

## Repairing Domestic Fan Heaters

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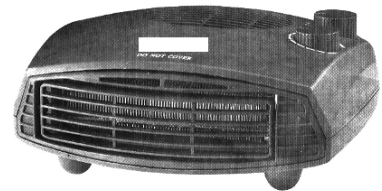
Maybe you've noticed these days that domestic appliances contain more and more plastic and seem to break more often than in the past. They are made by the million in the east and are not designed to be repaired. Being an engineer who can't stand waste, if something breaks, I must pull it apart to see if it can be fixed. More often than not, it can be, and the repair is a simple one.

**Safety first: Before opening any electrical appliance, you must have an appreciation of the hazards you are exposing your self to. Also you must be sure that you can make the repair safely, and that the item does not become dangerous as a result. If in doubt, before you close up the item, ask the advice of a competent person, or bring it to the club for some free (and sometimes conflicting) advice.**

In particular, domestic fan heaters seem to become more and more flimsy and plasticky. The main problem with a fan heater is that it gathers dust, which obstructs the airflow and it over-heats. As it ages, the fan also slows down and the element overheats.

In the past, these were made with a metal casing, and the element was supported on ceramic insulators, so even in the event of the element becoming red hot, it would just make a bad smell as the fluff carbonised. Eventually, the thermal cut-out would trip and the heater would sit there sulking and making bad smells – serve you right for neglecting it.

Nowadays, at the first hint of fluff, it overheats and the thermal fuse blows. It then sulks and is completely uncooperative. Modern designs are mostly plastic, so to make the heater safe, all sorts of thermal cut-outs are required to prevent the real possibility of a fire. Because heaters normally pick up fluff during use, it is inevitable that it will loose enough air flow to overheat internally. Then the thermal cut-out fuses and it stops working, dead!



Most units have a thermostat which can be used to set the temperature, and it turns itself on and off cycling around the set temperature. The minimum temperature setting is usually close to zero, so it can be used to prevent a room from freezing. Freezing is not usually a problem in South Africa, but can be very useful in cold climates as freezing causes all sorts of damage inside a room. If you turn the thermostat down and up, you should hear it click on and off. If the heater seems to be dead, check that the thermostat is not set down.

If the unit seems to be dead, first check that there is power at the socket, by plugging in something else, such as a lamp. If there is power then the thermal fuse has probably blown. The thermal fuse looks something like the picture.

This picture is about twice actual size. It contains a fusible link that melts at a defined temperature, to interrupt the power in the event of overheating and make the heater safe.



The problem is that any momentary overheating can cause this, and then the heater has to be repaired or discarded. The cost of a repair vs a new replacement unit is such that it is usually dumped, which is a waste.

The temptation when repairing the unit is to simply bridge out the fuse, which is not a good idea, as the heater can then become unsafe and start a fire. The fusing temperature of the last heater that I repaired was 121°C as per the marking on the fuse. This unit simply failed. I was in the room when it did and there was no apparent reason for the failure.

Replacement thermal fuses are about R7-00 each from RS Electronics <http://za.rs-online.com> and these are the genuine items, so you will not compromise safety if you replace with one of these. AP Electronics in Commissioner Street, Fairview may also keep these fuses.

If your heater is dead, and you wish to repair it, unplug it first before opening it up. Use a continuity tester to follow the connections from the plug through the wiring to the various parts of the heater. Be careful not to disturb the heating element as these can be very delicate, and it is easy to cause a short and make further mischief. Check continuity of the fan motor, the elements and the various switches, and by a process of elimination, you are likely to find an open circuit. It is possible that fluff can become trapped between the contacts of a bimetallic cut-out switch positioned next to the element, interrupting the circuit. This is simple to remove with a piece of paper. If the fluff was hot, it may have even melted onto one of the contacts. Use some P600 water paper to clean up the contacts.

Another source of an open circuit is a component that looks like the picture above. You will see that the leads are crimped and not soldered. This is because soldering would overheat it and then it would fuse. To replace it, I cut off the leads and soldered in a new one, using long nose pliers to grip each lead in turn. The pliers act as a heat-sink to conduct heat away.

If you remember germanium transistors, you will remember having to use this technique to avoid overheating them. If you can keep your finger on the body of the fuse without being burned, then you can be sure it will be safe during soldering. Once it is soldered in place, check continuity. If it is open, then you overheated it – try again – it took me two attempts on the last one I replaced. I used a 142°C fuse in place of the 121°C original, for some additional margin, but still remaining safe.

With the heater still open, I plugged it in and confirmed that it was operating. You need to be careful when you do this – check it carefully. There are moving parts – the fan, high voltages and hot elements – all hazards. Make sure nothing is interfering or touching where it shouldn't. Turn the heater switch to the fan position, then plug it in and switch it on at the plug and off again. Then try the remaining positions and confirm all is OK. Check for overheating elements and melting insulation before switching off, unplugging and closing up. Check for fluff, and blow out any that you see, being careful not damage the delicate element.

It takes longer to describe than to do this repair. New fan heaters are R200- and up, and you have the pleasure of avoiding waste in exchange for some time.

**However, you must know what you are doing – if you are unsure, ask a competent person. An electrical heater is a potential electrical shock hazard, burn hazard, and a potential fire hazard.**

**Avoid leaving a heater unattended – it can burn your house down. Be particularly careful in your workshop – wood shavings are very easy to ignite and are highly flammable.**