DC Drive Metering Roll System

Symptoms: Metering Roll will not turn, dryer shutdown-"Metering Roll Drive Failure"

Metering Roll Operation

- The DC drive system on the portable dryer is used to control the output of grain from the dryer. It is adjusted from the front of the control box using the high and low metering roll potentiometers. Components used in this circuit are the SCR contactor, SCR drive board, DC motor/ gear box, and the input/output board from the Electronic Monitoring Control System.

- All voltage for the drive system comes from terminals 1-(L1) and 3-(L2) of the SCR contactor. There should be 220 volts AC *across* these two points even if the unload system is turned off. If this voltage is zero, check your incoming main power.

- When the unload system is turned on you should be able to observe the SCR contactor energizing. The power to the contactor should turn on and off with the unload switch. You can check for power by putting an AC voltmeter *across* terminals *A1 and A2. Across these points you should read 120 Volts AC.* Also on the top of the contactor you can see a plunger pulling in whenever the contactor coil gets power. When the contactor is energized, power is transferred from terminals L1 and L2 to terminals T1 and T2. Understand that *L1 and L2 are the Input* of the SCR contactor and *T1 and T2 are the Output of the contactor.*

Check the SCR Drive Board

- Next if all the above checks out okay, put your voltmeter *across terminal L1and L2* of the SCR drive board. You should get 220 Volts AC across these points when the Unload Switch Is *in the 2 Speed position*. If this is present then the SCR contactor and input/output board are okay.

- If 220 volts AC is present across input of the SCR drive board (L1 and L2) then check for voltage across the output of the board. *Change your voltmeter to check for DC voltage* at a range above the 200 volt scale. Put the leads *across A+ and A-*. The voltage *across* these two points will vary depending on where the speed control potentiometer is turned. Also try turning the potentiometer up and down. The voltage should go from zero to approximately *180 Volts DC*. If zero voltage is present across the A+ and A- terminal, first try to disconnect the wires from these two points and then check for DC volts again. If the voltage returns, suspect a bad motor or a problem in the wiring to the motor. If the voltage does not return, suspect a bad DC drive board.

Check the Motor

If the voltage is not present try to disconnect the wires, then check for DC volts again. If you do not get any voltage then look for a broken or loose wire between the motor and the drive board terminals.

- If the voltage is present suspect the motor or the gear box. Removing the motor from the gear box and trying to run the motor only is one way of narrowing down the problem, or you may want to remove the chain and see if the metering rolls are froze up. Using a pipe wrench is an easy way to try and rotate the metering rolls.

Fenwal Ignition System

Symptoms: Burner will not light, dryer shutdown for "Loss of Flame"

Fenwal Ignition Operation

- The Fenwal Ignition System ignites the burner and monitors the flame. Once 120 VAC is applied to the Fenwal, the solenoids are powered up and the transformer begins ignition through the ignitor. If flame is sensed during the ignition period (about 4 seconds), the transformer is turned off, but the solenoids stay on. If no flame is detected after the ignition period, both the solenoids and transformer lose power and the dryer begins a shutdown sequence.

- All voltage for the Fenwal Ignition System is derived from the input/output board of the Electronic Monitoring Control System. For ignition to occur:
  1. The fan must be turned on.
  2. The pressure switch in the plenum must indicate the fan is operating.
  3. The burner switch must be in the auto or manual position.
  4. The dryer must go through a 10 second purge delay, which is indicated on the LCD screen.

  These steps must take place before troubleshooting of the Fenwal System can occur. The following assumes the above steps have been taken.

Fenwal Troubleshooting

- The Fenwal Board located in the fan can control box on the dryer has seven(7) terminals. They are L1, L2, V1, V2, S1, S2 and E2. L1 and L2 are considered the input to the board. After the 10 second purge delay, an AC voltmeter connected *Across L1 and L2 should read 120 Volts AC*. If this is true, you can assume the input/output board is operating properly and the problem is in the Fenwal Ignition System. If no voltage is present after the 10 second purge delay, check for voltage going through the auxiliary switch mounted on the side of the fan contactor for that burner. This switch has to close before the Fenwal gets power. If this is OK, check the appropriate output on the input/output board for that burner.

- If voltage is present across L1 and L2, check for voltage across the *Output* of the Fenwal board. The output terminals are *V1 and V2*, and they will also have *120 VAC across them for approximately four(4) seconds*. The four(4) seconds is the amount of time the Fenwal has to ignite and sense flame or it concludes no flame is detected and begins a "Loss of Flame" shutdown. If you have power on the in put terminals and no voltage on the output terminals, unload the secondary (take the wires off of V1 and V2) and recheck for voltage. If no voltage is present then suspect a bad Fenwal board. If power returns, look for a bad solenoid valve or a problem in the wiring.

Note: All of the above voltage checks can be bypassed if you can hear one or more of the solenoids on the gas train snap on after the 10 second purge delay. This is true because the solenoids are connected across V1 and V2, and for the solenoids to come on, power must be going through the Fenwal board. Also during the four(4) second ignition period the transformer is energized and you should be able to observe sparking across the ignitor. If the solenoids snap, but no ignition takes place, check for loose ignitor wires or check the ignitor condition/ignition gap (1/8 " to 3/16"). Remember even if flame is sensed the sparking will discontinue after the ignition period (4 seconds).

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Fenwal Ignition System continued...

Hints

- Hearing the solenoids snap on after the 10 second purge delay means that power is coming to and through the Fenwal board. The Fenwal board is probably okay.
- If flame is sensed, the power to the solenoids stays on but the power to the ignitor always goes off after about four(4) seconds.
- Power to the low pressure solenoid is always on anytime flame is sensed. This is because the power to the low solenoid is hooked directly across terminals V1 and V2 of the Fenwal board.
- Power to the high pressure solenoids is controlled by the Plenum thermostat. One side of the solenoid is hooked to V2(neutral) and the other side is run through the normally closed switch of the thermostat and then back to V1. This is how the burner is made to cycle. When the plenum is below temperature, power is run through the thermostat to the high pressure solenoid. When temperature is reached, the thermostat opens and the high solenoid loses power.
- L2 and V2 are connected internally in the Fenwal, and they *must be nuetral*.

Ignitor Tips

- Make sure that the ignitors are mounted correctly through an opening in the burner skirting. Also, make sure that they are not close enough to the edges of the opening to cause a spark to jump the skirting, instead of between the ignitors.
- Be sure that the ignitor tips are no more than 1/8" apart from each other.
- Make sure that the wire connections on the ignitors are good and tight.
- On stubborn lighting burners reverse the direction the ignitor tips are facing. Instead of having the tips pointing toward the fan or burner, change the direction so the tips are facing the exhaust end of the dryer. (This is especially true on burners with no burner cone installed (i.e. Natural Gas).

Metering Roll Sensors

Symptoms: No BPH, Total Bushels, RPM displayed on LCD or dryer shutdown with metering roll problems

Metering Roll Sensor Operation

- Each metering roll on the portable dryer has a sensor mounted to read pulses as the metering roll is turning. These pulses are transmitted to the input/output board of the Electronic Monitoring Control System. The computer interprets this information and then displays the data on the LCD screen.
- All voltage for the metering roll sensors is derived from the input/output board of the Electronic Monitoring Control System. The sensors are operated with *12 Volts DC from terminals J5-9 and J5-12 on the board*. When checking for voltage the negative or black probe (-)of a voltmeter should always go to terminal J5-12.

Always use j5-12 for the negaitve anytime you check for any DC voltage on the dryer.

Then put the red probe (+) of the voltmeter on terminal J5-9. Across these two points there should be 12 volts DC. This voltage needs to be checked, but you can be reasonably assured the 12 volts DC is present if the rest of the dryer is operating. Check for this voltage on the terminal strip in the upper control box.

- 12 volts DC is transmitted from J5-8 and J5-12 *directly* to the metering roll sensors located on the back of the dryer. Each of the metering rolls is enclosed in a white plastic box mounted to the back of the metering rolls. Inside each box is the metering roll sensor and the metering roll wheel.

- Each sensor has three(3) wires connected to it. Two(2) of these wires are the incoming 12 volts DC (the T1-+12V and T2-GND terminals), and one is a pulsing 12 volts DC back to the input/output board (the T3 out terminal). Checking across T1 and T2 will verify that 12 volts DC is getting to the sensor.

- The T3 (out) terminal is what delivers the metering roll information back to the input/output board in the main control box. The information for the metering roll on the left side of the dryer is sent on a yellow wire and goes to terminal J5-16. The information for the metering roll on the right side is sent on a blue wire and goes to terminal J5-19.

- You can use a DC voltmeter to observe this pulsing voltage. The best place to check for this voltage is directly on the input/output board located in the very back of the lower control box on the dryer. Check for a pulsing voltage from J5-16 to J5-12 (negative) and J5-19 to J5-12 (negative). Across each of these test points you should be able to observe a pulsing DC voltage when the metering rolls are turning. You should be able to speed up or slow down the pulses by turning the speed of the metering rolls up or down.

Note: Because a digital voltmeter cannot react fast enough you may not see a full 12 volts DC, instead you may see a pulsing from zero to about eight(8) volts.

Hints

- When checking for a pulsing voltage on J5-16 or J5-19 you should always leave the voltmeter across the terminals for about 30 seconds. Watch the meter closely. Each pulse should be about the same length and about the same time apart. If this is not true, suspect a problem with the sensor on the back of the dryer.

Air Pressure System

- When inspecting the sensor make sure that the wheel going through the sensor is positioned in the center and is not touching either side. If the sensor is scratched it is either bad or will probably go bad.

Airflow Operation

Symptoms: Dryer will indicate a "Loss of Airflow"

- After turning on a fan the computer must get a signal from the air pressure switch telling it that the fan is actually running and the plenum has been pressurized. If the switch does not show the air pressure within 20 seconds a "Loss of Airflow" shutdown occurs.

Troubleshooting: "Loss of Airflow"

- This error message indicates that the fan is running and the air pressure in the plenum did not pressurize. First, verify that the fan is running, and the dryer is full of grain. There must be grain in the dryer or no pressure will develop. If the fan does come on and the dryer is full of grain, but a "Loss of Airflow" shutdown still occurs, check the air pressure switch circuit.

- Watching the blue light in the fan switch is the easiest way to tell if the air pressure switch is sensing air pressure. Each air pressure switch has a light in the fan switch that will only come on if air pressure has developed. Turn on the fan and after it has run up to about one half of its operating speed the light should go on. If the fan light is not coming on then the air pressure circuit is not sensing pressure.

- Try adjusting the air switch on the front of the plenum to see if it is just out of adjustment. Use a straight blade screwdriver and turn the adjusting screw counterclockwise. Turning it this way makes the switch more sensitive to pressure and will turn on the light easier.

- If adjusting the screw does not solve your problem consult the layout diagram of the input/output board. Look for the input for the problem switch. Example: Fan #1 switch's input is J1-13. This is a 12 volt DC input and it can be checked with a DC voltmeter. One of the following conditions will exist when checking this input.

  NO AIR PRESSURE---ZERO VOLTS
  HAS AIR PRESSURE---12 VOLTS DC

  Remember when checking for 12 volts DC you should always use one of the DC negatives for the black probe(-) of your voltmeter. Some of the terminals that may be used for the negative(-) are J5-11, J5-12 or J5-13.

- To check fan #1 for air pressure with a voltmeter:
  1. Turn on the dryer.
  2. Place the black probe(negative) of your voltmeter on J5-11 or J5-12.
  3. Place the red probe(positive) of your voltmeter on J1-13. At this point there should be zero volts here because the fan is not running.
  4. Turn on the fan and watch your voltmeter.

- If the air switch is adjusted properly you should have zero volts across these test points when you first turn on the fan. After the fan has run up to about one half of its normal operating speed you should see the voltmeter change from zero volts to 12 volts DC. This also works in reverse when turning off the fan. After the fan is first turned off, the voltmeter should still show 12 volts DC until the fan has slowed down to about one half of its operating speed. This is because even though the fan is turned off it is still turning and developing some pressure in the plenum.

- If all the above fails to work then remove the two wires while blowing into the air tube. Blowing into the switch is the same as having air pressure in the plenum. You should have an open circuit until you blow into the switch, then it should close. If the switch does not close try adjusting it, or replace it with a known good one.

Hints

1. Dryer must be full of grain.
2. Light in the fan switch can be used exactly like a voltmeter to test.
3. Make adjustments of the pressure in one quarter turns.
4. Make sure the air tube in the plenum is not plugged after sitting over the summer.
5. Check the bulb in the fan light. It is a 12 volt bulb.

Vapor High Temperature

Symptoms: Dryer runs for only a short period of time, then a shutdown occurs.

- This message indicates that the vaporizer on an LP Dryer is not properly adjusted. LP (liquified petroleum) must be vaporized before the burner can operate properly. If LP is being fed to the dryer it must run through a vaporizer before it can be burned. If the vaporizer is getting the fuel too hot it will cause a Vapor High Limit shutdown.

- The vaporizer is located in the fan/heater unit. It is wrap of pipe mounted inside the fan can directly in front of the burner. It can be seen by looking through the inspection door on the side of the burner.

- To properly adjust the vaporizer a 1/2" wrench is needed. Knowing that the gas can get too hot, you must feel the pipe train before the regulator to check this temperature. This point may be very hot so be careful while checking the temperature. *The temperature before the regulator must be warm to the touch.* This point cannot be hot, nor can it be cold...only warm. Use the 1/2" wrench to loosen the hold down bracket on the vaporizer. Move the vapor izer away from the flame to cool down the pipe train or move it closer to the flame to make the pipe train warmer.

Troubleshooting: Vapor High Temperature

- The dryer will shutdown but will probably restart as soon as the computer is reset. This is because the high limit is an automatic reset and after the dryer shuts down it allows the pipe train to cool down.

- After the dryer is reset, it will run from a few seconds to a few minutes and then shutdown again. This is because the Vapor High Limit is heating up again as