KENWOOD
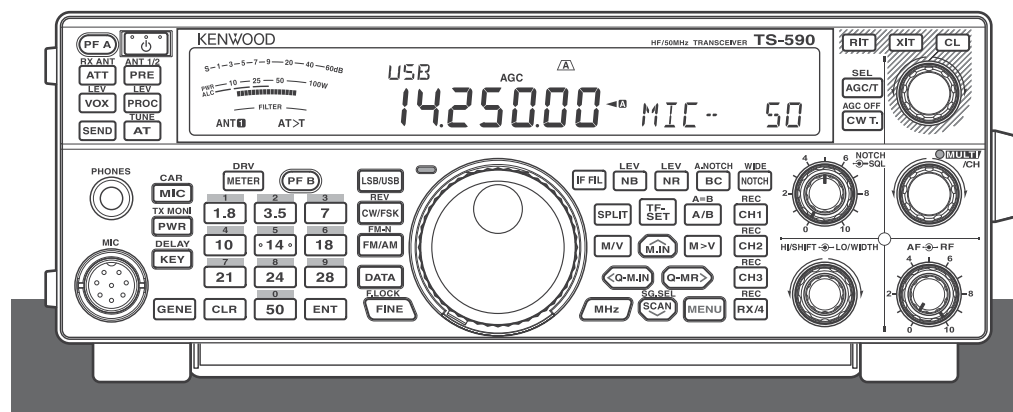
HF/50MHz TRANSCEIVER

TS-590SG

INSTRUCTION MANUAL

JVCKENWOOD Corporation

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THANK YOU

Thank you for choosing this **KENWOOD** TS-590S transceiver. It has been developed by a team of engineers determined to continue the tradition of excellence and innovation in **KENWOOD** transceivers.

This transceiver features a Digital Signal Processing (DSP) unit to process IF and AF signals. By taking maximum advantage of DSP technology, the TS-590S transceiver gives you enhanced interference reduction capabilities and improves the quality of audio. You will notice the differences when you fight QRM and QRN. As you learn how to use this transceiver, you will also find that **KENWOOD** is pursuing "user friendliness". For example, each time you change the Menu No. in Menu mode, you will see scrolling messages on the display, telling you what you are selecting.

Though user friendly, this transceiver is technically sophisticated and some features may be new to you. Consider this manual to be a personal tutorial from the designers. Allow the manual to guide you through the learning process now, then act as a reference in the coming years.

FEATURES

- All mode operation from HF to 50 MHz amateur radio band
- 500 Hz/ 2.7 kHz roofing filter
- Superior C/N response by the DDS largely decreases the noise of the undesired signal.
- IF DSP through the adoption of 32-bit floating point DSP
- Digital Noise Blanker
- PC interface via a Universal Serial Bus port (B-type)
- Drive output and RX only antenna connector
- Direct band keys
- Built-in Antenna Tuner for the HF/ 50 MHz band
- 100 W output power for SSB, CW, FSK, FM, and 25 W output power for AM.

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.

This device complies with Industry Canada licenseexempt 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.

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

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	HR				

ISO3166

Information on Disposal of Old Electrical and Electronic Equipment and Batteries (applicable for 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.

BEFORE STARTING

Amateur radio regulations vary from country to country. Confirm your local amateur radio regulations and requirements before operating the transceiver.

Depending on the size and type of vehicle, the maximum transmission output power for the mobile operation will vary. The maximum transmission output power is usually specified by the car manufacturer to avoid interference with other electric devices used in the vehicle. Consult your car manufacturer and amateur radio equipment dealer for the requirements and installation.

MARKET CODES

K-type: The Americas

E-type: Europe

The market code is shown on the carton box.

Refer to the specifications {page 86} for information on the available operating frequencies.

WRITING CONVENTIONS FOLLOWED

The writing conventions described below have been followed to simplify instructions and avoid unnecessary repetition.

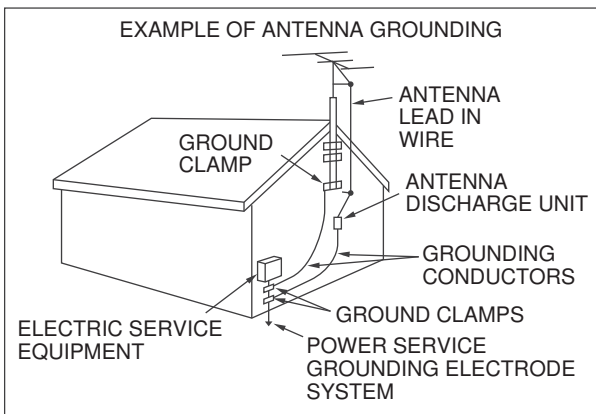| Instruction	Action
Press **[KEY]**.	Press and release KEY.
Press Mic **[KEY]**.	Press and release KEY on the microphone.
Press and hold **[KEY]**.	Press and hold KEY down for a moment, then release KEY.
Hold **[KEY]**.	Press and hold KEY down until instructed to release KEY.
Press **[KEY]** + **[⏻]**.	With the transceiver power OFF, press and hold KEY, then switch the transceiver power ON by pressing **[⏻]**.

SUPPLIED ACCESSORIES

After carefully unpacking the transceiver, identify the items listed in the table below. We recommend you keep the box and packing materials in case you need to repack the transceiver in the future.

Accessory	Comment	Quantity	
		K-type	E-type
Microphone		1	1
DC power cable		1	1
Line filter (with retaining band)		–	1
Fuse	25 A; for DC power cable	1	1
Fuse	4 A; for an external antenna tuner	1	1
DIN plug	7-pin	1	1
DIN plug	13-pin	1	1
Screw set	For bracket	1	1
Plastic spacer	For bracket	4	4
Instruction Manual	English	1	1
	French	1	1
	Spanish	–	1
	Italian	–	1
	German	–	1
	Dutch	–	1
Schematic diagram		2	–
Warranty Card		1	1

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.

EXAMPLE OF ANTENNA GROUNDING

ANTENNA LEAD IN WIRE

GROUND CLAMP

ANTENNA DISCHARGE UNIT

GROUNDING CONDUCTORS

GROUND CLAMPS

ELECTRIC SERVICE EQUIPMENT

POWER SERVICE GROUNDING ELECTRODE SYSTEM

- 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 attempt to perform any kind of configuration or menu setup while driving.

- Do not wear headphones while driving.

- Install the transceiver in a safe and convenient position inside your vehicle so as not to subject yourself to danger while driving. Consult your car dealer for the transceiver installation to ensure safety.

- HF/ 50 MHz mobile antennas are larger and heavier than VHF/ UHF antennas. Therefore, use a strong and rigid mount to safely and securely install the HF/ 50 MHz mobile antenna.

CONTENTS

CONTENTS

1 INSTALLATION

ANTENNA CONNECTION

An antenna system consists of an antenna, feed line, and ground. The transceiver can give excellent results if the antenna system and its installation are given careful attention. Use a properly adjusted 50 Ω antenna of good quality, a high-quality 50 Ω coaxial cable, and top-quality connectors. All connections must be clean and tight.

After making the connections, match the impedance of the coaxial cable and antenna so that the SWR is 1.5:1 or less. High SWR will cause the transmit output to drop and may lead to radio frequency interference with consumer products such as stereo receivers and televisions. You may even cause interference with your own transceiver. Reports that your signal is distorted could indicate that your antenna system is not efficiently radiating your transceiver's power.

Connect your primary HF/ 50 MHz antenna feed line to ANT 1 on the rear of the transceiver. If you are using two HF/ 50 MHz antennas, connect the secondary antenna to ANT 2. Refer to page 9 for the location of the antenna connectors.

The LF band is outputted only from the DRV terminal.

Note:
◆ Transmitting without connecting an antenna or other matched load may damage the transceiver. Always connect the antenna to the transceiver before transmitting.
◆ All fixed stations should be equipped with a lightning arrester to reduce the risk of fire, electric shock, and transceiver damage.
◆ The transceiver's protection circuit will activate when the SWR is greater than 1.5:1; however, do not rely on protection to compensate for a poorly functioning antenna system.

GROUND CONNECTION

At a minimum, a good DC ground is required to prevent such dangers as electric shock. For superior communications, a good RF ground is required against which the antenna system can operate. Both of these conditions can be met by providing a good earth ground for your station. Bury one or more ground rods or a large copper plate under the ground, then connect this to the transceiver GND terminal. Use heavy gauge wire or a copper strap, cut as short as possible, for this connection. Do not use a gas pipe, an electrical conduit, or a plastic water pipe as a ground.

LIGHTNING PROTECTION

Even in areas where lightning storms are less common, there is always a chance that a storm will occur each year. Consider carefully how to protect your equipment and home from lightning. The installation of a lightning arrestor is a start, but there is more that you can do. For example, terminate your antenna system transmission lines at an entry panel that you install outside your home. Ground this entry panel to a good outside ground, then connect the appropriate feed lines between the entry panel and your transceiver. When a lightning storm occurs, disconnecting the feed lines from your transceiver will ensure additional protection.

DC POWER SUPPLY CONNECTION

In order to use this transceiver, you need a separate 13.8 V DC power supply that must be purchased separately. Do not directly connect the transceiver to an AC outlet. Use the supplied DC power cable to connect the transceiver to a regulated power supply. Do not substitute a cable with smaller gauge wires. The current capacity of the power supply must be 20.5 A peak or more.

First, connect the DC power cable to the regulated DC power supply; the red lead to the positive terminal and the black lead to the negative terminal. Next, connect the DC power cable to the transceiver's DC power connector.

• Press the connectors firmly until the locking tab clicks.

• Attach the line filter to the DC cable as shown below (E-type only).

Note:
◆ Before connecting the DC power supply to the transceiver, be sure to switch OFF the DC power supply and transceiver.
◆ Do not plug the DC power supply into an AC outlet until you make all connections.

E-type only

Fuse (25 A)

Black (−) Red (+)

DC Power supply
(20.5 A or more)

TS-590SG

ANT 2   ANT 1   GND   AT   DC 13.8V

COM   EXT.SP 8Ω ACC 2   REMOTE   KEY   PADDLE   DRV   RX ANT
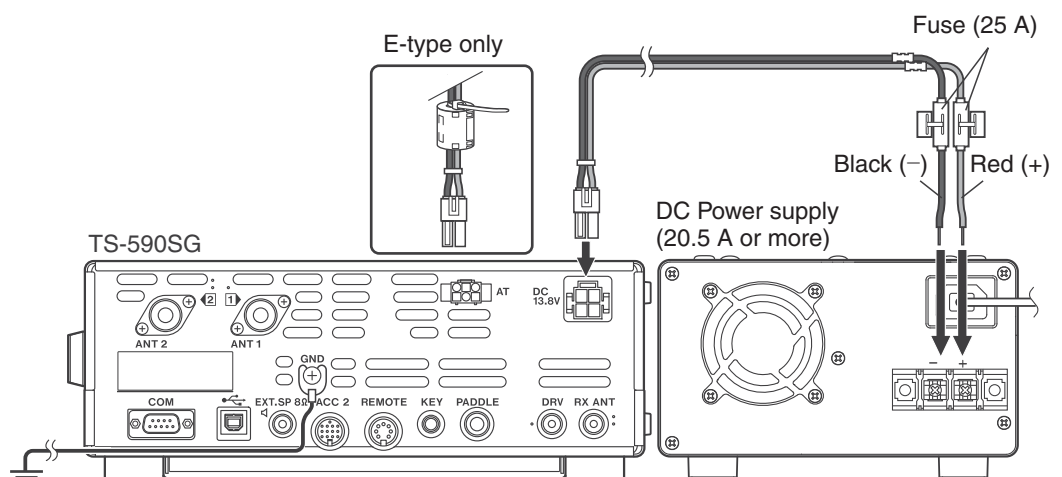
UTILIZING THE BAIL

This transceiver is equipped with a bail so that you can angle the transceiver. The bail is located on the bottom of the transceiver. Pull the bail forward to the limit as shown.
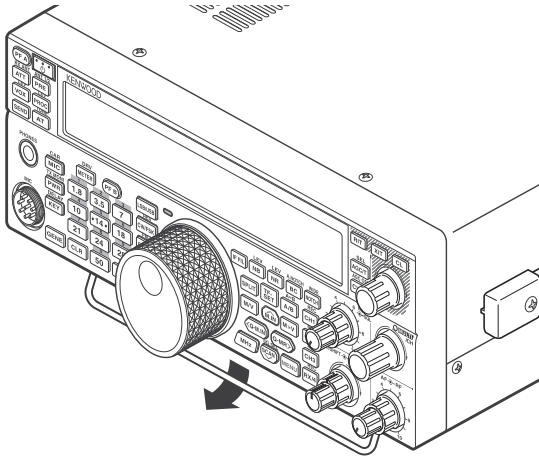
REPLACING FUSES

The following fuses are used in the TS-590SG transceiver. If a fuse blows, determine the cause then correct the problem. Only after the problem has been resolved, replace the blown fuse with a new one with the specified ratings. If newly installed fuses continue to blow, disconnect the power plug and contact a **KENWOOD** service center or your dealer for assistance.

Fuse Location	Fuse Current Rating
TS-590SG Transceiver	4 A (for external antenna tuner)
Supplied DC power cable	25 A

Fuse (4 A)

Fuse (25 A)

Fuse (25 A)
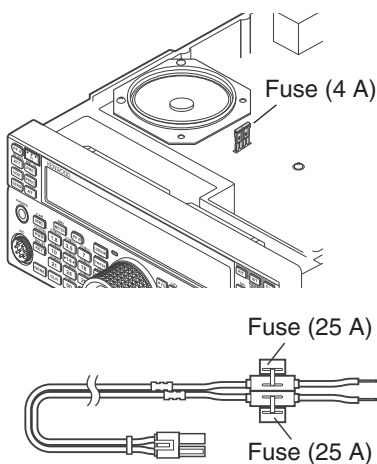
ACCESSORY CONNECTIONS

FRONT PANEL

■ Headphones (PHONES)

Connect monaural or stereo headphones with a 4 to 32 Ω (normal 8 Ω) impedance. This jack accepts a 6.3 mm (1/4") diameter, 2-conductor (mono) or 3-conductor (stereo) plug. After connecting the headphones, you will hear no sound from the internal (or optional external) Speaker/Microphone (MIC).

> **Note:** Using a high impedance headphone set causes the volume to be louder.

■ Microphone (MIC)

Connect a microphone with a 250 to 600 Ω impedance. Fully insert the connector, then screw the retaining ring clockwise until secure. Compatible microphones include the MC-43S, MC-47, MC-52DM, MC-60A, MC-80, MC-85, and MC-90.

> **Note:** Do not use the MC-44, MC-44DM, MC-45, MC-45E, MC-45DM, MC-45DME, or MC-53DM microphones.

REAR PANEL

■ External Speaker (EXT.SP)

On the rear panel of the transceiver, there is an external speaker jack. If an external speaker is connected to EXP.SP, the transceiver internal speaker will mute. Use only external speakers with an impedance of 4 to 8 Ω (8 Ω nominal). This jack accepts only 3.5 mm (1/8") diameter, 2-conductor (mono) plugs.

⚠ WARNING

Do not connect headphones to this jack. The high audio output of this jack could damage your hearing.

■ Keys for CW (PADDLE and KEY)

For CW operation while using the internal electronic keyer, connect a keyer paddle to the PADDLE jack.

For CW operation without using the internal electronic keyer, connect a straight key, semi-automatic key (bug), electronic keyer, or the CW keyed output from a Multi mode Communications Processor (MCP) to the KEY jack.

The PADDLE and KEY jacks mate with a 6.3 mm (1/4") 3-conductor plug and a 3.5 mm (1/8") 2-conductor plug, respectively. External electronic keyers or MCPs must use positive keying to be compatible with this transceiver. Use a shielded cable between the key and the transceiver.

> **Note:** Due to the functionality of the internal electronic keyer, you may find it unnecessary to connect both a paddle and another type of keyer unless you want to use a PC-based keyer for CW. Read the "ELECTRONIC KEYER" section {page 33} to become familiar with the internal keyer.

Headphones

Front Panel

MIC ① ———— ⑧ GND (STBY)
PTT ② ———— ⑦ GND (MIC)
DOWN ③ ———— ⑥ NC
UP ④ ———— ⑤ 8 V (10 mA max)

MIC connector (Front view)

External speaker

Microphone

Rear Panel

GND : dash dot

GND   +

• Paddle

• Straight key
• Bug key
• Electronic keyer
• PC keyer output
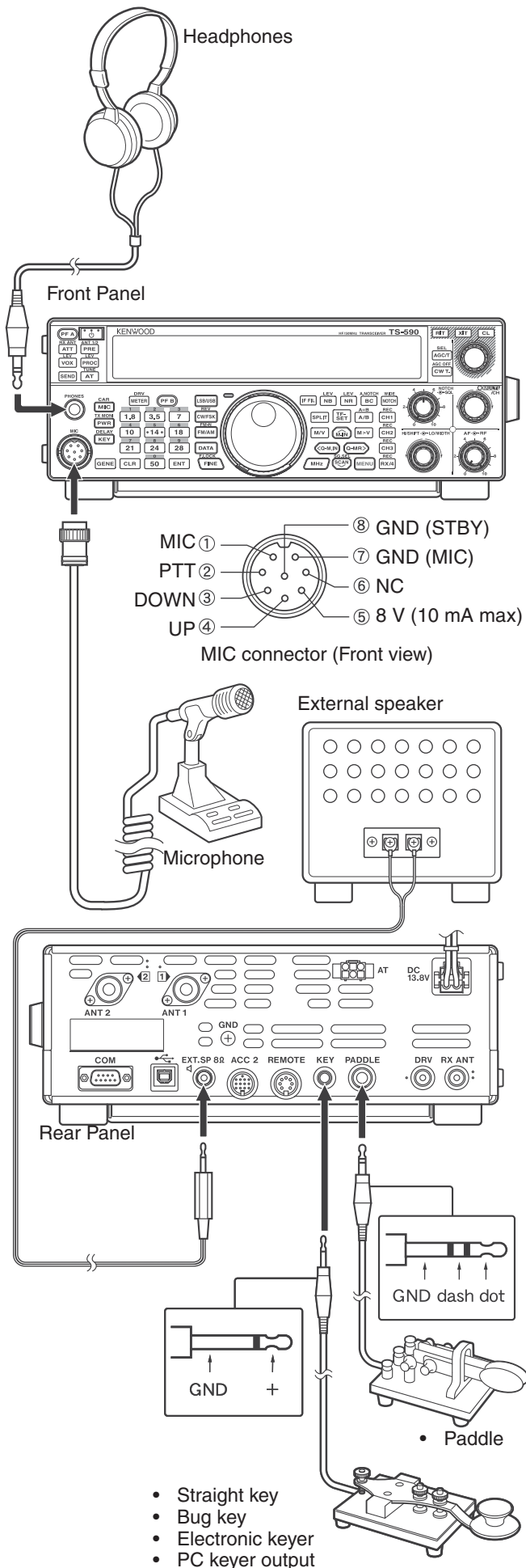
Note:

◆ Do not use a cable exceeding 3 m (9.8 feet) with the following connectors:

PHONES jack	MIC connector
COM connector	EXT. SP jack
ACC 2 connector	REMOTE connector
KEY jack	PADDLE jack
DRV connector	

◆ Do not use a cable exceeding 1 m (3.3 feet) with the following connector:

USB connector

3

FRONT PANEL

—— A ——
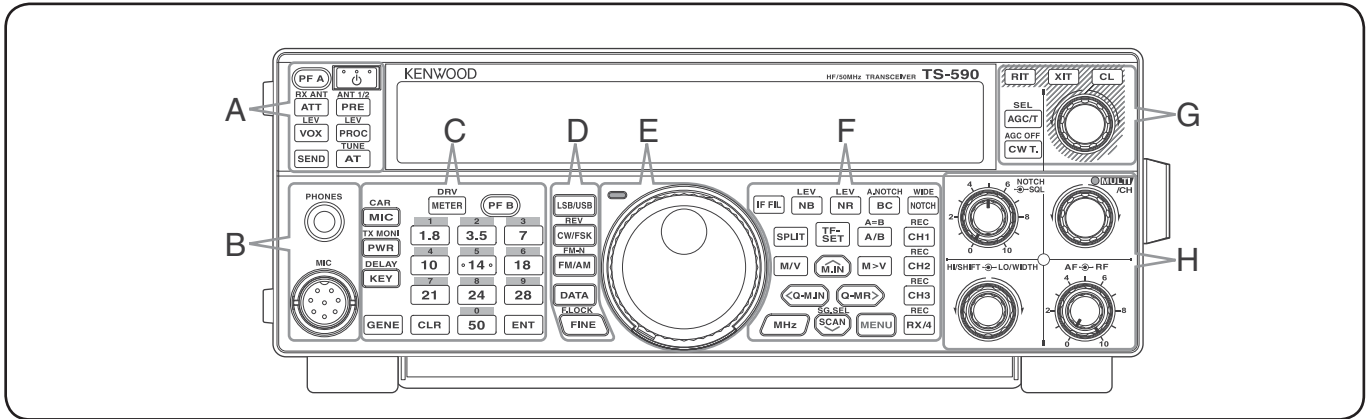
[⏻]
Press and hold to switch the transceiver power ON and OFF {page 10}.

[PF A]
You can assign a function to this Programmable Function key {page 56}.

[ATT (RX ANT)]
Press to turn the receiver attenuator ON or OFF {page 42}. Press and hold to enable or disable the RX-ANT terminal {page 52}.

[PRE (ANT 1/2)]
Press to turn the pre-amplifier ON or OFF {page 40}. Press and hold to select either ANT 1 or ANT 2 {page 52}.

[VOX (LEV)]
In voice mode, press to turn the VOX (Voice-Operated Transmit) function ON or OFF {page 32}. In CW mode, press to turn the Break-in function ON or OFF {page 35}. Press and hold to adjust the microphone input gain for VOX operation.

[PROC (LEV)]
Press to turn the Speech Processor ON or OFF {page 33}. Press and hold to adjust the Speech Processor input level.

[SEND]
Press to turn transmission ON or OFF.

[AT (TUNE)]
Press to turn the internal antenna tuner ON or OFF {page 50}. Press and hold to start tuning the automatic antenna tuner.

—— B ——

PHONES jack
Mate with a 6.3 mm (1/4") diameter, 2-conductor (mono) or 3-conductor (stereo) plug for connecting a set of headphones {page 2}.

MIC connector
Connect a microphone to this connector {page 2}.

—— C ——

[METER (DRV)]
Press to switch the meter type {page 12}. Press and hold to turn the Drive Out function ON or OFF {page 50}.

[PF B]
You can assign a function to this Programmable Function key {page 56}.

[MIC (CAR)]
Press to adjust the microphone gain {page 13}. While the Speech Processor function is ON, press to adjust the Speech Processor output level {page 33}. Press and hold to adjust the carrier level {page 24}.

[PWR (TX MONI)]
Press to adjust the transmission output power {pages 13, 58}. Press and hold to turn the transmission signal monitor function ON or OFF {page 58}.

[KEY (DELAY)]
Press to adjust the internal electronic keyer speed {page 35}. Press and hold to adjust the VOX delay time for voice mode {page 33} or Break-in time (Full Break-in/ Semi Break-in time) for CW mode.

[GENE]
Press to select the general coverage band memory {page 11}.

[1.8 (1)]
Press to select the 1.8 MHz band memory {page 11} or enter keypad number 1.

[3.5 (2)]
Press to select the 3.5 MHz band memory {page 11} or enter keypad number 2.

[7 (3)]
Press to select the 7 MHz band memory {page 11} or enter keypad number 3.

[10 (4)]
Press to select the 10 MHz band memory {page 11} or enter keypad number 4.

[14 (5)]
Press to select the 14 MHz band memory {page 11} or enter keypad number 5.

[18 (6)]
Press to select the 18 MHz band memory {page 11} or enter keypad number 6.

[21 (7)]
Press to select the 21 MHz band memory {page 11} or enter keypad number 7.

[24 (8)]
Press to select the 24 MHz band memory {page 11} or enter keypad number 8.

[28 (9)]
Press to select the 28 MHz band memory {page 11} or enter keypad number 9.

[50 (0)]
Press to select the 50 MHz band memory {page 11} or enter keypad number 0.

[CLR]
Press to exit from, abort, or reset various functions. Press and hold to clear a memory channel {page 46}.

[ENT]
Press to enter your desired frequency using the 10-key keypad {page 30}.

—— **D** ——

[LSB/USB]
Press to select LSB or USB mode {page 11}.

[CW/FSK (REV)]
Press to select CW or FSK mode {page 11}. Press and hold to select a sideband (CW/ CW-R or FSK/ FSK-R).

[FM/AM (FM-N)]
Press to select FM or AM mode {page 11}. Press and hold to select Narrow FM mode.

[DATA]
Press to select a Data mode (LSB/ LSB-DATA, USB/ USB-DATA, FM/ FM-DATA, or AM-DATA) {page 11}.

[FINE (F.LOCK)]
Press to activate the Fine tuning function to allow more precise tuning {page 31}. Press and hold to activate the Frequency Lock function {page 55}.

—— **E** ——

Central (**Tuning**) control
Turn to select the desired frequency {page 12}. Use the convenient finger-tip cavity for continuous tuning. Slide the lever underneath the **Tuning** control to the left or right to adjust the torque level of the control. Left makes the control light and right makes it heavy.

light   heavy

TX-RX LED
Lights red while transmitting and green when the squelch opens while receiving.

—— **F** ——

[IF FIL]
Press to toggle between IF Filter A and IF Filter B {page 41}. You can adjust the filter bandwidth using the **LO/WIDTH** and **HI/SHIFT** controls. Press and hold **[IF FIL]** to momentarily display each setting value of the current DSP filter DSP filter bandwidth {page 38}.

[NB (LEV)]
Press to cycle through Noise Blanker 1, Noise Blanker 2, and OFF. Press and hold to adjust the Noise Blanker level {page 42}.

[NR (LEV)]
Press to cycle through the DSP Noise Reduction types: NR1, NR2, or OFF {page 41}. When the Noise Reduction function is turned ON, press and hold to change the parameters of the Noise Reduction function {page 40}.

[BC (A.NOTCH)]
Press to select the DSP Beat Cancel function, BC1 (Beat Cancel 1), BC2 (Beat Cancel 2) or OFF {page 41}. Press and hold to toggle the Auto Notch Filter ON and OFF {page 41}.

[NOTCH (WIDE)]
Press to toggle the IF Notch Filter ON or OFF {page 41}. Press and hold to set up the IF Notch bandwidth {page 41}.

[SPLIT]
Press to enter split-frequency operation, allowing you to use different transmission and reception frequencies {page 25}.

[TF-SET]
During split-frequency operation, press to monitor or change your transmit frequency {page 26}.

[A/B (A=B)]
Press to select either VFO A or VFO B {page 10}. Press and hold to duplicate the data in the current VFO to the other VFO {page 27}. While in Menu mode, press to select Menu A or Menu B. While in Program Memory Channel mode, press to recall the start or end frequency.

[M/V]
Press to toggle between Memory and VFO modes.

[M.IN]
Press to enter Memory Scroll mode and to store data to a Memory channel {page 43}.

[M>V]
Press to transfer the current Memory Channel contents to the VFO.

[Q-M.IN]
Press to store data to the Quick Memory {page 46}.

[Q-MR]
Press to recall data from the Quick Memory {page 47}, while in VFO mode. Press to enter Memory Name Edit mode, while in Memory Channel mode {page 46}.

[MHz]
Press to turn the MHz Up/ Down function ON or OFF. The MHz digit increases or decreases when you turn the **MULTI/CH** control. In Menu mode, press to turn the Quick Menu ON or OFF {page 14}.

[SCAN (SG.SEL)]
Press to start or stop the Scan function {page 48}. Press and hold to select a Scan group {page 51}.

[MENU]
Press to enter Menu mode {page 14}.
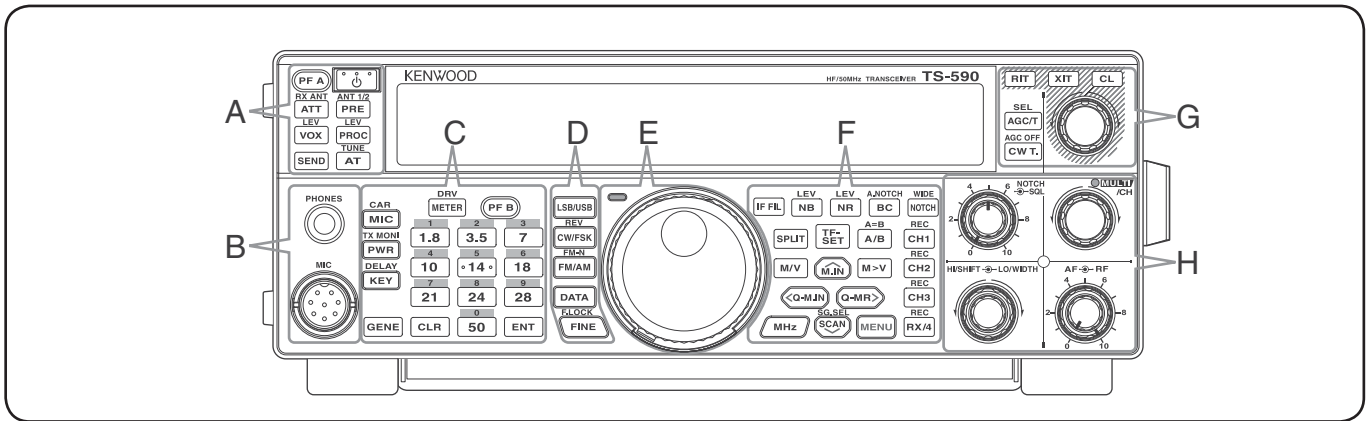
[CH1 (REC)]
Press to play back a CW {page 37} or voice message (requires VGS-1 option) {page 62}. Press and hold to record a CW {page 36} or voice message (requires VGS-1 option) {page 62}.

[CH2 (REC)]
Press to play back a CW {page 37} or voice message (requires VGS-1 option) {page 62}. Press and hold to record a CW {page 36} or voice message (requires VGS-1 option) {page 62}.

[CH3 (REC)]
Press to play back a CW {page 37} or voice message (requires VGS-1 option) {page 62}. Press and hold to record a CW {page 36} or voice message (requires VGS-1 option) {page 62}.

[RX/4 (REC)]
Press to play back a CW {page 37} or voice message (requires VGS-1 option) {page 62}, or the constantly recorded signal (requires VGS-1 option) {page 63}. Press and hold to activate the constant recorder (requires VGS-1 option) {page 63}.

—— G ——

[AGC/T (SEL)]
Press to toggle the fast or slow response time for the Automatic Gain Control (AGC) {page 31}. In FM mode, press to cycle through the Tone settings: Tone, CTCSS, CTCSSx, or OFF {page 28}. When Tone is activated in FM mode, press and hold to select a Tone frequency {page 28}. When CTCSS is activated in FM mode, press and hold to select a CTCSS frequency {page 29}.

[CW T. (AGC OFF)]
Press to start CW auto tuning {page 23}. Press and hold to turn AGC OFF {page 31}.

[RIT]
Press to turn the RIT (Receive Incremental Tuning) function ON or OFF {page 31}.

You can assign a function to this Programmable Function key {page 56}.

[XIT]
Press to turn the XIT (Transmit Incremental Tuning) function ON or OFF {page 33}.

You can assign a function to this Programmable Function key {page 56}.

[CL]
Press to clear the RIT/ XIT frequency to zero {pages 31, 33}.

You can assign a function to this Programmable Function key {page 56}.

RIT/ XIT control
When the RIT/ XIT function is ON, turn to adjust the offset frequency. The RIT/ XIT offset frequency appears on the sub-display {pages 29, 31}. While scanning, turn to adjust the scan speed.

—— H ——

SQL control
Turn to select the desired squelch level {page 12}.

NOTCH control
Turn to select the desired Notch frequency {page 41}.

MULTI/CH control
In VFO mode, rotate to step the operating frequency up or down {page 30}. In Memory Channel mode, rotate to select a Memory Channel {page 43}. Also, used for selecting Menu numbers when accessing the Menu mode {page 14} and for various configurations. The MULTI/CH LED lights when the **MULTI/CH** control is not being used to adjust the step frequency.

You can assign a function to this Programmable Function key {page 56}.

HI/SHIFT control
Rotate to adjust the DSP filter bandwidth (high-cut) or to adjust the DSP filter bandwidth (filter band shift) {page 40}.

LO/WIDTH control
Rotate to adjust the DSP filter bandwidth (high-cut or shift) {page 40}.

AF control
Turn to adjust the AF gain level {page 10}.

RF control
Turn to adjust the RF gain level {page 10}.

LCD DISPLAY
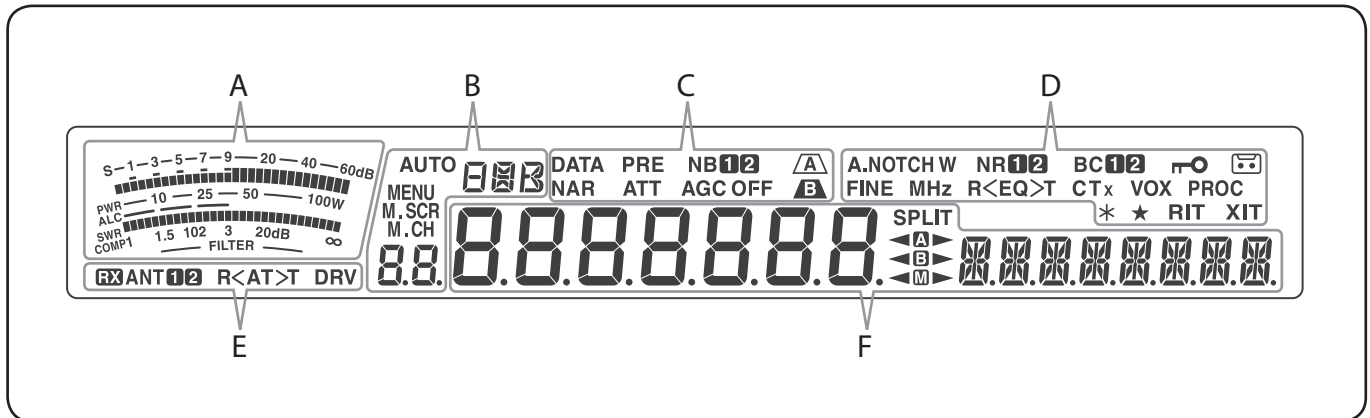
―― A ――
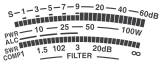
While receiving, the meter serves as an S-meter to measure and display the received signal strength. While transmitting, it serves as a power meter plus an ALC meter, an SWR meter, or a Speech Processor compression meter. The Peak Hold function holds each reading for approximately half a second. While adjusting the IF filter bandwidth, the meter displays an adjustment state.

―― B ――

AUTO
Appears when the Auto Mode function is ON and while in Auto Mode frequency setup {page 53}.

日回限
Displays the operating mode (USB, LSB, FM, AM, CW, CWR, FSK, or FSR) {page 11}.

MENU
Appears while in Menu mode {page 14}.

M.SCR
Appears while in Memory Scroll mode {page 44}.

M.CH
Appears while in Memory Channel mode or Memory Scroll mode {page 44}.

8.8.
In normal operating mode and various configuration modes, it displays the Memory Channel number, Quick Memory number, and entry log number. In Menu mode, it displays the Menu No.

―― C ――

DATA
Appears while in Data mode {page 11} and while in CW Morse Decoder mode {page 38}.

NAR
Appears while in narrow FM mode {page 11}.

PRE
Appears when the receiver pre-amplifier is ON {page 42}.

ATT
Appears when the receiver's attenuator is ON {page 42}.

NB❶❷
Appears when the Noise Blanker 1 or 2 is ON {page 42}.

AGC OFF
"**AGC   -F**" (fast) or "**AGC**" (slow) appears when the Automatic Gain Control function is ON. "**AGC OFF**" appears when the AGC is OFF {page 31}.

Ⓐ
Appears when IF filter A is selected {page 41}.

Ⓑ
Appears when IF filter B is selected {page 41}.

―― D ――

A.NOTCH W
"**NOTCH**" appears when manual notch is set to Normal. "**NOTCH W**" appears when Manual Notch is set to Wide. "**A.NOTCH**" appears when Auto Notch is selected {page 41}.

FINE
Appears when the Fine Tuning function is ON {page 31}.

MHz
Appears when the MHz Step function is ON {page 30}. Also appears when the Quick Menu function is ON {page 14}.

NR❶❷
"**NR❶**" or "**NR   ❷**" appears, depending on whether DSP Noise Reduction 1 or Noise Reduction 2 is selected {page 41}.

R<EQ>T
"**R<EQ**" appears when the RX Equalizer function is ON {page 57}. "**EQ>T**" appears when the TX Equalizer function is ON {page 34}.

BC❶❷
"**BC❶**" or "**BC   ❷**" appears, when you select the DSP Beat Cancel 1 or Beat Cancel 2 {page 41}.

CTx
"**T**" appears when the Tone function is ON {page 27}, and blinks during Tone scan. "**CT**" appears when the CTCSS (Continuous Tone Coded Squelch System) function is ON, and blinks during CTCSS scan {page 28}. "**CTx**" appears when the Cross Tone function is ON {page 29}.
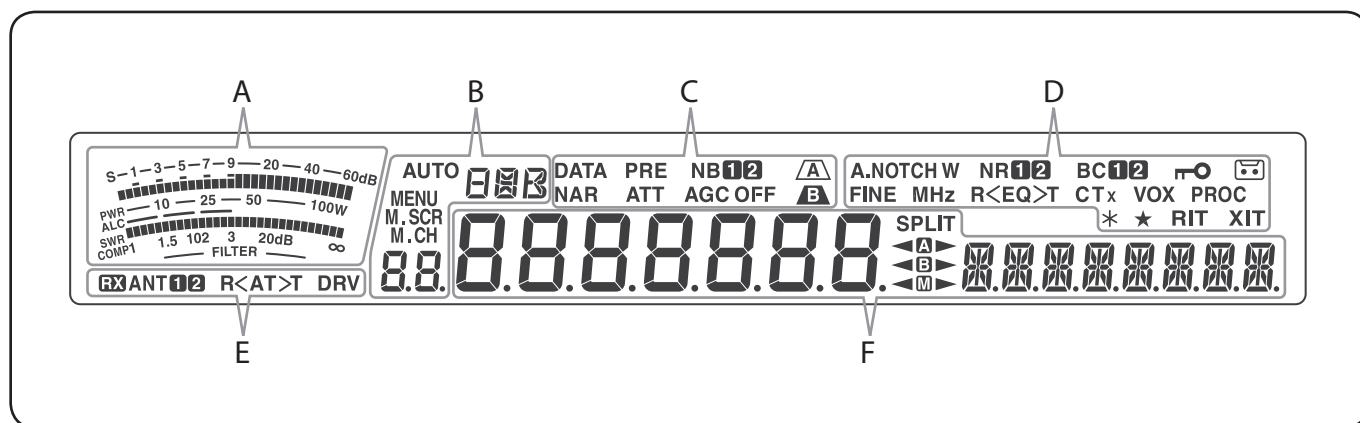
VOX

Appears when the VOX (Voice Operated Transmission) function is ON or the Break-in function is ON for CW mode {page 32}.

🔒

Appears when the Frequency Lock function is ON {page 55}.

PROC

Appears when the Speech Processor function is ON {page 33}.

📼

Appears when the constant recording function is ON {page 63}.

✳

Appears when the Antenna output is enabled (DRV connector) {page 52}.

★

Appears when the selected Menu No. is in the Quick Menu list {page 14}. It also appears when the transceiver is scanning the frequencies between the slow down frequency points {page 49}.

RIT

Appears when Receive Incremental Tuning function is ON {page 31}.

XIT

Appears when Transmit Incremental Tuning function is ON {page 33}.

—— E ——

RX

Appears when the RX ANT terminal is enabled {page 52}.

ANT12

Either "ANT**1**" or "ANT **2**" appears, depending on which antenna connector is selected {page 52}.

R<AT>T

">T" appears while the internal antenna tuner {page 61} is in-line for operation. "R<" appears while receiving when the internal antenna tuner is in-line for operation. "R<" and ">T" blink while tuning is in progress {page 52}.

DRV

Appears when the Drive output is enabled (DRV connector) {page 52}.

—— F ——

8.8.8.8.8.8.8.
(Main DIsplay)
In normal operating mode and various configuration modes, it displays the transceiver operating frequency. In Menu mode, it displays the various menus, and in Adjustment mode, it displays the adjustment values.

88.88.88.88.
(Sub-display)
When recalling a memory channel, it displays the Memory Channel name (if one has been programmed). During split frequency operation, it displays the frequency. When the following indications occur simultaneously, information is displayed in the following order: RIT/XIT frequency, Split frequency, Memory Name. In Menu mode, it displays a menu title. In other modes, it displays the configuration parameters.

SPLIT

Appears when the split-frequency operation is ON {page 25}.

◄A►

"◄A" appears while VFO A is selected. "A►" appears while transmitting on a split channel in VFO A {page 10}. "A" appears while Menu A is being accessed in Menu mode {page 14}.

◄B►

"◄B" appears while VFO B is selected. "B►" appears while transmitting on a split channel in VFO B {page 10}. "B" appears while Menu B is being accessed in Menu mode {page 14}.

◄M►

"◄M" appears while a simplex memory channel is selected. "◄M►" appears while a split memory channel is selected {page 43}.

REAR PANEL
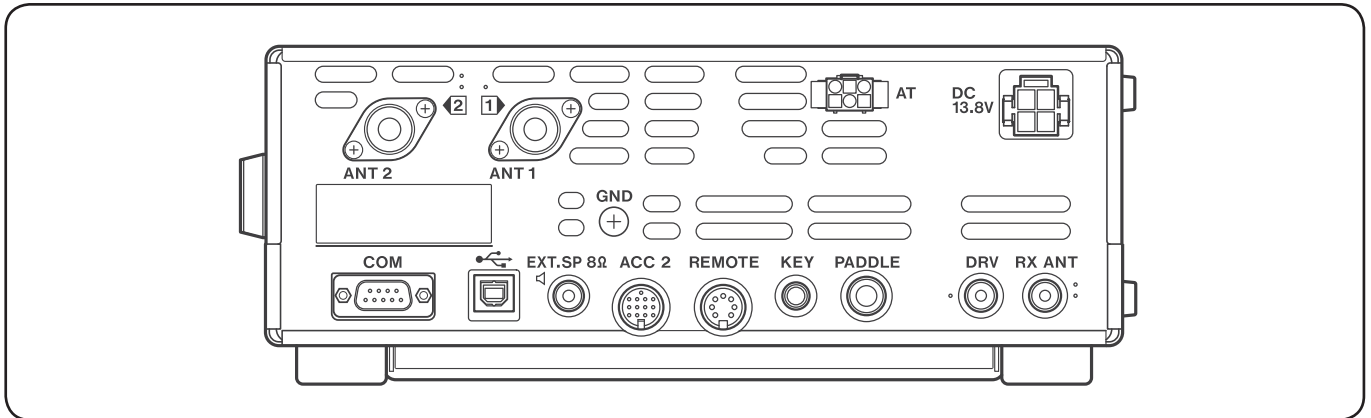
ANT 1 and **ANT 2** connectors
Connect your primary HF/ 50 MHz antenna to **ANT 1** connector. If you are using 2 antennas for the HF/ 50 MHz band, connect the secondary antenna to the **ANT 2** connector {page 1}.

GND post
Connect a heavy gauge wire or copper strap between the ground post and the nearest earth ground {page 1}.

AT connector
Mates with the connector from the cable supplied with the AT-300 external antenna tuner {pages 70, 73}. Refer to the instruction manual supplied with the tuner for more information.

DC 13.8 V connector
Connect a regulated 13.8 V DC power source to this connector {page 1}. Use the DC cable supplied with the transceiver.

COM connector
Mates with a DB-9 female connector for connecting a computer or compatible transceiver {pages 60, 69}. Also used with the Quick Data Transfer function {page 59} and DX PacketCluster Tune function {page 67}.

• (USB) connector
Mates with a USB connector for connecting a computer via one of its USB ports {pages 60}.

EXT.SP 8Ω jack
Mate with a 3.5 mm (1/8"), 2-conductor (mono) plug for connecting an external speaker {page 2}.

ACC 2 connector
Mates with a 13-pin male DIN connector for connecting various accessory equipment, such as an external TNC/ MCP or a RTTY terminal {page 69}.

REMOTE connector
Mates with a 7-pin male DIN connector for connecting an HF/ 50 MHz linear amplifier {page 65, 68}.

KEY and **PADDLE** jacks
The **KEY** jack mates with a 3.5 mm (1/8") 2-conductor plug for connecting an external key for CW operation. The **PADDLE** jack mates with a 6.3 mm (1/4") 3-conductor plug for connecting a keyer paddle to the internal electronic keyer. Refer to "Keys for CW (PADDLE and KEY)" {page 2} before using these jacks.

DRV connector
Connect a drive device to this RCA connector {page 52}.

RX ANT connector
Connect a separate receive-only antenna for HF low bands to this RCA connector {page 52}.

MICROPHONE
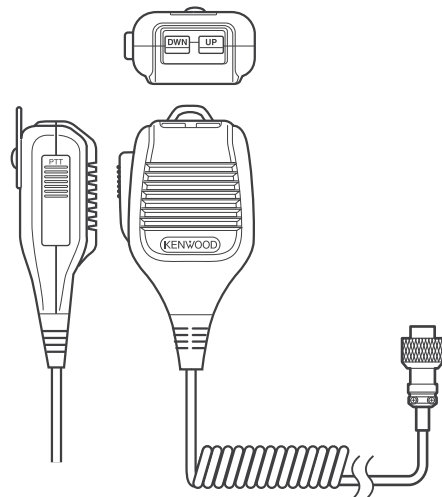
PTT (Push-to-Talk) switch
The transceiver is placed in Transmission mode when this non-locking switch is held down. Releasing the switch returns the transceiver to Reception mode.

⬆ / ⬇ Mic **[UP]**/ **[DWN]**
Use these keys to step the VFO frequency, Memory Channels, or Menu selections up and down.
Press and hold these keys to continuously change the settings.
You can also change the operational function of these keys {page 56}

3 OPERATING BASICS

SWITCHING POWER ON/ OFF

1 Switch the DC power supply ON.

2 Press **[ ]** to switch the transceiver ON.

- If you hold the power switch for more than approximately 2 seconds, the transceiver will switch back OFF.

- Upon power up, "HELLO" appears on the main display, followed by the current frequency and other indicators.
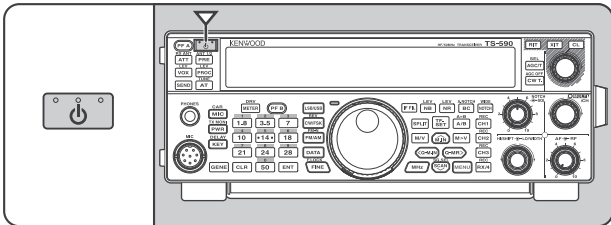
3 To switch the transceiver OFF, press **[ ]** again.

4 Switch the DC power supply OFF.

- You may skip step **3**. After switching the transceiver ON, you can switch it OFF or ON using only the power switch of the DC power supply. The transceiver remembers the power switch position when the DC power source is switched OFF.

ADJUSTING THE VOLUME

AF (AUDIO FREQUENCY) GAIN

Turn the **AF** control clockwise to increase the audio level and counterclockwise to decrease it.
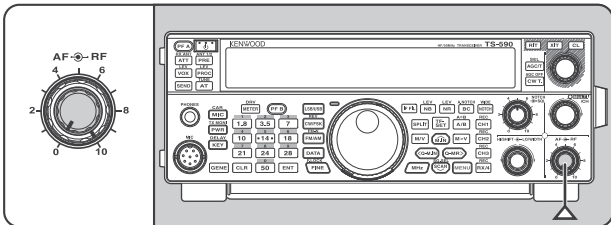
Note: The position of the **AF** control does not affect the volume of beeps caused by pressing keys nor the CW TX sidetone. The audio level for Digital mode operation is also independent of the **AF** control setting.

RF (RADIO FREQUENCY) GAIN

The RF gain is normally configured to the maximum level regardless of the operating modes. The transceiver has been configured to the maximum level at the factory. However, you may decrease the RF gain slightly when you have trouble hearing the desired signal due to excessive atmospheric noise or interference from other stations.

First, take note of the peak S-meter reading of the desired signal. Then, turn the **RF** control counterclockwise until the S-meter reads the peak value that you noted.
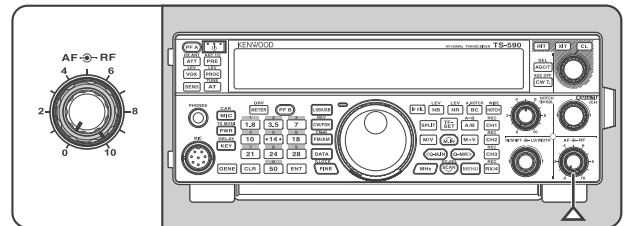
- Signals that are weaker than this level will be attenuated and reception of the station will become easier.

Depending on the type and gain of your antenna and the condition of the band, adjust the RF gain. When using FM mode, always adjust the RF gain to the maximum level.

SELECTING VFO A OR VFO B

Two VFOs are available for controlling the frequency on the transceiver. Each VFO (VFO A and VFO B) works independently so that a different frequency and mode can be selected. For example, when SPLIT operation is activated, VFO A is used for reception and VFO B is used for transmission. The opposite combination is also possible.

Press **[A/B (A=B)]** to toggle between VFO A and B.
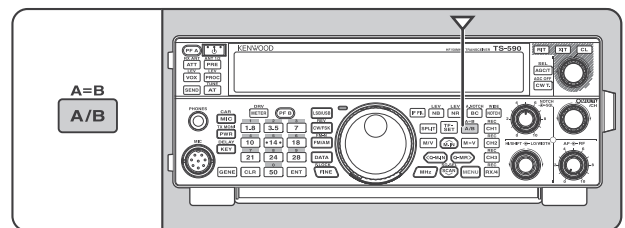
SELECTING A BAND

Press **[1.8 (1)]** ~ **[50 (0)]** or **[GENE]** to select your desired band.
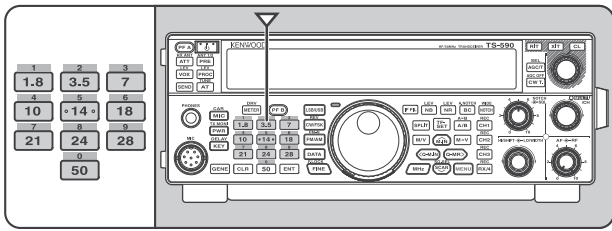
- Press each key to cycle through the 3 default settings as shown in the table below.
- Each setting can be modified with your personal preference for frequency and mode. After modifying the setting, pressing the key again will save that setting.

Key	Type	Frequency Range (MHz)	Default Setting (MHz)/ Mode		
			1	2	3
[1.8 (1)]	K	1.62 ~ 2	1.8/ CW	1.82/ CW	1.84/ CW
	E		1.83/ CW	1.84/ CW	1.81/ CW
[3.5 (2)]	K	3 ~ 4	3.5/ LSB	3.7/ LSB	3.8/ LSB
	E				3.79/ LSB
[7 (3)]	K	6.5 ~ 7.5	7.0/ LSB	7.1/ LSB	7.2/ LSB
	E			7.05/ LSB	7.1/ LSB
[10 (4)]	All	10 ~ 10.5	10.1/ CW	10.12/ CW	10.14/ CW
[14 (5)]	All	13.5 ~ 14.5	14.0/ USB	14.1/ USB	14.2/ USB
[18 (6)]	All	18 ~ 19	18.068/ USB	18.11/ USB	18.15/ USB
[21 (7)]	All	20.5 ~ 21.5	21.0/ USB	21.15/ USB	21.3/ USB
[24 (8)]	All	24 ~ 25	24.89/ USB	24.93/ USB	24.95/ USB
[28 (9)]	All	27.5 ~ 30	28/ USB	28.3/ USB	29/ FM
[50 (0)]	K	50 ~ 54	50/ USB	50.125/ USB	51/ FM
	E			50.15/ USB	
[GENE]	K	0.03 ~ 60	0.1357/ CW	5.3305/ USB	5.4035/ USB
	E			5.2585/ USB	

SELECTING A MODE

Press one of the following keys to select your desired mode set: **[LSB/USB]**, **[CW/FSK (REV)]**, or **[FM/AM (FM-N)]**.

[LSB/USB]
Press to select LSB or USB mode. Press again to toggle between LSB and USB mode.
While in LSB mode, press **[DATA]** to toggle between LSB and LSB-DATA mode. Likewise, while in USB mode press **[DATA]** to toggle between USB and USB-DATA mode.
Additionally, while in LSB-DATA or USB-DATA mode, you can press **[LSB/USB]** to toggle between LSB-DATA and USB-DATA mode.

[CW/FSK (REV)]
Press to select CW or FSK mode. Press again to toggle between CW and FSK mode.
While in CW mode, press and hold **[CW/FSK (REV)]** to toggle between CW and CW-R mode. Likewise, while in FSK mode press and hold **[CW/FSK (REV]** to toggle between FSK and FSK-R mode.
Additionally, while in CW-R or FSK-R mode, you can press **[CW/FSK (REV)]** to toggle between CW-R and FSK-R mode.

[FM/AM (FM-N)]
Press to select FM or AM mode. Press again to toggle between FM and AM mode.
While in FM mode, press and hold **[FM/AM (FM-N)]** to toggle between FM and FM-NAR mode, or press **[DATA]** to toggle between FM and FM-DATA mode. Additionally, while in FM-NAR mode, press **[DATA]** to toggle between FM-NAR and FM-NAR-DATA mode and while in FM-DATA mode, press and hold **[FM/AM (FM-N)]** to toggle between FM-DATA and FM-NAR-DATA mode.

While in AM mode, press **[DATA]** to toggle between AM and AM-DATA mode.
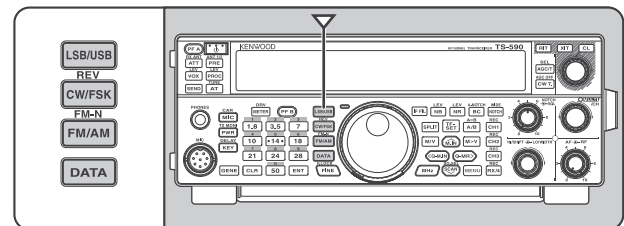
Access Menu No. 27 then press **[M.IN]** to select "on" to turn the Auto Mode selection ON. When it is ON, "**AUTO**" appears. As a default, if you change the frequency above or below 9.5 MHz, the transceiver automatically switches modes; LSB for frequencies under 9.5 MHz and USB for frequencies 9.5 MHz and over. You can further add the frequency borders to the Auto Mode selection {page 53}.

Note: The last used mode is stored per each band key.

ADJUSTING THE SQUELCH

The purpose of the Squelch is to mute the speaker when no signals are present. With the squelch level correctly set, you will hear sound only while actually receiving signals. The higher the selected squelch level, the stronger the signals must be to receive. The appropriate squelch level depends on the ambient RF noise conditions.

Turn the **SQL** control when there are no signals present to select the squelch level at which the background noise is just eliminated; the green TX-RX LED will turn off. Many ham operators prefer leaving the **SQL** control fully counterclockwise unless operating on a full-carrier mode such as FM. The squelch level for the transceiver is preset at the factory to approximately the 9 o'clock position for FM and 11 o'clock for SSB and AM.
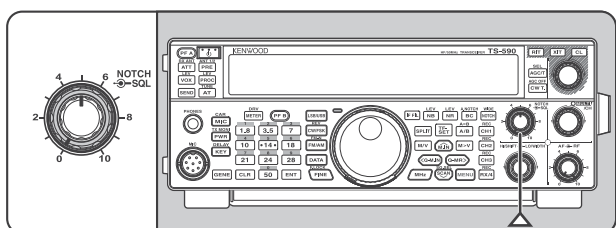
TUNING A FREQUENCY

Turn the **Tuning** control clockwise or press Mic **[UP** to increase the frequency. Turn the **Tuning** control counterclockwise or press Mic **[DWN]** to decrease the frequency.
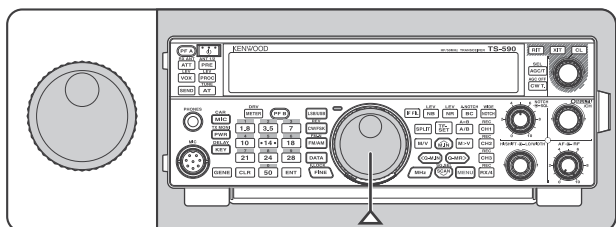
You may prefer directly entering a frequency using the numeric keypad if the desired frequency is far from the current frequency. Press **[ENT]**, then press the numeric keys as necessary. For details, refer to "Direct Frequency Entry" {page 30}.
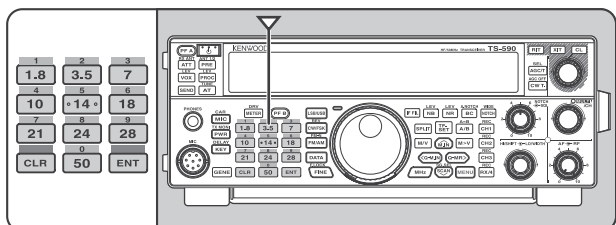
MULTI-FUNCTION METER

The multi-function meter measures the parameters in the table below. The S-meter and FILTER scales appears when the transceiver is in receive mode, and the PWR meter appears when it is in transmit mode. Each press of **[METER (DRV)]** cycles between the ALC, COMP, and SWR meters. Peak readings for the S-meter, ALC, SWR, COMP, and PWR functions are held momentarily.
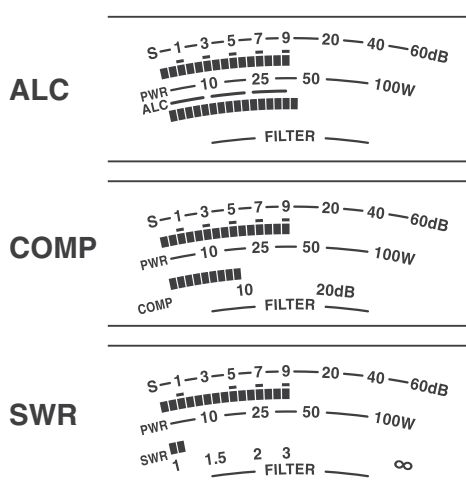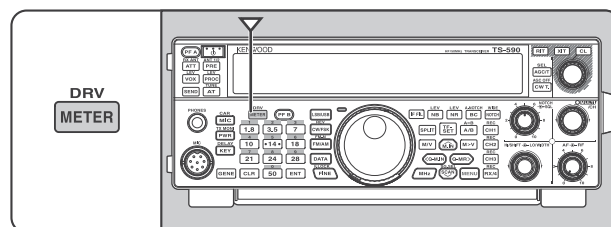
Meter Name	Parameters Measured
S	Strength of received signals
PWR	Transmission output power
ALC	Automatic level control status
SWR	Antenna system standing wave ratio
COMP	Speech compression level when using the Speech Processor {page 33}
FILTER	IF filter width {page 40}

Note:

◆ The COMP meter functions only when the Speech Processor is ON for SSB, FM, or AM mode.

◆ Peak Hold readings cannot be deactivated.

◆ The S-meter responds differently in FM mode, compared to other modes. This is not a malfunction.

◆ When you turn OFF the Speech Processor while using the COMP meter, the COMP meter changes to the ALC meter. When you turn ON the Speech Processor again, the ALC meter returns to the COMP meter.

TRANSMITTING

For voice communications, press and hold Mic **[PTT]** and speak into the microphone in your normal voice. When you finish speaking, release Mic **[PTT]** to receive.

To transmit CW, press **[VOX (REV)]** to turn the Break-in function ON. "**VOX**" appears. Close the key or keyer paddle. Connect a key or keyer paddle {page 2}, then select CW using **[CW/FSK (REV)]**.

For a detailed explanation on transmitting, refer to "BASIC COMMUNICATIONS", beginning on page 22.

SELECTING TRANSMISSION POWER

It is wise to select a lower transmission power if communication is still reliable. This lowers the risk of interfering with others on the band. When operating from battery power, selecting a lower transmission power allows you more operating time before recharging is necessary. This transceiver allows you to change the transmission power even while transmitting.

1　Press **[PWR (TX MONI)]**.
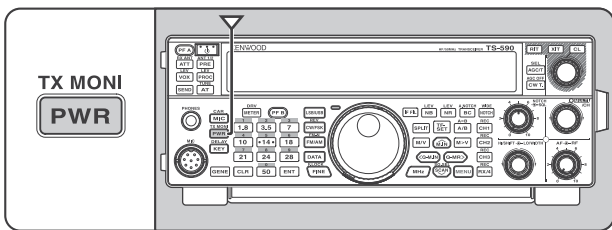
- The current transmission power appears.
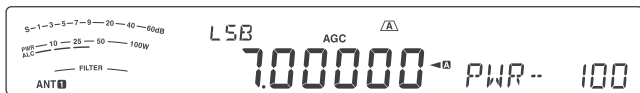
2　Turn the **MULTI/CH** control counterclockwise to reduce the power or clockwise to increase the power.
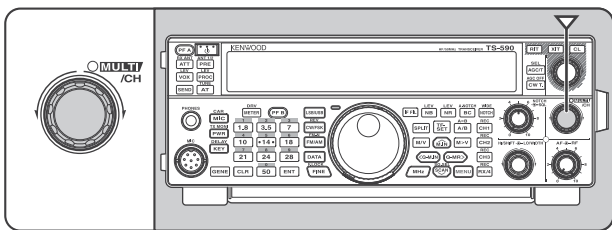
3　Press **[PWR (TX MONI)]** or **[CLR]** to complete the setting.

Note: You can access Menu No. 54, and select "on" to change the step size from 5 W to 1 W {page 58}.

MICROPHONE GAIN

The microphone gain must be adjusted when SSB or AM mode is selected without using the speech processor {pages 22, 23}.

1　Press **[MIC (CAR)]**.
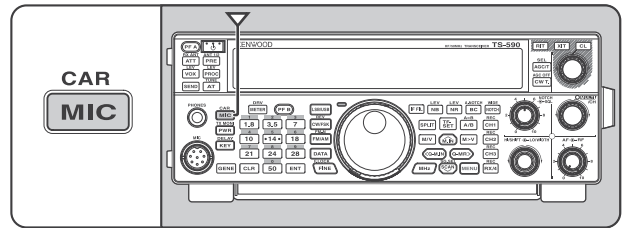
- The current microphone gain level appears. The range is from 0 to 100 with a default of 50.
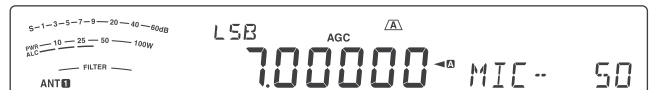
2　Press and hold Mic **[PTT]**.

- The TX-RX LED lights red.

3　SSB: While speaking into the microphone, adjust the **MULTI/CH** control so that the ALC meter reflects your voice level but does not exceed the ALC limit.

AM: While speaking into the microphone, adjust the **MULTI/CH** control so that the power meter slightly reflects your voice level.

FM: Access Menu No. 53 and select "1" (Normal), "2" (Medium), or "3" (High) for the microphone gain if necessary {page 22}.
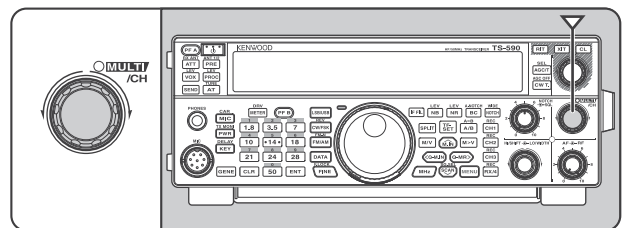
4　Release Mic **[PTT]** to receive.

- The TX-RX LED lights green or turns off, depending on the **SQL** control setting.

5　Press **[MIC (CAR)]** or **[CLR]** to exit the Microphone gain adjustment.

Note: When using the MC-90 microphone in FM mode, select "3" (High) for the microphone gain. The microphone sensitivity is low in FM mode. This may cause insufficient modulation. For other microphones, select either "1" (Normal) or "2" (Medium).

4 MENU SETUP

WHAT IS A MENU?

Many functions on this transceiver are selected or configured via a software-controlled Menu, rather than through the physical controls of the transceiver. Once familiar with the Menu system, you will appreciate the versatility it offers. You can customize the various timings, settings, and programming functions on this transceiver to meet your needs without using many controls and switches.

MENU A/ MENU B

This transceiver has 2 menus: Menu A and Menu B. These menus contain identical functions and can be configured independently. The transceiver, therefore, allows you to switch between 2 different environments quickly and easily. For example, you can configure Menu A for DXing and contesting while Menu B is for relaxed local ragchewing. By switching from Menu A to Menu B, you can instantly change the Menu configuration and key assignment to suit your current operating style. Or, 2 operators may share a single transceiver by dedicating one Menu to each operator. Both operators can always enjoy their own configuration.

MENU ACCESS

1   Press **[MENU]**.

- The Menu No. and setting appear on the display, and the explanation of the menu appears on the sub-display.
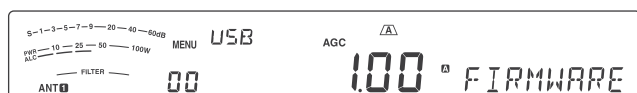
2   Press **[A/B (A=B)]** to select Menu A or B.

- "Ⓐ" or "Ⓑ" appears, indicating which Menu is selected.

3   Press **[Q-M.IN]**/ **[Q-MR]** or turn the **MULTI/CH** control to select the desired Menu No.

- Each time you change the Menu No., a different scrolling message appears on the sub-display, describing the Menu No.

4   Press **[M.IN]**/ **[SCAN (SG.SEL)]**, or Mic **[UP]**/ **[DWN]** to select a parameter.

5   Press **[MENU]** to exit Menu mode.

QUICK MENU

Because the number of functions this transceiver provides is extraordinary, there are numerous items in each Menu. If you find accessing desired Menu Nos. to be too time consuming, use the Quick Menu to create your own customized, abbreviated Menu. You can then add those Menu Nos. which you frequently use, to the Quick Menu. Copying Menu Nos. to the Quick Menu has no effect on the Menu.

PROGRAMMING THE QUICK MENU

1   Press **[MENU]**.

2   Press **[Q-M.IN]**/ **[Q-MR]** or turn the **MULTI/CH** control to select the desired Menu No.

3   Press **[FINE (F.LOCK)]**.

- "★" appears, indicating that the Menu item has been added to the Quick Menu.
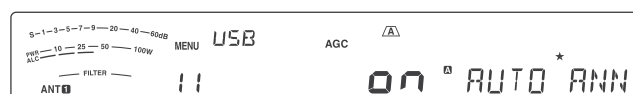
- To remove the item from the Quick Menu, press **[FINE (F.LOCK)]** again. "★" disappears.

4   Press **[MENU]** to exit Menu mode.

USING THE QUICK MENU

1   Press **[MENU]**.

2   Press **[MHz]**.

- "MHz" appears.

3   Press **[Q-M.IN]**/ **[Q-MR]** or turn the **MULTI/CH** control to select the desired Quick Menu No.

4   Press **[M.IN]**/ **[SCAN (SG.SEL)]**, or Mic **[UP]**/ **[DWN]** to change the current setting for the selected Menu No.

- When the Menu is registered to the Quick Menu list, "★" appears.

5   Press **[MENU]** to exit Quick Menu mode.
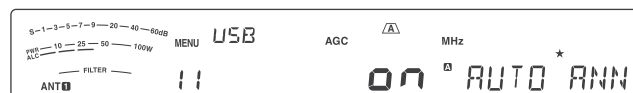
Note: If the Quick Menu has not been programmed, Press **[Q-M.IN]**/**[Q-MR]** or turning the **MULTI/CH** control in step **2** causes "CHECK" to be output in Morse code.

MENU CONFIGURATION

Category	No.	Description	Settings**	Ref. Page
		Display*	Default**	
Operator Interface	00	Firmware version	–	79
		FIRMWARE VERSION		
	01	Power on message	HELLO/ EDIT	24
		POWER ON MESSAGE	KENWOOD	
	02	Display brightness	OFF/ 1 ~ 6	55
		Off, 1: minimum, 6: maximum		
		DISPLAY **BRIGHTNE**SS	4	
	03	Display backlight color	1 ~ 10	55
		1: amber, 2 ~ 9: mixed colors, 10: green		
		BACKLIGHT **COLOR**	1	
	04	Panel key response for double function	1/ 2/ 3	55
		1: 0.2 second, 2: 0.5 second, 3: 1 second		
		PANEL **KEY RESP**ONSE FOR DOUBLE FUNCTIONS	2	
Volume	05	Beep output level	OFF/ 1 ~ 20 (1 step)	54
		OFF, 1: minimum, 9: maximum		
		BEEP VOLUME	10	
	06	Sidetone volume	OFF/ 1 ~ 20 (1 step)	24, 37
		OFF, 1: minimum, 9: maximum		
		SIDETONE VOLUME	10	
	07	VGS-1 message playback volume	OFF/ 1 ~ 20 (1 step)	63
		OFF, 1: minimum, 9: maximum		
		MESSAGE **PLAYBACK** VOLUME	10	
Voice Guide	08	VGS-1 announcement volume	OFF/ 1~ 20 (1 step)	66
		OFF, 1: minimum, 7: maximum		
		VOICE **GUIDE VO**LUME	10	
	09	VGS-1 announcement speed	0 ~ 4 (1 step)	66
		0: slow, 4: fast		
		VOICE **GUIDE SP**EED	1	
	10	VGS-1 announcement language	EN/ JP	66
		EN: English, JP: Japanese		
		VOICE **GUIDE LA**NGUAGE	EN	
	11	VGS-1 auto announcement	OFF/ 1/ 2	63
		AUTO ANNOUNCEMENT	1	
Tuning	12	MHz step	0.1/ 0.5/ 1 [MHz]	30
		MHZ STEP	1	
	13	Tuning control adjustment rate	250/ 500/ 1000 [Hz]	31
		TUNING CONTROL **CHANGE R**ATE PER REVOLUTION	1000	
	14	Rounds off VFO frequencies changed by using the **MULTI/CH** control	OFF/ ON	30
		FREQUENCY **ROUNDING** OFF WHEN USING MULTI/CH CONTROL	ON	

Category	No.	Description	Settings**	Ref.
		Display*	Default**	Page
Tuning (continued)	15	9 kHz frequency step size for the **MULTI/CH** control in AM mode on the AM broadcast band	OFF/ ON	30
		MULTI/CH CONTROL **9KHZ STE**P CHANGE IN AM BROADCAST BAND	K type: OFF E type: ON	
	16	Frequency step size for the **MULTI/CH** control in SSB mode	OFF/ 0.5/ 1/ 2.5/ 5/ 10 [kHz]	30
		MULTI/CH CONTROL	5	
	17	Frequency step size for the **MULTI/CH** control in CW/ FSK mode	OFF/ 0.5/ 1/ 2.5/ 5/ 10 [kHz]	30
		CW MULTI/CH CONTROL	0.5	
	18	Frequency step size for the **MULTI/CH** control in AM mode	5/ 6.25/ 10/ 12.5/ 15/ 20/ 25/ 30/ 50/ 100 [kHz]	30
		AM MULTI/CH CONTROL	5	
	19	Frequency step size for the **MULTI/CH** control in FM mode	5/ 6.25/ 10/ 12.5/ 15/ 20/ 25/ 30/ 50/ 100 [kHz]	30
		FM MULTI/CH CONTROL	10	
	20	Shiftable RX frequency during split transmission	OFF/ ON	25
		SHIFTABLE RX FREQUENCY DURING SPLIT TRANSMISSION	OFF	
Memory Channel	21	Number of quick memory channels	3/ 5/ 10 [ch]	47
		NUMBER OF **QUICK ME**MORY CHANNELS	5	
	22	Tunable memory recall frequencies	OFF/ ON	44
		TUNABLE MEMORY RECALL FREQUENCIES	OFF	
Scan	23	Program scan partially slowed	OFF/ ON	49
		PROGRAM SCAN PARTIALLY **SLOWED**	ON	
	24	Slow down frequency range for the program scan	100/ 200/ 300/ 400/ 500 [Hz]	49
		PROGRAM SLOW-**SCAN RAN**GE	300	
	25	Program scan hold	OFF/ ON	50
		PROGRAM **SCAN HOL**D	OFF	
	26	Scan resume method	TO/ CO	50
		SCAN RESUME METHOD	TO	
Auto Mode	27	Auto mode operation	ON/ OFF	53
		AUTO MODE OPERATION	OFF	
DSP Function	28	SSB filter type selection	1/ 2	40
		SSB FILTER TYPE SELECTION	1 (HI/LO)	
	29	SSB DATA filter type selection	1/ 2	40
		SSB **DATA FIL**TER TYPE SELECTION	2 (WIDTH/SHIFT)	
	30	Auto notch tracking speed	0 ~ 4 (1 step)	41
		AUTO **NOTCH TR**ACKING SPEED	2	
	31	TX filter for SSB/AM low cut	10/ 100/ 200/ 300/ 400/ 500 [Hz]	34
		TX FILTER FOR **SSB/AM L**OW CUT	300	
	32	TX filter for SSB/AM high cut	2500/ 2600/ 2700/ 2800/ 2900/ 3000 [Hz]	34
		TX FILTER FOR **SSB/AM H**IGH CUT	2700	

Category	No.	Description	Settings**	Ref. Page
		Display*	Default**	
DSP Function (continued)	33	TX filter for SSB-DATA low cut	10/ 100/ 200/ 300/ 400/ 500 [Hz]	34
		TX FILTER FOR SSB-**DATA LOW** CUT	300	
	34	TX filter for SSB-DATA high cut	2500/ 2600/ 2700/ 2800/ 2900/ 3000 [Hz]	34
		TX FILTER FOR SSB-**DATA HIG**H CUT	2700	
	35	Speech processor effect	SOFT/ HARD	33
		SPEECH PROCESSOR **EFFECT**	HARD	
Equalizer	36	DSP TX equalizer oFF: Off, Hb1: High boost1, Hb2: High boost2, FP: Formant pass, bb1: Bass boost1, bb2: Bass boost2, c: Conventional, U: User (Reserved for ARCP software)	OFF/ HB1/ HB2/ FP/ BB1/ BB2/ C/ U	34
		DSP **TX EQUAL**IZER	OFF	
	37	DSP RX equalizer oFF: Off, Hb1: High boost1, Hb2: High boost2, FP: Formant pass, bb1 Bass boost1, bb2: Bass boost2, FLAT: Flat U: User (Reserved for ARCP software)	OFF/ HB1/ HB2/ FP/ BB1/ BB2/ FLAT/ U	57
		DSP **RX EQUAL**IZER	OFF	
CW	38	Electronic keyer mode	A/ B	35
		ELECTRONIC **KEYER MO**DE	B	
	39	Keying priority over playback	OFF/ ON	36
		KEYING PRIORITY OVER PLAYBACK	OFF	
	40	CW RX pitch/ TX sidetone frequency	300 ~ 1000 (50 [Hz] step)	24
		CW RX PITCH/TX SIDETONE FREQUENCY	800	
	41	CW rise time	1/ 2/ 4/ 6 [ms]	36
		CW RISE TIME	6	
	42	CW keying dot, dash weight ratio	AUTO/ 2.5 ~ 4.0 (0.1 step)	36
		CW WEIGHTING	AUTO	
	43	Reverse CW keying auto weight ratio	OFF/ ON	36
		REVERSED CW WEIGHTING	OFF	
	44	Bug key function	OFF/ ON	36
		BUG KEY FUNCTION	OFF	
	45	Reversed dot and dash keying	OFF/ ON	38
		REVERSED **DOT AND** DASH KEYING	OFF	
	46	MIC UP/DWN key paddle function PF: PF key PA: Paddle	PF/ PA	38
		MIC **UP/DWN K**EY FUNCTION	PF	
	47	Auto CW TX when keying in SSB	OFF/ ON	38
		AUTO CW TX WHEN KEYING IN SSB	OFF	
	48	Frequency correction for changing SSB to CW	OFF/ ON	38
		FREQUENCY CORRECTION FOR **SSB-TO-C**W CHANGE	OFF	

Category	No.	Description	Settings**	Ref. Page
		Display*	Default**	
CW (continued)	49	No Break-in operation while adjusting keying speed	OFF/ ON	35
		NO BREAK-IN OPERATION WHILE ADJUSTING KEYING SPEED	OFF	
FSK	50	FSK shift	170/ 200/ 425/ 850 [Hz]	39
		FSK SHIFT	170	
	51	FSK keying polarity	OFF/ ON	39
		REVERSED **FSK KEY**-DOWN POLARITY	OFF	
	52	FSK tone frequency	1275/ 2125 [Hz]	39
		FSK TONE FREQUENCY	2125	
FM	53	MIC gain for FM 1: Low, 2: Mid, 3: Hi	1 ~ 3	22
		FM MIC GAIN	1	
TX Control	54	Fine transmission power tuning	OFF/ ON	58
		FINE TRANSMIT POWER CHANGE STEPS	OFF	
	55	Time-out timer	OFF/ 3/ 5/ 10/ 20/ 30 (min)	58
		TIME-OUT TIMER	OFF	
Transverter	56	Xverter/ power down of Xverter	OFF/ 1/ 2	58
		XVERTER/ POWER DOWN OF **XVERTER**	OFF	
Antenna Tuner	57	TX hold when AT completes the tuning	OFF/ ON	52
		ANTENNA TUNER **TX HOLD**	OFF	
	58	In-line AT while receiving	OFF/ ON	52
		ANTENNA **TUNER FO**R RECEPTION	OFF	
Linear Amp	59	Linear amplifier control relay for HF band	OFF/ 1/ 2/ 3/ 4/ 5	55
		HF LINEAR AMPLIFIER CONTROL RELAY	OFF	
	60	Linear amplifier control relay for 50 MHz band	OFF/ 1/ 2/ 3/ 4/ 5	55
		50MHZ LINEAR AMPLIFIER CONTROL RELAY	OFF	
Message	61	Constant recording	OFF/ ON	63
		CONSTANT RECORDING	ON	
	62	Repeat the playback	OFF/ ON	36, 62
		PLAYBACK **REPEAT**	OFF	
	63	Interval time for repeating the playback	0 ~ 60 [s] (1 step)	36, 62
		PLAYBACK **INTERVAL** TIME	10	
Split/ Transfer	64	Split frequency transfer in master/ slave operation	OFF/ ON	60
		TRANSFER SPLIT FREQUENCY DATA TO ANOTHER TRANSCEIVER	OFF	
	65	Permit to write the transferred Split frequencies to the target VFOs	OFF/ ON	60
		COPY SPLIT FREQUENCY DATA TO VFO	OFF	
TX Inhibit	66	TX inhibit	OFF/ ON	34
		TX INHIBIT	OFF	

Category	No.	Description	Settings**	Ref. Page
		Display*	Default**	
PC (Communication)	67	COM port communication speed***	4800/ 9600/ 19200/ 38400/ 57600/ 115200	60
		COM PORT BAUDRATE	9600 (bps)	
	68	USB port communication speed***	4800/ 9600/ 19200/ 38400/ 57600/ 115200	60
		USB PORT BAUDRATE	115200 (bps)	
External Audio (Input/ Output)	69	Audio input line selection for data communications	ACC2/ USB	61
		AUDIO INPUT **LINE SEL**ECTION FOR DATA COMMUNICATIONS	ACC2	
	70	Source for PTT/SEND transmission	FRONT/ REAR	61
		SOURCE OF PTT/SEND TRANSMISSION	FRONT	
	71	Audio level of USB input for data communications	0 ~ 9 (1 step)	61
		AUDIO LEVEL OF **USB INPU**T FOR DATA COMMUNICATIONS	4	
	72	Audio level of USB output for data communications	0 ~ 9 (1 step)	61
		AUDIO LEVEL OF **USB OUTP**UT FOR DATA COMMUNICATIONS	4	
	73	Audio level of ACC2 input for data communications	0 ~ 9 (1 step)	61
		AUDIO LEVEL OF **ACC2 INP**UT FOR DATA COMMUNICATIONS	4	
	74	AUDIO level of ACC2 output for data communications	0 ~ 9 (1 step)	61
		AUDIO LEVEL OF **ACC2 OUT**PUT FOR DATA COMMUNICATIONS	4	
	75	Mixing beep tones for ACC2/USB audio output	OFF/ ON	61
		MIXING BEEP TONES FOR ACC2/USB AUDIO OUTPUT	OFF	
External Accessory Control	76	Data VOX	OFF/ ON	32
		VOX OPERATION **WITH DAT**A INPUT	OFF	
	77	Data VOX delay time	0 ~ 100 (5 step)	33
		DATA **VOX DELA**Y TIME	50	
	78	Data VOX gain for the USB audio input	0 ~ 9 (1 step)	33
		USB VOX GAIN	4	
	79	Data VOX gain for the ACC2 terminal	0 ~ 9 (1 step)	33
		ACC2 VOX GAIN	4	
	80	PKS polarity	OFF/ ON	66
		REVERSED **PKS POLA**RITY	OFF	
	81	Busy lockout (TX)	OFF/ ON	34
		BUSY FREQUENCY TRANSMISSION **LOCKOUT**	OFF	
	82	CTCSS mute control	1/ 2	61
		CTCSS **MUTE CON**TROL	1	
	83	PSQ control signal logic	LO/ OPEN	61
		PSQ OUTPUT LOGIC	LO	
	84	PSQ source output condition	OFF/ BSY/ SQL/ SND/ BSY-SND/ SQL-SND	61
		PSQ SOURCE	SQL	
	85	DRV connector output function mode	DRO/ ANT	52
		DRV CONNECTOR FUNCTION	DRO	

Category	No.	Description	Settings**	Ref. Page
		Display*	Default**	
Timer	86	APO (Auto Power Off) function	OFF/ 60/ 120/ 180 [min]	52
		AUTO POWER OFF	OFF	
PF Keys	87	Front panel PF A key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		FRONT PANEL **PF A KEY** ASSIGNMENT	200 [VOICE1]	
	88	Front panel PF B key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		FRONT PANEL **PF B KEY** ASSIGNMENT	201 [VOICE2]	
	89	Front panel RIT key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		RIT KEY ASSIGNMENT	165	
	90	Front panel XIT key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		XIT KEY ASSIGNMENT	166	
	91	Front panel CL key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		CL KEY ASSIGNMENT	167	
	92	Front panel MULTI/CH key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MULTI CH KEY ASSIGNMENT	131	
	93	Front panel MULTI/CH key assignment (CW)	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		CW MULTI CH KEY ASSIGNMENT	133	
	94	Microphone PF 1 key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC **PF 1 KEY** ASSIGNMENT	151 [A/B]	
	95	Microphone PF 2 key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC **PF 2 KEY**ASSIGNMENT	148 [SPLIT]	
	96	Microphone PF 3 key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC **PF 3 KEY** ASSIGNMENT	154 [M>V]	
	97	Microphone PF 4 key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC **PF 4 KEY** ASSIGNMENT	203 [MONITOR]	
	98	Microphone DWN key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC DOWN KEY ASSIGNMENT	207 [DOWN]	
	99	Microphone UP key assignment	0 ~ 99, 120 ~ 170, 200 ~ 209, OFF	56
		MIC UP KEY ASSIGNMENT	208 [UP]	

*   The bolded lettering of the display message is what appears on the display while paused.

**   Settings and default values may be modified.

***   After changing this setting via the menu, turn the power OFF and then back ON to implement the change.

CHARACTER ENTRY

When character entry is required, a cursor will appear on the display.

1 Move the cursor to the left or right by pressing **[Q-M.IN]** or **[Q-MR]**.

2 Turn the **MULTI/CH** control or press **[M.IN]**/ **[SCAN (SG.SEL)]** to select your desired character.

- You can delete the selected character by pressing **[CL]**.

3 Repeat steps 1 and 2 to enter the remaining characters.

4 Press **[MENU]** to set the entry and to exit character entry mode.

- Press **[CLR]** at any time to cancel character entry mode and return to the Menu selection.

Available alphanumeric characters:

A B C D E F G H I J K L M N O P Q(q) R S T U V W X Y Z (space) ✶ + − / 0 1 2 3 4 5 6 7 8 9

Note: Refer to page 23 to change the Power On message, and page 43 to register a Memory Channel name.

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5 BASIC COMMUNICATIONS

SSB TRANSMISSION

SSB is the most commonly-used mode on the HF Amateur radio bands. Compared with other voice modes, SSB requires only a narrow bandwidth for communications. SSB also allows long distance communications with minimum transmission power.

If necessary, refer to "OPERATING BASICS", beginning on page 10, for details on how to receive.

1 Select an operating frequency.

2 Press **[LSB/USB]** until "USB" or "LSB" appears on the operating mode display.

- If the desired sideband ("USB" or "LSB") does not appear, select the other sideband first. Then, press **[LSB/USB]**. The mode indicator changes to your desired sideband.

- "USB" represents the upper sideband and "LSB" represents the lower sideband. Normally, USB is used for the communications for 10 MHz and above while LSB is used for the frequencies below 10 MHz.

```
S-1-3-5-7-9---20--40--60dB        USB            AGC      /A\
PWR--10--25--50---100W
ALC
        FILTER                       14.245.00◄A
ANT1        AT>T
```

3 Press **[MIC (CAR)]** to adjust the Microphone gain.

- The current gain level appears on the sub-display.

```
S-1-3-5-7-9---20--40--60dB        USB            AGC      /A\
PWR--10--25--50---100W
ALC
        FILTER                       14.245.00◄A MIC··  50
ANT1        AT>T
```

4 Press and hold Mic **[PTT]**.

- The TX-RX LED lights red.

- Refer to "VOX" {page 32} for information on automatic TX/ RX switching.

5 Speak into the microphone and turn the **MULTI/CH** control so that the ALC meter reflects your voice level but does not exceed the ALC limit.

- Speak in your normal tone and level of voice. Speaking too close to the microphone or too loudly may increase distortion and reduce intelligibility at the receiving end.

- You may want to use the Speech Processor. Refer to "SPEECH PROCESSOR" {page 33} for details.

6 Release Mic **[PTT]** to return to Reception mode.

- The TX-RX LED lights green or turns off, depending on the **SQL** control position.

7 Press **[MIC (CAR)]** or **[CLR]** to exit the Microphone gain adjustment.

Refer to "COMMUNICATING AIDS", beginning on page 30, for information on additional useful operation functions.

FM TRANSMISSION

FM is a common mode for communicating on VHF or UHF frequencies. As for HF and the 6 m band, 29 MHz and 51-54 MHz bands are commonly used for FM operation. You can also utilize 10 m/ 6 m band repeaters to reach your friends when they are outside or skipped over from your coverage. Although FM requires a wider bandwidth when compared to SSB or AM mode, it has the finest audio quality among these modes. When combined with the full-quieting aspect of FM signals, which suppresses background noise on the frequency, FM can be the best method for maintaining casual communications with your local friends.

If necessary, refer to "OPERATING BASICS", beginning on page 10, for details on how to receive.

1 Select an operating frequency.

2 Press **[FM/AM (FM-N)]** until "FM" appears.

- If "FM" does not appear, select "AM", then press **[FM/AM (FM-N)]**. The mode indicator changes to "FM".

```
S-1-3-5-7-9---20--40--60dB        FM              /A\
PWR--10--25--50---100W
ALC
        FILTER                       29.300.00◄A
ANT1        AT>T
```

3 Press and hold Mic **[PTT]**.

- The TX-RX LED lights red.

- Refer to "VOX" {page 32} for information on automatic TX/ RX switching.

4 Speak into the microphone in your normal voice.

- Speaking too close to the microphone or too loudly may increase distortion and reduce intelligibility at the receiving end.

- You can switch the Microphone gain for FM between 1 (Normal), 2 (Medium), and 3 (High) by using Menu No. 53. 1 (Normal) is usually appropriate; however, select 3 (High) if other stations report that your modulation is weak.

5 Release Mic **[PTT]** to return to Reception mode.

- The TX-RX LED lights green or turns off, depending on the **SQL** control position.

Refer to "COMMUNICATING AIDS", beginning on page 30, for additional information on useful operation functions.

Note: Microphone gain adjustment for SSB or AM has no effect in FM mode. In FM mode, you must select 1 (Normal), 2 (Medium), or 3 (High) in Menu No. 53.

AM TRANSMISSION

Each mode used on the HF Amateur bands has its own advantages. Although long distance DX contacts may be less common while using AM, the superior audio quality characteristic of AM operation is one reason why some hams prefer this mode.

If necessary, refer to "OPERATING BASICS", beginning on page 10, for details on how to receive.

1   Select an operating frequency.

2   Press **[FM/AM (FM-N)]** until "AM" appears.

   • If "AM" does not appear, select "FM" first, then press **[FM/AM (FM-N)]**. The mode indicator changes to "AM".

```
S─1─3─5─7─9──20─40──60dB      AM
PWR    10  25  50    100W             AGC         Ⓐ
ALC
      ── FILTER ──                28.305.00◄ᴬ
ANT🔳      AT>T
```

3   Press **[MIC (CAR)]** to enter the Microphone gain adjustment mode.

   • The current gain level appears on the sub-display.

4   Press and hold Mic **[PTT]**.

   • The TX-RX LED lights red.

   • Refer to "VOX" {page 30} for information on automatic TX/ RX switching.

5   Speak into the microphone and adjust the **MULTI/CH** control so that the power meter slightly reflects your voice level.

   • Speak in your normal tone and level of voice. Speaking too close to the microphone or too loudly may increase distortion and reduce intelligibility at the receiving end.

   • You may want to use the Speech Processor. Refer to "SPEECH PROCESSOR" {page 33} for details.

6   Release Mic **[PTT]** to return to Reception mode.

   • The TX-RX LED lights green or turns off, depending on the **SQL** control position.

7   Press **[MIC (CAR)]** or **[CLR]** to exit the Microphone gain adjustment mode.

Refer to "COMMUNICATING AIDS", beginning on page 30, for information on additional useful operation functions.

Note: When the TX power meter reading exceeds the value that you specified in the TX Power setting {page 56}, decrease the microphone gain or adjust your tone and level of voice.

NARROW BANDWIDTH FOR FM

Select wide band or narrow band TX deviation depending on whether the other station is using wide band or narrow band filter for FM mode. While "NAR" appears, the TS-590S transceiver transmits signals in narrow band FM but the reception IF filter bandwidth remains unchanged (Wide). The deviation selection is crucial to avoid audio distortion or insufficient intelligibility that the other station will encounter.

1   Press **[FM/AM (FM-N)]** until "FM" appears.

   • If "FM" does not appear, select "AM" first, then press **[FM/AM (FM-N)]**. The mode indicator changes to "FM".

2   Press and hold **[FM/AM (FM-N)]** to toggle the selection between wide and narrow TX deviation.

   • "**NAR**" appears when narrow TX deviation is selected.

```
S─1─3─5─7─9──20─40──60dB      FM   NAR        Ⓐ
PWR    10  25  50    100W
ALC
      ── FILTER ──                29.300.00◄ᴬ
ANT🔳      AT>T
```

CW TRANSMISSION

CW operators know that this mode is very reliable when communicating under worst conditions. It may be true that newer digital modes rival CW as being equally as useful in poor conditions. These modes, however, do not have the long history of service nor the simplicity that CW provides.

This transceiver has a built-in electronic keyer that supports a variety of functions. For details on using these functions, refer to "ELECTRONIC KEYER" {page 35}.

If necessary, refer to "OPERATING BASICS", beginning on page 10, for details on how to receive.

1   Select the operating frequency.

2   Press **[CW/FSK (REV)]** until "CW" appears.

   • If "CW" does not appear, select "FSK" first, then press **[CW/FSK (REV)]**. The mode indicator changes to "CW".

   • To precisely tune in another station, use Auto Zero-beat. Refer to "AUTO ZERO-BEAT" {page 24}.

```
S─1─3─5─7─9──20─40──60dB      CW
PWR    10  25  50    100W             AGC  ·F
ALC
      ── FILTER ──                14.025.00◄ᴬ
ANT🔳      AT>T
```

3   Press **[SEND]**.

   • The TX-RX LED lights red.

4   Operate the Keys or Paddle.

   • As you transmit, you should hear a sidetone that lets you monitor your own transmission.

5   Press **[SEND]** to return to Reception mode.

   • The TX-RX LED lights green or turns off, depending on the **SQL** control setting.

AUTO ZERO-BEAT

Use Auto Zero-beat before transmitting to tune in a CW station. Auto Zero-beat automatically and exactly matches your transmit frequency with the station you are receiving. Neglecting to do this will reduce your chances of being heard by the other station.

1 Tune to the CW signal using the **Tuning** control.

2 Press **[CW T. (AGC OFF)]** to start Auto Zero-beat while CW is selected for the operating mode.

   • "CW TUNE" appears.

   • Your reception frequency automatically changes so that the pitch (tone) of the received signal exactly matches the TX sidetone/ RX pitch frequency that you have selected. Refer to "TX SIDETONE/ RX PITCH FREQUENCY" {below}.

   • When matching is completed, "CW TUNE" disappears.

   • If matching is unsuccessful, the previous frequency is restored.

3 To quit Auto Zero-beat, press **[CW T. (AGC OFF)]** or **[CLR]**.

Note:

◆ When using Auto Zero-beat, the matching error is normally within ±5 Hz.

◆ Auto Zero-beat may fail if the keying speed of the target station is too slow or if some interference is present.

◆ When the RIT function is ON, only RIT frequencies change to make the Auto Zero-beat adjustment.

TX SIDETONE/ RX PITCH FREQUENCY

As you send CW, you will hear tones from the transceiver speaker. These are called TX (transmission) sidetones. Listening to these tones, you can monitor what you are transmitting. You may also use the tones to ensure that your key contacts are closing, the keyer is functioning, or to practice sending without actually putting a signal on the air.

RX (reception) pitch refers to the frequency of CW that you hear after tuning in a CW station.

On this transceiver, the frequency of the sidetone and RX pitch are equal and selectable. Access Menu No. 40 to select the frequency that is most comfortable for you. The selectable range is from 300 Hz to 1000 Hz in steps of 50 Hz (default is 800 Hz).

To change the volume of the TX sidetone, access Menu No. 06. The selections range from 1 to 20 and OFF (default is 10).

Note:

◆ The position of the **AF** control does not affect the volume of the TX sidetone.

◆ When changing the CW pitch/ side tone, the shift amount of the receive filter is automatically applied to the CW pitch/ side tone. (In Quick Memory mode, the CW pitch/ side tone is not revised since the receive filter information stored in the Quick Memory has priority.)

CARRIER LEVEL

When using AM, CW, or FSK mode, you can adjust the carrier level.

1 Press and hold **[MIC (CAR]**.

   • The current gain level appears on the sub display.

2 Turn the **MULTI/CH** control so that the ALC meter reads within the limits of the ALC zone.

   • For AM mode, adjust the **MULTI/CH** control so that the ALC meter just begins to indicate.

3 Press and hold **[MIC (CAR]** again or press **[CLR]** to complete the setting.

POWER ON MESSAGE

Each time you switch the transceiver ON, "KENWOOD" (default) appears on the sub display for approximately 2 seconds. You can program your favorite message in place of the default message. You can enter a message using up to 8 characters.

1 Press **[MENU]**, then press **[Q-M.IN]**/ **[Q-MR]** or turn the **MULTI/CH** control to access Menu No 01.

2 Press **[M.IN]**/ **[SCAN (SG.SEL)]** to begin editing the message.

3 Move the cursor to the left or right by pressing **[Q-M.IN]** or **[Q-MR]**.

4 Press **[M.IN]**/ **[SCAN (SG.SEL)]** or turn the **MULTI/CH** control to select your desired character.

   • You can delete the selected character by pressing **[CL]**.

5 Repeat steps **3** and **4** to enter the remaining characters.

6 Press **[MENU]** to set the entry and exit character entry mode.

   • Press **[CLR]** at any time to cancel character entry mode and exit the Menu mode.

6 ENHANCED COMMUNICATIONS

SPLIT-FREQUENCY OPERATION

Usually you can communicate with other stations using a single frequency for receiving and transmitting. In this case, you select only one frequency on either VFO A or VFO B. However, there are cases where you must select one frequency for receiving and a different frequency for transmitting. This requires the use of 2 VFOs. This is referred to as "split-frequency operation". One typical case which requires this type of operation is when you use an FM repeater {page 26}. Another typical case is when you call a rare DX station.

When a rare or desirable DX station is heard, that operator may immediately get many simultaneous responses. Often, such a station is lost under the noise and confusion of many calling stations. If you find that you are suddenly being called by many operators, it is your responsibility to control the situation. You may announce that you will be "listening up 5 (kHz, from your present transmission frequency)", or "listening down between 5 and 10 (kHz)".

1   Press **[A/B (A=B)]** to select VFO A or VFO B.
   - "◄🄰" or "◄🄱" appears to show which VFO is selected.

2   Select an operating frequency.
   - This frequency will be used for transmission.
   - To copy the selected VFO frequency to the other VFO, press and hold **[A/B (A=B)]**.

3   Press **[A/B (A=B)]** to select the other VFO.

4   Select an operating frequency.
   - This frequency will be used for reception.

5   Press **[SPLIT]**.
   - "**SPLIT**" appears.
   - Each time you press **[A/B (A=B)]**, the reception and transmission frequencies are swapped.

6   To quit split-frequency operation, press **[SPLIT]** again.
   - "**SPLIT**" disappears.

SHIFTABLE RX FREQUENCY DURING SPLIT TRANSMISSION

When the shiftable function of the RX frequency in split transmission is set to ON, it is possible to change the RX frequency by turning the Tuning control during split transmission. (When it is set to OFF, the TX frequency changes by turning the Tuning control during split transmission.)

1   Press **[MENU]**, then press **[Q-M.IN]**/ **[Q-MR]** or turn the **MULTI/CH** control to select Menu No. 20.

2   Press **[M.IN]**/ **[SCAN (SG.SEL)]** to select "on"

3   Press **[MENU]** to exit Menu mode.
   - When you switch the transceiver ON while this function is set to ON, the decimal point at the

right end digit of the main display flashes for approximately 2 seconds after the Power On message is displayed.

DIRECTLY ENTERING THE FREQUENCY SPLIT SPECIFIED BY A DXer

To directly enter the difference between the TX and RX frequencies specified by a DXer, follow the instruction below while receiving on the main band of a signal from the DXer.

1   Press and hold **[SPLIT]**.
   - "**SPLIT**" blinks.

2   Enter the frequency difference (the "split") in the order of kHz as specified by the DX station.

   If the frequency specified by the DXer is higher than your current frequency, enter the specified frequency in the order of kHz using the numeric and band-select keypad. Conversely, if the specified frequency is lower, prefix a value of "0" to the frequency.

   - For example, enter a value of "5" to increment the frequency by 5 kHz, and enter a value of "05" to decrement the frequency by 5 kHz.
   - "**SPLIT**" switches from split operation to simplex operation.

> **Note:**
> ◆   Pressing **[SPLIT]** switches from split operation to simplex operation.
> ◆   To temporarily receive using the transmit frequency, use the TF-SET function.

TURN THE TUNING CONTROL TO SEARCH FOR THE TRANSMIT FREQUENCY

To directly search for the transmit frequency by rotating the **Tuning** control, follow the instruction below while receiving on the main band of a signal from the DX station.

1   Press and hold **[SPLIT]**.
   - "**SPLIT**" blinks.

2   Turn the **Tuning** control to search for the frequency.
   - The frequency can be changed even if the frequency has been locked.
   - Press **[CLR]** to stop searching.

3   Press **[SPLIT]** to end.
   - The frequency is configured as the transmit frequency and split operation begins.
   - "**SPLIT**" lights.

TF-SET (TRANSMISSION FREQUENCY SET)

TF-SET allows you to temporarily switch your transmission frequency and reception frequency. Canceling this function immediately restores the original transmission and reception frequencies. By activating TF-SET, you can listen on your transmit frequency, and change it while listening. This allows you to check whether or not the newly selected transmission frequency is free of interference.

1 Configure split-frequency operation as explained in the previous section.

2 Press and hold **[TF-SET]**, then turn the **Tuning** control or press Mic **[UP]**/ **[DWN]** to change the transmission frequency.

- The transceiver receives on the frequency as you change, but the frequency shown on the sub-display (the original reception frequency) stays unchanged.

3 Release **[TF-SET]**.

- You are now receiving again on your original reception frequency.

Successfully contacting a DX station in a pileup often depends on making a well-timed call on a clear frequency. That is, it is important to select a relatively clear transmission frequency and to transmit at the exact instant when the DX station is listening but the majority of the groups aren't transmitting. Switch your reception and transmission frequencies by using the TF-SET function and listen to your transmission frequency. You will soon learn the rhythm of the DX station and the pileup. The more proficient you become at using this function, the more DX stations you will contact.

Note:
- TF-SET is disabled while transmitting.
- You can change the transmission frequency even when the Frequency lock function is ON.
- An RIT offset frequency is not added; however, an XIT offset frequency is added to the transmit frequency during TF-SET.

FM REPEATER OPERATION

Most Amateur radio voice repeaters use a separate reception and transmission frequency. The transmission frequency may be higher or lower than the reception frequency. In addition, some repeaters may require the transceiver to transmit a subtone before the repeater can be used.

Compared to simplex communication, you can usually transmit over much greater distances by using a repeater. Repeaters are typically located on a mountain top or other elevated location. Often they operate at higher ERP (Effective Radiated Power) than a typical station. This combination of elevation and high ERP allows communications over considerable distances.

HF/ 6 m band repeaters usually operate in the 29 MHz FM sub-band and 51-54 MHz band. This special service combines the advantages of FM operation, good fidelity with noise and interference immunity, with the excitement of HF DX (long distance) communications. Even on a quiet day, 10 m FM provides reliable around-town communications with the potential for sudden DX from across the country or around the world.

Note:
- When programming 2 separate frequencies using 2 VFOs, be sure to select FM mode on both VFOs.
- When operating through a repeater, over deviation caused by speaking too loudly into the microphone can cause your signal to "talk-off" (break up) through the repeater.
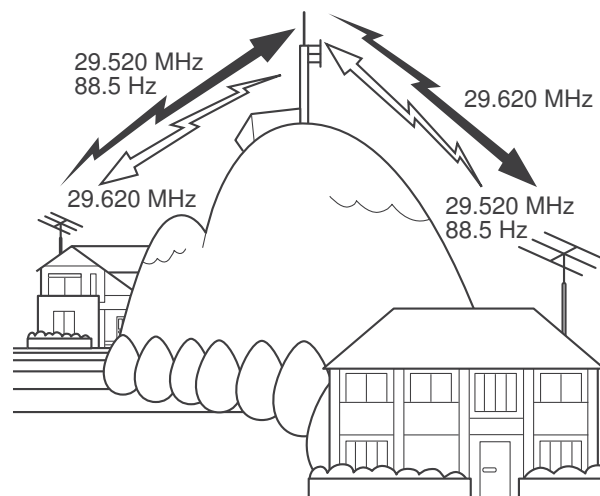
1 Press **[A/B (A=B)]** to select VFO A or VFO B.
- "◄Ⓐ" or "◄Ⓑ" appears to show which VFO is selected.

2 Turn the **Tuning** control or the **MULTI/CH** control to select the reception frequency.

3 Press **[FM/AM (FM-N)]** to select FM mode.

4 Press and hold **[A/B (A=B)]** to duplicate the frequencies and other data to the other VFO.

5 Turn the **Tuning** control or the **MULTI/CH** control to select the transmission frequency.

6 Press **[AGC/T (SEL)]** to turn the Tone function ON if the repeater requires a subtone.
- "T" appears.
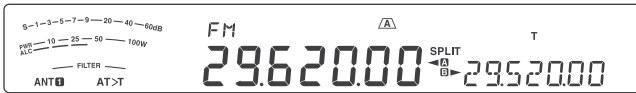- Refer to "Selecting a Tone Frequency" for more details on the subtone .

```
S—1—3—5—7—9——20——40——60dB
PWR  10  25  50      100W
ALC
      FILTER
ANT 1      AT>T
```
FM   Ⓐ   T

29.520.00◄B

- To quit the Subtone function, press **[AGC/T (SEL)]** twice.

7 Press **[SPLIT]**.

- "**SPLIT**" appears.

8 Press **[A/B (A=B)]** to return to the original reception frequency.

```
S—1—3—5—7—9——20——40——60dB
PWR  10  25  50      100W
ALC
      FILTER
ANT 1      AT>T
```
FM   Ⓐ   T

29.620.00 SPLIT ◄A B► *29.520.00*

9 Press Mic **[PTT]** to transmit.

- The VFO changes to the other VFO to transmit.
- Each time you press **[A/B (A=B)]**, the reception and transmission frequencies are swapped.

10 Press **[SPLIT]** to quit split-frequency operation.

- "**SPLIT**" disappears.

The data that you select in steps **1** to **8** can be stored in memory. Refer to "Split-Frequency Channels" {page 43}.

Note:
- When operating through a repeater, over deviation caused by speaking too loudly into the microphone can cause your signal to "talk-off" (break up) through the repeater.
- To check the tone frequency stored in a memory channel, recall the desired memory channel and press **[AGC/T (SEL)]**.

TRANSMITTING A TONE

In general, FM repeaters require the transceiver to transmit a sub-audible tone to prevent other repeaters on the same frequency from locking each other up. The required tone frequency differs among repeaters. Repeaters also differ in their requirements for either continuous or burst tones. For the appropriate selections for your accessible repeaters, consult your local repeater reference.

After completing the tone settings, pressing and holding Mic **[PTT]** causes the transceiver to transmit the selected tone. If you have selected a 1750 Hz tone, the transceiver sends a 500 ms tone burst each time transmission starts.

Note: If you store tone settings in a memory channel, you need not reprogram each time. Refer to "MEMORY FEATURES" {page 43}.

■ Activating the Tone Function

1 Confirm that FM mode has been selected on the VFO(s) {page 10}.

- When using 2 VFOs, you must select FM mode on both VFOs.

2 Press **[AGC/T (SEL)]**.

- "**T**" appears.

```
S—1—3—5—7—9——20——40——60dB
PWR  10  25  50      100W
ALC
      FILTER
ANT 1      AT>T
```
FM   Ⓐ   T

29.620.00 SPLIT ◄A B► *29.520.00*

Note: You cannot use the Tone function with the CTCSS function.

■ Selecting a Tone Frequency

1 While "**T**" appears (Tone function is ON), press and hold **[AGC/T (SEL)]**.

- The current tone frequency appears. The default is 88.5 Hz.

```
S—1—3—5—7—9——20——40——60dB
PWR  10  25  50      100W
ALC
      FILTER
ANT 1      AT>T
```
FM   Ⓐ   T

29.620.00 SPLIT ◄A B►T□-- 88.5

2 Turn the **MULTI/CH** control to select the desired tone frequency.

- The available tone frequencies are listed in the table below.

3 Press and hold **[AGC/T (SEL)]** or press **[CLR]** to complete the setting.

| No.	Freq. (Hz)	No.	Freq. (Hz)	No.	Freq. (Hz)	No.	Freq. (Hz)
00	67.0	11	97.4	22	141.3	33	206.5
01	69.3	12	100.0	23	146.2	34	210.7
02	71.9	13	103.5	24	151.4	35	218.1
03	74.4	14	107.2	25	156.7	36	225.7
04	77.0	15	110.9	26	162.2	37	229.1
05	79.7	16	114.8	27	167.9	38	233.6
06	82.5	17	118.8	28	173.8	39	241.8
07	85.4	18	123.0	29	179.9	40	250.3
08	88.5	19	127.3	30	186.2	41	254.1
09	91.5	20	131.8	31	192.8	42	1750
10	94.8	21	136.5	32	203.5	--	--

Note:
- You can select a tone frequency independent of a CTCSS frequency.
- When 1750 Hz is selected, the transceiver sends a 500 ms tone burst each time transmission starts. You cannot transmit 1750 Hz tone manually.

TONE FREQUENCY ID SCAN

This function scans through all tone frequencies to identify the incoming tone frequency on a received signal. You may find this useful when you do not know the tone frequency that the repeater uses.

1 While the Tone function is ON ("T" is visible), press and hold **[AGC/T (SEL)]**.

- The current tone frequency appears.

2 Press **[SCAN (SG.SEL)]** to activate the Tone frequency ID scan.

- While the transceiver is receiving a signal, "T" blinks and every tone frequency is scanned. When the tone frequency is identified, the transceiver stops scanning and the identified frequency is displayed.
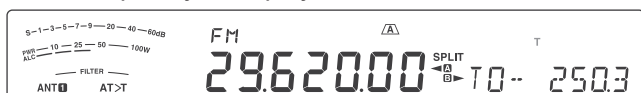
- Press **[SCAN (SG.SEL)]** or **[CLR]** to stop scanning while the tone frequency ID scan is active.
- Press **[SCAN (SG.SEL)]** again to resume scanning.

Note: Received signals are audible while scanning is in progress.

FM CTCSS OPERATION

You may sometimes want to hear calls only from specific persons. When using FM mode, the Continuous Tone Coded Squelch System (CTCSS) allows you to ignore (not hear) unwanted calls from other persons who are using the same frequency. A CTCSS tone is sub-audible and is selectable from among the 42 tone frequencies. Select the same CTCSS tone as the other stations in your group. You will not hear calls from stations other than those using the same CTCSS tone.

Note: CTCSS does not cause your conversation to be private. It only relieves you from listening to unwanted conversations.

1 Press **[A/B (A=B)]** to select VFO A or VFO B.

- "◄Ⓐ" or "◄Ⓑ" appears to show which VFO is selected.

2 Select the 29 MHz band or the 51-54 MHz band using **[28 (9)]** or **[50 (0)]**.

3 Select the desired frequency with the **Tuning** control or **MULTI/CH** control.

4 Press **[FM/AM (FM-N)]** to select FM mode.

5 Turn the **SQL** control to adjust the squelch.

6 Press **[AGC/T (SEL)]** until "CT" appears.

7 While "CT" is visible, press and hold **[AGC/T (SEL)]**.

- The current CTCSS frequency appears (default is 88.5 Hz).

8 Turn the **MULTI/CH** control to select the appropriate CTCSS frequency.

- The selectable CTCSS frequencies are listed in the table below.

9 Press and hold **[AGC/T (SEL)]** or press **[CLR]** to complete the setting.

No.	Freq. (Hz)	No.	Freq. (Hz)	No.	Freq. (Hz)	No.	Freq. (Hz)
00	67.0	11	97.4	22	141.3	33	206.5
01	69.3	12	100.0	23	146.2	34	210.7
02	71.9	13	103.5	24	151.4	35	218.1
03	74.4	14	107.2	25	156.7	36	225.7
04	77.0	15	110.9	26	162.2	37	229.1
05	79.7	16	114.8	27	167.9	38	233.6
06	82.5	17	118.8	28	173.8	39	241.8
07	85.4	18	123.0	29	179.9	40	250.3
08	88.5	19	127.3	30	186.2	41	254.1
09	91.5	20	131.8	31	192.8	--	--
10	94.8	21	136.5	32	203.5	--	--

You will hear calls only when the selected tone is received. To answer the call, press and hold Mic **[PTT]**, then speak into the microphone.

Skip steps **7** and **8** if you have already programmed the appropriate CTCSS frequency.

Note:
- When using split-frequency operation, select FM mode on both VFOs to use CTCSS.
- You can select a CTCSS frequency independent of a tone frequency.
- You cannot use the CTCSS function with the Tone function.

CTCSS FREQUENCY ID SCAN

This function scans through all CTCSS frequencies to identify the incoming CTCSS frequency on a received signal. You may find this useful when you cannot recall the CTCSS frequency that the other persons in your group are using.

1 While the CTCSS function is ON, press and hold **[AGC/T (SEL)]**.

- The current CTCSS frequency appears.

2 Press **[SCAN (SG.SEL)]** to activate the CTCSS frequency ID scan.

- While the transceiver is receiving a signal, "CT" blinks and every CTCSS frequency is scanned. When the CTCSS frequency is identified, the transceiver stops scanning and the identified frequency is displayed.

- Press **[SCAN (SG.SEL)]** or **[CLR]** to stop scanning while the CTCSS frequency ID scan is active.
- Press **[SCAN (SG.SEL)]** again to resume scanning.

Note: Received signals are audible while scanning is in progress.

CROSS TONE

Use this feature when using different uplink and downlink tones to access a repeater. You can set a transmission Tone frequency and reception CTCSS frequency to different frequencies.

To set the transmission tone:

1   Press **[A/B (A=B)]** to select VFO A or VFO B.

2   Select your desired transmission frequency.

3   Press **[FM/AM (FM-N)]** to select FM.

4   Press **[AGC/T (SEL)]** until "T" appears.

5   Press and hold **[AGC/T (SEL)]**, then turn the **MULTI/CH** control to select your desired Tone frequency.

6   Press and hold **[AGC/T (SEL)]** or press **[CLR]** to complete the setting.

To set the reception tone:

1   Press **[A/B (A=B)]** to select the other VFO.

2   Select your desired reception frequency.

3   Press **[FM/AM (FM-N)]** to select FM.

4   Press **[AGC/T (SEL)]** until "CT" appears.

5   Press and hold **[AGC/T (SEL)]**, then turn the **MULTI/CH** control to select your desired CTCSS frequency.

6   Press and hold **[AGC/T (SEL)]** or press **[CLR]** to complete the setting.

To set the Cross tone:

1   Press **[SPLIT]**.
   - "SPLIT" appears on the display.

2   Press **[AGC/T (SEL)]** until "CTx" appears.

Note: hen the cross tone function is ON, the Tone and CTCSS frequency cannot be changed. To change the Tone or CTCSS frequency, press **[AGC/T (SEL)]** to turn Tone or CTCSS ON, then change the setting.