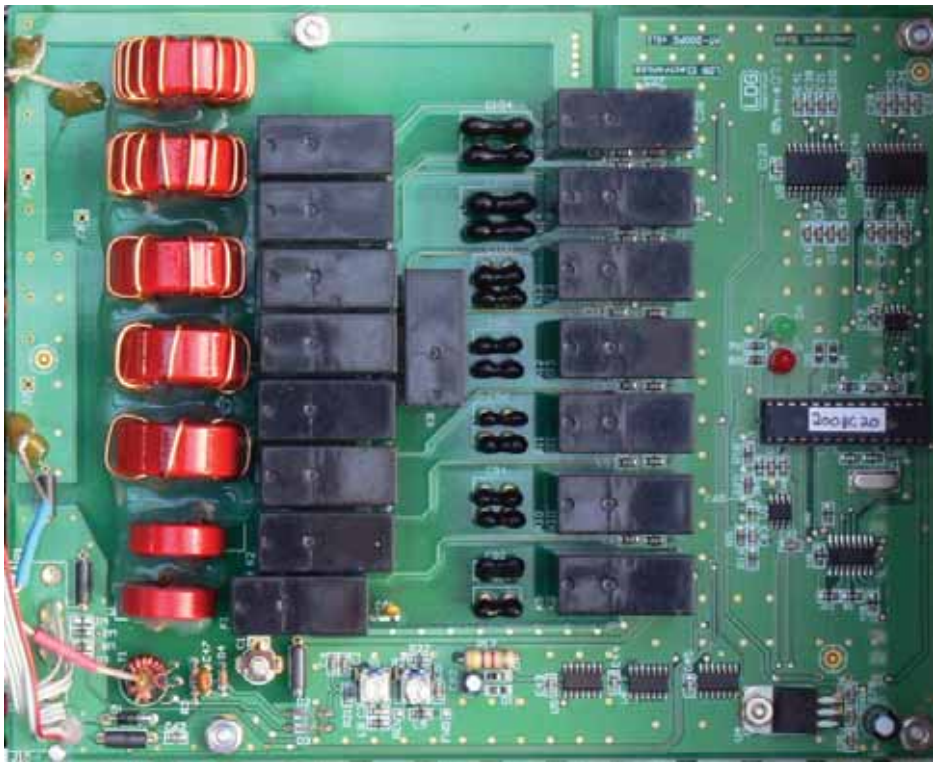
Flexradio FLEX-5000A upgrades

A second receiver and auto ATU for this SDR transceiver.

The Flex-5000A radio with the auto ATU and second receiver.



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INTRODUCTION. The Flex-5000A is a software defined radio transceiver covering the HF and 6m bands with a transmit output power of 100W. It is a high performing radio with exceptionally good close-in dynamic range and is supported by software that provides an unsurpassed and constantly growing level of features. It requires a fairly fast PC running Windows XP or Vista and a Firewire IEEE 1394 interface to communicate between the computer and the radio. The Flex-5000A was reviewed in the January 2008 edition of RadCom and since then a second receiver board has become available. The opportunity was taken to review this board together with the auto-ATU, which was not included in the original review. Both these units can be supplied factory fitted or easily added later to an existing radio.

AUTO ATU. The auto ATU is an LDG design and operates on all bands from 1.8 to 50MHz. It uses a ladder network of relay switched inductors and capacitors and claims to match up to 10:1 VSWR across the HF bands and 3:1 on 6m. A built-in microcontroller with 16000 automatic memories enables rapid tuning as the frequency is changed.

The ATU fits on top of the transmitter PA and filter board using spacing pillars, with a screening metal sheet between the two. It is simple to fit, with plug and socket connections and is fully described in the installation guide.

A full ATU tune generally took about a couple of seconds but sometimes could be rather longer and occasionally failed to find a match. In this case, a repeat tune operation usually resulted in a satisfactory match. The loss introduced by the ATU was negligible and it appeared to match well over a wide range of impedances. It is only suitable for matching coaxial cable fed antennas; don't be tempted to directly feed end-fed wire antennas as RF breakthrough problems, or worse, will invariably be experienced.

SECOND RECEIVER. The second receiver board provides a separate independent receiver, similar in design and performance to the main receiver, including a duplicate set of front-end filters. The main receiver already has the ability to receive on two separate channels and process these channels independently in stereo to the audio output. However, these two channels must lie within the baseband passband set by the audio sample rate and both channels use the same mode and filtering settings. This is fine for split frequency DX working where splits are relatively small and generally no more than 20kHz.

However, a fully independent second receiver opens up many more possibilities. It is possible to have the receivers connected to separate antennas, operating on different bands and modes and with different filtering and DSP settings. Transmission can be assigned to either receive frequency and it is even possible to receive on one band whilst transmitting on another (ie full duplex operation). A good use of this feature is to monitor 6m for short openings while using the radio for QSOs on another band. By using both the main and sub frequencies on receiver 1 together with receiver 2, three receive channels are possible with full flexible control over where these channels appear spatially across stereo headphones or with stereo speakers. The excellent panadaptor allows a band such as 6m to be monitored visually for signals, the smallest of signals being captured with relative ease.

Another use for the second receiver is SO2R contest operation – 'single operator two radios'. This technique is particularly useful for contests that use multipliers or bonus points for countries and zones such as the CQWW contests. With SO2R, whilst calling CQ on one band you can be tuning for multipliers on another band and respond rapidly to a new one. This normally requires two transceivers with well-separated antennas, sharp bandpass filters and quite a

complex switching arrangement for the key and PTT, headphone sharing, etc. The full duplex capability of the Flex-5000A allows SO2R operation with one box, simplifying the switching requirements. You still need well-separated antennas, of course, and band filters, not to mention a certain degree of experience, skill and a clear head!

The second receiver board fits on top of the main transceiver board using spacing pillars. Full instructions are given in the installation guide, no soldering is required and it is a purely mechanical operation with plug and socket connections. To obtain fully flexible antenna selection between the two receivers and transmitter it is necessary to ensure that the latest version of the RFIO board is fitted (assembly 34). The earlier version (assembly 27) is more limited in its antenna routing and does not support SO2R operation.

SOFTWARE. There are two key software packages that support and control operation of the Flex-5000A hardware – the firmware/driver software and the PowerSDR feature software. Both are updated regularly and can be freely downloaded from the FlexRadio website. Only the later versions support the second receiver board. I used my Dell laptop PC with a 1.3GHz Celeron M processor with satisfactory results at 96kHz sample rate but a faster PC is required for the higher sample rate of 192kHz. On this PC with the single receiver functioning, CPU usage averages around 45% at 96kHz sample rate and this increases to around 65% with both receivers, and over 70% with all three channels in operation. Peaks approaching 100% were frequently observed.

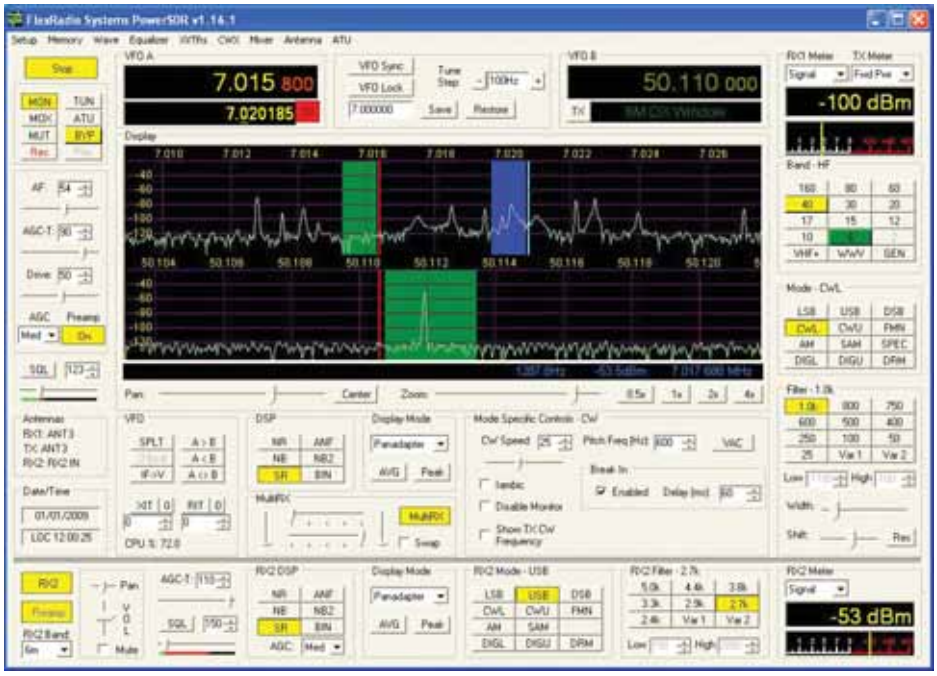
The PowerSDR operating console really looks very impressive with the dual receiver in operation. The additional controls are located on the lower part of the screen and the overall suite is well laid out and easy to use. Check out the review in the January 2008 edition of *RadCom* for more details.

For users who prefer round VFO control knobs, the Griffin PowerMate and the Contour ShuttlePro Multifunction Controller are both fully supported. These are USB-interfaced accessories.

On this occasion, I did not carry out any measurements on the performance with the second receiver fitted. The measurements in the earlier review should apply and both receivers should have similar performance.

CONCLUSIONS. The Flex-5000A with second receiver fitted is a most impressive radio and can do things that no other radio can. Some interesting new features are currently under development for the second receiver and should be available in future

Second receiver mounted on the main board. Assembly and connection is very easy.



Screen shot of the Power SDR console.

releases of the PowerSDR software. This includes various forms of diversity reception and adaptive interference elimination to enhance reception under adverse conditions. With the current exchange rate situation the prices are significantly higher than a year ago. The ATU currently retails for around £370 as a separate board, although somewhat less if purchased as part of a complete transceiver, and the second receiver board is £599. Prices include VAT.

A 2m/70cm transverter board giving 25W output power on both bands is currently under development by FlexRadio and should be available later this year. It fits inside the box and the interfaces to the other boards are already in place. The Flex-5000A is the first of a planned series of high performance SDR radios. The Flex-5000C with built-in computer is already available in the USA, but rather pricey, and two lower cost units are due for launch during 2009. The Flex-3000 will be a mid-range low profile 100W transceiver and the Flex-1500 an entry level QRP transceiver.

My thanks to Waters and Stanton PLC for the loan of the radio.