

Lab Notes

An occasional series in which we discuss interesting circuit techniques, circuits we have tried in our own laboratory but not developed as a project, practical notes on projects, measurement techniques for hobbyists etc.

"Plug Pack" battery eliminators



About the most convenient and least expensive mains power supplies suitable for powering our simple battery-operated projects are these "Plug Pack" battery eliminators. At left is the PS369 from A&R Soanar

— this unit gives three, selectable, voltages and comes with a range of output connectors, a very versatile unit. At right is the PPA9-DC from Ferguson Transformers Pty Ltd, which delivers 9 Vdc at up to 3 VA.

LOOKING THROUGH our pages each month, as well as the 'Project Electronics' and 'Simple Projects' series, reveals a myriad of simple projects, most of which use a single nine volt power supply. In fact we try to design all our simple projects to use the common No. 216 transistor radio battery.

After building a few of these projects you may have thought a simple mains power supply would be a good idea to reduce the turnover of batteries, which in some cases are the most expensive

item in the circuit! The power supply would not have to be complicated, good regulation being unnecessary for most of these projects, but by the time you bought a transformer, diode bridge, filter capacitor, box and leads you would have spent the best part of \$15. That's about 20 batteries worth at today's prices — and chances are if you're a newcomer to electronics, building our simpler projects, you shouldn't be thinking of building mains powered equipment for a while. We'd

like to keep our enthusiastic readers — not kill them off!

The two largest Australian transformer manufacturers, Ferguson Transformers Pty Ltd and A & R Soanar Pty Ltd, have come to the rescue with a range of "Plug Packs". These consist of a small plastic case containing a small transformer, diode rectifier and filter capacitor. The case has a moulded-in mains plug (generally two pins) allowing the whole unit to be plugged into a standard 240 Vac outlet. A twin-lead

and low voltage connector provides output connection.

Originally designed to power portable radios, calculators and cassette recorders, they are available in a range of voltages and power ratings, and are ideally suited to powering our simple projects.

Ferguson plug packs are locally made and available in 3, 4½, 6, 7½, and 9 volts at a rated output of 3 VA (watts) or 500 mA, whichever is the greater. They are terminated in a standard connector found on most portable equipment. The nine volt version (PPA 9-DC) is probably the most useful, to project constructors, of the Ferguson range and retails for \$7.19 inc. tax (Ferguson price).

A&R Soanar have come up with a novel idea in one of their Plug Packs. Rather than have a range of different voltage packs they use a single pack with a tapped transformer to give three, six or nine volts at an output of 300 mA. These have a multi connector with two sizes of jack plugs, two sizes of low voltage coaxial type connector and a battery clip for equipment without a remote power socket. Priced at around \$10 it is more expensive than the Ferguson range and has a lower output current but offers greater flexibility. You need to be careful though when using them not to short out the unused connectors.

Output voltages are rated at a specific current. As the supplies are unregulated the output voltage will be higher at low currents and fall below the rated output at high currents. This poor regulation will not effect most battery equipment or the operation of our projects, in general.

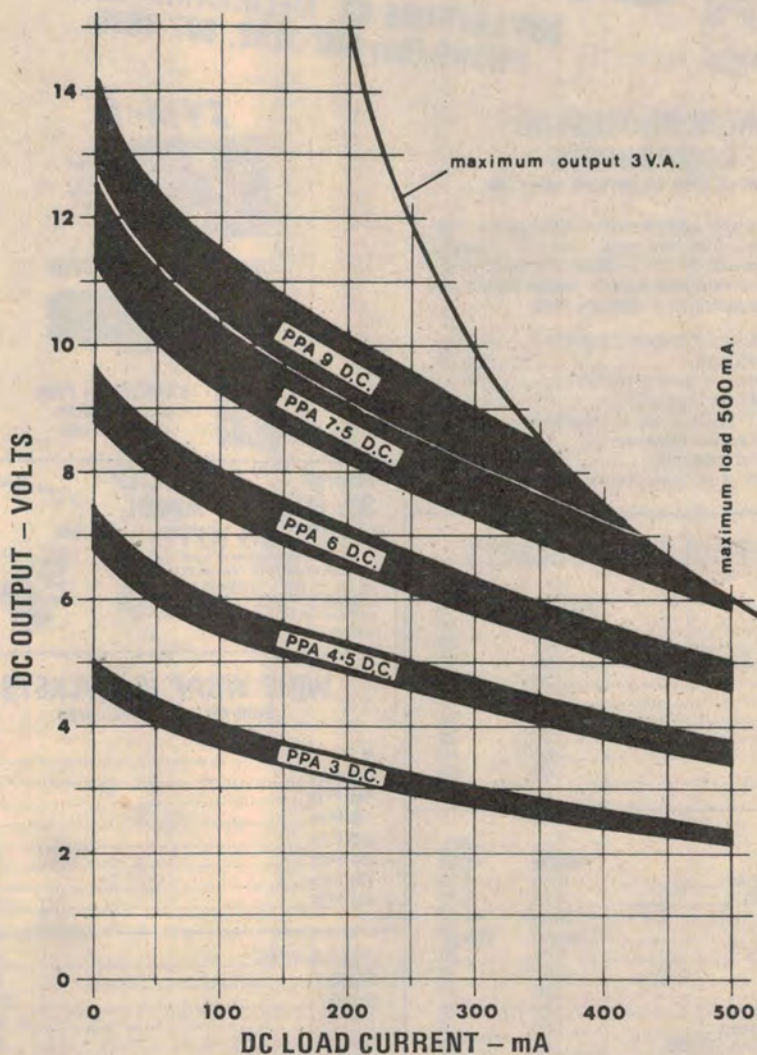
The graph here gives the output voltage for specific currents for each of the Ferguson range. The maximum current for the lower voltages is limited at 500 ma and at 3 VA for the higher voltage packs. The 3 VA curve can be seen at the top right of the graph. If an output of say 12 V dc at 40 mA is required it can be seen that a 9V Plug Pack will do nicely, however this drops to about 8 V. at full load.

Plug Packs can also be used for charging Nickel-Cadmium (NiCad) batteries if the right pack is selected for

the capacity and voltage of the batteries to be charged. Nicads must not be charged with a current greater than one tenth of their amp-hour capacity. The PPA9-DC will supply 400 mA maximum current and can be used to charge a 12 V 4 AH Nicad pack. Smaller NiCad packs will require a series resistor to

limit the maximum charging current. Penlite size cells requiring only 40 mA charging current will require about a 330 ohm series resistor.

Plug Packs can be obtained from many of the suppliers who advertise in the magazine, and you should have little difficulty obtaining what you require.



Curves showing the output voltage ranges and regulation for the various Ferguson model "Power Pack" battery eliminators. All deliver their rated output voltage at a current of 300 mA. They will give a higher voltage at low load currents and lower output voltage at high load currents, but note that the 3 VA (that's 3 watts generally in the applications we suggest) must not be exceeded for the PPA9-DC or PPA7.5-DC units. The width of each curve indicates the maximum and minimum output voltages for each unit.