

# KENWOOD

## TS-990S

KENWOOD NETWORK COMMAND  
SYSTEM Setting Manual

JVCKENWOOD Corporation

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## 1. Relevant Models

This operations guide is for the TS-990S.

Using the TS-990S and the KENWOOD NETWORK COMMAND SYSTEM (hereinafter called "KNS") enables transceiver operations by remote control using a home LAN or the internet.

KNS is a system configured using PCs, network environments, ARCP-990 (a Radio Control Program; hereinafter called "ARCP-990"), ARHP-990 (a Radio Host Program; hereinafter called "ARHP-990"), and ARVP-10 (a VoIP Program; hereinafter called "VoIP Program") for remote control of the TS-990S.

Note: If the firmware version of the TS-990S is V1.00, please update it to V1.01 or later.

### Important

- To configure the system, knowledge not only of transceivers but also of PCs and networks is required. JVC KENWOOD does not offer support for customer PCs and Networks. Furthermore, for operations relating to actual transmitting, note that procedures according to the Radio Act are also required.
- Operations via networks may be delayed due to unavoidable principles. Consequently, do not perform operations (such as contests or pile-ups requiring quick responses) for which delays are likely to be a problem.
- Even if you set by the procedures described in this document, the feature may not work properly because of the combination of PC, the network environment and the sound device.
- Refer to "[5. Limitations Caution!](#)" for other limitations.
- JVC KENWOOD Corporation shall bear no responsibility for related damage such as damage caused by missed communications and dialog opportunities due to incorrect customer settings, nonconformances, or misoperations as a result of using this document or the ARCP-990, ARHP-990 or ARVP-10 software.

## 2. Objectives of this document

To supply information to configure a remote control system via a home LAN or internet using the TS-990S, ARCP-990, ARHP-990 and VoIP Program.

### Programs and Functions

	Functions	Location
ARCP-990	Operates transceiver remotely	Remote Station
ARHP-990	Receives the display data from the transceiver, and sends it over the network to the ARCP. Also receives control data sent from the ARCP, and sends it to the transceiver.	Host Station
VoIP Program	Transmits and receives audio between the host station and the remote station.	Remote Station Host Station

### Requirements

	Via Internet	Home LAN
Programs used	ARCP-990 ARHP-990 VoIP Program	ARCP-990 ARHP-990
Transmits and receives audio	Requires VoIP Program. (The VoIP feature that is built into the ARCP-990 and ARHP-990 cannot be used.)	Use the VoIP feature that is built into the ARCP-990 and ARHP-990. Or use a VoIP Program.
Network	Connection via the internet (To use the internet, a contract with a provider is necessary.)	Connection using a home LAN
IP address used	Global IP address	Local IP address
Application based on the Radio Act	Application using the internet	Application using a home LAN

### 3. Outline

#### 3.1. Overall Configuration

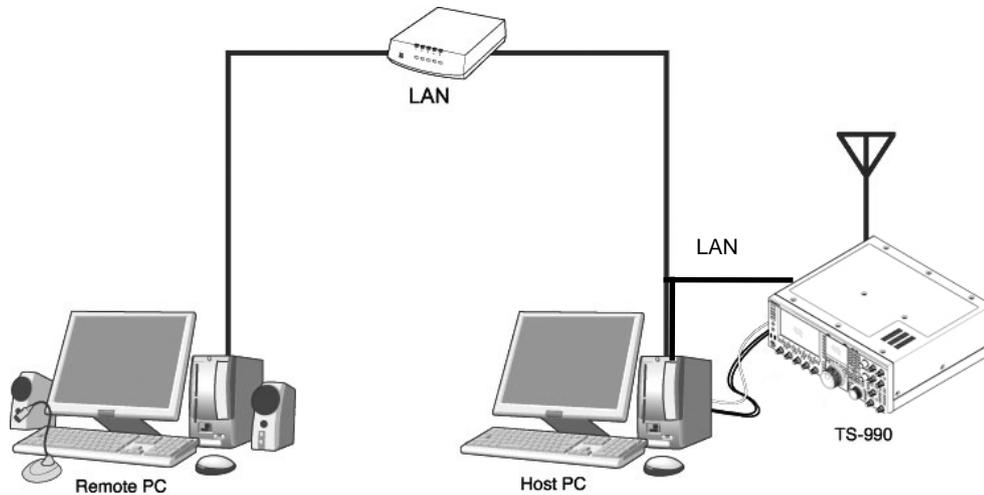


Fig. Example of a home LAN configuration  
(In this diagram, the modem, router, and hub have been omitted.)

As shown in the diagram, the configuration uses a host station (where the transceiver is installed; this is called the "transmitter" in the Radio Act) and a remote station (which performs the remote operations; this is called the "operator" in the Radio Act). A PC is connected to both, and the PCs are connected to each other via the network.

The transceiver connected to the PC to which the ARHP-990 has been installed on the host station is operated using the ARCP-990, which has been installed on the remote station PC. Furthermore, transmitted and received audio for the transceiver on the host station can be transmitted and received using the VoIP Program to and from the microphone and speaker connected to the PC sound device on the remote station.

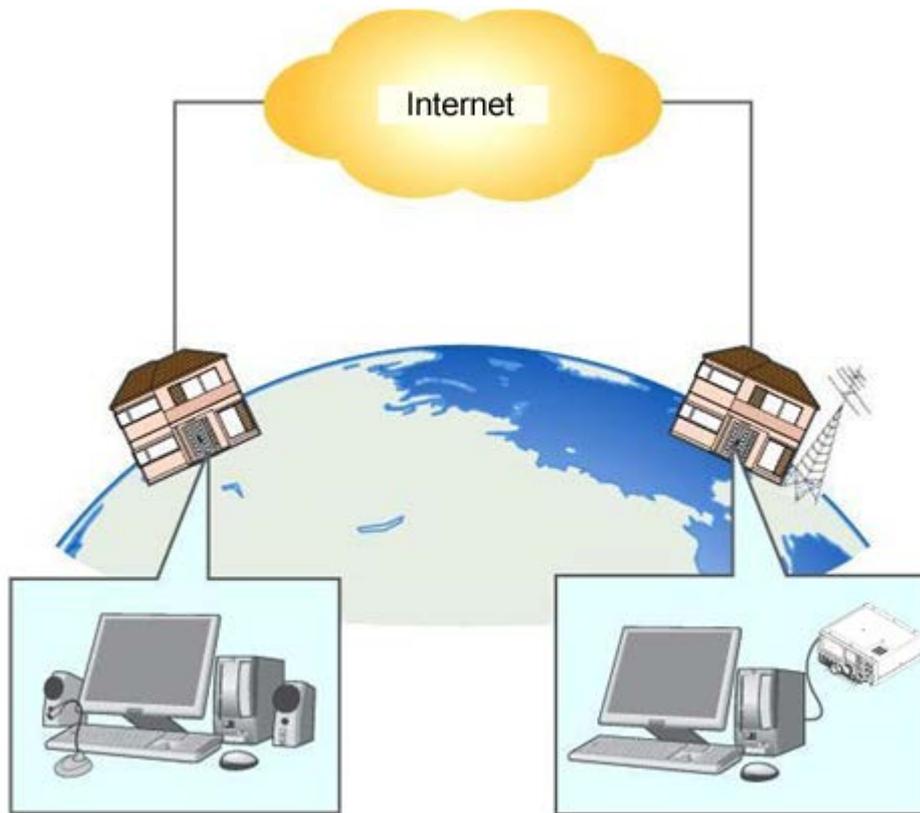


Fig. Example of a KNS configuration via the internet

The host station and remote station can be installed in any location with a home LAN connection or internet connection.

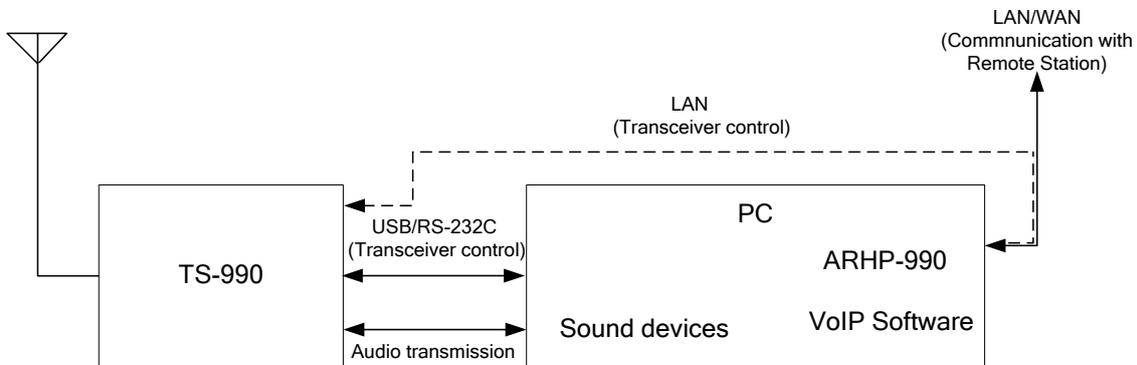
### 3.2. Outline of Host Station (Transmitter) Operations

The host station is configured using a transceiver and a PC connected to the network. Data signals that control the transceiver are connected to the PC using either LAN, USB or RS-232C. The PC uses its sound function to input and output audio transmitted and received by the transceiver, and converts them between digital and analog signals.

The ARHP-990 is installed on the PC. In the case of use via the internet, VoIP Program is installed on the PC. The ARHP-990 exchanges transceiver control data signals with the network. The VoIP Program exchanges audio transmissions with the network.

The PC is connected to the network, and exchanges transceiver control data signals and audio transmissions with the "Remote station (operator)" on the network.

### 3.3. Host Station (Transmitter) Configuration



(In this diagram, the modem, router, and hub have been omitted.)

Connection	LAN, USB or RS-232C	Controls that change the frequency or mode are performed by connecting the transceiver and PC using either a USB cable or RS-232C cable. (The transceiver has only one RS-232C connector, so if you are using the RS-232C connector for KNS operations, another device cannot be connected.) There is also a way to connect both the transceiver and PC to the home LAN. Since the transceiver control communication is high-speed, this method is recommended.
	Audio	The audio cable is created by the user. To exchange audio transmissions, connect the transceiver ACC2 connector to the PC sound I/O terminal. For the transceiver connector specifications, refer to the TS-990S instruction manual, and for the cable creation and connection methods, refer to " <a href="#">4.2. Connecting an Audio Cable</a> ".

PC	Specifications	CPU and memory: Minimum values recommended by the operating system. HDD: To install both the ARHP-990 and the VoIP Program, a minimum of approx. 100 MB of free disk space is required. If you are saving connection logs, additional memory space is required.
	Sound function	To exchange audio transmissions, a sound function is required.
	Network function	Connects to the home LAN. To perform KNS operations via the internet, connect to a network that is connected to the internet. A wired network is recommended.
Software	Operating System	Windows Vista (Service Pack 2 or later) (32-bit) Windows 7 (Service Pack 1 or later) (32-bit or 64-bit) Windows 8 (RTM or later) (32-bit or 64-bit) Windows 8.1 (RTM or later) (32-bit or 64-bit).
	Run-time	Microsoft .NET Framework 4.0.
	ARHP-990	This software controls the transceivers. Refer to the software help for the settings and operation methods. Download the software from the KENWOOD website, and install it onto the PC. <a href="http://www.kenwood.com/i/products/info/amateur/software_download.html">http://www.kenwood.com/i/products/info/amateur/software_download.html</a>
	VoIP Program	This software exchanges audio transmissions via the internet.  Example: ARVP-10 (See Note 1.) Refer to the software help for the settings and operation methods. Download the software from the KENWOOD website, and install it onto the PC. <a href="http://www.kenwood.com/i/products/info/amateur/software_download.html">http://www.kenwood.com/i/products/info/amateur/software_download.html</a>
LAN environment	Broadband router	To implement KNS operations via the internet, a model on which port forwarding settings are possible using the following protocol is required to transmit the data signals that control the transceiver and audio. (See Note 2.) Protocol: TCP; port No.: 50000 (ARHP-990 default value) Protocol: UDP; port No.: 33550 (ARVP-10 default value)
	Modem	Not specified.
	Firewall	To implement KNS operations via the internet, firewall environments configured using in-house company networks cannot be used. Use a home LAN environment.

Internet environment	Provider	<p>To implement KNS operations via the internet:</p> <ul style="list-style-type: none"> <li>▪ A high-speed wired broadband environment using xDSL, FTTH, or CATV network is required. (1Mbps min. recommended.)</li> <li>▪ A global IP address is required. (See Note 3.)</li> <li>▪ The ability to use protocols and ports to transmit the data signals that control the transceiver and audio is required.</li> </ul> <p>Protocol: TCP; port No.: 50000 (ARHP-990 default value)  Protocol: UDP; port No.: 33550 (ARVP-10 default value)</p> <p>For details, contact your internet service provider.</p>
	Proxy	A proxy server cannot be used.

Note 1: Other general purpose VoIP program can be used instead of the ARVP-10. Support for selecting, installing, and operating VoIP software is not available from JVC KENWOOD Corporation.

Note 2: Refer to the user's manual for the broadband router to be used before performing the settings.

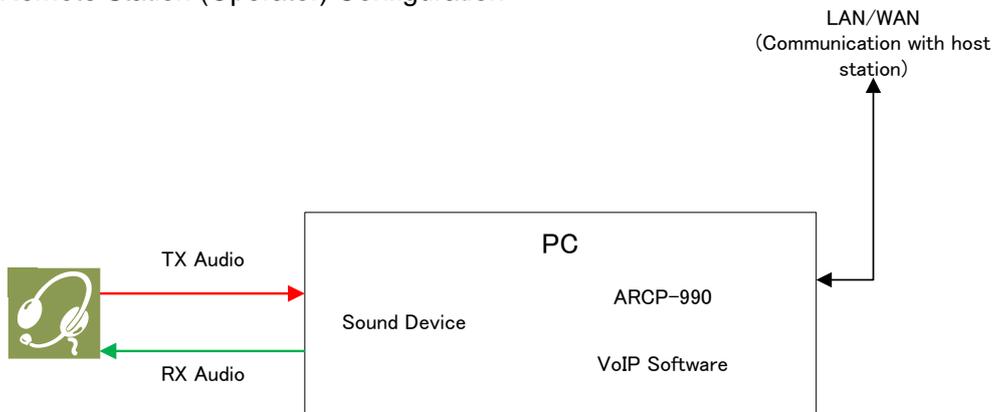
Note 3: KNS operations are possible even if the global IP address is variable, but the IP address may change with uncertain timing. In such cases, it is necessary to check and change the IP address of the connected host when connected from a remote station, which reduces user-friendliness. Consequently, using an environment in which the host station global IP address is fixed, is recommended. Furthermore, if the global IP address cannot be fixed, using a dynamic DNS service enables operations in the same way as an environment with a fixed global IP address.

### 3.4. Outline of Remote Station (Operator) Operations

The remote station is configured using a PC connected to the network, and a microphone and speaker connected to the PC sound function. The audio transmissions for the host station transceiver are input and output using the microphone and speaker connected to the sound function of the remote station PC via the network.

The ARCP-990 is installed on the PC. In the case of use via the internet, VoIP Program is installed on the PC. The host station transceiver connected via the network is controlled by the remote station ARCP-990 operations. The ARVP-10R is a VoIP program and supplies the transceiver with the transmitted and received audio of the host station side to the microphone and speaker of the PC of the remote station side.

### 3.5. Remote Station (Operator) Configuration



Connection	Audio	To exchange audio transmissions, connect the microphone and speaker, or a headset to the PC sound function. Use products compatible with the sound function used.
PC	Specifications	CPU and memory: Minimum values recommended by the operating system. HDD: To install both the ARCP-990 and VoIP Program, a minimum of approx. 100 MB of free disk space is required. If you are saving transceiver settings to data files, or saving keying logs, additional memory space is required.
	Sound function	To exchange audio transmissions, a sound function is required.
	Network function	Connects to the home LAN. To perform KNS operations via the internet, connect to a network that is connected to the internet. A wired network is recommended.
Software	Operating System	Same as host station.

	Run-time	Same as host station.
	ARCP-990	This software remotely controls the transceivers. Refer to the software help for the settings and operation methods. Download the software from the KENWOOD website, and install it onto the PC. <a href="http://www.kenwood.com/i/products/info/amateur/software_download.html">http://www.kenwood.com/i/products/info/amateur/software_download.html</a>
	VoIP Program	Same as host station.
LAN environment	Broadband router	Same as host station.
	Modem	Same as host station.
	Firewall	Same as host station.
Internet environment	Provider	Same as host station.
	Proxy	Same as host station.

## 4. Settings

### 4.1. Connecting a Communications Cable

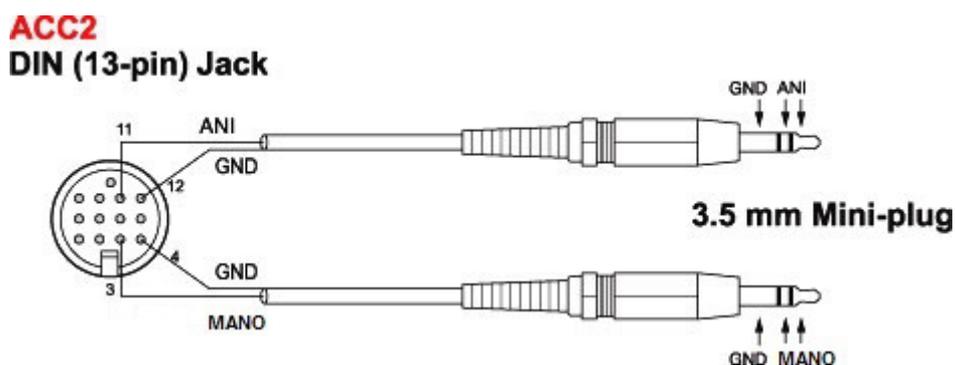
Connect the host station PC and TS-990S using a USB cable or RS-232C cable. There is also a way to connect both the transceiver and PC to the home LAN. This method makes high-speed data communication with the transceiver via USB or RS-232C cable.

Note: The LAN cable, RS-232C cable and USB cable are sold separately. Purchase them from a commercial retailer.

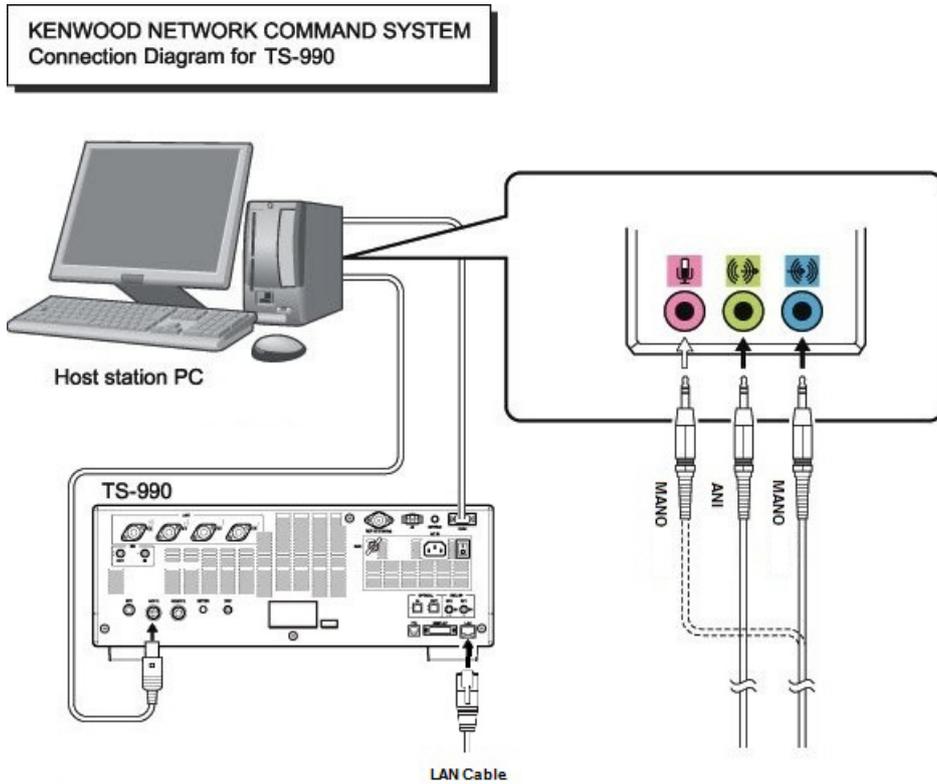
- When connecting using a LAN cable
  - (1) Depending on the network environment you are using, connects the TS-990S to the HUB using a LAN straight cable. (Refer to "CONNECTING TO YOUR LAN" in the instruction manual.)
  - (2) Setup the network functions (IP address, Administrator ID and password) of the TS-990S. (Refer to "CONFIGURING THE NETWORK" in the instruction manual.)
- When connecting using a USB cable
  - (1) Download the installer for the virtual COM port driver from the KENWOOD website: [http://www.kenwood.com/i/products/info/amateur/software\\_download.html](http://www.kenwood.com/i/products/info/amateur/software_download.html), then install it according to the procedures.
  - (2) Connect the PC and TS-990S using a USB cable.
- When connecting using an RS-232 cable  
Connect the PC and TS-990S using a RS-232C straight cable (9-pin to 9-pin).

### 4.2. Connecting an Audio Cable

To transmit and receive audio, an audio cable is required. Create an audio cable using the 13-pin DIN plug enclosed with the TS-990S with reference to the following diagram. For details of the connector specifications, refer to the TS-990S instruction manual.



Connect the PC sound functions and audio cable with reference to the following diagram.



**Reference:**

If the TS-990S is connected to the PC using a USB cable, audio transmission input and output are possible using the USB audio function, but the many signal conversions cause inherently unavoidable delays. Furthermore, during KNS operations, network delays will occur. To minimize delays as much as possible, connections using an audio cable are recommended.

Delays also depend on the PC load and network traffic.

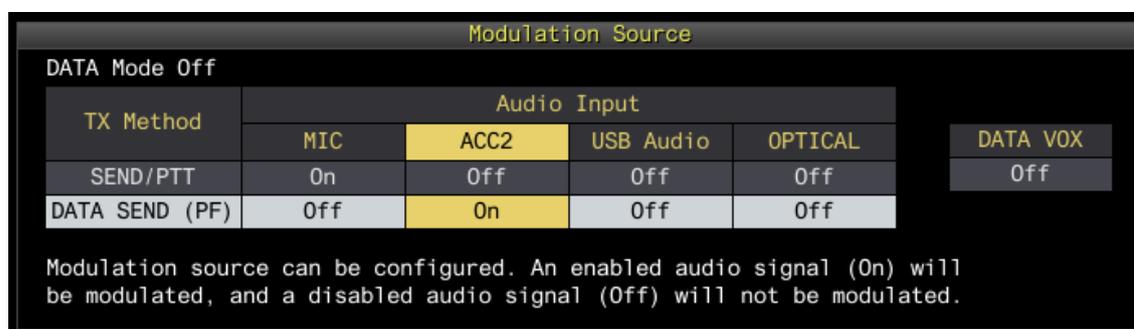
### 4.3. Transceiver Settings

Perform the required settings to implement KNS operations using transceivers.

- Set the transmitting audio input path settings

With KNS operations, normally transmitted audio is input from an ACC2 connector. Input is also possible using USB audio functions from a USB connector, but as the delays are great, this is not recommended.

On the Modulation Source screen of the TS-990S, set "ACC2" to ON, to be transmitted when "DATA SEND (PF)" is operated, to transmit audio input from the ACC2 connector. (Refer to "SELECTING THE AUDIO LINE FOR TRANSMISSION" in the instruction manual.)



Modulation Source can be configured for each DATA mode (DATA Mode Off, DATA 1~3) that is currently selected.

Reference:

Set "USB audio" to ON, to be transmitted when "DATA SEND (PF)" is operated, to transmit USB audio signals input to the USB connector.

Set a playback device and recording device to the device connected to the TS-990S as a default using the Windows sound settings of the host station.

- Data VOX settings

With the TS-990S, VOX functions can be implemented using either audio input to the ACC2 connector or USB audio signals input to the USB connector, but to prevent unintentional transmission during KNS operations, turn OFF the function on the Modulation Source screen.

Caution:

- When this function is ON, be aware that all sounds created by the PC other than the intended audio transmissions are also transmitted.
- When using this function for the first time, we recommend connecting a dummy load to the TS-990S to perform checks and adjustments.

- Audio I/O level settings

Use the following menu to adjust audio transmission input levels from the PC, and receive audio output levels to the PC.

Menu No.	Function	Setting range (Default)
7-06	Input level from the ACC2 connector	0~100 (50)
7-10	Output level (Main Band) from the ACC2 connector	0~100 (50)
7-11	Output level (Sub Band) from the ACC 2 connector	0~100 (50)
7-05	Audio level of ACC2 output for data communications	0~100 (50)
7-08	The main band USB audio output level	0~100 (100)
7-09	The sub-band USB audio output level	0~100 (100)

Reference:

Adjust the Windows sound function volume as necessary.

- Audio output configuration

In order to send both the main band audio and the sub band audio to the remote station using VoIP, perform the settings using the following menu.

Menu No.	Function	Set value
7-17	ACC2: Audio Output Configuration	Mixed
7-16	USB: Audio Output Configuration	Mixed

Reference:

In the default setting (Normal), the received audio of the main band and the received audio of the sub-band are output to separate audio channels.

- Mixed beep setting to external audio outputs

With the TS-990S default mode, the received audio signals that includes beeps or side tones are output from the ACC2 connector as audio signals and the USB connector as USB audio signals.

Menu No.	Function	Setting range (Default)
7-14	Audio output from the rear panel connectors	All, Received Audio Only (All)

Reference:

To implement data communications, set to "Received Audio Only".

- Timeout timer settings

During KNS operations, control data signals are transmitted using the network. Consequently, if normal network operations are disabled for any reason, control of the transceiver will also be disabled. Use the following menu to set the functions to stop transmitting automatically after a fixed period if control should be disabled while transmitting.

Menu No.	Function	Setting range (Default)
6-02	Maximum continuous transmit time (time-out timer)	Off, 3, 5, 10, 20, 30 [min] (Off)

- Prohibit transmission setting

If using the host station as a receive-only station, set to transmission inhibited. Make the settings using the following menu.

Menu No.	Function	Setting range (Default)
6-03	Transmit inhibit	Off, On (Off)

- Allocating the DATA SEND function to PF keys

Set the DATA SEND function to the PF keys to test the transmission of audio input from the ACC2 connector or USB connector. In this example, the [PF A] key has been set.

Menu No.	Function	Set value
0-15	Assignment of the programmable function to [PF A]	DATA SEND

Using the PF key, which has been set to the DATA SEND function, enables switching between transmit and receive modes for audio input from the ACC2 connector or USB connector.

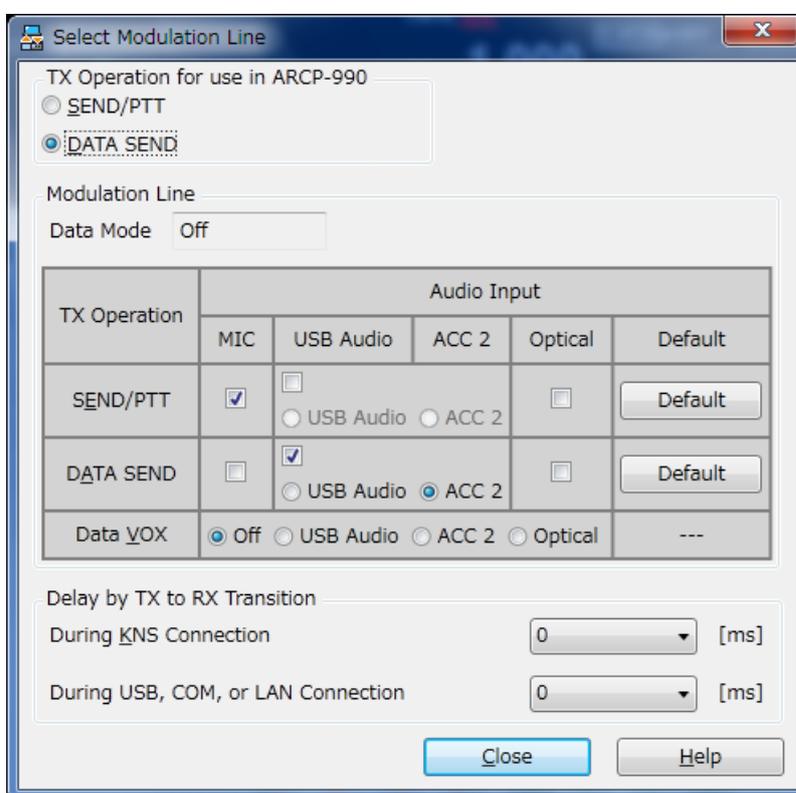
#### 4.4. Setting Transmission Methods for Audio Input to the ACC2 Connector

The PTT of the microphone connected to the TS-990S, and the [SEND] key on the TS-990S control panel, are the methods for transmitting audio input from the microphone connected to the TS-990S. When TXing by these methods, audio input as audio signals from the ACC2 connector cannot be transmitted.

To transmit audio input as audio signals from the ACC2 connector, select one of the following methods.

- Transmitting using the ARCP-990  
With the ARCP-990, settings must be performed to transmit audio input from the ACC2 connector to use the on-screen [Send] button.

Select "Select Modulation Line" from the ARCP-990 "TX/RX" menu. The "Select Modulation Line" window is displayed.



In this window, select "DATA SEND" under "TX Operation for use ARCP-990".

For details, refer to the ARCP-990 help.

- Transmitting using the PKS terminal in the ACC2 connector  
Audio input from the ACC2 connector can be transmitted by setting the PKS terminal in the ACC2 connector on the rear of the TS-990S to low.

For details of the connector and terminal specifications, refer to the TS-990S instruction manual.

- Transmitting using the PF keys allocated to the DATA SEND function  
If the DATA SEND function has been allocated to a PF key, operating the PF key enables audio input from the ACC2 connector to be transmitted.

For details, refer to "Allocating DATA SEND Function to PF Keys".

#### 4.5. Setting a Broadband Router

When implementing KNS operations via the internet, it is necessary to set the broadband router connected to the host station.

Perform the settings to transmit control data signals and audio transmissions via the internet from the broadband router to the host station PC.

This setting depends on the call method of the broadband router manufacturer, and may be "Port forwarding", "IP masquerade", "Port conversion", "NAT address conversion", etc. Refer to the user's manual for the broadband router used.

The settings are described below.

##### Control data signals

Item (Example)	Setting Details
Open IP address	IP address of the PC used in the host station
Protocol	TCP
Port Number	50000 (default value)
Direction	Two-way

##### Audio transmissions

Item (Example)	Setting Details
Open IP address	IP address of the PC used in the host station
Protocol	UDP
Port Number	33550 (default value)
Direction	Two-way

##### Caution:

- For the broadband router settings, refer to the broadband router user's manual.
- Incorrect broadband router settings may stop the network or enable illegal external access to the network. Take thorough precautions when changing the settings.
- JVC KENWOOD Corporation does not offer support for customer PCs and networks.

#### 4.6. Software Installation and Settings

Install the software required for KNS operations on the host station PC and the remote station PC, then perform the required settings.

- Host station PC

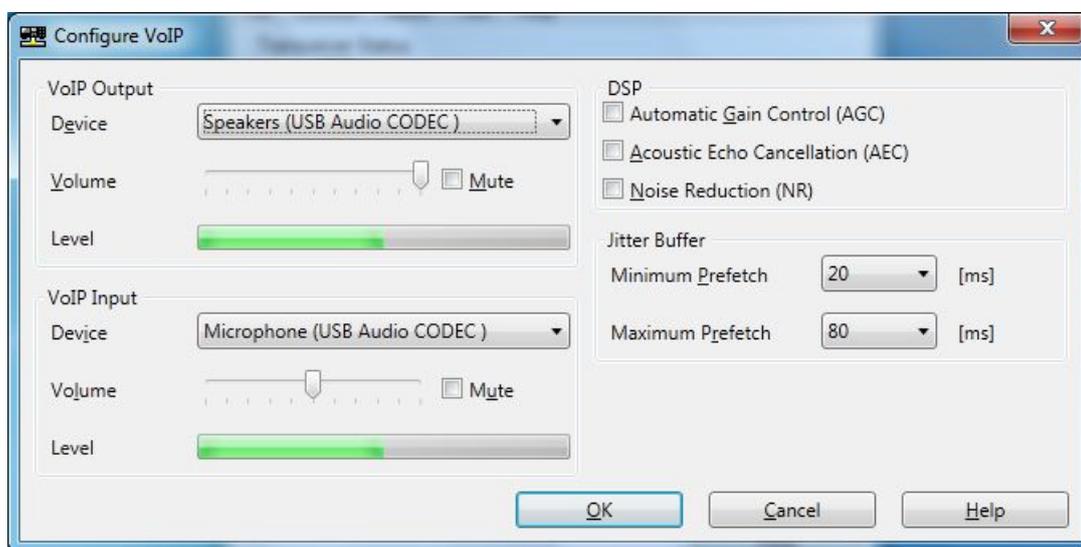
Download and install the ARHP-990 onto the PC from the KENWOOD website:  
[http://www.kenwood.com/i/products/info/amateur/software\\_download.html](http://www.kenwood.com/i/products/info/amateur/software_download.html)

Connect the PC and TS-990S using a USB or RS-232C cable. Then, turn ON the TS-990S.

After starting the ARHP-990, make the COM port settings used to connect to the TS-990S, network settings, optional settings, and user settings by selecting the "Tool" menu and then "Setup" in the ARHP-990. For the setting methods, refer to the ARHP-990 help file.

Additionally, in "Configure KNS" in the "Tool" menu, set a user account, whether or not to use the VoIP function and others.

On the remote operation within the home LAN area, the VoIP function built into the ARCP-990 and ARHP-990 can be used. In this case, in "Configure VoIP" in the "Tool" menu of ARHP-990, select the audio device that is connected with an audio cable to the TS-990, as the audio device to be used in VoIP.



**Caution:**

- Names in the selection of the device depend on the PC. For each setting, refer to the help file of the ARHP-990.

On the remote operation via the internet, install the VoIP Program. If you select to use the ARVP-10 as a VoIP program, download it from the KENWOOD website:  
[http://www.kenwood.com/i/products/info/amateur/software\\_download.html](http://www.kenwood.com/i/products/info/amateur/software_download.html)

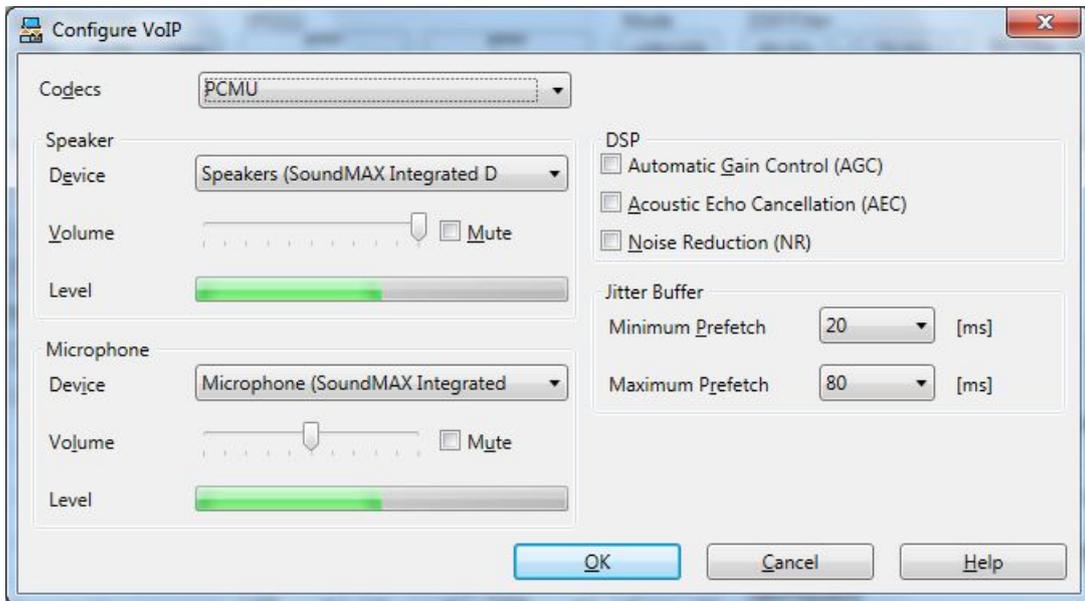
The ARVP-10 is included with the ARVP-10H for the host station and the ARVP-10R for the remote station.

- Remote station PC

Download and install the ARCP-990 onto the PC from the KENWOOD website:  
[http://www.kenwood.com/i/products/info/amateur/software\\_download.html](http://www.kenwood.com/i/products/info/amateur/software_download.html)

After starting the ARCP-990, select "Settings" in the "Tool" menu, and set "KNS (KENWOOD NETWORK COMMAND SYSTEM) (ARHP-990)" in "Connection to the TS-990S". Click the "Setting" button to configure the KNS connection.

On the remote operation within the home LAN area, the VoIP function built into the ARCP-990 and ARHP-990 can be used. In this case, in "Configure VoIP" in the "Tool" menu of the ARCP-990, select the speaker and microphone connected to the PC.



For the setting methods, refer to the ARCP-990 help file.

On the remote operation via the internet, install the VoIP Program. Install the same VoIP Program that was installed on the host station.

**Caution:**

On the remote operation via the internet, you can use a VoIP Program other than the ARVP-10. However, support for selecting, installing, and operating VoIP software is not available from JVC KENWOOD Corporation.

#### 4.7. Windows Firewall Settings

With the host station PC, receiving connections from networks and the internet using the ARHP-990 and ARVP-10 are blocked by the Windows firewall. When blocked, KNS operations are disabled, so remove the block.

Reference:

Add the ARHP-990 and ARVP-10H to "exceptions" using the Windows firewall settings, to release the block.

#### 4.8. Comprehensive Security Software Settings

If using comprehensive security software, it is necessary to adjust the settings so that ARHP-990, ARCP-990 and ARVP-10 communications are not blocked. Perform the settings with reference to the user's manual for the comprehensive security software used.

#### 4.9. Making the Host Station Connection Request Wait Mode

Click the "Connect" button in the main window of the ARHP-990 on the host station. The indicator will light yellow and the host station will enter connection request wait mode.

If you are using the ARVP-10 as a VoIP Program, click the "Online" button in the main window of the ARVP-10H on the host station. The notation of the "Online" button changes to "Offline" and the host station will enter connection request wait mode.

#### 4.10. Connecting to the Host Station from the Remote Station

Click the "Connect" button in the main window of the ARCP-990 on the remote station. If the connection to the host station is successful, the indicator will light green. After the pop-up message of display updating has disappeared, you can start operation.

If you are using the ARVP-10 as a VoIP Program, click the "Connect" button in the main window of the ARVP-10R on the remote station. If the connection to the host station is successful, the indicators will light green and red.

## 5. Limitations **Caution!**

### 5.1. PC Environment Limitations

Check that the ARCP-990, ARHP-990, and ARVP-10 operations use Windows Vista SP2 or later, Windows 7 SP1 or later, Windows 8 RTM or later, or Windows 8.1 RTM or later. Earlier versions and other operating systems are not supported. Use the operating systems described above for both the host and remote stations.

For KNS operations, it is necessary to set and change the open broadband router port, Windows firewall functions, and comprehensive security software. Furthermore, it is the customer's responsibility to handle security when using this system. If you do not have confidence in the settings, we recommended you stop using the system.

### 5.2. Network Environment Limitations

During KNS operations via the internet, it is necessary to set the global IP address on the host station. For your global IP address, consult your contracted provider.

Only registered people can access the host station using their ID and password. Make sure that the ID and password settings cannot be guessed easily by unauthorized people.

On this system, signals are exchanged via the network. Consequently, smooth operations may be disabled compared to normal transceiver operations, as delays (during analog/digital conversions) and data loss (which is greatly dependent on traffic) are unavoidable. This is the principle operation of the system.

Examples are cited below.

Audio may break up, meter deflection may not be smooth, standby time may be delayed (in particular, it is not suitable for contests or quick operations such as pile-ups). VFO variability may not be smooth, audio may differ from the actual transceiver audio and digital mode communications such as image communications with SSTV and AFSK, PSK-31, etc., may be disabled, etc.

Broadband is recommended for the internet line used. As a benchmark, use a minimum of 1 Mbps. The speed of analog modems that use telephone lines will greatly reduce sound quality, and may destabilize control, and so cannot be used.

### 5.3. Program Limitations

CW operations are possible, but keying using normal e-keys is not possible. Strings entered using the keyboard are collated for transmit operations.

### 5.4. Limitations if Using USB Audio Functions

If the PC and TS-990S are connected via a USB cable, audio transmissions can be transmitted using the USB audio function. However, in principle, there is a delay with USB audio, so sound may be lost depending on the PC performance and load status. If using a USB connection for audio transmissions on the host station, the delay due to network traffic to the remote station is also added, so the delay is further increased.

If audio transmissions are connected via a USB connection, and if playing warning sounds from the Windows or music and video on the PC, the sounds may not emit from the PC speakers.

Furthermore, depending on the Windows sound settings, the transceiver DATA VOX function settings, and the modulation path, audio may be modulated from the transceiver; take care during PC operations and when playing music and video.

Depending on the combination of PC and sound functions, normal operations may be disabled.

JVC KENWOOD does not offer support for customer PCs.

We recommend using an audio cable without using USB audio functions for KNS operations. (Refer to "[4.2. Connecting an Audio Cable](#)".)

## 6. Frequently Asked Questions

This section introduces questions that have been asked to date, and subjects verified by JVC KENWOOD Corporation.

	Question	Answer
Installation	When using a network connection via the internet, is KNS disabled unless I obtain a global IP address?	When using a network connection via the internet, a global IP address is required.
	I have a variable global IP address for the host station. Can I still use it?	A variable global IP address can also be used, but each time the global IP address changes, you must reset the settings, which is inconvenient. We recommend using a fixed global IP address.  Even with a variable global IP address, the inconvenience of resetting the settings can be eliminated by using a dynamic DNS service, which can be used in the same way as a fixed global IP address.
	I use CATV internet. Can I use KNS via the internet?	If you can obtain a fixed global IP address, yes.  If using a type with the broadband router built into the cable model, it is possible if you can make the port forwarding settings.
	Can I use environments with a proxy or firewall on the host station or the remote station or both sides?	A proxy and firewall environments cannot be used. Both the host station and the remote station can be used only on general home network environments.
	Can I use a wireless LAN or BWA (broadband wireless access)?	We do not recommend this, as line speeds are not fixed for best effort-type wireless.

	Question	Answer
Installation	I want to use a USB headset or Bluetooth headset on the remote station PC. Will there be any problems?	<p>You can use them, but in principle, a USB headset or Bluetooth headset has unavoidable delays, so entering standby will take considerable time. If the delays are a problem, it is better to avoid using them.</p> <p>After connecting a USB headset or Bluetooth headset, you must set the default recording and playback devices using the Windows sound settings. For details, refer to the USB headset or Bluetooth headset user manual.</p>
Connection	Cannot operate the transceiver. Cannot connect to the host station.	<p>Check the environment of the PC at the remote station.</p> <ul style="list-style-type: none"> <li>• Select "KNS (KENWOOD NETWORK COMMAND SYSTEM) (ARHP-990)" from "Settings" in the "Tool" menu on the ARCP-990, and click "Settings".</li> </ul> <p>If the choice of the IP address is blank, the IP address has not been able to be obtained. Check that the network devices are working properly.</p> <ul style="list-style-type: none"> <li>• If the choice of the IP address has several selections, select the IP address that is used to connect to the network.</li> </ul> <p>Check the environment of the PC at the host station.</p> <ul style="list-style-type: none"> <li>• Select "Configure KNS" from the "Tool" menu on the ARHP-990.</li> </ul> <p>If the choice of the IP address is blank, the IP address has not been able to be obtained. Check that the network devices are working properly.</p> <ul style="list-style-type: none"> <li>• If the choice of the IP address has several selections, select the IP address that is used to connect to the network.</li> </ul>

	Question	Answer
Internet	Cannot operate the transceiver via the internet. Cannot connect to the host station.	<p>Check that connections to websites and your internet mail server are still possible. Check the host station IP address, ID, and password.</p> <p>If there are no problems, check the following.</p> <ul style="list-style-type: none"> <li>▪ Check that the port used for transceiver control (TCP/default setting: 50000) and audio transmissions (UDP/default setting: 33550) are set to open on the host station broadband router.</li> <li>▪ Check that there are not two or more broadband routers (hereafter called "BBR") on the host station network. If there are two or more BBRs, either open the port required by KNS for either of the BBRs, or stop one of the BBRs and make sure that only one BBR exists on the network, then set the required KNS port to open on the BBR. (Refer to "<a href="#">(Supplement): FAQ: Explaining the Internet "Cannot operate transceiver"</a>".)</li> </ul>
Operating System	When attempting a KNS connection, a warning message may be displayed by Windows.	Add the ARHP-990 and VoIP Program to the Windows firewall exceptions.

	Question	Answer
Operations	Why can't I use the ARCP-480 or ARCP-590?	The ARCP-480 is for the TS-480 only. The ARCP-590 is for the TS-590 only. Use the ARCP-990 with the TS-990S.
	Why can't I use the ARHP-10 or ARHP-590?	The ARHP-10 is for the TS-480 only. The ARHP-590 is for the TS-590 only. Use the ARHP-990 with the TS-990S.
	Reception sound quality is different from the TS-990 itself.	Audio via a network is affected by the audio encoding and data bandwidth, so sound quality may differ from the actual received quality. These are VoIP specifications, and cannot be improved.
	I want to control an antenna rotator or peripheral device other than the transceiver.	The current system is compatible only for transceiver control.
	There are so many limitations. Can this system operate?	Although different from normal operations, considerably practical operations are possible in ordinary communications. There may be some initial confusion over the standby timing until you are familiar with the specific delays via the network. We recommend first becoming familiar with the transceiver operations from the PC using a single ARCP-990, and then attempting operations on a network environment as the next step.  When attempting actual operations, unless operating with a partner, the internet remote operation can be hard to understand.

	Question	Answer
Operations	Cannot hear the received transceiver audio from the speaker of the PC at the remote station.	Audio output level from the TS-990S may be too low. Refer to "Audio I/O level settings" in "4.3. Transceiver Settings" of this document, and adjust each output level.
		On the ARHP-990, check that the setting of the VoIP output device is not wrong.
		If several sound devices are connected to the PC of the remote station, check that the desired sound device has been selected as the output destination of the VoIP, in "Configure VoIP" of the ARCP-990.
	Cannot hear the received sub-band audio from the speakers of the PC at the remote station.	Refer to "Audio output configuration" in "4.3. Transceiver Settings" of this document.
	Audio transmissions are noisy or small. Where should I check and adjust?	Refer to "Audio I/O level settings" in "4.3. Transceiver Settings" of this document, and adjust each output level.
		Try changing the sound function driver version.
		If using the sound functions in comprehensive chipsets, try an independent sound card or USB sound.
	I want to hear the beeps and voice guidance audio of the transceiver from the PC speaker. Is this possible?	Refer to "Mixed beep setting to external audio outputs" in "4.3. Transceiver Settings" of this document, and set to "Received Audio Only".
	Can I set the PC to sleep mode while I'm not using the host station?  When a fixed time has elapsed without the host station being used, the host station PC screen turns OFF, and responses to connection requests from the remote station cannot be made.	Recovery from sleep mode takes time. During sleep mode recovery, responses to the remote station cannot be returned until there is a time out. Therefore, we recommend you do not set the host station to sleep mode.

	Question	Answer
Operations	If there is a connection request from the remote station while the host station is not being used, a message is displayed and connections to the host station are disabled.	Is the Windows energy save mode operating, and has the power supply to the host station HDD been disabled? When the HDD power supply is turned OFF, the HDD power supply is turned ON to respond, but at this time nothing can be returned until the response to the remote station has timed out. Consequently, set the Windows power supply function settings so that the HDD power supply does not turn OFF.
	An audio I/O between the host station PC and transceiver cannot be performed correctly.	Check that a default device is specified as the device connected to the TS-990S using the Windows sound settings on the host station PC.
	There is no modulation even when the ARCP-990 "Send" button is pressed.	Refer to "Transmitting using the ARCP-990" in "4.4. Setting Transmission Methods for Audio Input to the ACC2 Connector" of this document, and check the setting.
		Audio input level to the TS-990S may be too low. Refer to "Audio I/O level settings" in "4.3. Transceiver Settings" of this document, and adjust the audio input level.
		On the ARHP-990, check that the setting of the VoIP input device is not wrong.

	Question	Answer
Operations	The audio transmission keeps varying in volume and is not constant.	Has the AGC been turned ON using the VoIP software input audio settings? For details, refer to the VoIP software user's manual, and check the settings.
	The final part of the audio transmitted from the host station transceiver is missing.	If you return to receiving operations immediately after the conversation has finished using the remote station, you may switch to receiving before all the audio has been transmitted due to the audio transmission delay.  In such cases, on the ARCP-990, select "Select Modulation Line" in the "TX/RX" menu, and set a slightly longer time in "Delay by TX to RX Transition" when "During KNS Connection".
	Cannot hear the transmit monitor audio from the speakers of the PC at the remote station.	Several VoIP Programs have specifications that will shut off the voice from the other side while sending voice from this side. With a VoIP Program like this, you cannot hear the transmit monitor audio properly.
	When selecting a tuning step other than "Preset", reaction may be delayed during KNS operations.	When set to other than "Preset", the network is more easily delayed than when using "Preset" due to the difference in the internal commands. In such cases, either select "Preset" and perform tuning, or change the frequency using the "MULTI/CH" operation.
Comprehensive security software, etc.	I'm using comprehensive security software, but when I try a KNS connection, the warning "Software is attempting to connect to the internet" is displayed. Can I press the "Block" button?	Refer to the user's manual for the comprehensive security software being used, and set it so that the communications of the port used by the ARCP-990, ARHP-990 and VoIP Program are not blocked.

	Question	Answer
Other	After implementing KNS operations on the PC used as the host station, the sound has vanished from the PC during audio and video playback on the PC.	<p>It is possible that the device connected to the TS-990S has been selected as the default device using the Windows sound settings.</p> <p>Use the Windows sound settings to check whether the PC speakers have been selected as the default playback device.</p> <p>When the TS-990 is not used, we recommend you disconnect the USB cable from the PC.</p>
	When playing audio and video when implementing KNS operations on the PC used as the host station, the audio is transmitted from the TS-990S.	<p>During KNS operations, all audio output from the PC is input to the TS-990S as transmitted audio.</p> <p>During KNS operations, do not play audio or video. Furthermore, we recommend terminating other programs.</p>
	Loud sounds are suddenly output from the host station transceiver.	<p>The cause is the remote station user operating the volume control.</p> <p>You can use the ARHP-990 to prohibit volume operations from the remote station.</p> <p>Select the "Tool" menu and the "Setup", and enable the "Prohibit AF gain control from ARCP-990" checkbox.</p>
	After restarting the host station for any reason, are there any settings to enable standby mode automatically?	<p>In the ARHP-990 "Tool" menu, select "Setup", and then enable the "Run automatically at Windows startup" checkbox.</p> <p>When the PC is restarted, it will automatically enter standby mode.</p>
	What is the number of the TCP port when the KNS is operated within a home LAN area.	It is fixed at 60000.

(Supplement): FAQ: Explaining the Internet "Cannot operate transceiver"

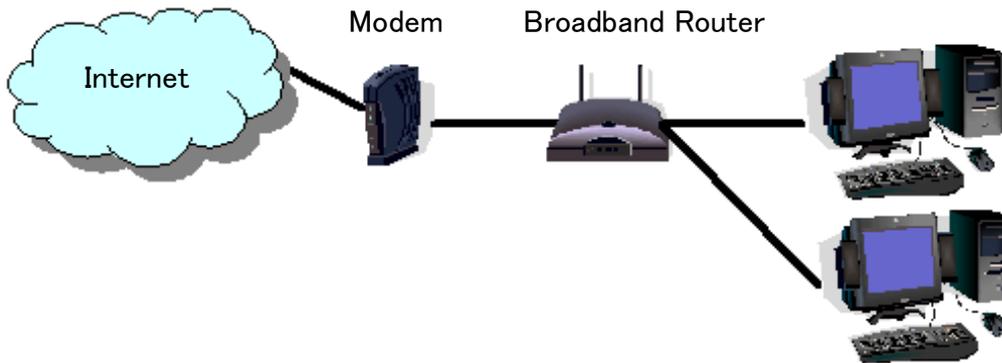


Fig. 1

As shown in Fig. 1, even though only one broadband router (BBR) is visible on the network, in reality there are two. (Duplex router phenomenon.)

There are multiple modems with built-in BBR functions, so when connecting such a modem as described above, there must not be two BBR paths connecting the PC to the internet.

Consequently, even if the open port has been set for one BBR only, the required KNS packets will not flow. For this reason, either set the required KNS port to open for both BBRs, or stop one BBR function, and set the network so that there is only one BBR on the network.

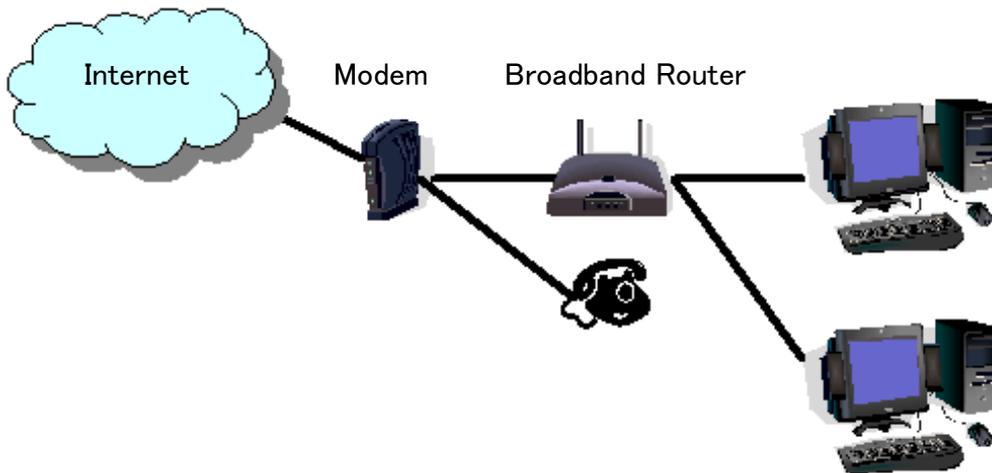


Fig. 2

As shown in Fig. 2, the case where a telephone is connected directly to a modem, in most models the modem has a built-in BBR function. In such cases, stopping the function of the BBR built into the modem stops the VoIP telephone functions connected to the modem, so VoIP telephony use is disabled.

To prevent the VoIP telephone functions from stopping, stop the functions of the BBR connected to the front of the PC, and set the port required by KNS to open in the BBR built into the modem.

**Caution:**

Change any settings such as open BBR ports at your own risk.

If you do not have confidence in the settings, we recommend you stop using the system.