

IC-451A/E

430MHz ALL MODE TRANSCEIVER

INSTRUCTION MANUAL

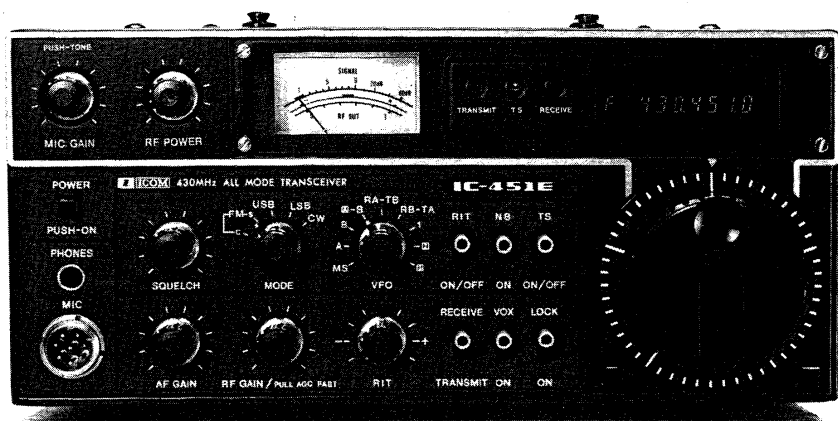


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SECTION I SPECIFICATIONS

GENERAL

Numbers of semi-conductors	:	Transistor	80
		FET	11
		IC	50 (IC-451A: 49)
		Diode	145 (IC-451A: 144)
Frequency coverage	:	430.0000 ~ 439.9999MHz	
Frequency resolution	:	SSB 100Hz steps FM 5KHz steps 1KHz steps with TS switch turned ON	
Frequency Control	:	Microcomputer based 100Hz step Digital PLL synthesizer. Independent Transmit-Receive Frequency Capability with 2 VFO's.	
Frequency Readout	:	7 digit Luminescent display 100Hz readout.	
Frequency stability	:	Within $\pm 0.001\%$	
Memory channels	:	3 channels, any inband frequency programmable	
Usable conditions	:	Temperature: $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$ ($14^{\circ}\text{F} \sim 140^{\circ}\text{F}$) Operating time: Continuous	
Antenna impedance	:	50 ohms unbalanced	
Power supply requirement	:	13.8V DC $\pm 15\%$ (negative ground) 4A Max. or 117V (IC-451A)/ 240V (IC-451E) AC $\pm 10\%$	
Current drain (at 13.8V DC)	:	Transmitting	
		SSB (PEP 10W)	Approx. 3.5A
		CW, FM (10W)	Approx. 3.5A
		FM (1W)	Approx. 1.6A
		Receiving	
		At max. audio output	Approx. 0.8A
		Squelched	Approx. 0.6A
Dimensions	:	111mm (H) x 241mm (W) x 264mm (D)	
Weight	:	Approx. 7.2 Kgs	

TRANSMITTER

Output power	:	SSB	1 ~ 10W PEP (Adjustable)
		CW	1 ~ 10W (Adjustable)
		FM	1 ~ 10W (Adjustable)
Emission mode	:	SSB (A3J, USB/LSB), CW (A1), FM (F3)	
Modulation system	:	SSB	Balanced modulation
		FM	Variable reactance frequency modulation
Max. frequency deviation	:	$\pm 5\text{KHz}$	
Spurious emission	:	More than 60dB below peak power output	
Carrier Suppression	:	More than 40dB below peak power output	
Unwanted Sideband	:	More than 40dB down at 1000Hz AF input	
Microphone	:	1.3K ohm dynamic microphone with built-in preamplifier and push-to-talk switch.	
Operating mode	:	Simplex, Duplex (Any inband frequency separation programmable)	
Tone Burst	:	1750Hz $\pm 0.1\text{Hz}$ (IC-451A : Not installed)	

RECEIVER

Receiving system	: SSB, CW Double conversion superheterodyne FM Triple conversion superheterodyne
Receiving Mode	: SSB (A3J, USB/LSB), CW (A1), FM (F3)
Intermediate Frequency	: SSB, CW 39.38MHz, 10.75MHz FM 39.38MHz, 10.75MHz, 455KHz
Sensitivity	: SSB, CW Less than 0.5 microvolts for 10dB S+N/N FM More than 30dB S+N+D/N+D at 1 microvolt Less than 0.6 microvolts for 20dB Noise quieting
Squelch sensitivity	: SSB, CW Less than 0.6 microvolts FM Less than 0.4 microvolts
Spurious response rejection ratio	: More than 60dB
Selectivity	: SSB, CW More than ± 1.2 KHz at -6 dB point Less than ± 2.4 KHz at -60 dB point FM More than ± 7.5 KHz at -6 dB point Less than ± 15 KHz at -60 dB point
Audio output power	: More than 2.0W
Audio output impedance	: 8 ohms

Specifications are approximate and are subject to change without notice or obligation.



SECTION II DESCRIPTION

430MHz ALL-MODE TRANSCEIVER INCORPORATING A MICROCOMPUTER

CPU control with ICOM's original programs provides various operating capabilities. No-backlash dial controlled by ICOM's unique photo-chopper circuit. Band-edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear giving problem-free use. The IC-451A/E provides FM, USB, LSB, CW coverage in the 430 ~ 440MHz frequency range. Thus the IC-451A/E can be used for mobile, DX, local calls, and satellite work.

MULTI-PURPOSE SCANNING

Memory Scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received, in all modes.

DUAL VFO'S

Two separate VFO's can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM

ICOM's new continuous tuning system features a luminescent display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 digits representing 100MHz to 100Hz digits.

Automatic recycling restarts tuning at the top of the band, i.e., the high edge when the dial goes below the low edge. Recycling changes the high edge to the low edge as well. Quick tuning in 1KHz steps is available, and fine tuning in 100Hz steps in the SSB and CW modes, and 5KHz steps and 1KHz steps in the FM mode (Also 1MHz step up in all modes), is provided for trouble free QSO.

EASIER OPERATION AND LIGHTER WEIGHT

The most compact, lightest weight all-mode 430MHz transceiver. First to use a pulse power supply in communication equipment, for lighter weight. 50mm-diameter large tuning control knob for smooth and easy tuning. Trouble-free controlling knobs for both receiving and transmitting. LED indicator for transmit and receive modes.

MOST SUITABLE FOR BOTH FIXED AND PORTABLE STATIONS

Built-in 117V/240V AC and DC power supplies. Convenient Dial Lock switch for mobile operation. Easy-carry handle. Effective Noise Blanker to reduce incoming pulse noise. IC-SM5 high quality stand microphone is suitable for fixed station operation. Powerful audio output, 2 watts at 8 ohm, for easy listening even in noisy surroundings.

OUTSTANDING PERFORMANCE

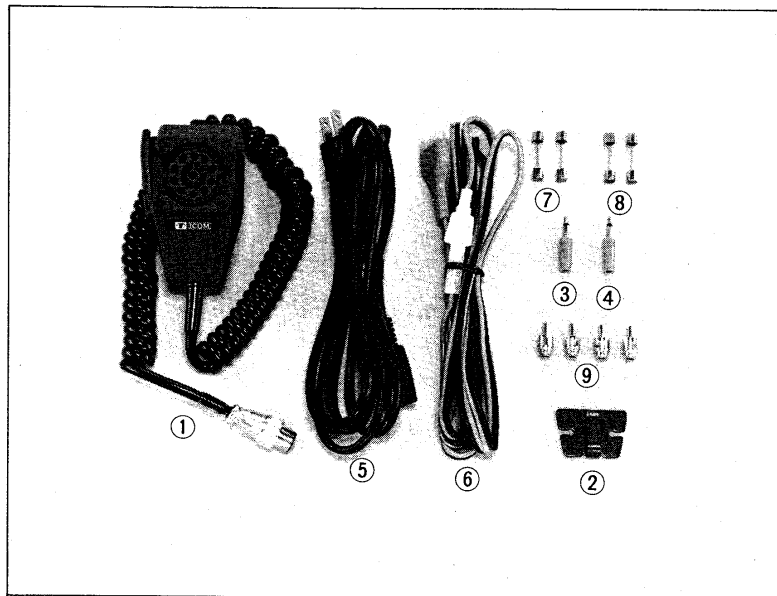
The RF amplifier and first mixer circuits using MOS FET's, and other circuits provide excellent Cross Modulation and Two-Signal Selectivity characteristics. The IC-451A/E has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having high shape factors, exceptional selectivity.

The transmitter uses double balanced mixers in a double conversion system, a band-pass filter and a high-performance low-pass filter. This system provides distortion-free signals with a minimum spurious radiation level.

SECTION III INSTALLATION

UNPACKING

Carefully remove your transceiver from the packing carton and examine it for signs of shipping damage. Should any be apparent, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended you keep the shipping carton. In the event storage, moving, or reshipment becomes necessary, they come in handy. Accessory hardware, cables, etc., are packed with the transceiver. Make sure you have not overlooked anything.



- | | | | |
|--------------------------------------------------------|---|-------------------------------------------|---|
| 1. Microphone
(preamplified dynamic type) | 1 | 6. DC Power Cord | 1 |
| 2. Microphone hook | 1 | 7. Spare Fuse (2A or 1A) for AC | 2 |
| 3. External Speaker Plug | 1 | 8. Spare Fuse (5A) for DC | 2 |
| 4. Key Plug | 1 | 9. Pin Plug | 4 |
| 5. AC Power Cord | 1 | 10. Jumper Plug | 1 |
- (Inserted in the DC power socket)

RECOMMENDATIONS FOR INSTALLATION

1. Avoid placing the IC-451A/E in direct sunlight, high temperature, dusty or humid places.
2. The temperature of the heatsink on the rear panel of the unit will usually become relatively warm. Any equipment should be at least 1 inch (3cm) away from the unit so as to provide good ventilation. Also avoid places near outlets of heaters, air conditioners etc.
3. Place the unit so that the controls and switches can easily be handled and the frequency indication and meter can easily be read.
For mobile installation, an optional mounting bracket is available. Select the best location that can stand the weight of the unit and that does not interfere with your driving in any way.
5. Use the Ground Lug!

POWER SUPPLY

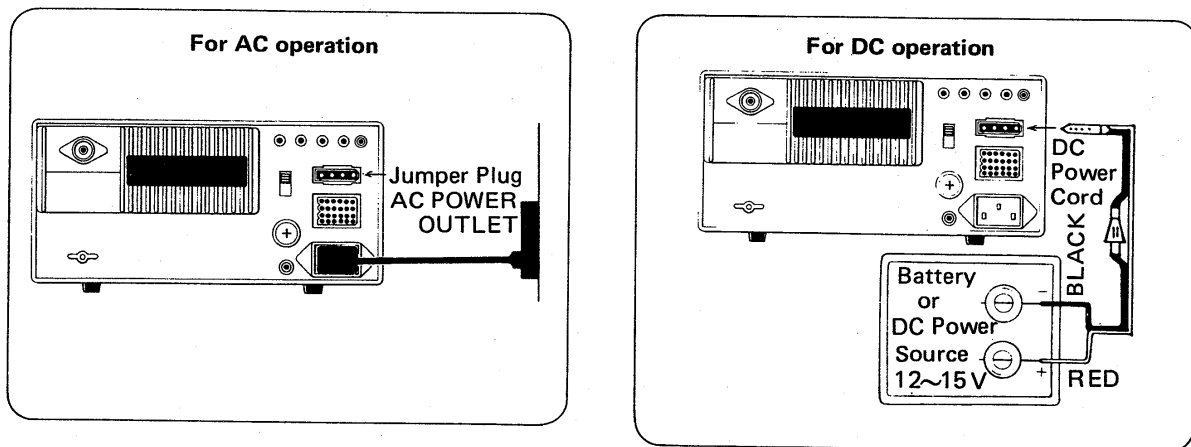
For AC operation:

The IC-451A/E has a built-in AC power supply. Connect the supplied AC power cord to the AC power socket on the rear panel of the IC-451A/E, and the opposite side plug of the power cord into any convenient AC power outlet. Be sure that the jumper plug is inserted to the DC power socket on the rear panel.

For DC operation:

If you would like to use your car battery or any other DC power supply, be sure that its output voltage is 12 ~ 15 Volts and the current capacity is at least 3.5 Amps. The maximum power consumption of the set during transmission runs from 3 ~ 3.5 Amps, so keep that in mind if the unit is installed in your automobile. Attention should also be paid to the condition of the battery and electrical system.

The connection of the DC power cord supplied with the IC-451A/E is done in the following way: First make sure that the power switch and the memory switch of the unit are in the OFF position and the T/R switch is in the receive position. Connect the cord to the DC power supply with the RED lead to the positive terminal and the BLACK lead to the negative terminal. (Reverse connection will cause the protection circuit to operate and blow the fuse.) Connect the DC plug to the socket on the rear panel of the IC-451A/E. Refer to the drawing below.



ANTENNA

The most important single item that will influence the performance of any communication system is the antenna. For that reason, a good, high-quality, gain antenna of 50 ohms impedance is recommended, fixed or mobile. In UHF as well as the low bands, every watt of ERP makes some difference. Therefore, 10 watts average output plus 3dB of gain antenna equals 20 watts ERP, presuming low VSWR of course. The few more dollars invested in a gain type antenna is well worth it. When adjusting your antenna, whether mobile or fixed, by all means follow the manufacturer's instructions. There are some pitfalls to be aware of. For example, do not attempt to adjust an antenna for lowest VSWR when using a diode VSWR meter not engineered for UHF applications. Such readings will invariably have an error of 40% or more. Instead, use an in-line watt meter similar to the Bird Model 43 or Sierra Model 164B with UHF cartridge. Further, when adjusting a mobile antenna, do so with the motor running preferably above normal idling speed. This will insure proper voltage level to the transceiver.

The RF coaxial connector on the rear chassis mates with a standard PL-259 connector. Some models may have metric threads. In any event, the RF connector will mate with almost any PL-259 connector if care is taken to seat them properly.

EXTERNAL SPEAKER

The IC-451A/E contains an internal speaker, and is also designed to that it can drive an external speaker from the external (EXT) speaker jack on the rear panel. Be sure the impedance of the external speaker is 8 ohms, and remember that with the external speaker connected, the internal speaker is disabled.



ICOM INCORPORATED
1-6-19, KAMI KURATSUKURI, HIRANO-KU,
OSAKA JAPAN

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