The following are 2 articles that relate to Federal Pacific "Stab-Lok" electrical panels and cautions about them. There are many of these panels in use but some real concerns about them are present. The CSPC has investigated the panels and found that there were not enough problems to warrant a recall.

Federal Pacific Electric Panels: Fires Waiting to Happen, Debate Waiting to Be Ended

Federal Pacific Electric "Stab-Lok" service panels and breakers are dangerous and can fail, leading to electrical fires. The problem is that some 240-Volt FPE circuit breakers and possibly also some 120-Volt units simply may not work. [NOTICE: 11/10/95 A paraphrase of this article was been posted on Internet in 1995]--Dan Friedman

It has been suggested that there are as many as 28 million of these breakers in use in the U.S. which means that in some conditions as many as one million of them may fail to provide proper fire protection.

But where are they? Most homeowners whose houses are served by these panels are unaware of the hazards. So too are some inspectors and contractors. Because most homeowners do not order periodic electrical safety inspections, the presence of these panels is often undiscovered until an inspection made in the course of renovating or selling a property. Our field experience indicates that even when problems occur with this equipment, often it is simply removed or replaced with little publicity. Neither manufacturers nor some electricians are inclined to frighten consumers.

These breakers can fail to trip. At a modest overload (135% of rating) switches that had never been touched (never mechanically switched) were energized on both poles. These failed 25% of the time, followed by a lockup that meant the switch would never trip in the future at any overload. Once these switches had been flipped on and off (mechanically energized), failures increased to 36%!

Worse, when individual poles on these switches were energized under the same conditions, 51% of the "virgin" switches failed, and for switches that had been mechanically energized, a whopping 65% of them failed!1

When a circuit breaker will not trip in response to an overload there is a risk of fire.

Homeowners and renovators who encounter these panels should consider replacing them with new equipment.

But identifying one of these defects can lead to an argument and in some cases, even lawsuits! For example, a knowledgeable inspector or contractor observes one of these panels and recommends replacement. An owner or another inspector, unaware of the background, refuses to cooperate, and insists there is "no problem." Who's right?

There is indeed "a problem." FPE panels and circuit breakers are a "safety-related defect." In some conditions the equipment may not provide the safety protection (against fire) that was intended.

This defect is associated with FPE panels and circuit breakers manufactured in the 1970's and possibly extending to current equipment. Testing was performed in 1982-3 by Wright Malta Corporation for the US Consumer Product Safety Commission.

What actually happens to cause unsafe conditions? Testing performed on FPE 2-pole (240V) circuit breakers indicated that in some overload conditions, particularly when one pole of the breaker is overloaded, the circuit breaker will not trip. Some tests showed that as many as 65% of the circuit breakers would malfunction.

Once this malfunction has occurred the breaker is "locked" and it will not trip under any circumstances, creating an even more serious fire hazard.

Are there real-world instances in which a current overload occurs on just a single "leg" of a 240-Volt circuit? Sure. At least some **clothes dryers and electric ranges** split the 240-V delivered to the appliance to run individual components such as a dryer drum motor or individual heater elements. **Multiwire branch circuits** which share a common neutral wire also serve different loads in a building.

Special Notice: Multiwire Branch Circuits - warning: to avoid overheating neutral wire and shock hazards involving multiwire branch circuits, it is important to assure that each of the individual circuits is on opposite poles (in the panel) from the other. In most panels this is accomplished, in fact forced, by using a 240-V common-trip-tie breaker (ganged together switches) which forces individual circuits onto opposite poles. However in FPE panels, the panel bus design does not provide this assurance. Ref: "Safe Wiring Practice," Rex Cauldwell, Journal of Light Construction, letter March 1995, p.6.

It is possible that there are similar failures among single-pole (120V) breakers. At least one case of a single-pole 120-Volt FPE GFCI breaker which failed to trip has been reported. Furthermore, simply purchasing new circuit breakers of the same type

from the same manufacturer may not correct the problem. And only special FPE breakers fit in the FPE "Stab-Lok" electric panel.

When this issue was examined in the early 1980's, FPE's opinion was that the chances of an overload occurring on only a single pole of a 240-volt breaker were very small. In our view there are some very common real-world examples where single-pole loading in a 240-volt breaker might include failures: multi-wire branch circuits and in electric clothes dryers where one of the heating elements shorts to the steel case of the dryer.

The circuit breakers do not directly cause an electrical fire. Some other failure must occur which in turn causes an overload of the circuit "protected" by the FPE breaker. When the breaker fails to trip in response to the overload it has failed to provide the protection intended, and a fire may result.

Report on FPE Equipment Defects

The following **reports on defects** (non trip and burning) of FPE Stab-Lock Circuit Breakers were obtained from Consumer Product Safety Commission by request, under the Freedom of Information Act:

- "Status Report - Evaluation of Residential Molded Case Circuit Breakers", Wright-Malta Corp., (For U.S. Consumer product Safety Commission, Project# CPSC-C-81-1455), August 10, 1982 (Contains analysis of mechanism of failure of FPE two-pole Stab-Lock breakers.)
- "Failure Analysis of Residential Circuit Breaker Panel", Wright-Malta Corp., (For U.S. Consumer product Safety Commission, Project #CPSC-C-81-1455), May 20, 1982 (Contains failure analysis of FPE Stab-Lock panel that ignited due to failure of buss-bar interconnections in the backside of the panel.)
- "Phase II Report, Evaluation of Residential Molded Case Circuit Breakers", Wright-Malta Corp., (For U.S. Consumer product Safety Commission, Project# CPSC-C-81-1455), March 10, 1984 (Contains experimental analysis of materials, construction, and performance of molded case circuit breakers, including FPE. Lack of corrosion resistance of certain internal parts is considered to be a factor in the failure of the circuit breakers.)
- "Final Report: Calibration and Condition Tests of Molded Case Circuit Breakers," Wright-Malta Corp., (For U.S. Consumer product Safety

Commission, Project #CPSC-C-81-1429), December 30, 1982 (Extensive calibration and functional testing of FPE breakers. Substantial percent failures to trip on overload).

More Information

- Federal Pacific Electric Panels - a Summary of the Issues
- Schneider Canada Federal Pioneer circuit breaker recall
- Reliance Electric Co. Press Release: improper practices used to obtain UL Listing for most of FPE's circuit breakers and notes testing which indicates "possible defects." 1980, Reliance Electric Co.
- Home Inspection Reporting Language and discussion for FPE panels
- Federal Pacific Electric Panel - CPSC press release
- The Home Inspection & Construction Diagnosis Website

Here is the other article

Federal Pacific Electric (FPE) Panels, a Summary

Information for home buyers, home owners, electricians exploring the background of possible hazards associated with Federal Pacific Electric Stab-Lok circuit breakers and service panels.

Federal Pacific Electric "Stab-Lok" service panels and breakers are a latent hazard and can fail, leading to electrical fires. The problem is that some double-pole (240-Volt) FPE circuit breakers and possibly also some single-pole units simply may not work. We also have reports that independent of the breaker problems, there have been panel and panel-bus fires and arcing failures in some equipment. The failure rates for these circuit breakers were significant and are documented in the CPSC study.

Having reviewed documentation regarding this issue, and having discussed the issue with forensic experts in the field, I am convinced that a latent hazard exists where FPE Stab-Lok circuit breakers continue in use. The hazard is worst for double-pole breakers. Published reports of actual tests that were performed indicate that under certain conditions it is possible for one leg of these circuits to attempt to trip the breaker, resulting in a jammed breaker which will afterward not trip under any load condition. I infer from the Commission final press release in 1983 that the

manufacturer and some Commission members were of the opinion that these conditions would not occur in the field.

This may be an erroneous conclusion. Some very common household appliances operate are powered by a two-pole 240V circuit (protected by the type of breaker under discussion) but use two or more independent 120V sub-circuits inside the appliance. Two obvious cases are electric clothes dryers and ranges. If, for example, the low-heat (110V) heater in a dryer were to short to the dryer case, a serious overcurrent would occur on one "leg" of the circuit.

Another wiring practice, using a single two-pole breaker to power a split circuit which uses a shared neutral, such as may be installed in kitchens in some areas, is nearly certain to have each leg of the circuit loaded independently and thus subject to single-leg overloading and subsequent breaker jamming. A breaker which jams and then fails to trip under this condition is, in my opinion, a serious fire hazard.

A careful reading of the CPSC press release of March 3, 1984 suggests that the press release was very careful NOT to conclude that there is no hazard, but simply that the information at hand did not prove the hazard, and that the Commission did not have funds to pursue testing. In this document, the representation that no real hazard exists is made by the manufacturer of the device - not exactly a neutral party, and even that wording is cautious in tone: "FPE breakers will trip reliably at most overload levels."

Consumers should read and follow the Commission's advice regarding circuit breakers. But this advice may be insufficient. The Commission's admonition to avoid overloading circuits and to turn off and have examined devices which seem to be creating a problem is a poor substitute for reliable, automatic, overcurrent protection. It is precisely because dangerous conditions can and do occur without adequate recognition and action by a consumer that circuit breakers and fuses are installed to provide overcurrent protection in the first place.

Therefore it is hardly an adequate "fix" for FPE breakers to just tell consumers to handle these cases manually.

It is possible that some breakers may perform with adequate reliability, possibly those manufactured after the companies discovered safety defects and improper practices in listing the product, and possibly those manufactured in Canada.