Building Quality DIY Mains Power Leads
Neville Roberts

As one progresses up the Hi-Fi ladder towards the unattainable goal of perfect realism, upgrades become harder to quantify in terms of measurable improvements and one increasingly relies on subjective analysis of the changes achieved, if any. One area to which this applies is the field of mains power leads. Having noticed some correspondence on the Hi-Fi World bulletin board on this subject I thought I would share my experiences, together with a low-cost alternative to expensive ready-made cables.

A few years ago, a friend lent me a mains cable he had purchased from a supplier of quality cables and invited me to try it. This was still in my 'transistor' period and I was somewhat sceptical of them being worth the money anyway. After a trail period, I concluded that I couldn't detect any difference with the cable and returned it to my friend, with my bank balance intact! However, time passed and my transistor amplifiers were gradually replaced with valve equipment in the form of a WAD K5881 Mk II and the WAD Series II Modular Pre-Amp. Following various component upgrades, I was again pressed to try a quality mains lead. This time, to my dismay, I really could detect a significant improvement - tighter, cleaner bass, open treble with better imaging. Rats!

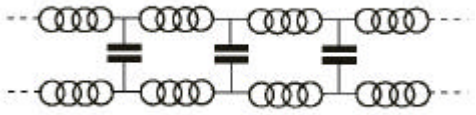

Figure 1. Power Lead Equivalent Circuit

However, I thought that there should be no reason why I could not construct a power cable of comparable quality myself, and at a fraction of the cost. My reasoning was that there must be two main factors that contribute to this significant improvement. One would be the lower resistance and higher power handling capacity of the lead and the other some sort of filtering effect. A lead is essentially a transmission line for the power with series inductance and parallel capacitance distributed along the length of the lead, and this must act as an RF filter (Figure 1). To increase this effect and lower the resistance of the resultant cable, I chose to use 6 pairs of 14/.0076 wire (or 14/.2 for you metric buffs!) conductors, twisted together, and a length of 32/.2 earth lead. Each pair is rated at 3A, so the resultant cable would be 18A.

I then turned my attention to how I was going to twist the conductors together. My thoughts were to twist pairs of blue and brown wires together and then plait the six pairs around the earth conductor. For advice on how to plait wires, I decided to consult an expert in this field - my 13-year-old daughter! I was duly shown how to plait three wires to make a flat ribbon. I would then wrap the two ribbons around the earth lead. The resulting 'Emma Weave' cable was duly constructed, but it soon became clear that the earth wire refused to stay inside the ribbons despite my attempts to bend the ribbons around it.

The second attempt involved arranging the six pairs of wires radially around the earth wire and plaiting three pairs together once, then moving to the next three and so on around the wire in an attempt to envelope the earth lead. Alas, this turned out to be more complicated than it seemed and after about half an hour and about six inches of completed cable later, I abandoned this approach!

Finally, I settled on the following technique. I individually twisted together 6 pairs of blue and brown by knotting a pair together at each end, slipping one end over a door handle and threading a pencil through the other end. The best way I can describe the process is by holding the cable taut in my left hand, I twisted the cable by 'winding up' the pencil as if it were a propeller on a rubber band powered model aeroplane! When complete, a final tug on the wire meant that it stayed twisted together after removing from the door handle. I repeated the process with the remaining five pairs of blue and brown conductors. Finally, I taped the six pairs of wires around a length of earth wire and then proceeded to twist the pairs around the earth wire. This resulted in the cable shown in Figure 2 and a pair of very sore hands! I would recommend gloves for this in future.

Figure 2. Power Lead Construction

I required 3 leads (one for the power amp, one for the pre-amp and one for the distribution box supplying power to all the equipment). The lead lengths I required were 1m, 1.5m and 2m. I therefore used 40m of blue, 40m of brown and 5m of green/yellow which will make about 5m of finished mains cable. Having cut the cable and some sheathing to the required length I set about the task of feeding the resultant cable into some 1cm diameter sheathing. This involved tying a length of nylon string to one end of the cable, threading the string through the sheathing, attaching the other end to a fixed object (a chair, door handle, the wife, etc.) and pulling the sheathing over the cable. Not an easy job, and in hindsight I would have used some sort of lubricant such as silicone grease or some 'Sleeve Oil' available from Maplin for the purpose.

Figure 3. Wiring the 13A Mains Plug

I separated the blue and brown leads at each end, twisted the six brown and six blue leads together and soldered them up to make 1 'solid' wire that just fitted into the holes on a 13A mains plug (Figure 3). I did a similar thing at the other end, but removed the fixing screws in the 3-pin IEC Euro socket ('kettle' plug) and soldered them in, as shown in Figure 4. I removed the cable restraints as the sheathing makes a very neat job and just fits snugly into the plugs and sockets anyway. Although the twisted cable is not as

Figure 4. Wiring into the IEC Plug

neat as commercially available products, this doesn't matter as the sheathing makes the final cable look very professional (Figure 5) and it is the sound quality that counts. I obtained the wires, plugs and sheathing from Maplin and the whole lot, including VAT and postage, came to just over £27 for my three cables - and you can choose you own colour for the sheathing!

Figure 5. A Finished Power Lead

You will notice that I have chosen to use a 13A fuse in the mains plug. All of my equipment is individually fused with appropriate fuses and I therefore decided that it was unnecessary to put a lower rated fuse in the plug from a safety point of view. There is a school of thought that argues that low-rated fuses can have a detrimental effect on sound quality and that all fuses should be replaced with high rated cartridges. I personally do not agree to any compromise on safety, but consider the equipment fuses adequate for the purpose and hence the use of 13A cartridges in the main plugs.

Was all the effort worth it? Absolutely! As I found with the borrowed lead, there was a significant improvement - tighter, cleaner bass, open treble with better imaging and more detail. I must state, however, that I have not been able to carry out any scientific testing of the cable to prove or disprove that it works, apart from basic continuity safety tests with a meter. All my comments are purely subjective; it just seems to work well. Do take it from me as a converted sceptic, it really does work, and at the price, you can't go wrong.

--ooOoo—