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## Electrical safety and fuses

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### ELECTRICAL SAFETY & THE ¼" WHIT FUSE !

A quick look at the photo below will show the meaning of the heading of this article. It shows that the conventional 13amp fuse has been replaced by a piece of a bolt; it could be M6 or Whitworth, but that is irrelevant.

I came upon this gem when I was asked to look at an item of workshop equipment recently purchased, second-hand, by a friend of mine. The power cable was cracked and split in places and since it was too long, I was asked to cut out the damaged part and reconnect to the equipment. I was a little concerned since I felt the cable was larger than that normally connected to a 13amp plug. The damaged part of the cable was taken out, this often happens with old TRC (tough rubber covered) cable, and was reconnected within the equipment. I felt that I should check the wiring within the plug and removing the cover showed the heat damage caused by obvious overloading. Fortunately, there was a 30amp supply in the workshop, and after fitting the appropriate plug the equipment was checked and found to be in working order. The actual current drawn by the unit was 22.5amps.



I once also found a 13amp plug with a paper clip used as a fuse. I estimate that the ¼ Whitworth bolt would have a fracture current in excess of 600amps and the paper clip in the region of 50amps depending on the contact area with the fuse clips. All rather immaterial since most houses have an incomer fuse of 100amps.

Examination of the photo will show the burnt area around the fuse carrier, and the obvious overheating in the general area of the fuse retaining clips, the live terminal, and the sheath around the live wire. There was clearly a serious volt drop at this point due to the high resistance joint which resulted in the generation of heat and the softening of the fuse clips.

The point is, that even though the equipment worked OK there was clear evidence of a fire risk but, more importantly, who knows what damage could have been caused in the house, within a junction box under the floor boards or in the loft space. A slightly loose terminal in dry still air with plenty of dry flammable materials around it needs only the smallest of sparks to create a fire hazard, and a loose terminal can create a spark. At the last time of checking, more than 80% of all fires in houses, offices, shops, schools and, even fire stations, were caused by electrical faults.

The other most important point is that you should always check the rating plate of any piece of equipment and, if it is second hand, have it checked out by an experienced person. The rating plate on this piece of equipment was 5.5kW which at 240 volts is 22.92 amps. Simply divide the watts by volts to give you the current. A 1HP motor under no load conditions will draw 3.125 amps. (The start current could be double this in certain load conditions).

In the second photo you will see another example of overheating caused by loose terminals. This connector block was removed from a 2kW convector heater. The unit was less than 2 years old and was purchased from a DIY store. As with the example described above, this also represented a serious fire risk. The offending unit was installed in my conservatory and the clue to there being a problem was an unusual smell. Many years ago, this problem could often be identified by a smell not unlike that of bad fish on a hot summer's day, with just a hint of bad eggs. The smell with modern synthetic materials is not the same as the bad fish/eggs. The advice is, if you smell something unusual first look in the kitchen and check tonight's dinner, and if all is well, follow your nose and try to trace the smell. By feeling plug tops to see if they are warm can help to identify the source of the problem. If you find a warm plug, have it checked out since there should be no heat generated within the plug top at 13amps.



Check the kitchen again, just in case, and if you can't find the source of the smell or a warm plug top, look at all appliances that are in use and try to eliminate them.

To be really sure and safe, check your smoke alarm. If you don't have a smoke alarm then get one, or two, or three if necessary. Don't install them too close to the kitchen since they will be constantly going off causing nuisance alarms that will probably result in the battery being removed. Ideal locations are the hall, top of the stairs and close to the bedroom door, farthest away from the stairs.

If anybody is interested in obtaining a smoke alarm it is possible that attractive prices can be obtained for quantity purchases.