

RM EQUIPMENT REPORT—
We look at the new

MacGregor **SERIES 2000**

UNVEILED at the Elmbridge Symposium at Sandown Park, was the new and decidedly "up market" MacGregor Series 2000 radio control system. We were lucky enough to be able to borrow one for our eager examination—just in time to describe for this issue.

A six-function unit, it features such desirable attributes as really high power servos, ceramic filters and all-i.c. receiver, all-i.c. encoder and well screened RF stages in transmitter and receiver. Variable rate switches have the effect of reducing servo movement from 100% down to 40% for those subtle small control movements sought by the serious flyer. There are Hirschmann plugs and sockets, as used on quality German equipment and, although the example we scrutinised was on the 27MHz band for use in the U.K., having a very clean output stage, we are told it can meet the exacting German FTZ 35/78 specifications when set up for use on the 35MHz band.

TRANSMITTER

The case is in black, deep embossed, vinyl clad aluminium with black nylon end-plates. It balances comfortably with the chromed telescopic aerial extended and has two stick units deep set in chromed escutcheons. The trim levers are positioned below and on the inner edges of these with reference plates alongside.

The rate switches are located above the left hand stick and control the primary functions of the right hand one, thus facilitating operation without "letting go" of those vital controls. Retract is controlled by a third switch on the case top above the rate switches, and a smooth acting slide control is positioned on top to the right of the aerial, where it may be conveniently moved by an available finger of the right hand, or by the left, as an auxiliary.

The feel of the controls is very smooth and positive; the sticks, which are adjustable for length, have ball gimbals, nylon yokes, and metal scissors-arm centring. The throttle has a click-action brake with 17 increments, while the trim levers have no less than 20 increments—each crisp and easily felt.

Between the sticks is a large, clearly marked battery-state meter and, in the centre, an escutcheon shrouds the on/off switch and provides an eye for the neck strap attachment hook. Nylon feet on the bottom, protect the case when upright.

At the left end of the case, there are two holes for screwdriver access to enable the rate-change to be adjusted, and below these there is a "Din" socket for the charging input or buddy-box harness. At the back of the case,

there are two Dzuz fasteners to retain the back panel which, on removal gives access to the crystal socket.

All the main electronics, which have screened RF coils, are arranged neatly on one p.c. board fixed to the rear face of the front panel, a small sub board being used for the rate-change circuit. Two four-cell packs of vented type 500mA/H type nicads supply the power, and are placed one at each side of the main board.

Size: 7 × 5½ × 1½ in. The sticks project 1½ in. and the aerial 1½ in., extending to 4½ in.

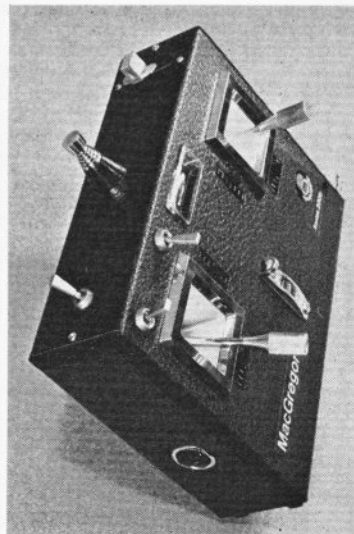
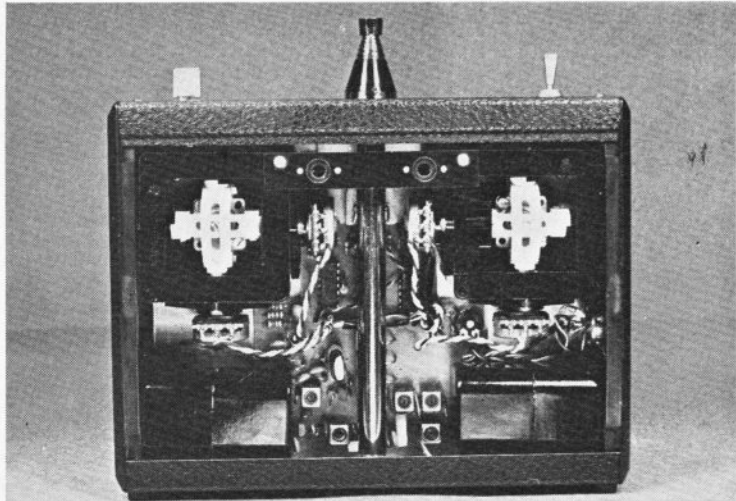
Stick effort: typically 3½ oz (100g)

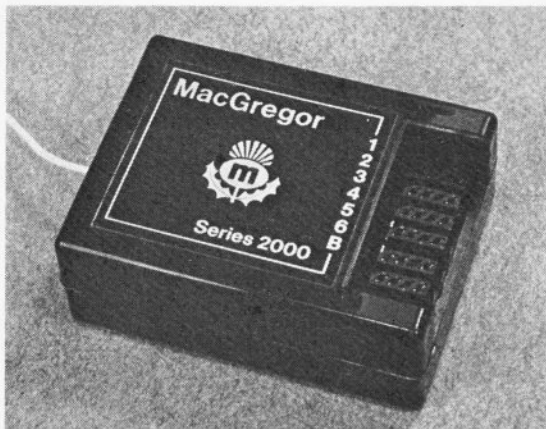
Weight: 1½ lb. (800g).

RECEIVER

The Series 2000 receiver has a flush fitting crystal carrier, which is colour-coded and nestles neatly at one corner. All the servo plugs and power supply have side entry for neat wiring and fit flush into the other end of the case, which is in black glossy nylon, as are all the airborne components. Four machine screws retain the top of the case which appears to offer plenty of protection to the single board p.c. with its three i.c.s and two filters. Both front end coils are screened and sealed

The rate switches are seen above the left-hand stick, while on top of the case is the retract toggle switch, and a slider auxiliary on the right.





and there are very few discrete components. The bank of sockets has sprung contacts and these are polarised to fit into shrouded round-pin plugs on the harness.

Size: $2\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{8}$ in. total.
Weight: 1.6oz. (45g).

SERVO

Supplied with this outfit, there were two normal and two reverse sense MR212 servos (the sense being identified by a coloured spot on the nameplate.) Each has a 16mm. motor and an in-line i.c. which feeds via two discrete transistors to handle the high power released to the four-stage nylon gear train. The third stage of this train runs on an extension of the output shaft, which it supports, and drives the pot. Most of the load is taken on a large bearing in the case top. A neat point of design is the extension of the top bearing which comes close to the disc or arm itself, to steady the shaft nearer to where the load is imposed.

The case is nylon and has lugs integral with the lower half. The servo is mounted via rubber grommets and the top retained by two self-tap screws below the lugs. Both disc and arm output devices are supplied, the latter providing more throw.

At rest, there is hardly perceptible gear float. When switched on, the operation is quiet, smooth and crisp, right down to trim movement, even rate change "in"; each tiny increment of trim produces a correspondingly clean notch of movement. Power is far more than the average model with correct installation might need, and such excess could be a comfort to the user, in that the servos would not normally be over-stressed in arduous flight conditions.

Size: $1\frac{1}{8} \times 1\frac{7}{16} \times \frac{3}{4}$ in. lugs project $\frac{1}{16}$ in. each end and the disc, $\frac{1}{4}$ over the top. cable 10in.
Weight: 1.4oz (38g).

Throws: Full in outer hole of arm: $\frac{1}{8}$ in., inner hole $\frac{1}{16}$ in. There is a choice of three hole positions, radiating from the centre in each arm, and two on the disc which gives the outer

hole $1/64$ in. more throw than the intermediate hole in the arm and the inner hole $1/16$ in. less.

Trim: outer hole of arm: $\frac{1}{4}$ in.

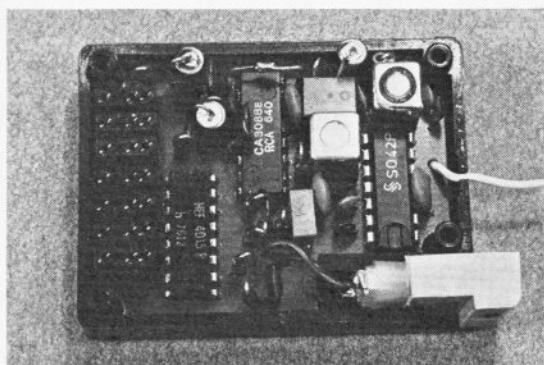
Transit: typically 0.4 sec. limit to limit (unloaded)

Power: in excess of 6lb. at outer hole of disc.

BATTERY AND HARNESS

The airborne power supply is provided by four vented type 500mA/H nicads in a nylon case. A short cable exits centrally at one end and terminates in a polarised socket. The switch harness which plugs into this carries a charging socket and double pole, double throw slide switch in a nylon case with an escutcheon for clamping it to the model.

Size: $2\frac{1}{2} \times 1\frac{1}{2}$ in. square, cable $2\frac{1}{2}$ in. switch harness (total) 14in. with the switch in the centre.
Weight: (battery and switch harness) $4\frac{1}{2}$ oz.



With and without lid—the receiver has three i.c.'s and two filters; bank of seven sockets has sprung contacts.

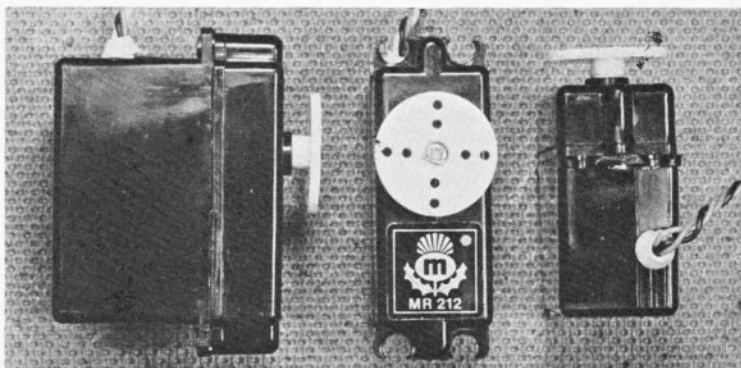
Airborne weight: (with 4 servos) 11oz (310g).

ACCESSORIES

There is a tray to take two servos lengthwise and one across, a pair of brackets to mount the fourth servo on its side, a full set of grommets and self tapping screws, alternative servo arms, one pair of crystals and frequency pennant and neck strap. A mains charger for 240volts A/C input has two independent outputs for transmitter and a receiver batteries, each with a l.e.d. indicator, and provides a 50mA charge rate.

This is altogether a comfortable-to-hold and precise-to-operate piece of equipment, not only for the contest minded flier, but for those who simply like to use radio with an air of sheer high quality.

Manufacturer and service: MacGregor Industries Ltd., Canal Estate, Langley, Berks SL3 6EQ.



Out of its case, the printed circuit board, inverted to show neat design and workmanship. Note crystal-holder. At right: servo opened up to display gear train and electronics— plus 16mm motor.

