



# **IC-240**

**PLL SYNTHESIZED  
2-METER  
TRANSCEIVER**



**INSTRUCTION  
MANUAL**

 **ICOM**

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## SECTION I SPECIFICATIONS

### General:

Number of semiconductors	Transistors 41 FET 7 IC 13 Diode 33 (Except Matrix Board)
Frequency Coverage	144MHz ~ 146MHz
Antenna Impedance	50 Ohms unbalanced
Power Supply Requirements	DC 13.8V $\pm$ 15% Negative Ground 2.5A Max.
Current Drain	Transmitting: Approx. 2.0A Receiving: At Max. Audio. Approx. 0.7A Squelched Approx. 0.4A
Dimensions	58mm(H) x 156mm(W) x 218mm(D)
Net Weight	1.9 Kg

### TRANSMISSION:

Transmitting Frequency	22 Channels in the 144MHz Band Programmable by a diode matrix for any channels on 25KHz spacing
Emission Mode	16F3
Output Power	10W
Max. Frequency Deviation	5KHz
Modulation System	Variable reactance phase modulation
Spurious Emission	More than 60dB below carrier
Microphone	Impedance: 600 Ohms Input level: 10mV typical Dynamic or optional Electret condenser microphone

### RECEPTION:

Receiving Frequency	22 Channels in 144MHz Band
Modulation Acceptance	16F3
Receiving System	Double super heterodyne
Intermediate Frequency	First IF 10.7MHz Second IF 455KHz
Sensitivity	Less than 0.5 $\mu$ V for 20dB Noise quieting More than 30dB S+N+D/N+D at 1 $\mu$ V
Squelch Sensitivity	Less than 0.3 $\mu$ V
Spurious Response Rejection Ratio	More than 60dB
Selectivity	$\pm$ 7.5KHz at the -6dB point $\pm$ 15KHz at the -60dB point
Audio Output Power	More than 1 Watt
Audio Output Impedance	8 Ohms

## SECTION II DESCRIPTION

This transceiver is extremely rugged and completely solid state. State of the art devices such as Integrated Circuits, Field Effect Transistors, Varactor and Zener diodes are engineered into a tight-knit straightforward electronic design throughout both transmitter and receiver. Reliability, low current demand, unexcelled performance and ease of operation are the net result.

The dual conversion receiver with its FET front end and high-Q helicalized cavity resonators boasts low noise and sensitivity of  $0.5\mu\text{V}$  or less. Signal gain of 90dB or more is accomplished from the second mixer back by virtue of a 4-stage IF amplifier. The need for additional front end RF amplification is thus eliminated. PLL controlled first and crystal-controlled second local oscillators produce excellent stability. Audio reproduction is of an unusually high order of distortion free clarity.

The transmitter section will produce a minimum of 10 watts RF output. Again, a phase locked loop is employed for initial frequency stability. Twenty two (22) channels are provided for operating convenience and versatility. High-Q stages provide minimum interstage spurious response. A low pass filter is placed at the output to further insure undesirable frequency products not being emitted. Final PA transistor protection circuit is incorporated in the final circuitry. A new design heat sink is employed to increase final amplifier reliability.

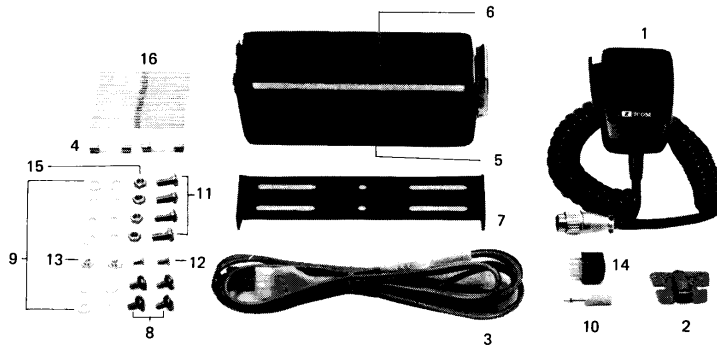
All circuitry is constructed on printed circuit boards which are easily accessible for servicing. The printed circuit boards are housed in a sturdy frame which is, in turn, housed in a rigid metal case providing an extremely durable and rugged unit. Care has been taken to filter and regulate internal DC voltages. A DC input filter is provided to eliminate alternator or generator "whine" generated in the vehicle environment. Test points are brought up from all major circuits to facilitate maintenance checks and trouble shooting should the necessity arise.

Each unit comes complete with built-in speaker, a high quality dynamic microphone, mobile mounting bracket, microphone clip, DC cabling and plug, external speaker plug, and operating manual. A modern styled face plate, large S meter, small size and low profile design complete the unit's styling. A welcome addition to a dashboard or fixed station.

# 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 cartons. 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.

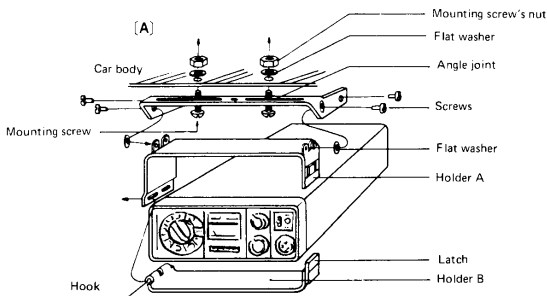


- |                              |   |                                   |    |
|------------------------------|---|-----------------------------------|----|
| 1. Microphone (dynamic type) | 1 | 9. Flat washers                   | 6  |
| 2. Microphone hook           | 1 | 10. Plug for speaker              | 1  |
| 3. Power cord                | 1 | 11. Mounting screws               | 4  |
| 4. Spare fuses (5A)          | 2 | 12. Screws for additional bracket | 2  |
| 5. Installing holder A       | 1 | 13. Flat head screw's nuts        | 2  |
| 6. Installing holder B       | 1 | 14. Acc. plug                     | 1  |
| 7. Installing angle joint    | 1 | 15. Mounting screw's nut          | 4  |
| 8. Gimp screws               | 4 | 16. Diodes for Matrix             | 20 |

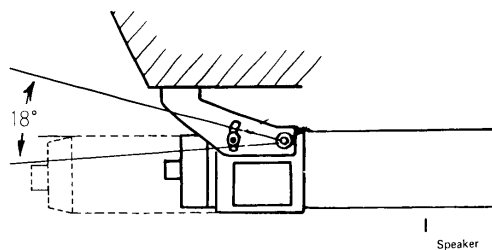
## Location:

Where you place the transceiver in your automobile is not critical and should be governed by convenience and accessibility. Since the unit is so compact, many mobile possibilities present themselves. In general, the mobile mounting bracket will provide you with some guide as to placement. Any place where it can be mounted with metal screws, bolts, or pop-rivets will work. For fixed station use, a power supply should be designed to produce 3 amps for the transceiver.

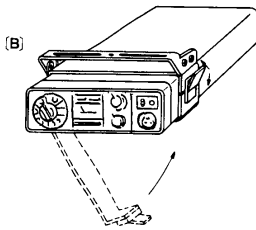
### Mounting bracket installation



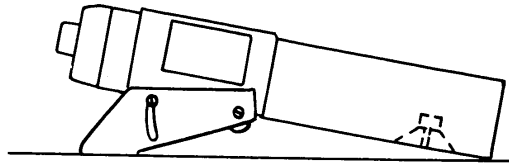
### Angle adjustment



### Transceiver installation



### Optional installation



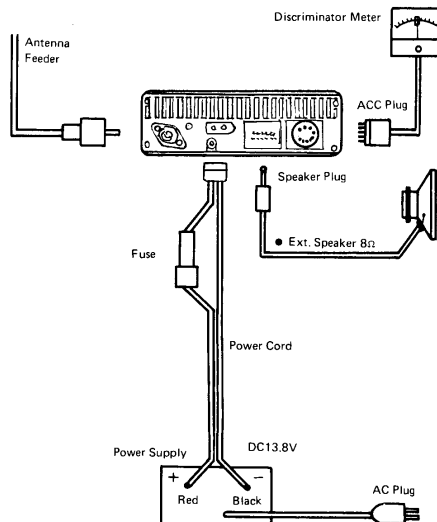
### Power Requirements:

The transceiver is supplied ready to operate from any regulated 13.8V DC, 2.5 ampere negative ground source. An automobile 12 volt, negative ground, system is usually more than adequate. Some note must be taken, however, of the condition of the vehicle's electrical system. Items such as low battery, worn generator/alternator, poor voltage regulator, etc., will impair operation of your transceiver as well as the vehicle. High noise generation or low voltage delivery can be traced to these deficiencies. If an AC power supply other than the matching ICOM AC power supply is used with your transceiver, make certain it is adequately regulated for both voltage and current. Low voltage while under load will not produce satisfactory results from your transceiver. Receive gain and transmitter output will be greatly impaired. Caution against catastrophic failure of the power supply should be observed.

**CAUTION:** Excessive Voltage (above 15VDC) will cause damage to your transceiver. Be sure to check source voltage before plugging in the power cord.

Included with your transceiver is a DC power cable with plug attached. The Red Wire is positive (+), the Black, negative (-). If your mobile installation permits, it is best to connect these directly to the battery terminals. This arrangement eliminates random noise and transient spikes sometimes found springing from automotive accessory wiring. If such an arrangement is not possible, then any convenient B+ lead in the interior of the vehicle and the negative frame can be utilized. Your transceiver provides an internal DC filter that will take out a large amount of transient difficulties anyway. Remember, the unit operates on a negative ground system only—it cannot be used in a positive ground automobile. After making your connections, simply insert the plug into your transceiver. When your transceiver is mated with its matching ICOM AC power supply, the power cable is simply plugged in the same receptacle in the transceiver and the AC line cord into any convenient wall receptacle.

### Rear external connections



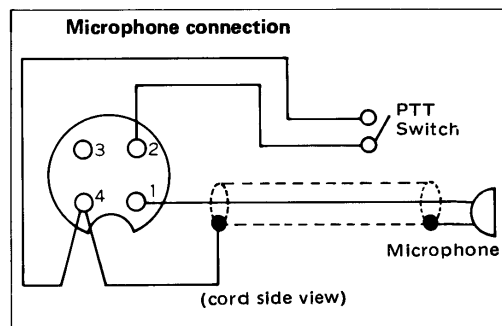
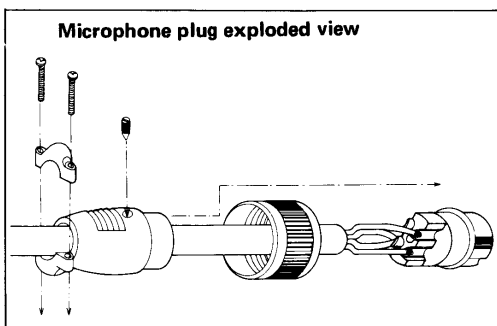
### Antenna:

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 VHF as well as the low bands, every watt of ERP makes some difference. Therefore, 10 watts average output plus 3 dB 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 VHF applications. Such readings will invariably have an error of 40% or more. Instead, use an in line watt similar to the Drake WV-4, Bird Model 43 or Sierra Model 164B with VHF 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 thread. In any event, the RF connector will mate with almost any PL-259 connector if care is taken to seat them properly.

### Microphone:

A high quality dynamic microphone is supplied with your transceiver. Merely plug it into the proper receptacle on the front panel. Should you wish to use a different microphone, make certain it is approximately 500 ohms. Particular care should be exercised in wiring also, as the internal electronic switching system is dependent upon it. See the schematic for the proper hook up.

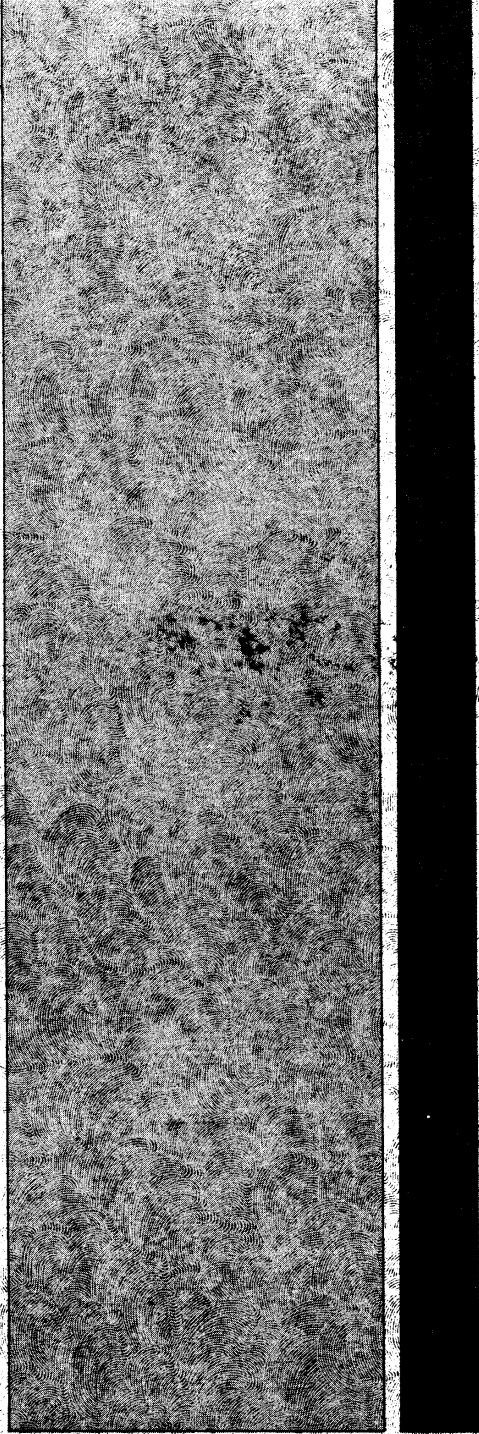


### External Speaker:

An external speaker jack and plug is supplied with your unit in the event another speaker is desirable. The external speaker impedance should be 8 ohms, and when used, will disable the internal speaker. An 8 ohm headset can be utilized as well.

### Synthesizer Programming:

Your transceiver does not use crystals to set the frequency. It has 22 channels programmable on a diode matrix board and selected by the channel selector switch. In addition, the channel selected has three options of how the offset is handled: receive and transmit on the programmed frequency (SPX), receive 600KHz higher than the programmed frequency (DPX A), and transmit 600KHz above the programmed frequency (DPX B). The programming is done on the diode matrix board by soldering computer grade silicon diodes into the boards in the locations indicated on the diode matrix diagram. Please refer to the chart on pages 20 for the locations.



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