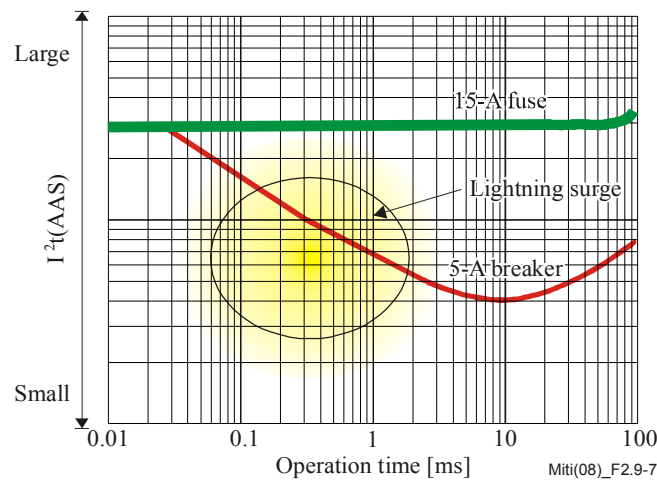


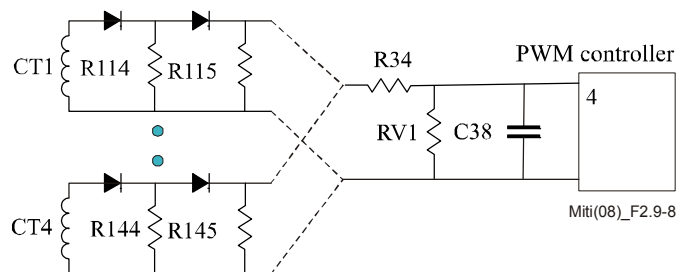
## Mitigation method

This malfunction was caused by two mechanisms. One was the lightning surge current flowing into the circuit breaker when MOV3 operated. In the field, the 15-A fuse did not break often, but the breaker did trip. The relationship between the lightning and operation time is shown in Figure 2.9-7. A new circuit breaker, whose characteristics at the AC mains frequency were the same, was developed and the response characteristics to lightning were improved.

The second mechanism was the malfunction of the pulse width modulator (PWM) controller, which has an overcurrent latch circuit consisting of a current transformer and filter circuits, as shown in Figure 2.9-8. The filter circuits (e.g., R114, R115, R34, RV1, C38) were from different manufacturers. In particular, R114 and R144 determine the sensitivity of CT1 and CT4, so their resistances were set smaller, and this improved the immunity level against lightning surges.



**Figure 2.9-7 – Operation time and energy**



**Figure 2.9-8 – PWM controller and filter**