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Industrial radio, Amateur band

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The availability of modular, component level radios for the commonly used European ISM data telemetry bands is no secret, and the common applications for such devices in industrial control and telemonitoring are well known. But with current developments in RF component technology, these inexpensive modules are beginning to offer features that make them suitable for another, often ignored, area of radio application: Amateur radio communications.

Conventional, single channel, short range wideband radio modules are, it must be admitted, worlds apart from even the most elementary amateur band system, where long range performance in often hostile radio environments is essential, but the introduction by several manufacturers of lower cost narrowband, programmable multiple channel telemetry modules intended for long range industrial control has changed the situation somewhat. While these units will be limited to FM operation by their "fsk data link" ancestry (unfortunately much amateur traffic uses narrower bandwidth SSB and CW modes), such modules provide performance adequate for use in those segments of the VHF and UHF bands where channelised FM operation is the norm.

Fig 2: A 500mW multi channel VHF transceiver

The available power output levels of 100-500mW are suitable for the now-popular low power (QRP) operating discipline (or an external third-party power amplifier could be used, within the legal limits for the licence and band).

An examination of the current Amateur band allocations reveals several frequency segments close enough to existing ISM allocations that equipment designed for the one band ought to be usable with little or no modification in the other:
(see *http://hflink.com/bandplans/UK_bandplan.pdf* for full details)

70cm band	433.000 - 433.400MHz	FM repeater outputs
	433.400 - 434.600MHz	Simplex FM
	434.600 - 435.000MHz	FM repeater inputs

The 70cm band actually co-exists with the commonly used 433MHz ISM band. Modules designed for this band will only require new channel frequency programming for amateur use.

2m band :	144.5000 - 144.7940MHz	fax, RTTY and SSTV (25KHz)
	144.7940 - 144.9900MHz	Packet radio (12.5 and 25KHz)
	144.9900 - 145.1935MHz	FM repeater inputs (12.5KHz)
	145.2000 - 145.5935MHz	Simplex FM voice (etc)
	145.5935 - 145.7935MHz	FM repeater outputs
	145.200 and 145.800MHz	FM space communications

The VHF 2m band does not have an ISM equivalent, but most manufacturers of modules can provide their multiple channel VHF designs tuned to any band segment. Some already offer 144MHz versions for the popular APRS systems.

From the point of view of the Radio Amateur, a wireless telemetry module constitutes a very useful 'off the shelf' constructional building-block. It provides much of the flexibility and 'feel' of completely scratch-built equipment, while bridging the ever widening gap between what is possible with simple home-built circuits, and the functionality offered by a commercially produced set.

This is not to say that the module provides a complete solution. Compared to an off-the-shelf transceiver the constructor needs to provide quite a bit of 'hardware' to make a usable radio: casings, power supplies, user connectors, controls (which could be as little as a volume control and a channel change thumb wheel switch, or as much as a microprocessor controlled

keypad and display) and all of the analogue interface from the microphone amplifier to the speaker will be needed, but this allows the final result to be exactly customised to the user's requirement.

For the more experienced constructor, a module can provide a useful shortcut, as a frequency source, an exciter or local oscillator, or as an IF section in a larger and more complex project. They also have many uses as "limited function" radios (where it would be wasteful commit a 'full' commercial transceiver) such as packet radio nodes, specific channel monitors, beacon transmitters or direction finding receivers.

Finally, if considering a wireless module for an amateur radio application, it is well worth contacting the manufacturer's technical department. You would be surprised just how many professional RF designers either are, or were, radio amateurs and will be more than happy to offer advice and support. Good luck!

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