

Follow the CB action at home with our

Powermate for transceivers

By the time you read this Citizens' Band radio could well be legal in Australia, in which case CB activity will increase markedly. You can follow the action at home by powering your transceiver from our CB Powermate.

by LEO SIMPSON

While most CB activity is likely to be mainly from cars, many operators will want to carry on the conversation while at home. The easy way to do this is to remove the transceiver from the car and operate it from a suitable mains power supply.

Just about any 12V DC power source with a current rating of about 1.5 amps or more could probably be pressed into service. But few transceivers will give the best performance when operated in this way, because the power output ratings of transceivers are quoted for a DC input voltage of 13.6 or 13.8V.

There is a dual reason for this. First, it enables the manufacturer to quote higher ratings than would be possible for a 12V input. Second, which the manufacturers would no doubt hasten to point out, the normal voltage available from a car's electrical system, with the motor running, hovers just below the 14V mark.

The above remarks equally apply to radios and stereo tape players designed for use in cars. This situation has existed for at least fifteen years.

It follows then, that the way to obtain the best performance from a CB transceiver is to operate at 13.6V DC. The CB Powermate puts out 13.6V at up to 1.5 amps, which should be adequate for most models.

Powermate can also be used to power other 12V appliances such as tape players, provided their current drain is 1.5 amps or less.

The circuit is simple and uses readily available parts. Cost should be around \$16 to \$18.

Refer now to the circuit diagram. The power transformer has a centre-tapped 30V secondary winding which is coupled to a full-wave rectifier and 4700uF filter capacitor to develop about 21 to 23 volts DC at no load. The output of the 4700uF is coupled to a simple series regulator consisting of a Darlington transistor pair and a 15V zener diode reference.

The Darlington pair merely acts like an emitter-follower. The reference voltage at the base of T1 determines the voltage at the emitter of T2. Because each transistor has a base-emitter voltage drop of approximately 0.7V, the resulting output

voltage at emitter of T2 is $15 - 1.4 = 13.6V$.

Low hum output is a feature of the circuit. This is because any ripple voltage (hum) applied to the input of the regulator is considerably attenuated by the voltage divider consisting of the 560 ohm resistor and the dynamic impedance of the zener reference (typically about 10 ohms).

Regulation of the circuit is about 5%. Put another way, the change in voltage from no load to full load at 1.5 amps is typically 14.2V to 13.6V. Ripple ranges from less than 10mV peak-to-peak at no load to about 40mV peak-to-peak at full load.

Powermate is easy to build and layout is not critical, although internal wiring should be kept reasonably short and compact to avoid instability.

Instability in a simple circuit like this? Yes, it is entirely possible in a series regulator circuit. It can happen because



CB Powermate puts out 13.6VDC at 1.5A

of long leads to the collector of T2. These can act as an inductance and the circuit oscillates at several Megahertz.

Fortunately, the remedy is usually simple. A 0.1uF capacitor can be connected across the output terminals or from collector of T2 to the chassis.

We built our Powermate into a compact box measuring 134 x 76 x 150mm (W x H x D) available from Dick Smith Electronics. The cases have a sturdy steel lid and a flimsy aluminium base but they are adequate for the job. Rubber feet are fitted to the case.

The transformer was also supplied by Dick Smith, type DSE 6672. This is equivalent to the A&R 6672. The Ferguson PF 3559 or PL30/40VA would also be suitable. We accommodated the few circuit components on a 12-lug length of



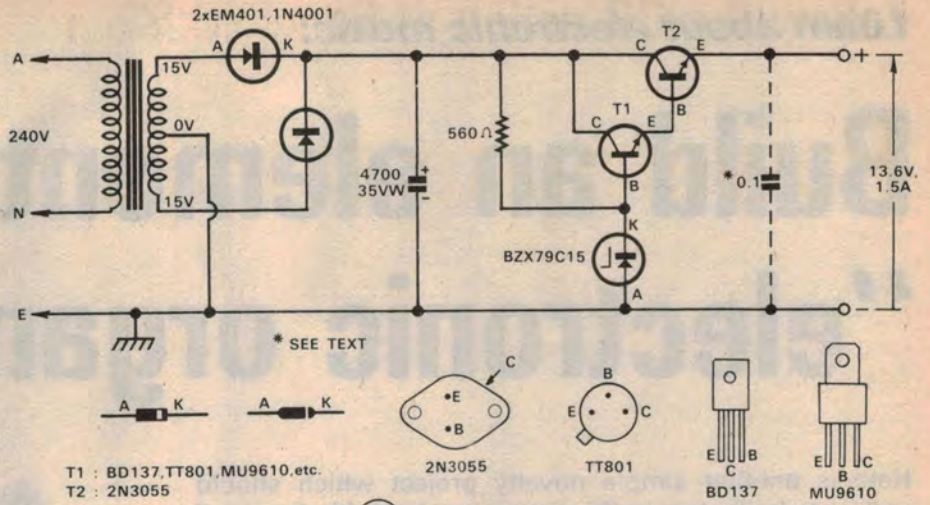
Powermate will run most CB transceivers with a maximum output rating of 5W.

miniature tagboard, but a large tagstrip would have done just as well.

Make sure that the zener diode and transistors are correctly wired otherwise damage is certain to result.

Follow this procedure for wiring the three-core mains cord: Pass the cord through a grommet in the rear of the case and anchor it with a cord clamp. The active and neutral wires are terminated in an insulated terminal block. The earth wire is soldered to a lug which is bolted or riveted to the chassis. Leave a loop of slack in the earth wire so that if the mains cord is pulled out, the earth wire will be the last to break.

The 2N3055 transistor T2 is mounted in the following way: Drill the mounting holes if not already provided. Make sure the contact area is free of burrs and swarf. Smear the contact surface and the underside of the transistor with silicone grease or heatsink compound. A mica



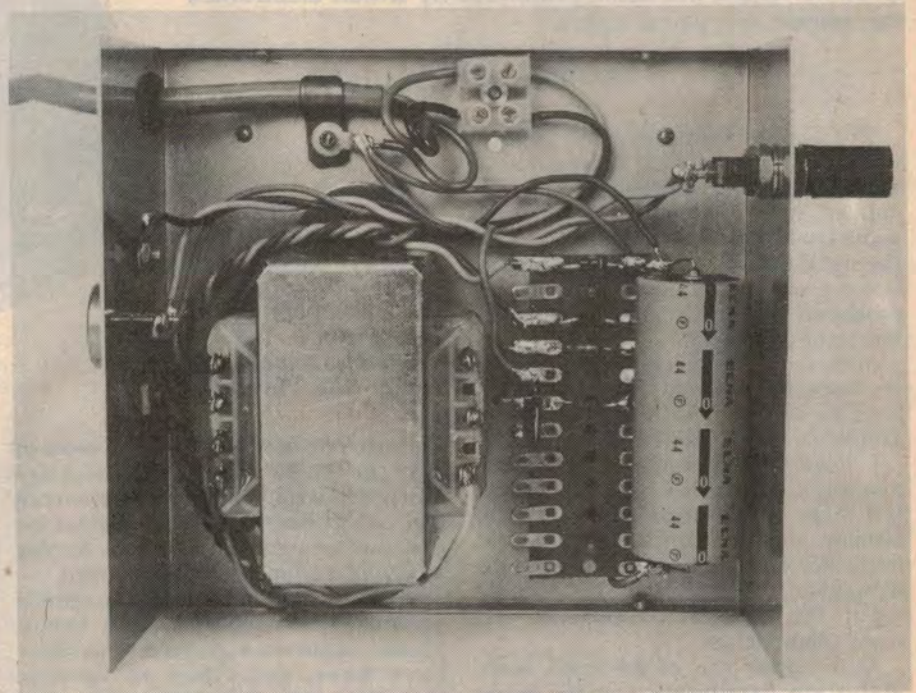
T1 : BD137, TT801, MU9610, etc.
T2 : 2N3055

EA CB POWERMATE

2/PS/.

PARTS LIST

- 1 metal box, 134 x 76 x 150mm
- 1 transformer with 30V centre-tapped secondary, A&R 6672, DSE 6672, Ferguson PF 3559 or PL30/40VA
- 1 2N3055 silicon NPN power transistor
- 1 BD137, TT801, MU9610 silicon NPN transistor
- 1 BZX79/C15 or similar 15V 400mW zener diode
- 2 EM401, 1N4001 silicon rectifier diodes
- 1 4700µF/35VW electrolytic capacitor
- 1 560 ohm ½W resistor
- 1 12-lug tagboard
- 1 2-way insulated terminal block
- 2 solder lugs
- 1 grommet
- 2 4mm banana socket/binding posts, one black, one red
- Mains cord and three-pin plug, screws, nuts, hookup wire, solder, common sense.



This photo and diagram below show the easy assembly of Powermate.

washer and insulating bushes must be used to isolate the transistor from the chassis. Attach a solder lug to one of the mounting screws to terminate the collector lead.

When assembly is complete, check the circuit for errors. Use the wiring and circuit diagrams for comparison with your work. Now switch on and check the voltage output. It should be close to 14V.

The Powermate is not proof against damage from severe overload or short-circuit. When making connections to the output terminals, make sure the unit is not energised. We have not included fuse protection since CB transceivers usually have at least one fuse in their supply leads.

Optional extra features on the unit could be an on/off switch and a pilot light. We think most constructors will do without these though, as they are usually provided on the CB transceiver itself. ☺

