Maintaining MCE Controls

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General

All controllers have screw terminations for the field connections. These connections should be checked periodically for proper tightness. Torque specifications are printed on, or near, controller terminal blocks. Printed circuit board screw terminals should be torqued to 7 in-LB.

Power conductors terminated near large frame size contactors should be inspected for proper snugness by gently pulling on the conductors where they terminate.

Controllers used in conjunction with motor generator sets have special needs due to carbon dust build up. The MG set needs to be blown out occasionally. If controller fuse labeled FC clears, this is an indication of a short in the loop circuit. MCE requires a minimum of 100Kohms insulation resistance between the machine frame and the pole pieces or fields. When Hi-Pot testing the rotating equipment, any readings of less than 1 Meg ohm should be suspect.

Carbon dust build up on printed circuit boards is also cause for concern. Replace PC boards where any signs of carbon “tracking” are observed. Periodically replace filters on fans and air conditioners as required.

On sealed cabinets, check functionality of air conditioners by hanging a simple thermometer inside the enclosure. Seal the enclosure. After an hour, open the enclosure and read the thermometer. If the reading is higher than 95° F, have the air conditioner serviced.

Capacitors

Most traction systems contain capacitors that need to be checked periodically. Check all electrolytic and motor starting capacitors for leaks or any signs of material escaping from vent holes. Replace as necessary.

Documentation

Proper documentation is essential for maintaining MCE control systems. A complete adjustment manual for the type of controller should be kept in the machine room along with an “as-built” set of controller wiring diagrams (prints). For programable controllers two copies of the final adjustment parameters should be kept; one set at the office and one set in the machine room. Also retaining a copy of the parameters is essential for all IMC type controllers as well as drive parameters for all variable frequency drives (AC or vector drives).

Drives
Many of the solid state drives used by MCE include cooling fans. Run the elevator and inspect fans to ensure that are operational. First check fusing for fans and then replace any fans that are nonfunctional.

Code requires us to utilize large main line contactors to interrupt the feed of current to the armature circuit where static (solid state) drives are used. Depending on the size of the contactors, vibration in the controller cabinet can exacerbate the loosening of components. Check tightness of connectors and screwed or bolted hardware. Run the car several times, power down and check all drive copper bus bars for localized heating or discoloration. Properly torque any connections near suspect areas. Refer to torque specification table in Appendix of adjustment manual.

For the VVC-XX drives the lift should be run at contract speed and voltage measurements should be recorded for all the test points on the VVC drive. Two copies should be made; one for the office and one for the machine room. "Glyptol" all adjustment trimpots on the drive to discourage tampering**.**

Fuses
Only replace fuses with similar size and style. Never replace quick blow fuses with slow blow fuses as in many cases the quick blow fuse protects circuit board traces. Once a year measure voltage drop across fuses. Typical fuse voltage drop is usually less than 0.1 volt. Any fuse that exhibits a voltage drop in excess of 1.0V (AC or DC) should be replaced.

Line Contactors (Starters)
For contactors with replaceable contacts, disassemble and inspect contact surfaces at least once a year. Replace worn or excessively pitted contacts. For contactors without replaceable contacts, operate the system as normal by placing a series of calls and looking for any excessive flashing coming from the contactor. Replace contactors as necessary. On hydraulic controllers with submersible pump motors be sure to inspect contactors for any wicking of hydraulic oil into the main line contactors. If oil is present in the contactor, replace contactor and repair splice (barrel splices with built in dam) isolation block.

Inspect the coil and shading pole of the armature on contactors that vibrate excessively. Replace defective components.

Load Weighers
MCE utilizes two different types of load weighing devices. Where an isolated platform is part of the cars construction the LW-MCEIP is used to measure the load in the car. Periodically the resiliency of the pads should be checked. Refer to the installation manual for details of the inspection process. A good indication of pad wear is an MP processor readout in excess of 10% full load with the empty car at the bottom landing.

Where an isolated platform is not available MCE uses the LW-KK2 (or, shipped after November 2000, the LW-KK3) which measure crosshead deflection via a pair of load cells. As the roller guides wear and building settles the offsets in strain at the cross head conspire to corrupt the measured load signal. Observe the MP load percentage readout with the empty car at the bottom floor. If the reading is greater then 5% perform the following procedure.

Move the empty car to the bottom floor. For LW-KK2, go to the car top and remove one of the output wires from either K-Tech amplifier board. Place a voltmeter between test points T4 and T5 and adjust ZERO trimpot so that the output measures 1.00 VDC (stand off the car top). Repeat for the second amplifier. Replace output wire in terminal of amplifiers. If required, more detailed instructions are included in the controller adjustment manual.

The 1.00 VDC empty car at bottom voltage should be checked for either load weigher after any buffer or safety tests. In this case follow the entire adjustment procedure in the adjustment manual. Full adjustment requires test weights.

For the LW-KK3 simply move the empty car to the bottom floor. Open the hinged cover of the load weigher and locate the “Auto Zero” pushbutton on the amplifier board. While standing off of the car top, gently depress and hold the “Auto Zero” push button for one second. Restore the car to normal operation.

Offsets
The IMC series of controllers have a few offsets that should be checked and calibrated periodically. These include IMC-DAS board offsets BIP and BAL as well as SCR-LG/A board offset SISO. For controllers manufactured before 1999, the IMC-DAS extender board and cable will simplify the task of adjusting BIP/BAL (order part number IMC-EXT-DAS-KT).

Relays
Depending on the application, many different styles of relays are used on MCE controllers. Most of the relays have a mechanical lifetime of several million operations. The only relays that have a shorter mechanical life are the safety relays (SAFB, SAFG, SAFM, etc.). These relays are all "definite purpose" type contactors. However, the safety relays normally remain energized as long as power is applied to the controller and hence rarely wear out.

Some relays like the PRD11 or PM17 style may benefit from periodic dressing of the contact surfaces. However, do not attempt to dress the contacts of the relays located on the SCR-PRI or IMC-PRI relay boards. We also do not recommend that contacts of the small ice-cube relays (MY4/HC4) be dressed.

The most common relay used is the standards "ice cube". We typically use the Omron MY4 or Aromat HC4 for this application. Both relays have an indicator which is energized by a tap from the relay's armature coil. If the coil burns out, the indicator no longer functions. Beware of relays that use neon bulbs as these indicators illuminate when power is applied to the relay's armature. Neon bulbs do not provide a true indication of current flow in the coil as with the Omron and Aromat parts.

Selectors
All hoist way components need periodic inspection and maintenance to remain trouble free. As each style of landing system has different requirements, each will be discussed in turn.

Selector Tape Guides
Some selectors use tape guides that are prone to wear and a spare set (4 guide shoes) should be kept on hand. The key elements that decrease the service life of the tape guides are corrosion of the tape and improper lubricant. Realize that oil-based lubricants can attract dust which tends to form a grit that wears away the tape guides. Preferred lubricants are spray Teflon, moly or graphite. Avoid oil-based lubricants that attract dust.

LS-STAN
This selector uses optical sensors for detection of the slow down, door zone and leveling vanes. An excessive build up of grease and dust can occlude the optical components. When this occurs, wipe the inside channel of the sensors with a clean dry rag. A mild detergent and water can be used. Avoid solvents as these can fog the plastic lens assembly of the sensor.

The LS-STAN contains a power supply that feeds power to the sensors. If a power supply channel burns out do not connect two sensors to one output wire. Instead, replace the entire power supply.

LS-QUTE
This selector uses magnetic strips to activate reed switches built into a threaded tube. The expected mechanical lifetime of the reed switch is about 60 million operations. It is a good idea to keep a few of these as spare parts.

LS-QUAD-2
This selector, like the LS-QUTE, uses magnetically activated reed switches for door zone, level up, level down, RD, OLM and floor code. Keep spare LS-PS1 sensors handy. This system also uses a special PC board called the HC-SB1 assembly that has optics for sensing the holes in the selector tape. As the system ages, the holes in the steel selector tape will start to fill with dust. When this happens, leveling will be affected. Observing the Delta-OLM message on the F3 screen is your first clue that the system needs cleaning.

Normally Δ-OLM is one to two inches. We can tolerate 6" before we lose the floor. Simply riding the car top and wiping down the steel tape with a clean rag is all that is necessary to restore proper operation. In some cases cleaning the optics and reflective tape that are behind the top tape guide may be necessary. To do this, simply remove the top and bottom tape guide thumbscrews. Be careful not to drop the special washer behind the thumbscrew. Pull the steel selector tape out of the selector tape guides and clean the optics. Do not use solvents as this will fog the plastic lens of the sensor. Use a clean rag and nothing stronger that warm soapy water. If the optics are damaged, replace the HC-SB1 sensor board.

LS-QUIK-1
This selector uses an encoder assembly that rides on the rail. Built in software allows for 2.5 feet of slippage between any two floors at contract speed and can also tolerate 6 inches of slippage on the final approach to the selected floor. If there is excessive grease on the rail or the encoder wears out (bearing failure) a message called “excessive position error at OLM” will be logged in the local event calendar. Clean the rail and roller with a clean rag to remove excessive grease.

Excessive side to side car sway, due to roller guide wear, should be corrected early as this could result in premature failure of LS-QUIK encoder roller. Worn roller guides may not allow enough vane engagement with the selector, resulting in a PG Not Ready message.

The selector also uses optical readers for the floor vane. With time these may require cleaning. Again use a clean rag to wipe the optical surface inside the slot of the sensor.

As the system ages, the diameter of the encoder wheel may reduce. When this happens, the system will start to slow down from the limit switches at the terminal landings. Check the local event calendar for "position error at UNTx/DNTx". Relearning the hoistway floor table (not the limit switch learn operation) will normally clear this up. On IMC systems, remember to simultaneously reset both the IMC-DIO and IMC-DDP boards before performing the limit switch learn operation(Learn switch is on the IMC-DIO board, part of the IMC-SI2 drive unit).

Tachometers

Analog tachometers when used for velocity feedback on our closed loop systems should be inspected periodically. The first sign that the tachometer is in need of servicing will be indicated by "overspeed" events logged into the local event calendar. Sometimes after 7 or 8 years of service carbon may build up in the end bell of the tachometer. Removing the end-bell and blowing out the carbon is the best approach. Realize that removing the end-bell, prior to the end of the warranty period, voids the warranty.

For tachometers that use a follower wheel, as in gearless applications, the wheel may develop a flat spot which could result in a low frequency oscillation at leveling speeds. However, this usually only occurs where the tachometer has been installed in such a way that there is substantial force on the follower wheel. Besides a flat spot, excessive tension on the follower wheel may increase the wear on the tachometer bearings. When this occurs the feel of the ride will be like riding on marbles. In this case the tachometer should be replaced and when reinstalling be sure that the wheel can be easily moved by hand when the installation is complete. The best solution is to allow the weight of the tachometer to hold the tach wheel against the running surface as this technique puts the minimum amount of stress on the bearings.

Triacs

The primary output circuits use triacs to activate devices attached to the output terminals (indicators, gongs, buzzers, relays). The standard triac used for the last several years was the TAG semiconductor #Z0405DE. We recently changed to the TAG #Z0405NF in most circuits. These two parts are interchangeable. However, some of our selectors and the CSB (Car Stop Bypass - on HC-PI/O and HC-PCI/O) circuit use a MAC228A6 triac which is capable of sourcing more current that the TAG part. The MAC228A6 can be used to replace the TAG but not the other way round. Realize that all unused circuits on the existing call boards are a source of spare parts for the rest of the controller.