Electrical Noise Reduction in Polygon Scan Systems

Lincoln polygon brushless motor controllers operate in the pulse width modulated (PWM)mode. The output waveform has very fast rise and fall times to minimize heating in the controller. Ferrite beads are used to reduce the radiated noise coming from the controllerboards. The fast edge times can be problematic if grounding and signal routing are not well thought out.

The following suggestions should be reviewed early in the design phase of the polygonscan system.

1. Eliminate multiple ground paths. These can occur between the high current motorsupply return and the customer control logic grounds.
2. Shield sensitive optical receiving devices such as Photomultipliers and Pin Photodiodes.
3. Isolate scanner motor case and provide a case ground return to motor supply.

Eliminate ground issues: The high current motor supply ground return should be wireddirectly to the motor controller power supply pin. The customer control logic grounds should be tied through the I/O connector only. Never daisy chain power connections always use a star connection. See figure 1.

Shield electro-optical receiving devices: the scanner can radiate pwm noise from the optical opening. This noise is typically coupled as an e-field. The best way to reduce the noise coupling to the detector is to place the detector in a cylinder and install a metal washer over the front of the cylinder. The metal washer and cylinder should be insulatedfrom the detector circuitry. The metal washer will be grounded to the machine frame.
The washer and cylinder will intercept the e-field noise and return it to the machineframe. See figure 2.

Isolate scanner motor case: The case of the scanner motor is capacitively coupled to the stator inside. The unwanted currents from the scanner case can flow through sensitive circuits by way of the equipment frame. The easiest way to eliminate this possibility would be to mount the scanner to an intermediate insulated plate made out of hard plastic or phenolic. A ground wire would be connected to the scanner mounting bolts, theother end would be returned to the high current motor supply ground. See figure 3.

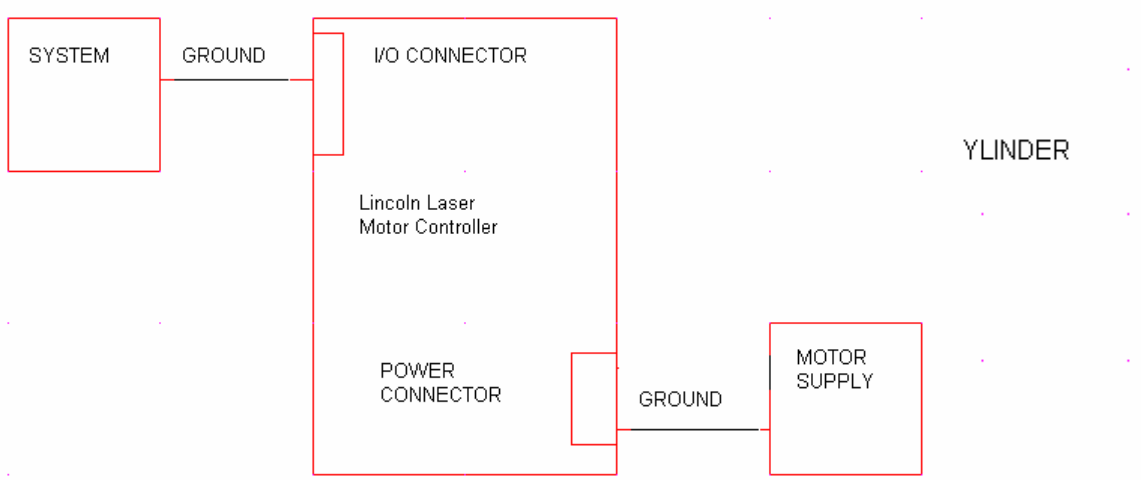

FIGURE 1

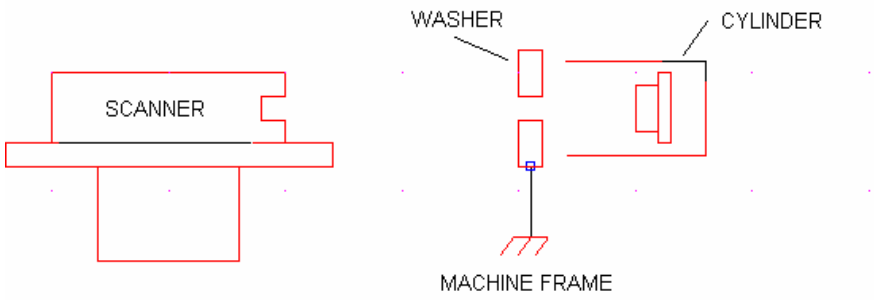

FIGURE 2

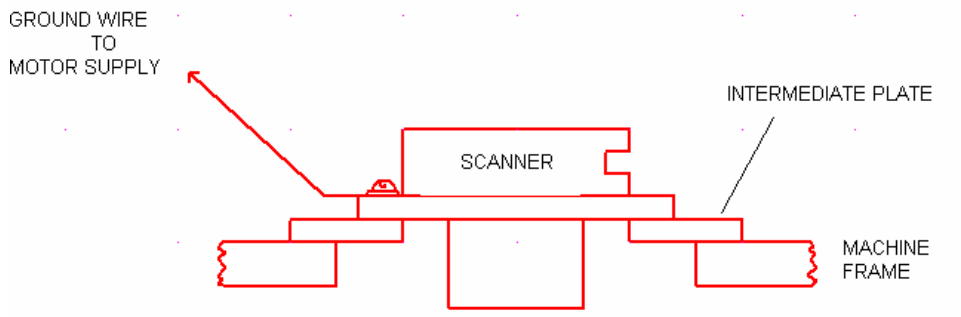

FIGURE 3