



REPORT

Rex Boyer tests

Right: as always, these Futaba outfits are supplied with a comprehensive range of accessories including servo mounts, all leads charger etc.

Futaba FP-7MAG

FOR SEVERAL YEARS NOW, the *Futaba* 'M' series of R/C systems has been one of the most popular R/C outfits available to UK R/C modellers. First produced in 27MHz AM form, then followed by an FM version in 27MHz form and finally by a 35MHz version of the FM system. In parallel with the evolution of the 'M' series, *Futaba* started to develop a new range of systems known as 'J' series. These top of the range outfits departed from previously established *Futaba* practice in their use of a 1.5 millisecond neutral pulse length, and a newly developed three pin connector for servo and power pack use.

Following on from the 'J' series, *Futaba* have reappraised their entire range of R/C equipment and reflecting the Japanese fad for continual novelty, have now introduced replacement ranges for all price bands in their range.

The new 'M' series range includes five systems, the FP-7 MAG is the top of the line aircraft system and is complemented by a specialist helicopter system, FP-7MHG, a general purpose seven function FP-7M plus four and five function systems. All systems are on the 35MHz band, and are FM. Styling is as unmistakably Japanese as the double 'U' folded cases for so long favoured by US manufacturers, and although apparently 'fussy' in its surface treatment, is undoubtedly one of the most comfortable transmitters to hold and use yet produced by *Futaba*.

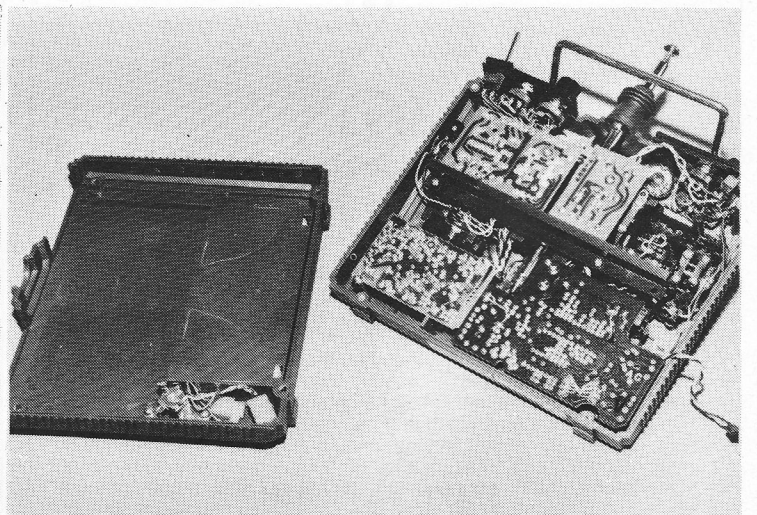
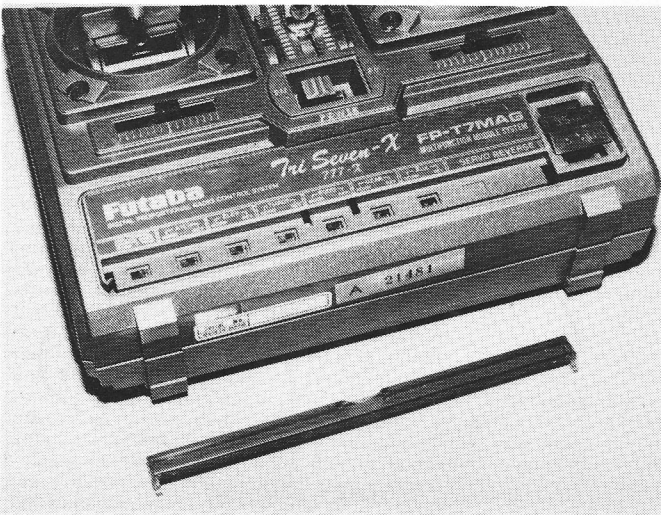
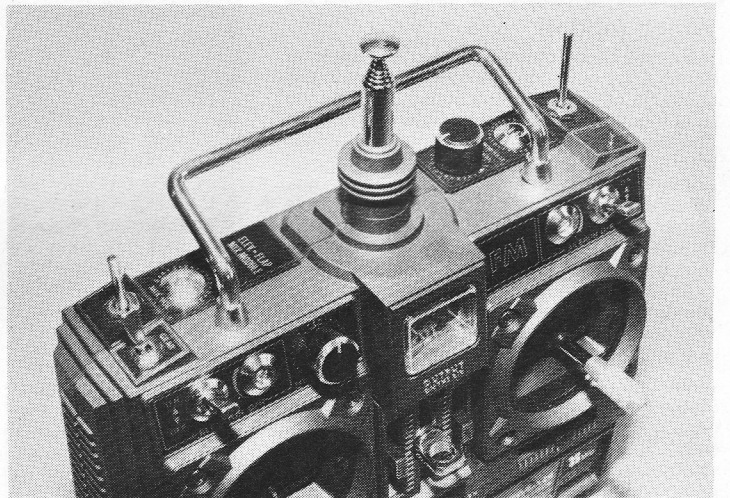
The layout of the system is well balanced and functional, all adjustments for all features are accessible without removing the transmitter back, while those which only need to be changed during initial R/C installation are

suitably covered against accidental movement. The system is supplied with a whole galaxy of extras such as servo trays, additional output arms/discs, neck strap, servo extension cables, all that we have come to expect from *Futaba*. The instruction book is a particularly fine piece of work, but aimed, we felt, more at selling the set than actually describing any particular function in detail. We also felt the 'quaint' English of some of the wording left something to be desired. If only the UK distributors could be allowed to vet the proofs of the manual for this sort of thing *before* the full scale production starts.

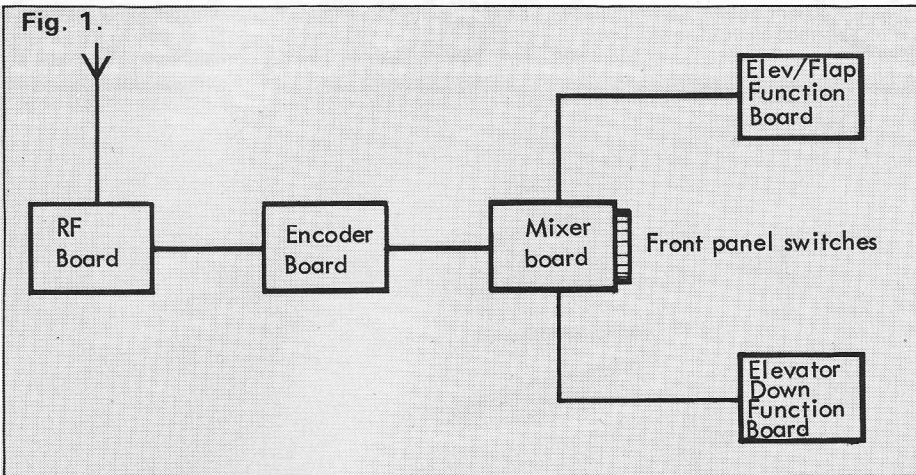
Right: rates, mixers and associated switches, knobs etc., all conveniently placed, fill the top of the transmitter. Below left: removal of dust cover exposes reverse switches. Below right: case back removed to reveal complex circuitry and interwiring, all neatly put together.



The system under review incorporates the basic four functions. The dust protected dual open gimbal stick units with electronic trims with ratchet arms, feature adjustable stick length, and a very neat and positive stick-spring tension adjustment. As with most such systems, it is next to impossible for the purchaser to alter the stick mode, and prospective buyers should make certain that the system supplied is of the correct mode. An array of several clearly marked slide switches protected by a snap-on cover provides servo reverse facility on six functions plus a coarse/fine setting on the flap/auxiliary trim control.



the Futaba FP-7MAG



A large, clear centrally placed meter is labelled 'Battery' but, in fact, appears to be an RF indicator as it does not give any reading with the crystal removed. Crystal socket is in the fascia of the transmitter, and whilst there is no external indication as to the frequency, the crystal is numbered. Beneath the meter, a very bright LED indicates when the transmitter is on, and flashes when the mixer function is operated.

Dual rates are fitted to both elevator and aileron. Adjustment requires a small screwdriver, but the enabling switches are ready to hand. Fifth function is a two position switch labelled 'gear.'

Two mixers are fitted, firstly a straightforward elevator/flap mixer to enable coupled flaps and elevators to be used for aerobatics, secondly an elevator down/mix unit, which enables the user to pre-programme the desired amount of down elevator to be switched in, as flaps are depressed. Flap movement can be tailored exactly to suit the characteristics of the model in the coupled mode, as throw either side of neutral can be individually adjusted. What a pity that the instruction book does not provide examples of actual use as found in the leaflets supplied with £5 pocket calculators!

Turning to the airborne side of the system, we find the same degree of styling and work-

manship as in the transmitter. The receiver is all new and has seven channels. On the system tested, six were effective (see technical review). We were pleased to see the retention of the very flexible harness wire. The on/off switch is of standard *Futaba* type with the charging lead incorporated.

Servos as supplied with the review set were the FP-S128 series, a general purpose middle of the road unit with adequate power for most applications, featuring a rotary output. The instruction manual quotes the FP126 servo as being supplied; a bit confusing!

Last, but most important, the airborne battery pack, a 500mAH pack made up of four AA size cells type No. NR-4J held together by a slip on plastic sleeve affording very little protection from other sharp objects or a crash. Surely after all the effort taken with the rest of the injection moulding in the system, a tough plastic case for the battery would not come amiss.

Overall, a well-styled and finished piece of equipment, well up to the *Futaba* name.

Technical-transmitter

Removal of the back of the transmitter reveals one of the most complicated interiors we have seen. There are no less than five

separate PC boards holding the various functions of the system.

Starting at the 'hot' or RF end, we find the commonplace half frequency crystal oscillator modulated by a varicap diode, a frequency doubler and power output stages. Two trimpots are fitted to the PC board which also contain four coils all in metal cases. Strangely, the bracket which holds the base of the aerial is not fitted to the RF board but to the adjacent encoder board and is connected by a short lead.

Very odd when you examine the rest of the circuitry and see the amount of RF decoupling fitted. All the PC boards are hand wired together.

Next in line is the encoder board, this is fitted with an HA16607A IC, a 22 pin 'special' made to perform the encoding function and one of several now available to manufacturers of R/C gear. Gone are the days of using standard logic chips and modified circuitry to suit. This chip, in fact, provides eight channels all of which are transmitted. In the case of the FP-7 MAG, channel seven was a duplicate of another channel and channel eight was of fixed length. In addition, this PC board carries an HD14051B chip. Two transistors and a multitude of RF decoupling capacitors, a few other components and three trim pots.

The third PC board, which contains the servo reversing switches and also acts as the interface between the 'add on' modules and the encoder board, contains two ICs, seven tiny switches and the now familiar multitude of decoupling capacitors.

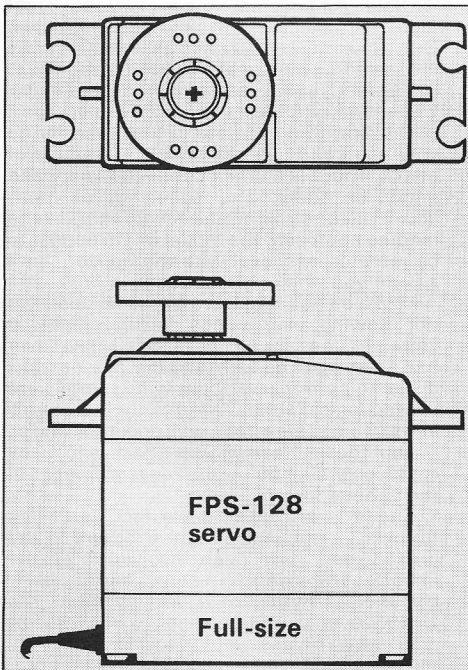
The remaining two PC boards are extra facility units, one contains a single eight pin IC, the other, one, 14 pin IC, two transistors — and of course, lots of decoupling capacitors!

Needless to say, the interconnecting wiring of all these PC boards is extensive, wires very neatly going everywhere, a wireman's nightmare. All extremely labour intensive, this must be a costly transmitter to build. Unlike some of the multi-mode transmitters we have examined, the wiring is neat, tidy, and well tied down.

Receiver

Here again, we see new developments, the front end of the receiver is of familiar discrete

Continued on page 575



Servo and transmitter data

Transmitter timings

Channel No.	Min.	Centre,	Max.	Function
1	1.18	1.52	1.91	RH stick
2	1.11	1.51	1.91	RH stick
3	1.0	—	1.82	LH stick
4	1.18	1.53	1.92	LH stick
5	1.00	—	2.04	LH Sw 'Gear'
6		1.00 to 1.5 or 1.5 to two variable		Top RH SW/ Knob
7		FIXED 1.5		
8		FIXED 1.5		

Power supply 8 x 500 mA AH AA size in plastic pack.
9.6v NOMINAL. Charging socket on rear bottom right.

Servo performance

Servo rotation $\pm 36^\circ$ (very linear)
Trim range $\pm 14^\circ$ (about normal)
Rotary output. Disc with numerous holes on spined output shaft.

Load	Against Load oz/in.	With Load oz/in.	Remarks
0	23	.22	
2	23	.22	
4	25	.20	
8	29	.19	
12	34	.18	3% 06 to set
16	41	.175	4% 12 to set

Servo just beginning to pull out of saturation at 12-16oz. in. Also at 16oz. in 3° total undershoot. Quite a good performance well above average for its price range.
Maximum torque: 22oz./in. or, 3lb 5oz at $\frac{3}{8}$ in. radius.

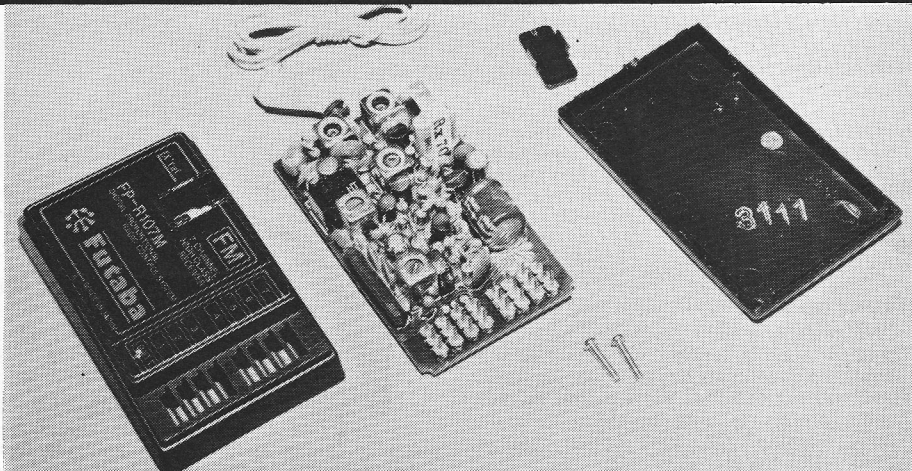
Continued from page 569

circuitry. A standard *Murata* IF crystal filter is used, but the intermediate frequency IC is a *Sharp* IR3203. The first time we have seen this particular IC used in R/C work, although it is becoming available in the FM radio (broadcast) world in several areas. There is an additional crystal filter fitted at what would appear the other end of the IF IC as well as seven transistors and a host of discrete components. Certainly no attempt has been made at cutting down the component count. The decoding of the AF signal is done by a flat pack style IC mounted directly on the PC board (which incidentally is double sided). The supply rails to this chip are decoupled by a hefty 470 μ f capacitor, this component incidentally is even mentioned in the instruction manual, as a feature! (More an admission of defeat I feel). Output to the servo is via the J series gold plated male pins separated by slots in the receiver top case.

We found the removal of the receiver crystal hazardous to fingernails.

Servo

Type FP-128, as stated, purely a middle of the road, general purpose medium sized servo with a plain output bush and unsealed case. Fitted with two ICs, the PC board is a double-sided unit with 'thin-film' style components fitted to the bottom of the board and the IC plus three capacitors fitted to the top. The motor is an 18mm unit, unmarked. The gear train is of plastic and has four stages. It is interesting to note that the screws holding the case together are of the type used on an automatic assembly machine and inserted by pressure rather than by turning.



Test results

No certificate of test or test results for the SMAE/MHTF type approval were submitted with the equipment, but it does carry a type approval certificate and our own tests showed the system to be within limits. We were not over-impressed by the AM rejection of the system, but it was comparable with contemporary systems.

Transmitter timing

All timing in Milliseconds.

Transmitter: Futaba FP-T7MAG Serial No. 12004005.

Tested on: Channel 70 35.100MHz.

Transmitter: eight channels (six active).

Frame rate: 22ms fixed.

Above: receiver circuit board bared - note that the PCB mounted pins are not polarised, this function is performed by shaped slots in the case top. Neat plastic cover protects and supports crystal.

Charger

Standard Futaba single/dual unit supplied with 1 metre of very heavy duty mains lead, to BS specification.

Conclusion

Yet another 'good buy' from Futaba, a worthy successor to the original 'M' series, of excellent quality throughout. Presentation and attention to detail are first class, this system can only enhance Futaba's enviable reputation.