

KENWOOD

HF/50 MHz Transceiver


TS-990S

Instruction Manual

JVC KENWOOD Corporation

NOTIFICATION

This equipment complies with the essential requirements of Directive 1999/5/EC.

The use of the warning symbol  means the equipment is subject to restrictions of use in certain countries.

This equipment requires a licence and is intended for use in the countries below.

ISO3166

CE 0682 

Bu ürün 26891 sayılı Resmi Gazete'de yayımlanan Elektrikli ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılmasına Dair Yönetmeliğe uygun olarak üretilmiştir.

This product complies with Directive, Number 26891 regarding "REGULATION ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT".

©B62-2388-00

09 08 07 06 05 04 03 02 01 00

PRIOR TO YOUR FIRST QSO

Thank you for purchasing this TS-990 transceiver. Prior to your first QSO, carefully read through the following precautions to become familiar with the safety precautions applicable to this transceiver. After reading through this instruction manual, store it with the warranty card and packing materials.

FEATURES

- A main receiver with IP3: +40 dBm, and a sub receiver with the TS-590 receiver diverted. Capable of receiving two signals at once, in different bands.
- 7-inch wide and 3.5-inch color TFT displays allow displaying of independent contents. Displays simplifying with a glance the complicated operations to be comfortable
- Covers the HF and 50 MHz bands.
- Clean 5 to 200 W transmit power through the 50 V FET final unit.
- Built-in and relayed system automatic antenna tuner allowing the fast tuning.
- Built-in switching power supply and low-power consumption mode.
- Wide range of operating modes including SSB, CW, FSK, PSK (QPSK31, BPSK31 and BPSK63), AM and FM modes.
- Three Analog Devices with 32-bit floating-point arithmetic DSPs.
- Standard equipped USB, Serial and LAN ports.
- Video signal output for display by an external PC (main screen display only).
- Free ARCP-990 software, allowing PC control, and ARHP-990 software allowing remote control.

NOTICE TO THE USER

One or more of the following statements may be applicable for this equipment.

FCC WARNING

This equipment generates or uses radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

INFORMATION TO THE DIGITAL DEVICE USER REQUIRED BY THE FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can generate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer for technical assistance.

MARKET CODES

K-type: The Americas

E-type: Europe

The market code is shown on the carton box.

Information on Disposal of Old Electrical and Electronic Equipment and Batteries (applicable for EU countries that have adopted separate waste collection systems)




Products and batteries with the symbol (crossed-out wheeled bin) cannot be disposed as household waste. Old electrical and electronic equipment and batteries should be recycled at a facility capable of handling these items and their waste byproducts. Contact your local authority for details in locating a recycle facility nearest to you. Proper recycling and waste disposal will help conserve resources whilst preventing detrimental effects on our health and the environment.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

NOTIFICATION

This equipment complies with the essential requirements of Directive 1999/5/EC.

The use of the warning symbol  means the equipment is subject to restrictions of use in certain countries.

This equipment requires a licence and is intended for use in the countries below.

AT	BE	DK	FI	FR	DE	GR	IS
IE	IT	LI	LU	NL	NO	PT	ES
SE	CH	GB	CY	CZ	EE	HU	LV
LT	MT	PL	SK	SI	BG	RO	

ISO3166

CE 0682 

This product is designed for connection to an IT power distribution system.

Bu ürün 26891 sayılı Resmi Gazete'de yayımlanan Elektrikli ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılmasına Dair Yönetmeliğe uygun olarak üretilmiştir.

This product complies with Directive, Number 26891 regarding "REGULATION ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT".

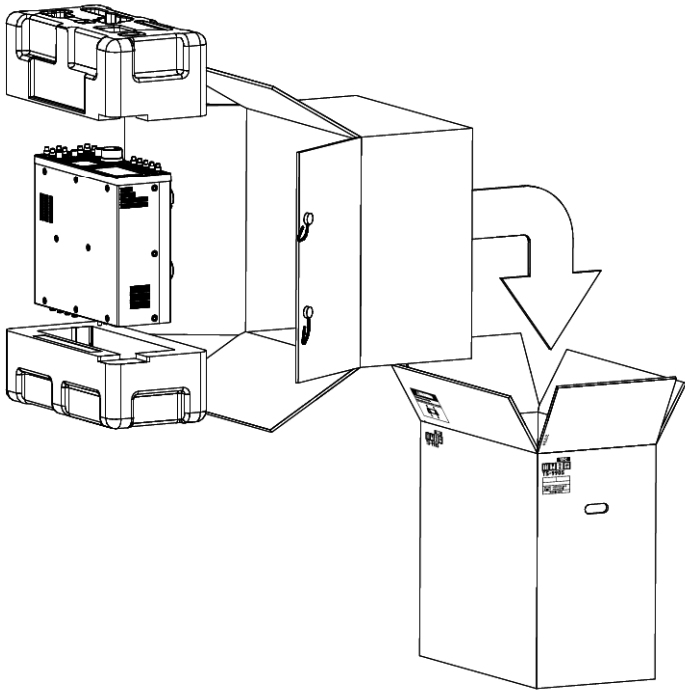
SUPPLIED ACCESSORIES

The following accessories are supplied with the transceiver. After carefully unpacking the transceiver, identify the accessories listed in the table.

Description	Quantity
AC Power Cable	1
7-pin DIN plug	1
13-pin DIN plug	1
Fuse (4 A)	1
INSTRUCTION MANUAL	1
Warranty Card	1
Circuit Diagram	1
Leaflet (E-type only)	1

IMPORTANT NOTICE FOR STORAGE OF PACKING MATERIALS AND TRANSPORTATION

This transceiver is heavy. Store all packing materials for the transceiver for future use, such as when transporting the transceiver when moving or requesting after service. Do not hire a regular door-to-door delivery service; we highly recommend you use a specialized transport company, such as a furniture delivery service, who is responsible for packing, pickup and delivery.



This transceiver is precise and sensitive. To prevent it from being damaged during transportation, the transceiver must be packed with its original packing materials and transported with the front panel facing up. Do not transport the transceiver placed sideways. To prevent injury, transport the transceiver with at least two workers.

ABOUT THIS MANUAL

This manual was written subject to the specifications and designs described below.

Specifications are described in SPECIFICATIONS in chapter 19, "OTHERS". (page 19-6)

Firmware Version: V1.0x.xx

You can verify the firmware version as described below.

The "⏻" LED lights red after the transceiver is turned OFF by pressing [⏻]. While the transceiver is in this state, you can verify the firmware version as described below.

1 Hold down [M.IN] (Memory), then press [⏻].
The Firmware Update screen appears after the startup screen, and the firmware version can be viewed.

2 Press [⏻] to turn the transceiver OFF.
The transceiver turns OFF.

Note:

- There are two [M.IN] keys on this transceiver; one is for Memory and the other for Quick Memory. To view the firmware version, be sure to use [M.IN] (Memory).

The latest firmware and its corresponding instruction manual, in PDF format, can be downloaded from the following URL:

<http://www2.jvckenwood.com/products/communications/amateur/index.html> (example)

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

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Furthermore, any reselling, assigning or transferring of the software is also strictly prohibited without embedding the software in KENWOOD product memories.

SOFTWARE LICENSE AGREEMENT

Software License Agreement contains the terms and conditions of use of the software embedded in or used with the transceiver. A user is entitled to use the software subject to the acceptance and agreement of this Software License Agreement by the user. Also, this Software License Agreement stipulates the terms and conditions of use of this software embedded in or used with the transceiver, and a user has the right to use the transceiver with the software embedded subject to the applicable laws and regulations, the description and defined in this manual and the warranty card.

The following procedures allow you to display the Software License Agreement on the main screen.

- 1 Press **[ADV.]** (F) from the **Menu** screen.
The **Advanced Menu** screen appears.
- 2 Select Menu 28, "Software License Agreement", from the **Advanced Menu** screen.
- 3 Press **[SELECT]** (F4).
The Software License Agreement appears.
- 4 Press [] (F2) or [] (F3), or rotate the **MULTI/CH** control.
You can scroll through the text of the Software License Agreement.
- 5 Press **[ESC]**.
The Software License Agreement disappears.

IMPORTANT NOTICES CONCERNING THE SOFTWARE

The software embedded in this transceiver consists of a multiple number of and individual software components. Title to and ownership of copyrights for each software component is reserved for JVC KENWOOD Corporation and the respective bona fide holder.



This product employs the software component in accordance with the End User License Agreement (hereinafter referred to as the "EULA") stipulated by JVC KENWOOD Corporation and/or the respective bona fide holder.

There is free software stipulated and governed by the "EULA", and this, a distribution condition of the software component in the executable format under the terms and conditions contained in the GNU General Public License or Lesser General Public License (hereinafter referred to as the "GPL/LGPL"), requires to make the source code for the relevant software components available.

Access the URL below for details of the software component stipulated in the "GPL/LGPL".

URL: <http://www.xxxxxxxx.co.jp/gpl.html> (example)



The following procedures allow you to display Important Notices concerning Free Open Source software on the main screen.

- 1 Press **[ADV]** (F) from the **Menu** screen.
The **Advanced Menu** screen appears.
- 2 Select Menu 29, "Important Notice concerning Free Open Source", from the **Advanced Menu** screen.
- 3 Press **[SELECT]** (F4).
Important Notices concerning Free Open Source appears.
- 4 Press [] (F2) or [] (F3), or rotate the **MULTI/CH** control.
You can scroll through the text of the Important Notices concerning Free Open Source software.

- 5 Press **[ESC]**.
The Important Notices concerning Free Open Source software disappears.

ABOUT THE GPL/LPGL LICENSE

The following procedures allow you to display About the GPL/LPGL License on the main screen.

- 1 Press **[ADV.]** (F) from the **Menu** screen.
The **Advanced Menu** screen appears.
- 2 Select Menu 30, "About the GPL/LPGL License", from the **Advanced Menu** screen.
- 3 Press **[SELECT]** (F4).
About the GPL/LPGL License appears.
- 4 Press [] (F2) or [] (F3), or rotate the **MULTI/CH** control.
You can scroll through the text of the About the GPL/LPGL License.
- 5 Press **[ESC]**.
About the GPL/LPGL License disappears.

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- JVC KENWOOD Corporation shall be free from any responsibilities for any incidental losses or damages, such as missing communications or call opportunities caused by a failure or performance error of the transceiver.

ABOUT THE URL AND CONTACTS OF JVC KENWOOD CORPORATION

The latest URL and contacts of JVC KENWOOD Corporation at the time when this manual was written are described in this manual. Due to changes of social circumstances or the management environment, the URL and contacts of JVC KENWOOD Corporation may change from time to time. If you are unable to access the URL or contacts, contact your dealer to determine the latest URL and contacts.

NOTATIONS APPLIED TO THIS MANUAL

This transceiver has many user operations, such as those for the main band and the sub-band, keys and controls, function keys and operations from connected equipment, etc., as well as unique transceiver behaviors. To clarify and simplify the descriptions provided in this manual, the following notations and writing conventions have been used.

The captioned display images may differ from what appears on your transceiver, due to your operating environment, design changes, etc.

■ MAIN BAND AND SUB BAND

Following a key or control name, (M) or (S) is described, allowing you to distinguish on which band, either the main band or the sub band, the key or control is to be used. If the band that the key or control is to be used for is not clarified as either the main band or the sub band, the band is specified as "the selected band" in this manual.

■ KEYS AND CONTROLS

The transceiver has many keys and controls. The notation "key" is omitted from individual keys; however, the notation "control" is not omitted, allowing you to distinguish controls from keys.

■ LEDS AND DISPLAYS

On the transceiver front panel, there are LEDs that indicate the status of the corresponding function as either active or inactive. Information that appears on the main screen or the sub screen is described as the "display". Refer to chapter 2, "PANEL DESCRIPTION", for further details. {page 2-1}

■ SCREEN AND MESSAGES

Information that appears on the main screen after pressing the MENU key or by a long press of any particular key is described as the "screen". A text string (mainly in a message box) navigating your operation or notifying you of an error is described as a "message".

■ AUDIBLE OPERATION AIDS

This transceiver assists your operation with a beep upon a key press and the use of voice guidance. Configuration methods for those audible operation aids are described in this manual.

■ NOTATION FOR KEYS, CONTROLS AND DISPLAYS

In this manual, each key, control, and display are described.

Notation	Example	Overview
[x x x]	[CW/REV] [M>S] (M)	Keys located on the front panel
The ○○○ control	The MULTI/CH control The NB1 (M) control	Controls located on the front panel

The Tuning control	The Tuning control The Tuning (S) control	The Tuning controls located on the front panel
The "○○○" LED	The "MAIN BUSY/TX" LED The "MONI/SEL" LED	LEDs located on the front panel or on the keys with the front panel
The ○○○ connector	The ACC 2 connector	Connectors, jacks and ports located on the front and rear panels
The ○○○ screen	The Menu screen The Bandscope screen	Screens that appear on the main screen to configure or select a parameter.
"○○○"	"FSK" "Off"	Information that appears on the main screen or the sub screen, or an option in the parameter box.
[x x x] (F)	[ATT -12dB] (F)	Function keys corresponding to the key guide along the right side of the main screen. The task name displayed on a key guide appears in brackets. This task name (key guide) may vary from screen to screen.

■ NOTATIONS FOR USER OPERATION

In this manual, various user operations are described, as below.

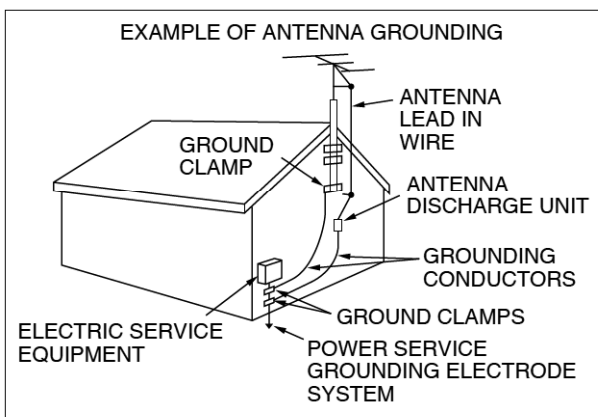
Notation	Example	Overview
Press down the main power switch		Press the main power switch located on the rear panel, to the "I" (ON) or "O" (OFF) position.
Press [⏻].		Press [⏻] on the front panel.
Press [S.DISP].	Press [MENU]	The MENU screen appears. If the MENU screen is open, the MENU screen closes.
Press [S.DISP].	Press [VOX]	Press momentarily to activate the unique function of the key.
Press [S.DISP].	Press [ESC].	Press to revert to the screen which was displayed prior to the current screen, or to close the screen assigned for the particular task.
Press and hold	Press and hold [CW/REV]	Press and hold a key for the time configured in Menu 0-12, "Long Press Duration of Panel Keys", to activate the unique function of the key or the function assigned to the key.
Hold down	Hold down [PTT]	Hold down a key to activate or enable the specific function or behavior, until the key is released.

PRECAUTIONS

Precautions

Please observe the following precautions to prevent fire, personal injury, and transceiver damage:

- Connect the transceiver only to a power source as described in this manual or as marked on the transceiver itself.
- Route all power cables safely. Ensure the power cables can neither be stepped upon nor pinched by items placed near or against the cables. Pay particular attention to locations near AC receptacles, AC outlet strips, and points of entry to the transceiver.
- Take care not to drop objects or spill liquid into the transceiver through enclosure openings. Metal objects, such as hairpins or needles, inserted into the transceiver may contact voltages resulting in serious electrical shocks. Never permit children to insert any objects into the transceiver.
- Do not attempt to defeat methods used for grounding and electrical polarization in the transceiver, particularly involving the power input cable.
- Adequately ground all outdoor antennas for this transceiver using approved methods. Grounding helps protect against voltage surges caused by lightning. It also reduces the chance of a build-up of static charge.



- Minimum recommended distance for an outdoor antenna from power lines is one and one-half times the vertical height of the associated antenna support structure. This distance allows adequate clearance from the power lines if the support structure fails for any reason.
- Locate the transceiver so as not to interfere with its ventilation. Do not place books or other equipment on the transceiver that may impede the free movement of air. Allow a minimum of 10 cm (4 inches) between the rear of the transceiver and the wall or operating desk shelf.
- Do not use the transceiver near water or sources of moisture. For example, avoid use near a bathtub, sink, swimming pool, or in a damp basement or attic.
- The presence of an unusual odor or smoke is often a sign of trouble. Immediately turn the power OFF and remove the power cable. Contact a Kenwood service station or your dealer for advice.
- Locate the transceiver away from heat sources such as a radiator, stove, amplifier or other devices that produce substantial amounts of heat.
- Do not use volatile solvents such as alcohol, paint thinner, gasoline, or benzene to clean the cabinet of the transceiver. Use only a clean cloth with warm water or a

mild detergent.

- Disconnect the input power cable from the power source when the transceiver is not used for long periods of time.
- Remove the transceiver's enclosure only to do accessory installations described in this manual or accessory manuals. Follow provided instructions carefully, to avoid electrical shocks. If unfamiliar with this type of work, seek assistance from an experienced individual, or have a professional technician do the task.
- Enlist the services of qualified personnel in the following cases:
 - a) The power supply or plug is damaged.
 - b) Objects have fallen into or liquid has spilled into the transceiver.
 - c) The transceiver has been exposed to rain.
 - d) The transceiver is operating abnormally or performance has seriously degraded.
 - e) The transceiver has been dropped or the enclosure damaged.
- Do not touch the power plug while your hands are wet to avoid risk of electric shock.
- Keep children away from the transceiver, to avoid unnecessary risk of harm to the child.
- Do not remove the plug from an AC outlet by pulling the AC cable.
- Plug the AC cable only into a grounded AC outlet.
- Do not block the transceiver air vent. Do not cover the transceiver. To maintain good ventilation, place the transceiver at least 10 cm (4 inches) away from the wall.

1 INSTALLING AND CONNECTING THE TRNASCEIVER

PRECAUTIONS FOR INSTALLATION

Carry and install the transceiver with two or more persons. Over-loaded carriage and installation may cause the damage to your body or the transceiver or both.

DO NOT heave the transceiver by grasping the Tuning knob or other knobs on the front panel and connectors on the rear panel. This may also cause the damage to your body or to knobs and connectors.

ANTENNA INSTALLTION AND CONNECTION

An antenna system consists of an antenna, coaxial cable and ground, and results in the best performance of the transceiver with the careful installation.

Use with the correctly tuned 50Ω antenna, the 50Ω coaxial cable and appropriate connectors. All connections must be clean and tight. Match the impedance of the coaxial cable and antenna, until the SWR becomes 1.5:1 or less.

High SWR results in the transmit power to drop and the radio frequency interference to consumer products such as the broadcast radio and television.

If you are notified that the signal has been distorted, there may be a feasibility that the antenna system is not efficiently radiating the transceiver's power.

PRECAUTIONS

- Transmission without connecting the antenna to the transceiver may damage the transceiver. Prior to transmission, connect the antenna or the 50Ω dummy load to the transceiver.
- For use with the transceiver as the base station, we recommend to install an arrester so as to avoid fire, electrification, damage, and injury.
- If the antenna SWR exceeds 1.5:1 or more, the protection circuit activates in the transceiver. Ensure to use the antenna with lower SWR.
- If the antenna, dedicated for reception using a semiconductor, such as an active antenna is connected to the transceiver, DO NOT transmit or activate the antenna tuning. Doing so will supply the power source to the antenna system damaging the semiconductor circuits of the antenna.

Connecting an AC Power Cable

Use the AC power cable supplied with this transceiver to plug to an AC inlet.

GROUND CONNECTION

To avoid any danger such as electrification, good ground connection is mandatory.

First, one or more of the ground rods or the large copper plate is buried in the ground and connected to the GND terminal on the rear panel. For this connection, use the thick conductive wires or the copper band plate formed as little as possible.

PRECAUTIONS

- DO NOT use a gas pipe, a conduit pipe and tube for electricity distribution, the plastic water pipe, etc. for grounding. These do not have any effect for grounding. These may cause an accident or fire.

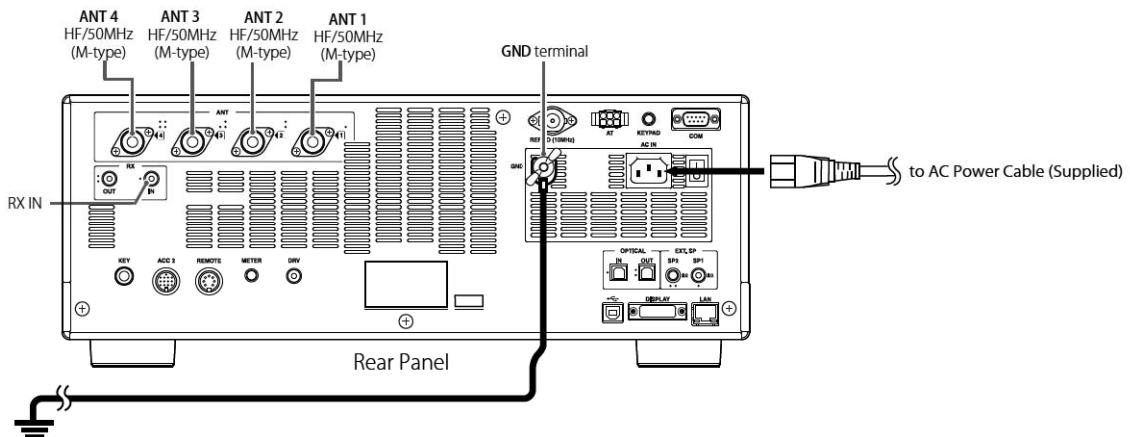
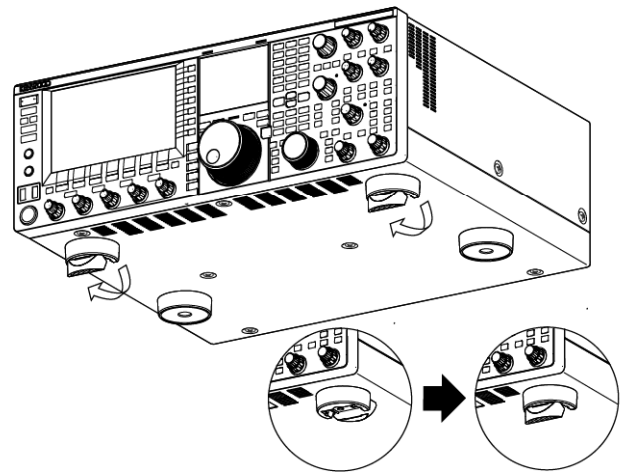
ARRESTER INSTALLATION

To avoid fire, electrification, damage, and injury by the lightning strike, install the lightning surge protector.

Alternately, should any lightning be assumed, remove from the transceiver a cable connected to an antenna.

UTILIZING FRONT BASES WITH LIFT UP MECHANISM

The lift-up supplementary bases are available in the front bases on the bottom of the transceiver. To position the front panel slightly toward the upper side, pull the supplementary bases forward to the limit.



CONNECTING ACCESSORIES

Note:

- A cable exceeding 3 m (9.8 feet) may not be connected to a connector below.
 - KEY jack
 - ACC 2 connector
 - REMOTE connector
 - METER jack
 - DRV connector
 - KEYPAD jack
 - COM connector
 - EXT.SP1 jack
 - DISPLAY connector
 - LAN connector
 - PHONES jack
 - PADDLE jack
 - MIC connector
- A cable exceeding 1 m (3.3 feet) may not be connected to a connector below.
 - USB connector (Front & rear panels)

HEADPHONES (PHONES)

Accepts the 2-conductor (mono) or 3-conductor (stereo) headphones with an impedance of 4 to 32Ω (standard: 8Ω) and the φ6.3 mm (φ1/4") plug. Once the headphones are plugged, an audio line for an internal speaker (or an optional external speaker) is muted, and the audio sounds from the headphones. Following are the optional headphones that can be connected to the transceiver.

- HS-5
- HS-6

Note:

- The higher impedance the headphones have, the larger volume becomes.

MICROPHONE (MIC)

Accepts the microphone with an impedance of 250 to 600Ω.

Connect a plug of the microphone to the MIC connector on the front panel and screw the retaining ring until the microphone is securely tightened.

Following are the optional microphones that conform to the transceiver.

- MC-43S
- MC-60A
- MC-90
- MC-47

The following microphones cannot be used with the transceiver.

- MC-44
- MC-44DN
- MC-45
- MC-45DN

PADDLE (PADDLE)

For the operation of CW using the built-in electronic keyer, connect the keyer to the PADDLE jack. To the PADDLE jack, the 3-conductor and φ6.3 mm (φ1/4") plug can be connected. The straight key can be connected to the PADDLE jack. In this case, select "Key" from Menu 5-00 "Paddle Jack Configuration (Front)". (page x-xx)

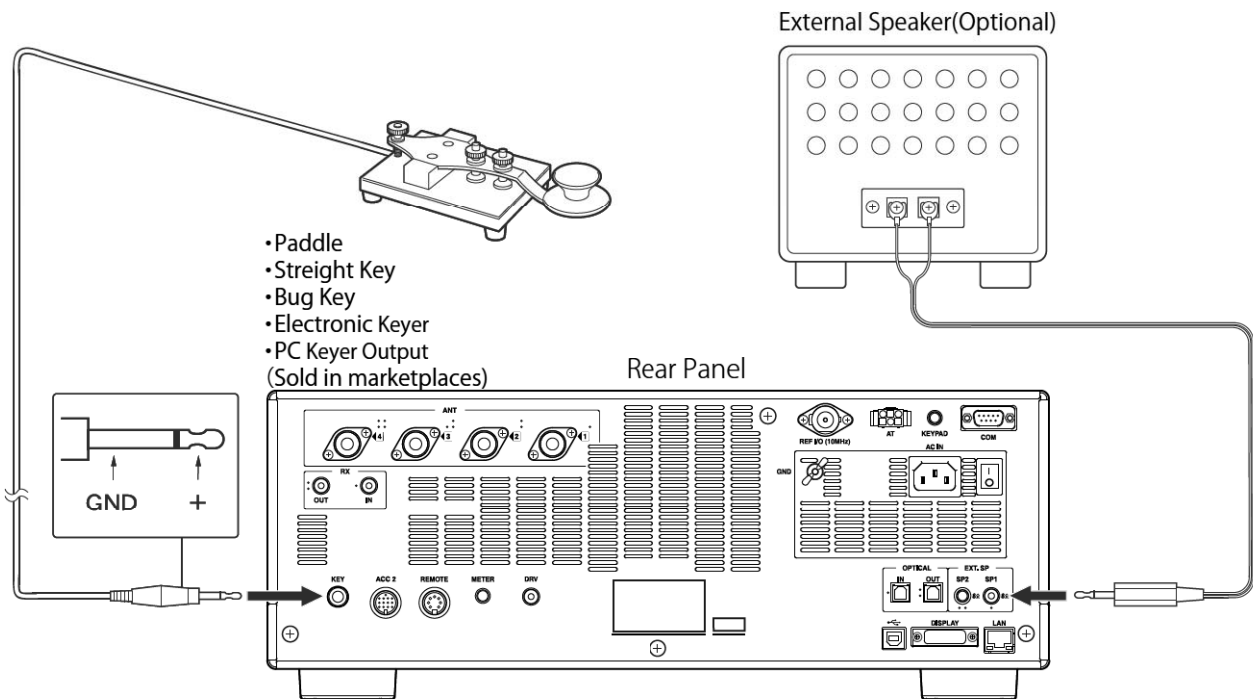
USB FLASH DRIVE/USB KEYBOARD (USB-A)

Any USB flash drive or USB keyboard sold in the market place can be connected.

Connect it securely to the (USB-A) port.

Note:

- During the use with the USB flash drive, for instance while the data in it is reading or writing, DO NOT disconnect the USB flash drive from the transceiver. Also, do not shut down the transceiver using the [apple] key. (page 12-xx)
- To remove the USB flash drive from the transceiver, ensure that the safe removal of USB flash drive has been executed in the Sub-menu. (page 12-xx)



EXTERNAL SPEAKERS (EXT.SP1/EXT.SP2, 8Ω)

The transceiver is equipped with two independent receivers. In general, audio from both receivers sounds from an internal speaker; however, connecting an external speaker enables to emit respective audio separately. On a rear panel, two jacks for an external speaker are available allowing you to connect two external speakers.

The external speaker with an impedance of 4 to 8Ω (standard: 8Ω) can be connected using the 2-conductor (mono) and the φ3.5 mm (φ1/8") plug. If an external speaker is connected to EXT.SP1, no audio sounds from the internal speaker.

If an external speaker is connected to EXT.SP2, the audio sounds from the external speaker connected to EXT.SP2 and the internal speaker.

Note:

- EXT.SP1 and EXT.SP2 have the 8Ω jacks dedicated for the external speakers. DO NOT connect the headphones. Doing so will result in the larger audio volume causing the auditory disorder.
- Audio to sound from an external speaker can be selected from the menu. {page 16-x}

KEYPAD (KEYPAD)

You can connect the PF keypad you have made. {page 16-x}

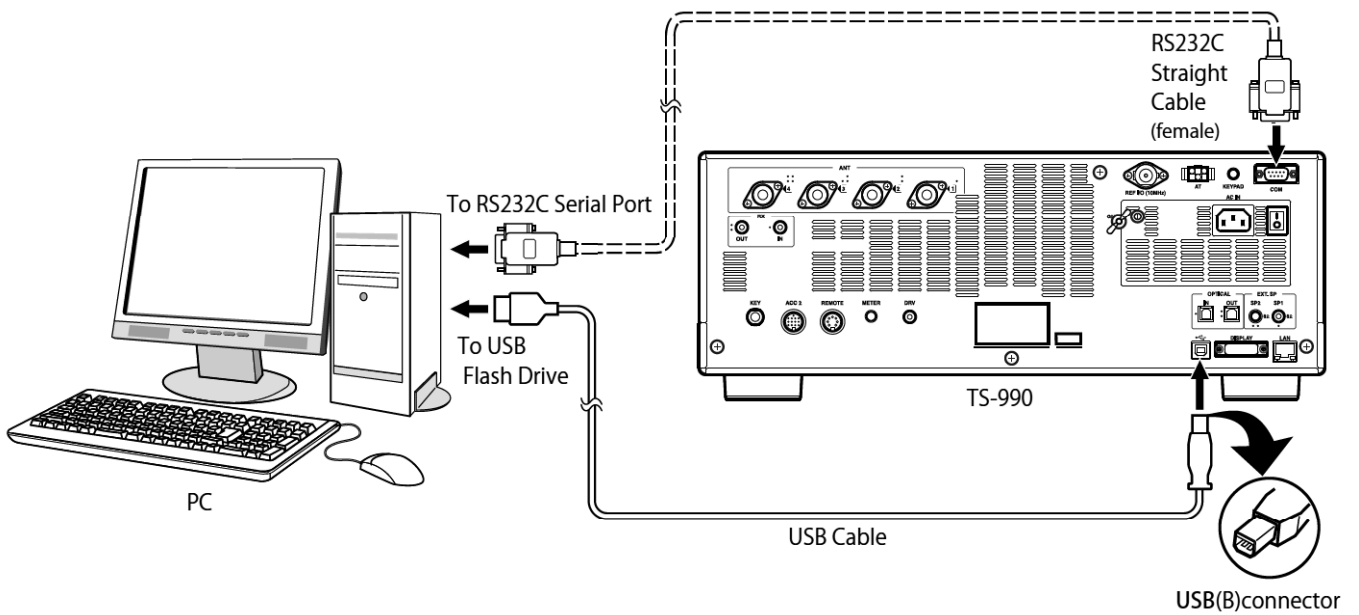
KEY FOR CW (KEY)

For the CW operation without using the built-in electronic keyer, the plug from the electronic key, the bag key, the external electronic keyer or the PC keyer can be connected. The plug must be the 2-conductor (mono) and φ3.5 mm (φ1/8").

The external electronic keyer and the PC keyer source the positive voltage during the key up, and sourcing such voltage to the ground line enables the key down. Use the shielded cable to connect the keyer to the transceiver. Depending on the menu configuration, a paddle can be connected to the KEY jack, and an internal electronic keyer can be used. {page x-xx}

Note:

- Refer to "Electronic Keyer" for the details of the built-in keyer. {page 5-x}

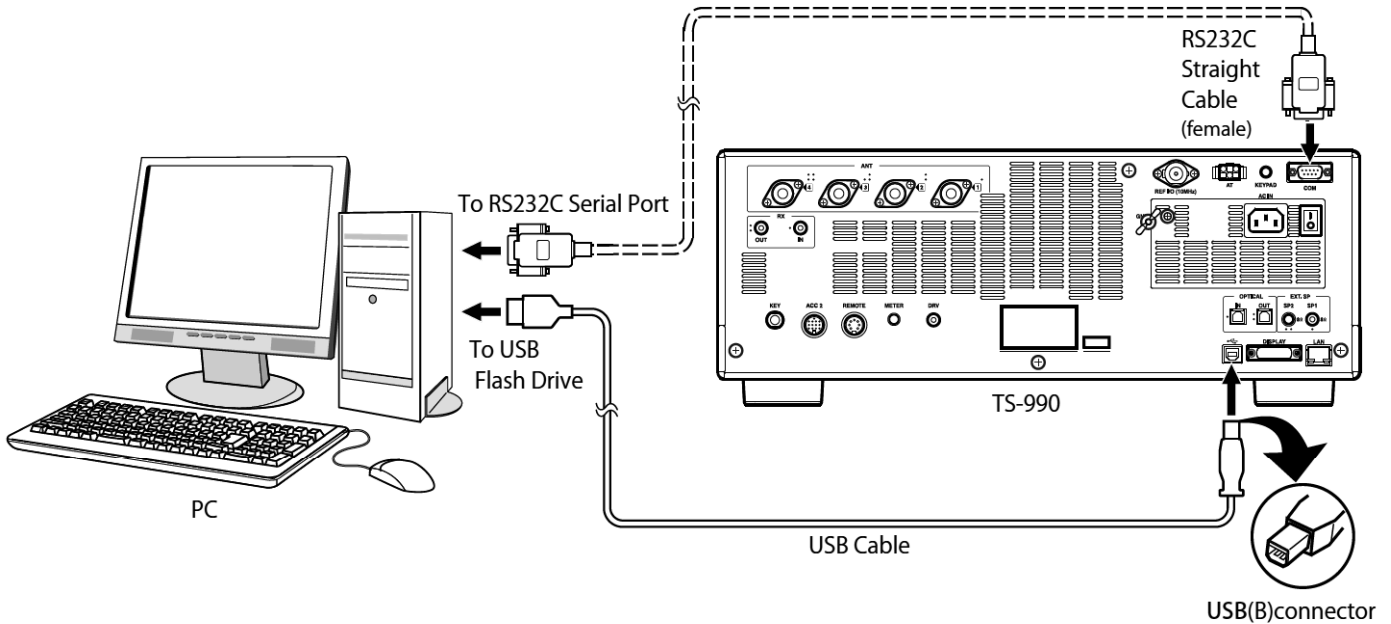


CONNECTION TO A PC

The transceiver can be connected directly to the PC using the USB cable or the RS-232C straight cable.

Note:

- Shut down the transceiver using the [apple] key prior to connecting the transceiver to the PC.
- The transceiver is not sold coupled with the USB cable nor the RS-232C straight cable; use the cable commonly sold in the market place.
- The USB audio in principle results in delay. Also, the audio interruption may occur depending on the characteristics of your PC and the status of load. USB audio fits in the communications to which the time lag does not influence or in the recording of the received audio in the PC.

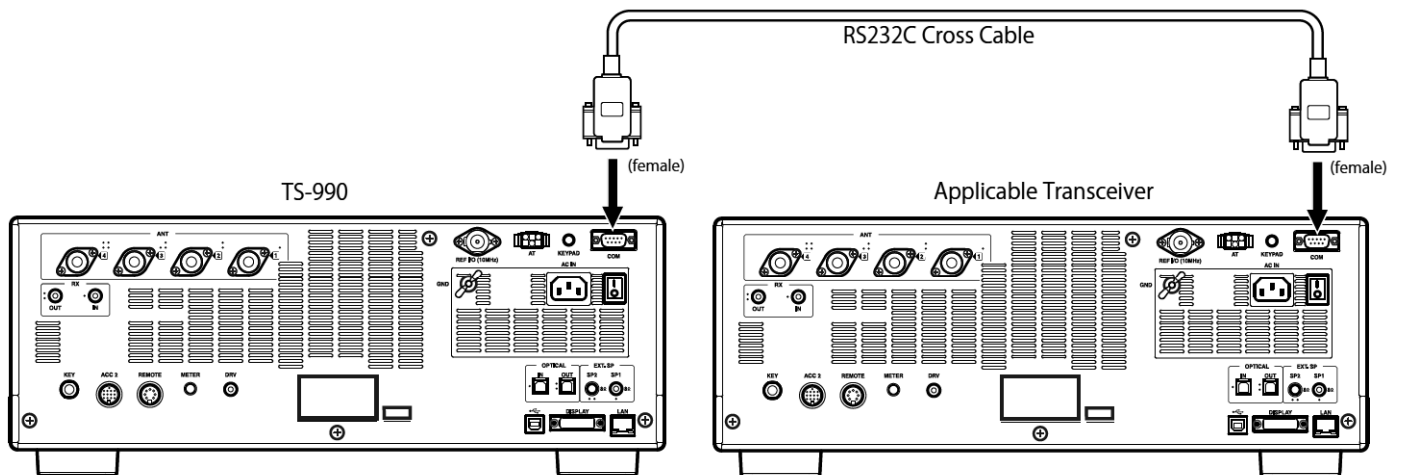


CONNECTION TO THE APPLICABLE TRANSCEIVER (SPLIT FREQUENCY TRANSFER)

For the data transfer {page 16-xx}, use the RS232C cross cable (female to female) to connect the COM connector in the transceiver to the COM connector of the applicable transceiver.

Following are the applicable transceivers:

- TS-990 series, TS-590 series, TS-480 series, TS-2000 series and TS-570 series transceivers



CONNECTING A LINEAR AMPLIFIER

The linear amplifier can be connected to the REMOTE connector.

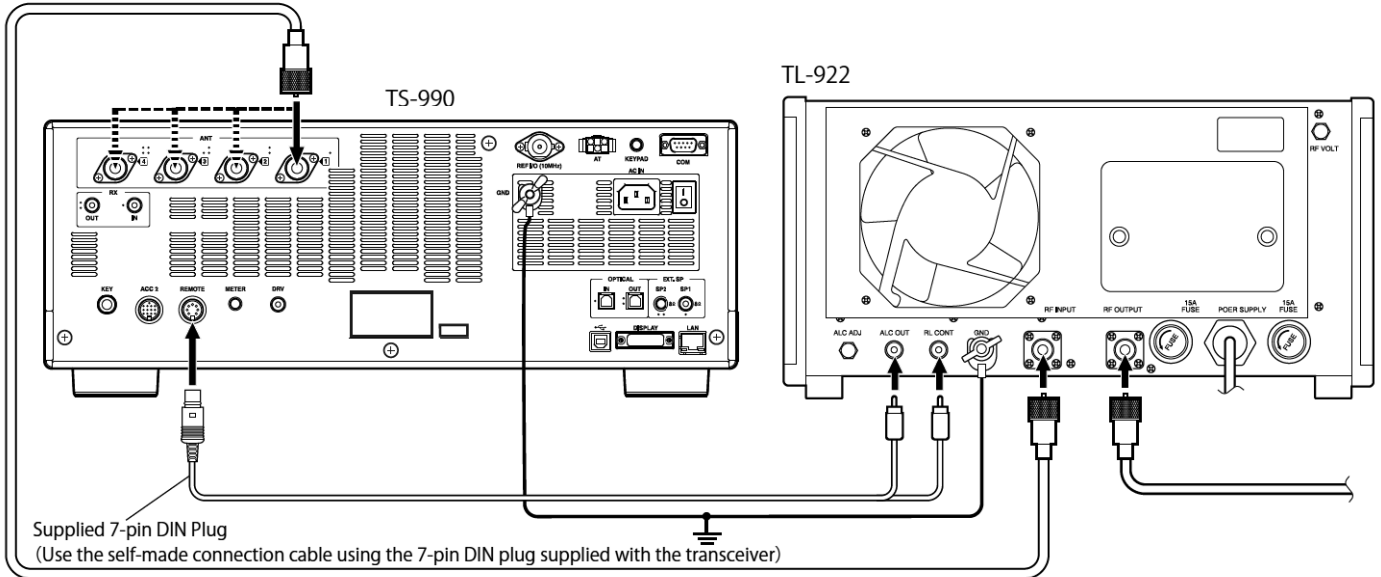
Prior to activating the linear amplifier, ensure that the configurations for the linear amplifier control have been complete. {page 16-x}

The response time from when the transceiver is placed in the transmit state until the signal is actually transmitted is 10 ms; however, 25 ms can be configured to extend the response time for operations except for CW full break-in.

Note:

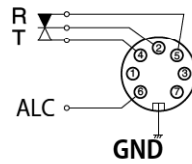
- The TX/RX control method may vary depending on the type of the external linear amplifier. There is the linear amplifier available which will enter the TX mode when the control terminal is switched to the ground line. For such a linear amplifier, allocate the pin number 2 in the REMOTE connector to connect to the GND terminal and the pin number 4 to the control terminal of the linear amplifier.
- TL-922 and TL-933 have been discontinued and are no longer available.

CONNECTION TO TL-922



CONTROL RELAY

Activates if "Active High + Relay" or "Active High + Relay & TX Delay Control" has been configured for Advanced Menu 11 "Linear Amplifier Control (HF Band)".



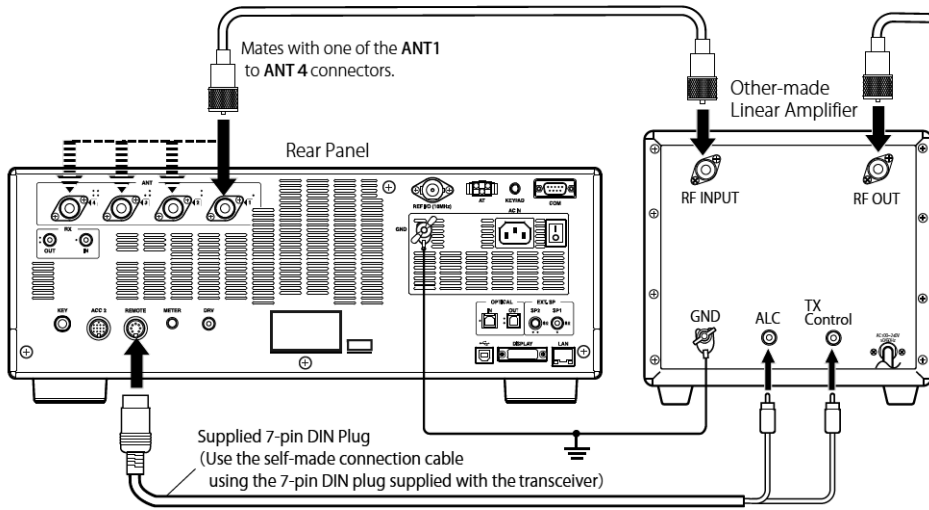
REMOTE connector {page 1-9}
(Viewed from the rear panel side)

CONNECTING A TYPICAL LINEAR AMPLIFIER

To connect to other made linear amplifier to the transceiver, follow the instructions in the following illustration.

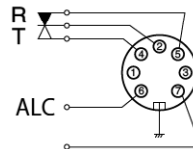
Note:

- Those linear amplifiers, having the ALC output level in the range between 0 to -4 V, are suitable for practical use. For those linear amplifiers having other ALC output level, automatic level control may not function correctly due to unexpected oscillation or distortion causing a drop of the rated output power.



CONTROL RELAY

Activates if "Active High + Relay" or "Active High + Relay & TX Delay Control" has been configured for Advanced Menu 11 "Linear Amplifier Control (HF Band)".



REMOTE connector {page 1-9}
(Viewed from the rear panel side)

CONNECTION TO OTHER TRANSCEIVER WITH TNC TERMINAL

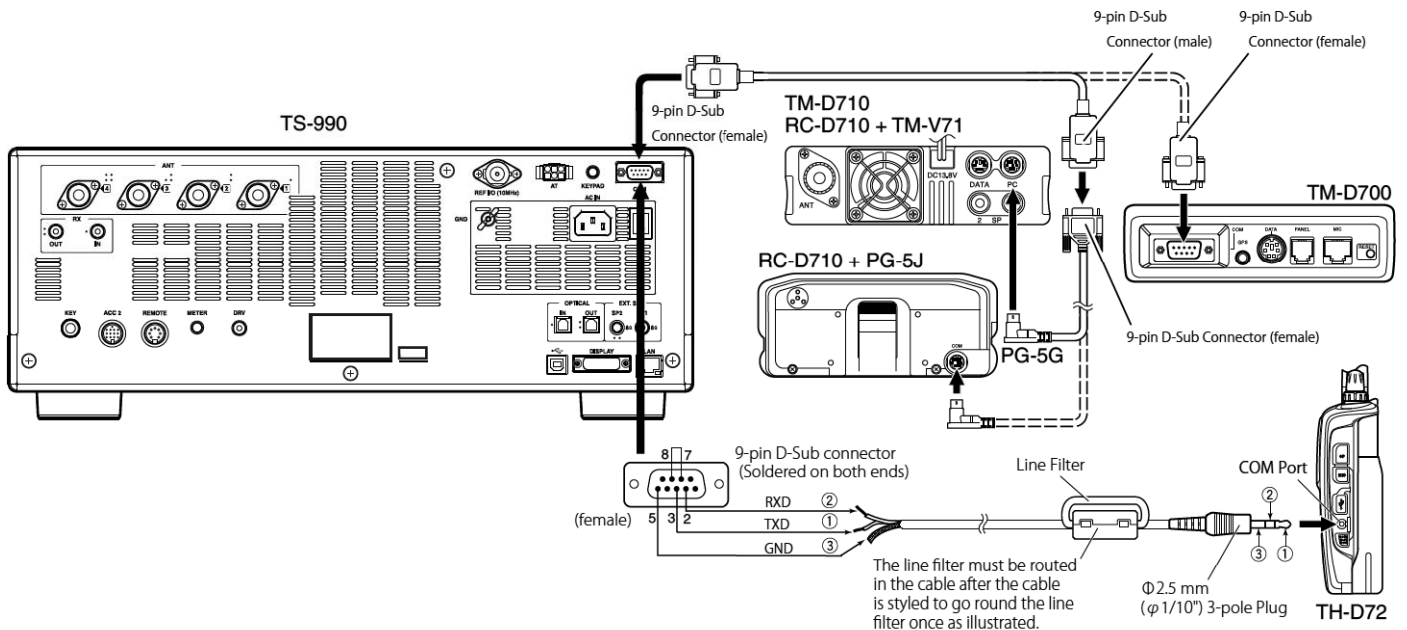
Following is the connection which allows the packet cluster tuning using TM-D710, RC-D710, or TM-D700.

The transceiver can be connected to TM-D710 or RC-D710 using the optional PG-5G and the RS-232C cross-cable which is sold in the market place. If the RS-232C cross cable has the female plugs or the male plugs, you need the female to male conversion plug.

The transceiver can be connected to TM-D700 using the RS-232C cross-cable which is sold in the market place.

Note:

- TM-D700 has been discontinued and is no longer available.
- Refer to the instruction manual supplied with TH-D72 for the details of connection to TH-D72.

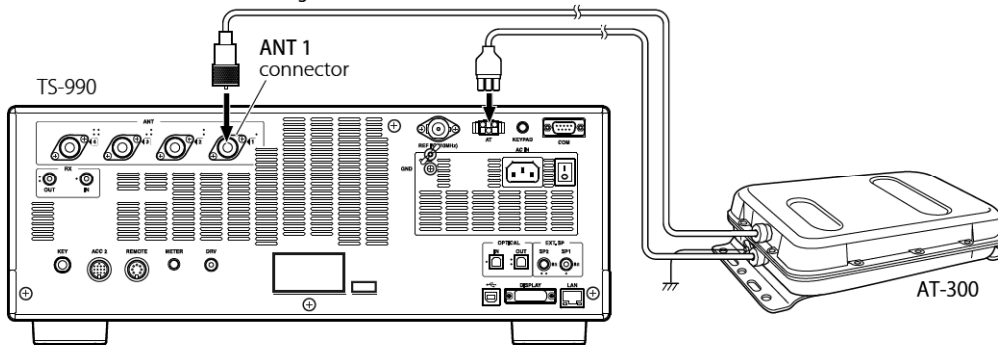


CONNECTION TO EXTERNAL ANTENNA TUNER

The antenna connector from the external antenna tuner must be connected to the antenna connector 1 (ANT1). The external antenna tuner does not function if the external antenna tuner has been connected to other antenna connector than the antenna connector 1 (ANT2).

Note:

- Connect AT-300 after the transceiver has been turned OFF using the [apple].
- While AT-300 is in use, the transceiver cannot be used in the 50 MHz band. The antenna for 50 MHz band must be connected to other antenna connector than the antenna connector 1 (ANT1).
- If the external antenna tuner is connected to the antenna connector 1 (ANT1), the internal antenna tuner becomes inactive, and the signal, as if the signal is pass through the tuner, is sent to the external antenna tuner.
- AT-300 has been discontinued and is no longer available.



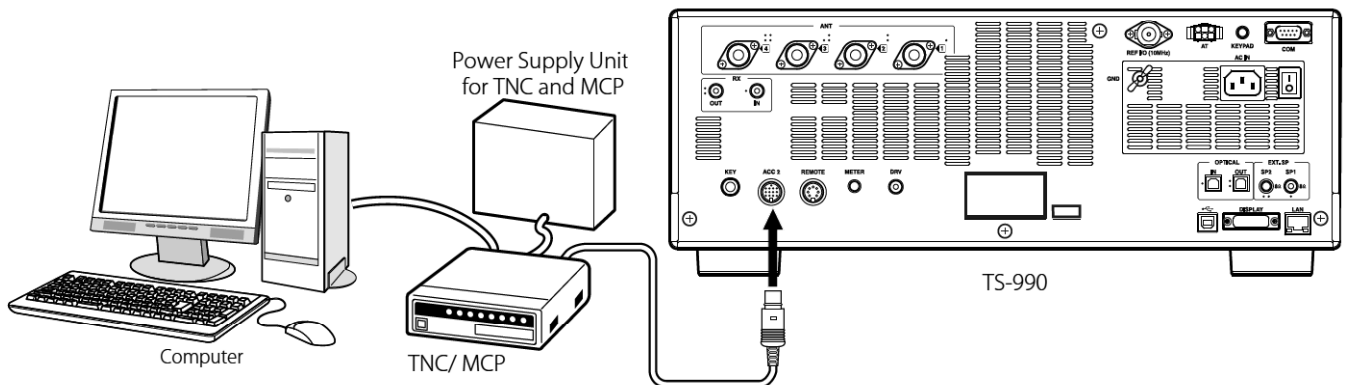
CONNECTION TO TNC, MCP, AND SO ON

To make the packet communications, using the external TNC (terminal node controller) or MCP (multi-mode communication processor) terminal or the sound capability in the PC, and to make the digital communications such as RTTY, P5K, S5TV, use the ACC2 connector on the rear panel.

- The cable with the 13-pin DIN plug can be used to connect the transceiver to the external device such as the PC having the TNC, MCP and sound capability, etc.
- To connect the PC to the TNC, MCP terminals and interface, use the RS232C cable sold in the market place.

Note:

- To prevent from being interference due to noise, etc., ensure that the transceiver is placed away from your PC.

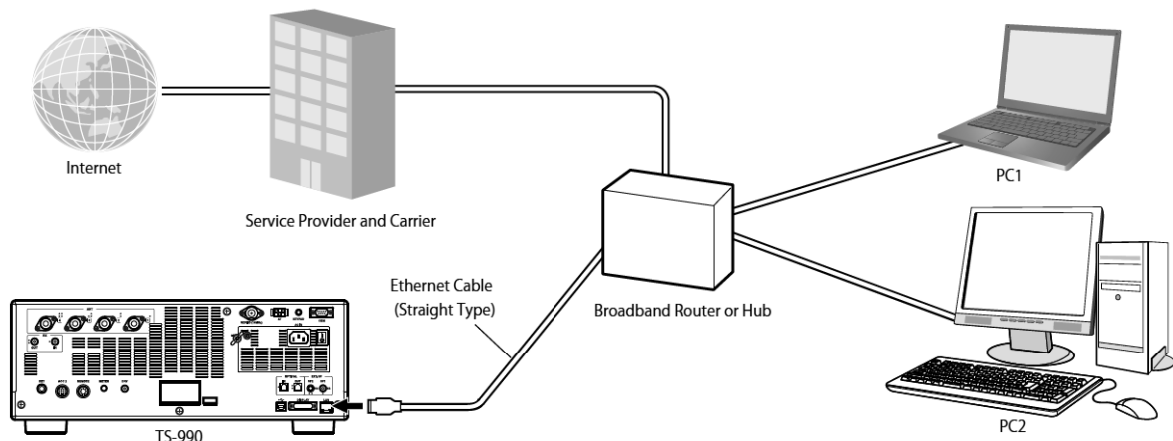


CONNECTING TO YOUR LAN

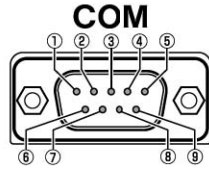
To connect the transceiver to your LAN, use an Ethernet cable (straight type) for connection shown in the illustration below:

Note:

- The transceiver is not sold coupled with the Ethernet cable; use the cable commonly sold in the market place.



TERMINAL DESCRIPTIONS



COM CONNECTOR

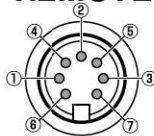
Pin No.	Pin Name	Function	Input/Output
1	NC	No connection	—
2	RXD	Sends the serial data to a PC.	O
3	TXD	Receives the serial data from a PC.	I
4	NC	No connection	—
5	GND	Ground	—
6	NC	No connection	—
7	RTS	Receives the status from a PC. If the PC cannot accept the serial data, the PC sends the "L" state signal to disables the transceiver to transfer the serial data.	I
8	CTS	Sends the serial data to a PC from the transceiver. If the transceiver cannot accept the serial data, the transceiver sends the "L" state signal to disables the PC to transfer the serial data.	O
9	NC	No connection	—



ACC2 CONNECTOR

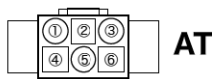
Pin No.	Pin Name	Function	Input/Output
1	SANO	Sends the Sub-band data.	O
2	RTTY	RTTY (FSK keying terminal)	I
3	MANO	Sends the Main-band data.	O
4	GND	Ground	—
5	MSQ	Sends the Main-band squelch control signal. <ul style="list-style-type: none"> Connects to the squelch input terminal in the TNC or MCP terminal or the interface terminal for connection to the PC. Open Squelch: Low impedance Tight Squelch: High impedance 	O
6	MMET	Sends the Main-band meter levels.	O
7	SSQ	Sends the Sub-band squelch control signal.	—
8	GND	Ground	—
9	PKS	PTT Input for data communication <ul style="list-style-type: none"> Connects to the PTT input terminal in the TNC or MCP terminal or the interface terminal for connection to the PC. Audio line from the MIC connector on the front panel will be muted during the transmission. 	I
10	SMET	Sends the Sub-band meter levels.	O
11	ANI	Audio input for data communication <ul style="list-style-type: none"> Connects to the audio output terminal in the TNC or MCP terminal or the PC (or an interface terminal for connection to the PC). Audio input level cannot be changed by the MIC GAIN knob on the front panel. Audio input level can be changed in Menu 7-06. 	I
12	GND	Ground	—
13	SS	PTT input (same as the MIC connector on the front panel)	I

REMOTE



REMOTE connector

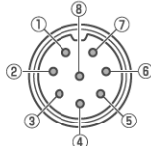
Pin No.	Pin Name	Function	Input/Output
1	SPO	Speaker output	O
2	COM	COMMON terminal	I/O
3	SS	Standby (PTT): Places the transceiver into TX mode upon grounding.	I
4	MKE	Connects to the COMMON terminal during the TX.	I/O
5	BRK	Connects to the COMMON terminal during the RX.	I/O
6	ALC	ALC input from the linear amplifier	I
7	RL	+12 V DC with a maximum of 10 mA signal is sent during the TX in the HF or 50 MHz band. Depending on the menu configuration, grounds with a maximum of 10 mA during the TX. {page x-xx}	O



EXT.AT connector

Pin No.	Pin Name	Function	Input/Output
1	GND	Ground	—
2	TT	EXT.AT control (TTI/TTO)	I/O
3	GND	Ground	—
4	NC	No connection	—
5	TS	EXT.AT control (TSI/TSO)	I/O
6	14S	13.8 V DC source for EXT.AT	O

MIC



MIC CONNECTOR

Pin No.	Pin Name	Function	Input/Output
1	MIC	Signal input from the microphone	I
2	SS	Microphone standby (PTT) control	I
3	MD	Microphone Down control	I
4	MU	Microphone Up control	I
5	8A	Sources DC 8 V to a microphone.	O
6	NC	No connection	—
7	MSG	Microphone Ground	—
8	MCG	Ground	—