

MANUAL

APPROVED	CHECKED	DRAWN
榎原	西浦	貸川

Software Number	SLS030023－02	Ver.	F
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Title: EH Tuner Maintenance Software

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1. Outline

Piat series automatic tuner (hereinafter referred to as Piat tuner) is a unit which is designed to automatically match the impedance of the load, such as plasma discharge load, to that of microwave source to effectively transmit the microwave power at 2.45 GHz. The Piat tuner detects the standing wave by the built-in detector and calculates the unmatched load impedance, and then, performs auto-matching operation by moving the motorized short-circuiting plungers in the E- and H-branch waveguides to positions suitable to cancel out the load mismatch.

The Piat tuner can perform auto-matching operation by itself. When equipped with the Piat-RM unit, Piat tuner operation is remotely controllable by PC or Input/Output System (customer's unit), and further, advanced operation can be achieved such as operation through pre-determined variety of recipe, etc.

This manual describes the Maintenance / Control software (Maintenance software for short) which is used for Piat tuner operation through PC. The Maintenance software includes a function to display the graph on a polar chart tracing the reflection coefficient $\Gamma \angle \theta$ viewed from the input port of the Piat tuner. This enables the customer to see how matching process by the Piat tuner progresses. The reflection coefficient in the log data file can be displayed as well.

Note;

Γ : absolute value of reflection coefficient,

θ : phase angle (argument) of reflection coefficient.

2. Composition

2.1. System

Maintenance software:

Using the Maintenance software installed in a PC, customer can monitor the operational state of the Piat tuner such as matching, alarm etc., manually operate the plungers, and modify the recipe parameters and the control parameters etc..

PC:

Customer is requested to prepare a personal computer (PC) which operates in Windows 2000, XP, 7 or Windows 10 OS and is equipped with USB port.

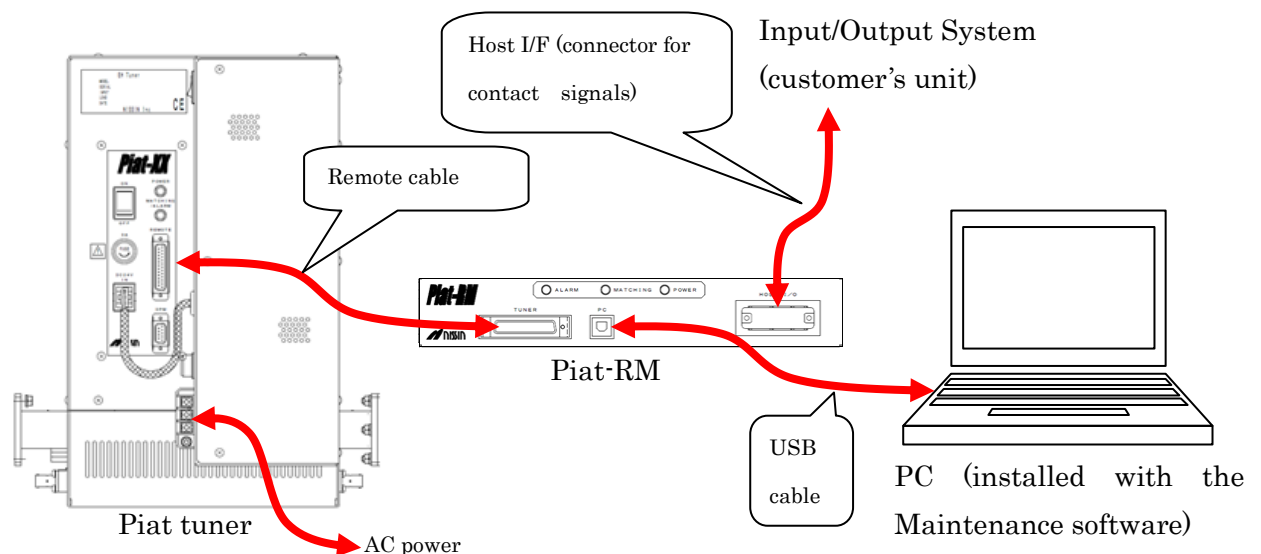
Note that;

- The Maintenance software is stored in CD-ROM which is attached to Piat-RM.
- Install the Maintenance software to PC. See Piat tuner manual for detail.
- USB driver is required to be installed in PC. (CP 210 x USB to UART Bridge VCP Driver).
- Piat-RM operates as an interface unit with PC.
- Turn off the Piat tuner when connecting.

2.2. Connection

Connect the PC (installed with the Maintenance software) and the Piat-RM with USB cable.

Connect the Piat tuner and the Piat-RM with Remote cable. The cables are attached to Piat-RM.



3. Description on function

Not all versions of the Maintenance software have the same features or capabilities.

3.1. Monitoring

The current state of the Piat tuner and the measured reflection coefficient can be monitored on PC screen.

The current state of the Piat tuner is displayed in the current information dialog.

It includes;

- Communication status (on-line /off-line),
- Active recipe number,
- Current information,
 - plunger positions (E plunger and H plunger) ,
 - reflection coefficient, voltage standing wave ratio, incident and reflected powers ($\Gamma\angle\theta$ 、VSWR、PF、RF) ,
- Tuning alarm,
- Alarm.

The reflection coefficient $\Gamma\angle\theta$ is displayed on the polar chart in the main window.

The main window and the current information dialog are available on PC screen at all times.

3.2. Remote operation

When customer set the Piat tuner to remote mode with the Maintenance software, customer can operate the following item.

- Start/Stop auto tuning,
- Select recipe number,
- Move plungers.

3.3. Recipe function

Customer can set a variety of conditions, such as 6 plunger positions of E and H, threshold VSWR for judgment of matching, etc., to the recipes.

Recipes are stored in the PC as files and can be loaded to or read from a FLASHROM in the Piat tuner as operational parameter.

Total of 16 recipes can be registered.

3.4. Log function

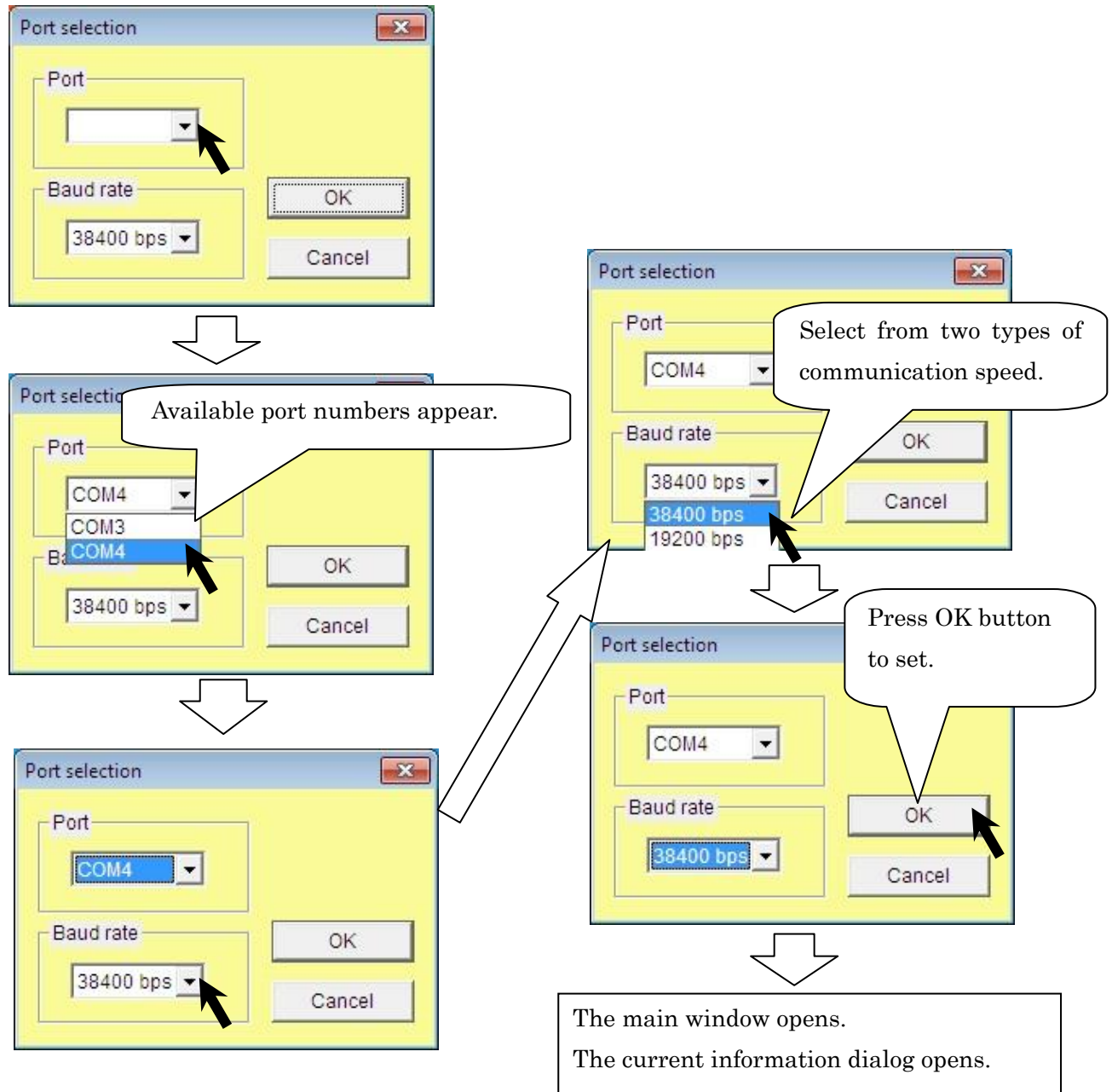
The current information of the Piat tuner is stored in the PC as log file at 100ms intervals.

Customer can operate to start logging, stop logging, and display log data.

4. Start-up

4.1. How to start-up

Double-click on the icon of “Maintenance VXXXX.exe” to open the main window and the current information dialog.



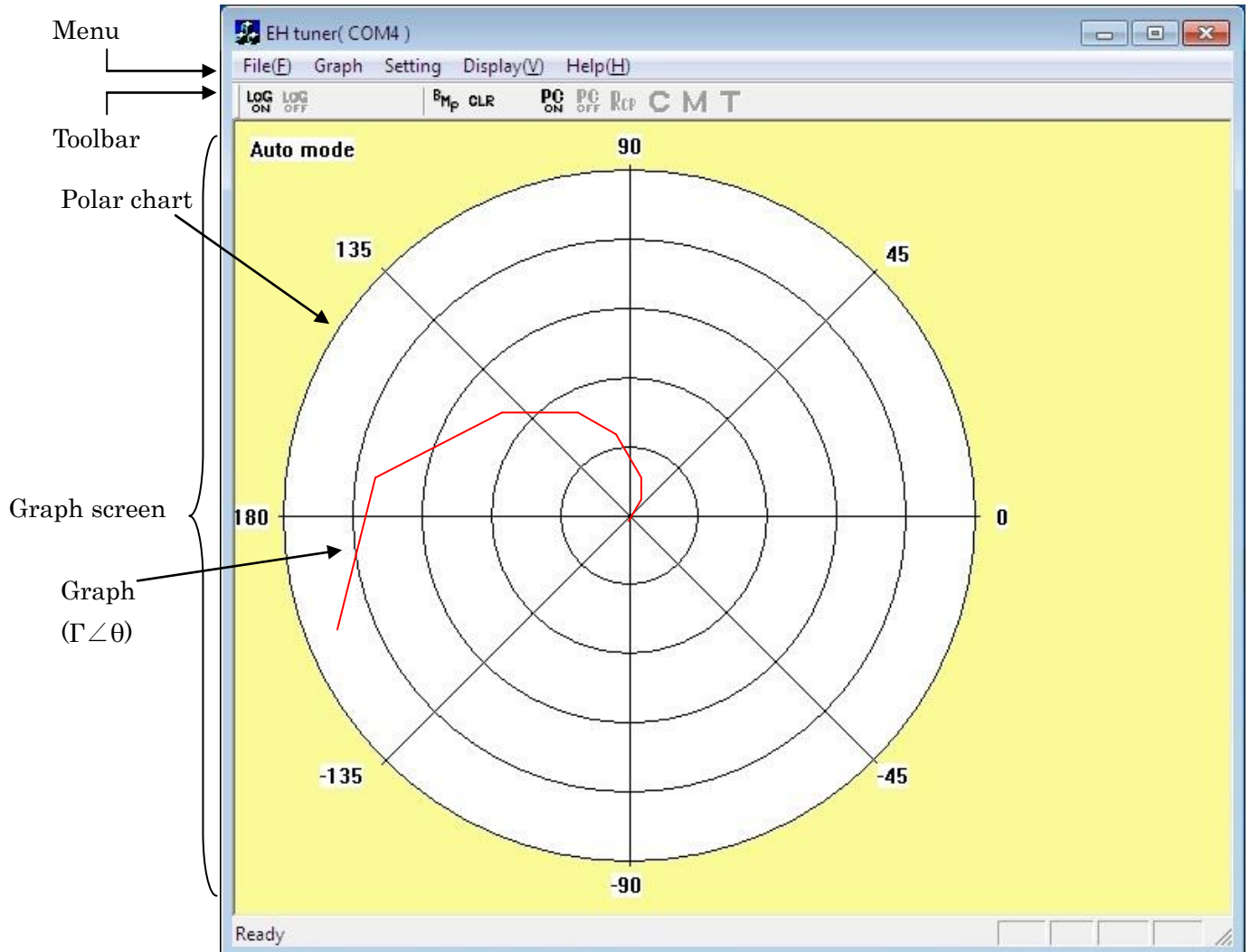
4.2. How to close

Select [Exit] from the file menu in the main window or click on the exit button at the top right corner of the main window (marked “X”) to close the main window and the current information dialog.

5. How to operate

5.1. Main window

The following figure shows the main window structure of the Maintenance software.

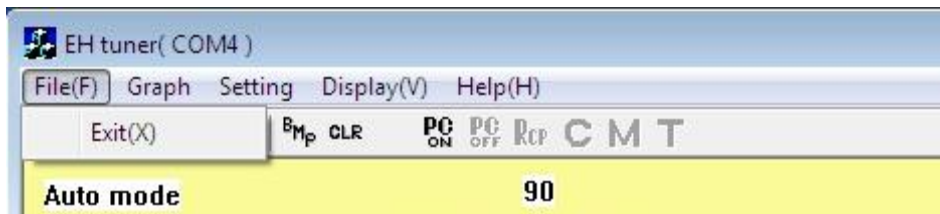


5.1.1. Menu structure

File	Exit
Graph	Continuous
	Hold
Setting	PC ON(Manual)
	PC OFF(Auto)
	Recipe setup
	Manual Control

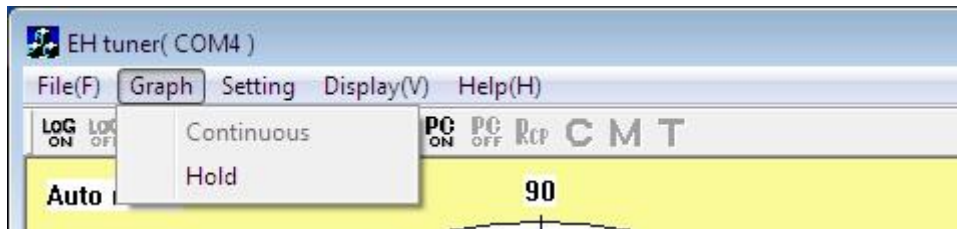
5.1.2. Menu function

5.1.2.1. File menu



- Exit : Close the application.

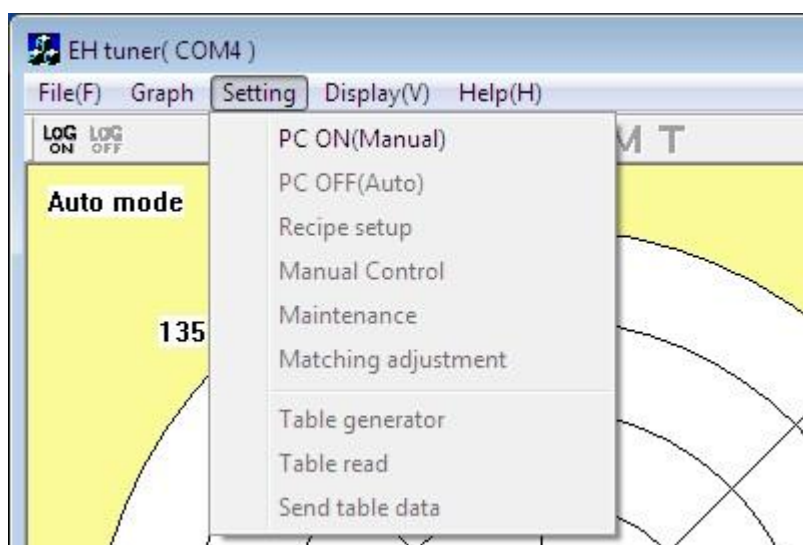
5.1.2.2. Graph menu



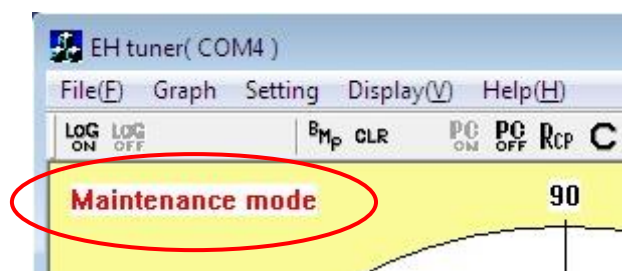
- Continuous : Start displaying the graph.
- Hold : Stop displaying the graph.

Note: The Maintenance software starts displaying the graph on start-up.
When customer stops displaying the graph, no new graph is displayed.

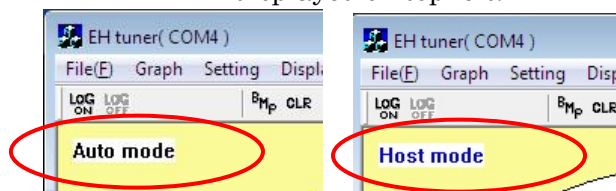
5.1.2.3. Setting menu



- PC ON(Manual) : Start operation by PC.
“Maintenance mode” is displayed on top left of the graph screen.



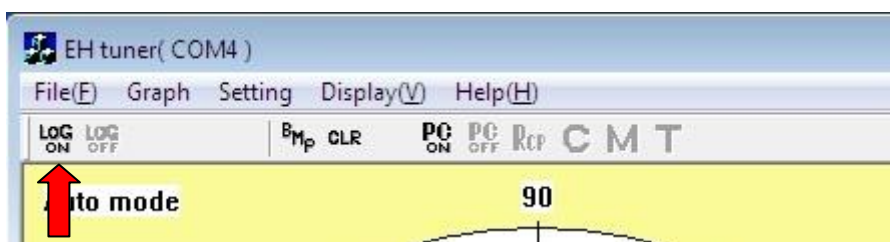
- PC OFF(Auto) : Stop operation by PC.
When the Input/Output operation is ready (i.e. REMOTE contact signal in I/O port of Piat-RM is set to ON), “Host mode” is displayed on top left of the graph screen.
Or, when the Input/Output operation is not ready, “Auto mode” is displayed on top left.



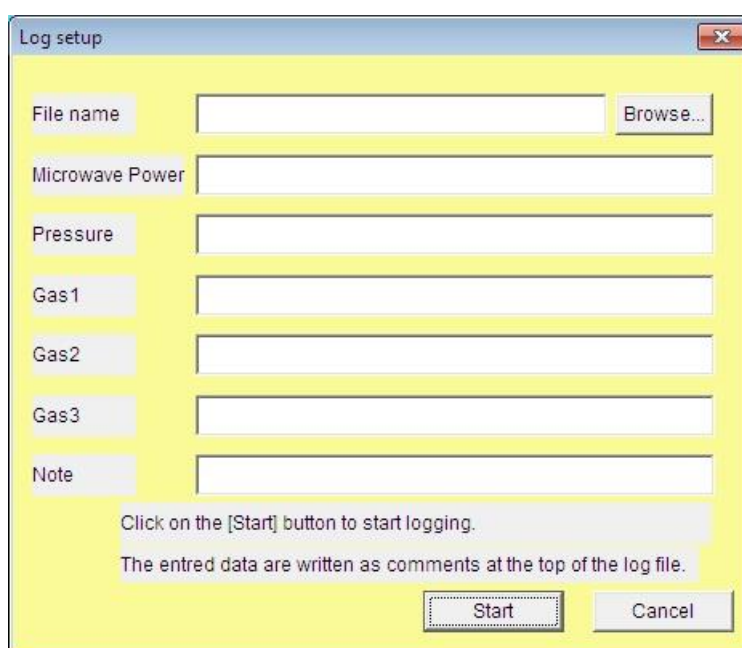
- Recipe Setup : Edit recipes.
(Refer to Chap.5.3 for detail.)
- Manual Control : Control the tuner.
(Refer to Chap.5.4 for detail.)

5.1.3. Toolbar

5.1.3.1. Start logging



Select [LOG ON] in the toolbar to open the dialog for logging.



Select or enter a file name, and click on the [Start] button to start logging.

The log data starts to be written to the specified file.

Click on the [Cancel] button to close the dialog for logging.

When the file with the same name already exists, existing file is overwritten.

The log data is written to the file at every 100ms interval.

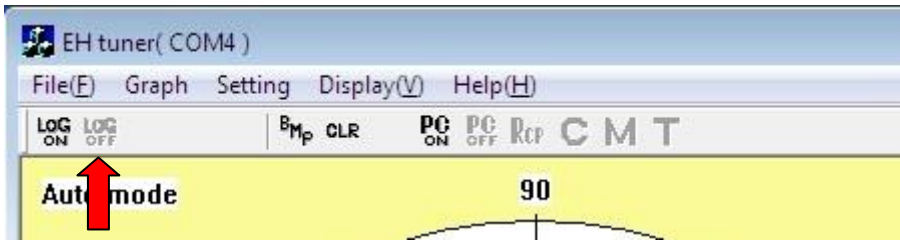
Note:

The file name should indispensably be entered, and enter the full path of the directory. In addition, create the destination folder to save in advance.

Other entered data (e.g., microwave power, pressure, gas1, etc.) are written as comments at the top of the log file. Enter them as required.

The log file is saved with changing file name every hour during logging.

5.1.3.2. Stop logging

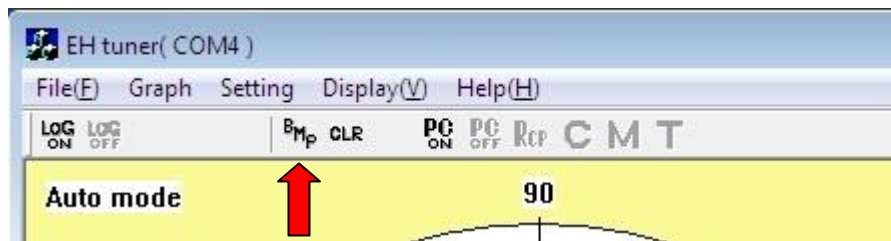


Select [LOG OFF] in the toolbar to stop logging, and the log file is completed. The log file is a CSV format file.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Log data(every 100ms interval)												
2	Date: 02 04 2018 12:14:27												
3	Microwave power:												
4	Pressure:												
5	Gas1 :												
6	Gas2:												
7	Gas3:												
8	Note:												
9													
10	E plunger(CH plunger((Gamma(0.0Phase(0.1dIncident poReflected ;Time(ms)	Matching s		Count of C	Load gamrr	Load phase	Recipe No.						
11	810	810	0	0	0	0	0	0	0	0	0	0	1
12	810	810	0	0	0	0	100	0	0	0	0	0	1
13	810	810	0	0	0	0	200	0	0	0	0	0	1
14	810	810	0	0	0	0	300	0	0	0	0	0	1
15	810	810	0	0	0	0	400	0	0	0	0	0	1
16	810	810	0	0	0	0	500	0	0	0	0	0	1
17	810	810	0	0	0	0	600	0	0	0	0	0	1
18	810	810	0	0	0	0	700	0	0	0	0	0	1
19	810	810	0	0	0	0	800	0	0	0	0	0	1

※ Example of log file.

5.1.3.3. Capture graph screen



Click on the [BMP] button, the current graph screen is captured and saved as bitmap image file automatically. Before saving the screen, create the “bitmap” folder in the folder which includes the Maintenance software. The bitmap file will be saved in this folder.

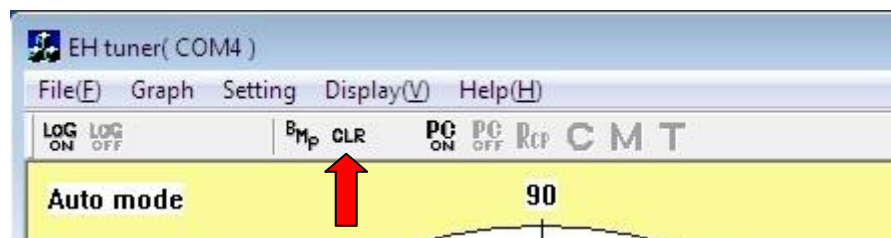
Before saving the screen, check that there are no other dialogs on the screen.

The new file name for saving is “capture+year+month+day+hour+minute+second” .

Example: Name of the file which was saved at 2005/04/27 18:33:40 is

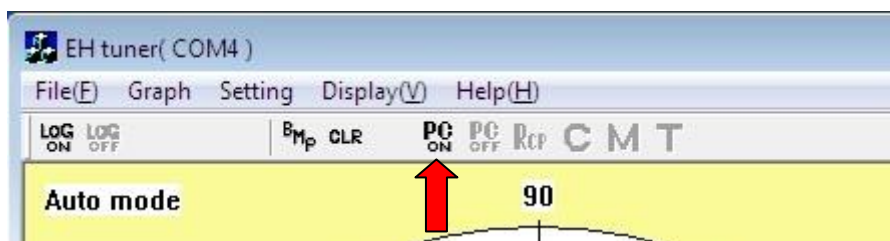
“capture20050427183340.bmp”

5.1.3.4. Clear graph



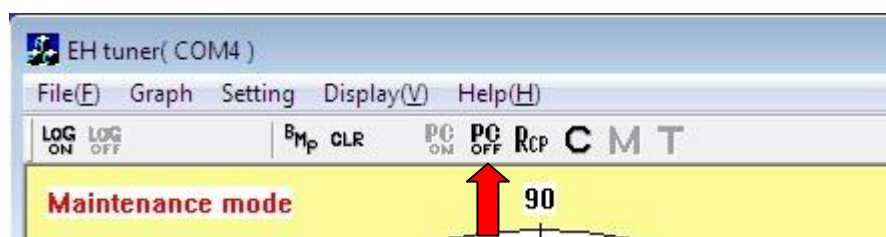
Click on the [CLR] button to erase the locus of graph on polar chart in the screen.

5.1.3.5. Start operation by PC (PC ON button)



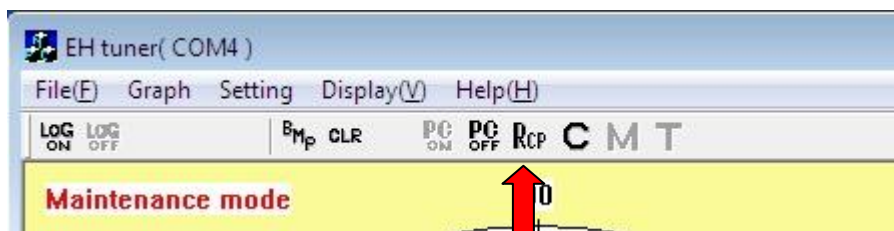
This button has the same function as [PC ON(Manual)] button in the “Setting” menu.

5.1.3.6. Stop operation by PC (PC OFF button)



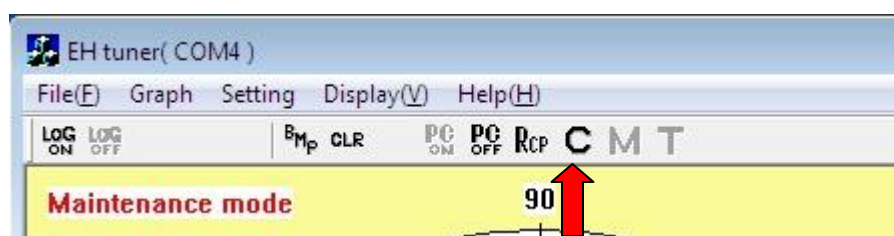
This button has the same function as [PC OFF(Auto)] button in the “Setting” menu.

5.1.3.7. Edit recipe (RCP button)



This button has the same function as [Recipe setup] button in the “Setting” menu.

5.1.3.8. Operate the Piat tuner (C button)



This button has the same function as [Manual Control] button in the “Setting” menu.

5.2. Current information dialog

Current information			
Status	On line		
Recipe No.	1		
Type of tuner	Piat 30		
State of tuner			
E (mm)	47.1	Mode	Normal
H (mm)	32.8	VSWR	0.00
$\Gamma(U)$	0.00	PF(W)	0
$\Theta(\text{deg.})$	0	RF(W)	0
Load $\Gamma(U)$	0.00	Load $\Theta(\text{deg.})$	0
Tuning Alarm			
Alarm			
Alarm reset			

This dialog displays the current state of the Piat tuner.

- “Type of tuner” displays model number of the connected tuner.
- Click on the [Alarm reset] button to reset the activated alarm. (Note that even reset action taken, alarm is activated again if the cause of alarm is not rectified. The Piat tuner has no “alarm recording” function.)
- In case that customer resets the activated “Plunger initializing” alarm, each plunger moves to the positions which are specified by “Stop” parameters in the effective recipe after the initializing process. If the causes of the alarm are left not fixed, the alarm will be activated again. If the initializing process fails due to a malfunction of the plunger drive system, the alarm will be activated again.

Description on the current states

Item	Description
E (mm)	Plunger position in the E-branch waveguide
H (mm)	Plunger position in the H-branch waveguide
Γ (U) ※	Absolute value of reflection coefficient
Θ (deg)	Angle of reflection coefficient
Mode	Operation status
VSWR	Voltage standing wave ratio
PF(W)	Incident power
RF(W)	Reflected power
Load Γ (U) ※	Absolute value of load reflection coefficient
Load Θ (deg.)	Angle of load reflection coefficient

※ Γ together with Θ is the reflection coefficient measured by the Piat tuner viewed from the input port of Piat tuner.

On the other hand, load Γ together with load Θ is the reflection coefficient of the load calculated from Γ and Θ above.

In usual operation, much smaller Γ is achieved even for larger load Γ due to the matching operation by the Piat tuner.

5.2.1. Alarm

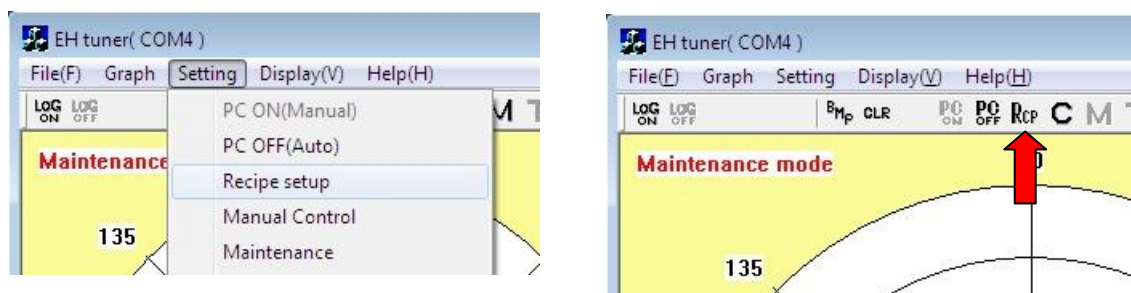
- ① When an alarm is activated, alarm contact signal is generated at Piat-RM. Messages shown in the table below are also displayed in the Maintenance software on the PC.
- ② The alarm once activated is kept active till [Alarm reset] button is clicked at Maintenance software or till reset signal is made to ON at I/O control in Piat-RM.
- ③ The Piat tuner has no “alarm recording” function.

5.2.1.1. Alarm content

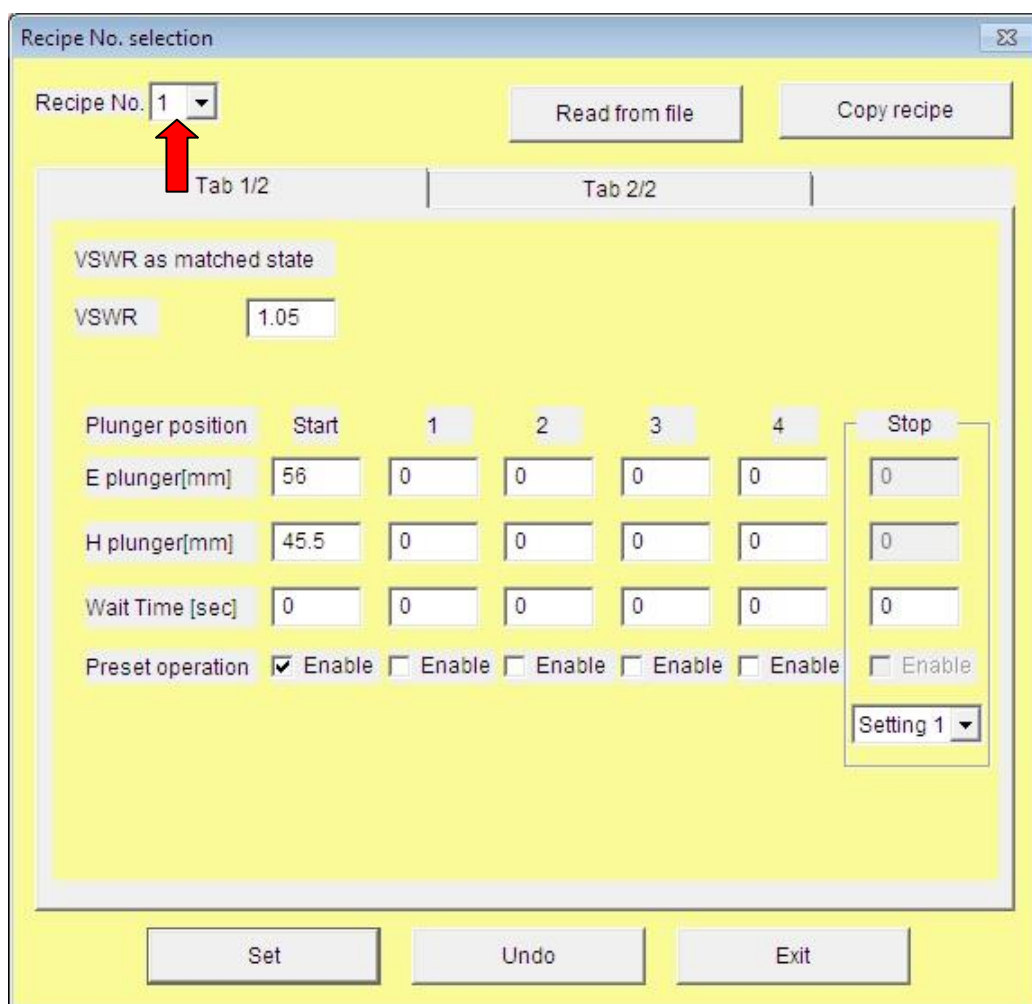
Displayed Message	Cause and possible trouble
Failed to locate plungers at home position.	Cause: Cannot detect home position for plungers. Trouble: Malfunction of position sensor, motor, or control circuit in control board. Operation: Stops matching operation.
No signal from reflection detector.	Cause: Cannot receive signal from detector. Trouble: No or loose connection of detector cable. Malfunction of detector or interface circuit in control board. Operation: Stops matching operation.
Failed to match within specified time.	Cause: Matching is not completed within 30 seconds. Trouble: I) Malfunction of control circuit or hardware for matching around motor or plunger. II) Unsuitable load. Reflection coefficient of load is larger than the specified limit or is unstable and varying largely with time. Operation: Continues matching operation.
Waveguide temp is higher than 80(deg.).	Cause: Sensor on waveguide detected temp more than the specified. Trouble: Reflection by the load exceeds the specified value. Operation: Stops matching operation.
Reflection coefficient of load is larger than 0.9.	Cause: Reflection coefficient of load being larger than 0.9 is kept for 30 seconds during the matching operation. Trouble: Reflection by the load exceeds the specified value. Malfunction of the load. Operation: Continues matching operation.
Failed to store data in flash ROM.	Cause : Time out error occurred during storing data in flash ROM (non-volatile memory). Trouble : Malfunction of flash ROM Operation : Stops matching operation. (Piat tuner firmware: V6.00 or later version)

5.3. Recipe edit dialog

5.3.1. Start-up



Click on either button above to open the dialog for editing the recipe. Before this operation, click on the “PC ON (Manual)” or “PC ON” button.



Select the recipe (No.2~16) which customer wants to edit.

Note: The recipe No.1 can not be edited.

5.3.2. Input item

Recipe No. selection

Recipe No. 1

Read from file

Copy recipe

Tab 1/2

Tab 2/2

VSWR as matched state

VSWR1.05

Plunger position

Start

1

2

3

4

Stop

E plunger[mm]

56

0

0

0

0

0

H plunger[mm]

45.5

0

0

0

0

0

Wait Time [sec]

0

0

0

0

0

0

Preset operation

☒ Enable

☐ Enable

☐ Enable

☐ Enable

☐ Enable

☐ Enable

Setting 1

Set

Undo

Exit

Recipe No. selection

Recipe No. 1

Read from file

Copy recipe

Tab 1/2

Tab 2/2

Masking time[msec]

0

Microwave-ON Power [W]

600

Phase change[deg/msec]

0

Start-judging phase change[deg/msec]

3000

Matching error timer[sec]

0

Time delay [msec]

3001

Plunger wait time [msec]

1

Set

Undo

Exit

Modify the recipe parameters as required referring to the following table. Click on the [Set] button without fail after modifying.

tab	item	range	decimal
1/2	VSWR	1.05 ~ 99.99	2places
"	E plunger[mm]	0 ~ 80.4	1place
"	H plunger[mm]	0 ~ 80.4	1place
"	Wait Time[sec]	0 ~ 99.99	2places
"	Preset operation	ON / OFF	
2/2	Masking time[msec]	0 ~ 9999	none
"	Microwave-ON Power[W]	1 ~ 9999	none
"	Phase change [deg/msec]	0 ~ 180	none
"	Start-judging phase change[deg/msec]	0 ~ 180	none
"	Matching error timer[sec]	2 ~ 60	none
"	Time Delay[msec]	0 ~ 9999	none
"	Plunger wait time[msec]	30 (fixed value)	none

tab	item	content
1/2	VSWR	The threshold value, lower than which it is judged as matched. When the detected VSWR becomes lower than this value, the tuner stops matching operation (ie matched). When it goes over across this value, the tuner starts matching operation again.
	E plunger[mm] (start, 1~4, stop)	Plunger preset has a function to locate the E and H plungers to specific positions before performing auto-matching (start position, positions 1 through 4) and after completion of matching session (stop position). Matching operation follows to move plungers to start position, and next, to positions 1 through 4 in this order waiting for wait time at each position, and then, performs normal auto-matching operation. The initially set "Stop" position (around 47mm for E and around 31mm for H) is one of the non-reflective positions of the tuner.
	H plunger[mm] (start, 1~4, stop)	
	Wait Time[sec] (start, 1~4, stop)	
	Preset operation (start, 1~4, stop)	
2/2	Masking time[msec]	When larger VSWR than the specified is detected continuously for more than this period after matching is once completed, the tuner starts matching operation again.
"	Microwave-ON Power [W]	The threshold power level which decides start or stop of matching operation. When incident microwave power becomes more than this value, the tuner starts matching operation. When it becomes lower for more than 1 second, the tuner stops matching, performs initialization and locates the plungers to "Stop" position set in the plunger preset section. In case that "Stop" position is invalid, plungers will be located at 81 mm positions.

"	Phase change [deg/msec]	These settings are to cope with the possible abrupt change of phase angle of the load just after "Microwave On". Piat tuner starts matching operation after calming-down of the abrupt phase change. Set the amount of large phase change to be avoided to "Phase change" box (e.g.40 deg/m sec) and set the calmed-down amount to "Start-judging phase change" (e.g. 2 deg/m sec).
"	Start-judging phase change [deg/msec]	In case the condition for these settings is not detected, Piat tuner will start matching operation 500 m sec after the detection of "Microwave On". Entry of 0 and 180 to these boxes respectively will disable this function.
"	Matching error timer[sec]	Time-limit for auto-matching operation. When VSWR does not once become lower than the specified for more than this duration after the start of matching operation, a warning signal is generated.
"	Time Delay[msec]	Waiting time before starting the auto-matching. The tuner waits for this duration to start matching operation after incident power grows up across the threshold level set in Microwave-on power section.
"	Plunger wait time[msec]	Not used.

Plunger position (Stop position)

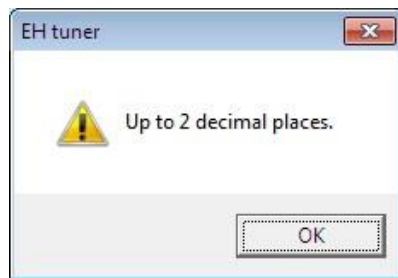
Select plunger stop position from pull-down list as shown above. When customer selects the [Any input], customer can enter the numerical data of the E and H plunger positions. The 5 stop positions, "Setting 1" through "Setting 2", have settings which are initially set at the time of delivery from manufacturer and they cannot be modified. (They are the non-reflective positions of the Piat tuner.)

5.3.3. Checking the entry

The software checks all of the entered values when customer clicks on the “Set” button or modifies the recipe number.

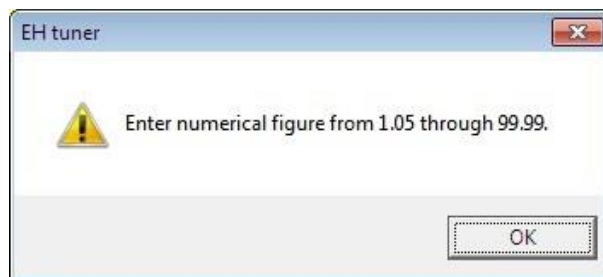
When unreasonable value is entered, it is not accepted and the error message is displayed as the following figures.

- In case that the number of decimal places overflows.



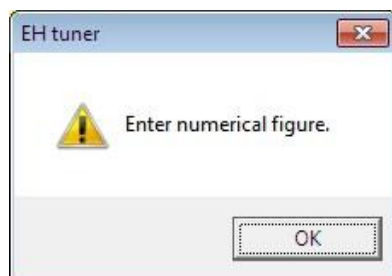
※The numbers of decimal places of all input items are not same.

- In case that the entered value is above or below the item's valid input range.

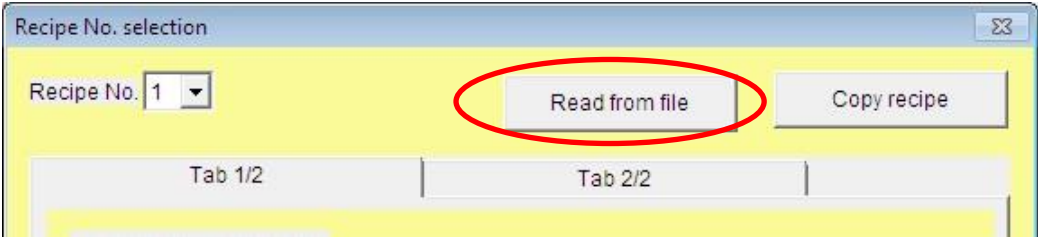


※The valid ranges of all input items are not same.

- In case that customer enters a character in the numerical input items.



5.3.4. Read from file



Click on the [Read from file] button to load the recipe data to Piat tuner from the recipe file in the folder which includes the Maintenance software. The recipe data is not set in the Piat tuner until customer clicks on the [Set] button.

Each of 16 recipe files has its own separate file name based on the recipe number, that is,
Recipe01.Set ~ Recipe16.Set

If a recipe file for a certain recipe number does not exist in the folder, the recipe file for that recipe number will not be loaded to Piat tuner.

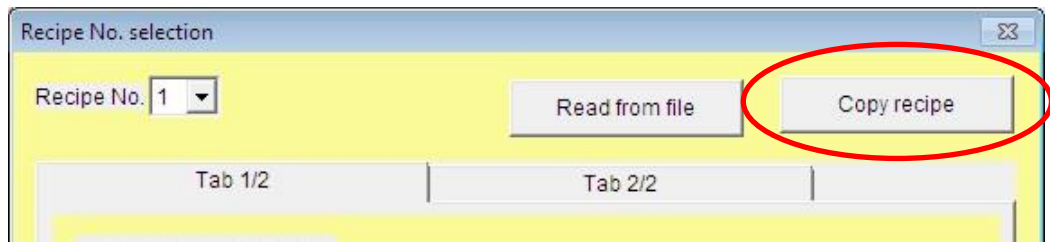
The data format of a recipe file is as shown below.

[POINT] VSWR=99.99 MOVEAVR=9999 SAMPLING=9999 [E_STAB] START=± 99.9 1=± 99.9 2=± 99.9 3=± 99.9 4=± 99.9 STOP=± 99.9 [H_STAB] START=± 99.9 1=± 99.9 2=± 99.9 3=± 99.9 4=± 99.9 STOP=± 99.9	[WAIT_TIME] START=99.99 1=99.99 2=99.99 3=99.99 4=99.99 STOP=99.99 [MOTOR_SPEED] START=9 1=9 2=9 3=9 4=9 STOP=9	[OTHER] NOADJUST=99 ONPOWER=999 ERRADJUST=99 TIMERDELAY=99 AVERAGECNT=99 DEGMSEC2=999 [BASEPOS] STOPPOS=9
--	--	--

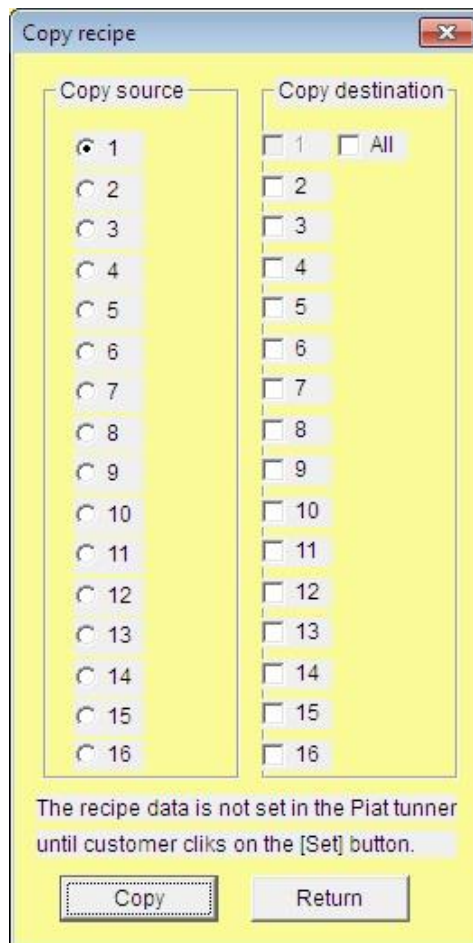
9 shows a certain numeral.

5.3.5. Copy recipe

It is a function to duplicate and change already set recipe and create new recipe.



When you click the [Copy recipe] button, the screen shown below appears and you can duplicate the recipe from the copy source recipe (other recipe number).

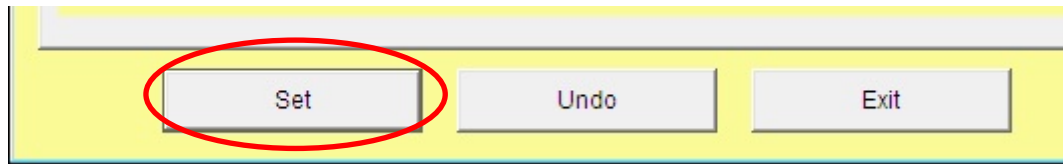


Select the recipe number of the copy source and the recipe number of the copy destination and duplicate it with the [Copy] button.

Multiple selections are possible for the recipe number of the copy destination.

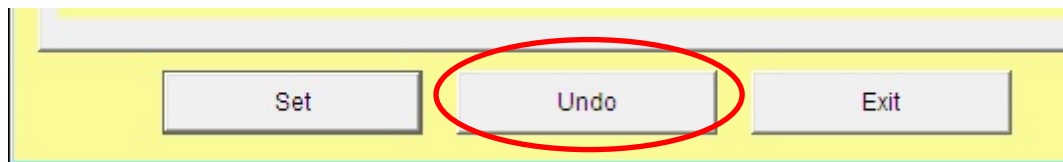
Please change the duplicated recipe in the recipe setting screen. After changing, please press "Setting" button and set to Piat tuner. When creating multiple recipes, please make settings for Piat tuner in each recipe.

5.3.6. Set



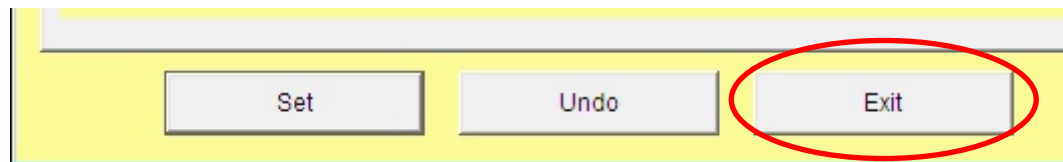
Click on the [Set] button, the currently displayed recipe data is set in the Piat tuner and is saved as recipe file to the recipe folder in the folder which includes the Maintenance software.

5.3.7. Clear



Click on the [Undo] button, the currently displayed recipe data is cleared and the default recipe data is displayed.

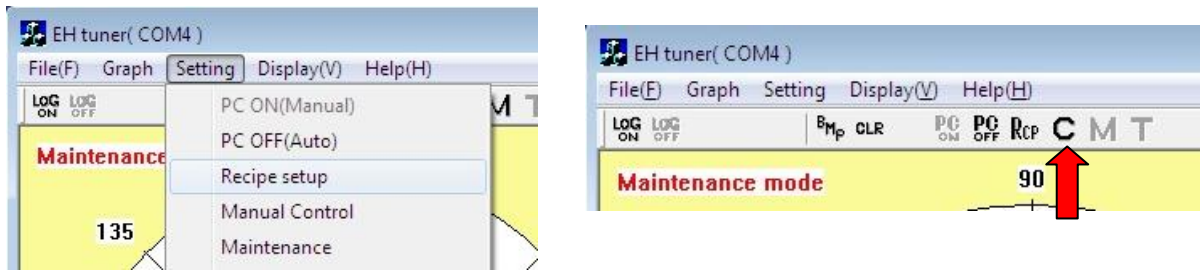
5.3.8. Exit



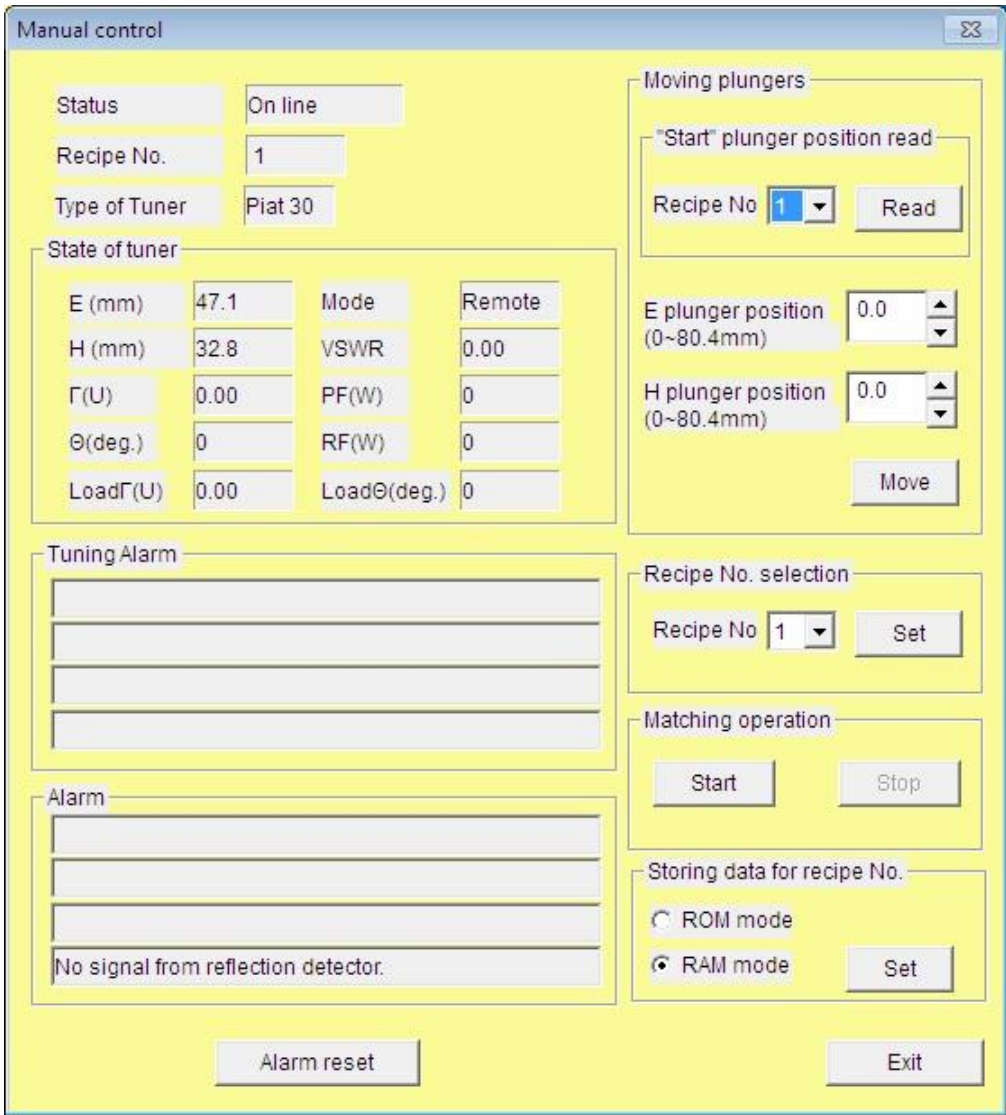
Click on the [Exit] button to close the recipe dialog. Note that if customer does not click on the [Set] button after modifying the recipe data, the modified and currently displayed recipe data will not be set nor saved.

5.4. Operating Piat tuner form PC

5.4.1. Start

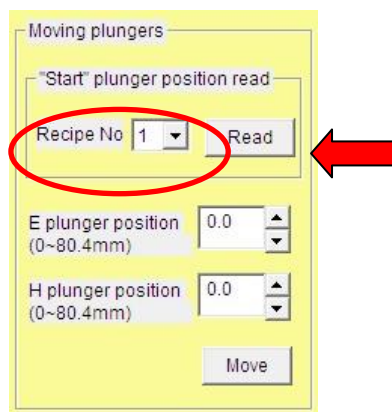


Click on either button above to open the dialog for operating the Piat tuner. Before this operation, click on the [PC ON (Manual)] or [PC ON] button.

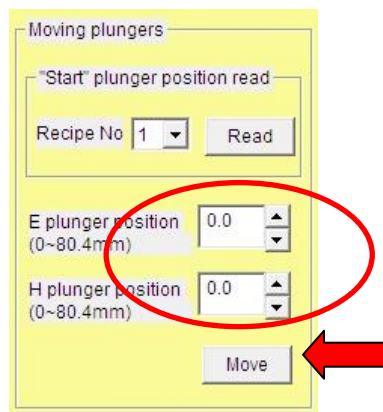


This dialog includes the current information at left side.

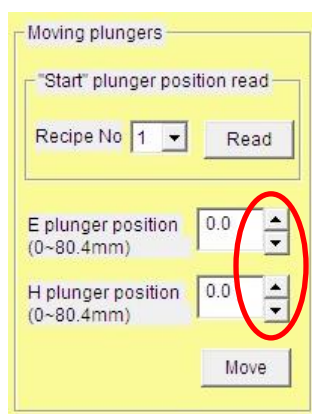
5.4.2. Moving plungers



Select the number of recipe and click on the [Read] button, then, "Start" plunger positions in the selected recipe are displayed.

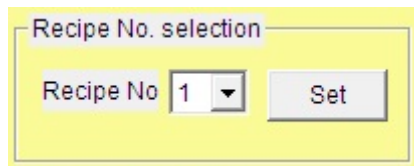


Click on the [Move] button, the Piat tuner moves plungers to displayed plunger positions.

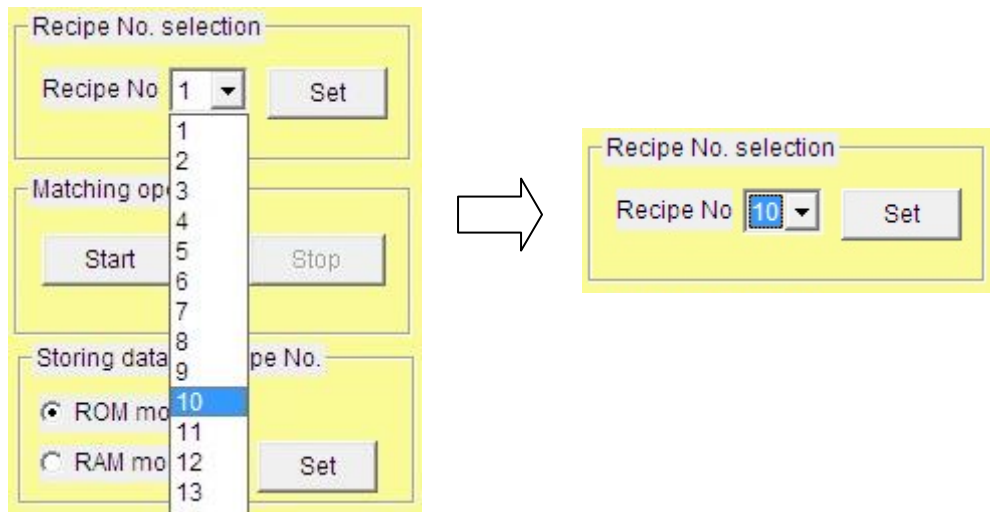


- By clicking on the [▲][▼] button at right side of "E plunger position" or "H plunger position", the plunger position can be set by the 0.5 mm of increment or decrement, and the Piat tuner moves the plungers to displayed plunger positions immediately.
- When customer clicks on the [Move] button after entering the plunger positions, the Piat tuner starts to move the plungers.
- The valid range of E and H plunger position is 0 ~ 80.4.

5.4.3. Tuning



- Select the number of recipe and click on the [Set] button. The Piat tuner is ready to perform auto-matching operation according to the parameters set in the specified recipe.

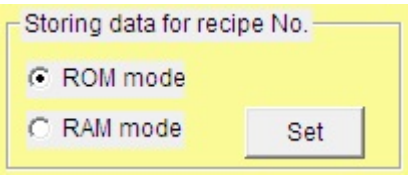


- Click on the [Start] button. The currently displayed graph on the screen is erased and the Piat tuner starts matching operation.

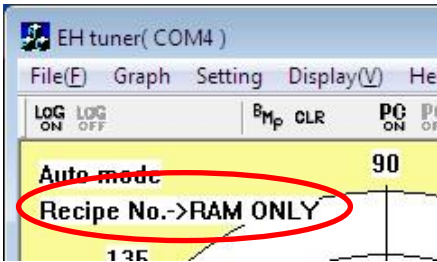


- Click on the [Stop] button, and the Piat tuner stops matching operation.

5.4.4. Storing data for recipe number



- Click on the radio button to select ROM mode or RAM mode and click on the [Set] button.

Mode	Description
ROM mode	The data for selected recipe number is stored in a non- volatile memory. The stored recipe number is set when the Piat tuner is restarted.
RAM mode	The data for selected recipe number is not stored in a non- volatile memory but is stored in a volatile memory. The previously stored recipe number in a non- volatile memory is set when the Piat tuner is restarted. Customer must select the recipe number before the process. In the RAM mode, “Recipe No. -> RAM ONLY” is displayed on top left of the graph screen. 

Note:

It is recommended that the Piat tuner be in the RAM mode if customer changes the recipe number frequently at short intervals through PC or host.

Note that the non-volatile memory may reach its life in shorter period in case of rewriting it at short intervals.

5.4.5. Exit



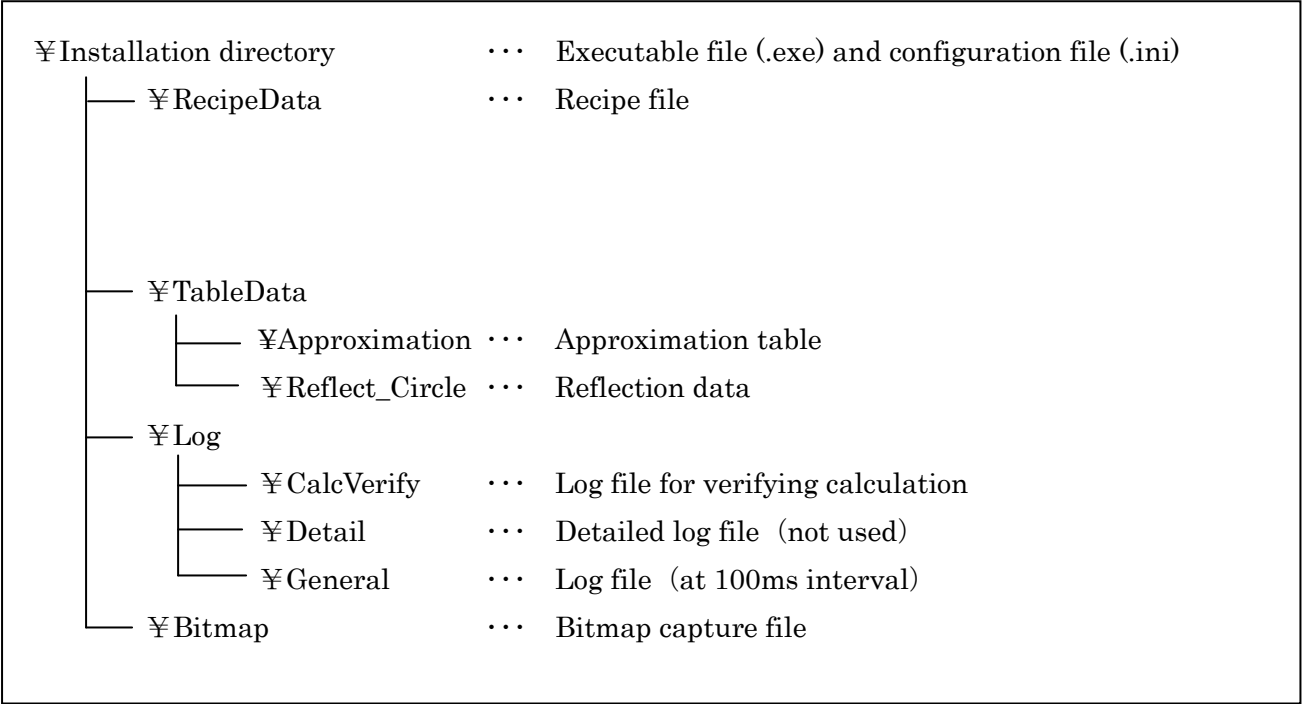
Click on the [Exit] button to close the dialog.

6. File

6.1. Directory structure

As the default directory structure, files arising from any operation in this software are created to or read from the following directory.

In the case that a dialog which requests entry of file directory is displayed during the operation, customer can use any arbitrary directory by specifying it directly.



6.2. ini file

[COM]

PORT=8

Set the communication port number between Piat tuner and PC.

When the maintenance software is of V460 or later version in which the port number is to be set in the port selection dialog, the port number here is not applicable.

[PLOT]

TRACE=1

COLOR=(255,0,0)

START_COLOR=(0,0,255)

STOP_COLOR=(0,255,0)

SIZE=5

<< Do not modify the parameters below. Modifying the parameters will cause start-up failure of the software. >>

[TIMER]

NOW_INFO=100

TRACE_INFO=200

[PRINT]

LEFT_MARGIN=180

TOP_MARGIN=100

BOTTOM_MARGIN=150

LF_PITCH=60

FONT_SIZE=40

FONT_NAME=MS Mincho

VS=102

[APLMODE]

SIMULATOR=0

[REFRECT]

PITCH=4

<< The following are the parameters for automatically setting maintenance dialog parameters. >>

[PIAT]

TYPE=0

[THETA]

OFFSET=117.4

GAMMA=0.0

CALCA=0

[MOTOR]

MOTIONCHANGEVSWR=1.50

SPEEDRATIO=100

MOVERETIOF=100

MOVERETIOR=100

MOVECHANGEVSWR=0.0

[REVISION]

W2=1

W3=1

ALL=1

[ADJUST]

VSWR=1.20

[REFLECT]

HPOS1=45.9

HPOS2=27.1

HPOS3=66.9

HPOS4=77.8

HPOS5=8.9

[RECIPE]

NUMBER=1

7. Error list

7.1. Causes of errors and solution

- In case that “xxxxx.DLL not found” is shown on start-up.
(Cause) There is no run-time library of MFC in customer’s PC.
(Solution) Get the run-time library of MFC and install it.
- In case that “Cannot Open COM” is shown at start-up.
(Cause) It is failed to open COM port.
(Solution) Make sure using the device manager of WINDOWS that the COM port is working properly and suitable unique number is assigned.
- In case that “Time out occurred during data transfer for XXXX” is shown.
(Cause) The communication between Piat tuner and PC is in failure.
(Solution) Check the connection and click on the [OK] button.
Refer to the following table.

NO.	Cause	Solution
1	Piat tuner is restarted while it is in the midst of communication with Maintenance software	Restart the Maintenance software.
2	USB cable for communication with EH tuner was pulled out while using maintenance software.	Restart the Maintenance software.
3	Other cause.	Restart the Maintenance software and the Piat tuner.