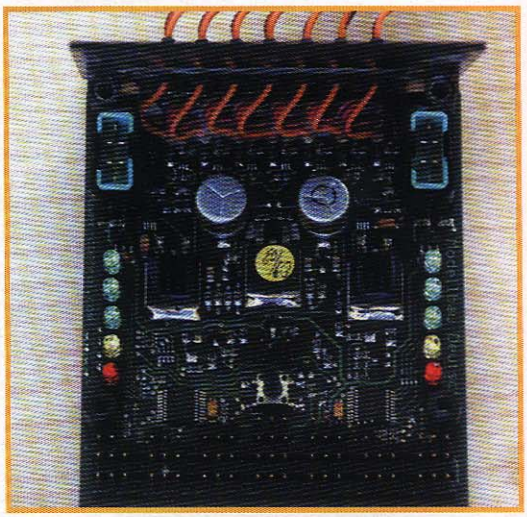
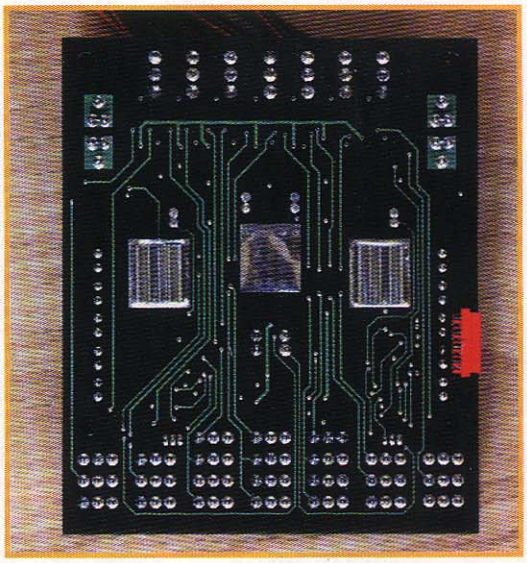
Power Box 40/24

A DUAL POWER SUPPLY SYSTEM FROM MODELBAU-DEUTSCH OPTIMISED FOR DURALITE PLUS LITHIUM BATTERIES

The Power Box 40/24 is a compact unit with outputs for 24 servos and inputs from seven receiver channels. Voltage supply is stabilised at 5.95



This interior shot reveals very high quality production standards. All critical components are duplicated



Very high quality is apparent in this shot of the rear of the PC board

Readers may recall that on several occasions in this magazine we have discussed the need for ultra reliable power sources to ensure the highest possible degree of safety and reliability for jet models, particularly those powered by gas turbine engines. Although Nickel Cadmium batteries have been developed to a very high level of reliability, the failure of just one cell in a four or five cell pack, where only one pack is used to power the radio, will almost certainly result in the loss of the model. My own attempts to eliminate the risk of such failure have led me to use Duralite batteries, firstly the Lithium-metal variety (Tadiran) which are no longer available and now the Lithium-ion type, the Duralite Plus packs, which are becoming increasingly popular and Lithium-ion and Lithium polymer packs are available under a number of brand names.

What's the difference?

Apart from the chemistry, a fundamental difference between the Ni-Cad and lithium type batteries is the cell voltage. Ni-Cad cells have a nominal voltage of 1.2 v whereas the Lithium-ion type has a nominal voltage of 3.7 volts. Thus, if a Lithium-ion pack is assembled in series/parallel from four cells, giving a 7.4 volt pack, the failure of one cell results in a loss of capacity, unlike a Ni-Cad where the loss of one cell in a conventional, series wired pack will result in a voltage drop which will almost certainly result in the radio ceasing to operate. Indeed, it is possible that two cells in a Lithium-ion pack could fail and the pack would still retain its voltage, albeit with a greatly reduced capacity. So, it can be seen that a four cell Lithium-ion pack greatly reduces the risk of radio failure due to low voltage and if two packs are used then the chances of a fatal voltage loss are absolutely minimal. The twin Lithium-ion arrangement is now used in all of my high value, high energy, gas turbine powered models.

My latest project, now that the hydraulic problems have been overcome by Rudi Joubert, is the completion of the FiberClassics MiG 29. This is a large model and uses many high power digital servos, some of which are a considerable distance from the receiver. This presents two problems, one of which is the very high current which would pass through the receiver, the second being

Author
DAVID GLADWIN

Photography
DAVID GLADWIN

the voltage loss and risk of RF of interference due to the very long servo cables. These problems have been addressed, and it would seem, overcome, by the Power Box 40/24 manufactured by Modelbau-Deutsch in a version optimised for use with Duralite Plus batteries. The Duralite version of the Power Box is based on and, in fact, is identical in operation to, the top of the range Power Box, the 40/24 Competition, a unit which is very popular for use in very large aerobatic models.

The Power Box 40/24 Duralite Plus is an electronic unit which receives power from two Duralite Plus batteries which have a nominal voltage of 7.4 volts per pack and give over 8 volts when freshly charged. The Power Box regulates this voltage to give a stable voltage of 5.9 volts to both the receiver, and all servos connected to the unit. This is achieved by DUAL linear stabilised voltage regulators which each give an output of 20 amps and all other critical items in this unit are duplicated to achieve a very high standard of reliability and redundancy. The 40/24 Box has seven channel inputs which are connected to the receiver, and as well as taking the channel signal from the receiver, these cables also feed stable voltage to the receiver. Each of the receiver connection cables features a ferrite ring to achieve earth de-coupling of the receiver from the power supply. Each channel has a two-way pulse amplifier so that multiple servos can be connected to each output and the 40/24 has three outputs capable of handling four servos and four outputs for three servos, making it possible to connect up to twenty-four servos. The output is configured for long servo leads and the circuit design is such that the leads are suppressed, making the use of ferrite rings unnecessary. Low current servos are simply connected to the receiver as is normal practice.

Switch failure sorted

The issue of switch failure has also been addressed in this unit and a very clever solution has been found. A special switch unit is connected to the Box and this unit does not have conventional sliding contacts but is an electronic unit. The 'switch' features three buttons and three LEDs, two green, one red. By pressing the 'SET' button, the red LED will appear, and when the red is ON, pressing button 1 and 2 will electronically connect the batteries, the appropriate green LED then illuminating. The batteries are electronically latched so that if the switch unit should fail or be disconnected the batteries will not be disconnected. The batteries are switched off by reversing the procedure. There are no charging sockets on the switch as Duralite batteries are charged directly via special cables which connect to the 'Charge-safe' circuitry.

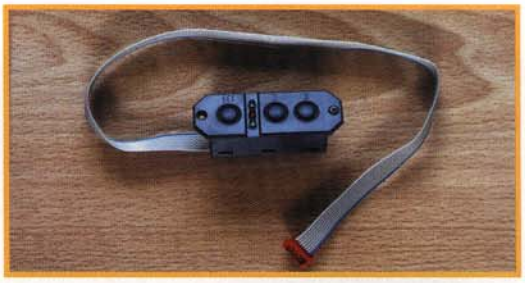
Battery state is indicated by two banks of five LEDs, one each side of the unit. The three greens indicate the level of battery charge, the ambers are caution lights and the red is the 'stop fly' light. In addition, two very bright LEDs connect to the box to give an external indication of battery state. These LEDs will glow red when battery voltage has reached 7 volts and will flash when a value of 6.9 volts is reached, which is the 'stop fly' voltage for Duralite Plus batteries. A further feature is a small push button in the centre of the unit and by pressing this button the lowest voltage experienced during flight will be displayed.

That really concludes the description of the hardware and, of course, the review unit has only been bench tested. When two Duralite Plus 2800 Mah packs were connected to the unit an output voltage of exactly 6 volts was displayed on the Duralite digital voltmeter. When four servos, two JR 8411s and two JR 8511s were connected, the indicated voltage fell to 5.95 volts. Operating the servos under no load conditions created virtually no voltage drop from that value of 5.95 volts. Applying the maximum hand load to two servos, (these powerful digital servos are almost impossible to stall by hand) the voltage hardly wavered from the 5.95v value, an impressive performance by any standard.

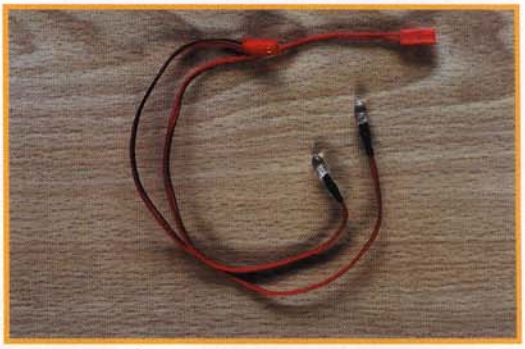
The construction standard of the unit was very impressive as can be seen in the photographs, and for the battery connections, high quality Mulitplex plugs are used and the receiver connectors are gold plated. Mounting is by means of rubber grommets. One thing I did not like was the lack of 'sealing' of the edges of the unit such that an errant screw or suchlike could cause a short across the power pins, an unlikely but not impossible occurrence which I think Modelbau-Deutsch should take steps to correct.

As said earlier, the Power Box is extensively used in large scale aerobatic models and it was interesting to note the considerable number being used in jets at the recent Australian jet meeting at Wangaratta and all of the operators to whom I spoke expressed their entire satisfaction with the unit. It may also be worth noting that the very high capacity of these Duralite Plus receiver batteries, coupled with the use of a Duralite ECU battery, virtually eliminates charging during a day's flying.

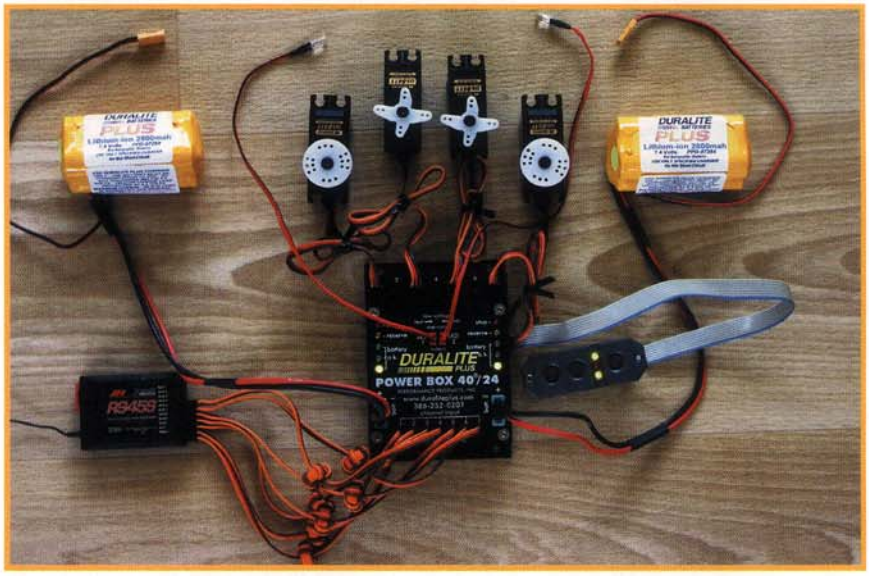
My initial assessment of this unit coupled with the inherent reliability and redundancy of four-cell Duralite Plus packs leads me to conclude that this unit will provide me with the ultimate in secure and reliable power supplies so essential for any gas turbine model and it will be installed in my MiG 29 with every confidence. I will also be installing a similar unit in my Eurosport which has adequate space within the fuselage for such an installation.



The switch used with the 40/24 is an electronic unit and the batteries are electronically 'latched' so that switch failure or disconnection leaves the batteries connected to the Power Box



Two very bright LEDs can be placed in a conspicuous point to indicate battery state. Steady red indicates 7 volts and a flashing red indicates 'stop fly' voltage of 6.9v



Power Box 40/24 for Duralite Plus batteries
Size: 7.5 cm x 10.5 cm x 2 cm
Weight : 135 grams plus switch @ 20 grams
Operating voltage: 7.4 volts Lithium-ion packs
Power output: 2 x 20 amps
Servo output: 24 in total, arranged 3 x 4 and 4 x 3
Voltage output: 5.95 volts
Current drain: 260 Mah
Voltage drop: 0.25

Price: US$395

Manufacturer: Modelbau-Deutsch. www.modelbau-deutsch.de www.dual-power-control.com
Tel: +49 (0)9 06 225 59
Distributor: Performance Products Inc.
www.duralitebatteries.com
Tel (USA): Int+ 877 744 3685

Only four servos are connected here but the unit can handle a total of twenty-four servos. Note the ferrite rings in the leads connecting the unit to the receiver, for earth de-coupling

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