

Icom IC-2820H dual band FM transceiver



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Are you in need of (or interested in) a dual band FM transceiver with D-STAR capability? Then you should seriously consider the IC-2820H. This feature packed transceiver gives you the option of adding D-STAR whilst having a host of features for normal VHF/UHF FM operations.

In line with recent reviews published in AR, this review will give the perspectives of one user of the IC-2820H transceiver. Any readers interested in a review which includes a full set of technical measurements should seek out a copy of the November 2007 issue of QST, published by the ARRL. The IC-2820H is reviewed on pages 74 – 77 of that issue.

The IC-2820H is the latest of a series of dual band transceivers from Icom, including the IC-2700H and the IC-2720H. Readers should note that I personally own and operate each of these earlier transceivers. As a result, this user did find it very easy to start using the review transceiver without referring to the Instruction Manual.

The review unit was supplied with the optional UT-123 installed. This module provides Digital/D-STAR DV (Digital Voice) mode and GPS capabilities. An IC-91AD handheld transceiver was also supplied, to enable some exploration of operations using the D-STAR DV mode. Whilst some comments may refer to the IC-91AD, this review will focus on the IC-2820H.

On unpacking, the two units were quickly assembled without the need to refer to the instruction manuals. The result was instant success – working radios in basic analogue FM mode. The author found it very simple to enter the required frequencies for local simplex and repeater operations into the appropriate VFO channels and to use both units. However, it should be noted that the transceiver is quite complex – it will probably require most new users to make several visits to the Instruction Manual to become familiar with all the operational features.

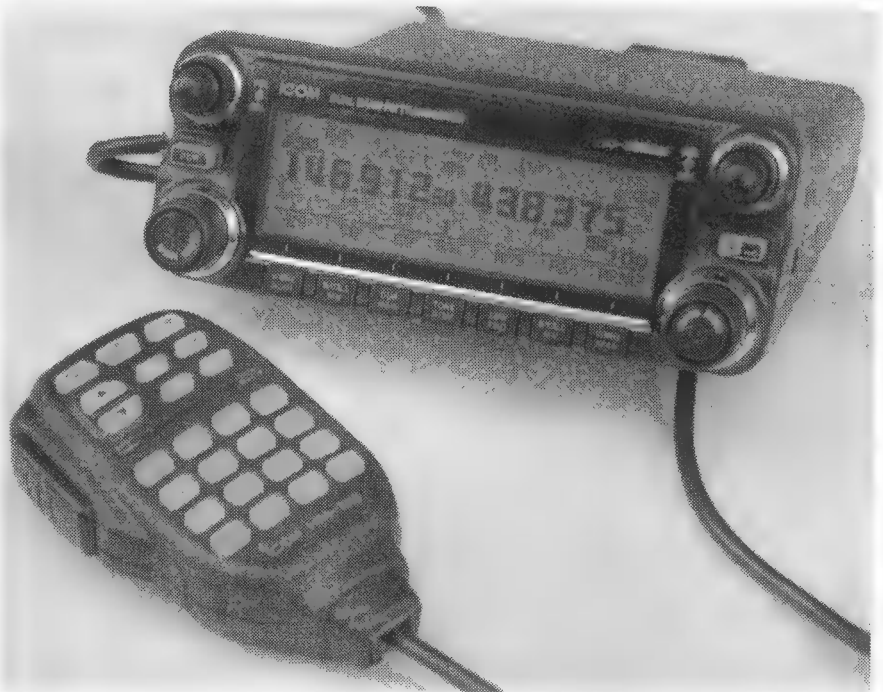


Photo 1: The Icom IC-2820H

IC-2820H features

The IC-2820H is a dual band FM transceiver covering the 2 metre and 70 centimetre amateur bands, with 50 W transmitter output on both bands. The transceiver control head has a large clear liquid crystal display which shows both receivers at the same time. The key features of the transceiver are:

- Diversity reception
- DV (Digital Voice) with GPS operation capabilities (with the optional UT-123 installed)
- V/V, U/U in addition to V/U simultaneous receive capability,
- Independent controls for both left and right receivers
- A separate controller for flexible installation

- A remote control microphone is included.

Comment will be made on some of these features later in this review.

Becoming familiar with the transceiver

Readers will have noted that, in some respects, the writer is not a good consumer – I opened the box and put the unit together without reference to the Instruction Manual. However, for any user that is less confident, the manual does have a very good “Quick reference guide” section near the front, which includes mounting and connection instructions and a quick guide to operation of the transceiver

– “Your first contact”. As you open the box, the first things that you see are the Instruction Manual and a small booklet – a Glossary of “Ham Radio Terms”. The glossary is available on the Internet (at http://w6trw.com/main/ham_radio_terms.pdf), courtesy of Icom America. The Glossary could be useful for many new amateurs.

The main body of the transceiver (the main unit) is very solidly constructed, with a die-cast chassis. There are several connection points and other features noticeable as the main unit is removed from the box. Located at the front are connections for the controller, the microphone, the GPS antenna, a data jack and a packet jack. Also clearly visible are two sets of indentations to accept the mounting magnets on the controller/display unit. At the rear of the main unit, the cooling fan is prominent, together with two SO239 antenna connectors. Only one of the antenna connectors can be used for transmitting – the other allows for the connection of a second antenna for diversity reception. Also at the rear are the DC power receptacle at the end of a short lead and two external speaker sockets.

Like many transceivers currently on the market, the IC-2820H has a controller/display head that can be mounted remote from the main transceiver body. One feature that is different from previous units in this series and from its competitors is that the control head attaches to a mounting plate or the transceiver body by the use of magnets. Even if you are planning to use the transceiver as a single unit, you are effectively remote mounting the control head. The transceiver is supplied with two separation cables: the 10 cm long OPC-1712 and the 3.4 m OPC-1663. Operation of the transceiver as a single unit requires the use of the shorter OPC-1712. When used as a single unit, there are cut-aways for the separation cable and microphone cable to exit (as required) from the front of the main unit.

If you have the UT-123 installed and wish to use the GPS capabilities, the controller will not sit on the front of the transceiver body if the GPS antenna cable is connected – you will need to remotely mount the controller. This characteristic is noted in the Instruction Manual.

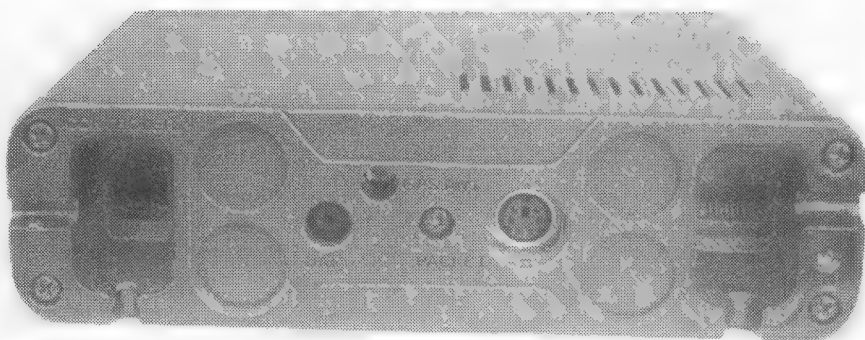


Photo 2: The view of the front of the main body of the transceiver, showing the various connectors and the two sets of magnet positions to mount the controller unit.

The controller has only a single connection, for the separation cable. As previously noted, the controller has two magnets on the rear to connect to any suitable surface or to the supplied remote controller bracket. The magnets are strong enough to hold the controller firmly, but not so firmly that it is difficult to remove easily. If mounting the controller on the main body, you can choose between two mounting positions, with the controller being up or down – the controller unit’s height is greater than that of the main unit. The use of magnetic mounting is probably the reason why there is no connection of the microphone to the control head – any pull of a microphone cord would be likely to detach the head from its mount. Given that the transceiver is most likely to be mounted with the control head remote to the main body, it is a little surprising that the microphone is not fitted with a longer cord, or that a microphone extension cable is not supplied as standard.

The controller display is a large 93 x 28 mm dot matrix LCD, giving a crisp clear display over wide viewing angles. The background colour can be varied from green to amber.

Specifications

The transceiver is primarily for FM and DV modes (with the UT-123 fitted), with AM available in receive only. Frequency coverage for the Australian model is listed in Table 1. The memory system provides 522 channels, including two call channels and 20 scan edge channels. Power supply required is 13.8 V DC +/- 15%, with current consumption of 1.2 amps on receive (muted) to 13 amps on transmit. The entire unit has a mass of approximately 1.7 kg, with overall dimensions of 150 x 58 x 220 (approx.)

mm (WxHxD) when configured as a single unit. Tuning steps can be set to 5, 6.25, 10, 12.5, 15, 20, 25, 30 or 50 kHz.

Table 1: Frequency coverage (MHz)

Transmit	Receive
144-148	(L): 116-549.995
430-440	(R): 118-173.995, 375-549.995, 810-999.990

Frequency coverage may be different on units not designed for the Australian market.

The receiver sensitivity in the amateur bands is specified as less than 0.18 uV in FM (12 dB SINAD) and less than 0.35 uV in DV (BER 1% with UT-123). Audio output at 13.8 V is more than 2.4



Photo 3. The supplied HM133 Remote Control Microphone – all controls at your fingertips.

W at 10% distortion with an 8 ohm load. The external speaker connections are 3.5 mm (1/8") mono (2 conductor) for an 8 ohm load.

Supplied accessories

The IC-2820H is supplied with the following Accessories:

- HM-133 Remote control hand microphone
- OPC-1132 DC power cable
- OPC-1712 Controller cable (10 cm)
- OPC-1663 Separation cable (3.4 m)
- Mounting bracket kit
- Microphone connector plate
- Remote controller bracket
- Microphone hanger
- Spare fuse

FM operation

In analogue FM mode, the transceiver performed extremely well. Having prior experience with Icom mobile dual band transceivers, it was very simple to get going and to use on-air, both at home and when mobile. In the short time available, I have not explored all the capabilities of this radio, but there are plenty of features to explore.

I have had some comments from others that the receiver does suffer from pager breakthrough. I did not experience any during my one long trip using the radio under review, but that trip was undertaken in the period just prior to New Year. It is possible that the level of pager traffic was lower at that time, as the issue of pager interference was one of interest. During my return journey through Melbourne from Geelong, I was listening with DV mode on the left channel and 70 cm FM on the right channel. One would not expect problems from pagers in DV mode, as the receiver would simply see the breakthrough signal and decode no valid data, and therefore not open the receiver mute.

I received good reports on transmit, using both FM and DV modes.

DV operation

One reason to consider purchasing this transceiver is the option of adding the DV voice mode by adding the UT-123 module. This allows access to the D-STAR system via 2 m and 70 cm.

However, being a new system, most will not have experienced this mode. Successful operation requires the appropriate equipment AND the correct

settings in the equipment. Chapter 5 of the Instruction Manual describes DV mode operation and settings in 24 A5 pages. Several different settings need to be made before a successful contact can be made, even in simplex mode. The descriptions in the manual are quite thorough, but successful implementation does require the user to read carefully and to remember several definitions. But this should not be surprising – most things that are new technology require us to learn the new procedures and definitions.

In addition to the Instruction Manual, several sources of information can be found on the Internet about the D-STAR system and its use. Of most use to Australians will be the Strictly Ham website (<http://www.strictlyham.com.au>) and the Australian National D-STAR Web Site (<http://www.dstar.org.au/>). Both sites have some quick guides on frequencies in use and a "D-STAR Get-On-The-Air radio configuration" guide. It is potentially confusing that the names used on different model radios may be slightly different for the same functional meaning. To most users, this should not be a problem if they are only using a single radio, for example the IC-2820H. This should not be much of an issue once the user becomes familiar with the D-STAR system, as the functional definitions are consistent. Once you are used to the system, it should be easy to remember the slightly different name of the function in a different radio – for example, the names are slightly different in the IC-91AD handheld.

Having initially set up the required definitions and other settings in both the IC-2820H and the IC-91AD handheld, I tried the DV mode across the room – success for simplex operation. The next challenge was to listen to the Mount Dandenong repeater VK3RWN. Reception was initially adequate. Some digital artefacts were observed, probably as a result of low signal strength, phase distortion due to multipathing, or both. This result occurred when the IC-2820H was connected to a small vertical antenna mounted just above the gutter of the house, which had been adequate for local communications.

The next morning I moved a small 4 element Yagi into vertical polarisation. Once pointing toward the repeater, better signals were heard. The path to

the repeater is a little over 100 km in length and crosses several ranges of hills. The predicted coverage map for the VK3RWN port C (146.9125 MHz) repeater indicated low signal strength was expected into the area around home. Having checked all the required settings and listened for a while, I successfully made contacts via the repeater. In FM mode, it is difficult for me to achieve a fully quietening signal into the co-located FM repeater. In DV mode, both transmitted and received signal reports were excellent. Whilst simply monitoring the repeater, stations were heard calling into Darwin and to and from overseas nodes via the Internet connected system. Again, received audio was generally excellent, with occasional "blips" when errors in the digital decoding occurred.

Several simplex DV contacts were made with Ralph VK3WRE, located approximately 20 km away with several obstructions in the path. Ralph was using the IC-91AD connected to an external gain vertical. Signals from Ralph were fine, even when running the handheld at low power.

In addition to DV voice communications, other operations such as low-speed data communication, brief message transmission, digital APRS (GPS-A), DV voice message storage and an emergency operating mode are possible. As a newcomer to the D-STAR system, I will not report on the system further at this time. As Editor, I would welcome an article for publication on the D-STAR system from a more experienced user.

The D-STAR system appears to be undergoing further development, as well as implementation into other capital cities (working systems are currently installed in Melbourne and Darwin). It will be interesting to explore the capabilities of the D-STAR system as time allows.

GPS functions

The UT-123 module includes a GPS receiver and antenna. The manual notes that the antenna is not waterproof, so it is not suitable for mounting outside the vehicle or house. I placed the antenna on the sill of the shack window. The receiver quickly acquired signals and located position. The GPS position data can be included in each DV transmission, using the GPS-A mode. The IC-2820H

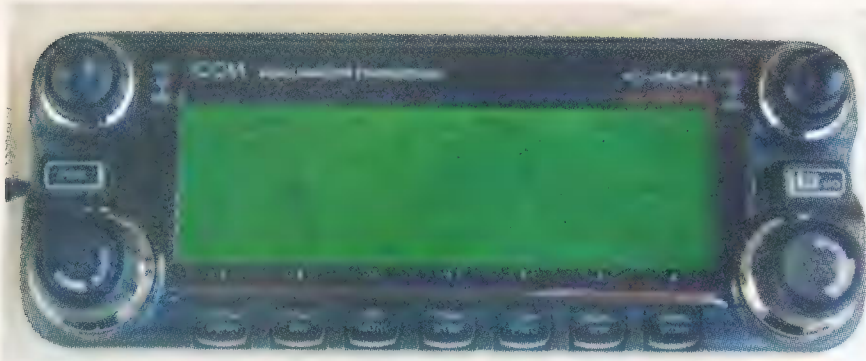


Photo 4. Close up of the controller showing one of the GPS position display options at a location close to the author's home.



Photo 5: View of the rear of the main body of the transceiver. The antenna socket at the left is the main Tx/Rx antenna. The cooling fan is obvious. The centrally located antenna socket is for "Diversity Reception" (see text). The two small sockets near the DC lead at the right hand side are the two external speaker sockets.

can also be set to sound an alarm if another DV/GPS user's transmitted position is close to your location. The display can also show the position, distance and bearing to another station's location, regardless of the location of the other station, local or in a far off land. Whilst similar to some features of APRS systems, it is only the GPS location data that is transmitted. I understand that a free software application tool is available to port the GPS-A data from the D-STAR system to APRS software applications such as UI-View, allowing station position to be displayed on appropriate maps.

The transceiver can send the GPS data in NMEA format to the Data port, allowing its use by software packages on a connected computer or for use by an APRS packet TNC. In the latter case, the TNC could be connected back to the IC-2820H via the packet port and transmitted as APRS packets using FM mode.

Memories

The transceiver has a total of 522 memory channels, including 20 scan edge memory channels (10 pairs) and 2 call channels. The memory channels can be organised into a total of 26 memory banks. Each memory channel can be programmed with the operating frequency, duplex offset and direction, subaudible tone encoder or tone squelch, its tone frequency and skip information (for scanning operations).

Whilst all this information can be set using the controller head or the remote control hand microphone, it is much simpler to manage these functions using the optional CS-2820 software package and the OPC-1529R programming cable or OPC-478 cloning cable. It is relatively simple to install the software, connect the cable, switch on the transceiver and read the data already loaded. It is a good idea

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to save this information, just in case you make a major blunder. Otherwise your option is to do a complete reset and start again. It is easy to set up the variety of memory channels and then banks in the software. You can also change a number of other transceiver settings within the software. Once you are happy, save the file and then transfer the data to the transceiver. Switch the transceiver off and then back on to activate the new configuration. Simple!

Other features

There are a number of other features in the transceiver. I will not attempt to

describe them all. Interested readers will find the promotional brochures and Instruction Manuals available for download on the Internet with some simple searching.

Some may find the band scope function of use – it allows you to watch conditions near the receiving frequency and visually assists in finding other stations. The transceiver also includes an automatic attenuator. The Receive Diversity function allows for a second antenna to be used on receive – the transceiver compares the signal strength from the two antennas and automatically selects the stronger signal.

Conclusion

The IC-2820H is a highly capable dual band FM transceiver. Once you add the UT-123 module, you gain DV mode capability and are therefore able to access the D-STAR system network, if in range of a D-STAR repeater. The transceiver is certainly a significant investment, with the current street pricing of \$795.00, and the UT-123 at \$319.00. After having the transceiver for almost three weeks, I am seriously considering making that investment.

Thanks to Icom Australia for the loan of the IC-2820H, the IC-91AD, and the required software and data communication cable.

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