



70 cm SINGLE-CHANNEL FM TRANSCEIVER



This review is rather different in nature to our usual ones in that it looks closely at not just the product but also the thinking behind the product as well as suggesting the reviewer's interpretation of the product in use.

Wood & Douglas is a small company set up by three enthusiastic radio amateurs who believe that the current trend towards "black boxes" at the expense of traditional "home-brew" equipment is not necessarily in the best interests of the amateur radio hobby.

Their solution is to offer kits of high quality parts for the "electronic" side of a range of transceivers. These cover 2m and 70cm f.m. single channel, multi-channel and synthesised transmitters and receivers, and some microwave units. Their list makes very interesting reading indeed.

We decided to review the 70cm single channel f.m. transceiver module in its most basic form, pushing out a nominal 500mW.

In order to keep the costs of their "kits" as low as possible, Wood & Douglas only supply those components actually mounted on the p.c.b.s and leave the constructor to find the controls, crystals and casework himself. This also allows the builder some degree of flexibility in what he can use, and of course if he is a "biscuit-tin" man then he can give full vent to his ideas.

The 70cm transceiver is, in fact, a two-board project, one p.c.b. being the receiver and the other the transmitter. Automatic r.f. switching is carried out by p.i.n. diodes on the receiver board. Each board "kit" is supplied in a plastic bag and full constructional and alignment instructions are supplied.

The components were all of first class quality and it was interesting to note that the instructions also contained a component check list which informed the builder of any changes or substitutions from the types shown. This is very welcome since most of the technical queries received about *PW* projects are as a direct result of component substitutions leaving the reader in doubt. Also in the instructions was a list of the minimum extra components required to complete the transceiver.

The two boards were completed with no problems at all and after a thorough visual inspection a pair of PF1 crystals for RB14 were inserted. Power was applied to the receiver board first and no problems were encountered in aligning this using GB3SD at Weymouth.

The transmitter board proved a bit more troublesome. There was not enough adjustment using the frequency adjust preset to net the crystal onto SD's input frequency. Also the power output was rather lower than the 500mW minimum expected. The board was rechecked and the alignment instructions followed exactly, but still not much output and still off frequency. A study of the circuit diagram showed that the p.a. was driven via a loose coupling of two air-spaced coils and these were indicated by an arrowed coupling line on the circuit. A slight bending of these two coils to bring them closer together resulted in the output power leaping up to around 800mW at 13.8V. This left the frequency adjustment problem. A check in the various catalogues showed that the varicap diode used for tuning the transmitter was in fact at maximum capacitance with the frequency set control at maximum travel. Fortunately there were two pads on the p.c.b. in parallel with the varicap and the circuit showed a capacitor in this position. The components check list however merely stated "if required to net crystal." In the end I opted for an extra 10pF and this did the trick. Once aligned the transceiver proved to be quite stable.

The actual manner in which the two boards are used to form a usable transceiver is left to the builder himself. The instructions do give some outline instructions on mounting the boards but these are only very sketchy. On their stand at Ally Pally in May, Wood & Douglas showed *several different* ideas for using these boards and this indicated the many different ideas that amateurs have on how to build projects of this nature.

With the upsurge in interest in 70cm, particularly the repeater network, it was decided to use the Wood & Douglas boards to build a simple, low-cost, 70cm "local repeater worker."

The two boards were mounted onto an aluminium plate

as suggested in the instructions and this unit was then fitted into a Verobox (65-2066-A) with the controls mounted on the aluminium front panel. The p.t.t. switch was also mounted on the front allowing the use of a simple cheap microphone. This switch also changes the small meter from "S" meter to battery voltage monitor on transmit. A small 8Ω loudspeaker was fitted into the top of the Verobox.

Power is provided by two 6V NiCad battery packs which fit neatly into the case alongside the transmitter board.

Wiring follows the layout given in the Wood & Douglas instructions and the only essential remaining to be fitted is the toneburst unit, the repeater having to be whistled up at present. Wood & Douglas can supply a kit for the toneburst.

The performance of the complete "local repeater worker" is good. The transmitter side works exceedingly well, pushing 800mW up to the aerial on 13.8V. The audio is reported to be bassy with the microphone currently being used and the only other microphone tried so far (a rather expensive unit) has not proved to be at all well matched. The audio gain can be varied simply, using a preset control on the transmitter board, as can the deviation.

The receiver is adequate if a trifle hissy. The hiss can be reduced simply by putting a suitable capacitor across the output of the CA3089E. A 22nF capacitor was used as a larger value reduced the audio output too much. Keeping in mind the fact that the repeater is some 35 miles away from the reviewer's QTH the performance is good.

The kit constitutes a good low-cost means of getting started on 70cm f.m. Various r.f. amplifiers are available to boost the output if required for, say, mobile use as well as several interesting and useful modules designed to improve the project.

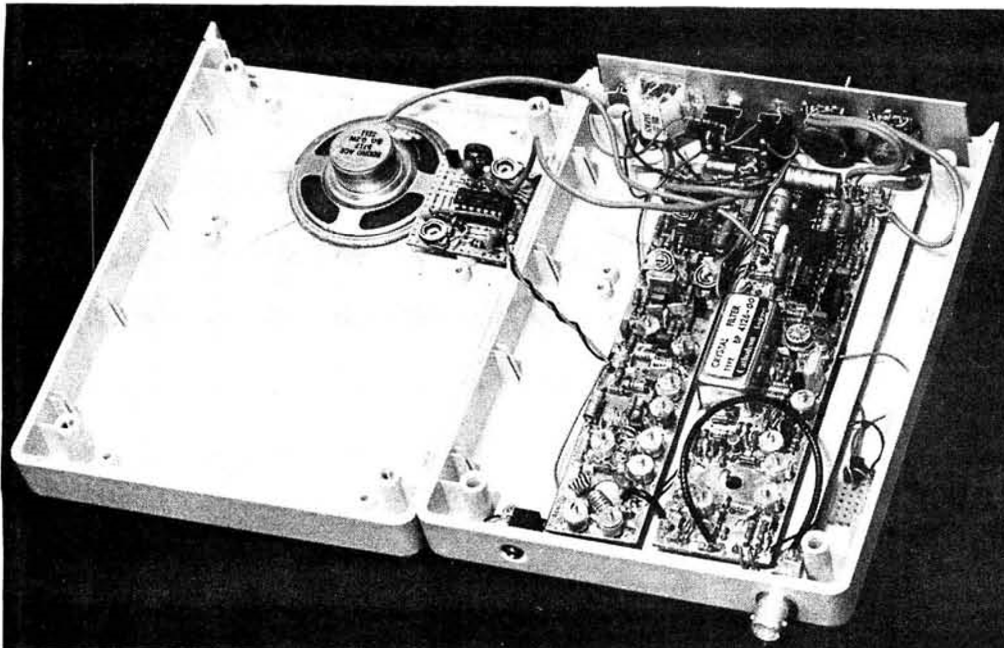
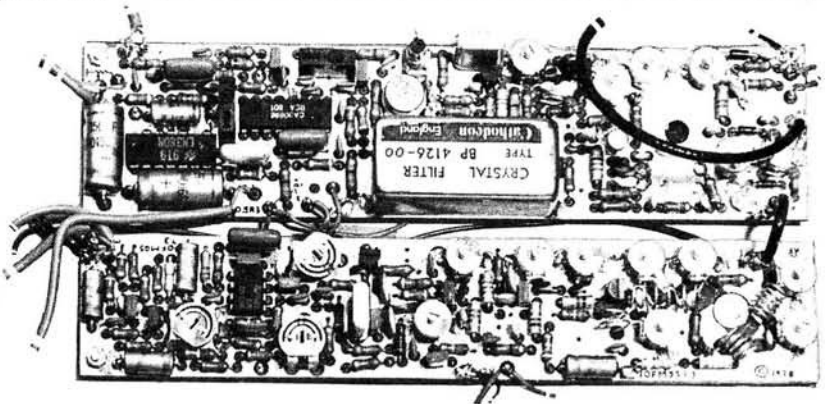
For those who do not feel up to putting the kits together, Wood & Douglas can supply ready built units. Again these do not include crystals or external controls and boxes, and the constructor should be prepared to spend another £10 or so on these.

Prices

The basic kit for the 70cm f.m. transceiver costs £48.10 inc. VAT. A toneburst kit costs £2.81. Post and packing is 50p. From **Wood & Douglas, 9 Hillcrest, Tadley, Basingstoke, Hants RG26 6JB. Tel: Tadley 5324.**

★ specifications

RECEIVER	
Type:	Single channel, single conversion superhet
Sensitivity:	0.5µV for 12dB SINAD (typ) at 5kHz deviation and 1kHz modulation
Intermediate frequency:	10.7MHz at 30kHz bandwidth
Crystal:	84MHz range as used in PF1
Audio output:	1W into 8Ω
Power:	12V 60 to 70mA at low volume
Size:	38 x 154 x 19mm
TRANSMITTER	
RF output:	500mW nominal into 50Ω
RF switching:	By p.i.n. diodes on the Rx board
Spectrum:	Spurious outputs >40dB down on 500mW
Microphone:	2.5mV basic sensitivity
Input impedance:	100kΩ adjustable
Crystal:	12MHz range as used in PF1
AF stage:	Includes limiter and low-pass filter
Power:	12V 160mA (crystal oscillator stabilised down to 10.5V)
Size:	31 x 154 x 14mm (PA transistor stud is 15mm below p.c.b. but may be carefully sawn off)



The two p.c.b.s forming the Wood & Douglas 70cm single channel transceiver. The receiver board is the top one. Although both boards are tightly packed with components, and double-sided, no problems were found during assembly

The transceiver fits neatly into a medium size Verobox to form a useful "local repeater worker" at reasonable cost. The Ni-Cads have yet to fitted