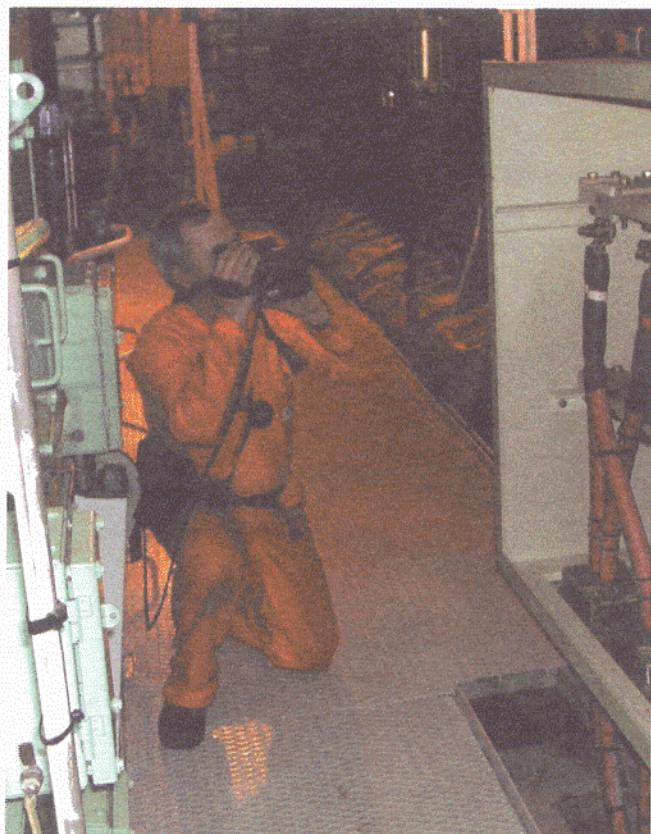


the electric component's emission of heat, and the exact temperature can be read from the photograph. Inexpensive adjustments to the electrical installations can be made before a short circuit and the consequences of a fire occur. For instance, Norwegian electric power stations are regularly having extensive thermographical examinations carried out to secure their installations.

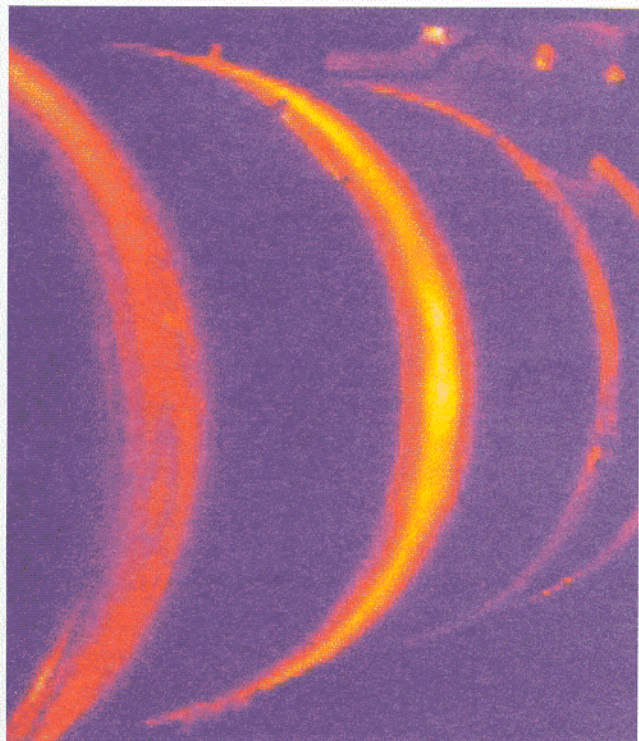
Due to its ability to discover weaknesses in the electrical installations, shipowners may consider including thermographical examinations in newbuilding specifications and have such tests carried out during sea trials. Any defect then found is for the shipbuilder to correct, but if revealed by a fire outside the guarantee period, the then much higher price is the owner's own to pay. It follows from the above, that a thermographical examination of the engine room and the vessel's electrical installation should be carried out with engines and electrical equipment running. Some examination can be done at the quay, but the operator will need to follow the vessel on a short voyage for full benefit.

Some shipowners have hired operators at around USD 1,000 a day, which is really very reasonably priced. One Gard member took an operator on board a vessel in Gibraltar and he followed the vessel to Rotterdam where it was to dock for repairs. The findings, some of a quite critical nature, were included in the repair specifications for immediate attention. Another Gard



Courtesy: Teknisk Assistanse, Kristiansand.

To ensure the quality of service, operators of thermographical equipment should be certified by the competent authorities. In Norway certification is carried out by DNV and NEMKO. Above, a thermographer in action.



The thermophoto of the exhaust manifold of the main engine shows a maximum temperature of 250°C. The manifold should be checked for exhaust leakages and the insulation should be improved upon.

member, Color Line, the largest passenger ferry operator in Norway, has hired thermographic camera operators to check the electrical installations on board their ships since the early 1990s. Since the fire on board the "PRINSESSE RAGNHILD" in 1999, caused by a burst fuel oil pipe and a hot spot, they have also introduced a regular thermographic examination of hot surfaces.

There are probably some advantages in the hiring of camera operators rather than buying equipment to be used by the crew: the hired operator will be more strict and careful in his work, and at least in Norway he is approved by authorities on electrical installations. He will deliver good and clear reports and recommend actions to be taken. Such reports may be used by owners to demonstrate that they pay close attention to maintenance and to the safety of the vessel.

In addition to thermographic cameras, there is also infrared thermoscanning video equipment on the market, costing around USD 50,000. However, the still pictures of the reports by thermographic camera operators are so illustrating and easy to read, with both a normal photo of the item examined and an infrared picture showing the temperatures, that it is probably the most useful. ■