

# Theory of Operation for PDI Punch Machines

All PDI paper punch machines use an on demand motor / brake system. After the main power switch is switched on, the controlling circuit board is ready for various commands. If all of the interlock switches are closed, pressing the foot pedal, palm switch or versa switch will start a single cycle. When the foot pedal is pressed, the brake opens and allows the motor to turn freely when power is applied to it. The cycle starts by the motor / brake being energized which in turn drives a gearbox output shaft. The shaft has two cams and connecting rods that change rotary motion into linear motion. The other end of the connecting rods attach to a pusher bar in which the top half of the punching die is mounted to it. The punch die will now move the punch pins into and through the paper. The cycle is complete when the home micro switch has signaled the control board to stop the cycle. The motor / brake is turned off and the machine will come to rest. A slight amount of variation where it stops can be expected which is normal. If the punch pins from the die protrude into the paper opening, then the brake or home switch may be at fault.

There are various configurations of home switches and also motor and brake sizes. There are also different interlock systems on various models. To use the troubleshooting charts properly, make sure you locate the correct model of machine before proceeding.

The controlling circuit board is powered by either 115 volt ac or 230 volt ac depending on model. There is a series of inputs and outputs. The inputs consist of a home switch input, foot pedal input and a die handle-top cover-reverse handle input. Not all machines have the reverse handle interlock or die handle. The outputs consist of only the motor / brake unit.

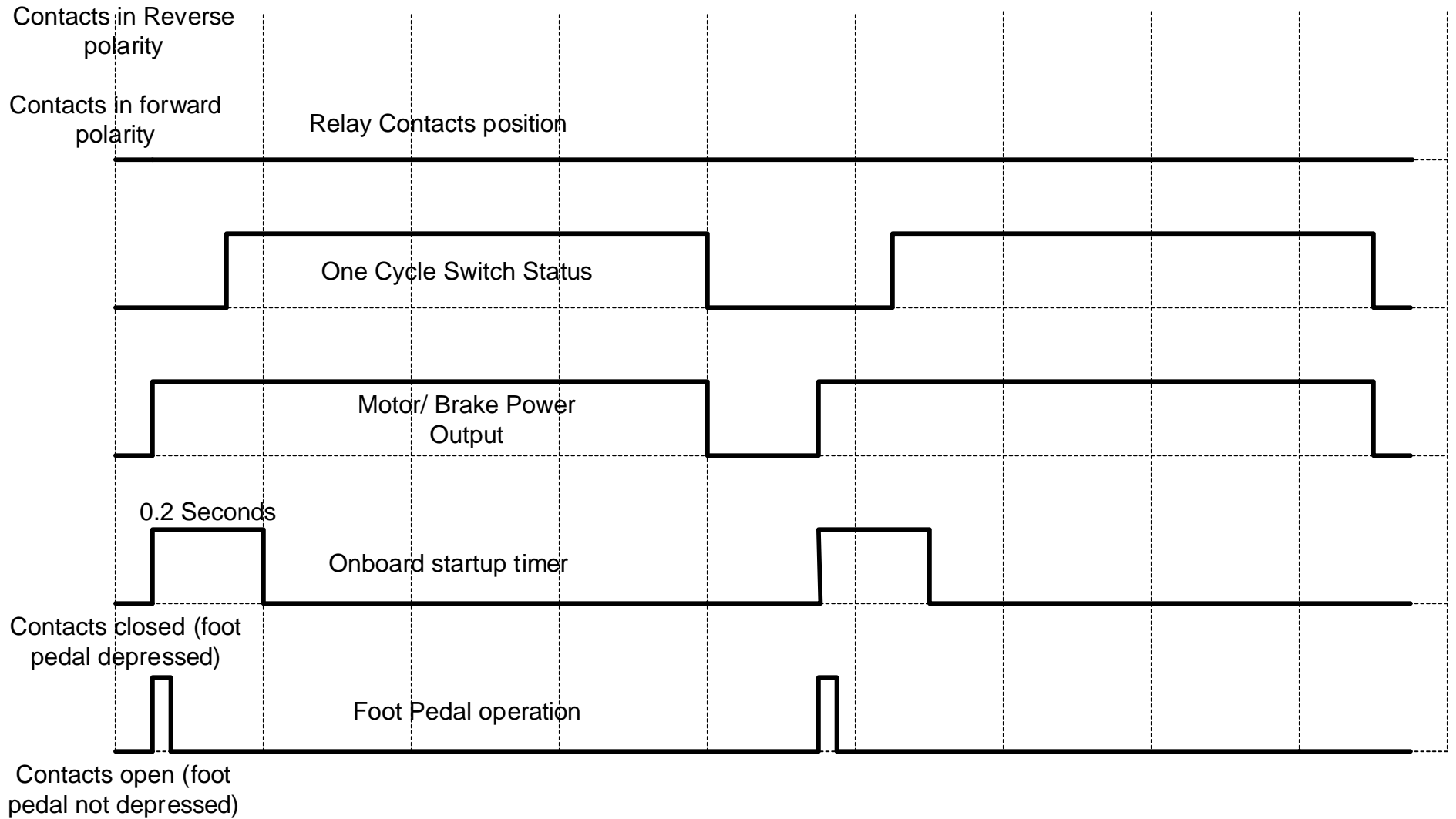
The circuit board has a reverse feature which allows a direction change of the motor if the motor stalls. The motor can stall if too much paper is being punched. The reverse condition is based upon an internal timer located inside the micro processor. If the home switch condition is not met within a certain amount of time, (because of a paper jam) a relay on the circuit board is energized which changes the polarity of the motor wires. This in turn reverses the motor. Another feature of the control circuit board is during initial startup. If the home switch signal is not met during startup, the motor will start in the reverse mode and bring the machine to its home position.

The voltage for the motor is either 115volt dc or 230 volt dc. The brake is 115 volt ac or 230 volt ac. There is an internal rectifier in the brake that changes the ac to dc.

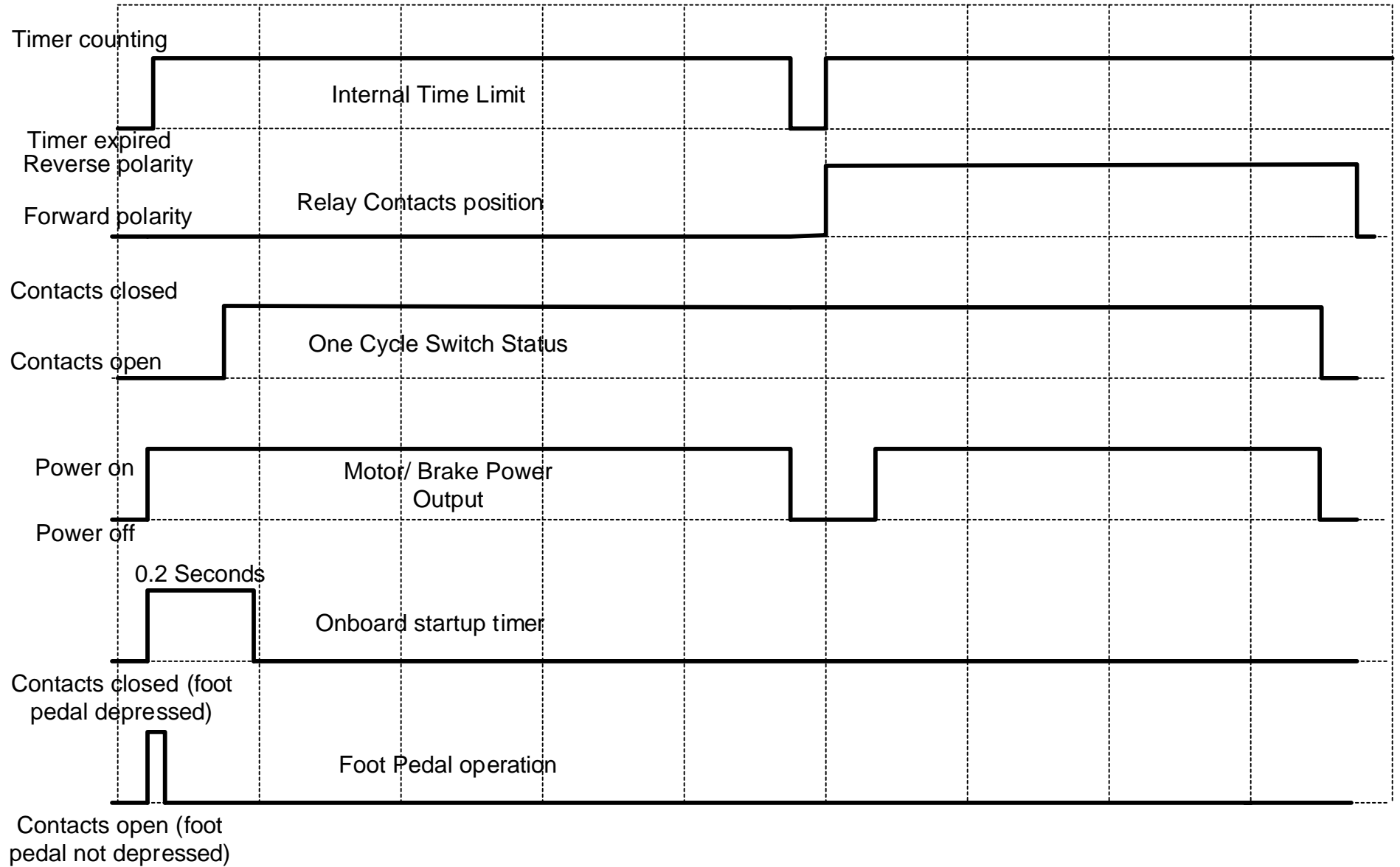
**There are some older models which are 230 volt CE type machines that have an input to the circuit board of 230 volt ac and an output to the motor / brake of 115 volt. These troubleshooting charts do not cover these older models which can only be found in Europe.**

**The following troubleshooting charts can be used for the HD7700, HD7700CE, HD7700H, HD7700HCE, HD7500, HD7500CE, HD7000, HD7000CE, HD6500, HD6500CE, OD4012, OD4012CE & OD4000. (Specified CE models are 230 volt 50hz) Make sure all wires are connected and tight before proceeding.**

# Normal Cycle Timeline Chart



## Auto Reverse Cycle Timeline



# Die Chart

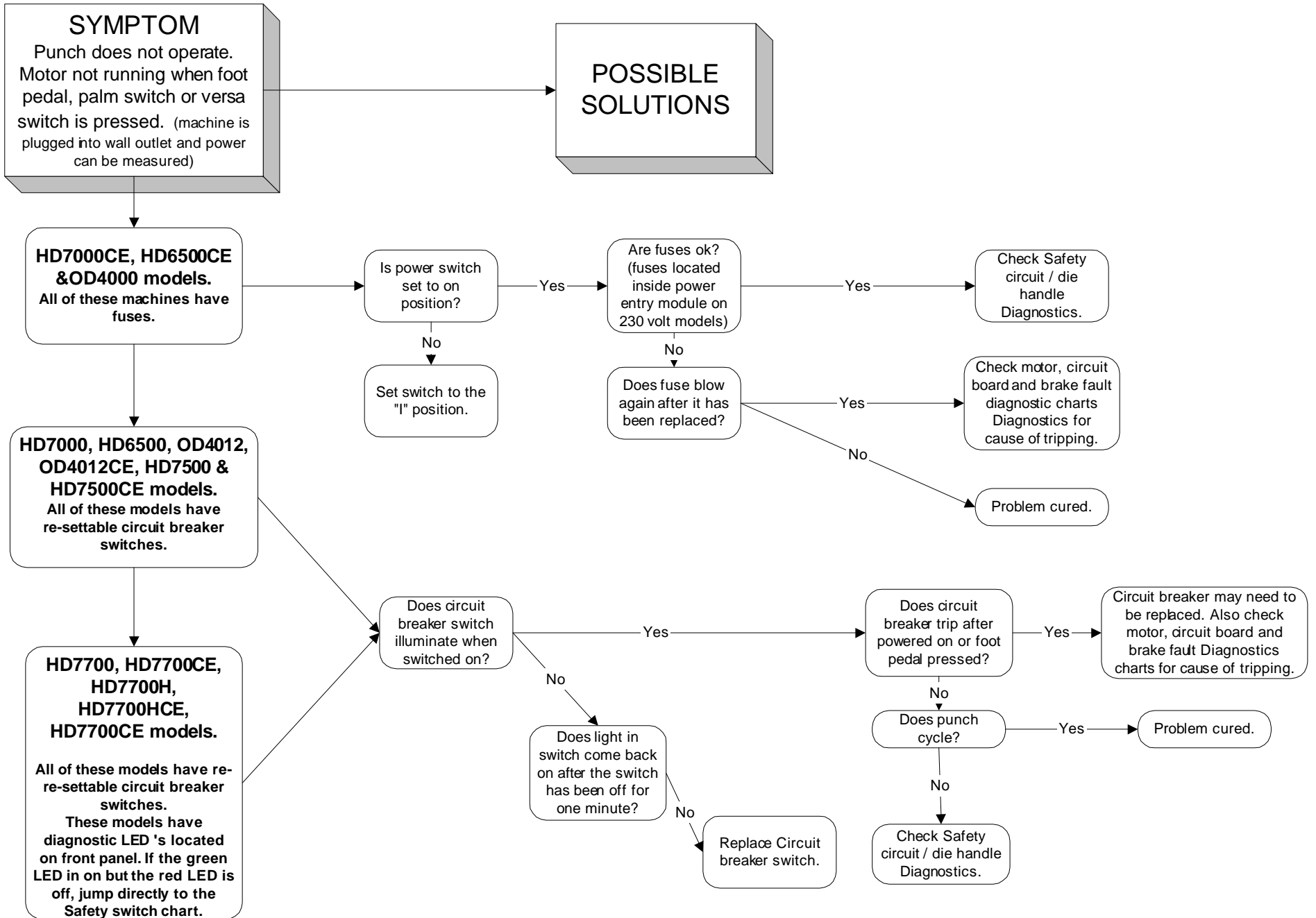
There are many varieties of punch hole patterns. For each punch hole pattern there is a die. Many of the dies have common features and parts. The comb die is the only style with an adjustable backstop (adjustable margin). Moving an adjustment knob in and out will vary the edge to hole distance. There are a total of 4 positions.

Most of the dies have five lengths of punch pins. This is to reduce the amount of power required by the punch motor. It also helps reduce the noise because each pin is going through the sheets as the next length is starting the punch process. Always make sure when loading a set of pins you start with shortest and end with the longest pin repeating this until the die is fully loaded. There are a few dies that do not have five lengths of pins. The three hole and velobind dies do not.

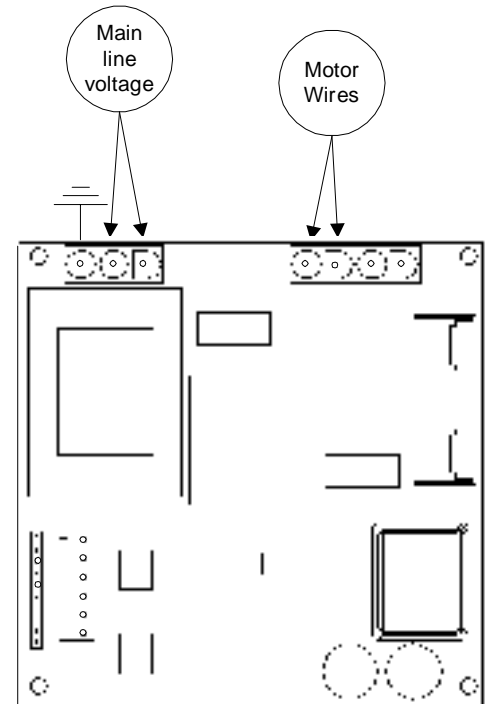
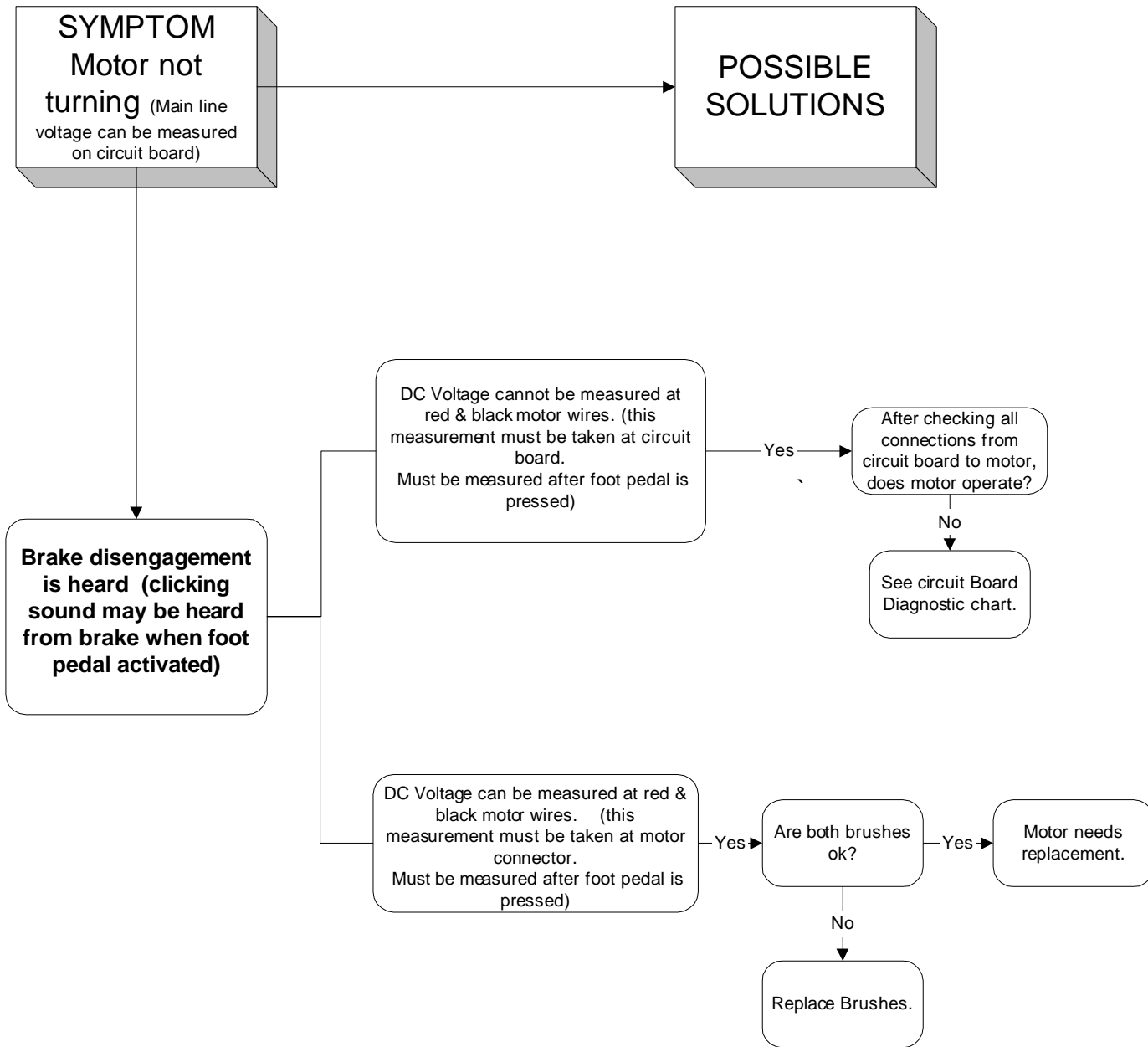
The die should be oiled daily or depending on use. Use 3-1 oil and rub some oil on the punch pins between the pin retainer and where the pins enter the top of the die. Other than oiling, dies do not require much maintenance. If the customer notices the quality of the holes in the paper become less desirable after time, the die should be sharpened. Instead of sharpening the die plate and sharpening the punch pins, a customer can replace only the punch pins and an improvement will be noticed. It is ok to do this but it should be done before too much wear has taken place on the die plate.

There are two springs that keep the pin retainer in its full open position. When a die is new, these springs may not always return the pin retainer to its upper most position. This is normal. As the die wears it will return the pin retainer fully up.

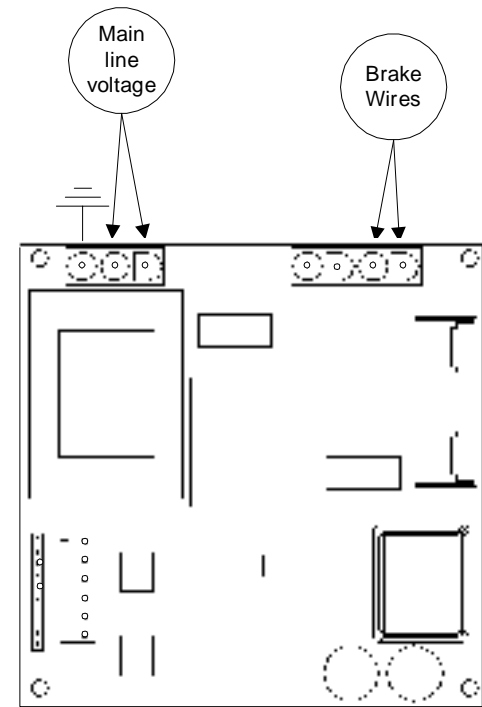
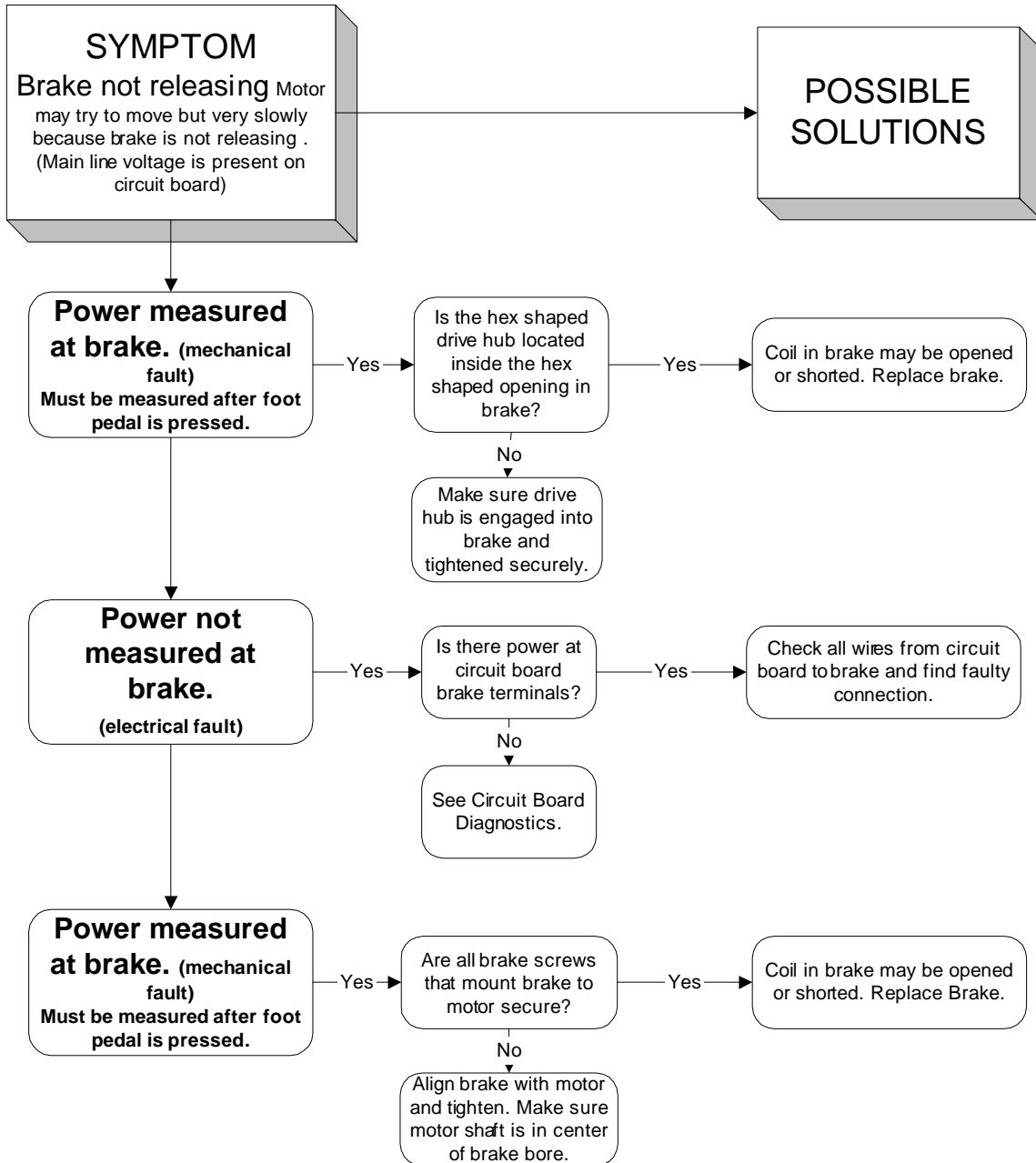
# Main Machine Fault Chart



# Motor Fault Chart



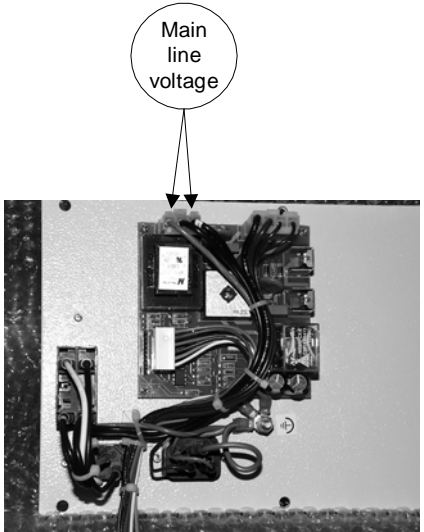
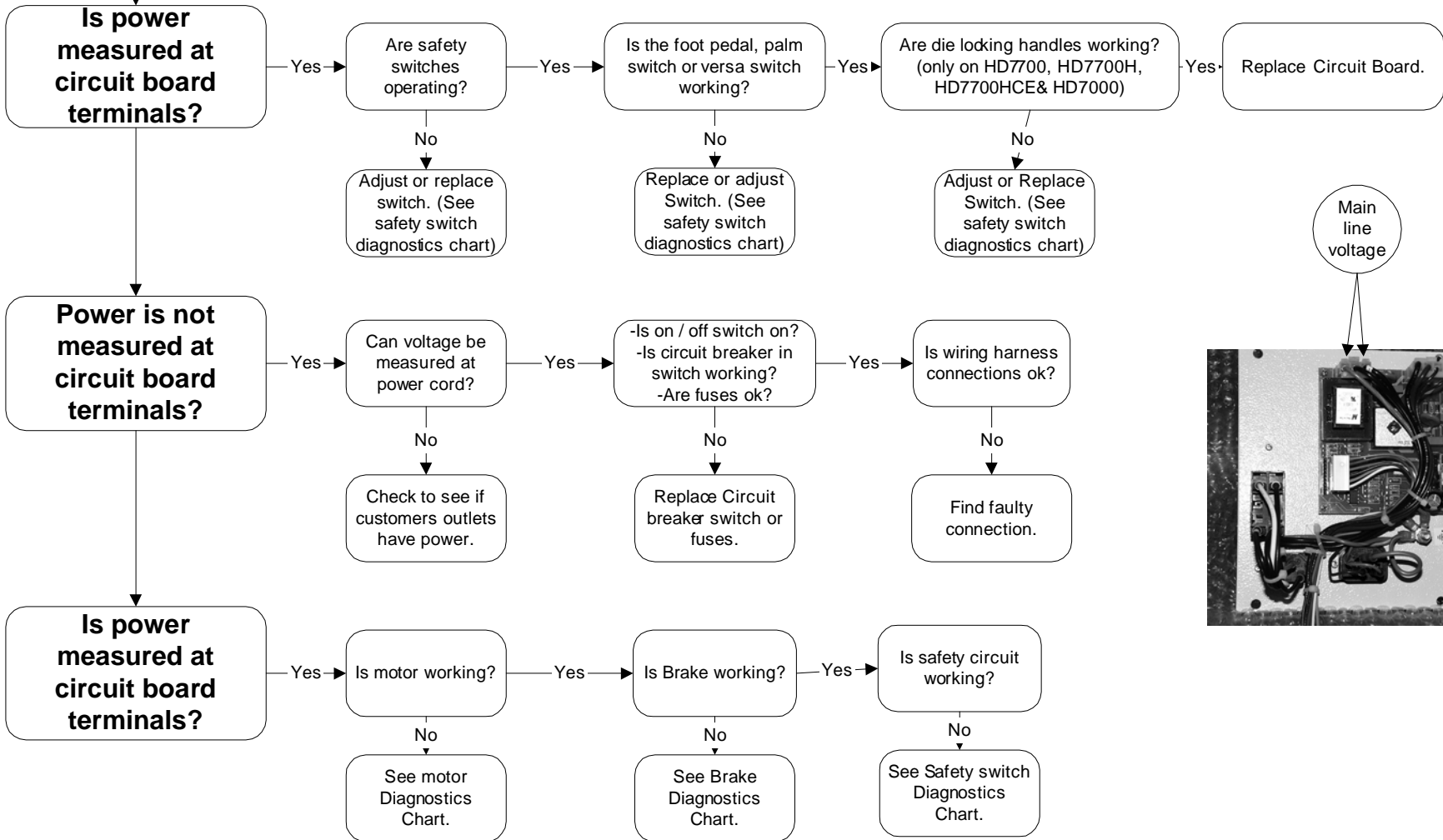
# Brake Fault Chart



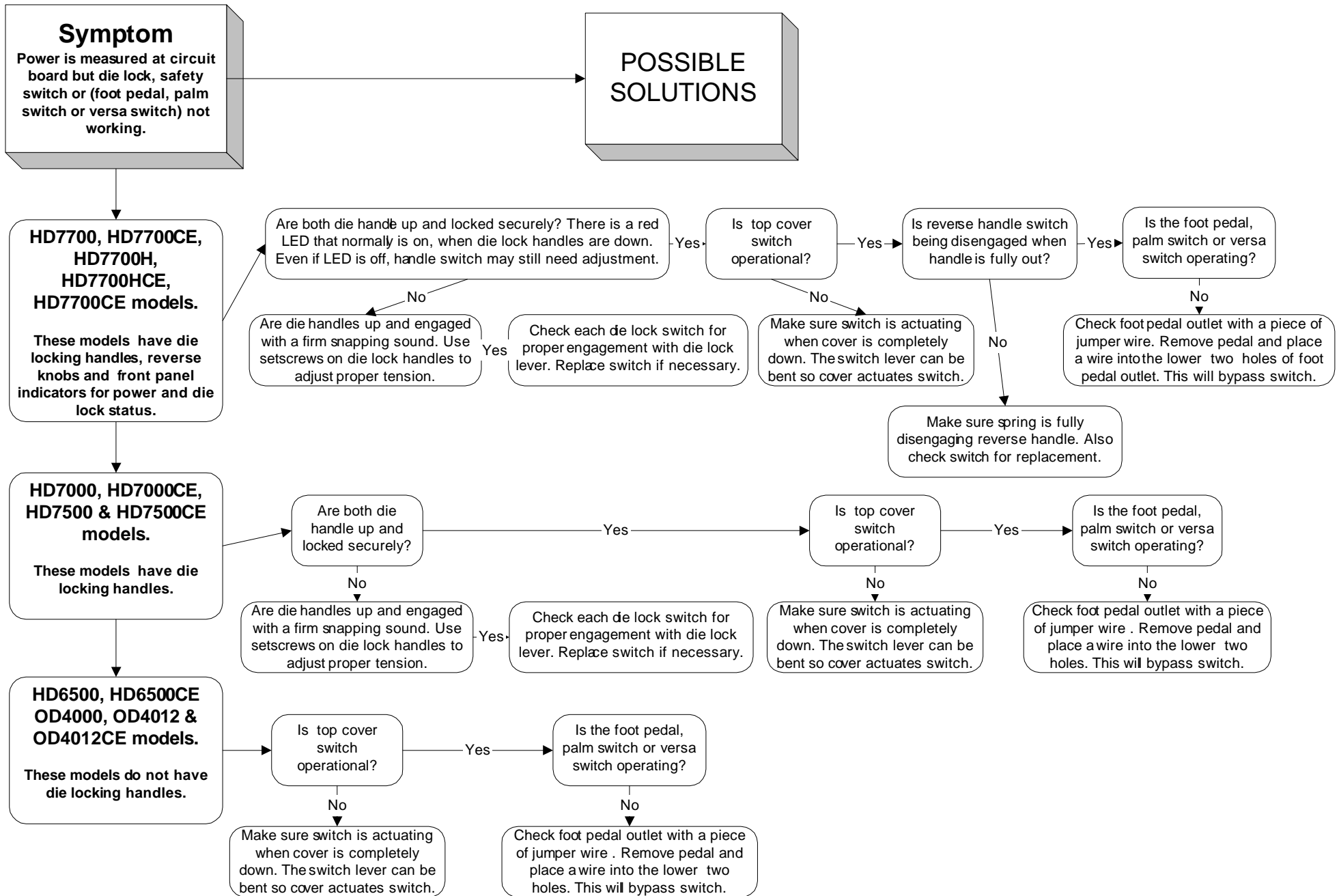
# Circuit Board Fault Chart

**Symptom**  
**No response from Circuit board. Possible board Failure**  
 115 volt machines will measure 115 volt ac at connector block.  
 230 volt machines will measure 230 volt ac at connector block.  
 See picture

**POSSIBLE SOLUTIONS**



# Safety Switch and Die handle Fault Chart



# Home switch Fault Chart

