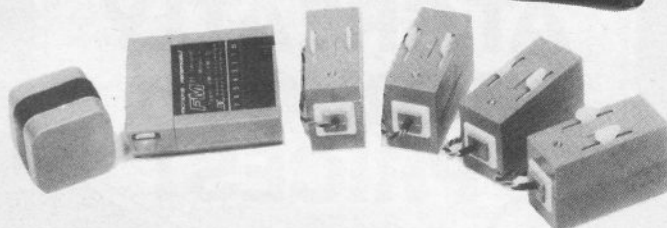


sprengbrook
variomodul



REPORT By REX BOYER



THE name of Harry Brooks first became well-known in R/C when he was co-winner of the 1962 World R/C Championships with Tom Brett which gives an idea of the long involvement with R/C modelling that the Brook part of Sprengbrook has enjoyed.

After the Corsican based World Championship success in 1965 when Digital R/C really became established and with it the partnership of Doug Spreng and Harry Brooks – so the now familiar name of *Sprengbrook* evolved. First equipment to bear the name of the new company was totally British made, and a very successful range of systems it was; indeed many examples are still to be seen on flying fields to this day.

In recent years, the line has been developed as a joint venture between *Sprengbrook* and *Brand Electronik* of West Germany.

The latest system to be offered is in fact the first FM system to be tested by RCM&E. In case you are wondering what FM is, and what it does for you – in a nutshell, it is another way of modulating the 27MHz RF carrier from the more usual, until now, Amplitude Modulation. FM is short for Frequency Modulation; it is the same method used by the BBC, etc. for FM broadcast stations on the VHF band.

The FM system has certain technical advantages over the AM (Amplitude Modulation) in that it is theoretically less affected by random interference, because the 27MHz RF carrier frequency is never switched off as it is in the AM system. Its basic frequency is changed, or as the boffins say, 'shifted' by some 3kHz to permit a different RF frequency. This is detected in the receiver by a piece of circuitry known as a discriminator which, as the name implies, discriminates between the basic 27MHz signal and the shifted signal. In so doing it converts this difference usually into a DC voltage difference which can then easily be corrected into logic levels for decoding for servo drive pulses.

We were extremely impressed with the Tx, the injection moulded case being very well made and finished in a mock leather finish black plastic which splits into a front and back section. There is only one screw visible – that for the adjustable ball joint socket into which the Tx aerial fits. Any

user can thus adjust the aerial angle to his liking.

The stick assemblies, masterpieces of plastic engineering, give the equivalent of open gimbal operation whilst retaining closely fitting half spheres which cover up the usual unsightly holes essential with the open gimbal type of stick assemblies. There is not the slightest sign of free play or give in the sticks which are also easily adjustable for tension and length by means of screws.

Trim controls are electrical and are flush mounted through the front panel. Movement is achieved by rolling the large knurled knobs with fingers or thumbs whichever method is to your taste. Rotationally these trims have some 250° of movement which tends to make them rather fine in action; we feel less movement with more electrical effect would be beneficial as some 25° of movement of the knob is required before the servo runs.

The on/off switch is clearly marked both in German and English. As to its position – other makers take note – and indeed that of the meters. Yes, in the plural – they indicate both battery voltage and RF output.

The battery voltage meter is a little confusing however, as the needle indicates two scales, one black on green, the other green on black. These different scales can be used to monitor transmitter voltage or receiver voltage via an extension lead, both on and off load.

Auxiliary controls, of which there are 3, are controlled by a switch on the top right hand corner of the case and 2 proportional channels controlled in the same manner as primary function trims.

A second, spring loaded switch, adjacent to the aerial socket is for 'Buddy Box' operation.

Looking at the back of the Tx we find a 'plug in' section marked *Variomodul*, which in fact is the complete RF section of the Tx. It is cleverly designed with spring loaded side edges which lock it in place. Access to the XTAL is via this module, not all that easy to change and *not* a standard XTAL, in fact it is marked at half the transmitted frequency which suggests a doubler/modulator in the RF section.

The 'module' concept allows the user to change the band on which the equipment operates. Modules are available for 27, 32, 35, 40, 53 and 72MHz. With the exception of the 72MHz band all modules feature a plug in crystal facility. Thus it is possible for the Variomodul owner to use his equipment anywhere in the world by purchasing the appropriate modules.

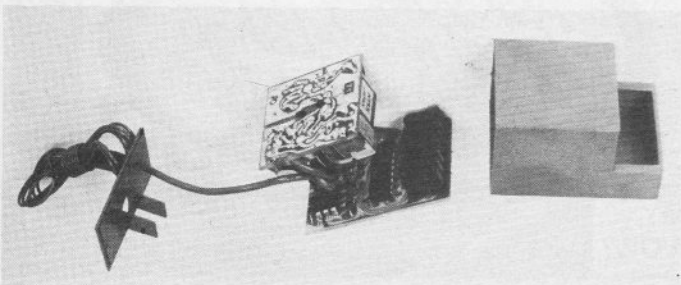
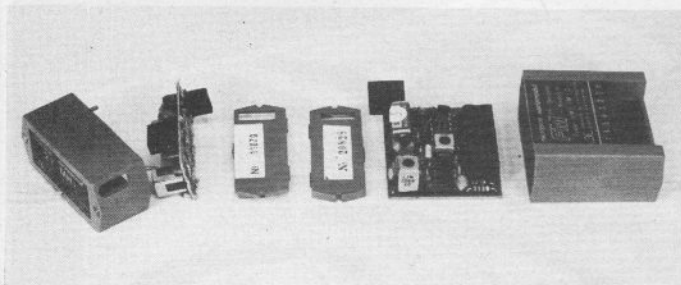
All in all a very well engineered piece of equipment.

The Rx also has been well thought out. The red plastic case which is held together with captive screws (a nice touch) has the now popular integral sockets for servo/battery plugs but still requires a pull on the wires before enough of the sockets are revealed to allow safe removal. XTAL changes are relatively easy and the 'Noble' switch harness incorporates a charging socket for external fitting to the model. The Rx battery pack is a cube in shape and contains the now familiar Sprengbrook short pencil type Ni-Cads. We are advised by Sprengbrook that 3 different types are available of 450, 500 and 550mAh capacity.

Tx Technical

Again we see a 'new' circuit from the all too familiar half shots. This one contains a NE 566 timer chip as the master clock generator, feeding into a SN74L164 shift register which clocks round the control pots in turn to give the 7 control pulses. In addition to the 2 IC's there are 4 transistors

Left above; receiver case dismantled to reveal the works! To the left is the plug-in module, the module case end (labelled No. 11070) has a connector plug projecting which plugs into the de-coder section. Below left; Sprengbrook unveiled a new Mini FM Rx at Sandown not of the modular type but features almost identical circuitry achieved by using new smaller IC chips.



and 8 preset pots. Incidentally, the control pots are in the variable resistor mode which would be expected using the NE 566.

All the logic generation is on one board and all connections to the board are made via a multi-contact in-line connector.

The RF module which, as stated earlier, is separately contained in a sealed unit, which should deter those addicted to twiddling. However, we managed to dismantle the test set module to reveal no less than 4 transistors, 5 coils and 3 preset pots. We were able to establish that the oscillator basic frequency is half the transmitter frequency. Modulation would appear to be via a varicap diode connected to one side of the XTAL. Transmitter power is supplied from 1.2Ah Ni-Cads which provide a claimed 8 hours of operation.

Receiver

The Rx is entirely different to any other circuit we have yet seen, as it operates on different principles. Full use has been made of up-to-date technology in that all the RF and logic circuits are IC's only one discrete transistor is used.

The PCB is in two parts - the first small board contains the aerial input circuitry and the XTAL oscillator stage, the semi-conductors for which are contained in a SO42P 14 pin Siemens IC. The output of this board is fed via a plug and socket to the main board. The signal level is at IF frequency a normal 455kHz into a NTKK ceramic filter in place of the more widely used IF transformers. In conjunction with this filter is an IC the type number of which is obscured, and a TAA 685 6 pin IC. Two coils are also used as are a handful of components. The decoding action is via a 4015 CMOS 8 bit shift register.

We would have liked a circuit in order to give better technical description but this was not forthcoming.

Servos

Two types of servo were presented with the system. The rotary output type as reviewed in the *Servo Test Report* (see RCM&E May 1978) and the slightly larger linear version - both types have been about for some time and we feel the system would be improved with a more up-to-date servo package. Incidentally, the IC amplifiers in both servos are the Texas type SN 28604, the same type as those fitted to the servo covered in the *Servo Test Report*.

General

The overall presentation of the system is a little strange in that the Tx comes beautifully boxed in polystyrene; the Rx, servos, battery, etc., were separately packed which we understand is common practice with West German systems. The charger comes with *Wanda* plug outputs at 2V, 4.8V and 12V. Polarity of the charger outputs is colour coded and it would be quite possible for the less experienced or colour blind to reverse charge both Tx and Rx batteries.

Text figures

Tx timings - all in milliseconds.

Channel	Min.	Neutral	Max.	Trim	Function
1	1.2	—	2.8	+ .15m/s	Throttle
2	1.2	1.75	2.8	± .15m/s	Aileron
3	1.25	1.8	2.8	± .15m/s	Elevator
4	1.25	1.8	2.8	± .15m/s	Rudder
5	1.1	—	2.8	—	Retract Switch
6	1.15	—	2.85	—	Auxilliary 1
7	1.15	—	2.85	—	Auxilliary 2

Frame Rate 28m/s - 36 FPS
 Frequency deviation - 3kHz
 Power supply 9.6V Ni-Cads

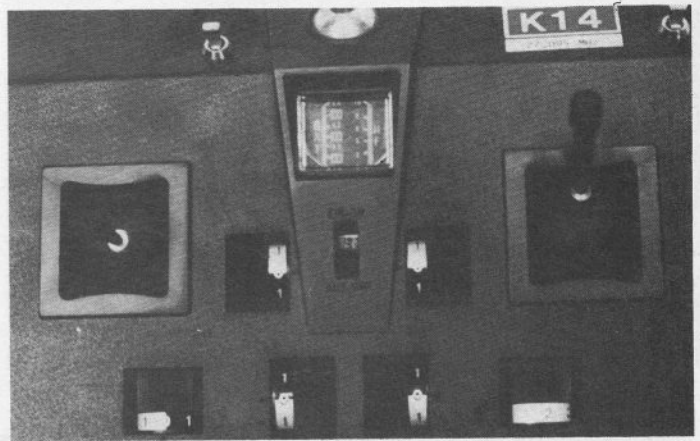
Servo

Load in oz./in.	Times actual in secs		±35°	
	Against load	With load	Against load	With load
0	.4	.38	.341	.33
2	.4	.375	.383	.319
4	.475	.362	.405	.308
8	.55	.35	.469	.298
12	.575+.175	.35	.490+.149	.298
16	.65+.35	.35	.553+.298	.298

Just stalled load 27 oz./in. Total travel 88°
 1 ms=41°
 2 ms=47°
 Amplifier Texas SN 28604
 Gearbox Motor 10T-38T 10T-38T 10T-38T 10T-38T
 Overall ratio 208:1
 Motor type 16 mm unmarked

Distributor

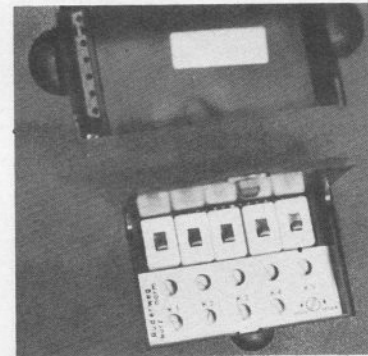
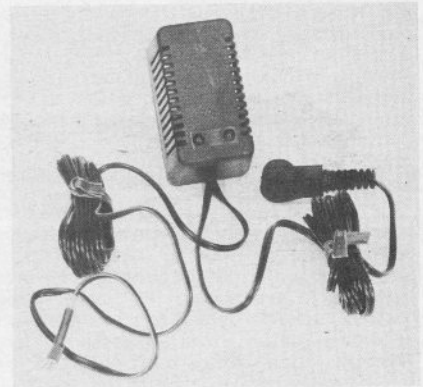
Sprengbrook Precision (Brighton) Ltd.,
 15A Victoria Road, Portslade, Sussex.
 Price: £299.50 inc. VAT. Neckstrap and frame opt. extra £6.50.



Above; clearly marked ON/OFF switch on Variomodul Tx. Tx stick lengths are adjustable via socket grub-screws in the stick knob ends. Right; The De Luxe charger. A fine charger for the expert.



Right; basic charger has permanently attached output leads which make it impossible for the inexperienced to plug in to charge with the polarity reversed. Some form of Polarisation would benefit the De Luxe charger outputs. We understand the manufacturer is attempting to rectify this fault.



Left; Variomodul Professional system (not reviewed here) features variable rate switches, servo reversal at the flick of a switch, plus variable throw. All these adjustments are made through controls sited beneath a hinged access panel on the rear of the Tx.

Right; high quality components and attention to detail are the hallmarks of Variomodul. This view is of the inside of the Professional series Tx with RF module in place. PCB plugs in via a multi-pin connector.

