The CW Machine Remote Option

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Introduction

The CW Machine Remote Option is an extension of the CW Machine Manager program which comes with the CW Machine. It allows you to use your CW Machine and your paddle or straight key to key a transmitter at another location, using an Internet connection.

Several different configurations are supported which are described in this document, and the choice of a particular setup is determined by the way you are keying your transmitter:

- It can be keyed by a second CW Machine device

- It can be keyed by UA9OV's CWType program

- It can be keyed using its own remote keyboard keying program, like e.g. the TenTec Omni VII
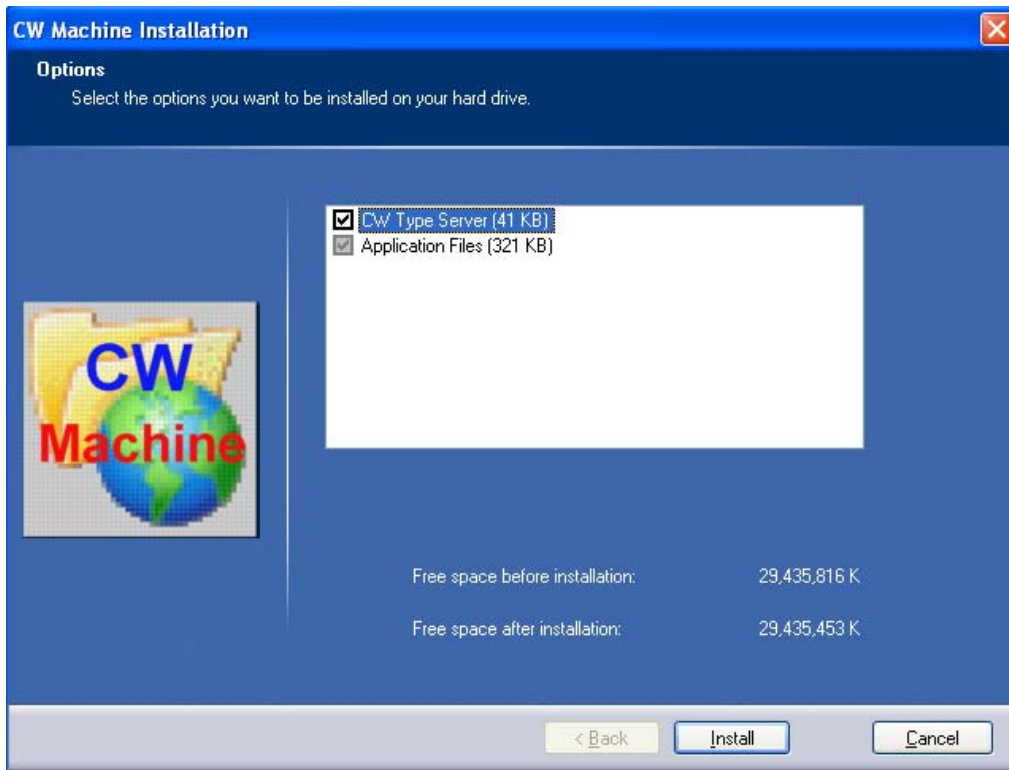
Installation

Installing the CW Machine Remote Option is straight forward, using an installation program that will put all the necessary files on your hard disk. Since it is an extension of the CW Machine Manager program, the installation will only proceed if an existing installation of the CW Machine Manager is found on your computer.

The installation process is self explanatory once you start the CWMSETUPRC.EXE program, and actually there are only two choices that you could potentially override:

- The installation program will ask for permission to update the CW Machine Manager to Version R (for Remote Control), which you should confirm:
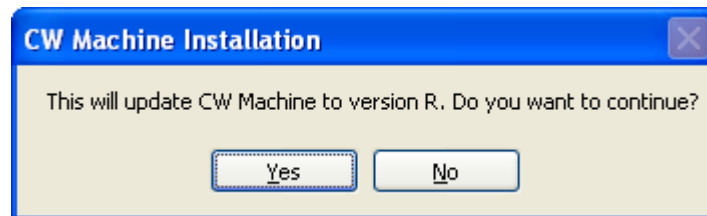
- if you are using CWType to key your transmitter, you have to select the *CW Type Server* option as shown in the next screen shot . If you select this option, **an icon to start the CW Type Server will be placed on your Windows desktop**.

The installation will also put a link to this document into the CW Machine
Manuals folder on your Windows desktop. After a successful installation, when
you start the CW Machine Manager, you will have the **Remote Control** button
on the Configuration screen, which lets you configure the options for remote
operation.
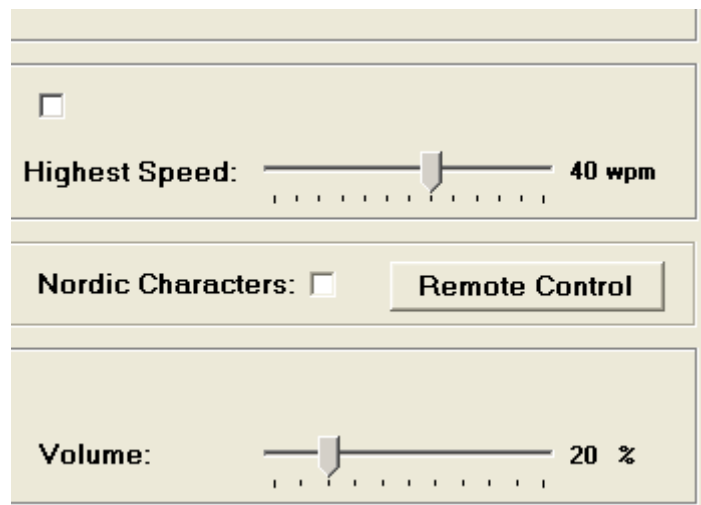
Configuration

Remote operation with the CW Machine always implies that at least one of the computers, at the transmitter site or at the remote site or both, has a CW Machine attached to it and is running the CW Machine Manager.

As shown above, after the installation of the Remote Control Option, there is a **_Remote Control_** button on the Configuration screen of the CW Machine Manager which gives you access to a screen that controls various settings for remote operation.

If you are running CW Type at your transmitter location you would not start the CW Machine Manager there, although it has to be installed. Instead you would install the Remote Control Option and check the **_CWType Server_** box during the installation, as shown above. This creates an icon on your desktop to start the CWType Server, which has its own configuration panel.

Using the CW Machine as a Remote CW Keyboard Keyer

This is the situation where you have a CW Machine attached to your radio, and you are at a remote location without a CW Machine. On the **Remote Control Configuration** screen, which is shown when you click on the **Remote Control** button in the Configuration screen of the CW Machine Manager, select the **Off** option:
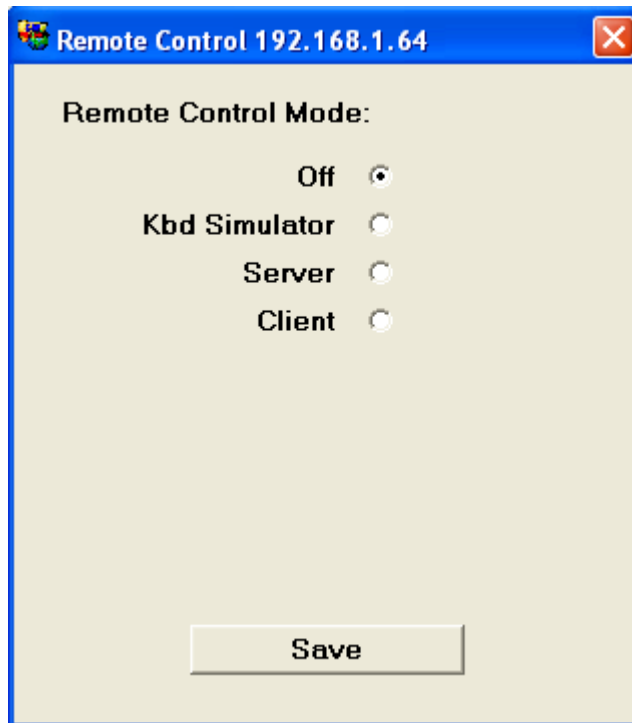

This is the default setting of the CW Machine Manager, and you need to click **Save** only if you have changed something on this screen before. For this scenario you actually don't need the Remote Control Option.

The Terminal screen of the CW Machine Manager supports a comfortable keyboard keyer function. If you perform remote operation of your radio by using a remote desktop package that lets you operate a Windows PC remotely, all you would do is to start the CW Machine Manager remotely on the PC at your transmitter location and use it via the remote desktop software. (An example of such a package is the Remote Desktop application built into Windows XP and Vista.) The speed slider on the Terminal screen lets you adjust the speed, and you just type in the text to be sent.

This is very similar to the type of operation that you could get from any CW keyboard program that somehow keys your radio, and it often is not a very satisfying experience because irregularities and delays in the communication link make for "choppy" CW, and, of course, you can't use your beloved Morse key but have to use the keyboard. The CW Machine Manager can do a lot better ….

Using the CW Machine as a Keyboard Simulator

This is the situation where you do not have a CW Machine attached to your radio, but your radio has some kind of CW keyboard program that you can see on a computer at a remote location, where you also have the CW Machine and your Morse key. **This function does not work with remote control software using RDP, like the remote desktop facility built into Windows XP and Vista. You have to use a remote keyboard program that uses the standard Windows keyboard driver.** A typical example for this type of operation is the OnePlug software package for the TenTec Omni VII. This radio has built-in Internet connectivity and does not even require a computer at the radio site for remote operation; all the functions that let you control your radio run on your remote computer. One of the functions of that package is a CW type window that lets you enter text to be sent via your keyboard. You could type text into that keyboard program, but you want to use your paddle or straight key and the CW Machine that you have with you at your remote location. This is what you would do: On the *Remote Control Configuration* screen, which is shown when you click on the *Remote Control* button in the Configuration screen of the CW Machine Manager, select the *Kdb Simulator* option:
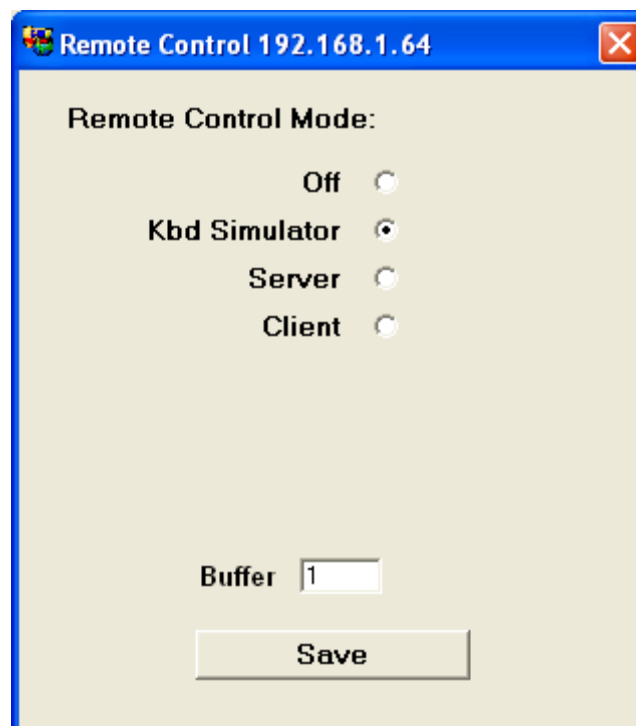
The *Buffer* value, a number from 0 thru 3, controls a mechanism which ensures that no gaps occur in the outgoing transmission. A value of **0** turns dynamic buffering **off**. A value of 1,2, or 3 makes the CW Machine Manager start "typing" after a brief delay, the higher the value the longer the delay, and it uses this head start to smooth out any gaps. The downside is that there is a delay before your

transmission starts when you are using your paddle. Normally you should leave buffering on with the lowest value that does not cause gaps in your transmission. But you can turn it off if minimizing a startup delay is more important to you than a smooth flow of the transmission. Messages that are invoked by keys on the numeric keypad always start immediately without a delay.

After selecting your buffering option, click the **Save** button on the **Remote Control Configuration** screen.

At the top of all CW Machine Manager screens you have the CW Machine logo with the globe. Click on that globe logo, and you should see **Kbd Simulator** appear right below **On the Air**.

Then bring the remote CW keyboard program to the foreground (in technical terms: it should have the focus, so that it accepts keyboard input). When you now create characters with your paddle or straight key, they will appear in the CW keyboard program just like if you had typed them in, and they will be sent out by your radio. You can also give the focus to some other program which accepts input from the keyboard, like Notepad or MS Word. Set the Buffer value to 0 to "type" your letters with your paddle, using the Shift keys on your keyboard, or Caps Lock, to control upper and lower case.

While you are in this mode, the CW Machine Manager will not accept keyboard input, even if you bring it into focus, which also means that you cannot use the numeric keypad on your Windows keyboard to invoke some functions of the CW Machine – you have to use a keypad that is directly attached to the CW Machine.

You can go back to "normal" operation of the CW Machine by clicking on the globe logo again, making the **Kbd Simulator** disappear.

When you go off the air by hitting the NumLock button on your keypad (**On the Air** disappears), the keyboard simulation will be inactive and no characters would be sent to your CW keyboard program. This allows you to perform the various functions on the CW Machine which you don't want to create a signal (like, e.g., entering a call that you want to check against the log in the CW Machine)

This type of remote operation has two issues that you have to be careful about. The CW Machine uses certain characters for prosigns and understands many

foreign language characters like the Spanish Ñ or the German Umlaut characters. In all probability your CW keyboard program will use different characters for the prosigns, and it may not know how to handle the national characters at all. The CW Machine will send a # for the prosign <sk>, while the TenTec Omni VII, e.g., uses a > for that purpose, and it knows none of the national characters.

These "language" differences can be solved by a translation table that the CW Machine Manager uses for the simulated keystrokes. The translation is contained in an ASCII file named **remote.txt** that you can create and modify with Notepad. It has to be located in the CW Machine directory. It has to contain one line for every character that <u>differs</u> in the CW Machine and your CW keyboard program, with each line showing the character that the CW Machine uses, a comma, and the character that the CW keyboard program uses.

As an example, if your CW keyboard program uses the character ">" to send <sk>, you would include the following line in the **remote.txt** file:

#,>

This tells the CW Machine Manager to send the keystroke for ">" whenever it receives a "#" from the CW Machine device.

Many CW keyboard programs do not support national characters and other special characters. To avoid any confusion, you can insert a few lines into **remote.txt** that will make the CW Machine Manager send a space instead. The line to send a space for the German Ü would be, e.g.:

Ü,   or just   **Ü**   (without the comma)

Or you could translate the Ü into a U:

Ü,U

The second issue is that the CW keyboard program and the keyer in your radio operate at a certain speed, while the CW Machine runs at the pace that is determined by the speed potentiometer. **You should always run the keyer in your radio at a slightly slower speed than your CW Machine to avoid "choppy" CW coming from your radio.** If the keyer in the radio runs too fast, the resulting CW would have improper spacing. If the keyer in your radio were running *much* slower than the CW Machine, you could eventually overflow its type-ahead buffer. The bottom line is that, whenever you adjust the speed on your CW Machine, you have to use the interface of your CW keyboard program or your radio to synchronize the two speeds. This is clearly not the most convenient situation, and the CW Machine Manager can do much better …

Using the CW Machine in a Client / Server Connection

This is a scenario where you control your radio with a remote desktop link and you either have two CW Machines, one at the remote site and one at the transmitter site, or one CW Machine (at the remote site) and the CW Type program (at the transmitter site).

The CW Machine Manager can operate in **Server mode (at the radio site)** and in **Client mode (at the remote site)**, and the two CW Machines can "talk" to each other directly over the Internet. In Client mode the CW Machine Manager can also "talk" to the **CW Type Server** that you may have installed at the radio location.

Setting up the CW Machine Manager for client-server operation is fairly simple, but a bit of background information may be helpful to clear up the jargon:
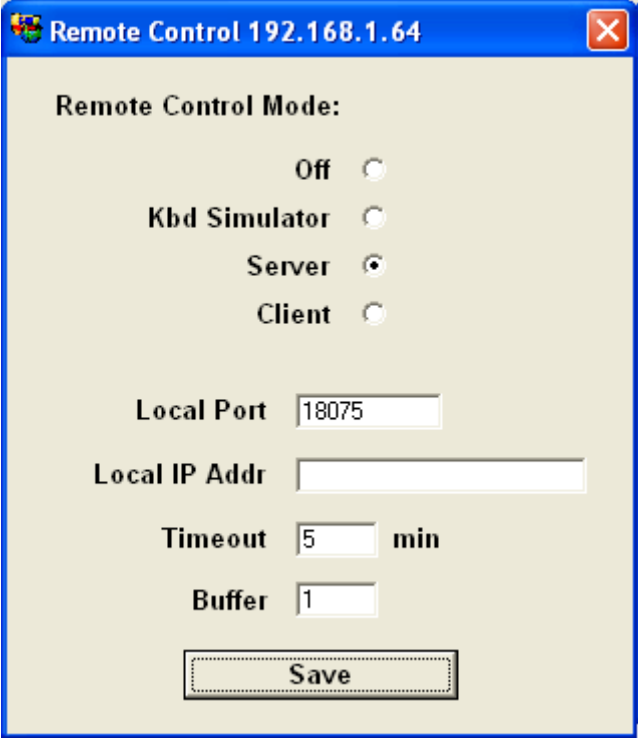
Servers, Clients, IP Addresses, and Ports in a Nutshell

A *Server* is a program that initially listens for incoming connection attempts by another program, the *Client*. Once a connection is established, the Server performs certain actions that the Client requests.

In order to establish a connection, the client needs to know the "phone number" of the server machine. This number has to be unique in the network, and, if the network is the Internet, it has to be unique in the world. That "phone number" is the *IP Address*. An IP address is a group of 4 numbers, each from 0 through 255, separated by decimal points. An example would be 64.233.167.147. These numbers are easy for computers, but hard to remember for humans, who much prefer www.google.com for that particular IP address. Therefore large networks like the Internet have the equivalent of telephone directories, called DNS servers, which translate a *symbolic address* like www.google.com into the "real" *numeric IP address*.

On a server machine you may have many Server programs for different applications, and each of them is identified by a unique number in that server machine, the *Port*. If a client knows the IP address for the server machine and the Port for the Server application, it can connect to the Server from anywhere within the network. There are some conventions and restrictions for the port numbers, and the CW Machine will let you select port numbers from **10000 through 49151**. The port number as such is not significant as long as no other application in that server machine is using it and potential Clients know it. The CW Machine Manager suggests 18074 as a default port number.

Setting up the CW Machine Server

Let's start with the Server side at the radio location. On the **Remote Control Configuration** screen, which is shown when you click on the **Remote Control** button in the Configuration screen of the CW Machine Manager, select the **Server** option:

As discussed in our networking primer, the **Local Port** has to be unique in this server machine, and you can specify any 5-digit port number less than 49152. Initially 18074 is suggested, and, if you have no other software on your machine using this port number, you can leave it at that.

The **Local IP Address** should usually be left blank. It is **only** for situations where your server machine has several protocol adapters with different IP addresses. If that is the case, you specify the IP address that should be bound to the port that the CW Machine Server uses. This has to be a numeric IP address. If the Local IP Address is left blank, the CW Machine Server will automatically use the IP address of the one and only protocol adapter in your machine, which is shown in the title bar of the screen.

The **Timeout** value is the number of minutes that the CW Machine Server will permit a Client to remain **inactive** before terminating the connection. If that

number is **0**, it will <u>never</u> be automatically terminated. Remember that there are times in a CW conversation where the other side is sending and you are not touching your Morse key for a while – you don't want the Timeout value to be so low that the Server terminates the connection while you are just listening. You can enter a number between 0 and 99, and, if you are unsure, you should just leave it at 0.

The *Buffer* value, a number from 0 thru 3, controls a mechanism which ensures that no gaps occur in the outgoing transmission. A value of **0** turns dynamic buffering **off**. A value of 1,2, or 3 makes the CW Machine Manager start the transmission after a brief delay, the higher the value the longer the delay, and it uses this head start to smooth out any gaps. The downside is that there is a delay before your transmission starts when you are using your paddle. Normally you should leave buffering on with the lowest value that does not cause gaps in your transmission. But you can turn it off if minimizing a startup delay is more important to you than a smooth flow of the transmission. Messages that are invoked by keys on the numeric keypad always start immediately without a delay.

When you are done, click the *Save* button on the *Remote Control Configuration* screen. You start the Server by clicking on the CW Machine logo with the globe, and you should see:

What you will probably see first, however, is a message from your Windows firewall telling you that the CW Machine Manager wants to access the Internet. You have to grant that permission, and then try again. The CW Machine Server is now listening for incoming CW Machine Client calls on the port that you specified (or left at 18074).

While in Server mode, the CW Machine Manager can be used locally at the radio site without restrictions, and it could even be used from a remote location as a keyboard keyer in the fashion described in the first scenario. But, of course, we want to use it with a "real" CW Machine Client out there.

An alternative to using a CW Machine and a CW Machine Manager running in Server mode at the radio location is using the CWType program and the CW Type Server described in the next section.

Setting up the CW Type Server

CWType is a popular CW program, written by UA9OV. Like with all computer programs of this kind, you need to build or buy an interface box that allows the program to key your transmitter using lines on a serial port or a printer port.

The CW Type Server is a program which receives commands over an Internet link from a CW Machine Client at a remote location, and sends the characters to be transmitted and speed information to CWType. The combination of CWType, its interface box, and the CW Type Server acts very similar to a CW Machine and a CW Machine Manager running in Server mode.

If you have checked the "CW Type Server" box during the installation of the CW Machine Remote Option (see above), you will have an icon on your Windows desktop to start the CW Type Server. When you do, and if you have the Windows firewall enabled, you will get a message asking you to grant permission to the CW Type Server **cwts.exe** to access the Internet. Since it is a program that runs in the Windows System Tray, all you are going to see is a CW Type Server icon at the bottom of your Windows desktop near the clock. Click on that icon, and you should see (with your own local IP address, of course):
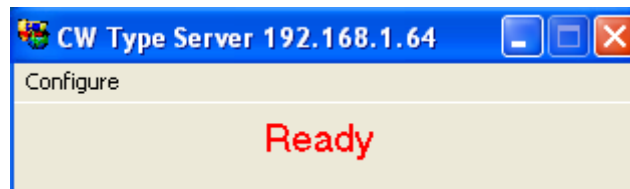

The CW Type Server is initially configured to listen for incoming connection attempts from a CW Machine client on port 18074.

If you click on the Configure menu item, you can change the port, the timeout, the buffering, and you can specify a local IP address, just like you can for the CW Machine Server as explained in the previous section:
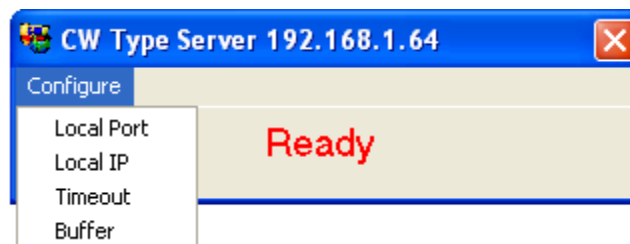
Please refer to the previous section for a detailed explanation of these parameters. After you have set these parameters for the first time, after the firewall message, end the CW Type Server program and then start it again.

You should have started CWType before or after you start the CW Type Server, and it should be properly configured to key your transmitter. To make sure that CWType interprets the prosigns that are used by the CW Machine correctly, you have to configure it for a **user defined character set**, using the **CWM.CWT** file that was installed by the CW Machine Remote Option:
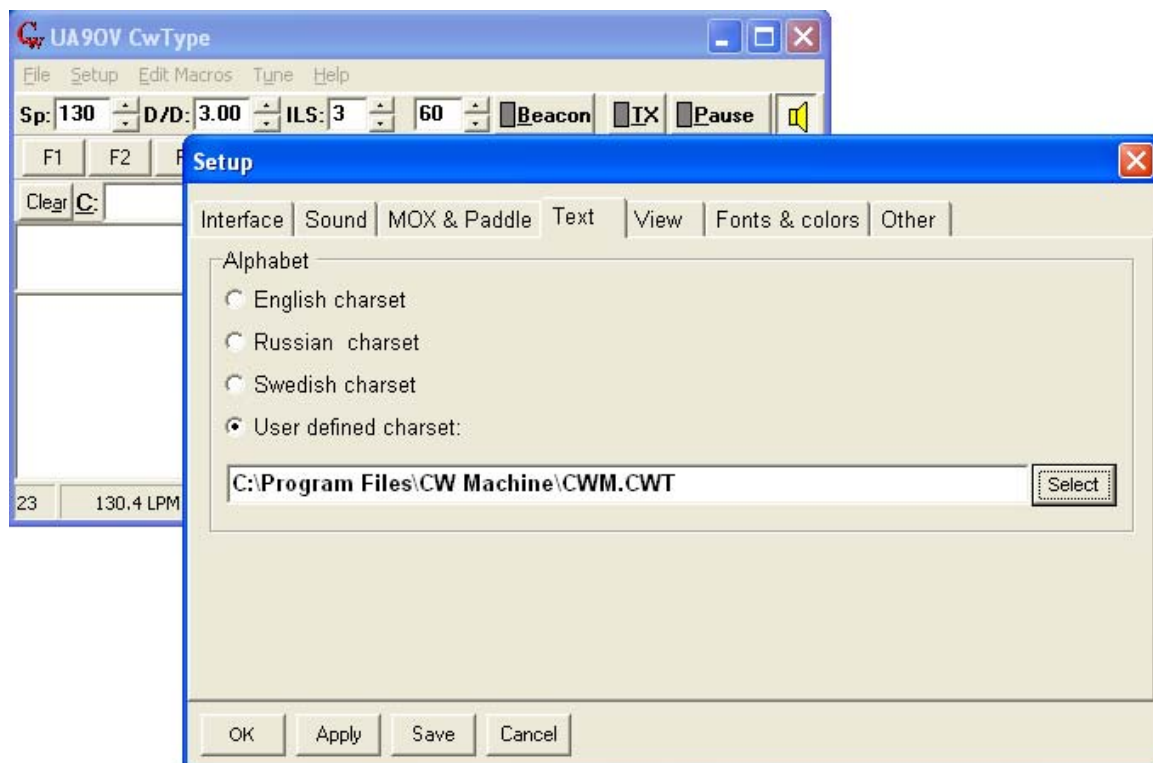
You may also have to select a western style font; otherwise some national characters used by the CW Machine may be shown as Cyrillic characters.

When a CW Machine client connects to the CW Type Server, you will see:

When you turn the speed potentiometer on the remote CW Machine the speed of CWType will be adjusted to a slightly lower value. (CWType shows the speed in

characters per minute, so you have to divide that number by 5 to get the corresponding speed of the CW Machine which uses words per minute as a unit for speed.) At higher speeds the increments that CWType can provide are not evenly spaced (this has to do with the timer resolution in CWType), and you may see some unexpected "jumps" in the speed (as an example, it will jump directly from 186 to 200 cpm, corresponding to 37 and 40 wpm), but the CW Type Server will always make sure that it is slower than the setting on your CW Machine.

When you create characters with your paddle or straight key at the client site, they are sent by the CW Machine Manager, which has to run in client mode as explained in the next section, to the CW Type Server, which then passes them on to CWType, which translates them using the CWM.CWT file, and finally keys your transmitter. The result should be a steady stream of CW at a speed that is usually a little slower than the setting of the speed potentiometer on your CW Machine.

When a client disconnects, the CW Type Server reverts back to the "Ready" state shown in the first screen shot, waiting for the next call. Once you have verified that your connection works as intended, you may run the CW Type Server minimized, so that it doesn't take up space on your Windows desktop.
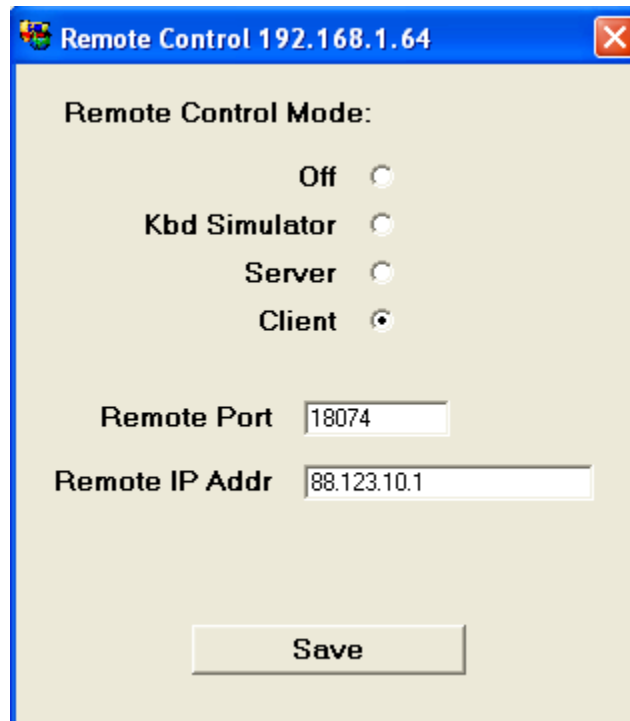
A quick check to verify that the communication between the CW Type Server and CWType works properly can be made with your keyboard: put the CW Type Server in the foreground (give it the focus) and CWType in the background so that you can still see all of the CWType window. If you now type characters on the keyboard you should see them appear in uppercase in CWType. If you use a special character like # (which is the CW Machine shorthand for <sk>) you should see CWType sending <sk>. If CWType does not send <sk>, you probably forgot to point it to the user defined character set in CWM.CWT as explained further up.

The CW Type Server is a program that runs in the System Tray of Windows: it has a small icon near the clock at the bottom of the Windows screen. When you minimize the CW Type Server, all that will be visible is that icon in the System Tray. When you click on it, the CW Type Server will be restored as a normal window; when you right-click on it, you have the options to Restore or Exit the CW Type Server.

Setting up the CW Machine Client

On the **Remote Control Configuration** screen, which is shown when you click on the **Remote Control** button in the Configuration screen of the CW Machine Manager, select the **Client** option:

The **Remote Port** is the port that you specified on your Server (the Local Port there). The **Remote IP Address** is the IP address of your server machine, which can be a numeric address or a symbolic address. Again, click on **Save** when you are done.

Let's assume your Server (CW Machine Manager or CW Type Server) is up and listening, and that you are at a remote location with an Internet connection. You obviously have some kind of program running already to control your radio over the Internet. You then start the CW Machine Manager which was configured as a Client, and you click on the CW Machine logo with the globe. If all goes well you will see:

As in the Server case, you may have to grant permission for the program to tunnel through your firewall. If you can see the Server desktop, the server program (CW Machine Manager running in server mode or the CW Type Server) will show connected state, too. Both programs are now "talking" to each other. If you turn the speed potentiometer on your CW Machine device, the speed of the Server will change in sync. If you create a character with your Morse key, it will be sent out by your transmitter. Since we have CW Machines on both sides of the link, or CWType with the CWM.CWT translation file, the compatibility issues mentioned in the keyboard simulation scenario don't exist – if you form a valid character, it will come out faithfully at the other end. (an invalid "garbage" character will not make it across the link to the Server …) To smooth out minor delays and "bumps" in the communication link the Server buffers a few characters at the beginning of a transmission before it actually starts sending.

To **end your Client session**, you just click on the globe logo again. The word **Connected** will disappear, and the Server will be waiting for the next call.

Trouble Shooting the Client / Server Connection

Setting up the CW Machine as Client / Server has been simplified as much as possible, so that you don't have to be a networking wizard to do it. Most problems arise because of firewalls and/or because the server machine is part of a virtual private network (**VPN**). To test whether your client is able to connect at all to any server, the CW Machine Client allows you to specify port 80 in addition to the normal port range mentioned above. **Port 80** is the standard for HTTP servers on the Internet. Typing http://www.google.com into your browser's address bar really is trying to connect to port 80 at IP address 64.233.167.147 (or another of Google's many IP addresses that a DNS server assigns to your request). If you have connection problems, specify port 80 as the Remote Port in your client, and www.google.com or another known web server as your IP address, and try to connect. You should get the **Connected** status in your client for a few moments. Of course, Google will be reluctant when the CW Machine Client tells it to run at 30 wpm, and it will disconnect after a few seconds, but you will be able to verify that your client can connect to something.

If your server machine is part of a VPN you have to make the IP addresses in that VPN available to your client machine first – this is usually done with special VPN client software or through Windows configuration options.

On both sides, the Server and the Client, you may have to set permissions in a firewall for the local and remote ports that you have selected.