Caution 2 | When it compares with lmt_pos+ and inconsistency arises, it becomes an error at the time of mode command execution. |
| Caution 3 | This setup becomes invalid after a program end. |
| Caution 4 | When there is no specification into a program, -5mm becomes a limit of the direction of -. This is a position on the basis of a origin sensor. |

| | |
|---------------|---|
| Command | home |
| Meaning | A user home position is specified. |
| The example 1 | home,HomeTbl8 |
| Description 1 | The position specified on the home position table 8 is specified to a user home. |
| Caution 1 | A starting point is a system home position. The amount of offset from the origin sensor of a user home position becomes what applied the specification value in home command to the system home position. |
| Caution 2 | Only a home position table is possible for specification of a position. |
| Caution 3 | This setup is effective after completing a program. |

| | |
|---------------|--|
| Command | brake |
| Meaning | A mechanical brake is controlled. |
| The example 1 | brake,on |
| Description 1 | A brake is turned on. |
| The example 2 | brake,off |
| Description 2 | A brake is turned off. |
| Caution 1 | Even if it executes a brake-on command in the state of servo on, a brake does not operate. If it will be in a servo off state, a brake will operate. |
| Caution 2 | After completing a program, a brake command remains in the effective state. |
| Caution 3 | A brake is an object for position maintenance. There is no durability for braking. |

5.10.5. Branch control

| | |
|---------------|--|
| Command | jmp_al |
| Meaning | An unconditional jump (always) |
| The example 1 | jmp_al,tag10 |
| Description 1 | It jumps unconditionally to the step of tag10. |

| | |
|---------------|--|
| Command | jmp_eq |
| Meaning | Comparison = jump (equal) |
| The example 1 | jmp_eq,STRK,#30,tag2 |
| Description 1 | When a stroke is 30mm, it jumps to the step of tag2. |

| | |
|---------|----------------------------------|
| Command | jmp_gt |
| Meaning | Comparison > jump (greater than) |

| | |
|---------------|--|
| The example 1 | jmp_gt,STRK,#30,tag2 |
| Description 1 | When a stroke is larger than 30mm, it jumps to the step of tag2. |

| | |
|---------------|---|
| Command | jmp_ge |
| Meaning | Comparison \geq jump (greater or equal) |
| The example 1 | jmp_gt,LOAD,#10,tag8 |
| Description 1 | When load is 10kN or more , it jumps to the step of tag8. |

| | |
|---------------|--|
| Command | jmp_st |
| Meaning | Comparison $<$ jump (smaller than) |
| The example 1 | jmp_st,SPD ,#3.6,tag8 |
| Description 1 | When speed is less than 3.6mm/s, it jumps to the step of tag8. |

| | |
|---------------|---|
| Command | jmp_se |
| Meaning | Comparison \leq jump (smaller or equal) |
| The example 1 | jmp_se,P_LOAD ,#12.3,tag8 |
| Description 1 | When peak load is 12.3kN or less, it jumps to the step of tag8. |

| | |
|---------------|--|
| Command | jmp_pe |
| Meaning | Positioning end jump (positioning end) |
| The example 1 | jmp_pe,tag8 |
| Description 1 | When positioning is completed, it jumps to the step of tag8. |

| | |
|---------------|---|
| Command | jmp_of |
| Meaning | Servo off jump (off) |
| The example 1 | jmp_of,tag8 |
| Description 1 | In servo off, it jumps to the step of tag8. |

| | |
|---------------|--|
| Command | jmp_bh |
| Meaning | Bit high check & jump (bit high) |
| The example 1 | jmp_bh,PIN1.LH,#0,tag8 |
| Description 1 | When the bit 8 of the general-purpose input ch1 is high, it jumps to the step of tag8. |
| Caution 1 | The object of a bit check is restricted to general-purpose input and output and IO register. |

| | |
|---------------|--|
| Command | jmp_bl |
| Meaning | Bit low check & jump (bit low) |
| The example 1 | jmp_bl,PIN1,#14,tag8 |
| Description 1 | When the bit 14 of the general-purpose input ch1 is low, it jumps to the step of tag8. |
| Caution 1 | The object of a bit check is restricted to general-purpose input and output and IO register. |

| | |
|---------------|--|
| Command | jmp_zn |
| Meaning | Jump tag specification at the time of zone judging NG (zone) |
| The example 1 | jmp_zn,tag100 |
| Description 1 | The jump place at the time of being set to NG by zone judging is set to tag100. |
| Caution 1 | When you carry out operation other than usual by zone judging in the case of NG, please specify a jump place by this command. When there is no description of this command, even if zone judging NG occurs, it becomes the same program execution as the time of normal. |
| Caution 2 | A jmp_zn command always acts effectively after the step it was described to be in the program. It is processed in the background like processing of a zone judging. |

5.10.6. Variable operation

| | |
|---------------|--|
| Command | load |
| Meaning | A numerical value is set to a register etc. |
| The example 1 | load,LOAD_R1,LOAD |
| Description 1 | The present load value is substituted for the load register 1. |
| The example 2 | load,P_LOAD,#0 |
| Description 2 | Peak load value is set as zero. |
| Caution 1 | |

5.10.7. General-purpose input and output

| | |
|---------------|--|
| Command | out |
| Meaning | It outputs to a general-purpose output. |
| The example 1 | out,POUT1.LH,#16 |
| Description 1 | 16 is outputted to the bit 15-8 of the general-purpose output ch1. |
| The example 2 | out,POUT2,P_LOAD |
| Description 2 | Peak load value is outputted to the general-purpose output ch2. |
| The | out,POUT2.L,IO_R1.H |

| | |
|---------------|--|
| example 3 | |
| Description 3 | The bit 31-16 of the IO register 1 is outputted to the bit 15-0 of the general-purpose output ch2. |
| Caution 1 | It can be used only to a general-purpose output. |
| Caution 2 | Please arrange the bit width of an outputting agency and an output place. Operation when bit width is uneven is unfixed. |
| Caution 3 | Please use IO register, when you output an internal variable per a byte and word. |
| Caution 4 | When an output place is a system allotment bit, the state of the concerned bit does not change. |

| | |
|---------------|--|
| Command | in |
| Meaning | It inputs from a general-purpose input. |
| The example 1 | in,IO_R2.HH,PIN1.LH |
| Description 1 | The bit 15-8 of the general-purpose input ch1 is inputted into the bit 31-24 of the IO register 2. |
| The example 2 | in,IO_R3.H,PIN2.L |
| Description 2 | The low rank word of the general-purpose input ch2 is inputted into the higher rank word of the IO register 3. |
| Caution 1 | IO register and a general-purpose input are operation objects. |
| Caution 2 | An inputting agency is inputted also except a user input. |
| Caution 3 | Please arrange the bit width of an outputting agency and an output place. Operation when bit width is uneven is unfixed. |

5.10.8. Bit operation

| | |
|---------------|--|
| Command | orb |
| Meaning | Logic sum operation for every bit is performed. |
| The example 1 | orb,POUT1.LH,0x8 |
| Description 1 | The bit 15-8 of the general-purpose output ch1 and the logic sum of 0x8 are calculated, and a result is reflected in the bit 15-8 of the general-purpose output ch1. |
| The example 2 | orb,IO_R1.L,PIN1.L |
| Description 2 | The logic sum of the low rank word of the IO register 1 and the low rank word of the general-purpose input ch1 is calculated, and it is reflected in the low rank word of the IO register 1. |
| Caution 1 | IO register and a general-purpose input are operation objects. |
| Caution 2 | Please arrange the bit width of two parameters. Operation when bit width is uneven is unfixed. |

| | |
|---------------|--|
| Command | andb |
| Meaning | Logic product operation for every bit is performed. |
| The example 1 | andb,POUT1.LH,0x8 |
| Description 1 | The bit 15-8 of the general-purpose output ch1 and the logic product of 0x8 are calculated, and a result is reflected in the bit 15-8 of the general-purpose output ch1. |

| | |
|---------------|--|
| The example 2 | andb,IO_R1.L,PIN1.L |
| Description 2 | The logic product of the low rank word of the IO register 1 and the low rank word of the general-purpose input ch1 is calculated, and it is reflected in the low rank word of the IO register 1. |
| Caution 1 | IO register and a general-purpose input are operation objects. |
| Caution 2 | Please arrange the bit width of two parameters.Operation when bit width is uneven is unfixed. |
| Caution 3 | A result is not reflected in the system allotment bit of a general-purpose output. |

| | |
|---------------|--|
| Command | setb |
| Meaning | The specified bit is set to high. |
| The example 1 | setb,POUT1.LH,#0 |
| Description 1 | The bit 8 of the general-purpose output ch1 is set to high. |
| The example 2 | setb,IO_R2,#19 |
| Description 2 | The bit 19 of the IO register 2 is set to high. |
| Caution 1 | IO register and a general-purpose output are operation objects. |
| Caution 2 | A result is not reflected in the system allotment bit of a general-purpose output. |

| | |
|---------------|--|
| Command | rstb |
| Meaning | The specified bit is set to low. |
| The example 1 | rstb,POUT1.LH,#5 |
| Description 1 | The bit 13 of the general-purpose output ch1 is set to low. |
| The example 2 | rstb,IO_R2,#26 |
| Description 2 | The bit 26 of the IO register 2 is set to low. |
| Caution 1 | IO register and a general-purpose output are operation objects. |
| Caution 2 | A result is not reflected in the system allotment bit of a general-purpose output. |

5.10.9. Four arithmetical operations

| | |
|---------------|---|
| Command | add |
| Meaning | It adds. |
| The example 1 | add,LOAD_R2,#2.5 |
| Description 1 | 2.5 is added to the load register 2. |
| Caution 1 | An internal variable register can be used for a parameter 1, and an internal variable, an internal variable register, and |

| | |
|--|--|
| | immediate value can be used for a parameter 2. |
|--|--|

| | |
|---------------|--|
| Command | sub |
| Meaning | It subtracts. |
| The example 1 | sub,STRK_R3,STRK |
| Description 1 | Stroke value is pulled from the Stroke register 3. |
| Caution 1 | An internal variable register can be used for a parameter 1, and an internal variable, an internal variable register, and immediate value can be used for a parameter 2. |

| | |
|---------------|--|
| Command | mul |
| Meaning | Multiplication is performed. |
| The example 1 | mul,SPD_R2,#1.5 |
| Description 1 | 1.5 is applied to the speed register 2. |
| Caution 1 | An internal variable register can be used for a parameter 1, and an internal variable, an internal variable register, and immediate value can be used for a parameter 2. |

| | |
|---------------|--|
| Command | div |
| Meaning | Division is performed. |
| The example 1 | div,LOAD_R1,#1.8 |
| Description 1 | The load register 1 is divided by 1.8. |
| Caution 1 | An internal variable register can be used for a parameter 1, and an internal variable, an internal variable register, and immediate value can be used for a parameter 2. |

5.10.10. Timer control

| | |
|---------------|---|
| Command | tm_rs_st |
| Meaning | A timer is reset and started. |
| The example 1 | tm_rs_st,TIM_10m |
| Description 1 | "10 m second timer" is reset and calculation is started simultaneously. |

| | |
|---------------|--|
| Command | tm_stp |
| Meaning | A timer is suspended. |
| The example 1 | tm_stp,TIM_1m |
| Description 1 | The calculation of "1m second Timer" is stopped. |

| | |
|---------|--------|
| Command | tm_sta |
|---------|--------|

| | |
|---------------|---|
| Meaning | A timer is started. |
| The example 1 | tm_sta,TIM_1s |
| Description 1 | The calculation of a "1 second timer" is started. |

5.10.11. End

| | |
|---------------|--|
| Command | end |
| Meaning | A program is ended. |
| The example 1 | end |
| Description 1 | It is one or more places necessity in a program. |

5.11. The example of programs

5.11.1. Waiting for fixed time

| tag | command | Para. 1 | Para. 2 | jump | Explanation |
|------|----------|---------|---------|------|---|
| | tm_rs_st | TIM_10m | | | "10ms timer" is reset and started. |
| tag1 | jmp_st | TIM_10m | 50 | tag1 | When "10ms timer" is less than 50 (less than 500ms), it jumps to tag1. If it becomes 50 or more, it will progress to the following step (tag2). |
| tag2 | nop | | | | Nothing is performed. |

5.11.2. Positioning and the waiting for completion of positioning

| tag | command | Para. 1 | Para. 2 | jump | Explanation |
|------|---------|---------|---------|------|--|
| | pos_a | #20.00 | #35.00 | | It is positioning execution to 35.00mm in 20mm/s in speed. |
| tag1 | jmp_pe | | | tag2 | If positioning is completed, it will jump to tag2. When positioning has not been completed, it is to the following step. |
| | jmp_al | | | tag1 | It jumps to tag1 unconditionally. |
| tag2 | nop | | | | Nothing is performed. |

5.11.3. Waiting for a bit input

| tag | command | Para. 1 | Para. 2 | jump | Explanation |
|------|---------|-----------|---------|------|--|
| tag1 | jmp_bl | USR_IN.LL | #1 | tag1 | When USR_IN1 is Low, it jumps to tag1. If it is Hi, it progresses to the following step. |
| | nop | | | | Nothing is performed. |

5.11.4. Speed mode specification and waiting for load condition

| tag | command | Para. 1 | Para. 2 | jump | Explanation |
|------|---------|---------|---------|------|--|
| | spd | #40.00 | ACC_ON | | 40mm/s in speed is specified by control of acceleration. |
| tag1 | jmp_st | LOAD | #2.0 | tag1 | If load value is less than 2.0 kNs, it |

| | | | | | |
|--|-----|--|--|--|---|
| | | | | | jumps to tag1. If it is 2.0kN or more , progress to the following step. |
| | nop | | | | Nothing is performed. |

6. Menu Outline

| main | sub1 | sub2 | Function | |
|---------|---------------------|------|---|--|
| File | File Manager | | The various files used with this application are managed. | |
| | Data File Merge | | The file of a numerical value and waveform data is merged. | |
| | Data Complement | | The data which has not been collected with the obstacle of PC etc. is collected from the buffer of controllers. | |
| | Data Convert | | The file of Ver1.01 form is changed into Ver1.02 form. | |
| | Disp. Setup File | Read | | A setup of a receive filter, a work position name, etc. is read from a file. |
| | | Save | | A setup of a receive filter, a work position name, etc. is saved at a file. |
| | Close | | Application is ended. | |
| Monitor | Num. Monitor | | It acts as the monitor of the numerical value of a program execution result. | |
| | Wave Monitor | | It acts as the monitor of the waveform of a program execution result. | |
| | I/O | | It acts as the monitor of the general-purpose input and output. | |
| | Sensor | | It acts as the monitor of the various sensors. | |
| | Index | | It acts as the monitor of the number of times of program execution. | |
| | Serial Com. | | It acts as the monitor of the contents of communication of serial ports. | |
| | Connected Spdls. | | It acts as the monitor of the connection situation of each spindle, and the software version. | |
| | Wave Monitor(Multi) | | The waveform monitor of 4 screens or 8 screens can be done simultaneously. | |
| | Work Position | | The judgment result of O.K./NG for every work position is displayed on the picture of a work. | |
| | Anybus Monitor | | It acts as the monitor of the contents of communication between PLC and CPS controllers via Anybus i/f. | |
| Viewer | Num. Viewer | | The numerical file saved at PC is perused. | |
| | Wave Viewer | | The waveform file saved at PC is perused. | |
| Program | Editor | | An editor is started. | |
| | Execute | | A program is executed. | |
| | Program Tables | | Tables are edited. | |
| | Judgment table | | A judgment table is edited. | |
| | Zone | | A zone is created. | |

| | | | | |
|-------------|-----------------------|---------------|--|------------------------------------|
| | Automatic generation | | A program is automatically generated by setup of few parameters. | |
| | Exec. Multi | | A program is simultaneously performed to two or more spindles. | |
| | Post Judge | | A post judgment file is edited. | |
| Manual | I/O | | General-purpose input and output are operated manually. | |
| | Tool Operation | | A tool is operated manually. | |
| | Alarm Reset | | Alarm is reset. | |
| | Battery Reset | | Battery alarm is reset. | |
| | Brake | | A brake is operated manually. | |
| Maintenance | Information | | Preservation information is managed. | |
| | Backup | | A setup of a controller is backed up. | |
| | Alarm history | | It acts as the monitor of the alarm history. | |
| | Operation history | | It acts as the monitor of the operation history to a controller. | |
| | Origin Sensor Monitor | | The position relation between z-phase of the encoder and the origin sensor is monitored. | |
| Setup | Data collection | Collect | Collection is started or it stops. | |
| | | Communication | The communication method between PC-controllers is set up. | |
| | | Reciev Filter | The filter of the data to collect is set up. | |
| | | Data Forder | The preservation holder of collected data is set up. | |
| | | PC Watch | It sets up about the surveillance of PC of operation. | |
| | | CSV Save | A setup about the automatic preservation to CSV file is performed. | |
| | | Post Judge | Give a check if Post Judge will be used. | |
| | Date | Setup Date | A clock is set up. | |
| | | Format | A date format is set up. | |
| | Serial Port | | The serial port of a controller is set up. | |
| | Operation authority | | Operation authority is set up. | |
| | Tool Select | | A tool type is set up. | |
| | JOG | | JOG speed is set up. | |
| | Others | | Others are set up. | |
| | Anybus | | Anybus is set up. | |
| | Home | | A home position is set up. | |
| | Area Signal | | Stroke ranges of the area signal are set up. | |
| | Anybus Static Item | | Setup items for Anybus Static i/f. | |
| | View | Tool Bar | | A tool bar is customized. |
| | | Icon | | All display screens are icon-ized. |
| All Close | | | All display screens are closed. | |

| | | | |
|------|-----------------|--|---|
| | Startup Display | | When application is started, the monitoring screens displayed automatically are set up. |
| Help | Help | | The help is displayed. |
| | Licens | | License registration of the data collection function extended by Ver1.02 is performed. |

7. Functional Details

7.1. File

7.1.1. File Manager

Although many files were treated in this application, the management function of a file was collected.

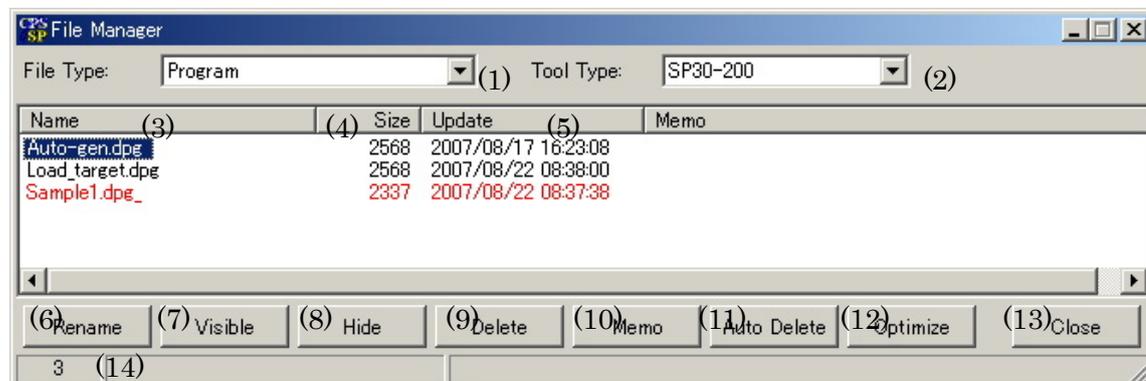


Fig.7-1-1 File manager screen

| No. | Item | Explanation |
|------|---------------------|---|
| (1) | File Type | The file type for operation is set up. |
| (2) | Tool Type | The tool type for operation is set up. A program file is managed by another folder for every tool type. |
| (3) | Name | A file list is sorted by the name. |
| (4) | Size | A file list is sorted in file size. |
| (5) | Update | A file list is sorted under a date. |
| (6) | Rename | The name of the selected file is changed. |
| (7) | Visible | The selected file is setup visible. |
| (8) | Hide | The selected file is setup hidden. The hidden file is expressed in red as this screen. Moreover, '_' is added to the end of an extension and it is un-displaying in the file selection dialog of each function. |
| (9) | Delete | The selected file is deleted. Since it does not go into the garbage box of OS, please be careful. |
| (10) | Memo | The memorandum of the selected file is edited. |
| (11) | Auto Deletion | The automatic deletion setting screen of a waveform file opens.(Fig. 7-1-2) |
| (12) | Optimize | The memorandum without necessity is deleted. |
| (13) | Close | The screen is ended. |
| (14) | The number of files | The number of files currently displayed on the file list is shown. |

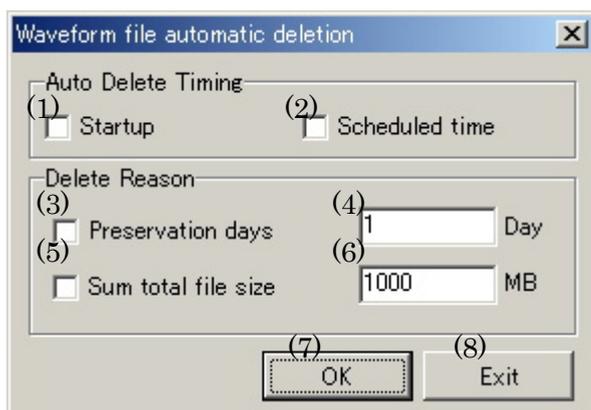


Fig.7-1-2 Waveform file automatic deletion setting screen

A waveform file has the size of a maximum of 16KB by one data, and if it saves much waveform data, it may occupy many domains of HDD. This is a setup about the function to delete a waveform file automatically per file.

| No. | Item | Explanation |
|-----|---------------------|--|
| (1) | Startup | If a check is put in, file deletion processing will be carried out at the time of application starting. |
| (2) | Scheduled time | If a check is put in, when a date changes, file deletion processing is carried out. |
| (3) | Preservation days | If a check is put in, the file for deletion will be decided by preservation days. |
| (4) | Day | A file older than the set-up days is set as the deletion object. |
| (5) | Sum total file size | If a check is put in, deletion processing will be carried out in the sum total size of a waveform file. |
| (6) | Size | Deletion is carried out when the sum total size of a waveform file exceeds setting size. It is deleted in the order of a date of a file. |
| (7) | OK | The screen is ended reflecting a setup. |
| (8) | Exit | A setup is canceled and the screen is ended. |

7.1.2. Data File Merge

Two or more data files are merged into one file.

| No. | Item | Explanation |
|-----|--------|--|
| (1) | Open | The file dialog which chooses the file to merge opens. |
| (2) | Merge | The files currently displayed on the list are merged. The file dialog which inputs the file name of the file which is merged and is newly created opens. |
| (3) | Delete | The file chosen in the list is deleted from the list. |
| (4) | Clear | All the contents of a list are deleted. |
| (5) | Close | The screen is closed. |

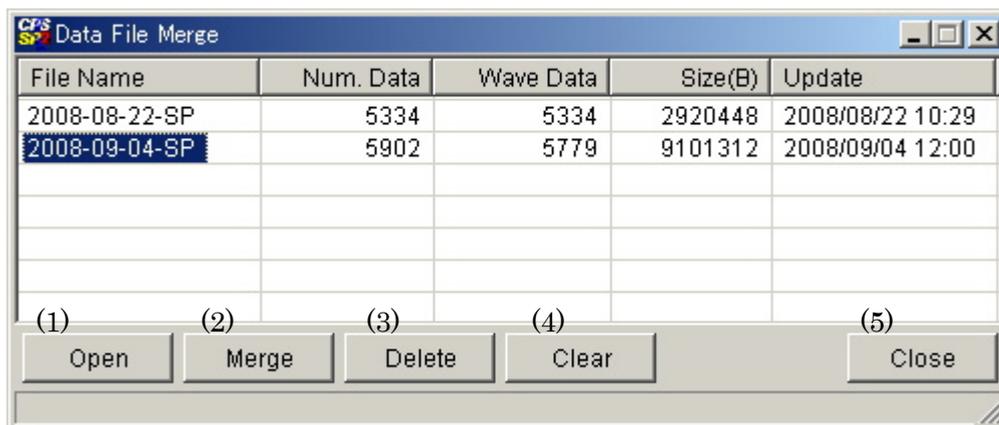


Fig. 7-1-3 Data file merge screen

7.1.3. Data Complement

This is the function which reads the data from the buffer of a controller which has not been collected in the trouble of PC or a network during data collection, and complements a data file. The controller to access follows a setup of a receiving filter.

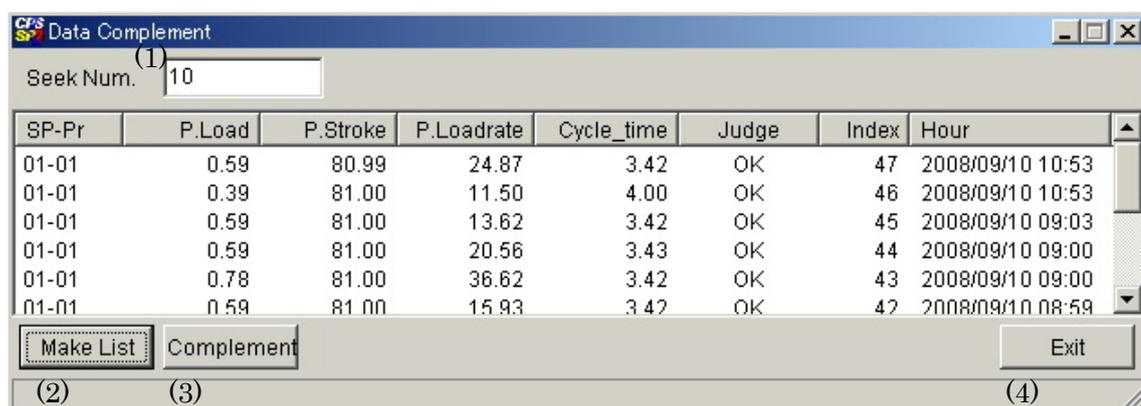


Fig. 7-1-4 Data complement screen

| No. | Item | Explanation |
|-----|------------|---|
| (1) | Seek Num. | The number of the buffers for which this function seeks is set up. Maximum is 25 affairs. 25 or more complements cannot be performed. |
| (2) | Make List | The list of the data which has not been collected is created. |
| (3) | Complement | The additional writing of the data currently displayed in a list is carried out at a data file. |
| (4) | Exit | The screen is closed. |

7.1.4. Data Convert

The file of Ver1.01 form is changed into the file of Ver1.02 form. The file of Ver1.01 form cannot be displayed directly with the viewers. Please use this function, and have a look with a viewer after changing into Ver1.02 form. In Ver1.01, numerical data and waveform data are saved at the separate files. In Ver1.02, numerical data and waveform data are saved at the same file. In changing into Ver1.02, please choose either a numerical data file or a waveform data file. The remaining file of the same name is searched automatically and changed into the file of Ver1.02 form in a perfect form.

7.1.5. Disp. Setup File

A setup of a receive filter, a work position name, etc. is saved at a file, or is read. It is convenient when copying a complicated display setup to other PCs.

7.1.6. Exit

Application is ended.

7.2. Monitor

7.2.1. Numerical Monitor

It acts as the monitor of the numerical data of a program execution result.

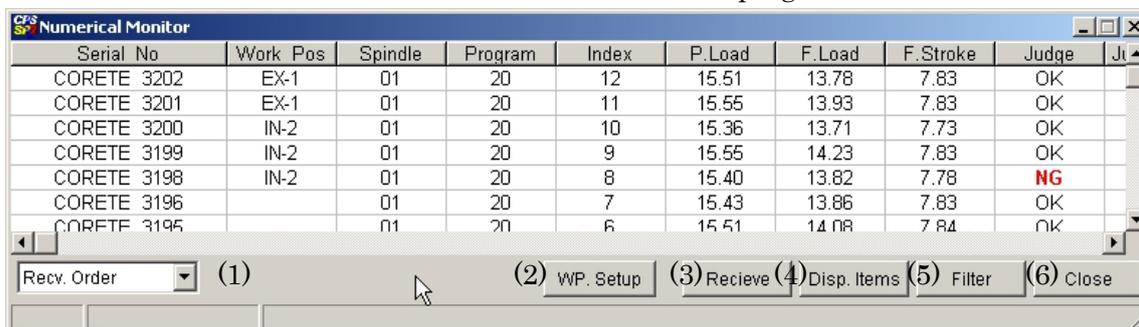


Fig.7-2-1 Numerical Monitor screen

| No. | Item | Explanation |
|-----|-------------------------|--|
| (1) | Display style selection | Display style is chosen. In the case of Recieve Order, the data received newly is displayed on the top line. The existing datas are shifted downward. In the case of Spindle No., a display position is decided for every spindle number, and only the newest data of each spindle is displayed. In the case of Work Position, a display position is decided for every Work Position, and only the newest data of each Work Position is displayed. |
| (2) | WP Setup | The screen which sets up Work Position name for every display position opens. (Figure 7-2-15-2 Work Position Name Setup screen) It is used with a waveform monitor(multi) 's Work Position Name Setup screen in common. |
| (3) | Recieve | The numerical data of a maximum of 2700 affairs currently held in the controller is received, and they are displayed on a figure 7-2-3 Numerical Viewer screen. The number of receiving data can be specified arbitrarily. The newest data to the data of the number of specification are received. |
| (4) | Display item | The screen for setting up the display item of the screen opens.(Fig. 7-2-2) |
| (5) | Filter | The filter setting screen of display data opens.(Fig. 7-2-3) |
| (6) | Close | The screen is ended. |

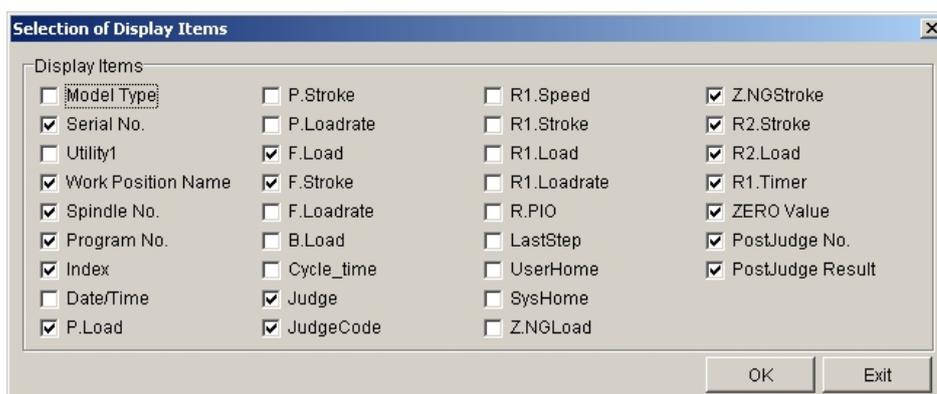


Fig. 7-2-2 Display item selection screen

A check is put into the item to display. It does not have influence on the data collected from a controller. It is restricted to a setup of the display on PC.

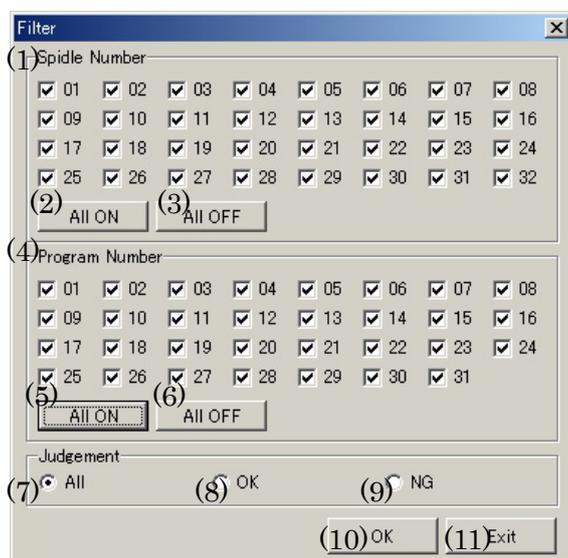


Fig. 7-2-3 Filter screen

| No. | Item | Explanation |
|-----|----------------|---|
| (1) | Spindle Number | The numerical data of the spindle containing the check is displayed. |
| (2) | All ON | A check goes into all spindle numbers. |
| (3) | All OFF | The check of all spindle numbers turns off. |
| (4) | Program Number | The numerical data of a program number containing the check is displayed. |
| (5) | All ON | All program numbers will be in ON state. |
| (6) | All OFF | All program numbers will be in OFF state. |
| (7) | All | When displaying regardless of a judgment result, it turns ON. |
| (8) | OK | When displaying only the numerical data of judgment O.K., it turns ON. |
| (9) | NG | When displaying only the numerical data of judgment NG, |

| | | |
|------|------|--|
| | | it turns ON. |
| (10) | OK | The screen is ended reflecting a setup. |
| (11) | Exit | A setup is canceled and the screen is ended. |

Cautions 1 A filter function is restricted to a display and is unrelated to collection of data.

Cautions 2 Displaying of a numerical monitoring screen and data collecting are unrelated. If it is a setup to which data collection is carried out even if it is not displayed, numerical data is saved at PC.

7.2.2. Waveform monitor

It acts as the monitor of load, the stroke, etc., and displays them by the waveform. 30 graph is displayed at the maximum. A monitor is possible for four kinds of waveforms. Load and a stroke are fixed. Remaining two are an extended function and the kind of data can be chosen.

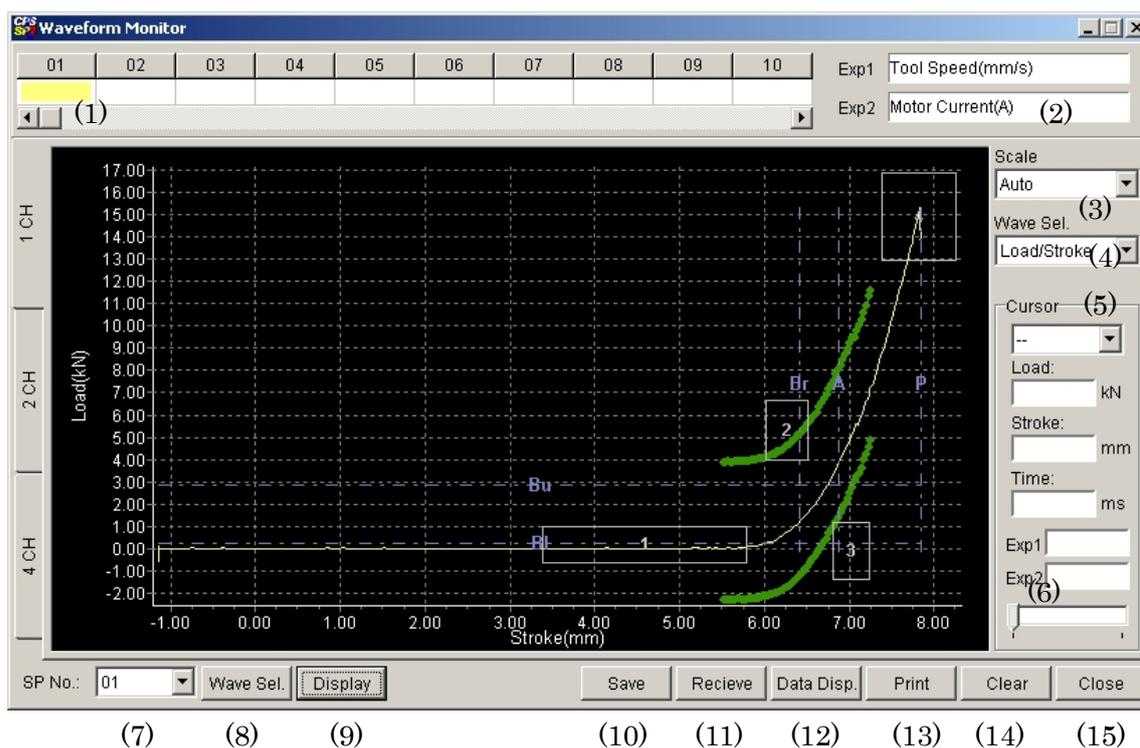


Fig. 7-2-4 Waveform monitoring screen

| No. | Item | Explanation |
|-----|------------------------|--|
| (1) | Waveform No. | A waveform number and its drawing color are shown. The newest waveform is No. 1. |
| (2) | Extended waveform name | The data name chosen by the extended waveform data 1 and 2 is shown. |
| (3) | Scale | A scale setup of graph is performed. Three kinds of setup, |

| | | |
|------|--------------------|--|
| | | Auto, Data, and Manual, is possible for a scale. You can set up a scale by drug operation of a mouse as another method. Graph is expanded with the drug to the direction of the lower right. A scale returns to Auto with the drug to the direction of the upper left. Graph is scrolled with the drug in a right click. |
| (4) | Waveform selection | The waveform displayed on graph is chosen. Four kinds of data loads, a stroke, the extension 1, and extended 2- can be drawn with a time-axis base or a stroke axis base. |
| (5) | Cursor | A waveform number is chosen and a numerical value can be read with cursor. |
| (6) | Cursor operation | Cursor is moved. Movement of cursor is possible by left click. |
| (7) | Spindle Number | A spindle number is chosen. When "Select" is chosen, the spindle number selection screen opens. Only the newest data is overwritten in the waveform data of the spindle number chosen on the screen. (Multi- spindles type display) When one of spindle numbers is chosen, it becomes a history type display. |
| (8) | Waveform selection | The screen which chooses the data of the extended waveforms 1 and 2 is displayed. Please refer to a figure 7-2-5 waveform selection screen. |
| (9) | Display | The screen which sets up the color of graph, the number of data collection, a sampling cycle, etc. is displayed. Please refer to Fig. 7-2-6-1 - 4 display setting screen. |
| (10) | Save | The waveform currently displayed is saved at a waveform file . |
| (11) | Recieve | The waveform data saved in the controller is received. |
| (12) | Data Disp. | The numerical data of the waveform currently displayed is displayed. |
| (13) | Print | The graph currently displayed is printed. |
| (14) | Clear | Graph is eliminated. |
| (15) | Close | The screen is ended. |

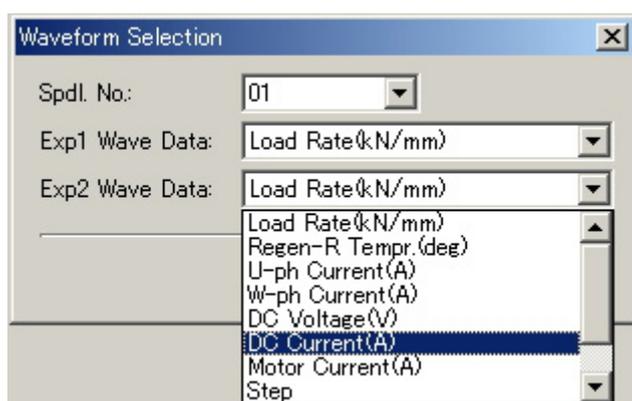


Fig. 7-2-5 Waveform selection screen

Some typical waveforms are explained.

| Name | Explanation |
|-----------|--|
| Load Rate | It is the change rate of load. Suitable filter processing needs to |

| | |
|------------------------------|--|
| | be set up. |
| DC voltage | It is the voltage of the both ends of an electrolysis capacitor after rectifying AC input. It becomes the standard of regeneration generating. Regeneration electric discharge is started by 375V. |
| DC current | It is the current value supplied to a power IGBT module from an electrolysis capacitor. In the case of regeneration electric discharge, the current value of several A is seen in the shape of a spike. Moreover, if DC current exceeds 20A as over-current protection, a drive of IGBT will be stopped by hardware. Please create a program so that DC current does not exceed 20A. DC current value rises by high speed and high load operation. |
| Motor current absolute value | It is the current value proportional to the torque of a motor. It becomes a 1.73 times as many numerical value as phase current. |
| Step | It is the execution step of a program. It can use for the analysis of a program by acting as a monitor combining other waveforms. |
| Tool speed | It is the speed of ram. It can use for the action analysis of a tool against to load change etc. |
| Electronic thermal | If this exceeds fixed value, it will become the abnormalities in electronic thermal. At the time of program start, if electronic thermal is zero, the abnormalities in electronic thermal will not be generated. |

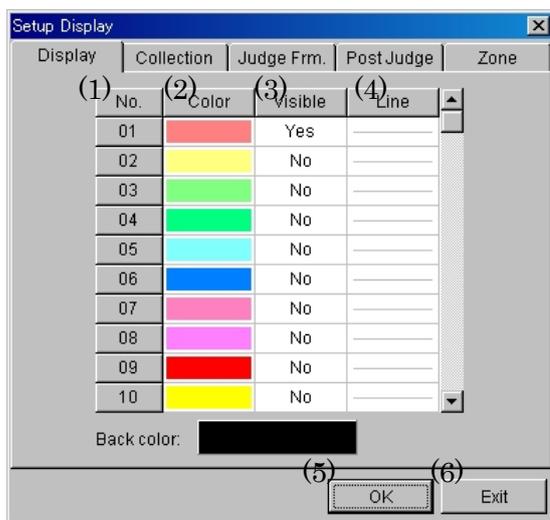


Fig. 7-2-6-1 Setup Display screen-Display

A setup about graph drawing of a waveform screen is performed.

| No. | Item | Explanation |
|-----|---------|--|
| (1) | Number | As for the case of a multi-spindle type display, it means a spindle number. In a single spindle display, it shows a history number. No. 1 becomes the newest data. |
| (2) | Color | The drawing color of graph is set up. |
| (3) | Visible | The graph set as "Yes" is displayed. |
| (4) | Line | The width of the line of graph is set up. |
| (5) | OK | The screen is closed reflecting a setup. |
| (6) | Exit | A setup is canceled and the screen is closed. |

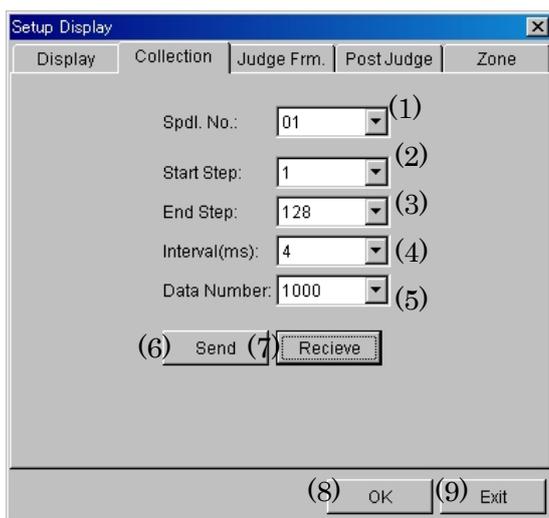


Fig. 7-2-6-2 Setup Display screen-collection

A setup about waveform data reception of a waveform screen is performed.

| No. | Item | Explanation |
|-----|----------------|--|
| (1) | Spindle Number | The spindle number for a setup is chosen. |
| (2) | Start Step | The step number in the user program which starts waveform data preservation is set up. |
| (3) | End Step | The step number in the user program which ends waveform data preservation is set up. |
| (4) | Interval | The sampling cycle of data is set up per ms. |
| (5) | Data Number | The maximum number of waveform data which receives is set up. |
| (6) | Send | A setup is sent to the controller of an appointed spindle number. |
| (7) | Recieve | A setup is received from the controller of an appointed spindle number. |
| (8) | OK | The screen is ended reflecting a setup. |
| (9) | Exit | A setup is canceled and the screen is ended. |

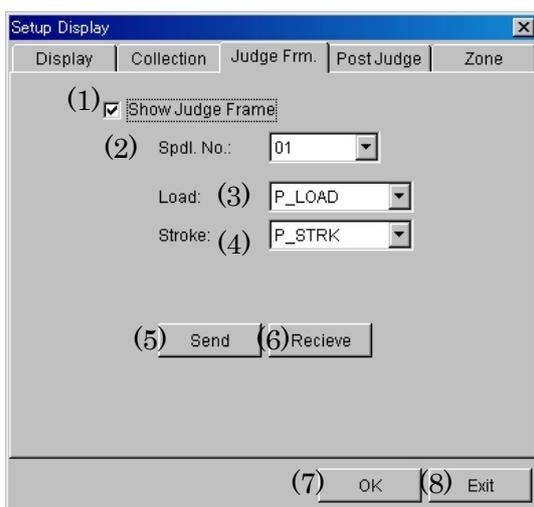


Fig. 7-2-6-4 Setup Display screen-Judging Frame

Judgment area can be drawn on a waveform screen by choosing a stroke and load

from a judgment table. A setup about it is performed. Judgment area is drawn when both selected stroke and / load item are set as "YES" on the judgment table. Please check on the judgment table used by the program performed.

| No. | Item | Explanation |
|-----|------------------|---|
| (1) | Show Judge Frame | Check it, when displaying a judge frame. |
| (2) | Spindle Number | The spindle number for a setup is chosen. |
| (3) | Load | It chooses from the variable which expresses load on a judgment table. Peak load, Final load, Bottom load, load register 1, and load register 2 are selection candidates. |
| (4) | Stroke | It chooses from the variable which expresses a stroke on a judgment table. Peak stroke, Final stroke, stroke register 1, and stroke register 2 are selection candidates. |
| (5) | Send | A setup is sent to the controller of an appointed spindle number. |
| (6) | Recieve | A setup is received from the controller of an appointed spindle number. |
| (7) | OK | The screen is ended reflecting a setup. |
| (8) | Exit | A setup is canceled and the screen is ended. |

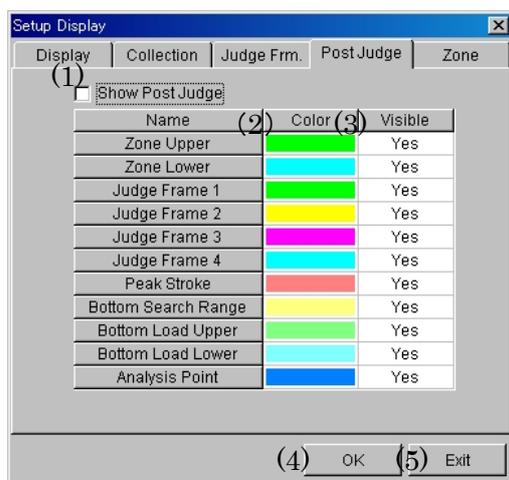


Fig. 7-2-6-5 Setup Display screen-Post Judge

On this screen, it sets up about a display of the judgment base line at the time of using the Post Judge function.

| No. | Item | Explanation |
|-----|-----------------|--|
| (1) | Show Post Judge | Check it, when displaying judgment base line of Post Judge function. |
| (2) | Color | The drawing color of each lines are set up. |
| (3) | Visible | The line set as "Yes" is displayed. |
| (4) | OK | The screen is ended reflecting a setup. |
| (5) | Exit | A setup is canceled and the screen is ended. |

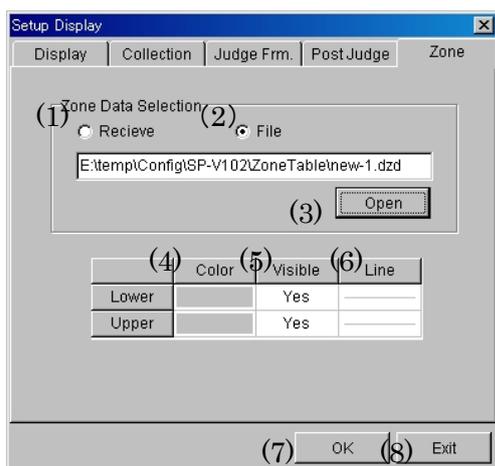


Fig. 7-2-6-5 Setup Display screen-Post Judge

On this screen, it sets up about a display of the judgment base line at the time of using the Post Judge function.

| No. | Item | Explanation |
|-----|---------|---|
| (1) | Recieve | Please choose this “Recieve” button, when you want to display the zone used in a program. |
| (2) | File | Please choose this “File”button, when you want to display a zone file in PC. |
| (3) | Open | The screen which chooses a zone file opens. |
| (4) | Color | The drawing color of each lines are set up. |
| (5) | Visible | The line set as "Yes" is displayed. |
| (6) | Line | The width of the line of graph is set up. |
| (7) | OK | The screen is ended reflecting a setup. |
| (8) | Exit | A setup is canceled and the screen is ended. |

7.2.3. Sensor

It acts as the monitor of the information on various sensors.

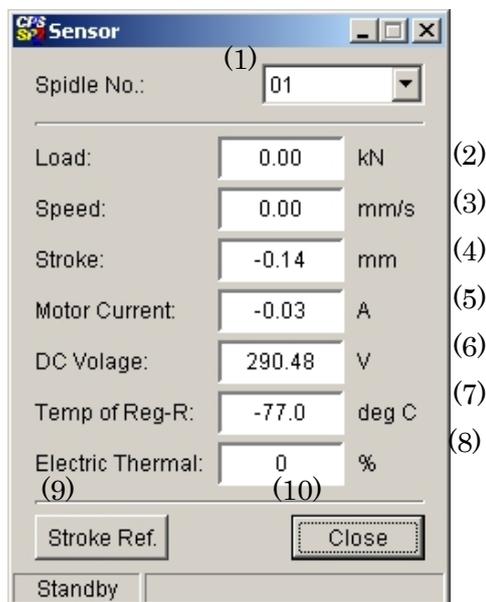


Fig. 7-2-9 Sensor screen

| No. | Item | Explanation |
|------|-------------------------------------|--|
| (1) | Spindle No. | The spindle number which acts as a monitor is chosen. |
| (2) | Load | It acts as the monitor of the load value. |
| (3) | Speed | It acts as the monitor of the ram speed. |
| (4) | Stroke | It acts as the monitor of the stroke. |
| (5) | Motor Current | It acts as the monitor of the motor current. |
| (6) | DC Voltage | It acts as the monitor of the DC voltage. DC voltage is the voltage after flat and smooth of AC supply, and 1.41 times of AC voltage are shown in the state of a stop. Since the maximum value of AC is 230V+10%, the monitor value in that case is set to about 357 V. When 357V are exceeded at the time of a power supply injection, it becomes "the abnormalities in over voltage." Moreover, if regeneration electric power is taken into consideration, since the frequency of regeneration electric discharge increases, use near AC maximum cannot be recommended. We recommend you use at AC200V strongly. |
| (7) | Regeneration resistance temperature | It acts as the monitor of the regeneration resistance temperature. It becomes "the abnormalities in regeneration" above 70 degrees C. When regeneration resistance of an option is used, please take the measure against overheating protection with a thermostat etc. separately. |
| (8) | Electronic Thermal | It acts as the monitor of the rate of electronic thermal load. It becomes "the abnormalities in electronic thermal " at 100%. |
| (9) | Strok Ref. | The screen which sets up the standard of a stroke opens. (Fig. 7-5-3) |
| (10) | Close | The screen is ended. |

7.2.4. I/O

The monitor of I/O can be done.

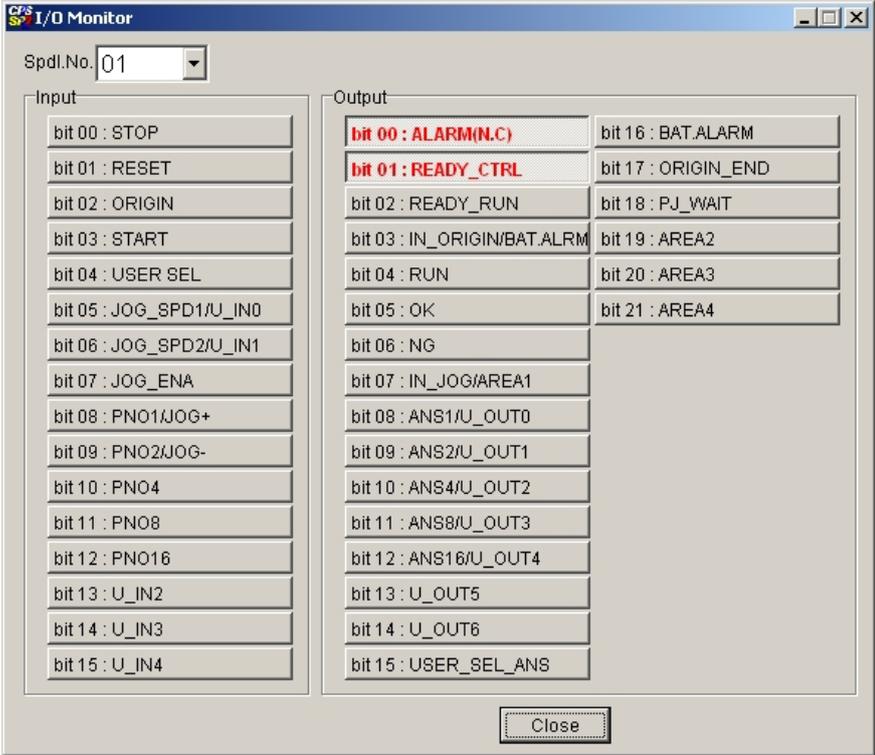


Fig. 7-2-10 I/O monitoring screen

7.2.5. Index

An index is the reference number which shows the number of times of execution of programs. An index number is held in a controller and used continuously. Updating of a date sets index to 1. In a numerical data file and a waveform data file, unless a user pre-sets, an index number is unique.

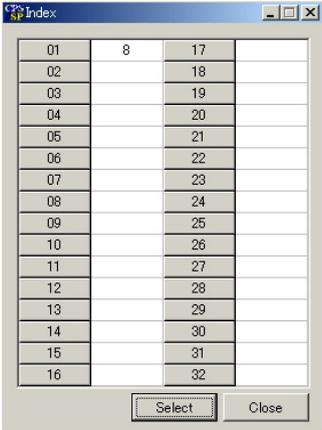


Fig. 7-2-11 Index monitoring screen

7.2.7. Connection table of spindles

A list display of CPS controller connected to the same communication system is possible.

A tool type, a microcomputer software version, and a communication state are displayed in a list for every spindles.

When it is in the state where the spindle scan button was depressed, scan of each spindles is carried out.

A software version consists of the numerical value of 6 figures, and is divided 2 figures at a time by the period. It becomes a major version and middle version and a minor version from left-hand side. The version is added also like this application CPS SP Configurator. Transmission (setup) is impossible although reception is possible when more than a middle version is not in agreement with a controller and application. Please use CPS SP Configurator of a suitable version after arranging the middle version of a controller, and a major version, when the system of multi-spindles composition is built.

| Spdl.No. | Tool Type | Version | Connection | Spdl.No. | Tool Type | Version | Connection |
|----------|-----------|---------|------------|----------|-----------|---------|------------|
| 01 | CNN20SS | 1.01.18 | OK | 17 | | | |
| 02 | | | ERROR | 18 | | | |
| 03 | | | ERROR | 19 | | | |
| 04 | | | ERROR | 20 | | | |
| 05 | | | ERROR | 21 | | | |
| 06 | | | ERROR | 22 | | | |
| 07 | | | ERROR | 23 | | | |
| 08 | | | ERROR | 24 | | | |
| 09 | | | ERROR | 25 | | | |
| 10 | | | ERROR | 26 | | | |
| 11 | | | | 27 | | | |
| 12 | | | | 28 | | | |
| 13 | | | | 29 | | | |
| 14 | | | | 30 | | | |
| 15 | | | | 31 | | | |
| 16 | | | | | | | |

Fig.7-2-14 Connection table of spindles screen

7.2.8. Wave Monitor(Multi)

The monitor of 4 or 8 waveforms is possible simultaneously. If switched by tab operation, display of 32 waveforms is possible at the maximum.

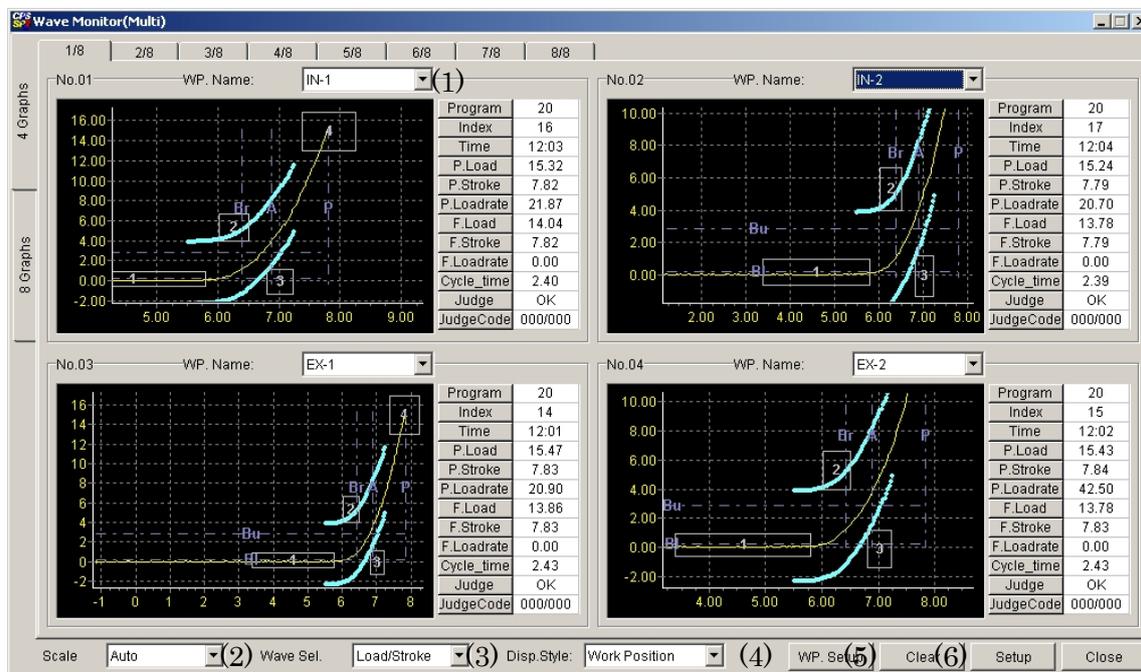
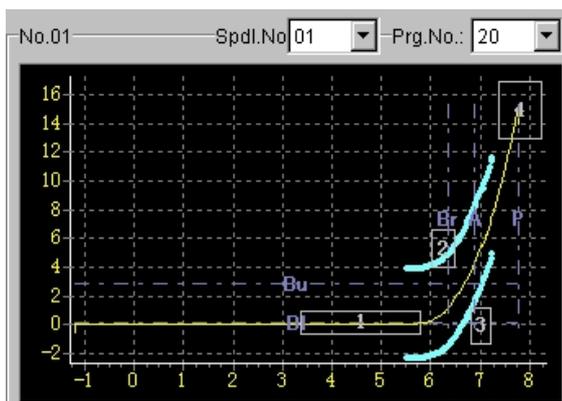


Fig.7-2-15 Wave Monitor(Multi) screen

| No. | Item | Explanation |
|-----|-------------|---|
| (1) | WP Name | When (3)Displ.Style is selected as Work Position, select the work position name which are set up by (4) WP. Setup. When (3)Displ.Style is selected as Spdl.No-Prg.No, select a spindle number and a program number as shown in Fig. 7-2-15-1. |
| (2) | Wave Sel. | The waveform displayed on graph is chosen. Four kinds of data loads, a stroke, the extension 1, and extended 2- can be drawn with a time-axis base or a stroke axis base. |
| (3) | Disp. Style | Please set up the specification method of the waveform source displayed on each graph screen. Work Position or Spdl.No + Prg.No is chosen. |
| (4) | WP. Setup | The Work Position Name Setup screen of Fig. 7-2-15-2 opens.The work position name set up here must be the same name as what is set to the controller via Anybus i/f from PLC.A waveform is not displayed when work position names differ. |
| (5) | Clear | All the graph currently displayed is eliminated. |
| (6) | Setup | The setup screen about drawing color of graph or a judgment refernce line opens. |

Caution A Work Position Name is a part of a numerical data set up to a contoller via Anybus i/f from PLC.



When Disp. Style is selected as Spdl.No-Prg.No, an appointed waveform is drawn by specifying a spindle number and a program number.

Fig.7-2-15-1 A screen selected Spdl.No-Prg.No

| No | Name |
|----|------|
| 01 | IN-1 |
| 02 | IN-2 |
| 03 | EX-1 |
| 04 | EX-2 |
| 05 | |
| 06 | |
| 07 | |
| 08 | |
| 09 | |
| 10 | |
| 11 | |
| 12 | |

A work position name is set to each graph number. The work position name set up here must be the same name as what is set to the controller via Anybus i/f from PLC. A waveform is not displayed when work position names differ.

Fig.7-2-15-2 Work Position Name Setup screen

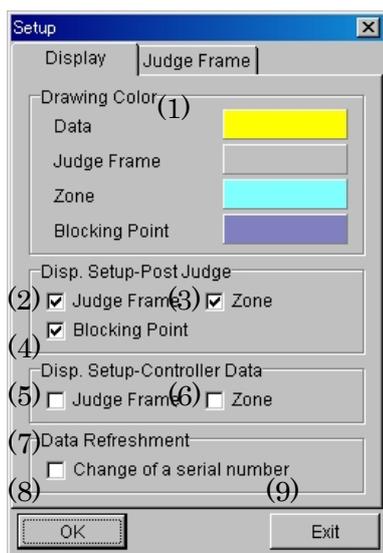


Fig..7-2-15-3 Wave Monitor(Multi) Setup screen-Display tab

| No. | Item | Explanation |
|-----|---------------------------|---|
| (1) | Drawing Color | The drawing color of waveform data, a judgment frame, a zone, and a blocking point is set up. |
| (2) | Judge Frame | A check is put in when displaying the judgment frame by the post judgment. |
| (3) | Zone | A check is put in when displaying the zone by the post judgment. |
| (4) | Blocking Point | A check is put in when displaying the blocking point by the post judgment. |
| (5) | Judge Farme | A check is put in when displaying the judgment frame by the judgment table of a controller. |
| (6) | Zone | A check is put in when displaying the zone line by zone judging of a controller. |
| (7) | Change of a serial number | A check is put in when once eliminating the whole graph by change of a serial number. A serial number means a part of numerical data set up to a contoroller via Anybus i/f from PLC. |
| (8) | OK | The screen is ended reflecting a setup. |
| (9) | Exit | A setup is canceled and the screen is ended. |

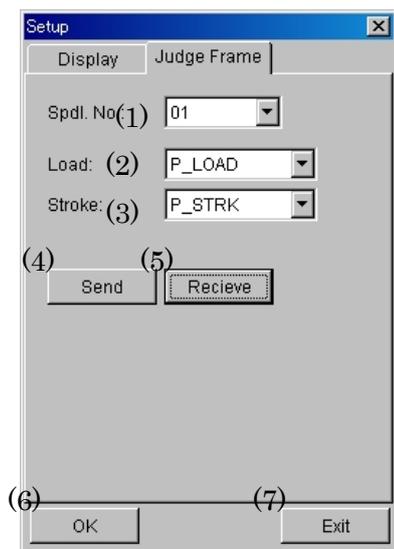


Fig.7-2-15-5 Wave Monitor(Multi) Setup screen-Judge Frame tab

It is a setting screen in the case of drawing a judgment frame according to the setting value of the judgment table in a controller.

| No. | Item | Explanation |
|-----|----------|---|
| (1) | Spdl.No. | An spindle number to set up is chosen. |
| (2) | Load | It chooses from the variable which expresses load on a judgment table. Peak load, Final load, Bottom load, load register 1, and load register 2 are selection candidates. |
| (3) | Stroke | It chooses from the variable which expresses a stroke on a judgment table. Peak stroke, Final stroke, stroke register 1, and stroke register 2 are selection candidates. |
| (4) | Send | A setup is sent to the controller of an appointed spindle number. |
| (5) | Recieve | A setup is received from the controller of an appointed spindle number. |
| (6) | OK | The screen is ended reflecting a setup. |

7.2.9. Work Position Monitor

O.K. / NG judging of each work position or each spindle number are displayed on the picture of a work.

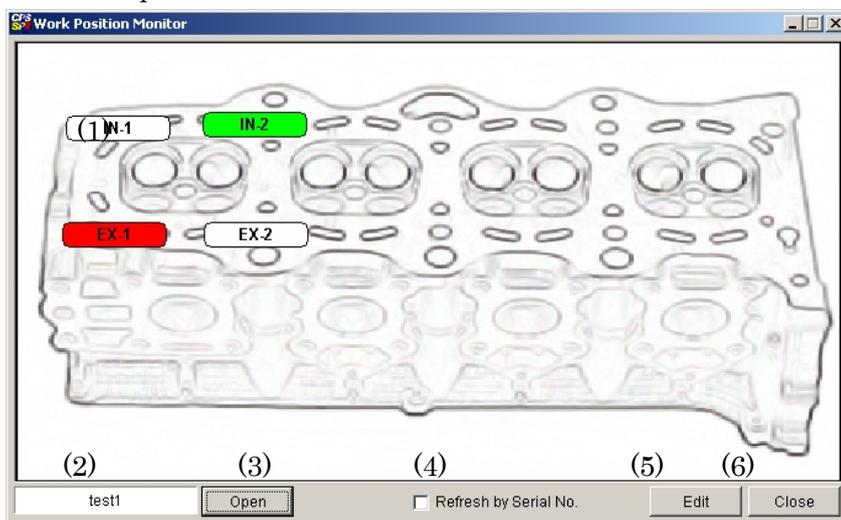


Fig..7-2-16 Work Position Monitor screen

| No. | Item | Explanation |
|-----|-----------------------|---|
| (1) | Judgement display | When a program execution result is O.K., it is displayed green. In the case of NG, it is displayed on red. If the judgment display is right-clicked, the floating menu which refers to numerical data and waveform data will be displayed. |
| (2) | File Name | The name of a work position monitor file on display is shown. |
| (3) | Open | The screen which chooses the work position monitor file to display opens. |
| (4) | Refresh by Serial No. | It is a setup about reset of a judgment display. A check is put in when resetting a judgment display to the timing from which the serial number of a work changed. A serial number means a part of numerical data set up to a controller via Anybus i/f from PLC. |
| (5) | Edit | The edit screen of a work position monitor file opens. (Fig. 7-2-16-1) |
| (6) | Close | The screen is closed. |

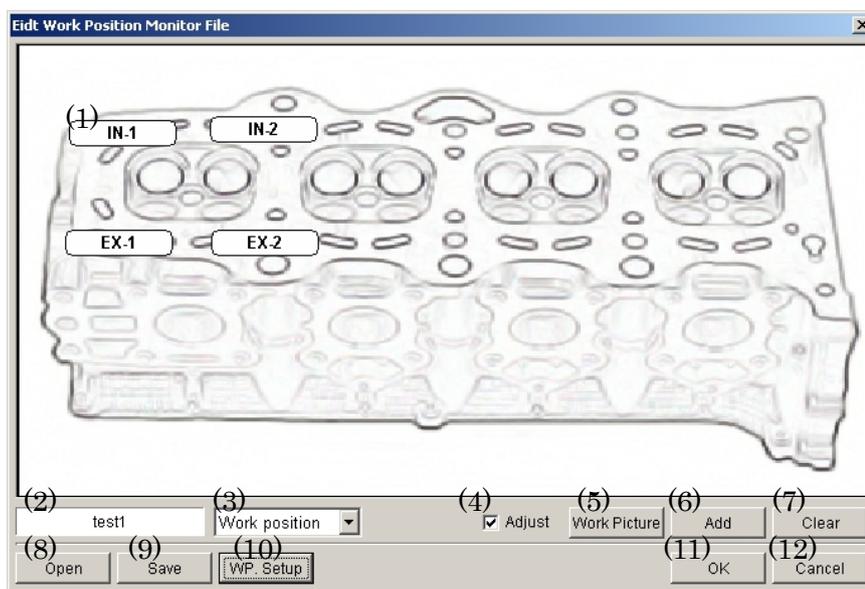


Fig..7-2-16-1 Work Position Monitor File Edit screen

| No. | Item | Explanation |
|------|-------------------------------|---|
| (1) | Judgment display | It can arrange in arbitrary positions with a drug. A judgment display setting screen is displayed if it is right-clicked. (Fig. 7-2-16-2) |
| (2) | File name | The name of the work position monitor file under edit is shown. |
| (3) | Selection of a display method | It chooses whether the display method of a judgment display is made by Work Position name, or it is made by a spindle number + program number. |
| (4) | Adjust | A check is put in when bmp file chosen by (5) is adjusted to screen size. |
| (5) | Work Picture | The screen which chooses the file of bmp form opens. The selected file is displayed as a work form picture. |
| (6) | Add | Please click, when you add a judgment display. A judgment display setting screen (Fig. 7-2-16-2) opens. |
| (7) | Clear | All the contents of a setting are cleared. |
| (8) | Open | The screen which chooses a work position monitor file opens. |
| (9) | Save | The contents on display are saved. A file dialog opens. |
| (10) | WP. Setup | A work position name setting screen opens. (Fig. 7-2-16-3) The work position name set up here must be the same name as what is set to the controller via Anybus i/f from PLC. When a work position name is not right, a judgment display does not work well. |
| (11) | OK | The screen is ended reflecting a setup. |
| (12) | Cancel | A setup is canceled and the screen is ended. |

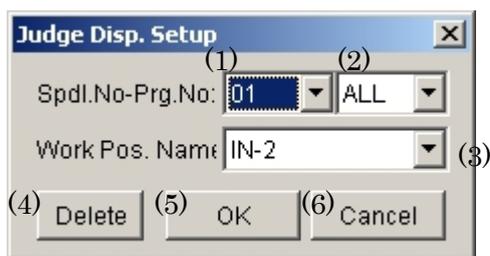
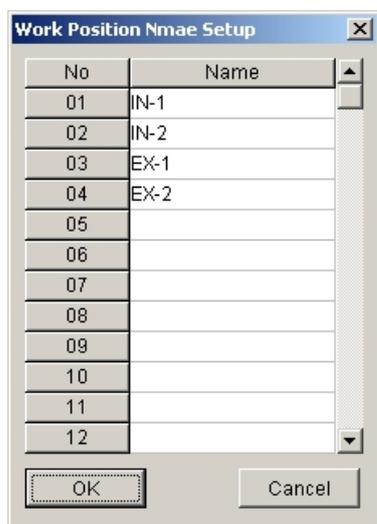


Fig..7-2-16-2 Judge Disp.Setup

| No. | Item | Explanation |
|-----|----------------|---|
| (1) | Spdl.No | The judgment result of the spindle chosen on this screen is displayed. |
| (2) | Prg.No | The judgment result of the program chosen on this screen is displayed. |
| (3) | Work Pos. Name | The name set up on the work position name setup screen(Fig..7-2-16-3) is displayed in a list. The judgment result of the work position chosen from the list is displayed. |
| (4) | Delete | A judgment display is deleted and a screen is ended. |
| (5) | OK | The screen is ended reflecting a setup. |
| (6) | Cancel | A setup is canceled and the screen is ended. |



This is the same as that of the work position name setup screen of Fig.7-2-15-2. No. is the internal management number of a judgment display. This is also a graph number of waveform monitor (multi) . The work position name set up here must be the same name as what is set to the controller via Anybus i/f from PLC. When a work position name is not right, a judgment display does not work well.

Fig.7-2-16-3 Work Position Name Setup screen

7.2.10. Anybus Monitor

This screen acts as the monitor of the contents of communication between PLC and CPS controllers via Anybus i/f. The display is updated when the contents of the control part or the data part change. The display is not updated when both the control part and the data part are zero altogether.

The lower picture is the screen of 4 times extension specification. The number

of data to link is recognized automatically and a suitable screen is displayed.

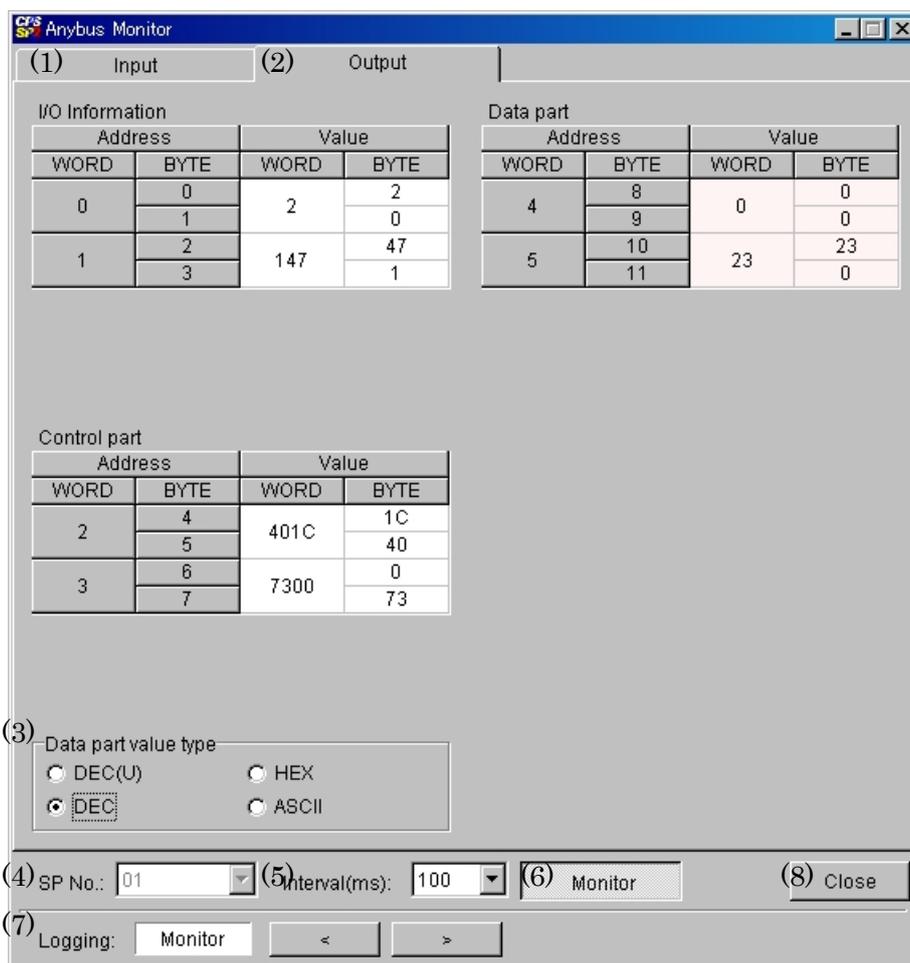


Fig 7-2-17 AnybusMonitor screen

| No. | Item | Explanation |
|-----|----------------------|---|
| (1) | Input | The output from PLC is displayed. |
| (2) | Output | The output from CPS controller is displayed. |
| (3) | Data part value type | The display form of the numerical value of the data part is chosen. |
| (4) | SP No. | Please choose the spindle number for monitoring. |
| (5) | Interval(ms) | A time interval to access CPS controller is set up. Generally data communication of CC-Link etc. is performed at intervals of some dozens of Milli second. Since the shortest time of this screen is 100ms, all the contents of data are not necessarily displayed. |
| (6) | Monitor | The monitor is performed where this button is depressed. |
| (7) | Logging | The data for the past 10 times is saved. |
| (8) | Close | The screen is end. |

7.3. Viewer

7.3.1. Numerical viewer

The numerical data which was collected by PC and saved at the file can be



Fig. 7-3-1 Numerical viewer screen

| No. | Item | Explanation |
|------|---------------|--|
| (1) | Open | A numerical data file is chosen. |
| (2) | Save | The contents of a display are saved. |
| (3) | Filter | The filter setup screen of display data opens. (Fig. 7-3-2) |
| (4) | Print | The contents of a display are printed. |
| (5) | Delete | The data of the selected line is deleted. |
| (6) | CSV | The contents of a display are formed into CSV file. |
| (7) | Display Items | The screen for setting up the item to display opens. |
| (8) | Wave View | Selected data can be seen with the Waveform Viewer. (Fig. 7-3-3) |
| (9) | Close | A screen is ended. |
| (10) | File name | A file name on display is shown. |
| (11) | Data number | The number of records on display is shown. |

It is the filter setup screen of the display data of a numerical viewer screen. When a file is opened by the numerical viewer, all filter setup is invalid. Please set up a required item, put in a check and push an execution button. The filtered data is displayed on a numerical viewer screen. Wild card "*" and "?" can be used for a product model name, serial number, and work position name.

Cation When "%" and "_" are contained in a product model name, serial number, and work position name, a filter may not function correctly.

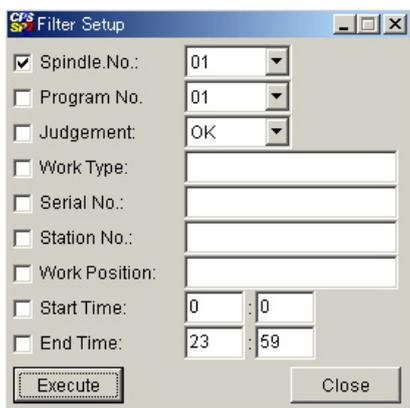


Fig. 7-3-2 Numerical viewer Filter setup screen

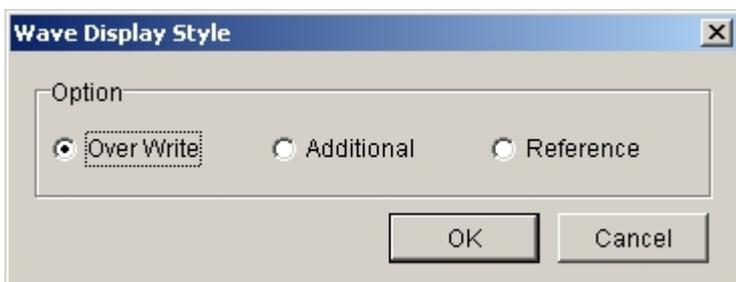


Fig. 7-3-3 Waveform display function

In the case of Over Write, waveforms are displayed from the head of a waveform number only for the number of selected data. In the case of Additional, selected data is displayed from the next of the waveform already displayed. In the case of Reference, only two waveforms are displayed on the domain which is not rewritten by Over Write or Additional.

7.3.2. Waveform viewer

The waveform data saved as a file at PC can be displayed. A screen is almost the same as that of a figure 7-2-4 waveform monitoring screen. Please make a reversal display the data which you want to display. Please push the Open button. Then, the waveform of selected data will be displayed.



Fig. 7-3-4 Data selection screen

| No. | Item | Explanation |
|-----|---------------|--|
| (1) | Filter setup | Please set up the filter of the data displayed on a data list. The item which put in the check becomes effective. Wild card "*" and "?" can be used for a Model Tp , Serial No., and WP. Name. |
| (2) | Display style | The display style of waveform data is set up. In the case of Over Write, waveforms are displayed from the head of a waveform number only for the number of selected data . In the case of Additional, selected data is displayed from the next of the waveform already displayed. In the case of Reference, only two waveforms are displayed on the domain which is not rewritten by Over Write or Additional. |
| (3) | Filter | A filter is applied to the file specified by the contents set up by (1). |
| (4) | Open | A data file is chosen.* When a zone file (dgz) is chosen, both lines of the upper and lower of a zone are displayed as reference waveforms. |
| (5) | CSV | Selected data is formed into CSV file. One CSV file per data is created. A file name is given automatically. Example of a file name: 03-05-2010-SP_02_0076.csv |
| (6) | OK | Selected data is displayed on the waveform viewer. |
| (7) | Exit | The screen is ended. |
| (8) | File name | A file name on display is shown. Also the number of data contained in a file on display is shown. |

* The file of Ver1.01 form cannot be displayed. Please use a data conversion function and change into Ver1.02 form.

7.4. Program

7.4.1. Editor

About the editor, the basic function is explained at the Chapter 4 operation procedure [4] a setup of a program. Here, the other function is explained.

1. Operation of Line

A floating menu is displayed by right click in step number of an editor.

Clear All the contents of the line are deleted.

Insert One line is newly inserted in the line.

Delete The line is deleted.

Remark The line is comment-ized. The comment-ized line is disregarded at the time of program execution. The comment-ized line is displayed in red.

Macro A macro is inputted.

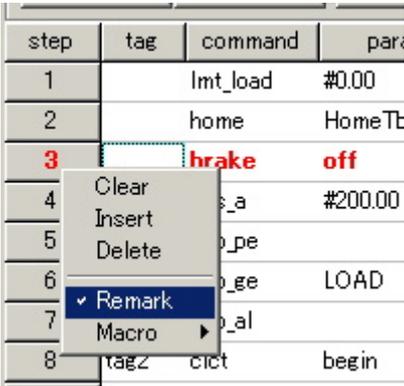


Fig. 7-4-1 Operation of line

2. Input Assistance

The input candidate of a floating menu is displayed by right click of a command code and the parameters 1 and 2. For example, if a positioning command is inputted into a command code, only a speed parameter can be inputted no longer into a parameter 1, and only a position parameter can be inputted no longer into a parameter 2.

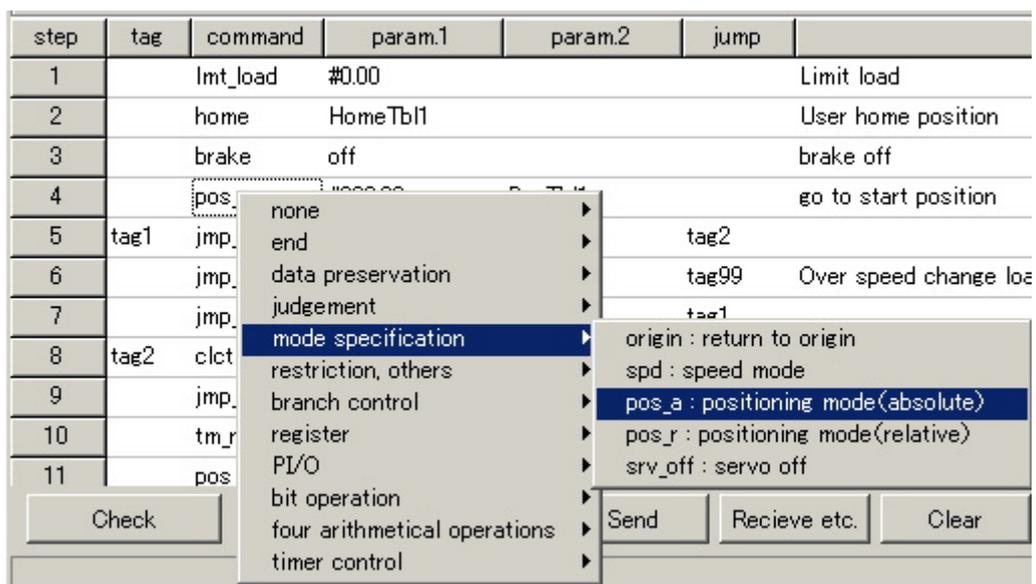


Fig. 7-4-2 Input assistance

7.4.2. Execution

Please refer to the Chapter 4 operation procedure [6] execution of program.

7.4.3. Tables

If the position, speed, and a load parameter in a program are indirectly specified on a table, operation of a program can be changed by change of the table value. The contents of a table are rewritable with Anybus. If a system which rewrites table value by PLC, the touch panel, etc. is designed, it can correspond also to multi-kind production. Please refer to the CPS CTRL for SP Instruction Manual Vol Network for details.

Specification of a user home position is possible only by the home position table.

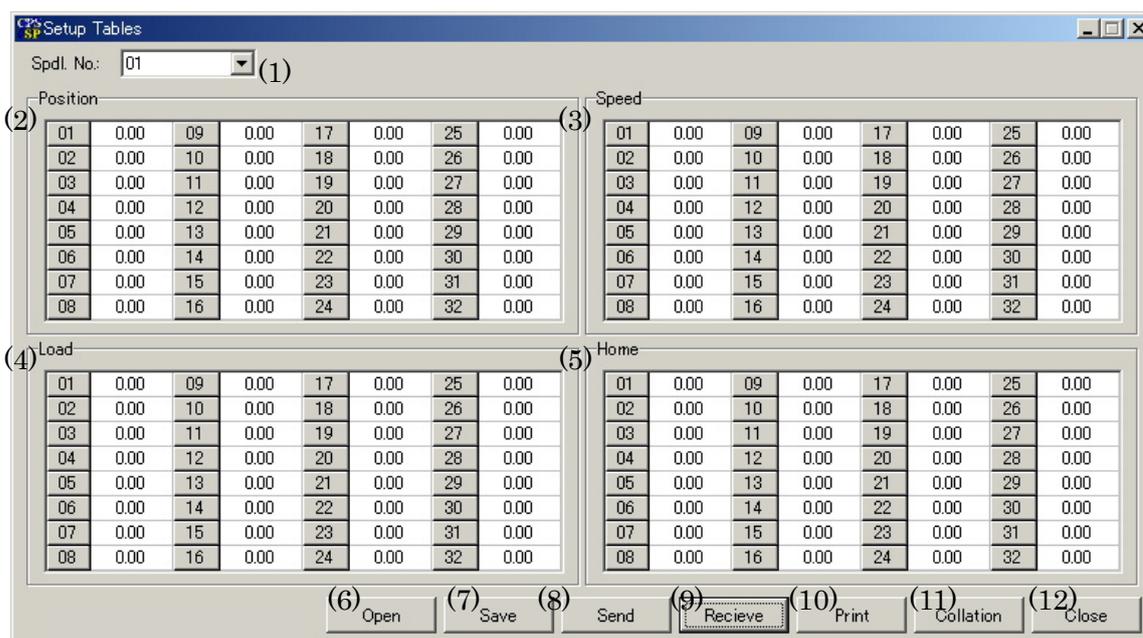


Fig. 7-4-3 Table setting screen

| No. | Item | Explanation |
|------|-------------|--|
| (1) | Spindle No. | The spindle number for operation is set up. |
| (2) | Position | A position table is displayed. |
| (3) | Speed | A speed table is displayed. |
| (4) | Load | A load table is displayed. |
| (5) | Home | A home position table is displayed. |
| (6) | Open | A table is read from a file. A file selection screen opens. |
| (7) | Save | A table is saved at a file. A file selection screen opens. |
| (8) | Send | A table is sent to a controller. |
| (9) | Recieve | A table is received from a controller. |
| (10) | Print | A table on display is printed. |
| (11) | Collation | The contents on display are compared with the table in the controller specified by the spindle number. |
| (12) | Close | The screen is ended. |

7.4.4. Judgment table

A judgment table is used when judging a result. Use, a maximum, minimum value, and the output place at the time of NG are set to the judgment table about each internal variable. 32 judgment tables can be saved for a controller. The user output at the time of NG can use USER 0-6.

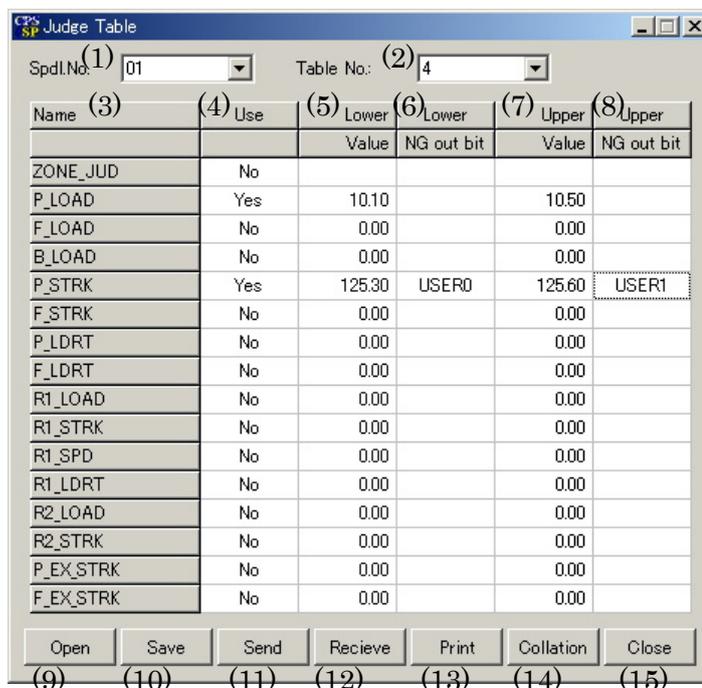


Fig. 7-4-4 Judgment table screen

| No. | Item | Explanation |
|------|------------------|--|
| (1) | Spimdle No. | The spindle number for operation is set up. |
| (2) | Table No. | The table number to edit is set up. |
| (3) | Name | It is the internal variable name used for a judgment. |
| (4) | Use | When using this internal variable for a judgment, it is set as "Yes." |
| (5) | Lower Value | The minimum value of a judgment of this internal variable is set up. |
| (6) | Lower NG out bit | A user output number when an internal variable is less than minimum value is set up. |
| (7) | Upper Value | The maximum value of a judgment of this internal variable is set up. |
| (8) | Upper NG out bit | A user output number when an internal variable exceeds maximum value is set up. |
| (9) | Open | The judgment table saved at PC is opened. |
| (10) | Save | A judgment table on display is saved at PC. |
| (11) | Send | A judgment table on display is sent to a controller. |
| (12) | Recieve | A judgment table is received from a controller. |
| (13) | Print | A judgment table on display is printed. |
| (14) | Collation | A judgment table on display and the judgment table in a controller are compared. |
| (15) | Close | The screen is ended. |

7.4.5. Zone

A zone is the judgment area created based on an actual waveform of operation. It can judge continuously in the domain of stroke-load. A controller can hold 32 zones. By using zone command in a user program, 32 zones can be used arbitrarily. Creation of a zone and the usage are explained briefly.

1. Operate a servo press on actual conditions of operation, and collect the sample of waveform data.
2. Choose the waveform data used as the standard of a zone. Please refer to a figure 7-4-6 waveform file selection screen.
3. Set up zone creation conditions. Effective stroke range, the margins of a zone maximum and a minimum, automatic creation mark, etc. are set up. Please refer to a figure 7-4-7 zone operation screen.
4. Send the created zone to a controller.
5. Describe that a zone is used in the user program.
6. Verify by operating the user program.
7. If you are necessity, please add a new reference waveform or correct a zone manually.

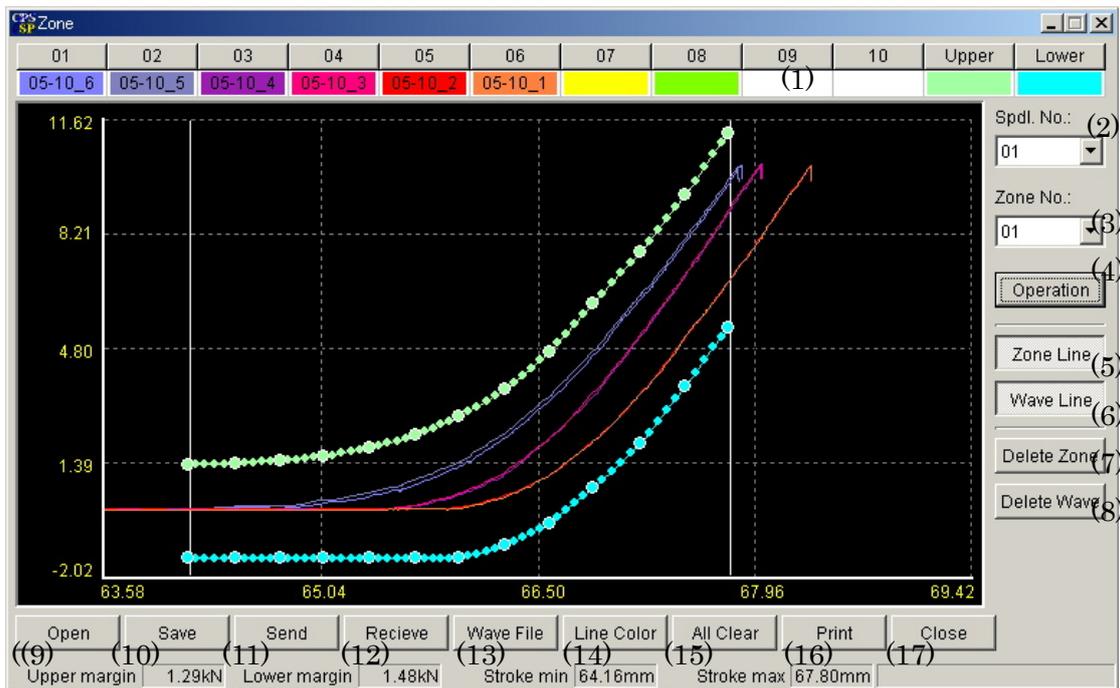


Fig. 7-4-5 Zone creation screen

| No. | Item | Explanation |
|-----|----------------|--|
| (1) | Data ID, Color | Data ID of waveform graph and a color are shown. ID serves as an spindle number-program number-index number. |
| (2) | Spindle No. | The spindle number for operation is set up. |

| | | |
|------|-------------|--|
| (3) | Zone No. | A zone number is set up. 1-32 can be set up. |
| (4) | Operation | The screen which operates a setup of a zone opens. |
| (5) | Zone line | A zone is displayed as two lines. |
| (6) | Wave line | Reference waveforms are displayed. |
| (7) | Delete Zone | The Upper and lower linrs of a zone are eliminated. |
| (8) | Delete Wave | A waveform display is erased and reference waveform data is also eliminated. |
| (9) | Open | The zone saved at PC is called. |
| (10) | Save | A zone on display is saved to PC. Standard waveform data is also saved in the same file. |
| (11) | Send | A zone on display is sent to a controller. |
| (12) | Receive | The zones in a controller are displayed in a list. |
| (13) | Wave File | The waveform file used as the standard of a zone is chosen. |
| (14) | Line Color | The screen which performs many setup about zone creation opens. |
| (15) | All Clear | All the data in a screen is eliminated. |
| (16) | Print | A zone on display is printed. |
| (17) | Close | The screen is ended. |

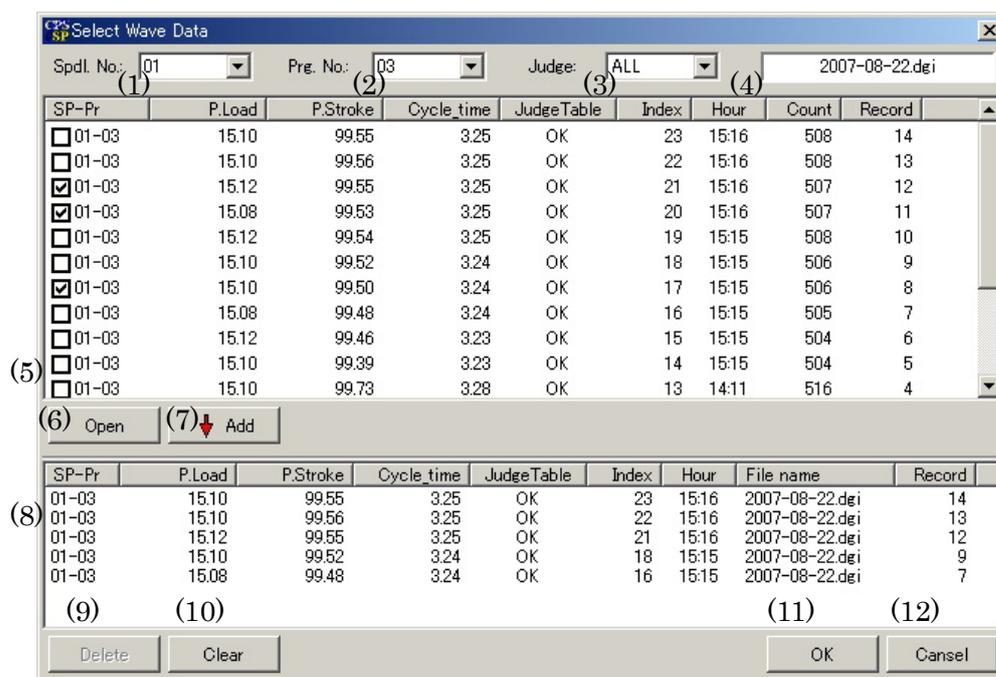


Fig. 7-4-6 Waveform file selection screen

| No. | Item | Explanation |
|-----|-------------------------|--|
| (1) | Spindle No. | A filter by spindle number is applied to the wavefoem data. |
| (2) | Program No. | A filter by program number is applied to the wavefoem data. |
| (3) | Judge | A filter by judgement result is applied to the wavefoem data. |
| (4) | File name | The selected waveform file name is shown. |
| (5) | Waveform data selection | The waveform data suitable for the conditions of (1) - (3) is displayed in a list, and a check is put in to what is made into the standard waveform of a zone. |
| (6) | Open | A waveform file is chosen. |

| | | |
|------|------------------------|---|
| (7) | Add | The waveform data checked in the area of (5) is added to the area of (8). |
| (8) | Standard waveform data | The waveform data chosen as a standard waveform of a zone is displayed in a list. |
| (9) | Delete | Selected waveform in the area of (8) is deleted. |
| (10) | Clear | All the waveform data in the area of (8) is deleted. |
| (11) | OK | The screen is ended reflecting a setup. |
| (12) | Cancel | A setup is canceled and the screen is ended. |

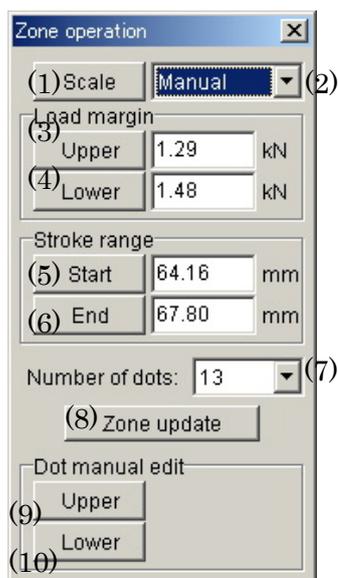


Fig. 7-4-7 Zone operation screen

| No. | Item | Explanation |
|------|----------------|--|
| (1) | Scale | If graph is dragged when this button is depressed, the drug range will be set as a manual scale. |
| (2) | Scale | The scale of graph is chosen. It can choose from Auto and Manual. |
| (3) | Upper | The upper margin of load is set up by left click, when this button is depressed. |
| (4) | Lower | The lower margin of load is set up by left click, when this button is depressed. |
| (5) | Start | The point of a zone start will be set up by left click, when this button is depressed. |
| (6) | End | The point of a zone end will be set up by left click, when this button is depressed. |
| (7) | Number of dots | The number of basic dots of a zone line is set up. |
| (8) | Zone update | A zone is updated according to the contents of the operation screen. |
| (9) | Upper | When this button is depressed, the upper dots of a zone can be dragged. |
| (10) | Lower | When this button is depressed, the lower dots of a zone can be dragged. |

7.4.6. Automatic generation

It is the simple creation function of a program. A program will be created if the numerical value is set up according to the guide screen displayed. If a tool type, a program number, and a judgment table number are chosen and a "next" button is clicked, a course selection screen will be displayed. A course can be chosen from simplicity, general, and proofreading.

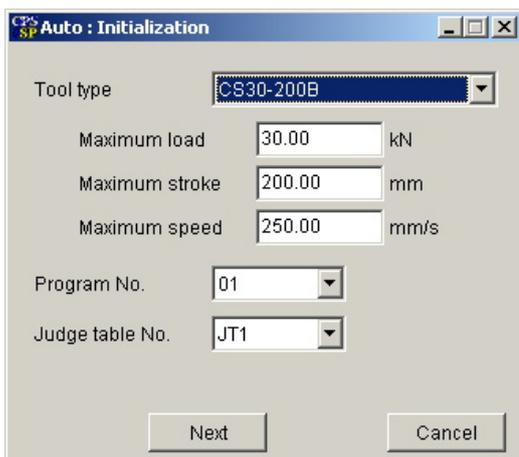


Fig.7-4-8 Initialize screen

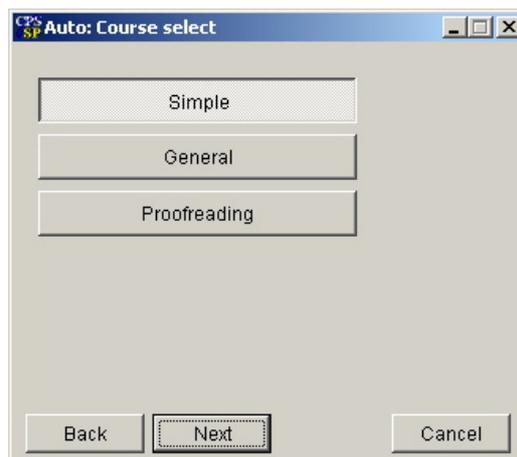


Fig.7-4-9 Course selection screen

In the case of a simple course, there is two choice, a load target and a stroke target. A standard program can be obtained only by all setting up five parameters. Approach speed, pressing speed, etc. are set up with the value decided beforehand. These parameters should edit the generated program directly and should change it into the numerical value suitable for the purpose. Moreover, if a general course is chosen, these parameters can also be set up arbitrarily.

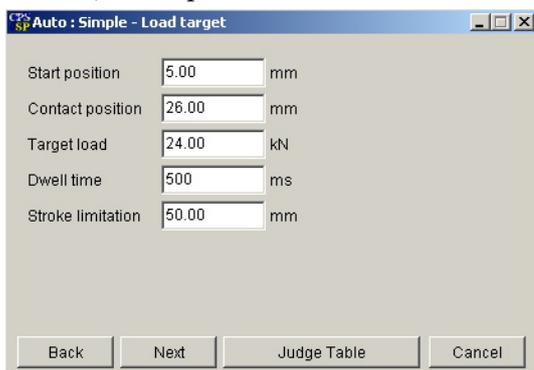


Fig.7-4-10 Load target screen

In addition to the load target and the stroke target, through the general course, four choice called the position keep after pressing and load keep is prepared. The position keep after pressing is the program which performs operation which holds a position until it gives a trigger in a user input after pressing of a stroke target. Load keep is a program holding the defined load value during the time on which it decided.

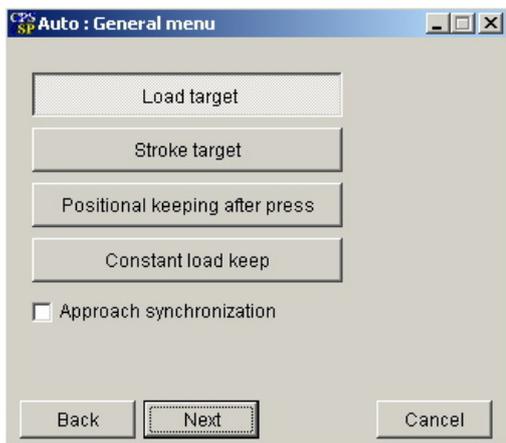


Fig.7-4-11 General course screen

Through a general course, the parameters of important points are set up on the operational chart of speed-load. Therefore, the program of operation more detailed than a simple course can be obtained.

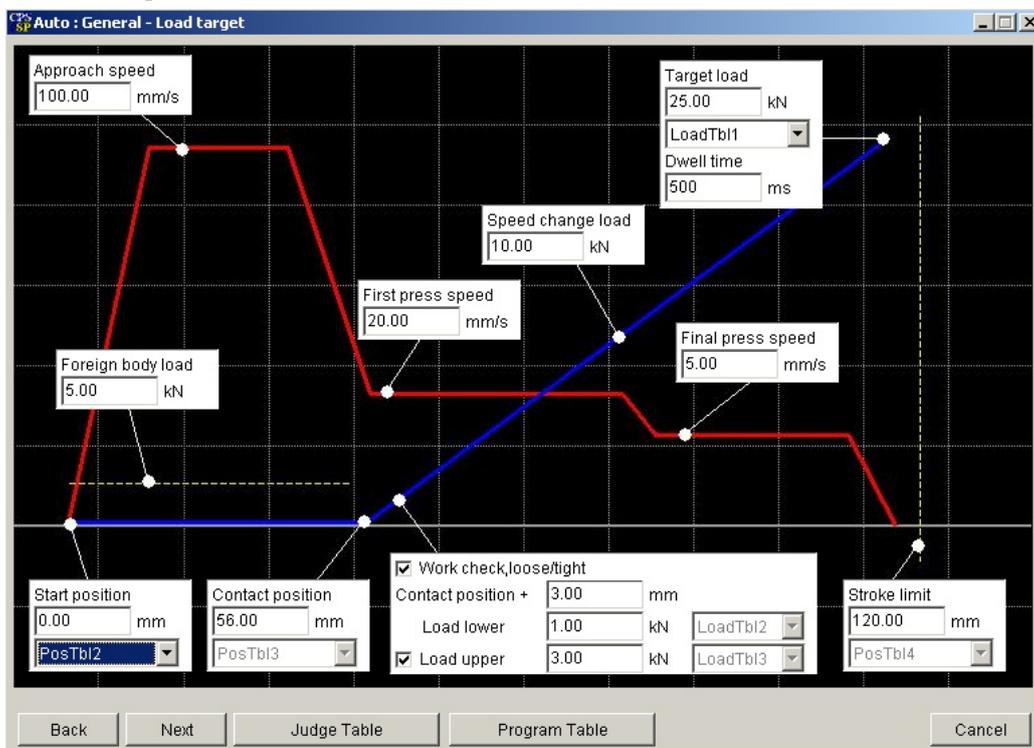


Fig.7-4-12 General course -Load target screen

Through a proofreading course, the program used when inspecting the load of a tool and stroke accuracy where a standard load cell and a linear scale are attached outside can be obtained. The outline of the program obtained by the load target is as follows. It starts pressing in speed of 0.3mm/s from 1mm of the upper parts of a standard load cell. Load proofreading can be performed by comparing peak load between CPS controller and a standard load cell.

Moreover, in a stroke target, the program which performs 0.2mm positioning down can be obtained from the contact position of a standard load cell. In this program, repetition positioning accuracy and repetition load accuracy can be checked in case there is some load.

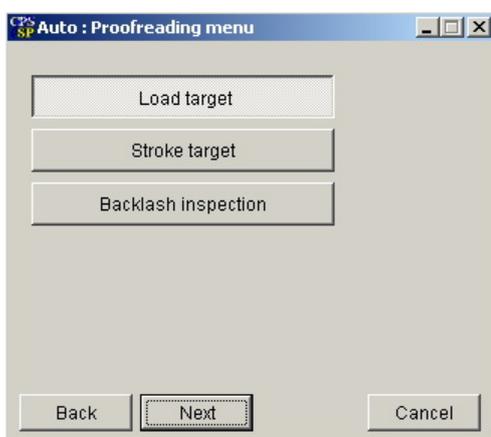


Fig.7-4-13 Proofread course

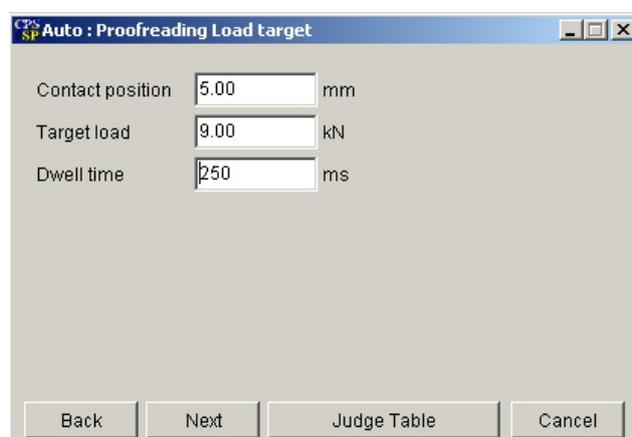


Fig.7-4-14 Proofread-Load target screen

Important

1. When using an automatic generation function, if the contact position with a work is not set up correctly, there is a risk of leading to breakage of a tool, a work, and a system. Please be careful enough.
2. If a predetermined numerical value is not set as a program table, in the case of the program of table reference form, it becomes the motion different from expectation, and it has the same danger as the above.
3. Since two or more programs may be referring to one program table, please pay attention enough to rewriting them.

7.4.7. Post Judge

It is the function to take in a waveform to PC, to analyze a waveform within PC, and to return a result to CPS controller. The requirements for composition for using a post judgment function are as follows.

| | |
|---------------------|-------------------------------|
| CPS SP Configurator | Ver.1.02.42 or more |
| CPS-SP-75 | Ver. 1.02.24 or more |
| Anybus i/f | CC-Link,DeviceNet,Profibus-DP |

The contents of waveform analysis are three kinds, Judge Frame, Zone, and Blocking Point.

Judge Frame Four judgment frames can be set up. The kind of judgment is three kinds, pass frame, non-pass frame, and peak frame.

Zone What set up the up-and-down load margin to standard waveforms and stroke range is called zone. If a waveform is settled in a zone, it will be judged as O.K. This differs from the zone which analyzes on real time within a controller.

Blocking Points It is based on a peak stroke. It judges with a load rate of change and load value in a certain position in front of a peak stroke.

The Post judge's using procedure

1. Create a post judgment file and register with PC.
2. Set a post judgment number to CPS controller via Anybus i/f from PLC.
3. Start a program.
4. PC takes in waveform data and analyze it.
5. PC returns an analysis result to CPS controller.
6. Output O.K./NG to IO on the basis of the analysis result of the judgment in CPS controller, and PC.

Creation procedure of a post judgment file

1. Choose standard waveforms.
2. Set up the contents of analysis of Judge Frame, Zzone, and Blocking Point.
3. Perform a simulation and check the contents of analysis.
4. Save the file.
5. Register a Post judge number.

Result check of Post Judge

| er | PJ No | PJ Result |
|----|-------|-----------|
| | 1 | 30 |
| | 1 | 30 |
| | 1 | 30 |

A result of Post Judge can be checked by PJ No and PJ Result of a numerical monitor or numerical viewer. PJ No shows the used Post Judge number. PJ Result shows the details of a judgment result.

judgment result.

| Name | Judge |
|------------------|-------|
| Judge frame 1 | OK |
| Judge frame 2 | OK |
| Judge frame 3 | NG |
| Judge frame 4 | NG |
| Zone | NG |
| Bottom load | OK |
| Loadrate | OK |
| COM Timeout | OK |
| Postjudge number | OK |

If the display domain of PJ Result is left-clicked, the judgment result screen will be displayed. These data can be read into PLC via Anybus i/f. A result of Post Judge is not reflected in the conventional Judge Code.

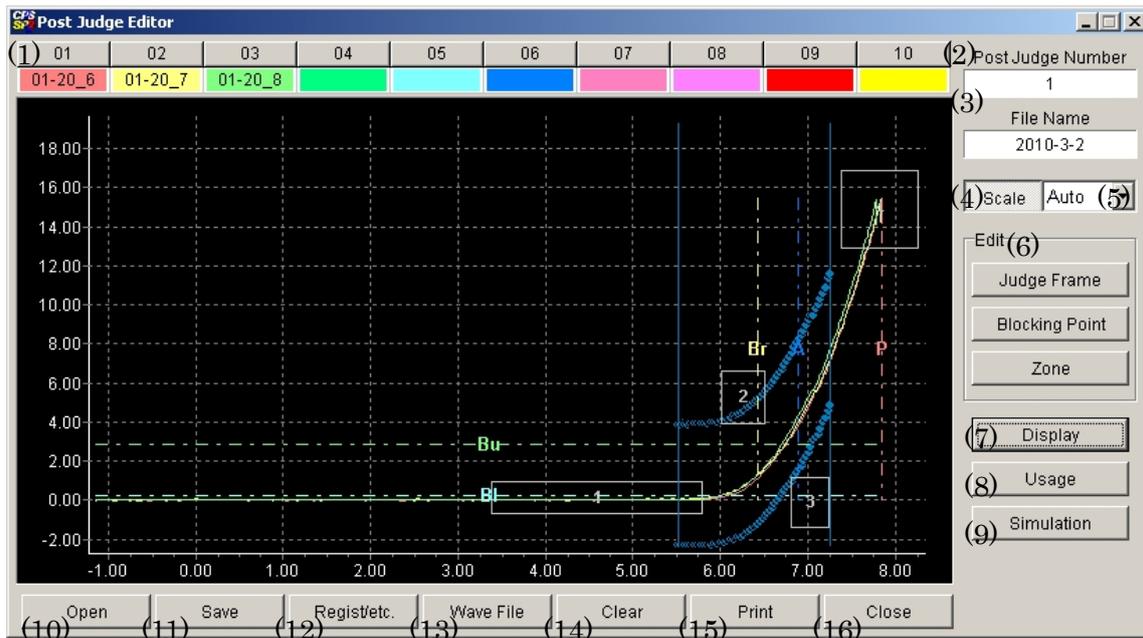


Fig.7-4-15 Posy Judge Editor screen

| No. | Item | Explanation |
|-----|----------------------------|---|
| (1) | Reference Wave information | The information about a standard waveform is displayed. |
| (2) | Post Judge Number | The Post Judge number registered into PC currently used is displayed. |
| (3) | File Name | A Post Judge file name on display is displayed. |
| (4) | Scale | A scale setup of the graph by drug operation is possible in the state where this button was pushed in. Scrolling of |

| | | |
|------|------------|--|
| | | graph is also possible by drug operation with right click. |
| (5) | Scale | The scale of a graph screen is chosen. In Auto, the optimum scale for display data is set up automatically. In Data, it becomes a scale setup as which display data is displayed on the maximum. |
| (6) | Edit | The operation dialog of each judgment item opens.(Fig.7-4-15-1,2,3) |
| (7) | Display | The screen which sets up a display of a judgment base line and a waveform and a drawing color opens.(Fig.7-4-15-4) |
| (8) | Usage | The screen which sets up usage of each judgment item opens. (Fig.7-4-15-5) |
| (9) | Simulation | A simulation is possible with the post judgment file on display to the existing waveform data. (Fig.7-4-15-6) |
| (10) | Open | A post judgment file is opened. |
| (11) | Save | The contents of a display are saved at a file. |
| (12) | Regist/etc | The post judgment number and post judgment file which have already been registered are displayed in a list. Registration of a post judgment, release, etc. are possible.(Fig.7-4-15-7) |
| (13) | Wave File | The screen which chooses a standard waveform opens. (Fig.7-4-6) |
| (14) | Clear | All the contents of a display are eliminated. |
| (15) | Print | The contents of a display are printed. |
| (16) | Close | The screen is ended. |

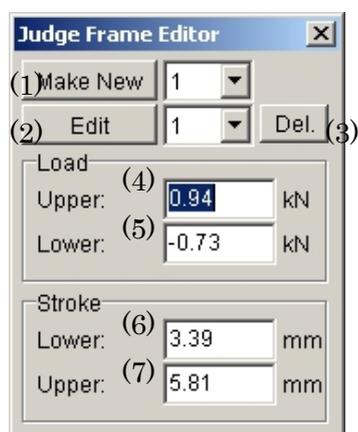


Fig.7-4-15-1 Post Judge-Judge Frame Editor screen

Four judgment frames can be used. There is three kinds of usage of a frame.

- 1.Pass When a waveform passes two sides of right and left of a frame, it is judged as O.K.
- 2.Non-Pass When a waveform does not pass through the inside of a frame, it is judged as O.K.
- 3.Peak When the point which recorded peak load exists in a frame, it is judged as O.K.

The usage is set up on a usage screen (Fig. 7-4-15-5).

The drawing color of a frame and a display are set up on a display screen (Fig. 7-4-15-4).

| No. | Item | Explanation |
|-----|--------------|---|
| (1) | Make New | Where this button is pushed in, the frame of the number specified is created newly by drag operation of the mouse on the graph of an editor screen. |
| (2) | Edit | Where this button is pushed in, the position and size of a frame can be edited by drag operation of a mouse. |
| (3) | Del. | The judgment frame of the specified number is deleted. |
| (4) | Load-Upper | The upper load value of the specified judgment frame is shown. It is also possible to input a value directly by clicking the editing box. |
| (5) | Load-Lower | The lower load value of the specified judgment frame is shown. It is also possible to input a value directly by clicking the editing box. |
| (6) | Stroke-Upper | The upper stroke value of the specified judgment frame is shown. It is also possible to input a value directly by clicking the editing box. |
| (7) | Stroke-Lower | The lower stroke value of the specified judgment frame is shown. It is also possible to input a value directly by clicking the editing box. |

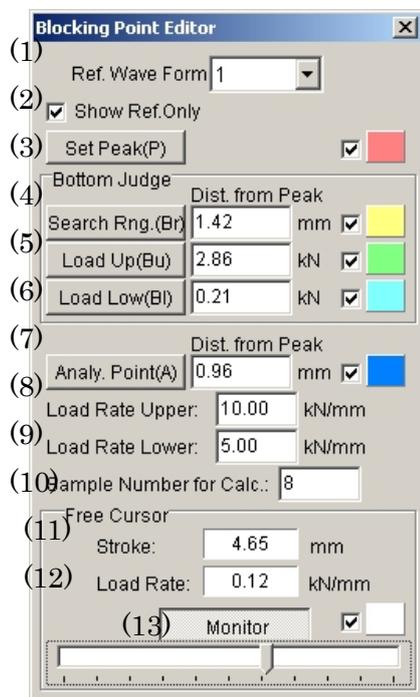


Fig.7-4-15-2 Post Judge-Blocking Point Editor screen

There are two kinds of analyses of a blocking point. One is a load rate of change in an analysis point. An analysis point means the position from which an appointed distance was deducted from the peak stroke.

Another is the range of bottom load. The bottom search range is specified on the basis of a peak stroke. The lowest load value of the bottom search range is bottom load.

When the check is put in the check box on the right of each operation button, the judgment base line of the corresponding item is drawn on the graph of the editor. Control of the right shows the drawing color of a judgment base line. It can be set as arbitrary colors by left click.

| No. | Item | Explanation |
|------|-------------------------|---|
| (1) | Ref. Waveform | The waveform used as the standard of a peak is specified. |
| (2) | Show Ref. Only | Only a reference waveform will be displayed if a check is put in. |
| (3) | Set Peak(P) | The peak value of a standard waveform is searched. |
| (4) | Search Rng.(Br) | Where this button is pushed in, if left click is given on the graph of the editor screen ,the search range of bottom load will be set up. |
| (5) | Load Up(Bu) | Where this button is pushed in, if left click is given on the graph of the editor screen ,the maximum value of bottom load will be set up. |
| (6) | Load Low(Bl) | Where this button is pushed in, if left click is given on the graph of the editor screen ,the minimum value of bottom load will be set up. |
| (7) | Analy.Point(A) | Where this button is pushed in, if left click is given on the graph of the editor screen , the analysis point of the load rate will be set up. |
| (8) | Load Rate Upper | The upper value of a load rate of change is set up. Please click the editing box and input numerical value directly. |
| (9) | Load Rate Lower | The lower value of a load rate of change is set up. Please click the editing box and input numerical value directly. |
| (10) | Sample Number for Calc. | The number of data used in order to compute a load rate is set up. Although the correspondence to change of graph will become good if the number of data is small, smoothness falls victim. |
| (11) | Stroke | The stroke value of the monitor cursor is displayed. |
| (12) | Load Rate | The load rate of monitor cursor is displayed. |
| (13) | Monitor | Where this button is pushed in, if left click is given on the graph of the editor screen , monitor cursor will move. Monitor cursor is movable also in lower slide control. When a focus is in the slide control, the monitor cursor can be moved by the arrow key of a keyboard. |

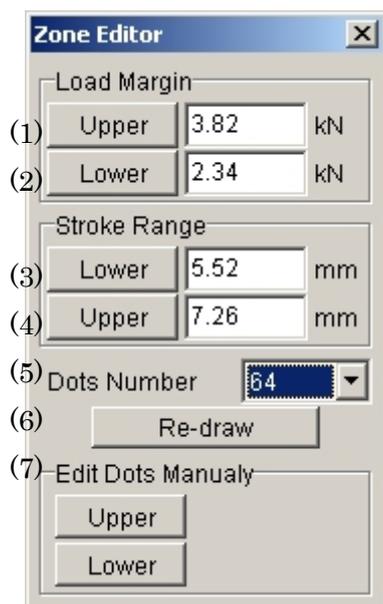
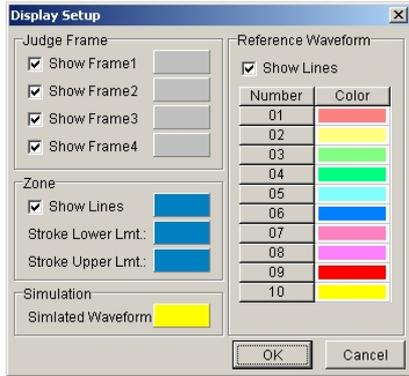


Fig.7-4-15-3 Post Judge-Zone Editor screen

What set up the up-and-down load margin to reference waveforms and stroke range is called zone. The line of a zone is drawn in accordance with the envelope form of reference waveforms.

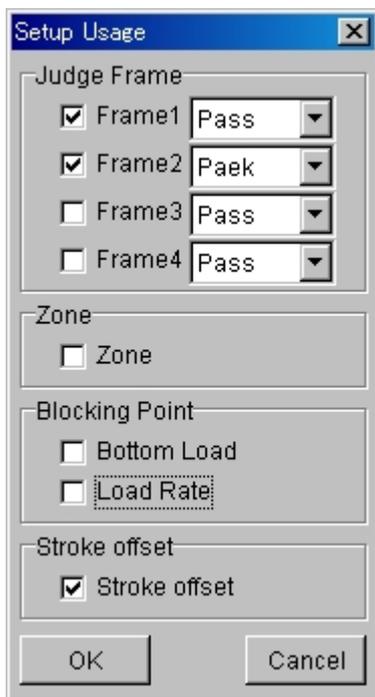
Caution Although a zone judgment is performed on real time inside the CPS controller, the zone explained here is another with it.

| No. | Item | Explanation |
|-----|--------------------|--|
| (1) | Load Margin Upper | Where this button is pushed in, if left click is given on the graph of the editor screen , the upper value of a load margin will be set up. |
| (2) | Load Margin Lower | Where this button is pushed in, if left click is given on the graph of the editor screen , the lower value of a load margin will be set up. |
| (3) | Stroke Range Upper | Where this button is pushed in, if left click is given on the graph of the editor screen , the upper value of a stroke range will be set up. |
| (4) | Stroke Range Lower | Where this button is pushed in, if left click is given on the graph of the editor screen , the lower value of a stroke range will be set up. |
| (5) | Dots Number | The number of dots which constitutes zone lines is set up. |
| (6) | Re-draw | A zone lines are redrawn. The result manually edited by the dot edit function is reset. |
| (7) | Edit Dots Manually | Where these buttons are pushed in, the dots of a zone can be edited by drug operation. |



A setup about the display except the blocking point is performed. Please put a check into the line to display.

Fig.7-4-15-4 Post Judge-Display screen



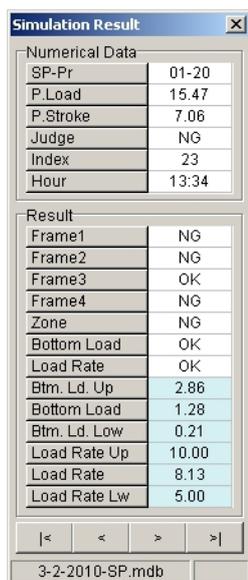
The usage setup screen of each judgment item—a judgment frame, a blocking point, and a zone opens. Please put a check into the item used for a judgment. Three kinds of usage of a frame can be chosen about a judgment frame.

- 1.Pass When a waveform passes two sides of right and left of a frame, it is judged as O.K.
- 2.Non-Pass When a waveform does not pass through the inside of a frame, it is judged as O.K.
- 3.Peak When the point which recorded peak load exists in a frame, it is judged as O.K.

Fig.7-4-15-5 Post Judge-Usage screen

Stroke Offset

The stroke offset function was added in CPS SP Configurator Ver1.02.80. This is the function to set offset to all strokes in a post judge. The peak stroke of the reference waveform 1 is used as a standard. The difference with a peak stroke of the waveform data for evaluation is set up as offset. This function enables the judgment on the basis of the so-called blocking point.



According to the contents of a judgment set up on the editor screen, a simulation can be performed to arbitrary waveforms. If a simulation button is clicked, the screen which chooses a waveform file and waveform data will open one by one, and if selection of waveform data is completed, a simulation result as shown in the left figure will be displayed. Moreover, selected waveform data and each selected judgment standard line are displayed on the editor screen.

A simulation is performed to the waveform data before and after the waveform file chosen if the arrow button of the screen lower part is clicked.

Fig.7-4-15-6 Post Judge-Simulation Result screen



Fig.7-4-15-7 Post Judge-Regist/etc. screen

| No. | Item | Explanation |
|-----|----------|--|
| (1) | Open | The post judgment file chosen in the list is opened. |
| (2) | Regist | The post judgment file currently displayed on the editor screen is registered into the post judgment number specified in the list. The post judgment file needs to be saved with a name. The maximum of a post judgment number is 255. |
| (3) | Unregist | Registration of the post judgment number chosen in the list is canceled. |
| (4) | Delete | The post judgment file chosen in the list is deleted, and registration is also canceled. |
| (5) | Close | The screen is ended. |

7.5. Manual

7.5.1. I/O

General-purpose input and output can be operated by the manual. Although the same screen as a figure 7-2-10 I/O monitoring screen are used, an operation object is chosen by lower left I/O operation combobox. When operating an input, emulation processing by communication is performed within a controller.

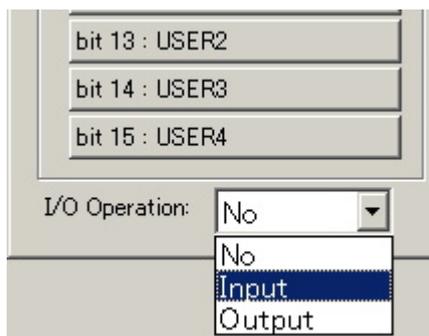


Fig. 7-5-1 I/O operation screen

7.5.2. Tool operation

A tool can be operated manually.

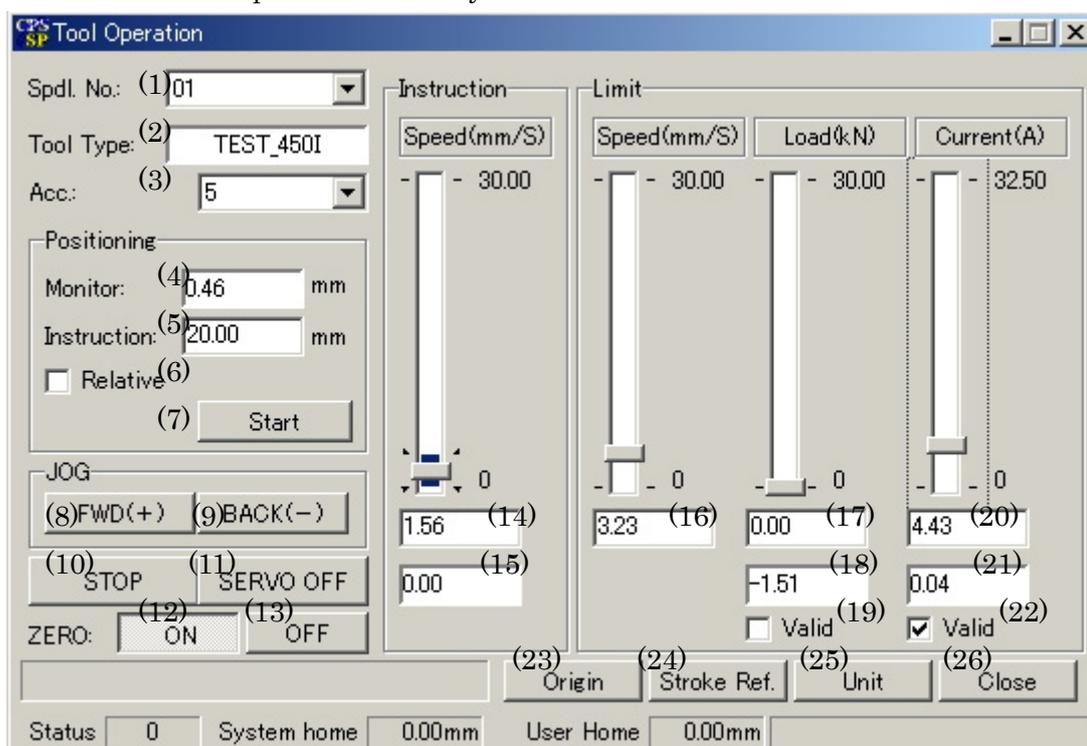


Fig. 7-5-2 Tool operation screen

| No. | Item | Explanation |
|-----|-------------|---|
| (1) | Spindle No. | The spindle number for operation is set up. |
| (2) | Tool Type | The tool type for operation is shown. |

| | | |
|------|---------------------|---|
| (3) | Acc | The acceleration in JOG operation is specified. Although "NO" is the specification without acceleration, since there is a possibility of giving a mechanical damage to a tool or over-current, please use it only at the time of low-speed operation. |
| (4) | Monitor | The present position of a tool is shown. The standard of a position is set up in (24) stroke reference. |
| (5) | Instruction | The target stroke of positioning is specified. |
| (6) | Relative | In positioning of relative position specification, a check is put in. |
| (7) | START | Positioning is started. It is toggle operation. |
| (8) | FWD(+) | JOG operation (the direction of +) is started. |
| (9) | BACK(-) | JOG operation (the direction of -) is started. |
| (10) | STOP | It becomes speed zero. Servo on state is maintained. |
| (11) | SERVO OFF | It will be in a servo off state. |
| (12) | ZERO ON | ZERO compensation of load value and the motor current value is carried out. |
| (13) | ZERO OFF | ZERO compensation is canceled for load value and motor current value. |
| (14) | Instruction | A speed of operation is specified. |
| (15) | Monitor | It is a monitor display of speed. |
| (16) | Speed limit value | Speed limit value is set up. |
| (17) | Load limit value | Load limit value is set up. |
| (18) | Load monitor | It is a monitor display of load value. |
| (19) | Valid | Load limit will become effective if a check is put in. |
| (20) | Current limit value | Current limit value is set up. |
| (21) | Current monitor | It is a monitor display of motor current. A 1.73 times as many numerical value as phase current is displayed. |
| (22) | Valid | Current limit will become effective if a check is put in. |
| (23) | Origin | Origin is started. |
| (24) | Stroke Ref. | The screen which chooses a standard position opens.(Fig. 7-5-3) |
| (25) | Unit | The screen which chooses the display unit of a position and speed opens. (Fig. 7-5-4) |
| (26) | Close | The screen is ended. |

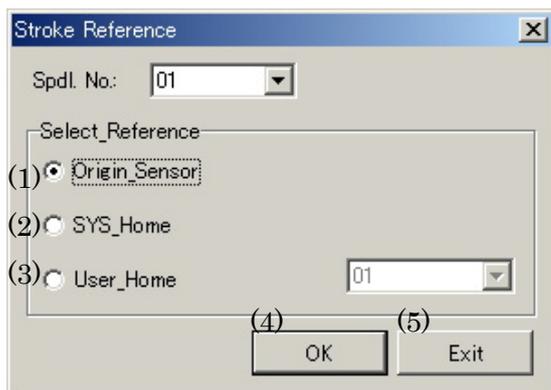


Fig.7-5-3 Stroke reference screen

The reference position of stroke calculation is set up.

| No. | Item | Explanation |
|-----|---------------|--|
| (1) | Origin Sensor | An origin sensor serves as the standard of a stroke. |
| (2) | SYS_Home | A system home position serves as the standard of a stroke. |
| (3) | User_Home | A user home position serves as the standard of a stroke. |
| (4) | OK | The screen is ended reflecting a setup. |
| (5) | Exit | A setup is canceled and the screen is ended. |

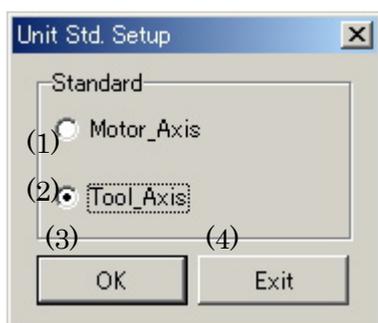


Fig. 7-5-4 Display unit setup screen

| No. | Item | Explanation |
|-----|------------|---|
| (1) | Motor Axis | The unit of a stroke is the pulse of an encoder. The unit of speed is the rotation speed rpm of a motor axis. |
| (2) | Tool Axis | The unit of a stroke is the position mm of ram. The units of speed are the speed mm/s of ram. |
| (3) | OK | The screen is ended reflecting a setup. |
| (4) | Exit | A setup is canceled and the screen is ended. |

7.5.3. Alarm reset

An alarm reset command is transmitted to all spindles.

7.5.4. Battery reset

A battery alarm reset command is transmitted to selected spindle.

Reset of battery alarm is impossible except this screen.

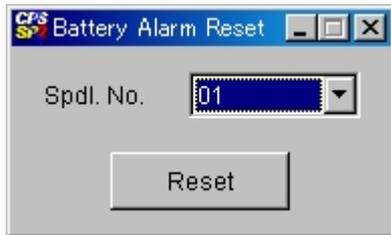


Fig. 7-5-5 Battery Alarm Reset screen

7.5.5. Brake

A mechanical brake is operated manually. Although a brake operation result remains as it is, a brake is turned off during servo on.

7.6. Maintenance

7.6.1. Information

Information, such as a version, is managed in a general information tab. In a memorandum tab, it can leave a memorandum in text form using the memory capacity of about 300 bytes. Since these informations are memorized by EEPROM, even if it extracts a backup battery, it is not eliminated.

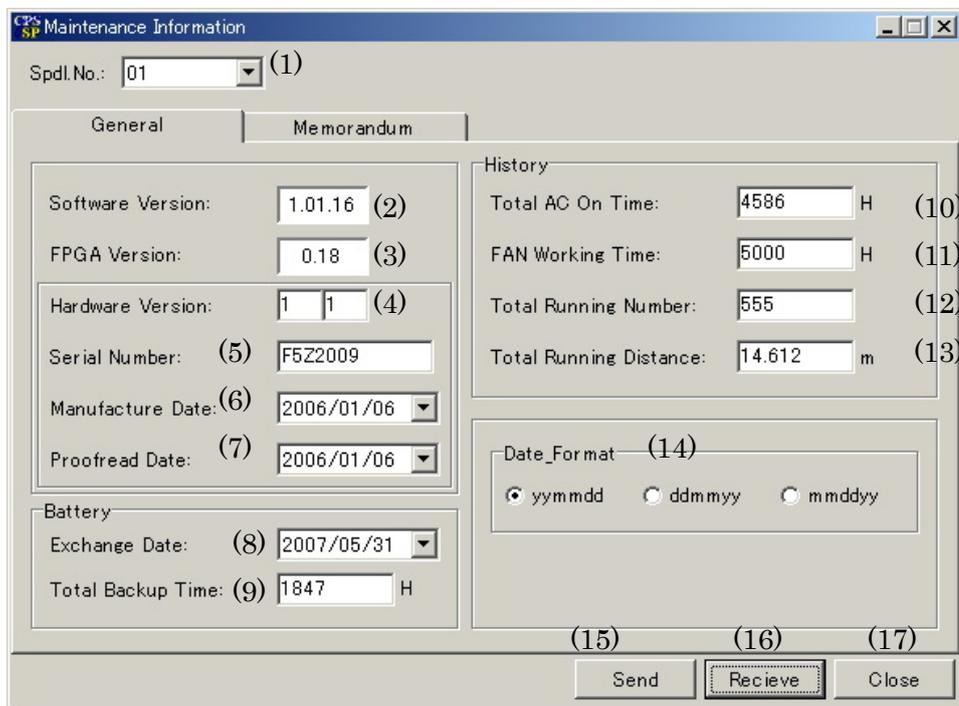


Fig. 7-6-1 Maintenance information screen

| No. | Item | Explanation |
|------|------------------------|--|
| (1) | Spindle No. | The spindle number for operation is set up. |
| (2) | Software version | The software version of a microcomputer is displayed. Since it is the information described in the program code, rewriting is impossible. |
| (3) | FPGA version | The version of FPGA is displayed. Since it is the information described in the program, rewriting is impossible. |
| (4) | Hardware version | A hardware version is shown like this (CPU board version).(inverter board version). |
| (5) | Serial No. | A serial number is shown. As for rewriting, a user cannot do. |
| (6) | Manufacture date | A manufacture date is shown. As for rewriting, a user cannot do. |
| (7) | Proofreading date | The proofreading date of current amplifier is shown. As for rewriting, a user cannot do. |
| (8) | Exchange date | The exchange date of a backup battery is shown. |
| (9) | Total Backup Time | The accumulation backup time of a backup battery is shown. |
| (10) | Total AC ON Time | Accumulation of the time which AC power supply turns on is shown. |
| (11) | FAN Working Time | A cooling fan's total hours worked are shown. |
| (12) | Total Running Number | Accumulation of the number of times of execution of programs is shown. |
| (13) | Total Running Distance | The total of the mileage of ram is displayed. |
| (14) | Date Format | The display form of a date is chosen. |
| (15) | Send | The contents of a display are sent to a controller. Moreover, the contents of (12) and (13) which are the operation history of a tool are saved at the tool. |
| (16) | Recieve | Maintenance information is received from a controller. |
| (17) | Close | The screen is ended. |

7.6.2. Backup

The tool type, programs, tables, various parameters, etc. are set as the controller backed up as a file to PC. Moreover, a backup file can be read and it can be set as a controller. If a detailed display function is used, the individual contents of a backup file or receiving data can be checked.

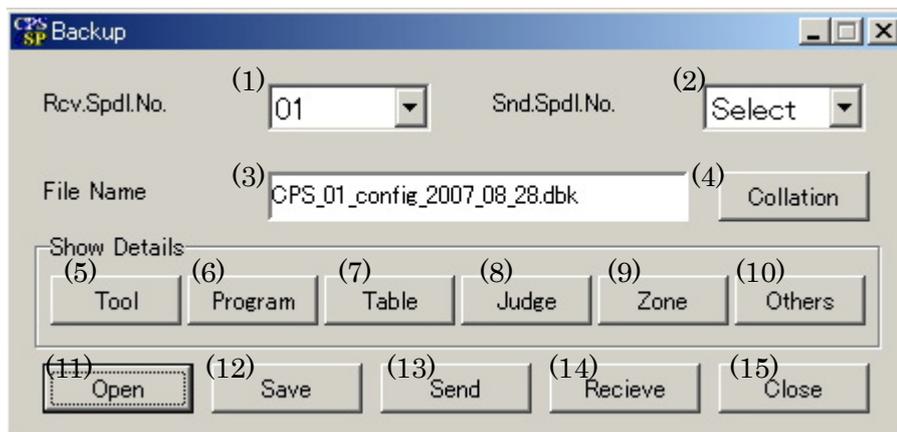


Fig. 7-6-3 Backup screen

| No. | Item | Explanation |
|------|------------------------|---|
| (1) | Receive Spindle Number | The spindle number for operation is set up. |
| (2) | Send Spindle Number | The spindle number to which the contents of a backup file are sent is set up. If Select is chosen, the spindle number selection screen will open. Simultaneous sending on the spindle chosen on the screen is possible. |
| (3) | File Name | A backup file name is displayed. |
| (4) | Collation | The selection screen of a backup file opens. The data of this screen and the selected file are compared. When there is disagreement as a result of collation, a figure 7-6-4 collation result screen is displayed. |
| (5) | Tool | A tool selection screen is displayed and the data of a backup screen is displayed there. |
| (6) | Program | An editor screen is displayed and the data which the backup screen has is displayed there. Please choose a program number. |
| (7) | Table | A table setting screen is displayed and the data which the backup screen has is displayed there. |
| (8) | Judge | A judgment table screen is displayed and the data which the backup screen has is displayed there. Please choose a table number. |
| (9) | Zone | A zone screen is displayed and the data which the backup screen has is displayed there. Please choose a zone number. |
| (10) | Other | The screen which displays other setting items is displayed and the data which the backup screen has is displayed there. |
| (11) | Open | The selection screen of a backup file opens. |

| | | |
|------|---------|---|
| (12) | Save | The contents received from the controller are saved at a file. |
| (13) | Send | A setup specified by the file name is sent to the controller specified by sending spindle number. |
| (14) | Recieve | The contents of a setting of the controller specified by (1) are received. |
| (15) | Close | The screen is ended. |

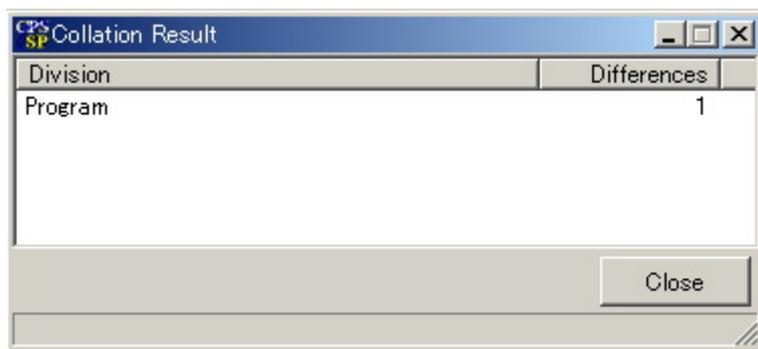


Fig.7-6-4 collation result screen

7.6.3. Alarm history

The 100 newest alarms are saved for a controller. It can be displayed in a list.

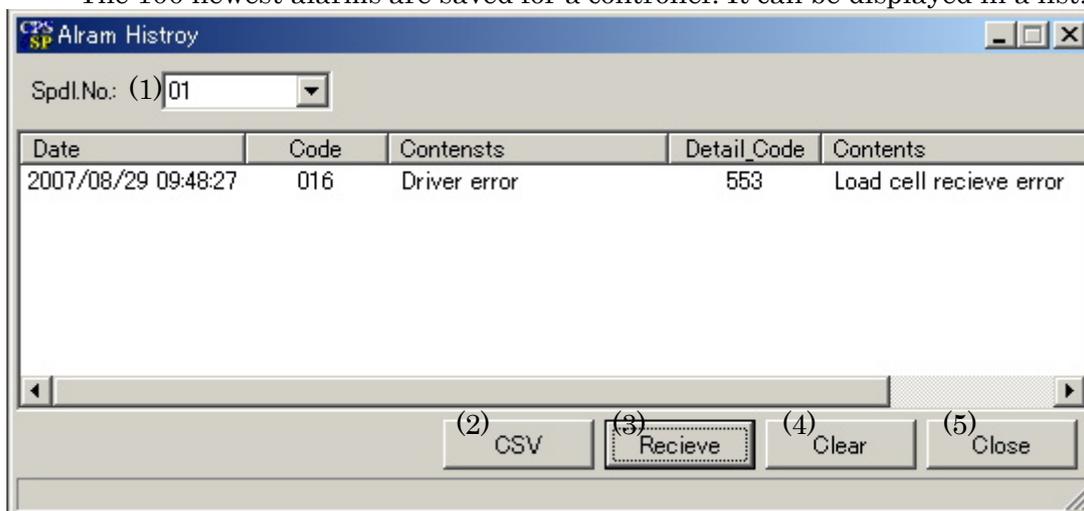


Fig. 7-6-5 Alarm history screen

| No. | Item | Explanation |
|-----|-------------|---|
| (1) | Spindle No. | The spindle number for operation is set up. |
| (2) | CSV | The contents of a display of a screen are saved as a CSV file at the folder of specification of PC. |
| (3) | Recieve | An alarm history is received from a controller. |
| (4) | Clear | All the alarm histories in a controller are deleted. |
| (5) | Close | The screen is ended. |

7.6.4. Origin Sensor Monitor

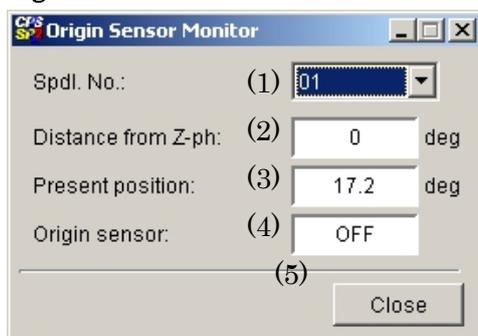


Fig.7-6-6 Origin Sensor Monitor screen

| No. | Item | Explanation |
|-----|--------------------|---|
| (1) | Spindle No. | The spindle number for monitor is set up. |
| (2) | Distance from Z-ph | The position relation between Z-phase of the encoder and an origin sensor at the time of orign finished is shown. |
| (3) | Present position | The phase of the present of an encoder is displayed on the basis of Z-phase. |
| (4) | Origin sensor | ON or off of an origin sensor is displayed. |
| (5) | Close | The screen is closed. |

7.7. Setup

7.7.1. Data collection

Collect

A check is put in when collecting data. When collecting data, data files are created newly whenever a date is updated by the predetermined folder of PC. The data size of each file is shown.

Numerical data 132 bytes / data.

Waveform data It is 4 bytes in one point of one waveform. If it collects 1000 point by four waveforms, it will become 16 K bytes.

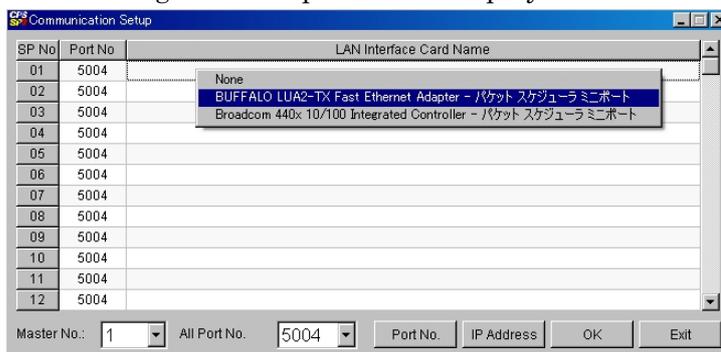
Waveform data is compressed and saved. When efficiency is the best, it becomes about 1/4 size.

Communication

The communication method between PC and a controller is set up. Please refer to Chapter 3-4 communication setting-The IP address by the side of application. Here, the port number of LAN and a route setup are explained.

It is also possible to install two CPS SP Configurators in one PC, and to start simultaneously. Starting of the 2nd Configurator displays the message "the port cannot be used." It is because the 1st Configurator has already used the port number 5004 (default value). Then, at the 2nd Configurator, it is set up so that the port number except 5004 may be used. In the menu of the 2nd Configurator, Setup-Data collection-Communication is chosen, and the communication setting screen is opened.

Please choose 5005 at the list-box of All Port No. button, and click O.K. button. Please re-start the 2nd Configurator. Two Configurators can be used if the message about a port is not displayed. If two Configurators are used, data can



be displayed by the station.

Moreover, when you set arbitrary IP addresses to a controller, please click IP Adrs. button of this screen. Then, an exclusive screen (Fig.7-7-1-2) opens.

Fig7-7-1-1 Communication Setup screen

If LAN Interface Card Name in the Communication Setup screen of Fig7-7-1-1 is used, the communication route between a PC and controllers can be specified.

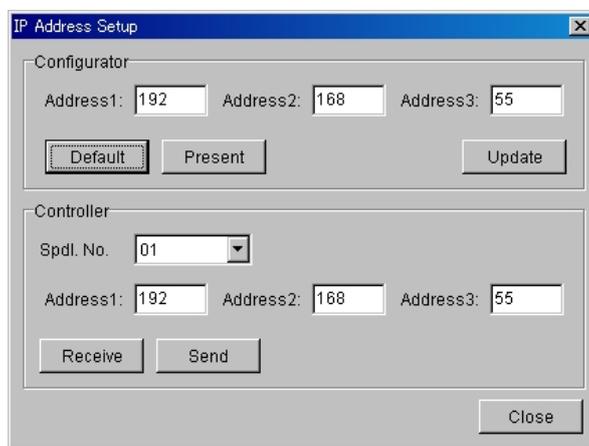
Mixture of a network is avoidable if this function is used when using two or more network interface cards. Moreover, if two Configurators are started and data collection is performed by the separated network interface card, the time of data collection can be shortened.

As shown in Fig7-7-1-1, the network interface card names are displayed in a floating window by right click of the lower part of LAN Interface Card Name.

A setup will become effective, if LAN Interface Card Name of you wish is chosen and O.K. button is clicked.

Arbitrary IP address setup

Arbitrary IP addresses can be set up now to the controller of a version 1.02.31 or later. On Fig. 7-7-1-1 Communication Setup screen if IP Address button is clicked, Fig.7-7-1-2 IP Address Setup screen will open. The IP address of



Configurator and the IP address of a controller can be arbitrarily set up on this screen. Address 4 is decided by the spindle number. A spindle number is set up with the rotary SWs of the front upper part of a controller. The setting range of a spindle number is from 1 to 31.

Fig.7-7-1-2 IP Address Setup screen

Notes

Communication is impossible unless Configurator and a controller are the same IP addresses. Moreover, it is necessary to also change the IP address of the network interface card used with a personal computer. Please setup addresses 1 and 2 with the same addresses of a controller.

A setup of a controller becomes effective after a re-injection of a power supply.

The communication method with an IP address unknown controller

Please use a default fixed IP address to the controller with an unknown setup of an IP address. When a spindle number is set as 71 to 99 with the rotary SW of the upper part in front of a controller, the IP address of the controller is as follows.

192.168.55.(spindle number - 70)

A new IP address becomes effective by re-injection of a power supply.

Arbitrary Port number setup

Arbitrary port number can be set up now to the controller of a version 1.02.50 or later. On Fig. 7-7-1-1 Communication Setup screen if Port No. button is clicked, Fig.7-7-1-3 Port No. setup screen will open. The port numbers of Configurator and those of a controller can be arbitrarily set up on this screen.

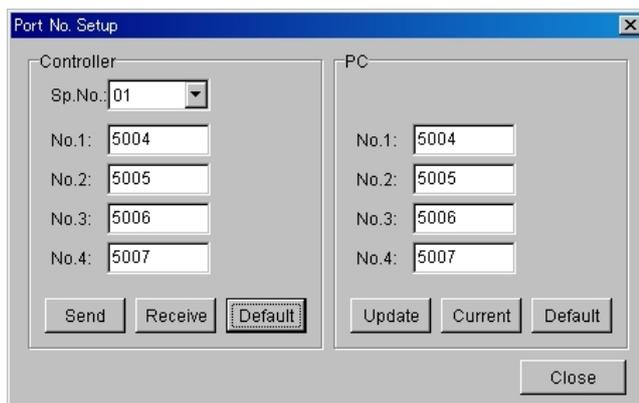


Fig.7-7-1-3 Port No. Setup screen

Notes

Communication is impossible unless Configurator and a controller are the same port number.

A setup of a controller becomes effective after a re-injection of a power supply.

Default port number of the system are 5004-5007.

The communication method with a port number unknown controller

Please use a default port number to the controller with an unknown port number. When a spindle number is set as 71 to 99 with the rotary SW of the upper part in front of a controller, the port number of the controller becomes default setting.

A new port number becomes effective by re-injection of a power supply.

Receive filter

The kind and its collection condition of the data saved as a file at PC are set up.

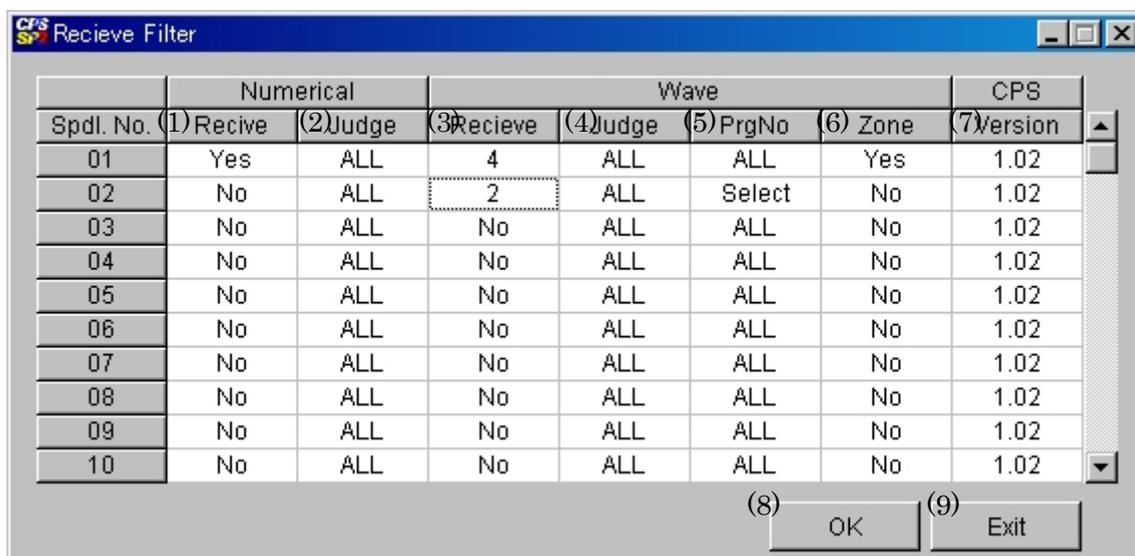


Fig. 7-7-2 Receive filter screen

| No. | Item | Explanation |
|-----|-------------------|---|
| (1) | Numerical-Recieve | When receiving numerical data, it is set as "Yes." |
| (2) | Numerical-Judge | The receiving condition of the numerical data by judgment of a program execution result is set up. O.K. ... Only O.K. data is received. NG ... Only NG data is received. ALL ... All data is received. |
| (3) | Waveform-Recieve | A setup about reception of waveform data is carried out. NO ... Waveform data is not received. 2.... Two waveforms of torque and angle are received. 4.... Four waveforms of torque, angle, the Expansion1, and the Expansion2 are received. |
| (4) | Waveform-Judge | The receiving conditions of the waveform data by judgment of a program execution result are set up. O.K. ... Only O.K. data is received. NG ... Only NG data is received. ALL ... All data is received. |
| (5) | PrgNo | ALL ... The data of all program numbers is received. Select ... Only the data of the program number set up on the number selection screen is received. The number selection screen is displayed when a setup is changed into Select from ALL. |
| (7) | Zone | In the version 1.02.52 of Configurator, when a zone is used, it has been improved so that the zone to use might also be saved as data. The version of the controller corresponding to this function is 1.02.34 or more. The zone display method in a waveform monitor |

| | | |
|-----|---------|---|
| | | and a viewer is also changed. Note The zone pointed out here is a zone processed within a controller. It is not a post judgment's zone. |
| (6) | Version | The software version of a controller is set up. The numerical data items collected by Ver1.01 and Ver1.02 differ. Please check the version of a controller with the maintenance information screen or the connected spindles list screen, and set up correctly. When an error is in a version setup, data collection cannot be performed correctly. |
| (8) | OK | The screen is closed reflecting a setup. |
| (9) | Exit | A setup is canceled and the screen is closed. |

Data folder

The folder which saves collected data is set up. Unless the data folder is set up correctly, numerical data and waveform data are not saved. Moreover, those monitor ability does not operate normally, either.

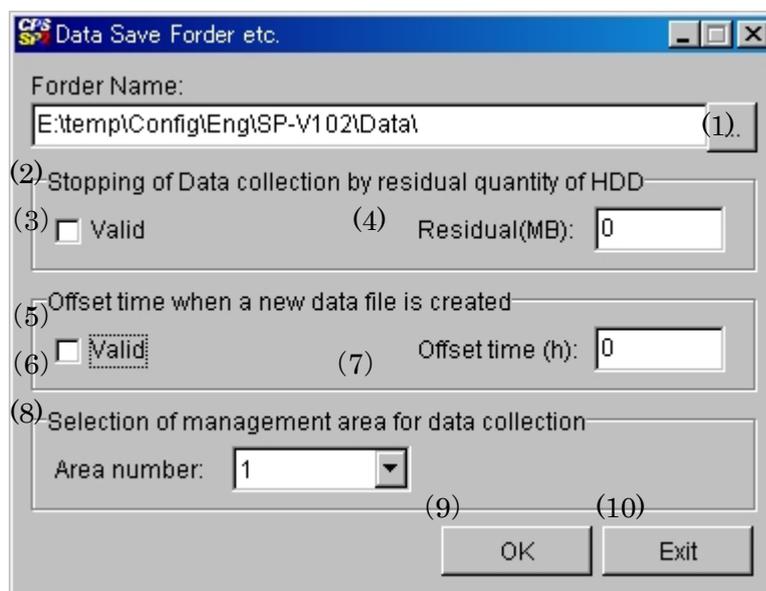


Fig.7-7-3 Data Save Folder etc. screen

| No. | Item | Explanation |
|-----|----------------------|--|
| (1) | Folder Name | The preservation folder of data is set up. |
| (2) | Stopping of Data ... | When the residual quantity of HDD is less than setting value, it sets up about the function to stop data collection automatically. |
| (3) | Valid | A check is put in when using the function of (2). |
| (4) | Residual(MB) | The residual quantity of HDD which data collection stops is set up. |
| (5) | Offset time... | A data file is newly created at the timing by which the date of PC to save is updated. If this function is used, the |

| | | |
|------|--|---|
| | | creation timing of a data file can be set up arbitrarily. |
| (6) | Valid | A check is put in when using the function of (5). |
| (7) | Offset time(h) | Time to create a data file is set up. |
| (8) | Selection of management area for data collection | This function is effective with the controller of version 1.0.2.52 or later. If this function is used, Up to 4 sets of PCs can perform data collection to one controller simultaneously. Each PC should set up a different management domain number. Data is collected by only PC which accessed the controller previously when two or more PCs of the same management domain number exist. |
| (9) | OK | The screen is ended reflecting a setup. |
| (10) | Exit | A setup is canceled and the screen is ended. |

PC Watch

When data is uncollectible in the trouble of PC, it is the function which outputs an error. While the controller set as Yes in PC watch performs a program, when there is no access from PC, it is regarded as the trouble of PC and an error is outputted.

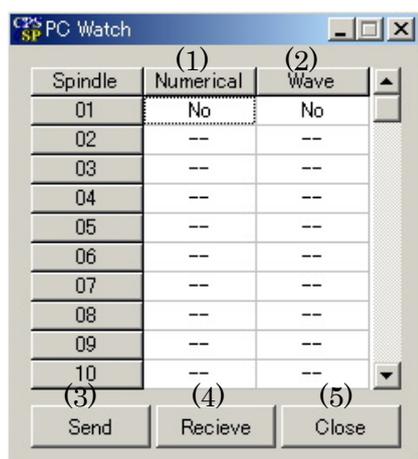


Fig.7-7-4 PC Watch screen

| No. | Item | Explanation |
|-----|-----------|---|
| (1) | Numerical | The access surveillance to numerical data is set up. |
| (2) | Wave | The access surveillance to waveform data is set up. |
| (3) | Send | The contents of a display are sent to a controller. |
| (4) | Recieve | The setting state of PC surveillance is received from a controller. |
| (5) | Close | The screen is ended. |

CSV Save

Numerical data and waveform data are automatically saved to files in csv form. The preservation function to csv works on the checked item. The preservation place of files is Data of the installation folder.

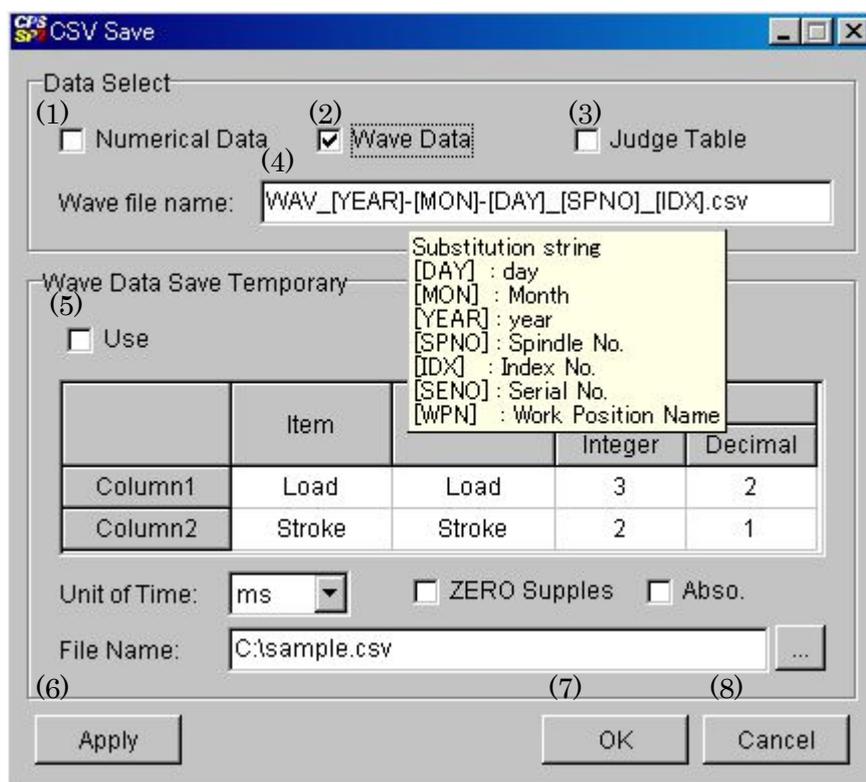


Fig.7-7-5 CSV Save screen

| No. | Item | Explanation |
|-----|--------------------------|--|
| (1) | Numerical Data | Please give a check if you will save numerical data in csv files. A csv file is created for every day. |
| (2) | Wave Data | Please give a check if you will save wave data in csv files. When saving waveform data in csv file, a folder is created for every date, and one waveform is saved at one file. Moreover, since file size becomes several times as large as mdb, please be careful. |
| (3) | Judge Table | Please give a check if you want to save the upper and lower limits of Judge Table used in judgement. |
| (4) | Wave file name | A waveform file name can be freely set up in the range of the contents currently displayed on the tool hint. |
| (5) | Wave Data Save Temporary | When you save the newest waveform data file, please put a check into Use. A data format, a preservation place, and a file name can be set up. |
| (6) | Apply | The contents of a display of a screen are saved. |
| (7) | OK | The contents of a display of a screen are saved and a screen is ended. |
| (8) | Cancel | The screen is ended, without saving the contents of a display of a screen. |

Post Judge

If you use Post Judge, give a check here.

7.7.2. Date

The controller has a clock function. The time of PC is copied to a controller.

7.7.3. Serial port

The baud rate of the serial port of a controller and a use are set up.

As a use, Printer, LED DISPLAY, PC Application, and PC Application (ASCII) can be chosen. When you perform reading/writing of a parameter using the serial communication unit of PLC, please choose PC Application (ASCII). Please refer to CPS servo press controller handling description-communication section about a communicative protocol.

7.7.4. Operation authority

Please refer to Chapter 2-5-2 setup-restriction matter-operation authority about the authority in each operation level. A password setup of each operation level and a setup of the operation level at the time of application starting are possible.

7.7.5. Tool selection

Please refer to a Chapter 4-2 operation procedure-tool type setup.

7.7.6. JOG Speed

JOG speed is set up. JOG speed is switched to four stages. The output limitation in JOG operation were implemented to CPS controller after Ver1.01.58. The output at the time of JOG operation can be restricted by setting up the ratio to the maximum output. This setting value can be rewritten from PLC, when CPS controller is equipped with Anybus option. Please refer to “CPS CTRL for SP Instruction Manual Vol Network” for details. This setting value does not have influence on the time of program execution. The lmt_load value set up within the program acts as output restrictions at the time of program execution.

Note Setup of output limitation is invalid to the controller ver1.01.57 or less.

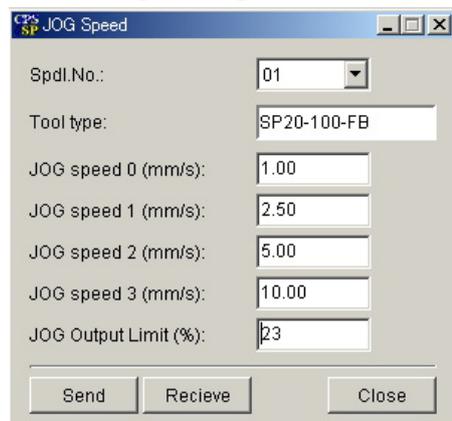


Fig. 7-7-6 JOG speed setup screen

7.7.7. Others

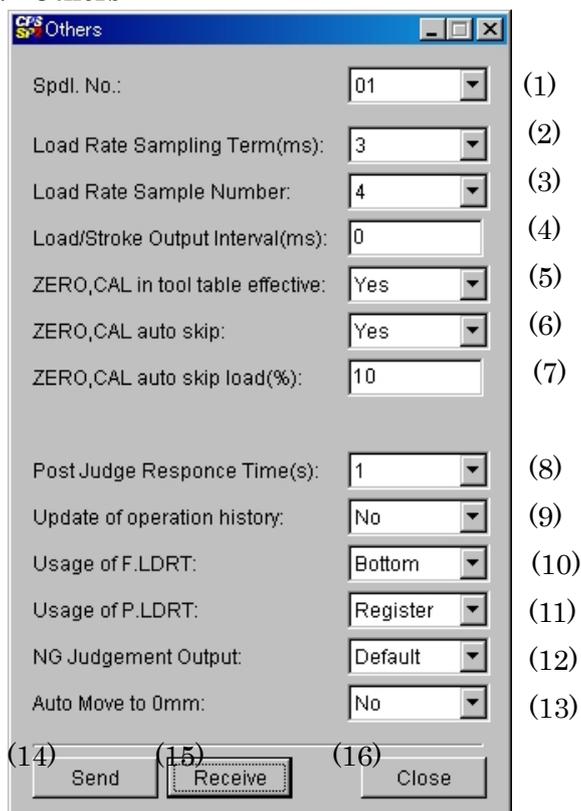


Fig. 7-7-7 Others setup screens

| No. | Item | Explanation |
|-----|-----------------------------|--|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Load Rate Sampling Term | It is used for filter processing of load rate-of-change calculation. The sampling interval of data is set up. A load rate of change is more smooth as a sampling interval is longer, however delay becomes larger. |
| (3) | Load Rate Sample Number | It is used for filter processing of load rate-of-change calculation. The number of samples for asking for an approximation curve is set up. A load rate of change is more smooth as a sampling number is bigger, however delay becomes larger. |
| (4) | Load/Stroke Output Interval | When PC Application (ASCII) is chosen for the use of a port, load and position data are outputted from a serial port at intervals of specification time. The time interval is set up.It will not be outputted if 0 is set up. |
| (5) | ZERO,CAL in tool table | The validity of ZERO and CAL described by the tool table is set up. Usually, please choose Yes. The program |

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| | effective | start from the state to which load is applied may serve as an error with the check of ZERO and CAL. In such a case, please choose No and describe a zero_cal command in a program if needed. |
| (6) | ZERO,CAL auto skip | When the load of a motor exceeds setting value, ZERO and CAL check are skipped automatically. This function is effective to the controller after a version 1.02.50. |
| (7) | ZERO,CAL auto skip load(%) | When you use the function of ZERO,CAL auto skip, please set up the rate of load of a motor here. When the load of a motor exceeds this setting value, the check of ZERO and CAL is skipped. |
| (8) | Post Judge Response Time(s) | After program execution ending inside a controller, the maximum value of time until a judgment of a post judgment returns from PC is set up. When setting value is exceeded, it becomes the alarm of a "post-judgment response error" (alarm code 51). |
| (9) | Update of operation history | Please choose "Yes", when you record the operation history of a tool to the tool. The operation history in a controller is transmitted to a tool after a power supply injection each time. Be careful not to turn off a power supply in the meantime. There is a risk of data peculiar to a tool disappearing. Transmission is ended in about 2 seconds. Although there is such no danger when "No" is chosen, the operation history of a tool remains only in a controller. When the version of a controller is 1.02.33 or less, an operation history is transmitted to a tool irrespective of this setup. |
| (10) | Usage of F.LDRT | Please choose the usage of F.LDRT from Final, Bottom and Register. When Rregister is chosen, F.LDRT is not updated automatically with Final value nor Bottom value of changing rate of load against to stroke. It can be used as a general-purpose register in the case of saving and judging arbitrary numerical values within a program. Selection of Register is effective when the version of CPS controller is 1.02.55 or later. |
| (11) | Usage of P.LDRT | Please choose the usage of P.LDRT from Peak and Register. When Rregister is chosen, P.LDRT is not updated automatically with Peak value of changing rate of load against to stroke. It can be used as a general-purpose register in the case of saving and judging arbitrary numerical values within a program. Selection of Register is effective when the version of CPS controller is 1.02.55 or later. |
| (12) | NG Judgement Output | The NG judgment output method of POUT is set up. Default: When a result is not O.K., NG is always outputted. Program: NG is outputted according to the contents of a program and a judgment table. For example, in case of a program in which Judge command is not included, both O.K.and NG will not be outputted. |

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| | | Selection of Program becomes effective after Ver1.02.48 of CPS controller. |
| (13) | Auto Move to 0mm | This is the function automatically moved to 0mm of a system home position after Origin search end. This function is effective to the controller after a version 1.02.50. |
| (14) | Send | The contents of a display are sent to a controller. |
| (15) | Recieve | A setup is received from a controller. |
| (16) | Close | The screen is ended. |

7.7.8. Anybus

CPS type controller is equipped with i/f of Anybus standard made from HMS. In Anybus, various i / f cards for FA networks, such as DeviceNet, are offered. It can correspond to various FA networks by equipping with Anybus card. When using Anybus, general-purpose input and output become invalid.

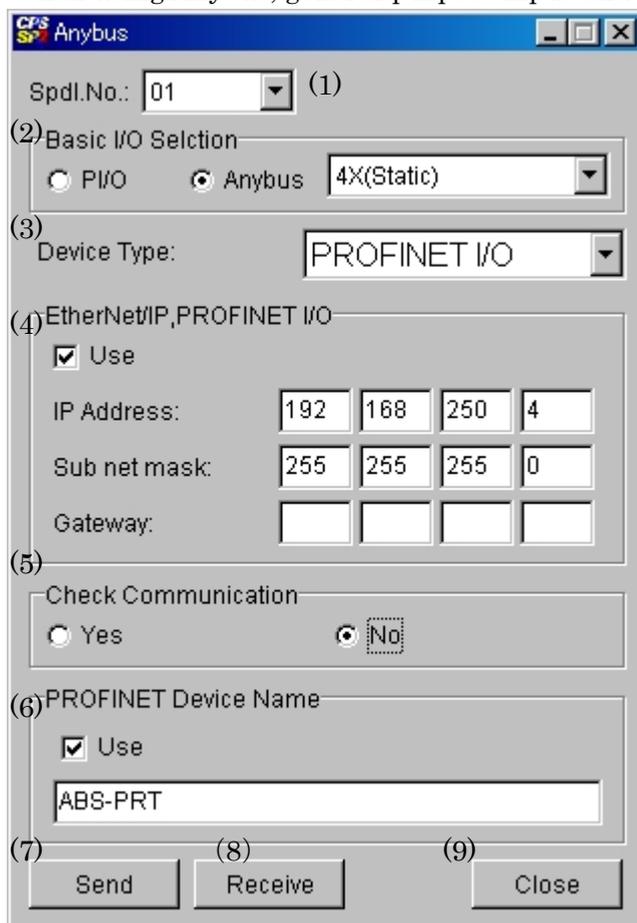


Fig. 7-7-8 Anybus screen

| No. | Item | Explanation |
|-----|---------------------------|--|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Basic IO Selection | Basic input and output are chosen. When Anybus is chosen, I/O allotment of basic input and output shifts to Anybus, and PI/O becomes invalid. If 4 times extension is chosen, the number of the devices for communication will increase 4 times. Therefore, high-speed communication is possible. In addition to the conventional i/f method with the PLC, in CPS-SP-75xB Ver1.01.54, the static method was newly added. Please refer to CPS CTRL for SP Instruction Manual Vol Network1.06 for details. Please refer to 7.7.11 Anybus Static Item about a detailed setup of a static system. |
| (3) | Device Type | The type of Anybus card to use is set up. The standard which corresponds now is CC-Link and DeviceNet. |
| (4) | Ethernet/IP,PROFI NET I/O | In the case of using Ethernet/IP or PROFINET I/O, a setup of an IP address, a subnet mask, and a gateway are |

| | | |
|-----|----------------------|---|
| | | required. In the case of EtherNet/IP, please put a check into "Use". The IP Address set up here becomes effective. In the case of PROFINET I/O, IP Address may be set up from a master side. In that case, please do not put a check into "Use". |
| (5) | Check communication | This is a communication monitoring function with the master machine at the time of choosing Anybus. Alarm is generated when the communication with a master stops. |
| (6) | PROFINET Device Name | In the case of PROFINET I/O, it is necessary to assign a unique device name to each station. When you set up a device name using an application for a master, please do not put a check into "Use". A device name is memorized to the non-volatilized domain on Anybus card. A device name cannot be read by click of the receive button. |
| (7) | Send | The contents of a display are sent to a controller. |
| (8) | Recieve | A setup is received from a controller. |
| (9) | Close | The screen is ended. |

7.7.9. Home position

Refer to the Chapter 5 program language [8] home position for explanation of a home position. On this screen, a setup of a system home and a user home and a check are possible.

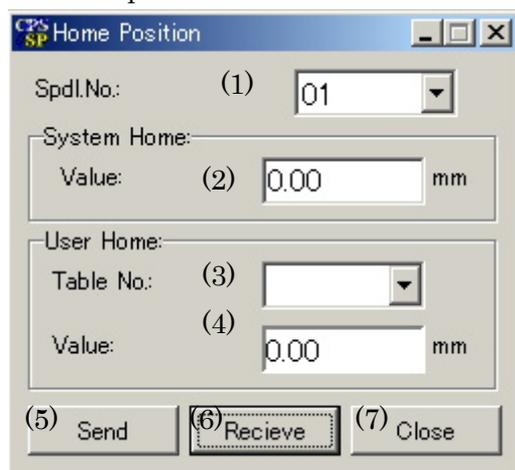


Fig. 7-7-9 Home position screen

| No. | Item | Explanation |
|-----|--------------|---|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | System home | The value of a system home is shown. |
| (3) | Table number | A home position table number is shown. |
| (4) | Value | The setting value of the home position table shown by (3) is shown. |
| (5) | Send | The contents of a display are sent to a controller. |
| (6) | Recieve | A setup is received from a controller. |
| (7) | Close | The screen is ended. |

7.7.10. Area Signal

The area signal is prepared for the interlock with other apparatus by the position of ram. When ram is in the installed stroke range, an area signal turns on. An area signal is not outputted before origin.

Note A stroke of the servo press is calculated from the encoder pulse of a motor. When the timing belt cuts, a stroke of the servo press and the position of actual ram are not in agreement.

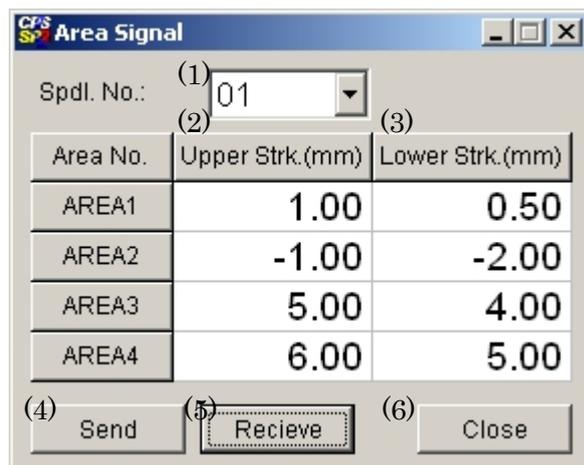


Fig.7-7-10 Area Signal screen

| No. | Item | Explanation |
|-----|-----------------|--|
| (1) | Spindle No. | The spindle number for operation is chosen. |
| (2) | Upper Strk.(mm) | The maximum value of the stroke which an area signal turns on is set up. |
| (3) | Lower Strk.(mm) | The minimum value of the stroke which an area signal turns on is set up. |
| (4) | Send | The contents of a display are sent to a controller. |
| (5) | Recieve | A setup is received from a controller. |
| (6) | Close | The screen is ended. |

* In CPS controller of Ver1.02.36, the area signal was extended to four.

7.7.11. Anybus Static Item

In CPS-SP-75xB Ver1.02.54, the static method was newly added to i / f of Anybus. In the case of a static method, all data items are set up on this screen. Although access to all defined data was possible for the conventional dynamic method, setup of access code and calculation of checksum are needed. Although the number of data which can be accessed has restriction in the case of a static system, PLC can access the predetermined data with control of STROBE signal and bank-switching signal.

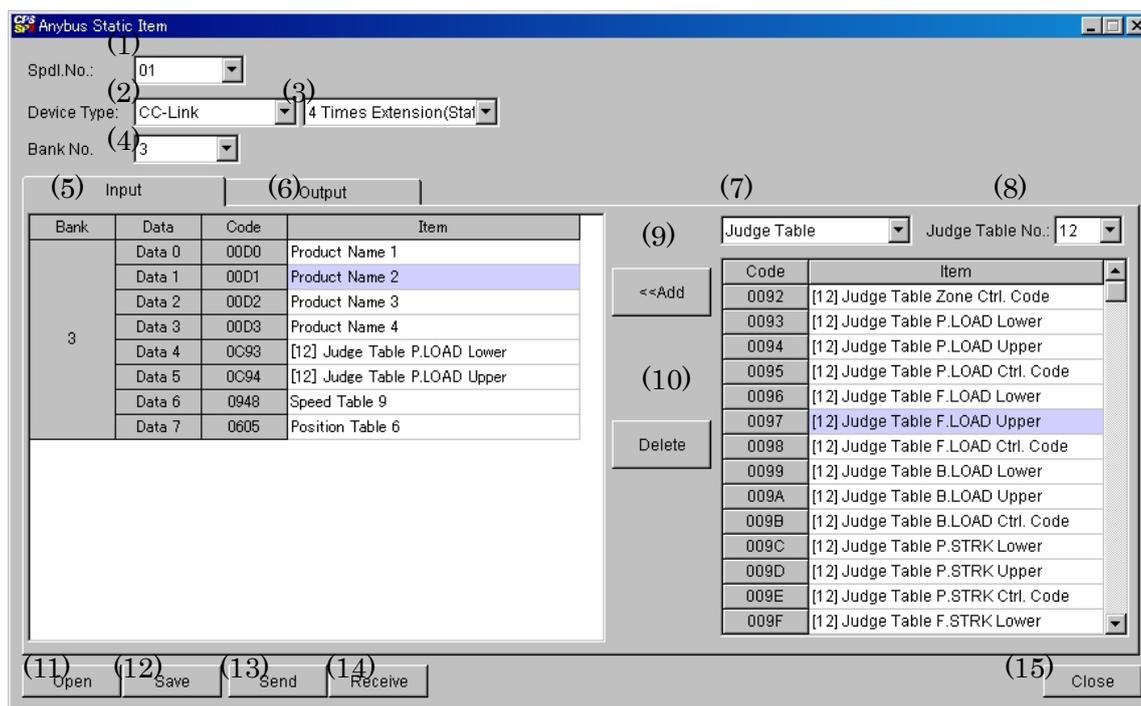


Fig.7-7-11 Anybus Static Item

| No. | Item | Explanation |
|-----|---------------------|---|
| (1) | Spdl. No. | The spindle number for operation is chosen. |
| (2) | Device Type | The kind of network is chosen. Please make it match with Basic I/O Setup of Anybus setting screen. The information on this part is not sent to a controller. |
| (3) | Link Device Number. | Choice is a standard and 4 times extension. Please make it match with Basic I/O Setup of Anybus setting screen. The information on this part is not sent to a controller. |
| (4) | Bank No. | When 4 times extension specification is chosen, please set up the bank number to operate. |
| (5) | Input Tab | The screen which sets up the input item from PLC is chosen. |
| (6) | Output Tab | The screen which sets up the output item to PLC is chosen. |
| (7) | Setting item list | The list of setting items is chosen. |
| (8) | Judge Table No. | When a judge table is chosen by (7), please choose a judge table number here. |

| | | |
|------|---------|---|
| (9) | <<Add | The item chosen by the right list is added to the place where the left list was chosen. |
| (10) | Delete | The item chosen by the left list is deleted. |
| (11) | Open | The file which saved the contents of a setting is opened. |
| (12) | Save | The contents of a setting are saved at a file. |
| (13) | Send | The contents of a display of the screen are sent to a controller. |
| (14) | Receive | The contents of a setting of a controller are received. |
| (15) | Print | The contents of a display of the screen are printed. |
| (16) | Close | This screen is closed. |

7.8. View

7.8.1. Tool bar

All the items of a pull down menu are iconized to the tool bar, and can be displayed on it. Please customize a required function and display on the tool bar.

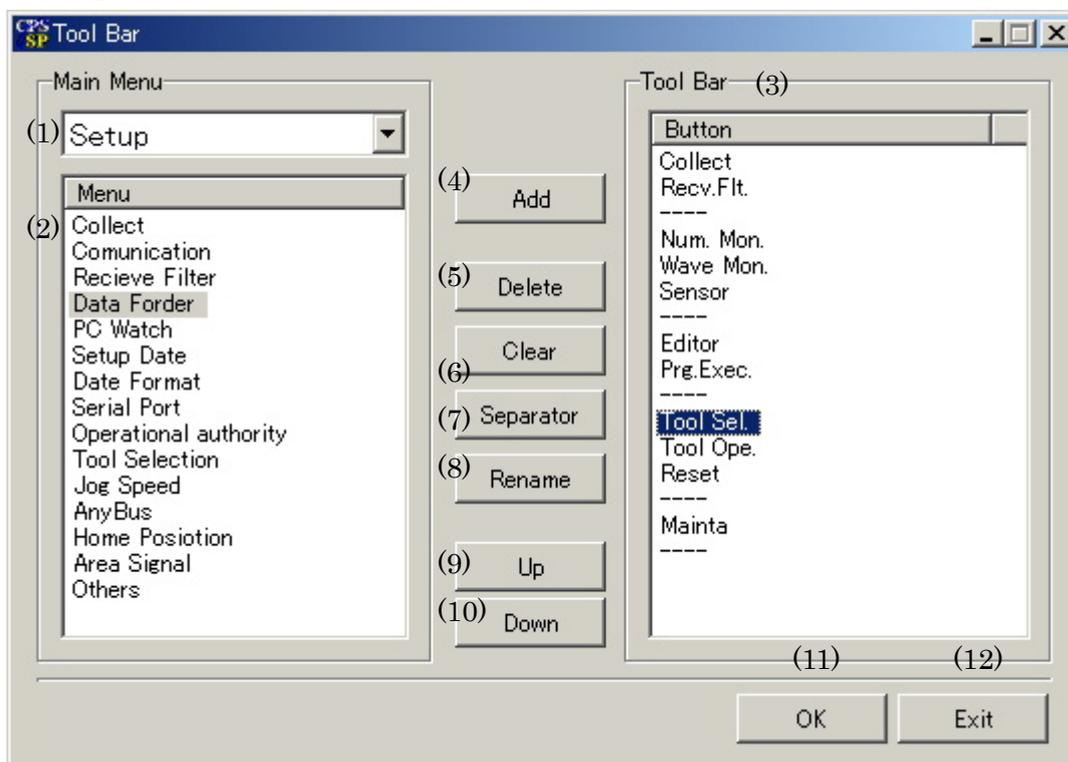


Fig. 7-8-1 Tool bar setup screen

| No. | Item | Explanation |
|------|-----------|---|
| (1) | Main Menu | The item of a main menu is chosen. |
| (2) | Menu name | The sub menu of the item chosen by (1) is displayed in a list. |
| (3) | Tool Bar | The display item of a tool bar is shown. |
| (4) | Add | If the item of a menu name is chosen and this button is pushed, it will be added to (3). |
| (5) | Delete | If the item of (3) is chosen and this button is pushed, it will be deleted from (3). |
| (6) | Clear | All the contents of (3) are eliminated. |
| (7) | Separator | A separation line is inserted in (3). |
| (8) | Rename | A name can be changed, if the item of (3) is chosen and this button is pushed. |
| (9) | Up | If the item of (3) is chosen and this button is pushed once, it will move to up side by one line. |
| (10) | Down | If the item of (3) is chosen and this button is pushed once, it will move to down side by one line. |
| (11) | OK | The screen is ended reflecting the contents of a display. |
| (12) | Exit | The contents of the display are canceled and the screen is ended. |

7.8.2. Icon

All the screens currently displayed are icon-ized.

7.8.3. All close

All the screens currently displayed are ended.

7.8.4. Startup Display

Please set up the screen to display when this application starts.

The characters set at Caption are displayed on a title following the application name. It is convenient when using two or more Configurators.

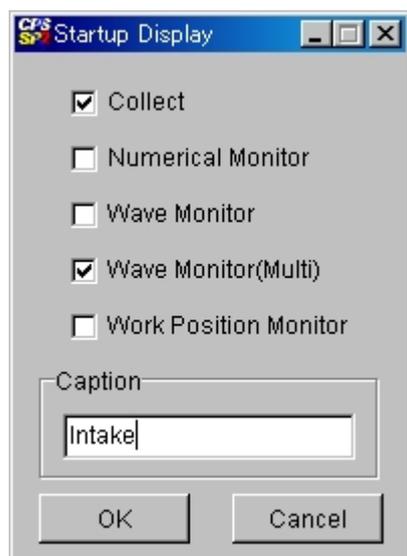


Fig. 7-8-2 Startup Display screen

7.8.5. Unit of Load

Unit of load is selectable between kN and N. However, the numerical notation does not change.

7.9. Help

7.9.1. Help

The help file is described by HTML. The default browser of PC starts and the

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