

Circuit Breaker Problems

Most circuit breaker problems are due to loose electrical connections; however, there are some inheritance problems with specific brands of circuit breakers.

When a circuit breaker trips, it releases a cocked spring mechanism that separates the electrical contacts. Circuit breakers have two means of tripping:

(1) An electromagnet that trips almost instantaneously when the current is between nine (9) and 15 times the rated current of the circuit breakers (USA),

and

(2) [A temperature sensitive bimetal strip that bends](#) and releases the spring mechanism at a calibrated temperature. Usually, the temperature of the bimetal strip is proportional to the amount of current passing through the circuit breaker. However, the bimetal strip will react and bend to any rise in temperature. The rise in temperature may be due to a loose wire connection, misalignment of the circuit breaker contacts, or the heat from a fire.

Circuit breakers are sized to protect the integrity of the wire insulation; they are not sized to protect human life.

If a circuit breaker is over loaded to a value of 135% it rated current, it must trip within one hour.

If a circuit breaker is over loaded to a value of 200% it rated current, it must trip within two minutes.

Tripped Position

All circuit breakers do not trip to the center position. The following circuit breakers do not have a center position, and they trip to the "off" position: Cutler Hammer, Bryant and Murray.

Square D Circuit Breakers with Red Indicator Flags

For Maximum Resolution, Click on the Body of the Picture.



Two Square D Circuit Breakers were placed in an Oven.
The Lens melted at 450°F; the Breaker Tripped at 550°F.



The Plastic Lenses are intact. The Circuit Breakers in this Panel tripped because of
Electrical Activity and not the Heat of the Fire.



The Plastic Lenses in this Panel are starting to melt.
The Heat of the Fire could have tripped the Circuit Breakers.



Exemplar Square D Circuit Breaker with Clear Plastic Back.

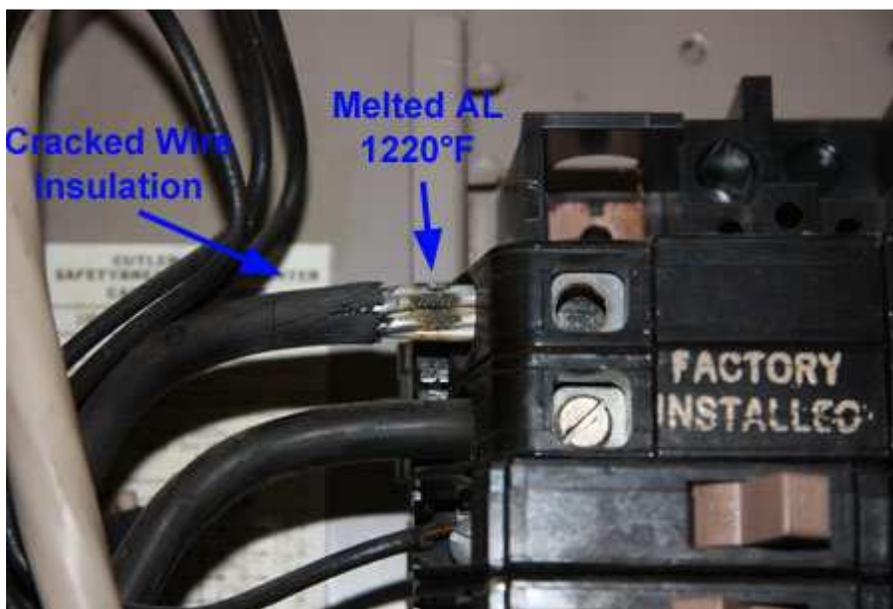
Cutler Hammer Circuit Breaker Overheating Due to a Loose Wire Connection

For Maximum Resolution, Click on the Body of the Picture.

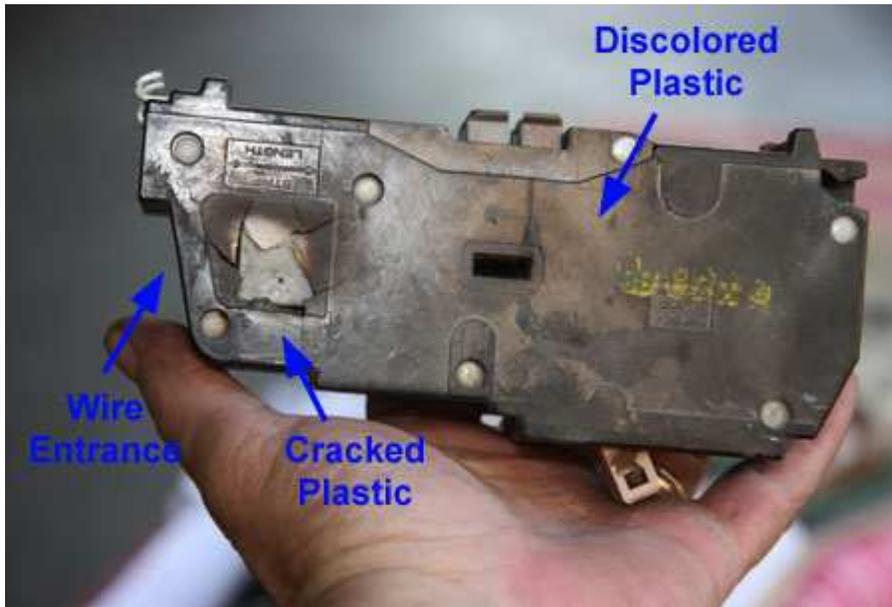
When a tree limb fell, there was structural damage to this homeowner's weatherhead and meterbase. After repairs were made, the homeowner complained that his lights were blinking and the dryer circuit breaker was tripping. The inside electrical distribution panel was directly behind the meterbase. It is possible that when the weatherhead moved, it pulled the conductors feeding the inside panel box; it is also possible that this problem existed long before the tree limb fell.



Heat on a Screw will cause it to Oxidize or Rust (F09-028).



The Heat from the Loose Electrical Connection has cracked the Wire Insulation and the Aluminum Conductor is starting to melt (F09-028).

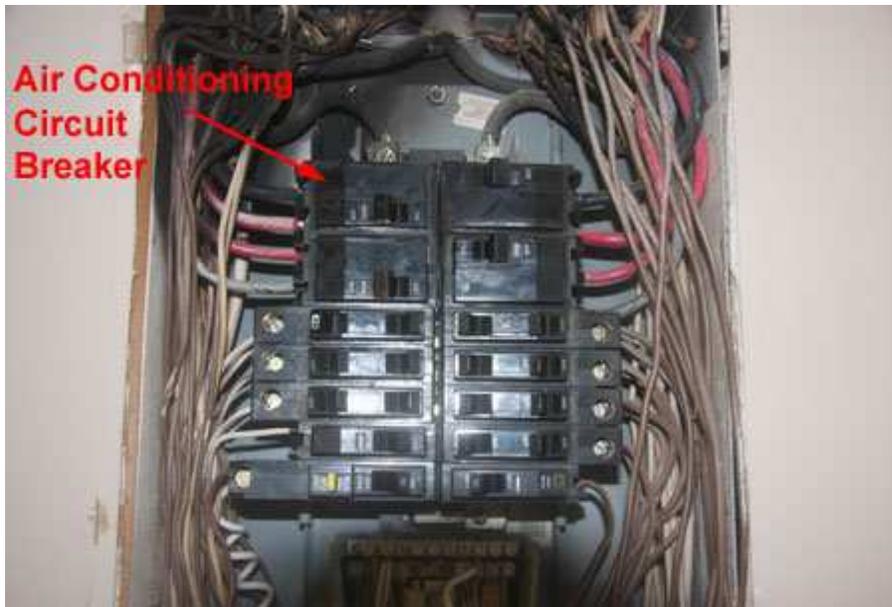


The Plastic on the Bottom of the Circuit Breaker was Cracked and Discolored (F09-028).

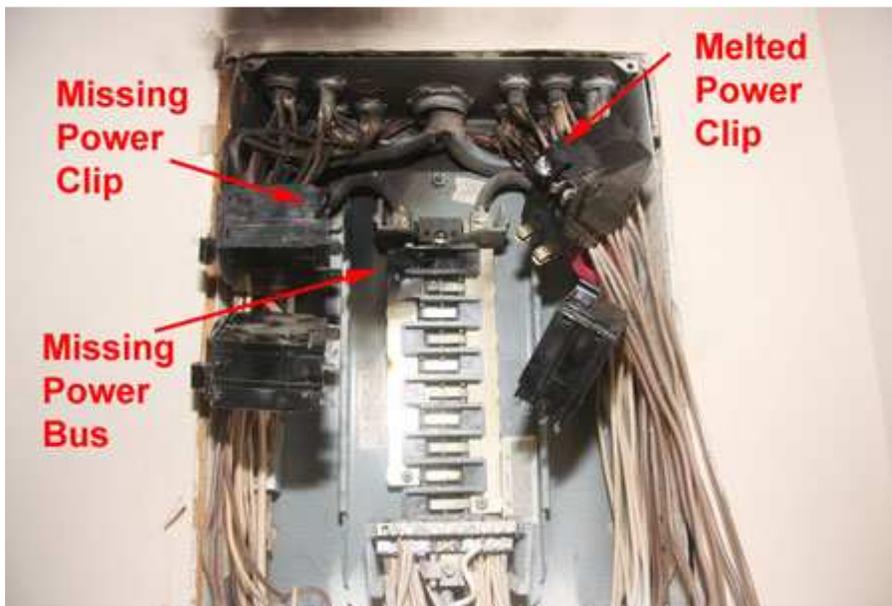
Square D - Circuit Breaker Damage Due to a Loose Connection at the Power Bus

For Maximum Resolution, Click on the Body of the Picture.

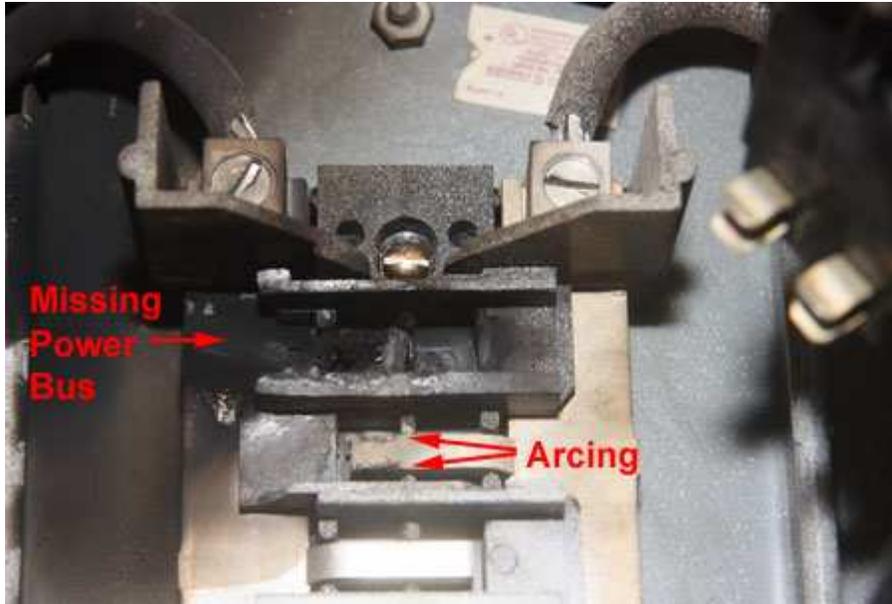
The day before this fire, the homeowner heard a cracking sound whenever the central air conditioning came on. The next day, a small fire occurred when an electrician was tightening the screws in the panel box.



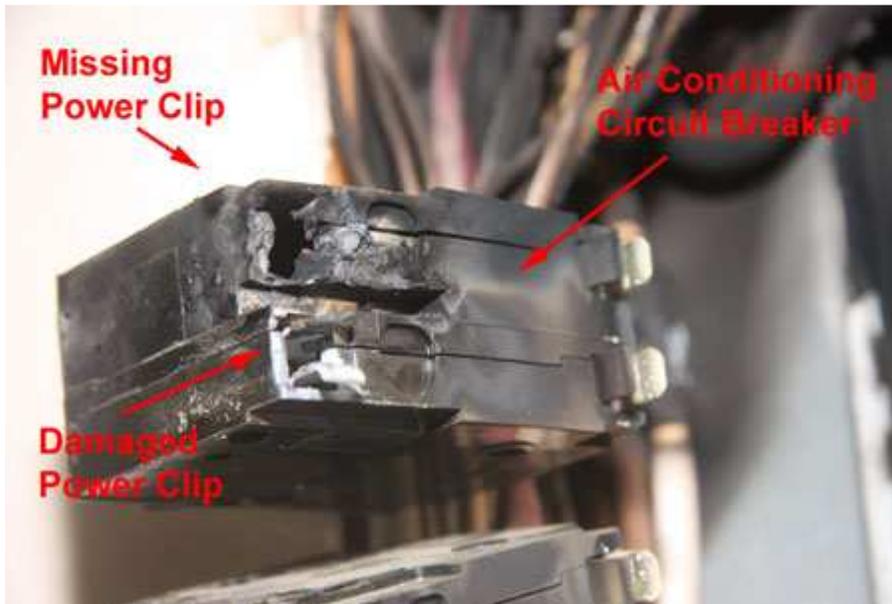
Looking at the Front of the Electrical Distribution Panel, there appeared to be no Damage (F09-045).



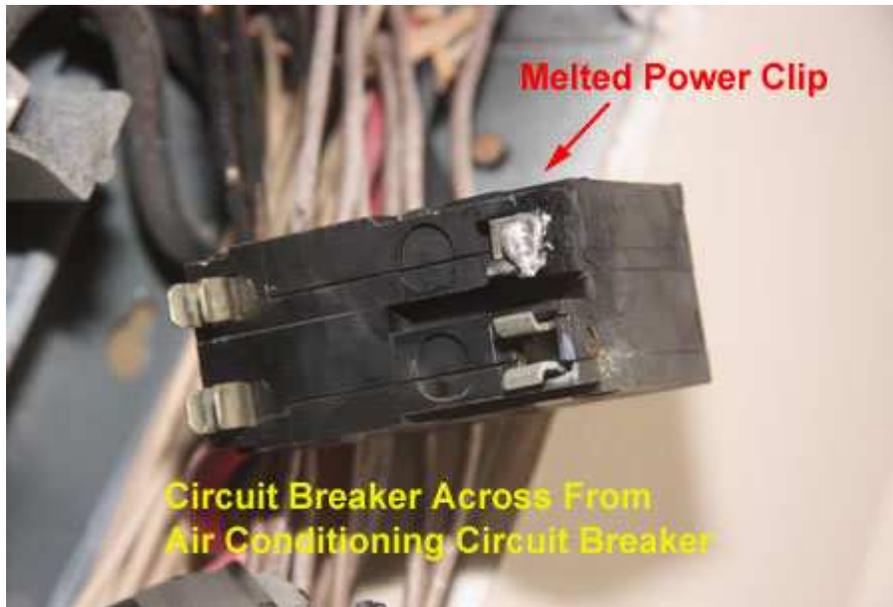
One of the Power Clips on the AC Circuit Breaker was Missing, Part of the Power Bus was Missing and Melting of a Power Clip.



Missing Power Bus and Arcing on the Power Bus Immediately below the Missing Bus (F09-045).



Missing Top Power Clip and Melting on the Bottom Power Clip of the AC Circuit Breaker (F09-045).



The Circuit Breaker Across from the AC Circuit Breaker shared the same Power Bus, and its Top Clip was melted (F09-045).

GE Circuit Breaker Overheating Due to Misaligned Contacts:

For Maximum Resolution, Click on the Body of the Picture.

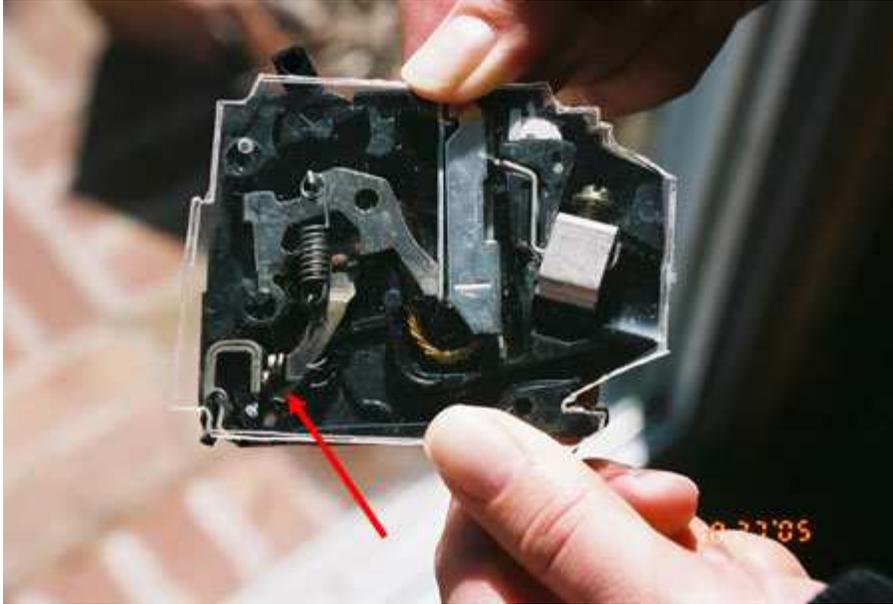
A one-half size GE circuit breaker was repeatedly tripping at a RV hookup. The paper barcode on the circuit breaker had started to turn brown. The problem was traced to the contacts inside the circuit breaker being misaligned.



No Continuity with GE Circuit Breaker in "ON" Position.



Brown Area on Barcode Label Indicating Excessive Heat.



GE Circuit Breaker with Cover Removed - Contacts Not Aligned.



Side View of GE Circuit Breaker with Misaligned Contacts.

Zinsco Circuit Breakers

Zinsco circuit breakers are notorious for arcing and welding to the aluminum power bus. Even though this homeowner worked for an electric utility company, he allowed

the electrician to bypass the bad spot in the bus without replacing it. The first time I tried to remove Zinsco circuit breakers from a panel box, every circuit breaker in the panel box was tack welded to the power bus.

For Maximum Resolution, Click on the Body of the Picture.



Zinsco Panel Box with Missing Circuit Breaker (F09-026).



Zinsco Panel Box with Cover Removed (F09-026).



Damage to Power Bus as a Result of Arcing (F09-026).



Melting on the Zinceo Power Bus as a Result of Arcing (F09-026).



In 1973, Zinsco was Purchased by GTE-Sylvania (F10-007).

References: <http://www.inspectapedia.com/electric/Zinsco.htm>