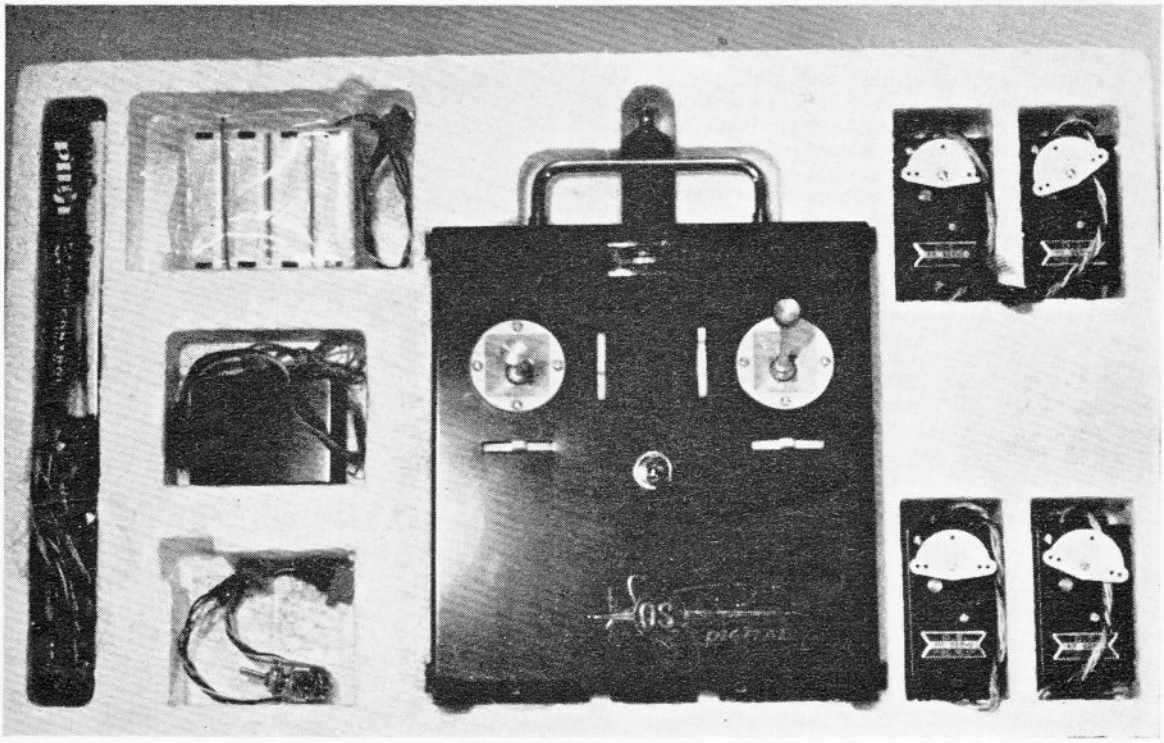


On test —

O. S. DIGITRON D-4

Attractive Japanese proportional outfit

IF one has ever seen any other O.S. gear, one would have no doubt as to the origin of this; the unmistakable, dark blue anodised transmitter case, with white plastic stick surrounds and trim levers, that characteristic carrying handle and centre-loaded aerial, are all so obviously O.S. The overall appearance is very smart; the layout is straight-forward and noticeably uncluttered by any superfluous paraphernalia. At the top of the case is a rubber grommet, through which is fitted the aerial. When fully retracted, this leaves only the plastic moulding, which covers the loading coil, projecting above the case. Just in front of this is the chromed carrying handle.

At the top of the front face is the R. F. meter and below it, roughly at the centre, is the on-off switch. This is wired in the American manner, up for on, so one has to be careful not to get caught out. At the top left-hand of our specimen is the rudder/elevator stick and, on the top right-hand side, the throttle/aileron stick. We see no mention in the leaflet of the alternative arrangement being available, i.e. with aileron and elevator on the right-hand stick (Mode 1).

At the bottom of the case, in addition to the four rubber feet, is a miniature socket for coupling in the charging lead. Now, removing the case back, which is held in place by two simple 'dimples' that locate in corresponding holes in the flanges of the case front, we can examine the works. Incidentally, we could not think of any other digital transmitter which has a quick-release back. Frankly, we feel that it is better that it be a more solid fixture, since this discourages prying eyes and prodding fingers.

The printed circuit board is of 1/16 in. glass-fibre, flashed with silver or some similar protection. The layout is quite tidy, but with some signs of provision for small modifications, if an individual transmitter should need it. The arrangement of components places the encoding parts at the top, the modulation switch at the centre, and the R.F. section at the bottom. This latter feature is deliberate, because the aerial is mounted so

that its base remains keyed to a support on the inside of the case bottom; therefore the connection from the R.F. unit can be kept short, which it should be. At the base of the case is fitted a twelve volt, 450 mA. hr. Nicad—a rechargeable nickel-cadmium battery.

The P.C. board is fixed to the stick units with four nylon screws. These stick mechanisms have aroused some interest; they are really very neat in design. The main frames are of steel, as are the yokes and springs. But the trim system and the hollow cone which supports the machined dural stick, are of very cleanly-moulded white nylon, as mentioned above. The net result of all this is a unit which is simple to make and assemble, smart and consistently precise on centring.

Receiver

This is small—only 2⅞ x 1 11/16 inches in plan area, and 1⅞ inches deep. Double-deck construction is employed, and the boards are held into the case by "tongues" which extend the actual end of the P.C. These tongues engage in slots in the end faces of the case. The lid of the case slides over the main section and is retained only by slight friction. A motif is stuck to one end of the case giving the frequency of the particular outfit and, at the other, the aerial, the battery leads and the signal leads emerge. The aerial passes through a separate grommet from the other leads. The latter are terminated in a small seven-pin plug.

The superhet receiver is apparently of standard form, using I.F. transformers etc. We noted one or two small components on the back of the superhet P.C. board, and provision on the logic board for another stage. We can only guess that this stage would be a fifth channel, since the board carries the mark "O.S. D.P.R. 5.D.11."

Servo

This bears a marked resemblance, outwardly, to the O.S. reed multi servo. It has the same blue case of folded aluminium, with a white nylon output lever. Removing the base cover from the case, one sees a compact assembly. The motor drives the output through a contrate and three stages of spur gears. A wire-wound potentiometer is set into the P.C. board mounted in the lid of the case, and it looks as though there is fail-safe switching available, although none is used. The switch lands prevent stalling at the end of the range of travel.

The servo amplifier is built on a separate P.C. board, fitted next to the case bottom; we counted eight silicon transistors and two large output types, probably germanium. There were also eight resistors soldered to the back of the amplifier board.

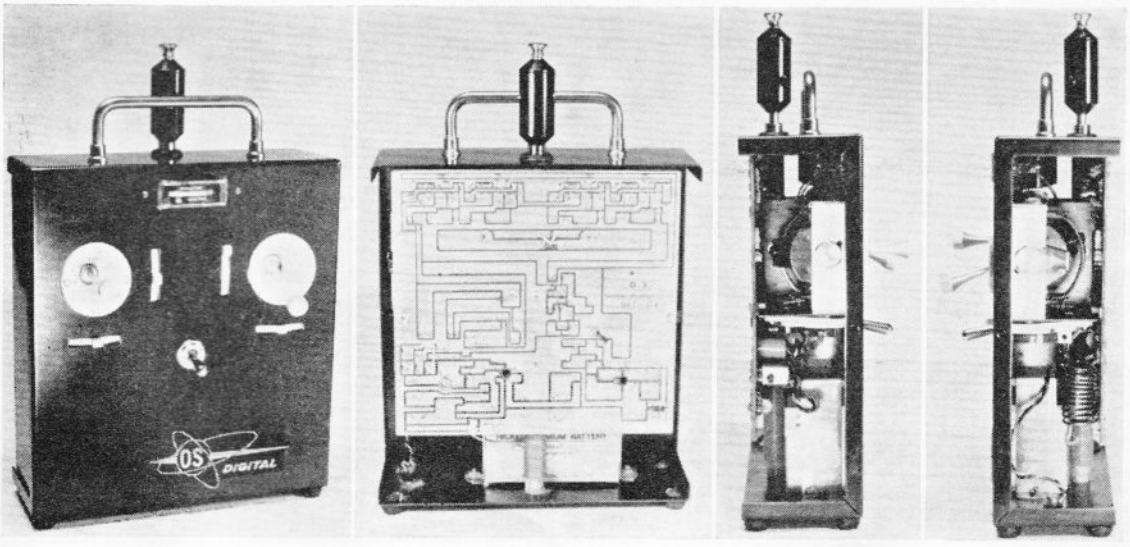
Ancillaries

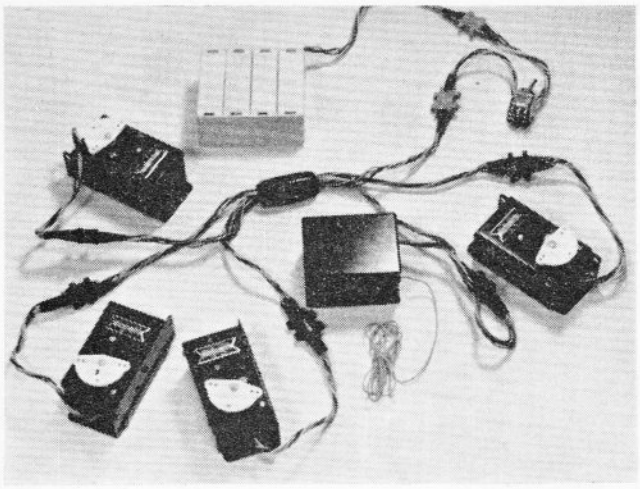
The wiring from the signal leads out of the receiver to the battery and the individual servos, is accomplished by means of a rather cunning harness. A small plastic sleeve, with rubber end grommets, is used to cover the junction of all the necessary battery leads, etc., leaving only a series of easily-identified plugs and sockets to be coupled up. So that people may use a switch, or plug-in the battery directly to the servo/receiver harness, a completely separate small harness is supplied, with the switch in it.

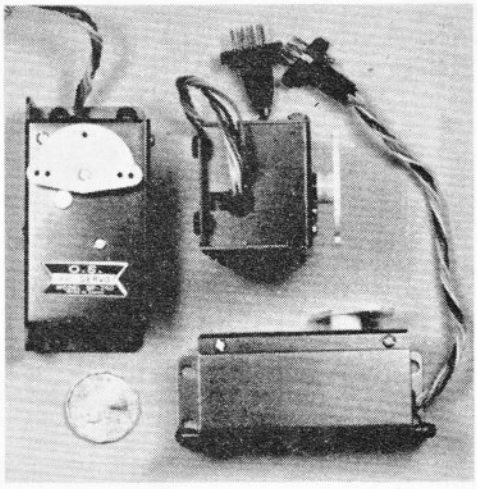
The battery for the receiver is, unfortunately, quite large. It consists of eight nicads of the "pencell" type, housed in a plastic moulding. The charger supplied is a 110 volt type, but the version to be distributed in this country will be of the 250 volt type. It is very simple, using a capacitor to regulate the flow of current. A two-element neon is fitted to indicate that charging is taking place.

General

There is not much one can fault in the actual construction of the set, especially if one takes into account the important fact that this is a low-price outfit. Considered on that basis, it is surprising how much minor detail work has been done to render the gear as robust as possible, which it certainly must be, if it is to stand up to the rigours of general r/c usage. For example, all flex leads in the airborne unit are tightly







sleeved to prevent fracture. The plugs and sockets used are so easy to pair up that one would have to be utterly moronic to get them wrong.

In the transmitter, all leads are again firmly supported, either by passing them through the board before soldering, or by sticking them to the potentiometer tags with an Evostick-type cement.

We liked the stick action. There is a distinct difference between moulded nylon stick mechanisms and metal ones, not necessarily meaning that one is better than the other, but that individuals may easily develop a marked preference for one or the other, and select their gear partly on this basis. The system of trim is such that the lever rotates the whole pot giving, in effect, a form of electric trim. As you move the trim lever round, you still retain the same amount of stick travel about that neutral at all trim settings. Such matters are a personal preference, again, so we do not propose to enter into a discussion of their relative merits here.

One unusual feature of the throttle stick is that it is limited to part of the full travel possible, by small nylon mouldings fitted to the mechanisms inside. The travel "lost" in this way is thus transferred to the trim lever. This gives about 35° of trim instead of 20° provided on the other sticks.

Now, what of the overall performance of the system in terms of servo response, etc.? Well, frankly, after examining so many sets which stay silent unless a control change was demanded, we found the continuous ticking and buzzing of the O.S. servos rather disturbing. In itself, this is not a dangerous thing; the servos will not do anything which might splatter your model simply because they buzz. There will, however be an increased drain, and the life of the commutators and motor bearings will be shortened to some extent.

Various odd effects were noted in the course of the test, mostly associated with the "liveliness" of the servos. For example, when switching on, all the servos went into a momentary state of oscillation, which immediately died down to the steady buzz. However, the precision and centring accuracy of the servos are good; their output torque is the equivalent of any other servo on the market. Backlash too, considered as a fraction of the total travel, is of acceptable magnitude.

TECHNICAL DATA

TRANSMITTER
Size: 6¼ x 6⅞ (high) x 2½ins.
Weight: (Including Nicad battery) 2lb. 14oz.
Aerial: Centre loaded, non-detachable. Height above case top—retracted 2¼in, extended 47½in.
Battery supply: 12 volts nominal (10 cell Nicad).
Charger: 110 volt A.C. on test sample. (230 volt A.C. type available with later sets).
Charger connections: Miniature socket in case bottom, kept clear of ground by rubber feet.
Currents: (Test voltage 12.7 on load).
Aerial extended—113mA.
Aerial retracted—122mA.
R.F. Output: High.

RECEIVER
Size: 2⅜ x 1 11/16 x 1 7/16 ins.
Weight: 3½oz.
Aerial length: 34½in.

SERVOS
Size: 2⅞ x 1⅝ x 1½ins. Actual case length is 2 5/16in. Balance being taken up by the flanges.
Mounting centres: 25/32 x 2⅝ and 19/32 x 2⅜ins. Fixing on two faces by rubber grommets.
Weight: 3⅜oz.
Motor: Furuichi DIS 1.5 volt D.C.
Case: 20 s.w.g. Aluminium.
Output: Semi disc (see photos) with two pairs of holes on ¾ and ½in radii and one hole on 7/16in. radius.
Travel: 5/16in. nominal (outer hole).
Maximum dead weight lift: 48oz. typical-each direction outer hole.
Time for limit to limit travel: No load—0.8 sec. typical. 16oz. load outer hole—1.1 secs. typical.
Total deflections (no load):
Rudder—39° left. 42° right. Trim 20° total.
Elevator—40° down. 40° up. Trim 22° total.
Aileron—35° left. 41° right. Trim 22° total.
Throttle—90° total movement. Trim range 35° total.
Centring Accuracy: (40° total movement on control surface)—½° typical.

AIRBORNE BATTERY SYSTEM
Battery pack: 8 x 450mA. hr. Nicads in plastic housing arranged as one tapped 4.8 volt battery for the servos.
Current from untapped battery: (Receiver) 25mA almost constant.
Current from Tapped battery (Servo) 70-90mA average.
With one servo moving—180-190 mA
With two servos moving—250-270 mA
With one servo stalled—430 mA
With one servo moving (16oz load dead left)—210-230 mA.

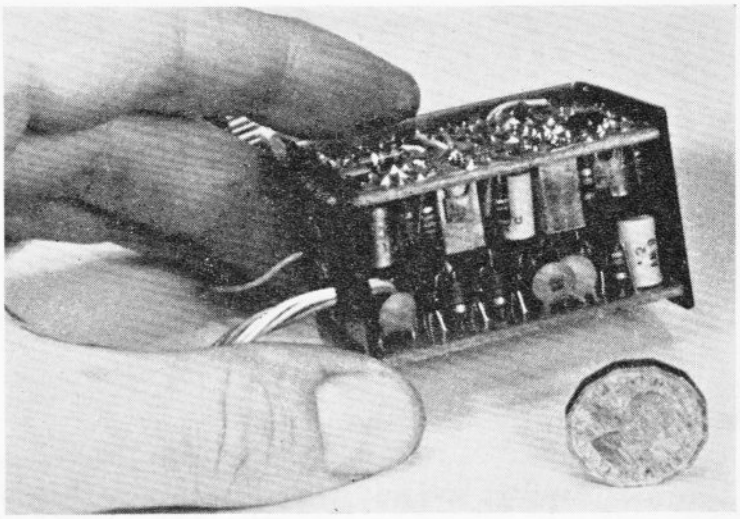
TOTAL AIRBORNE WEIGHT:
Complete system with four servos: 26½oz.

We were a little puzzled about the logic system used in the receiver. It has silicon controlled switches at the outputs, five of them, in fact, on a four-channel set, where one would expect to see one S.C.S. per output. Just to add to the bewilderment, there are no less than ten transistors as well, on this same board! Most manufacturers use the S.C.S.'s because they allow the total number of semi-conductors to be reduced drastically, yet this one has enough to cope with an unusually-comprehensive logic; why, we wonder? Here we come to an important point; we have made much of the servo "jitters". Yet the fault, if you consider it to be such, is probably not in the servo, but in the receiver and/or the logic.

In the course of the test, one of the S.C.S.'s failed. However, do not form any hasty conclusions from that. The large number of semiconductors in a modern proportional outfit renders it vulnerable to this short-life failure, if a transistor is manufactured with a weakness in it. We know of no equipment which is immune to a fault of this nature.

Summary

Ignoring this failure then, what is our assessment? On the debit side, only the "lively" servos and the airborne weight, which at 26½ oz., is up on most other systems today, mainly because of the complex battery pack used. On the credit side, the outfit is cheap at £166 and is reasonable value at that. The servos are accurate, powerful and strong, the transmitter has plenty of "steam" and the installation is straightforward. We have had the gear in three different models now (*Thor*, sort of *Taurus* and *Kwik-Fli*) and, in all cases, there was no problem in installing the Nicad, receiver and servos, and linking up to existing control rods. Several hours of flying have been completed with only one mishap — when



"swamped" landing over a powerful homemade GG Tx. However, both model and equipment survived. The transmitter is convenient to hold and the control stick response sensitive and positive. We have no hesitation in entrusting the test-flying of new models to this equipment—can we say more?

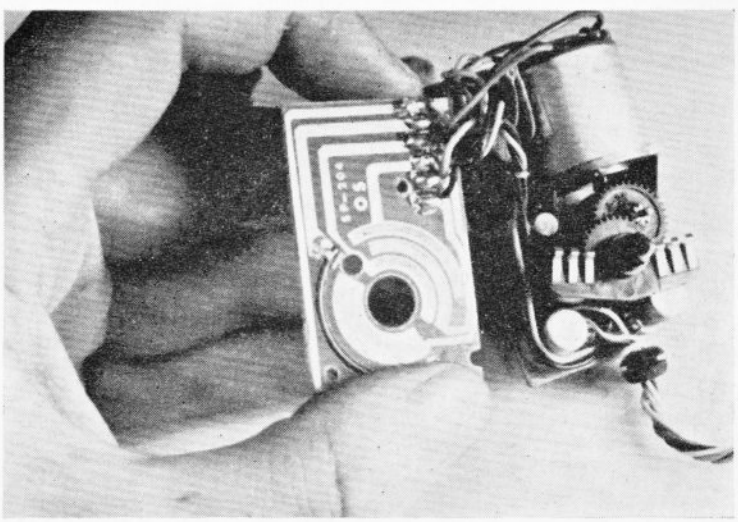
Distribution and Service

E. Keil & Co. Ltd., Keilkraft Works, Wickford, Essex.

Price

Complete outfit with four servos all batteries and charger — £165. 18. 10.

NOTE This figure is pre-devaluation—an increase is inevitable in due course.



GOT YOUR LICENCE?

Don't forget you need a G.P.O. licence to operate radio control equipment. It only costs £1 for **five years** (4s. a year!) and all you have to do is fill up a form obtainable from:

Radio Branch,
Radio and Accommodation Dept.,
G.P.O. Headquarters, London, E.C.1