

Xiegu X6100

ultra-portable

HF & 50MHz

SDR transceiver

The Xiegu X6100 is a miniature portable transceiver based on SDR technology and featuring a relatively large liquid crystal display.

The receiver covers 500kHz to 55MHz and the transmitter is enabled on amateur bands only. It is rated at 10W output on an external supply and 5W from its internal battery. It weighs 840g and measures 180mm x 87mm x 50mm excluding the knobs and the BNC connector.

In the box

The package contains the radio, a fairly useful instruction manual, a charger, microphone, plus USB and power leads. Unfortunately, the charger has a continental 2-pin mains plug so needs an adaptor to plug into a UK 13A socket. The charger is CE marked and passes an electrical safety test but some 2-pin adaptors are unsafe so beware (see EMC April 2022).

A nice touch is the inclusion of a pair of fold-out legs that allows you to sit the radio at a comfortable viewing angle on a flat surface.

Initial operation

The X6100 can be operated from an external power supply but needs charging before use from its fixed internal battery. You can either use the 'wall wart' charger provided (12V 1A) or any supply of 10 to 13.8V that is capable of supplying one amp. To use the radio on transmit, the power supply should be 12 to 13.8V and be capable of supplying 3A or more, you cannot use the supplied charger as it is only rated at 1A. There is a warning in the manual that a supply of over 15V should not be used to power the radio.

The charging rate is about 600mA and the internal battery will take a couple of hours to recharge from flat whereupon the flashing power light turns steady green. Even after the power light has stopped flashing the charging circuit continues



The Xiegu X6100 on the bench next to an Icom 7610.

to put 600mA into the battery for some time, so it's best to leave it on until the current drops if you want a full charge. It appears to be safe to leave the radio on charge overnight as it doesn't warm up. I did notice some interference from the supplied charger.

The radio turns on if the power button is pressed for 1 second and, after a boot-up sequence of a few seconds, the operational screen appears. The screen is impressively sharp and bright with clear indications of the major operating parameters, it is not a touch screen. In addition to dedicated buttons for bands, modes, preamp, attenuator etc, there is a row of buttons beneath the screen that gives access to a comprehensive choice of further

options. Here you will find things like mic gain, power level, AGC threshold etc. Incidentally the radio has two microphone options, one is the fist mic – confusingly called 'Handle' – and the other is an internal mic for use when using the X6100 as a walkie talkie. Normally the menu should be set to 'Auto' and the fist-mic will take over when plugged in.

To turn off the radio the power button must be held down for four seconds.

Measurements

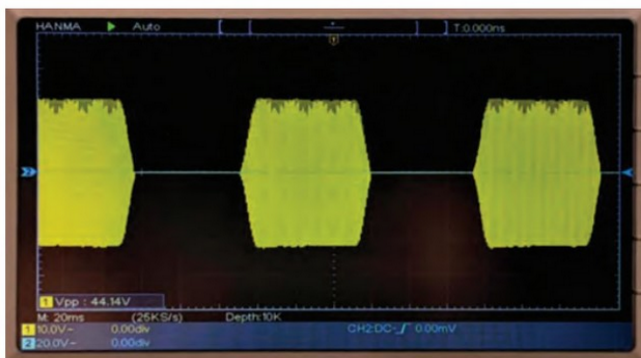
Before making measurements, I updated the firmware to the 15 February version, which was



The CW decoder in action, shown on the display.



The Radio Setting 1 menu.



The display shows a CW envelope at 20wpm.



The SWR scanner display.

the latest at the time I did the tests. I have since updated to the April version, 1.1.5. and have taken the changes into account in my text. There seem to be regular firmware updates that do bring some new features, which is nice to see.

The battery life on receive at a normal listening level was tested at just over three hours before the radio turned itself off. Transmitting shortens this considerably and an external battery would be necessary for a long portable foray. You can save a little current by reducing the backlight in the menu, running it at full brightness (10) draws 76mA more than at minimum brightness (2) on a 13.8V supply. I found 5 to be a good compromise. You can cycle round the brightness settings by pressing the 'lock' button (padlock symbol), the screen goes dark at brightness setting one but just press the button again to bring it back. Unplugging the microphone saves another 35mA or so.

Receive current on an external 13.8V supply with a fully charged battery was 410mA (brightness 5 and mic plugged in). With 10V supply this rose to 500mA. I mention the state of charge because approximately 600mA is added to the current draw if the battery is charging. You can switch off the charger in the Radio Setting 1 menu and I suggest you do this when running portable from an external battery. There is a constant drain of about 80mA whenever an external supply is connected, even when the battery is fully charged and the radio is switched off.

Transmit (Tx) power was measured on various bands and was just over 4W when set to 5W (the

maximum in battery mode) or about 9.5W when set to 10W.

Here are the power outputs measured on 160m with a 13.8V supply:

Set to 0.1W	0.12W	1.5A
Set to 1W	0.86W	1.8A
Set to 5W	4.5W	2.1A
Set to 10W	9.9W	2.6A

The transmitter is fairly free of harmonics and spurs with most bands showing second and third harmonics more than 60dB down. Strangely 10m was the worst with a second harmonic only 45dB down at 5W. Putting the ATU in circuit didn't seem to help.

I did notice that at 10W the transmitter got a bit wide, reducing this to 8W cleaned it up nicely.

The radio will transmit on the US allocations such as 3.5 to 4MHz and 7.0 to 7.3MHz, which isn't ideal but quite common. The issue for 60m operators is that the coverage is limited to 5.330 to 5.405MHz, which omits about half our UK allocated slots. It is possible to open up the transmit coverage but then it'll transmit everywhere! Googling X6100 MARS mod will reveal all but that would be at your own risk and I didn't attempt it with the review radio.

Receive

The internal speaker is very small and although the audio quality is clear it is rather thin and doesn't go very loud. A good external speaker

transforms the sound of the receiver, it then sounds nice and smooth with no distortion up to a fairly loud volume. I tested the audio output into an 8Ω load and measured just over 1W at the onset of clipping.

The receiver has a switchable pre-amplifier and attenuator, both of about 14dB, and an RF gain control. I found that if the RF gain was increased beyond about 60 (the control varies from 10 to 100) front end noise became excessive and the waterfall screen got too bright to see very much. The best compromise seemed to be to set the RF gain to 57 on all bands, which gave a sensitivity of 50μV for S9 without the pre-amplifier or attenuator. On the higher bands sensitivity is good with a 0.3μV signal easily heard with the preamp switched in and the RF gain at 57.

In general, the receiver coped adequately with large antennas except at my South Birmingham QTH where signals from the nearby Droitwich high-power medium and long wave transmitters got the better of it. Even with the attenuator in, all I could hear on Top Band was loud broadcast stations. A 5-pole high-pass filter at 1.7MHz cured the problem entirely. This may sound like a big issue but to put it into context an IC-7300 suffers similarly on my Top Band antenna! At more rural

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locations there were no issues even when listening on 40m at night.

Whilst tuning around on quiet bands I noticed quite a few spurious responses or 'birdies' on the receiver some of which would converge on each other on the waterfall as I tuned across a band. With a dummy load connected there were four such birdies on 6m, five on 10m, four on 12m, five on 15m, one on 17m and three on 20m. Below this there wasn't very much except for one at S8 on 1827.1kHz. This doesn't seem very good, for a comparison I tested my FT-817 and heard three very weak birdies on 10m and one on 15m.

The screen shows a waterfall with a span of either 100kHz or 50kHz and has adequate resolution to give a good idea of what's around you on the band. You can make it darker or lighter by adjusting 'WF Ref' in the 'Display Setting' menu. There are other settings in there for parameters of the RF and the AF spectrum display.

On SSB there are three preset audio filters (press the 'DFL' button to access) that can be adjusted slightly to either roll off the top or bottom of the response. They are 60 – 2950Hz, 300 – 2700Hz and 600 – 2400Hz. On AM you get 9kHz, 6kHz and 3kHz bandwidths, on FM 15kHz, 10kHz and 7kHz and on CW it's 500Hz, 300Hz or 150Hz. FM receive is a problem with the current firmware, the quality is very distorted whatever filter is chosen, but Tx is OK.

Under the 'DFN' button you find settings for the digital notch filter that works well but is outside the AGC loop so a strong carrier will still de-sense the receiver even when notched out. On the other page of this menu is the noise reduction that seems to work even when set to level '0' and makes everyone sound as if they are under water. It certainly does reduce the background noise but, as with many of these things, I don't find the station any easier to read with it in circuit. There is also a noise blander with width and depth settings.

Under the 'APP' button are the automatic RTTY, BPSK and CW decoder functions. I got it to work pretty well on RTTY and CW although you have to guess the speed and set the decoder accordingly. I didn't find any BPSK during my time with the rig. The tuning point is shown with a cursor on the AF spectrum display but it's very small and quite hard to see.

On this menu you will also find the 'SWR Scan' facility that sweeps across the band in use (and possibly well outside it!) at a level of about 4 watts, whatever you have the power set to. When you want to stop sweeping the band you press the 'EXIT' button and the trace disappears immediately, I think it would be more useful if it stayed on the screen so that you could study it without continuing to sweep. In view of the QRM it will cause. I suggest that this function is used sparingly if at all.

Connecting up

The X6100 has USB connections, and



The Xiegu X6100 is a true 'hand-held' HF radio.

Bluetooth and WiFi are both present in the System Menu. I managed to connect the radio to a Bluetooth speaker but I couldn't get any sound through it; I also spent a while entering information into the fiddly WiFi menu but despite the radio connecting to my WiFi I couldn't get the time to sync with any NTP server. I note that there is a greyed-out 'NTP UPDATE' button on the time setting menu so I guess more of these features will be fully implemented in future versions of firmware?

The 'DEV' USB connector is used to connect the rig to a PC for use with digital modes etc. but this can be an awkward process. One snag was that as soon as I connected the X6100 to my PC via USB, Windows 10 loaded what it considered to be the appropriate drivers for the two serial ports. You then connect via Omnirig to whatever software you choose to use, I was trying WSJT-X. Whatever I tried I couldn't get Omnirig to connect to the Xiegu, it reported 'no response' from the serial ports. Eventually I discovered that Windows had installed 'USB-Enhanced-SERIAL-A CH342' drivers and what I actually needed was just plain old 'USB-SERIAL-A CH342'. I managed to find the right driver by searching for 'CH343CDC.inf' that I found on a Chinese manufacturer's website at www.wch.cn. I had to install this by identifying the port in device manager and right-clicking to 'update driver', then going through 'browse

my computer' and selecting 'Have Disk' and navigating to the extracted 'CH343' folder containing the .inf file. Perhaps installing the correct driver before the rig was plugged in might have saved me a lot of trouble? The other quirk was that I had to point Omnirig (version 1.2 worked for me) at the second of the two serial ports rather than the first as it stated in the instructions. I used "IC7000" as the protocol in Omnirig as suggested by the instruction sheet. I am pleased to report that the audio came through straight away as the radio appeared as a 'USB audio device' automatically.

I tried the 'IQ' audio output, feeding that into the stereo line input of my PC sound card and using HSDR to demodulate the audio. It did work but suffered a lot of noise, I think a proper audio interface would be required to get the best out of it.

Interestingly when using the Omnirig control from software like HSDR you can set the radio to pretty much any frequency. I tried it on 472kHz but unsurprisingly it didn't work too well down there. I also set it to 70.1MHz where it did work but was a bit deaf, with the preamp in it took a 300µV signal to reach S9, but with an external 4m preamp it would be useable. As soon as you move the tuning control on the radio it reverts to its standard range.

The other USB-C connector is labelled 'Host' and with a suitable adaptor cable (USB-C plug to USB-A socket) will accept a keyboard that can be used for programming CW and RTTY messages and some other functions: F1 brings up Radio Setting1 menu, F2 brings up Radio Setting2 and so on in line with the buttons under the screen. Page Up and Page Down buttons change bands or you can jump straight to a band by pressing one of the number keys, 1 being 160m and 9 being 10m. Oddly, to go to 6m you press the full stop key. I couldn't figure out a way of sending CW or RTTY directly from the keyboard. You can also connect a mouse which works in some menus but not others. With the version of firmware I was running (V1.1.5) I couldn't use the mouse to change frequency, which would be useful.



You can enjoy portable operation with a whip or with a wire antenna.

Transmitting

Audio reports were generally OK although the first microphone is prone to breath noise and I found it best to talk across it rather than straight into it. It really needs a pop shield but there are many buttons on the microphone that would be obscured by the shield. I tried another microphone wired to Icom convention and the audio was better.

The built-in microphone is a little lacking in top but works OK and is a useful facility to have. It enables you to use the X6100 in 'walkie-talkie' mode with a whip aerial as the PTT button is easy to reach whilst holding the radio.

There is no choice of Tx audio bandwidth or equalisation and no speech processor. On FM there is no CTSS tone facility for working repeaters on 10 or 6m. TX audio is clean and clear. AM transmission is good with plenty of modulation.

I took the radio outside and tried it with a random length of wire. The internal ATU seemed to achieve a match except where the wire was approximately a half-wave but the added complications of counterpoise wires or earth stakes made me think that a dipole would be an easier option for a portable session. I also tried the X6100 with a loaded whip on the BNC connector and a short counterpoise for 'walkie-talkie' mode. I didn't encounter any RF feedback or other instability whilst trying it out using the internal microphone.

Back in the shack I wanted to use the linear amplifier so that I could get some critical audio reports. I found a camera AV lead that has a 4-pole 3.5mm jack plug to three phono sockets and plugged it into the ACC socket on the right-hand side of the radio. This gave access to the PTT, ALC and band-voltage connections on the three phono sockets. Unfortunately, the band voltages aren't compatible with my Icom linear so I had to manually switch bands. Xiegu sell a compatible 100W linear amplifier, the XPA125B, that can be connected via their L4001 cable.

CW can be set for a straight key or a paddle with a choice of left or right handed modes and iambic A or B. QSK time can be set between 0 and 1000ms. I found that there wasn't much point in going below 30ms as full 'between the dots' break-in is not possible. The keying shape is quite good with not much in the way of key clicks.

Xiegu band voltages as measured on the ACC connector:

160m	230mV	17m	1618mV
80m	460mV	15m	1850mV
60m	695mV	12m	2080mV
40m	925mV	10m	2310mV
30m	1155mV	6m	2540mV
20m	1387mV		

Conclusion

At considerably less than half the cost of the bigger and heavier IC-705 you are getting a great deal of functionality (although no 2m or 70cm). There are quite a lot of birdies and noises to be heard but I found the set entirely useable on crowded bands and with the addition of an external speaker and probably a better microphone it gives a good account of itself.

It'll fit in an anorak pocket if you're hiking up a hill and give you an hour or so of operating time from its internal battery.

Although at times it seems like a 'work in progress' the regular firmware updates are a welcome sign that Xiegu are listening and want to give their customers the best experience.

Most relevant of all, I enjoyed using this little radio despite its foibles and kept finding things to do with it, like chasing interference sources or just listening whilst I was out and about.

Availability

The Xiegu X6100 is available from Sinotel, who kindly provided the review sample, at £559.98. From the 'Download' link on their website at www.sinotel.co.uk you will also find new firmware releases and various documents that will help with setting up the radio.

Contest Calendar July 2022

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RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 4 Jul	80m CC CW	1900-2030	CW	3.5	RST + SN
Wed 13 Jul	80m CC SSB	1900-2030	SSB	3.5	RS + SN
Sun 17 Jul	International Low Power Contest	0900-1600	CW	3.5, 7, 14	RST + SN + TX power
Mon 18 Jul	RSGB FT4 Contest	1900-2030	FT4	3.5, 7, 14	Report + 4-character Locator
Thu 28 Jul	80m CC DATA	1900-2030	RTTY, PSK63	3.5	RST + SN
Sat 30-Sun 31 Jul	IOTA Contest	1200-1200	CW, SSB	3.5-28	RS(T) + SN + IOTA Reference

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Sat 2-Sun 3 Jul	VHF NFD	1400-1400	All	50, 70, 144, 432, 1.3G	RS(T) + SN + Locator
Sun 3 Jul	3rd 144MHz Backpackers	1100-1500	All	144	RS(T) + SN + Locator
Tue 5 Jul	144MHz UKAC	1900-2130	All	144	RS(T) + SN + Locator
Tue 5 Jul	144MHz FMAC	1800-1855	FM	144	RS + SN + Locator
Wed 6 Jul	144MHz FT8 AC	1900-2100	FT8	144	Report + 4-character Locator
Tue 12 Jul	432MHz UKAC	1900-2130	All	432	RS(T) + SN + Locator
Tue 12 Jul	432MHz FMAC	1800-1855	FM	432	RS + SN + Locator
Wed 13 Jul	432MHz FT8 AC	1900-2100	FT8	432	Report + 4-character Locator
Thu 14 Jul	50MHz UKAC	1900-2130	All	50	RS(T) + SN + Locator
Sat 16 Jul	70MHz Trophy Contest	1400-2000	All	70	RS(T) + SN + Locator + 2-letter Postcode
Tue 19 Jul	1.3GHz UKAC	1900-2130	All	1.3G	RS(T) + SN + Locator
Thu 21 Jul	70MHz UKAC	1900-2130	All	70	RS(T) + SN + Locator
Tue 26 Jul	SHF UKAC	1830-2130	All	2.3-10G	RS(T) + SN + Locator
Sat 30 Jul	4th 144MHz Backpackers	1400-1800	All	144	RS(T) + SN + Locator + 2-letter Postcode

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (Info)
Sat 1 May - Sun 2 Aug	UKSMG Summer Marathon	All	All	50	4-character Locator
Sun 10 Jul	UKuG 24/47/76GHz	0900-1700	All	24-76G	RS(T) + SN + Locator
Sat 9-Sun 10 Jul	IARU HF Championship	1200-1200	CW, SSB	1.8-28	RS(T) + ITU zone (UK = 27)
Sun 31 Jul	UKuG 5.7/10G	0600-1800	All	5.7 & 10G	RS(T) + SN + Locator
Sat 30 Jul	WAB 144MHz Low Power Phone	1400-1800	AM, FM, SSB	144	RS + SN + WAB area

For all the latest RSGB contest information and results, visit www.rsgbcc.org