ICOM®

INSTRUCTION MANUAL

HF/VHF
ALL MODE TRANSCEIVER

IC-746PRO

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Icom Inc.

FOREWORD

We understand making you have a choice of many different radios in the market place.I want to take a couple of moments of your time to thank you for making your IC-746PRO your radio of choice, and hope you agree with Icom's philosophy of "technology first".Many hours of research and development went into the design of your IC-746PRO.

Rather than completely redesigning all areas to create a new radio, the engineering team at Icom decided to follow in the footsteps of the IC-746 (one of the best values in the marketplace) with the new "PRO". Focused on real world improvements compiled over the last few years from letters, phone calls, E-Mails and newsgroup postings the engineering team at Icom is proud to say "many of these changes were compiled from a list of suggestions from you, the amateur radio operator!"

FEATURES

- *32-bit Floating point DSP and 24-bit AD/DA converter*
- *DSP IF Filter creates 102 types of filter types*
- *All mode capability covering 160–2 m*
- *100 Watt continuous duty cycle*
- *All mode digital modulation and demodulation*
- *RTTY demodulator and decoder*
- *Twin Pass Band Tuning*
- *RF speech compression with selectable pass band*
- *Microphone Equalizer*
- *SSB/CW synchronous tuning*

EXPLICIT DEFINITIONS

READ THIS INSTRUCTION MANUAL CAREFULLY before attempting to operate the transceiver.

SAVE THIS INSTRUCTION MANUAL. This manual contains important safety and operating instructions for the IC-746PRO.

EXPLICIT DEFINITIONS

WORD	DEFINITION
⚠ **WARNING**	Personal injury, fire hazard or electric shock may occur.
CAUTION	Equipment damage may occur.
NOTE	If disregarded, inconvenience only. No risk or personal injury, fire or electric shock.

PRECAUTIONS

⚠ **WARNING RF EXPOSURE!** This device emits Radio Frequency (RF) energy. Extreme caution should be observed when operating this device. If you have any questions regarding RF exposure and safety standards please refer to the Federal Communications Commission Office of Engineering and Technology's report on Evaluating Compliance with FCC Guidelines for Human Radio frequency Electromagnetic Fields (OET Bulletin 65).

⚠ **WARNING HIGH VOLTAGE! NEVER** attach an antenna or internal antenna connector during transmission. This may result in an electrical shock or burn.

⚠ **NEVER** apply AC to the [DC13.8V] jack on the transceiver rear panel. This could cause a fire or ruin the transceiver.

⚠ **NEVER** apply more than 16 V DC, such as a 24 V battery, to the [DC13.8V] jack on the transceiver rear panel. This could cause a fire or ruin the transceiver.

⚠ **NEVER** let metal, wire or other objects touch any internal part or connectors on the rear panel of the transceiver. This may result in an electric shock.

NEVER expose the transceiver to rain, snow or any liquids.

AVOID using or placing the transceiver in areas with temperatures below –10°C (+14°F) or above +50°C (+122°F). Be aware that temperatures on a vehicle's dashboard can exceed 80°C (+176°F), resulting in permanent damage to the transceiver if left there for extended periods.

AVOID placing the transceiver in excessively dusty environments or in direct sunlight.

AVOID placing the transceiver against walls or putting anything on top of the transceiver. This will obstruct heat dissipation.

Place unit in a secure place to avoid inadvertent use by children.

During mobile operation, **DO NOT** operate the transceiver without running the vehicle's engine. When transceiver power is ON and your vehicle's engine is OFF, the vehicle's battery will soon become exhausted.

Make sure the transceiver power is OFF before starting the vehicle. This will avoid possible damage to the transceiver by ignition voltage spikes.

During maritime mobile operation, keep the transceiver and microphone as far away as possible from the magnetic navigation compass to prevent erroneous indications.

BE CAREFUL! The heatsink will become hot when operating the transceiver continuously for long periods.

BE CAREFUL! If a linear amplifier is connected, set the transceiver's RF output power to less than the linear amplifier's maximum input level, otherwise, the linear amplifier will be damaged.

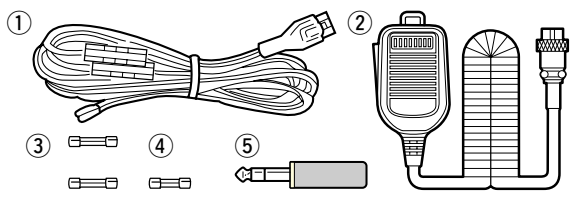
Use Icom microphones only (supplied or optional). Other manufacturer's microphones have different pin assignments, and connection to the IC-746PRO may damage the transceiver.

TABLE OF CONTENTS

SUPPLIED ACCESSORIES

The transceiver comes with the following accessories.

	Qty.
① DC power cable (OPC-025D)	1
② Hand microphone (HM-36)	1
③ Spare fuses (FGB 30 A)	2
④ Spare fuse (FGB 5 A)	1
⑤ CW keyer plug (AP-330)	1



QUICK REFERENCE GUIDE

■ Installation

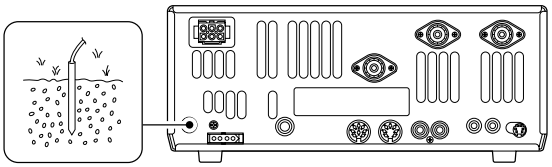
1. Install a ground system for DC noise suppression and RFI suppression
2. Install your DC power supply
3. Install lightning protection. This will help protect more than your gear.
4. Install and connect an antenna system for the appropriate bands of operation
5. Connect other peripheral equipment. This includes microphones, headsets, TNC, amplifiers and any other equipment necessary to make your shack complete.

1. Grounding your Shack

Although your radio will operate by connecting the DC power supply and antenna, it is necessary to have a good ground system in your shack. A ground connection is the electrical contact between the common point of an electrical or electronic system and the earth.

A good earth ground is necessary to prevent electrical shock, eliminate problems from RFI and DC noise. With more electronic devices being used today, it is also important to reduce RFI and EMI. Although you may not see interference in your shack, without a grounding system, your neighbors may experience interference. Even though many of these devices are part 15, where they must accept interference from their surrounding environment, it is best to eliminate as much of the possible interference from your shack.

If you do not have a grounding system for your shack, depending on the location of your shack, basement or ground floor, a good ground system can be as simple as a couple of ground rods driven 6 to 8 feet into the soil. When installing your IC-746PRO to your grounding system, the shortest most direct connection is recommended.



NOTE: There are many publications covering proper grounding techniques. Check with your local dealer for more information and recommendations.

◇ Some Symptoms if inadequate grounding

a. Poor DC Ground

60 Hz hum on the audio either Rx or Tx without the antenna connected.

If you feel a tingling sensation when you touch a metal surface. Surfaces such as the cover of your radio or power supply.

b. Poor RF Ground

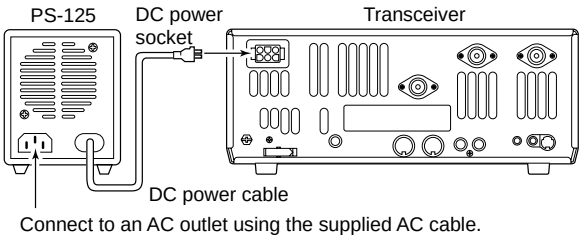
While transmitting and you feel a tingling sensation when you touch a metal surface. Surfaces such as the cover of your radio or power supply.

While transmitting, you experience interference to other electronic devices, such as the telephone, television or stereo audio systems.

2. Installing your DC Power Supply

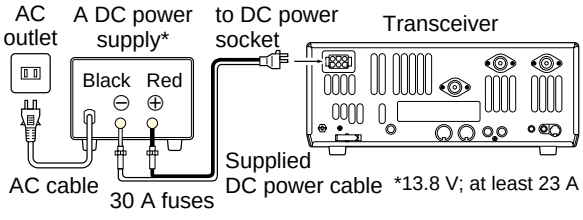
The DC power supply is a device used to convert 110/220 V AC, also know as Household current, to a steady source of 12 V DC.

The perfect match to your IC-746PRO is the PS-125. This compact switching power supply is the matching power supply for your IC-746PRO with a current rating of 25 A continuous duty. This plug and play unit; plugs into the DC jack located on the rear of the radio.



•If you are not using the PS-125:

Connect the supplied DC power cable (OPC-025D) to the appropriate color coded terminals, then insert the DC connector into the DC jack located on the rear of the radio.



NOTE: Although the power supply current requirement is quite low during receiving, this not the case when you transmit. With many electrical devices in the shack, it is very important to verify the electrical circuit is not overloaded.

3. Installing lightning protection

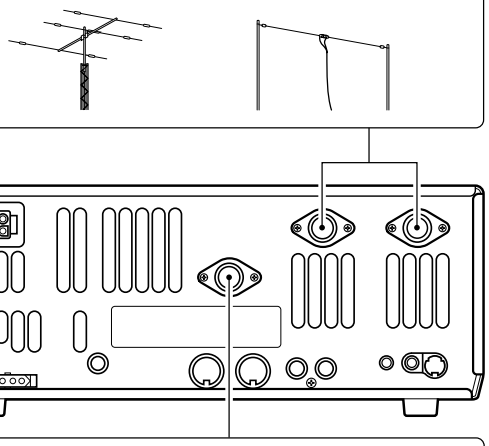
Although you may not live in an area with high occurrence for lightning storms, it is always wise to take precautions for lightning or static discharges. Proper lightning protection not only offers protection to the ham gear, but the shack and most importantly the operator.

NOTE: There are many publications covering proper lightning protection, check with your local dealer for more information and recommendations.

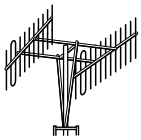
4. Installing your antenna system

Whether your IC-746PRO is your first radio or one of many, one of your key elements in a great shack is the antenna system. There are three connections on the back of your IC-746PRO, two for HF and 6 m and one for 2 m. If you are using one antenna for HF and 6 m, for simplicity, connect the antenna coax to ANT1.

ANTENNA 1, 2
[Example]: ANT1 for 1.8–18 MHz bands
ANT2 for 21–50 MHz bands



144 MHz ANTENNA



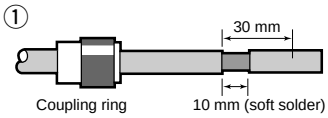
Connect a VHF (60–144 MHz) antenna; impedance: 50 Ω.

Your IC-746PRO is equipped with an internal antenna tuner (ATU) for operation on 160–6 m. This ATU is designed to work with an unbalanced 50 Ω feedline. The purpose of the internal antenna tuner is match the impedance of your antenna system to as close to a 50 Ω load as possible. This ATU will not operate with a long wire or ladder line (450 Ω or balanced feedlines). An external ATU such as the AH-4 would be necessary for this kind of operation.

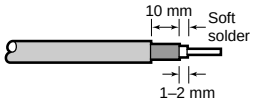
Antenna SWR

Each antenna is tuned for a specified frequency range and SWR may be increased out-of-range. When the SWR is higher than approx. 2.0:1, the transceiver's power drops to protect the final transistor. In this case, an antenna tuner is useful to match the transceiver and antenna. Low SWR allows full power for transmitting even when using the antenna tuner. The IC-746PRO has an SWR meter to monitor the antenna SWR continuously.

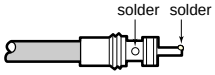
PL-259 CONNECTOR INSTALLATION EXAMPLE

① 

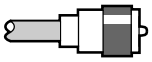
Slide the coupling ring down. Strip the cable jacket and soft solder.

② 

Strip the cable as shown at left. Soft solder the center conductor.

③ 

Slide the connector body on and solder it.

④ 
Screw the coupling ring onto the connector body.

30 mm ≈ 9/8 in 10 mm ≈ 3/8 in 1–2 mm ≈ 1/16 in

⚠ **WARNING:** Although a mag mount antenna works great on a vehicle, **DO NOT** use with IC-746PRO on this type of antenna.

CAUTION: Although your IC-746PRO has protection to drop down power with a high SWR, this does not completely protect the transceiver from transmission without an antenna. Make sure you have an antenna connect whenever you transmit with your radio.

NOTE: There are many publications covering proper antennas and their installation, check with your local dealer for more information and recommendations.

5. Connect other peripheral equipment

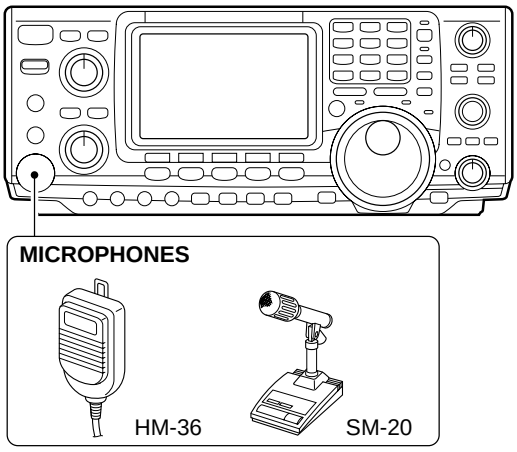
Everyone has his or her favorite ad-on gear; now is the time to connect this gear! We will cover the basic devices that can be connected to your IC-746PRO.

If you do not see the particular item you are wanting to connect, refer to the Advance Connections section starting on page 15.

■ Operation

1. Voice

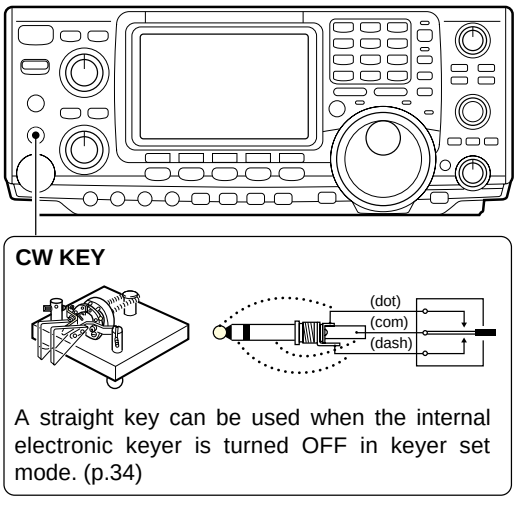
Microphones: Connect it to the eight-pin connector on the front of the radio.



2. CW

CW Key: There are several types of keys or keyers that can be used with your IC-746PRO.

a. Lambic Key paddle: Use a 6.35(d) mm (¼″) stereo plug and connect to the [ELEC-KEY] jack located on the front of the radio.

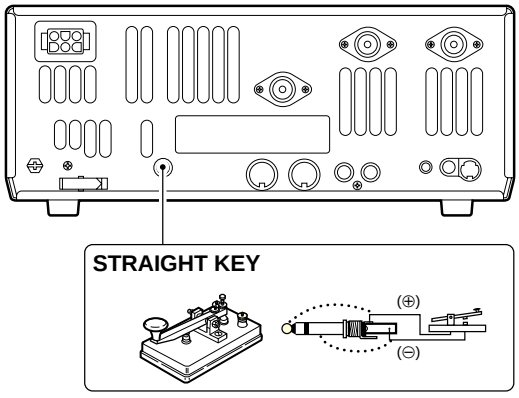


A straight key can be used when the internal electronic keyer is turned OFF in keyer set mode. (p.34)

b. Straight Key: Use a 6.35(d) mm (¼″) mono plug and connect key to the back of the radio.

c. External Keyer: Use a 6.35(d) mm (¼″) mono plug and connect to the back of the radio.

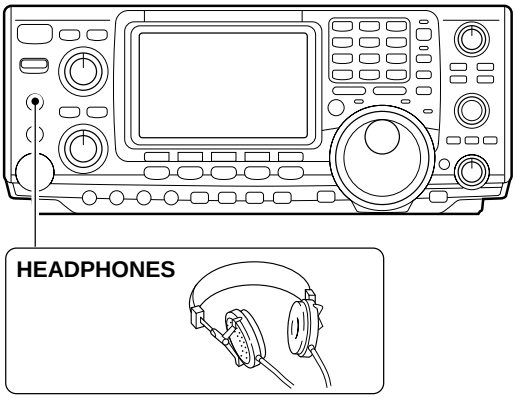
d. Computer Keying: Use a 6.35(d) mm (¼″) mono plug and connect to the back of the radio.



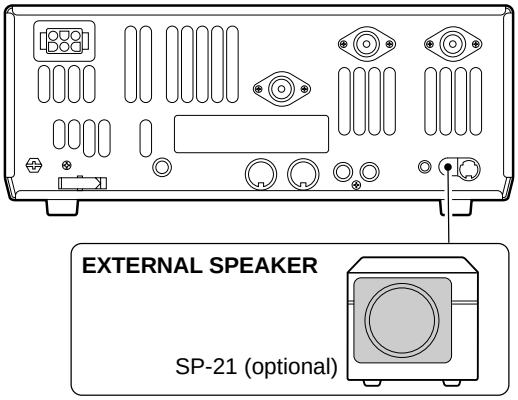
NOTE: You will need to select the type of keyer you are using in the Keyer Set mode. There are many advanced CW functions in this set mode, until you have a full understanding of these functions change only the items necessary.

3. Other convenient items

Headphones:
A 6.35(d) mm (¼″) mono jack for operation without using the internal or external speakers. Perfect for operation without disturbing others in the room.



External Speaker:
A 3.5(d) mm (⅛″) mono jack for operation with an external speaker. (Input impedance: 8 Ω/Max. input power: 5 W)

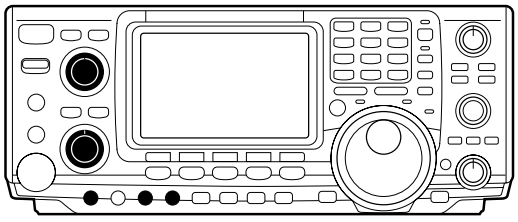


■ Your first contact

Now you should have your IC-746PRO installed in your shack, and like a kid on his birthday, you are probably excited to get on the air. We would like to take you through a few basic operation steps to make your first “On The Air” an enjoyable experience.

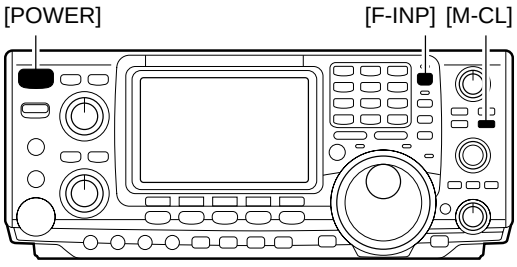
◇ Turning on the radio

1. Before powering up your radio, you may want to make sure the following controls are set in the following positions:



- [AF] : Commonly referred to as the volume: fully CCW.
- [NR] : The noise reduction control: fully CCW.
- [MIC GAIN] : The mic gain: fully CCW.
- [RF/SQL] : The control for the RF Gain and Squelch circuits: 12 o’clock.
- [CW PITCH] : The control for the CW pitch: 12 o’clock.
- [KEY SPEED] : Internal CW Keyer Speed: fully CCW
- [NOTCH] : Control for the manual notch: 12 o’clock

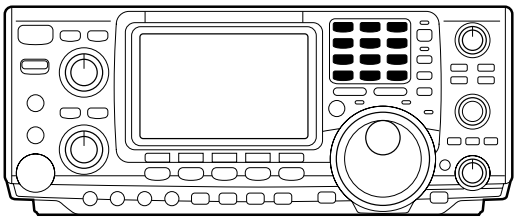
2. Resetting the CPU: Although you have purchased a brand new radio, some settings may be changed from the factory defaults from the CQ process. So your radio can start from Factory Defaults resetting the CPU is necessary.



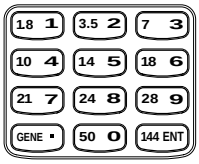
◇ Just listening

1. Select the desired band

Your IC-746PRO easy way of changing bands using the keypad located just above the tuning knob on the right hand side of the display. You will notice each switch has two sets of numbers; one set of numbers represents the band selection.

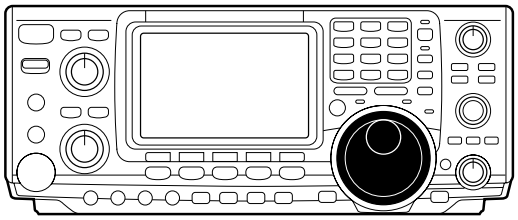


• Say you want to go to 20 meters or 14 MHz; you would push the [14 **5**]. This will immediately change the displayed operating frequency to the 20-meter band. This system is the triple band stacking registers. For more details on this system refer to p. 19.



2. Tune to the desired frequency

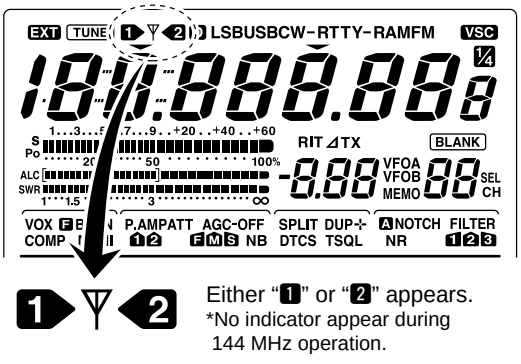
Directly below the keypad is the tuning knob. This will allow you to dial in the frequency you want to operate. You will notice the tuning speed [TS] is 10 Hz resolutions. Page 22 will instruct you on how to set the tuning speed [TS] for 1 Hz resolution.



NOTE: Although you can directly enter the frequency with the keypad, using the Band Stacking Registers and the tuning knob is the most popular method of hoping around the bands. For more information regarding the direct frequency entry method, refer to p. 22.

3. Verify proper antenna has been selected.

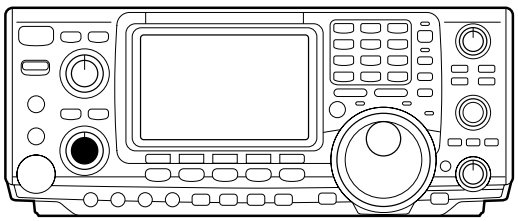
You IC-746PRO has three antenna connectors. Two for HF and 6m and a one for 2m. The selection for 2m is automatic, where the HF and 6m is user selectable for either one of the antenna jacks. For the first time use, the antenna selector should show "1▽2" on the display of your radio. Verify the antenna selected on the display is the antenna port your connected your antenna.

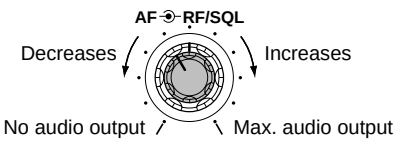


Either "1" or "2" appears.
*No indicator appear during 144 MHz operation.

4. Adjust audio output

Adjust this control to a comfortable audio level.



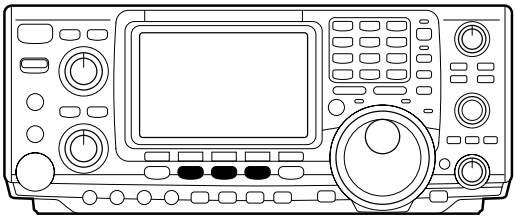


◇ What are you hearing?

Stop and focus on what you are hearing. Do you hear a lot of noise? Is the signal intelligible? Are you set up for the right mode? How about the filters?

1. Verify mode

Although your IC-746PRO will automatically select USB or LSB in the HF bands, it will not select any of the other modes. You will need to select the proper mode whether CW, RTTY, AM or FM.

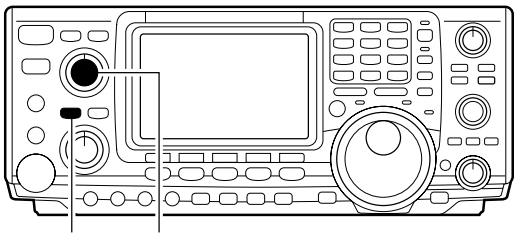


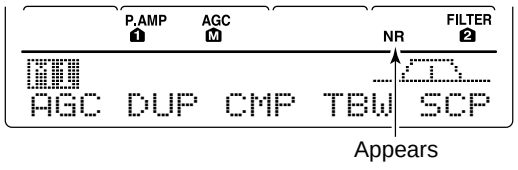
Hint!
The Triple Band Stacking Registers will memorize the last three frequencies used in the band, as well as the Mode, Filter, Tuner and AGC settings. Making band hoping much easier.

2. Reducing interference

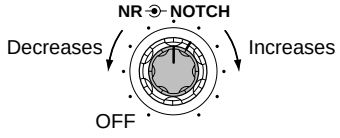
Your IC-746PRO has many features to reduce QRM and QRN from the desired signal.

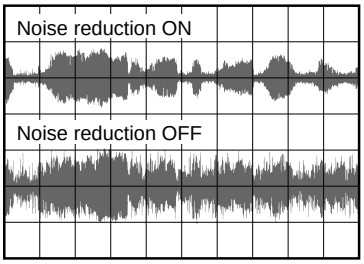
a. Noise Reduction: The noise reduction system on your IC-746PRO is part of the 32-bit DSP. This is used to reduce the hiss and QRM levels. To activate, push the [NR] switch located just to the right of the [PHONES] jack.





b. Adjusting the Noise Reduction: The noise reduction is completely variable on how much of the DSP Noise Reduction is used. Located just above the [NR] switch, this is where the [NR] level control.





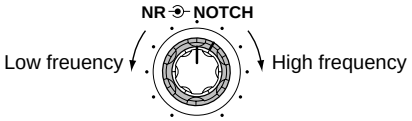
Hint!
How much [NR] will depend on the S/N ratio, Signal to Noise. Just using the [NR] may cause the signal to become distorted. To keep this from happening, using the [NR] along with the [RF GAIN] and Filter bandwidths will allow you to zero in on the desired signal with as little QRM as possible.

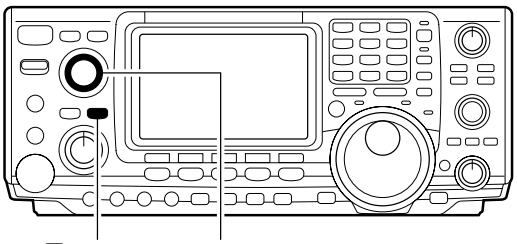
c. Notch: There are two notch systems on your IC-746PRO.

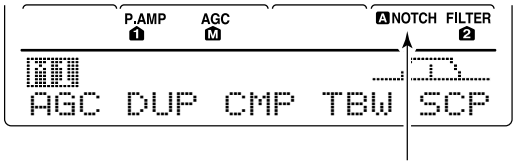
- *Automatic:* The automatic notch will track up to three heterodynes. This is great for eliminating heterodynes on 80 and 160 meters, and those annoying tune up signals across the band. Once selected an icon will appear "A NOTCH" on the display.

> ***Hint!***
> The Automatic Notch will not operated in the SSB data, CW or RTTY modes.

- *Manual:* The Manual notch provides 70 dB of attenuation to pin point an interfering signal. The 12 o'-clock position is on the operating frequency, turning the Notch knob clockwise moves the notch up the band and counter clockwise will move the notch down the band. Once selected an icon will appear "NOTCH" on the display.





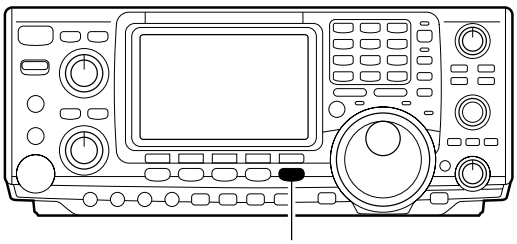


Notch function indicators

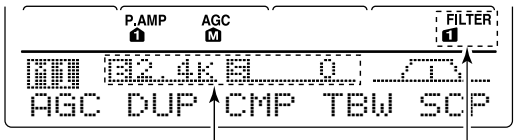
NOTE: Your IC-746PRO is equipped with multiple AGC circuits. This allows the DSP to filter out interfering signals and QRM, while also taking this interference out of the AGC. Bottom line, this will either eliminate or greatly reduce the pumping of the AGC from the interfering signal.

d. Filters: Your IC-746PRO has an incredible IF DSP based filter network with over 100 settings.

- Dial in your filters: By pushing [FILTER] for 1 sec., you enter the filter set mode. This is where you are able set the three filter presets. Across the bottom of the display you will see the "BW" icon. The switch directly below, along with the tuning dial, will be used to select the changes you will make.



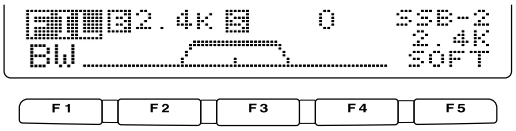
[FILTER]



The selected filter width is indicated for approx. 1 sec. when [FILTER] is pushed.

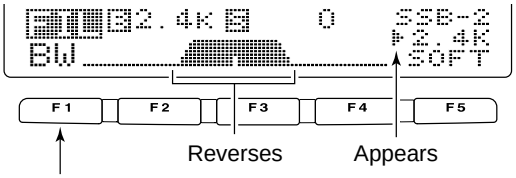
Filter selection

• Filter set mode indication



Shows the selected filter and passband width.

• Indication while setting



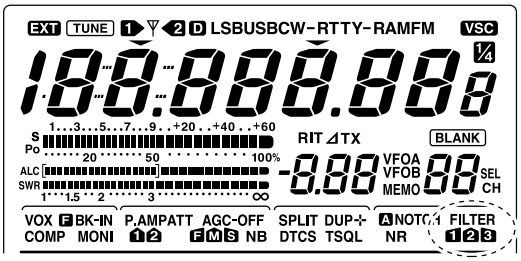
Reverses

Appears

While pushing [F1 BW], rotate the tuning dial to set passband width.

d. Filters:— continued

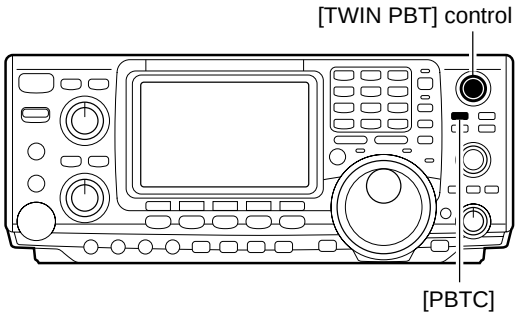
•On the fly adjustment: Once the adjustments have been made in the filter set mode, you can make on the fly changes by using the Twin Pass Band Tuning, Twin PBT. You will be able to see the effects of the Twin PBT on the upper left hand side of the screen.



One of "1," "2" or "3" is displayed for selected filter number indications.

NOTE: The Twin PBT filters shift the two IF DSP filters (See Diagrams below and right). This feature allows both an IF shift as well as a narrowing of the Pass Band. Although you can narrow the pass band by shifting the two filters, this does not narrow both filters, thus the filter shape is not narrowed. You may hear some signal artifacts pass through this filter adjustment.

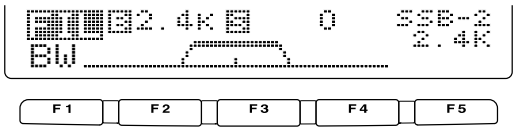
PBT operation example



Passband width and shifting value are indicated while [TWIN PBT] is operated.

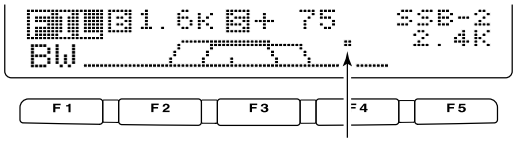
Appears when PBT is used.

• Filter set mode indication



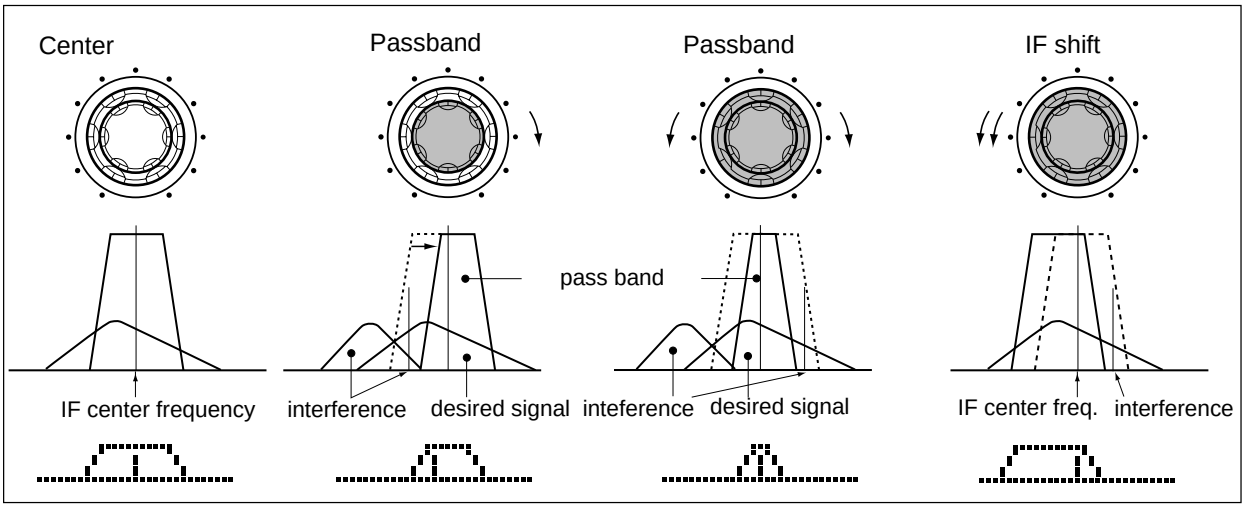
Shows the selected filter and passband width.

• Indication while PBT setting



Appears when passband is shifted.

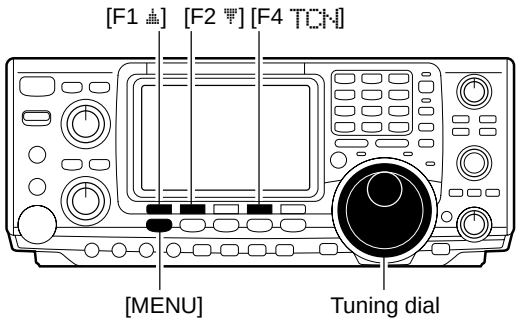
*Pushing [PBTC] for 1 sec., the shifted value return to default setting and the "dot" disappears.



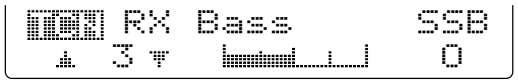
3. RX Tone Control:

Once you have mastered your filter settings, one last feature to enable the most intelligible audio is the actual audio tone you hear. You can adjust the equalization of your received audio ±5dB.

① Push [MENU] several time, or until MΩ is shown on the display.
② Push [F4 TCN] for the Tone Control set mode.
③ Push the appropriate mode switch to adjust SSB, AM or FM.
④ Push [F1 ▲] or [F2 ▼] to change to the desired component.



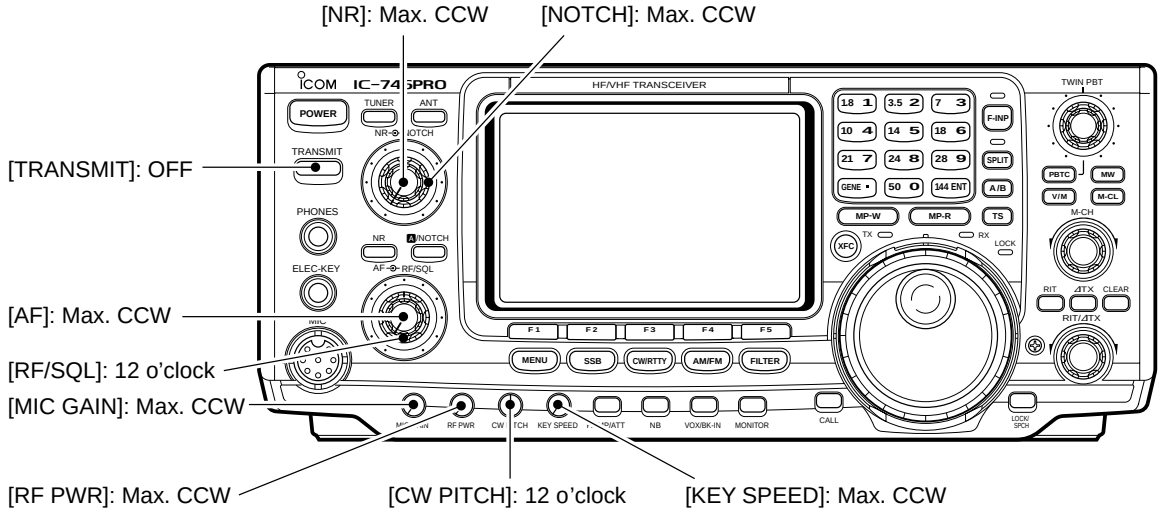
1. RX Bass
This item adjusts the bass level of the receive audio tone from –5 dB to +5 dB in 1 dB steps.



2. RX Treble
This item adjusts the treble level of the receive audio tone from –5 dB to +5 dB in 1 dB steps.

We hope these pointers have been helpful. Now you are ready for the “Ready to call CQ?”.

■ Ready to call CQ?



1. Setting up your transmit audio

The 32-bit DSP in your IC-746PRO is capable of giving you the type of transmit audio for your SSB Operation.

2. Mic Gain

The microphone gain is used for proper transmit audio level for full output power. Although the hand microphone supplied with your IC-746PRO should require a setting of the [MIC GAIN] you should find a 10–11 o’clock position.

3. DSP TX Audio Pass Band

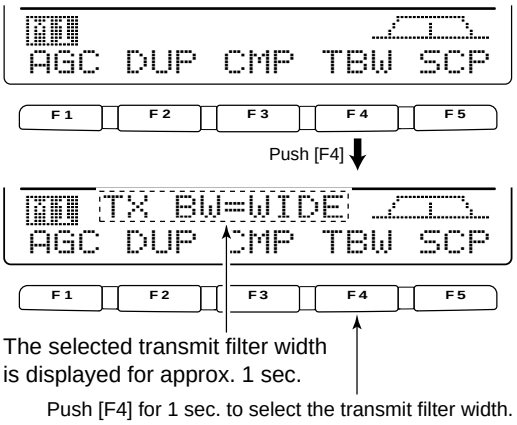
The capable of changing the pass band of your transmit audio, is at your finger tip. Regardless of the condition of the speech compressor, you can adjust by selecting the [F4 TBW].

You will find this located on the M1 menu. Pushing the [F4 TBW] for 1 sec. you can step through the TX audio band pass.

There are three levels of audio passband available (Wide, Mid, and Nar).

TX Audio Passband widths

Wide	: 2.9 kHz	; Great Full Audio
Mid	: 2.6 kHz	; Great for operators with deep full voices
Nar	: 2.0 kHz	; Great for breaking through pile ups

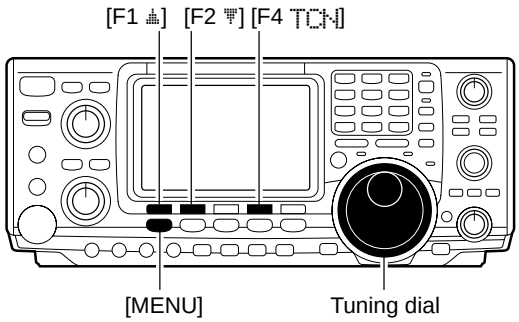


4. Microphone Equalizer

Although these bandwidths are fixed, the Microphone Tone Control will give you more audio control for your Voice operation on SSB, AM, and FM modes. Your IC-746PRO is equipped with a very powerful equalizer system with 121 possible combinations. This is achieved by using the separate bass and treble adjustments. The default for both the Base and Treble is at 0 dB.

Entering Microphone Tone Control set mode:

① Push [MENU] several time, or until M2 is shown on the display.
② Push [F4 TCN] for the Tone Control set mode.
③ Push the appropriate mode switch to adjust SSB, AM, or FM.
④ Push [F1 ▲] or [F2 ▼] to change to the desired component.



Hint!
Voice patterns and audio characteristics vary with each operator, therefore the [MIC GAIN], DSP TX Audio Pass Band and Microphone Tone Control settings will be different for each operator. Actual on air experimenting is necessary to get the just right sound.

1. TX Bass

This item adjusts the bass level of the transmit audio tone from –5 dB to +5 dB in 1 dB steps.

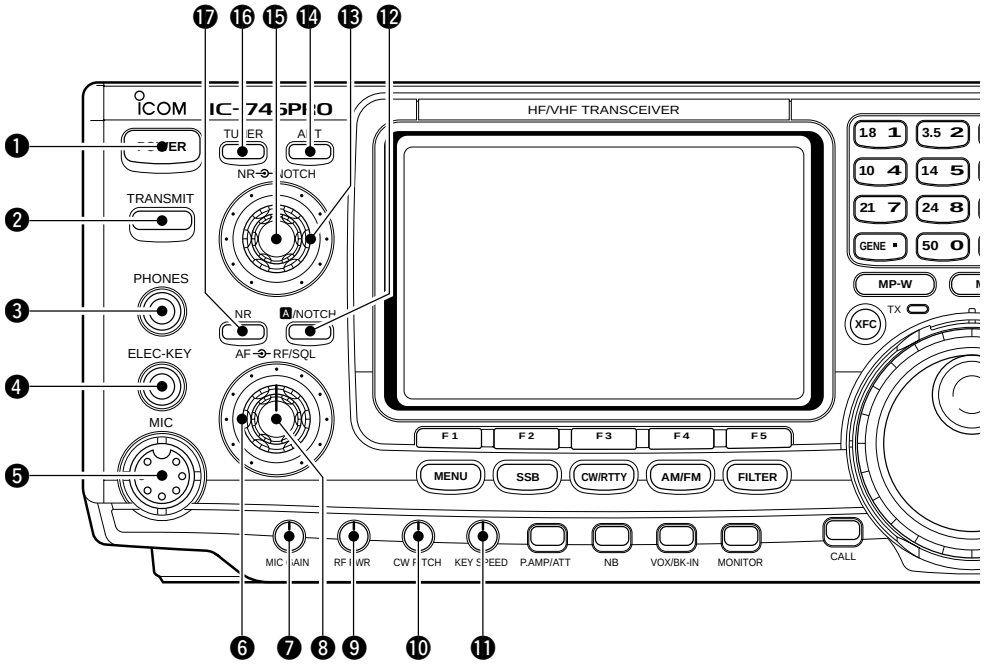
2. TX Treble

This item adjusts the treble level of the transmit audio tone from –5 dB to +5 dB in 1 dB steps.

Verify you have selected a clear frequency and call out your CQ!

1 PANEL DESCRIPTION

■ Front panel



❶ POWER SWITCH [POWER]

➥Push momentarily to turn power ON.
- Turn the optional DC power supply ON in advance.

➥Push for 1 sec. to turn power OFF.

❷ TRANSMIT SWITCH [TRANSMIT]

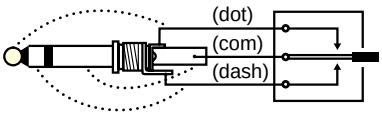
Selects transmitting or receiving.
- The [TX] indicator lights red while transmitting and the [RX] indicator lights green when the squelch is open.

❸ HEADPHONE JACK [PHONES]

Accepts headphones.
- Output power: 5 mW with an 8 Ω load.
- When headphones are connected, the internal speaker or connected external speaker does not function.

❹ ELECTRONIC KEYER JACK [ELEC-KEY] (p. 14)

Accepts a paddle to activate the internal electronic keyer for CW operation.
- Selection between the internal electronic keyer, bug-key and straight key operation can be made in keyer set mode. (p. 34)
- A straight key jack is separately available on the rear panel. See [KEY] on p. 7.
- Keyer polarity (dot and dash) can be reversed in keyer set mode. (p. 34)
- 4-channel memory keyer is available for your convenience. (p. 30)



❺ MICROPHONE CONNECTOR [MIC]

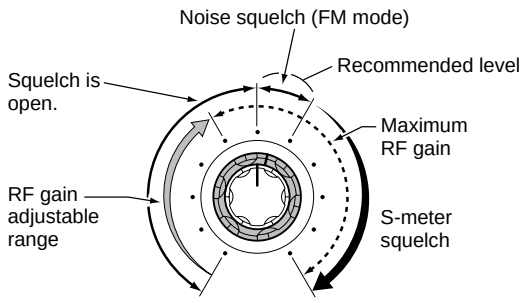
Accepts the supplied or optional microphone.
- See p. 100 for appropriate microphones.
- See p. 12 for microphone connector information.

❻ RF GAIN CONTROL/SQUELCH CONTROL [RF/SQL] (outer control)

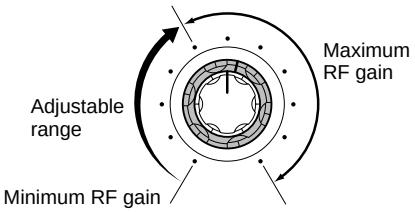
Adjusts the RF gain and squelch threshold level. The squelch removes noise output from the speaker (closed condition) when no signal is received.
- The squelch is particularly effective for FM. It is also available for other modes.
- 12 to 1 o'clock position is recommended for any setting of the [RF/SQL] control.
- The control can be set as 'Auto' (RF gain control in SSB, CW and RTTY; squelch control in AM and FM) or squelch control (RF gain is fixed at maximum) in set mode as follows. (p. 81)

MODE	SET MODE SETTING		
	AUTO	SQL	RF GAIN + SQL
SSB, CW RTTY	RF GAIN	SQL	RF GAIN + SQL
AM, FM	SQL	SQL	RF GAIN + SQL

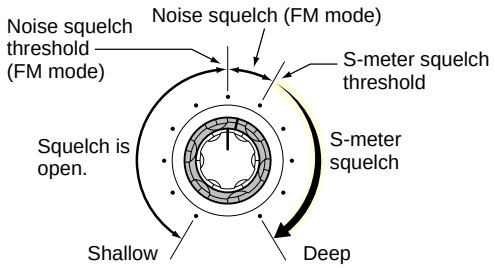
•When setting as RF gain/squelch control



•When functioning as RF gain control
(Squelch is fixed open; SSB, CW, RTTY only)



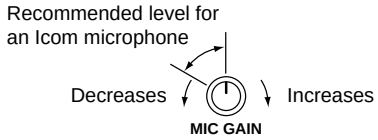
•When functioning as squelch control
(RF gain is fixed at maximum.)



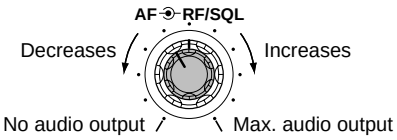
While rotating the RF gain control, noise may be heard. This comes from the DSP unit and does not indicate an equipment malfunction.

❼ MIC GAIN CONTROL [MIC GAIN]
Adjusts microphone input gain.
- The transmit audio tone in SSB, AM and FM modes can be adjusted in tone control set mode. (p. 88)

✔ How to set the microphone gain.
Set the [MIC] control so that the ALC meter sometimes swings during normal voice transmission in SSB mode.



❽ AF CONTROL [AF] (inner control)
Varies the audio output level from the speaker.



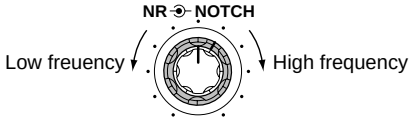
❾ RF POWER CONTROL [RF PWR]
Continuously varies the RF output power from minimum (less than 5 W*) to maximum (100 W*).
*AM mode: less than 5 W to 40 W

❿ CW PITCH CONTROL [CW PITCH] (p. 28)
Shifts the received CW audio pitch and monitored CW audio pitch without changing the operating frequency.
- The pitch can be changed from 300 to 900 Hz in approx. 25 Hz steps.

⓫ ELECTRONIC CW KEYER SPEED CONTROL [KEY SPEED] (p. 28)
Adjusts the internal electronic CW keyer's speed.
- 6 wpm (min.) to 60 wpm (max.) can be set.

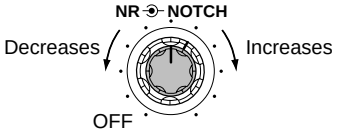
⓬ AUTO NOTCH/MANUAL NOTCH SWITCH [A/NOTCH] (p. 53)
Toggles the notch function between manual and automatic when pushed.
- "NOTCH" appears when manual; "A NOTCH" appears when automatic notch is selected.

⓭ NOTCH CONTROL [NOTCH] (outer control; p. 53)
Adjusts the notch filter frequency to remove a interference signal.



⓮ ANTENNA SELECTOR SWITCH [ANT] (p. 75)
Switches the antenna connector selection between ANT1 and ANT2 when pushed.

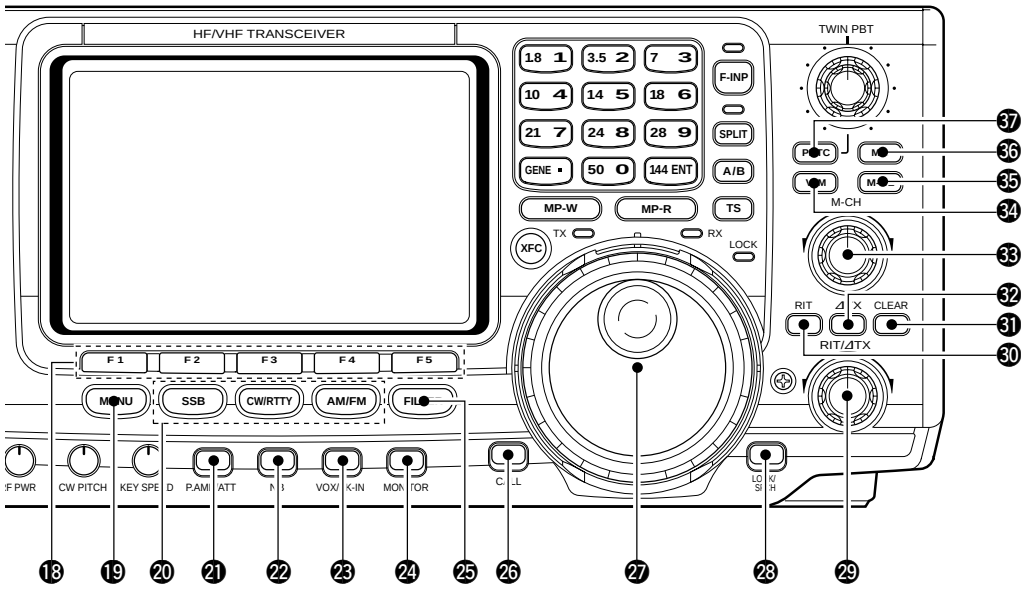
⓯ NOISE REDUCTION LEVEL CONTROL [NR] (inner control; p. 53)
Adjusts the noise reduction level when the noise reduction is in use. Set for maximum readability.



⓰ ANTENNA TUNER SWITCH [TUNER] (pgs. 76, 77)
➥Turns the antenna tuner ON and OFF (bypass) when pushed momentarily.
➥Starts to tune the antenna manually when pushed for 1 sec.
- When the tuner cannot tune the antenna, the tuning circuit is bypassed automatically after 20 sec.

⓱ NOISE REDUCTION SWITCH [NR] (p. 53)
Switches the noise reduction ON and OFF.
- "NR" appears while the noise reduction is activated.

■ Front panel (continued)



⓲ MULTI-FUNCTION SWITCHES [F1]–[F5]

➥Push to select the function indicated in the LCD display above these switches. (p. 11)
- Functions vary depending on the operating condition.

➥Push to input a character for memory keyer programming or memory name. (pgs. 31, 66)

⓳ MENU SWITCH [MENU]

Push to change the set of functions assigned to the multi-function switches.
- Toggles between menu 1 (Ⅰ) and menu 2 (Ⅱ).

⓴ MODE SWITCHES

Selects the desired mode. (p. 23)
- Announces the selected mode when an optional UT-102 is installed. (p. 89)

SSB
➥Selects USB and LSB mode alternately.
➥Selects SSB data mode (USB-D, LSB-D) when pushed for 1 sec. in SSB mode.

CW/RTTY
➥Selects CW and RTTY mode alternately.
➥Switches CW and CW-R (CW reverse) mode when pushed for 1 sec. in CW mode.
➥Switches RTTY and RTTY-R (RTTY reverse) mode when pushed for 1 sec. in RTTY mode.

AM/FM
➥Selects AM and FM mode alternately.
➥Selects AM/FM data mode (AM-D, FM-D) when pushed for 1 sec. AM/FM mode.

㉑ PREAMP/ATTENUATOR SWITCH [P.AMP/ATT] (p. 48)

➥Push momentarily to toggle between preamp-1 and preamp-2.
- "P.AMP1" activates for HF all bands.
- "P.AMP2" activates high-gain preamp for 24 MHz band and above.

➥Push for 1 sec. to toggle the attenuator function ON and OFF.

✔ What is the preamp?

The preamp amplifies received signals in the front end circuit to improve the S/N ratio and sensitivity. Select "P.AMP1" or "P.AMP2" when receiving weak signals.

✔ What is the attenuator?

The attenuator prevents a desired signal from distorting when very strong signals are near the desired frequency, or when very strong electric fields, such as from a broadcasting station, are near your location.

㉒ NOISE BLANKER SWITCH [NB] (p. 51)

➥Switches the noise blanker ON and OFF when pushed. The noise blanker reduces pulse-type noise such as that generated by automobile ignition systems. This function cannot be used for FM, or non-pulse-type noise.
- "NB" appears while the noise blanker is activated.

➥Enters the noise blanker level set mode when pushed for 1 sec.

㉓ VOX/BREAK-IN SWITCH [VOX/BK-IN]
- ➥ In SSB, AM and FM modes, push momentarily to turn the VOX function ON and OFF (p. 54); push for 1 sec. to enter VOX set mode (p. 54).
- ➥ In CW mode, push momentarily to turn the semi break-in, full break-in or break-in OFF (p. 56); push for 1 sec. to enter break-in set mode (p. 56).

✔ What is the VOX function?
The VOX function (voice operated transmission) starts transmission without pushing the transmit switch or PTT switch when you speak into the microphone; then, automatically returns to receive when you stop speaking.

✔ What is the break-in function?
The break-in function switches transmit and receive with CW keying. Full break-in (QSK) can monitor the receive signal during keying.

㉔ MONITOR SWITCH [MONITOR] (p. 57)
- ➥ Monitors your transmitted signal.
- ➥ Enters to monitor set mode when pushed for 1 sec.

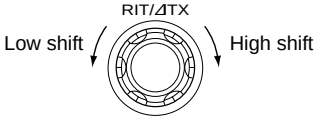
㉕ FILTER SWITCH [FILTER] (p. 50)
- ➥ Selects one of 3 IF filter settings.
- ➥ Enters the filter set mode when pushed for 1 sec.

㉖ CALL SWITCH [CALL] (p. 64)
Selects the call channel when pushed momentarily.

㉗ TUNING DIAL (p. 21)
Changes the displayed frequency, selects set mode items, etc.

㉘ LOCK/SPEECH SWITCH [LOCK/SPCH]
- ➥ Push momentarily to toggle the dial lock function ON and OFF. (p. 53)
- ➥ Pushing for 1 sec. announces the selected readout frequency and S-meter indication when an optional UT-102 is installed. (p. 89)

㉙ RIT/Δ TX CONTROL [RIT/Δ TX] (pgs. 48, 56)
Shifts the receive and/or transmit frequency without changing the transmit and/or receive frequency while the RIT and/or Δ TX functions are ON.
- • Rotate the control clockwise to increase the frequency, or rotate the control counterclockwise to decrease the frequency.
- • The shift frequency range is ±9.99 kHz in 10 Hz steps (or ±9.999 kHz in 1 Hz steps).



㉚ RIT SWITCH [RIT] (p. 48)
- ➥ Turns the RIT function ON and OFF when pushed.
  - • Use the [RIT/Δ TX] control to vary the RIT frequency.
- ➥ Adds the RIT shift frequency to the operating frequency when pushed for 1 sec.

✔ What is the RIT function?
The RIT (Receiver Incremental Tuning) shifts the receive frequency without shifting the transmit frequency.

This is useful for fine tuning stations calling you on an off-frequency or when you prefer to listen to slightly different-sounding voice characteristics, etc.

㉛ CLEAR SWITCH [CLEAR] (pgs. 48, 56)
Clears the RIT/Δ TX shift frequency when pushed for 1 sec.

㉜ Δ TX SWITCH [Δ TX] (p. 57)
- ➥ Turns the Δ TX function ON and OFF when pushed.
  - • Use the [RIT/Δ TX] control to vary the Δ TX frequency.
- ➥ Adds the Δ TX shift frequency to the operating frequency when pushed for 1 sec.

✔ What is the Δ TX function?
The Δ TX shifts the transmit frequency without shifting the receive frequency. This is useful for simple split frequency operation in CW, etc.

㉝ MEMORY CHANNEL SELECTOR [M-CH] (p. 62)
Select a memory channel.
- • Rotate clockwise to increase the memory channel; rotate counterclockwise to decrease the memory channel.

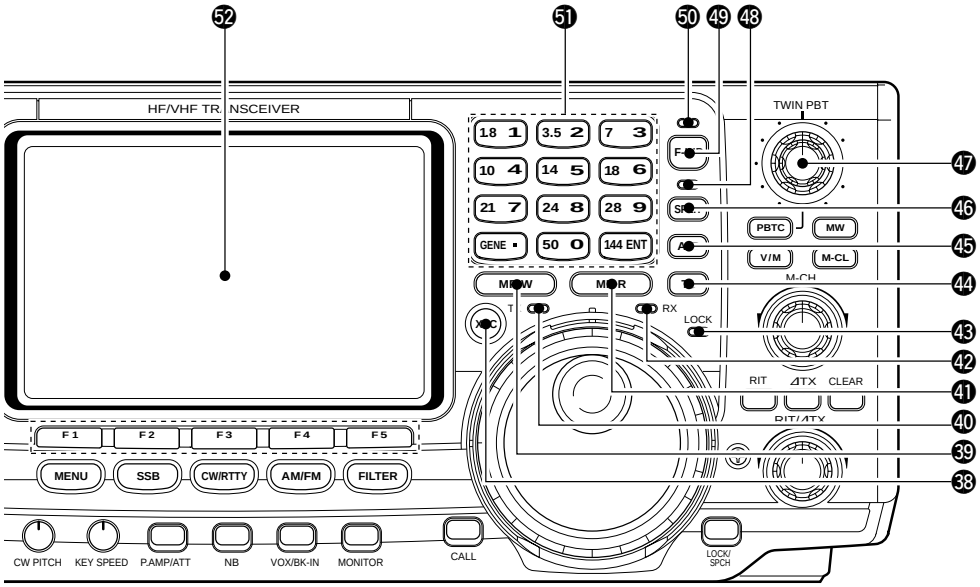
㉞ VFO/MEMORY SWITCH [VFO/MEMO]
- ➥ Switches the selected readout operating mode between the VFO mode and memory mode when pushed. (pgs. 20, 61)
- ➥ Transfers the memory contents to VFO when pushed for 1 sec. (p. 65)

㉟ MEMORY CLEAR SWITCH [M-CL] (p. 62)
Clears the selected readout memory channel contents when pushed for 1 sec. in memory mode.
- • The channel becomes a blank channel.
- • This switch does not function in VFO mode.

㊱ MEMORY WRITE SWITCH [MW] (p. 63)
Stores the selected readout frequency and operating mode into the displayed memory channel when pushed for 1 sec.
- • This function is available both in VFO and memory modes.

㊲ PBT CLEAR SWITCH [PBTC] (p. 52)
Clears the PBT settings when pushed for 1 sec.

■ Front panel (continued)



㊳ TRANSMIT FREQUENCY CHECK SWITCH [XFC] (pgs. 45, 48)
Monitors the transmit frequency when pushed and held.
- While pushing this switch, the transmit frequency can be changed with the tuning dial, keypad or memo pad.
- When the split lock function is turned ON, pushing [XFC] cancels the dial lock function. (p. 60)

㊴ MEMO PAD-WRITE SWITCH [MP-W] (p. 67)
Programs the selected readout frequency and operating mode into a memo pad.
- The 5 most recent entries remain in memo pads.
- The transmit frequency is programmed when pushed together with [XFC].
- The memo pad capacity can be expanded from 5 to 10 in set mode for your convenience. (p. 84)

㊵ TRANSMIT INDICATOR [TX]
Lights red while transmitting.

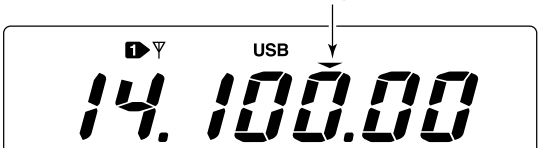
㊶ MEMO PAD-READ SWITCH [MP-R] (p. 67)
Each push calls up a frequency and operating mode in a memo pad. The 5 (or 10) most recently programmed frequencies and operating modes can be recalled, starting from the most recent.
- The memo pad capacity can be expanded from 5 to 10 in set mode for your convenience. (p. 84)

㊷ RECEIVE INDICATOR [RX]
Lights green while receiving a signal and when the squelch is open.

㊸ LOCK INDICATOR [LOCK] (p. 53)
Lights when the dial lock function is activated.

㊹ QUICK TUNING SWITCH [TS] (p. 21)
➥Turns the quick tuning step ON and OFF.
- While the quick tuning indicator is displayed, the frequency can be changed in programmed kHz steps.
- 0.1, 1, 5, 9, 10, 12.5, 20 and 25 kHz quick tuning steps are available.

Quick tuning indicator



➥While the quick tuning step is OFF, turns the 1 Hz step ON and OFF when pushed for 1 sec.
- 1 Hz indication appears in and the frequency can be changed in 1 Hz steps.

➥While the quick tuning step is ON, enters the quick tuning step set mode when pushed for 1 sec.

㊺ VFO SELECT SWITCH [A/B] (p. 20)
➥Push to toggle between VFO A and VFO B.
➥Push for 1 sec. to equalize the frequency and operating mode of the two VFO's.

㊻ SPLIT SWITCH [SPLIT]

➥Turns the split function ON and OFF when pushed.(p. 59)

➥Turns the quick split function ON, when pushed for 1 sec. (p. 60)

- The offset frequency is shifted from the displayed frequency.
- The quick split function can be turned OFF using set mode. (p. 82)

➥Turns the split function ON and sets the transmit frequency after inputting an offset frequency with the keypad (±4 MHz in 1 kHz steps; p. 59).

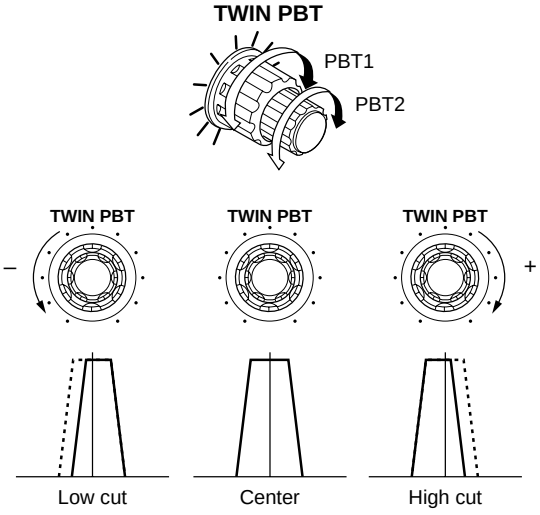
㊼ PASSBAND TUNING CONTROLS [TWIN PBT]

Adjust the receiver's "passband width" of the DSP filter. (p. 52)

- Passband width and shift frequency are displayed in the multi-function switch indicator.
- Push [PBTC] for 1 sec. to clear the settings when not in use.
- Variable range is set to half of the IF filter passband width. 25 Hz steps and 50 Hz steps are available.
- These controls function as an IF shift control while in AM mode and when the RTTY filter is turned ON. Only the inner control may function in this case.

✔ What is the PBT control?

General PBT function electronically narrows the IF passband width to reject interference. This transceiver uses the DSP circuit for the PBT function.



㊽ SPLIT INDICATOR (p. 59)

Lights during split operation.

㊾ FREQUENCY INPUT SWITCH [F-INP] (p. 22)

Push to toggle keypad input between frequency and band.

- The frequency input indicator lights during frequency input is selected for the keypad.

㊿ FREQUENCY INPUT INDICATOR (p. 22)

Lights during frequency input from the keypad is enable.

(51) KEYPAD

➥Pushing a key selects the operating band.

- [GENE] selects the general coverage band.

➥Pushing the same key 2 or 3 times calls up other stacked frequencies in the band. (p. 19)

- Icom's triple band stacking register memorizes 3 frequencies in each band.

➥After pushing [F-INP], enters a keyed frequency. Pushing [144 ENT] is necessary at the end. (p. 22)

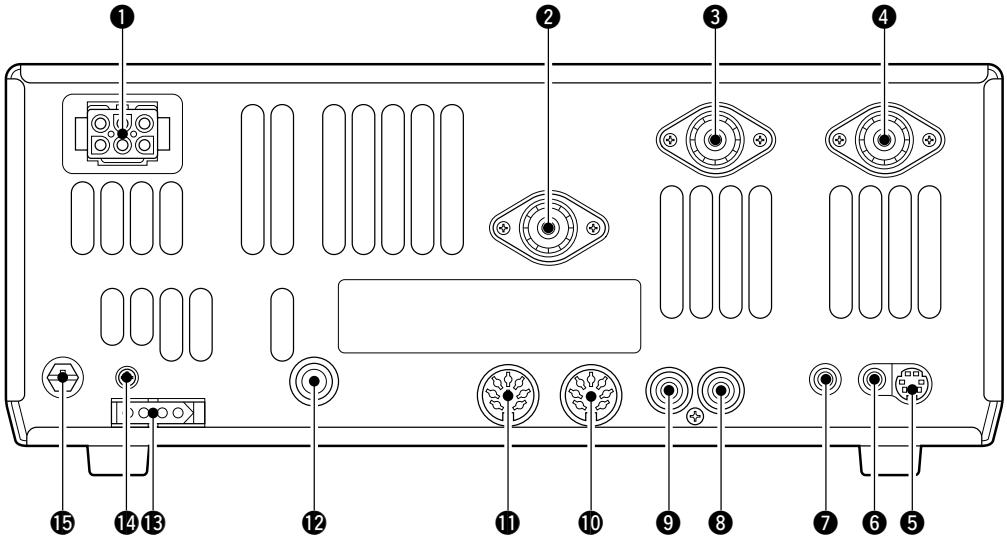
- e.g. to enter 14.195 MHz, push [F-INP] [1] [4] [•] [1] [9] [5] [144 ENT].

(52) LCD FUNCTION DISPLAY

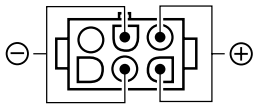
(See pgs. 9, 10 for details.)

Shows the operating frequency, function switch menus, band scope screen, memory name screen, set mode settings, etc.

■ Rear panel



❶ DC POWER SOCKET [DC 13.8V] (pgs. 14, 16)
Accepts 13.8 V DC through the supplied DC power cable (OPC-025D).



Rear panel view

❷ ANTENNA CONNECTOR [ANT 144MHz]
❸ ANTENNA CONNECTOR 2 [ANT2]
❹ ANTENNA CONNECTOR 1 [ANT1]
(pgs. 14, 15, 17, 74)
Accept a 50 Ω antenna with a PL-259 connector.
• [ANT 144MHz] for 144 MHz band only; [ANT1]

When using an optional AH-4 HF/50 MHz AUTOMATIC ANTENNA TUNER, connect it to the [ANT1] connector. The internal antenna tuner activates for [ANT2] and deactivates for [ANT1] when connecting the AH-4.

❺ DATA SOCKET [DATA] (pgs. 15, 77)
Connects a TNC (Terminal Node Controller), etc. for data communications.
• See p. 8 for connector information.

❻ EXTERNAL SPEAKER JACK [EXT SP]
(pgs. 15, 100)
Accepts a 4–8 Ω speaker.

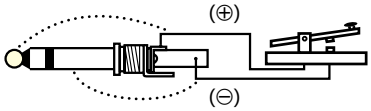
❼ CI-V REMOTE CONTROL JACK [REMOTE] (p. 94)
➥ Designed for use with a personal computer for remote control of transceiver functions.
➥ Used for transceive operation with another Icom CI-V transceiver or receiver.

❽ SEND CONTROL JACK [SEND] (p. 17)
Goes to ground while transmitting to control external equipment such as a linear amplifier.
• Max. control level: 16 V DC/0.5 A

❾ ALC INPUT JACK [ALC] (p. 17)
Connects to the ALC output jack of a non-Icom linear amplifier.

❿ ACCESSORY SOCKET 2 [ACC(2)]
⓫ ACCESSORY SOCKET 1 [ACC(1)]
Enable connection of external equipment such as a linear amplifier, an automatic antenna selector/tuner, TNC for data communications, etc.
• See p. 8 for socket information.

⓬ STRAIGHT KEY JACK [KEY] (p. 14)
Accepts a straight key or external electronic keyer with ¼ inch standard plug.
• [ELEC-KEY] on the front panel can be used for a straight key or external electronic keyer. Deactivate the internal electronic keyer in keyer set mode. (p. 34)



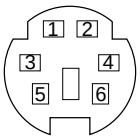
⓭ TUNER CONTROL SOCKET [TUNER]
(pgs. 15, 76)
Accepts the control cable from an optional AH-4 HF/50 MHz AUTOMATIC ANTENNA TUNER.

If you use an external electronic keyer, make sure the voltage retained by the keyer is less than 0.4 V when the key is ON.

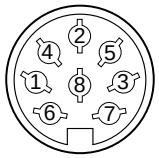
⓮ CALIBRATION POT [CAL] (p. 93)
This is used for frequency calibration.
• The transceiver has been adjusted and calibrated thoroughly at the factory. Under normal circumstances, the frequency does not need to be re-calibrated.

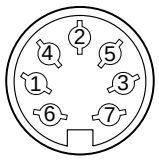
⓯ GROUND TERMINAL [GND] (pgs. 13, 14)
Connect this terminal to a ground to prevent electrical shocks, TVI, BCI and other problems.

◇ DATA SOCKET

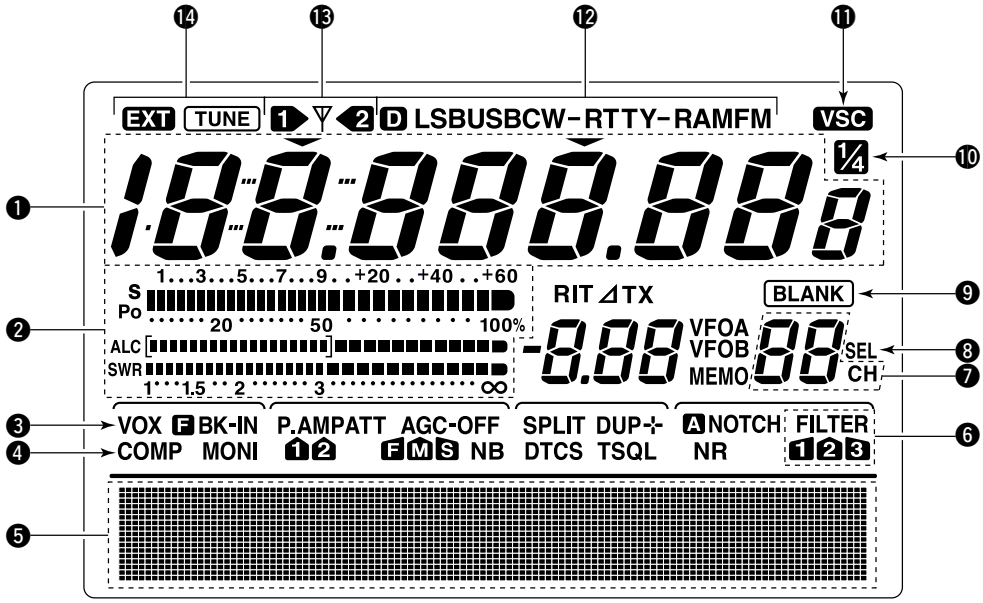
DATA	PIN No.	NAME	DESCRIPTION
 Rear panel view	1	DATA IN	Input terminal for data transmit. (1200 bps: AFSK/9600 bps: G3RUH, GMSK)
	2	GND	Common ground for DATA IN, DATA OUT and AF OUT.
	3	PTT P	PTT terminal for packet operation. Connect ground to transmit data.
	4	DATA OUT	Data out terminal for 9600 bps operation only.
	5	AF OUT	Data out terminal for 1200 bps operation only.
	6	P SQL	Squelch out terminal. Becomes high (+8 V) when the transceiver receives a signal which opens the squelch. • To avoid unnecessary TNC transmission, connect squelch to the TNC to inhibit transmission when receiving signals. • Keep audio output at a normal level, otherwise a "P SQL signal will not be output.

◇ ACC SOCKETS

ACC (1)	PIN No.	NAME	DESCRIPTION	SPECIFICATIONS
 Rear panel view	1	RTTY	Controls RTTY keying	"High" level : More than 2.4 V "Low" level : Less than 0.6 V Output current : Less than 2 mA
	2	GND	Connects to ground.	Connected in parallel with ACC(2) pin 2.
	3	HSEND	Input/output pin. (HF/50 MHz only) Goes to ground when transmitting. When grounded, transmits.	Ground level : –0.5 V to 0.8 V Output current : Less than 20 mA Input current (Tx) : Less than 200 mA Connected in parallel with ACC(2) pin 3.
	4	MOD	Modulator input. Connects to a modulator.	Input impedance : 10 kΩ Input level : Approx. 100 mV rms
	5	AF	AF detector output. Fixed, regardless of [AF] position in default settings. (see notes below)	Output impedance : 4.7 kΩ Output level : 100–300 mV rms
	6	SQLS	Squelch output. Goes to ground when squelch opens.	SQL open : Less than 0.3 V/5 mA SQL closed : More than 6.0 V/100 µA
	7	13.8 V	13.8 V output when power is ON.	Output current : Max. 1 A Connected in parallel with ACC(2) pin 7.
	8	ALC	ALC voltage input.	Control voltage : –4 V to 0 V Input impedance : More than 10 kΩ Connected in parallel with ACC(2) pin 5.

ACC (2)	PIN No.	NAME	DESCRIPTION	SPECIFICATIONS
 Rear panel view	1	8 V	Regulated 8 V output.	Output voltage : 8 V ±0.3 V Output current : Less than 10 mA
	2	GND	Same as ACC(1) pin 2.	
	3	HSEND	Same as ACC(1) pin 3.	
	4	BAND	Band voltage output. (Varies with amateur band)	Output voltage : 0 to 8.0 V
	5	ALC	Same as ACC (1) pin 8.	
	6	VSEND	Input/output pin (144 MHz only) Goes to ground when transmitting. When grounded, transmits.	Ground level : –0.5 V to +0.8 V Output current : Less than 20 mA Input current (Tx) : Less than 200 mA
	7	13.8 V	Same as ACC(1) pin 7.	

■ LCD display



❶ **FREQUENCY READOUTS**
Show the operating frequency.

❷ **MULTI-FUNCTION METER INDICATION**
➥ Shows receiving signal strength, etc. during receive.
➥ Shows transmit output power, ALC and SWR during transmit.

❸ **VOX INDICATOR** (p. 54)
Appears when the VOX function is activated.

❹ **MICROPHONE COMPRESSOR INDICATOR** (p. 58)
Appears when the microphone compressor is activated.

❺ **MULTI-FUNCTION SWITCH INDICATOR** (p. 11)
Indicates the functions assigned to the multi-function switches ([F1]–[F5]).

❻ **DSP FILTER INDICATOR** (p. 50)
Shows the selected IF filter.

❼ **MEMORY CHANNEL READOUTS** (p. 62)
Show the selected memory channel.

❽ **SELECT MEMORY CHANNEL INDICATOR** (p. 72)
Appears when the selected memory channel is set as a select memory channel.

❾ **BLANK MEMORY INDICATOR** (p. 62)
Appears when the selected memory channel is blank.

❿ **¼ TUNING DIAL SPEED INDICATOR** (p. 21)
Appears when the tuning dial speed is set so that one rotation is equal to ¼ of the normal rotation.

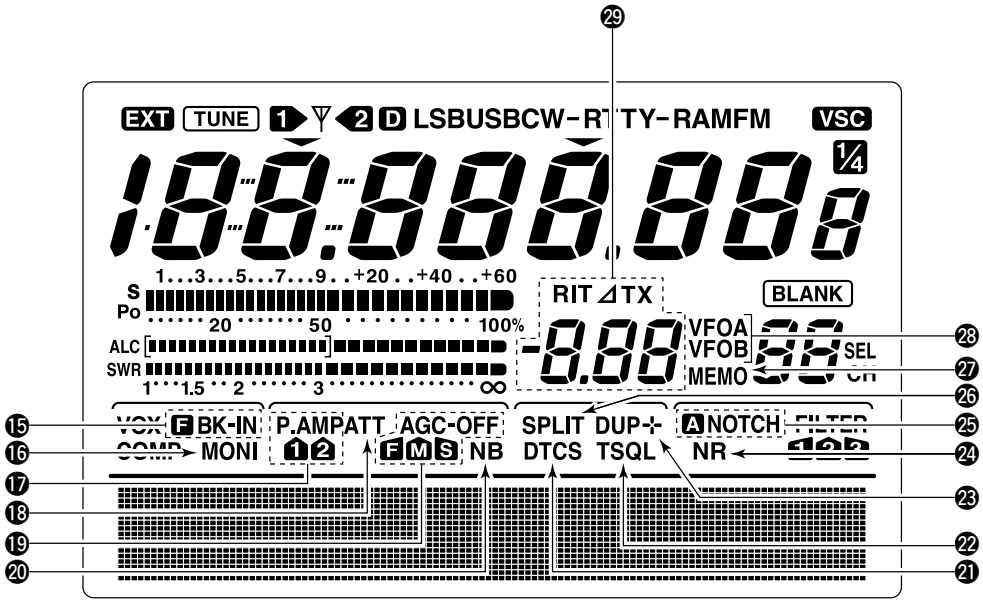
⓫ **VOICE SQUELCH CONTROL INDICATOR** (p. 54)
Appears during VSC (Voice Squelch Control) function is activated.

⓬ **MODE INDICATORs** (p. 23)
Shows the selected operating mode.
• "D" appears when SSB data, AM data or FM data mode is selected.

⓭ **ANTENNA INDICATOR** (p. 75)
Indicate which antenna connector is use for HF/50 MHz.

⓮ **ANTENNA TUNER INDICATORS** (pgs. 75, 76)
➥ "TUNE" appears when the antenna tuner is ON; "TUNE" appears and flashes during manual tuning.
➥ "EXT" appears when the optional AH-4 external antenna tuner is connected to [ANT1].

■ LCD display (continue)



⓯ **BREAK-IN INDICATORS** (p. 56)
- ➥"F BK-IN" appears when the full break-in function is activated.
- ➥"BK-IN" appears when the semi break-in function is activated.

⓰ **MONITOR INDICATORS** (p. 57)
Appears when the monitor function is activated.

⓱ **PREAMP INDICATORS** (p. 48)
Appears when the preamp is activated.

⓲ **ATTENUATOR INDICATORS** (p. 48)
Appears when the attenuator is activated.

⓳ **AGC INDICATORS** (p. 49)
Shows the selected AGC time constant.
- "F" for AGC fast; "M" for AGC middle; "S" for AGC slow; "-OFF" for AGC OFF.

⓴ **NOISE BLANKER INDICATOR** (p. 51)
Appears when the noise blanker is activated.

㉑ **DTCS INDICATOR** (p. 43)
Appears during DTCS operation.

㉒ **TONE SQUELCH INDICATORS**
- ➥"T" appears when the repeater tone is activated. (p. 44)
- ➥"TSQL" appears during tone squelch operation. (p. 42)

㉓ **DUPLEX INDICATOR** (p. 44)
"DUP–" or "DUP+" appears during repeater operation.

㉔ **NOISE REDUCTION INDICATOR** (p. 53)
Appears when the noise reduction is activated.

㉕ **NOTCH INDICATORS** (p. 53)
- ➥"NOTCH" appears when the manual notch function is activated.
- ➥"ANOTCH" appears when the automatic notch function is activated.

㉖ **SPLIT INDICATOR** (pgs. 58, 59)
Appears during split operation.

㉗ **MEMORY INDICATOR** (p. 62)
Appears during memory mode.

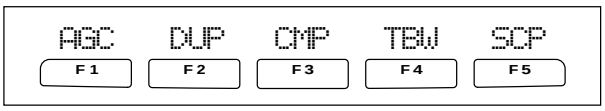
㉘ **VFO INDICATORS** (p. 20)
Indicates whether VFO A or VFO B is selected.

㉙ **RIT/⊿TX INDICATORS** (pgs. 48, 56)
Appears during RIT or ⊿TX operation and indicate the frequency offset.

■ Multi function switches

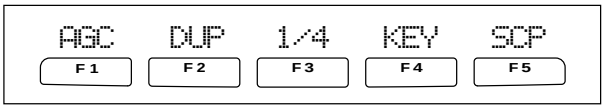
◇M1 FUNCTIONS

During SSB operation

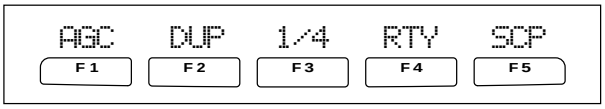


During SSB data operation

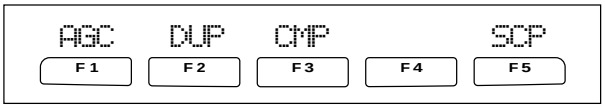
During CW operation



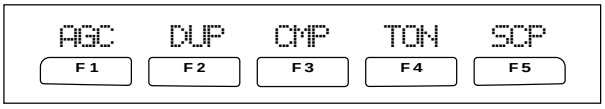
During RTTY operation



During AM operation



During FM operation



AGC (p. 49)

➥Push momentarily to changes the time constant of the AGC circuit.
➥Push for 1 sec. to enter to the AGC set mode.

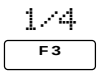
DUPLEX (p. 44)

➥Push momentarily to selects the duplex direction or turn the function OFF.
•"DUP–" or "DUP+" indicator appears during duplex operation.
➥Push for 1 sec. to turn the one-touch repeater function ON/OFF.

SPEECH COMPRESSOR (p. 58)

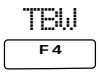
➥Push momentarily to turn the speech compressor function ON/OFF.
•"COMP" indicator appears when the speech compressor is ON.
➥Push for 1 sec. to enter to the compressor set mode.

¼ FUNCTION (p. 21)



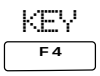
Push to turn the ¼ function ON/OFF.
•"¼" indicator appears when the ¼ function is ON.

TRANSMISSION BANDWIDTH (p. 58)



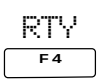
Push to select the transmission bandwidth.
•Bandwidth is selectable from narrow, middle and wide.

MEMORY KEYER MENU (p. 29)



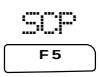
Push to select the memory keyer or keyer send menu, depending on the KEYER 1st Menu setting in the set mode (p. 86).

RTTY MENU (p. 36)



Push to select the RTTY menu.

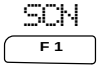
BAND SCOPE FUNCTION (p. 47)



Push to select the band scope screen.

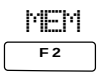
◇M2 FUNCTIONS

SCAN MENU (p. 70)



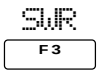
Push to select the scan menu.

MEMORY NAME MENU (p. 67)



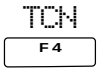
Push to select the memory name screen.

SWR GRAPH FUNCTION (p. 61)



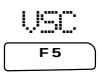
Push to indicates the SWR graph screen.

TONE CONTROL SET MODE (p. 88)



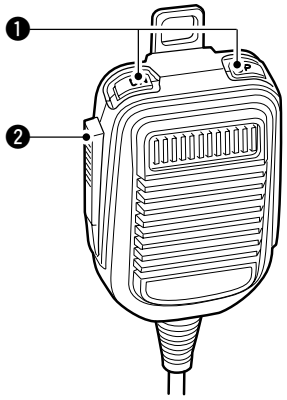
Push to enter the audio tone set mode.

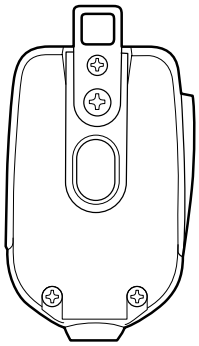
VSC FUNCTION (p. 54)



Push to turns the VSC (Voice Squelch Control) function ON and OFF.

■ Microphone (HM-36)



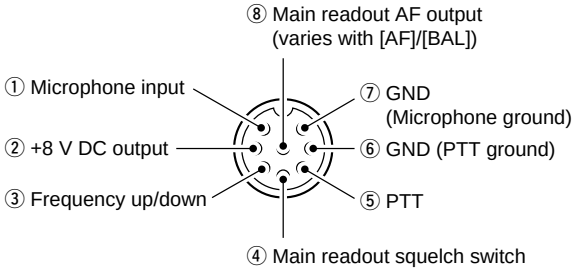


❶ UP/DOWN SWITCHES [UP]/[DN]
Change the selected readout frequency or memory channel.
- Continuous pushing changes the frequency or memory channel number continuously.
- While pushing [XFC], the transmit readout frequency can be controlled while in spilt frequency operation.
- The [UP]/[DN] switch can simulate a key paddle. Preset in the keyer set mode. (p. 34)

❷ PTT SWITCH
Push and hold to transmit; release to receive.

•MICROPHONE CONNECTOR

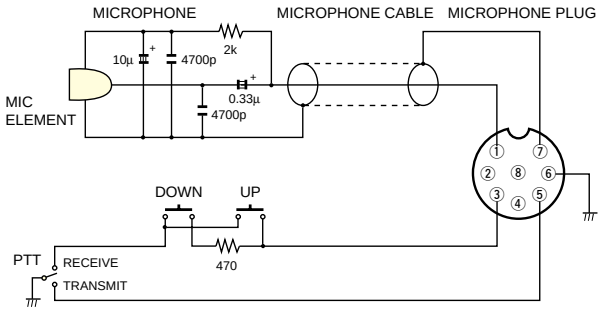
(Front panel view)



[MIC] Pin No.	FUNCTION	DESCRIPTION
②	+8 V DC output	Max. 10 mA
③	Frequency up	Ground
	Frequency down	Ground through 470 Ω
④	Squelch open	"Low" level
	Squelch closed	"High" level

CAUTION: DO NOT short pin 2 to ground as this can damage the internal 8 V regulator.
NOTE: DC voltage is applied to pin 1 for microphone operation. Take care when using a non-Icom microphone.

•HM-36 SCHEMATIC DIAGRAM



2 INSTALLATION AND CONNECTIONS

■ Unpacking

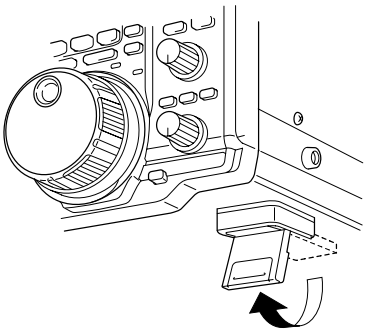
After unpacking, immediately report any damage to the delivering carrier or dealer. Keep the shipping cartons.

For a description and a diagram of accessory equipment included with the IC-746PRO, see 'Supplied accessories' on p. ii of this manual.

■ Selecting a location

Select a location for the transceiver that allows adequate air circulation, free from extreme heat, cold, or vibrations, and away from TV sets, TV antenna elements, radios and other electro magnetic sources.

The base of the transceiver has an adjustable stand for desktop use. Set the stand to one of two angles depending on your operating conditions.

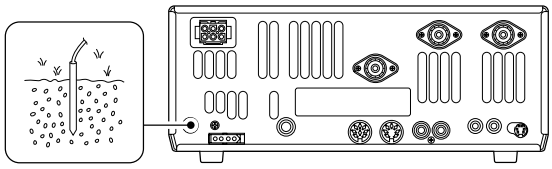


■ Grounding

To prevent electrical shock, television interference (TVI), broadcast interference (BCI) and other problems, ground the transceiver through the GROUND terminal on the rear panel.

For best results, connect a heavy gauge wire or strap to a long earth-sunk copper rod. Make the distance between the [GND] terminal and ground as short as possible.

⚠ **WARNING: NEVER** connect the [GND] terminal to a gas or electric pipe, since the connection could cause an explosion or electric shock.



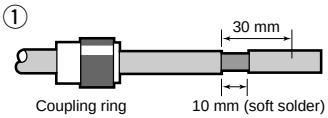
■ Antenna connection

For radio communications, the antenna is of critical importance, along with output power and sensitivity. Select antenna(s), such as a well-matched 50 Ω antenna, and feedline. 1.5:1 or better of Voltage Standing Wave Ratio (VSWR) is recommended for your desired band. Of course, the transmission line should be a coaxial cable.

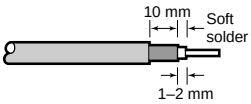
When using 1 antenna, use the [ANT1] connector.

CAUTION: Protect your transceiver from lightning by using a lightning arrestor.

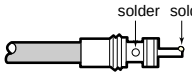
PL-259 CONNECTOR INSTALLATION EXAMPLE

① 

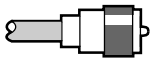
Slide the coupling ring down. Strip the cable jacket and soft solder.

② 

Strip the cable as shown at left. Soft solder the center conductor.

③ 

Slide the connector body on and solder it.

④ 
Screw the coupling ring onto the connector body.

30 mm ≈ 9/8 in 10 mm ≈ 3/8 in 1–2 mm ≈ 1/16 in

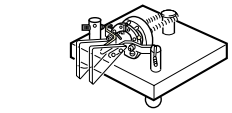
Antenna SWR

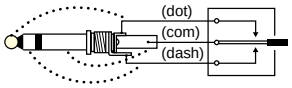
Each antenna is tuned for a specified frequency range and SWR may be increased out-of-range. When the SWR is higher than approx. 2.0:1, the transceiver's power drops to protect the final transistor. In this case, an antenna tuner is useful to match the transceiver and antenna. Low SWR allows full power for transmitting even when using the antenna tuner. The IC-746PRO has an SWR meter to monitor the antenna SWR continuously.

■ Required connections

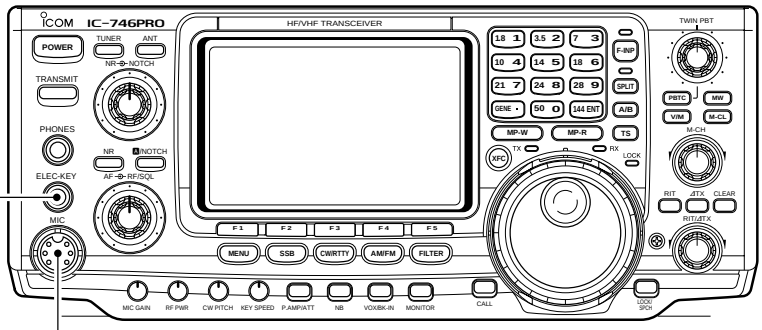
•Front panel

CW KEY





A straight key can be used when the internal electronic keyer is turned OFF in keyer set mode. (p.34)



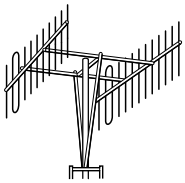
MICROPHONES (p. 100)

HM-36

SM-20 (optional)

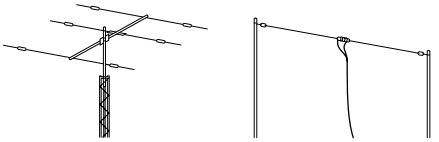
•Rear panel

144 MHz ANTENNA (pgs. 13, 74)

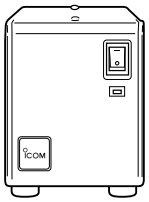


Connect a VHF (60–144 MHz) antenna; impedance: 50 Ω.

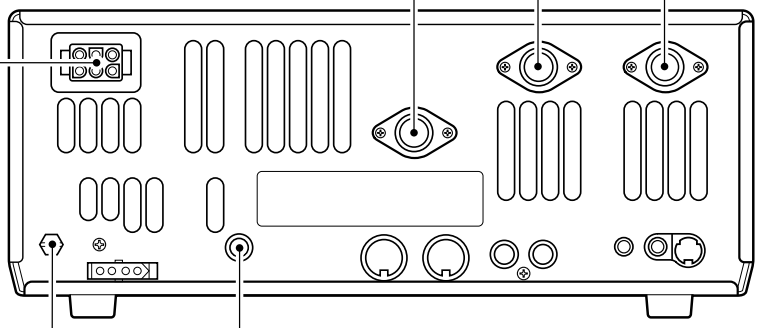
ANTENNA 1, 2 (pgs. 13, 74)
[Example]: ANT1 for 1.8–18 MHz bands
ANT2 for 21–50 MHz bands



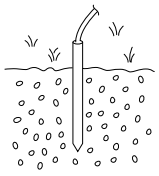
DC POWER SUPPLY



PS-125 (Optional)



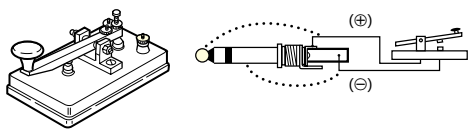
GROUND (p. 13)



Use the heaviest gauge wire or strap available and make the connection as short as possible.

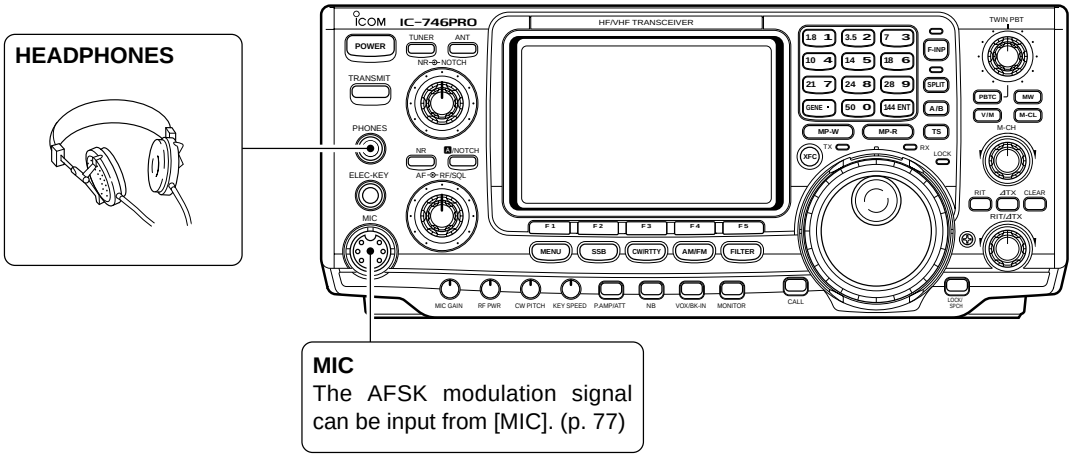
Grounding prevents electrical shocks, TVI and other problems.

STRAIGHT KEY

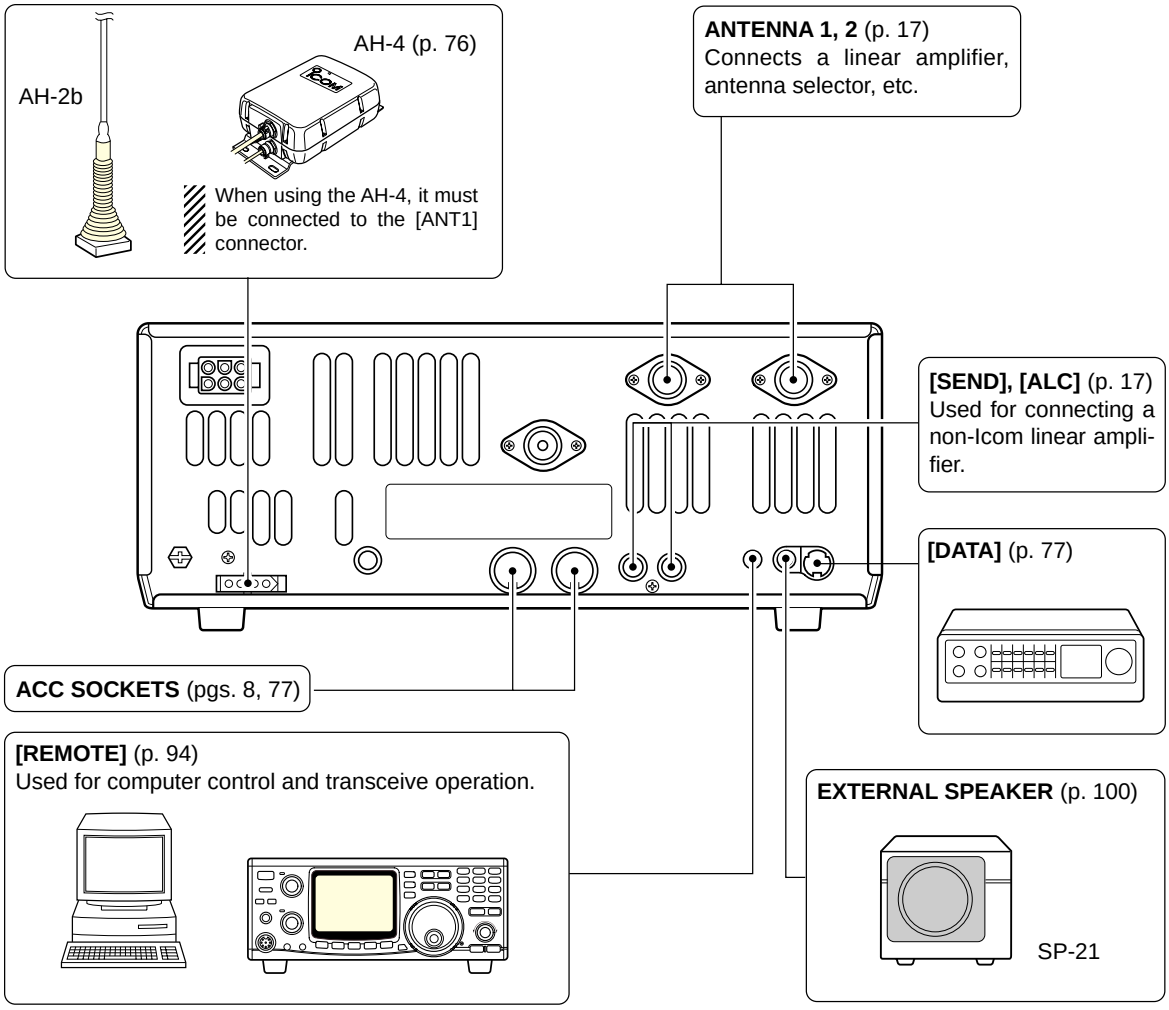


■ Advanced connections

• Front panel



• Rear panel

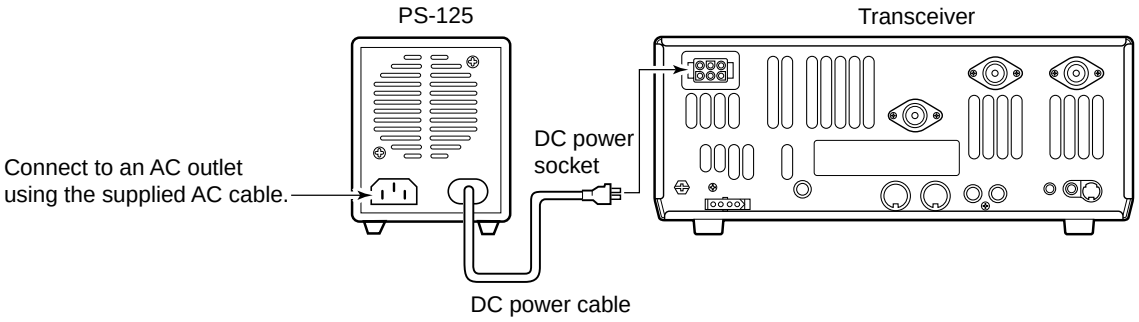


■ Power supply connections

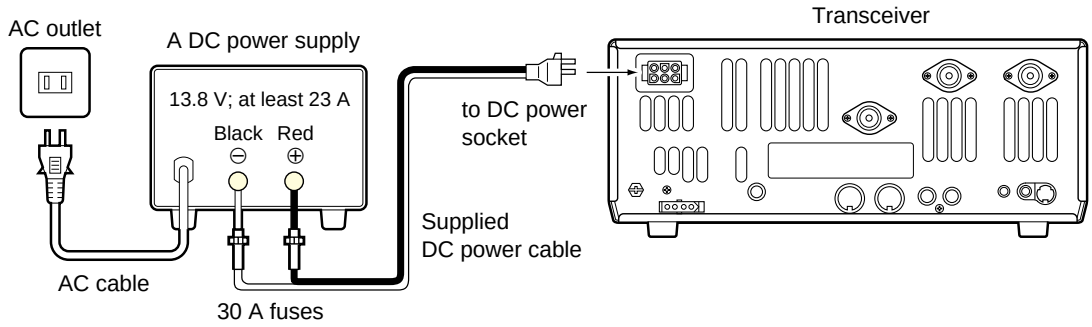
Use an optional DC power supply with a 25 A capacity and above when operating the transceiver with AC power. Refer to the diagrams below.

CAUTION: Before connecting the DC power cable, check the following important items. Make sure:
- The [POWER] switch is OFF.
- Output voltage of the power source is 12–15 V when you use a non-Icom power supply.
- DC power cable polarity is correct.
  Red : positive ⊕ terminal
  Black : negative ⊖ terminal

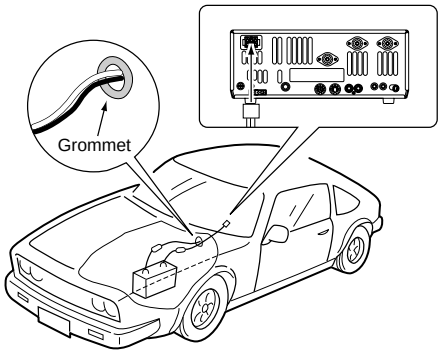
CONNECTING PS-125 DC POWER SUPPLY



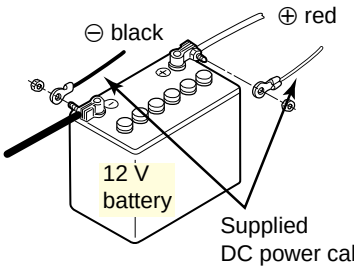
CONNECTING A DC POWER SUPPLY



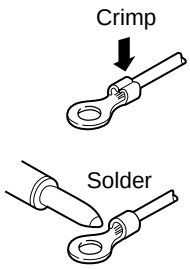
CONNECTING A VEHICLE BATTERY



NEVER connect to a 24 V battery.



NOTE: Use terminals for the cable connections.

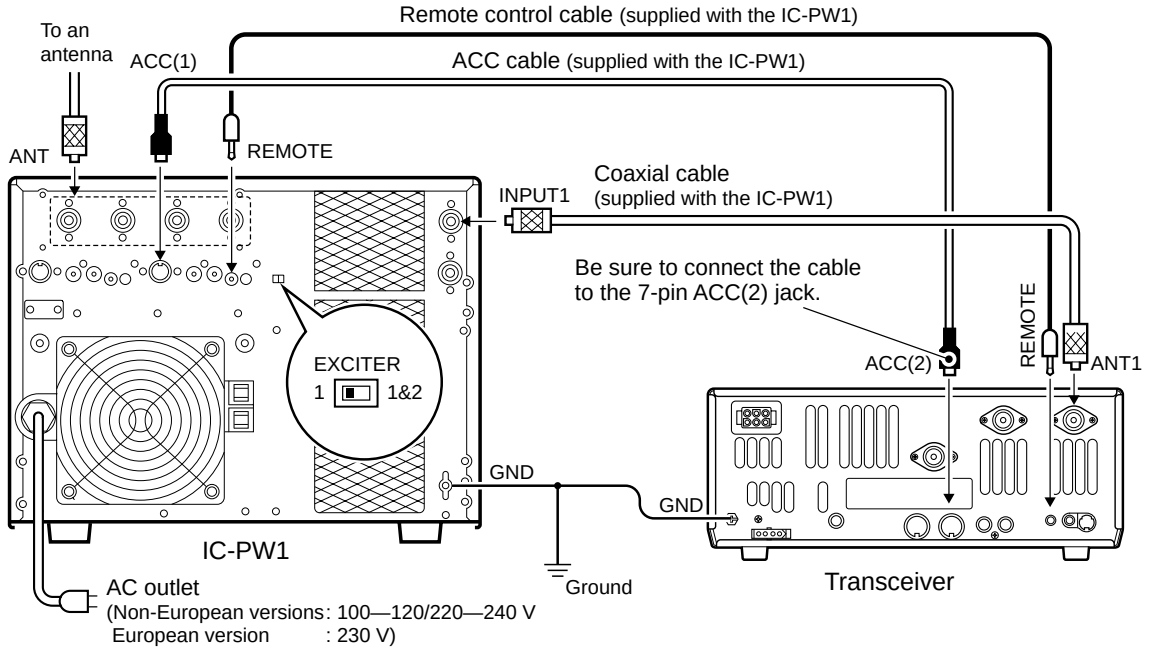


NEVER connect to a battery without supplied DC fuses, otherwise a fire hazard may occur.

■ Linear amplifier connections

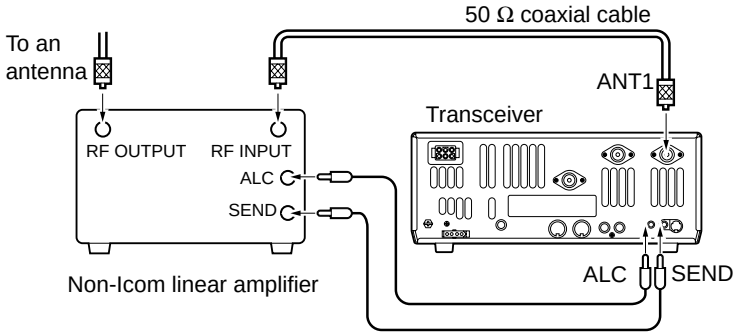
Use the [ANT1] connector when connecting a linear amplifier.

CONNECTING THE IC-PW1



Turn OFF the transceiver's antenna tuner while tuning the IC-PW1's tuner.

CONNECTING A NON-ICOM LINEAR AMPLIFIER



⚠ WARNING:

Set the transceiver output power and linear amplifier ALC output level referring to the linear amplifier instruction manual.

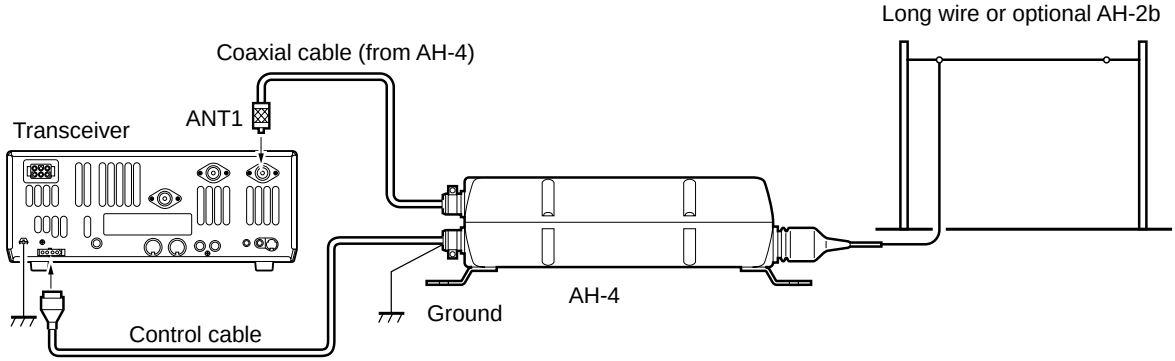
The ALC input level must be in the range 0 V to –4 V, and the transceiver does not accept positive voltage. Non-matched ALC and RF power settings could cause a fire or ruin the linear amplifier.

The specifications for the SEND relay are 16 V/DC 0.5 A. If this level is exceeded, a large external relay must be used.

■ External antenna tuner connection

CONNECTING THE AH-4

The AH-4 must be connected to [ANT1].



■ When first applying power (CPU resetting)

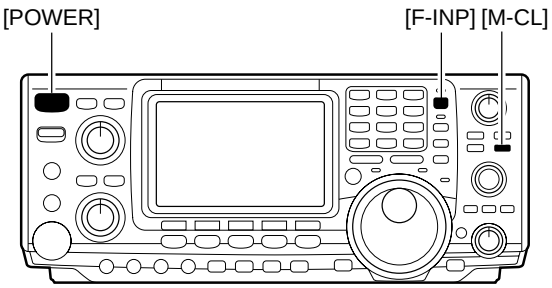
Before first applying power, make sure all connections required for your system are complete by referring to Chapter 2. Then, reset the transceiver using the following procedure.

NOTE: When first applying power or when operating in cold environments, the display may flicker or appear faint. This is normal and will disappear once the transceiver has warmed up.

① Make sure the transceiver power is OFF.
② While pushing [M-CL] and [F-INP], push [POWER] for 1 sec. to turn power ON.
- The internal CPU is reset.
- The transceiver displays its initial VFO frequency when resetting is complete.

③ Correct the set mode settings after resetting, if desired.

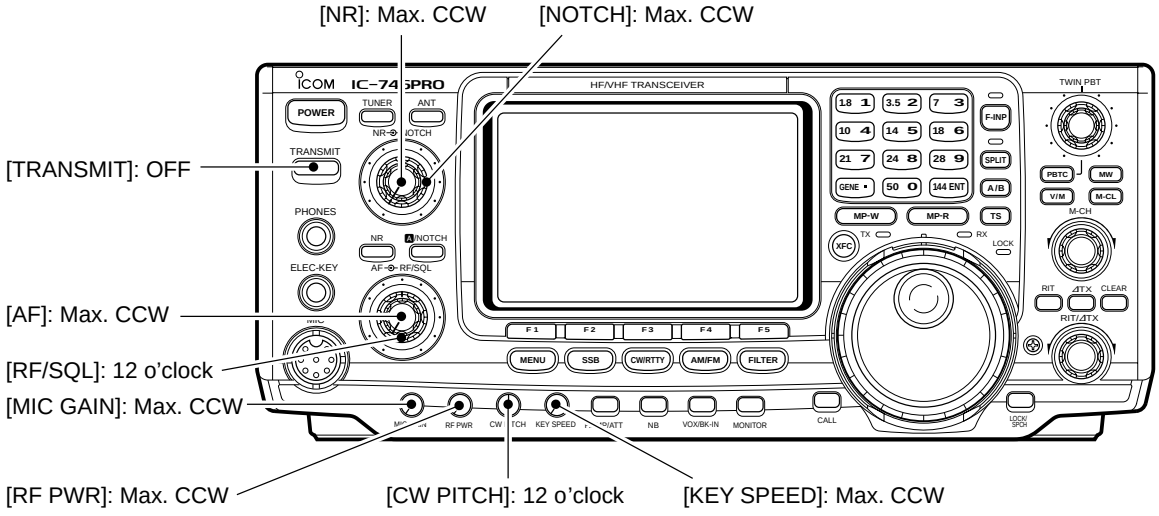
Resetting **CLEARS** all programmed contents in memory channels and returns programmed values in set mode to default values.



■ Initial settings

After resetting the transceiver, set controls and switches as shown in the figure below.

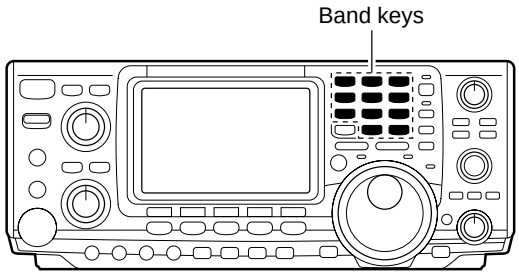
CW : Clockwise
CCW : Counterclockwise



■ Selecting an operating band

The transceiver has a triple band stacking register. This means that the last 3 operating frequencies and modes used on a particular band are automatically memorized.

See the table below for a list of the bands available and the default settings for each register.



BAND	REGISTER 1	REGISTER 2	REGISTER 3
1.8 MHz	1.900000 MHz CW	1.910000 MHz CW	1.915000 MHz CW
3.5 MHz	3.550000 MHz LSB	3.560000 MHz LSB	3.580000 MHz LSB
7 MHz	7.050000 MHz LSB	7.060000 MHz LSB	7.020000 MHz CW
10 MHz	10.120000 MHz CW	10.130000 MHz CW	10.140000 MHz CW
14 MHz	14.100000 MHz USB	14.200000 MHz USB	14.050000 MHz CW
18 MHz	18.100000 MHz USB	18.130000 MHz USB	18.150000 MHz USB
21 MHz	21.200000 MHz USB	21.300000 MHz USB	21.050000 MHz CW
24 MHz	24.950000 MHz USB	24.980000 MHz USB	24.900000 MHz CW
28 MHz	28.500000 MHz USB	29.500000 MHz USB	28.100000 MHz CW
50 MHz	50.100000 MHz USB	50.200000 MHz USB	51.000000 MHz FM
144 MHz	145.000000 MHz FM	145.100000 MHz FM	145.200000 MHz FM
General	15.000000 MHz USB	15.100000 MHz USB	15.200000 MHz USB

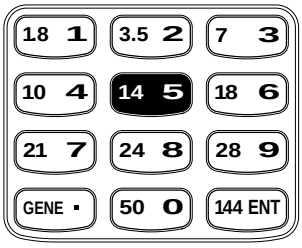
◇Using the band stacking registers

①Push [14 **5**], then select a frequency and an operating mode.
- •Frequency and operating mode are memorized in the first band stacking register.

②Push [14 **5**] again, then select another frequency and operating mode.
- •This frequency and operating mode are memorized in the second band stacking register.

③Push [14 **5**] again, then select another frequency and operating mode.
- •This frequency and operating mode are memorized in the third band stacking register.
- •When a fourth frequency and operating mode are selected on a band, the first register. set in step ①, is overwritten.

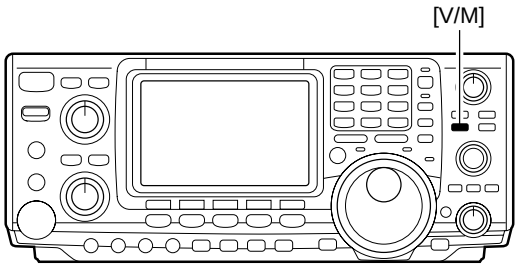
[Example]: 14 MHz band



■ Selecting VFO/memory mode

VFO is an abbreviation of Variable Frequency Oscillator, and traditionally refers to an oscillator.

➥ Push [V/M] to switch between VFO and memory modes.
- Pushing [V/M] for 1 sec. transfers the contents of the selected memory channel to VFO mode (p. 65).

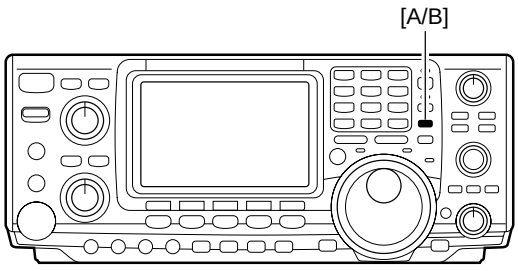


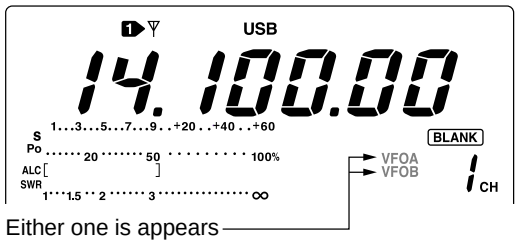
■ VFO operation

The transceiver has 2 VFOs and are called VFO A and VFO B. You can use the desired VFO to call up a frequency and operating mode for your operation.

◇Selecting the VFO A/B

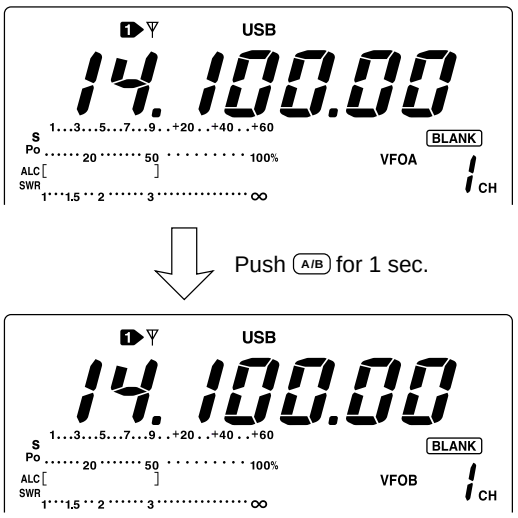
➥ Push [A/B] to switch between the VFO A and VFO B.
- "VFO A" or "VFO B" appears.





◇VFO equalization

➥ Push [A/B] for 1 sec. to equalize the undisplayed VFO condition to the displayed VFO.
- 3 beeps sound when the VFO equalization is completed.



CONVENIENT

Use two VFOs as a quick memory

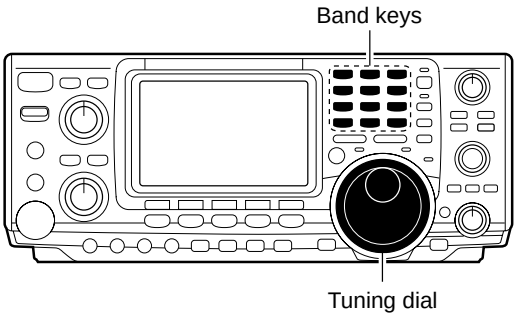
When you find a new station, but you wish to continue searching, the Two VFO system can be used for quick memory storage.

① Push [A/B] for 1 sec. to store the displayed frequency into the undisplayed VFO.
② Continue to searching for stations.
③ Push [A/B] to retrieve the stored frequency.
④ To continue searching for station, push [A/B] again.

■ Frequency setting

The transceiver has several tuning methods for convenient frequency tuning.

◇Tuning with the tuning dial



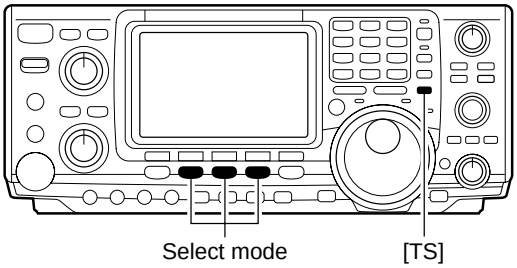
① Push the desired band key on the keypad 1–3 times.
- 3 different frequencies can be selected on each band with the band key. (p. 19)

② Rotate the tuning dial to set the desired frequency.

If the dial lock function is activated, the lock indicator lights, and the tuning dial does not function. In this case, push [LOCK/SPCH] to deactivate the lock function. (see p. 53 for details)

◇Quick tuning step

The operating frequency can be changed in kHz steps (0.1, 1, 5, 9, 10, 12.5, 20 or 25 kHz selectable) for quick tuning.

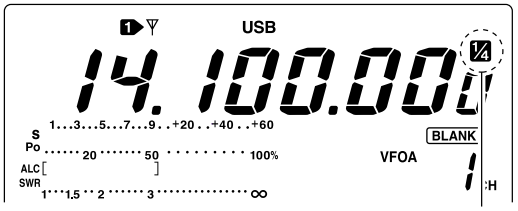


① Push [SSB], [CW/RTTY] or [AM/FM] to select the desired operation mode.
② Push [TS] momentarily to activate the quick tuning function.
- "▼" appears.

③ Push [TS] for 1 sec. to enter the tuning step set mode.
④ Rotate the tuning dial to select the desired tuning step.
⑤ Push [TS] to exit the tuning step set mode.

◇¼ Tuning step function (SSB data, CW and RTTY only)

While operating in SSB data/CW/RTTY, the ¼ function is available for critical tuning. Dial rotation is reduced to ¼ of normal when the ¼ function is in use.

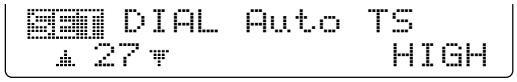


¼ indicator

➥While M1 is selected with [MENU], push [F3 1/4] to toggle the ¼ function ON and OFF.

◇Auto tuning step function

When rotating the tuning dial rapidly, the tuning step automatically changes several times as selected.



① Push [MENU] for 1 sec. to enter the set mode.
② Push [F1▲] or [F2▼] to select the DIAL Auto TS item.
③ Rotate the tuning dial to select the function ON (HIGH or LOW) and OFF.
- HIGH : Approx. 5 times faster
- LOW : Approx. 2 times faster
- OFF : Auto tuning step is turned OFF.

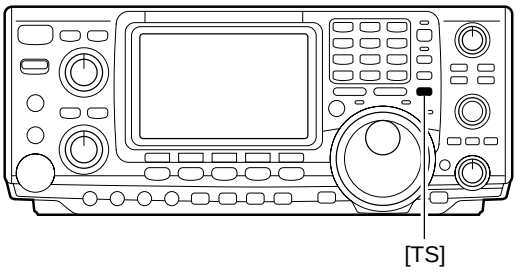
④ Push [MENU] to exit the set mode.

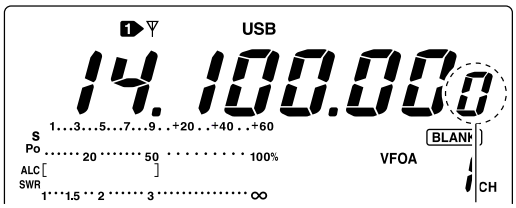
◇Selecting the 1 Hz step

The minimum tuning step of 1 Hz can be used for fine tuning.

① Push [TS] momentarily to turn the quick tuning step OFF
- "▼" disappears.

② Push [TS] for 1 sec. to toggle the 1 Hz tuning step ON and OFF.





1 Hz indicator

◇Band edge warning beep

When selecting a frequency that lies outside of a band's specified frequency range, a warning beep sounds.

This function can be turned OFF in set mode, if desired. (p. 81)

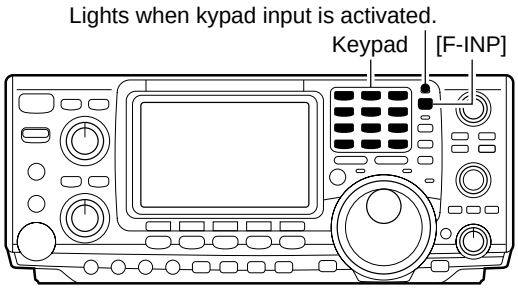
◇Frequency setting with the keypad

The transceiver has a keypad for direct frequency entry as described below.

① Push [F-INP].
- F-INP indicator lights

② Input the desired frequency.
- Input "•" (decimal point) between the MHz units and kHz units.

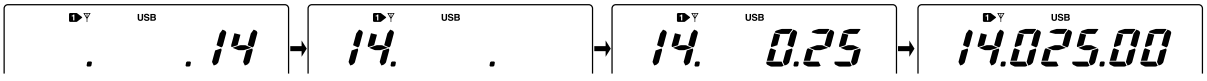
③ Push [144 ENT] to enter the input frequency.
- To cancel the input, push [A/B] instead of [144 ENT].



[EXAMPLE]

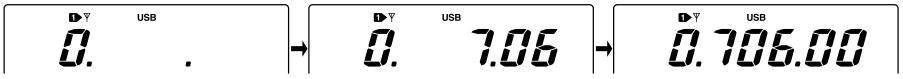
14.025 MHz

Push F-INP 18 1 10 4 GENE 50 0 3.5 2 14 5 144 ENT



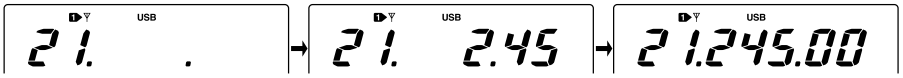
706 kHz

Push F-INP 50 0 GENE 21 7 50 0 18 6 144 ENT



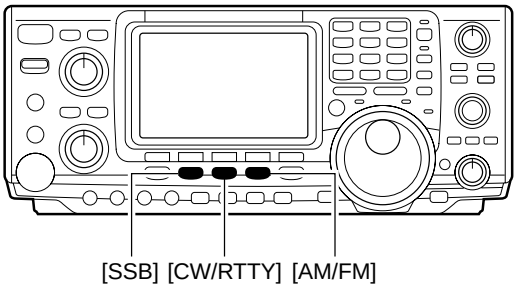
21.280 MHz → 21.245 MHz

Push F-INP GENE 3.5 2 10 4 14 5 144 ENT



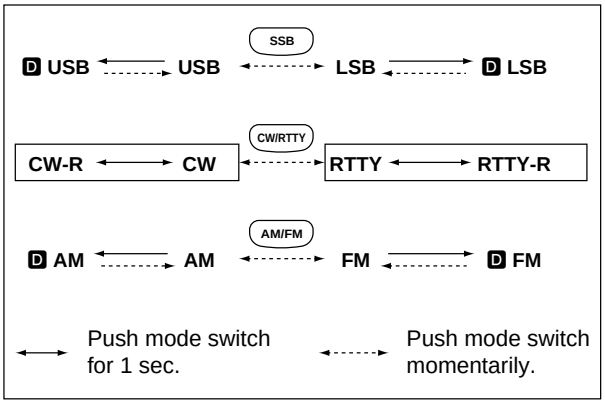
■ Operating mode selection

SSB (USB/LSB), SSB data (USB data/LSB data), CW, CW reverse (CW-R), RTTY, RTTY-R (RTTY reverse), AM, AM data, FM and FM data modes are available in the IC-746PRO. Select the desired operation mode as follows.



To select a mode of operation, push the desired mode switch momentarily. Push the switch again to toggle between USB and LSB, CW/CW-R and RTTY/RTTY-R, AM and FM, if necessary. Push the switch for 1 sec. to toggle between CW and CW-R, RTTY and RTTY-R, or to select data mode, if necessary.
See the diagram right below for the order of selection.

Microphone signals are muted when data mode is selected.



• Selecting SSB mode

➥ Push [SSB] to select USB or LSB.
- USB is selected first during above 10 MHz; or LSB is selected first during below 10 MHz operation.
- After USB or LSB is selected, push [SSB] to toggles between USB and LSB.
- After USB or LSB is selected, push [SSB] for 1 sec. to select USB data or LSB data mode, respectively.

• Selecting CW/RTTY mode

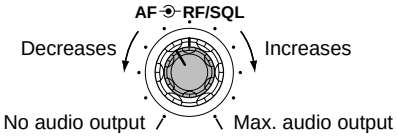
➥ Push [CW/RTTY] to select CW or RTTY.
- After CW/CW-R or RTTY/RTTY-R is selected, push [CW/RTTY] to toggles between CW and RTTY.
- After CW or RTTY is selected, push [CW/RTTY] for 1 sec. to toggles between CW and CW reverse, or, RTTY and RTTY reverse mode, respectively.

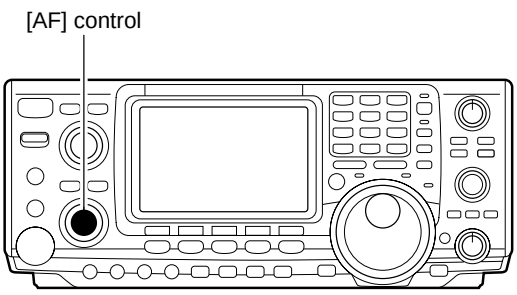
• Selecting AM/FM mode

➥ Push [AM/FM] to select AM or FM.
- After AM or FM is selected, push [AM/FM] to toggles between AM and FM mode.
- After AM or FM is selected, push [AM/FM] for 1 sec. to select AM data or FM data mode, respectively.

■ Volume setting

➥ Rotate [AF] control to output a suitable audio level.





■ Squelch and receive (RF) sensitivity

Adjusts the RF gain and squelch threshold level. The squelch removes noise output from the speaker (closed position) when no signal is received.

- The squelch is particularly effective for FM. It is also available for other modes.
- The control can be set as the RF gain control only (squelch is fixed open) or squelch control (RF gain is fixed at maximum) in set mode (p. 81). See below right.
- The 11 to 12 o'clock position is recommended for any setting of the [RF/SQL] control.

SET MODE	OPERATION
RF+SQL (default)	Can be used in all modes. Functions as noise squelch or S-meter squelch in AM and FM; S-meter squelch only in other modes.
SQL	➥Operates as a squelch control. •RF gain is fixed at max. sensitivity.
AUTO	➥Operates as an RF gain control in SSB, CW and RTTY. •Squelch is fixed open. ➥Operates as an squelch control in AM and FM. •RF gain is fixed at max. sensitivity.

Adjusting RF gain (Receive sensitivity)

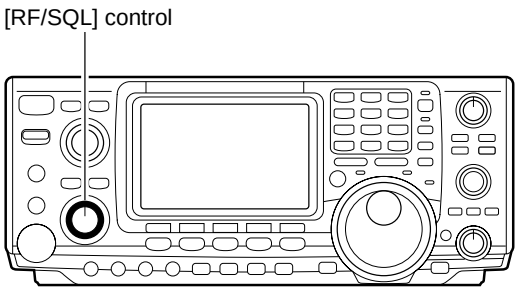
Normally, [RF/SQL] is set to the 11 o'clock position. Rotate [RF/SQL] to the 11 o'clock position for maximum sensitivity.

- Rotating counterclockwise from the maximum position reduces sensitivity.
- The S-meter indicates receive sensitivity.

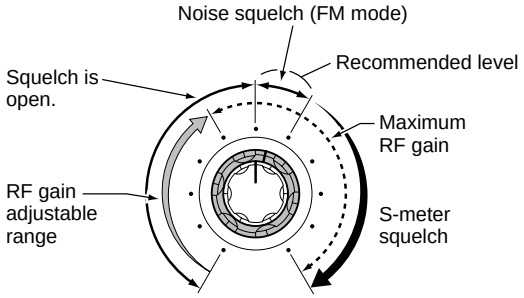
Adjusting squelch (Removing non-signal noise)

Rotate [RF/SQL] clockwise, when receiving no signal, until the noise just disappears.

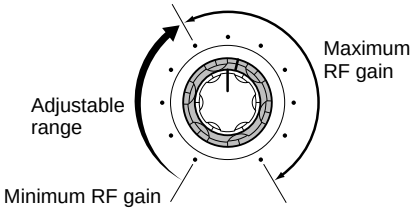
- [RX] indicator light goes out.
- Rotating [RF/SQL] past the threshold point invokes the S-meter squelch— this allows you to set a minimum signal level needed to open the squelch.



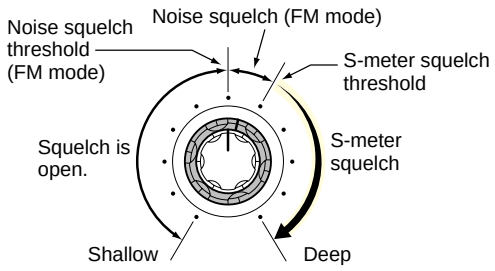
•When setting as RF gain/squelch control



•When functioning as RF gain control (Squelch is fixed open; SSB, CW, RTTY only)



•When functioning as squelch control (RF gain is fixed at maximum)



■ Basic transmit operation

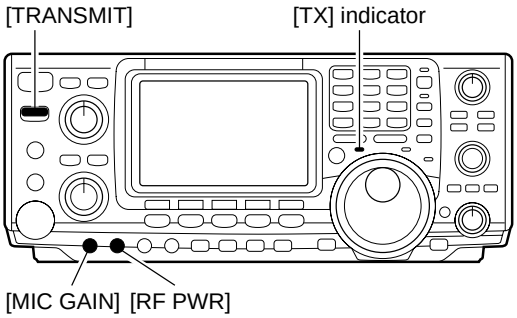
Before transmitting, monitor your selected operating frequency to make sure transmitting won't cause interference to other stations on the same frequency.

◇Transmitting

Before transmitting, monitor your selected operating frequency to make sure transmitting won't cause interference to other stations on the same frequency.

① Push [TRANSMIT] or [PTT] (microphone) to transmit.
- The [TX] indicator lights red.

② Push [TRANSMIT] again or release [PTT] (microphone) to return to receive.



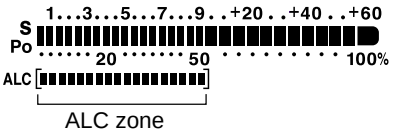
◇Microphone gain adjustment

Before transmitting, monitor your selected operating frequency to make sure transmitting won't cause interference to other stations on the same frequency.

① Push [PTT] (microphone) to transmit.
- Talk into the microphone at your normal voice level.

② While talking into the microphone, rotate [MIC GAIN] so that the ALC meter reading doesn't go outside the ALC zone (see right).

② Release [PTT] (microphone) to return to receive.



■ Operating SSB

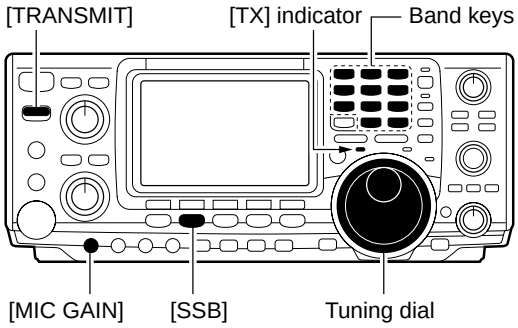
① Push a band key to select the desired band.
② Push [SSB] to select LSB or USB.
- Below 10 MHz LSB is automatically selected; above 10 MHz USB is automatically selected.

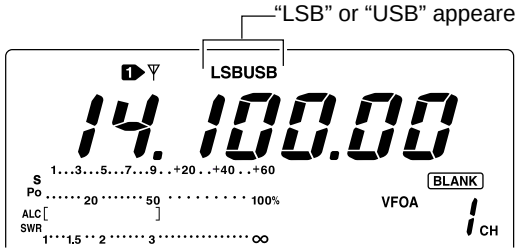
③ Rotate [AF] to set audio to a comfortable listening level.
④ Rotate the tuning dial to tune a desired signal.
- S-meter indicates received signal strength.

⑤ Push [TRANSMIT] or [PTT] (microphone) to transmit.
- The TX indicator lights red.

⑥ Speak into the microphone at your normal voice level.
- Adjust [MIC GAIN] at this step, if necessary.

⑦ Push [TRANSMIT] or release [PTT] (microphone) to return to receive.





◇ Convenient functions for receive

- **Preamp and attenuator** (p. 48)
  ➥ Push [P.AMP/ATT] several times to set the preamp OFF, preamp 1 ON or preamp 2 ON.
  - "P.AMP1," "P.AMP2" or "P.AMP" appears when the preamp 1, preamp 2 or preamp is set to ON, respectively. (depending on operating frequency band)

  ➥ Push [P.AMP/ATT] for 1 sec. to set the attenuator ON.
  - Push [P.AMP/ATT] momentarily to turn the attenuator OFF.
  - "ATT" appears when the attenuator is set to ON.

- **Noise blanker** (p. 51)
  ➥ Push [NB] to turn the noise blanker ON and OFF.
  - "NB" appears when the noise blanker is set to ON.
  - Push [NB] for 1 sec. to enter noise blanker set mode.

- **Noise reduction** (p. 53)
  ➥ Push [NR] to turn the noise reduction ON and OFF.
  - Rotate [NR] control to adjust the noise reduction level.
  - "NR" appears when the noise reduction is set to ON.

- **Auto notch filter** (p. 53)
  ➥ Push [A/NOTCH] to turn the auto or manual notch function ON and OFF.
  - Rotate [NOTCH] control to set attenuate frequency for manual notch operation.

- **Twin PBT (passband tuning)** (p. 52)
  ➥ Rotate [TWIN PBT] controls (inner/outer).
  - Push [PBTC] to clear the settings.

- **AGC (auto gain control)** (p. 49)
  ➥ While M1 is selected with [MENU], push [F1 AGC] several times to select AGC F, AGC M, AGC S or AGC OFF.

- **VSC (voice squelch control)** (p. 00)
  ➥ While M2 is selected with [MENU], push [F5 VSC] to turn the VSC function ON and OFF.
  - The VSC indicator appears when the voice squelch function is set to ON.

◇ Convenient functions for transmit

- **Speech compressor** (p. 58)
  ➥ While M1 is selected with [MENU], push [F3 CMP] to turn the speech compressor ON and OFF.
  - "COMP" appears when the speech compressor is set to ON.

- **VOX (voice operated transmit)** (p. 54)
  ➥ Push [VOX/BK-IN] to turn the VOX function ON and OFF.
  - "VOX" appears when the VOX function is set to ON.

- **Transmit quality monitor** (p. 57)
  ➥ Push [MONITOR] to turn the monitor function ON and OFF.
  - "MONI" appears when the monitor function is set to ON.

- **Audio tone control** (p. 88)
  ➥ While M2 is selected with [MENU], push [F4 TONE], select an item with [F1 ▲] and [F2 ▼] then rotate the tuning dial to adjust the audio tone.

■ Operating CW

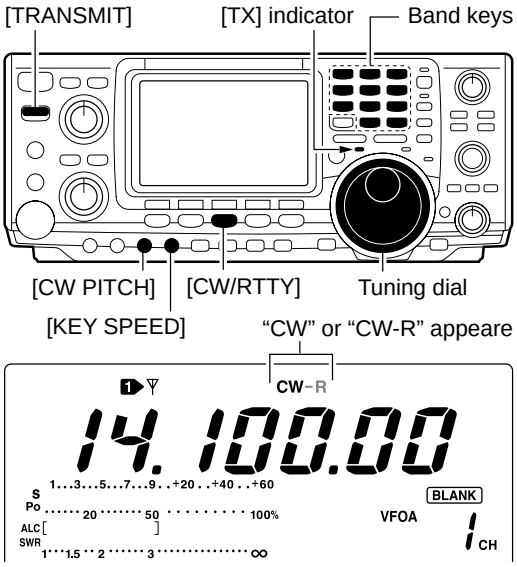
① Push a band key to select the desired band.
② Push [CW/RTTY] to select CW.
- After CW mode is selected, push [CW/RTTY] for 1 sec. to toggle between CW and CW-R modes.

③ Rotate [AF] to set audio to a comfortable listening level.
④ Rotate the tuning dial to simultaneously tune a desired signal and its side tone.
- S-meter indicates received signal strength.

⑤ Push [TRANSMIT] to transmit.
- The TX indicator lights red.

⑥ Use the electric keyer or paddle to key your CW signals.
- The Po meter indicates transmitted CW signal strength.

⑦ Push [TRANSMIT] to return to receive.



◇Convenient functions for receive

- **Preamp and attenuator** (p. 48)
  ➥ Push [P.AMP/ATT] several times to set the preamp OFF, preamp 1 ON or preamp 2 ON.
  - "P.AMP1," "P.AMP2" or "P.AMP" appears when the preamp 1, preamp 2 or preamp is set to ON, respectively. (depending on operating frequency band)

  ➥ Push [P.AMP/ATT] for 1 sec. to set the attenuator ON.
  - Push [P.AMP/ATT] momentarily to turn the attenuator OFF.
  - "ATT" appears when the attenuator is set to ON.

- **Noise blanker** (p. 51)
  ➥ Push [NB] to turn the noise blanker ON and OFF.
  - "NB" appears when the noise blanker is set to ON.
  - Push [NB] for 1 sec. to enter noise blanker set mode.

- **Noise reduction** (p. 53)
  ➥ Push [NR] to turn the noise reduction ON and OFF.
  - Rotate [NR] control to adjust the noise reduction level.
  - "NR" appears when the noise reduction is set to ON.

- **Auto notch filter** (p. 53)
  ➥ Push [A/NOTCH] to turn the auto or manual notch function ON and OFF.
  - Rotate [NOTCH] control to set attenuate frequency for manual notch operation.

- **Twin PBT (passband tuning)** (p. 52)
  ➥ Rotate [TWIN PBT] controls (inner/outer).
  - Push [PBTC] to clear the settings.

- **AGC (auto gain control)** (p. 49)
  ➥ While M1 is selected with [MENU], push [F1 AGC] several times to select AGC F, AGC M, AGC S or AGC OFF.

- **¼ function** (p. 21)
  ➥ While M1 is selected with [MENU], push [F3 1/4] to turn the ¼ function ON and OFF.

◇Convenient functions for transmit

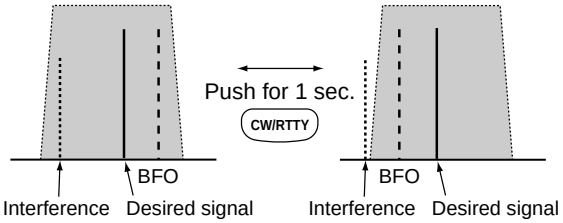
- **Break-in function** (p. 56)
  ➥ Push [VOX/BK-IN] several times to set the break-in OFF, semi break-in or full break-in.
  - "BK-IN" or "F BK-IN" appears when the semi break-in or full break-in is set to ON, respectively.

◇About CW reverse mode

CW reverse mode receives CW signals with a reverse side CW carrier point like that of LSB and USB modes. Use this mode when interfering signals are near the desired signal and you want to change the interference tone.

Use when interfering signals are near a desired signal and you want to change the interference tone.

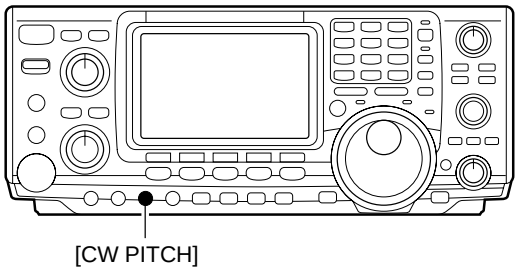
① Push [CW/RTTY] several times to select CW mode.
② Push [CW/RTTY] for 1 sec. to select CW or CW-R mode.
• Check the interfering tone.



CW mode (LSB side) **CW-R mode (USB side)**

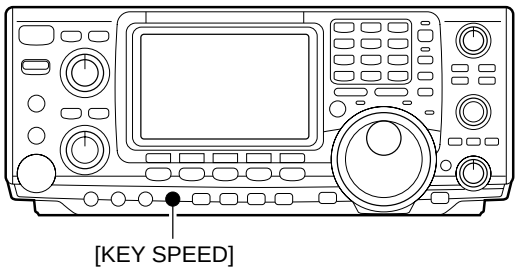
◇About CW pitch control

The received CW audio pitch and monitored CW audio can be adjusted to suit your preference (300 to 900 Hz in 25 Hz steps) without changing the operating frequency.



◇About keying speed

The transceiver's internal electronic keyer speed can be adjusted from 6 to 60 wpm.
➥ Rotate [KEY SPEED] clockwise to increase keying speed; counterclockwise to decrease keying speed.



◇CW side tone function

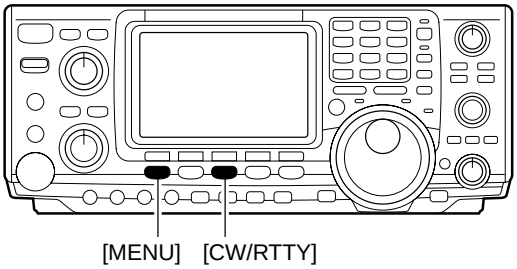
When the transceiver is in the receive condition (and the break-in function is OFF— p. 56) you can listen to the tone of your CW signal without actually transmitting. This allows you to match your transmit signal exactly to another station's. This also convenient for CW practice. CW side tone level can be adjusted in keyer set mode (p. 33).

■ Electronic keyer functions

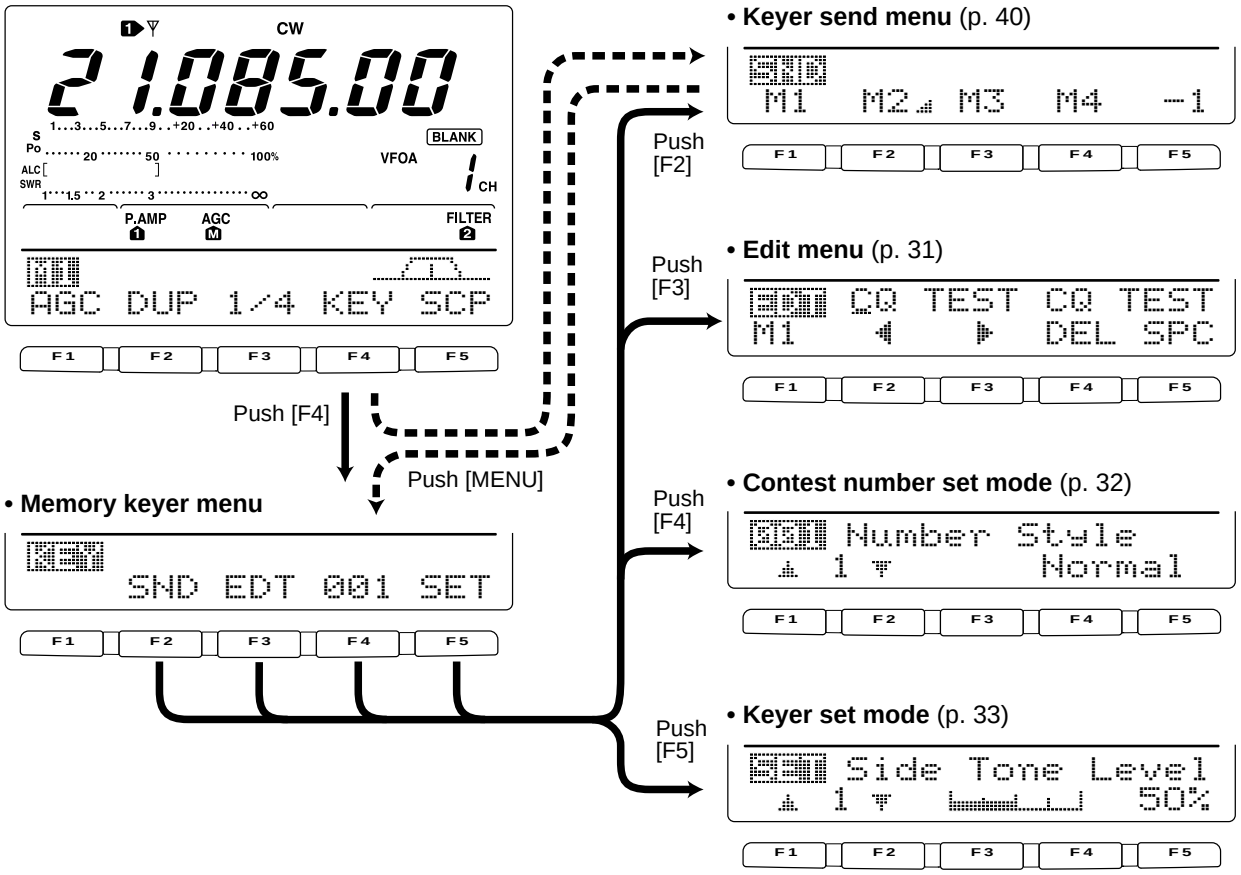
The transceiver has a number of convenient functions for the electronic keyer that can be accessed from the memory keyer menu.

① Push [CW/RTTY] to select CW mode.
② Push [MENU] to select M1.
③ Push [F4 KEY] to select the memory keyer menu.
- The selectable menu can be changed with the keyer send menu in the set mode. (p. 86)

④ Push one of the multi-function keys ([F1] to [F5]) to select an item in the memory keyer menu. See the diagram below.
- Push [MENU] to return to the previous indication.



◇IN CW MODE



◇Memory keyer send menu

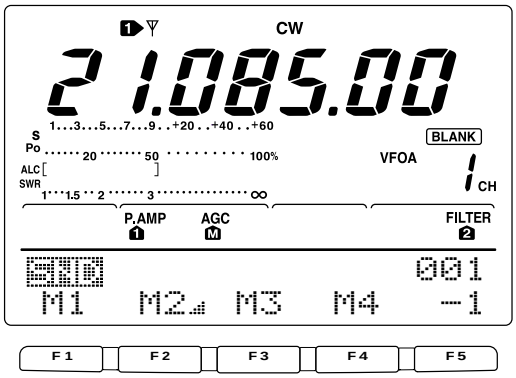
Pre-set characters can be sent using the keyer send menu. Contents of the memory keyer are set using the edit menu.

•Transmitting

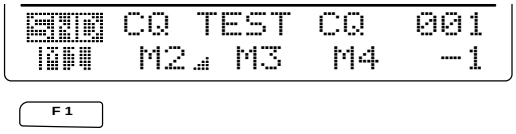
① While M1 is selected in CW mode, push [F4 KEY] to select the memory keyer menu.
② Push [F2 SND] to select the keyer send menu.
③ Push [TRANSMIT] to set the transceiver to transmit, or set the break-in function ON (p. 56).
④ Push one of the function keys ([F1] to [F4]) to send the contents of the memory keyer.
- Pushing a function key for 1 sec. repeatedly sends the contents; push any function key to cancel the transmission.
- The contest number counter, above [F5], is incremented each time the contents are sent.
- Push [F5] to reduce the contact number count by 1 when resending contents to unanswered calls.

For your information
When an external keypad is connected to the pin 3 and pin 7 of the [MIC] connector, the programmed contents, M1—M4, can be transmitted without selecting the keyer send menu.
See p. 86 for details.

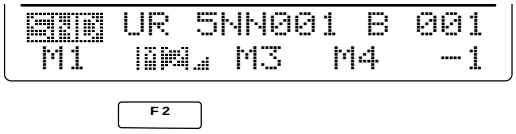
④ Push [MENU] 2 times to return to M1.



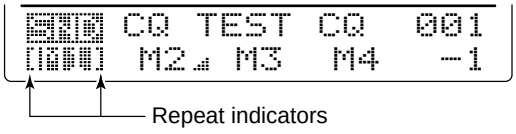
M1 send indication



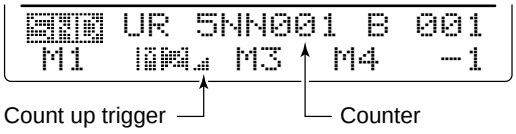
M2 send indication



Repeat send indication

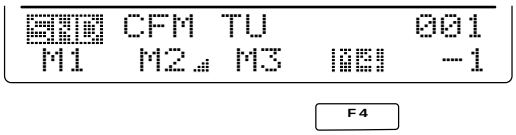


M2 send indication



M3 send indication

M4 send indication



◇Editing a memory keyer

The contents of the memory keyer memories can be set using the memory keyer edit menu. The memory keyer can memorize and re-transmit 4 CW key codes for often-used CW sentences, contact numbers, etc. Total capacity of the memory keyer is 50 characters per memory channel.

• Programming contents

① Push [MENU] to select M1, then push [F4 KEY] to select the memory keyer menu.
② Push [F3 EDIT] to select edit menu.
- Memory keyer contents of the channel 1 (M1) is indicated.
- Push [F5] to manually increment the contest number.

③ Push [F1] to select the desired memory keyer channel to be edited.
④ Input the desired character by rotating the tuning dial or by pushing the keypad for number input.
- Selectable characters (with the tuning dial);

```
A B C D E F G H I J K L M N O P Q R S T
U V W X Y Z / ? . , * ^
```

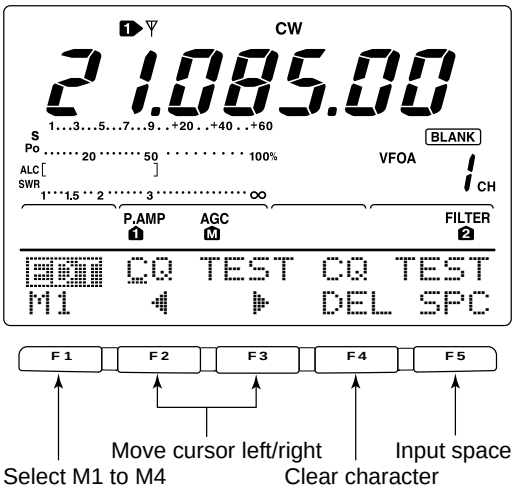
NOTE:
"^" is used to transmit a following word with no space such as $\overline{\text{AR}}$. Put "^" before a text string such as ^AR, and the string "$\overline{\text{AR}}$" is sent with no space.
"*" is used to insert the CW contact number. The contact number automatically increments by 1. This function is only available for one memory keyer channel at a time. Memory keyer channel M2 used "*" by default.

⑤ Push [F2 ◀] or [F3 ▶] to move the cursor backwards or forwards, respectively.
⑥ Repeat steps ④ and ⑤ to input the desired characters.
⑦ Push [MENU] 2 times to return to M1.

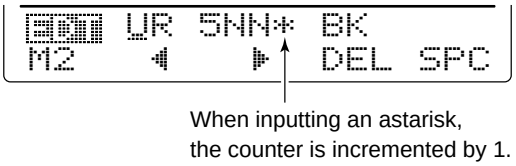
Pre-programmed contents

CH	Contents
M1	CQ TEST CQ TEST DE JA1 JA1 TEST
M2	UR 5NN* BK
M3	CFM TU
M4	QRZ?

• Edit menu



• M2 default indication



• M3 default indication

• M4 default indication

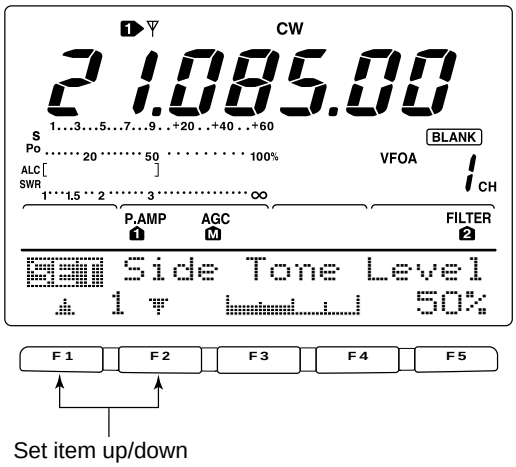
Example display— when inputting "QSL TU DE JA3YUA TEST" into M3.

◇Contest number set mode

This menu is used to set the contest (serial) number and count up trigger, etc.

•Setting contents

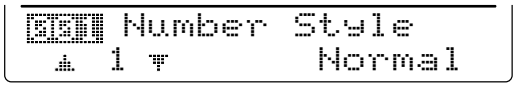
① Push [MENU] to select M1, then push [F4 KEY] to select the memory keyer menu.
② Push [F4 001] to enter the contest number set mode.
③ Push [F1▲] or [F2 ▼] to select the desired set item.
④ Set the desired condition using the tuning dial.
  •Push [F3] for 1 sec. to select a default condition or value.
⑤ Push [MENU] 2 times to return to M1.



1. Number Style

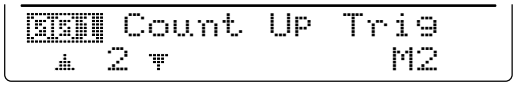
This item sets the numbering system used for contact (serial) numbers— normal or morse cut numbers.

- •Normal : Does not use morse cut number (default)
- •190→ANO : Sets 1 as A, 9 as N and 0 as O.
- •190→ANT : Sets 1 as A, 9 as N and 0 as T.
- • 90→ NO : Sets 9 as N and 0 as O.
- • 90→ NT : Sets 9 as N and 0 as T.



2. Count Up Trig

This item sets the count up trigger channel.
•M1, M2, M3 and M4 can be set. (default: M2)



3. Present Number

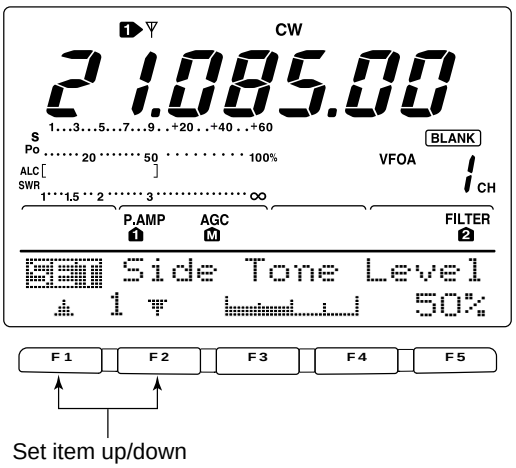
This item shows the current number for the count up trigger channel set above.
•Rotate the tuning dial to change the number, or push [F3 CLR] for 1 sec. to reset the current number to 001.

◇Keyer set mode

This set mode is used to set the CW side tone, memory keyer repeat time, dash weight, paddle specifications, keyer type, etc.

•Setting contents

① Push [MENU] to select M1, then push [F4 KEY] to select the memory keyer menu.
② Push [F5 SET] to select keyer set mode.
③ Push [F1▲] or [F2 ▼] to select the desired set item.
④ Set the desired condition using the tuning dial.
  •Push [F3] for 1 sec. to select a default condition or value.
⑤ Push [MENU] 2 times to return to M1.



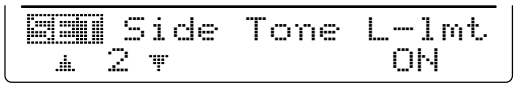
1. Side Tone Level

This item sets the CW side tone output level.
•0 to 100% in 1% step can be selected.

2. Side Tone L-lmt

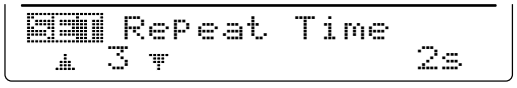
This item sets the CW side tone level limit. When the [AF] control is rotated above a specified level, the CW side tone does not increase.

ON	CW side tone level is limited. (default)
OFF	CW side tone level is not limited.



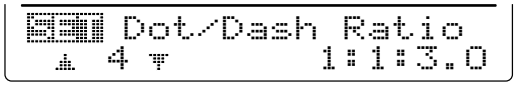
3. Repeat Time

When sending CW using the repeat timer, this item sets the time between transmission.
•1 to 60 sec. in 1 sec. step can be selected.

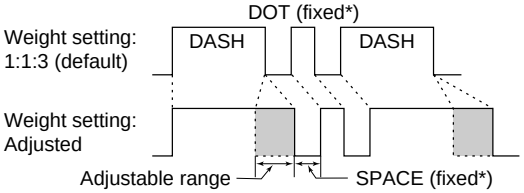


4. Dot/Dash Ratio

This item sets the dot/dash ratio.
•1:1:2.8 to 1:1:4.5 (in 0.12 step) can be selected.



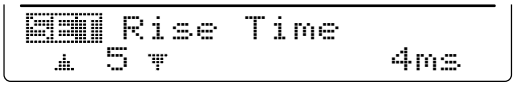
Keying weight example: Morse code "K"



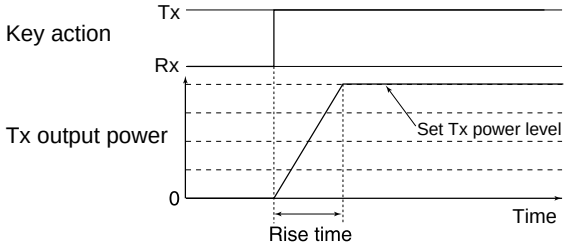
*SPACE and DOT length can be adjusted with [KEY SPEED] only.

5. Rise Time

This item set the envelop time period which the output power becomes the set transmit power.
• 2, 4, 6 or 8 msec. can be selected.

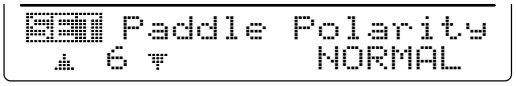


• **About rise time**



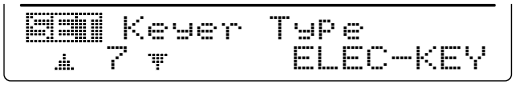
6. Paddle Polarity

This item sets the paddle polarity.
• Normal and reverse polarity can be selected.



7. Keyer Type

This item selects the keyer type for [ELEC-KEY] connector on the front panel.
• ELEC-KEY, BUG KEY and Straight key can be selected.

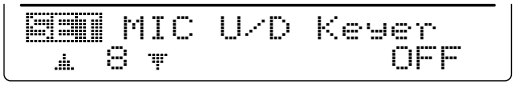


8. MIC U/D Keyer

This item allow you to set the microphone [UP]/[DN] keys to be used as a paddle.

ON	[UP]/[DN] switches can be used for CW.
OFF	[UP]/[DN] switches cannot be used for CW.

NOTE: When "ON" is selected, the frequency and memory channel cannot be changed using the [UP]/[DN] switches.



■ Operating RTTY (FSK)

Before operating RTTY, be sure to consult the manual that come with your TNC.

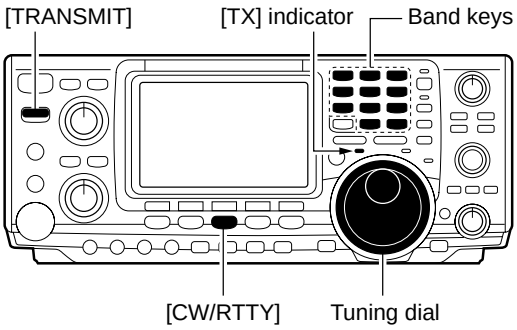
① Push a band key to select the desired band.
② Push [CW/RTTY] several times to select RTTY.
- After RTTY mode is selected, push [CW/RTTY] for 1 sec. to toggle RTTY and RTTY-R modes.

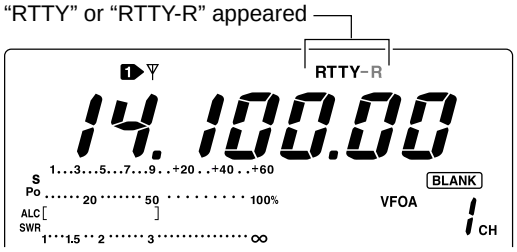
③ Rotate [AF] to set audio to a comfortable listening level.
④ Rotate the tuning dial to tune a desired signal.
- S-meter indicates received signal strength.
- If the received signal cannot be demodulated, try selecting RTTY-R mode.

⑤ Push [TRANSMIT] to set the transceiver to the transmit condition or transmit a SEND signal from your TNC.
- The TX indicator lights red.
- The Po meter indicates transmitted RTTY signal strength.

⑥ Operate the connected PC or TNC (TU) to transmit RTTY (FSK) signals.
- Adjust [MIC GAIN] at this step, if necessary.

⑦ Push [TRANSMIT] to return to receive.





◇ Convenient functions for receive

- **Preamp and attenuator** (p. 48)
  ➥ Push [P.AMP/ATT] several times to set the preamp OFF, preamp 1 ON or preamp 2 ON.
  - "P.AMP1," "P.AMP2" or "P.AMP" appears when the preamp 1, preamp 2 or preamp is set to ON, respectively. (depending on operating frequency band)

  ➥ Push [P.AMP/ATT] for 1 sec. to set the attenuator ON.
  - Push [P.AMP/ATT] momentarily to turn the attenuator OFF.
  - "ATT" appears when the attenuator is set to ON.

- **Noise blanker** (p. 51)
  ➥ Push [NB] to turn the noise blanker ON and OFF.
  - "NB" appears when the noise blanker is set to ON.
  - Push [NB] for 1 sec. to enter noise blanker set mode.

- **Noise reduction** (p. 53)
  ➥ Push [NR] to turn the noise reduction ON and OFF.
  - Rotate [NR] control to adjust the noise reduction level.
  - "NR" appears when the noise reduction is set to ON.

- **Twin PBT (passband tuning)** (p. 52)
  ➥ Rotate [TWIN PBT] controls (inner/outer).
  - Push [PBT C] to clear the settings.

- **AGC (auto gain control)** (p. 49)
  ➥ While M1 is selected with [MENU], push [F1 AGC] several times to select AGC F, AGC M, AGC S or AGC OFF.

- **¼ function** (p. 21)
  ➥ While M1 is selected with [MENU], push [F3 1/4] to turn the ¼ function ON and OFF.

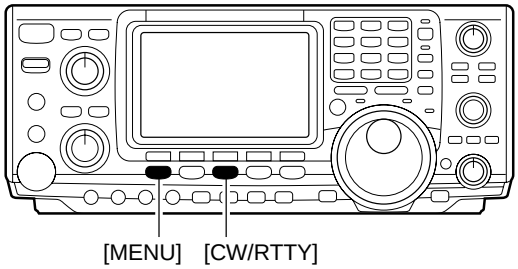
◇ Convenient functions for transmit

- **Transmit quality monitor** (p. 57)
  ➥ Push [MONITOR] to turn the monitor function ON and OFF.
  - "MONI" appears when the monitor function is set to ON.

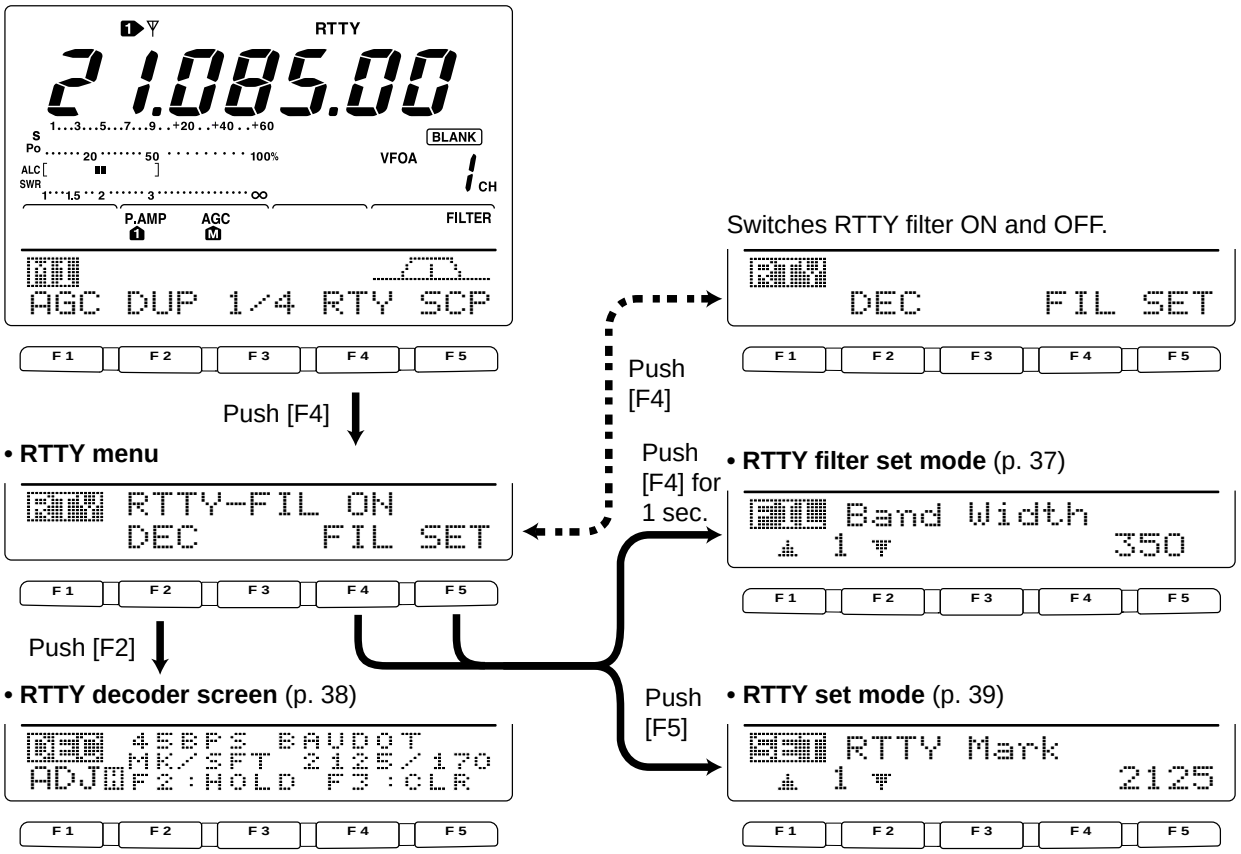
■RTTY functions

The transceiver has a number of convenient functions for the RTTY operation that can be accessed from the RTTY menu.

① Push [CW/RTTY] to select RTTY mode.
② Push [MENU] to select M1.
③ Push [F4 RTY] to select the RTTY menu.
④ Push one of the multi-function keys ([F2], [F4] or [F5]) to select an item in the RTTY menu. See the diagram below.
• Push [MENU] to return to the previous indication.



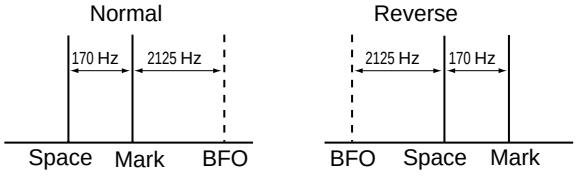
◇IN RTTY MODE



◇About RTTY reverse mode

Received characters are occasionally garbled when the receive signal is reversed between MARK and Space. This reversal can be caused by incorrect TNC connections, setting, commands, etc. To receive reversed RTTY signal correctly, select RTTY-R mode.

➥ While RTTY mode is selected, push [CW/RTTY] for 1 sec. to select the RTTY reverse mode.
• "RTTY-R" appears when the RTTY reverse mode is selected.
• Push [CW/RTTY] for 1 sec. again to select the normal RTTY mode.



◇RTTY filter/Twin peak filter

The transceiver has 5 RTTY filters in addition to normal IF filters. The passband width can be selected from 1 kHz, 500 Hz, 350 Hz, 300 Hz and 250 Hz. When the RTTY filter is turned ON, the RTTY tuning meter can be used.
Moreover, the twin peak filter changes the receive frequency response by boosting 2 particular frequencies (2125 and 2295 Hz) for better copying of desired RTTY signals.

•RTTY filter and twin peak filter setting

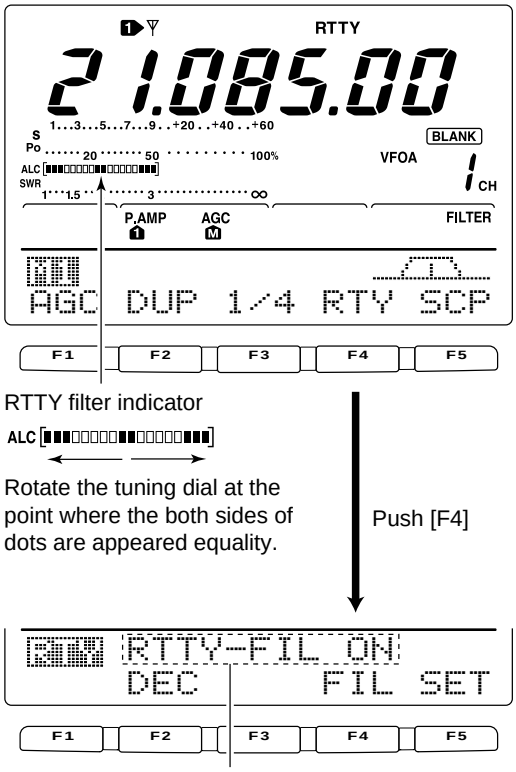
① Push [CW/RTTY] to select RTTY mode.
- After RTTY mode is selected, push [CW/RTTY] for 1 sec. to select RTTY-R mode.

② Push [MENU] several times to select M1.
③ Push [F4 RTY].
④ Push [F4 FIL] to turn the RTTY filter ON and OFF.
- When the RTTY filter is turned ON, the normal IF filter number indication (1, 2 or 3) disappear.

⑤ Push [F4 FIL] for 1 sec. to enter RTTY filter set mode (see below).
⑥ Push [F1▲] to select bandwidth item.
⑦ Rotate the tuning dial to select the RTTY filter width from 1 kHz, 500 Hz, 350 Hz, 300 Hz and 250 Hz.
- Push [F3] for 1 sec. to select a default value.

⑧ Push [F2 ▼] to select twin peak filter item.
- The received audio volume may become greater when the twin peak filter is turned ON.

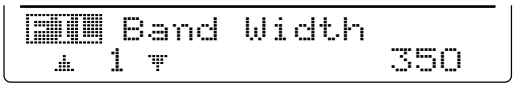
⑨ Rotate the tuning dial to turn the twin peak filter function ON and OFF.
⑩ Push [MENU] 2 times to return to M1.



•RTTY filter set mode

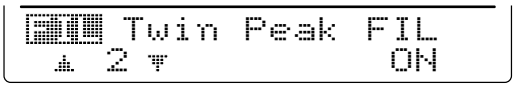
1. Band Width

This item sets the RTTY filter width.
- 250, 300, 350, 500 Hz and 1 kHz can be selected.



2. Twin Peak FIL

This item turn the twin peak filter ON and OFF.



◇RTTY decoder

The transceiver has an RTTY decoder for Baudot (mark freq.: 2125 Hz, shift freq.: 170 Hz, 45 bps).

An external terminal unit (TU) or terminal node connector (TNC) is not necessary for receiving a Baudot signal.

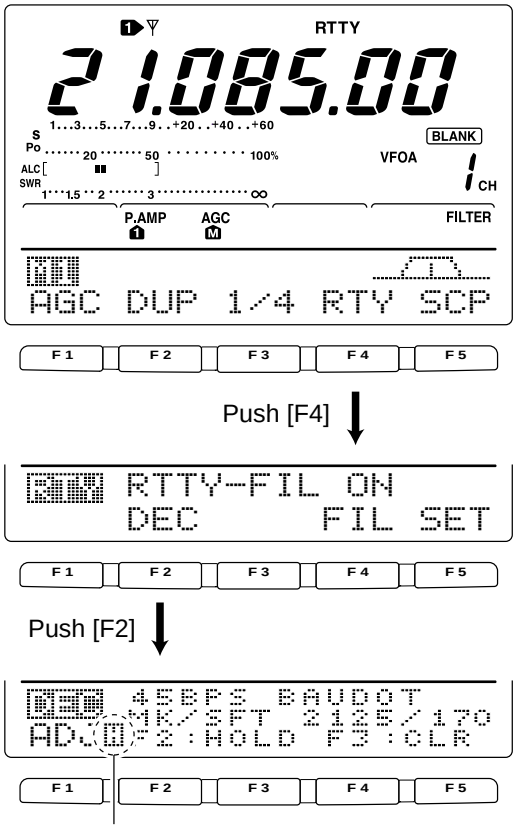
① Push [CW/RTTY] to select RTTY mode.
- After RTTY mode is selected, push [CW/RTTY] for 1 sec. to select RTTY-R mode.

② Push [MENU] several times to select M1.
③ Push [F4 RTY] to select RTTY menu.
④ Push [F4 FIL] to turn the RTTY filter ON.
- The RTTY decoder does not function when the RTTY filter is turned OFF.

⑤ Push [F2 DEC] to turn the RTTY decoder ON.
- RTTY decoder screen appears.

⑥ Push [F2] to freeze the current screen.
- "H" appears while the function is in use.

⑦ Push [F3] for 1 sec. to clear the displayed characters.
⑧ Push [MENU] to exit the RTTY decoder screen.



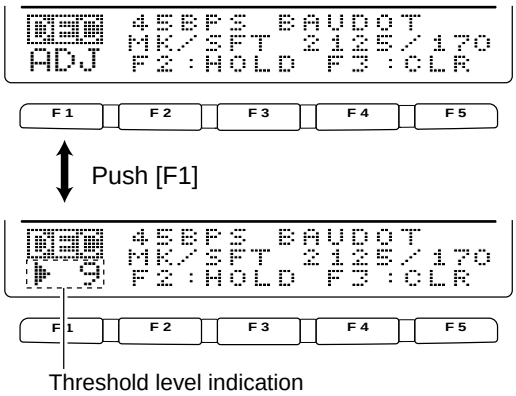
Appears while the RTTY decoder screen is freezed with [F2] operation.
Push [F3] to erase the displayed characters.

•Setting the decoder threshold level

Adjust the RTTY decoder threshold level if some characters are displayed when no signal is received.

① Call up the RTTY decoder screen as described at above.
② Push [F1 ADJ] to select the threshold level setting condition.
③ Rotate the tuning dial to adjust the RTTY decoder threshold level.
- Push [F3] for 1 sec. to select the default condition.

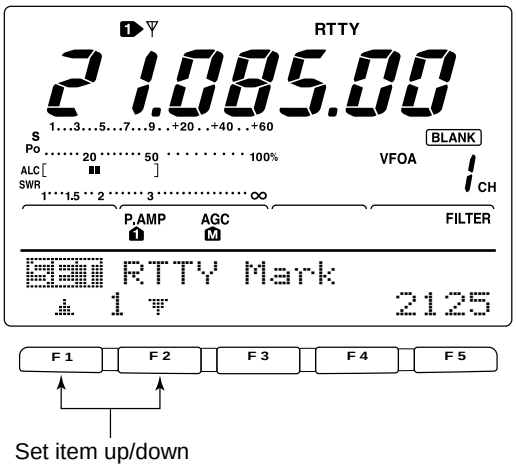
④ Push [MENU] to exit the RTTY decoder screen.



A number of indicating line, the UnShift On Space (USOS) function and new line code can be set in the RTTY set mode. (p. 39)

◇RTTY set mode

This set mode is used to set the mark and shift frequencies, keying type, decode USOS function, etc.



•Setting contents

① Push [MENU] to select M1, then push [F4 RTY] to select the RTTY menu.
② Push [F5 SET] to select RTTY set mode.
③ Push [F1▲] or [F2 ▼] to select the desired set item.
④ Set the desired condition using the tuning dial.
  •Push [F3] for 1 sec. to select a default condition or value.
⑤ Push [MENU] 2 times to return to M1.

1. RTTY Mark

Sets the mark frequency for RTTY operation.
•1275, 1615 and 2125 Hz are selectable.

SET RTTY Mark
1 2125

2. RTTY Shift

Sets the shift frequency for RTTY operation.
•170, 200 and 425 Hz are selectable.

SET RTTY Shift
2 170

3. RTTY Keying

Selects the keying polarity from normal and reverse.

NORMAL	Key open/close = Mark/Space
REVERSE	Key open/close = Space/Mark

SET RTTY Keying
3 NORMAL

4. Decode USOS

Turn the USOS (UnShift On Space) function ON/OFF

ON	Decode as letter code
OFF	Decode as character code

SET Decode USOS
4 ON

5. Decode New Line

Selects the new line code of the internal RTTY decoder.
CR: Carriage Return; LF: Line Feed

CR,LF,CR+LF	CR, LF and CR+LF
CR+LF	CR+LF only

SET Decode New Line
5 CR,LF,CR+LF

6. Decode Screen

Selects a number of the decoder indication from 2 line and 3 line.

SET Decode Screen
6 3line

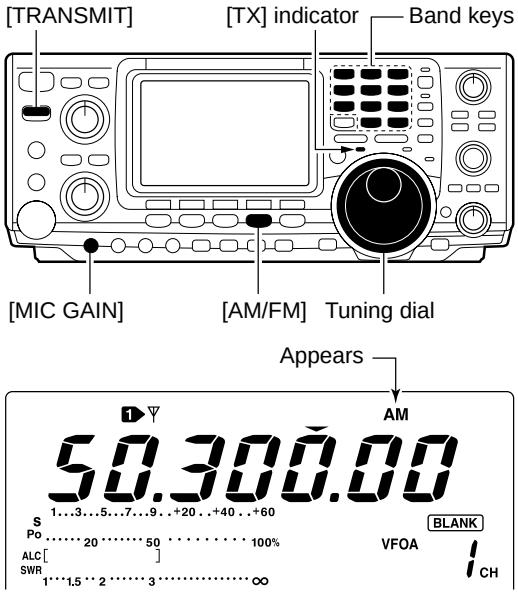
■ Operating AM

① Push a band key to select the desired band.
② Push [AM/FM] to select AM.
③ Rotate [AF] to set audio to a comfortable listening level.
④ Rotate the tuning dial to tune a desired signal.
- S-meter indicates received signal strength.
- The default tuning step for AM mode is 1 kHz; this can be changed using tuning step program mode. (p. 21)

⑤ Push [TRANSMIT] or [PTT] (microphone) to transmit.
- The TX indicator lights red.

⑥ Speak into the microphone at your normal voice level.
- Adjust [MIC GAIN] at this step, if necessary.

⑦ Push [TRANSMIT] or release [PTT] (microphone) to return to receive.



◇ Convenient functions for receive

- **Preamp and attenuator** (p. 48)
  ➥ Push [P.AMP/ATT] several times to set the preamp OFF, preamp 1 ON or preamp 2 ON.
  - "P.AMP1," "P.AMP2" or "P.AMP" appears when the preamp 1, preamp 2 or preamp is set to ON, respectively. (depending on operating frequency band)

  ➥ Push [P.AMP/ATT] for 1 sec. to set the attenuator ON.
  - Push [[p.AMP/ATT] momentarily to turn the attenuator OFF.
  - "ATT" appears when the attenuator is set to ON.

- **Noise blanker** (p. 51)
  ➥ Push [NB] to turn the noise blanker ON and OFF.
  - "NB" appears when the noise blanker is set to ON.
  - Push [NB] for 1 sec. to enter noise blanker set mode.

- **Noise reduction** (p. 53)
  ➥ Push [NR] to turn the noise reduction ON and OFF.
  - Rotate [NR] control to adjust the noise reduction level.
  - "NR" appears when the noise reduction is set to ON.

- **Auto notch filter** (p. 53)
  ➥ Push [A/NOTCH] to turn the auto or manual notch filter ON and OFF.
  - Rotate [NOTCH] control to set attenuate frequency for manual notch operation.

- **IF shift** (p. 52)
  ➥ Rotate [TWIN PBT] controls (inner only).
  - Push [PBTC] to clear the settings.

- **AGC (auto gain control)** (p. 49)
  ➥ While M1 is selected with [MENU], push [F1 AGC] several times to select AGC F, AGC M, AGC S or AGC OFF.

- **VSC (voice squelch control)** (p. 00)
  ➥ While M2 is selected with [MENU], push [F5 VSC] to turn the VSC function ON and OFF.
  - The VSC indicator appears when the voice squelch function is set to ON.

◇ Convenient functions for transmit

- **Speech compressor** (p. 58)
  ➥ While M1 is selected with [MENU], push [F3 CMP] to turn the speech compressor ON and OFF.
  - "COMP" appears when the speech compressor is set to ON.

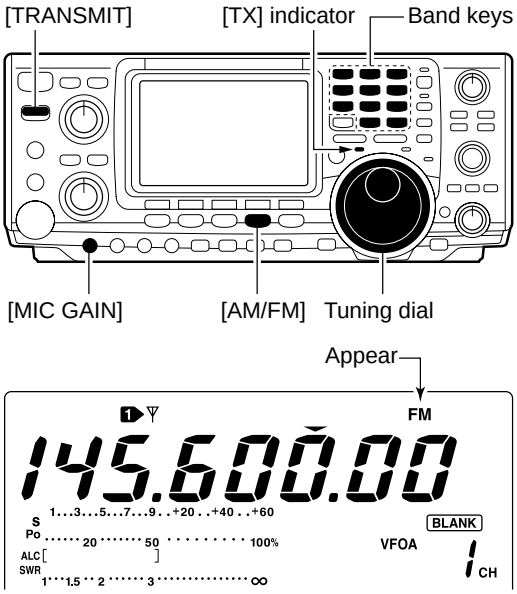
- **VOX (voice operated transmit)** (p. 54)
  ➥ Push [VOX/BK-IN] to turn the VOX function ON and OFF.
  - "VOX" appears when the VOX function is set to ON.

- **Transmit quality monitor** (p. 57)
  ➥ Push [MONITOR] to turn the monitor function ON and OFF.
  - "MONI" appears when the monitor function is set to ON.

- **Audio tone control** (p. 88)
  ➥ While M2 is selected with [MENU], push [F4 TCN], select an item with [F1 ▲] and [F2 ▼] then rotate the tuning dial to adjust the audio tone.

■ Operating FM

① Push a band key to select the desired band.
② Push [AM/FM] to select FM.
③ Rotate [AF] to set audio to a comfortable listening level.
④ Rotate the tuning dial to tune a desired signal.
 • S-meter indicates received signal strength.
⑤ Push [TRANSMIT] or [PTT] (microphone) to transmit.
 • The TX indicator lights red.
⑥ Speak into the microphone at your normal voice level.
 • Adjust [MIC GAIN] at this step, if necessary.
⑦ Push [TRANSMIT] or release [PTT] (microphone) to return to receive.



◇ Convenient functions for receive

• **Preamp and attenuator** (p. 48)
 ➥ Push [P.AMP/ATT] several times to set the preamp OFF, preamp 1 ON or preamp 2 ON.
  • "P.AMP1," "P.AMP2" or "P.AMP" appears when the preamp 1, preamp 2 or preamp is set to ON, respectively. (depending on operating frequency band)
 ➥ Push [P.AMP/ATT] for 1 sec. to set the attenuator ON.
  • Push [[p.AMP/ATT] momentarily to turn the attenuator OFF.
  • "ATT" appears when the attenuator is set to ON.

• **Noise blanker** (p. 51)
 ➥ Push [NB] to turn the noise blanker ON and OFF.
  • "NB" appears when the noise blanker is set to ON.
  • Push [NB] for 1 sec. to enter noise blanker set mode.

• **Noise reduction** (p. 53)
 ➥ Push [NR] to turn the noise reduction ON and OFF.
  • Rotate [NR] control to adjust the noise reduction level.
  • "NR" appears when the noise reduction is set to ON.

• **Auto notch filter** (p. 53)
 ➥ Push [A/NOTCH] to turn the auto or manual notch filter ON and OFF.
  • Rotate [NOTCH] control to set attenuate frequency for manual notch operation.

• **VSC (voice squelch control)** (p. 00)
 ➥ While M2 is selected with [MENU], push [F5 VSC] to turn the VSC function ON and OFF.
  • The VSC indicator appears when the voice squelch function is set to ON.

◇ Convenient functions for transmit

• **Speech compressor** (p. 58)
 ➥ While M1 is selected with [MENU], push [F3 CMP] to turn the speech compressor ON and OFF.
  • "COMP" appears when the speech compressor is set to ON.

• **VOX (voice operated transmit)** (p. 54)
 ➥ Push [VOX/BK-IN] to turn the VOX function ON and OFF.
  • "VOX" appears when the VOX function is set to ON.

• **Transmit quality monitor** (p. 57)
 ➥ Push [MONITOR] to turn the monitor function ON and OFF.
  • "MONI" appears when the monitor function is set to ON.

• **Audio tone control** (p. 88)
 ➥ While M2 is selected with [MENU], push [F4 TCN], select an item with [F1 ▲] and [F2 ▼] then rotate the tuning dial to adjust the audio tone.

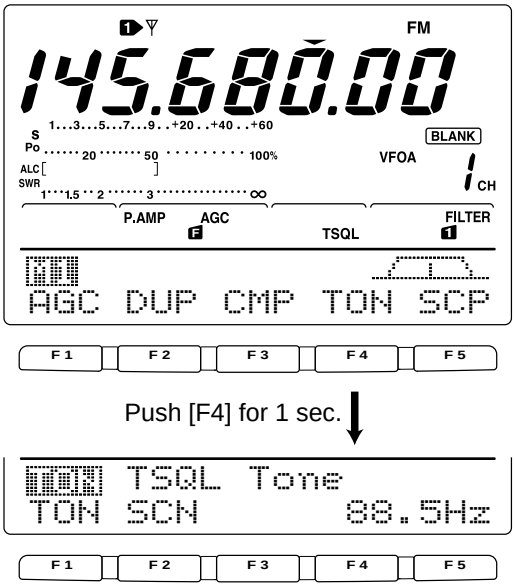
◇Tone squelch operation

Tone squelch operation is a method of communications using selective calling. Only received signal having a matching tone will open the squelch. Before communicating using tone squelch, all members of your party must agree on the tone squelch frequency to use.

① Push [AM/FM] to select FM mode.
② Push [MENU] several times to select M1.
③ Push [F4 TON] several times to turn the tone squelch function ON.
 • "TSQL" appears
④ Push [F4 TONE] for 1 sec. to enter tone frequency set mode.
⑤ Push [F1 TON] several times until TSQL Tone appears, if necessary.
⑥ Rotate the tuning dial to select the desired tone squelch frequency.
 • Push [F3] for 1 sec. to select the default frequency.
⑦ Push [MENU] to return to M1.
⑧ Communicate in the usual manner.

• Available tone squelch frequencies (Unit: Hz)

67.0	85.4	107.2	136.5	165.5	186.2	210.7	254.1
69.3	88.5	110.9	141.3	167.9	189.9	218.1	
71.9	91.5	114.8	146.2	171.3	192.8	225.7	
74.4	94.8	118.8	151.4	173.8	196.6	229.1	
77.0	97.4	123.0	156.7	177.3	199.5	233.6	
79.7	100.0	127.3	159.8	179.9	203.5	241.8	
82.5	103.5	131.8	162.2	183.5	206.5	250.3	



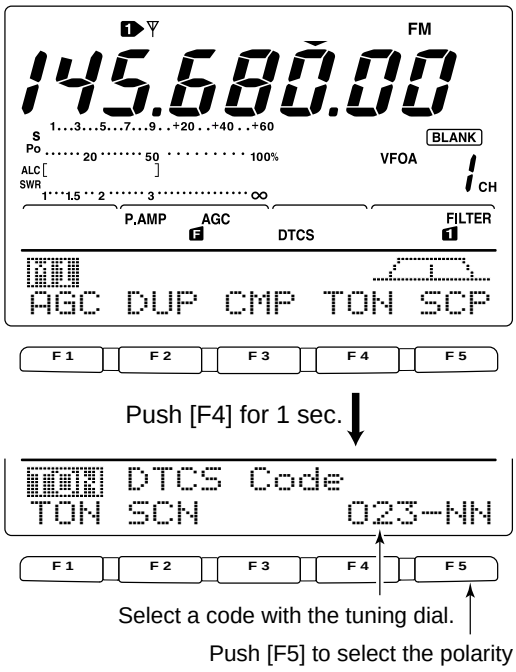
◇DTCS operation

DTCS function is an another method of communications using selective calling. Only received signal having a matching 3-digit code will open the squelch.

① Push [AM/FM] to select FM mode.
② Push [MENU] several times to select M1.
③ Push [F4 TON] several times to turn the DTCS function ON.
 • "DTCS" appears
④ Push [F4 TON] for 1 sec. to enter tone frequency set mode.
⑤ Push [F1 TON] several times until DTCS Code appears, if necessary.
⑥ Rotate the tuning dial to select the desired DTCS code number and push [F5] to select the desired code polarity.
 NN : Normal polarity is used for both transmit and receive.
 NR : Normal polarity is used for transmit, reversed polarity is used for receive.
 RN : Reversed polarity is used for transmit, normal polarity is used for receive.
 RR : Reversed polarity is used for both transmit and receive.
 • Push [F3] for 1 sec. to select the default code and polarity.
⑦ Push [MENU] to return to M1.
⑧ Communicate in the usual manner.

• Available tone codes

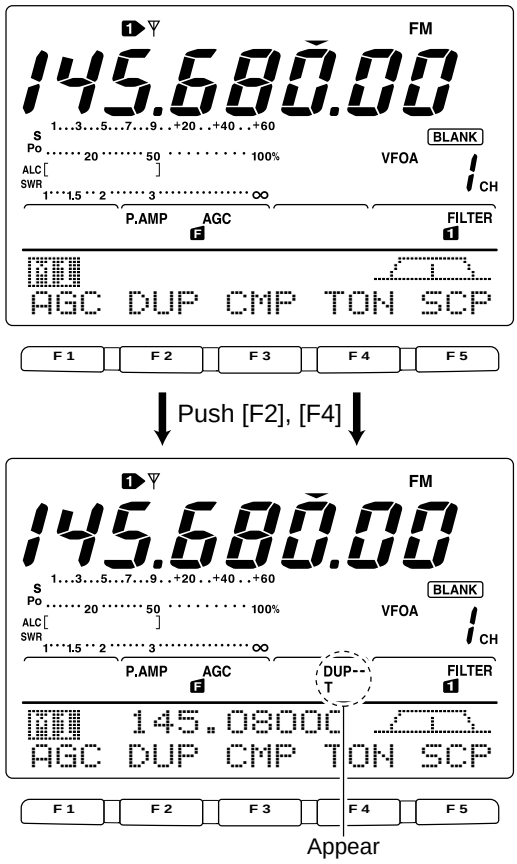
023	072	152	244	311	412	466	631
025	073	155	245	315	413	503	632
026	074	156	246	325	423	506	654
031	114	162	251	331	431	516	662
032	115	165	252	332	432	523	664
036	116	172	255	343	445	526	703
043	122	174	261	346	446	532	712
047	125	205	263	351	452	546	723
051	131	212	265	356	454	565	731
053	132	223	266	364	455	606	732
054	134	225	271	365	462	612	734
065	143	226	274	371	464	624	743
071	145	243	306	411	465	627	754



■ Repeater operation

A repeater amplifies received signals and retransmits them at a different frequency. When using a repeater, the transmit frequency is shifted from the receive frequency by an offset frequency. A repeater can be accessed using split frequency operation with the shift frequency set to the repeater's offset frequency.

① Push a band key to select the desired band.
② Push [A/B] to select VFO A.
③ Push [AM/FM] to select FM.
 • Pushing [AM/FM] toggles between AM and FM.
④ Rotate the tuning dial to set the repeater transmit frequency.
⑤ While M1 is selected, push [F2 DUP] several times to set the offset direction.
 • "DUP–" or "DUP+" appears
 • 0.100 MHz for HF, 0.500 MHz for 50 MHz and 0.600 MHz for 144 MHz band is set by default in set mode. (p. 82)
⑥ Push [F4 TON] to turn the repeater tone ON.
 • "T" appears.
 • Set the tone frequency in tone frequency set mode in advance, if desired. (p. 45) 88.5 Hz is set by default.
 To transmit a 1750 Hz European repeater tone, push [F4 TON] while transmitting.
⑦ Communicate in the normal way.

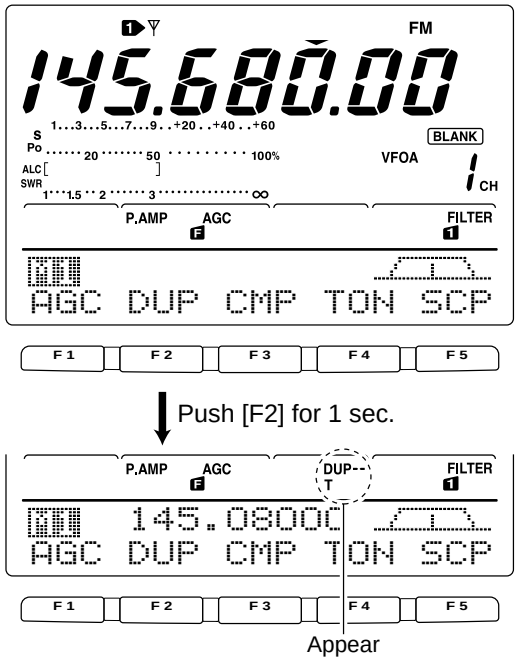


◇ One-touch repeater function

This function allow you to set repeater operation with push of one switch.

➥ To set the transceiver for repeater operation using the one-touch repeater function, follow the steps ① to ④ as above, then push [F2 DUP] for 1 sec.

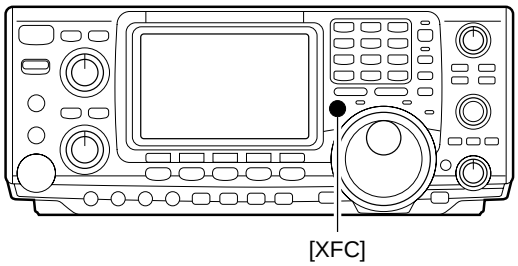
Set the offset shift direction and frequency in advance (p. 82) as well as the tone frequency (see p. 45).



◇Transmit frequency monitor check

You may be able to receive the other party's transmit signal directly without having to go through a repeater. This function allows you to check this.

➥While receiving, push and hold [XFC] to see if you can receive the other party's transmit signal directly.
- While holding [XFC], the offset direction and frequency are displayed on the multi-function switch indicator.

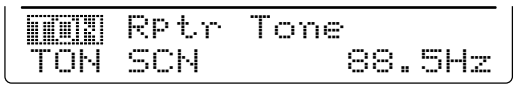


◇Repeater tone frequencies

The transceiver's repeater tone frequency is set to 88.5 Hz by default. This can be changed if desired.

① While M1 is selected, push [F4 TON] to turn the tone encoder ON.
- "T" appears.

② Push [F4 TON] for 1 sec. to select the tone frequency set mode.
③ Push [F1 TON] several times to select Rptr Tone, if necessary.
④ Rotate the tuning dial to select the desired frequency. (see the table at right)
⑤ Push [MENU] to return to M1.



• Available tone frequencies (Unit: Hz)

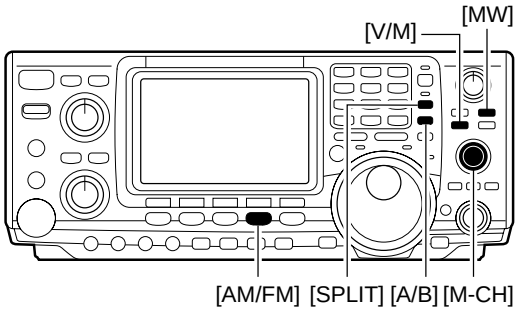
67.0	85.4	107.2	136.5	165.5	186.2	210.7	254.1
69.3	88.5	110.9	141.3	167.9	189.9	218.1	
71.9	91.5	114.8	146.2	171.3	192.8	225.7	
74.4	94.8	118.8	151.4	173.8	196.6	229.1	
77.0	97.4	123.0	156.7	177.3	199.5	233.6	
79.7	100.0	127.3	159.8	179.9	203.5	241.8	
82.5	103.5	131.8	162.2	183.5	206.5	250.3	

◇Storing a non standard repeater

① Turn the auto repeater function OFF in the set mode. (p. 83)
② Push [AM/FM] to select FM mode.
③ Push [V/M], then [A/B] to select VFO A.
④ Rotate the tuning dial to set the repeater output frequency.
- Set the tuning step if desired.

⑤ Push [A/B] to select VFO B.
⑥ Rotate the tuning dial to set the repeater input frequency.
⑦ Push [A/B] to select VFO A.
⑧ Push [SPLIT] to turn the split function ON.
⑨ Push [F4 TON] to turn the previously set tone encoder ON.
⑩ Rotate [M-CH] to select the desired memory channel.
- "BLANK" appears when blank channel is selected.

⑪ Push [MW] for 1 sec. to store the contents in the selected memory channel.



◇ Auto repeater function

This function automatically activates the repeater settings (DUP– or DUP+ and/or tone encoder ON/OFF) when the operating frequency falls within the general repeater output frequency range and deactivates them when outside of the range.

Set the auto repeater function ON-1 or ON-2 in set mode in advance (p. 83). When set ON-1 or ON-2, repeater settings are automatically activated according to the table below.

ON-1 automatically set the duplex setting and ON-2 automatically sets the duplex setting and tone encoder automatically.

• Frequency range and offset direction

FREQUENCY RANGE	DUPLEX DIRECTION
145.200–145.495 MHz	minus duplex
146.610–146.995 MHz	minus duplex
147.000–147.395 MHz	plus duplex