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You can read the recommendations in the user guide, the technical guide or the installation guide for ICOM IC-E90. You'll find the answers to all your questions on the ICOM IC-E90 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual ICOM IC-E90
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MULTIBAND FM TRANSCEIVER
IC-E90

Icom Inc.



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Manual abstract:

The IC-E90 is a tri-band, 50 MHz, 144 MHz, 430 MHz FM transceiver that offers a wide-band AM, FM and WFM scanning receiver*. Not only you can hear your favorite TV programs with the pre-programmed TV memories*, but you can also listen to short wave, AM and FM broadcast radio stations, police, fire, military, aircraft, various amateur bands and more. New DMS(Dynamic Memory Scan) bank scanning provides 555 alphanumeric memory channels, including 50 band edges, with a maximum of 18 banks or 100 channels per bank. @@@@The newly designed antenna also provides stable signal strength. We want to thank you for making your IC-E90 your radio of choice, and hope you agree with Icom's philosophy of "technology first." Many hours of research and development went into the design of your IC-E90. i FEATURES Tri-band FM transceiver Wide-band receiver --Covers 495 KHz to 999.990* MHz New DMS (Dynamic Memory Scan) bank scan Lithium-Ion technology Rugged palm sized, weather-resistant construction DTCS and CTCSS tone squelch Simple operation * Available frequency range and/or the pre-programmed TV memories may differ depends on version. See p. 85 for details. i IMPORTANT READ ALL INSTRUCTIONS carefully and completely before using the transceiver. SUPPLIED ACCESSORIES Accessories included with the transceiver: Qty. q Li-Ion battery pack (BP-217) ...

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.... 1 w Wall charger* (BC-110D/DR)

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..... 1 e MB-83 (Swivel belt clip)

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.... 1 set r Handstrap.

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. 1 t Antenna (FA-S6270D; with 50 MHz band adapter) .. 1 set * Not supplied with some versions. SAVE THIS INSTRUCTION MANUAL -- This instruction manual contains important operating instructions for the IC-E90. EXPLICIT DEFINITIONS The explicit definitions below apply to this instruction manual. q e r t WORD WARNING CAUTION NOTE DEFINITION Personal injury, fire hazard or electric shock may occur. Equipment damage may occur. If disregarded, inconvenience only. No risk of personal injury, fire or electric shock.

w Icom, Icom Inc. and the logo are registered trademarks of Icom Incorporated (Japan) in the United States, the United Kingdom, Germany, France, Spain, Russia and/or other countries. ii CAUTIONS WARNING RF EXPOSURE! This device emits Radio Frequency (RF) energy. Extreme caution should be observed when operating this device. If you have any questions regarding RF exposure and safety standards please refer to the Federal Communications Commission Office of Engineering and Technology's report on Evaluating Compliance with FCC Guidelines for Human Radio Frequency Electromagnetic Fields (OET Bulletin 65) NEVER connect the transceiver to a power source that is DC fused at more than 5 A.

Accidental reverse connection will be protected by this fuse, but higher fuse values will not give protection against such accidents and the transceiver will be ruined. DO NOT operate the transceiver near unshielded electrical blasting caps or in an explosive atmosphere. WARNING! NEVER hold the transceiver so that the antenna is very close to, or touching exposed parts of the body, especially the face or eyes, while transmitting. The transceiver will perform best if the microphone is 1 to 2 in (2 to 5 cm) away from the lips and the transceiver is vertical. WARNING! NEVER operate the transceiver with a headset or other audio accessories at high volume levels.

Hearing experts advise against continuous high volume operation. If you experience a ringing in your ears, reduce the volume level or discontinue use. NEVER CONNECT a power supply of more than 11.5 V DC to the DC jack. The supply voltage must be between 10.5 V and 11.5 V to prevent damaging the transceiver. AVOID using or placing the transceiver in direct sunlight or in areas with temperatures below 10°C (+14°F) or above +60°C (+140°F). RF output power is automatically reduced to 0.5 W (Low) in cold environments (below 0°C) while operating with the BP-217 Li-Ion battery pack, to protect the battery pack.

Keep the battery pack warm, then select high power again. (p. 28) The use of non-Icom battery packs/chargers may impair transceiver performance and invalidate the warranty. Even when the transceiver power is OFF, a slight current still flows in the circuits. Remove the battery pack or case from the

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detaching the transceiver to/from the belt.

q Attach the stopper to supplied stopper the transceiver with screw the supplied screw. I Installing the battery pack q Open the latch.



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Then, attach the BP-217 Li-Ion battery pack or optional BP-216 battery case. · Be sure to observe the correct direction. · Charge Li-Ion battery pack before use. w Lock the latch. q Battery pack or battery case w w Clip the belt clip to your belt. Latch NOTE: The battery pack is provided uncharged. BE SURE to charge the battery before using it with the transceiver. D Installing the alkaline batteries Install 2 R6 (AA) size alkaline batteries into BP-216.

· Be sure to observe the correct polarity. Keep battery contacts clean. It's a good idea to clean battery terminals once a week. 1 QUICK REFERENCE GUIDE e Insert the transceiver to the end of the clip as shown at right. 1 q QUICK REFERENCE GUIDE 2 CAUTION! HOLD THE TRANSCEIVER TIGHTLY, WHEN ATTACHING OR REMOVING THE TRANSCEIVER TO/FROM THE BELT CLIP. If the transceiver accidentally dropped and the swivel belt clip's stopper is scratched, the swivel belt clip may not work properly. · Once the transceiver is locked in place, it will swivel 360 degrees as shown at right. iC-190a D Handstrap To remove: r Turn the transceiver upside down, and then lift to release the transceiver from the belt clip as shown at upper right. Slide the handstrap through the loop on the top of the belt clip as shown at right. 1 QUICK REFERENCE GUIDE D Installing the antenna Insert the supplied wide band antenna into the antenna connector and screw down the antenna as shown below.

· 50 MHz band adapter Attach the 50 MHz band antenna adapter before operating 50 MHz band or receiving the signal below 50 MHz band. Be sure to use this 50 MHz band adapter during the operation below 50 MHz band. You can operate the whole band with this adapter. CAUTION! TRANSMITTING WITHOUT AN ANTENNA MAY DAMAGE THE TRANSCEIVER. NEVER HOLD the antenna when carrying the transceiver.

KEEP the jack covers attached when the jack is not in use, to avoid bad contacts from dust and moisture. *KEEP the the antenna top cap in the safe place when it not in use. Detach the top cap* 50 MHz band adapter Hold the base , then screw the antenna down. Attach the 50 MHz band adapter NOTE: Commercially available antennas may increase transceiver performance. An optional AD-92SMA ANTENNA CONNECTOR ADAPTER is available to connect an er mouth.

y Push and hold [PTT], then speak at your normal voice level. u Release [PTT] switch to receive. · Repeat steps, t, y and u to continue communication. 2 PANEL DESCRIPTION q POWER SWITCH [PWR] Push for 1 sec. to turn the transceiver power ON and OFF. w BAND SWITCH [BAND] Push to select the operating band (50MHz, Air, VHF, UHF, etc.). (p. 21) Push to select the memory bank or push to proceed the memory name cursor while programming the memory option. (pgs.

39, 41) Push for 1 sec. for morse code synthesizer announcement. (p. 75) While pushing [PTT], this key sends a DTMF "D". e UP/DOWN SWId 1 [DIAL] functions. (p. 23) VD · "VOL" appears when the tuning dial functions as a volume control. Inputs digit '2' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "2". !8 OUTPUT POWER SWITCH [3 H/L] (p.

28) Push for 1 sec. to toggle the output power between high and low. H/L · "LOW" appears when low output power is selected. Inputs digit '3' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "3".

!9 DUPLEX SWITCH [4 DUP] (pgs. 29, 31) Push for 1 sec. to activate the following duplex 4 functions in order. DUP · Minus duplex operation -- "DUP" appears. · Plus duplex operation -- "DUP" appears.

· Simplex operation -- no duplex indicator appears. Inputs digit '1' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "1". !7 TONE SWITCH [2 TONE] (p. 70) Push for 1 sec. to activate the following tone 2 functions in order. TONE 9 Inputs digit '4' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "4". PANEL DESCRIPTION @0 FREQUENCY SKIP SWITCH [5 SKIP] Push for 1 sec. to turn the frequency skip function ON and OFF in VFO mode.

(p. 47) SKIP · "P SKIP" appears when the frequency skip function is in use. 2 w PANEL DESCRIPTION 10 While pushing [PTT], this key sends the DTMF code "7". @3 SET MODE SWITCH [8 SET] Push for 1 sec. to enter the set mode. Push to 8 select the displayed set mode item after selecting with [DIAL] while in the set mode. (p. 55) Inputs digit '8' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "8". @4 TUNING STEP SWITCH [9 TS] Push for 1 sec.

to select the tuning step. 9 (p. 18) TS Inputs digit '9' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "9". @5 RIT/ATTENUATOR SWITCH [0 RIT] Push for 1 sec.

to enter the RIT/attenuator set 0 mode. Push to select the item after selecting RIT with [DIAL]. (p. 27) · RIT function is available for 630.000 MHz and above. · Attenuator for 629.995 MHz or less only. Push for 1 sec. to set the memory channel as the following skip channel in memory mode in order. (p. 48) · Skip channel -- "SKIP" appears. · Frequency skip channel -- "P SKIP" appears. · Non-skip channel -- no skip indicator appears. Push for 1 sec. to program a paused frequency as a skip frequency while scanning.

(p. 46) Inputs digit '5' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "5". @1 MEMORY NAME SWITCH [6 M.N] Push for 1 sec. to turn the memory name indication ON and OFF. (p. 40) M.N · Frequency appears for nameless memory channels. Inputs digit '6' for frequency input, memory channel selection, etc.

While pushing [PTT], this key sends the DTMF code "6". @2 TONE SCAN SWITCH [7 T.SCAN] Push for 1 sec. to start a tone scan. (p.

73) 7 Inputs digit '7' for frequency input, memory T.SCAN channel selection, etc. Inputs digit '0' for frequency input, memory channel selection, etc. While pushing [PTT], this key sends the DTMF code "0". 2 PANEL DESCRIPTION 1 Function display w e r t y u i o q !0 !5 !4 !3 !2 !1 q FREQUENCY READOUT Shows the operating frequency, set mode contents, etc.

· The smaller "75," "50" and "25" to the right of the readout indicate 0.75, 0.5 and 0.25 kHz, respectively. · The decimal point of the frequency flashes during scan. e RECEIVE MODE INDICATORS (p. 21) Shows the receive mode. · AM, FM and WFM are available. w LOCK INDICATOR (p. 74) Indicates that the lock function is in use.

11 r DUPLEX INDICATORS (pgs.



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29, 31) Appears when semi-duplex operation (repeater operation) is in use. · "DUP" appears when minus duplex is selected; "DUP" only, appears when plus duplex is selected. PANEL DESCRIPTION t TONE INDICATORS (p. 70) Appear when the following tone functions are activated. · Subaudible tone encoder -- "T" appears. (p. 29) · Tone squelch -- "T SQL" appears. (p. 71) · Pocket beep -- "T SQLS" appears. (p. 71) · DTCS squelch -- "DTCS" appears. (p. 71) · DTCS beep -- "SDTCS" appears. (p. 71)

71) 2 w PANEL DESCRIPTION 12 !0 MEMORY CHANNEL READOUT (p. 20) Shows the memory or call channel number, etc. !1 S/RF INDICATORS (p. 28) Shows the relative signal strength while receiving. Shows the relative output power while transmitting.

!2 LOW POWER INDICATOR (p. 28) Appears when low output power is selected. !3 VOLUME EXCHANGE INDICATOR (p. 23) Appears when the functions of tuning dial and [Y]/[Z] switches are exchanged. !4 BATTERY INDICATORS Both segments appear when the batteries have ample capacity. · They do not appear when operating with an external power source. "S" flashes when the correct tone or code is received during pocket/DTCS beep operation. (p. 71) y RIT INDICATOR (p. 27) Appears when the RIT (Receive Incremental Tuning) function for 630.000 MHz and above is in use. u SKIP SCAN INDICATOR (p. 47) "SKIP" appears when a selected memory channel is set as a skip channel. "P SKIP" appears when the memory channel frequency is set as a skip frequency in memory mode. "P SKIP" appears when the frequency skip function is turned ON in VFO mode. i PRIORITY WATCH INDICATOR (p. 50) Appears when priority watch is in use. o MEMORY MODE INDICATOR (p. 20) Appears when a memory channel is selected. Only the right segment " " appears when the batteries are nearing exhaustion.

Blinks while charging the attached Li-Ion battery pack. !5 ATTENUATOR INDICATOR (p. 27) Appears when the attenuator is in use. 3 BATTERY CHARGING I Battery cautions NEVER incinerate used battery packs. Internal battery gas may cause an explosion. NEVER immerse the battery pack in water. If the battery pack becomes wet, be sure to wipe it dry BEFORE attaching it to the transceiver. Battery pack or battery case NEVER short terminals of the battery pack. Also, current may flow into nearby metal objects so be careful when placing battery packs in handbags, etc. If your battery pack seems to have no capacity even after being charged, completely discharge it by leaving the power ON overnight. Then, fully charge the battery pack again. If the battery pack still does not retain a charge (or very little), a new battery pack must be purchased. Use Icom battery packs, chargers and cables only. The use of non-Icom products may impair transceiver performance and invalidate the warranty. Even when the transceiver power is OFF, a slight current still flows in the circuits. Remove the battery pack or case from the transceiver when not using it for a long time. Otherwise, the battery pack or installed batteries will become exhausted. I Battery attachment q Attach the BP-217 Li-Ion battery pack or optional BP-216 battery case. · Be sure to observe the correct direction. · Charge Li-Ion battery pack before use.

w Lock the latch. q w Latch D Operating periods The operating periods with BP-217 are: 50 MHz Approx. 6 hr. 144 MHz Approx. 5 hr. 440 MHz Approx. 5 hr. at high power, Tx : Rx : Standby = 1:1:8 13 BATTERY CHARGING 3 I Regular charging CAUTION: To avoid damage to the transceiver, turn the transceiver OFF while charging. · Recommended temperature range for charging: 0°C to +35°C; +32°F to +95°F · Use the wall charger* (BC-110AR/DR) only. NEVER use another manufactures' charger.

* Not supplied with some versions. * Not supplied with some versions. r Remove any cables from the [DC11V] jack. · Charging period: 15 hours (w/BP-217) · An optional cable CP-19E (for 12 V cigarette lighter socket) can be used instead of the AC adapters of the above chargers. IC-E90 with BP-217 BC-110D/DR to AC outlet D Battery indicators The battery indicators blink while charging but do not indicate the power condition. "CHG_F" appears when the charging is completed. Disconnect the wall charger in this case. to DC power jack CP-19E (optional) to a 12 V cigarette lighter socket 14 BATTERY CHARGING Prior to using the transceiver for the first time, the battery pack must be fully charged for optimum life and operation. q Attach the battery pack to the transceiver. w Be sure to turn the transceiver power OFF.

e Connect the AC adapter* (BC-110D/DR) as shown below. e 3 BATTERY CHARGING I Rapid charging The optional BC-139 provides rapid charging of the battery pack. · Charging period: 2.5 hours (w/BP-217) CAUTION: To avoid damage to the transceiver, turn it OFF while charging. · Recommended temperature range for charging: 0°C to +35°C; +32°F to +95°F · NEVER connect 2 chargers to the [AC ADAPTER] and [DC13.5V] jacks of BC-139. · Use the supplied BC-123 for the BC-139 desktop charger. Connect BC-123 to the [AC ADAPTER] jack. · NEVER use another manufactures' charger. · An optional cable CP-19E (for 12 V cigarette lighter socket) can be used instead of the supplied AC adapter.

Connect one of these to the [DC11V] jack in this case. Turn power OFF. Check the orientation. A BP-217 Li-Ion battery pack to AC outlet Adapter (supplied with BC-139) Charging terminal LED Charging: Orange Finished: Green BC-123 (supplied with BC-139) BC-139 (optional) desktop charger to [AC ADAPTER] jack If the charge indicator blinks orange, there may be a problem with the battery pack (or charger). Re-insert the battery pack or contact your dealer. 15 BATTERY CHARGING 3 I Battery case (Option) q Install 2 R6 (AA) size alkaline batteries into BP-216. · Be sure to observe the correct polarity. I External power operation An optional cable CP-19E (for 12 V cigarette lighter socket) can be used for external power operation. · Power supply range is between 5. 511.0 V DC. NEVER connect over 11.5 V DC directly into the DC power jack of the transceiver. · BE SURE to use CP-19E when connecting regulated 12 V DC power supply. · If a battery pack is attached, the voltage of the external power must be within 11.516 V DC, otherwise, the battery power may be used for operation. · The maximum output power is 5.0 W regardless of the power supply voltage. · Remove the cables from the transceiver when not using it. Otherwise, the vehicle battery will become exhausted. e BATTERY CHARGING 16 w Install the battery case as shown at right. A build in step-up convertor in the BP-216 increases the voltage up to 5 V DC.



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Keep battery contacts clean. It's a good idea to clean battery terminals once a week. Voltage indication D Battery information The batteries may seem to have low capacity when used in low temperatures such as 10 °C (+14 °F) or below. Please keep the battery case or pack warm in this case. CP-19 (optional) to DC power jack D Battery replacement When the batteries become exhausted, the function display may blink or have a lower contrast. In these cases, replace all batteries with new, same brand, alkaline batteries. to a 12 V cigarette lighter socket 4 BASIC OPERATION D Setting volume level The audio level can be adjusted through 32 levels.

Push [Y] or [Z] to set the desired audio level. · Rotating the tuning dial while pushing [Y] or [Z] also sets the audio level. · [Y]/[Z] and [DIAL] can be exchanged by [I VD]. (p. 23) I Turning power ON D Turning power ON q Make sure alkaline batteries are installed in the battery case or the battery pack is charged, and attach them. (p. 13) w Push [PWR] for 1 sec. to turn the power ON. · The function display shows "ICOM," current voltage then the operating frequency. · Repeat this step to turn power OFF.

Shows volume level. The opening message can be turned ON or OFF in the expanded set mode 1. (p. 64) Opening message 'ICOM' [] [] Voltage indication D Volume level indication The frequency display shows the volume level during setting as shown below. Indication Audio level Frequency indication FM P SKIP [PWR] 0 (no sound) 111 1218 1923 (default) 2427 2830 31 (Maximum) 17 BASIC OPERATION 4 I Tuning step When using the tuning dial to change the frequency, or when a scan function is activated, the frequency changes in increments determined by the set tuning step.

Tuning steps can be selected for each band. This transceiver has 13 tuning steps as follows: · 5 kHz · 6.25 kHz · 8.33* kHz · 9* kHz · 10 kHz · 12.5 kHz · 15 kHz · 20 kHz · 25 kHz · 30 kHz · 50 kHz · 100 kHz · 200 kHz *Depends on version.

[DIAL] D Setting the tuning step q Push [9 TS] for 1 sec. to enter tuning step set mode. · "TS" appears. D MHz tuning step This is useful to change the frequency rapidly. r BASIC OPERATION 18 q Select VFO mode with [VFO]. w Push [VFO MHz] for 1 sec. to select 1 MHz tuning step. e Push [VFO MHz] for 1 sec. again to select 10 MHz tuning step, if required. r Rotate [DIAL] to select the desired MHz frequency.

t Push [VFO] to exit MHz tuning step. 1 MHz tuning step FM P SKIP w Rotate [DIAL] to select the desired tuning step. · Rotating the tuning dial while pushing [9 TS] also selects the tuning step. · Tuning step can be set in VFO and memory modes. e Push [9 TS] or [VFO] to exit. 5 kHz tuning step 20 kHz tuning step 10 MHz tuning step FM P SKIP [VFO MHz] [9 TS] 4 BASIC OPERATION D Setting the frequency with keypad q Select VFO mode with [VFO]. w Push the desired numeral buttons until inputting 1 kHz digit to set the frequency. · When you want to change the 100 kHz digit and below, push [-] first, then the numeral buttons. · Acceptable digits for the 1 kHz digit depend on the 10 kHz digit. I Setting a frequency Push numeral keys and [-] to input the desired frequency.

· Frequency can be set irrelevant of the selected band. · When inputting a frequency outside of the frequency range, the previously selected frequency is automatically selected after inputting 1 kHz digit. · Setting to 0.684 MHz RIT · Setting to 433.580 MHz DUP 0 FM P SKIP 4 FM P SKIP * Available frequency range and/or the pre-programmed TV memories may differ depends on version.

See p. 85 for details. · Changing 100 kHz and below. Setting 433.580 MHz to 433.

240 MHz. · DTMF.M FM P SKIP H/L 3 FM P SKIP M.N 6 FM P SKIP H/L 3 FM P SKIP · DTMF.M SET 8 FM P SKIP · DTMF.M FM P SKIP TONE 2 [VFO] DUP 4 FM P SKIP SKIP 5 FM P SKIP DUP 4 V 1 4 7 D TONE 2 5 8 H/L 3 6 9 TS SET 8 FM P SKIP RIT 0 DUP SKIP M.N RIT .

DTMF.M 0 T.SCAN SET RIT 0 FM P SKIP 19 BASIC OPERATION 4 I Mode selection D VFO mode VFO mode is used for setting a desired frequency within the band range. Push [VFO] to select VFO mode. · Pushing [VFO] in VFO mode toggles VFO A and B. D Memory mode Memory mode is used for operation of memory channels which have programmed frequencies. Push [MR] to select memory mode. · Pushing [MR] in memory mode toggles memory channel and memory bank indications. · To program a memory Ch, refer to p. 37.

D Call/TV channels Call channels are used for most-oftenused frequencies for quick recall. TV channels* can be selected with [CALL/TV]. Push [CALL/TV] to select a call, TV channel* in sequence. *Depends on version. r BASIC OPERATION 20 What is VFO? VFO is an abbreviation of Variable Frequency Oscillator.

Frequencies for transmitting and receiving are generated and controlled by the VFO. [MR] [VFO] Memory channel FM [CALL/TV] Call channel FM VFO A FM P SKIP Memory bank FM TV channel W FM VFO B FM P SKIP A00Y99 appear when a memory bank is programmed. 4 BASIC OPERATION I Operating band and receive mode selection D Selecting the operating band The transceiver can receive the BC (broadcast)* bands, 5 MHz* band, 50 MHz* band, WFM* bands, Air* band, 144 MHz (VHF) band, 220 MHz* band, 300 MHz* band, 430 MHz (UHF) band or 800 MHz* band. NOTE: Available frequency range may differ depends on version. q Select VFO mode with [VFO].

w Push [BAND] several times to select the desired band. · Rotating the tuning dial while pushing [BAND] also selects the operating band. D Selecting the receive mode Receive modes are determined by the physical properties of the radio signals. The transceiver has 3 receive modes: FM, AM and WFM modes. Typically, AM mode is used for the avionics band (108 135.975 MHz) and WFM is used for FM broadcast stations (88107.75 MHz). When pushing [PTT], a beep tone sounds indicating the mode is not FM mode. The transceiver cannot transmit in AM or WFM mode. [BAND] [VFO] BC (broadcast) bands AM P SKIP 5 MHz bands AM P SKIP 50 MHz band FM P SKIP WFM bands* W FM P SKIP FM mode FM P SKIP 0.

4951.620 MHz 800 MHz band* FM P SKIP 1.62534.995 MHz 35.00087.995 MHz* 88.000107.995 MHz* Air bands* AM P SKIP BAND Push [BAND] several times to select the desired band. WFM mode W FM MODE SCAN *UK and Italy versions only. 550.

000999.990 MHz UHF band FM P SKIP P SKIP 108.000135.995 MHz 300 MHz band* FM P SKIP Push MODE SCAN to toggle the operating mode.



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220 MHz band* FM P SKIP VHF band FM P SKIP AM mode AM MODE SCAN P SKIP 383.

000549.995 MHz 255.000383.995 MHz 220.000254.

995 MHz 136.000221.995 MHz 21 BASIC OPERATION 4 I Setting the squelch level The squelch circuit mutes the received audio signal depending on the signal strength. The transceiver has 9 squelch levels, a continuously open setting and an automatic squelch setting. e Release [SQL] to return to the previous indication. [Squelch level indication] D Monitor function This function is used to listen to weak signals or to open the tone squelch manually. Push and hold [SQL] to monitor the operating frequency. r BASIC OPERATION 22 D Setting the squelch level q While pushing and holding [SQL], rotate [DIAL] one-click to display the current squelch level. w Rotate [DIAL] successively to adjust the squelch level. · "LEVEL1" is loose squelch and "LEVEL9" is tight squelch.

· "AUTO" indicates automatic level adjustment with a noise pulse count system. Indication Squelch level Open Automatic (default) Level 1 (loose) Level 2 Level 3 Level 4 Level 5 Level 6 Level 7 Level 8 Level 9 (tight) [SQL] FM P SKIP [DIAL] Blinks while monitoring. [SQL] The [SQL] switch can be set as a monitor ON/OFF switch in set mode. (p. 60) 4 BASIC OPERATION YZ D Exchange [DIAL] and [Y]/[Z] functions The functions of tuning dial and [Y]/[Z] switches can be exchanged, if desired. Push [1 VD] for 1 sec. to exchange the functions of the tuning dial and [Y]/[Z] switches. · "VOL" appears when the functions are exchanged. I Receiving D Setting volume level Push [Y] or [Z] to set the desired audio level. · Rotating the tuning dial while pushing [Y] or [Z] also sets the audio level.

D Setting squelch level q While pushing [SQL], rotate [DIAL] to select the squelch level. · "LEVEL1" is loose squelch and "LEVEL9" is tight squelch. [DIAL] w Release [SQL] to return to the previous indication. [DIAL] [] [] [1 V D] FM P SKIP VOL Appears when the functions are exchanged. [SQL] [] [] [DIAL]

Default setting Frequency setting Memory channel setting Scan direction setting Set mode setting Volume setting Exchanged setting Volume setting Frequency setting Memory channel setting Scan direction setting Set mode setting [Y]/[Z] 23 BASIC OPERATION D Receiving FM broadcast [EXAMPLE]: Receiving 88.

200 MHz. q Select VFO mode with [VFO]. w For direct frequency input, push [8], [8], [-], [2], [0], [0]. · Skip e and t in this case. 4 D Receiving amateur bands [EXAMPLE]: Receiving 145.

600 MHz. q Select VFO mode with [VFO]. w For direct frequency input, push [1], [4], [5], [-], [6], [0], [0]. · Skip e and t in this case. r BASIC OPERATION 24 e Push [BAND] several times to select the FM broadcast band. · Default frequency (FM broadcast band): 76.000 or 88.000 MHz e Push [BAND] several times to select the 144 MHz band. · Default frequency (144 MHz band): 145.000 MHz r Push [MODE] several times to select WFM mode if required.

t Rotate [DIAL] to set 88.200 MHz. y When a signal is received: The TX/RX indicator lights green. Squelch opens and audio is emitted from the speaker. The S/Rf indicator shows the relative signal strength. [DIAL] W FM P SKIP r Push [MODE] several times to select FM mode if required. t Rotate [DIAL] to set 145.600 MHz. y When a signal is received: The TX/RX indicator lights green. Squelch opens and audio is emitted from the speaker.

The S/Rf indicator shows the relative signal strength. [DIAL] FM P SKIP [BAND] [VFO] [BAND] [VFO] [MODE] S meter [MODE] S meter 4 BASIC OPERATION D Receiving TV channels Available TV channels depends on the version. Refer to the TV frequency table (p. 81) for details. Some channels are set as skip channels.

Refer to the skip channel setting (p. 26) for details. TV channel frequency and skip setting can be re-programmed via the CS-T90A cloning software, ask your dealer for details. NOTE: Some versions of the IC-E90 may not available a TV receiving function. q Select TV mode with [CALL/TV].

· Pushing [CALL/TV] toggles a call, TV and channel in sequence. W FM [DIAL] [BAND] [CALL/TV] w Rotate [DIAL] to select the desired TV channel. · Rotate [DIAL] while pushing [BAND] to select all TV channels. e When a signal is received: The TX/RX indicator lights green. Squelch opens and audio is emitted from the speaker. The S/Rf indicator shows the relative signal strength. TV channel indication TV mode indication Pushing [CALL/TV] selects the call channel and does not return to the previous TV channel even if the previous mode (VFO or memory) is selected from TV channel. 25 BASIC OPERATION D TV skip scan The transceiver automatically programs the receivable TV channels as non-skip channels and others as skip channels. q Select TV mode with [CALL/TV]. · Pushing [CALL/TV] selects a call, TV and weather channel (U.

S.A. version only) in sequence. 4 D TV skip channel setting The skip channel setting can be set manually. q Select TV mode with [CALL/TV]. w Push [MODE SCAN] for 1 sec. to start TV skip scan. · The transceiver automatically scans all TV channels. w Rotate [DIAL] while pushing [BAND] to select the desired TV channel. e Push [5 SKIP] for 1 sec.

to toggle the skip setting. · "SKIP" appears when the channel is set as a skip channel. [DIAL] e When the scan is finished: The receivable TV channels have been programmed as nonskip channels and others as skip channels. Rotate [DIAL] to select the receivable TV channel. Rotate [DIAL] while pushing [BAND] to select all TV channels.

[DIAL] [BAND] [BAND] [MODE SCAN] [CALL/TV] W FM [5 SKIP] SKIP Skip indication W FM SKIP 26 BASIC OPERATION · Pushing [CALL/TV] selects a call, TV and weather channel (U.S.A. version only) in sequence. r 4 BASIC OPERATION I RIT function (UK and Italy versions only) To compensate for the off frequency of a transmitting station, the transceiver has receive incremental tuning for receiving frequencies above 630.

000 MHz. The RIT function cannot be used in TV mode and is automatically canceled below 630.000 MHz. The receive incremental tuning (RIT) shifts only the receive frequency within approx. ± 5 kHz. q Set an operating frequency above 630.000 MHz. w Push [0 RIT] for 1 sec. to select the RIT set mode item. · If "ATT" appears, rotate [DIAL] to select "RIT."

" I Attenuator function The attenuator prevents a desired signal from distorting when very strong signals are near the desired frequency or when very strong electric fields, such as from a broadcasting station, are near your location. The attenuation level is approx. 10 dB. q Push [0 RIT] for 1 sec. to select the ATT set mode item. · "RIT" or "ATT" appears.



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If "RIT" appears, rotate [DIAL] to select "ATT." When the operating frequency is 629.995 MHz or below, ATT set mode is automatically selected. e Push [0 RIT] again to select the RIT set mode.

RIT set mode RIT function OFF w Push [0 RIT] again to select the ATT set mode. RIT/ATT selection menu Attenuator set mode r Rotate [DIAL] to adjust the shift frequency. · 5 to +5 appears while setting the shift frequency. If the operating frequency is 629.995 MHz or below, this menu does not appear.

t Push [VFO] to exit the RIT set mode. RIT frequency adjustment RIT function example FM R P SKIP e Push [VFO] to exit the ATT set mode. Attenuator is in use FM P SKIP ATT Approx. +3 kHz shift RIT indication ATT appears 27 BASIC OPERATION 4 I Transmitting D Amateur band operation CAUTION:

Transmitting without an antenna may damage the transceiver. Make sure a charged battery pack or alkaline batteries are installed.

(p. 1) [DIAL] D Operating band and frequency setting q Select VFO mode with [VFO]. w Push [BAND] several times to select the desired amateur band. · Rotating the tuning dial while pushing [BAND] also selects the operating band. w Push and hold [PTT] to transmit, then speak into the microphone. · TX/RX indicator lights red. · The S/Rf indicator shows the output power selection. · Approx. output power: 4.5 W/0.

5 W with 11 V DC (w/CP-19E) 5.0 W/0.5 W with BP-217 0.1 W with BP-216 (fixed to low power) The output power is fixed to low while operating with battery case. r BASIC OPERATION 28 e Set an operating frequency with the tuning dial. (p. 19) · To input the frequency directly, push [4], [3], [5], [·], [6], [8] and [0] for the example below. FM P SKIP [PTT] Microphone Lights red while transmitting [BAND] [3 H/L] e Release [PTT] to receive. When LOW power is selected. FM P SKIP LOW IMPORTANT: To maximize the readability of your transmitted signal, pause a few sec.

after pushing [PTT], hold the microphone 2.5 to 5 cm (1 to 2 inches) from your mouth and speak at a normal voice level. The protect circuit interrupts the output power when more than 11.5 V DC is connected. D Selecting output power and transmitting q Push [3 H/L] for 1 sec.

to select the output power. · Rotating the tuning dial while pushing [3 H/L] also toggles the output power. · "LOW" appears when low output power is selected. If "LOW" does not appear, high output power is selected. When HIGH power is selected.

FM P SKIP DFM narrow mode (transmit only) The transceiver has narrow deviation (± 2.5 kHz) mode. Set narrow mode in expanded set mode 2, if desired.

(p. 66) 4 BASIC OPERATION I Repeater operation When using a repeater, the transmit frequency is shifted from the receive frequency by the offset frequency. (p. 31) It is convenient to program repeater information into memory channels. (p. 37) Repeater 434.340 MHz 434.

340 MHz Uplink (transmitting freq.) Downlink (receiving freq.) r Push and hold [PTT] to transmit. · The displayed frequency automatically changes to the transmit frequency (repeater input frequency). · If "OFF" appears, check the offset frequency or shift direction. (p. 30) [PTT] Lights red while transmitting. 439.340 MHz 439.340 MHz Station A Station B q Set the receive frequency (repeater output frequency).

w Set the shift direction of the transmit frequency. (DUP or DUP; see p. 31 for details.) "DUP" appears. FM DUP T P SKIP While receiving FM DUP T P SKIP While transmitting FM DUP T P SKIP t Release [PTT] to receive.

y Push and hold [SQL] to check whether the other station's transmit signal can be directly received or not. e Push [2 TONE] for 1 sec. to activate the subaudible tone encoder, according to repeater requirements. · "T" appears. Refer to p.

70 for tone frequency settings. 29 BASIC OPERATION 4 D Checking the repeater input signal The transceiver can check whether the other station's transmit signal can be received directly or not. Push and hold [SQL] to check whether the other station's transmit signal can be directly received or not. · When the other station's signal can be directly received, move to a non-repeater frequency with simplex. (duplex OFF) Indication while receiving FM DUP T P SKIP D Off band indication If the transmit frequency is out of the amateur band, the off band indication "OFF" appears on the display when [PTT] is pushed. Check the offset frequency or duplex direction in this case. (p. 31) r BASIC OPERATION 30 FM DUP T P SKIP [SQL] FM DUP T SQL Receives 5 MHz shift frequency P SKIP CONVENIENT Tone scan function: When you don't know the subaudible tone used for a repeater, the tone scan is convenient for detecting the tone frequency. Push [7 T.SCAN] for 1 sec.

to activate. See p. 73 for more information. 4 BASIC OPERATION I Duplex operation D Setting offset frequency When communicating through a repeater, the transmit frequency is shifted from the receive frequency by an amount determined by the offset frequency. q Select VFO mode or desired memory channel to be programmed. w Push [8 SET] for 1 sec. to enter set mode. e Rotate [DIAL] until "OFFSET" appears. r Push [8 SET] again to select offset frequency. t Rotate [DIAL] to set the desired offset frequency.

· The tuning step becomes the selected tuning step. · Push [VFO MHz] for 1 sec. to use the MHz tuning step, if desired. D Setting duplex direction Push [4 DUP] for 1 sec. to select "DUP" or "DUP".

· "DUP" or "DUP" indicates the transmit frequency for minus shift or plus shift, respectively. · When offset frequency is 500 kHz. [DIAL] Duplex example Receiving FM DUP T P SKIP [SQL] Transmitting FM DUP T P SKIP y Push [VFO] to exit set mode. No offset frequency 5.0 MHz offset [4 DUP] [VFO MHz] [8 SET] +Duplex example Receiving FM DUP T P SKIP 20.

0 MHz offset Transmitting FM DUP T P SKIP 31 BASIC OPERATION 4 I Split operation Split frequency operation allows you to transmit and receive on two different frequencies in the same band. The split frequency operation is performed using 2 frequencies, one in VFO A and one in B. D Split frequency operation example [EXAMPLE]: VFO A FM 145.240 MHz VFO B FM 145.340 MHz q Push [VFO] several times to select VFO A. · Pushing [VFO] toggles VFO A and B. r BASIC OPERATION 32 D Setting split frequency operation q Push [8 SET] for 1 sec. to enter set mode. w Rotate [DIAL] until "EXP2" appears. e Push [8 SET] to select expanded set mode 2.

r Rotate [DIAL] to turn the expanded set mode 2 ON. t Push [8 SET] to exit expanded set mode 2. y Rotate [DIAL] until "SPLIT" appears. u Push [8 SET] to select split function.



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i Rotate [DIAL] to select split function ON or OFF. w Push [BAND] several times to select the 144 MHz band. e Push [MODE] several times to select FM mode. r Set the operating frequency to 145.240 MHz with the tuning dial. t Push [VFO] to select VFO B.

y Push [BAND] several times to select the 144 MHz band. u Push [MODE] several times to select FM mode. i Set the operating frequency to 145.340 MHz. o Push [PTT] to start the split frequency operation.

[DIAL] VFO A FM P SKIP [PTT] o Push [VFO] to exit set mode. FM P SKIP [BAND] · "SPA" or "SPB" appears and the split frequency operation is activated. [VFO] [MODE] [8 SET] VFO B FM P SKIP 4 BASIC OPERATION I 1750 Hz tone Some European repeaters require a 1750 Hz tone to be accessed. For such European repeaters, perform the following. q Push [·DTMF.

M] for 1 sec. to select DTMF memory. i Release [PTT] to receive. o Push and hold [SQL] to check whether the other station's transmit signal can be received directly or not. w Rotate [DIAL] counter-clockwise until "T-CALL" appears. e Push [VFO] to exit DTMF memory. r Set the receive frequency (repeater output frequency). t Set the shift direction of the transmit frequency. (DUP or DUP; see p. 31 for details.

) y While pushing [PTT], push [SQL] for 1 to 2 sec. to transmit a 1750 Hz tone burst signal. · If "OFF" appears, check the offset frequency or shift direction. (p. 31) · The displayed frequency automatically changes to the transmit frequency (repeater input frequency). u Push and hold [PTT] to transmit. 33 MEMORY/CALL CHANNELS I General The transceiver has 500 memory channels, 50 scan edge channels and 5 call channels for storage of often-used frequencies. Memory channels can be named with 6 characters and assigned to 18 banks. 5 D Memory/call channel contents The following information can be programmed into memory or call channels: · Operating frequency (p. 19) · Receive mode (p. 21) · Tuning step (p. 18) · Duplex direction (DUP or DUP) with an offset frequency (p. 31) · Subaudible tone encoder, tone squelch or DTCS squelch ON/OFF (pgs. 29, 71) · Subaudible tone and tone squelch frequencies (p. 72) · DTCS code with code phase mode (pgs. 65, 72) · Memory bank (p. 41) · Memory name (p. 40) · Scan skip setting (p. 47) t MEMORY/CALL CHANNELS 34 5 MEMORY/CALL CHANNELS D Default memory contents example CHANNEL DESCRIPTION · Regular memory channel · Default memory channel example 000499 (Memory channel; Mch) Mch 000 Mch 001 Mch 002 151.000 MHz 145.000 MHz 430.000 MHz CHANNEL C0C4 (Call channel) DESCRIPTION · Calling channel for amateur bands · Can be used as regular memory channel · Default call channel example C0 151.000 MHz C1 145.000 MHz C2 430.000 MHz *C3 and 4 are blank channels. *Mch 003499 are blank channels. · Program scan edge channel 25 pairs (50 channels) · Default scan edge example 0A/0B 24A/24B (Scan edge channel) 0A: 1110.495 MHz 1A: 1150.000 MHz 2A: 1144.000 MHz 3A: 1430.000 MHz 1 0B: 440.000 MHz 1B: 1152.000 MHz 2B: 1146.000 MHz 3B: 1440.000 MHz 1 *4A/4B24A/24B are blank channels. 1 35 MEMORY/CALL CHANNELS 5 I Calling up memory channels Memory channels can be selected with the [DIAL] and keypad. · Blank channels cannot be selected via [DIAL]. · Blank channels can be selected via keypad. · Previously selected channels appear when the wrong memory channel number is entered. [DIAL] D Selecting with tuning dial q Push [MR] to select memory mode.

w Rotate [DIAL] to select the desired memory channel. Memory mode indication FM CONVENIENT The memory channels (000099) can be selected with 1 or 2 digits plus [MR]. · Selecting memory channel 005. Push [5] and [MR]. · Selecting memory channel 024. Push [2], [4] and [MR]. t MEMORY/CALL CHANNELS 36 Appears Memory channel number D Check contents of all memory channels q Push [MR S.MW] for 1 sec. to enter memory write condition. · Memory channel readout blinks.

FM D Selecting with keypad q Push [MR] to select memory mode. w Push the desired numeral keys to select the desired memory channel. [MR S.MW] · Selecting memory channel 001. Push [0], [0] and [1]. · Selecting memory channel 056. Push [0], [5] and [6]. · Selecting memory channel 499. Push [4], [9] and [9]. V 1 4 7 D TONE 2 5 8 H/L 3 6 9 TS keypad 0 w Rotate [DIAL] to check the desired memory channel.

Rotating [DIAL] while pushing [BAND] also selects all memory channels. DUP SKIP M.N RIT T.SCAN SET 5 MEMORY/CALL CHANNELS I Programming memory channels Program the desired frequency into a memory channel, call channel or scan edge channel as follows. The memory channels are shared with all bands. Memory channels 003499 are blank (non-programmed) channels as a factory setting. [DIAL] D Programming a memory channel [EXAMPLE]: 433.520 MHz into Mch 11 q Select VFO mode with [VFO]. w Set the desired frequency: Select the desired band with [BAND]. Set the frequency using [DIAL].

Set other data (e.g. offset frequency, duplex direction, subaudible tone frequency, etc.), if required. e Push [MR S.MW] for 1 sec. to indicate memory channels. · Memory channel indicator " " and channel readout blinks. · Do not hold [MR S.MW] for more than 2 sec. , otherwise the previously selected memory channel contents will be overwritten. [BAND] [VFO] [MR S.MW] r Rotate [DIAL] to select the desired channel. · Call channels (C0C4), VFO (VF) and scan edge channels (0A/0B24A/24B), as well as regular memory channels, can be programmed in this way. t Push [MR S.MW] for 1 sec. to program. q, w Set the frequency. FM P SKIP e Push [MR S.MW] for 1 sec.

FM r Select the desired channel. t Push [MR S.MW] for 1 sec. FM P SKIP " " and memory channel readout blinks. VFO mode is selected after writing. 37 MEMORY/CALL CHANNELS 5 D Auto memory channel increment While programming a memory channel, the next memory channel can be selected automatically. This is convenient when programming memory channels one after another. Keep pushing [MR S.MW] for 2 sec. or more, at step t of the left section, to select the next memory channel automatically.

Push [MR S.MW] for 1 sec. FM I Transferring memory contents to VFO This is convenient when operating around a memory or call channel. t MEMORY/CALL CHANNELS 38 q Push [VFO] several times to select VFO A or B to be transferred. w Push [MR] to select memory mode. e Set the desired memory channel with [DIAL]. · Call or scan edge channel contents can be transferred in the same manner. Select a call channel in this case. Keep pushing [MR S.MW].

FM P SKIP r Push [MR S.MW] for 2 sec. to transfer. [EXAMPLE]: Transferring memory channel 26 to VFO A.



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[DIAL] Select the desired Mch. FM DUP T Next memory channel is automatically selected. VFO is selected. FM P SKIP MR S.MW for 2 sec. P SKIP Transfer to VFO.

FM DUP T [MR] 5 MEMORY/CALL CHANNELS I Copying memory contents This is convenient when programming memory contents into a scan edge channel or call channel. · Call or scan edge channel contents can be copied in the same manner. I Memory names Each memory, scan edge and call channels can be programmed with an alphanumeric name such as a repeater name, club name, etc., for easy recognition. @@w Select the memory channel to be copied with [DIAL]. @@@@t Push [MR S.MW] for 2 sec. @@@@t The 1st character of the name and "X" blinks. @@ Push [6 M.N] for 1 sec.

@@i Push [VFO] to program the name. @@You cannot display both. @@Each bank (AH, J, L, NR, T, U and Y) can be assigned up to 100 memory channels. Mch contents 000 001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 51.000 MHz 145.

000 MHz 433.000 MHz 145.120 MHz 435.340 MHz 145.040 MHz 433.

560 MHz 438.480 MHz 51.560 MHz 1.620 MHz 50.140 MHz 118.200 MHz 76.500 MHz 118.125 MHz 145.540 MHz 436.850 MHz 434.

720 MHz 435.750 MHz 432.720 MHz 75.795 MHz 127.700 MHz 146.300 MHz Memory banks are used for arrangement of a memory channel. @@w Set the desired memory channel with [DIAL]. e Push [MR S.MW] for 1 sec. @@@@w Select Mch with [DIAL].

FM t Push [BAND] to select memory bank. @@Selected memory channel. e Push [MR S.MW] for 1 sec. @@@@w Scan edges (0A/0B) cannot be cleared. q Push [MR S.MW] for 1 sec. @@@@w (version only) channel in sequence. @@@@46) Lower edge P SKIP D Memory scans FULL

MEMORY SCAN (p. @@@@w (e.

g. WFM, 144M or 440M memory band, etc.) PROGRAMMED SCAN (p. @@Used for checking for frequencies within a specified range such as repeater output frequencies, etc. BANK SCAN (p. 48) CH-A01 CH-A00 CH-A99 CH-A35 CH-A13 CH-A03 CH-A04 CH-A12 SKIP Repeatedly scans memory channels except skip channels within specified memory bank (i.e. memory Bank, A00A99). 45 SCAN OPERATION 6 I VFO scan The following scans are available for the VFO scan. FULL SCAN Repeatedly scans all frequencies over the entire receive range.

· Some frequency ranges are restricted depending on versions. q Select VFO mode with [VFO]. w Push [5 SKIP] for 1 sec. to toggle the frequency skip function ON or OFF. · "P SKIP" appears when the frequency skip function is turned ON. e Set the squelch level, if desired. r While pushing [MODE SCAN], rotate [DIAL] to select the desired scan range. · "ALL" for full scan, "BAND" for band scan or "PROG 024" for programmed scan. y SCAN OPERATION 46 BAND SCAN Repeatedly scans all frequencies over the entire selected band. PROGRAMMED SCAN Repeatedly scans between two user-programmed frequencies.

Used for checking for frequencies within a specified range such as repeater output frequencies, etc. Skip frequencies are not scanned when the frequency skip function is in use. ("P SKIP" appears.) If the same frequencies are programmed into a pair of scan edges, programmed scan does not start. For programmed scan, scan edges must be programmed in advance.

Program scan edges in the same manner of programming a memory channel. (p. 37) t Release [MODE SCAN] to start the scan. · Decimal point blinks while scanning. · "P SKIP" blinks when the frequency skip function is turned ON.

· To change the scanning direction, rotate [DIAL]. · If the pocket beep or DTCS beep function is activated, the transceiver automatically selects the tone squelch or DTCS squelch function when a scan starts. y To stop the scan, push [VFO]. Full scan Band scan Programmed scan Scanning example FM P SKIP Flashes while scanning. 6 SCAN OPERATION I Frequency skip function Unwanted frequencies can be skipped and programmed as skip channels when full scan, band scan or programmed scan is pausing. q Start a VFO scan. (p. 46) w While receiving an unwanted signal and scan pauses, push [5 SKIP] for 1 sec. to program the received frequency as a skip frequency. · The transceiver emits 3 beeps and the scan resumes.

· Non-programmed memory channels (blank channels) are used for skip frequency programming in reverse sequence. · Do not release [5 SKIP] before 1 sec., otherwise, scan stops and the transceiver enters frequency setting condition. Push [5 SKIP] for 1 sec. to program the frequency as a skip frequency. P SKIP FM P SKIP I Skip channel setting Memory channels can be set to be skipped for memory skip scan. In addition, memory channels can be set to be skipped for both memory skip scan and frequency skip scan. These are useful to speed up the scan interval. q Select memory mode with [MR]. w Rotate [DIAL] to select memory channel to set the skip information.

e Push [5 SKIP] for 1 sec. one or more times to select condition. · "OFF" for no skipping of channels, "SKIP" for memory skip scan or "P SKIP" for frequency skip scan and memory skip scan. @@(p. @@(p.

@@@@@ · Scan-guidance appear(s) programmed band(s) only. @@@@ · To change the scanning direction, rotate [DIAL]. @@@@**Bank name appears. *** 6 SCAN OPERATION I Scan notes D Squelch setting Scanning stops when the squelch opens. Make sure the squelch is set to the threshold point or desired squelch level.

Rotate the tuning dial while pushing [SQL] to select automatic squelch (AUTO) or a level (19) where the noise is muted. (p. 22) D When receiving a signal The scan pauses according to the scan pause time (default: 10 sec.). It can be selected as a pause or timer scan (220 sec.) in set mode. (p. 58) The scan restarts after a signal disappears according to the resume time (default: 2 sec.). It can be selected to 05 sec.

or 'hold' (indefinitely) in set mode. (p. 58) D Tuning dial while scanning Scan starts in the upward direction. To change the scanning direction, rotate [DIAL] clockwise or counterclockwise. Rotating [DIAL] while pausing a scan resumes the scan manually. D Scan stop beep A beep sounds when a scan stops to confirm the scan detects a signal. This function can be turned ON or OFF in expanded set mode 1. (p. 62) D Tuning step while scanning Tuning steps while scanning becomes the selected tuning step. Reset the tuning step before scanning, if necessary.

(p. 18) D Scan stop LED The keypad backlighting blinks when a scan stops to confirm the scan detects a signal. This function can be turned ON or OFF in expanded set mode 1. (p. 62) D Skip function Memory channels can be set to be skipped for memory skip scan.

In addition, memory channels can be set to be skipped for both memory skip scan and frequency skip scan. These are useful to speed up the scan interval. (p. 47) 49 D Busy LED ON/OFF The receive indicator can be turned ON or OFF in set mode. (p.

59) PRIORITY WATCH I Priority watch types Priority watch checks for signals on a frequency every 5 sec.



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while operating on a VFO frequency or scanning. The transceiver has 6 priority watch types to suit your needs. The watch resumes according to the selected scan resume condition. See p. 58 for details. MEMORY or CALL CHANNEL WATCH While operating on a VFO frequency, priority watch checks for a signal in the selected memory or call channel every 5 sec. · A memory channel with skip information can be watched. 7 If the pocket beep function is activated, the transceiver automatically selects the tone squelch function when priority watch starts. I Priority alert You can be alerted with beeps and a blinking "S," when a priority watch detects a signal on the watching frequency.

q Push [8 SET] for 1 sec. to enter set mode. w Rotate [DIAL] until "PRIO" appears. u PRIORITY WATCH 50 MEMORY SCAN WATCH While operating on a VFO frequency, priority watch checks for signals in each memory channel in sequence. · The memory skip function is useful to speed up the scan. e Push [8 SET] to select the priority watch item. r Rotate [DIAL] to select the priority alert item. ("BELL") VFO SCAN with MEMORY or CALL CHANNEL WATCH While scanning in VFO mode, priority watch checks for signals in the selected memory or call channel every 5 sec. VFO SCAN with MEMORY SCAN WATCH While scanning in VFO mode, priority watch checks for signals in memory channels every 5 sec. t Push [VFO] to exit set mode and start the priority watch.

7 PRIORITY WATCH I Priority watch operation D Memory channel watch While operating on a VFO frequency, priority watch checks for a signal in the selected memory channel every 5 sec. · A memory channel with skip information can be watched. u Push [VFO] to exit set mode and start the priority watch. · The transceiver checks the memory channel frequency every 5 sec. · The watch resumes according to the selected scan resume condition.

(p. 58) While operating on a VFO frequency FM P SKIP PRIO q Select VFO mode; then, set an operating frequency. w Select the desired memory channel. e Push [8 SET] for 1 sec. to enter set mode.

r Rotate [DIAL] until "PRIO" appears. t Push [8 SET] to select the priority watch item. y Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). Priority watch item [DIAL] The watch stops on the selected channel when a signal is received. FM PRIO Checks for a signal in the selected memory channel every 5 sec. i Push [VFO] while the display shows the VFO frequency to stop the watch. Priority watch with alert [VFO] [8 SET] Push [VFO] to start. FM P SKIP PRIO 51 PRIORITY WATCH D VFO scan with memory channel watch While scanning in VFO mode, priority watch checks for signals in the selected memory channel every 5 sec. · A memory channel with skip information can be watched. 7 D Memory scan watch While operating on a VFO frequency, priority watch checks for a signal in memory channels every 5 sec.

q Select VFO mode; then, set an operating frequency. w Select memory mode. e Push [MODE SCAN] for 1 sec. to start a memory scan. r Push [8 SET] for 1 sec. to enter set mode. t Rotate [DIAL] until "PRIO" appears. y Push [8 SET] to select the priority watch item. u Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). i Push [VFO] to exit set mode and start the priority watch.

o Push [VFO] while the display shows the VFO frequency to stop the watch. CH-499 CH-400 CH-000 Memory scan 51.000 438.600 145.100 145.120 145.140 PRIO CH-300 CH-001 VFO frequency FM P SKIP PRIO 433.500 VFO scan Memory channel FM 5 sec. CH-002 CH-200 5 sec. 433.000 CH-100 Watches Mch while operating on VFO. CH-006 CH-005 CH-004 CH-003 Watches Mch while VFO scanning. Pauses when a signal is received in Mch. 145.280 145.260 145.200 145.220 145.240 Pauses when a signal is received in Mch. PRIORITY WATCH 52 q Select the desired memory channel to be watched.

w Select VFO mode. e Push [MODE SCAN] for 1 sec. to start a VFO scan. (full scan, band scan or programmed scan) r Push [8 SET] for 1 sec. to enter set mode. t Rotate [DIAL] until "PRIO" appears. y Push [8 SET] to select the priority watch item. u Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). i Push [VFO] to exit set mode and start the priority watch. o Push [VFO] while the display shows the VFO frequency to stop the VFO scan and priority watch.

u 7 PRIORITY WATCH D Call channel watch While operating on a VFO frequency, priority watch checks for a signal in the selected call channel every 5 sec. q Select VFO mode; then, set an operating frequency. w Push [CALL/TV] to select call channel mode. e Rotate [DIAL] to select the desired call channel. r Push [8 SET] for 1 sec.

to enter set mode. t Rotate [DIAL] until "PRIO" appears. y Push [8 SET] to select the priority watch item. u Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). i Push [VFO] to exit set mode and start the priority watch.

o Push [VFO] while the display shows the VFO frequency to stop the watch. While operating on a VFO frequency FM P SKIP PRIO D VFO scan with memory scan watch While scanning in VFO mode, priority watch checks for signals in memory channels every 5 sec. q Select memory mode. w Push [MODE SCAN] for 1 sec. to start a memory scan. · Start the memory scan first, otherwise, memory scan watch does not start. e Push [8 SET] for 1 sec. to enter set mode. r Rotate [DIAL] until "PRIO" appears. t Push [8 SET] to select the priority watch item.

y Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). u Push [VFO] to exit set mode and start the memory scan watch. i Push [MODE SCAN] for 1 sec. to start a VFO scan. (full scan, band scan or programmed scan) · VFO scan with memory scan watch is now activated. · The scan or watch pauses when a signal is received on a VFO frequency or watching memory channels. The watch stops on the selected channel when a signal is received. FM PRIO o Push [VFO] while the display shows the VFO frequency to stop the VFO scan and priority watch. Checks for a signal in the selected call channel every 5 sec. 53 PRIORITY WATCH D VFO scan with call channel watch While scanning in VFO mode, priority watch checks for signals in the selected call channel every 5 sec.

q Select VFO mode. w Push [CALL/TV] to select call channel mode. e Rotate [DIAL] to select the desired call channel. r Push [8 SET] for 1 sec. to enter set mode.

t Rotate [DIAL] until "PRIO" appears. y Push [8 SET] to select the priority watch item. u Rotate [DIAL] to select the priority watch ("ON") or priority watch with alert ("BELL"). i Push [VFO] to exit set mode and start the priority watch. o Push [MODE SCAN] for 1 sec.



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