IC-280

144MHz FM TRANSCEIVER

INSTRUCTION MANUAL

ICOM

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SECTION I SPECIFICATIONS

GENERAL

Numbers of semi-conductors	:	Transistors	37
		FET	4
		IC	26
		Diode	49
Frequency coverage	:	143.90 - 148.11MHz	
		143.900 ∿ 146.000MHz : 5KHz steps	
		146.010 ∿ 148.110MHz : 15KHz steps	
Memory channels	:	3 channels, any inband frequency programmable	
Usable conditions	:	Temperature: −10°C - 60°C (14°F - 140°F)	
		Operationable time: continuous	
Frequency stability	:	Within ±1.5KHz	
Antenna impedance	:	50 ohms unbalanced	
Power supply requirement	:	13.8V DC ±15% (negative ground) 3.0A Max.	
Current drain	:	Transmitting	
		HIGH (10W)	Approx. 2.5A
		LOW (1W)	Approx. 1.2A
		Receiving	
		At max audio output	Approx. 0.7A
		Squelched	Approx. 0.5A
Dimensions	:	156mm (W) x 58mm (H) x 228mm (D)	
Weight	:	Approx. 2.2kg	

TRANSMITTER

Output power	:	10W (HIGH), 1W (LOW)
Emission mode	:	16 F_3
Modulation system	:	Variable reactance frequency modulation
Max. frequency deviation	:	±5kHz
Spurious emission	:	More than 60dB below carrier
Microphone	:	600 ohms dynamic microphone with push-to-talk switch
		(IC-SM2 electret condenser microphone may also be used.)
Operating mode	:	Simplex, Duplex (±600KHz from receive frequency)

RECEIVER

Receiving system	:	Double conversion superheterodyne
Modulation acceptance	:	16 F_3
Intermediate frequency	:	1st: 10.695MHz
		2nd: 455KHz
Sensitivity	:	More than 30dB S+N+D/N+D at 1μV
		Less than 0.6μV for 20dB Noise quieting
Squelch sensitivity	:	Less than 0.4μV
Spurious response rejection ratio	:	More than 60dB
Selectivity	:	More than ±7.5KHz at −6dB point
		Less than ±15KHz at −60dB point
Audio output power	:	More than 2.0W
Audio output impedance	:	8 ohms

SECTION II DESCRIPTION

Use of Microcomputer

This IC-280 is the world's first amateur transceiver with a P-channel MOS 4-bit microcomputer. Frequency control, band-edge detection, and the display are accomplished by the microcomputer. The 3-channel memory is controlled electrically by the use of a 256-bit RAM area. The circuits for these IC-280 functions are equivalent in capability to conventional circuits having a large number of C-MOS MSI's.

Separable Control Unit

The control portion (front panel) of the IC-280 can be separated from the rest of the unit, and the two parts can be connected with a cable. The control unit is approximately one-third of the whole unit; therefore, the IC-280 can be easily mounted almost anywhere in a car.

Superior Receiving Characteristics

The use of newly developed low-noise and large dynamic range junction FET's (for the RF amplifier and the first mixer) and of helical cavity filters (for the antenna and RF circuits) provides excellent sensitivity and intermodulation distortion characteristics. A pair of high quality monolithic crystal filters facilitates very stable receiving and excellent durability.

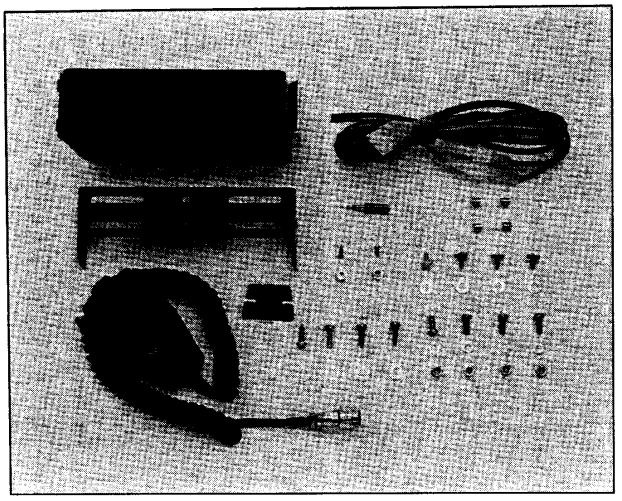
Highly Stable Transmitting Characteristics

Both the directly amplified VCO output without the use of multipliers or mixers and the use of a power module in the PA unit produce very clean transmitting signals without spurious radiation. RF power is selectable 10W (HIGH) and 1W (LOW).

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.

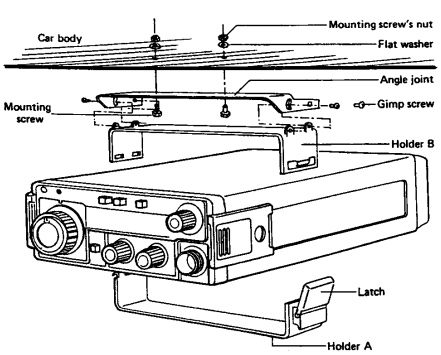


1. Microphone (dynamic type)	1	8. Gimp screws	4
2. Microphone hook	1	9. Flat washers	12
3. Power cord	1	10. Plug for speaker	1
4. Spare fuses (5A)	2	11. Mounting screws	8
5. Installing holder A	1	12. Screws for additional bracket	2
6. Installing holder B	1	13. Flat head screw's nuts	2
7. Installing angle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

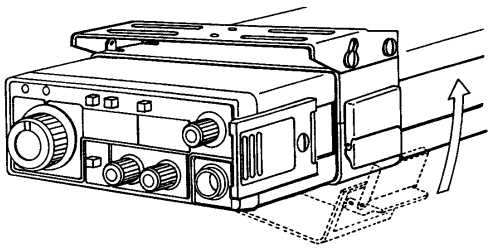
Location:

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.

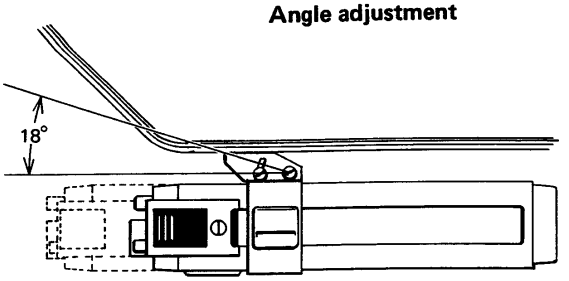
Mounting bracket installation



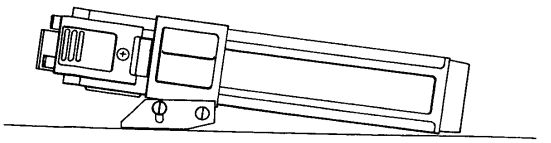
Transceiver installation



Angle adjustment



Optional installation

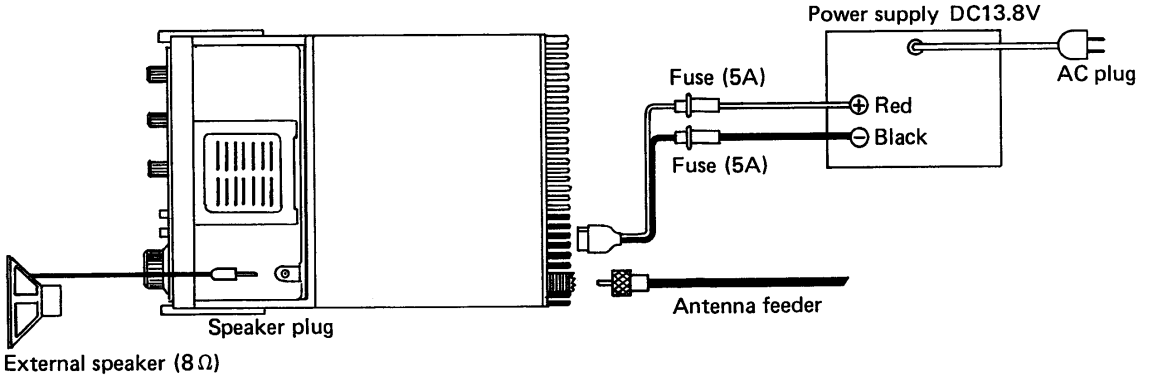


Power Requirements:

The transceiver is supplied ready to operate from any regulated 13.8V DC, 3 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. Receiver 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. 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.



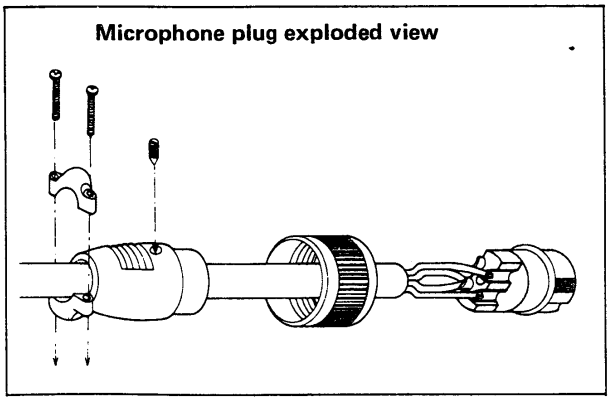
Antenna:

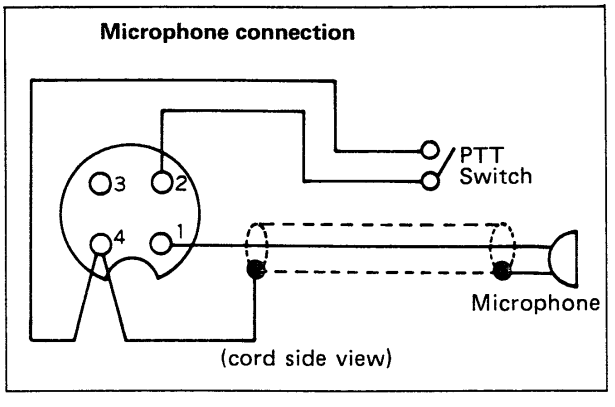
The most important single item that will influence the performance of any communication system is the antenna. For that reason, a good, high-quality, gain antenna of 50 ohms impedance is recommended, fixed or mobile. In VHF as well as the low bands, every watt of ERP makes some difference. Therefore, 10 watts average output plus 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 VHF applications. Such readings will invariably have an error of 40% or more. Instead, use an in line watt meter 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 threads. 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 600 ohms. Particular care should be excercised in wiring also, as the internal electronic switching system is dependent upon it. See the schematic for the proper hook up.



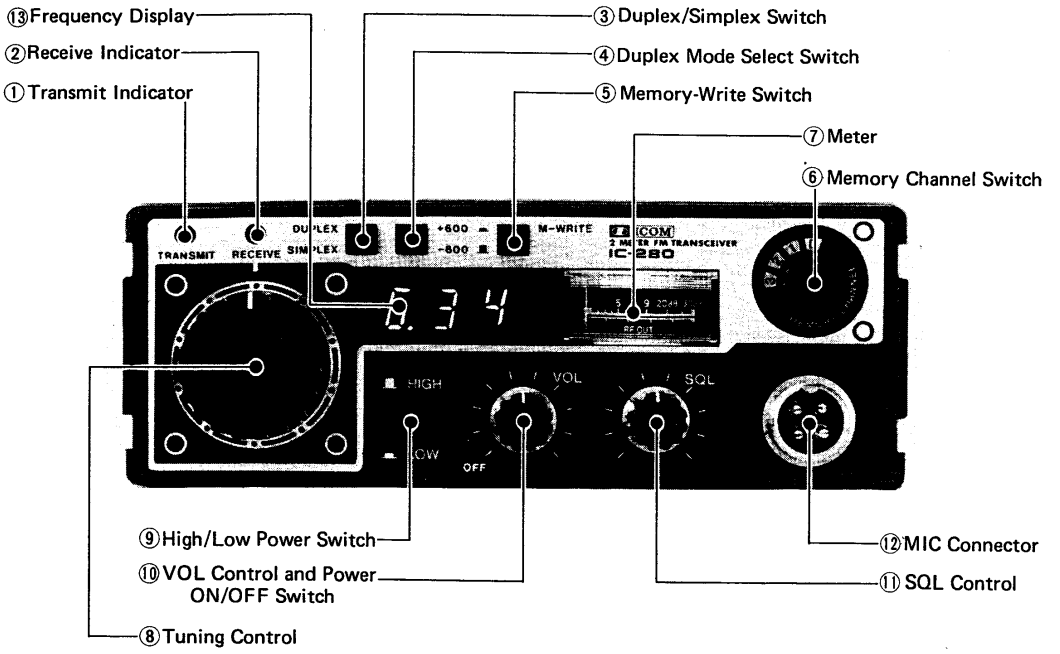


External Speaker:

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.

SECTION IV CONTROL FUNCTIONS

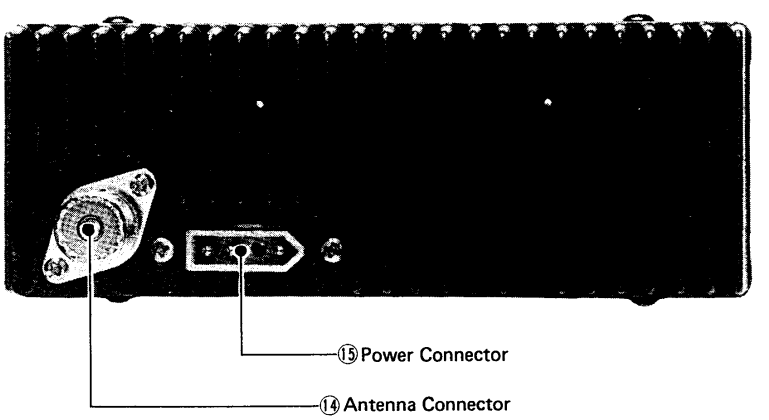
FRONT VIEW



1. Transmit Indicator: Illuminates in the transmit mode.
2. Receive Indicator: Illuminates in the receive mode. (When squelch opened).
3. Duplex/Simplex Switch: Selects Duplex or Simplex operation.
4. Duplex Mode Select Switch: Sets the transmitting frequency 600KHz above or 600KHz below the receiving frequency at Duplex operation.
5. Memory-Write Switch: To insert the desired frequencies into any of three Memory channels.
6. Memory Channel Switch: To select operation with the tuning control or the memory channels.
7. Meter: Functions both as a signal strength meter (S-meter) and as a relative RF output meter.
8. Tuning Control: Sets the operating frequency.
9. High/Low Power Switch: Sets the RF output power to 10 watts or 1 watt.
10. VOL Control and Power ON/OFF Switch: Controls audio level and turns the unit ON or OFF.
11. SQL Control: Controls squelch threshold level.
12. MIC Connector: Accepts microphone plug.
13. Frequency Display: Digitally displays the operating frequency.

BACK VIEW

14. Antenna Connector:
    Accepts standard PL-259 coaxial connector.
15. Power Connector:
    Mates with DC cord plug.



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

Printed in Japan