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You can read the recommendations in the user guide, the technical guide or the installation guide for ICOM UT-109. You'll find the answers to all your questions on the ICOM UT-109 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

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ICOM INSTALLATION INSTRUCTIONS
SCRAMBLER UNIT
UT-109/UT-110
Rev.1.2

Thank you for purchasing the UT-109/UT-110 SCRAMBLER UNIT. The UT-109 and UT-110 are designed for Icom F series VHF/UHF FM transceivers. Please read these instructions thoroughly before installing and operating the UT-109/UT-110.

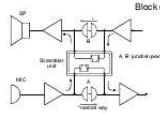
IC-F300/F400/S SERIES PRECAUTIONS

- Some transceiver versions will not be able to have scrambler units installed because of CPU revision and other factors. Please confirm that the transceivers' serial number is over 50000.
- UT-109 and UT-110 scrambler units require some PC board modifications. (See below.)
- There are 2 versions (#01: Low AF level type for IC-F3/F4/S series and #02: High AF level type for the others) for each scrambler unit. Do not install the wrong version, as they are not compatible.
- IC-F300/F400/S series require the #02 type scrambler unit.
- The UT-110 may function as the UT-109 through cloning software.
- Compatible cloning software: CS-F300S, CS-F300.

PC BOARD MODIFICATION

The scrambler unit may be installed between the mic amplifier circuit and AF circuit. Cut or desolder the junction points (or take off jumper chip for IC-F3/F4/S series).

Block diagram

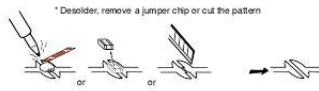


IC-F300 F400/S series

- ① Turn power OFF, then disconnect the DC power cable.
- ② Unscrew the 4 screws, then remove the bottom cover.
- ③ Cut or desolder the point pattern on the PC board at the TX mic circuit (A) and RX AF circuit (B).
- ④ Install the unit as shown in the instruction manual.
- ⑤ Replace the bottom cover and screws, then the DC power cable.

NOTE:
Modification points are marked A or B on the circuit board (see corresponding figures)
A - TX modulation circuit.
B - RX AF circuit.

* Desolder, remove a jumper chip or cut the pattern



CLONING

- Program the scrambler function ON/OFF and scrambler type, group codes, synchronous capture mode and tone start timing on the [Common] screen with cloning software when installing this unit. (*UT-110 only)
- Assign the scrambler function to a programmable key as [SCRM] on [Key & Display Assign] screen, if required.
- Operation with the [SCRM] key:
 - Push and hold to turn the voice scrambler function ON.
 - Push to turn the voice scrambler function OFF.

NOTE FOR REMOVAL

Be sure to resolder above disconnected points, otherwise no TX modulation or AF output is available when you remove the scrambler units.

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Manual abstract:

I.2 Thank you for purchasing the UT-109/UT-110 SCRAMBLER UNIT. The UT-109 and UT-110 are designed for Icom F series VHF/UHF FM transceivers. Please read these instructions thoroughly before installing and operating the UT-109/UT-110. IC-F300/F400/S SERIES PRECAUTIONS · Some transceiver versions will not be able to have scrambler units installed because of CPU revision and other factors. Please confirm that the transceivers' serial number is over 50000. · UT-109 and UT-110 scrambler units require some PC board modifications. (See below.) · There are 2 versions (#01: Low AF level type for ICF3/F4/S series and #02: High AF level type for the others) for each scrambler unit. Do not install the wrong version, as they are not compatible.

· IC-F300/F400/S series require the #02 type scrambler unit. · The UT-110 may function as the UT-109 through cloning software. · Compatible cloning software: CS-F300S, CS-F300. PC BOARD MODIFICATION The scrambler unit may be installed between the mic amplifier circuit and AF circuit. Cut or desolder the junction points (or take off jumper chip for IC-F3/F4/S series).

SP * Block diagram B A, B: junction points Scrambler unit MIC A M IC-F300/F400/S series q Turn power OFF, then disconnect the DC power cable. w Unscrew the 4 screws, then remove the bottom cover. e Cut or desolder the print pattern on the PC board at the TX mic circuit (A) and RX AF circuit (B). r Install the unit as shown in the instruction manual. @@(see corresponding figures) A : TX modulation circuit.

@@@@@@- Push to turn the voice scrambler function OFF. NOTE FOR REMOVAL Be sure to resolder above disconnected points, otherwise no TX modulation or AF output is available when you remove the scrambler units. -1- IC-F300/F400/S SERIES MODIFICATION POINTS M Model: IC-F300/S series REAR ANT Main board A and B. A B M Model: IC-F400/S series REAR ANT Main board A and B. B A -2- APPENDIX -1; IC-F3/F4/S SERIES PRECAUTIONS · Some transceiver versions will not be able to have scrambler units installed because of CPU revision and other factors. Please confirm that the transceivers' serial number is over 50000. · UT-109 and UT-110 scrambler units require some PC board modifications. (See below.) · IC-F3/F4/S series require a #01: Low level type scrambler unit. Do not install the wrong version, as they are not compatible.

· The UT-110 may function as the UT-109 through cloning software. · Compatible cloning software: CS-F3. PC BOARD MODIFICATION M IC-F3/F4/S series There are 2 types of PC boards are exist. Be sure to confirm the board number in advance. · IC-F3/IC-F3S B4929E requires LCD side and CPU side modifications. B4929F*1 requires CPU side only. · IC-F4/IC-F4S B4923G LCD side and CPU side modifications. B4923H*1 requires CPU side only. q Take out the knob and unscrew the antenna connector screw. w Unscrew the 2 screws, then remove the front panel.

e Remove the shield cover if necessary. r Remove the jumper chip (DET)*2 or (AF)*2 on the LCD side of the PC board. t Replace the shield cover to the original position. y Remove the jumper chip resistor(s) on the CPU side of the PC board. (see right figures) u Install the unit as shown in the instruction manual.

i Replace the front panel and screws. NOTE: *1 B4929F and B4923H's modification points may access through the service window without take apart. *2 Modification points are marked DET or AF on the main board. (see below figures) CLONING · Program the scrambler function ON/OFF and scrambler codes on the [Memory CH] screen, scrambler type*, group codes*, synchronous capture mode* and tone start timing* on the [Common] screen with cloning software when installing this unit. (*UT-110 only) - Push and hold to turn the voice scrambler function ON.

- Push to turn the voice scrambler function OFF. · Assign the scrambler function to a programmable key as [SCRM] on [Key & Display Assign] screen, if required. · Operation with the [SCRM] key: NOTE FOR REMOVAL Be sure to resolder above disconnected points, otherwise no TX modulation or AF output is available when you remove the scrambler units. -3- DET MICROPHONE MICROPHONE AF C112 C112 R130 C147 C156 R134 C146 C408 R144 C163 C154 R83 C171 IC5 C149 C151 C152 Q17 IC6 R444 Q19 R408 R128 R135 R142 R142 D402 C154 L22 R131 C114 R82 C150 C117 MC1 R84 R85 C115 R239 C112 R83 IC2 C121 C69 R87 C63 R80 C118 C120 R89 R100 C169 C129 R99 R178 C132 R257 R257 C286 C164 R177 R95 C124 R109 R108 C134 C126 C166 R93 R176 R176 R54 C165 R94 IC3 C133 C179 C75 R251 C291 R52 C135 R97 R114 R114 C136 R53 C137 R210 R55 C79 C77 R56 C14 C289 C204 C78 D8 R160 C288 C20 D29 C219 C21 R115 R116 R117 C243 Q37 C73 R104 R159 R96 C125 R132 1 C217 J6 L30 C167 R253 R91 R44 C213 R168 R169 R112 C64 R45 R45 C54 R170 R81 R167 IC1 IC1 C290 C214 C212 R166 C111 R88 R90 Q14 C122 C168 R79 R49 D7 C59 R42 C57 C55 R86 C110 C119 J7 C113 R244 X3 C116 R126 R127 C162 R407 R442 R137 Q22 R406 Remove the resister from the board. Q400 R424 X3 R46 Q20 C51 R84 C146 R238 C268 R245 DS2 C186 Remove the resister from the board. R45 C63 C160 R126 R82 R40 C451 R176 L13 IC2 C117 C124 C167 J7 R107 C115 C115 R141 Q18 MC1 C114 C113 C213 C142 C116 C64 DS2 C52 R85 C149 R44 C456 R469 R450 C118 IC1 C491 Q404 · LCD side: B4929E only. · LCD side: B4923G only. SPEAKER SP1 R121 C238 R154 R154 C107 C109 C109 L14 L404 R128 R67 C139 R96 R41 C61 R100 R451 C140 C140 R122 C169 C415 R65 Q16 C60 IC5 R174 C450 C242 D405 R452 R452 C120 C217 SPEAKER SP1 D27 R123 R120 Q31 C237 C237 R34 R32 Q401 Q13 R414 IC10 C126 C48 C48 C166 R113 Q37 R108 C134 R420 IC3 C106 L407 C47 R151 R175 R95 R415 C165 C234 C180 R241 Q11 R30 R30 IC10 R106 R31 R154 R153 C240 C241 C242 R250 C19 R255 L6 L5 R9 C25 R8 R8 R7 L28 C18 C12 R5 C23 R4 R4 R10 Q2 C11 C205 D1 D1 C15 Q1 C278 C16 C279 L4 L23 C8 R6 C24 R11 L3 L2 C1 C1 R1 C287 L24 C280 C17 C13 C22 DS4 R14 Q3 L27 L26 C239 D3 C40 C46 D19 C50 R242 D16 R243 C256 C237 R185 R185 C181 C233 C131 C244 C238 R105 R105 Q402 C108 L412 R210 C10 C179 C496 C18 C189 R186 Q34 C211 R63 Q34 C62 IC4 R52 R77 C419 C464 D404 C473 R184 C497 R454 R21 R72 C465 R162 C218 C99 R104 R114 Q28 Q9 D4 R68 R68 R69 L21 R19 C483 R117 C234 R422 C32 R116 C455 C455 R165 C486 C182 C185 C184 R16 C273 C274 C232 C141 C142 C26 R15 R183 C170 R13 R12 L7 C183 C27 D1 C474 C42 R209 R17 R112 R439 L5 C20 R5 C204 C452 Q403 R449 R208 D24 C476 R455 C460 R14 C26 Q2 C467 C17 R9 L24 L24 C76 C481 C8 C229 C3 R8 C482 C11 R160 L1 C14 C9 C448 R163 R3 C170 C170 R157 R156 R457 R446 Q3 C458 R158 C205 L411 R1 R190 R215 R216 C231 C231 R204 Q25 C221 R205 C143 R155 DS3 C25 R12 C202 C5 C200 C201 C492 C22 C15 C2 W6 C7 C487 R7 L6Q1 R55 C13 ANTENNA D17 D3 R97 C136 L15 L406 C137 C135 R453 R438 C128 C75 R53 C211 R115 D406 C479 C73 R421 C30 R70 C477 R153 C240 C239 R105 R109 R159 L414 R240 C133 C190 C49 R107 R132 R98 L12 R409 L20 R405 R54 IC4 C443 R464 R35 R178 R94 R459 C151 1 C150 C125 R127 R34 R33 R99 C152 R93 J6 SP SPG P1 C56 C58 SP SPG P1 ANTENNA R458 C5 IC-F3/F4 SERIES MODIFICATION POINTS M Model: IC-F3/IC-F3S PC board number B4929E; Remove the LCD side jumper chip and the CPU side jumper chip q.



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B4929F; Remove the CPU side jumper chips q and w. M Model: IC-F4/IC-F4S PC board number B4923G; Remove the LCD side jumper chip and the CPU side jumper chip q.

B4923H; Remove the CPU side jumper chips q and w. B4929F or E -4 · CPU side · CPU side q Service window Service window Jumper chips w w Jumper q chips B4923H or G APPENDIX -2; CLONING -1 M Memory CH screen D SCRAMBLER ON/OFF/INH Turns the scrambler function "ON" or "OFF" as a initial setting. This item can also be turned "ON" or "OFF" with a program function switch when the function is assigned to a switch. "INH": This means the scrambler function selection is inhibited. Optional UT-109 or UT-110 Voice scrambler unit is required. M Common D Scrambler code Set the scrambler code number. Selectable value; UT-109: 1 to 32 UT-110: 1 to 255 *Set the scrambler group code in the Common screen in advance. (UT-110 only) 2 screen

NOTE: This setting is invalid for UT-109. NOTE: The following setting will be invalid: Scrambler Group Code D SYNCHRONOUS CAPTURE (UT-110 only) "Synchronous capture mode" is useful when communicating through a repeater. @@Normally it is best to set this item to "Standard".

Selectable value; Standard (Normal operation) Continuous (repeater operation) D TONE START TIMING (UT-110 only) D SCRAMBLER GROUP CODE (UT-110 only) Set the scrambler group code. Selectable value; 1 to 4. Optional scrambler unit (UT-110) is required. NOTE: This setting is invalid for UT-109. D SCRAMBLER TYPE (UT-110 only) Set the UT-110 Rolling type scrambler as UT-109 Non-rolling type.

@@@ Selectable value; Rolling type (UT-110 normal) Non-rolling type (UT-110 functions as UT-109) Tone start timing selects the synchronous tone signal transmit delay time. @@@@ In the TX Code CH screen, set CH NO.1 to 1 only. In the TX Code Common screen, set the Long Tone Timer to 0.300.

@@@@@ The following groups of codes are the same: 1 to 32 (33 to 64) (65 to 96) (97 to 128) (129 to 160) (161 to 1T-110 only) "Synchronous capture mode" is useful when communicating through a repeater. @@Normally it is best to set this item to "Standard".

@@@@@ Use the same scrambler group code for same group. Selectable value; 1 to 4. @@@@ 1 sec. @@@@ The following groups of codes are the same: 1 to 32 (33 to 64) (65 to 96) (97 to 128) (129 to 160) (161 to 192) (193 to 224) (225 to 255) When using the UT-110 for rolling type scrambling similar but different codes will often result in a match. To avoid this, use codes that are sufficiently different (generally speaking codes that are separated by values of 20 or more will not match). When using the UT-110 for rolling type scrambling and a channel is in the scramble ON condition, if a received signal includes no simultaneous tone, the receiving station automatically enters the through condition and the transmission can be monitored. However, when non-rolling type scrambling is set, simultaneous tone are not used and therefore signals from other stations are received with modulation reversed. When using the UT-110 as rolling type scrambler unit to keep the highest level of privacy, the LOG IN' function provides full time scrambling communications.

M Using LOG IN' function @@ In the DTMF Autodial screen, set the LOG/ID code to 5 and the 1st Timer to 0.700. In the memory CH screen, set necessary channels to LOG IN (L-IN). NOTE: At these settings, when the period from pushing PTT to when you can talk seems long, set the Power Save Start timer (2nd) in the Expert screen to "0.000" and set the Tone Start Timing in the Common 2 screen to 0.600. In the DTMF Autodial screen, set the 1st Timer to 0.200. · For PMR: In the Common 2 screen, set the Tone Start Timing to 1.100.

In the TX Code CH screen, set CH NO.1 to 1 only. In the 5Tone setting screen, set the Long Tone Timer to 0.300. In the Edit Memory CH screen, set necessary channel ID's to 1L (click check box to turn the Long Tone ON).

(CCIR 5-tone format) In the memory CH screen, set necessary channels to LOG IN (L-IN). NOTE: At above settings, when the period from pushing PTT to when you can talk seems long, set the Power Save Start timer (2nd) in the Expert screen to 0.000 and set the Tone Start Timing to 0.600. - 10 - APPENDIX-4; IC-F1010/F1020/F2010/F2020 SERIES MODIFICATION POINTS M Model: IC-F1000/F2000 series Cut the junction patterns on Main board AFO and MIC.

FRONT MIC MAIN unit UT-109/110 AFO CLONING · UT-109 and UT-110 scrambler units require some PC board modifications. (See above MIC and AFO.) · IC-F1010/F1020, IC-F2010/F2020 series require a #02: High AF level type scrambler unit. Do not install the wrong version, as they are not compatible. · The UT-110 may function as the UT-109 through cloning software. · Compatible cloning software: CS-F1000 Rev.2.2. · Program the scrambler function OFF/ON/INH and scrambler codes on the Memory Channel screen, Scrambler Type*, Group Code*, Synchronous Capture* and Tone Start Timing* on the [Common 2] screen with cloning software when installing scrambler unit. (*UT-110 only) · Assign the scrambler function to a programmable key as "Scrambler" on [Key & Display Assign] screen, if required.

· Operation with the [Scrambler] key: - Push and hold to turn the voice scrambler function ON. - Push to turn the voice scrambler function OFF. · Please refer the "IC-F3/F4/S SERIES CLONING PRECAUTIONS" on p. 3. NOTE FOR REMOVAL Be sure to resolder above disconnected points, otherwise no TX modulation or AF output is available when you remove the scrambler units. - 11 - APPENDIX -4; IC-F30/F31GT/GS, IC-F40/F41GT/GS SERIES PRECAUTIONS · UT-109 and UT-110 scrambler units require some PC board modifications. (See below and next.) · IC-F30/F31GT/GS, IC-F40/F41GT/GS series require a #02: High AF level type scrambler unit. Do not install the wrong version, as they are not compatible. · The UT-110 may function as the UT-109 through cloning software.

· Compatible cloning software: CS-F30G. OPTIONAL UNIT INSTALLATION M Installation Disassemble the some parts before install the scrambler unit. q Unscrew nut a, and remove the knobs. w Unscrew screw b and 2 screws c, then remove the multi-connector cover and rear panel. e Unscrew 2 screws d, then remove the multi-connector.

@@@t Install the desired optional unit. Insert tightly to avoid bad contact. @@Otherwise the unit will not work correctly. @>(*UT-110 only) · Assign the scrambler function to a programmable key as "Scrambler" on Key & Display Assign screen, if required. · Operation with the [Scrambler] key: - Push and hold to turn the voice scrambler function ON.

- Push to turn the voice scrambler function OFF. · Please refer the "IC-F3GT/GS, IC-F4GT/GS SERIES CLONING NOTES" on p.



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10. NOTE FOR REMOVAL Be sure to resolder disconnected points, otherwise no TX modulation or AF output is available after you remove the scrambler units. - 12 - MODIFICATION POINTS · Modification points. (Both IC-F30/F31GT/GS, F40/F41GT/GS) · Cut the junction patterns A and B on the MAIN unit. urface A AF line MIC line B OPT1 connector for; UT-105, UT-111, UT-109/110, UT-113 OPT2 connector for; UT-109/110, UT-113 *DO NOT install UT-105 or UT-111 into OPT2. G 10 15 10 15 1 5 1 5 OPT1 OPT2 J1 E J2 16 30 F C 25 20 30 25 D 20 16 MAIN unit 09.2000 - 13 1-1-32 Kamiminami, Hirano-ku, Osaka 547-0003 Japan Count on us! A-8326I-1EX-w Printed in Japan © 1997 Icom Inc. .



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