TECHNICAL BULLETIN

▸ *Immediate Attention Recommended* ◂

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Reference	**105**
Route to	**Service Manager/Modernization Manager/Construction Manager**
From	MCE Technical Support Department (916/638-4011 then touch 2)
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Pages	18
Enclosures	Bus Bars (3); Motor Field Circuit (1); Motor Field Adjustment (6)

Subject **IMC Intelligent Motion Control Troubleshooting Techniques**

Description Through the analysis of field reports we have compiled a list of field observations and problems, and we have developed the following troubleshooting techniques and solutions to enhance reliability. While we have attempted to make this information as complete as possible, as additional information is compiled, we will analyze it and make it available.

Action A **As soon as possible check items #1 and #2.**

Action B If you identify any of the problems that are described in this bulletin **(items #3 - #14)**, troubleshoot and/or take the action as suggested. If parts and components are required, call MCE.

Contents

Help **Should you require additional assistance**:

- Call **David Dunlap** at **916/638-4011x231**
- Refer to the reference number above

Details

1. IMC-DAS BOARD: VERIFY COMPONENT TYPE

U16 on the IMC-DAS board must be an AD1674 by Analog Devices. It is possible that, on a few units in the field, an identical part manufactured by SIPEX may have been used. We have seen a few failures of the SIPEX part and yet have not seen any failure of the Analog Devices part. The symptoms of this part failing include observed motor field fluctuation, and one or more of the following errors: Tach Saturation (TSAT), Tach failure (TF), Tach Error (TE),Motor Field Failure (MF), Parameter Initialization Error (PIE). If you have the SIPEX part, call MCE for a replacement part and adjustment instructions. To differentiate between the two devices, Sipex has the word SIPEX written on the part while Analog Devices has AD1674.

2. BUS BARS ON SCR DRIVE: VERIFY INTEGRITY

Verify the integrity of the copper bus bars by looking for signs of heating, damage or loose connections, particularly where the copper bus bars are bolted together without being bolted to an SCR or Diode. Verify proper torque at these locations (see three page exhibit attached -- *2. Bus Bars on SCR Drive*).

3. GROUNDING AND WIRE ROUTING PROBLEMS

PROPER GROUNDING: All MCE controllers require proper grounding. This is an absolute must. Please ensure that all control cabinets are grounded per installation manual instructions. Also ensure that the hoist motor is grounded to the same building ground as the controllers. Tachometer and encoder shields must be grounded at the controller end only.

FIELD WIRE ROUTING: It is extremely important to separate the six leads coming from the isolation transformer and armature wires from any control wires. Use dedicated conduits for power wires. Specifically, you must not have any tachometer and/or encoder wires in the same conduit as the motor armature wires, motor field wires or brake wires.

4. MLT FAULTS RESULTING IN SYSTEM SHUT DOWN

A number of conditions are manifested as MLT faults which will result in system shut down. Some of the more common conditions are discussed below.

SCR-PRI BOARD

This board contains several power relays and the detection mechanism for CNPB and CNPM faults (displayed on the F3 screen). Since relay contacts are used for proof of relay operations, it has been observed that relay contacts may intermittently fail to "make up", resulting in an MLT fault.

MX and PT1 Redundancy Failure on F7 screen (same as CNPB on F3 screen)*:* This fault indicates that the normally closed (NC) contacts of relays MX or PT1 failed to **"**make up**"** prior to start of car motion. This failure prevents energizing the RE relay and thus disables all power relays which feed power to the brake and M contactors. This problem has been observed with several MIDTEX relays and, to a lesser extent, with P&B relays. Do not attempt to dress relay contacts as this will compromise the integrity of the relay enclosure latches. Check the integrity of the crimp connections to the spade lugs that are attached to the relays.

PT2 and PT3 Redundancy Failure on F7 screen (same as CNPM on F3 screen)*:* This fault indicates that the normally closed (NC) contacts of relays PT2 or PT3 failed to **"**make up**"** when the car stopped. See MX and PT1 Redundancy Failure above for details.

If you experience this particular shut down condition, call MCE . We have a kit containing two RC networks to draw more current through the (NC) relay contacts and enhance the reliability of these relays.

Opto-Isolators*:* Two opto-isolators on the **SCR-PRI** board create the CNPB and CNPM fault conditions. If you have been experiencing CNPB or CNPM faults as explained above, inspect for the manufacturer of the opto-isolators U1 and U2 on the SCR-PRI board. It has been observed that the K3022P Telefunken parts (logo on part is a tiny house and color is black) are not as reliable as the MOC3022 part by either Motorola (color is white) or QT (color is black). If you find Telefunken parts on the board, call MCE for replacement.

5. SAFB AND SAFM RELAY TROUBLESHOOTING

These relays are generally quite reliable. In a couple of instances we have seen Square D relays that have failed (intermittently, by mechanically getting stuck). We have not seen the same failure with either GE or Joslyn Clarke equivalents. The failure of this relay to make up can create either CNPB or CNPM faults, respectively. If all other attempts at troubleshooting CNPB and CNPM faults have failed, then consider replacement of the SAFB relay (for CNPB fault) or the SAFM relay (for CNPM fault).

6. IMC-DAS BOARD

Reset switch failure (self activation): Some MCE customers have experienced intermittent reset switch failure where Alco switches (contained in a gray body) have been used on the IMC-DAS board. C&K switches (contained in a red body) have not caused this problem. For older systems, if the car is running, IOC and DBF faults are generated. For newer systems, no fault is generated while the car is running, but a PLL fault will be generated when the car stops. If you have an Alco reset switch, call MCE for replacement parts and readjustment instructions.

7. TROUBLESHOOTING SYSTEM 12 SCR DRIVE

System 12 SCR drives that are used in conjunction with emergency power generators may require SCR-LG board rev. 2-9 for proper operation. If difficulties are encountered, upgrade to SCR-LG board rev. 2-9. Note that, when upgrading, the DDP software version must be 1.27 or higher and CPA software must also be upgraded on a car-by-car basis. The jumper (unmarked), located at the top right hand corner of the SCR-LG board rev. 2-9, is shipped in the left hand position. If difficulties are still encountered after software upgrading, move the jumper to the right hand position to increase the response of the Phase Lock Loop circuit.

SCR-PS: This is the power supply for the SCR-LG board. If you experience a Power Supply Failure (PSF) fault, verify the integrity of the +5, +15, and -15 volt supplies on the SCR-PS board. Failure of these supplies is more likely if a blue CDE series WBR capacitor, or a Sprague series TVA capacitor is present in location C1, C6 and C13.

8. HEAT AND MECHANICAL CONCERNS

Duct Kits: If the machine room is not equipped with air conditioning, and machine room temperatures climb above 104 degrees F (maximum ambient operating temperature per MCE Product Specifications), be aware that temperatures inside the controller cabinet may be even higher. We recommend the installation of duct kits. High temperatures inside the cabinet can cause a variety of SCR drive faults, including LVN, DBF and HIT.

Data cable: An RJ-45 data cable is plugged into a phone jack on the IMC-MB and SCR-LG boards. Failure of the cable can be indicated by a current limit fault or TE (Tach error) fault. Note that adjustment of SISO on the SCR Parameter Screen (Page 6) will not change the TP3 test point voltage on the SCR-LG board if the data cable is faulty.

Header HDR for the SCR-LG board: Verify the integrity of the plug-in header in position U81 on the SCR-LG board by measuring the three resistors R336, R337 and R338. Their resistance should be steady when measured. Also, visually inspect for evidence of damage to parts, jumpers or solder connections on the header.

***A2 connector*:** Behind the SCR-LG board is the SCR-DS board. Verify the integrity of the A2 connector located at the bottom left of the SCR-DS board. Failure of this connection can be indicated by an *LVN or DBF fault* (on the F3 screen) or a *NON-ZERO ARMATURE VOLTAGE* or *DYNAMIC BRAKE ACTIVATED* fault on the F7 screen. If the connector is loose, carefully squeeze it with a pair of needle nose pliers and reattach it.

9. POSITION ENCODER

Certain problems with the position encoder may show up as excessive OLM position errors. It has been observed that, under some conditions, the encoders with the black/soft follower wheels provide better operation than those with brown/hard polyurethane wheels. If you have any excessive OLM position error problems, and you have the brown/hard wheels, call MCE to discuss a possible replacement.

Check the coupler between the wheel and the encoder to verify all set screws are sufficiently tightened.

Check the follower wheel for ease of rotation by pulling the wheel away from the rail and spinning it by hand while feeling for roughness in the rotation. If it does not rotate smoothly, or if it feels like there is “sand” in the bearings, contact MCE.

10. LS- QUIK LANDING SYSTEM

Vanes for the LS-QUIK landing system that use only one thin support bracket (green color) have been observed to cause excessive OLM position errors on some high speed installations. Additional brackets may be necessary.

OLM errors and binary floor code errors can result if the dead zone is adjusted too wide, or if the arrangement of the VS-1C leveling switches is not symmetrical to within 0.125" about the center of the mounting plate.

11. LS-QUAD LANDING SYSTEM

OLM errors and binary floor code errors can result if the dead zone is adjusted too wide, or if the arrangement of the leveling sensors is not symmetrical to within 0.125" about the center of the mounting plate.

12. EMERGENCY TERMINAL STOPPING SOFTWARE

Emergency terminal stopping software is responsible for monitoring the car speed at terminal landings. This software is contained in two microcontrollers at locations U19 and U3 on the IMC-DIO board. Inspect the white tags on microcontrollers to verify that software at U19 is v2.08 or above and software at U3 is v1.02 or above. Call MCE if you have lower software versions.

13. MOTOR FIELD

Motor Field Circuit: Motor field snubber circuit (RM2 and CM) may cause problems with motor field resistance values above 30 ohms. If motor field failure messages or unstable motor field voltages occur, disable the snubber circuit (as shown in exhibit #13) by disconnecting the RM2 end of the wire between RM2 and CM. Verify that the problem has cleared. If problem is eliminated, do not reconnect snubber circuit at this time. Continue by readjusting the motor field (see below). Following motor field readjustment, reconnect the snubber circuit and verify proper operation. If proper operation cannot be achieved, disconnect snubber circuit permanently.

Motor Field Adjustment: A simplified step-by-step adjustment procedure for motor field calibration has been developed (see six page exhibit attached -- *13. Motor Field Circuit and Motor Field Adjustment*).

14. DIAGNOSTIC ISSUES

On the F3 screen, highlighted OLP and PPS indications do not represent any actual fault conditions. Disregard these indications.

On the F7 screen, the description of *Generator Shunt Field Failure* or *DDP##* (#1 to #50) are not provided in the manual (see three page exhibit attached -- *14. List of Events for IMC-SCR*). We urge you to use MCE's Special Event Calendar (F7 screen) during each site visit making a note of what type of events have been recorded on each individual car.