ICOM

ADVANCED MANUAL

HF TRANSCEIVER

# IC-78


Icom Inc.

Thank you for choosing this Icom product. This product is designed and built with Icom' s state of the art technology and craftsmanship. With proper care, this product should provide you with years of troublefree operation.

## ABOUT THE MANUALS

You can use the following manuals to understand and operate this transceiver. (As of March 2024)

**TIP:** You can download each manual and guide from the Icom website.
https://www.icomjapan.com/support/
Enter "IC-78" into the Search box in the site.

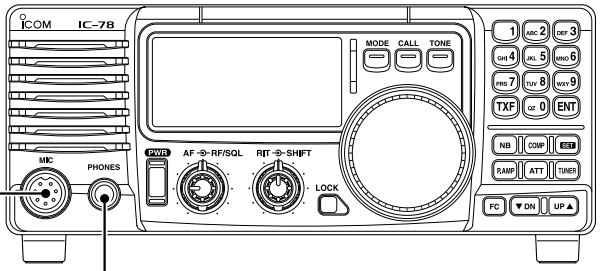
- **Basic manual (Comes with the transceiver)**
  Instructions for basic operations.

- **Advanced manual (This manual)**
  Instructions for advanced operations.

## TRADEMARKS

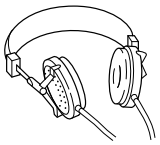
# Section 1 ADVANCED CONNECTIONS

## ◇ Front panel

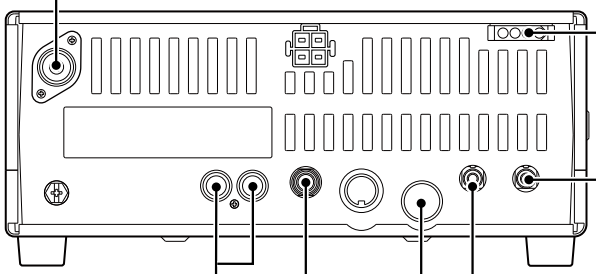



**[MIC]**
AFSK modulation signal input (p. 3-13)

**[PHONES]**
Headphones

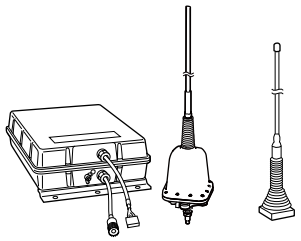


## ◇ Rear panel

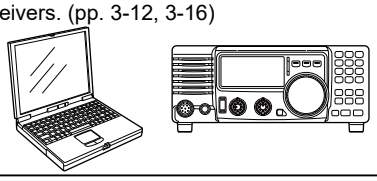


**[ANT]**
Connect an antenna, linear amplifier, and so on.

**[TUNER]**
Connect the control cable from an optional automatic antenna tuner such as the AT-130, AT-140, AH-730, or AH-740. (p. 4-4)

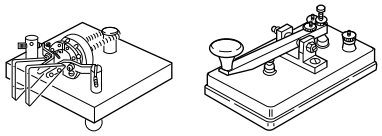


**[REMOTE]**
Connect a device for remotely controlling the transceiver or cloning operation between transceivers. (pp. 3-12, 3-16)

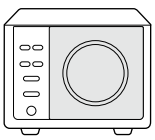


**[ALC], [SEND]**
Connect a non-Icom linear amplifier. (p. 5-4)

**[KEY]**
Connect an external electronic keyer.
Set “Key Type” in the Initial Setup mode, according to the keyer type. (p.3-10)



**[EXT SP]**
Connect an external speaker.



**[ACC]**
Connect control lines for external devices such as a TNC or PC. (pp. 3-12, 3-13)
Refer to the external device’s manual for connection.

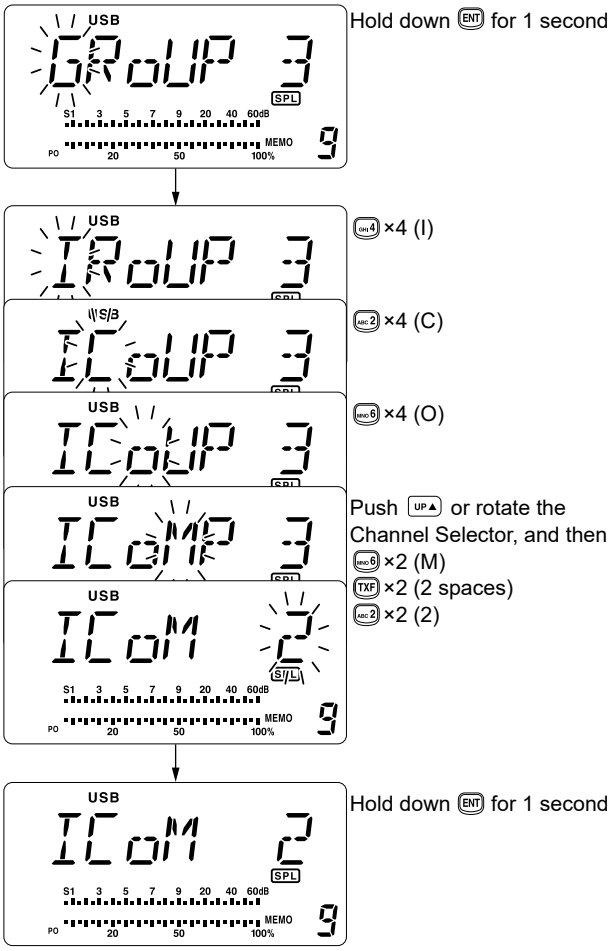
# Section 2 MEMORY CHANNEL OPERATIONS

## Entering a channel name

You can enter a channel name of up to 8 characters for each Memory channel. This provides easy recognition of channel use or the station name.

1. Select a channel by pushing [UP▲] or [▼DN], rotating the Channel Selector, or using the Keypad.
2. Push [FC] to select a Memory name display, if necessary.
3. Hold down [ENT] for 1 second to enter the Memory channel name entry mode.
   • The first digit blinks.
4. Push Keypad keys to enter the desired characters. (See the chart below.)
   ⓘ Push [UP▲] or [▼DN], or rotate the Channel Selector to move the cursor to select the next character, or to change the digit.
5. Hold down [ENT] for 1 second to save the channel name.

**Channel name programming example:**




**Assignable characters with the Keypad**

| KEY | Assignable characters | KEY | Assignable characters | KEY | Assignable characters |
|---|---|---|---|---|---|
| 1 | (1), (space), (’), ( ( ), ) ( ), (*), (+), (–), (/), (<), (=), (>), (@) | ABC 2 | (2), (A), (B), (C) | DEF 3 | (3), (D), (E), (F) |
| | | JKL 5 | (5), (J), (K), (L) | MNO 6 | (6), (M), (N), (O) |
| GHI 4 | (4), (G), (H), (I) | TUV 8 | (8), (T), (U), (V) | WXY 9 | (9), (W), (X), (Y) |
| PRS 7 | (7), (P), (R), (S) | TXF | (space w/change digit) | QZ 0 | (0), (Q), (Z) |

# Section 3 ADVANCED OPERATIONS

## RF gain and Squelch

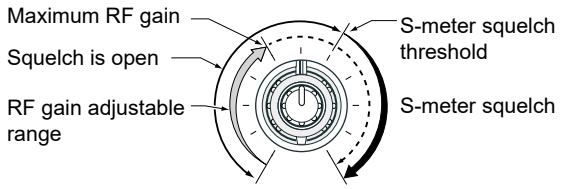
The [RF/SQL] control adjusts either the RF gain or the squelch. The action depends on the operating mode and the condition of the RF/SQL item in the Initial Set mode.

**[RF/SQL] control priority**

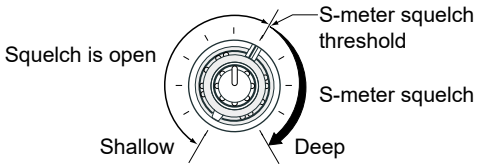
| Set mode setting | Mode | |
|---|---|---|
| | SSB, CW, RTTY | AM |
| rS (RF/SQL) | RF/SQL | RF/SQL |
| At (Auto) | RF gain | SQL * |
| Sq (SQL) (Default) | SQL* | SQL * |

* The RF gain is set to maximum level when the [RF/SQL] is set as [SQL] control.

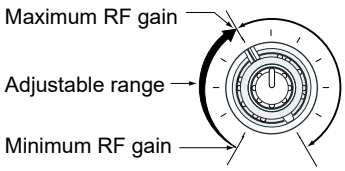
• As the [RF/SQL] control




• As the [SQL] control




• As the [RF] control




The RF gain is used to adjust the receiver gain. Shallow rotation moves the S-meter to the right indicating the signal strength which can be received.

**NOTE:** Setting the RF gain to the 12 o'clock position is recommended because the RF gain will be set to the maximum.

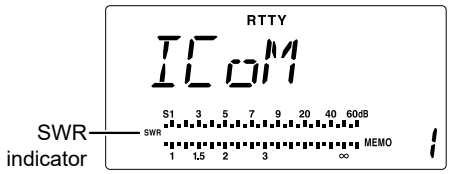
The Squelch removes noise output from the speaker (closed condition) when no signal is received.
The squelch is available for the other modes.

• A segment is displayed in the S-meter to indicate the S-meter squelch level.

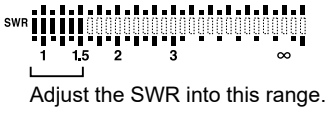
## Measuring SWR

The IC-78 has a built-in circuit to measure antenna SWR.
No external equipment or special adjustments are necessary.

1. Confirm that the output power is over 30 W.
2. Push [SET] to display the SWR meter.
   • "SWR" is displayed.




3. Push [MODE] to select the CW or RTTY mode.
4. Push down the Key or push [PTT] to transmit, and then read the actual SWR from the meter.
   • ≤ 1.5: Well matched antenna.
   • > 1.5: Check the antenna or the cable connection, and so on.

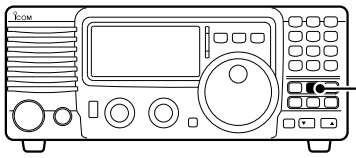


## Microphone Compressor

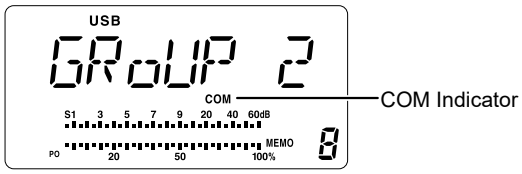
IC-78 has a built-in, low distortion Microphone compressor circuit.
This circuit increases your average talk power in the SSB mode and is especially useful when the receiving station is having difficulty copying your signal.

**Using the Microphone Compressor function**

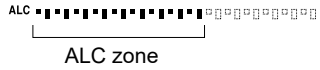
1. Select the USB or LSB mode. (Example: USB)
2. Push [COMP] to turn ON the microphone compressor.




ⓘ "COM" is displayed while the function is ON.




3. Push [SET] until the ALC meter is displayed.
   ⓘ Pushing [SET] toggles the meter to Po, SWR, ALC.
4. While speaking into the microphone at your normal voice level, rotate Channel Selector to adjust the Speech Compressor level to where the ALC meter reads within the ALC zone.



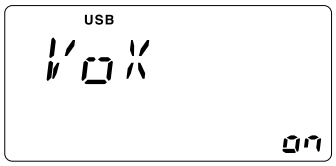

ⓘ If the ALC meter peak exceed the ALC zone, re-adjust the Microphone gain. Otherwise, your transmitted voice may be distorted.
ⓘ Be sure that the microphone gain is in the range of 20 to 50.

## VOX function

The Voice-operated Transmission (VOX) function switches between transmit and receive with your voice. This function enables hands-free operation.

**Setting the VOX function**

1. Hold down [SET] for 1 second to enter the Quick Set mode.
2. Push [UP▲] or [▼DN] to select "VOX."
3. Rotate Channel Selector to turn the VOX function ON.




4. Push [UP▲] or [▼DN] to select "VOX GAIN."
5. While speaking at your normal voice level, rotate Channel Selector to adjust the VOX gain until the transceiver transmits.
6. Push [UP▲] or [▼DN] to select "VOX Delay."
7. While speaking at your normal voice level, rotate Channel Selector to adjust the VOX delay as desired.
8. Push [UP▲] or [▼DN] to select "Anti VOX" (AN-VOX).
9. Adjust the Anti VOX level to prevent unwanted VOX activation from the speaker or other sounds.
10. Push [SET] to exit the Quick Set mode.

# Optional external tuner operation

## ◇ Optional external tuner operation

⚠ **DANGER HIGH VOLTAGE! NEVER** touch the antenna element while tuning or transmitting. Always place it in a secure place.

**CAUTION: DO NOT** operate the external antenna tuner without an antenna connected. The tuner and transceiver will be damaged.

**NEVER** operate the external antenna tuner if it is not grounded.

**NOTE:** Transmitting before tuning may damage the transceiver. The AT-130, AT-140 and AH-4 cannot tune when using a ½ λ long wire or multiple of the operating frequency.

### AT-130, AT-140, AH-4 and AH-730

The AT-130, AT-140, AH-4 and AH-730 matches the IC-78 to a long wire antenna more than 7 m/23 ft long (3.5 MHz and above).

- See page 4-4 for connection details.
- See also the antenna tuner's instruction manual for installation and connection details.

### AH-740

The optional AH-740 covers 2.5 to 30 MHz range with a supplied whip antenna element. Or when using with the optional NVIS kit, it covers 2.2 to 30 MHz range.

- See page 4-4 for connection details.
- See the AH-740 instruction manual for the installation and connection details.

### Tuner operation

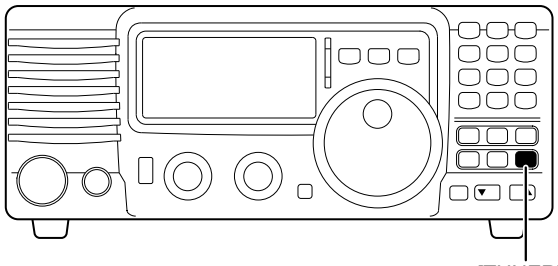
**NOTE:** Antenna tuning is necessary for each frequency.
Retune the antenna before transmitting when you change the frequency, even slightly.

### Setting the tuner type

1. Hold down [PWR] for 1 second to turn OFF the transceiver.
2. While holding down [SET], push [PWR] to enter the Initial Set mode.
3. Push [UP▲] or [▼DN] to select "TUNER."
4. Rotate Channel Selector to select a tuner type, according to the connected antenna tuner.
   - no: No antenna tuner is selected.
   - 4: AT-140, AH-4, AH-730, or AH-740
   - 12: AT-120 (discontinued)
   - 13: AT-130
5. Hold down [PWR] for 1 second to turn OFF the transceiver.
6. Push [PWR] to turn ON with the new setting.

### Manual tuning

1. Set the operating frequency an HF band.
   - The transceiver will not transmit outside the ham bands.
2. Hold down [TUNER] for 1 second to start a manual tuning.

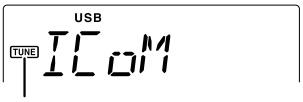


[TUNER]

- "TUNE" blinks and "CW" is displayed while tuning.
- "TUNE" is continuously displayed when the tuning has been completed.

ⓘ When the tuning has not been successful, "TUNE" disappears and the antenna tuner is passed through.

ⓘ To manually bypass the antenna tuner, push [TUNER] to turn it OFF.

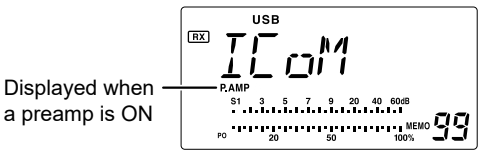



Tuning indicator
- Blinks while tuning.
- Displayed when the tuning is completed.
- Disappears when the tuning could not be completed.

## Preamplifiers

The preamplifier amplifies received signals in the front end circuit to improve the S/N ratio and sensitivity.
Turn this function ON when receiving weak signals.
ⓘ The preamplifier functions under 1.6 MHz bands, however, the sensitivity may be reduced.

1. Select the operating band.
2. Push [P.AMP] to turn the preamplifier ON or OFF.
   • "P.AMP" is displayed when the function is ON.

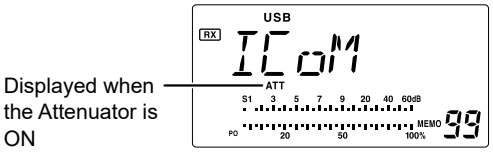



**NOTE:** When you use the preamp while receiving strong signals, the receiving signal may be distorted. In such case, turn OFF the preamp.

## Attenuator

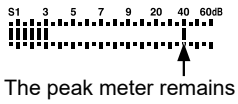
The Attenuator prevents a desired signal from becoming distorted when a very strong signal is near the frequency, or when a very strong electric field, such as from a broadcasting station, is near your location.
ⓘ Each band memorizes the Attenuator setting.

1. Select the operating band.
2. Push [ATT] to turn the 20 dB attenuator ON or OFF.
   • "ATT" is displayed when the function is ON.




## Meter peak hold

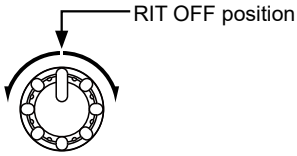
The meter peak hold function keeps the highest displayed bar segment in any meter function for about 0.5 seconds so that you can read the meter indication easier.
This function can be turned ON or OFF in the Initial Set mode.




## RIT function

The Receiver Incremental Tuning (RIT) function compensates for differences in frequencies of other stations.
The function shifts your receive frequency up to ±1.2 kHz without shifting the transmit frequency.

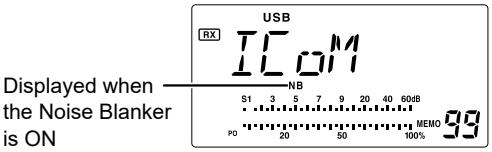
1. Rotate the [RIT] control to set the RIT frequency to match the received station's transmit frequency.
   • "RIT" is displayed while RIT frequency is set.
   • The transmit frequency on the screen does not change.
2. To cancel the RIT function, rotate [RIT] to the 12 o'clock position.
   • "RIT" disappears.




## Noise Blanker

The Noise Blanker eliminates pulse-type noise, such as the noise from car ignitions.

- Push [NB] to turn the Noise Blanker ON or OFF.
  • "NB" is displayed while the Noise Blanker function is ON.




**Adjusting the Noise Blanker level**

1. Hold down [NB] for 1 second to enter the Noise Blanker level set mode.
2. Rotate Channel Selector to adjust the Noise Blanker level.
3. Push [NB] to exit the set mode.

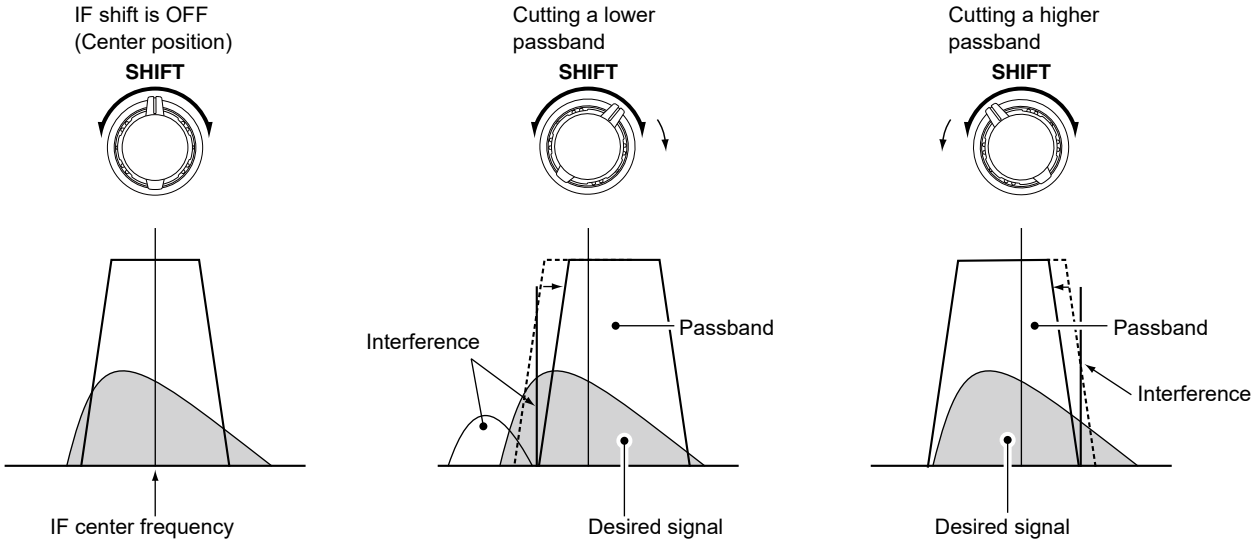
**NOTE:**
- When using the Noise Blanker, received signals may be distorted if they are excessively strong, or the noise is other than a pulse type. In that case, turn OFF the Noise Blanker.
- You can turn the Noise Blanker function in the AM mode ON or OFF in the Initial set mode.

# IF Shift function

The IF Shift function electronically narrows the passband frequency of the intermediate frequency (IF) and cuts out higher or lower frequency components of the IF to reject interference.
The function shifts the IF frequency up to ±1.2 kHz in the SSB/CW/RTTY modes and up to ±250 Hz in the CW-narrow/RTTY narrow modes.
The IF shift is not selectable in the AM mode.

***IF shift operation example:***

- Adjust the [SHIFT] control for minimum interference.
- When IF shift is used, the audio tone may change.
- Set the IF shift control to the center position when there is no interference.



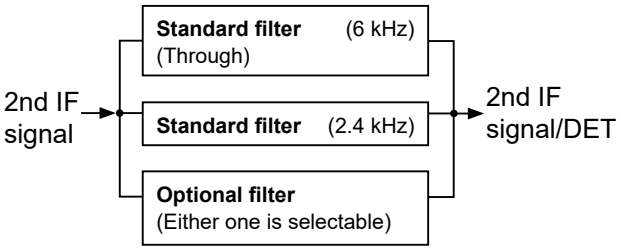
# Selecting the IF filter

The filter selection adjusts the IF bandpass width, as shown to the right.
ⓘ Each operating mode memorizes the IF filter setting.

1. Select the desired mode with the mode keys.
2. Hold down [SET] for 1 second to enter the Quick Set mode.
3. Push [UP▲] or [▼DN] to select “FILTER.”
4. Rotate the Channel Selector to select a desired filter combination.
   - **W** or **N** is not displayed when using the Normal (standard) IF filter.
   - **W** is displayed when the Wide IF filter is selected.
   - **N** is displayed when the Narrow IF filter is selected.
5. Push [SET] for 1 second to exit the Quick Set mode.

| Filter | | Band width | Mode |
|---|---|---|---|
| Standard | | 6 kHz | SSB/CW/RTTY: Wide<br>AM: Normal |
| | | 2.4 kHz | SSB/CW/RTTY: Normal<br>AM: Narrow |
| Optional | 52A | 500 Hz/–6dB | CW/RTTY: Narrow |
| | 53A | 250 Hz/–6dB | CW/RTTY: Narrow |
| | 96 | 2.8 kHz/–6dB | SSB: Wide |
| | 222 | 1.8 kHz/–6dB | SSB: Narrow |
| | 257 | 3.3 kHz/–6dB | SSB: Wide |

**Filter image**




**Filter selection table** (Unit: Hz)

| Mode | Filter width | Expanded filter | Optional filter | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | None | 52A | 53A | 96 | 222 | 257 |
| SSB | WIDE | OFF | – | | | 2.8 k | – | 3.3 k |
| | | ON | 6 k | | | | | |
| | NORMAL | OFF/ON | 2.4 k | | | | | |
| | NARROW | OFF | – | | | | 1.8 k | – |
| | | ON | – | 500 | 250 | – | | |
| CW RTTY | WIDE | OFF | – | | | 2.8 k | – | 3.3 k |
| | | ON | 6 k | | | | | |
| | NORMAL | OFF/ON | 2.4 k | | | | | |
| | NARROW | OFF/ON | – | 500 | 250 | – | 1.8 k | – |
| AM | WIDE | OFF/ON | – | | | | | |
| | NORMAL | OFF/ON | 6 k | | | | | |
| | NARROW | OFF | 2.4 k | | | | | |
| | | ON | 2.4 k | 500 | 250 | 2.8 k | 1.8 k | 3.3 k |

ⓘ To use the filters marked with , you must set the short-pin on the main board.
Refer to the next page and set the short-pin to the position according to your desired filter width.

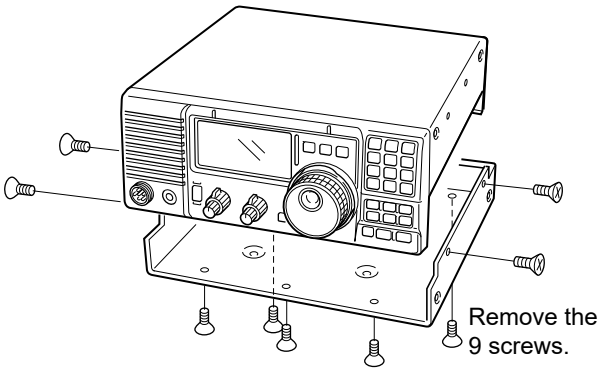
## Selecting the IF filter

Choose the appropriate filter for your operating needs.
To use an Optional filter, you need the following steps:
- Set an IF bandpass width by replacing the short-pin on the main board.
- Select the proper filter in the Initial Set mode.

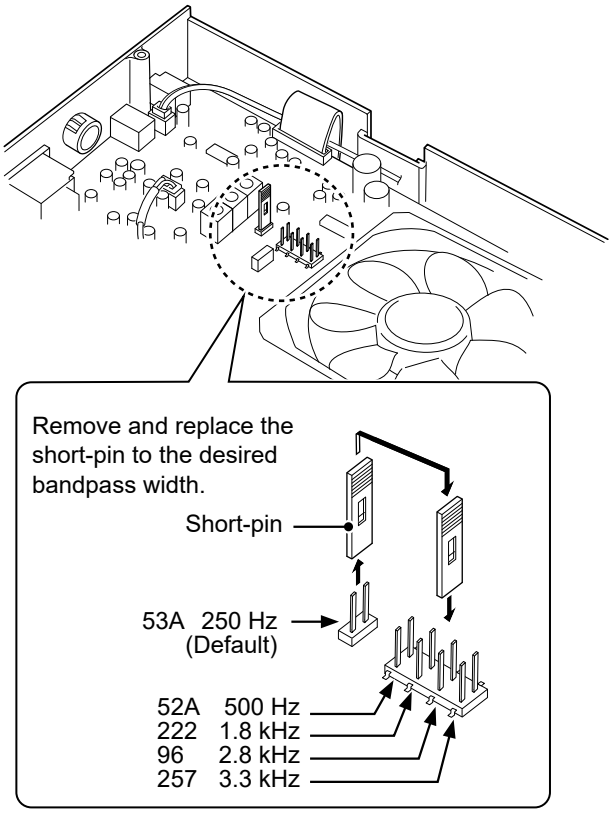
**CAUTION: DISCONNECT** the DC power cable before performing any work inside the transceiver to prevent an electrical shock or damage to the transceiver.

### ◇ Setting the short-pin

1. Remove the transceiver's bottom cover.




2. Remove the short-pin as shown below, and install it onto the appropriate pins, according to your desired bandpass width.




3. Replace the bottom cover and the screws to their original positions.

After installing the short-pin, select the filter in the Initial Set mode. Otherwise, the set filter will not function properly.

### ◇ Setting the filter

The optional filter is not selected by default.
To use an Optional filter, set the items in the Initial Set mode.

**Entering the Initial Set mode**

1. Turn OFF the transceiver.
2. While holding down [SET], push [PWR].
   - Enters the Initial set mode.
3. When the setting has been finished, push [PWR] to exit the Initial Set mode and turn OFF the transceiver.

**Selecting an Optional filter**

1. In the Initial Set mode, push [UP▲] or [▼DN] to select "FIL."
2. Rotate Channel Selector to select a desired filter from no (None,) 52A, 53A, 96, 222, and 257.

**Selecting an Expanded filter**

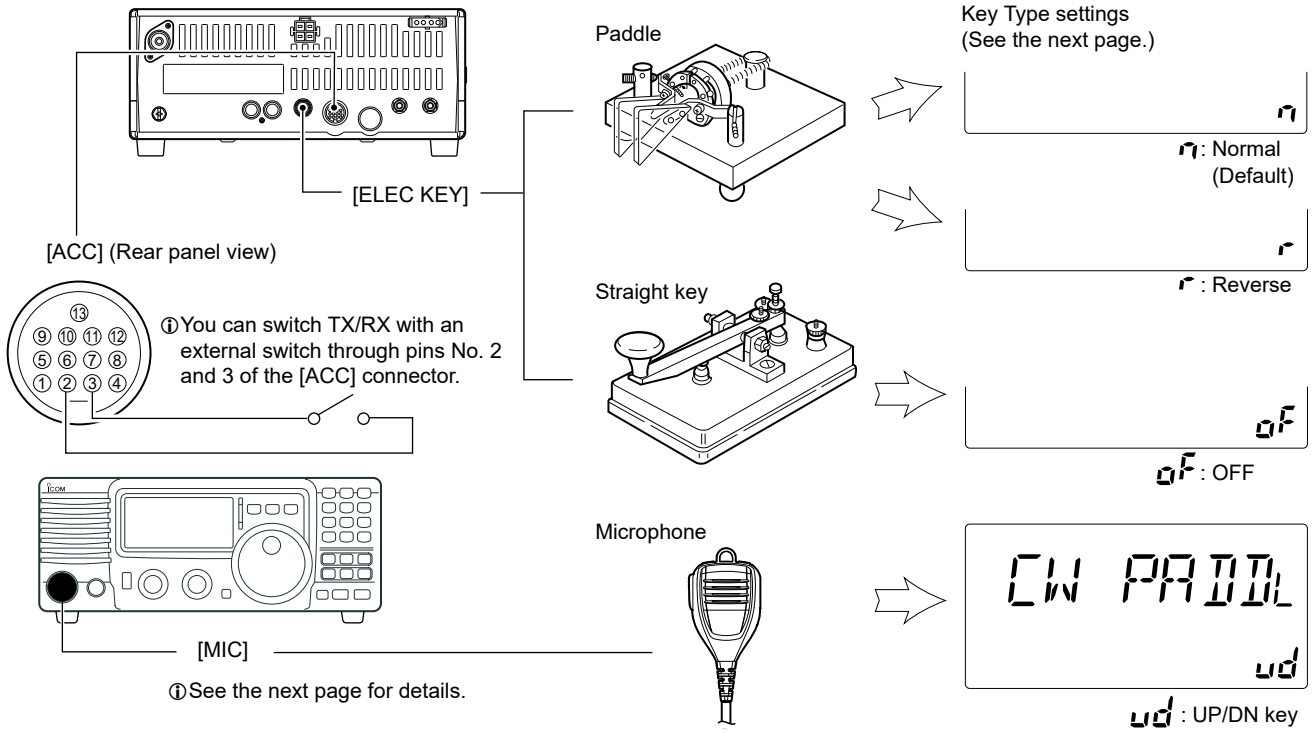
1. In the Initial Set mode, push [UP▲] or [▼DN] to select "EXP FIL."
2. Rotate Channel Selector to set the Expanded filter ON or OFF.
   ⓘ You can use the expanded filter when this item is set to ON.
   ⓘ See the filter selection table on the previous page for details.

**• Selecting the Wide or Narrow filter**

3. In the Initial Set mode, push [UP▲] or [▼DN] to select "WIDE" (Wide) or "NARW" (Narrow).
4. Push [MODE] to select an operating mode.
5. Rotate Channel Selector to select a filter.
   - For the Wide filter, "THU" (Through) selects the 6 kHz standard filter.
   - For the Narrow filter in the AM mode, "NOR" (Normal) selects the 2.4 kHz standard filter.
6. Repeat steps 4 and 5 to select IF filters in other operating modes, if desired.
   ⓘ The filter selection is memorized in each operating mode.
7. When the setting has been finished, push [PWR] to exit the Initial Set mode and turn OFF the transceiver.
8. Push [PWR] to turn ON with the new setting.

# Operating CW

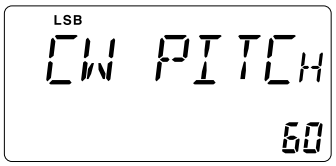
## ◇ Connection for CW




## ◇ Setting the CW pitch control

You can set the received CW audio pitch and the CW side tone to suit your preference, without changing the operating frequency.

1. Hold down [SET] for 1 second to enter the Quick Set mode.
2. Push [▼DN] or [UP▲] to select “CW PITCH.”




3. Rotate Channel Selector to set the pitch to between 30 (300 Hz) and 90 (900 Hz).
4. Push [SET] to exit the Quick Set mode.

## Operating CW

### ◇ The electronic Keyer function

The IC-78 has an built-in electronic keyer.

**Setting the Key type**

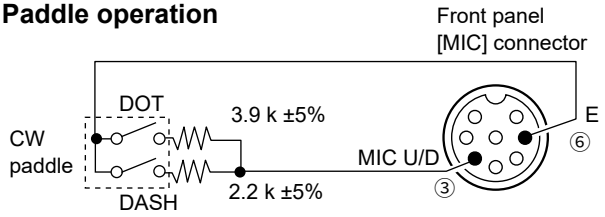
1. Push [MODE] to select the CW mode.
2. While holding down [SET], push [PWR] to turn ON the transceiver.
   - Enters the Initial Set mode and a setting item is displayed.
3. Push [UP▲] or [▼DN] to select “CW PADDL.”
4. Rotate the Channel Selector to set the paddle type.
   - n: Normal (Default) (for an electronic keyer)
   - r: Reverse (for an electronic keyer)
   - oF: Turns OFF the electronic keyer (for a straight key)
   - ud: For using the microphone’s Up/Down keys instead of the paddle
     ⓘ In this case, you cannot use squeeze keying.
5. Hold down [PWR] for 1 second to turn OFF the transceiver.
6. Push [PWR] to turn ON the transceiver with the revised settings.

**Paddle operation from the [MIC] connector**

Connect a CW paddle to the [MIC] connector on the front panel to operate the built-in electronic keyer.

ⓘ This function is usable only on the [MIC] connector on the front panel.

**Paddle operation**

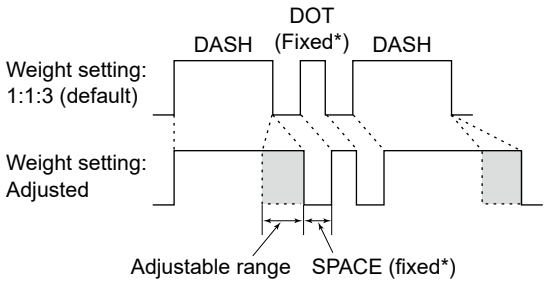



ⓘ Connect a straight key to “DOT.” side.

**Setting the keying weight**

1. Hold down [SET] for 1 second to enter the Quick Set mode.
2. Push [UP▲] or [▼DN] to select “KEY RAT.”
3. Rotate the Channel Selector to set weight to between 2.8 and 4.5.
4. Push [SET] to exit the Quick Set mode.

**Keying weight example:** morse code “K”

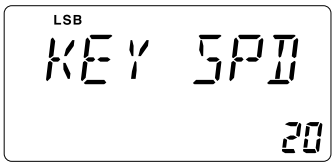



* SPACE and DOT length can be adjusted in “KEY SPD” setting in the Quick Set mode.

**Setting the key speed**

You can set the keying speed of the internal electronic keyer.

1. Hold down [SET] for 1 second to enter the Quick Set mode.
2. Push [▼DN] or [UP▲] to select “KEY SPD.”




3. Rotate Channel Selector to set the key speed to between 20 and 60 wpm.
   ⓘ Some value may not be selectable.
4. Push [SET] to exit the Quick Set mode.

## Operating CW

### ◇ Using the Break-in function

Use the Break-in function in the CW mode to automatically switch between transmit and receive when keying. The IC-78 is capable of operating in the Semi Break-in and Full break-in modes.

- **Semi Break-in operation**
  In the Semi Break-in mode, the transceiver transmits when keying, and then automatically returns to receive after a preset time after you stop keying.
  ⓘ "BK" is displayed while Semi break-in is selected.

- **Full Break-in operation**
  In the Full Break-in mode, the transceiver automatically transmits while keying down, and then immediately returns to receive after keying up.
  ⓘ "F-BK" is displayed while Full break-in is selected.

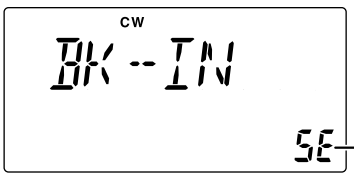
**Setting the Break-in function**

Before using the Break-in function, set the following items in the Quick Set mode.

- BK-IN (Break-in)
  Set the Break-in type from oF (OFF), SE (Semi break-in), or FL (Full break-in).
  ⓘ "BK" is displayed while Semi break-in is selected or "F-BK" is displayed while Full break-in is selected.

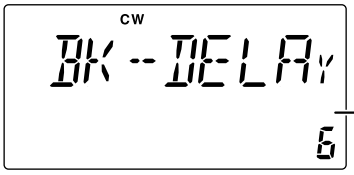
- BK-DELAY (Break-in Delay)
  Sets the delay time the transceiver returns to receive after the desired delay time after you stop

1. Push [MODE] to select the CW (or CW-R) mode.
2. Hold down [SET] for 1 second to enter the Quick Set mode.
3. Push [UP▲]/[▼DN] to select the "BK-IN."
4. Rotate Channel Selector to set the Break-in type.



Shows when Semi break-in is selected

5. Push [UP▲]/[▼DN] to select the "BK-DELAY."
6. Rotate Channel Selector to set the Break-in delay time.

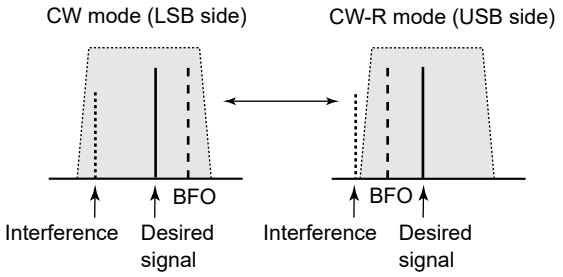


Break-in delay time

7. To exit the Quick Set mode, push [SET].

### ◇ About the CW Reverse mode

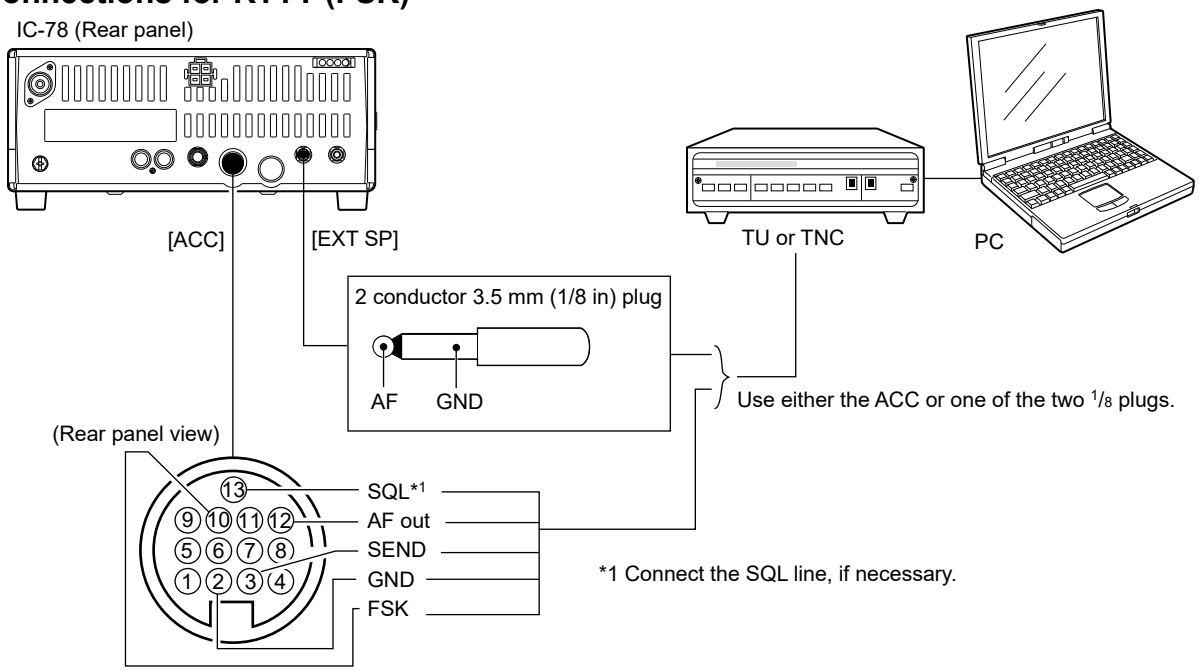
The CW-R (CW Reverse) mode reverses the receive Beat Frequency Oscillator (BFO) to receive CW signals.
Use this mode when interfering signals are near the desired signal, and you want to use the CW-R to reduce interference.




1. Push [MODE] to select the CW mode.
2. Hold down [MODE] for 1 second to toggle between the CW and CW-R modes.
   • **REV** is displayed when the CW-R mode is selected.

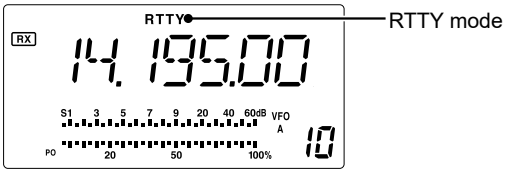
# Operating RTTY

## ◇ Connections for RTTY (FSK)




## ◇ RTTY (FSK) operation

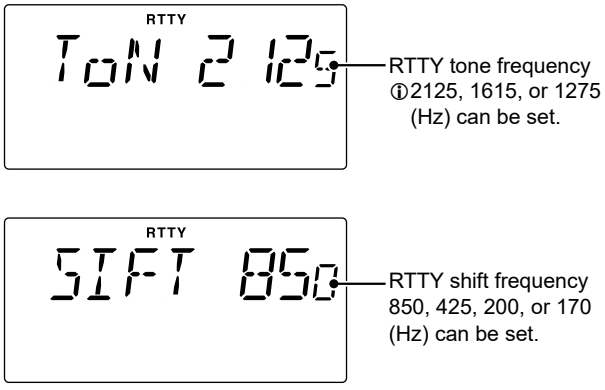
1. Select the RTTY mode by pushing [MODE].
   ⓘ Hold down [MODE] for 1 second to select RTTY-R (reverse) mode, if necessary.
2. Select the desired tone and shift frequencies.
3. Set the desired operating frequency by rotating Channel Selector.
4. Start using the PC or TNC (TU).




**Presetting for RTTY**

Before operating RTTY, set the following items in the Quick Set mode.

1. Hold down [SET] for 1 second to enter the Quick Set mode.
2. Push [UP▲]/[▼DN] to select a setting item.
3. Rotate Channel Selector to set a value.
   - **Tone frequency** “TON 2125”
     Select a tone frequency.
   - **Shift frequency** “SIFT 170”
     Select the desired shift frequency.
4. Push [SET] to exit the Quick Set mode.

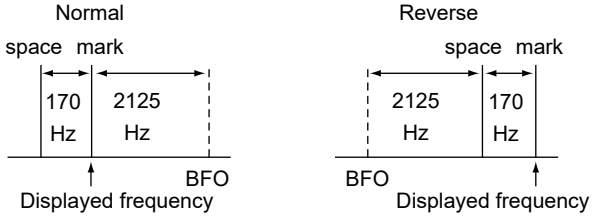



**RTTY reverse mode**

Received characters are occasionally garbled when the receive signal is reversed between MARK and SPACE. This reversal can be caused by incorrect TNC connections, settings, commands and so on.

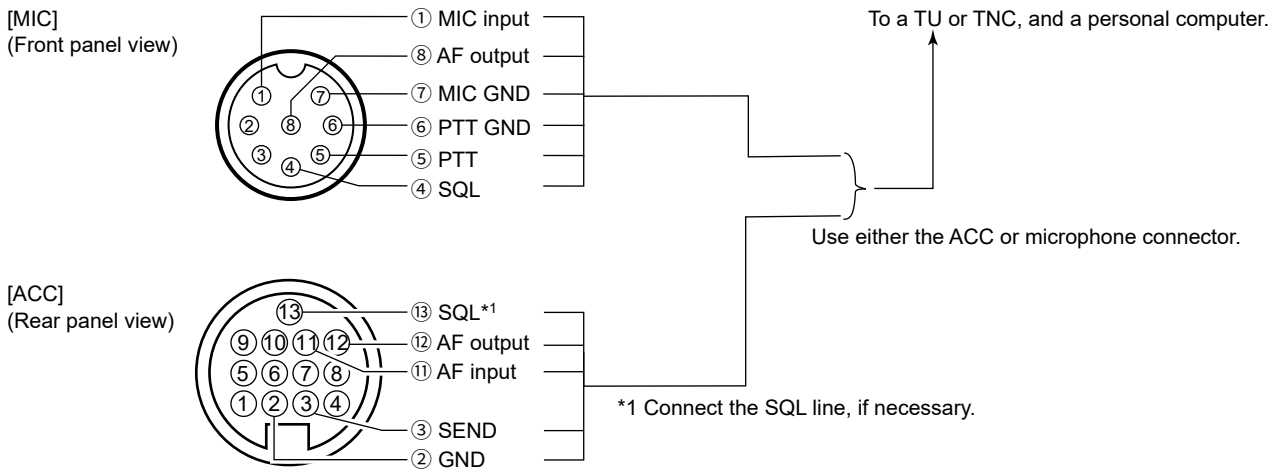
To receive a reversed RTTY signal correctly, select the RTTY-R (RTTY reverse) mode.

- **REV** is displayed when the RTTY reverse mode is selected.



## Operating RTTY

### ◇ Connections for RTTY (AFSK)




### ◇ RTTY (AFSK) operation

1. Select the SSB (LSB) mode by pushing [MODE].
   ⓘ Usually LSB is used on the HF bands.
2. Select the desired FSK tone frequency, shift frequency, and keying polarity, as described on the previous page.
3. Set the desired operating frequency by rotating Channel Selector.
4. Start using the PC or TNC (TU).

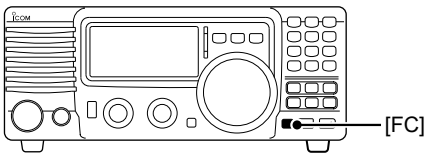
# VFO mode operation

Depending on the transceiver version, you can temporarily operate the transceiver in the VFO (Variable Frequency Oscillators) mode, for a frequency operation.

## ◇ Entering VFO mode

- To enter the VFO mode, hold down [FC] for 1 second.
  - The VFO icon is displayed.

ⓘ In the VFO mode, channels cannot be displayed.

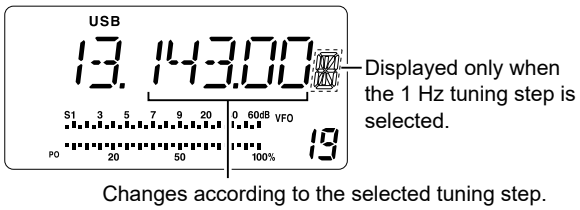



## ◇ Tuning in the VFO mode

You can tune for temporary operation, as follows.

**With the Channel Selector**

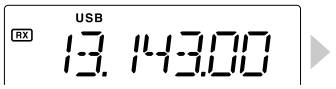
Rotating the Channel Selector changes the operating frequency in the desired tuning step, set in the Quick Set mode.
This is the most convenient way to search for signals around a pre-entered frequency.




**With the Keypad**

Enter the frequency as follows:

Start

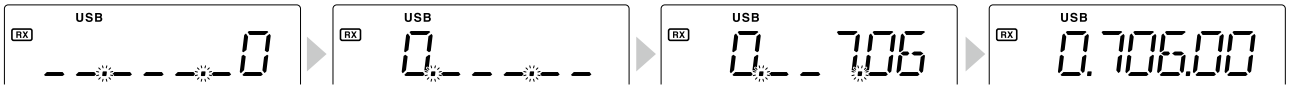



- To set to 25.118 MHz:

ABC 2 JKL 5 1 1 TUV 8 ANF 0 ANF 0 ENT

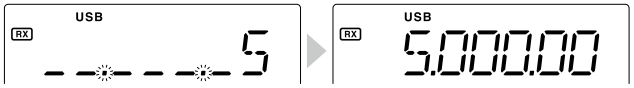

- To set to 706 kHz (0.706 MHz):

ANF 0 TXF PRS 7 QZ 0 MNO 6 ENT



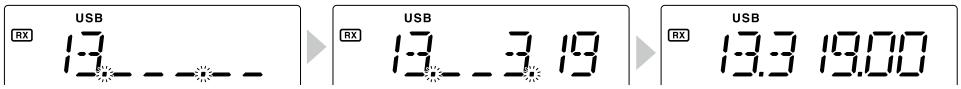

- To set to 5.0000MHz:

JKL 5 ENT




- To change 13.1430 MHz to 13.3190 MHz:

TXF DEF 3 1 WXY 9 ENT




**Entering duplex frequencies with the Keypad:**

1. Enter the receive frequency, and then push [ENT].
2. Push [TXF].
3. Enter the transmit frequency and push [ENT].

VFO mode operation

## ◇ Programming a channel

In the VFO mode, you can save the operating mode and frequency setting into a Channel.

1. Hold down [FC] for 1 second to enter the VFO mode.
2. Push [UP▲] or [▼DN] to select a Cannel number you want to set.
   ⓘ You can also select a blank channel.
   ⓘ You can select a channel by entering the channel number with the Keypad, before entering the VFO mode.
3. Tune to the desired frequency with the Channel Selector, or Keypad. (p. 3-14)
   ⓘ Also select the operating mode and other settings, such as filter selection, attenuator, and so on, if necessary.
4. Hold down [ENT] for 1 second to write the settings into the channel.
   • 3 beeps sound.
5. Edit the channel name, if necessary. (p.2-2)

**Setting a duplex channel:**
In Step 3 above, enter the receive frequency first and then push [TXF].
Next, enter the transmit frequency and push [ENT].
ⓘ The "SPL" icon is displayed when a duplex channel is programmed.

## ◇ Setting the Call channel

In the VFO mode, you can set the receive and transmit frequencies of the Call channel (Channel 0).

1. Hold down [FC] for 1 second to enter the VFO mode.
2. In the VFO mode, push [UP▲] or [▼DN] to select the Channel "0."
3. Set the receive frequency or both the receive and transmit frequencies, operating mode and other settings as described step 3 on the left.
4. Hold down [ENT] for 1 second to save them into the Call channel.

## ◇ Clearing a programmed channel

You can clear unnecessary channels. The cleared channels will be skipped in the channel mode operation.

1. Select a channel in the Channel mode.
2. Hold down [FC] for 1 second to enter the VFO mode.
   ⓘ You can also select the channel with [UP▲] or [▼DN] keys in the VFO mode.
3. Push [0], and then push [ENT].
4. Hold down [ENT] for 1 second to clear the selected channel content.
   • 3 beeps sound, and the "BLANK" icon is displayed when the channel content has been cleared.

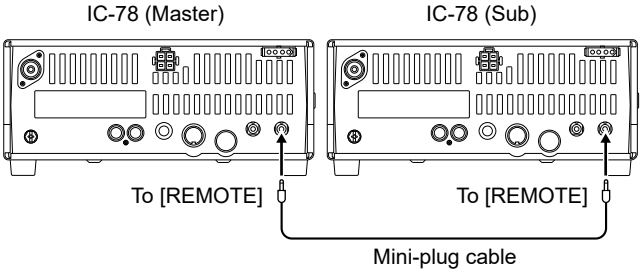
**NOTE:** Use the Keypad to select a blank channel. [UP▲]/[▼DN] keys or Channel Selector operation skips the blank channels.

# Data cloning between transceivers

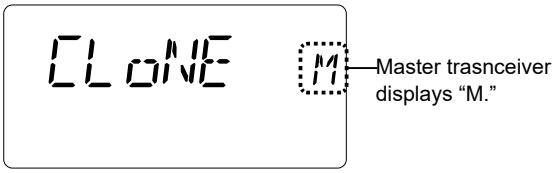
You can copy the IC-78's settings (Entered frequencies, channel names, both the Quick and Initial Set mode values, and so on) to another IC-78. This function is useful when the same settings of the IC-78 is required.

## ◇ Cloning operation

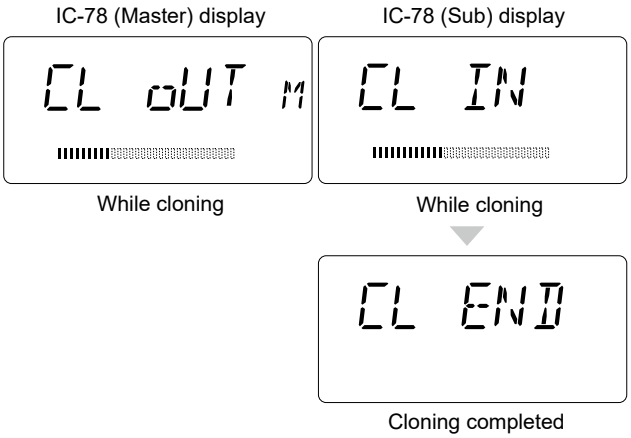
1. Turn OFF both the Master (source) and Sub (target) transceivers.
2. Connect a mini-plug cable between the [REMOTE] jacks of the Master and Sub transceivers.




3. While holding down [TXF] and [FC], turn ON the Master transceiver.




4. While holding down [SET] and [FC], turn ON the Sub transceiver.
5. On the Master transceiver, push [TONE] to start cloning.
   - When the cloning has been completed, "CL END" will be displayed on the Sub transceiver.




6. Turn OFF both the transceivers, and disconnect the cable.

# Section 4 OPTIONS

# Options

(As of March 2024)

### Microphones

**HM-219** HAND MICROPHONE
The same as supplied.
**SM-30** DESKTOP MICROPHONE
**SM-50** DESKTOP MICROPHONE

### Speaker

**SP-41** EXTERNAL SPEAKER

### Antennas

**AT-130** HF AUTOMATIC ANTENNA TUNER
**AT-140** HF AUTOMATIC ANTENNA TUNER
**AH-4** HF + 50 MHz AUTOMATIC ANTENNA TUNER
To tune a long wire antenna for portable or mobile HF operation.
Input power rating: 120 W
**AH-2b** ANTENNA ELEMENT
A 2.5 m long antenna element for mobile operation with the AH-4.
Frequency coverage: 3.5 MHz ~28 MHz bands with the AH-4
**AH-710** FOLDED DIPOLE ANTENNA
**AH-730** AUTOMATIC ANTENNA TUNER
Fast Tune-up from 1.8 to 50 MHz Band
Input power rating: 150 W Maximum
**AH-740** AUTOMATIC TUNING ANTENNA
Frequency coverage with 1.54 m whip antenna: 2.5 MHz ~29.9999 MHz
**MN-100** ANTENNA MATCHER
Matcher with two 8 m antenna wires
**MN-100L** ANTENNA MATCHER
Matcher with a 15 m antenna wire

### Cables

**OPC-420** 4-CONDUCTOR SHIELD CABLE
For the connection between transceiver and an antenna tuner AT-130 or AH-4.
Cable length: 10 m (32.8 ft)
**OPC-599** ADAPTER CABLE
13-pin, ACC connector to 7-pin + 8-pin ACC connectors.
**OPC-1147N** SHIELDED CONTROL CABLE
For the connection between transceiver and the AT-140.
Cable length: Approximately 10 m (32.8 ft)
**OPC-2321** CONTROL CABLE
To connect the AH-740.
Cable length: Approximately 6 m, (19.7 ft)

### Others

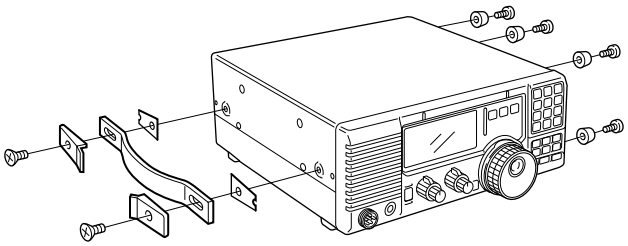
**MB-23** CARRYING HANDLE
**MB-118** MOBILE MOUNTING BRACKET

## Carrying handle

The MB-23 CARRYING HANDLE allows you to easily carry and transport the transceiver.

Attach the MB-23 with the supplied rubber feet, as shown to the right.

**NOTE:** Use only the supplied screws to attach the handle. Otherwise, the handle may not be attached correctly and may drop the transceiver.

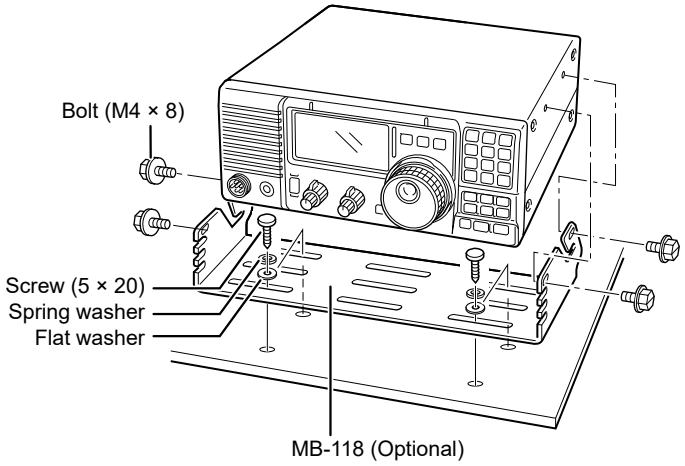


## Mobile mounting bracket

The MB-118 MOBILE MOUNTING BRACKET can be used for fixed mounting.

Securely mount the transceiver with the 4 supplied screws (5 × 20) to a thick surface that can support more than 3.8 kg (8.4 lb).

**CAUTION: DO NOT** use non-supplied screws (longer than 8 mm; 5/16 in) or bolts. Otherwise, the internal equipment of the transceiver may be damaged.



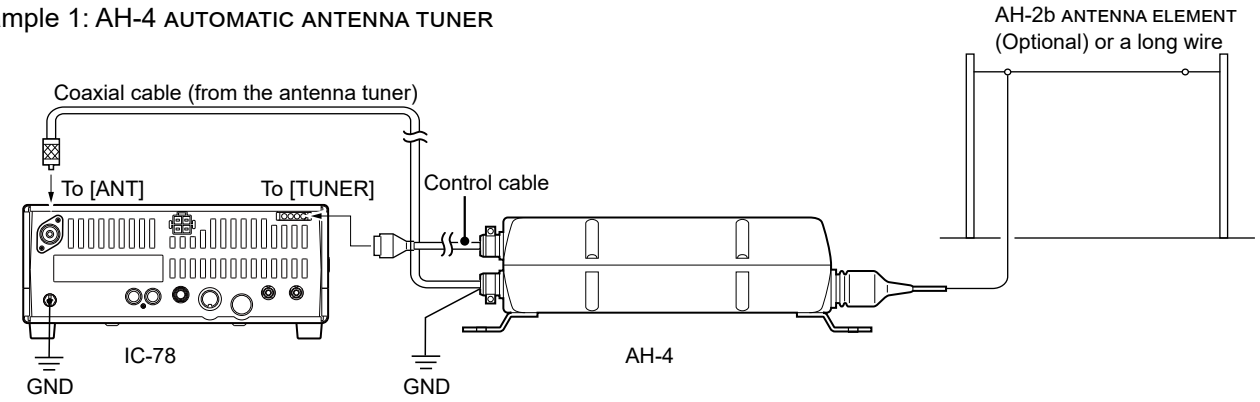
## Connecting an external antenna tuner

You can connect an optional external antenna tuner.
See page 3-4 and the antenna tuner's manual for details.

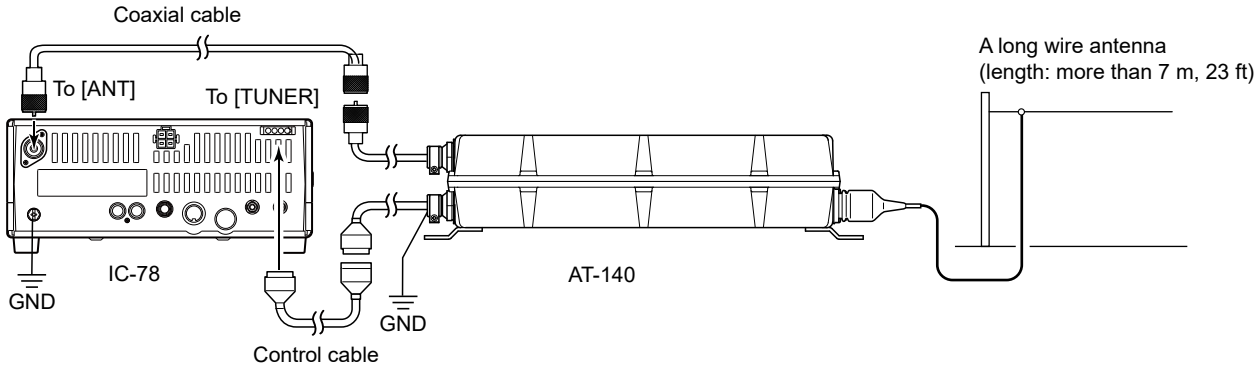
**DO NOT** connect two or more antenna tuners at the same time. Both tuners will not function correctly.

**NOTE:** Before connecting the antenna tuner, turn OFF the transceiver. Otherwise, the transceiver and the antenna tuner may be damaged.

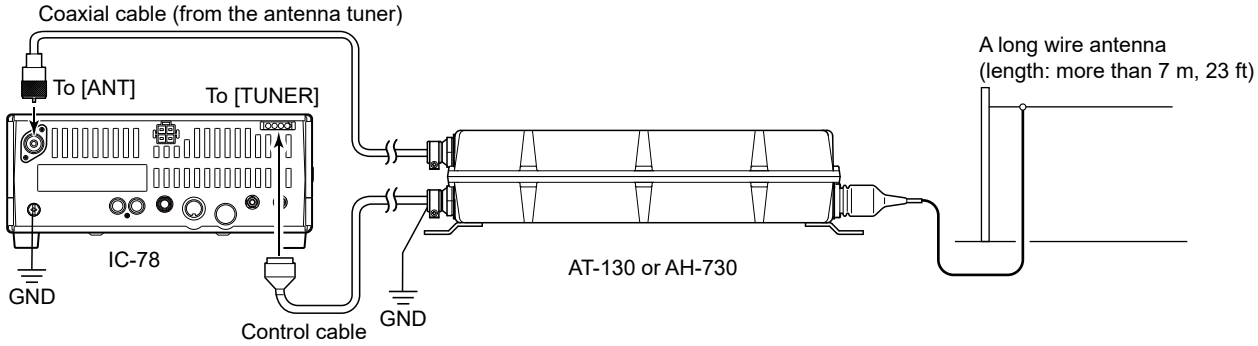
Example 1: AH-4 AUTOMATIC ANTENNA TUNER




Example 2: AT-140 AUTOMATIC ANTENNA TUNER

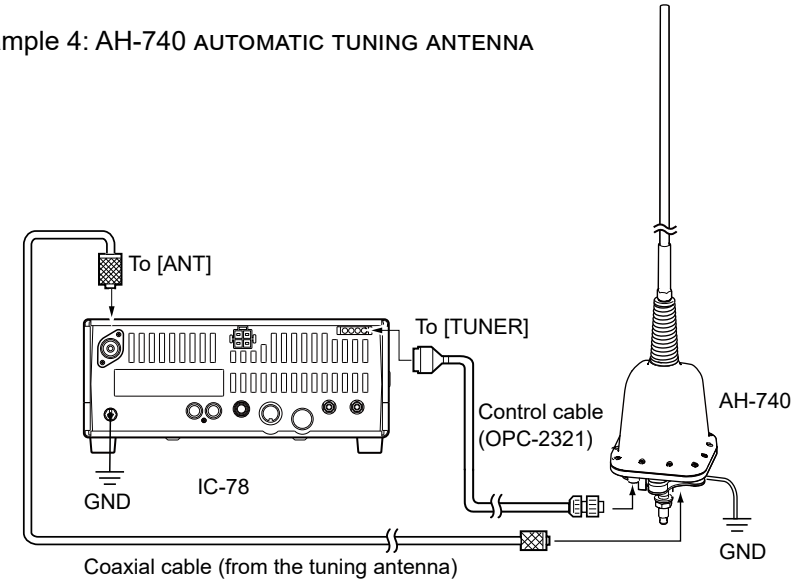



Example 3: AT-130, AH-730 AUTOMATIC ANTENNA TUNER



## Connecting an external antenna tuner

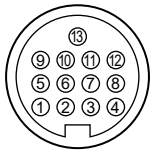
Example 4: AH-740 AUTOMATIC TUNING ANTENNA



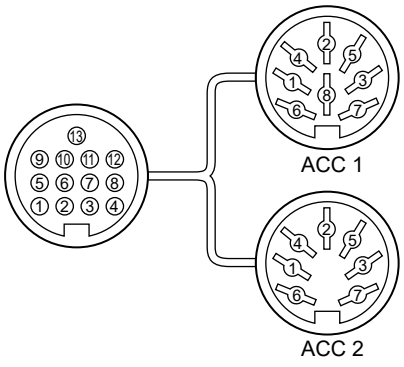
# Section 5 CONNECTOR INFORMATION

# [ACC]

Connects to an external equipment or a PC to control an external unit or the transceiver.

| ACC | PIN No. | NAME | DESCRIPTION | SPECIFICATIONS |
|---|---|---|---|---|
|  Rear panel view | 1 | 8 V | Regulated 8 V output. | Output voltage: 8 V ±0.3 V<br>Output current: Less than 10 mA |
| | 2 | GND | Connects to ground. | — |
| | 3 | SEND | Input/output pin.<br>Goes to ground when transmitting.<br>When grounded, transmits. | Ground level: –0.5 ~ +0.8 V<br>Input current: Less than 20 mA |
| | 4 | BDT | Data line for the optional AT-180. | — |
| | 5 | BAND | Band voltage output.<br>(Varies with amateur band) | Output voltage: 0 ~ 8.0 V |
| | 6 | ALC | ALC voltage input. | Control voltage: –4 ~ 0 V<br>Input impedance: More than 10 kΩ |
| | 7 | NC | — | — |
| | 8 | 13.8 V | 13.8 V output when power is ON. | Output current: Less than 1 A |
| | 9 | TKEY | Key line | — |
| | 10 | FSKK | RTTY keying input. | Ground level: –0.5 ~ 0.8 V<br>Input current: Less than 10 mA |
| | 11 | MOD | Modulator input. | Input impedance: 10 kΩ<br>Input level: Approximately 100 mV rms |
| | 12 | AF | AF detector output.<br>Fixed, regardless of [AF] position. | Output impedance: 4.7 kΩ<br>Output level: 100 ~ 300 mV rms |
| | 13 | SQL S | Squelch output.<br>Goes to ground when squelch opens. | SQL open: Less than 0.3 V/5 mA<br>SQL closed: More than 6.0 V/100 µA |

### When using the OPC-599 ADAPTER CABLE

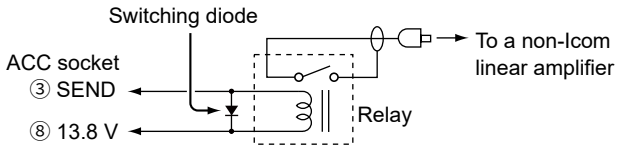



① FSKK
② GND
③ SEND
④ MOD
⑤ AF
⑥ SQL S
⑦ 13.8 V
⑧ ALC

① 8 V
② GND
③ SEND
④ BAND
⑤ ALC
⑥ NC
⑦ 13.8 V

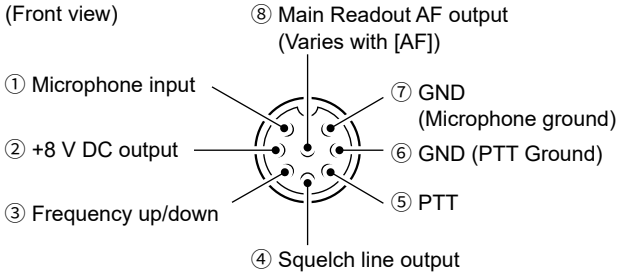
When the SEND terminal controls an inductive load, such as a relay, a counter-electromotive force can malfunction or damage the transceiver. To prevent this, we recommend adding a switching diode, such as an 1SS133, on the load side of the circuit to absorb the counter-electromotive force. When the diode is added, a delay in relay switching may occur. Be sure to check its switching action before operating.

(Example) ACC socket



## [MIC]

Connect the supplied microphone.
8-pin connector (600 Ω)

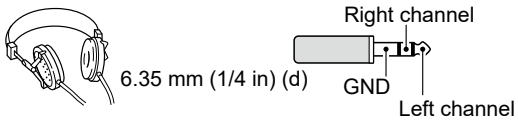



| [MIC] PIN No. | FUNCTION | DESCRIPTION |
|---|---|---|
| 2 | +8 V DC output | Maximum 10 mA |
| 3 | Frequency up | Ground |
| | Frequency down | Ground through 470 Ω |
| 4 | Squelch open | “LOW” level |
| | Squelch close | “HIGH” level |

**CAUTION: DO NOT** short the pin 2 to ground, otherwise the internal 8 V regulator may be damaged. DC voltage is also applied to the pin 1 for a microphone operation. Be careful when using a non-Icom microphone.

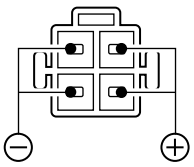
## [PHONES]

Connect standard stereo headphones.
Output impedance: 8 Ω




ⓘ The internal speaker is deactivated while an external speaker is connected.
ⓘ When high impedance headphones are used, the audio output level may be too high.

## [DC 13.8V]

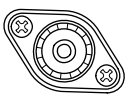



Rear panel view

Accepts the regulated DC power for 13.8 V DC ±15% through the supplied DC power cable.

⚠ **WARNING! NEVER** reverse the DC power cable polarity.

## [ANT]

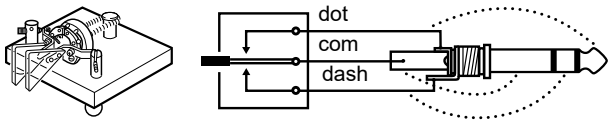


Connect an antenna for HF bands.
Input/Output impedance: 50 Ω
(unbalanced)

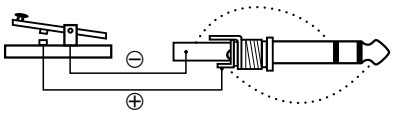
## [KEY]

Connect a Paddle key or Straight key.
ⓘ You can select the key type in “Key Type” item in the Initial Set mode.

• Paddle key



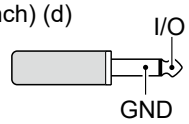

• Straight key



## [REMOTE]

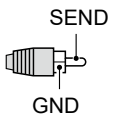
Connects to a PC for remote control using CI-V commands, or the transceiver for data cloning.

3.5 mm (1/8 inch) (d)




## [SEND]

An external unit controls the transceiver.
When the SEND pin goes to ground, the transceiver transmits.
The terminal goes low when the transceiver transmits. (RCA plug)



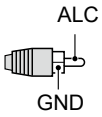

## [EXT SP]

Connects an external speaker.
2-conductor, 3.5 mm (1/8 in) (d)
Output impedance: 8 Ω

ⓘ The internal speaker is deactivated while an external speaker is connected.

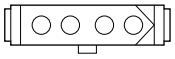
## [ALC]

When operating with a non-Icom linear amplifier, input ALC voltage (–4 ~ 0 V) from the linear amplifier.
The output impedance and output level differ, depending on the amplifier that is used.




RCA plug

## [TUNER]

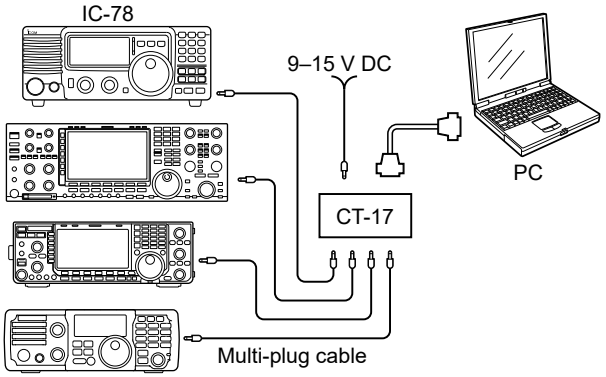


Accepts the control cable from an optional antenna tuner.

# Section 6 CONTROL COMMANDS

The transceiver's operating frequency, mode can be remotely controlled using a PC.
The Icom Communications Interface V (CI-V) controls the transceiver.
Set the "CI-V address," "CI-V Baud Rate," and "CI-V transceive" function in the Initial set mode.
(Refer to the basic manual.)

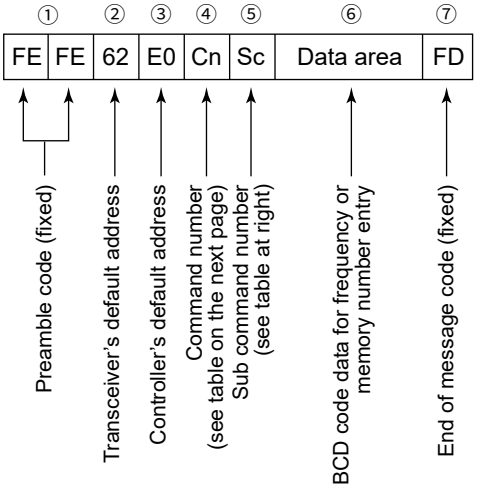
When you remotely control the transceiver, use a CT-17 CI-V LEVEL CONVERTER (discontinued product) or cable (User supplied) to connect the PC.
The transceiver can be connected through an optional CT-17 to a PC equipped with an RS-232C port.



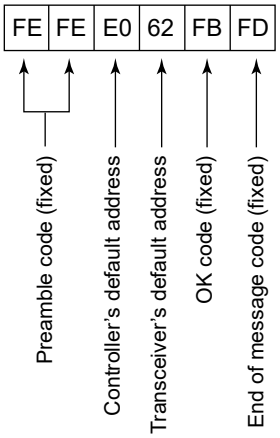

## ◇ Data format

The CI-V system can be written using the following data formats. Data formats differ according to command numbers. A data area or sub command is added for some commands.

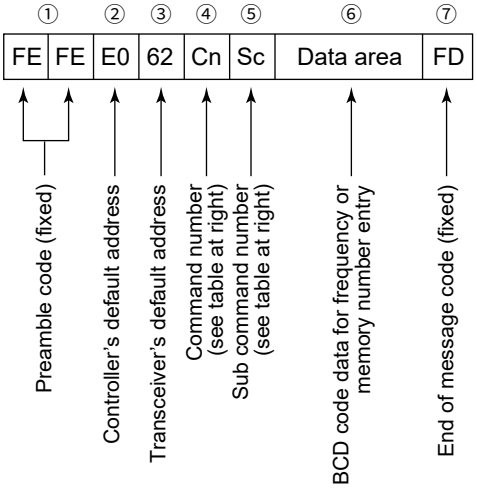
**CONTROLLER TO IC-78**



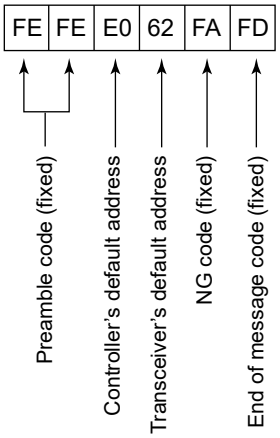

**OK MESSAGE TO CONTROLLER**




**IC-78 TO CONTROLLER**




**NG MESSAGE TO CONTROLLER**



## ◇ Command table

| Command | Sub command | Description |
|---|---|---|
| 00 | – | Send frequency data |
| 01 | – | Send mode data |
| 02 | – | Read Upper/Lower frequencies |
| 03 | – | Read frequencies |
| 04 | – | Read operating mode |
| 05 | – | Set operating frequency |
| 06 | – | Set mode |
| 08 | – | Set Memory |
| | – | Set Memory CH |
| 0E | 00 | Scan stop |
| | 01 | Memory scan start |
| 11 | – | ATT |
| 14 | 01 | AF gain |
| | 02 | RF gain |
| | 03 | Squelch level |
| 15 | 01 | Read squelch Open/Close |
| | 02 | Read S-meter level |
| 16 | 02 | PREAMP |
| | 22 | Noise blanker |
| | 44 | Microphone compressor |
| 19 | 00 | Read ID |

How the World Communicates

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