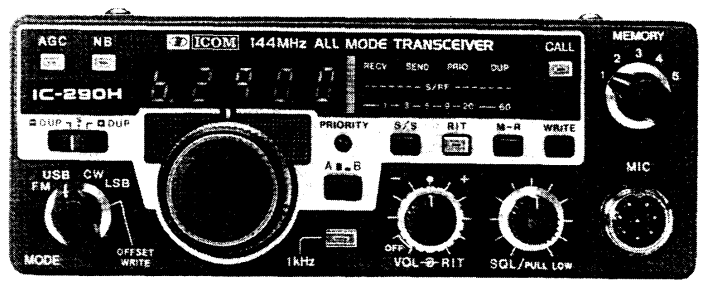
# IC-290H/D

## 144MHz ALL MODE TRANSCEIVER

## INSTRUCTION MANUAL




ICOM

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# SECTION I SPECIFICATIONS

## GENERAL

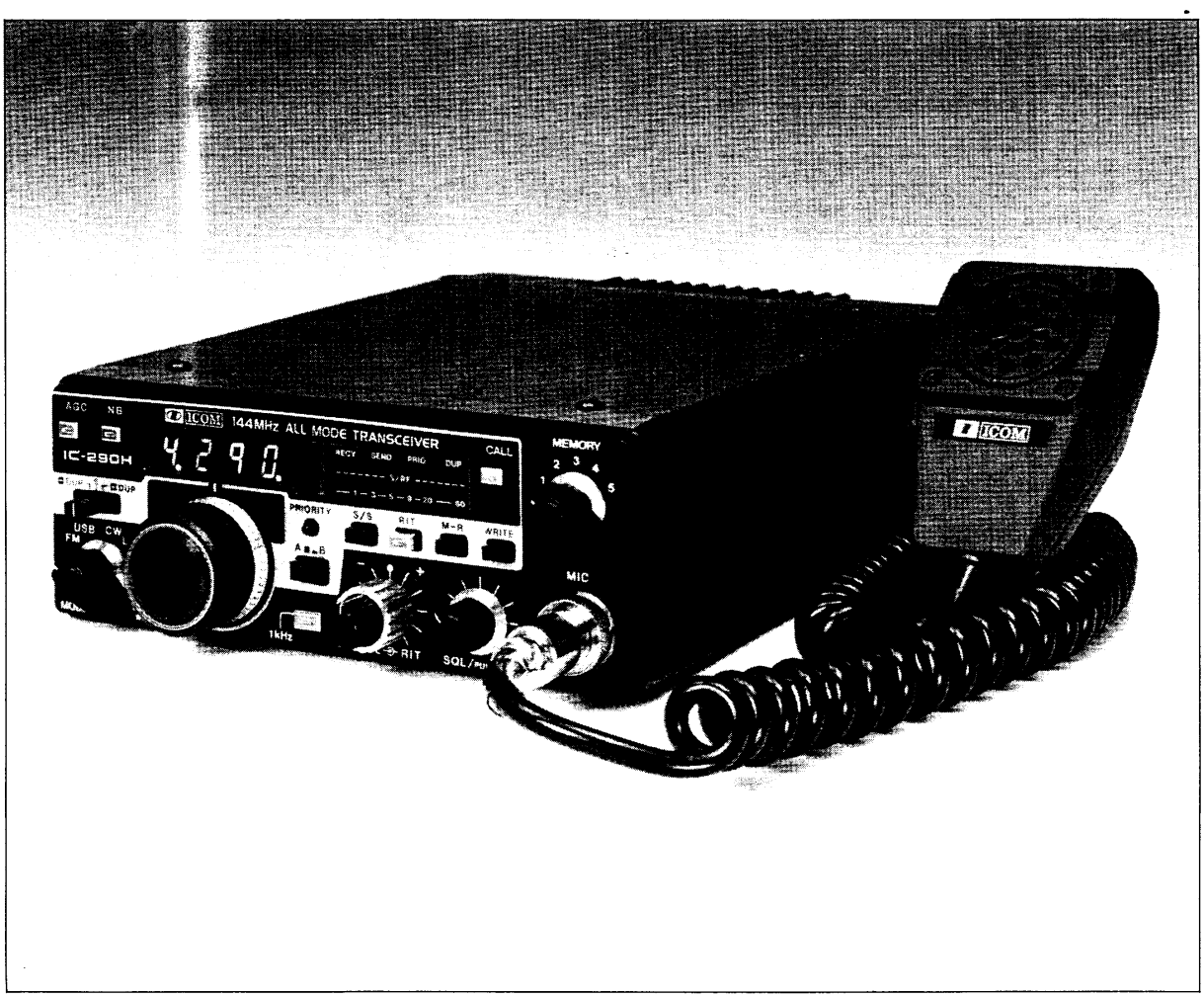
| | | |
|---|---|---|
| Numbers of semiconductors | : | Transistor 61<br>FET 6<br>IC 28<br>Diode 134 (IC-290H : 135) |
| Frequency coverage | : | 144.0MHz ~ 146.0MHz<br>(IC-290H : 143.8 ~ 148.2MHz) |
| Frequency resolution | : | SSB 100Hz steps FM 5KHz steps<br>1KHz steps with 1KHz STEPS button depressed |
| Frequency control | : | Microcomputer based 100Hz step Digital PLL synthesizer<br>Independent Dual VFO Capability |
| Frequency readout | : | 5 digit LED 100Hz readout |
| Frequency stability | : | Within ±1.5KHz |
| Memory channels | : | 5 channels with any inband frequency programmable |
| Usable conditions | : | Temperature: −10°C ~ 60°C (14°F ~ 140°F)<br>Operational time: Continuous |
| Antenna impedance | : | 50 ohms unbalanced |
| Power supply requirement | : | 13.8V DC ±15% (negative ground) 6A Max. |
| Current drain (at 13.8V DC) | : | Transmitting<br>SSB (PEP 25W) Approx. 4.8A<br>CW, FM (25W) Approx. 5.0A<br>FM (1W) Approx. 1.6A<br>Receiving<br>At max audio output Approx. 0.9A<br>Squelched Approx. 0.7A |
| Dimensions | : | 64mm (H) x 170mm (W) x 218mm (D) |
| Weight | : | Approx. 2.5Kgs |

## TRANSMITTER

| | | | |
|---|---|---|---|
| Output power | : | SSB | High 25W (PEP) Low 1W (PEP) |
| | | CW | High 25W Low 1W |
| | | FM | High 25W Low 1W |
| Emission mode | : | SSB | (A3J, USB/LSB), CW (A1), FM (F3) |
| Modulation system | : | SSB | Balanced modulation |
| | | FM | Variable reactance frequency modulation |
| Max. frequency deviation | : | ±5KHz | |
| 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<br>(Any in-band 100KHz steps frequency separation programmable) | |
| Tone Burst | : | 1750Hz ±0.1Hz (IC-290H : Not installed) | |

## RECEIVER

| | | | |
|---|---|---|---|
| Receiving system | : | SSB, CW | Single conversion superheterodyne |
| | | FM | Double conversion superheterodyne |
| Receiving mode | : | SSB | (A3J, USB/LSB), CW (A1), FM (F3) |
| Intermediate frequency | : | SSB, CW | 10.75MHz |
| | | FM | 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 | : | Less than 0.4 microvolts | |
| Spurious response rejection ratio | : | More than 60dB | |
| Selectivity | : | SSB, CW | More than ±1.2KHz at −6dB point |
| | | | Less than ±2.4KHz at −60dB point |
| | | FM | More than ±7.5KHz at −6dB point |
| | | | Less than ±15KHz at −60dB point |
| Audio output power | : | More than 2W | |
| Audio output impedance | : | 4 ~ 8 ohms | |



# SECTION II DESCRIPTION

## 144MHz ALL-MODE TRANSCEIVER INCORPORATING A MICROCOMPUTER

CPU control with ICOM's original programs provide various operating capabilities. No-backlash dial controlled by ICOM's unique rotary encoder circuit. The band-edge detector and Endless System provides out-of-band protection. There are no variable capacitors or dial gear, ensuring problem-free use. The IC-290H/D can accomodate FM, USB, LSB, CW coverage in the 144 ~ 146 MHz (IC-290H: 143.8 ~ 148.2MHz) frequency range, and thus the IC-290H/D can be used for mobile, DX, local calls, and satellite work.

## MULTI-PURPOSE SCANNING

The Memory Scan allows you to monitor five different memory channels and two VFO frequencies, and the Program Scan provides scanning between two programmed frequencies. The scanning speed is adjustable, and the auto-stop terminates scanning when a signal is received or a channel is empty, for all modes.

## DUAL VFO'S

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

## CONTINUOUS TUNING SYSTEM

ICOM's new continuous tuning system features an LED display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 5 LED digits representing 100Hz digits.

Automatic recycling restarts tuning at the top of the band, i.e., at 145.999.9MHz when the dial goes below 144.000.0MHz. Recycling changes 145.999.9MHz to 144.000.0MHz 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, is also provided for trouble-free QSO.
(IC-290H: 145.999.9MHz and 144.000.0MHz should be read 148.199.9MHz and 143.800.0MHz.)

## OUTSTANDING PERFORMANCE

The RF amplifier and first mixer circuits using MOS FETs, and other circuits provide excellent Cross Modulation and Two-Signal Selectivity characteristics. The IC-290H/D has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having high shape factors, exceptional selectivity as well.

The transmitter uses a balanced mixer in a single 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.

## ADDITIONAL CIRCUITS

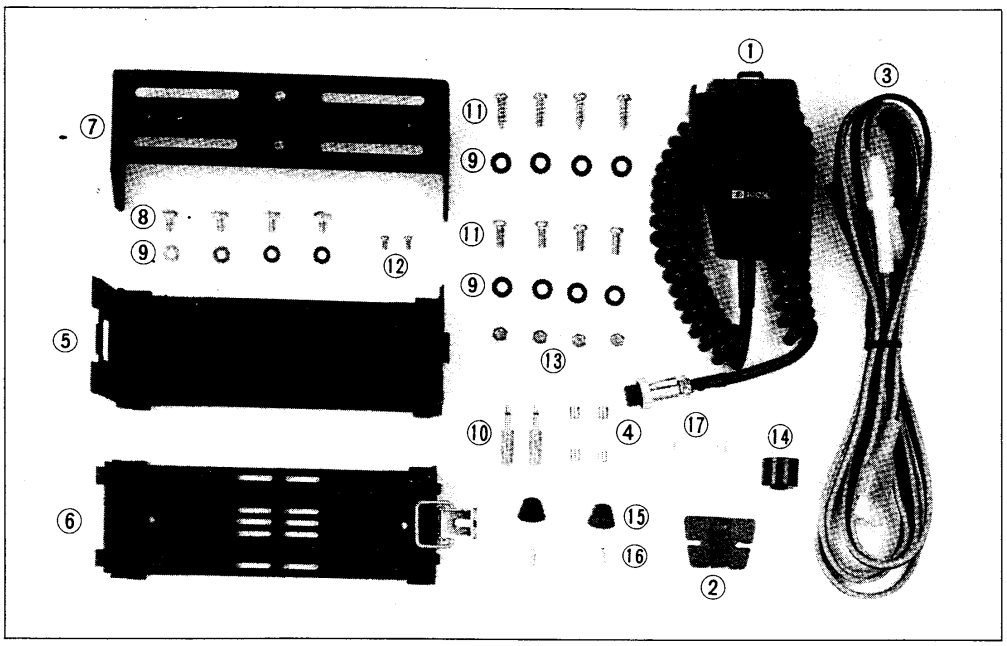
The IC-290H/D has a built-in Noise Blanker, CW Break-in, CW Monitor, APC, and many other circuit features for your convenience.

The IC-290H/D has everything you need to truely enjoy VHF operation, in an extremely compact, rugged transceiver, designed to ensure high quality, long term use.

# SECTION III INSTALLATION

## UNPACKING

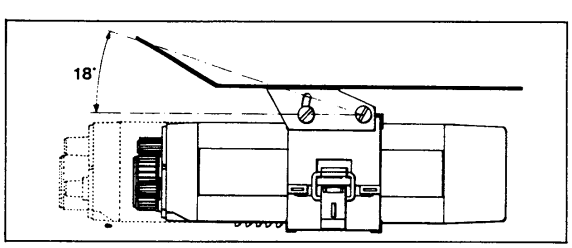
Carefully remove your transceiver from the packing carton and examine it for signs of shipping damage. Should there be any damage, notify the delivering carrier or dealer immediately, stating the full extent of the damage. It is recommended you to keep the shipping cartons. In the event storage, moving,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

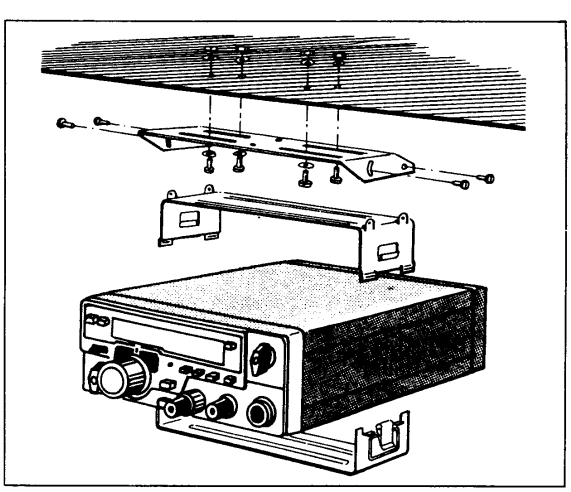



1. Microphone (dynamic type) . . . . . 1
2. Microphone hook . . . . . 1
3. Power cord. . . . . 1
4. Spare fuses (10A). . . . . 2
5. Installing holder A. . . . . 1
6. Installing holder B . . . . . 1
7. Installing angle joint. . . . . 1
8. Gimp screws. . . . . 4
9. Flat washers . . . . . 12
10. Plugs for speaker and key . . . . . 2
11. Mounting screws . . . . . 8
12. Screws for additional bracket. . . . . 2
13. Mounting screw nuts . . . . . 4
14. 9-Pin MT plug. . . . . 1
15. Rubber feet . . . . . 2
16. Fixing screws . . . . . 2
17. Battery Terminal Lugs . . . . . 2

## LOCATION

The placement of the transceiver in your automobile is not critical and should be determined by convenience and accessibility. Since the unit is so compact, various mobile possibilities present themselves. In general,



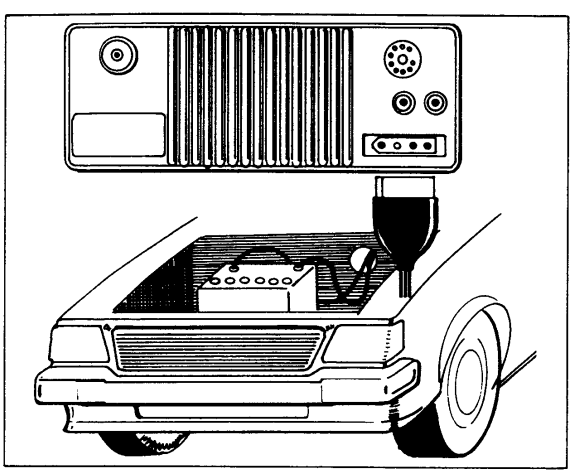
the mobile mounting bracket will provide you with some guidance as to placement. Any place where it can be mounted with metal screws, bolts, or pop-rivets will work. For fixed station use, a power supply should be designed to produce 6 amps for the transceiver.

## POWER REQUIREMENTS

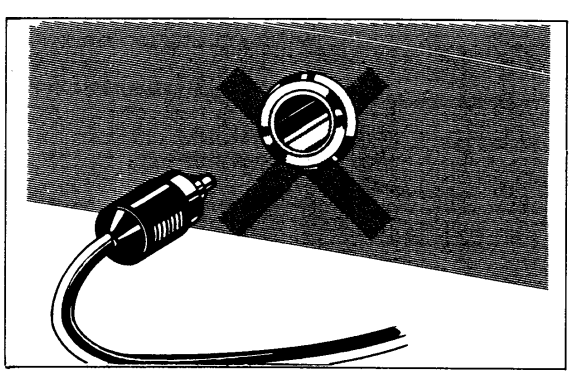
The transceiver is supplied ready to operate from any regulated 13.8V DC, 6 ampere negative ground source. An automobile 12 volt, negative ground system is usually more than adequate for operation. Some note must be taken, however, of the condition of the vehicle's electrical system. Items such as a 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 back to these deficiencies. If an 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, and steps should be taken to ensure continual maintenance of the power supply.

**CAUTION:** Excessive Voltage (above 15V DC) 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.



Do not use a cigarette lighter socket.



## ANTENNA

The single most important 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, 25 watts average output plus 3dB of gain antenna equals 50 watts ERP, presuming low VSWR of course. The few extra 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 however some pitfalls to be aware of. For example, do not

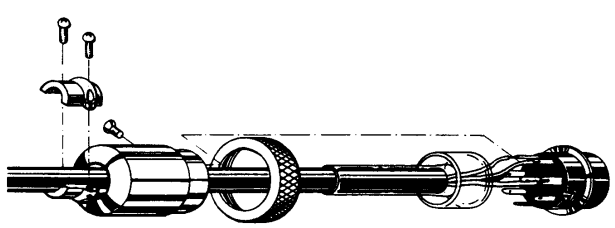
attempt to adjust an antenna for lowest VSWR when using a diode VSWR meter not engineered for VHF applications. Such readings will invariably have an error of 40% or more. Instead, use an in line watt meter similar to the Drake WV-4, Bird Model 43 or Sierra Model 164B with VHF cartridge. Further, when adjusting a mobile antenna, do so with the engine 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.

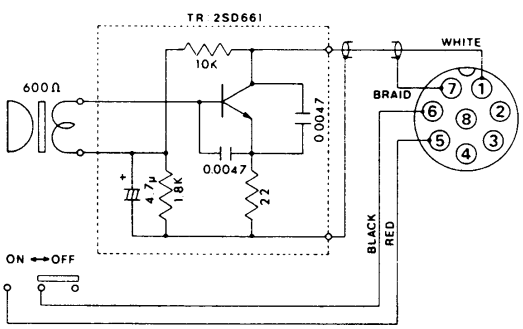
## MICROPHONE

A high quality dynamic microphone with built-in preamplifier 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 has a proper preamplifier. Particular care should be excercised in wiring also, as the internal electrics switching system is dependent upon it. See the schematic for the proper hookup.

**Microphone plug exploded view**



**Microphone connection**

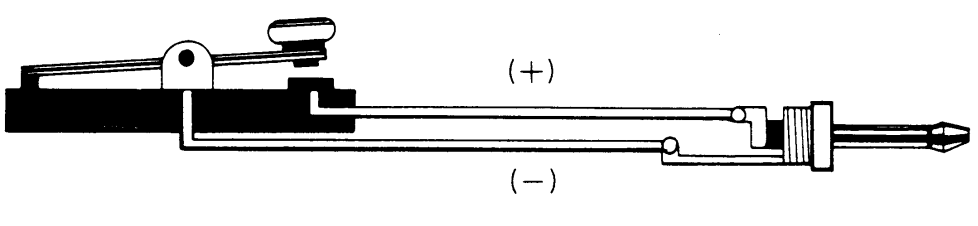



## EXTERNAL SPEAKER

An external speaker jack and plug is supplied with your unit in the event another speaker is desirable. The external speaker impedance should be 4 ~ 8 ohms, and when used, will disable the internal speaker. A 4 ~ 16 ohm headset can be utilized as well.

## CW KEY

When operating CW, connect a key to the Key Jack with the plug supplied as shown in the figure. If the terminals have polarity, be sure to make the correct connection. Note that the keyed voltage when switching with semiconductors or relays with resistors in the circuit, should be adjusted to be below 0.4 Volts!

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