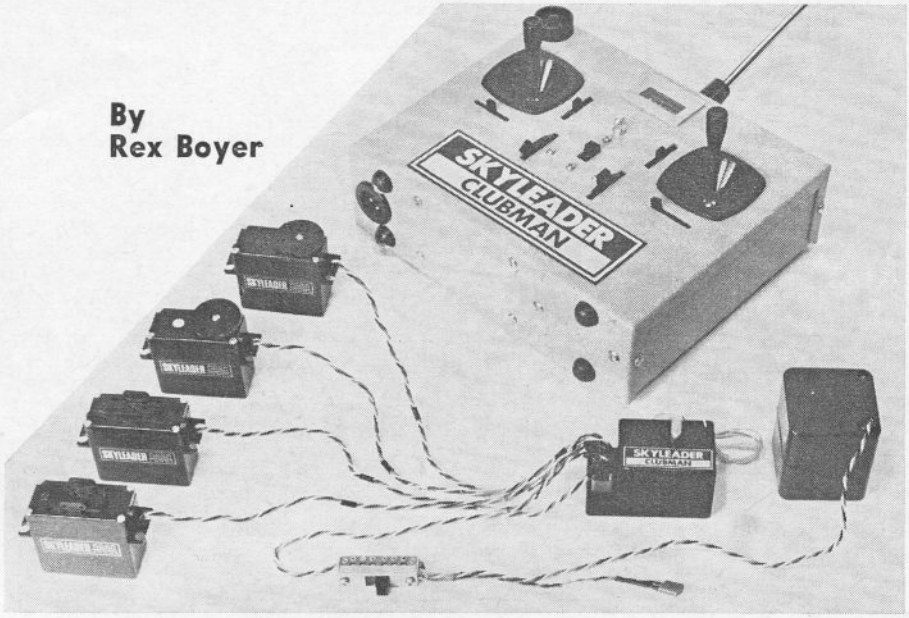
TEST REPORT

SKYLEADER CLUBMAN 6

By Rex Boyer



THE clubman series is the economy line in the Skyleader range of R/C systems. Our last Skyleader test analysis covered the top-of-the-line SLX 6 system which the Clubman 6 unit tested here closely resembles, but with some differences.

Basically, the style and layout are common to both units. The transmitter features the yellow folded metal case in Skyleader's house style using dual axis stick units which are Skyleader's own, but for the Clubman, the stick front bezels are finished black rather than chromed as with the SLX. Being a six-function unit, our test sample has two auxiliary transmitter controls, operated via auxiliary control levers placed centrally below the main control column. No retract switch is provided, but the pupil/teacher buddy box arrangement for linking two transmitters remains, operated by the push button at the top left of the case. The connector lead for the pupil/teacher trainer facility is available as an extra.

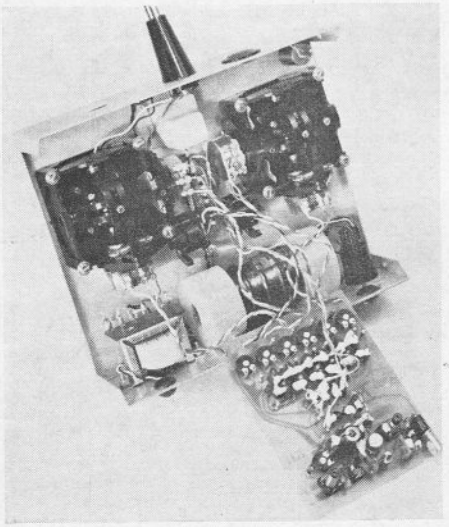
Distinctive features of the Clubman transmitter are the angled aerial, the plug-in crystal facility (the crystal accessible by removing the black moulded cap in the case top) and the rubber case stops on the bottom and rear cover which protect the vinyl case against abrasions. A neck strap for suspending the transmitter is not provided with the set, but the transmitter does feature the necessary toggle, fitted centrally between the two stick units on the front face. Stick units are very smooth – the throttle function employing a fine ratchet action, while the trim levers also have a very nice operational action with a uniform amount of friction drag – a small but important point.

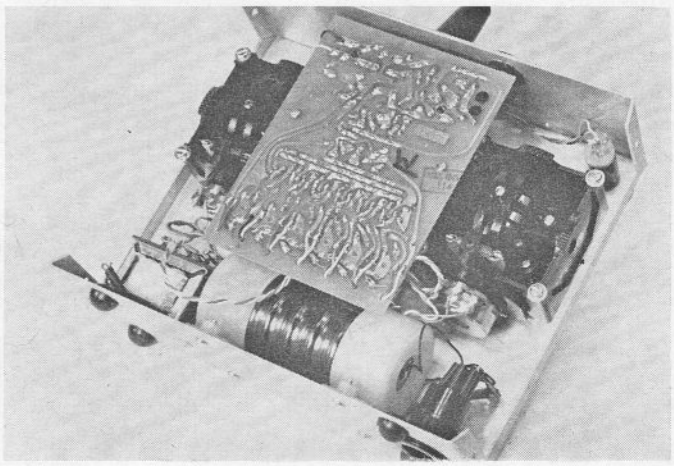
Like the SLX, the Clubman transmitter incorporates a transformer isolated charger, which charges transmitter and airborne power packs simultaneously, and for which a charging harness is provided with the system.

Airborne System

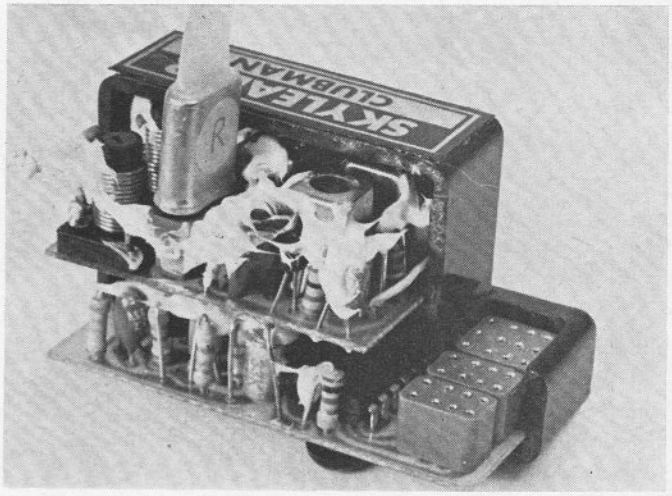
By any standards, the Skyleader Clubman receiver is a pretty small unit. The moulded case measures $2\frac{1}{8}$ x $1\frac{1}{4}$ x $1\frac{1}{8}$ in. overall, including the 'toe' extension at one end for the servo/battery connector block into which the connectors plug vertically. The plug-in crystal stands partially proud of the case top and should be carefully protected in any model installation to avoid damage to its delicate internals. Both the transmitter and receiver crystals are colour coded by a coloured disc, inscribed 'R' for receiver use and 'T' for transmitter. In either case, the coloured disc is covered with a clear plastic shroud, heat shrunk over the crystal body to form a tag which makes handling of the crystal easier (*a point we seem to have been a bit confused about in our SLX test, we might add*).

Servos supplied with the Clubman are Skyleader's own and four are normally included with the six-function system. The new Skyleader servo features both linear and rotary output drive

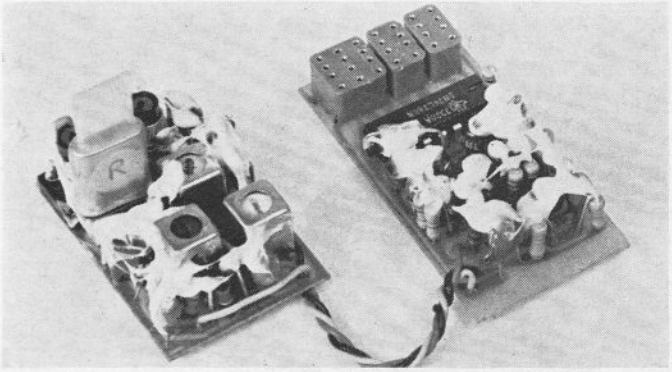




The Skyleader Clubman follows a total conventional layout of double 'U' folded case. Skyleader stick units and trim levers are finished black to set off the yellow vinyl of the case. Rubber stops protect case bottom and back. Internal layout shown left and right – note silicone compound used to support components.



Clubman receiver features connector block for servos and power pack and employs two-deck p.c. layout. Crystal stands partially proud of case and should be carefully protected in any installation. Silicone compound support for components is a sensible feature.



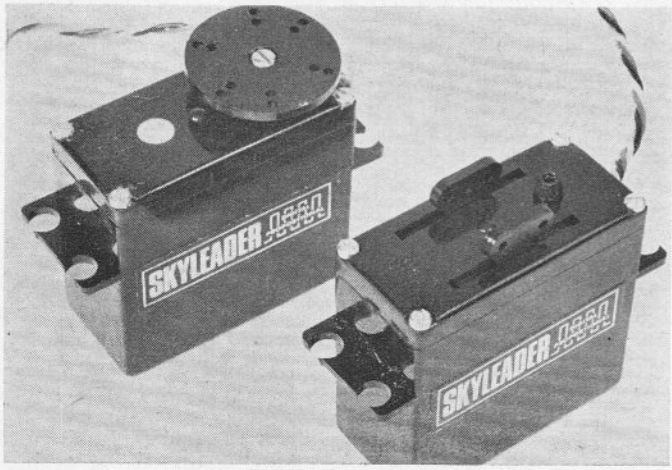
styles. It is normally supplied with the system set up for rotary output, but case tops to convert all four servos to dual linear output are provided in a hardware packet which also includes mounting grommets, mounting screws, two sizes of rotary output disc and a rotary output lever for each of the four servos. Position of the rotary output disc drive is micro adjustable, thanks to tiny serrations in the top of the output drive shaft.

Available as an extra is a three-position servo mounting tray designed specially to suit the Skyleader servo. The tray mounts two servos abreast and one transverse in a compact formation. No screws are required to retain the servos on the tray which are instead held in place by 'U'-shaped locating pegs retained in place by vertical, quick release retainer clips. The tray also mounts the on/off switch for which an extension toggle is also provided to make the internally-mounted switch operable from outside the fuselage of the model.

As with the previous Skyleader systems, the servos are so set up that for a given command, two will react on one direction and the other two drive the opposite way. To identify which are which, two servos carry white identification spots on their case tops . . . it's a small feature, but one we like very much. Note though, that a change from rotary to linear output will reverse drive direction. Not quite so happy though, is the battery pack on/off switch, the leads to which are simply smeared with contact adhesive for support. This is perfectly adequate, but a switch cover would tidy it all up.

The case of the Skyleader servo measures $1\frac{9}{16}$ x $1\frac{1}{2}$ x 23/32 in. with 7/32 in. servo lug extensions at either end. At this size, it is not the smallest, not as small as the Kraft KPS-12 unit supplied with the Skyleader SLX unit, but is nevertheless for all practical purposes as small as one needs to go.

Total airborne system weight is $12\frac{1}{2}$ oz., a good figure and overall impression is one of a tidy, practical and thoroughly conventional proportional R/C system. The transmitter is well balanced with the aerial extended, the controls are light and very smooth and the servos have a nice tight centre with the barest minimum of gear train backlash. The Clubman system lacks some of the features available with the Skyleader SLX unit, such as the retract switch on the transmitter and the facility to charge the airborne power pack alone. With the Clubman, there is no choice of servo type and servo trays are extras. For these reasons, the SLX is the better set (we do not necessarily imply a better buy), but the Skyleader Clubman does offer the price-conscious modeller the opportunity to own a set bearing the brand name which, among British modellers and many more overseas, enjoys a very enviable reputation. A powerful Skyleader retract servo using M.K. mechanics is available to those who require this facility and Skyleader continue to wire their battery packs with centre tap to enable latest I.C. sets to operate older Skyleader servos.



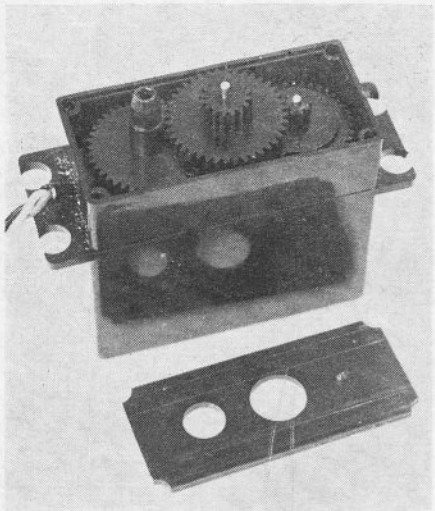
Technical Analysis

THE latest 'Skyleader Clubman' which is the subject of this report shows little theoretical deviation from the previous Skyleader system tested (see R.C.M.&E. February '73). Rather it is a consolidation of effort to produce a well developed system. Most of the differences we found were in type and manufacture of components rather than new circuit innovations.

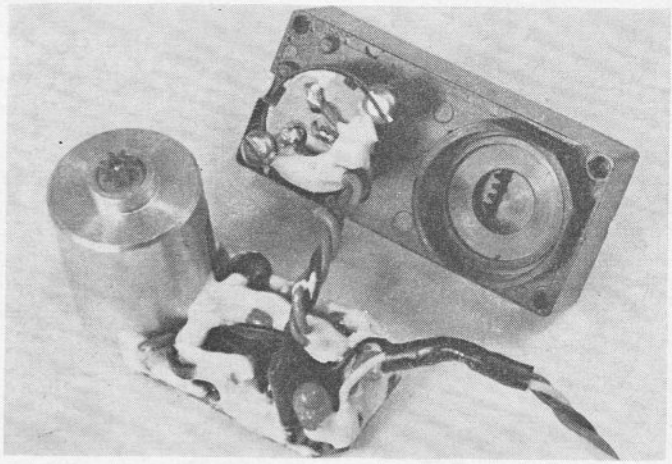
Transmitter

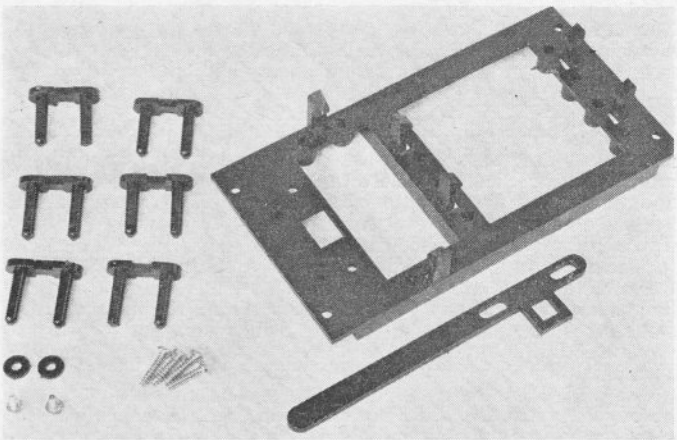
In the transmitter we find a conventional logic encoding line-up, consisting of a multivibrator followed by a chain of half-shots. Each halfshot timing circuit has a preset pot, a fully

New Skyleader SRC servo can be used with either rotary or linear output. Units are supplied fitted out for rotary action, but case tops for linear drive are also provided for conversion.



Two more views of the Skyleader SRC servos showing internal layout. Servo installation tray is designed for Skyleader servos which peg and clip into tray without use of screws. Extended switch toggle also provided. Tray is available separately.





shrouded device by 'PIHER' which we have not encountered in the R/C world before and far superior we feel to the usual skeleton type normally used.

The Clubman, reverts to an earlier Skyleader encoded signal, in that only the sync pause is constant. In a 6-channel system there is a 5 ms change in frame time by moving all controls from one extremity to the other. We did notice that the full throttle position on the left-hand stick gave a maximum width control pulse and consequently a longer frame time whereas the throttle on the right-hand stick gave a minimum width control pulse and a higher frame speed for the full throttle position due to pots rotating in different directions.

From the pulse generators the outputs are fed via the familiar diode gate arrangement to a full monostable rather than a half-shot arrangement to produce the 'carrier off' pulses. The subsequent signal is then applied to the modulation transistor which is in the emitter circuit of the RF output stage.

A 'Silec' transistor forms the crystal oscillator stage which is of the conventional parallel tuned arrangement and features a plug-in crystal. RF output is the familiar π (Pi) circuit, the output transistor being a 2N2218 by Newmarket. No provision is made to tune the stage which is designed to do without it, and all matching is effected by adjusting a slug in the aerial loading coil and a small padding capacitor.

One feature we noted was that although the system uses NPN transistors, the positive line is bonded to the case. There is, therefore, no need for a DC blocking capacitor in the RF circuit to prevent the aerial being 'live'.

The transmitter contains the charging transformer and all the necessary socketry for mains input and airborne pack charge output, situated on the bottom of the case. Power is supplied by a 500 mAH 9.6v DEAC.

Receiver

Again, we could find no really radical circuit design changes from previous Skyleader products.

The circuit consists of the commonly used layout of a double tuned front end with the aerial itself directly coupled to the top of the aerial coil. A separate, choke tuned crystal oscillator is used and would appear to be injected into the base of the mixer transistor via a small value capacitor. Both the mixer and crystal oscillator transistors are Siemers types, of Silec configuration. The two IF stages utilise Piher type 115 transistors, the first AF transistor is a 4286 and is used in the usual configuration with its base biased via a diode to ground and a resistor to the positive rail. A conventional diode clipper circuit feeds the signal to pulse shaping circuits together with the sync. stage. Decoding is done via a TTL MSI chip type SN74L164, an eight-bit shift register, the outputs of which are positive going. The servo output sockets are fixed to the board and are soldered directly to the P.C. lands. SLM miniature sockets are used at this point in a 3-2-2 way configuration (for the six function set) while the four channel has the last two-way missing.

The components are neatly and effectively arranged so that the P.C. board has reasonable size P.C. lands with no 'spiders web' areas. Circuitry is arranged on two boards, the RF section up to the first AF stage on the top board and the rest of the circuitry, plus the servo connecting plugs on the bottom board.

To prevent vibration damage, components on both boards of the receiver are supported with white silicon rubber. We would like to see more manufacturers use this technique, one which Skyleader have practised for a long time.

Perhaps our only criticism of the receiver is the aerial wire retention – just a knot in the wire where it passes through the case and straight onto the coil. We have seen better arrangements.

Servos

The Skyleader Servos are relatively new introductions. These servos retain the Kraft 12-pin IC three-wire bridge amplifier circuit with discrete PNP output transistors, in this instance MEO404-2's. This type is a very good, low saturation voltage silicon transistor and in this particular application, is specially selected for this feature. Feedback pot is the usual CTC component of 1.5 k while the servo motor is a 16 mm Mitsumi.

The servos come complete with the necessary extras to convert from rotary output to linear. Total reduction gear ratio of the rotary output is 222 to 1, using gears with 9 and 40 teeth for three passes. The final pass has a pinion of 16 teeth and all gear wheels use a tooth size of 64DP. Conversion of the output merely involves removal of the rotary output top cover by unscrewing the four screws and replacing with the linear output racks. One point worth noting here is that it is possible to assemble the racks in the wrong position so that when the servo is operated, the racks can hit the end stops and stall the motor, so read the instructions which cover this point. Attention should therefore be paid to ensuring that the racks are exactly in the mid-position and fitted centrally before screwing the assembly down, after which a check should be made to ensure that at extremes of travel + trim travel, the servo racks do not hit the stops.

The connecting leads for the servo emerge above the mounting lugs so that installation will not involve tucking and fiddling about for the connecting plug. Termination of the leads is by way of the miniature SLM connector.

Servo Response

Load at $\frac{3}{8}$" rad.	Travel times (secs.) With load (CW)	Against load (ACW)	Results
4 oz.	.355	.512	—
8 oz.	.338	.49 + .245	3% undershoot
12 oz.	.328	.525 + .3	3.6% undershoot
16 oz.	.313	.584 + .425	6.3% undershoot
No load	.396	.46 sec.	

Just stalled load on the rotary output at $\frac{3}{8}$" radius = 2 lb. 14 oz.

Just stalled load on the linear output: 3 lb. 2 oz.

Travel of rotary output from neutral stick and trim:

Anticlockwise 45° trim 10°

Clockwise 39° trim 6°

All figures in the above table are corrected for 70° of total travel and $\frac{3}{8}$" load radius servo times in seconds.