

TS440 Remote Controller

User manual

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1 Introduction

TS440 Remote Controller is a software designed to remotely control the Kenwood TS-440 by means of a Personal Computer. This user manual explains working criteria of the program.

1.1 Scope of the program and working criteria

It is important to underline the “philosophy” behind the program. The main scope was the implementation of a robust and reliable tool to manage the transceiver, without the physical presence close to it. A typical application could be the installation of the transceiver and a dedicated PC in a room immediately under the roof, with the possibility to fully control it from a first-floor room.

For this reason the program has been designed in order to make it as robust and reliable as possible: after have sent any command to the transceiver, the program typically asks the TS-440 in order to have confirmation about the real execution of the command just sent. Moreover a monitor window has been included, in order to keep an eye on strings coming from the transceiver and sent from the Personal Computer.

There are no advanced tool for memory channel management. (e.g. the possibility to keep stored on the HD a set of memory banks to be loaded onto the 100 memories bank in the TS-440).

1.2 Disclaimer

The *TS440 Remote Controller* program has been designed and implemented for amateur purposes only. It is distributed for free, with the inclusion of the source code. The author thanks in advance any people suggesting or proposing any fix or any improvement in general.

It is understood that users will use this software at their own risk. The author cannot guarantee the correctness of the program and cannot be kept responsible for any kind of problem or loss or any kind of damages to user’s devices.

1.3 Hardware requirements

The communication between Personal Computer and TS-440 needs:

- The installation of a Kenwood kit named IC-10 (two integrated circuits μ **PD8251AFC** and **TC4040BP**) needed to enable the serial data transmission through the **ACC1** port on the rear panel of the TS-440. It is possible to find those ICs on the market without buying the IC-10 kit, and install them following directions included in the User Guide of the Kenwood TS-440 transceiver.
- The use of a RS232-TTL converter to be installed between the serial COM of the Personal Computer and the serial ACC1 on the TS-440. Such device translates RS232 logical levels used by the serial port of the personal Computer in TTL logical levels, understood by the ACC port and vice versa. Kenwood puts on the market a product called **IF232C**, however it is possible to find a scheme to home-made such device using, for instance, a MAX232 or a couple of MC1488/MC1489. Please note that it is suggested to use opto-electronic devices

for the translation, in order to physically separate the PC from the RTX, with the aim of avoiding problems of RF feedbacks.

1.4 Working and development environment

Please refer to the following picture for working environment:

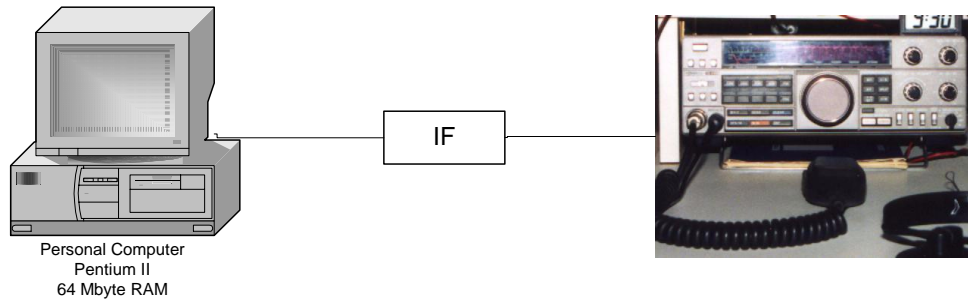


figure 1 - Development and testing conditions

- Personal Computer
 - ❑ Processor Pentium II
 - ❑ Operative System Microsoft Windows 98
 - ❑ RAM Memory 64Mbyte
 - ❑ 1 Serial Port COM 1, 9 pin connector
 - ❑ Screen 1024x768
- Home made interface converter (IF in picture)
 - ❑ IF converter based on MC1488/MC1489
 - ❑ External dual power +12V GND -12V
- RTX Kenwood TS-440S-AT
 - ❑ Equipped with μ PD8251AFC e TC4040BP
 - ❑ Parameters of ACC1 serial port: Full Duplex, 4800bps, Start-Stop (Asynchronous), 1 Start bit, 8 Character bits, 2 Stop bits, parity None.

PIN	Segnale	Descrizione
1	GND	Signal Ground
2	\overline{TXD}	Transmit Data (logically denied)
3	\overline{RXD}	Receive Data (logically denied)
4	CTS	Transmit Enable
5	RTS	Receive Enable
6	N/C	Not connected

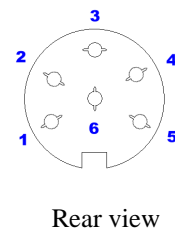


figure 2 - ACC1 pin layout

Notes:

- In the above mentioned environment, I experienced no problems when the transceiver was in RX, on the other hand I found very heavy RF feedbacks when the transceiver was in TX mode. It is therefore mandatory to use a good quality interface converter.
- The program has been developed for the Kenwood model TS 440. However is not excluded that it may work, even partially, with other transceivers/receivers of the same brand.

- The program is based on the Kenwood proprietary serial protocol whose parameters are described in the Kenwood IC-10 kit instruction manual.
- The Personal Computer used in program development and testing was equipped with a single serial port, named COM1. The program allows the user to select the desired communication port among COM1, 2, 3, 4. However such features have not been tested.

2 The program: graphic interface and features

The graphic user interface (GUI) is shown below. For a world-wide use, menus and commands are in English language. Two user manual versions have been prepared, the present one , in English and a further version in author's mother tongue: Italian.

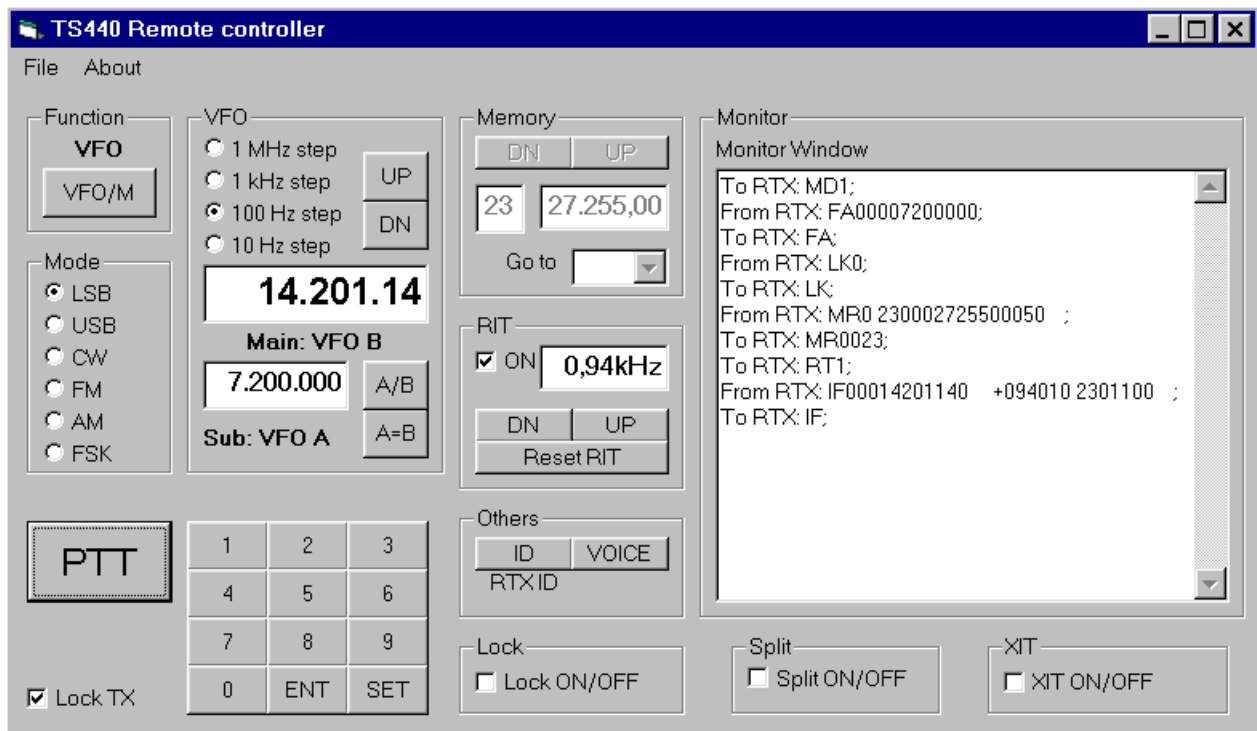


figure 3 - Graphic User Interface

The figure 3 shows the main panel. It is the only window of the program.

2.1 Working criteria

Once launched the program, the working logic is:

- **PC - TS440 link enabling:** first of all it is needed to enable the desired serial communication port. Please refer to menu File. After the port has been open, the program asks the transceiver for all needed parameters to set-up the panel. In a second, all needed parameters are loaded and the user may begin to use the program.
- **Regular working :** Once linked, it is possible to perform a large set of commands onto the transceiver, without touch it. Please refer to section 2.2 for a detailed view of possible features.
- **Link closing:** After the regular use, it is suggested to close the serial link with the TS-440.
- **Exit:** The menu **File/Exit** exits the program. Before exiting, the software automatically closes the serial communication port, if open.

2.2 Menus, Controls and Groups of Controls

Please refer to the following sections for a detailed explanation of menus, controls and groups of controls onto the main program panel.

2.2.1 Menus

The menu **File** allows the following actions:

- **Open COM 1:** Enables the serial port COM 1 to connect with the TS-440 and loads from the transceiver the needed parameters to set-up the panel.
- **Open COM 2:** Enables the serial port COM 2 to connect with the TS-440 and loads from the transceiver the needed parameters to set-up the panel.
- **Open COM 3:** Enables the serial port COM 3 to connect with the TS-440 and loads from the transceiver the needed parameters to set-up the panel.
- **Open COM 4:** Enables the serial port COM 4 to connect with the TS-440 and loads from the transceiver the needed parameters to set-up the panel.
- **Close Serial Port:** Disables the currently used serial port.
- **Exit:** Exits the program. If the serial port currently used for the link to the transceiver is still open, it closes it.

The menu **About** shows an “info” window. If the users attempts to open a serial port already open, a warning message is shown.

2.2.2 Frame “Function”



figure 4 - Frame "Function"

The **frame “Function”** contains a button VFO/M to be used to switch the status of the transceiver from the mode VFO to the mode MEMORY and vice versa. The label immediately above the button shows the current status of the TS-440. When the transceiver is in VFO mode, the **frame Memory** is disabled (see 2.2.5). On the other hand, when the transceiver is in Memory Mode the **frame VFO** (see 2.2.3) is disabled, as well as further features (e.g. the possibility to input a desired frequency by means of the numeric keypad (see 2.2.13)).

2.2.3 Frame “VFO”

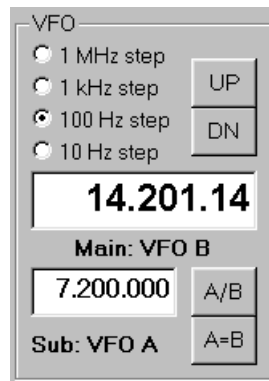


figure 5 - Frame "VFO"

The **Frame “VFO”** includes:

- **Four option buttons** to select the desired frequency increment (or decrement) step by means of UP/DN buttons (see bullet below);
- Two **DN/UP buttons** to increment (UP) or decrement (DN) the current frequency shown on the main VFO panel (VFO A or VFO B).
- A **main VFO panel** indicating the frequency of the VFO currently set-up as main VFO on the Kenwood TS-440. The label immediately below the main panel shows which VFO is currently set as main VFO on the transceiver. It is not possible to input digits in the panel (the panel is writing disabled), but the user may input the desired frequency by means of the numeric keypad (2.2.13).
- A **secondary panel** indicating the frequency of the VFO currently set-up as SUB VFO on the Kenwood TS-440. The label immediately below the secondary panel shows which VFO is currently set as SUB VFO on the transceiver. Please note that the TS-440 does not indicate the SUB frequency on its embedded display. It is not possible to input digits in the secondary panel (the panel is writing disabled).
- An **A/B button** to switch the status of the TS-440 relating to Main/Sub VFO. This software button has the same function of the A/B key on the front panel of the TS-440.
- An **A=B button** to make the SUB VFO frequency equal to the main one. This software button has the same function of the A=B key on the front panel of the TS-440.

The sample above (figure 5) shows:

- On the TS-440, the main VFO is VFO B. The transceiver’s display indicates 14.201.14 MHz);
- On the TS-440, the SUB VFO is VFO A (There are no indications on SUB VFO frequency on the TS-440);
- Pushing software button “UP” (or “DN”), the main VFO frequency will be incremented (or decremented) of 100Hz;

2.2.4 Frame "Mode"



figure 6 - Frame "Mode"

The **frame "Mode"** contains a set of option buttons to select the desired mode. Please note that this frame may be affected by the use of other buttons/commands of the program. For instance, switching from VFO A to VFO B (please see A/B button in section 2.2.3) shall change the current mode if VFO B (the new main VFO) has a different mode from VFO A.

2.2.5 Frame "Memory"

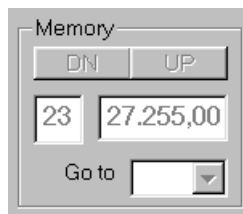


figure 7 - Frame "Memory"

The **frame "Memory"** contains:

- A **panel** indicating the current memory channel on the TS-440. The panel is writing disabled;
- A **panel** indicating the frequency of the current channel on the TS-440. The panel is writing disabled;
- Two **DN/UP buttons** to increment (UP) or decrement (DN) the memory channel;
- A **Combo Box** with a 00-99 list to have direct access to the desired channel memory, avoiding the multiple use of UP/DN buttons.

When the user asks for an empty memory (by means of the DN/UP keys or the Combo box tool) a warning windows is proposed. Empty memories cannot be accessed. If the program is launched while the TS-440 is set in Memory Mode and the current memory channel is empty, the relevant memory frequency panel is set to 0,00. The memory channel panel remains empty.

In the sample pictures above (figure 3 and figure 7) the TS-440 is set on VFO mode. For this reason the Memory panel is disabled. However the current channel memory (23) and the relevant frequency (27.255,00 khz) are shown. However there is no indication about the channel memory mode.

2.2.6 Frame "RIT"

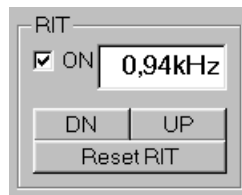


figure 8 - Frame "RIT"

The **frame "RIT"** contains:

- A **Check Box** named "ON" by means of which the user may enable or disable the RIT function on the transceiver.
- A **panel** indicating the current RIT frequency in kHz on the TS-440. The panel is writing disabled;
- Two **DN/UP buttons** to increment (UP) or decrement (DN) the RIT frequency. The increment (decrement) step is fixed and set to 0,01 kHz;
- A **RESET button** to be used to cancel (set to 0) the RIT frequency.

2.2.7 Frame "Others"

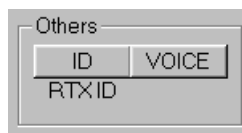


figure 9 - Frame "Others"

The **frame Others** contains:

- An **ID button** to ask the radio for an ID code. The string coming back from the connected device is interpreted and the relevant label, immediately below the key is set to "TS-440" or "R-5000", depending on the device being asked. No tests have been made with different Kenwood equipment;
- A **VOICE button** to ask for voice confirmation. This software button has the same function of the VOICE key on the front panel of the TS-440.

2.2.8 Frame "Lock"

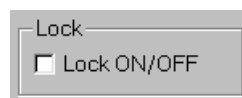


figure 10 - Frame "Lock"

The **frame "Lock"** contains a Check Box to be used to enable or disable the "frequency lock" function. This software button has the same function of the LOCK key on the front panel of the TS-440. This Check Box is automatically set-up at the program launch on the basis of the current status on the TS-440.

2.2.9 Frame “Split”

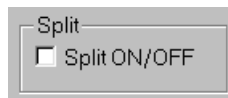


figure 11 - Frame "Split"

The **frame “Split”** contains a Check Box to be used to enable or disable the “Split” function. This software button has the same function of the SPLIT key on the front panel of the TS-440. This Check Box is automatically set-up at the program launch on the basis of the current status on the TS-440.

2.2.10 Frame “XIT”

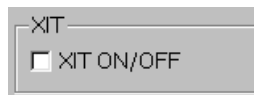


figure 12 - Frame "XIT"

The **frame “XIT”** contains a Check Box to be used to enable or disable the “XIT” function. This software button has the same function of the XIT key on the front panel of the TS-440. This Check Box is automatically set-up at the program launch on the basis of the current status on the TS-440.

2.2.11 Frame “Monitor”

The **frame “Monitor”** contains a window reporting command strings coming from (presented with the label **From RTX**) and going to (presented with the label **To RTX**) the transceiver. The scope of the windows is to put the user in the condition to keep an eye on the strings exchanged between the Personal Computer and the Transceiver.

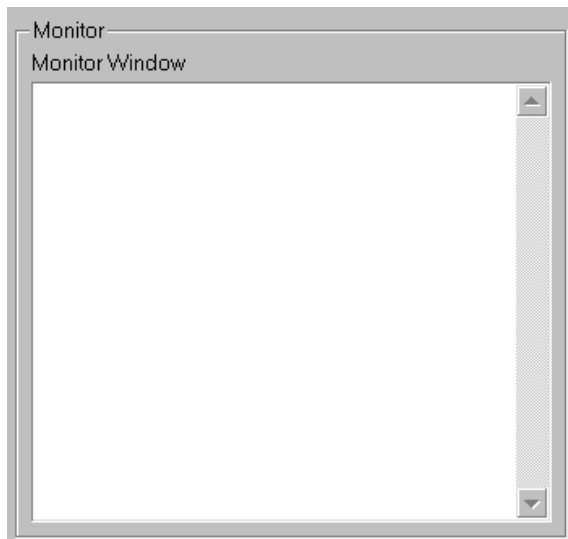


figure 13 – Frame "Monitor"

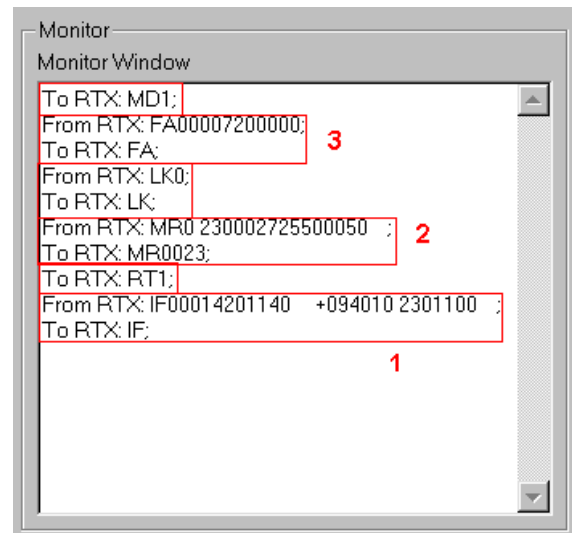


figure 14 – Example of exchanged strings

The strings are intercepted on the serial port and are reported on the window, starting from above. Old strings scroll below. Please refer to figure 14 for a typical program start-up sequence. In this picture, highlighted commands, beginning from below (older commands) to above (newer commands), are briefly explained below:

1. The PC asks the TS-440 sending the “IF” (Information)¹ command. The TS-440 answers back with a complex string with a lot of information, including the main VFO frequency in Hz (00014201140), the RIT frequency in Hz (+0940) and several other info;
2. The PC asks the TS-440 sending the “MR” (Memory Read) command attaching several parameters including the channel memori ID (23). The TS-440 answers back with a string containing the channel 23 frequency in Hz (00027255000), the current channel mode (5 stands for AM) and other info;
3. The PC asks the TS-440 sending the “FA” (VFO A) command. In this case the VFO A is set as SUB. The TS-440 answers back with a string containing the VFO A frequency in Hz (00007200000);

Please refer to the Kenwood IC-10 Instruction Manual to have a deep understanding of the proprietary serial communication protocol (commands/parameters).

2.2.12 PTT key



figure 15 - PTT key

The PTT key is used to put the transceiver in transmission. The PTT software key has to be pushed with the left key of the mouse:

PUSHING the left key of the mouse:

- The user puts the TS-440 in transmission mode;
- The “ON AIR” label lights.

RELEASING the left key of the mouse:

- The user puts the TS-440 in receiving mode;
- The “ON AIR” turns off.

A Check Box “Lock TX” prevents from an accidental pressing of the PTT key. The Check Box is set to “ON” at the program launch.

2.2.13 Numeric keypad



figure 16 - Numeric keypad

¹ The Kenwood proprietary communication protocol requires that all commands strings ends with “;”.

The **numeric keypad** is used to set on the main VFO the desired frequency. The keypad is enabled only when the TS-440 is in VFO mode (please see 2.2.3). To use the keypad correctly:

- Push the **SET** key. The main VFO panel empties;
- Insert the **desired frequency** by means of software, 0 to 9, keys. Please note that:
 - Inserting “0” as first digit does not have any effect;
 - It is possible to input few digits only, letting the program to complete the frequency value, adding the needed number of zeros. Please note that:
 - The program will complete figures starting with 1 or 2 in the range 10-19 e 20-29 MHz.
 - The program will complete figures starting with 3, 4, 5, 6, 7, 8, 9 in the range 3, 4, 5, 6, 7, 8, 9 MHz.
- Push the **ENT** key to load the frequency onto the TS-440.