Bandscope

With the signal strength represented on the vertical axis and frequency on the horizontal axis, the bandscope provides a visual representation of the condition of the RX frequency band.

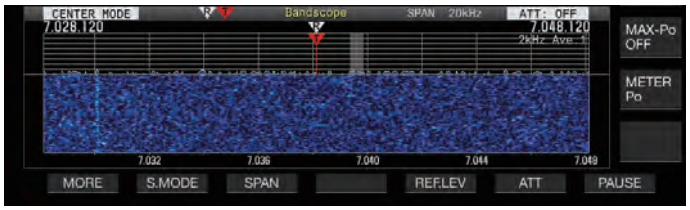
- The bandscope comes in the following 3 modes.
  Center mode: A mode where the center of the horizontal axis represents the RX frequency.
  Fixed mode: A mode where the lower and upper frequency limits of the frequency band to be displayed are fixed.
  Auto scroll mode: A mode where the scope range scrolls automatically while maintaining the span when the lower or upper limit of the marker scope range is exceeded.
- By displaying a waterfall below the bandscope display, the RX frequency, surrounding conditions as well as transition in the signal strength can be viewed.
- The vertical axis of the waterfall display represents time while the horizontal axis represents frequency.
- Signal strength is represented in a spectrum in the order of white (strong), red to yellow (medium) and green to blue (weak). The color changes according to the strength of the signal to be observed.
- The speed of the waterfall drop can be adjusted.
- When the waterfall is displayed, the height of the bandscope display is reduced to one-third of the original size.
- The filter passband is constantly represented by a translucent display in the bandscope.

- "OVF" is displayed when excessive signal is received. In this case, configure an attenuator for the bandscope.

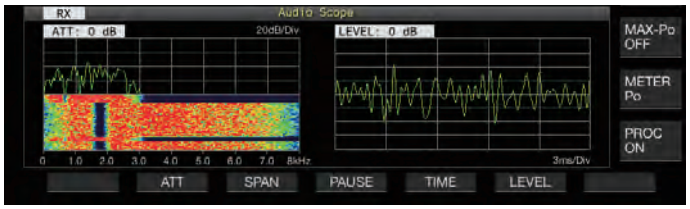
Displaying the Bandscope

Press [SCP] to display the scope screen.
Pressing and holding **[SCP]** each time toggles the display between "Bandscope" and "Audio Scope".

Bandscope



Audio Scope



Switching the Bandscope Display Type

1 **Display the bandscope.**

2 **Press [SCP].**
Pressing **[SCP]** each time switches the selection in the following sequence.
"(Standard size) Bandscope + Waterfall"
↓
"(Enlarged size) Bandscope + Waterfall"
↓
"(Standard size) Bandscope"
↓
No scope display (ends scope display)

- While a bandscope is displayed, pressing **[ESC]** ends the bandscope display.

Adjusting the Reference Level

If there is difficulty distinguishing the target signal from the noise when there is significant noise or when observing weak signals when there is little noise, the reference level of the bandscope can be adjusted to ease identification of the target signal.

1 **Press F5 [REF.LEV] to display the setting value of the reference level at the center of the bandscope screen.**
- If **F5 [REF.LEV]** is not displayed, press **F1 [MORE]**.

2 **Turn the [MULTI/CH] control to adjust the reference level while observing the bandscope waveform and waterfall spectrum on the bandscope screen.**

Setting Value	-20 to 0 (default) to +10 dB (0.5 dB step)

3 **Press F5 [REF.LEV] to end adjustment of the reference level.**

- If the target signal cannot be identified on the bandscope screen even after adjusting the reference level due to the excessively high input signals, switch to a different attenuator for the bandscope.

Configuring the Speed of Waterfall Drop

The speed at which the waterfall is flowing can be selected from the options available.

Press F4 [SPEED].
Pressing **F4 [SPEED]** each time switches the flow speed.

Setting Value	Speed1/ Speed2/ Speed3/ Speed4 (default)

- After altering the speed, "Speed n" is displayed in the waterfall area for about 1 second.
- Pressing and holding **F4 [SPEED]** switches the options in the reverse sequence.

Waterfall Display during Tuning (Center Mode)

This is a function for switching the behavior of the waterfall display when the frequency is changed.

● Configure in Menu [8-03] “Waterfall when Tuning (Center Mode)”

Setting Value	Straight (default)/ Follow

Straight: Uses a straight line to show transition in the level of the target signal displayed on the waterfall when the frequency is altered.
Follow: Tracks and displays the latest FFT level at the portion where the waterfall starts flowing when the frequency is altered.

Reduced Bandscope Display

A small bandscope (with a waterfall display) can be displayed on screens such as those for the different settings, RTTY communication and PSK communication.

1. **Display the menu, configuration modes except equalizer configuration and the RTTY/PSK communication screen.**
2. **Press [SCP].**
   A small bandscope is displayed.

- While the reduced bandscope is displayed, the horizontally arrayed F keys are switched to the function keys of the configuration screen and thus the bandscope settings cannot be changed.

Switching the Scope Display Mode

1. **Display the bandscope screen.**
2. **Press F2 [S.MODE].**
   Pressing **F2 [S.MODE]** each time switches the selection to “Center Mode”, “Auto Scroll Mode” and “Fixed Mode” in sequence. If **[S.MODE]** is not displayed, press **F1 [MORE]**.

Center Mode (CENTER MODE)

Displays a bandscope with the display frequency as the center at all times.

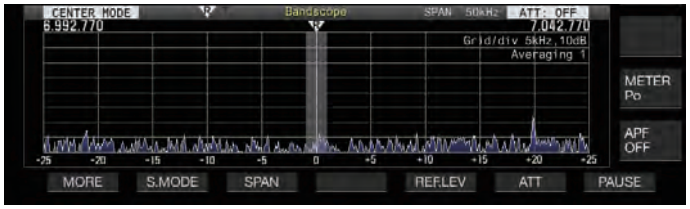
Auto Scroll Mode (A.SCROLL MODE)

The basic behavior is the same as that of the Fixed mode, except that the scope range scrolls automatically while maintaining the span when the marker (tuning frequency) exceeds the lower or upper limit of the scope range.

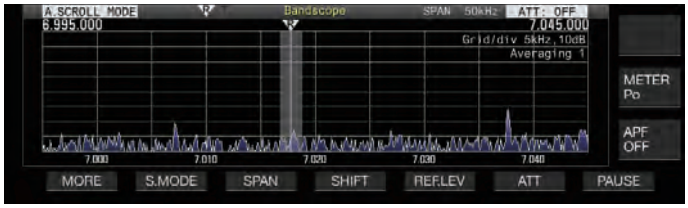
Fixed Mode (FIXED MODE)

The scope range is fixed for each of the amateur bands, and the operating frequency is displayed with a marker.

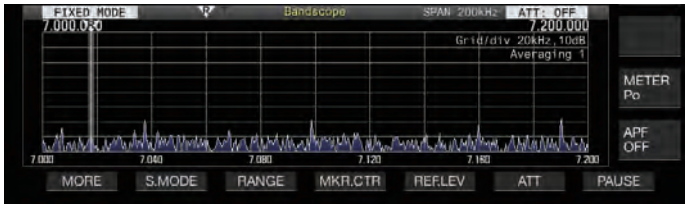
Center Mode



Auto Scroll Mode



Fixed Mode



Switching the Display Frequency Span

When the bandscope is displayed in the Center mode or Auto Scroll mode, the display frequency span (the width between the lower and upper frequency limits in the bandscope screen) can be adjusted.

● Press F3 [SPAN].

Pressing **F3[SPAN]** each time switches the frequency span.

Setting Value	±2.5kHz/ ±5kHz/ ±10kHz/ ±15kHz/ ±25kHz (default)/ ±50kHz/ ±100kHz/ ±250kHz

- Pressing and holding **F3[SPAN]** each time switches the options in the reverse sequence.
- The selected display frequency span is displayed in the toolbar of the bandscope screen as “SPAN 50kHz”, for example.

Selecting Relative or Absolute Frequency Display for the Grid (Center Mode)

During carrier point center display in the Center mode, the mode of frequency scale display at the bottom of the bandscope can be switched to one of the options available.

● Configure in Menu [8-06] “Frequency Scale (Center Mode)”

Setting Value	Relative Frequency (default)/ Absolute Frequency

Relative Frequency: The frequency scale display at the bottom of the scope area represents the relative frequency from the center of the scope.
Absolute Frequency: The frequency scale display at the bottom of the scope area represents the absolute frequency.

Marker Shift

This function shifts the scope range in the auto scroll mode operation so that the marker is displayed at a position that makes observation easier.
Shifting the marker to the left edge in the upper frequency transmitted by the DX station as well as in digital communication will widen the display area of the bandscope. Making it easier to determine the TX frequency and to observe in the various digital modes.

Shifting the Marker

● Press F2 [SHIFT].

The marker shifts to the preset shift position.

Changing the Shift Position of Marker Shift

1 **Press and hold F2 [SHIFT].**
The transceiver enters the shift position configuration mode. The value indicating the position of the selected vertical grid line is displayed.

2 **Move the shift position to the desired position using the [MULTI/CH] control.**
- Pressing and holding **F [SHIFT]** moves the shift position to the center.

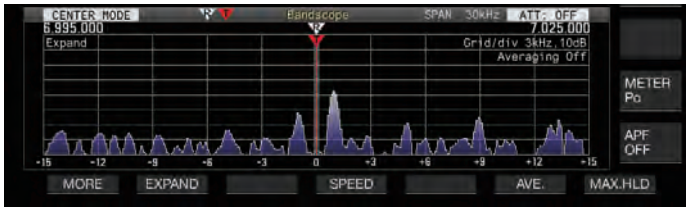
3 **Press F [SHIFT].**
The transceiver exits the shift position configuration mode.

- Depending on the relationship between the RX frequency and the span, deviation of 1 grid to the left or right may occurred in the shift operation.

Expand

This function expands the frequency range for spectral analysis while in the center mode (when the waterfall display during tuning is configured to “Straight”) or auto scroll mode to prevent the waterfall display from being interrupted when the frequency is changed.

● **Press F2 [EXPAND].**
Pressing **F2 [EXPAND]** each time toggles the expand function between ON and OFF.
- When the expand function is ON, “Expand” is displayed below the lower frequency limit display.



Scope Range of Each Band (Fixed Mode)

The steps to configure the scope range for each of the amateur bands when the bandscope is displayed in the Fixed mode are described below. Three types of scope range are available for selection for each band.

Switching the Scope Range

● **Press F3 [RANGE].**
Pressing **F3 [RANGE]** each time switches the scope range.

Setting Value	Range No.1 (default)/ Range No.2/ Range No.3

Configuring the Scope Range

1 **Press and hold F3 [RANGE] to display the screen for configuring the scope range in the Fixed mode.**

2 **Press F3 [RANGE] to select the scope range “Range No.1”, “Range No.2” and “Range No.3”.**

3 **Press F4 [LOWER] or F5 [UPPER] to select the frequency to adjust.**

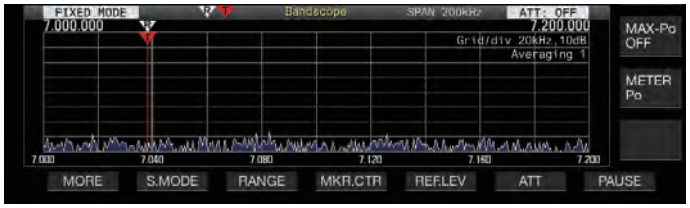
4 **Press F6 [–]/ F7 [+] or turn the [MULTI/CH] control to select the frequency.**
- Details of the configurable frequency range are shown in the table below.

Band	Configurable Frequency Range [MHz]	Range No.	Default Lower Limit [MHz]	Default Upper Limit [MHz]
LF Band	0.03 ≦ f ≦ 0.300	1	0.130	0.140
		2	0.130	0.140
		3	0.130	0.140
MF Band1	0.300 ≦ f ≦ 0.522	1	0.470	0.480
		2	0.470	0.480
		3	0.470	0.480
MF Band2	0.522 ≦ f ≦ 1.705	1	0.750	1.250
		2	0.750	1.250
		3	0.750	1.250
1.8 MHz Band	1.705 ≦ f ≦ 2.00	1	1.800	2.000
		2	1.800	1.864
		3	1.840	2.000
3.5 MHz Band	2.00 ≦ f ≦ 4.00	1	3.500	4.000
		2	3.500	3.600
		3	3.600	4.000
5 MHz Band	4.00 ≦ f ≦ 6.00	1	5.000	5.500
		2	5.000	5.500
		3	5.000	5.500
7 MHz Band	6.00 ≦ f ≦ 8.00	1	7.000	7.200
		2	7.000	7.045
		3	7.045	7.200
10 MHz Band	8.00 ≦ f ≦ 11.00	1	10.100	10.150
		2	10.100	10.130
		3	10.130	10.150
14 MHz Band	11.00 ≦ f ≦ 15.00	1	14.000	14.350
		2	14.000	14.100
		3	14.100	14.350
18 MHz Band	15.00 ≦ f ≦ 20.00	1	18.068	18.168
		2	18.068	18.110
		3	18.110	18.168
21 MHz Band	20.00 ≦ f ≦ 22.00	1	21.000	21.450
		2	21.000	21.150
		3	21.150	21.450
24 MHz Band	22.00 ≦ f ≦ 26.00	1	24.890	24.990
		2	24.890	24.930
		3	24.930	24.990
28 MHz Band	26.00 ≦ f ≦ 30.00	1	28.000	28.500
		2	28.000	28.200
		3	28.200	28.700
50 MHz Band	30.00 ≦ f ≦ 60.00	1	50.000	50.500
		2	50.000	50.100
		3	50.100	50.300
70 MHz Band (E Type)	30.00 ≦ f ≦ 74.80	1	70.000	70.500
		2	70.000	70.250
		3	70.250	70.500

Marker Centering

The scope range can be shifted with the display frequency span maintained such that the marker of the selected amateur band is displayed near the center (within one grid to the left or right from the center).

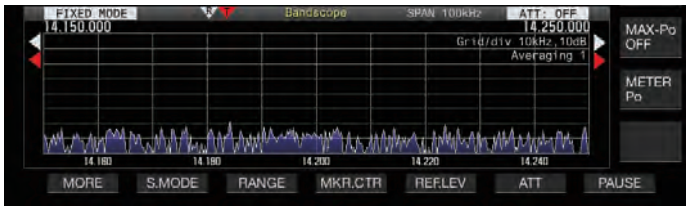
● **Press F4 [MKR.CTR].**
The scope range is shifted with the frequency span maintained.



- Changes in the lower and upper frequency limits due to the marker centering operation are temporary, and does not alter the preconfigured lower and upper frequency limits of the scope band in question.

Notification on Exceeding of Lower or Upper Limit

If the marker frequency falls outside the display range of the bandscope when a frequency marker is displayed on the bandscope in the Fixed mode, a display appears to inform the user that the marker has moved out of the bandscope range.
A "◁" icon appears at the left edge of the bandscope screen if the marker frequency value is smaller than the lower frequency limit, and a "▷" appears at the right edge if the marker frequency value is larger than the upper frequency limit.
The markers indicating that the lower or upper limit is exceeded are color coded as follows.
White: RX frequency
Red: TX frequency

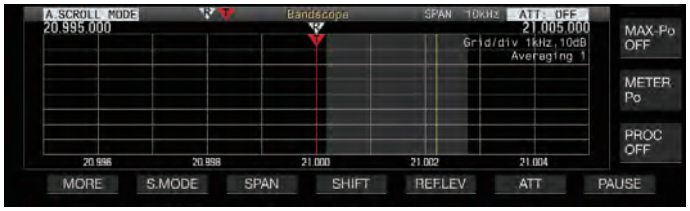


Displaying Tuning Assist Line (SSB Only)

This is a function for displaying a tuning assist line (yellow) in the waterfall display area during operation in the SSB mode. When the tuning assist line is displayed, the peak of the waveform is set near this line.
For example, the frequency spectrum of a male voice is said to be strongest near 500 Hz. In this case, displaying the tuning assist line near a position shifted by 500 Hz from the carrier point of the waterfall display area and allowing the part where strong signals are flowing to overlap with the line helps to increase the probability of zeroing in the target signal.

● **Configure in Menu [8-05] "Tuning Assist Line (SSB Mode)"**

Setting Value	Off (default)/ 300/ 400/ 500/ 600/ 700/ 800/ 1000/ 1500/ 2210 [Hz]

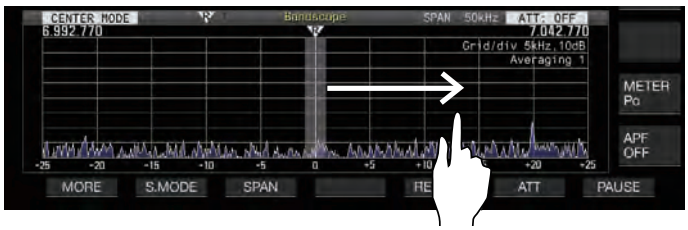


- This function works in the Center mode only when Menu [8-03] "Waterfall when Tuning (Center Mode)" is configured to "Straight".
- The tuning assist line is displayed on the upper side with respect to the carrier point in the case of USB and on the lower side in the case of LSB.

Touchscreen Tuning

This function enables signals to be received by touching the desired point in the bandscope display area or waterfall display area.

- When in the Center mode, touching a point sets the corresponding frequency as the center frequency.
- When in the Fixed mode, touching a point moves the marker to the corresponding frequency.



Turning ON/OFF Touchscreen Tuning

● **Configure in Menu [0-14] "Touchscreen Tuning"**

Setting Value	Off/ On (default)

- The following operations are prohibited even when touchscreen tuning is ON.
  - When the frequency lock function is ON
  - When the memory channels are empty or when temporary change of memory channels is disabled
  - When an area outside the frequency range of the memory channel for specific band segments is touched
  - During transmission
  - When the TX frequency is received by TF-SET while only XIT is ON during simplex operation

Configuring the Gradation of the Waterfall

10 levels of gradation are available for configuring the waterfall display.
To make it easy to find the weak signals, configure to a smaller value to increase the sensitivity to color change.

● **Configure in Menu [8-04] "Waterfall Gradation Level"**

Setting Value	1 to 7 (default) to 10 (1 step)

Touchscreen Tuning Correction

● **Touch and hold with a finger on the corresponding point in the bandscope or waterfall display screen where signal is to be received.**

- Touching in the SSB/ CW/ FSK/ PSK mode changes the correction behavior according to the "Touchscreen Tuning Step Correction" setting in the menu.
- The CW auto tune function is activated after correction is completed in the CW mode.

Step Correction

Configure the step correction operation during touchscreen tuning in the SSB/ CW/ FSK/ PSK mode.

● **Configure in Menu [8-07] Touchscreen Tuning Step Correction(SSB/ CW/ FSK/ PSK)**

Setting Value	Off/On (default)

Marker Display

The positions of the TX and RX frequencies are indicated as markers on the bandscope screen. This marker function allows the checking of edge frequency on the bandscope by registering the edge frequency of the contest or band plan.
During split operation, the TX frequency can be changed easily by moving the TX frequency marker to the desired frequency while monitoring the bandscope screen.
The frequency markers are color coded as follows.
White: RX Frequency
Red: TX Frequency

Registering a Marker

When a preferred frequency (up to 50 entries) is registered to the frequency marker list, the registered frequency is indicated by a marker on the bandscope (white dotted line).

1 **Press [MENU].**

2 **Press and hold F [F.MKR] to display the Frequency Marker list screen.**

3 **Align with the frequency to register.**

4 **Press F4 [ADD] to register.**

- The current VFO frequency is added to the list.
- When RIT is ON, the display frequency with RIT added is registered.
- The list is automatically sorted in ascending order starting from the lowest frequency.
- If the frequency to be added is already registered, it will not be registered twice and there will be no response even when **F4 [ADD]** is pressed.
- If there are already 50 frequency entries in the list, the frequency will not be registered and pressing **F4 [ADD]** will have no response.

Deleting a Registered Frequency

1 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the frequency to delete.**

2 **Press and hold F5 [(DELETE)] to delete.**

Turning ON/OFF Marker Function

1 **Press [MENU].**

2 **Press F [F.MKR].**
Pressing **F [F.MKR]** each time toggles the marker function between ON and OFF.

Displaying the Maximum Value in the Waveform

The maximum value of the waveform shown on the bandscope screen can be displayed to get a better grasp of the signal status.

Turning ON/OFF Maximum Value Display

● **Press F7 [MAX.HLD].**
Pressing **F7 [MAX.HLD]** each time toggles the maximum value display between ON and OFF.

Configuring the Hold Type

Select the method of displaying the maximum value of the waveform.

● **Configure in Menu [8-02] "Bandscope Maximum Hold"**

Setting Value	10 [s] (default)/ Continuous

10 [s]: Maximum value information is cleared after 10 seconds.
Continuous: Maximum value information is not cleared.

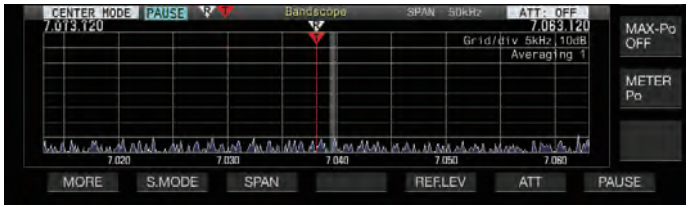
- The maximum value information is cleared automatically if the RX frequency changes in the Center mode regardless of the setting value selected.

Pausing the Waveform Display

The waveform display on the bandscope screen can be paused.

● Press F7 [PAUSE] to pause the waveform display.

- When the waveform display is paused, << PAUSE >> is displayed on the screen.



- Pressing **F7 [PAUSE]** again cancels the paused state.

Averaging of Bandscope Waveform

Averaging the bandscope waveform allows changes in the waveform display to look smoother with continuous signals like those of Morse signals which make observation easier.

● Press F6 [AVE.] to switch the averaging level.

- Pressing **F6 [AVE.]** each time switches the selection in the following sequence: "Off" (averaging disabled) → "1" (minimum) → "2" → "3" (maximum) → "Off". The averaging level selected is displayed at the top right corner of the grid.
- Pressing and holding **F6 [AVE.]** each time switches the options in the reverse sequence.
- The default setting is "1".

Switching the Bandscope Attenuator

If the target signal cannot be identified on the bandscope screen even after adjusting the reference level due to the excessively high input signals, attenuate the input level to the bandscope by switching to a different attenuator for the bandscope.

● Press F6 [ATT] to switch to a different attenuator.

Pressing **F6 [ATT]** each time switches the attenuator.

Setting Value	Off (default)/ 10 dB/ 20 dB/ 30 dB

- Pressing and holding **F6 [ATT]** each time switches the options in the reverse sequence.
- The current attenuator level setting is displayed at the top of the bandscope.

Switching the attenuator for the bandscope does not affect the RX sensitivity.

Displaying the TX Signal Waveform

A waveform for the TX signal can be displayed when a bandscope for transmission is displayed in the Center mode.

● Configure in Menu [8-00] "Bandscope Display during TX"

Setting Value	Off (default)/ On

On: Displays the TX waveform in the bandscope while transmission is in progress.
Off: Does not display the waveform in the bandscope while transmission is in progress.

- The TX signal waveform cannot be displayed in the Fixed mode.
- The setting for this function cannot be switched while transmission is in progress.

Audio Scope

Two audio scope screen modes are available for selection: the "audio scope screen" mode displays the waveform with an audio bandscope + waterfall as well as an oscilloscope, while the "multi scope screen" shows a reduced display of the bandscope at the top together with the "audio scope screen".

- "OVF" is displayed when excessive signal is received. In this case, configure an attenuator for the audio scope.

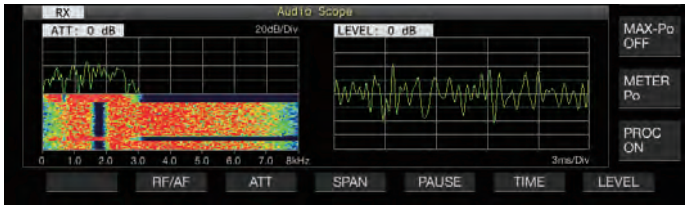
Displaying the Audio Scope

● Press and hold [SCP] to display the Audio Scope screen.

Pressing and holding [SCP] each time toggles the display between "Audio Scope" and "Bandscope".

Audio Scope Screen

Left: Audio scope
Right: Oscilloscope



Switching the Audio Scope Display Type

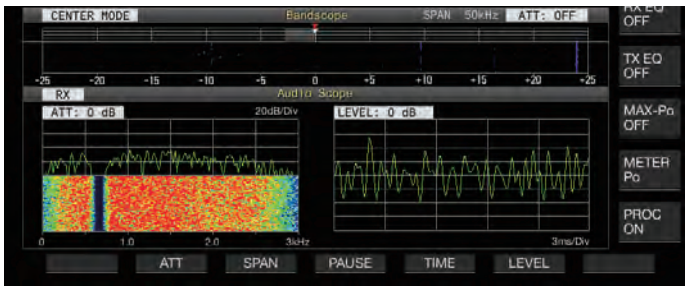
***1* Display the Audio Scope screen.**

***2* Press [SCP].**

Pressing **[SCP]** each time switches the selection in the following sequence.
"Audio Scope screen"
↓
"Multi Scope screen"
↓
No scope display (ends scope display)

Multi Scope Screen

Top: Reduced bandscope display
Left: Audio scope
Right: Oscilloscope



***3* Press [ESC] to end the display.**

Switching the Audio Scope Attenuator

When the signal input level to the audio scope is excessively high, attenuating the level helps to reduce the amplitude of the waveform. Doing so optimizes the waveform display for easy observation.

● Press F2 [ATT].

Pressing **F2 [ATT]** each time switches the attenuator.

Setting Value	Off (default)/ 10 dB/ 20 dB/ 30 dB

- Pressing and holding **F2 [ATT]** each time switches the options in the reverse sequence.
- The current attenuator level setting is displayed at the top of the audio scope.

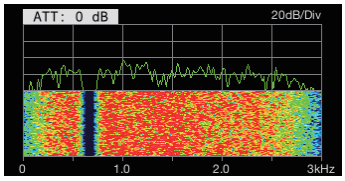
Switching the Display Frequency Span of the Audio Scope

The display frequency span of the audio scope can be configured to 3 kHz or 8 kHz. Configure the display frequency span to an appropriate setting according to the filter band setting and frequency to observe.

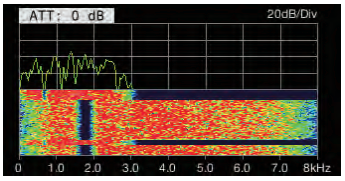
● Press F3 [SPAN].

Pressing **F3 [SPAN]** each time toggles the span between “3 kHz (default)” and “8 kHz”.

Display when 3 kHz is selected



Display when 8 kHz is selected



Switching the Oscilloscope Level

Switching the input level of signals to the oscilloscope alters the vertical amplitude of the waveform. Configuring the waveform amplitude to an appropriate size helps to ease observation of the waveform.

● Press F6 [LEVEL].

Pressing **F6 [LEVEL]** each time switches the input level.

Setting Value	0 dB (default)/ -10 dB/ -20 dB/ -30 dB

- Pressing and holding **F6 [LEVEL]** each time switches the options in the reverse sequence.
- The current signal input level setting is displayed at the top of the oscilloscope.

Switching the Sweep Time

Switching the sweep time of the oscilloscope alters the time range of the oscilloscope display. The sweep time can be adjusted according to the status of the signal to be observed.

● Press F5 [TIME].

Pressing **F5 [TIME]** each time switches the sweep time.

Setting Value	1 ms/ Div/ 3 ms/ Div/ 10 ms/ Div/ 30 ms/ Div/ 100 ms/ Div (default)/ 300 ms/ Div

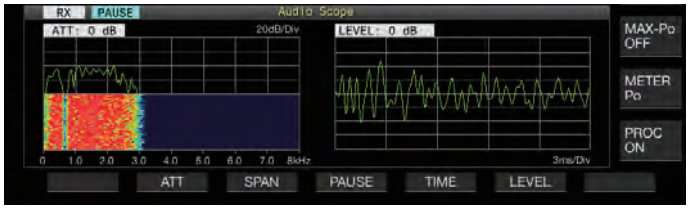
- Pressing and holding **F5 [TIME]** each time switches the options in the reverse sequence.
- The sweep time is displayed at the bottom of the oscilloscope.

Pausing the Audio Scope

When the waveform displayed on the Audio Scope screen is paused, the waveform is maintained until it is unpaused. The audio scope can be paused to enable analysis of the waveform without being interrupted whenever the display is refreshed.

● Press F4 [PAUSE] to pause the waveform display.

- When the waveform display is paused, << PAUSE >> is displayed on the screen.
- Pressing **F4 [PAUSE]** again cancels the paused state.



Configuration of the Input Path of TX Audio

The method for transmitting the audio source that is input to the MIC connector on the front panel as well as the ACC 2, (USB-B) and LAN connectors on the rear panel of this transceiver can be configured.

Audio Source Input	Description
MIC	Inputs the microphone audio when MIC is set to ON.
ACC 2	Inputs audio signal from the device connected to the ACC 2 connector when ACC 2 is set to ON.
USB Audio	Inputs audio signal from the connected PC when USB Audio is set to ON.
LAN	Inputs audio signal from the audio device connected via LAN when LAN is set to ON.

Switching the Audio Source Input

The steps to configure the audio (audio source input) to transmit via PTT/SS/SEND and DATA PTT/DATA SEND are as follows.

- A separate setting can be configured when DATA mode is in the OFF and ON status.

1 **Press and hold [DATA] to display the audio source input screen.**

The current ON/OFF status of the DATA mode at the transmitting end is displayed at the top left corner.

2 **Press F2 [▲], F3 [▼], F4 [◀‖] or F5 [‖▶] to select the method of transmission (“SEND/PTT” or “DATA SEND (PF)”) and audio input line (“Front” or “Rear”).**

3 **Press F6 [SELECT] or turn the [MULTI/CH] control to change the setting value.**

- Pressing and holding **F1 [(RESET)]** restores both audio input settings of the selected method of transmission to the default values.
- The default setting varies as follows when DATA mode is in the ON and OFF status.

Setting Item			Setting Value	Default
DATA OFF	SEND/ PTT	Front	Off/ MIC	MIC
		Rear	Off/ ACC 2/ USB Audio/ LAN	Off
	DATA SEND (PF)	Front	Off/ MIC	Off
		Rear	Off/ ACC 2/ USB Audio/ LAN	ACC 2
DATA ON	SEND/ PTT	Front	Off/ MIC	MIC
		Rear	Off/ ACC 2/ USB Audio/ LAN	Off
	DATA SEND (PF)	Front	Off/ MIC	Off
		Rear	Off/ ACC 2/ USB Audio/ LAN	USB Audio

- Note that some setting combinations might trigger unintended transmission by this transceiver. Also, when this transceiver is connected to a PC or another audio source via USB audio, LAN or ACC 2 and when DATA VOX is ON, sound that is emitted by the audio source might trigger transmission by this transceiver.

- These are common settings for the SSB, AM and FM modes. Although settings can also be changed during operation while the operation mode at the transmitting end is configured to CW, PSK or FSK, the settings that are displayed on the screen are those when DATA mode is in the OFF status.

VOX (Voice-Operated Transmit)

VOX (voice) is a function that automatically starts transmission when the user speaks into the microphone and returns to the receiving status when voice input stops. After speaking into the microphone, insert a short pause before returning to the receiving status.

- For Data VOX, data that is input from an audio source other than the MIC connector can also be transmitted in the same way.

Turing ON/OFF VOX Function

The VOX function switches automatically between transmission and reception based on audio input from the microphone in the SSB, FM or AM mode.

● **Press [VOX].**

Pressing **[VOX]** each time toggles the VOX function between ON and OFF.
When the VOX function is ON, the [VOX] LED lights up in green.

- During transmission using the VOX function, audio input from the microphone is transmitted regardless of the audio source input settings.
- If transmission and reception are not performed automatically when the VOX function is set to ON, try adjusting the VOX gain level, increasing the distance between the microphone and the speaker, move closer to the microphone when speaking or turn down the volume level for incoming calls. If the above methods do not work, use a headphone.

Selecting Audio Source Input for Data VOX

The transmission status can be activated automatically when data audio beyond a certain level is input from the ANI terminal of the ACC 2 connector, ⇻ (USB-A or USB-B) or LAN connector on the rear panel of this transceiver in the SSB, FM or AM mode. This function is known as Data VOX.
The audio source input that is activated with the Data VOX function can be switched using the steps below.

1 **Press and hold [DATA] to display the audio source input screen.**

2 **Press F7 [D.VOX].**

Pressing **F7 [D.VOX]** each time switches the Data VOX audio source.

Setting Value	Off (default)/ ACC 2/ USB Audio/ LAN

- “OFF”, “ACC 2”, “USB” or “LAN” is displayed to the right of “D.VOX” at the top of the screen.

- If this transceiver is left connected to an audio source such as a PC when Data VOX is configured to an audio source input setting other than “OFF”, this transceiver may be placed in the transmission state by the signals from the audio source.
- When this transceiver is to be left connected to the audio source, set the Data VOX audio source input to OFF to prevent transmission that is unintended.

Configuration Example

Transmission via PTT by modulating signals from MIC in the SSB mode or transmission via DATA VOX by modulating signals from a PC via USB Audio in the SSB-DATA mode.
Settings when DATA mode is OFF:
- SEND/PTT Front: MIC, Rear: Off
- DATA SEND (PF) Front: Off, Rear: USB Audio
- DATA VOX: Off

Settings when DATA mode is ON:
- SEND/PTT Front: MIC, Rear: Off
- DATA SEND (PF) Front: Off, Rear: USB Audio
- DATA VOX: USB Audio

VOX Configuration Screen

1 **Press [VOX] to set the VOX function to ON.**

2 **Press and hold [VOX] to display the VOX configuration screen.**

On the VOX configuration screen, the horizontal rows represent the audio source input while the vertical columns represent the setting item.

The VOX configuration screen ends when the transmitting end is configured to a mode (non-audio mode) other than SSB, AM and FM mode.

Adjusting VOX Gain

VOX gain of the VOX function allows the VOX gain level to be adjusted according to the loudness of the audio input from the MIC connector or the noise in the surroundings.
VOX gain of the input data from the ANI terminal of the ACC 2 connector, ⇢ (USB-A or USB-B) or LAN connector on the rear panel of this transceiver can be adjusted in the Data VOX mode.

1 **Press F2 [▲]/ F3 [▼] to select the audio source input (horizontal row).**
Select the audio source input row to adjust from “MIC”, “ACC 2”, “USB” and “LAN”.

2 **Press F4 [◄‖]/ F5 [‖►] to select the “VOX GAIN”.**

3 **Press F6 [–]/ F7 [+] or turn the [MULTI/CH] control to adjust the VOX level.**
Input signal from the audio source selected in step 2, and adjust the level to activate transmission when audio signals are input.

Setting Value	0 to 10 (default) to 20 (1 step)

Adjusting the Anti VOX Gain Level

When the VOX function is ON, transmission may be activated by the playback sound from the speaker in some cases in addition to audio from the microphone. Speaker sound may be transmitted if the speaker volume is configured to a high level. This function can be used to prevent unintended transmission by configuring the anti VOX level to adjust the lower limit for activating the VOX function with respect to the playback sound from the speaker.

1 **Press F2 [▲]/ F3 [▼] to select the audio source input.**

2 **Press F4 [◄‖]/ F5 [‖►] to select “ANTI VOX”.**

3 **Press F6 [–]/ F7 [+] or turn the [MULTI/CH] control to adjust the sensitivity of the anti VOX gain.**
Adjust the sensitivity of the anti VOX level so that transmission will not be activated by the playback sound from the speaker.

Setting Value	0 to 20 (1 step)

- The smaller the anti VOX gain value, the more susceptible the transceiver is to playback sound from the speaker.
- The default settings are as follows.
  - Microphone: 10
  - ACC 2: 0
  - USB: 0
  - LAN: 0

- When a headphone is connected to the PHONES connector, the VOX function (transmission) will not be activated by the speaker audio regardless of the audio source and anti VOX level settings.
- Anti VOX gain applies to audio sources other than Data VOX.
- The speaker output level is compared with the ANTI VOX level for any input line.

Adjusting VOX Delay Time

During transmission of audio or data using the VOX function, the transceiver may sometimes be restored to the receiving state, and the end of the audio that is clipped off may not be transmitted as a result. To prevent this from occurring, the delay time can be adjusted to insert an appropriate pause before switching from the transmitting to the receiving state.

1 **Press F2 [▲]/ F3 [▼] to select the audio source input (horizontal row).**
Select the audio source input row to adjust from “MIC”, “ACC 2”, “USB” and “LAN”.

2 **Press F4 [◄‖]/ F5 [‖►] to select the “VOX DELAY”.**

3 **Press F6 [–]/ F7 [+] or turn the [MULTI/CH] control to select the delay time.**
Input signal from the audio source selected in step 2, and adjust the delay time before returning to the receiving state after audio input has ended.

Setting Value	0 to 10 (default) to 20 (1 step)

- When “MIC” is selected, adjust the delay time while speaking into the microphone.
- The delay time for “MIC” can also be adjusted by turning the **[DELAY]** control.

VOX Voice Delay

When the VOX function is ON, there may be a time lag before transmission begins after voice input has started. For this reason, the beginning part of the audio may be clipped off. To prevent this phenomenon from occurring wherever possible, a VOX voice delay time can be configured between the timing when transmission is activated and before audio signals are sent out.

When using a microphone as the audio source input for transmission:

● **Configure in Menu [6-13] “VOX Voice Delay (Microphone)”**

When using devices other than a microphone as the audio source input for transmission:

● **Configure in Menu [6-14] “VOX Voice Delay (Except Microphone)”**

Setting Value	Off/ Short/ Middle (default)/ Long

TX Monitor

TX audio can be monitored while transmission is in progress. This is a convenient tool for checking the effect of the speech processor or TX equalizer. In the FSK and PSK modes, FSK and PSK signals transmitted by this transceiver can be monitored.

● Press [MONI] to turn the TX monitor ON or OFF

The [MONI] LED lights up in green when the TX monitor is turned on.

- The ON/OFF status of the TX monitor and monitor level are stored in the memory for each of the mode groups below. During split operation, the mode at the transmitting end will be monitored.
  - SSB/ FM/ AM
  - SSB-DATA/ FM-DATA/ AM-DATA
  - FSK/ PSK
- Each time there is a change in the mode, the transceiver switches back to the TX monitor ON/OFF status stored in each group. TX monitor is always OFF in the CW mode.

Adjusting the TX Monitor Level

The volume level when monitoring the TX audio can be adjusted.

1 **Press and hold [MONI] to display the TX Monitor Level configuration screen.**

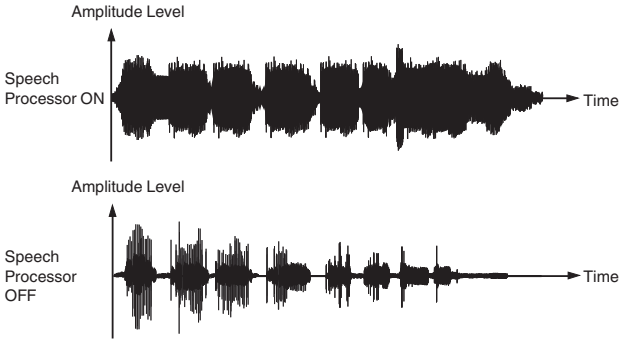
2 **Press F4 [–]/ F5 [+] or turn the [MULTI/CH] control to select the TX monitor level.**

Setting Value	0 to 10 (default) to 20 (1 step)

- Feedback may occur when a speaker is used in the SSB, AM or FM mode. Make use of a headphone instead.
- Transmission of CW messages cannot be monitored using the TX monitor. To monitor CW messages, make use of CW sidetone.
- In the FM, FSK and PSK modes, the audio of the TX monitor may differ from the audio of the signal that is actually transmitted.

Speech Processor

In the SSB mode, TX output power varies according to the loudness of the audio from the transmitting transceiver, which may sometimes cause audibility to deteriorate at the receiving transceiver. A speech processor can be used in this case to compress signals via digital signal processing to raise the average power.
Similarly, using the speed processor in the AM or FM mode stabilizes the degree of modulation regardless of the loudness of the audio from the transmitting transceiver and helps to enhance intelligibility.



Turning ON/OFF Speech Processor

1 **Press the mode key to select either SSB, AM or FM mode.**

2 **Press F [PROC].**
Pressing F [PROC] each time toggles the speech processor between ON and OFF.

- When the speech processor is set to ON, “PROC OUT:nnn” is displayed at the top of the screen. [nnn: 0 to 100]

- The speech processor also functions with respect to audio input from the ANI terminal of the ACC 2 connector or the ⇐USB (USB-B) connector on the rear panel of this transceiver.

Speech Processor Configuration Screen

● Press and hold F [PROC] to display the Speech Processor configuration screen

SSB/SSB-DATA/AM/AM-DATA Mode

FM/FM-DATA Mode

- Switching the mode at the transmitting end to a non-audio mode while the Speech Processor configuration screen is displayed ends the Speech Processor configuration screen.

Configuring the Speech Processor Input Level

1 **Press F2 [▲]/ F3 [▼] to select "Input".**

2 **Press F4 [–]/ F5 [+] or turn the [MULTI/CH] control to adjust the input level.**

Setting Value	0 to 50 (default) to 100 (1 step)

- The speech processor input level is used to adjust the input level of the mixed audio between the audio source input configured for microphone gain and that configured on the audio source input screen.

Configuring the Speech Processor Output Level

1 **Press F2 [▲]/ F3 [▼] to select "Output".**
- "Output" is not displayed when the transmitting transceiver is in the FM mode.

2 **Press F4 [–]/ F5 [+] or turn the [MULTI/CH] control to adjust the output level.**
- The output level can also be adjusted by turning the **[MIC/ PITCH)]** control.

Setting Value	0 to 50 (default) to 100 (1 step)

- Configuring the output to a level that is too high causes distortion to occur in the TX signals and deterioration in the radio wave quality as a result.
- The speech processor output level is applied to both the audio input from the microphone as well as the audio source configured on the audio source input screen.
- The speech processor output level is fixed and not changeable in the FM mode.

Configuring the Speech Processor Effect

It is possible to configure how TX signals are to be processed by the speech processor.

Press F6 [EFECT].
Pressing **F6 [EFECT]** each time switches the effect type.

Setting Value	Soft (default)/ Hard

Hard: Places priority on raising the average power although signals may remain distorted.
Soft: Places priority on reducing the level of distortion with minimal effect on raising the average power.

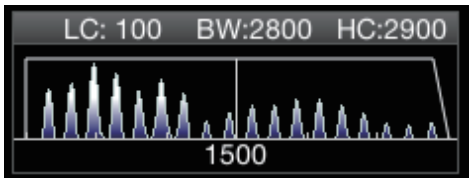
- The speech processor effect selected is the same in each mode.

TX Filter

Configure the bandwidth of the SSB/AM or SSB-DATA/AM-DATA TX filter to a low cutoff frequency or a high cutoff frequency.
- The filter display area switches automatically according to transmission in the SSB, SSB-DATA, AM and AM-DATA modes.
- A trapezoidal waveform of the low cutoff/high cutoff frequency configured with this function is displayed with the settings at the top (LC: low cutoff frequency; BW: occupied bandwidth; HC: high cutoff frequency).

Displaying the Filter Scope during Transmission

During transmission, an image of the passband width for the TX filter and the audio FFT of the TX audio can be displayed on the filter scope.



Configure in Menu [8-01] "TX Audio Waveform Display"

Setting Value	Off/ On (default)

On: Displays the TX filter bandwidth as well as TX monitor waveform on the filter scope during transmission in the SSB, FM and AM modes.
Off: The filter scope area maintains the last display during transmission and the waveform is not displayed.

- During transmission in the CW, PSK and FSK modes, the image of the filter passband characteristics during reception is maintained. In modes other than those above, an image of the filter passband characteristics is displayed based on the HI/LO cut setting of the TX filter. In the FM (including DATA) mode, an image of the passband characteristics for the fixed filter is displayed.
- When the Audio Scope screen is displayed, waveform is not displayed in the filter scope.
- The setting for this function cannot be switched while transmission is in progress.
- When HI/SHIFT or LO/WIDTH is operated during transmission while the TX audio waveform display is ON, the setting value of the RX filter changes and the RX filter display appears temporarily.

Changing the TX Filter Bandwidth

- Please make use of the TX filter while ensuring that the occupied bandwidth in the SSB mode falls within the permitted range as stipulated by the relevant laws.

Configuring the Low Cutoff Frequency in the SSB/AM Mode

● Configure in Menu [6-06] "TX Filter Low Cut (SSB/AM)"

Setting Value	10/ 100 (default)/ 200/ 300/ 400/ 500 [Hz]

Configuring the High Cutoff Frequency in the SSB/AM Mode

● Configure in Menu [6-07] "TX Filter High Cut (SSB/AM)"

Setting Value	2500/ 2600/ 2700/ 2800/ 2900 (default)/ 3000/ 3500/ 4000 [Hz]

Configuring the Low Cutoff Frequency in the SSB-DATA/AM-DATA Mode

● Configure in Menu [6-08] "TX Filter Low Cut (SSB-DATA/AM-DATA)"

Setting Value	10/ 100 (default)/ 200/ 300/ 400/ 500 [Hz]

Configuring the High Cutoff Frequency in the SSB-DATA/AM-DATA Mode

● Configure in Menu [6-09] "TX Filter High Cut (SSB-DATA/AM-DATA)"

Setting Value	2500/ 2600/ 2700/ 2800/ 2900 (default)/ 3000/ 3500/ 4000 [Hz]

TX Equalizer

This item can be used to alter the frequency characteristics of the TX audio via DSP sound processing. It enables correction of the microphone frequency characteristics as well as transmission in the audio quality according to the audio properties or user's preferences.

Turning ON/OFF TX Equalizer

1 **Press the mode key to select either SSB, AM or FM mode.**

2 **Press F [TX EQ].**
Pressing **F [TX EQ]** each time toggles the TX equalizer between ON and OFF.

- The TX equalizer turns OFF automatically when this transceiver is configured to a mode other than SSB, AM or FM.

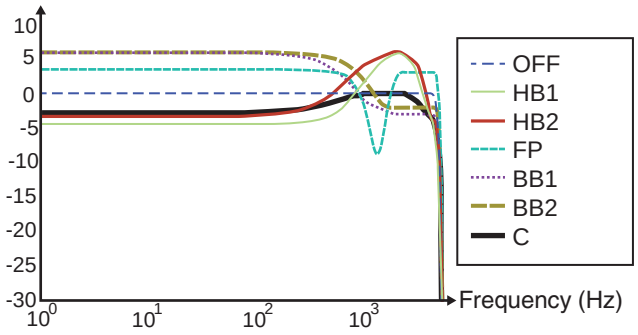
Selecting a Frequency Characteristic for the TX Equalizer

This transceiver comes with 6 types of frequency characteristics for the TX equalizer. In addition, there are 3 other types that can be customized according to the user's preferences. A selection can be made from these options.

1 **Press and hold F [TX EQ] to display the TX Equalizer screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a characteristic.**
- Make a selection based on the equalizer effects in the table below.

Effects	Purpose
High Boost 1 (HB1)	Boosts the high frequency component. This is effective for audio sound that contains a low frequency component.
High Boost 2 (HB2)	Boosts the high frequency component. The low frequency attenuation level for this option is half of that of the HB1 option.
Formant Pass (FP)	This option attenuates frequency components that is outside the audio bandwidth so that the audio can be heard more clearly.
Bass Boost 1 (BB1)	Boosts the low frequency component. This is effective for audio sound that contains a high frequency component.
Bass Boost 2 (BB2)	Boosts the low frequency component. The low frequency is further boosted compared to BB1.
Conventional (C)	Applies a 3 dB boost to the frequency range of 600 Hz or higher. This is suited for communication that attenuates gradually as it approaches the low frequency range.
User 1 (U1)	Frequency characteristics can be adjusted according to the user' preferences and stored in the options between User 1 and User 3. The flat frequency characteristic is selected in the default setting.
User 2 (U2)	
User 3 (U3)	



TX Characteristic Curve

Adjusting the TX Equalizer

The frequency characteristics of the TX equalizer can be adjusted to produce the desired sound quality.

1 **Press and hold F [TX EQ] to display the TX Equalizer screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a characteristic.**

3 **Press F3 [ADJ] to display the TX Equalizer Adjustment screen.**

4 **Press F3 [◀‖]/ F4 [‖▶] to select the frequency band to adjust.**

5 **Press F5 [–]/ F6 [+] or turn the [MULTI/CH] control to adjust the level of each frequency band.**

- Touching a point on the RX Equalizer Adjustment screen selects the corresponding band and changes the frequency to the selected level.
  An alternative way is to touch a rough point followed by fine-tuning in steps 3 and 4.
- Pressing and holding F2 [(RESET)] resets all the frequency levels to the default setting.

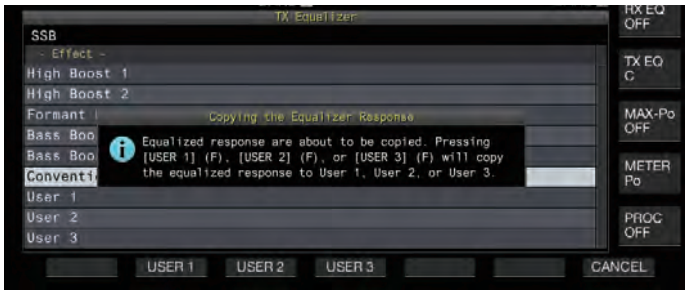
Copying the TX Equalizer Settings

Equalizer effects that are configured according to the user's preferences can be copied and saved as user-defined settings.

1 **Press and hold F [TX EQ] to display the TX Equalizer screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a characteristic.**

3 **Press F5 [COPY].**
A message with instructions on how to specify the destination for saving the settings is displayed.



- To copy after adjusting the TX equalizer settings, press F5 [COPY] on the TX Equalizer Adjustment screen.

4 **Press F2 [USER1], F3 [USER2] or F4 [USER3] to specify the destination for saving the settings.**

- Copying of the TX equalizer settings is complete and the display returns to the TX Equalizer screen.
- Pressing F7 [CANCEL] returns the display to the TX Equalizer screen without copying the settings.

Saving the TX Equalizer Settings

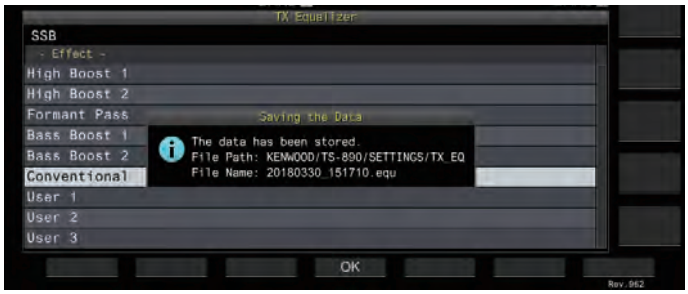
The steps to write the TX equalizer settings data are as follows.

- Before doing so, configure the destination for saving the data in "File Storage Location" of the "USB/File Management Menu" to "Internal Memory" or "USB Flash Drive".
- To save the data to a USB flash drive, insert a USB flash drive formatted using this transceiver into ⇐ (USB-A).

1 **Press and hold F [TX EQ] to display the TX Equalizer screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a characteristic.**

3 **Press F7 [SAVE].**
A message indicating that saving is complete is displayed.



4 **Press F4 [OK] to end the process.**

- The saved file is named in the "yyyymmdd_hhmmss" format. The extension of the saved file is ".equ".
  (Example) If the date is 10:20:30 a.m., February 15, 2018: 20180215_102030.equ
- The name of the destination folder is as follows. (The name varies depending on the destination for saving files.)
  USB flash drive: "KENWOOD\TS-890\SETTINGS\RX_EQ"
  Built-in memory: "SETTINGS\RX_EQ"
- When removing the USB flash drive, make sure to execute "Safe Removal of USB Flash Drive". (See 11-6)

Reading the TX Equalizer Settings

The steps to read the TX equalizer settings that are saved in the internal memory or USB flash drive are as follows.

- To read data from a USB flash drive, insert the USB flash drive containing the TX equalizer data into ⇐ (USB-A).

1 Press and hold F [TX EQ] to display the TX Equalizer screen.

2 Press F2[▲] / F3[▼] or turn the [MULTI/CH] control to select an equalizer characteristic to read.

3 Press F6 [READ] to display the File (TX EQ.) screen.

- The File (TX Equalizer) screen appears.

- To read data from the internal memory, press **F7 [INT.MEM]**.
- To read data from the USB flash drive, press **F7 [USB.MEM]**.
- Pressing F1 [↰] exits data file selection and returns the display to the TX Equalizer screen.
- Pressing **F6 [DELETE]** displays a message to confirm deletion of the file. Pressing **F4 [OK]** deletes the file.
- Pressing **F5 [NAME]** allows the file name to be changed.

4 Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a file.

5 Press F4 [OK] to read the settings data.

- A "reading" message appears while reading is in progress, which changes to a "reading complete" message when reading is complete.

6 Press F4 [OK].

- When removing the USB flash drive, make sure to follow the proper steps on the USB screen to remove the device safely. (See 11-6)
- Even if the equalizer type selected in step 3 is different from the equalizer type that is associated with the file to read, the settings data read will overwrite the TX equalizer selected in step 3.

TX Tuning

This is a function that transmits constant output carrier continuously regardless of the current TX mode. It is used for purposes such as adjusting external antenna tuners or linear amplifiers.
Assign TX tuning ("TX Tune 1" or "TX Tune 2") to a PF key. For more details, please refer to "PF (Programmable Functions)".

Toggling between transmission and reception each time the key is pressed:

1 Press the PF key that is assigned with "TX Tune 1".

- Transmits with a continuous carrier in the CW mode.
- "TX TUNE" blinks.
- The meter switches to SWR.

2 Press the PF key that is assigned with "TX Tune 1" again.

Stops transmission and returns to the original mode.

Activating transmission only while the key is pressed:

1 Press the PF key that is assigned with "TX Tune 2".

- Transmits in the CW mode while the key is pressed.
- "TX TUNE" blinks.
- The meter switches to SWR.

2 Release the PF key that is assigned with "TX Tune 2".

Stops transmission and returns to the original mode.

Adjusting TX Output Power during TX Tuning

1 Press and hold F [MAX-Po] to display the Transmit Power Limit screen.

2 Press F4 [◀‖]/ F5 [‖▶] to select a frequency band.

The settings of the selected frequency band column can be changed.

3 Press F2 [▲]/ F3 [▼] to select the "TX Tune Power" (horizontal row).

4 Press F6 [–]/ F7 [+] or turn the [MULTI/CH] control to select a TX output power.

Setting Value	5 to 10 (default) to 100 [W] (1-step)

Timeout Timer (TOT)

This function forcibly stops transmission and restores the receiving status when the preconfigured TX time is exceeded.

Configure in Menu [6-02] "Time-out Timer"

Setting Value	Off (default)/ 3/ 5/ 10/ 20/ 30 [min]

ID Beep

During continuous transmission via the [SEND] key, [PTT] on the microphone or the SS/PKS function on the rear panel, a beep tone (ID ID "・・ －・・ ・・ －・・") is output whenever the preconfigured duration from the time transmission starts is exceeded.

Configure in Menu [6-05] "ID Beep"

Setting Value	Off (default)/ 1 to 30 [min] (1 step)

- The transceiver may not function as intended in some cases as it may return to the receiving state during CW break-in or VOX transmission.

9 MEMORY CHANNELS

This transceiver comes with 120 memory channels, each of which can be used for registering operating data.
The 120 memory channels are divided into 3 types which are assigned respectively with the following channel numbers: 00 to 99, P0 to P9 and E0 to E9. Below is a general outline of the respective memory channel types.

00 to 99 (standard memory channels):

For registering operating data that are frequently used.

P0 to P9 (memory channels for specific band segments):

For registering programmable VFO or program scan frequency ranges.

E0 to E9 (expanded memory channels):

These can be used in the same way as the standard memory channels.
Data that can be registered in each of the memory channels are as follows.

Operating Data	Channel	
	00 to 99/ E0 to E9	P0 to P9
RX Frequency	○	○ (Simplex)
TX Frequency	○	
RX Mode	○	○ (Simplex)
TX Mode	○	
Split Operation	○	×
Start Frequency	×	○
End Frequency	×	○
Tone/CTCSS/Cross Tone	○	○
Tone Frequency	○	○
CTCSS Frequency	○	○
Memory Name	○	○
Lockout	○	○

Displaying the Memory Channel List

Settings registered in a memory channel can be displayed on the Memory Channel List screen. The channel for registering operating frequency data or the channel to use can be selected on the Memory Channel List screen.
Memory channels can be assigned with names on this screen.
A memory channel can be selected on the Memory Channel List screen.

1 **Press F7 [M.LIST] to display the Memory Channel List screen.**

- The selected memory channel is indicated in white color. When registering data to the memory channel, it changes into a pink display.
- Pressing **F7 [EXTEND]** enlarges the Memory Channel List screen display. Pressing it again restores the screen to the original size.

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a memory channel.**
Operating frequency data that are displayed on the Memory Channel List screen are as follows.

Operating Data	Description
CH	Displays the channel number. 00 to 99: standard memory channels P0 to P9: memory channels for specific band segments E0 to E9: expanded memory channels
Frequency 1	Registers a single frequency and mode for simplex channels. (Simplex operation frequency or radio station frequency) Registers the RX frequency and mode during split operation for split channels. Registers the start frequency and mode of a band segment for memory channels assigned to specific band segments.
Frequency 2	This is left blank in the case of simplex channels. Registers the TX frequency and mode during split operation for split channels. Registers the end frequency and mode of a band segment for memory channels assigned to specific band segments.
Name	Displays the name of the memory channel.
Lockout	Displays the lockout status of the respective memory channels. Memory scan is not performed for channels selected with a check mark.

Registering Operating Frequency Data to a Memory Channel

The steps to register the frequency and mode to the memory channel are as follows.

- To register a split channel, press **[SPLIT]** to switch to the split mode and operate accordingly.

1 **Configure the frequency and mode to register.**

2 **Press F7 [M.LIST] to display the Memory Channel List screen.**

3 **Press [M.IN].**

4 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the memory channel for registering the operating data.**

- Choose a memory channel from 00 to 99 or E0 to E9.

5 **Press [M.IN] or F4 [M.IN] to register the operating data.**

- Pressing **F1 [CANCEL]** or **[ESC]** exits the Memory Channel List screen without registering the operating data to the memory channel.

Configuring the Operating Data through Direct Frequency Entry

The numeric keypad can be used to register a frequency to a memory channel or make changes to an operating data that is already registered to a memory channel.
This is handy for adjusting the frequency to a station with a fixed frequency.

1 **Turn the [MULTI/CH] control to select the memory channel (00 to 99 or E0 to E9) for registering the operating data.**

2 **Press [ENT] to enable use of the numeric keypad.**

- The frequency entry mode starts up in the corresponding band with all the frequency digits appearing as "-".
- To change the operating mode, press the mode key.

3 **Key in a frequency value using the numeric keypad.**

- "-" changes into a numeric value when a numeric key is pressed and a value can be input starting from the highest-order digit.
- To enter 1.82 MHz, press **[0/50]**, **[1/1.8]**, **[8/24]** followed by **[2/3.5]**, and press **[ENT]** when input is complete.
- To enter a frequency lower than 6 MHz for K type transceivers, start by keying in a "0".
- To enter a frequency lower than 8 MHz for E type transceivers, start by keying in a "0".
- Pressing **[CLR]** clears the input and exits the frequency entry mode.

4 **Press [ENT] to register the operating data.**
The operating data is now registered to the memory channel selected in step 2.

Memory Channel Mode

An operating data can be called up from a memory channel for transmission or reception. Operating data such as the TX and RX frequencies, mode and tone can be changed temporarily.

Operating in the Memory Channel Mode

Follow the steps below to call up the operating data of a memory channel. Operating data that is registered in the memory channel selected on the memory channel list is called up.

1 **Pressing [M/V] in the VFO mode to switch to the memory channel mode.**
The selected band switches to the operating data that is registered in the memory channel on the memory channel list, and the memory channel number that is used is displayed on the screen.

2 **Press [UP] or [DOWN] on the microphone or turn the [MULTI/CH] control to switch to the target memory channel.**

3 **Pressing [M/V] again exits the memory channel mode.**
The transceiver returns to the VFO mode.

Direct Entry of a Memory Channel Number

A memory channel number can be selected by pressing the corresponding number on the numeric keypad.

1 **Enter the tens digit of the memory channel using the numeric keypad.**

- The tens digit of the channel number is being entered for the selected band while the ones digit appears as "-".

2 **Enter the ones digit of the memory channel using the numeric keypad.**

- The operating data corresponding to the entered number is called up and the channel number entry mode ends.
- Pressing **[CLR]** clears the input and exits the channel number entry mode.

Changing the Memory Channel Temporarily

During operation in the memory channel mode, it is possible to change the frequency and mode temporarily without affecting the registered memory channel settings.

Changing the Frequency Temporarily

Follow the steps below to change the frequency temporarily.

1 **Configure Menu [4-01] "Temporary Change (Memory Channel Configurations)" to "On".**

Setting Value	Off (default)/ On

2 **Press [M/V] to switch to the memory channel mode.**

3 **Turn the Tuning control to alter the frequency.**
To register a frequency that has been changed, store it in a different memory channel.

- For memory channels assigned to specific band segments, changing the frequency or mode alters the operating data that is registered in the corresponding memory channel regardless of this setting.
- Operating data related to the operating mode and FM tone can be altered temporarily regardless of this setting.

Copying the Operating Data of a Memory Channel

Operating data of a memory channel can be copied to a VFO or another memory channel.

Memory Shift (Memory → VFO)

The operating data of a memory channel can be copied to a VFO. It comes in handy when the frequency to use is near the frequency registered in a memory channel.

Selecting a Memory Channel and Copying to VFO

1 **Turn the [MULTI/CH] control in the memory channel mode to select a memory channel.**

2 **Press and hold [M/V], or press F6 [M ▶ VFO] to copy the operating data to the VFO.**
The operating data of the selected memory channel is copied to the VFO.
- The transceiver exits the memory channel mode and enters the VFO mode.
- When the operating data is temporarily changed, the altered operating data is copied to the VFO.
- Operating data of memory channels assigned to specific band segments cannot be copied to a VFO.
- Operating data that is registered in "Frequency 1" is copied to the VFO.
- Performing memory shift of a split memory channel copies the information of Frequency 1 to VFO A and that of Frequency 2 to VFO B and switches the VFO mode to the split state.

Copying Data from the Memory Channel List Screen to VFO

1 **Press F7 [M.LIST] to display the Memory Channel List screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a memory channel.**

3 **Press and hold [M/V], or press F4 [M ▶ VFO] to copy the operating data to the VFO.**
- After operating data is copied to a VFO, the data at the source will be erased.
- The transceiver exits the memory channel mode and enters the VFO mode.
- Operating data of memory channels assigned to specific band segments cannot be copied to a VFO.
- When in the VFO mode, operating data that is registered in the memory channel selected on the Memory Channel List screen is copied to the VFO.

Channel-to-Channel Copying

Operating data of a memory channel can also be copied to another memory channel. This is useful in cases such as when sorting the registered memory channels in a certain sequence.

1 **Press F7 [M.LIST] to display the Memory Channel List screen.**

2 **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the memory channel for which the operating data is to be copied.**

3 **Press F6 [COPY] to copy the operating data.**
- The memory channel that is being copied changes into a pink display.

4 **Press F2[▲]/ F3[▼] or turn the [MULTI/CH] control to select the memory channel for registering the copied operating data.**

5 **Press F4 [M.IN] to end the process.**
- Operating data of the memory channel selected in step 2 is copied to the memory channel selected in step 4.
- Pressing **F1 [CANCEL]** or **[ESC]** ends the operation without copying the operating data.

- Operating data of the standard memory channels (00 to 99) and expanded memory channels (E0 to E9) cannot be copied to memory channels assigned to specific band segments (P0 to P9). The same applies to copying from memory channels for specific band segments to standard and expanded memory channels.
- Operating data cannot be copied from memory channels that are not registered with operating data.

Configuring the Program Scan Frequency Range

The frequency range for programmable VFO or program scan can be registered to the memory channels from P0 to P9. Register the start frequency and end frequency in advance to enable changes to the frequency or scanning operation within a specific range. For more details on program scan, please refer to Chapter 10.

1. **When in the VFO mode, turn the Tuning or [MULTI/CH] control to align the VFO frequency with the frequency at which to start scanning.**
2. **Press [M.IN] to display the Memory Channel List screen.**
3. **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the memory channel (P0 to P9) for registering the frequency range.**
4. **Press F4 [M.IN] or [M.IN] to register the start frequency.**
   The start frequency is registered to “Frequency 1”.
5. **Turn the Tuning or [MULTI/CH] control to align the VFO frequency with the end frequency.**
6. **Press F4 [M.IN] or [M.IN] to register the end frequency.**
   The end frequency is registered to “Frequency 2” and the transceiver exits the Memory Channel List screen.

Erasing Memory Channels

Data from a registered memory channel can be erased.

1. **Press F7 [M.LIST] to display the Memory Channel List screen.**
2. **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select a memory channel to be erased.**
3. **Press and hold F4 [(CLEAR)] to erase the operating data.**

- When the operating data of a memory channel is erased during operating in the memory channel mode, the corresponding channel number will be maintained but there will be no registered data inside.
- To erase all the memory channels, perform memory channel reset.

Registering a Memory Channel Name

Each memory channel can also be assigned with a name. The name should contain not more than 10 characters (alphanumeric characters and symbols).

1. **Press F7 [M.LIST] to display the Memory Channel List screen.**
2. **Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the memory channel to be named.**
3. **Press F4 [NAME].**
4. **Use the function keys, [MULTI/CH] control or USB keyboard to enter a name.**
   - Enter a name that contains not more than 10 characters.

Key	Behavior
F1 [SPACE]	Inserts a space.
F2 [–]/ F3 [+]	Selects a character.
F4 [◄‖]/ F5 [‖►]	Moves the cursor.
F [BACK SPACE]	Deletes the character to the left of the cursor.
F [DEL]	Deletes the character to the right of the cursor.
F [CHAR]	Switches the type of character to edit. Pressing the key each time switches the selection in the following sequence: ABC (upper case) → abc (lower case) → !”# (symbols) → ABC (upper case)

5. **Press F6 [SAVE] to register the name.**
   - Pressing **F7 [CANCEL]** returns the display to the Memory Channel List screen without assigning a name to the memory channel.

- Characters that can be used are characters that can be input using the keyboard selected in menu [9-01] “Keyboard Language (USB Keyboard)”.
- Quick memory channels cannot be assigned with a name.
- Only memory channels that contain registered operating data can be assigned a name.

Quick Memory Channels

Quick memory is a function that enables speedy registration of temporary data without specifying a memory channel. For example, this function is useful for registering the operating data of the mobile station that this transceiver communicates with when moving within a specific band to search for a DX station.
A quick memory channel can be called up only during operation in the VFO mode. The following types of operating data can be registered to a quick memory channel.

- Frequency/mode of VFO A and VFO B
- TX and RX functions
- Status of the RIT function
- Status of the XIT function
- RIT/XIT frequency
- Status of the FINE-tuning function
- Status of the noise blanker
- Noise reduction status
- Status of the beat canceler
- Status of the notch filter function
- RX filter

Registering a Quick Memory Channel

Up to 10 quick memory channels (Q0 to Q9) can be registered on this transceiver. The latest operating data that is registered is assigned to “Q0”. Whenever operating data is newly registered, the current registered data in “Q0” will be shifted to “Q1”, while the newly-registered data will occupy the “Q0” channel.

● Press [Q-M.IN] to register the operating data to the quick memory channel.

- When in the VFO mode, pressing **[Q-M.IN]** registers the operating data to the channel 0.
- When in the quick memory channel mode, pressing **[Q-M.IN]** registers the operating data to the selected quick memory channel.
- Each time new operating data is registered, the currently-registered data will be shifted to the next larger channel number.

- When the memory channel mode is active, pressing **[Q-M.IN]** does not register data to a quick memory channel.
- If all the quick memory channels are occupied with registered data, pressing **[Q-M.IN]** erases the oldest operating data which is stored in the largest quick memory channel number.

Calling up a Quick Memory Channel

Follow the steps below to call up a registered quick memory channel.

1 **Press [Q-MR] to call up the operating data from the quick memory channel.**
Displays the quick memory channel number.

2 **Turn the [MULTI/CH] control to switch the quick memory channel.**

- Pressing **[Q-MR]** again exits the quick memory channel mode and returns the transceiver to the VFO mode.

- When data is retrieved from a memory channel for use or when operating data is not registered to the quick memory channel, pressing **[Q-MR]** does not call up the quick memory channel.
- Temporary changes can be made to the frequency and other operating data without affecting the operating data that is registered in the quick memory channel. To register the operating data after changes are made, press **[Q-M.IN]** to register it to a quick memory.

Configuring the Number of Quick Memory Channels

This transceiver comes with 10 quick memory channels (Q0 to Q9). However, it is possible to customize the number of quick memory channels for registering data.

● Configure in Menu [4-00] “Number of Quick Memory Channels”

Setting Value	3/ 5 (default)/ 10 [ch]

- When the number of quick memory channels is reduced from a larger to a smaller number, registered data that exceeds the smaller number of channels will be erased.
- The preconfigured number of quick memory channels cannot be changed when a quick memory channel is being called up.

Erasing a Quick Memory Channel

Follow the steps below to erase all registered operating data from the quick memory channels.

1 **Press [Q-MR] to call up a quick memory channel.**

2 **Press and hold [Q-MR].**
A message appears which prompts the user to confirm deletion of all the operating data in the quick memory channels.

3 **Press F4 [OK] to erase the operating data.**

- Operating data is erased from the quick memory channels and the transceiver switches to the VFO mode.
- Pressing **F7 [CANCEL]** clears the confirmation message without erasing the operating data from the quick memory channels.

Memory Shift (Quick Memory → VFO)

Follow the steps below to copy the operating data of a quick memory channel to the VFO.

1 **Press [Q-MR] to call up a quick memory channel.**

2 **Turn the [MULTI/CH] control to select the quick memory channel for which the operating data is to be copied.**

3 **Press and hold [M/V], or press F6 [M ▶ VFO].**

- Operating data is copied from the quick memory channel to the VFO and the transceiver switches to the VFO mode.
- When the operating data is temporarily changed, the altered operating data is copied to the VFO.

10 SCAN

Scan is a function that searches for signals by automatically altering the frequency. This transceiver makes use of the following scan methods to search for signals.

Scan Type		Purpose
Normal Scan	Program Scan	Performs scan in the frequency ranges that are registered in the memory channels for specific band segments (P0 to P9).
	VFO Scan	Performs scan on the entire RX frequency band. When Program Scan is set to OFF for all the memory channels for specific band segments, Program Scan switches automatically to VFO Scan. However, when VFO Scan is selected, VFO Scan is performed even when not all channels are set to OFF.
Scan Using Memory Channels	All-Channel Scan	Scans all Memory channels from 00 to 99, P0 to P9, and E0 to E9.
	Group Scan	Scans the grouped memory channels.
	Quick Memory Scan	Scans the Quick Memory channels.

Program Scan

Program Scan performs scan between the range specified by the start and end frequencies which are registered in the each of memory channels for specific band segments (P0 to P9).

- Configure the frequency range for Program Scan in the memory channels for specific band segments (P0 to P9). Up to 10 frequency ranges that are transmitted by specific stations can be preconfigured. Enabling standby in a nearby frequency makes it easy to perform tuning to a specific station when the station starts communication in the preconfigured frequency range.

- Program Scan performs scan between the start and end frequencies of a memory channel for specific band segments and moves to the next channel after scanning of the specified frequency range has ended.
- While scanning is in progress, turning the Tuning or **[MULTI/CH]** control allows the frequency to be changed quickly. The same operation can also be used to change the scanning direction.
- Scanning is performed in the ascending order from low to high frequency. Configuring the end frequency to a value smaller than the start frequency by turning the Tuning or **[MULTI/CH]** control reverses the scanning direction (high to low frequency).
- Scanning is performed based on the step frequency of the Tuning control when in the SSB, CW, FSK and PSK modes, while it is based on the step frequency of the **[MULTI/CH]** control when in the FM mode, and fixed at 100 Hz in the AM mode.
- Scanning stops when signals are received while performing Program Scan (VFO Scan) in the FM mode or during Memory Scan (All-channel Scan or Group Scan) or Quick Memory Scan regardless of the operating mode. For more information on the conditions to resume scanning, please refer to “Configuring the Conditions for Resuming Scan”.
- During standby for the CTCSS tone in the FM mode, scan stops only when there is a matching CTCSS tone.
- When the **[SQL]** control is turned to the right to a level that far exceeds the squelch threshold while in the FM mode, scanning may not stop even at a channel where a signal is present. Configure the squelch level to a point that is near the squelch threshold.

Starting the Program Scan (VFO Scan)

1 **Press [M/V] to switch to VFO mode.**

2 **Press F5 [SCAN] to start program scan (VFO scan).**

- Pressing **F5 [SCAN]** again or **[ESC]** ends the Program Scan (VFO Scan).

Configuring the Program Scan (VFO Scan) Frequency Range

Scanning can be configured to the frequency range specified in the memory channels for specific band segments (Program Scan) or the entire RX frequency band (VFO Scan).
To perform Program Scan, register the memory channels for specific band segments.

1 **Press [M/V] to switch to VFO mode.**

2 **Press and hold F5 [SCAN] to display the Program Scan segment screen.**

3 **Press F2 [◄‖]/ F3 [‖►] to select a memory channel for specific band segments.**

4 **Press F4 [☐ ⇆ ☑] to select whether to scan the memory channel for specific band segments.**

- Pressing F4 [☐ ⇆ ☑] each time selects (performs scan) or deselects (does not perform scan) the checkbox.
- When performing VFO Scan, deselect the checkboxes for all the memory channels for specific band segments or press **[VFO/PRG]** to switch the display to “VFO SCAN”.
- Pressing **F6 [SEL.ALL]** selects the checkboxes for all the memory channels for specific band segments.
- Pressing **F7 [CLR.ALL]** deselects the checkboxes for all the memory channels for specific band segments.

- Examples on the configuration of Program Scan and VFO Scan:
  - Configure the memory channels for specific band segments such that the checkboxes for P1, P3 and P5 are selected. Next, press **F5 [SCAN]**. Program Scan starts and scanning is performed in the frequency range registered for the respective channels.
  - Configure the memory channels for specific band segments such that all the checkboxes are deselected and press **F [SCAN]**. Or press **[VFO/PRG]** to switch the display to "VFO SCAN". VFO Scan is performed on the entire RX frequency band.
  - The checkbox will remain deselected for memory channels that do not contain any operating data. These checkboxes cannot be selected.
  - For more details on registering memory channels for specific band segments, please refer to 9-4 "Configuring the Program Scan Frequency Range".

Switching the Scan Speed

The time interval for switching the Program Scan (VFO Scan) frequency can be configured in modes other than FM.

1 **Press F3 [–] or F4 [+] while Program Scan (or VFO Scan) is in progress.**
The scan speed is shown below the frequency display.

The frequency switching interval changes as follows.

Scan Speed Display	Frequency Switching Interval
SCAN-SPD1	10 ms
SCAN-SPD2	30 ms
SCAN-SPD3	100 ms
SCAN-SPD4	150 ms
SCAN-SPD5	200 ms
SCAN-SPD6	250 ms
SCAN-SPD7	300 ms
SCAN-SPD8	350 ms
SCAN-SPD9	400 ms

Program Slow Scan

Program Slow Scan is a function that extends the frequency switching interval (performs scan more slowly) using the preconfigured frequency for performing Program Scan (frequency point) and the frequencies before and after this point (segment). Switching slowly between the specified frequency (frequency point) and the corresponding segment allows the communication status to be checked in detail.

- To perform Program Slow Scan, register a frequency range to a memory channel for specific band segments in advance.

Turning ON/OFF Program Slow Scan

To combine the use of Program Slow Scan while Program Scan is running, set Program Slow Scan to ON in advance.

- When scanned frequency falls in the segment for Program Slow Scan during Program Scan, "SCAN-SLOW" is displayed on the screen and the speed of frequency switching slows down.

Configure in Menu [4-02] "Program Slow Scan"

Setting Value	Off/ On (default)

Configuring the Frequency Points for Program Slow Scan

The frequency points for extending the frequency switching interval during Program Slow Scan can be configured as follows.

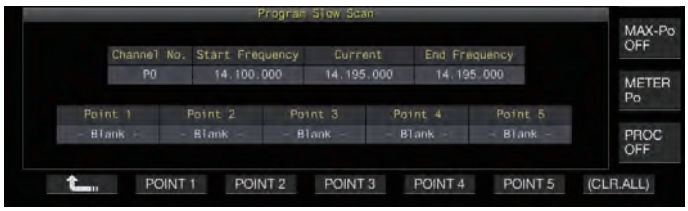
- Up to 5 frequency points can be configured for each memory channel assigned to specific band segments (P0 to P9).
- To configure the frequency points, register a band segment to a memory channel for specific band segments in advance.

1 **Press [M/V] to switch to the memory channel mode.**

2 **Press F7 [M.LIST] to display the Memory Channel List screen.**

3 **Press F2 [▲] or F3 [▼], or turn the [MULTI/CH] control to select a memory channel for specific band segments.**

4 **Press F5 [SLW.SCN] to display the Program Slow Scan screen.**



5 **Turn the Tuning control and align the "Current" frequency as the frequency point for Program Slow Scan.**

6 **Press any of the function keys (F2 [POINT 1] to F6 [POINT 5]) to configure the center point of the preferred frequency range to perform Program Slow Scan.**

- Pressing and holding the key clears the frequency point that is stored.
- Pressing and holding **F7 [(CLR ALL)]** clears all the frequency points.

7 **Press F1 [ ] to exit the Program Slow Scan screen.**
The display returns to the Memory Channel List screen.

- Pressing a function key (**F2 [Point 1]** to **F6 [POINT 5]**) that already contains a frequency point overwrites the frequency point with the new input.
- When configuring a frequency point, frequencies that are smaller than 10 Hz are rounded off.

Configuring the Segment for Program Slow Scan

The frequency switching interval during Program Scan slows down in the preconfigured segment that contains frequencies before and after the frequency point for Program Slow Scan.

● Configure in Menu [4-03] "Program Slow Scan Range"

Setting Value	100/ 200/ 300 (default)/ 400/ 500 [Hz]

- For example, when 500 [Hz] is selected, the frequency switching interval is extended to a range of ± 500 Hz from the frequency point.

Scan Hold

While Program Scan (VFO Scan) is performed in a mode other than FM, changing the frequency by turning the Tuning or **[MULTI/CH]** control pauses the scan operation for 5 seconds.
Signals can be received temporarily without stopping the scan operation.

● Configure in Menu [4-04] "Scan Hold"

Setting Value	Off (default)/ On

When Scan Hold is set to "On", signals are received with Program Scan paused for 5 seconds.

Memory Scan

Memory Scan allows the registered memory channel to be automatically switched at a specific time interval for scanning. There are 2 types of Memory Scan modes. All-channel Scan performs scan on all the memory channels that are registered with operating data, while Group Scan performs scan on a selected group among the memory channels.

Performing Memory Scan

1 **Press [M/V] to switch to the memory channel mode.**

2 **Press F5 [SCAN] to start memory scan.**
- Turning the **[MULTI/CH]** control allows the scan channel to jump rapidly to the next or previous channels.
- Pressing **F5 [SCAN]** again or pressing **[ESC]** ends Memory Scan.
- The scan direction is fixed at the ascending order.

- The frequency switching interval during Memory Scan is 400 ms. However, when a CTCSS tone is received in the FM mode, the frequency switching interval is extended to 600 ms. During Memory Scan, "SCANNING" is displayed instead of the scan speed.

Configuring All-channel Scan and Group Scan

1 **Press [M/V] to switch to the memory channel mode.**

2 **Press and hold F5 [SCAN] to display the Memory Scan group screen.**

3 **Press F2 [ ] or F3 [ ] to select a memory group.**

4 **Press F4 [ ] or turn the [MULTI/CH] control to select whether to start scanning of the memory channels belonging to a memory group.**
- Pressing F4 [ ] each time selects (performs scan) or deselects (does not perform scan) the checkbox.
- When performing All-channel Scan, select the checkboxes for all the memory groups.
- Pressing **F6 [SEL.ALL]** selects the checkboxes for all memory groups.
- Pressing **F7 [CLR.ALL]** deselects the checkboxes for all memory groups.
- Memory channels are classified into memory groups as follows. The classification of the memory groups and channels cannot be altered.

Group	Memory Channel	Group	Memory Channel
0	00 to 09	6	60 to 69
1	10 to 19	7	70 to 79
2	20 to 29	8	80 to 99
3	30 to 39	9	90 to 99
4	40 to 49	P	P0 to P9
5	50 to 59	E	E0 to E9

- Pressing **F5 [SCAN]** does not start the scan operation when the memory groups to be scanned are configured as follows.
  - When the checkboxes for all the memory groups are deselected.
  - When operating data is not stored in the memory channels of a memory group, even if the checkboxes of the memory group are selected.
  - When all the memory channels belonging to a memory group are locked out, even if the checkboxes of the memory group are selected.
- Examples on the configuration of All-channel Scan and Group Scan:
  - When the checkboxes for Memory Groups 1 and 5 are selected, pressing **F5 [SCAN]** activates Group Scan. In this case, scan is performed on the memory channels included in Memory Groups 1 and 5.
  - When the checkboxes for all memory groups are selected, pressing **F5 [SCAN]** activates All-channel Scan.

Memory Channel Lockout

Selected memory channels can be omitted (locked out) in advance before performing Memory Scan.

1 **Press F7 [M.LIST] to display the Memory Channel List.**

2 **Press F2 [▲] or F3 [▼], or turn the [MULTI/CH] control to select a memory channel.**

3 **Press F6 [L.OUT] to lock out the memory channel.**

- Lockout is applied to memory channels for which the "Lockout" checkbox is selected.
- Pressing **F6 [L.OUT]** again cancels the lockout mode.
- "L.OUT" lights up in the standard mode screen and compression mode screen.

Quick Memory Scan

Quick Memory Scan allows the registered quick memory channel to be automatically switched at a specific time interval for scanning.

1 **Press [Q-MR] to call up a quick memory channel.**

2 **Press F5 [SCAN] to start quick memory scan.**

- Turning the **[MULTI/CH]** control allows the scan channel to jump rapidly to the next or previous channels.
- Pressing **F5 [SCAN]** again or pressing **[ESC]** ends Quick Memory Scan.
- The scan direction is fixed at the ascending order.

Configuring the Conditions for Resuming Scan

Scanning stops when signals are received while performing Program Scan (VFO Scan) in the FM mode or during Memory Scan or Quick Memory Scan regardless of the operating mode.

- The conditions for resuming the scan operation after it has stopped can be configured.

Time-operated (Time-operated mode):

Pauses scan for 3 seconds after signals are received. Continues to pause scan for another 3 seconds if signal reception is still in progress after 3 seconds.
Scan operation resumes after this interval even if reception is still ongoing. (The maximum duration for pausing scan using the time-operated mode is 6 seconds.)

Carrier-operated (Carrier-operated mode):

Pauses scan while signals are received. Scan operation resumes when signals are not received for a duration of 2 seconds.

● Configure in Menu [4-05] "Scan Resume"

Setting Value	Time-operated (default)/ Carrier-operated

11 USB/FILE MANAGEMENT

Managing Different File Types

The following data can be stored as files on this transceiver.

- Settings data of the transceiver
- Settings data of TX and RX equalizers
- Audio data of manual and full-time recordings
- Audio data of timer recordings
- Screen capture image data (can be stored but cannot be displayed on this transceiver)
- CW, RTTY and PSK communication log data
- KNS communication log data (can be stored but cannot be displayed on this transceiver)

Destination for Saving Files

Files are stored in the built-in memory of the transceiver (maximum capacity of 1 GB) in the default setting. However, settings can be changed for files to be saved to a USB flash drive that is connected to the transceiver.

Copying Files Stored in the Built-in Memory to an External Source

Files that are stored in the built-in memory of the transceiver can be copied to a PC that is connected to this transceiver via a USB cable.

Folder Configuration of the Built-in Memory

When copying files to a PC via a USB cable, the built-in memory of the transceiver is recognized on the PC as a removable device with the name “TS-890”. The folder configuration of the “TS-890” removable device is as follows.

TS-890	
├CAPTURE	
├DECODE	Folder for captured image files
│ ├CW	Folder for CW communication log files
│ ├FSK	Folder for FSK communication log files
│ └PSK	Folder for PSK communication log files
├KNS_LOG	Folder for KNS communication log files
├RX_REC	Folder for audio files of manual and full-time recordings
├SETTINGS	
│ ├DATA	Folder for settings data files
│ ├RX_EQ	Folder for RX equalizer data files
│ └TX_EQ	Folder for TX equalizer data files
└TIMER_REC	Folder for audio files of timer recordings

- All the folders above are read-only files. They cannot be edited or deleted on the PC.
- Among the folders above, only those selected by the operations in “Copying Files to a PC” (see 11-4) will appear under “TS-890” removable device.

Folder Configuration of the USB Flash Drive

KENWOOD	
└TS-890	
├CAPTURE	Folder for captured image files
├DECODE	
│ ├CW	Folder for CW communication log files
│ ├FSK	Folder for FSK communication log files
│ └PSK	Folder for PSK communication log files
├IMAGE	Folder for screen saver image files
├KNS_LOG	Folder for KNS communication log files
├RX_REC	Folder for audio files of manual and full-time recordings
├SETTINGS	
│ ├DATA	Folder for settings data files
│ ├RX_EQ	Folder for RX equalizer data files
│ └TX_EQ	Folder for TX equalizer data files
└TIMER_REC	Folder for audio files of timer recordings

Image Files for Use as Screen Savers

Write image files to be used as screen savers (Type 3) in advance to the “Folder for screen saver image files (IMAGE)” of the USB flash drive such as via a PC before loading them into the built-in memory of the transceiver.

- For more details on the method of configuration, please refer to “Configuring the Screen Saver”. (16-1)

Saving Files (For Both USB Flash Drive and Built-in Memory)

- When the date and time are not configured in the CLOCK menu, the recorded date and time when the file is saved is determined with the timing at which this transceiver is powered on as January 1, 2018, 0:00.
- A maximum number of 255 files can be stored in each folder. When trying to save files that exceed this number, an error occurs and a screen showing “Insufficient Memory Size” is displayed.
- If the USB flash drive is write-protected when writing files to the USB flash drive, an error occurs and a screen showing “Insufficient Memory Size” is displayed.

Compatible USB Flash Drives

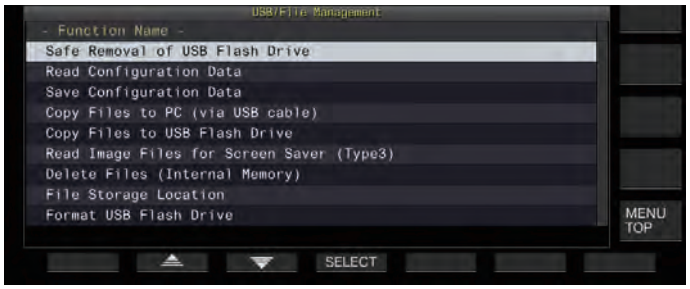
- This transceiver does not come supplied with a USB flash drive. Use a commercially available USB flash drive.
- The USB flash drive needs to be formatted by this transceiver before it can be used. After formatting is complete, a folder is automatically created in the USB flash drive. (Formatted to FAT32)
- When formatting is performed, any file that exists on the USB flash drive will be erased. To prevent data from being lost, back up the necessary files to devices such as a PC before formatting.
- When a compatible USB flash drive is connected to this transceiver, any data that is not found in the folder configuration will be automatically created.
- If multiple USB flash drives are connected to this transceiver at the same time, only the first USB flash drive that is recognized can be used.

- A USB flash drive and USB keyboard can also be connected at the same time via a USB hub.
- The USB-A connector of this transceiver supports the USB 1.1 standard. The USB flash drive is capable of running at the Full Speed (maximum 12 Mbps) transfer rate.
- We do not provide guarantee with regard to the operation and power supply of all USB devices that are commercially available.
- When using an extension cable, make use of one that complies with the USB standard with a length not longer than 3 m.
- If the power consumption of the connected device exceeds the allowable current of this transceiver (0.5 A), a “USB bus power error screen” is displayed.
- This transceiver does not support security-enabled USB flash drives.

USB/File Management Menu Screen

1 **Press [MENU].**

2 **Press F [USB/FILE] to display the USB/File Management menu screen.**



Configuring the Destination for Saving Files

Follow the steps below to select the destination for saving files such as the transceiver data and audio recordings.

1 **Press F2 [▲]/ F3 [▼] to select "File Storage Location".**

2 **Press F4 [SELECT].**

3 **Press F4 [–]/ F5 [+] or turn the [MULTI/CH] control to select the destination for saving the files.**

Setting Value	Internal Memory (default)/ USB Flash Drive

Internal Memory: Saves files to the built-in memory of the transceiver.
USB Flash Drive: Saves files to a USB flash drive.

- The destination for saving files cannot be changed while manual recording or CW/RTTY/PSK communication log recording is in progress. Pressing **F4 [SELECT]** in this case displays a "File destination change error" on the screen.

Saving Settings Data

Settings data or audio data created using this transceiver can also be written to the built-in memory or a USB flash drive.

- To save the data to a USB flash drive, insert a USB flash drive formatted using this transceiver into ⇐ (USB-A).
- << ▭ >> starts to blink when a USB flash drive is connected, and << ▭ >> lights up when the USB flash drive is recognized by this transceiver.

1 **Select "Save Configuration Data" in the USB/File Management menu.**

2 **Press F4 [SELECT].**
File saving starts.
- While file saving is in progress, a "processing" screen is displayed on the screen. (This is not displayed if the duration of the saving process is very short.)

3 **When the "data saving complete screen" is displayed, press F4 [OK].**

- The settings data contains the data of all settings that are currently configured on this transceiver. However, the following are excluded.
  - Data that are stored in the operating environment (CONFIG A or B) that is not currently selected.
  - Screen capture image files
  - Audio data files of manual recordings, full-time recordings and timer recordings
  - Settings data files of TX and RX equalizers
  - CW/TTY/PSK communication log files
  - KNS communication log files
  - Image files for screen savers (Type 3)
- The destination folder cannot be selected.
  - USB flash drive: "\KENWOOD\TS-890\SETTINGS\DATA"
  - Built-in memory: "\SETTINGS\DATA"
- The extension of the saved file is ".dat".
- The saved file is assigned with a name using the date and time in the following format: "yyyymmdd_hhmmss.dat".
- (Example)
  - 20180215_102030.dat (File that is saved on February 15, 2018, 10:20:30 a.m.)
- To save files to a USB flash drive, check the following in advance.
  - The USB flash drive is formatted by this transceiver.
  - The USB flash drive is correctly inserted into this transceiver.
  - There is sufficient free space on the USB flash drive.
  - The USB flash drive is not write-protected or the file system is not corrupted.
- If there is insufficient memory, "Insufficient Memory Size" is displayed on the screen.
- If the USB flash drive is removed while files are being saved to it, "Saving to USB flash drive unsuccessful" is displayed on the screen.
- If the USB flash drive for saving files to is write-protected, "Insufficient Memory Size" is displayed on the screen.

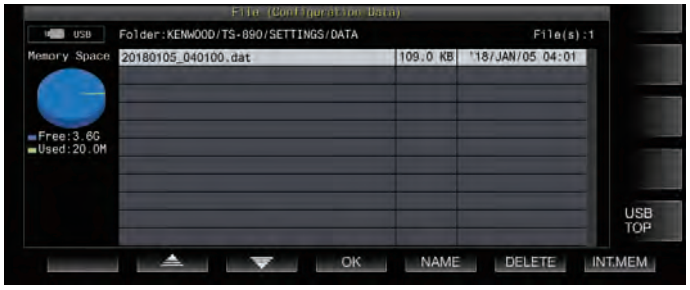
Reading Settings Data

Follow the steps below to read the settings data file of the transceiver that is stored in the built-in memory or a USB flash drive.

- To read data from a USB flash drive, insert the USB flash drive containing the settings data into ⇐USB (USB-A).

1 **Select "Read Configuration Data" in the USB/File Management menu.**

2 **Press F4 [SELECT].**
A screen for selecting the file (DATA) to read appears.



- Information of the location to read files from (built-in memory or USB flash drive) that was last selected on this screen is displayed. However, if a USB flash drive is not connected or cannot be correctly recognized, information of the built-in memory will be displayed.
- If no file is found, "No file is found." is displayed on the screen.

3 **Select the file to read.**

- To read data from the internal memory, press **F7 [INT.MEM]**.
- To read data from the USB flash drive, press **F7 [USB.MEM]**. (If a USB flash drive is not connected, a message will appear prompting you to get ready the USB flash drive.)
- Pressing **F5 [NAME]** allows the file name to be changed.
- Pressing **F6 [DELETE]** displays a message to confirm deletion of the file. Pressing **F4 [OK]** deletes the file.

4 **Press F2 [▲]/F3 [▼] or turn the [MULTI/CH] control to select the settings data file to read.**

5 **Press F4 [OK] to display the selection screen (DATA) for reading the data.**

- Pressing **F7 [CANCEL]** ends the operation without reading a file.

6 **Press F2 [▲] or F3 [▼], or turn the [MULTI/CH] control to select a function group to read.**

7 **Press F5 [☐ ⇆ ☑] to select the checkbox to the left of the settings data name.**

- Pressing **F5 [☐ ⇆ ☑]** again deselects the checkbox. (Settings data will not be read.)

8 **Repeat steps 7 and 8 to select the corresponding checkboxes for the settings data to read.**

9 **Press F4 [OK] to start reading the files.**
Reading of settings data files with a check mark starts. When reading starts, a reading in progress screen is displayed.

- Pressing **F7 [CANCEL]** exits the file selection screen without starting reading and returns the display to the USB/File Management menu screen.
- After the settings data files have been read successfully, a message indicating that reading is complete is displayed.

10 **Press F4 [OK] to end the process.**
This transceiver reboots automatically.

- Data that are not created by this transceiver cannot be read.
- The following function groups can be excluded from the reading process.
  - "Environmental Dependent" data (settings data that are dependent on the installation environment)
    - Antenna selection data and preset data of antenna tuner
    - Settings for items in menu group 6 (settings related to the rear terminals)
    - Advanced menu settings
    - Linear amplifier menu settings
    - Transverter settings
    - LAN menu settings
    - KNS menu settings and KNS registered users' list
    - Clock menu settings
  - "CW/RTTY/PSK Message Memory" data (CW/RTTY/PSK message memory)
  - "Voice Message Memory" data (voice message data)
- If the settings data file is saved in a transceiver with a newer firmware version, pressing **F4 [OK]** in step 9 will result in an error. A "data reading error screen due to mismatch between new and old firmware versions" is displayed and reading is not executed.
- If the settings data file is corrupted, pressing **F4 [OK]** in step 6 will result in an error. A "file reading NG screen" is displayed and reading is not executed.
- If data mismatch is detected after reading a settings data file, a "corrupted data is detected screen" is displayed. When this occurs, pressing **F4 [OK]** runs a full reset and reboots this transceiver.

Changing the Name of Files Stored in the Built-in Memory

The file name of the settings data that is stored on the transceiver can be changed by the user to ease identification.

1 Select "Read Configuration Data" in the USB/File Management menu.

2 Press F4 [SELECT] to display the screen for selecting the file (DATA) to read.

3 Press F5 [NAME].
The file name edit screen is displayed.

4 Use the function keys and the [MULTI/CH] control to edit the file name.

- Enter a name that contains not more than 255 characters.

Key	Operation
F1 [SPACE]	Inserts a space.
F2 [–]/ F3 [+]	Selects a character.
F4 [◄‖]/ F5 [‖►]	Moves the cursor.
F [BACK SPACE]	Deletes the character to the left of the cursor.
F [DEL]	Deletes the character to the right of the cursor.
F [CHAR]	Switches the type of character to edit. Pressing the key each time switches the selection in the following sequence: ABC (upper case) → abc (lower case) → !"# (symbols) → ABC (upper case)

5 Press F6 [SAVE] to save the file name.

- Pressing **F7 [CANCEL]** discards the edited information and returns the display to the USB/File Management menu screen.

Copying Files to a PC

Files that are stored in the built-in memory of this transceiver can be copied to a PC.

- Connect the USB-B connector on the rear panel of this transceiver to a PC using a commercially available USB cable. (See 1-4)

1 Select "Copy Files to PC (via USB Cable)" in the USB/File Management menu.

2 Press F4 [SELECT].
A screen for selecting the files to copy is displayed.

3 Press F2 [▲]/ F3 [▼] or turn the [MULTI/CH] control to select the items to copy.

4 Press F5 [☐ ⇆ ☑] to select the checkbox to the left of the settings data name.

- Pressing **F5 [☐ ⇆ ☑]** again deselects the checkbox. (Files are not copied.)
- Pressing **F6 [CLR.ALL]** deselects all the checkboxes.
- Select at least 1 item to copy from the following.

Display	Description
Configuration Files	Settings data file
Audio Files (RX_REC)	Audio files of manual and full-time recordings
Audio Files (TIMER_REC)	Audio files of timer recordings
Equalizer Files (TX_EQ)	TX equalizer data files
Equalizer Files (RX_EQ)	RX equalizer data files
Communication Log Files (CW)	CW communication log files
Communication Log Files (FSK)	RTTY communication log files
Communication Log Files (PSK)	PSK communication log files
Screen Captured Files	Screen capture image files
KNS Log Files	KNS communication log files

5 Press F4 [OK].
A screen indicating "preparing to copy" is displayed. A "confirmation tone" is output once the copy preparation is completed and a "PC on copy standby screen" is displayed. Then, a removable device with the name "TS-890" appears on the PC.

- When the built-in memory is selected as the destination for saving files and while manual recording or CW/RTTY/PSK communication log recording is in progress, selecting a file to copy followed by pressing **F4 [OK]** will result in an error and an "unable to copy" message will be displayed.
- Pressing **F7 [CANCEL]** while the "preparing to copy" screen is displayed starts the cancel copy operation. When the cancel copy operation is complete, the display returns to the USB/File Management menu screen.
- After the "preparing to copy" screen is displayed, a "confirmation tone" is output once the copy preparation is completed and a copy standby screen is displayed on the PC. Then, a removable device with the name "TS-890" appears on the PC.
- When a remote user is logged in via the KNS function and the communication log is set to ON, selecting "KNS Log Files" and pressing **F4 [OK]** will result in an error and an "unable to copy" message will be displayed.

6 Access the removable device named "TS-890" from the PC and copy the files or folders to the PC.

7 After copy is complete, remove the removable device ("TS-890") safely from the PC.

- The files may not be copied successfully if the proper steps to remove the device safely from the PC are not observed.

8 Press F4 [EXIT].

A confirmation screen on the batch deletion of files is displayed. Items for which the checkboxes are selected on the screen for selecting the files to copy can be deleted from the built-in memory.

- Pressing and holding **F4 [(DELETE)]** executes the file deletion operation.
- Pressing **F7 [KEEP]** leaves the files intact and returns the display to the USB/File Management menu screen.

Deleting Files (Built-in Memory)

Follow the steps below to delete settings data or audio data from the built-in memory. Deletion will apply to the function folders that contain the corresponding files.

1 Select "Delete Files (Internal Memory)" in the USB/File Management menu.

2 Press F4 [SELECT].

A screen for selecting the files to delete is displayed.

3 Press F2 [ ]/ F3 [ ] or turn the [MULTI/CH] control to select the items to delete.

4 Press F5 [☐ ⇆ ☑] to select the checkbox to the left of the settings data name.

- Pressing **F5 [☐ ⇆ ☑]** again deselects the checkbox. (Files are not deleted.)
- Pressing **F6 [CLR.ALL]** deselects all the checkboxes.
- Select at least 1 item to delete.
- Pressing **F7 [CANCEL]** returns the display to the USB/File Management menu screen.

5 Press F4 [OK].

A file deletion confirmation screen is displayed.

6 Press F4 [OK].

File deletion starts.

- Pressing **F7 [CANCEL]** returns the display to the file deletion confirmation screen without deleting the files.

- When the built-in memory is selected as the destination for saving files and the item to be deleted coincides with an item for which manual recording or CW/RTTY/PSK communication log recording is in progress, pressing **F4 [OK]** will result in an error and an "unable to delete" message will be displayed.
- When a remote user is logged in via the KNS function and the communication log is set to ON, selecting "KNS Log Files" as an item to delete and pressing **F4 [OK]** will result in an error and an "unable to delete" message will be displayed.

Formatting a USB Flash Drive

The USB flash drive needs to be formatted by this transceiver before it can be used. USB flash drives cannot be recognized if they are not formatted by this transceiver.

- Formatting a USB flash drive using this transceiver erases all data that exist in the USB flash drive. As such, make sure to save the necessary data to a PC or other external data storage devices before deleting.

1 Insert the USB flash drive into the ⇠ (USB-A) connector.

<< >> starts to blink and lights up when the USB flash drive is recognized by this transceiver.

2 Select "Format USB Flash Drive" in the USB/File Management menu.

3 Press F4 [SELECT] to start formatting.

- A message to confirm the start of the formatting process is displayed.
- Pressing **F7 [CANCEL]** ends the operation without formatting the USB flash drive.

4 Press F4 [OK].

When formatting is complete, the display returns to the USB/File Management menu screen.

Copying Files to a USB Flash Drive

Files that are stored in the built-in memory of this transceiver can be copied to a USB flash drive.

- Insert a USB flash drive formatted using this transceiver into ⇠ (USB-A).

1 Select "Copy Files to USB Flash Drive" in the USB/File Management menu.

2 Press F4 [SELECT].

A screen for selecting the files to copy is displayed.

3 Press F2[ ] or F3[ ], or turn the [MULTI/CH] control to select the items to copy.

4 Press F5 [☐ ⇆ ☑] to select the checkbox to the left of the settings data name.

- Pressing **F5 [☐ ⇆ ☑]** again deselects the checkbox. (Files are not copied.)
- Pressing **F6 [CLR.ALL]** deselects all the checkboxes.
- The items that can be copied are the same as those in the table in "Copying Files to a PC". Select at least 1 item.

5 Press F4 [OK].

Copy starts and a copy in progress screen is displayed. After file copying is complete, a confirmation screen on the batch deletion of files is displayed.
Items for which the checkboxes are selected on the screen for selecting the files to copy can be deleted from the built-in memory.

- Pressing and holding **F4 [(DELETE)]** executes the file deletion operation.
- Pressing **F7 [KEEP]** leaves the files intact and returns the display to the USB/File Management menu screen.

- If the number of files exceeds 255 while copy is in progress, the copy operation stops.
- When removing the USB flash drive, make sure to execute “Safe Removal of USB Flash Drive”.

- If the same file on the source location is also found in the destination USB flash drive, the latter file will be overwritten.
- If there is insufficient memory in the USB flash drive for all the files to be copied, pressing **F4 [OK]** will result in an error and “Insufficient Memory Size” will be displayed on the screen.
- Pressing **F7 [CANCEL]** while copying is in progress starts the cancel copy operation. When the cancel copy operation is complete, the display returns to the USB/File Management menu screen.
- While manual recording or CW/RTTY/PSK communication log recording is in progress, selecting a file to copy followed by pressing **F4 [OK]** will result in an error and an “unable to copy” message will be displayed.
- When a remote user is logged in via the KNS function and the communication log is set to ON, selecting “KNS Log Files” and pressing **F4 [OK]** will result in an error and an “unable to copy” message will be displayed.

Safely Removing the USB Flash Drive

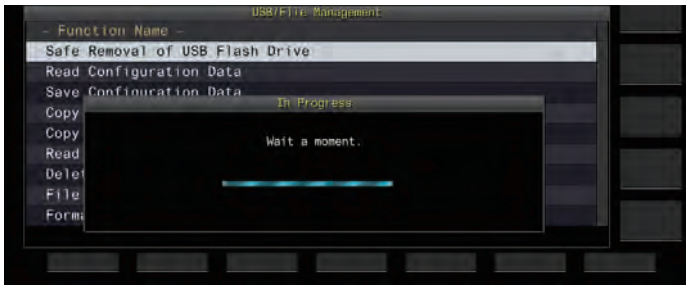
When removing a USB flash drive from this transceiver, make sure to follow the steps below to remove the device safely. Failure to do so may result in the damage of the USB flash drive, settings data files and audio data files or malfunction of this transceiver.

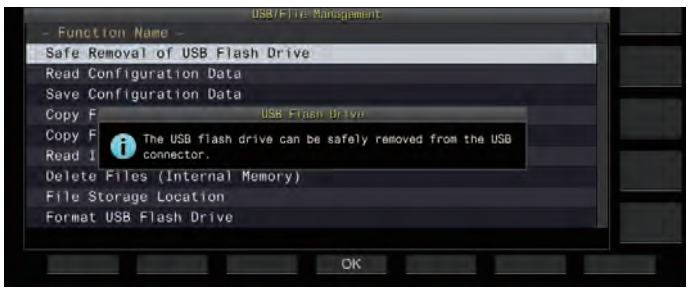
1 **Select “Safe Removal of USB Flash Drive”.**

2 **Press F4 [SELECT].**
A message on the safe removal of the USB flash drive is displayed.

- Pressing **F7 [CANCEL]** ends the operation without performing the safe removal of the USB flash drive.

3 **Press F4 [OK].**
Safe removal starts.





4 **Press F4[OK].**
The USB flash drive can now be removed.

Recording/Playing a Voice Message

This transceiver comes with a function for recording, playing and transmitting standard voice messages as well as a function for recording and playing audio that is transmitted or received.
Voice messages can be recorded to a maximum of 6 channels.
Messages recorded with a microphone can also be transmitted.

- This is handy during DX-pedition or contest operation where repeated calls need to be made over a long period of time or for adjusting an antenna or transceiver by transmitting a test radio wave. The maximum recording time is 100 seconds. In other words, recording to all the channels is possible up to a duration of 100 seconds in total.

Recording a Voice Message

Follow the steps below to record a voice message to a voice message channel (TX CH 1 to TX CH 6).

1 **Press the mode key to select either SSB, FM or AM mode.**

2 **Press F2 [TX MSG] to display the Voice Message screen.**

3 **Press and hold the function key (F2 [CH 1] to F7 [CH 6]) corresponding to the channel for storing the voice message.**
A message to confirm the start of voice message recording appears.

- If **F2 [CH 1]** to **F7 [CH 6]** is not displayed, press **F1 [MORE]**.

4 **Press F2 [REC IN].**

- Pressing **F2 [REC IN]** each time switches the audio input path.

Setting Value	MIC (default)/ ACC 2/ USB/ LAN

- To adjust the recording level, turn the **[MIC]** control. Adjust the recording level while monitoring the peak recording level on the recording level meter such that the peak does not show in the red zone.
- Pressing **F7 [CANCEL]** ends the recording.

5 **Press and hold F4 [REC].**
Recording continues and the recording time of the voice message is displayed while **F4 [REC]** is pressed and held down.

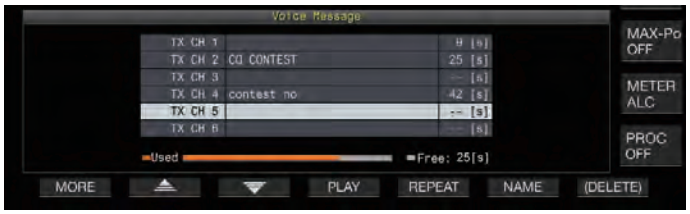
6 **Releasing F4 [REC] ends the recording and saves the voice message.**

- Recording ends automatically when the total recording time of all channels exceeds 100 seconds even when the **F4 [REC]** key is still pressed down.
- This transceiver does not allow continuous voice message recording using multiple channels.
- When a new message is recorded, the voice message that already exists on the channel will be overwritten.

Registering a Name for a Voice Message

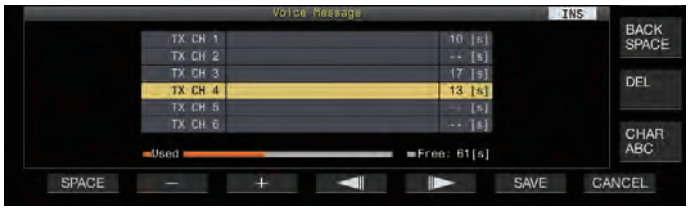
Recorded voice messages can be assigned with a name.

1 **Press F2 [TX MSG] to display the Voice Message screen.**



2 **Select the voice message to name.**

3 **Press F6 [NAME].**
Doing so enables editing of the voice message name.



4 **Use the function keys, [MULTI/CH] control or USB keyboard to input the characters.**

Key	Operation
F1 [SPACE]	Inserts a space.
F2 [–]/ F3 [+]	Selects a character.
F4 [◄‖]/ F5 [‖►]	Moves the cursor.
F [BACK SPACE]	Deletes the character to the left of the cursor.
F [DEL]	Deletes the character to the right of the cursor.
F [CHAR]	Switches the type of character to edit. Pressing the key each time switches the selection in the following sequence: ABC (upper case) → abc (lower case) → !"# (symbols) → ABC (upper case)

5 **Press F6 [SAVE] to save the name of the voice message.**

- Pressing **F7 [CANCEL]** discards the input characters and exits the editing mode for the voice message name.

Playing Back a Voice Message

Follow the steps below to play back a recorded voice message.

1 Select a voice message channel to play back.

2 Press F4 [PLAY] to play back the voice message.
The voice message playback screen appears.

The following operations are possible while a voice message is being played back.

Operation	Behavior
Press and hold F6 [FF ▶▶].	Fast forwards the voice message. • Release the key to resume playback at the normal speed.
Press and hold F2 [◀◀ REW] .	Rewinds the voice message. • Release the key to resume playback at the normal speed.
Press F3 [❚❚ PAUSE].	Pauses the voice message.
Press F3 [▶ PLAY] while playback is paused	Resumes playback from the position where it was paused.
Press F4 [■ STOP].	Stops the playback of voice message.
Press [ESC].	Closes the Voice Message screen and ends the playback.

Adjusting the Playback Volume

Configure the volume level when playing back a voice message.

● Configure in Menu [1-01] "Voice Message Volume (Play)"

Setting Value	Off/ 1 to 10 (default) to 20 (1 step)

Configuring to a larger value raises the volume level. Selecting "Off" mutes the playback sound.

- When TX monitor is ON, the voice message is output as the TX monitor audio so the volume changes in tandem with the TX monitor level.
- For more details on adjusting the TX monitor level, please refer to (8-3).

Sending a Voice Message

A recorded voice message can be transmitted while it is being played back.

1 Press F2 [TX MSG] to display the Voice Message screen.

2 Press and hold the function key (F2 [CH 1] to F7 [CH 6]) corresponding to the channel that contains the voice message to be transmitted.
- A voice message playback screen is displayed, and the voice message is transmitted.

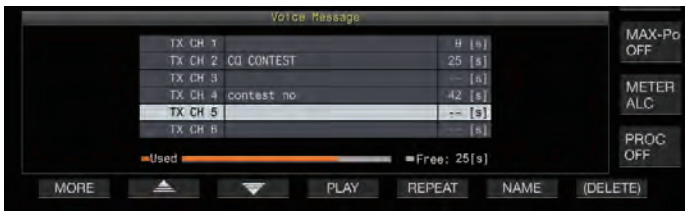
- Turning the **[MIC/PITCH]** control while transmission of a voice message is in progress enables the gain level of the microphone used exclusively for the voice message to be adjusted.
- The following operations are possible while a voice message is being transmitted.

Operation	Behavior
Press F5 [REPEAT].	Plays back and transmits the voice message repeatedly. Pressing **F5 [REPEAT]** again ends repeat playback and transmission, and returns this transceiver to the RX mode. • << ⮌ >> lights up while repeat playback is in progress. • The time interval for repeating the transmission can be configured.
Press F4 [■ STOP].	Stops transmission of the voice message and closes the voice message transmission screen.
Press [ESC].	Closes the Voice Message screen and ends transmission of the voice message.

Deleting a Voice Message

Follow the steps below to delete a recorded voice message.

1 Select a channel that contains the voice message to be deleted.



2 Press and hold F7 [(DELETE)] to delete the selected voice message.

Configuring the Time Interval for Repeated Transmission

The time interval for repeating playback of a voice message can be configured.

● Configure in Menu [5-16] "CW/Voice Message Retransmit Interval Time"

Setting Value	0 to 10 (default) to 60 [s] (1 step)

Configuring to a larger value lengthens the playback interval.

Recording/Playing Voice Communication

This transceiver can be used to record voice communication or play back the recordings.
Recording functions that can be used on this transceiver are as follows.

Manual Recording

- Voice recordings up to 9 hours per file can be stored in the built-in memory of this transceiver. As the built-in memory is also used by other functions, the maximum recording time varies depending on the remaining space available.
- Voice data up to 18 hours per file can be recorded when a USB flash drive is used. If recording continues for a duration longer than 18 hours per file, a new file will be created upon reaching 18 hours and recording will continue.

Full-time Recording

This recording function records the most recent voice data up to the last 30 seconds to an audio file.
Timer Recording (USB Flash Drive Only)
This function records audio based on the preconfigured duration and conditions. For more details on the timer recording operation, please refer to Chapter 14 “CLOCK DISPLAY/TIMER”.

- If DC power is turned off during recording, the saving of the file recorded at that time is not guaranteed. To turn off the power during recording, do so using **[⏻]** on the front panel.

Manual Recording

The [●] and [■] keys can be used to start or stop recording of communication using this transceiver.

1 **Press [●] to start recording.**
- “● REC” appears on the screen and the [REC] LED lights up.

2 **Press [■] to end the recording.**
- “● REC” disappears from the screen and the [REC] LED light goes off.

- When the remaining memory at the destination for storing the file runs out while recording is in progress, a “recording end” tone is output and the recording ends automatically.

Full-time Recording

This recording function records the most recent communication audio up to the last 30 seconds. This allows the user to check the content of the most recent voice communication.

Configuring the Maximum Duration for Full-time Recording

● Configure in Menu [6-00] “Playback Time (Full-time Recording)”

Setting Value	Last 10/ Last 20/ Last 30 (default) [s]

Saving Full-time Recording Audio

● Press and hold [●].
- The <<[REC]>> LED starts to blink for 1 second.
- The most recent audio until [●] is pressed and held down is recorded to the built-in memory or USB flash drive according to the preconfigured maximum duration (number of seconds) for full-time recording.

- Pressing **F1 [RX PLAY]** or **F2 [TX MSG]** does not activate full-time recording if manual recording is in progress.
- When the remaining memory at the destination for storing the file is running out, a “Insufficient memory space” message is displayed on the screen and recording ends automatically.
- When the squelch did not open for a duration longer than the preconfigured recording time, pressing and holding [●] does not activate recording.

Audio Recording in Tandem with Squelch

Recording of the RX audio can be activated in tandem with the squelch operation.

● Configure in Menu [6-01] “Recording with Squelch”

Setting Value	Off/ On (default)

Off: Performs recording even when a signal is not received.
On: Performs recording only when the squelch opens. (Closing the squelch while recording is in progress pauses the recording operation.)

- When “Recording with Squelch” is enabled, the “● REC” remains lit even when the squelch is closed. Also, the “● REC” remains lit even if the squelch has not opened at all. (In this case, a file will not be generated when recording ends.)

Quick Playback

This function allows playback of the most recent manual recording or full-time recording audio file.

Playback

● **Press [▶] to play back the most recent audio file.**
- "▶ PLAY" and the playback progress bar appear.

- The selected audio file is played back when the audio file screen is displayed.

Pausing Playback

● **Press [▶] during playback to pause the audio file.**
- <<▮▮>> lights up.

Pressing [▶] again resumes the playback.

Stopping Playback

● **Press [■] to stop playback of the audio file.**
- The light of "▶ PLAY" and that of the playback progress bar goes off.

Adjusting the Playback Volume

Turn the **[AF]** control to adjust the playback volume.

Audio Recording File Screen

Audio files saved via manual recording, full-time recording or timer recording can be operated on this screen.

Playing Back an Audio File

Follow the steps below to play back audio files that are stored in the built-in memory or a USB flash drive.
To use a USB flash drive, insert it into ⇐ (USB-A) in advance and check to ensure that it is recognized by this transceiver.

1 **Press F1 [RX PLAY] to display the audio recording file screen.**

2 **Press F7 [INT.MEM] or F7 [USB MEM] to toggle between the screens for the built-in memory and USB flash drive.**
- Pressing **F7 [INT.MEM]** displays the audio file (built-in memory) screen. "Internal" is shown on the screen.
- Pressing **F7 [USB MEM]** displays the audio file (USB flash drive) screen. "USB" is shown on the screen.
- To change the folder to browse, press **F1 [FOLDER]**.
- Files recorded using the timer-recording reservation function are stored in the TIMER_REC folder, while all other recordings are stored in the RX_REC folder.

3 **Press F2[▲]/ F3[▼] or turn the [MULTI/CH] control to select the audio file to play back.**

4 **Press F4 [PLAY] or [▶] to play back the audio file.**

The following operations are possible while an audio file is being played back.

Operation	Behavior
Press and hold F5 [FF ▶▶].	Fast forwards the audio file. Release the key to resume playback at the normal speed.
Press and hold F2 [◀◀ REW] .	Rewinds the audio file. Release the key to resume playback at the normal speed.
Press F3 [▮▮ PAUSE].	Pauses the audio file. Pressing **F3 [PLAY]** while playback is paused resumes playback from the position where it was paused.
Press F7 [NEXT ▶▶|].	Plays back from the beginning of the audio file that immediately precedes the audio file that is current playing.
Press F1 [|◀◀ PREV] twice quickly.	Plays back from the beginning of the audio file that immediately follows the audio file that is current playing.
Press F1 [|◀◀ PREV] once.	Plays back the currently playing audio file again from the beginning.
Press F4 [■ STOP].	Stops playback of the audio file.
Press [ESC].	Exits the audio file playback screen and audio recording file list screen.
Turn [MULTI/CH].	Cueing is possible when 2 or more audio files are saved.

- RX audio is muted during playback of an audio file. Transmission is also disabled.
- When removing the USB flash drive, make sure to execute "Safe Removal of USB Flash Drive". (See 11-6)

Renaming an Audio File

The name of audio files saved via manual recording, full-time recording or timer recording can be changed.

1 **Press F1 [RX PLAY] to display the audio recording file screen.**

2 **Press F2[▲]/ F3[▼] or turn the [MULTI/CH] control to select the audio file for which the name is to be changed.**

3 **Press F5 [NAME].**

4 **Use the function keys, [MULTI/CH] control or USB keyboard to enter a name.**

Key	Operation
F1 [SPACE]	Inserts a space.
F2 [–]/ F3 [+]	Selects a character.
F4 [◄‖]/ F5 [‖►]	Moves the cursor.
F [BACK SPACE]	Deletes the character to the left of the cursor.
F [DEL]	Deletes the character to the right of the cursor.
F [CHAR]	Switches the type of character to edit. Pressing the key each time switches the selection in the following sequence: ABC (upper case) → abc (lower case) → !"# (symbols) → ABC (upper case)

5 **Press F6 [SAVE] to save the file name.**

- Pressing **F7 [CANCEL]** discards the information entered and exits the audio file name input mode.

- When removing the USB flash drive, make sure to execute “Safe Removal of USB Flash Drive”. (See 11-6)

Deleting an Audio File

Follow the steps below to delete audio files that are stored in the built-in memory or a USB flash drive.
To use a USB flash drive, insert it into ⇻ (USB-A) in advance and check to ensure that it is recognized by this transceiver.

1 **Press F1 [RX PLAY] to display the audio file screen.**

2 **Press F2[▲]/ F3[▼] or turn the [MULTI/CH] control to select the audio file to delete.**

3 **Press F6 [DELETE].**
A message to confirm deletion of the file is displayed.

4 **Press F4 [OK] to delete the audio file.**

- Pressing **F7 [CANCEL]** returns the display to the audio file screen without deleting the audio file.

13 VOICE GUIDANCE

This transceiver comes with a voice guidance that sends out a voice notification of the operating status that is displayed on the screen.
The voice guidance content is described in the following style in this manual.

Voice	The actual voice guidance content is enclosed in quotation marks (“ ”).
Numeric values and alphabets	Content of the voice guidance is described collectively using numeric values and alphabets.
Options	The actual voice guidance content is listed up using **[ ]**. Each option is separated from the other by a slash (/), and only one of the options will be uttered at a time.

Voice Guidance

Pressing the PF key that is assigned with the voice guidance function outputs a guidance voice on the operating status from the built-in speaker.
The following 4 types of voice guidance are available.

VOICE1

Announces the current frequency and operating status.
The default setting is **[PF A]**.

VOICE2

Announces the status of the S meter and power meter.
The default setting is **[PF B]**.

VOICE3

Announces the status of the meter selected in **F [METER]** except for the power meter.
The default setting is **[PF C]**.

Auto Announce

Announces automatically when a specific operation is performed or upon entering a specific status. The default setting is “OFF”.

Adjusting the Voice Guidance Volume

Adjust the volume level of the voice guidance. When the voice guidance volume is set to OFF, pressing the corresponding PF key does not output a voice guidance announcement from this transceiver.

● Configure in Menu [1-03] “Voice Guidance Volume”

Setting Value	Off/ 1 to 10 (default) to 20 (1 step)

- Configuring to a larger value raises the volume level.

Adjusting the Voice Guidance Speed

Adjust the speed of the announcement.

● Configure in Menu [1-04] “Voice Guidance Speed”

Setting Value	1 (default) to 4 (1 step)

- The larger the value, the faster the speed of the announcement. (1:1x (normal speed), 2:1.15x, 3:1.3x, 4:1.45x)

● Increasing the voice guidance speed may sometimes cause the audibility to deteriorate depending on the content of the announcement.

Configuring the Voice Guidance Language

The voice guidance language can be configured to English or Japanese.

● Configure in Menu [1-05] “User Interface Language (Voice Guidance & Messages)”

Setting Value	English (default)/ Japanese

Auto Voice Guidance

When auto voice guidance is set to ON, a voice guidance is automatically output when a specific operation is performed.

● Configure in Menu [1-06] “Automatic Voice Guidance”

Setting Value	Off (default)/ On

● When this function is in the OFF status, turning on the power of this transceiver while pressing down the **[PF A]** key turns on [Auto Voice Guidance].

- When auto voice guidance is ON, voice guidance is output in the following sequence.

*1 : Announces the VFO (“A” or “B”) that is currently operating.
*2 : “X” is uttered when XIT is ON, “R” is uttered when RIT is ON, and “XR” is announced followed by the RIT/XIT frequencies when both XIT and RIT are ON. The numeric values of the “RIT/XIT frequencies” are announced in sequence starting from the kHz digit. “Point” is uttered after the kHz value. If the frequency is a negative value, “Minus” is uttered at the beginning.
*3 : [USB/ LSB/ CW/ FSK/ PSK/ FM/ AM/ USB Data/ LSB Data/ CW Reverse/ FSK Reverse/ PSK Reverse/ FM Data/ AM Data]
*4 : When in the SWL mode, “SWL” is added to the beginning of the announcement.

Operation on This Transceiver	Key Operation	Content of Voice Guidance
When powering on	-	Announces the data used for operation regardless of the status of the setting screen. (Refer to “Voice 1”.)
Switching between VFO A and VFO B	**[A/B]**	Outputs announcements according to the operating status after switching. (Refer to “Voice 1”.)
Switching between the VFO mode and memory channel mode	**[M/V]**	
Memory shift	**[M ▶ V]** **F [M ▶ VFO]**	Announces the data used for operation. (Refer to “Voice 1”.)
Switching to the quick memory channel mode	**[Q-MR]**	Announces the details of the quick memory channel mode. (Refer to “Voice 1”.)
Switching of the memory channel in the memory mode (except when the Memory Channel List screen is displayed)	Turn **[MULTI/CH]**	Blank channel: “Channel” + Number + “Blank”
		Simplex mode: “Channel” + Number + Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
		Split mode: “Channel” + Number + “Split” + Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2

Operation on This Transceiver	Key Operation	Content of Voice Guidance
Switching of quick memory channel	Turn **[MULTI/CH]**	Simplex mode: "Quick" + Number + [A/ B][*1] Frequency + ([X/ R/ XR] + RIT/XIT Frequency) [*2]
		Split mode: "Quick" + Number + "Split" + [A/ B][*1] Frequency + ([X/ R/ XR] + RIT/XIT Frequency) [*2]
Entering a frequency using the numeric keypad	**[ENT]**	"Enter"
Entering a channel number using the numeric keypad	Press a key on the numeric keypad	Numeric value that is entered
Switching the frequency entry history	Turn **[MULTI/CH]**	Frequency entry history
Switching frequency lock	**[LOCK]**	"Lock" + [On/ Off]
Switching split operation	**[SPLIT]**	"Split" + [On/ Off]
Configuring split frequency via numeric keypad operation	Press and hold **[SPLIT]**	"Split" + "Enter"
	When **[0]** is first pressed	"Minus"
	Numeric keypad	"TX" + [Plus/ Minus]* + Numeric value that is entered + "Kilohertz" * Pressing the keys from **[1]** to **[9]** adds a "Plus" utterance, while pressing **[0]** + (**[1]** to **[9]**) adds a "Minus" utterance.
When configuration of the split frequency using the Tuning control is complete	**[SPLIT]** (After configuration using the Tuning control)	"TX" + Finalized TX frequency
Change in the low cutoff frequency	Turn **[LO/ WIDTH]**	"Low" + Frequency
Change in the width	Turn **[LO/ WIDTH]**	"Width" + Options
Change in the high cutoff frequency	Turn **[HI/SHIFT]**	"High" + Options
Change in the shift frequency	Turn **[HI/SHIFT]**	"Shift" + Options
Change in the TX output power	Turn **[POWER]**	• When drive output is ON: TX power + Value • When drive output is OFF: When the transverter is ON and "TX Power Down with Transverter Enabled" is "On": "TX power" + 5 In all other cases: "TX power" + Value (The value shows a value up to the TX output power limit if the TX output power limiter is operating.)
[MIC/PITCH] control operation	Turn **[MIC/ PITCH]**	• When adjusting microphone gain: "Mic. Gain" + Value • When adjusting the speech processor output level: "Processor"+ "Out" + Value * No voice is output during adjustment of the sidetone/pitch frequency.
[DELAY] control operation	Turn **[DELAY]**	• When adjusting the break-in delay time: "Full" + "Break-in" in the case of FULL-BK DELAY: "Break-in delay" + Displayed value in the case of 1 to 20 • When adjusting VOX delay: "VOX delay" + Value
[KEY] control operation	Turn **[KEY]**	• When adjusting the keying speed: Keying speed + Value
Timer function ON/OFF operation	**F [TIMER]**	"Timer" + [On/ Off]
Dimmer switching	**F [DIMMER]** **F2 [DIMMER]**	"D" + Numeric value (single digit)
Antenna switching	**F [ANT]**	"Antenna" + Number
Band Direct selection	Band Direct keys (including operation of **[GENE]**)	Frequency
Calling up the preconfigured emergency frequency	**PF [Emergency Frequency]**	"Emergency" + Frequency
Meter switching	**F [METER]**	Analog meter display (TX digital meter OFF): [Power/ SWR/ ID/ Processor/ ALC/ VD]
		Analog meter display (TX digital meter ON): [SWR/ ID/ Processor/ VD/ TMP]
		Digital meter display: [SWR/ ID/ Processor/ VD/ TMP]
		Mini digital meter display: [Power/ SWR/ ID/ Processor/ ALC/ VD/ TMP]
Error/warning messages	**(none)**	Error or warning + Number For more details on the number, please refer to the "Error Messages" and "Warning Messages" lists.

Voice 1

Voice 1 announces the displayed frequency, channel number, details of the respective configuration modes as well as the status of menu settings.
Announces the digits of the VFO and memory channel frequencies which are higher than 10 Hz when fine tuning is OFF. "Point" is uttered after announcing the MHz digits. When a channel that does not contain any operating data is selected during memory scroll, "Blank" is uttered.

● Press the PF key that is assigned with "VOICE1".

Announces the operating status. Announces the setting value while configuration is in progress on the configuration screen.

- Pressing the PF key that is assigned with "VOICE1", "VOICE2" or "VOICE3" during the announcement stops the announcement.
- Altering the frequency by turning the Tuning or [MULTI/CH] control during an announcement stops the announcement.
- For more details on how to change the assignment of PF keys, please refer to "PF Keys (Programmable Function Keys)".
- Announcement is not output while scanning is in progress.

Pressing "VOICE1" outputs an announcement as follows. The content of the announcement varies with the screen that is being displayed.

Announcements Related to Operating Frequency (Including Content of Auto Announcements)

Screen	Operation/Status	Content of Announcement
VFO mode *4	Simplex mode	[A/ B]*1 Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
	Split mode	"Split" + [A/ B]*1 Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
Memory channel mode *4	Blank channel	"Channel" + Number + "Blank"
	Simplex mode	"Channel" + Number + Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
	Split mode	"Channel" + Number + Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
Quick memory channel mode *4	Simplex mode	"Quick" + Number + [A/ B] + Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
	Split mode	"Quick" + Number + "Split" + [A/ B]*1 Frequency + ([X/ R/ XR] + RIT/XIT Frequency) *2
During frequency entry	Before numeric keypad input	Enter
	Input in progress	The numeric value that is most recently input ("Point" is also uttered after announcing the MHz digits. A pause is inserted for the kHz digit.)
	During confirmation	[A/ B] + Frequency
	When entry is canceled	No announcement
	When entry history is selected	Frequency entry history
During entry of memory channel no.	During 1-digit input	"Enter" + Number
	During 2-digit input	1st digit + 2nd digit + [Frequency/Blank]
When configuring the split frequency	Pressing and holding SPLIT	"Split" + "Enter"
	When [0] is first pressed	"Minus"
	When the numeric keypad ([1] to [9]) is operated	"TX" + [Plus/ Minus]* + Numeric value that is entered + Kilohertz * Pressing the keys from [1] to [9] adds a "Plus" utterance, while pressing [0] + ([1] to [9]) adds a "Minus" utterance.

Announcements during Display of Configuration Screens (Including Content of Auto Announcements)

Screen	Operation/Status	Content of Announcement
Auto mode	Screen launch	"Auto" + Frequency at the top of the list + Mode *3
	When **[VOICE1]** is pressed	"Auto" + Frequency
	When a selection is made	Selected frequency + Mode *3
	When frequency is copied to the list	"Copy" + Copied frequency + Mode *3
	Switching between ON/OFF	"Auto" + [On/ Off]
AGC settings	When screen is displayed or when **[VOICE1]** is pressed	"AGC" + [Fast/ Middle/ Slow/ Off] (+ Value)
	When value is changed	Value
	When AGC speed is switched	[Fast/ Middle/ Slow] + Value
	AGC OFF	"AGC" + "Off"
Equalizer	When screen is displayed or when **[VOICE1]** is pressed	[RX/TX] + "Equalizer" + (HB1/ HB2/ FP/ BB1/ BB2/ F/ C/ U1/ U2/ U3)
	When a selection is made via key operation	[HB1/ HB2/ FP/ BB1/ BB2/ F/ C/ U1/ U2/ U3]
Equalizer adjustment	When screen is displayed or when **[VOICE1]** is pressed	[RX/TX] + "Equalizer" + "Adjustment"
	When a selection is made	[0/0.3/0.6/0.9/1.2/1.5/1.8/2.1/2.4/2.7/3.0/3.3/3.6/3.9/4.2/4.5/4.8/5.1] (+ [+/-]) + Value + dB ([+/-] is not uttered when it is 0 dB.)
	When value is changed via key operation	(+/-) + Value + dB ([+/-] is not uttered when it is 0 dB)
	Initialization	No announcement
Confirmation of equalizer copy	When screen is displayed or when **[VOICE1]** is pressed	"Copy" + "Are you Sure?"

Screen	Operation/Status	Content of Announcement
Selection of file to read	When the RXEQ screen is displayed or when **[VOICE1]** is pressed	“File” + “List” + “RX” + “Equalizer”
	When the TXEQ screen is displayed or when **[VOICE1]** is pressed	“File” + “List” + “TX” + “Equalizer”
	When the DATA screen is displayed or when **[VOICE1]** is pressed	“File” + “List” + “Data”
	When a selection is made	Year + Month + Day + Time (Announces the time stamp of the file)
	When the file deletion confirmation screen is displayed or when **[VOICE1]** is pressed	“Delete” + “Are you Sure?”
	Name editing	“Edit”
	When the file browsing location is changed	[USB/ Internal]
Selection of data to read (DATA)	When screen is displayed or when **[VOICE1]** is pressed	“Read” + “Data” + “Selection”
	When a selection is made (environment-dependent)	“ENV” + [On/ Off]
	When a selection is made (CW)	“CW” + “Message” + [On/ Off]
	When a selection is made (voice message)	“Voice” + “Message” + [On/ Off]
	Switching between ON/OFF	[On/ Off]
Processing (without CANCEL key)	When screen is displayed or when **[VOICE1]** is pressed	“Please wait” (Announcement is not output when reading data with RXEQ/TXEQ.)
Data reading complete	When screen is displayed or when **[VOICE1]** is pressed	“Completed”
Request to get ready the USB flash drive	When screen is displayed or when **[VOICE1]** is pressed	“USB” + “Connect”
Data saving complete	When screen is displayed or when **[VOICE1]** is pressed	“Completed”
TX audio source input settings	When screen is displayed or when **[VOICE1]** is pressed	“Moduration-Source” + [Mic. + PTT/ Data + PTT]
	Switching method of transmission	[Mic. + PTT/ Data + PTT]
	Specification of audio input line (Front/Rear) (</>)	[F/ R]
	Front input selection **F4 [SELECT]**	[Off/ Mic.]
	Rear input selection **F4 [SELECT]**	[Off/ ACC 2/ USB/ LAN]
	Switching DATA VOX between ON/OFF	“Data” + “VOX” + [Off/ ACC two/ USB/ LAN]
VOX level configuration	When screen is displayed or when **[VOICE1]** is pressed	[VOX gain/ Anti- + VOX gain/ VOX delay] + [Mic./ ACC two/ USB/ LAN] + Value
	Switching of audio source input	[Mic./ ACC two/ USB/ LAN]
	Switching the parameter to configure	[VOX gain/ Anti- + VOX gain/ VOX delay]
	Increasing or decreasing the setting value	Value
	Reset to default value	No announcement
TX output power limiter configuration	When screen is displayed or when **[VOICE1]** is pressed	[TX power + Limit + [SSB/ CW/ FSK PSK/ FM AM/ Data]/ [TX Tune] + Band + Value The band is [1.8/ 3.5/ 5/ 7/ 10/ 14/ 18/ 21/ 24/ 28/ 50] + Mega Hertz
	TX output power type selection	[TX power + Limit + [SSB/ CW/ FSK PSK/ FM AM/ Data] / TX Tune]
	Band selection	[1.8/ 3.5/ 5/ 7/ 10/ 14/ 18/ 21/ 24/ 28/ 50/ 70] + Mega Hertz
	Increasing or decreasing TX output power	Value
	Reset to default value	No announcement
Speech processor configuration	When screen is displayed or when **[VOICE1]** is pressed	“Processor” + [Soft/Hard] + [In/Out] + Value
	Effect selection	[Soft/ Hard]
	Switching between “Input” and “Output”	[In/ Out]
	Increasing or decreasing the value	Value

Screen	Operation/Status	Content of Announcement
CW message (paddle version)	When screen is displayed or when **[VOICE1]** is pressed (deselected)	“CW” + “Message”
	When screen is displayed or when **[VOICE1]** is pressed (selected)	“Channel” + Number (+ “Repeat”) (+ “Blank”)
	Switching of repeat mode	“Repeat” + [Off/ On]
	Switching of channel	Number + “Repeat” + “Blank”
	Switching of playback list	No announcement
	Delete	No announcement
Standby for CW message (paddle) registration	When screen is displayed or when **[VOICE1]** is pressed	No announcement
During CW message registration	When **[VOICE1]** is pressed	No announcement
CW message (text version)	When screen is displayed or when **[VOICE1]** is pressed (deselected)	“CW” + “Message”
	When screen is displayed or when **[VOICE1]** is pressed (selected)	“Channel” + Number (+ “Repeat”) (+ “Blank”) (+ Contest number)
	Switching of repeat mode	“Repeat” + [Off/ On]
	Switching of channel	Number (+ “Repeat”) (+ “Blank”) (+ Contest number)
	Switching of playback list	No announcement
	Delete	No announcement
	Subtraction of contest number	Contest numbers
	Channel message editing	“Edit”
RTTY communication	When screen is displayed or when **[VOICE1]** is pressed	“RTTY” + “Communication”
PSK communication	When screen is displayed or when **[VOICE1]** is pressed	“PSK” + “Communication”
RTTY/PSK message	When screen is displayed or when **[VOICE1]** is pressed (deselected)	[RTTY/ PSK] + “Message”
	When screen is displayed or when **[VOICE1]** is pressed (deselected)	“Channel” + Number + “Auto” + “TX” + “RX”
	Switching of channel	Number
	AUTO TX mode switching	“Auto” + “TX” + [Off/ On]
	AUTO RX mode switching	“Auto” + “RX” + [Off/ On]
	Message editing (including when **[VOICE1]** is pressed)	“Message” + “Edit”
Log file selection	When screen is displayed or when **[VOICE1]** is pressed	In the case of log file selection screen (CW): “Log” + “File” + “CW” In the case of log file selection screen (RTTY): “Log” + “File” + “RTTY” In the case of log file selection screen (PSK): “Log” + “File” + “PSK”
	When a selection is made	Year (2018 to 2099) + Month + Day + Time
	File deletion confirmation	“Delete” + “Are you Sure?”
	Name editing	“Edit”
	When the file browsing location is changed	[USB/ Internal]
Log View	When screen is displayed or when **[VOICE1]** is pressed	“Log” + “View”
FM tone frequency configuration	When screen is displayed or when **[VOICE1]** is pressed	“Tone” + Frequency
	Change in frequency	Frequency
	Start of TONE scanning During TONE scanning or when **[VOICE1]** is pressed	“Tone” + “Scan”
	End of TONE scanning	Frequency
FM CTCSS frequency configuration	When screen is displayed or when **[VOICE1]** is pressed	“CTCSS” + Frequency
	Change in frequency	Frequency
	Start of CTCSS scanning During CTCSS scanning or when **[VOICE1]** is pressed	“CTCSS” + “Scan”
	End of CTCSS scanning	Frequency

Screen	Operation/Status	Content of Announcement
FM cross tone frequency configuration	When screen is displayed or when **[VOICE1]** is pressed	“Cross-Tone” + [Tone/ CTCSS] + Frequency
	TONE/CTCSS switching	[Tone/ CTCSS]
	Change in frequency	Frequency
RX filter configuration	When screen is displayed or when **[VOICE1]** is pressed	“RX” + “Filter” + [A/ B/ C] + [R/ IF/ AF] + Options
	Switching of filter	[A/ B/ C]
	Switching of roofing filter	[Auto/ 270 + Hertz/ 500 + Hertz/ 2.7 + Kilohertz/ 6 + Kilohertz/ 15 + Kilohertz]
	Switching of shape factor	[Soft/ Medium/ Sharp]
	Configuring or clearing preset passband characteristics	No announcement
	Switching of audio filter width	[Narrow/ Medium/ Wide]
Audio peak filter configuration	When screen is displayed or when **[VOICE1]** is pressed	“APF” + [Narrow/ Medium/ Wide]
	When a selection is made	[Narrow/ Medium/ Wide]
	Switching of shift frequency	“Shift” (+ [+/-]) + Value + “Hertz”
	Switching of gain level	“Gain” (+ [+]) + Value + “dB”
NB1/ NR1/ NR2 level configuration	When screen is displayed or when **[VOICE1]** is pressed	“Noise blanker” + “1” + Value “Noise reduction” + “1” + Value “Noise reduction” + “2” + Value
	Reset to default value	No announcement
	Switching of setting value	Value
NB2 level configuration	When screen is displayed or when **[VOICE1]** is pressed	“Noise blanker” + “2” + “A” + Value or “Noise blanker” + “2” + “B” + “Level” + Value or “Noise blanker” + “2” + “B” + “Width” + Value or “Noise blanker” + “2” + “B” + “Depth” + Value
	Switching of type	[A/ B]
	When a selection is made	[Level/ Width/ Depth]
	Reset to default value	No announcement
	Switching of value	Value
(Standard size) Bandscope + Waterfall	When screen is displayed or when **[VOICE1]** is pressed	“Bandscope”
(Standard size) Bandscope screen	When screen is displayed or when **[VOICE1]** is pressed	“Bandscope”
(Enlarged size) Bandscope + Waterfall	When screen is displayed or when **[VOICE1]** is pressed	“Bandscope”
Audio scope	When screen is displayed or when **[VOICE1]** is pressed	“Audioscope”
Multi scope Bandscope (upper screen)/ audio scope (lower screen)	When screen is displayed or when **[VOICE1]** is pressed	“Audioscope”

Screen	Operation/Status	Content of Announcement
Memory channel list	When screen is displayed or when **[VOICE1]** is pressed	**During normal selection** Blank channel: “Memory” + “List” + Number + “Blank” Simplex mode: “Memory” + “List” + Number + Frequency Split mode: “Memory” + “List” + Number + “Split” + Frequency **During selection of data writing destination** Blank channel: “Memory” + “In” + Number + “Blank” Simplex mode: “Memory” + “In” + Number + Frequency Split mode: “Memory” + “In” + Number + “Split” + Frequency
	When a selection is made	Blank channel: Number + Blank Simplex mode: Number + Frequency Split mode: Number + Split + Frequency
	Registration or pasting of data	No announcement
	Input of start frequency for specific band segments (Input of end frequency)	“End” + “Frequency” + Current frequency
	Erasing channel data	No announcement
	Name input	“Edit”
	Lockout mode switching	“Lockout” + [On/ Off]
Confirmation for deletion of all quick memory data	When screen is displayed or when **[VOICE1]** is pressed	“Quick memory” + “Clear” + “Are you Sure?”
Group configuration for Memory Scan	When screen is displayed or when **[VOICE1]** is pressed	“Memory” + “Scan” + “Group” + Number + [On/ Off]
	When a selection is made	Number + [On/ Off]
	Switching between ON/OFF	[On/ Off]
	Switching between All ON/All OFF	“Select” + “All” “Clear” + “All”
Configuration of segment for Program Scan	When screen is displayed or when **[VOICE1]** is pressed	Program Scan: “Program” + “Scan” + “Channel”+ Number + [On/ Off] VFO Scan: “VFO” + “Scan”
	When a selection is made	Number + [On/ Off]
	Switching between ON/OFF	[On/ Off]
	Switching between VFO Scan/ Program Scan	[VFO + Scan/ Program + Scan]
	Switching between All ON/All OFF	“Select” + “All” “Clear” + “All”
Configuration of Program Slow Scan points	When screen is displayed or when **[VOICE1]** is pressed	“Program” + “Slow” + “Scan” + Operating frequency
	During configuration of point frequency	No announcement
	Batch delete	“Clear” + “All”
Voice message	When screen is displayed or when **[VOICE1]** is pressed	“Voice” + “Message”
	When the editing screen is displayed or when **[VOICE1]** is pressed	Blank channel: “Message” + Number + “Blank” Registered channel: “Message” + Number (+ “Repeat”)
	Switching of channel to edit	Blank channel: Number + “Blank” Registered channel: Number (+ “Repeat”)
	Switching of repeat mode	“Repeat” + [Off/ On]
	Deletion	No announcement
	Name registration (Including when **[VOICE1]** is pressed)	“Edit”
Voice message recording standby	When screen is displayed or when **[VOICE1]** is pressed	“Record” + [Mic./ ACC two/ USB/ LAN]
	Switching of audio source input	[Mic./ ACC two/ USB/ LAN]

Screen	Operation/Status	Content of Announcement
Recording file (built-in memory)	When screen is opened or when **[VOICE1]** is pressed	When browsing audio files: “Audio” + “File” When browsing audio files of timer recordings: “Audio” + “File” + “Timer”
	When a selection is made	Year (2018 to 2099) + Month + Day + Time
	Folder switching (recording file/ timer)	When browsing the built-in memory: Same as when a screen is displayed When browsing the USB flash drive: Refer to “When a screen is displayed” in “Recording file (USB flash drive)”
	Switching memory	Same as when the recording file (USB flash drive) screen is launched However, if the USB flash drive is not connected, refer to the “Request to get ready the USB flash drive” screen
	File deletion confirmation (Including when **[VOICE1]** is pressed)	“Delete” + “Are you Sure?”
	Editing of file name	“Edit”
	Request to get ready the USB flash drive (Including when **[VOICE1]** is pressed)	“USB” + “Connect”
Recording file (USB flash drive)	When screen is opened or when **[VOICE1]** is pressed	When browsing audio files: “Audio” + “File” + “USB” When browsing audio files of timer recordings: “Audio” + “File” + “USB” + “Timer”
	When a selection is made	Year (2018 to 2099) + Month + Day + Time
	Switching memory	Refer to the Recording file (built-in memory) screen
	Folder switching (between TIMER_REC and RXREC)	When browsing a USB flash drive: Same as when a screen is displayed When browsing the built-in memory: Refer to “When a screen is displayed” in “Recording file (built-in memory)”
	File deletion confirmation (Including when **[VOICE1]** is pressed)	“Delete” + “Are you Sure?”
	Name editing	“Edit”
LAN menu	When screen is displayed or when **[VOICE1]** is pressed	“LAN” + “Menu” + Item number (1 digit) + Settings
	Switching of setting item	Item number (1 digits) + Settings
	Start of setting value editing, movement of selection, input of setting value	Value of selected position
	Switching of setting item (Related to address)	Item number (1 digit) + nnn + “Point” + nnn + “Point” + nnn + “Point” + nnn However, content is as follows when nnn is blank: Item number (1 digit) + “Blank”
	Switching of setting item (Related to ID/Pass)	Item number (1 digit)
	Start of setting value editing, movement of selection (related to address)	Value of selected position
	Input of setting value (related to address)	Numeric value that is entered
	Selection of setting value (related to address)	Selected value
CLOCK menu top	When a screen is displayed	“Clock” + “Menu” + “Group” + Group number (1 digit)
	Group selection	Number
CLOCK menu items display	When screen is opened or when **[VOICE1]** is pressed	“Clock” + “Menu” + Item number (2 digit) + Settings
	Item selection	Item number (2 digits) + Settings
	Start of Date and Time configuration	“Edit”
	Start of configuration	No announcement
	Change in setting value	Description
Acquisition of NTP date/time data	When a screen is displayed	“Clock” + “Update”
Acquisition of NTP date/time data is complete	When screen is displayed or when **[VOICE1]** is pressed	“Completed”
Acquisition of NTP date/time data failed	When screen is displayed or when **[VOICE1]** is pressed	“Error” + Number
Timer configuration	When screen is displayed or when **[VOICE1]** is pressed	“Programmable” + “Timer” + Options
	When the sleep timer settings are changed	“Sleep Timer” + Options

Screen	Operation/Status	Content of Announcement
Program timer configuration	When screen is displayed or when **[VOICE1]** is pressed	“Programmable” + “Timer” + [On/ Off] “Programmable” + “Timer” + “Repeat” + [On/ Off] “Programmable” + “Timer” + Day + [On/ Off] “Programmable” + “Timer” + “Mode” + [Timer Off/ On/ Off/ Both/ Record] “Programmable” + “Timer” + “Start” + “Hour” + Numeric value (2 digits) “Programmable” + “Timer” + “Start” + “Minute” + Numeric value (2 digits) “Programmable” + “Timer” + “End” + “Hour” + Numeric value (2 digits) “Programmable” + “Timer” + “End” + “Minute” + Numeric value (2 digits) “Programmable” + “Timer” + Frequency + Timer RX mode
	When a selection is made	Announces the status of the selected position “Timer” + [On/ Off] “Repeat” + [On/ Off] Day + [On/ Off] “Mode” + [Timer Off/ On/ Off/ Both/ Record] “Start” + “Hour” + Numeric value (2 digits) “Start” + “Minute” + Numeric value (2 digits) “End” + “Hour” + Numeric value (2 digits) “End” + “Minute” + Numeric value (2 digits) Frequency + Timer RX mode
	When a setting value is input	Numeric value that is entered
	Switching between ON/OFF	[On/ Off]
	Mode switching	[Timer Off/ On/ Off/ Both/ Record]
	Change in selected setting ([MULTI/CH] control/F4[+]/ F5[–]/numeric keypad)	Description
Program timer configuration is complete	When screen is displayed or when **[VOICE1]** is pressed	“Completed”
Menu top	When screen is displayed or when **[VOICE1]** is pressed	“Menu” + “Group” + Group number (1 digit)
	Group selection	“Group” + Group number (1 digit)
	Upon entering SWL mode	“SWL” + “On”
	When SWL mode is OFF	“SWL” + “Off”
Menu items display	When screen is displayed or when **[VOICE1]** is pressed	“Menu” + Group number (1 digit) + Item number (2 digits) + Setting
	When a menu is selected	Item number (2 digits) + Settings
	During start of parameter editing (Including when **[VOICE1]** is pressed)	“Edit”
	When a setting value is selected	No announcement
	When a setting value is altered	Selected value
	[GROUP ▲]	“Group” + Group number (1 digit)
	[GROUP ▼]	“Group” + Group number (1 digit)
USB/file management menu	When screen is displayed or when **[VOICE1]** is pressed	Announces the selected function item “USB” + “File” + “Menu” + [Remove/ Read + Configuration/ Save + Configuration/ Copy + File + PC/ Copy + File + USB/ Read + File/ Delete + File/ File + Save/ Format]
	When an item is selected	[Remove/ Read + Configuration/ Save + Configuration/ Copy + File + PC/ Copy + File + USB/ Read + File/ Delete + File/ File + Save/ Format]
Selection of destination to save files	When screen is displayed or when **[VOICE1]** is pressed	“File” + “Save” + [Internal/ USB]
	When switching the selection option	[Internal/ USB]
Selection of items to copy	When screen is displayed or when **[VOICE1]** is pressed	Announces the selected function item “Copy” + “File” + “Select” + [Configuration/ Audio/ Timer + Audio/ TX + Equalizer/ RX + Equalizer/ CW + Log/ RTTY + Log/ PSK + Log/ S + C/ KNS + Log]
	When an item is selected	[Configuration/ Audio/ Timer + Audio/ TX + Equalizer/ RX + Equalizer/ CW + Log/ RTTY + Log/ PSK + Log/ S + C/ KNS + Log]
	Switching between check and uncheck	[Off/ On]

Screen	Operation/Status	Content of Announcement
Selection of items to delete	When screen is displayed or when **[VOICE1]** is pressed	Announces the selected function item “Delete” + “File” + “Select” + [Configuration/ Audio/ Timer + Audio/ TX + Equalizer/ RX + Equalizer/ CW + Log/ RTTY + Log/ PSK + Log/ S + C/ KNS + Log]
	When an item is selected	[Configuration/ Audio/ Timer + Audio/ TX + Equalizer/ RX + Equalizer/ CW + Log/ RTTY + Log/ PSK + Log/ S + C/ KNS + Log] * S+C: Screen Captured Files
	Switching between check and uncheck	[Off/ On]
Formatting confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Format” + “Are you Sure?”
When “formatting in progress” screen is displayed or during other ongoing processes in general	When screen is displayed or when **[VOICE1]** is pressed	“Please wait”
Unmount confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Remove” + “Are you Sure?”
Unmount is complete	When screen is displayed or when **[VOICE1]** is pressed	“Completed”
RESET menu items display	When screen is displayed or when **[VOICE1]** is pressed	“Menu Reset” “Memory Channel Reset” “VFO Reset” “Standard Reset” “Full Reset”
Standard reset confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Standard Reset” + “Are you Sure?”
Full reset confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Full Reset” + “Are you Sure?”
VFO reset confirmation	When screen is displayed or when **[VOICE1]** is pressed	“VFO Reset” + “Are you Sure?”
Memory reset confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Memory Channel Reset” + “Are you Sure?”
Menu reset confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Menu Reset” + “Are you Sure?”
Reset in progress	When screen is displayed or when **[VOICE1]** is pressed	“Please wait”
Advanced menu items display	When screen is displayed or when **[VOICE1]** is pressed	“Advanced” + “Menu” + Item number (from 1 digit)
	When a selection is made	Item number (from 1 digits) + Settings
Advanced menu adjustment	When screen is displayed or when **[VOICE1]** is pressed	No announcement
	Change in setting value	Value
Touchscreen adjustment in progress	When screen is displayed (No voice is output when [VOICE1] is pressed)	“Touchscreen” + “Calibration”
Advanced menu license display	When screen is displayed or when **[VOICE1]** is pressed	“License”
Version display for advanced menu firmware	When screen is displayed or when **[VOICE1]** is pressed	Numeric value + “Point” + 2-digit numeric value
Switching of operating environment data	When screen is displayed or when **[VOICE1]** is pressed	“A” + Waiting time + “B” + “Are you Sure?”
Error/warning message	When screen is displayed or when **[VOICE1]** is pressed	[Error/ Warning] + Number
AGC quick recovery configuration	When screen is displayed or when **[VOICE1]** is pressed	“AGC Quick Recovery” + [Off/ On] (+ Value)
	Switching between ON/OFF	[On/ Off]
	Change in threshold level	Value
Carrier level configuration	When screen is displayed or when **[VOICE1]** is pressed	“Carrier” + Value
	Change in carrier level	Value
TX monitor level configuration	When screen is displayed or when **[VOICE1]** is pressed	“TX monitor” + Value
	Change in TX monitor level	Value

Screen	Operation/Status	Content of Announcement
CW communication	When screen is displayed or when **[VOICE1]** is pressed	“CW” + “Communication”
	Contest number decrement	Subtracted contest number
Scope range configuration in Fixed mode	When screen is displayed or when **[VOICE1]** is pressed	“Bandscope” + “Configuration”
TX output power limiter OFF confirmation	When screen is displayed or when **[VOICE1]** is pressed	“TX power” + “Limit” + “Off” + “Are you Sure?”
Dimmer configuration	When screen is displayed or when **[VOICE1]** is pressed	“D” + “Menu” + Value (1 to 100) * D: Dimmer
	When the position to configure is selected (When F3 [◀]/ F4 [▶] is pressed)	[D/L] + Value *D: Display/ L: LED
	Altering of value	Value
Linear amplifier menu configuration	When screen is displayed or when **[VOICE1]** is pressed	“Linear Amplifier” + Target bands of linear amplifier menu + Function name of focusing position + Setting
	Band selection	[HF/ 50/ 70 (E type only) + Mega Hertz]
	Linear amplifier ON/OFF	[Off/On]
	Linear amplifier TX control	[Low/ High]
	Linear amplifier TX delay ON/OFF	[Off/ On]
	Linear amplifier TX delay time (CW/FSK/PSK)	[5/ 10/ 15/ 20/ 25/ 30/ 35/ 40]
	Linear amplifier TX delay time (SSB/AM/FM)	[5/ 10/ 15/ 20/ 25/ 30/ 35/ 40/ 45/ 50]
	Linear amplifier relay control	[Off/ On]
	Linear amplifier external ALC voltage	[-1/ -2/ -3/ -4/ -5/ -6/ -7/ -8/ -9/ -10/ -11/ -12]
KNS information	When screen is displayed or when **[VOICE1]** is pressed	“KNS” + “Connect” + [Off / User name]
KNS configuration	When screen is displayed or when **[VOICE1]** is pressed When a selection is made	“KNS” + “Configuration” + Item number (from 1 digit) + Settings
KNS Users List	When screen is displayed or when **[VOICE1]** is pressed	“KNS” + “User” + “List” + User name of selected item*
	When a selection is made	User name of selected item* * The registered user name is uttered one character at a time. Characters that cannot be uttered will be inserted with a pause. Blank is uttered if a user name is not registered.
KNS user registration	When screen is displayed or when **[VOICE1]** is pressed	“KNS” + “User” + “List” + User name of selected item*
	When a selection is made	Name of selected item* * The content of the announcement for the item name is as follows. “User Name”: “User” “Passwoard”: “PASS” (utters 1 character at a time) “Description” : “D” “RX Only”: “RX” + [Off/ On] “Disabled”: “Disable” + [Off/ On]
	Switching between check and uncheck	[Off/ On]
Frequency marker list	When screen is displayed or when **[VOICE1]** is pressed	“Frequency” + “Marker” + “List” + [ON/OFF] + [Blank / Frequency] * * “Blank” if no data is registered. Frequency when data is registered.
	When a selection is made	[Blank / Marker + Frequency]
Calling up the preconfigured emergency frequency	When screen is displayed or when **[VOICE1]** is pressed	“Emergency” + “Frequency”
Confirmation for batch deletion of files	When screen is displayed or when **[VOICE1]** is pressed	“All” + “Delete” + “Are you sure?”
File deletion confirmation	When screen is displayed or when **[VOICE1]** is pressed	“Delete” + “Are you sure?”

- For more details on the option numbers when configuring the PF keys, please refer to “List of Assignable Functions”. When the higher order digit of the menu number or memory channel number is “0”, “0” will also be uttered.
- When the setting screen overlaps with messages on errors, warnings and other information, announcement will be output for the error, warning or information message.
- Frequency value in the VFO mode is announced in sequence starting from the highest order digit that is being displayed. “Point” is uttered as a delimiter for MHz.

Voice 2

Pressing the key that is assigned with “VOICE2” announces the S meter and power meter values. For example, “S5” or “20 dB” will be announced in this case.

● Press [PF B] or the PF key that is assigned with “VOICE2”.

Announces the S meter and power meter values.

- Pressing the PF key that is assigned with “VOICE1”, “VOICE2” or “VOICE3” during the announcement stops the announcement.
- For more details on how to change the assignment of PF keys, please refer to “PF Keys (Programmable Function Keys)”.
- Even while an analog meter is displayed, the “VOICE2” announcement changes according to the level when a digital meter is displayed (dot: 0 to 70).

Content that is announced in the VOICE2 mode is as follows.

S meter		Power Meter	
Level	Content of Announcement	Level	Content of Announcement
0	S 0	0	P 0
1 to 4	S 1	1 to 5	P 5
5 to 8	S 2	6 to 10	P 10
9 to 12	S 3	11 to 14	P 17.5
13 to 16	S 4	15 to 19	P 25
17 to 20	S 5	20 to 27	P 37.5
21 to 24	S 6	28 to 35	P 50
25 to 28	S 7	36 to 47	P 75
29 to 32	S 8	48 to 59	P 100
33 to 36	S 9	60 to 65	P 125
37 to 41	10 dB	66 to 70	P 150
42 to 47	20 dB	-	-
48 to 52	30 dB	-	-
53 to 58	40 dB	-	-
59 to 64	50 dB	-	-
65 to 70	60 dB	-	-

Voice 3

Pressing the key that is assigned with “VOICE3” announces the meter values.

● Press [PF C] or the PF key that is assigned with “VOICE3”.

Announces the meter value at the time when the key is pressed.

- VOICE3 makes announcement only during transmission.
- Pressing the PF key that is assigned with “VOICE1”, “VOICE2” or “VOICE3” during the announcement stops the announcement.
- For more details on how to change the assignment of PF keys, please refer to “PF Keys (Programmable Function Keys)”.
- Even while an analog meter is displayed, the “VOICE3” announcement changes according to the level when a digital meter is displayed (dot: 0 to 70).
- When the meter selected is PWR meter, the announcement is the same as that of the PWR meter in VOICE2.
- Pressing **[VOICE3]** while the voice message recording standby screen or the voice message recording in progress screen is displayed announces the value (recording level) of the “Recording Level Meter”.
- Pressing **[VOICE3]** during configuration of the microphone gain in Advanced Menu [10] announces the value of the level meter.

Content that is announced in the VOICE3 mode is as follows.

SWR Meter		COMP Meter		ALC Meter	
Level	Content of Announcement	Level	Content of Announcement	Level	Content of Announcement
0 to 1	R 1.0	0	C 0 dB	0	A 0
2	R 1.1	1 to 9	C 5 dB	1 to 2	A 1
3 to 4	R 1.2	10 to 19	C 10 dB	3 to 4	A 2
5	R 1.3	20 to 34	C 15 dB	5 to 6	A 3
6 to 7	R 1.4	35 to 50	C 20 dB	7 to 8	A 4
8 to 9	R 1.5	51 to 57	C 25 dB	9 to 10	A 5
				11 to 12	A 6
10 to 11	R 1.6	58 onwards	C OVER	13 to 14	A 7
12 to 13	R 1.7			15 to 16	A 8
14 to 15	R 1.8			17 to 18	A 9
16 to 17	R 1.9			19 to 20	A 10
18 to 21	R 2.0			21 to 22	A 11
22 to 27	R 2.5			23 to 24	A 12
28 to 36	R 3.0			25 to 26	A 13
37 to 42	R 4.0			27 to 28	A 14
43 to 47	R 5.0			29 to 30	A 15
48 onwards	R OVER			31 to 32	A 16
				33 to 34	A 17
				35 onwards	A OVER

ID Meter		TEMP Meter		VD Meter	
Level	Content of Announcement	Level	Content of Announcement	Level	Content of Announcement
0 to 9	I 2.5	0 to 25	T LOW	Up to 46	V LOW
10 to 17	I 5	26 to 60	T MID	47 to 48	V 10
18 to 26	I 7.5	61 onwards	T HIGH	49 to 51	V 11
27 to 35	I 10			52 to 55	V 12
36 to 44	I 12.5			56 to 58	V 13
45 to 52	I 15			59 to 61	V 14
53 to 60	I 17.5			62 to 64	V 15
61 onwards	I 20			65 onwards	V HIGH

Recording Level Meter/ Audio Lever Meter during FM Microphone Gain Configuration	
Level	Content of Announcement
0	L 0
1 to 2	L 1
3 to 4	L 2
5 to 6	L 3
7 to 8	L 4
9 to 10	L 5
11 to 12	L 6
13 to 14	L 7
15 to 16	L 8
17 to 18	L 9
19 to 20	L 10
21 to 22	L 11
23 to 24	L 12
25 to 26	L 13
27 to 28	L 14
29 to 30	L 15
31 to 32	L 16
33 to 34	L 17
35 onwards	L OVER

14 CLOCK DISPLAY/TIMER

Configuring Date and Time

This transceiver can display 2 types of clocks.

Local Clock

Displays the current date and time.

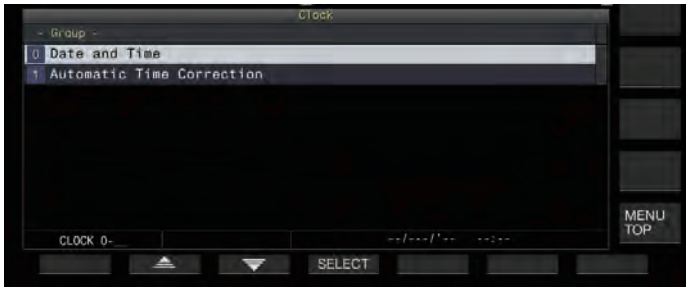
Auxiliary Clock

Displays information such as the UTC clock.

Displaying the Clock Menu Screen

1 **Press [MENU] to display the menu screen.**

2 **Press F [CLOCK] to display the Clock menu screen.**



3 **Select Clock Menu [0] “Date and Time”.**

4 **Press F4 [SELECT].**
The date/time configuration screen is displayed.

- Pressing **F7 [CANCEL]** while the date and time configurations for Local Clock is still in progress discards the settings and returns the display to the Date and Time configuration screen.

Configuring the Local Clock Date

The date of the local clock that is used for display or the time stamp in files can be configured as follows.

1 **Select Clock Menu [00] “Date (Local Clock)”.**

2 **Press F4 [EDIT].**

3 **Use the function keys and the [MULTI/CH] control to select the date.**

Key	Behavior
F2 [–]/ F3 [+]	Selects a setting value.
[MULTI/CH]	
F4 [◄‖]/ F5 [‖►]	Moves the cursor.

- The date and time is displayed in the parameter field of the Clock screen according to the “Date Display Format” setting.
- The local clock cannot be configured when the auto time correction function using the NTP server is ON.

4 **Press F6 [OK].**

Configuring the Local Clock Time

Follow the steps below to configure the local clock time. This is usually configured to the local time of the location where this transceiver is being operated.

1 **Select Clock Menu [01] “Time (Local Clock)”.**

2 **Press F4 [EDIT].**

3 **Use the numeric keypad, function keys and the [MULTI/CH] control to configure the time.**
A numeric value can be entered by pressing the corresponding key on the numeric keypad.

Key/Control	Behavior
F2 [–]/ F3 [+]	Selects a setting value.
[MULTI/CH]	
F4 [◄‖]/ F5 [‖►]	Moves the cursor.

4 **Press F6 [OK].**

Configuring the Local Clock Time Zone

Follow the steps below to configure the time zone of the local clock.

1 **Select Clock Menu [02] “Timezone (Local Clock)”.**

2 **Press F4 [SELECT].**

3 **Press F2 [–]/ F3 [+] or turn the [MULTI/CH] control to select the time zone of the local clock.**

Setting Value	UTC-14:00 to UTC+00:00 (default) to UTC+14:00 (15min/step)

4 **Press F6 [OK].**

Configuring the Auxiliary Clock Time Zone

Follow the steps below to configure the time zone of the auxiliary clock.

1 **Select Clock Menu [03] “Timezone (Secondary Clock)”.**

2 **Press F4 [SELECT].**

3 **Press F2 [–]/ F3 [+] or turn the [MULTI/CH] control to select the time zone of the local clock.**

Setting Value	UTC-14:00 to UTC+00:00 (default) to UTC+14:00 (15min/step)

4 **Press F6 [OK].**

Registering an Auxiliary Clock Identifier

The auxiliary clock can be assigned with a single alphabet as an identifier.

1 **Select Clock Menu [04] “Secondary Clock Identification Letter”.**

2 **Press F4 [EDIT].**

3 **Press F2 [–]/ F3 [+] or turn the [MULTI/CH] control to select an identifier character.**
- “U” is used in the default setting, which stands for “Coordinated Universal Time (UTC)”.

4 **Press F6 [OK].**

Configuring the Date Display Format

The date display format can be configured as follows.

1. **Select Clock Menu [05] "Date Display Format".**
2. **Press F4 [SELECT].**
3. **Select the preferred date display format.**

Setting Value	MMM/DD/'YY (K type: default)/ DD/MMM/'YY (E type: default)/ 'YY/MMM/DD

4. **Press F6 [OK].**

Configuring the Clock Display

Follow the steps below to configure the types and number of clocks to display.

1. **Select Clock Menu [06] "Clock Display".**
2. **Press F4 [SELECT].**
3. **Select the preferred time display format.**

Setting Value	Off/ Local Clock/ Secondary Clock/ Both (default)

Off: Does not display the clock.
Local Clock: Displays only the local clock.
Secondary Clock: Displays only the auxiliary clock.
Both: Displays both the local clock and auxiliary clock.

4. **Press F6 [OK].**

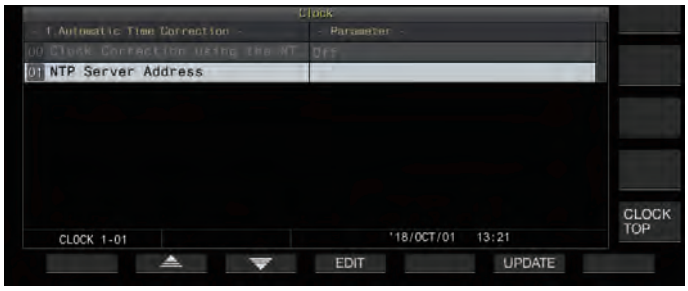
Clock Correction Using NTP (Network Time Protocol)

The NTP server can be used to correct the clock time automatically. This is done by applying the date and time acquired from the NTP server to the built-in clock of this transceiver.
The following configuration procedures are needed to make use of the NTP function.

- Connect this transceiver to a network such as a home LAN via a LAN cable.
- To make use of an NTP server on WAN, allow communication to be established via the Network Time Protocol Port (port 123). For a home LAN that uses a broadband router, ensure that port 123 of the broadband router is open.
- Configure the network on this transceiver.
- Configure the network and IP address on this transceiver. For more details on the method of configuration, please refer to "Configuring the IP Address".
- Configure the address of the NTP server.
- Configure the NTP server address of the time zone configured for the local clock on this transceiver. For more details on the method of configuration, please refer to "Configuring the NTP Server Address".

Displaying the Auto Correction Configuration Screen

1. **Press [MENU] to display the menu screen.**
2. **Press F [CLOCK] to display the Clock menu screen.**
3. **Select Clock Menu [1] "Automatic Time Correction".**
4. **Press F4 [SELECT].**
   The auto correction configuration screen is displayed.



Configuring the NTP Server Address

Follow the steps below to configure the address of the NTP server.

1. **Select Clock Menu [01] "NTP Server Address".**
2. **Press F4 [EDIT].**
3. **Use the function keys, [MULTI/CH] control or USB keyboard to enter the address of the NTP server.**

Key	Behavior
F2 [–]/ F3 [+]	Selects a character.
F4 [◄‖]/ F5 [‖►]	Moves the cursor.
F [BACK SPACE]	Deletes the character to the left of the cursor.
F [DEL]	Deletes the character to the right of the cursor.
F [CHAR]	Switches the type of character to edit. Pressing the key each time switches the selection in the following sequence: ABC (upper case) → abc (lower case) → !"# (symbols) → ABC (upper case)

4. **Press F6 [SAVE] to save the address.**
   - Pressing **F7 [CANCEL]** discards the input and restores this transceiver to the NTP server address setting input mode.

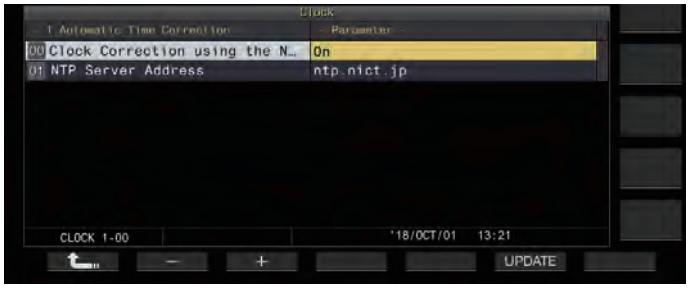
- The response time of the NTP server varies depending on the condition of the network and the NTP server.
- Search for the NTP server address using “NTP server” as the keyword.

Turning ON/OFF Auto Clock Correction

The date and time that is configured for the clock of this transceiver can be corrected by communicating automatically with the NTP server.

1 **Select Clock Menu [00] “Clock Correction using the NTP Server”.**

2 **Press F4 [SELECT].**



3 **Press F2 [–]/ F3 [+] to set auto correction to “On” or “Off”.**
When auto correction is set to “On”, communication is established automatically with the NTP server when the power (⏻) of this transceiver is turned on and correction of the clock’s date and time is performed. If the power (⏻) of this transceiver is left on, auto correction is performed at an interval of approximately 24 hours. The default setting is “Off”.

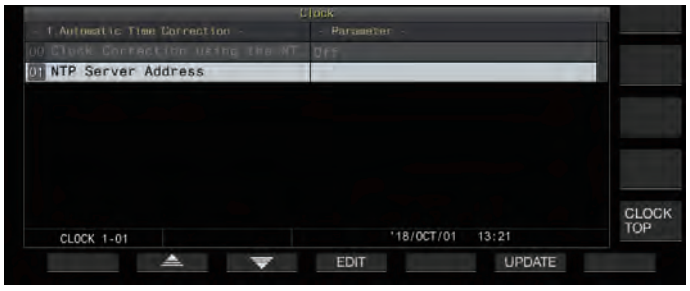
4 **Press F6 [OK].**

Correcting the Date and Time Manually

The date and time that is configured for the clock of this transceiver can be corrected by connecting this transceiver manually to the NTP server.

1 **Select Clock Menu [1] “Automatic Time Correction”.**

2 **Press F4 [SELECT].**



3 **Press F6 [UPDATE].**
Communication with the NTP server starts, and the date and time configured for the clock of this transceiver is corrected. After correction is complete, a message is displayed to notify the user that communication with the NTP server has ended.
- Pressing **F7 [CANCEL]** while acquiring the date and time via NTP stops the acquisition process.

- The NTP server is a public server, please refrain from accessing it frequently.

Timer

This transceiver supports programmed operation using the following timer functions. The frequency and mode can be configured in the Program Timer screen.

Power ON (Program Timer Configuration Screen)

Turns on this transceiver with the preconfigured frequency and mode at the preconfigured timing.

Power OFF (Program Timer Configuration Screen)

Turns off this transceiver at the preconfigured time.

Power ON and Power OFF (Program Timer Configuration Screen)

Turns on or off this transceiver with the preconfigured frequency and mode and at the preconfigured timing.

Timer Recording (Program Timer Configuration Screen)

Records RX audio to the built-in memory or a USB flash drive during the interval between the preconfigured Power-on and Power-off time.

Sleep Timer (Timer Configuration Screen)

Turns off this transceiver after the preconfigured duration has elapsed.

APO (Auto Power Off) (Menu [0-32])

Turns off this transceiver if there is no key or control operation for the preconfigured duration.

Configuring the Program Timer

Follow the steps below to configure the timing for powering on and off this transceiver as well as the operation of the program timer.

1 **Press F [TIMER] on the menu screen to display the Timer configuration screen.**

2 **Press F3 [PROG] to display the Programmable Timer configuration screen.**

3 **Press F2 [◄‖]/ F3 [‖►] to select the setting item.**

4 **Use the function keys and the [MULTI/CH] control to configure the program timer.**

Setting Item	Configuration Method
Timer Mode	Press **F4 [MODE]** to select a timer operation. • Power-on: Turns on this transceiver at the preconfigured time. • Power-off: Turns off this transceiver at the preconfigured time. • Power-on/off: Turns on this transceiver for the preconfigured time. • Record: Performs recording for the preconfigured time. • Off: Disables timer function.
Repeat	Press **F4 [ON/OFF]** to toggle the repeat mode between ON and OFF. • On: Operates the timer at the preconfigured days every week. • Off: Operates the timer only once at the preconfigured day.
Day of the Week	Press **F4 [☐ ⇆ ☑]** to program the timer operation on a specific day of the week. • Timer operation is enabled only on the days for which the corresponding checkbox is selected.
Power-on Time/ Power-off Time	Press **F4 [–]**/ **F5 [+]** or the numeric keypad, or turn the **[MULTI/CH]** control to configure the time for turning on and off this transceiver using the timer. • Configure the time to a value between “00:00” and “23:59”. • When “Power-on” is selected, the power-on time can be configured. • When “Power-off” is selected, the power-off time can be configured.
Frequency/ Mode	Press **F5 [COPY]** to configure the frequency and mode to start up in by the timer. • Turn the Tuning or **[MULTI/CH]** control or use the Band or Mode key to change the current receiving VFO or memory channel and align it with the frequency/mode for performing reception when the program timer is activated. • Press **F5 [COPY]** every time when changing the frequency or mode to start up by the timer.

5 **Press F6 [OK].**
The “configuration complete” screen appears.
- The programmed timer operation is now enabled. (<< >> lights up.)

6 **Press F6 [OK].**
Returns to the Timer menu screen.

7 **Press [ESC] to end the process.**

8 **If the timer (excluding Power-off timer) is set to ON, press [⏻] to power off this transceiver.**
- If a timer mode other than “Off” is configured, the [POWER] LED lights up in orange.

- Before pressing **F5 [COPY]** to copy the operating data that is registered in the memory channel, press [M>V] to shift the operating data of the memory channel to VFO.
- Configure settings other than frequency and mode before pressing **F5 [COPY]** in step 5.
- When programming the timer recording function, there must be an interval of at least 1 minute from the time recording starts (Power-on time) to the time recording ends (Power-off time). Otherwise, programmed recording cannot be performed.
- Timer recording up to a duration of 4 hours can be configured.
- Program timer can be configured even when **F6 [OK]** in step 4 is pressed after the preconfigured interval has elapsed.
- To record audio to a USB flash drive, insert the USB flash drive into the (USB-A) connector on the front panel after configuring the timer recording settings and before recording starts. Use a USB flash drive that is formatted by this transceiver and one with sufficient remaining space.
- Timer recording does not starts unless this transceiver is powered off.
- When the power of this transceiver is OFF, the [POWER] LED starts blinking 1 minute before timer recording starts, and pressing [⏻] in this state does not power on this transceiver.
- If the power of this transceiver is not in the OFF state when timer recording is ON, a message will be displayed 3 minutes and 1 minute before timer recording starts. Press [⏻] to power off this transceiver.
- The [POWER] LED light remains orange during timer recording, while the [REC] LED lights up in red.
- To cancel timer recording after the [POWER] LED starts blinking and before timer recording starts, press and hold [⏻] for 4 seconds.
- While timer recording is in progress, all other operations are disabled until timer recording stops. To cancel timer recording, press [⏻] and follow the displayed message to press and hold down **F4 [(BREAK)]** .
- If the sleep timer is configured, the operation of the program timer function will be temporarily disabled.
- If the power-off time configured in APO is earlier, the power of the transceiver is turned off by the APO function.

Pausing Program Timer Operation

The program timer can be paused while the timer is running.
- Power shutdown at the Power-off time
- Start of timer recording
- Power shutdown by the sleep timer

After the program timer is paused, pressing **F [TIMER]** resumes the program timer operation.

● **Press F [TIMER].**
<< >> goes off, and countdown by the sleep timer or program timer is paused.
Pressing **F [TIMER]** again illuminates << >> and resumes countdown by the sleep timer or program timer.

Sleep timer

Sleep timer is a function for powering off this transceiver after the preconfigured interval has elapsed.

Configuring the Sleep Timer

1 **Press F [TIMER] on the menu screen to display the Timer configuration screen.**

2 **Press F5 [SLEEP] and select the duration before powering off this transceiver.**
<< >> lights up.

Setting Value	Off (default)/ 5/ 10/ 15/ 30/ 60/ 90/ 120 [min]

- Select “Off” if the sleep timer is not used.

3 **Press [ESC] to end the process.**

Pausing the Sleep Timer

The sleep timer can be paused while the timer is running.

● **Press F [TIMER].**
<< >> goes off, and automatic power-off by the sleep timer is temporarily disabled.

- Pressing **F [TIMER]** again disables or resumes both the sleep timer and programmable timer.
- If the power-off time configured in APO is earlier, the power of the transceiver is turned off by the APO function.

APO (Automatic Power Off)

APO is a function that powers off this transceiver when there is no key or control operation in the RX mode for the preconfigured time interval. “CHECK” is output in the Morse code from the speaker 1 minute before the power of this transceiver turns off.

● **Configure in Menu [0-32] “Automatic Power Off”**

Setting Value	Off (default)/ 60/ 120/ 180 [min]

- Upon reaching the preconfigured APO time, a timer power off screen is displayed and the power shuts down after 10 seconds. Operating any of the keys while the timer power off screen is displayed turns off the APO setting.