

A large, efficient loudspeaker system with 100W capacity!

Peerless PAS100 3-way 100-litre loudspeaker

This loudspeaker system is the first of three systems to be presented using Peerless drivers. The first, the Peerless PAS100, is a large three-way system with high efficiency and generous power handling for those with large rooms, and plenty of amplifier power. The Peerless PAS100 provides a frequency response from below 40Hz to beyond the upper limits of audibility.

by LEO SIMPSON

The Peerless PAS100 loudspeaker system presented here is the most powerful loudspeaker system for high fidelity use that we have ever featured. With an internal capacity of 100 litres, a power handling capacity of 100 watts plus sensitivity of 93.5dB, it is a very good solution to those people who require a large loudspeaker system which can handle the power output of today's powerful amplifiers and receivers.

To accommodate a pair of these loudspeakers, a large listening room is almost mandatory. This is firstly necessary to provide the required floor space since, not only do they require the actual space that they stand upon but, for best results, they require a certain amount of free space around them. They should not be placed close to the corners of the room and ideally should be at least 30cm from the nearest wall.

The second and ultimately more important reason for having a large listening room is to allow the system to produce the low frequency bass reproduction of which it is capable. The laws of physics inhibit the reproduction of low bass frequencies in small rooms so do not consider the Peerless PAS100 if your living room is only four metres square.

On the other hand, if you are able to perform elementary carpentry and can solder, you could obtain a great deal of satisfaction from building these loudspeakers. They are supplied with ready-cut veneered cabinets which assemble together very easily to produce a finish which is comparable with quality loudspeaker systems sold by high fidelity retailers.

In this respect, a kit-built loudspeaker system offers a unique opportunity to the do-it-yourself enthusiast and electronics beginner. Even if he decides he is not up to the challenge of constructing a complete amplifier, AM/FM tuner or other electronic hifi component, he can still successfully complete assembly of this loudspeaker system.

Again, even the skilled electronics hobbyist may decide that he has not the time to build his own gear or perhaps may desire a particular combination of commercial equipment. With this combination he can team a pair of the Peerless PAS100 systems for a very small amount of time and effort.

One other point before we proceed to describing the drivers and cabinet: You don't have to buy the complete kit. If you are skilled in cabinet making and

and manufactured in Denmark and are distributed in Australia by G.R.D. Group Pty Ltd, of Camberwell, Victoria. It was G.R.D. Group who approached us and suggested that we feature a number of articles on Peerless designs, as a suitable follow-up to our highly successful and very popular Playmaster designs, the most popular being the Playmaster 3-75L featured in May 1977.

Having reviewed the three loudspeaker systems submitted by G.R.D. Group we had to admit that they were eminently suitable. Although notably more expensive than the earlier Playmaster systems they are attractive in that they represent a way for the kit builder to obtain an outstanding loudspeaker system for less than he would pay for a comparable finished system from a hifi retailer.

Do these Peerless designs supersede our earlier Playmaster designs? More

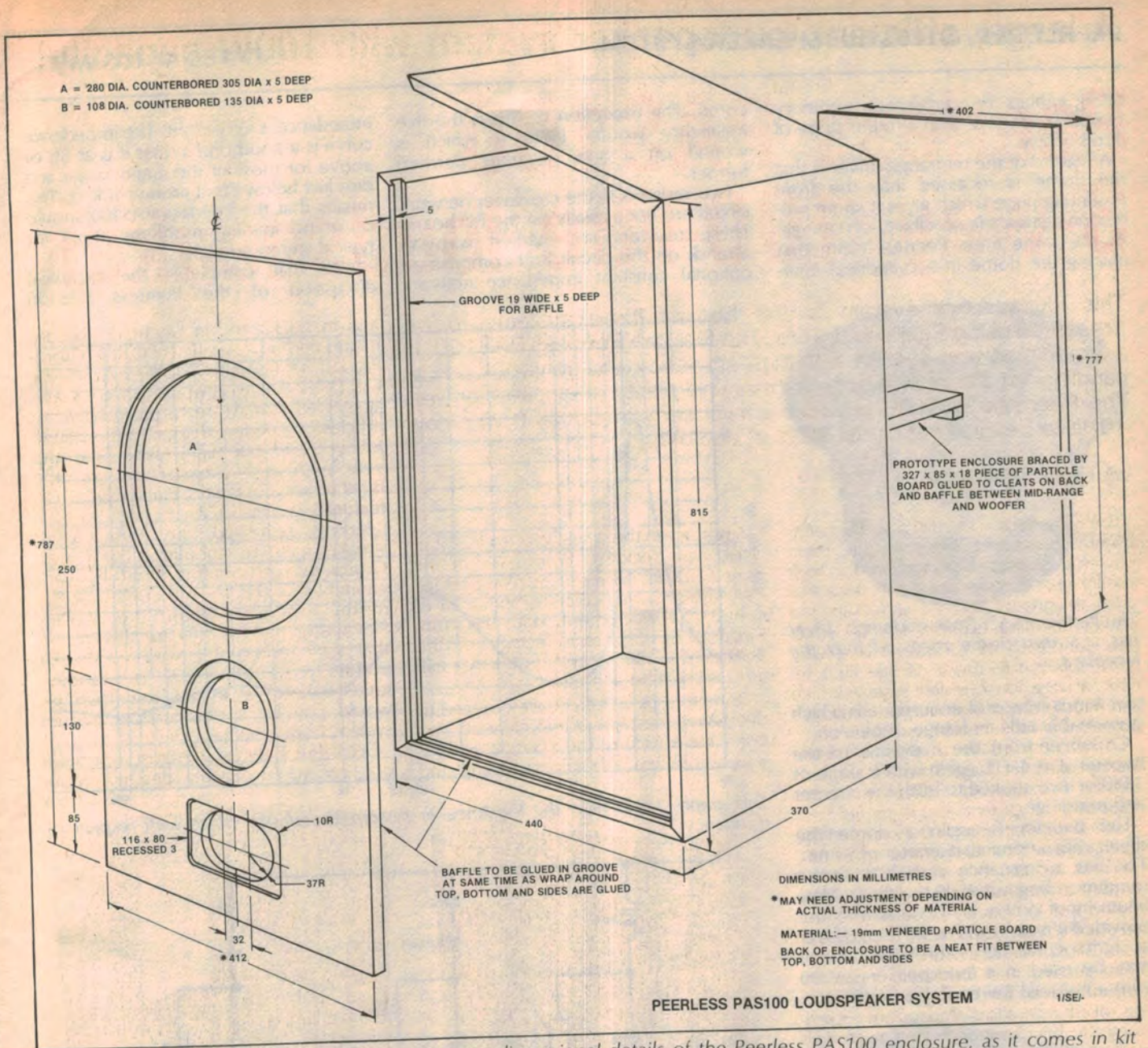


Two views of the Peerless PAS100 system, with grille cloth and without.

have the requisite tools or want to make a cabinet to suit a particular decor, then you can work to the cabinet dimensions provided with this article and possibly save yourself a nice little sum in to the bargain.

Peerless loudspeakers are designed

specifically, does the Peerless PAS100 supersede the popular Playmaster 3.75L design? Well no, in that where the Playmaster designs are still currently available, they offer exceptional value for money. The extra money spent on the Peerless designs buys more efficient



cy, more power and ultimately, a better quality loudspeaker system, although the audible differences may not seem commensurate with the price to those to whom the extra dollars are important.

Easily the most impressive single component of the Peerless PAS100 system is the woofer, KD120WFX. This has a nominal diameter of 305mm (that is 12 inches in obsolete parlance) with a large foam rubber roll surround which enables the low resonance figure of 26Hz to be achieved in free air. A large ceramic magnet provides a high flux density of 1.18 Tesla (11800 Gauss). This results in a Q-factor of 0.4 and sensitivity of 93.5dB. Explaining this last parameter, this means that the woofer will produce a sound pressure level of 93.5dB at a distance of one metre on its axis with a drive signal of one watt, at a particular reference frequency (which is probably 400Hz in this case).

The foam rubber roll surround is of

Here are dimensional details of the Peerless PAS100 enclosure, as it comes in kit form, ready for "wrap-around" assembly. Note that it is drawn in the upside-down position in which it should be put together. A handyman carpenter building an enclosure from uncut sheets should work to the external dimensions, using internal cleats as necessary. The baffle and back panel dimensions would need to be modified to become a slide-in fit.

"closed cell" construction and is treated on the rearside with damping material to control resonances in the surround itself.

The cone material is Peercone (a registered trade name of Peerless), a white moulded polypropylene which is said to have high tensile strength, low mass, high temperature stability and high internal damping. In short, it is a material which would appear to be ideal for loudspeaker cones, being strong and light. In fact, the total moving mass of the woofer is only 42 grams.

When mounted in the enclosures, the woofer resonance rises to only 45Hz, a very creditable figure. This can be noted from the curve showing the impedance

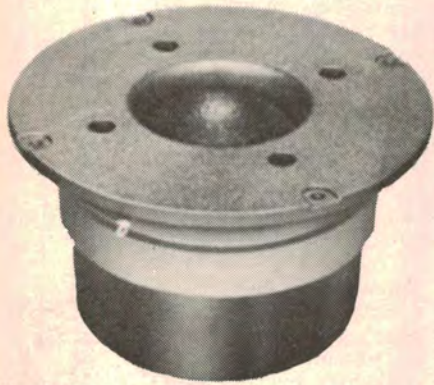
(modulus) variation over the audio range. This means that the woofer can deliver usable bass response down to around 30Hz.

The upper frequency limit of the Peerless woofer is 1500Hz but the crossover point to the midrange driver is well below that at 500Hz. The midrange driver is the Peerless KA20DMR which has a soft dome with a nominal diameter of 50mm. Fundamental resonance is 270Hz and working range of the driver is 600Hz to 6kHz with a smooth rolloff at both extremes. This enables the use of a relatively simple crossover network.

Rated power of the midrange is again 100 watts, to match the woofer. This

rating applies for a crossover frequency of 600Hz or more with a rolloff slope of 12dB/octave.

A feature of the midrange driver is that the dome is recessed into the front mounting plate which gives it some protection against the possibility of damage. At the same time, Peerless claim that placing the dome in a cylindrical aper-



The Peerless KA20DMR midrange driver has a 50mm dome recessed into the faceplate.

ture forms a type of acoustic lens which presumably aids midrange dispersion.

Crossover from the midrange to the tweeter is at 4kHz, again with a slope of 12dB/octave applied to both the tweeter and midrange.

The tweeter is again a dome-type driver with a nominal diameter of 50mm. This has a resonance of 1000Hz and a frequency range of 1500 to 20kHz. Maximum input power is 10 watts RMS but provided it is used with a 4kHz crossover at 12dB/octave (as is the case here) it may be used in a loudspeaker system with a nominal rating of 100 watts.



The Peerless K010DT tweeter has a 25mm dome and covers the range from 4kHz to 20kHz.

As may be expected from a small dome tweeter such as this, the high frequency dispersion is very good, as depicted on the accompanying graph of sound pressure response. Characteristic sensitivity of the tweeter is 92dB.

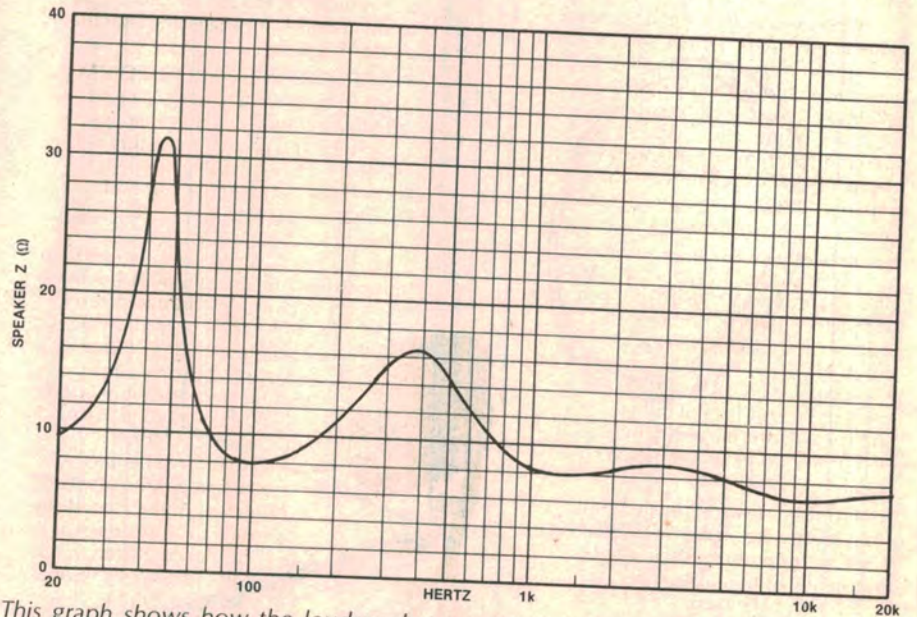
All of the crossover components are mounted on a PC board which uses push-on connectors for all terminations to the three drivers. The crossover capacitors are non-polarised electrolytics while the inductors are air-

cored. The exception to this is the five millihenry woofer inductor which is wound on a soft magnetic (ferrite?) former.

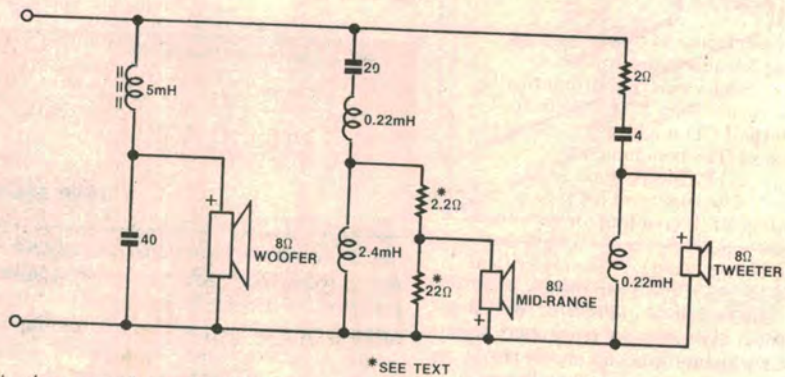
Two resistors in the crossover network circuit are not actually on the PC board. These resistors are marked with an asterisk on the circuit and comprise an optional constant impedance network

impedance is very slight. The impedance curve is a good one in that it is at 8Ω or above for most of the audio range and dips just below 7Ω at around 10kHz. This means that the Peerless PAS100 should cause no loading problems at all for typical stereo amplifiers.

Well that completes the technical discussion of the Peerless PAS100



This graph shows how the loudspeaker system impedance varies with respect to frequency.



*SEE TEXT

This is the complete circuit of the Peerless PAS100 showing drivers and crossover network.

that we added to reduce the signal to the midrange driver by 3dB. We felt that this was desirable to reduce the "presence" of the system caused by the midrange tending to dominate the tweeter.

Those constructors who wish to add this midrange attenuator network may do so readily by wiring the 22Ω and 2.2Ω resistors across the terminals on the back of the midrange driver. The resistors should have a rating of at least 1W.

The graph of the impedance modulus versus frequency was taken with the midrange driver attenuator network in circuit, although its effect on the overall

system. Let us now talk about construction. As already mentioned the cabinet is large, with specified dimensions of 440 x 815 x 370mm, not including the grille cloth frame. Mass is approximately 25kg.

You may buy the kit in two forms. The first includes, the speakers, crossover PCBs, interconnecting wires and rear terminal panels for a stereo pair but without the cabinet materials. The second form includes all of the above plus cabinet kits, acoustic filling material, foam sealing tape and all other materials to complete the enclosures, with perhaps the exception of the adhesive.

If you have the tools to make the

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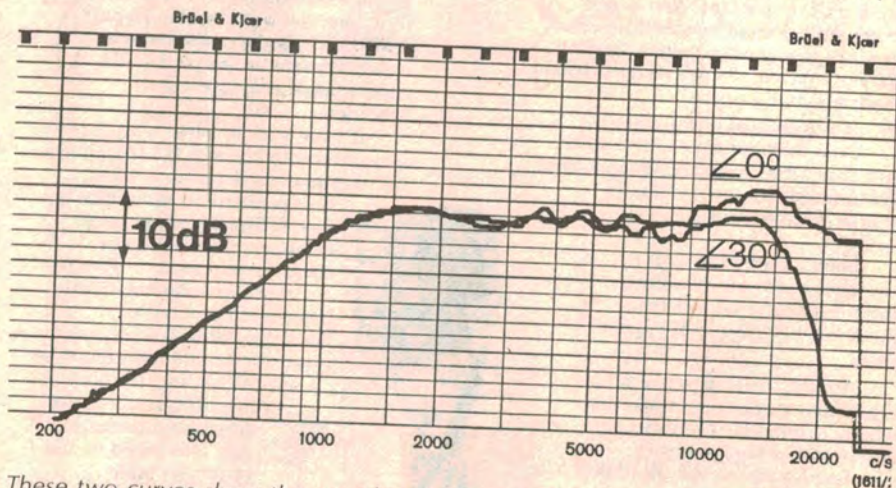
PEERLESS PAS100 3-way Loudspeaker System

cabinets from scratch, you may vary the cabinet dimensions if necessary provided the enclosure does not vary by more than 10% from the designated volume of 100 litres.

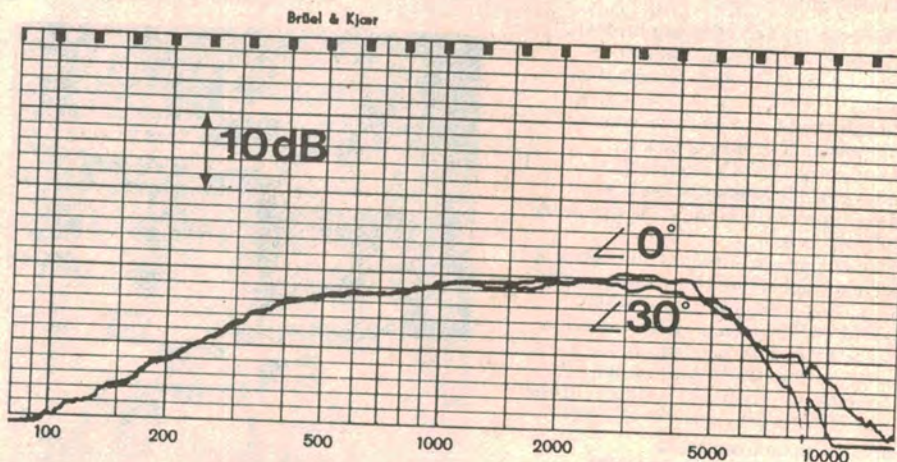
We understand that kit suppliers will sell their pre-cut timber kits in stereo pairs to minimise packaging costs. The normal practice with these pre-cut timber kits is to cut the sides, top and base from one strip of vinyl veneered board. Ninety degree grooves are milled where the joints will be, leaving the segments held together only by the vinyl

have available a large tube of PVC adhesive ("Aquadhere" is fine), some adhesive tape, and clear space on the floor covered with paper, in case you spill some glue. Oh, yes, and a scrap of clean cloth to wipe off any surplus.

Open the cabinet timbers full length on the floor and tentatively stand the baffle, tweeter end down, in what will ultimately be the top of the enclosure. The idea is that, when the panels are folded around it, the join where the two outer ends ultimately meet will be at the bottom, resting out of sight on the carpet.



These two curves show the sound pressure response curve of the tweeter (above) and midrange (below).



veneer. An additional groove is milled to take the baffle and rear panel. When adhesive is run into the grooves and the sides folded around the baffle, a rigid potentially airtight enclosure is formed.

While the surfacing material provides a surprisingly effective "hinge", allowing the panels to be folded and unfolded, we suggest that you don't tempt fate by idly demonstrating to yourself or to anyone else how it all goes together. Leave that until you are ready to do the job.

Before starting, make sure that you

Remember also that the rebated side of the baffle is the front face.

Having worked out how everything will fit together, put the baffle aside and apply adhesive to all the 45° surfaces and to all surfaces of the rectangular slot for the baffle. Apply enough adhesive so that, when spread with a finger, it will wet all surfaces thoroughly and evenly. Wet the butt edges of the baffle all around and, for good measure run a thin, extra line of glue in the bottom of each V and in the bottom of the rectangular groove.

This done, slip the baffle into position,

PEERLESS PAS100 3-way Loudspeaker System



Assistant Editor Greg Swain shows how a typical pre-cut cabinet kit goes together, with the top of enclosure on the floor. In this way, the corner joint will normally be out of sight.

tweeter end down and rebated face to the front, without pushing it too hard into the groove. Now fold the sides and bottom carefully up around it, allowing the baffle to slip into its natural position, without straining either "hinge". Bump the panels into place with the ball of the hand, bringing the two free edges tightly together. Hold them in this position with as many strips of adhesive tape as seem necessary.

Wipe away the surplus adhesive which will have been squeezed from the joints and put the enclosure aside overnight for the joints to set hard.

The second enclosure can be assembled

in a similar manner.

If you want to be doubly fussy, prop the two enclosures so that they are resting on one edge. Run a line of glue on the inside of the joint, bridging the side and bottom. Allow the glue to dry and repeat the procedure for other edges to ensure an airtight seal.

Next, the back can be inserted and glued in position, but not before securing a brace with suitable cleats, to run between baffle and rear panel (as shown in our diagram). Then fix the rear terminal panel in place, making sure that the connecting wires are attached.

Now attach the crossover network

PC board to the underside of the brace mentioned previously and attach the leads from the tweeter and rear terminal panel. These merely push on. A diagram supplied with the PC board shows how the connections are made.

Mounting the tweeter is straightforward. Just fix the connecting lead to it. Drill the four pilot holes required for the self tapping screws, run foam tape around the rebate for sealing and drop the tweeter into place, having first attached the connecting leads. Then screw it down.

Next, push about half of the supplied filling material (Danfil or bonded acetate fibre) into the top section of the enclosure and make sure that it occupies the space evenly.

Follow the same procedure as for the tweeter when mounting the midrange unit. If you wish to incorporate the optional midrange attenuator network, wire it across the back of the midrange unit, as described previously. Connect it to the crossover PC board.

The woofer is held in place by means of four screws and four small metal brackets. Once again, drill pilot holes for the screws and run foam tape around the woofer rebate to aid sealing. Now push the rest of the acoustic filling material into the enclosure, making sure that it will not pack around the woofer. Then connect the wires from the woofer to the crossover PC board and fix the woofer in place.

All that remains then is to fit the grille cloth frame. Probably the simplest way to do this is to use Velcro fastenings.

After that, you can relax and enjoy the results of your handiwork.

Where do you buy these kits. Initially, in Sydney, they will be available from Electronic Agencies, 115-117 Parramatta Road, Concord, Phone (02) 745 3077. In Melbourne, contact G.R.D. Group Pty Ltd, 698 Burke Road, Camberwell, Phone (03) 82 1256.