

Appendix C Thermographic survey

A thermographic survey of a sample of the houses in the York Energy Demonstration Project was carried out by EA Technology on 10th March 1993. The equipment used was an AGEMA 870. Because internal conditions in the houses could not be controlled, and because of the time available, this survey did not produce detailed numerical results. It did however provide a graphic illustration of a number of issues that are frequently raised when existing houses are thermally upgraded.

Summary of external conditions.

| | |
|----------------------|-----------------|
| External Temperature | 6.1-6.8 °C |
| Weather conditions | still, overcast |

The Chapelfield houses.

The first two pages of photographs were taken at Chapelfield A and B. The infra-red images of the front elevations of both properties show the large heat loss through the front doors. All doors used in the York Energy Demonstration Project were single skin tropical hardwood, with single glazed inserts. The U value of the opaque parts of these doors varies between 2 and 3 W/m²K, while the single glazed portion will have a U value of around 5.7 W/m²K. The doors installed in the 4 houses tended to warp, rendering the draught proofing largely ineffective. The single glazed inserts in doors show up as the warmest external elements in all infra-red images, and the opaque sections of the doors are significantly warmer than the adjacent double glazed windows. In heat loss terms, the letterbox on Chapelfield A appears to outperform the rest of the door.

Cold bridging around the front doors is masked by an external timber architrave, but examination of the images appears to show the effects of cold bridging around the windows. The resolution of the IR camera was not sufficient to show the heat losses at the edge of the glazing units.

It was possible to gain access to Chapelfield B. One of the features of this house is the sloping section approximately 200 mm wide at the edge of the first floor ceiling. It was impossible to insulate this part of the roof, and the effects of this can clearly be seen in the infra-red photograph taken from the inside of the bathroom. In this image the ceiling below each rafter shows up as warmer than the surrounding ceiling because of the additional insulation provided by the timber rafter.

The Bell Farm houses.

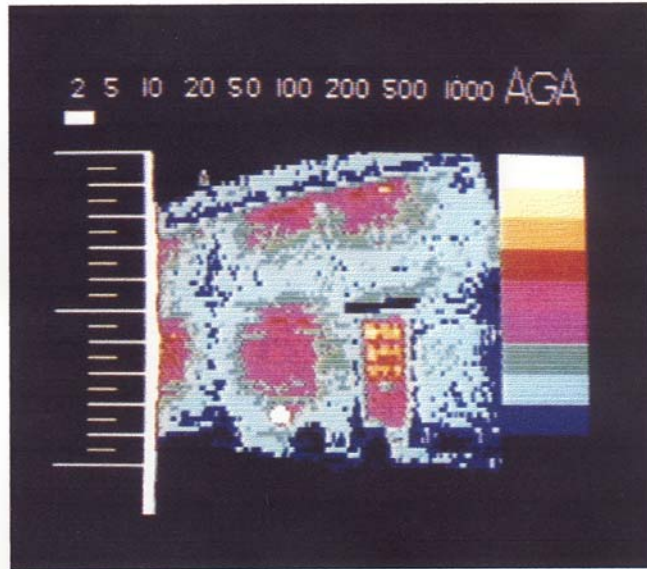
The third page of images was taken at the Bell Farm houses, and tells much the same story. The front door of Bell Farm A shows up as a major source of heat loss. The U value of the opaque parts of this door appears to be almost as high as that of the single glazed insert.

The infra-red images again suggest cold bridging around doors and windows (the doors in these houses are not surrounded by architraves as in the Chapelfield houses). The close-up of the ground floor rear window of Bell Farm A shows a significant area of additional heat loss below the window cill. This is not being caused by a radiator on the other side

of the wall, since this house has a ceiling mounted warm air heating system. Our only explanation is that the wall insulation is partly or completely missing at this point. This close-up shows the heat loss effects of the window frames, which appear significantly warmer than the glazing. The additional heat loss at the edge of the glazing units can just be seen at the bottom of the centre light of this window.



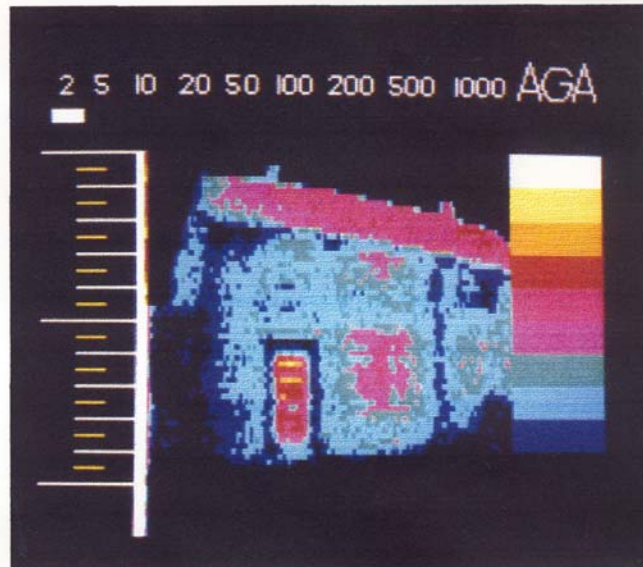
Chapelfield B from front.
Photograph for reference.



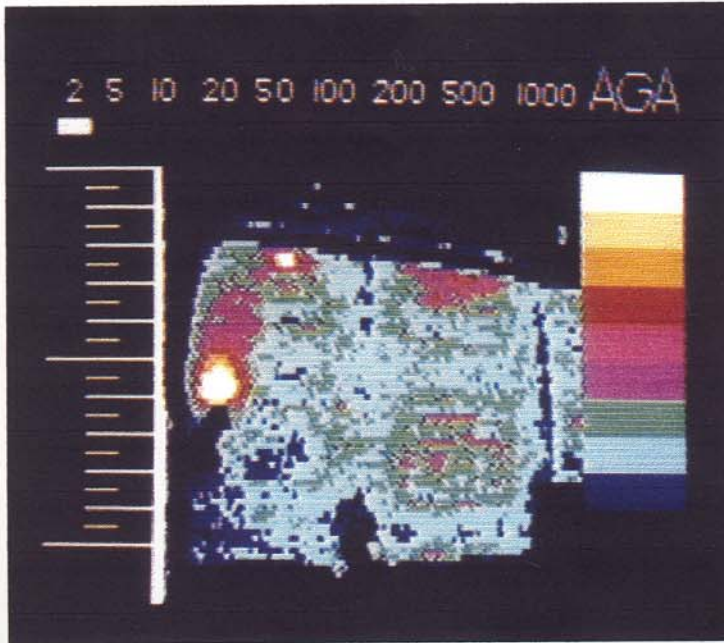
Chapelfield B from front.
IR photograph showing heat loss from windows and front door.



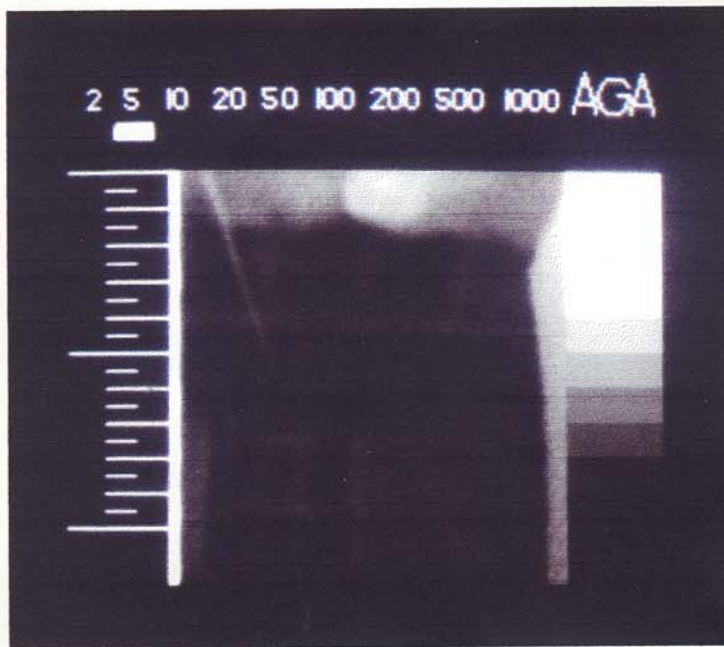
Chapelfield A from front.
Photograph for reference.



Chapelfield A IR from front.
Note heat loss through uninsulated single glazed front door.



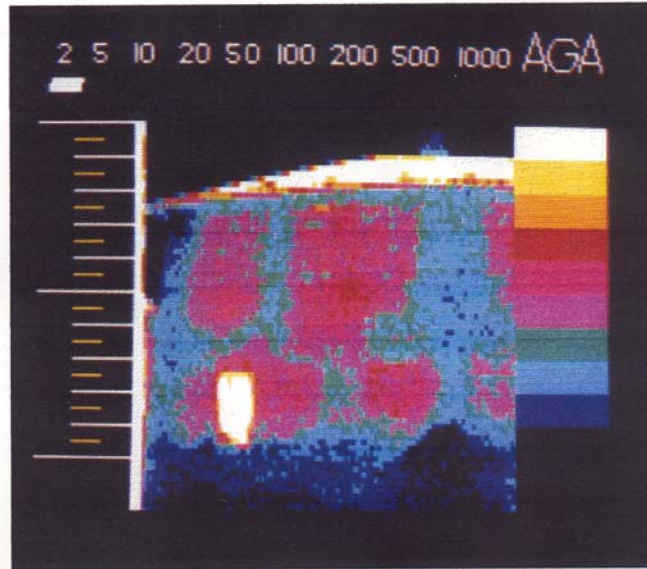
Chapelfield B IR photograph of back.
Note image of multi-point heater flue.



Chapelfield B IR taken from inside bathroom.
Note cold bridging through sloping section of ceiling with rafters clearly outlined.



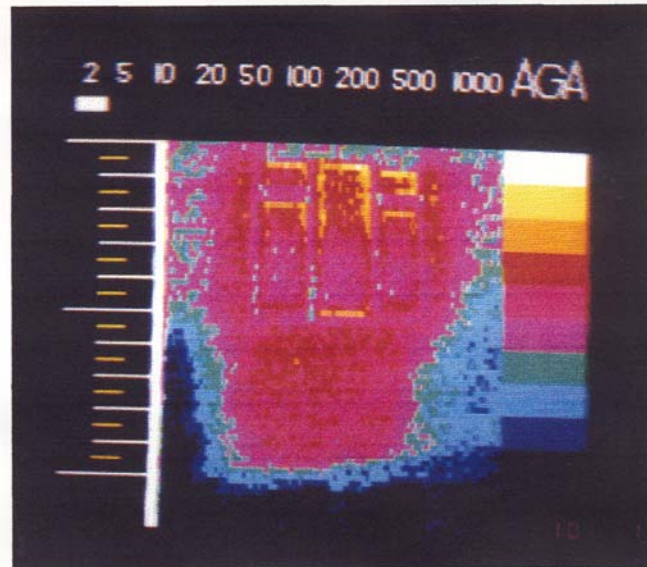
Bell Farm A from front.
Photograph for reference.



Bell Farm B IR from front.
Note heat loss through uninsulated single glazed door.



Bell Farm B window.
Photograph for reference.



Bell Farm IR of rear window.
Additional heat loss at edge of glazing units,
and cold bridging through masonry around
window is visible.