ICOM®

INSTRUCTION MANUAL

SmarTrunk II™ Compatible

VHF TRANSCEIVER
IC-F110

UHF TRANSCEIVER
IC-F210

Icom Inc.

IMPORTANT

READ ALL INSTRUCTIONS carefully and completely before using the transceiver.

SAVE THIS INSTRUCTION MANUAL — This instruction manual contains important operating instructions for the **IC-F110 VHF TRANSCEIVER** and **IC-F210 UHF TRANSCEIVER**.

EXPLICIT DEFINITIONS

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

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PRECAUTION

⚠**WARNING! NEVER** connect the transceiver to an AC outlet. This may pose a fire hazard or result in an electric shock.

NEVER connect the transceiver to a power source of more than 16 V DC such as a 24 V battery. This connection will ruin the transceiver.

NEVER cut the DC power cable between the DC plug and fuse holder. If an incorrect connection is made after cutting, the transceiver might be damaged.

NEVER place the transceiver where normal operation of the vehicle may be hindered or where it could cause bodily injury.

NEVER allow children to touch the transceiver.

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

USE the supplied microphone only. Other microphones have different pin assignments and may damage the transceiver.

DO NOT use or place the transceiver in areas with temperatures below –30°C (–22°F) or above +60°C (+140°F), or in areas subject to direct sunlight, such as the dashboard.

AVOID operating the transceiver without running the vehicle's engine. The vehicle's battery will quickly run out if the transceiver transmits while the vehicle's engine OFF.

AVOID placing the transceiver in excessively dusty environments.

AVOID placing the transceiver against walls. This will obstruct heat dissipation.

AVOID the use of chemical agents such as benzine or alcohol when cleaning, as they damage the transceiver surfaces.

BE CAREFUL! The transceiver will become hot when operating continuously for long periods.
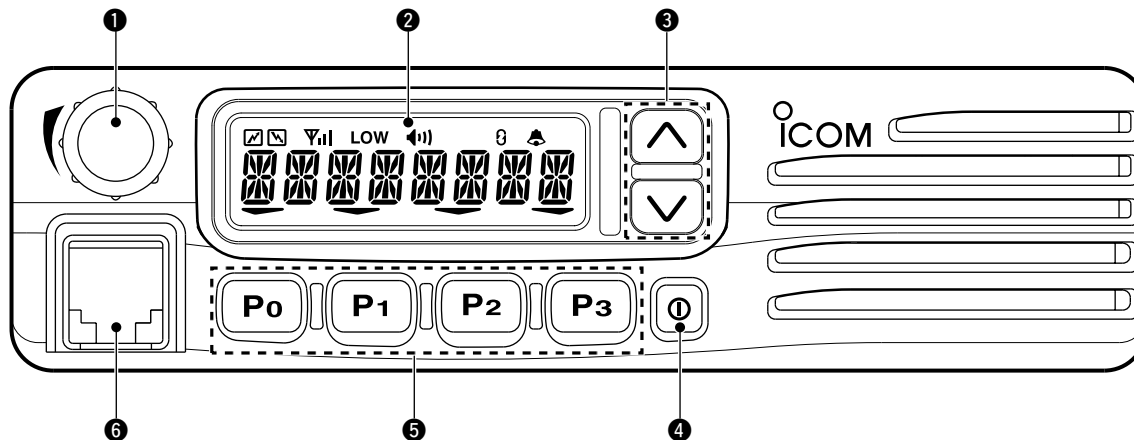
TABLE OF CONTENTS

1 PANEL DESCRIPTION

■ Front panel

q AF VOLUME CONTROL KNOB

Rotate the knob to adjust the audio output level.
• Minimum audio level is pre-programmed.

w FUNCTION DISPLAY

Displays a variety of information, such as an operating channel number/name, 5-tone code, DTMF numbers and audible condition, etc.

NOTE: The above functions depend on pre-programming.

e UP/DOWN [∧]/[∨] KEYS

➥Push to select the operating channel.

➥Can be programmed for one of several functions by your dealer. (Same as [P0] to [P3] keys)

r POWER SWITCH [POWER]

Push to turn the power ON and OFF.
• The following functions are available at power ON as options:
  - Automatic scan start
  - Password prompt
  - Set mode

❺**DEALER-PROGRAMMABLE KEYS [P0] to [P3]**
Desired functions can be programmed independently by your dealer.

❻**MICROPHONE CONNECTOR**
Connect the supplied microphone or optional DTMF microphone for SmarTrunk II™ operation here.

NEVER connect non-specified microphones. The pin assignments may be different and the transceiver may be damaged.

◇ **MICROPHONE**
The supplied microphone has a PTT switch and a hanger hook.
• The following functions are available when the microphone is on or off hook:
- Automatic scan start when on hook.
- Automatic priority channel selection when off hook.
- Sets to 'Inaudible' condition (mute condition) when on hook.
- Sets to 'Audible' condition (unmute condition) when off hook.

■**Function display**
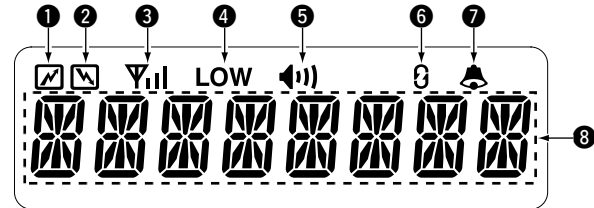
❶**TRANSMIT INDICATOR**
Appears while transmitting.

❷**BUSY INDICATOR**
Appears while the channel is busy.

❸**SIGNAL STRENGTH METER**
Indicates relative receive signal strength level.

❹**LOW POWER INDICATOR**
Appears when low output power is selected.

❺**AUDIBLE INDICATOR**
Appears when the channel is in the 'Audible' condition (unmute condition).

❻**SCRAMBLER INDICATOR**
Appears when the scrambler function is activated. (Optional UT-109 (#02)/UT-110 (#02) SCRAMBLER UNIT is required.)

➐ 2/5TONE INDICATOR

Appears when the specified 2/5-tone call is received.

➑ ALPHANUMERIC DISPLAY

Displays the CH number, 5-tone indication, DTMF numbers, Audible indication, etc.

NOTE: When the alphanumeric display blinks and transmitting becomes impossible, check that the DC battery voltage has not dropped below 8 V or that the antenna is not tuned properly or the antenna connection is faulty.

■Programmable function keys

The following functions can be assigned to **[P0], [P1], [P2], [P3], [∧]** and **[∨]** programmable function keys.
Consult your Icom dealer for details concerning your transceiver's programming.
In the following explanations, programmable function names are bracketed. The specific switch used to activate the function depends on programming.

● *CH UP AND DOWN KEYS*

CH UP
CH DN

➥ Select an operating channel.
➥ Select a transmit code channel after pushing the **[TX CH]** key.
➥ Select a DTMF channel after pushing the **[DTMF]** key.
➥ Select a scan group after pushing and holding the **[SCAN]** key.

● *BANK KEY*

BANK

Select and determine a bank number.
• When the optional UT-105 is installed, push one or more times to select a channel bank for conventional channels or SmarTrunk II ™ channels.

● *SCAN START/STOP KEY*

SCAN A   Push this key to start scanning; and push again
SCAN B   to stop.

> **NOTE:** Place the microphone on hook to start
> scanning.
> Take the microphone off hook to stop scanning.

● *SCAN TAG KEY*

TAG   Adds or deletes the selected channel to the scan
group.

● *PRIORITY CHANNEL KEYS*

PRI A   Push these keys to select priority A or priority B
PRI B   channel, respectively.

● *OPERATING CHANNEL KEYS*

CH1   Select an operating channel directly.

CH2

CH3

CH4

● *MONITOR KEY*

MONI   Activates one of (or two of) the following functions
on each channel independently:
• Push and hold the key to unmute the channel (audio
is emitted; 'Audible' condition).
• Push the key to toggle between the mute and unmute
conditions (toggles between 'Audible' and 'Inaudible').
• Push the key to mute the channel (sets to 'Inaudible'
only).
• Push the key to unmute the channel (sets to 'Audible'
only).
• Push the key after communication is finished to send a
'reset code'.

> **NOTE:** The unmute condition ('Audible' condi-
> tion) may automatically return to the mute con-
> dition ('Inaudible' condition) after a specified
> period depending on the pre-setting.

● *LOCK KEY*

LOCK   Push this key for 1 sec. to lock all programmable
keys except the following:
• **[CALL]** (incl. **[CAL A]** and **[CAL B]**), **[MONI]** and
[EMER] keys.

1 PANEL DESCRIPTION

● **OUTPUT POWER SELECTION KEYS**

[H/L] Select the transmit output power temporarily, or permanently, depending on the pre-setting.
  • Contact your dealer for the output power level for each selection.

● **TALK AROUND KEY**

[TA] Turns the talk around function ON and OFF.
  • The talk around function equalizes the transmit frequency to the receive frequency for mobile-to-mobile communication.

● **WIDE/NARROW KEY**

[W/N] Push this key to toggle the bandwidth between wide or narrow.

● **DTMF AUTODIAL KEY**

[DTMF] Push this key to display the text of the DTMF channel number and set the desired channel number via the **[∧]**/**[∨]** key. Then, push this key again to transmit a specified DTMF code.

● **CALL KEY**

[CALL] Transmit a 2-tone, 5-tone code.
  • Call transmission is necessary before you call another station depending on your signaling system.

[CAL A]
[CAL B]
  • The **[CAL A]** and/or **[CAL B]** keys may be available when your system employs selective 'Individual/Group' calls. Contact your dealer about which call is assigned to each key.

● **EMERGENCY KEY**

[EMER] Push and hold the key to transmit an emergency call.
  • If you want to cancel the emergency call, push and hold (or push) the key again before transmitting the call.
  • Depending on the pre-setting, the emergency call is transmitted one time only, or repeatedly, until receiving a control code.

● **HOOK SCAN**

[HOOK] When the Hook Scan function is turned ON, push this key to stop scanning temporarily. Push this key again to re-start scanning.

● **TX CODE KEY**

[TX CH] Select a transmit 5-tone code (station code) channel.

● *SCRAMBLER KEY*

SCRM ➥ Push and hold to turn the voice scrambler function ON.

➥ Push this key to turn the voice scrambler function OFF.

NOTE:
• The optional UT-109 (#02) or UT-110 (#02) VOICE SCRAMBLER UNIT is required.
– UT-109: Non-rolling type. 32 codes are available.
– UT-110: Rolling type. Provides higher communication security. 1020 (4 groups × 255) codes are available.
• This transceiver requires version #02 of these units. Do not install version #01, as they are not compatible.
• Some PC board modifications are required when installing UT-109 or UT-110. Please refer to 'Optional UT-109 or UT-110 installation'. (p.16)
• Please contact your dealer for details.

● *USER SET MODE KEY*

SET Changes the contents of the items in the User Set mode. Please refer to p. 10.
• Push and hold this key for 1 sec. to enter set mode. Push this key again momentarily to select the desired item. Push **[∧]/[∨]** to set the desired level/condition.
Push and hold this key again to exit set mode.
• User set mode also available via the 'Power ON function'.

2 OPERATION

■ Turning power ON

① Push [⏻] to turn the power ON.

② If the transceiver is programmed for a start up passcode, input the digit codes as directed by your dealer.
• The keys in the table below can be used for password input:
• The transceiver detects numbers in the same block as identical. Therefore "01234" and "56789" are same.

KEY	P0	P1	P2	P3	⏻
NUMBER	0 5	1 6	2 7	3 8	4 9

③ When the "PASSWORD" indication does not clear after inputting 4 digits, the input code number is incorrect. In this case, turn the power off and start over.

■ Channel selection

Several types of channel selection are available. The methods may differ according to your system setup.

NON-BANK TYPE:
Push **[∧]**/**[∨]** to select the desired operating channel in sequence; or, push one of the **[CH 1]** to **[CH 4]** keys to select a channel directly.

BANK-TYPE:
Push **[BANK]** to select the desired bank number or name.

AUTOMATIC SCAN TYPE:
Channel setting is not necessary for this type. When turning the power ON, the transceiver automatically starts scanning. Scanning stops when receiving a call or when taking the microphone off hook.

■Receiving and transmitting

RECEIVING:

① Push [⏻] to turn the power ON.

② Push **[∧]** and **[∨]** to select a channel.

③ When receiving a call, adjust the audio output level to a comfortable listening level.

TRANSMITTING:

④ Take the microphone off hook.
  • 2-tone, 5-tone mute may be released. (The 'audible' condition is selected and " ⊠ " appears.)
  • A priority channel may be selected automatically.

⑤ Wait for the channel to become clear.
  • The channel is busy when " ⊠ " appears.

⑥ Push the **[CALL]** key when initiating a call from your side.
  • Coded audio may be heard from the transceiver, then " ◀)) " appears.
  • This operation may not be necessary depending on your signaling system. Contact your dealer.

⑦ While pushing and holding [PTT], speak into the microphone at your normal voice level.

⑧ Release [PTT] to receive.

IMPORTANT!: To maximize the readability of your signal;
➥ Pause briefly after pushing [PTT].
➥ Hold the microphone 2 to 5 cm (0.8 to 2 inches) from your mouth, then speak into the microphone at a normal voice level.

◇ Transmitting notes

• **Transmit inhibit function**

The transceiver has several inhibit functions which restrict transmission under the following conditions:
- The channel is in mute condition ('Inaudible' condition; " ◀)) " does not appear).
- Channel is busy.
- A matched/un-matched CTCSS code is received.
- The selected channel is a 'receive only' channel.

• **Time-out timer**

After continuous transmission for a pre-programmed period, the time-out timer is activated causing the transceiver to stop transmitting and automatically select receive.

• **Penalty timer**

Once the time-out timer is activated, transmission is further inhibited for a period determined by the penalty timer.

2 OPERATION

◇ TX code channel selection

If the transceiver has a **[TX CH]** key, the display can be toggled between the operating channel number (or name) and TX code channel number (or name). When the TX code channel number (or name) is displayed, the **[∧]**/**[∨]** keys select the TX code channel.

To select a TX channel:

① Push **[TX CH]**—a TX code channel appears.
② Push **[∧]**/**[∨]** to select the desired TX code channel.
③ Push **[CALL]** to transmit the selected TX code.
④ Push **[TX CH]** again to return to the channel display.

◇ TX code number selection

If the transceiver has a **[TX CH]** key, TX code contents can be changed within the allowable digits.

To select a TX code:

① Push **[TX CH]**—a TX code number appears and the first digit blinks.
② Push **[∧]**/**[∨]** to select the desired number of the blinking digit.
③ Push **[TX CH]** to enter the selected number and the next digit will start blinking automatically.
④ Repeat step ② and ③ to input all allowed digits.
⑤ Push **[CALL]** to transmit the selected TX code.

◇ DTMF transmission

If the transceiver has a **[DTMF]** key, the automatic DTMF transmission function is available. Up to 7 DTMF channels may be available.

To transmit a DTMF code:

① Push **[DTMF]**—a DTMF code channel appears.
② Push **[∧]**/**[∨]** to select the desired DTMF channel.
③ Push and hold **[DTMF]** to transmit the DTMF code on the selected DTMF channel.

◇ Scrambler function

The UT-109 (#02) or UT-110 (#02) optional voice scrambler unit provides high performance private communication between stations with the same scrambler codes.

To turn the scrambler function ON and OFF:

① Push and hold **[SCRM]** to turn the scrambler function ON.
② Push **[SCRM]** to turn the function OFF.

◇ User set mode

User set mode is accessed at power ON and allows you to set seldom-changed settings. In this case you can "customize" transceiver operation to suit your preferences and operating style.

Entering the user set mode:

① While pushing and holding **[∧]** and **[∨]**, push [POWER] to enter user set mode ON, allowing you to set seldom-changed settings.

② Push and hold **[P0]** to select the appropriate item. Then, push **[∧]** or **[∨]** to set the desired level/mode.
  - Available set mode functions;
    • Backlight   : OFF, Dim, Auto or ON
    • Beep   : OFF or ON
    • SQL Level   : 0 to 255
    • AF Min level   : 0 to 255

③ Push [POWER] (or push and hold **[P0]**) again to exit set mode.

User set mode is also available via a programmable key. Please refer to p. 6 **[SET]** section.

3 OPTIONAL SmarTrunk II™ OPERATION

■ SmarTrunk II™ and conventional modes

This transceiver is capable of SmarTrunk II™ functions.

The optional UT-105 allows communication in conventional channels or SmarTrunk II™ channels. Select a channel bank for SmarTrunk II™ before trunking operation.

• Push **[BANK]** several times to select a channel bank for conventional channels or SmarTrunk II™ channels.
 - Scanning starts when a channel bank for SmarTrunk II™ operation is selected.
 - Contact your dealer for channel bank details.

NOTE: Optional HM-100TN DTMF MICROPHONE is required. Contact your dealer for details.

■ SmarTrunk II™ operation

These features are enabled by a dealer and may not be available in your system. Contact your dealer for details.

◇ Placing a telephone call
Enter the phone number followed by [1], [∗].
• A high-pitched beep indicates that the number is accepted.
• When the called party answers, push the [PTT] switch to talk, and release it to listen.

◇ Calling another local system subscriber
Enter the subscriber number followed by [3], [∗].
• A high-pitched beep indicates that the number is accepted.
• You hear ringing, then two short beeps when the subscriber answers.
• If the other subscriber is on another call or out of range, you hear a fast busy signal and the call terminates automatically.

◇ Receiving a call
When you hear ringing, push [∗] to answer.
• For a group call, you hear a short ring followed by two short beeps. You do not have to answer a group call to hear it over the air.

◇ **Terminating a call**

After completing a call, push [#] to disconnect (hang up).

ĭ IMPORTANT!: If one person in the conversation termi-
nates a call, all participants will be cut off.

◇ **Last number re-dial**

Push [∗] 2 times to automatically re-dial the last called num-
ber.

• A high-pitched beep indicates that the number is accepted.

◇ **Memory speed-dialling**

To automatically dial a commonly used number from memory:
• Push [∗] followed by the memory location (0–9).

◇ **Turbo SpeeDial**

To automatically dial a commonly used number with one
push:
• Push one of the turbo SpeeDial keys ([A], [B], [C] or [D]).

◇ **Programming memory speed dial**

① Push and hold [∗] until you hear a high-pitched beep.
② Enter the memory location (0–9, A, B, C, D), the telephone
or subscriber number, then [1], [∗] (or [3], [∗] if for another
system subscriber).
• A high-pitched beep indicates successful programming.
• Memories [A]–[D] are used for the Turbo SpeeDial.

◇ **System busy indication**

If all channels are busy, three low beeps sound after you initi-
ate a call. Try the call again later.

◇ **PTT dispatch operation**

① Push [PTT] once (without dialling) to initiate a dispatch call.
② Begin talking after you hear three beeps (one short, high-
pitched, two very-short, low-pitched).
③ Receiving a dispatch call is indicated by the same three-
beep sequence.
• It is not necessary to push [∗] to answer a dispatch call.

◇ **Emergency call**

Push [0], [∗] to initiate an emergency call.
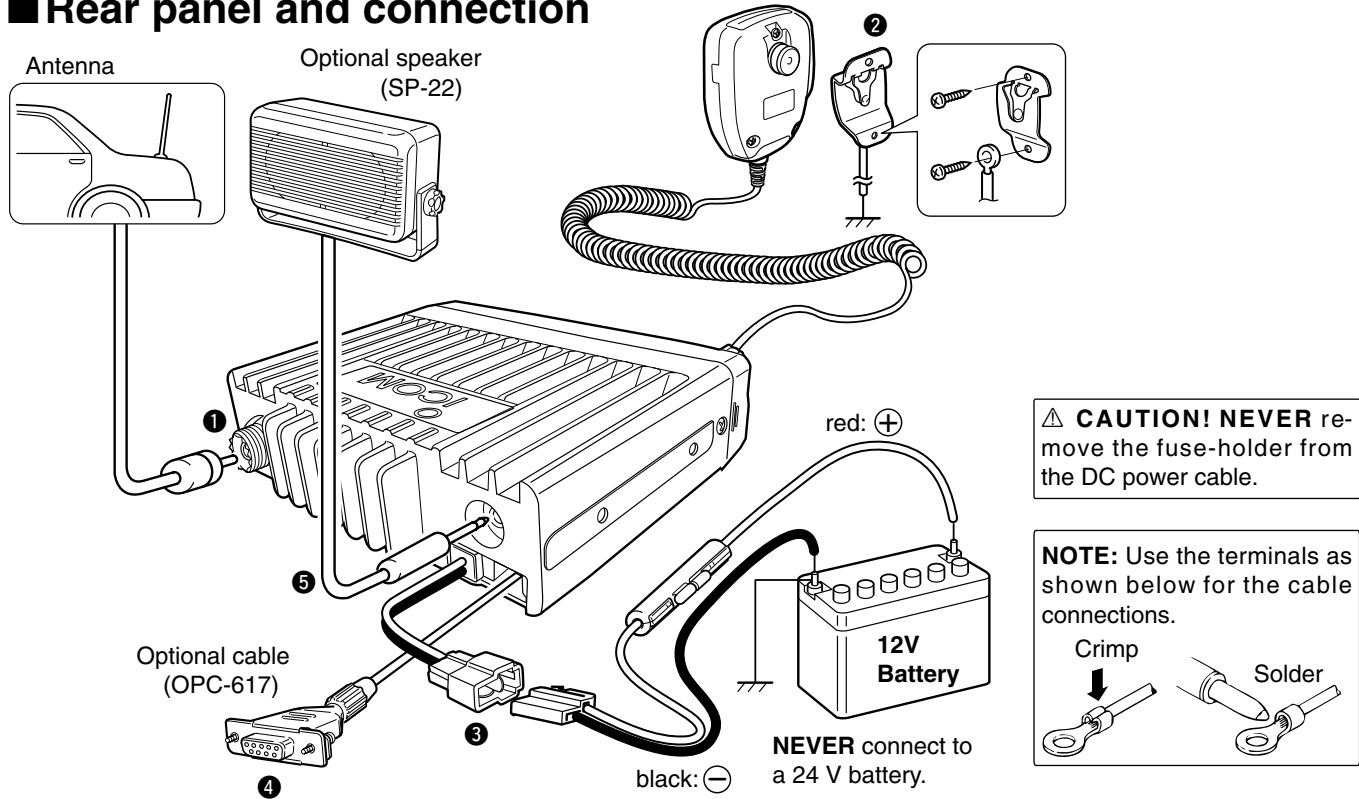• Contact your dealer for details.

◇ **Clear channel alerting**

If all channels are busy, the transceiver automatically begins
searching for an open channel and beeps every ten seconds.
When two short beeps (low-pitched, then high-pitched) are
heard, a channel is available. Push [∗] two times immediate-
ly to re-dial the last number.

ĭ NOTE: For additional operating instructions, contact your
dealer.

4 CONNECTION AND MAINTENANCE

■ Rear panel and connection

Antenna

Optional speaker (SP-22)

❶

❷

red: ⊕

❺

⚠ CAUTION! NEVER remove the fuse-holder from the DC power cable.

Optional cable (OPC-617)

❸

❹

12V Battery

black: ⊖

NEVER connect to a 24 V battery.

NOTE: Use the terminals as shown below for the cable connections.

Crimp

Solder

q **ANTENNA CONNECTOR**
Connects to an antenna. Contact your dealer about antenna selection and placement.

w **MICROPHONE HANGER**
Connect the supplied microphone hanger to the vehicle's ground for microphone on/off hook functions. (See p. 2)

e **DC POWER RECEPTACLE**
Connects to a **12 V DC** battery. Pay attention to polarities. **NEVER** connect to a **24 V** battery. This could damage the transceiver.

r **OPTIONAL CABLE** (OPC-617)
Connect an external modem unit, dimmer control, etc.

t **EXTERNAL SPEAKER JACK**
Connect a 4–8 Ω external speaker, if desired.

■ **Supplied Accessories**
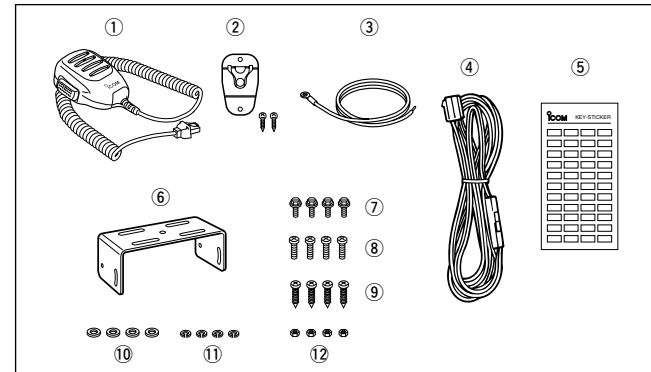
① Microphone 1
② Microphone hanger and
 screw set .... 1 set
③ Microphone hanger cable . 1
④ DC power cable (OPC-1194)
1
⑤ Function name stickers*
 (KEY STICKER) 1
⑥ Mounting bracket 1
⑦ Bracket bolts 4
⑧ Mounting screws (M5×12) . 4
⑨ Self-tapping screws (M5×20)
 4
⑩ Flat washers 4
⑪ Spring washers 4
⑫ Nuts 4

*Function name stickers
There are no names on the programmable function keys since the functions can be freely assigned to these keys.
Attach the supplied function name stickers above the appropriate keys for easy recognition of that key's assigned function.

■ Mounting the transceiver

The universal mounting bracket supplied with your transceiver allows overhead mounting.

• Mount the transceiver securely with the 4 supplied screws to a thick surface which can support more than 1.5 kg.

Flat washer

Spring washer
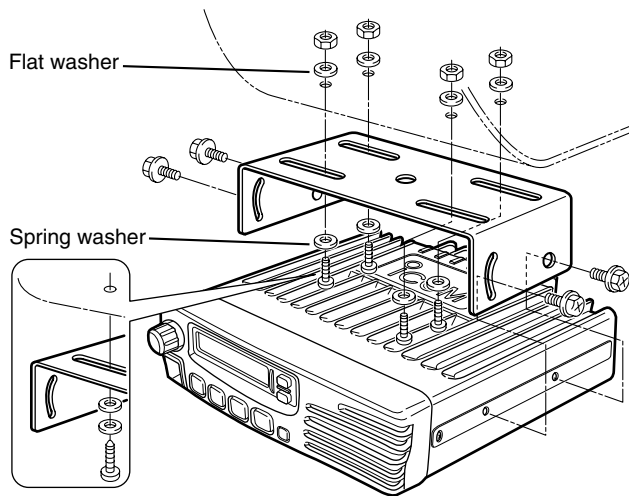
When using
self-tapping screws

■ Optional UT-105, UT-108 or UT-111 installation

Install the optional UT-105, UT-108 or UT-111 unit as follows:

① Turn the power OFF, then disconnect the DC power cable.
② Unscrew the 4 cover screws, then remove the bottom cover.
③ Install the unit as shown in the diagram below.
④ Replace the bottom cover and screws, then re-connect the DC power cable.

UT-105/
UT-108/
UT-111

Front panel
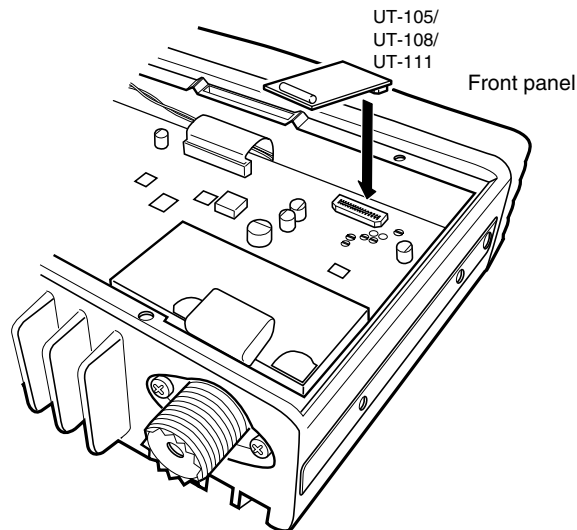
■ Optional UT-109 or UT-110 installation

① Turn the power OFF, then disconnect the DC power cable.
② Unscrew the 4 cover screws, then remove the bottom cover.
③ Cut the pattern on the PCB at the TX mic circuit (MIC) and RX AF circuit (DISC) as shown below.
④ Install the scrambler unit as described in the installation of optional UT-105, UT-108 or UT-111 as on the page at left.
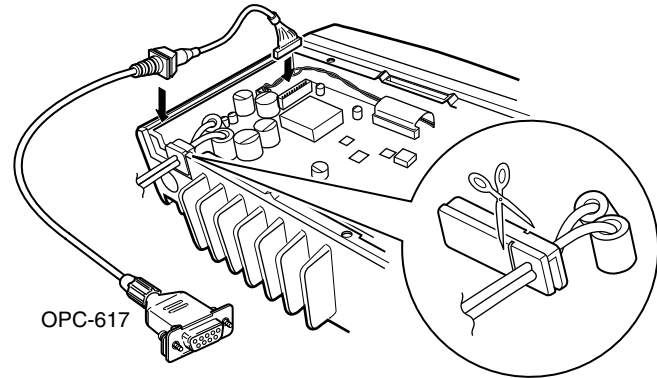⑤ Replace the bottom cover and screws.

Front panel

DISC   MIC
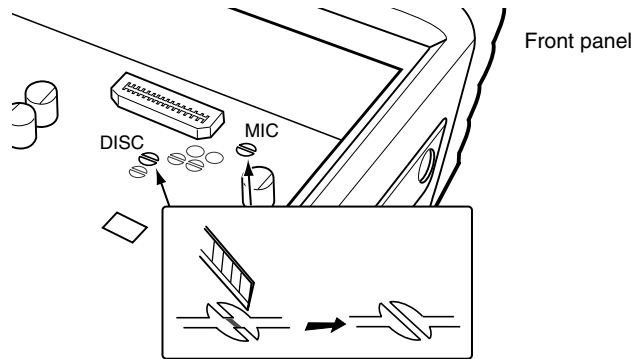
NOTE: Be sure to re-solder the above disconnected points when you remove the scrambler units. Otherwise no TX modulation or AF output is available.
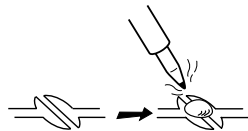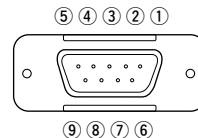
■ Optional OPC-617 installation

Install the OPC-617 as shown below.

OPC-617

Cut off the bushing as in the illustration, when you install the optional OPC-617.

OPTIONAL CABLE PIN ASSIGNMENT

⑤ ④ ③ ② ①
⑨ ⑧ ⑦ ⑥

① Dimmer cont. IN or IGSW cont. IN
② AF OUT
③ Det. AF OUT
④ Mod. IN
⑤ PTT control IN or FTSW control IN
⑥ Horn drive cont. OUT
⑦ AF GND
⑧ Det. AF GND
⑨ Mod. GND

■ **Antenna**

A key element in the performance of any communication system is an antenna. Contact your dealer about antennas and the best places to mount them.

■ **Fuse replacement**

A fuse is installed in the supplied DC power cable. If a fuse blows or the transceiver stops functioning, track down the source of the problem if possible, and replace the damaged fuse with a new rated one.

❑Fuse rating: 10 A
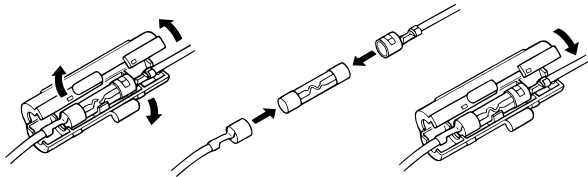
■ **Cleaning**

If the transceiver becomes dusty or dirty, wipe it clean with a soft, dry cloth.

AVOID the use of solvents such as benzene or alcohol, as they may damage the transceiver surfaces.

SP-22 EXTERNAL SPEAKER
Compact and easy-to-install.
Input impedance : 4 Ω
Max. input power : 5 W

HM-100N/HM-100TN/HM-152/HM-152T/HM-148
• HM-100TN/HM-152T : DTMF microphone
• HM-148 : Heavy duty microphone

SM-25
Desktop microphone.

UT-105 SmarTrunk II™ Logic Board
Provides SmarTrunk II™ capabilities.

UT-108 DTMF DECODER UNIT
Provides pager and code squelch capabilities.

UT-109/UT-110 (#02) VOICE SCRAMBLER UNIT
• UT-109 : Non-rolling type (max. 32 codes)
• UT-110 : Rolling type (max. 1020 codes)

UT-111 TRUNKING BOARD
Provides trunking operation.

OPC-617 ACC CABLE
Allows you to connect to an external terminal.

MEMO

MEMO

Count on us!