

GUI Software Guide

Protek 3200 Series



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1. GUI Software

1.1. Introduce

Protek 3200 Series RF field Strength analyzer is portable instrument and supports the measuring graph and numerical data which user need through the PC. In the case of that, Protek 3200 Series and GUI(Graphical User Interface) software are offered.

User can review the analyzed data from Supplied GUI software and Protek 3200 Series and revises the diagram and measurement data also save the data. User can make full use of GUI program. Protek 3200 Series support the communication with RS232C (Direct communication)

1.2. Features

Protek 3200 Series' specifications are as below and if user needs the detail information, please check the user manual.

- Wide-bandwidth of 3290N/3290C: 100 kHz to 2,900MHz
Wide-bandwidth of 3201N: 100 kHz to 2,000MHz
- Function of Frequency spectrum analyzer and frequency counter
- Measures and demodulates W-F M/W-FM/AM and SSB
- Enhanced accuracy for signal level
- Convenience for using the marker mode
(Marker / Delta Marker / Squelch)
- Channel Power measurement
- Support PLL tuning system for the setting exact frequency
- Internal speaker
- 192 pixels X 192 pixels Back Light LCD
- Convenience to use function selection of method for selected menu

- RS-232C interface
- User-friendly icon display
- Field wire/wireless equipment installation and maintenance
- Cable installation and maintenance
- RFID Tag RF Strength measurement
- Jammer(for hospital and theater, etc) performance test
- Satellite antenna installation and maintenance
- Tapping, hidden camera detection

2. Installation

2.1. Preparation

To use the GUI software, Preparation is as below.

- Protek 3200 Series
- RS 232C cable supplied
- PC (RS232C interface port)
- OS: MS Windows XP recommended
 - MS Windows ME. 2000 support
 - This product can be working with MS Windows 98SE, by the way, it can be not working due to memory capacity.
- GUI software.

2.2. Installation of GUI software

Double click "Setup.exe" file from GUI software, which will be installed automatically. And after rebooting the "Protek32Series.exe" icon will be showed on the window.

2.3. PC environment installation

Installation between Protek 3200 Series and PC is as below.

- 1) First at all, power on the computer and check the OS whether it is working or not
- 2) Check the power off Protek 3200 Series
- 3) Connect SMPS type adaptor (DC12V.3A) with Protek 3200 Series.
- 4) Connect the RS 232C between PC and Protek 3200 Series.
- 5) Next, set up Protek7830
- 6) Turn Protek 3200 Series on.
- 7) Click the "Menu" key to display "Main Menu" on LCD monitor.
- 8) Use the "UP/Down" key, find the "Connect PC" Manu and enter this

mane.

- 9) List "None" and "Remote PC" displayed and clicks "Remote PC" and push "Enter" key.
- 10) At Setup on main menu, select the Port Set and must agree with "COM Port Number" and the Port Number offering at User's PC.
- 11) And then check the "Remote PC" message on the monitor. If "Remote PC" message was displayed on monitor, Protek 3200 Series is ready to connect PC, It means GSI mode.
- 12) Next, explain the GUI software.
- 13) Find the icon of "Protek32Series.exe" on desktop and double click it to start the GUI program. Check the Instruction 2.1.

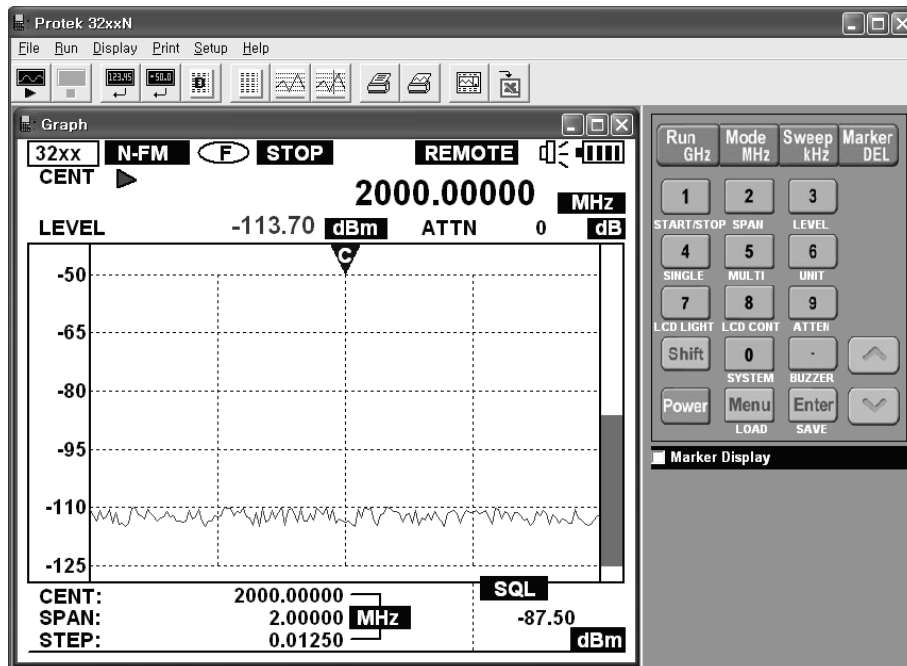


Figure 2.1. Protek 3200 Series GUI software

3. The method of GUI software key button

3.1. GUI Software

GUI software is classified for Menu part and Protek 3200 Series

First from this chapter explain the method of using GUI equipment and from next chapter explain the menu part. Refer the instruction 2.1.

GUI equipment organizes the LCD display and keypad button. First LCD display show the measurement data same as real equipment.

The measurement graph is displayed GUI equipment on LCD monitor and this graph can be enlarged for user reviewing. To use enlargement mark function, the user can use the window of graph. As the Figure 3.1, double click the LCD display, run the window of graph.

More detail information is mentioned on 4.3.2. Running method for the window of Graph and 4.7 additional explanation for the window of graph

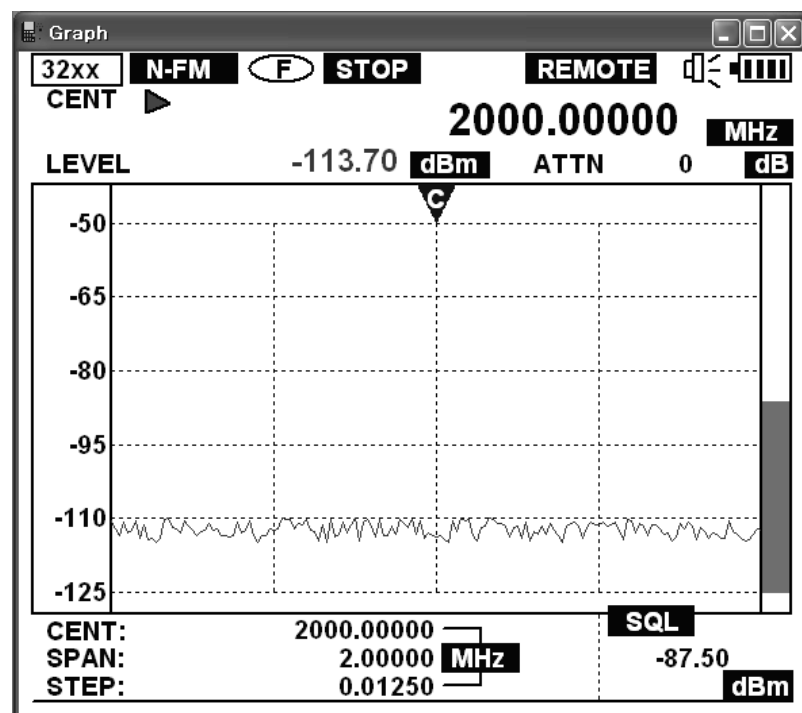


Figure 3.1. Function of LCD display

and in case of GUI equipment of the keypad button, it is working same as real keypad button. (But Wheel key of GUI equipment is not working during the communication)

GUI equipment use is same as real equipment so if user needs more detail information, refer the user manual of Protek 3200 Series.

3.2. The method of key button

Check the Figure 3.2. to recognize the arrangement of keypad button.



Figure 3.2. Keypad button

3.2.1. “Shift” keypad button

- 1) Push the “Shift” button.
- 2) At that time, the “3201” or “3290” icon in the top left on the screen will be change into “SHIFT” This manual is explained both models 3290N and 3201N simultaneously so the “32xx” display will be showed in example figures.
- 3) Push the “Shift” key again.
- 4) From that time, “Shift” icon will be changed to “3201N, 3290C or 3290N” icon.
- 5) For more additional explanation of No.4, when Protek 3200 Series' icon is changed from “Shift” icon to “3201 or 3290” icon, frequency mark is changed from the lower end at LCD display monitor. In other word, from the selection of “Shift” key twice, the user can convert the each mark of center frequency, span frequency, step frequency, start frequency, stop frequency, and step frequency. (LCD display mark:

CENT/SPAN/STEP \leftrightarrow STAR/STOP/STEP)

3.2.2. “DEL” keypad button

- 1) The user can delete the number of frequency value with “Marker/DEL” as below.
- 2) The user can use “DEL” key to delete the miss-typing number (0~9 and “.”)
- 3) If the user push “DEL” key one time, the one letter will be deleted from the last input letter.
- 4) The user can push “DEL” key repeatedly to delete all of the letter,
- 5) Next, Protek 3200 Series is display the previous frequency value automatically.

3.2.3. “Mode” keypad button

- 1) Generally, push “Mode” key to select measurable demodulation mode.
- 2) When the user push the “Mode” key, the demodulation mode is changed in orders W-FM \rightarrow SSB \rightarrow AM \rightarrow N-FM repeatedly.
- 3) In case of SSB mode changed, when sweep mode is stopped, the user can use “U/Down” key to change the frequency value.

3.2.4. Input the center frequency

- 1) The user can input the center frequency value with Protek 3200 Series keypad button (The number & unit)
- 2) GUI program support to input the center frequency value with keypad button.
- 3) But, to set the frequency value up easily, prepare the main menu of GUI equipment separately.
- 4) Refer the Figure 3.3. Set frequency and 4.2.3 Set frequency

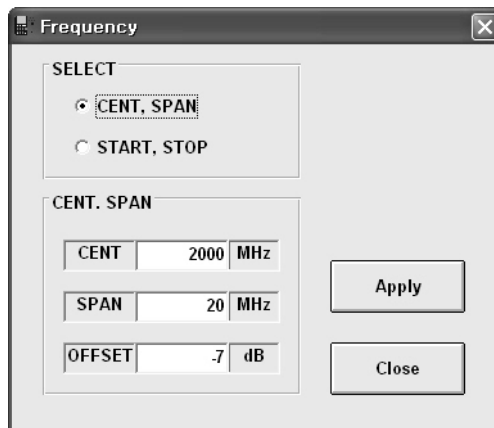


Figure 3.3. The window of set frequency

3.2.5. Input the span frequency

- 1) The user can input the span frequency value with Protek 3200 Series keypad button (The number & unit)
- 2) GUI program support to input the span frequency value with keypad button.
- 3) But to set the frequency value up easily, prepare the main menu of GUI equipment separately. The user can use “Set frequency” to input the span frequency value from the* main menu “Run”
- 4) Refer the Figure 3.3. Set frequency and 4.2.3 Set frequency

3.2.6. Input the start frequency and the stop frequency

- 1) The user can input the start frequency value and the stop frequency value with Protek 3200 Series keypad button (The number & unit)
- 2) GUI program support to input the start frequency value and stop frequency value with keypad button
- 3) But to set the frequency value up easily, prepare the main menu of GUI equipment separately. The user can use “Set frequency” to input the span frequency value from the main menu “Run”
- 4) Refer the Figure 3.3. Set frequency and 4.2.3 Set frequency

3.2.7. Setting the reference level

- 1) The user can input the reference level value and the stop frequency value with Protek 3200 Series keypad button (The number & unit)
- 2) But to set up the reference level value and the difference level value easily, prepare the main menu of GUI equipment separately. The user can input the reference level value and the difference level value from "Set REF.Level".
- 3) Refer 4.2.5. Set reference level

3.2.8. The function of Mark1/Mark2/Squelch

- 1) Generally push the "Marker/Del" to use the selection for marker mode
- 2) When the user push the "Maker" key, the marker mode is changed in orders None → Marker1 (Marker) → Marker2 (Delta Marker) → Squelch Marker repeatedly.
- 3) For entering the Marker1 on None mode, push the "Marker" key. Check <M> icon mark whether it is displayed or not on upper middle of window. This mark is the changed Marker1 mode. The user can arbitrate Marker1 with "Up/Down" key from Marker1 mode.
- 4) To change the mode from Marker1 to Marker2, Push "Marker" key too. Check the "△" icon mark whether it is displayed or not on upper middle of window. This mark is for changed the marker2 mode. The user can arbitrate Marker2 with "Up/Down" key from Marker2 mode, also the user can use Marker2 mode with Delta Marker from the standard value of Marker1.
- 5) To change from Marker 2 mode to Squelch Marker mode, push "Marker" key too. Check the "S" icon mark whether it is displayed or not on upper middle of window. This mark is for changed the Squelch mode. The user can arbitrate Squelch Marker with "Up/Down" key from Squelch Marker. The user can set up the Squelch level value to run Sweep mode and check the Squelch Marker value from LCD monitor lower right side "SQL"
- 6) To change the mode from Squelch to None, push the "Marker" key.
- 7) Additionally, in case of None mode, the user cancel the Marker mode from Protek 3200 Series, but the user can use Marker 10 sets with GUI equipment to click the data. If the user needs more explanation, refer the chapter 4.7 the additional explanation for the window of

graph.

3.2.9. Sweep function

- 1) The user can select the sweep mode using “Sweep/kHz” key generally. Sweep mode is changed in orders Free Run → Squelch Run → Single Run repeatedly.
- 2) GUI software supports the function of free run, therefore when input the frequency value with “Sweep/kHz” key, the user can input the value per kHz.
- 3) To use the function of free run, push the “Run/GHz” key. The user can run and stop it with “Run/GHz” key.
- 4) Or the user select the main menu “Run” → “Run”. In case of “Stop” the sub menu displays “Run” and for the state of “Run” the sub menu displays “Stop”.

3.2.10. The function of LCD Light ON/OFF

- 1) The user can set the LCD back light to turn on or off. The initial setting is power off.
- 2) Push “shift” key one time and push the No.7 key to select the additional function of “LCD LIGHT”.
- 3) If the user push the No. “7” repeatedly, the on/ off of LCD back light is changed repeatedly automatically.

3.2.11. The Function of LCD contrast

- 1) Following environment, the contrast of LCD is different so the user can set the LCD contrast.
- 2) Push “Shift” key and push the No.8 to select the additional function of “LCD CONT”
- 3) The user can set LCD contrast with “Up/Down” key.

3.2.12. The function of internal ATTEN (Attenuator)

- 1) Protek 3200 Series is set with the internal ATTEN
The user can set the dB value. As 0dB, 10dB, 20dB, 30dB and 35dB
- 2) Push “Shift” key one time and push the No.9 key to select the

additional function of “ATTEN”

- 3) The user can select the ATTEN value with “Up/Down” key.
- 4) Push “Enter” key.

3.2.13. The function of buzzer on/off

- 1) The user can set the key buzzer and the initial setting is buzzer off.
- 2) Push “shift” key and push “.” to select the function of “BUZZER”
- 3) If the user push the “.”, the On/Off of LCD back light is changed repeatedly automatically.

3.2.14. The function of SAVE/LOAD/DELETE

- 1) Protek 3200 Series can save and load the measuring data and setting equipment. In other word the user can save or load data for displayed data except LCD part.
- 2) To use the function of “SAVE/LOAD/DELET” easily, Protek 3200 Series of the main menu supports the each function, but GUI equipment is not supported.
- 3) But, to use the SAVE/LOAD/DELETE function easily, it is offer on the main menu of GUI software separately. Please use the “Equipment Data List” in “Run” of the main menu.

[If need more detail, refer the “4.2.6. Equipment Data List” section]

4. The method of main menu for GUI software

Toolbar is same as figure 4. 1. Tool bar is gathered the abridged buttons which are often used from the menu. When the mouse cursor moves the button up, Tool Tip is showing. If selected key is pushed, the same operating will be done as like that the key on instrument is pushed. The descriptions of each buttons are as follow:

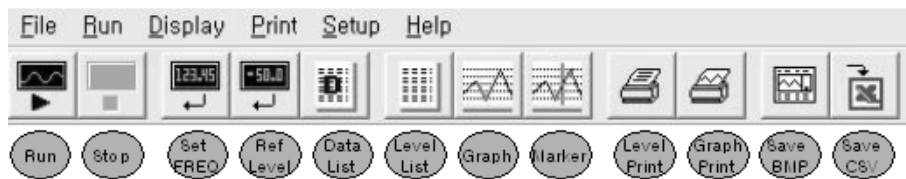


Figure 4.1. Tool Bar

- 1) Run: It is same as the Run function in main menu. (Refer 4.2.3. Run)
- 2) Stop: It is same as the Stop function in main menu. (Refer 4.2.3. Run)
- 3) Set FREQ: It is same as the Set Frequency function in main menu. (Refer 4.2.5. Set Frequency)
- 4) REF. Level: It is same as the Set REF. Level function in the main menu. (Refer 4.2.5. Set Reference Level)
- 5) Equipment Data List: It is same as the Data List function in main menu. (Refer 4.2.6. Data List)
- 6) Level List: It is same as the Display of Level function in main menu. (Refer 4.3.1. Level)
- 7) Graph: It is same as the Display of Graph function in main menu. (Refer 4.7. Graph widow)
- 8) Marker: It is same as the Display of Marker function in main menu. (Refer 4.3.3. Marker)
- 9) Level Print: It is same as the Print of Level function in main menu. (Refer 4.4.1. Level)
- 10) Graph Print: It is same as the Print of Graph function in main menu. (Refer 4.4.2. Graph)
- 11) Save Bmp: It is same as the File of "Save Graph as BMP" function in

main menu. (Refer 4.1.3. Save Graph as BMP)

12) Save CSV: It is same as the “Data to CSV” function in main menu.
(Refer 4.1.4. Data to CSV)

Main menu list of GUI software is as figure 4.2. The description of each menu is as follow:

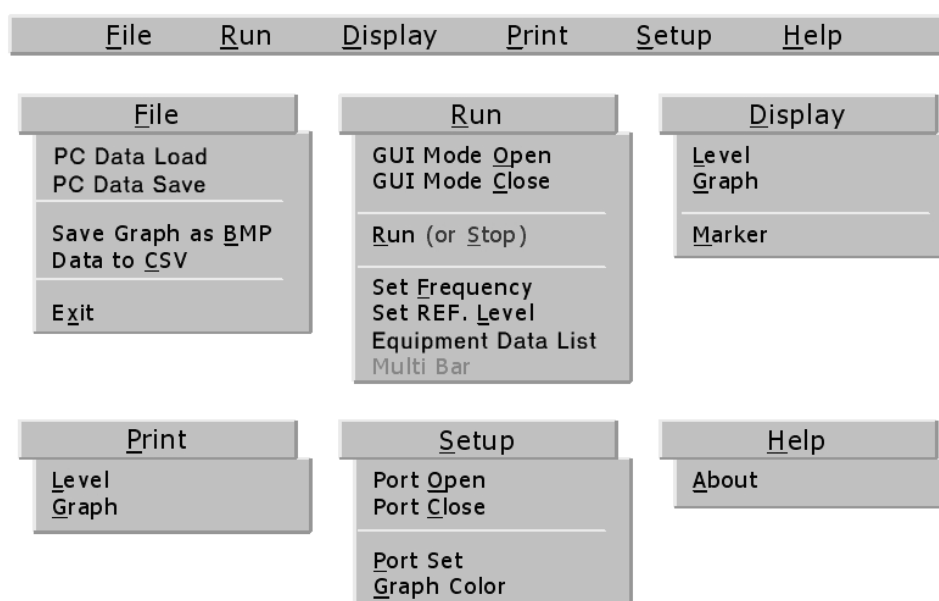


Figure 4.2. Main menu List

4.1. “File” menu

4.1.1. PC Data Load

- 1) Protek 3200 Series can save and load the measuring data and setting equipment. In other word the user can save or load date for displayed data except LCD part.
- 2) But If the user use the function of Save and Load, the data is saved or loaded with Protek 3200 Series' memory, buy the way if the user use the function of save and load with GUI equipment, the date is saved or loaded to PC.
- 3) For your reference, if the user save or load the file, refer the article 4.2.4. “Equipment Data list”.
- 4) The user loads the save file for the measuring data and setting value of equipment.
- 5) Select “File” of the main menu → Load to open the window of Load as Figure 4.3.
- 6) Select the desired save file and click the “Open.”
- 7) Saved Data display

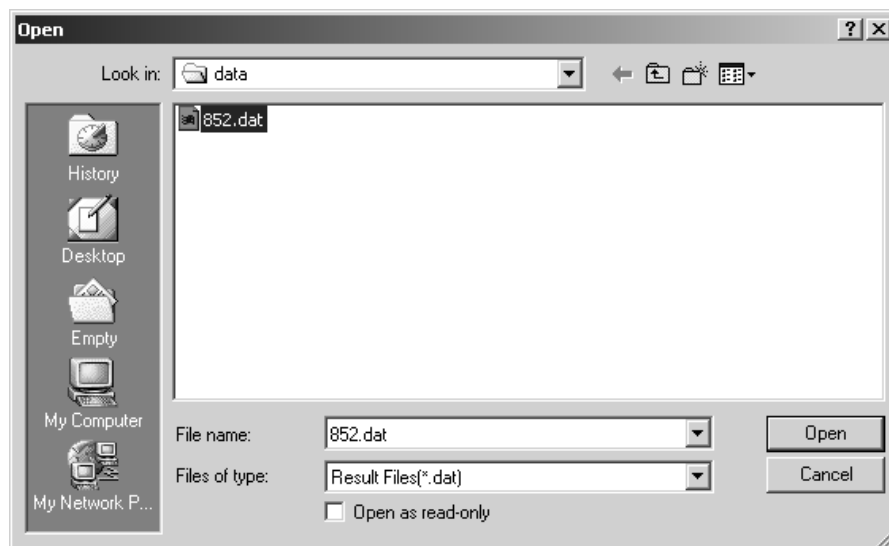


Figure 4.3. The window of Load

4.1.2. PC Data Save

- 1) The function of “PC Data Save” menu is used to save the measuring data or setting value of the equipment.
- 2) Select “File” of the main menu → Save to open the window of Save Figure 4.3.
- 3) The user can name the file for save and click the “Save”.

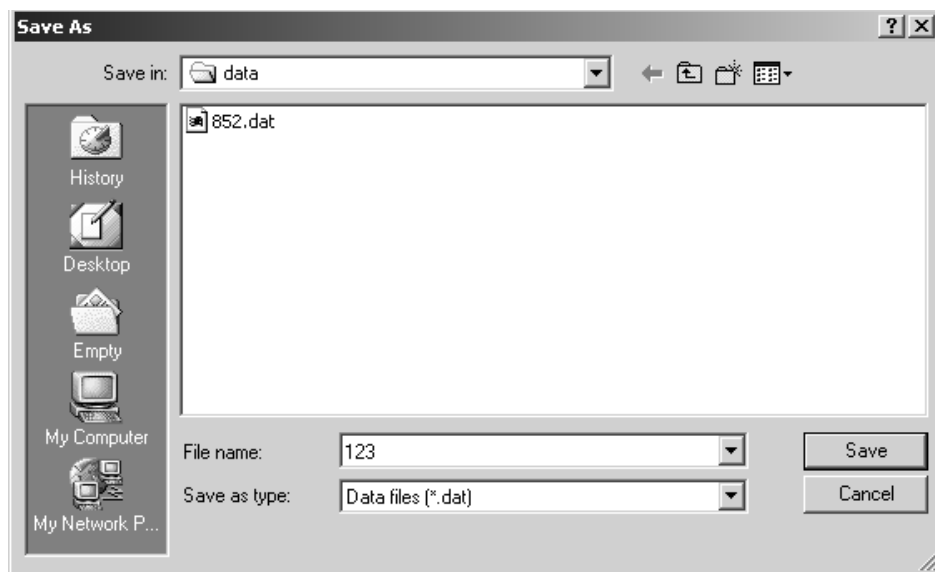


Figure 4.4. The window of Save

4.1.3. Save Graph as BMP

- 1) To use the function of “Save Graph as BMP” easily, GUI equipment support to save the data of graph as bitmap file also the user can check the latest data from the bitmap preview of graph.
- 2) Select “File” of the main menu → Save Graph as BMP to open the window of Save Figure 4.4.
- 3) After push “Save Graph”, Input the desired Graph name and push the “Save” button, Automatically open the message of “Waiting” during a few second.
- 4) The present measured graph will be saved and display the recent saved graph. (Refer the recently saved BMP preview)

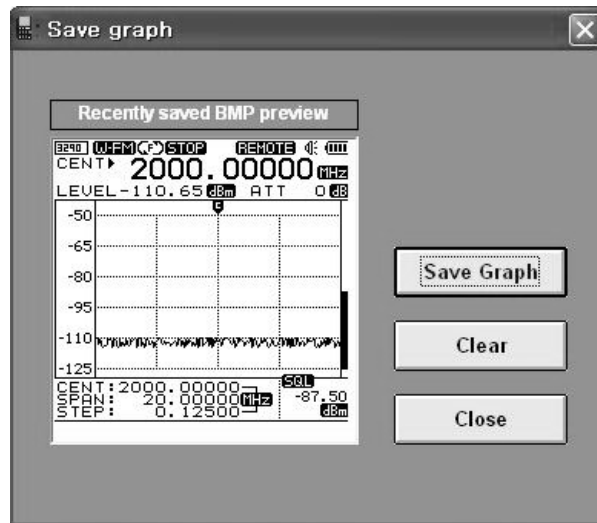


Figure 4.5. The window of Save Graph as BMP

4.1.4. Data to CSV

- 1) "Data to CSV" is the function for saving the measuring data to CSV.File. This file is opened with Excel program. If the user double click the CSV.File, the excel program is run to display the measuring data automatically.
- 2) If the user selects the main menu File → Data to CSV, the window of Data to CSV is opened.
- 3) The user can name the desired CSV.File and click the "Save" button

4.1.5. Exit

- 1) The user can exit the GUI software from "Exit" menu.
- 2) But Protek 3200 Series is kept at the states of "REMOTE PC"
- 3) So the user can re-start the GUI program with Protek 3200 Series and it is not necessary the procedure as below.
- 4) "Menu → CONNECT PC → REMOTE PC"
- 5) If Protek 3200 Series is kept at the states of "REMOTE PC" as the procedure No., reset Protek 3200 Series to work it without GUI equipment.
- 6) Also if user exits the GUI software abnormally (Disconnect the RS232C

before using the function of “Exit”, Stop the GUI software compulsorily, etc), the user should exit the GUI software and Protek 3200 Series reset and re-install the user environment. Refer the article 2.3.

4.2. “Run” menu

4.2.1. GUI Mode Open

- 1) “GUI Mode Open” menu is used for connection with Protek 3200 Series through the GUI software. In other hand, this menu is for re-installation of the environment.
- 2) This function of menu is as below.
 - The user fails the installation of the user environment.
 - The user closed user environment through the function of “GUI Mode Close”
- 3) As additional explanation, this function can be displayed on “Communication Fail” from these symptoms.
 - Fail to install the user environment.
 - Protek 3200 Series is out of power
 - Protek 3200 Series is operated on “REMOTE PC” without RS232C cable.
 - Protek 3200 Series mode is not changed to the mode of “REMOTE PC”
 - The user operates the GUI software.
- 4) In case of previous 2), to reinstall the user’s environment, the equipment could be selected “REMOTE PC” function, be connected with serial cable and be corresponded with ComPort Number.
- 5) Next, select GUI Mode open from Run menu to install the user environment.

4.2.2. GUI Mode Close

- 1) “GUI Mode Close” menu is same as the function of “Exit” to close the GUI Mode (Refer 4.1.5 “Exit”)
- 2) But, this function is different with “Exit” so “GUI Model close” can not exit the GUI software, so the user can install the user environment following the “GUI Mode Open” menu as the article 4.2.1 GUI Mode Open

4.2.3. RUN

- 1) "Run" menu is operated to start and stop the Sweep mode of Protek 3200 Series. GUI software supports the Sweep mode of Free Run (Free Run, Squelch Run and Single run). Refer the article 3.2.9. The function of sweep and the instruction 4.5
- 2) If Protek 3200 Series display the "Run" icon at upper monitor, it is the free mode of Sweep Run and in this case, select the menu Run → STOP to change the mode of sweep from run to stop.
- 3) If Protek 3200 Series display the "Stop" icon at upper monitor, it is the free mode of Sweep Stop and in this case, selects the menu Run → Run, it is Sweep STOP.

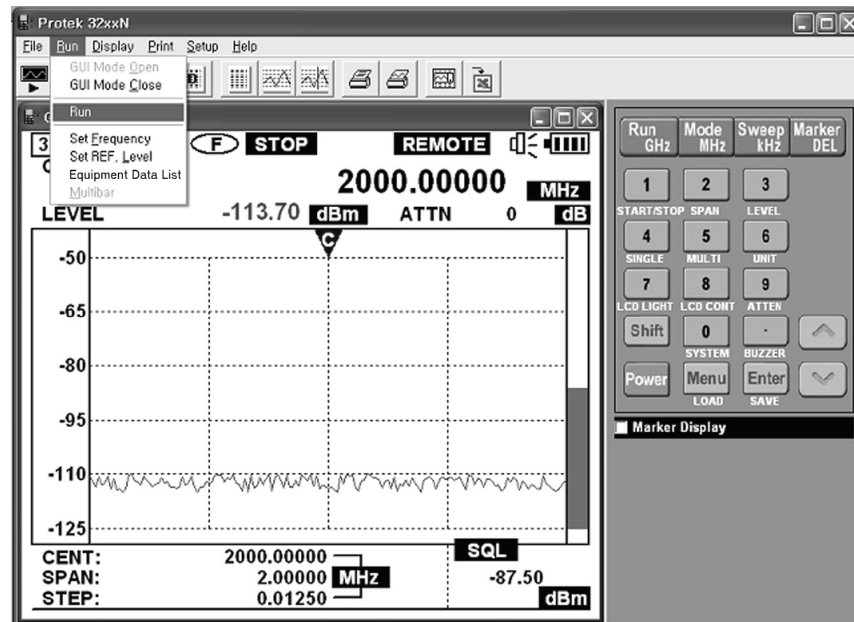


Figure 4.6. Run menu

4.2.4. Set Frequency

- 1) "Set Frequency" menu is that the user can easily fix the measuring frequency range and offset value. If the user selects this menu, the window of Set frequency is displayed as the Figure 4.6. Regarding more information, refer the article 3.2.5. Input the center frequency, 3.2.5. Input the span frequency and 3.2.6. Input the start and stop frequency.

- 2) At first choose the desired method of input frequency from the window of Set frequency. In other words choose the one method between “CENT,SPAN” or “START,STOP ”
- 3) Next, input the frequency value & OFFSET value and etc, and then push “Apply” button
- 4) For reference Span value could be set a multiple from 1MHz to 20MHz, for example If the desired span value range is 12MHz, the user should input the span frequency as 12MHz.
- 5) If the span frequency range is over 21MHz, the user can set the span frequency range as multiple 20MHz so if the desired span frequency range is 25MHz, the user can set the span frequency range to 40MHz and in case of 78MHz, the use can set the span frequency range to 80MHz.

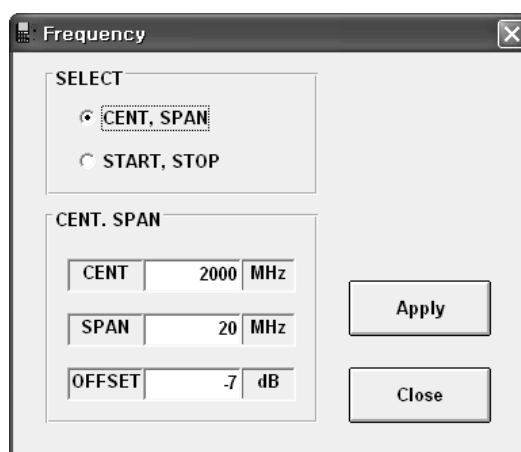


Figure 4.7. Set Frequency window

4.2.5. Set Reference (REF) Level

- 1) "Set REF. Level" menu function could be using by setting reference level value. Select this menu as figure 4.9 executing set reference level windows. Relating this contents refer to "3.2.7. setting reference level".

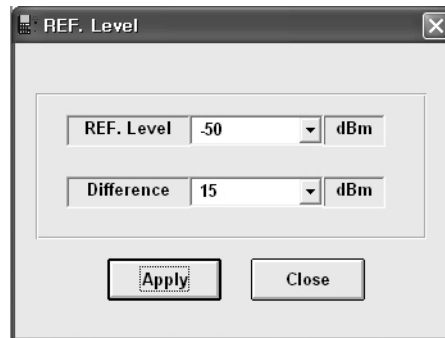


Figure 4.8. Setting window of "Set Reference Level and Difference Level"

- 2) As Figure 4.9 set reference level window display Reference level value and difference level value. For reference consideration measuring signal for which appointing display window level value also Difference level value is level grid value of display window.
- 3) Reference level value support, as following figure 4.10 directly inputting or select combo box list etc.
- 4) According to assign level unit, it's different supporting list level
 - dBm unit: -50,-60,-70,-90,-100,-110,-120
 - dBuV unit: 60,50,40,30,20,10,0-10
 - dBmV unit: 0,-10,-20,-30,-40,-50,-60,-70
- 5) For reference method of changing level unit, actually using measuring instrument "menu" keypad select "main menu" ,"level unit" then select level unit.
- 6) Difference level value also support directly inputting or select combo box list etc. Supporting value are 5, 10, 15 and 20. Fundamental value is 15. If measuring instrument appointing unit is dBm, appointing 15 then level grid value interval value 15dBm.
- 7) Select setting value then after input push "apply" button
- 8) Directly input reference level value or Difference value, push "apply"

button, In discord with supporting level value (For reference 3)) in this case output “Check the REF. Level value support!” message. Check reference value and Input again or at list input selected value.

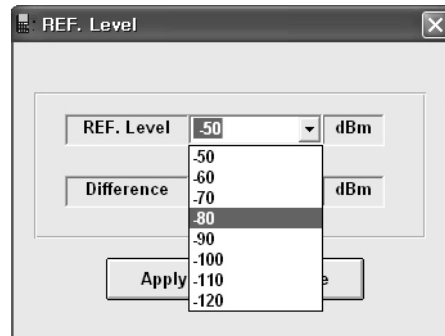


Figure 4.9. Setting the values of Reference Level and Difference Level

4.2.6. Equipment Data List

- 1) In practically, Measuring instrument function that is measuring data, setting equipment (etc.) save to save file(save function), load file that already saved(load function) or can delete this save file(delete function).
- 2) On this GUI software easily manage by using “Equipment Data List” menu.(save, load and delete function) refer to 4.10

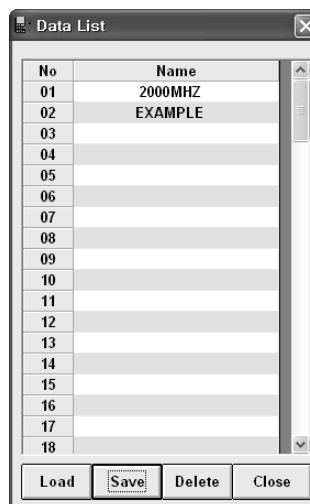


Figure 4.10 The window to manage “Save File”

- 3) On manage window the left side number is save file list number.(01~100). Name means save file.

- 4) If you want to load saved file at first select saved file by mouse then push “load” button.
- 5) If you want to delete save file at first select saved file by mouse then push “delete” button.

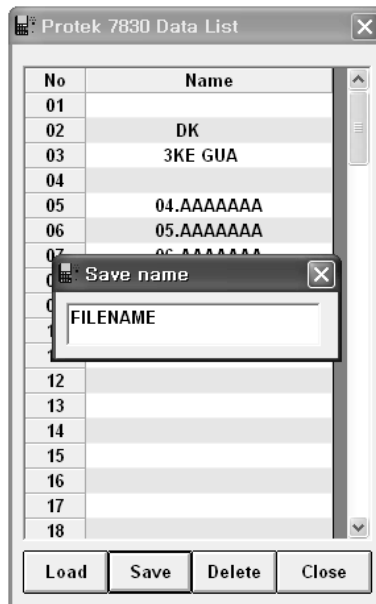


Figure 4.11. Input the name of “Save File”

- 6) For saving the present measuring data, setting equipment, push “save” button. As refer to 4.8 execute input name file of save file.
- 7) Also using possibly input letters are capital letters “A”~”Z” number “0”~”9” blank letter (space) “,”, dot letter(Dot) “.”. Using possible maximum input letters are one to ten. Assigned more than ten letters, automatically appoint ten letters.
- 8) If completed inputting name, push “enter” key
- 9) Refer to sub menu, which is belonging to main menu load & save function, in this case practically it is not belonging to measuring instrument problem, On the PC without limit using save & load function. In detail description refers to “4.1.1. PC Data Load; 4.1.2. PC Data Save ”.

4.2.7. SINGLE or MULTI Bar

- 1) "Multi Bar" menu function display the Frequency that is measuring during the sweep now into the Bar by user's request.
- 2) As like the figure 4.12, select the MAIN MENU → FUNCTION → SINGLE MODE or MULTI MODE key on the screen in sequence. Also it is possible to use simultaneously with the Shift and "4" or "5" key to operate same performance.

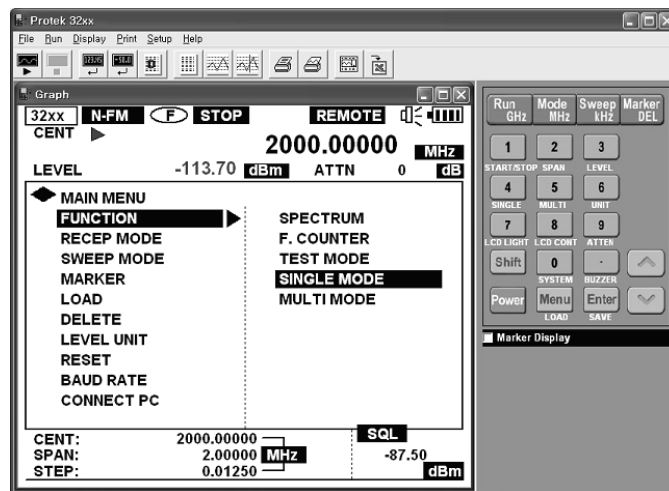


Figure 4.12. Set SINGLE MODE

- 3) SINGLE MODE is showing as like figure 4.13 could be set to FREQUENCY in 5 lines and the At the equipment, if the 5 lines is selected, the combo box is showing. User can select "GHz", "MHz" and "kHz". If Apply button is clicked, one of Single Bar will be displayed.

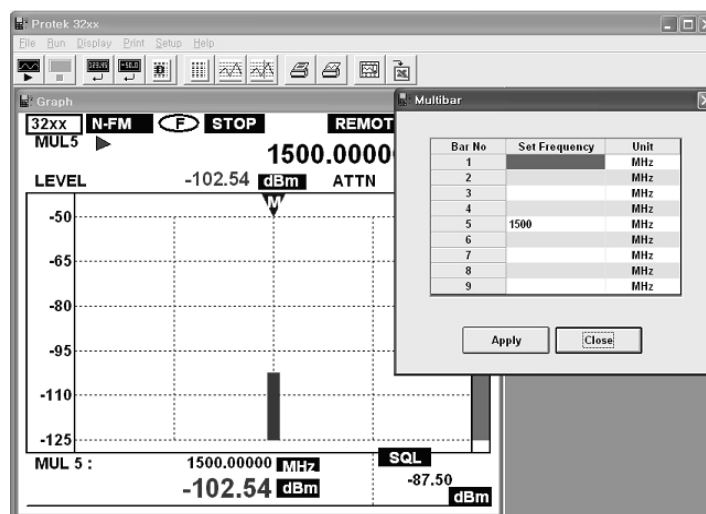


Figure 4.13. Set SINGLE MODE FREQUENCY

A. But, MULTI MODE is possible to set up to 9 of FREQUENCY.

The setup method is that when Ste Frequency column of line is selected, the mouse point is changed to input. As below figure 4.14, user can put the input value. For example for 3290N, if the input value is over 100 kHz to 2900MHz, Message Box is displayed and has to setup again. If the Apply button is selected, the Bar as like figure 4.14 will be showed.

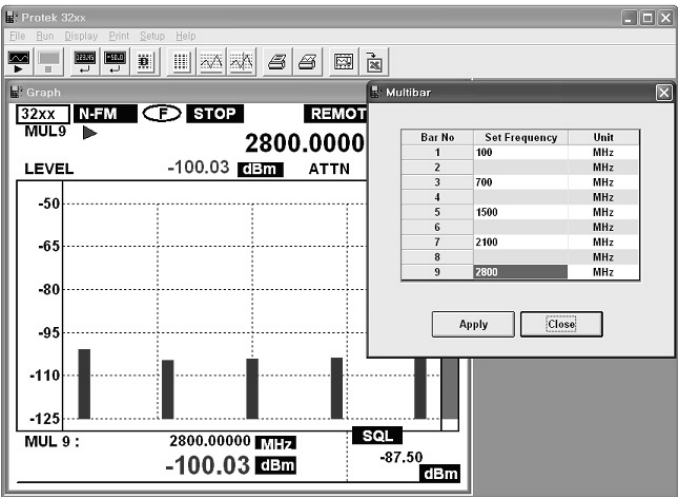


Figure 4.14. Set MULTI MODE FREQUENCY

B. The Marker of Single Bar is 5 and the Default value of Multi Bar of Marker position laid the Marker on the last Bar. As like figure 4.15, using the Up/Down key on the key pad of GUI software, Marker is moved on the MULTI Bar. After finishing the movement of the marker, the frequency and the Level value will be displayed.

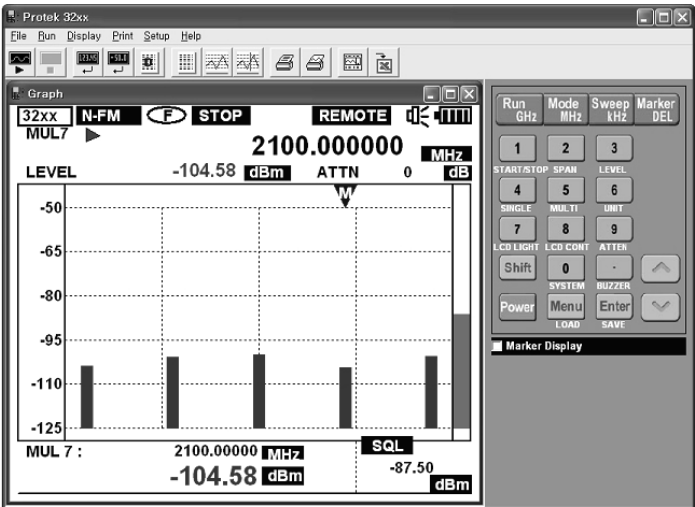
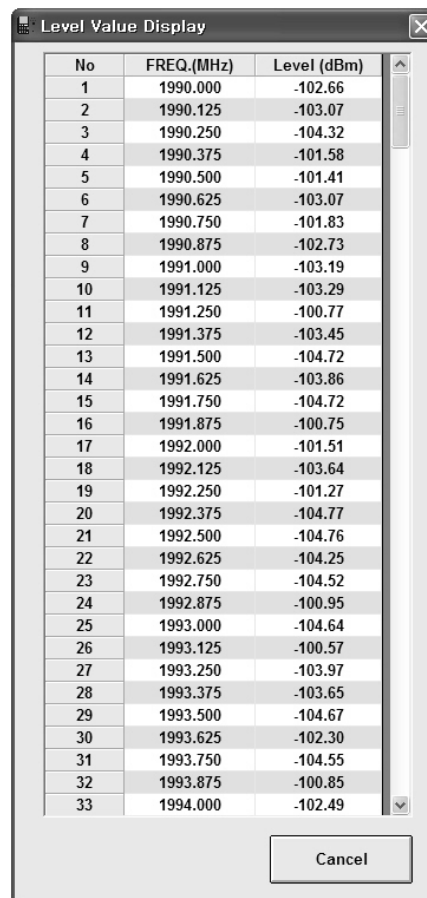


Figure 4.15. Marker setup using UP/DOWN on key pad

4.3. “Display” menu

4.3.1. Level

- 1) “Level” menu function display measuring data that converted numerical value information. Display 161 unit measuring numerical value data one after the other.
- 2) Display main menu → Select level, as following figure 4.11 operate level value display window.



No	FREQ.(MHz)	Level (dBm)
1	1990.000	-102.66
2	1990.125	-103.07
3	1990.250	-104.32
4	1990.375	-101.58
5	1990.500	-101.41
6	1990.625	-103.07
7	1990.750	-101.83
8	1990.875	-102.73
9	1991.000	-103.19
10	1991.125	-103.29
11	1991.250	-100.77
12	1991.375	-103.45
13	1991.500	-104.72
14	1991.625	-103.86
15	1991.750	-104.72
16	1991.875	-100.75
17	1992.000	-101.51
18	1992.125	-103.64
19	1992.250	-101.27
20	1992.375	-104.77
21	1992.500	-104.76
22	1992.625	-104.25
23	1992.750	-104.52
24	1992.875	-100.95
25	1993.000	-104.64
26	1993.125	-100.57
27	1993.250	-103.97
28	1993.375	-103.65
29	1993.500	-104.67
30	1993.625	-102.30
31	1993.750	-104.55
32	1993.875	-100.85
33	1994.000	-102.49

Figure 4.16. The window of Level Value Display

4.3.2. Graph

- 1) Main menu display → select graph or click two times measuring instrument GUI of LCD display window. As figure 4.17 execute graph window.
- 2) In this chapter briefly prescribe graph window, detailed description refer to “4.7.graph window additional description”

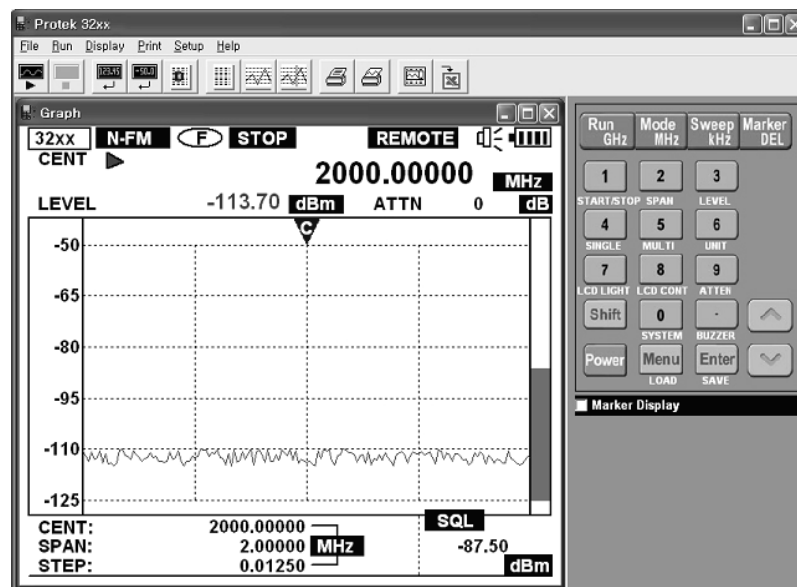


Figure 4.17. Graph window

4.3.3. Marker

- 1) “Marker” menu function of marker mode is none mode in this case User for looking assigned marker information use this mode.
- 2) Click at graph window left side arranged “maker or CH PWR display” check box also can look marker information at graph window. Click again, check box convert keypad mode.

Main menu display → select marker as figure 4.13 execute marker display window.

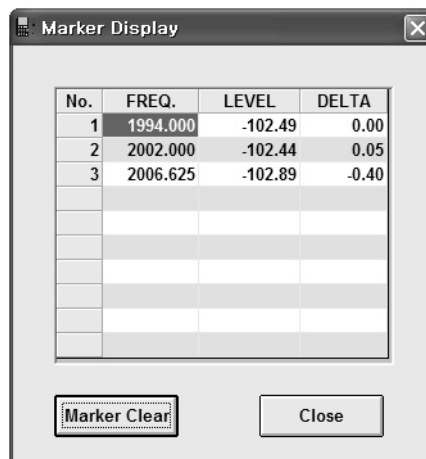


Figure 4.18. Marker Display window

4.4. “Print” menu

4.4.1. Level

- 1) “Level” menu function, which prints installed at PC, is output function graph of numerical value.
- 2) Main menu print → select level, executed print option window click “confirm” output by print installed at PC.

4.4.2. Graph

- 1) “Graph” menu function, which prints installed at PC, is output function graph of numerical value.
- 2) Main menu print → select level, executed print option window click “confirm” output by print installed at PC.

4.5. “Setup” menu

4.5.1. Port Open

- 1) “Port open” menu function setting separated RS232C series port (For reference “ 4.5.3. port set ”) or when use for open closed RS232C series port. RS232C series port mean COM port.
- 2) Main menu set up → select port open, open RS232C series port (COM port).

4.5.2. Port Close

- 1) Main menu setup → select port close, open RS232C series port(COM port & Baud rate).

4.5.3. Port Set

- 1) “Port Set” menu function for using that assigning RS232C series port at GUI software. It is able to set COM port & Baud rate.
- 2) Main menu set up → Select port set as figure 4.14 execute port setting window.

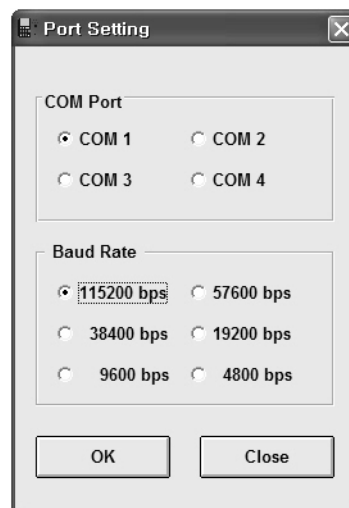


Figure 4.19. Port Setting window

4.5.4. Graph Color

- 1) “Graph Color” menu function when setting LCD display window of GUI software. Click each setting buttons, execute color figure, and select what you want color then click “confirm” button or click two times what you want color. Click “Default” button convert the first stage color.
- 2) Main menu setup → select graph color as figure 4.15 executes graph color setting.

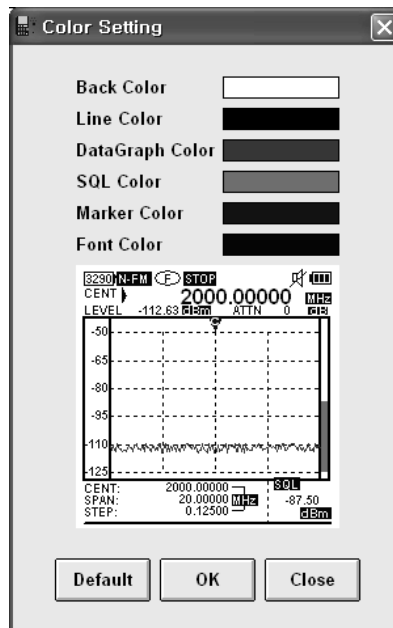


Figure 4.20. Graph Color Setting window

4.6. “Help” menu

4.6.1. About

- 1) “About menu function offer GUI software version and information.

4.7. additional description of Graph window

4.7.1. Graph window

- 1) Graph window executive method refer to “4.3.2.Graph”
- 2) This chapter explains about describe graph window introduction.
- 3) Graph window support two kinds of mode. Keypad mode, maker information.
- 4) Looking at the right of Graph window, there is the check box of “Marker Display” item.
- 5) After checking the check box of “Marker Display” item, the Marker information as like the [5] in figure 4.22 is supported.
- 6) Figure 4.21 will be explained at base.
- 7) Note 1 use GUI measuring instrument measure some data, among these data, this shown sweep measuring data(graph)
- 8) Note 2 shown standard levels, According to three units can convert by

dBm, dBuV, dBmV.

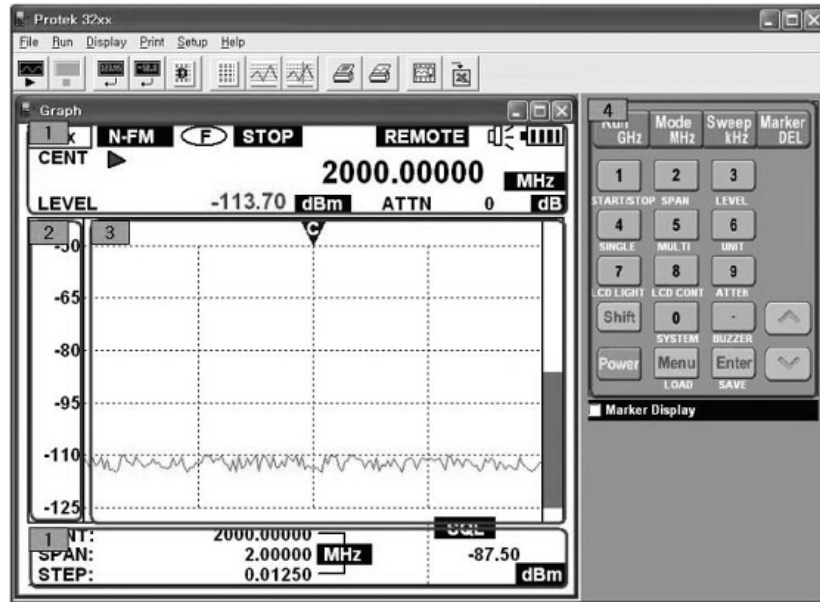


Figure 4.21. Keypad mode on graph window

- 9) Note 3 use GUI measuring instrument measure some data among these data, this shown sweep measuring data(graph).
- 10) Figure 4.21, note 4 as keypad mode, GUI measuring instrument similar with practical measuring instrument. In detail instruction refer to "3.2. The method of key button.
- 11) Figure 4.22, note 5 is the information of Marker. As mentioned before, in case of that "Marker Display" check box is checking and "Marker" list is selecting it is changed.
- 12) The Marker data on showing at the right bottom of Marker Display part is the frequency which user selects Marker (Max. 10 points), level value and difference(Delta) in None mode.
- 13) It is same as the data of executing Marker Display window selecting Display → Marker in the main menu. Refer the description "4.3.3. Marker"
- 14) Figure 4.22, note 5 user can get the information that they want using "ALL DEL", "Row Clear" and "DELTA". The "ALL DEL" button could delete all Markers (Max. 10 points) in None mode. The "Row Clear" button is used in case of that selected markers are only deleted

among the marker list. The “DELTA” is used when the difference value between the selected marker by reference and another among Marker list.

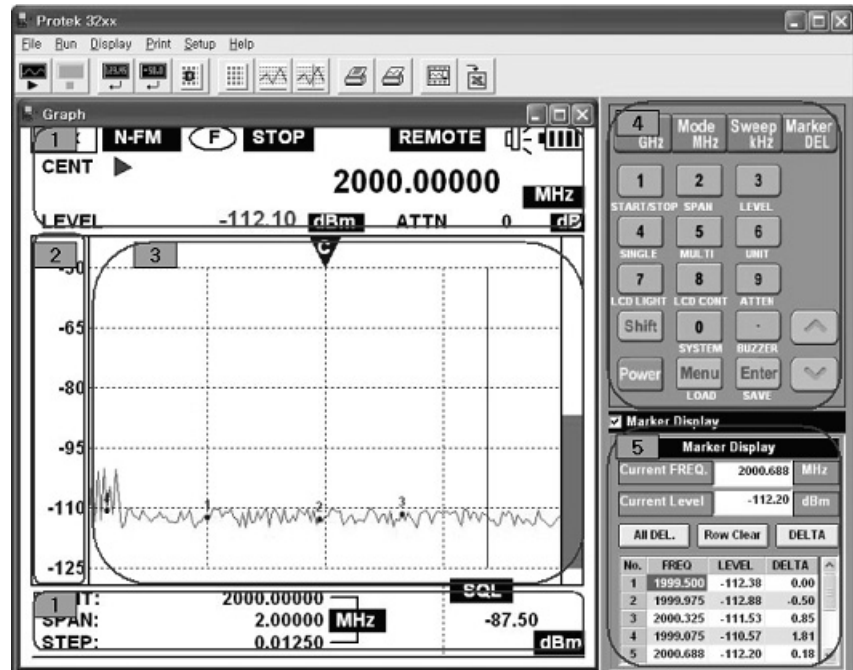


Figure 4.22. Information of Marker of Graph window

5. Communication Protocol

5.1. General

Protek 3200 Series equipment connects with pc for user convenience offer GUI software. For Protek 3200 Series equipment communicate with GUI software use communication protocol. Communication protocol describe at “5.communication protocol definition”. If user use this communication protocol make GUI software, can obtain and manage what user want measuring data.

5.2. Define Communication Protocol

For using communication protocol at first open GUI mode, If user use “GUI mode open “ open GUI mode then can use “keypad” communication protocol for using measuring instrument. User use “requesting data communication protocol” can receive measuring data also use that on LCD display window displayed graph information “requesting LCD” can receive and request graph data. For closing GUI mode use “GUI mode close” communication protocol normally close.

5.2.1. “GUI Mode Open” Protocol

- 1) “Command” is TX data that send to measuring instrument, “response” is RX data that send to pc.
- 2) “Respond” have two kinds of order. Generated fail, receiving didn’t stipulate communication protocol or didn’t open GUI except this receiving communication protocol then inform user.
- 3) Command : GUI@
- 4) OK Response : OK@
- 5) Fail Response : FA@

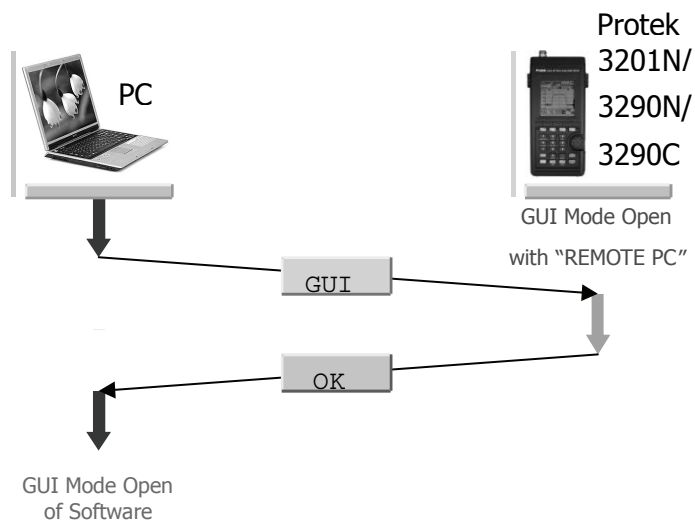


Figure 5.1. "GUI Mode Open" Protocol

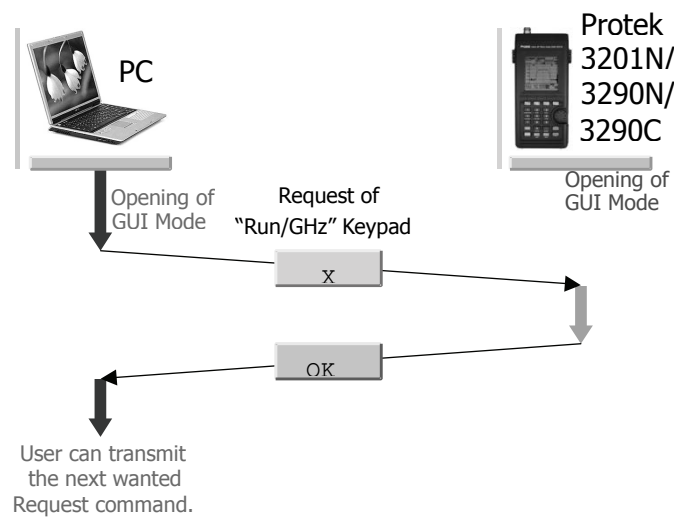


Figure 5.2. "Keypad" Protocol (example: "Run/GHz" Keypad)

5.2.2. “Key pad” Protocol

1) Offered GUI software, in this case, use keypad button remote control measuring instrument keypad. If user use Communication protocol it also can use at GUI software, response is same,

- | | | | |
|-------------------|---------|---|-----|
| 2) “Run/GHz” | Command | : | X |
| 3) “Mode/MHz” | Command | : | T |
| 4) “Sweep/kHz” | Command | : | Z |
| 5) “Marker/DEL” | Command | : | S |
| 6) “1” | Command | : | R |
| 7) “2” | Command | : | U |
| 8) “3” | Command | : | V |
| 9) “4” | Command | : | O |
| 10) “5” | Command | : | P |
| 11) “6” | Command | : | Q |
| 12) “7” | Command | : | K |
| 13) “8” | Command | : | L |
| 14) “9” | Command | : | M |
| 15) “0” | Command | : | H |
| 16) “Shift” | Command | : | G |
| 17) “.” | Command | : | I |
| 18) “Menu” | Command | : | B |
| 19) “Enter” | Command | : | D |
| 20) “Up” | Command | : | J |
| 21) “Down” | Command | : | E |
| 22) OK Response | | : | OK@ |
| 23) Fail Response | | : | FA@ |

5.2.3. “Setting of Center/Span frequency and Offset” Protocol

- 1) Using this protocol can appoint measuring instrument measuring range and measuring offset value. If user appoint Center frequency value and span frequency value, in this way can appoint frequency range. Unit is Hz.
 - 2) The initial offset value of Protek 3200 Series is "0". Following the user's measuring environment, the offset value will be applicable. From the length of wire cable or other equipment used, measuring value will be influenceable.
 - 3) The user can use the function of Protocol as below. Refer Figure 5.4.
 - 4) Freq. Range & Offset Setting Command
: y (Y small letter)
 - 5) OK Response : OK@
 - 6) Fail Response : FA@
 - 7) If display "OK message" on monitor, the user can input the center frequency and the span frequency. Unit is "Hz" for input frequency value and the user can input the letter within 10 letters. Also the unit is "dB" for Offset value and the user should input the letter within 5 letters following the structure of letter.
 - 8) For example, if the center frequency value is "824.5MHz", the span frequency value is "100MHz" and the offset value is "0dB" (The recommendation value), the input data will be converted as "0824500000", "0100000000" and "00000" so the user can transmit 082450000001000000000000@. No display response.
 - 9) Freq. Range & Offset : FREQ. RANGE & OFFSET@
 - 10) Response : None
- The user can set the Span value from 1MHz to 20MHz limited and from this range the user can set value per multiple 1MHz. For example, if the span frequency setting range is "12MHz", the user should the input the span frequency setting value as "12MHz".
 - If the span frequency setting range is over 21MHz, the user can set the span frequency range per multiple 20MHz. For example, if the desired span frequency range is 25MHz, the user can set the span frequency range to 40MHz and in case of 78MHz, the use can set the

span frequency range to 80MHz.

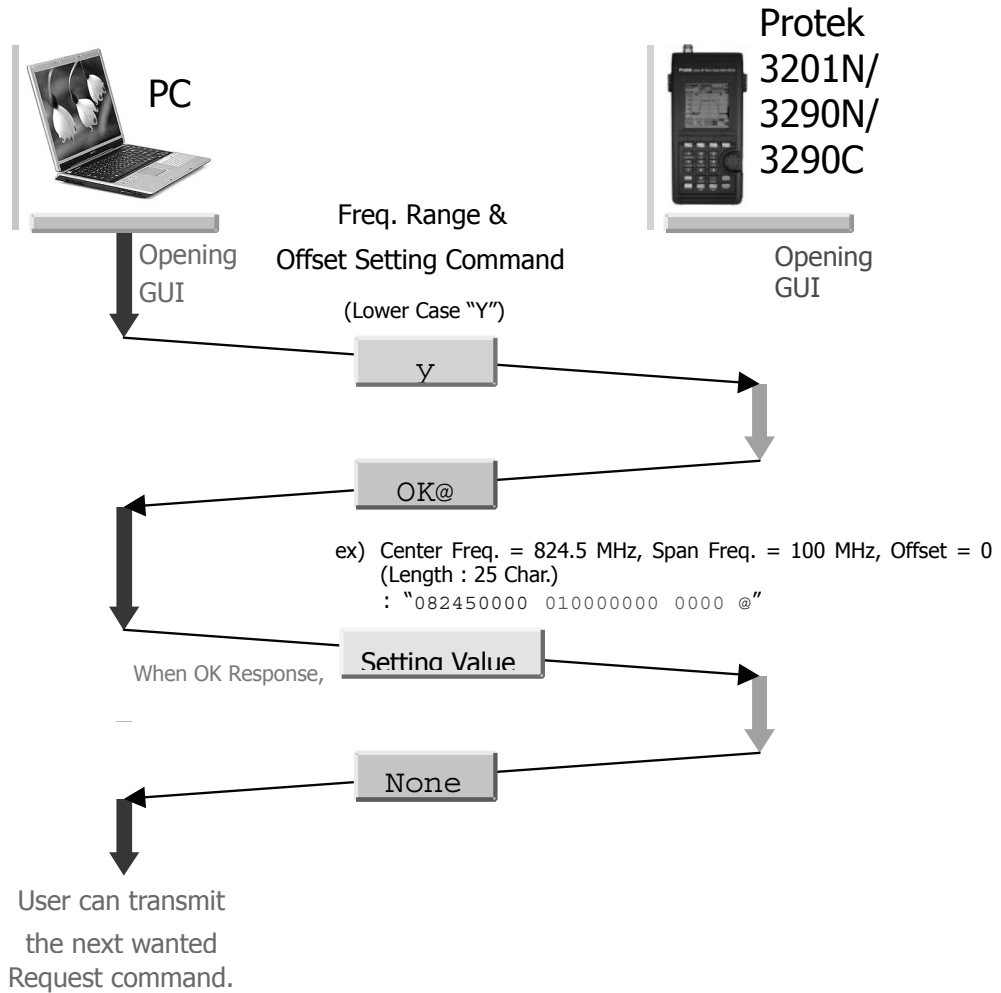


Figure 5.4. "Setting of Frequency range and Offset" Protocol

5.2.4. “Setting of Reference and Difference Level” Protocol

- 1) It's possible to set the reference level and difference level using protocol.
- 2) The important items which are already fixed the value by the level unit of the instrument are adapted as below.
 - a. dBm Unit : -50, -60, -70, -80, -90, -100, -110, -120
 - b. dBuV Unit : 60, 50, 40, 30, 20, 10, 0, -10
 - c. dBmV Unit : 0, -10, -20, -30, -40, -50, -60, -70
- 3) Also, the value of Difference Level is the difference between the axis of display graph and guide line. Without reference to level unit, it is selected one among system 5, 10, 15 and 20. The default is 15. For example, if the level unit is dBm and difference level is 15, the value of difference between level grids must be 15dBm.
- 4) The using of this communication protocol is as below and refers the Figure 5.5.
- 5) Reference Level & Difference Level Setting Command
: z (Z small letter)
- 6) OK Response : OK@
- 7) Fail Response : FA@
- 8) If the response is OK, the values of Reference Level and Difference Level must be inputted. The input level unit is applied with the present level unit and it is consist of the sign of reference level (+ or -), the value of reference level (3 letters) and the value of difference level (2 letters). After assigning the 6 letters, add the @ letter and then send them.
- 9) For example, if the value of reference level is -60dBm and the value of difference level is 15dBm with dBm unit, have to send “-06015”.
- 10) For another example, if the value of reference level is 50dBuV and the value of difference level is 10dBuV with dBuV unit, have to send “+05010”.
- 11) Freq. Range & Offset : REF. LEVEL & DIFFERENCE LEVEL @
- 12) Response : OK@

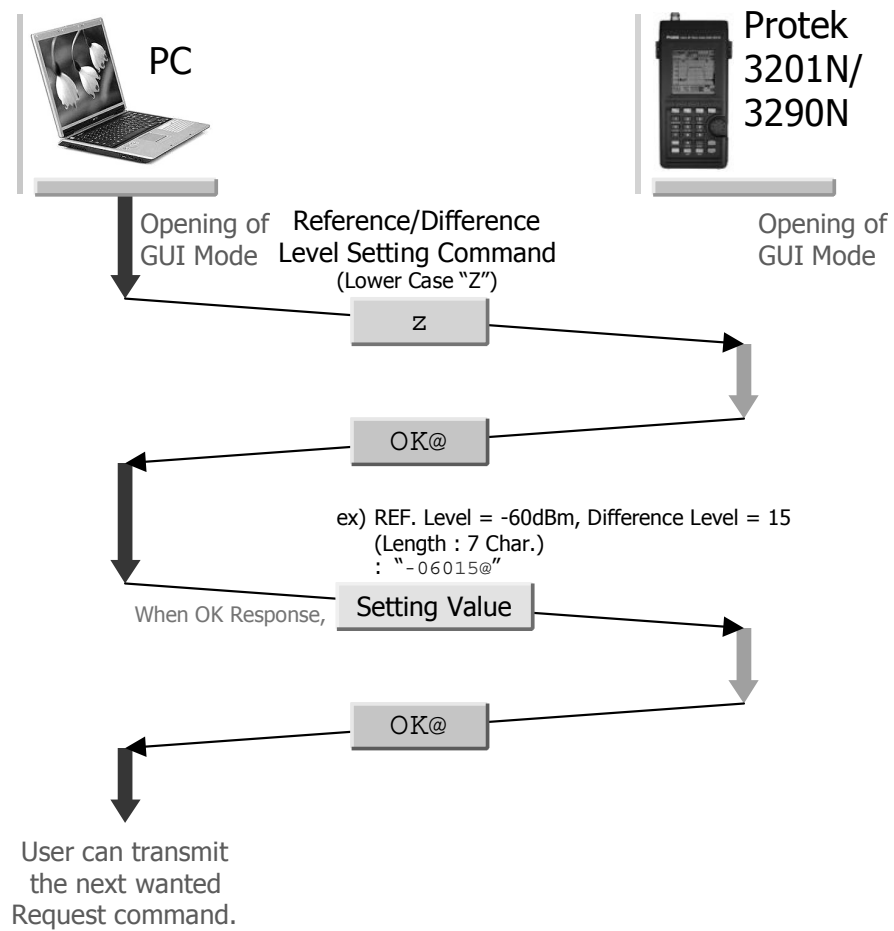


Figure 5.5. "Setting of Reference and Difference" Protocol

5.2.5. “Data Request” Protocol

- 1) Using this communication protocol, setup data of the unit and measuring data (Level value) are obtained. Setup data (Setting Data) received actually and characters of measuring data (Measured Level Data) are 1,050 characters. The indications of received information are “ , ”, the last contents also are “ and ”. Please refer more detail descriptions for received setting parameters in article 12).
- 2) As occasion require, user can received the setup data and measuring data severally. Both data are received at same time or one of them can be received. Refer the Figure 5.6.

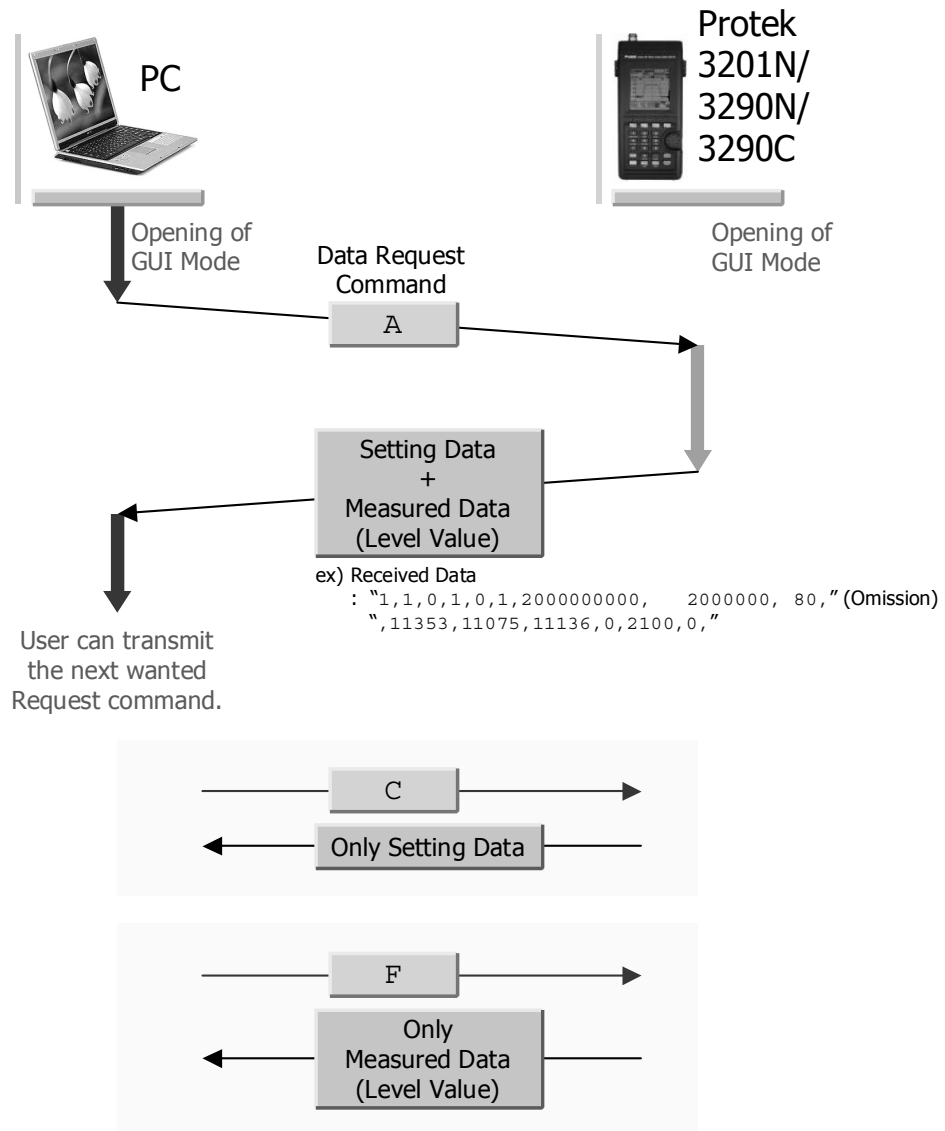


Figure 5.6. “Data Request” Protocol

3) The communication protocol to receive the setup and measuring data at same time is as below.

4) Data Request Command : A

5) Data Response : setup data and measuring data

6) The communication protocol to receive the setup data is as below.

7) Data Request Command : C

8) Data Response : setup data

9) The communication protocol to receive the measuring data is as below.

10) Data Request Command : F

11) Data Response : measuring data

12) The basic forms are arranged such as “the first setup data”, “measuring data” and “the second setup data”.

13) The reception sequence and contents of the first setup data are as below and the values of each item use “ , ”. If there is no value, only show the “ ”(Space). This part is different of “5.2.3. “Frequency range and Offset setting communication protocol””.

d. Mode : 1 (N-FM),
2 (W-FM),
3 (SSB),
4 (AM)

e. Sweep Mode : 1 (Free Run),
2 (Squelch Run)
3 (Single Run)

f. Run Mode : 0 (Stop),
1 (Run)

g. Marker Mode : 0 (None),
1 (Marker1 Mode)
2 (Marker2 or Delta Marker Mode)
3 (Squelch Marker Mode)

h. Buzzer Mode : 0 (Buzzer OFF),
1 (Buzzer ON)

- i. Unit : 1 (dBm),
2 (dBuV),
3 (dBmV)
- j. Center frequency : 10 characters are basic and the unit is "Hz".

Ex) in case of 824.5MHz, the center frequency is "824500000".

- k. Span frequency : It is same as information of Center frequency. Also the unit is "Hz".

Ex) In case of 100MHz, the Center frequency is "100000000".

- l. Marker1 Position : It is the value to indicate the position of the frequency range on Marker1. The measuring positions of frequency range are 161 points and the value is from "0" to "160". For example, if the position is on center frequency, the value will be "80".

- m. Marker2 Position : It is the value to indicate the position of the frequency range on Marker2.
It is same as "Marker1 Position".

- n. Squelch : It indicates the rate of Squelch Bar(%). For example, if the display level is -50dB to -125dB, the 50% means -87.5dB and displayed value is "50".

- o. Reference Level : It uses dBm unit by the value of reference level in default. The default is -50dBm.
In the default, the reference level shows "-50". When the units are changed, the level will be changed by the units.

- p. Difference Level : It is the interval value between the upper and lower line. The default is 15dB and from -50dB to -125dB, it can be set by 15dB and the “15” will be showed on the screen.
- q. Frequency setting Mode: 0(On Center/Span frequency display)
- r. 1 (On Start/Stop frequency display)
- s. Internal ATTEN : It's for using internal ATTEN and the default is 0dB. The setting value is 0, 10, 20, 30 and 35d. For example, if 10dB is set, the display will be showed “1000” (5 letters). The displayed value is 10 times of real level value.
- t. External ATTEN : It's for using the external ATTEN and the default is 0dB. The setting level can be 0 to 100dB by 10db step.
- u. OFFSET : The default is 0dB and it is for setting the offset function. For example, if 2dB is set, the display will be showed “200”(5 letters). The setting value is 10 times of real offset value.

14) The data received straight is measuring data. This data is the level value for 161 points into the frequency range and in the frequency range, in case of the basic unit is dBm, if want to use real dBm value, divide the received value by -100. For example, if the received value is “11481”, the real level value will be -11.48dBm.

Even though the unit on the instrument is changed, the measuring data unit is always dBm. Therefore if the value of dBm is changed by dBuV, user must apply that formula $(\text{received value}/-100)+107$. when change into the dBmV unit, also must apply next formula $(\text{received value}/-100)+47$. Each received value is separated by “ , ”.

15) The received sequence and contents of the second setup data is same as below and the values of each item use “ , ”. If there is no value, only show the “ ”(Space).

- a. Shift icon : 0 (OFF; on display 7830 icon)
1 (ON; on display Shift icon)
- b. Menu Selection : It is received total 4 characters and 2 characters in front mean Menu and the rest characters mean sub menu. The information of Menu Selection is as Figure 5.6.
- c. Menu : It is displayed whether Menu is selected or not on the screen and in case of Menu is not selected, Sweep Mode is displayed.
0 (Sweep Mode)
1 (Select Main Menu)
2 (Select System Menu)

#Menu	Menu Name	1900	BAUD RATE	2400	LCD CONTRA
1100	FUNCTION	1901	115200BPS	2401	01STEP
1101	SPECTRUM	1902	57600BPS	2402	02STEP
1102	F.COUNTER	1903	38400BPS	2403	03STEP
		1904	19200BPS	2404	04STEP
		1905	9600BPS	2405	05STEP
		1906	4800BPS	2406	06STEP
1200	RECEP MODE			2407	07STEP
1201	N-FM	2000	CONNECT PC	2408	08STEP
1202	W-FM	2001	NONE	2409	09STEP
1203	SSB	2002	REMOTE PC	2410	10STEP
1204	AM				
1300	SWEEP MODE	2100	AUTO POWER	2500	INT. ATTEN
1301	FREE RUN	2101	NONE	2501	NONE
1302	SQUEL RUN	2102	05MINUTES	2502	10dB
1303	SINGLE RUN	2103	10MINUTES	2503	20dB
		2104	20MINUTES	2504	30dB
		2105	30MINUTES	2505	35dB
1400	MARKER	2200	BUZZER	2600	EXT. ATTEN
1401	NONE	2201	ON	2601	NONE
1402	MARKER	2202	OFF	2602	10dB
1403	DELTA MARKER			2603	20dB
1404	SQUEL MARKER	2300	LCD LIGHT	2604	30dB
1405	PK SEARCH	2301	ON	2605	40dB
1406	MKR 2 CENT	2302	OFF	2606	50dB
1407	CHAN POWER	2303	AUTO	2607	60dB
				2608	70dB
1500	SAVE			2609	80dB
1600	DELETE			2610	90dB
1700	LEVEL UNIT			2700	OFFSET
1701	dBm			2800	DEFAULTSAVE
1702	dBuV			2801	SAVE
1703	dBmV				
1800	RESET				
1801	PRESET				
1802	MEMORY CLR				
1803	SYSTEM INI				

Figure 5.7. Menu selection Numbers

5.2.6. "Save File management" Protocol

- 1) This instrument has the save, load function and delete function of 100 files for measuring data and setup data. In GUI software, those functions are used on base PC for users to use easily.
- 2) Also, before the LOAD and DELETE functions is used, at first, please check the numbers of saved data files. "Save File name list request" is used to get the numbers of saved data file. After checking it, use the LOAD and DELETE functions.
- 3) The below Figure are showing the SAVE function protocol.

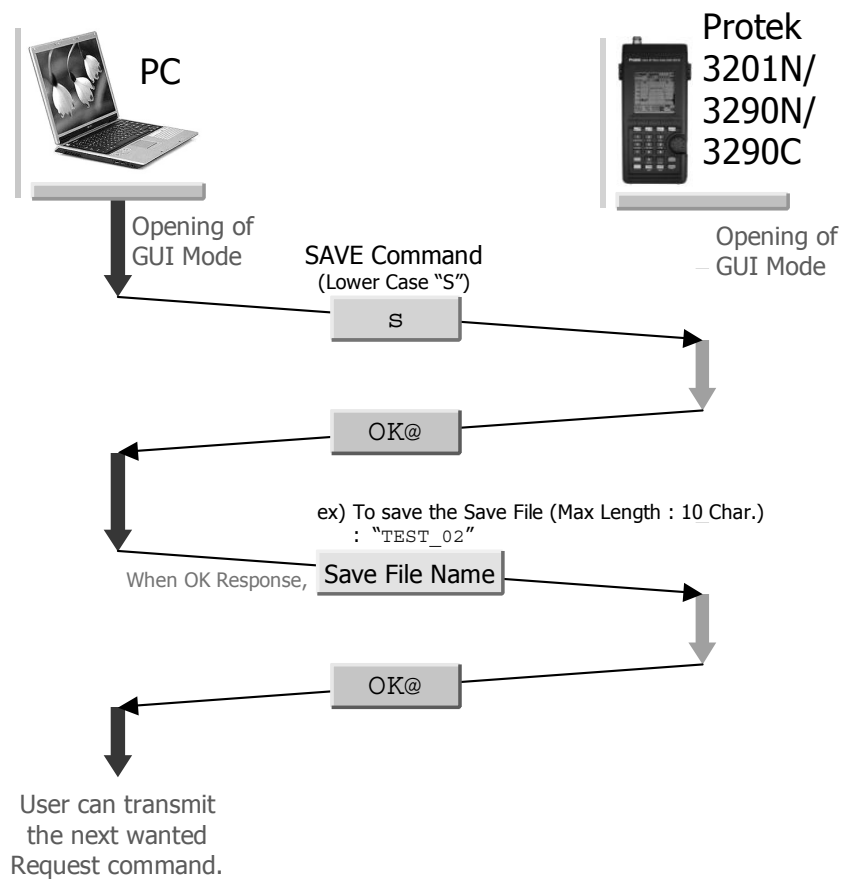


Figure 5.8. "SAVE function" Protocol

- | | | | |
|------------------|---|-----|------------------|
| 4) SAVE Command | : | s | (S small letter) |
| 5) OK Response | : | OK@ | |
| 6) Fail Response | : | FA@ | |

- 7) If the message of OK@ is received, total letters are 11 and first 10 letters are consisting only alphabet and numeral. The last letter must be "@". For example, if the name of saved file is SAVE_01, send "SAVE_01@".
- 8) File Name : STRING@
- 9) OK Response : OK@
- 10) Fail Response : FA@

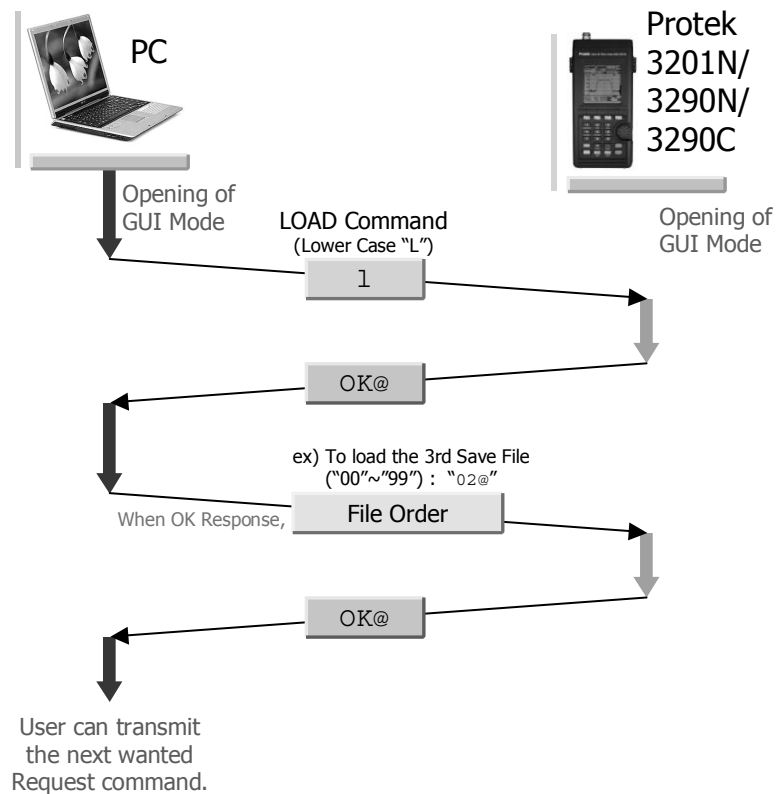


Figure 5.9. "LOAD function" Protocol

- 11) The using of LOAD function is as below.
- 12) SAVE Command : l (L small letter)
- 13) OK Response : OK@
- 14) Fail Response : FA@
- 15) After received OK, must assign the Save File to recall at saved file list (Max. 100 lists). And then send the numbers from "00" to "99" with @. For example, when recalled the 3rd Save File, send "02@".

- 16) File List Number : NUMBER@
 17) OK Response : OK@
 18) Fail Response : FA@

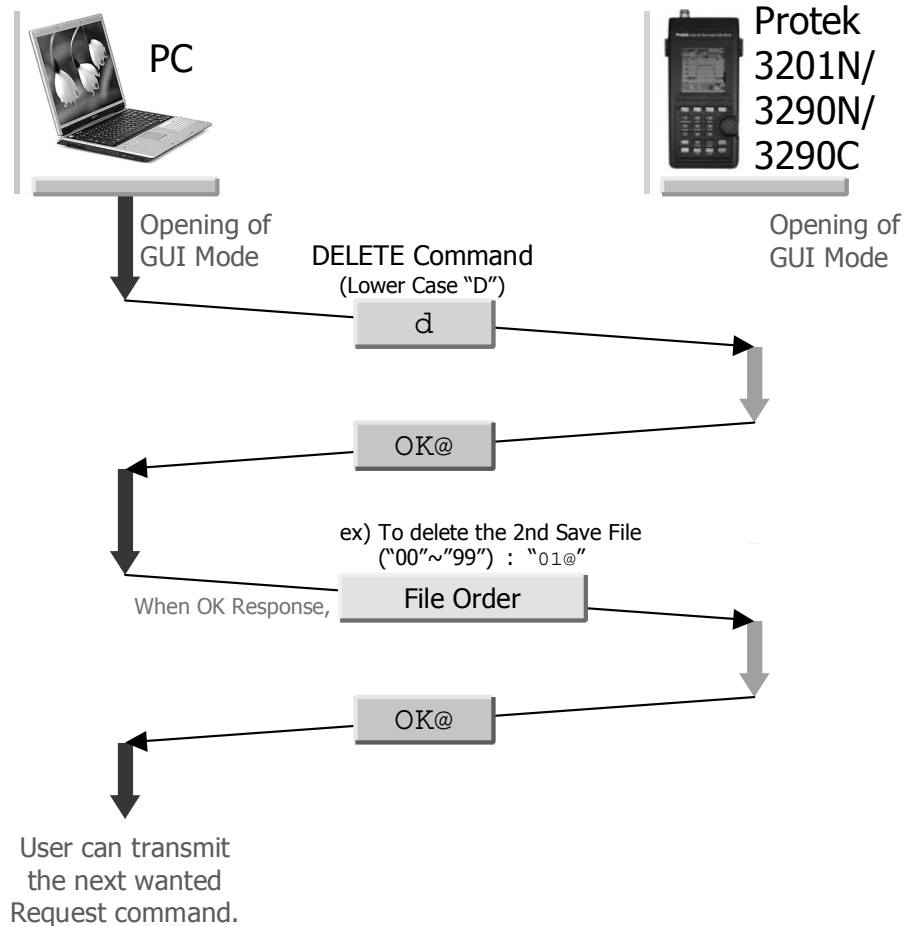


Figure 5.10. "DELETE Function" Communication Protocol

19) The using of DELETE function is as below.

- 20) SAVE Command : d (D small letter)
 21) OK Response : OK@
 22) Fail Response : FA@

23) After received OK, must assign the Save File to recall at saved file list (Max. 100 lists). And then send the numbers from "00" to "99" with @. For example, when recalled the 2nd Save File, send "01@".

- 24) File List Number : NUMBER@
 25) OK Response : OK@

27) The one of protocols which is “Save File Name List Request” is as below. Please refer the 2) for more detail description.



29) File Name List Response : Save File Name List

31) For example, if the saved files are 3 which are "RF_TEST_01"(consist of 10 letters), "TEST_02"(consist of 7 letters) and "ETC_0721"(consist of 8 letters), the response are

32) The number of File name is 10 characters and total file is 100. Therefore, the number of file name will be 1,000 including the space letter and the “,” letter is using after file name. So 1,100 letters are received totally.

5.2.7. “LCD Request” Protocol

- 1) The data of displayed graph on the instrument can be asked or received. Those data are mono pixel data and user can use this received data to save or use by bitmap data of GUI software. Refer Figure 5.12.
- 2) Command : N
- 3) OK Response : received LCD (Graph) data
refer Figure 5.12 if need more detail description.
- 4) Fail Response : FA@

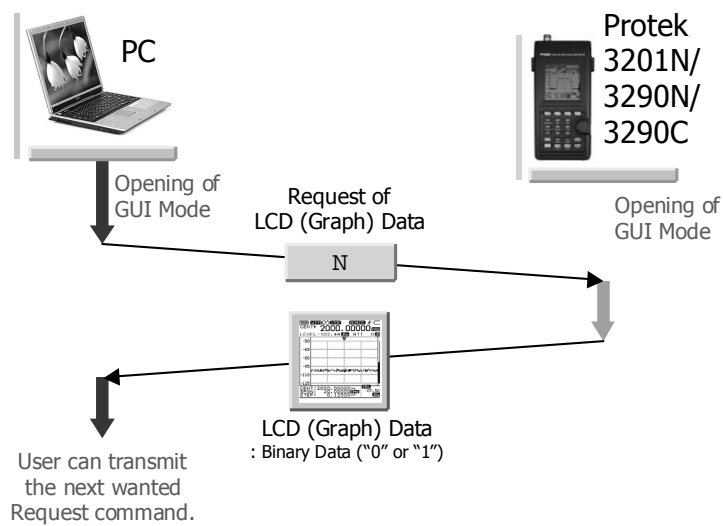


Figure 5.12. “LCD Request” Protocol

[LCD (Graph) Data to be Received]

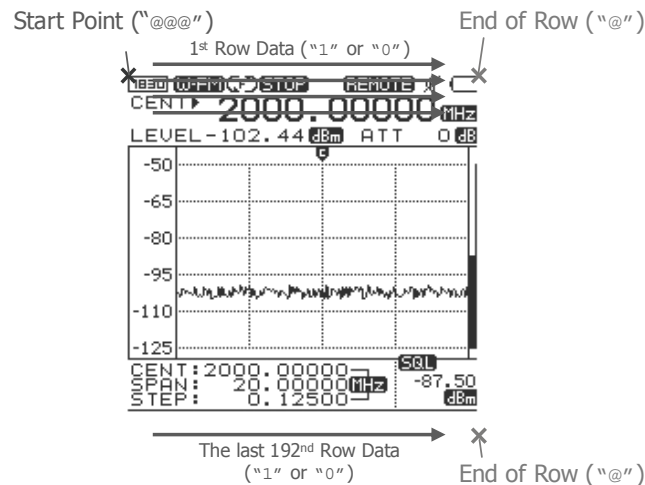
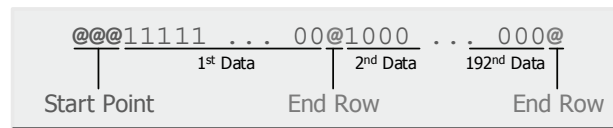


Figure 5.13. LCD (Graph) Reception data

5.2.8. "SINGLE or MULTI BAR Change" Protocol

- 1) When user wants to display the SINGLE or MULTI BAR on the LCD display of equipment, this protocol is used.
- 2) The same instructions is used in SINGLE and MULTI BAR protocol. Totally 9 bars on LCD screen could displayed by inputting the values.
- 3) When inputting two bars more, at first select any position among 9 multi bars, must keep the rule of 10 letters and resting values must place with "0".
- 4) When display the SINGLE BAR, the fifth value keep the rule of 10 letters and resting values place with "0".
- 5) Command : m (small letter of M)
- 6) OK Response : ok@
- 7) Fail Response : FA@
- 8) If there is OK Response, by the rule of 10 letters, when 2GHz is

assigned with BAR at this communication protocol, it will be "2000000000". After fixed the frequency, place the @ and if not displayed among 9 bars, after fixed with "0" and then transmits the @.

- 9) OK Response : OK@
- 10) Fail Response : FA@

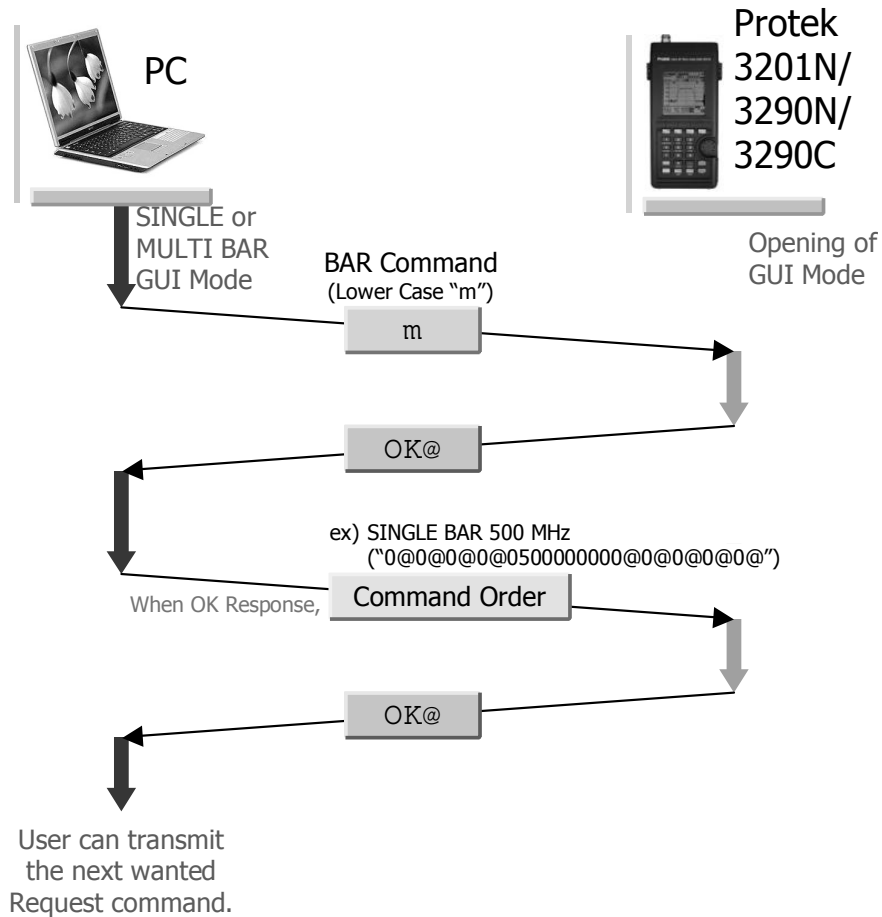


Figure 5.14. "SINGLE or MULTI BAR" Protocol

5.2.9. "GUI Mode Close" Protocol

- 1) Using the "GUI Mode Open", after opening the GUI mode, when closing it again, this protocol is using. Refer Figure 5.14. At first GUI mode is closed and then open the GUI mode again. The "GUI Mode Open" is used.
- 2) Command : W

- 3) OK Response : OK@
- 4) Fail Response : FA@

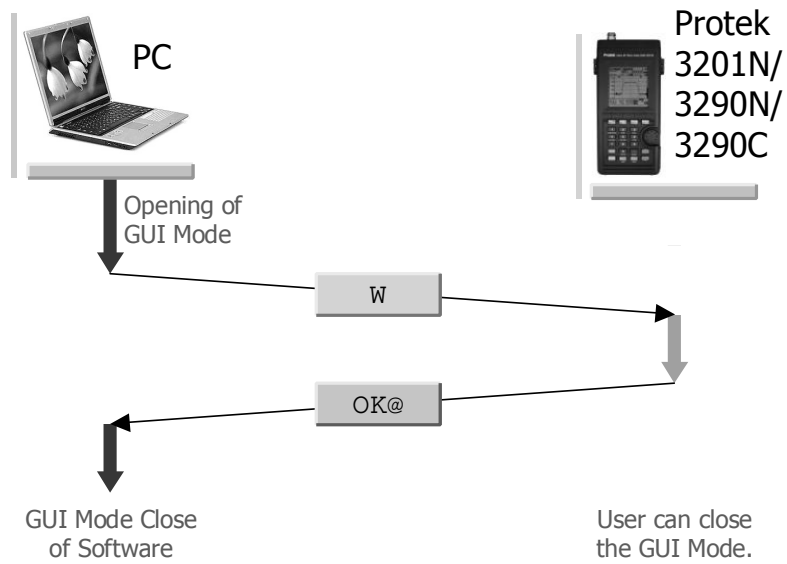


Figure 5.15. “GUI Mode Close” Protocol

6. Firmware Upgrade

6.1. General

Protek 3200 Series have more convenient functions for user. That is firmware upgrade function for user to download and update the firmware source directly. If we make new powerful function for users we will support it by our internet side on download.

When users make the unit to be upgrade directly, must be careful not to fail the update. If in case of that the firmware upgrade is failed, the instrument might get some problem and it have to be repaired at the A/S team.

6.2. Procedure of upgrading firmware

At first, download the "Protek7830_FW.exe" which is for updating software and updating source file on your PC from our website.

6.2.1. Prepare the Protek 3200 Series unit

- 1) After confirm the power of Protek 3200 Series is OFF,
- 2) Connecting the power line at right side of the unit offered SMPS type adaptor (DC12V, 3A) to supply the DC voltage to the unit.
- 3) And then connect the RS-232C cable between the port of the right side of unit and PC.
- 4) Turn on the power of Protek 3200 Series.
- 5) Push the "Menu" key on the keypad, the Main Menu message will be showed on the screen.
- 6) Select the "CONNECT PC" icon using the Up/Down key, and then press the "Enter" key.
- 7) "NONE" and "REMOTE PC" icon will be displayed. Using the Up/Down key, select the "REMOTE PC" and then press the "Enter" key.
- 8) The "REMOTE PC" message will be displayed on the middle of screen. That means it is ready to connect to the PC. That is, it means on GUI mode.

- 9) After then, run the firmware upgrading program you received from our website.

6.2.2. Firmware upgrading program

- 1) After doing the procedure as the chapter of “6.2.1. Prepare Protek 3200 Series unit”,
- 2) Click the “SA_FW.exe” twice to run this program as lower Figure 6.1.



Figure 6.1. Firmware upgrading program for Protek 3200 Series

- 3) To upgrade firmware, RS232C serial port which is COM Port on the program must be selected correctly. After running this program, the default is COM Port.
- 4) If “F/W mode error” message is displayed on the screen of PC, must reset the COM Port. Select the “ComPort Set” on the display. The window to set the COM Port will be run as like Figure 6.2.



Figure 6.2. The window to set COM Port

- 5) On the window to set COM Port, after selecting the “COM Port” and “Baud Rate”, press the “OK” button. After then, if the message of “F/W mode error” is not displayed, the COM Port is setting correctly and it means ready to download the source file.
- 6) Select the prepared source file from your PC pressing the Select icon.

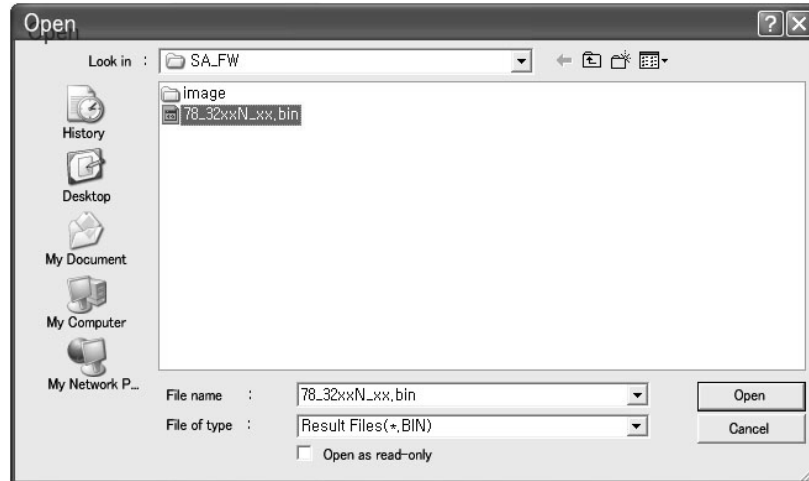


Figure 6.3. The window to select source file

- 7) After pressing the button of “Select”, the window to select the source file will be activity as like Figure 6.3.
- 8) After selecting the source file, press the Open button or click the source file twice and then the source file will be downloaded into the unit automatically as like Figure 6.4.
- 9) During the download, left the unit and the PC until the working is finishing. During working, if the PC is using another program, the unit can take wrong data. In case of that, the unit makes wrong operating after upgrading the source file.
- 10) As upper articles 8) and 9), during the download, displayed messages are changing like that “REMOTE PC” → “F/W UPGRADE” → “BUFFER SAVING” → “ON WRITING . . .” in sequence.



Figure 6.4. During running the download of source file



Figure 6.5. Finish the download of source file

- 11) After about 4 or 5 minutes, the message of "F/W Update Success!!!" will be showing on the screen.
- 12) After finish the update, the message of "ON WRITING . . ." is changed with "UPGRADE SUCCESS" on the screen of the unit.
- 13) All procedures are finished and then put off the power of the unit to disconnect the unit from the PC.
- 14) That is all to update the source file. From now, the Protek 3200 Series will accept new version of firmware.