

## R.C.M.&amp;E. TEST REPORT

**FLIGHT LINK  
SERIES 4**

SINCE its introduction during 1970, the Flight Link 4 system has achieved considerable popularity. The Series 4, however, is only a partially new system, repackaged and redesigned only to a limited extent, and so this report will concern primarily the changes which have been introduced since the Series 3 system. A full test report on the Series 3 appeared in our September, 1969 edition, and since the mode of the circuit remains unaltered, a full technical explanation of this unique R/C system can be found there.

### Transmitter

Virtually all changes which have taken place since our last Flight Link test concern the transmitter, where the rearrangement has been quite drastic as can be seen. The result of this is to produce the smallest full house propo. transmitter we have ever seen, with a case size just  $7\frac{1}{2} \times 4\frac{3}{8} \times 2\frac{1}{8}$  in. The case is arranged as a one-piece sturdy moulding with stepped sides and top to produce an effect which, seeing it for the first time, most people identify with a modern transistor sound broadcast

receiver. Certainly there is a superficial resemblance! The case has a two-tone finish, silver-grey on the rear half, matt black on the front part, while the Tx. front face is a metal sheet, complimenting the silver-grey of the Tx. rear half to produce a very handsome effect. In fact, the whole appearance tends to grow on you, the more you eye it.

Handling the transmitter for the first time, it is deceptively heavy, a sure sign that the case is sturdy. This weight, together with the appearance, gives one the impression of picking up not just a transmitter, but a well-protected test instrument. If this effect was deliberate, then it was certainly not lost on us.

Flight Link continue to offer a choice unavailable with other British proportional R/C systems—single or dual stick arrangements, the single triple axis stick unit featuring rudder control from a twist knob atop the main stick unit. The set supplied for test featured dual axis stick units, which, like the triple axis units, are all-new Flight Link designs.

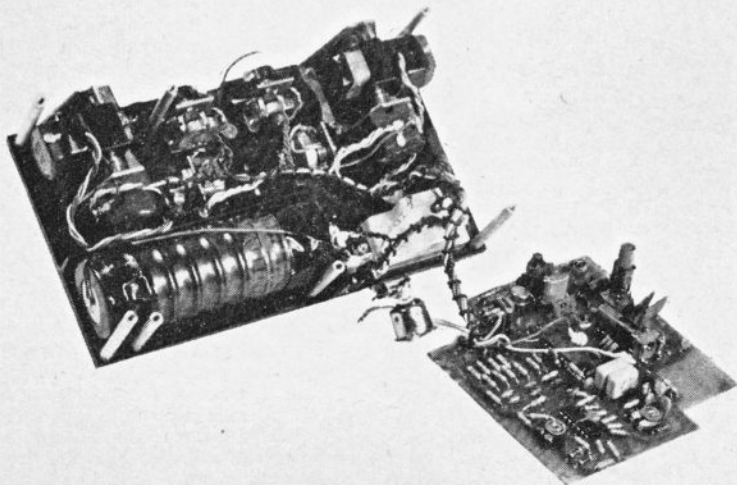
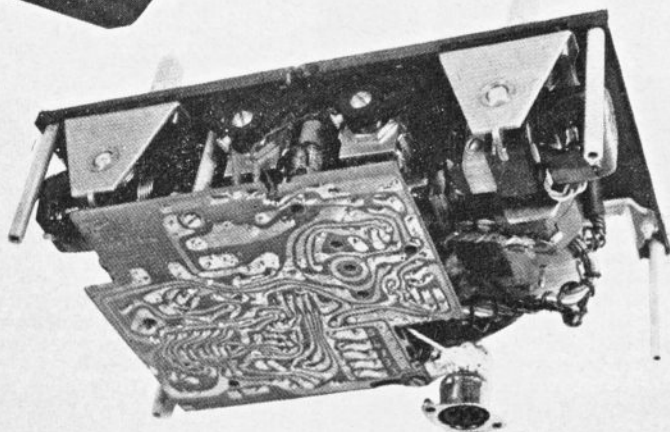
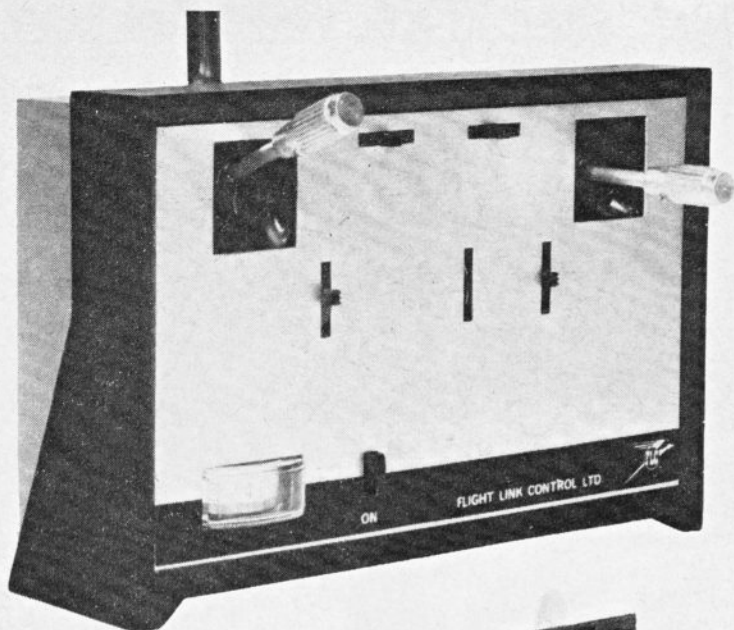
The dual axis sticks are adjustable in length and provide a very good control action, unimpaired by the rubber membranes which seal the control column wells against ingress of dust, moisture and other foreign bodies.

Handling the transmitter and operating the sticks is very comfortable, hands and fingers easily supporting the box, with the aid of the step in the case. Trim controls are very smooth, elevator and throttle trims being easily accessible and while thumbs have to stretch a little further for rudder and aileron trims, this is not as uncomfortable as might at first be envisaged.

Final touches to the front face effect are the edgewise output meter and on/off switch set on to the face bottom left, with the maker's nameplate.

Access to the 'works' is achieved by first removing four retainer screws from the case back face. This allows the front face assembly to be extracted from the case complete with electronics and various mechanics as a single module.

Extraction of this module reveals immediately that the metal



front face plate is backed by a moulded tray which acts as a mounting frame for the stick boards, trim controls, circuit board, power pack, etc. The power pack, incidentally, is a 12v. DEAC, and here we note another change from the Series 3 which had a 15v. pack. Since the transmitter is so small, it is no surprise to find the internals to be a very tight fit. In fact, as an example of space utilisation, it is an interesting exercise. Consequently, the components on the P.C. board are quite tightly packed, at least for an R/C transmitter.

Circuit changes in the transmitter do not affect the *mode* of operation, the circuit, in spite of rearrangements dictated by the repackaging doing the same job as the Series 3. One change, however, is the employment of an entirely new R.F. stage with tuned output stage. In addition, the tone generating system (the signal information generating part of the circuit) now uses integrated circuits, while still retaining zener diode stabilisation which was a feature of the earlier F.L.C. set.

In all, the transmitter is obviously the result of a concentrated 'think' session, small extra commendable points being the neat and tidy arrangement of fly-leads inside the case with soldered joints to these supported against fracture, plus careful attention to detail, right down to the grounded neck strap connector.

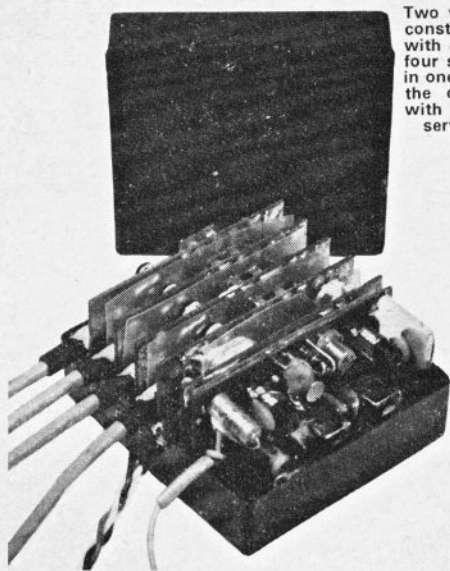
The same transmitter layout incidentally, now applies to F.L.C.'s *Launch Link* marine R/C systems and all F.L.C. systems can be obtained with provision for frequency change for an extra £5. Here, instead of the usual plug-in crystal arrangement, the Flight Link carries two sets of crystals, allowing change of frequency by the flip of a switch.

### The airborne system

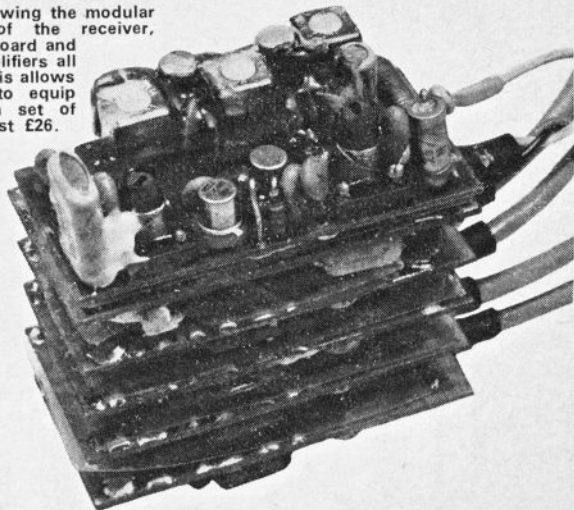
The receiver case is arranged to take four servo amplifiers, so that in the case of a five-function system, the extra servo amplifier is built into the servo.

The airborne complement of the Flight Link Series 4 remains virtually unaltered from the earlier unit. The receiver is at least half as large again as comparable

Left: three views showing the new Flight Link transmitter. The case is very small, and handles nicely. The sticks are adjustable in length. In comparison with other R/C transmitters, the F.L.C. is very densely packed—everything in its place!



Two views showing the modular construction of the receiver, with decoder board and four servo amplifiers all in one case. This allows the operator to equip with an extra set of servos at just £26.



propo. receivers, but then the four servo amplifiers do demand space.

As mentioned in our earlier F.L.C. test report, this has distinct advantages when servicing is concerned and allows the operator to equip himself with an extra set of servos at a cost comparable to the price of a single servo in the case of some digital systems, and that feature alone must have certain sales appeal.

The F.L.C. airborne system is normally supplied without plugs and sockets in the lines between the receiver and servos or power pack (apart from the aileron servo, of course, where one of the latest S.L.M. mini-plugs are used). The system can, of course, be supplied with plugs in the leads if required. One notable change to the airborne system is the on/off switch, now enclosed in a moulded switch cover with all soldered joints well supported against fracture—quite obviously F.L.C. are determined that there shall be no trouble at this point—in fact it would appear difficult to devise a safer arrangement without removing the switch from the circuit entirely.

Servos on the Series 4 remain unaltered. They are tiny and move with an eerie silence as the control columns are operated. Movement is fast and throw generous. Trim movements are, however, noticeably less than with the Series 3, and to our mind, this is an improvement over the earlier unit which had, if anything, too much trim travel.

Flight Link offer an extra powerful, geared down servo for retracting undercarriage operation, and we know from experience that this provides a very powerful action. Early in 1970, we sat in the F.L.C. workshop and watched Idris Francis set up one of these undercarriage servos, building the amplifier into the servo. The amplifier was built up, wire upon wire, without any P.C. board, and done by Id., without any reference to either component layout or theoretical circuit—and it worked first time. It was a most impressive demonstration—here was a man who knew his circuit!

Total airborne system weight is just over 17 ozs. (add about an ounce if a full complement of plugs and sockets are required). In this respect, the F.L.C. system is beginning to lag in comparison to other systems. However, 6 ozs. of this is accounted for by the power pack, a 7.2v. 500 mA unit and some of this weight could certainly be saved by going to the smaller 225 mA pack. Normally, use of these smaller packs is considered to hold an element of risk, but since the F.L.C. system current drain is considerably less than most systems, the small power pack can be used with confidence, still providing good operational time between charges.

### Accessories

The F.L.C. Series 4 system is supplied complete with neck strap, charging leads and shock absorber grommet set for mounting a servo tray.

### Conclusions

By any standards, the Flight Link Series 4 is an excellent system, reflecting good workmanship and design throughout. As already emphasised, the 'new' appeal is in the transmitter where clever layout and styling have resulted in a unit which will never be mistaken for anything but a Flight Link and here the designers have certainly achieved their objective. F.L.C. have, in fact, always been noted for the distinctive appearances of their transmitters, and this new, ultra small unit will certainly carry that banner well.

By the standards of the moment, the F.L.C. Series 4 is in the upper price bracket among proportional systems, and in this respect, we are rather surprised that the F.L.C. charger, is not included in the price and remains an extra.

### Physical data

#### Transmitter

Size:  $7\frac{1}{8} \times 4\frac{1}{4} \times 2\frac{1}{2}$  in.  
Weight: 2 lb. 14 oz.  
Power: 12v. DEAC  
Aerial: retracted  $3\frac{1}{4}$  in.  
extended in.

#### Receiver

Size:  $2\frac{1}{2} \times 2.1/16$  in.  $\times 1\frac{1}{8}$  in.  
Power: 7.2v., 500 mA DEAC  
(225 mA alternative)

#### Servos

Size:  $1.9/16$  in.  $\times 1.5/16$  in.  $\times \frac{7}{8}$  in.  
(mounting lug extension  $3/16$  in. each end)  
Output: rotary  
Total airborne installation weight:  $17\frac{1}{2}$  oz. (with 500 mA power pack).