MOTION CONTROL ENGINEERING, INC.
11380 WHITE ROCK ROAD
RANCHO CORDOVA, CA 95742
TELEPHONE (916) 463-9200 FAX (916) 463-9201

CONTROLLER INSTALLATION MANUAL

VFMC-1000 SERIES M (OPEN LOOP)
VFMC-1000 SERIES M (CLOSED LOOP FLUX VECTOR)
VARIABLE FREQUENCY TRACTION CONTROLLER

Compliant with ASME A17.1 - 2000 / CSA B44-00 and later codes

Applicable to EMS / IDM (G5), MagneTek (GPD515),
MagneTek (HPV 900 Flux Vector)
and TORQMAX AC Drives

PART # 42-02-2022 REV. A.5 FEBRUARY 2009

Hook Up Schedule

For Temporary Operation of A17.1 -2000 Series M Traction Controllers

EXERCISE EXTREME CAUTION WHEN OPERATING THE ELEVATOR IN THIS MODE

Critical Safety Precautions:

1. ALWAYS connect an individual jumper for each device, so when the device is installed that jumper is removed. Note: NEVER jump out more circuits than necessary when preparing the car to operate or conduct a test.

2. ALWAYS connect the temporary run buttons in the CAR TOP INSPECTION circuits so they have top priority.

3. ALWAYS insert the temporary run button's EMERGENCY STOP SWITCH in the safety circuit between terminals 17 and 18. NOT in series with the ENABLE button.

4. ALWAYS get the GOVERNOR/GOVERNOR SWITCH and SAFETIES/SAFETY OPERATOR SWITCH (plank) operational as soon as possible.

If the door operator, fire service and emergency power are not yet wired:
Remove wire from panel mount terminal **DCL**
Remove wire from terminal **47** and on the SC-SB2K board
Jumper from **2 bus** to panel mount terminal **DPM**
Jumper from **2 bus** to terminal **36** and **36R** on the SC-SB2K board
Jumper from **2 bus** to panel mount terminal **EPI** (if present)
Jumper from **2F bus** to terminal **38** on the SC-SB2K board
Jumper from **2F bus** to terminal **FRSM** on the SC-SB2K board
Jumper from **2F bus** to terminal **FRSA** on the SC-SB2K board

Safeties, door locks and temporary run buttons, jump terminals as follows:
2 bus to 15, INCTI and 2 9 to 10 9 to 11 9 to 12 9 to 13 15 to 16 16 to 17
18 to 20 EB3 to EB4 2CT to CD 2CT to HD or IDL 75 to 85 77 to 87

If rear doors are present also jump:
2CT to CDR 2CT to HDR 2 bus to DPMR remove wires from 37R & 47R

If you have earthquake operation then jump CW1 to CW2 and SSI to EQ24

Install Temporary Run Buttons as follows (refer to area #6 of job prints):
Connect **EMERGENCY STOP SWITCH** between terminals **17 and 18**
Connect **ENABLE button** to terminal **INCTI**
Connect **UP button** to terminal **INCTU** and **ENABLE button**
Connect **DOWN button** to **INCTD** and **ENABLE button**
On the SC-BASE board, place the **PFLT Bypass** in the “**ON**” position

Refer to section 5.3.2 for A17.1-2000 bypass function

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IMPORTANT PRECAUTIONS & NOTES

We strongly recommend that you read this manual carefully before proceeding with installation. Throughout this manual you will see icons followed by a WARNING, CAUTION or NOTE. These icons denote the following:

WARNING: Operating procedures and practices which, if not done correctly, may result in personal injury or substantial damage to equipment.

CAUTION: Operating procedures and practices which, if not observed, may result in some damage to equipment.

NOTE: Procedures, practices or information which are intended to be immediately helpful and informative.

The following general rules and safety precautions must be observed for safe and reliable operation of your system.

The controller may be shipped without the final running program. However, you may install the unit, hookup and run the elevator on Inspection operation. Call MCE approximately one week before you are ready to turn the elevator over to full automatic operation so the running program can be shipped to you. If you need to change a program chip on a computer board make sure you read the instructions and know exactly how to install the new chip. Plugging these devices in backwards may damage the chip.

Elevator control products must be installed by experienced field personnel. This manual does not address code requirements. The field personnel must know all the rules and regulations pertaining to the safe installation and operation of elevators.

This equipment is an O.E.M. product designed and built to comply with ASME A17.1, National Electrical Code, CAN/CSA-B44.1/ASME-A17.5 and must be installed by a qualified contractor. It is the responsibility of the contractor to make sure that the final installation complies with all local codes and is installed in a safe manner.

“This equipment is suitable for use on a circuit capable of delivering not more than 10,000 rms symmetrical amperes, 600 Volts maximum.” The 3 phase AC power supply to the Drive Isolation Transformer used with this equipment must originate from a fused disconnect switch or circuit breaker which is sized in conformance with all applicable national, state and local electrical codes, in order to provide the necessary motor branch circuit protection for the Drive Unit and motor. Incorrect motor branch circuit protection will void warranty and may create a hazardous condition.

Proper grounding is vitally important to the safe and successful operation of your system. Bring your ground wire to the system subplate. You must choose the proper conductor size and minimize the resistance to ground by using the shortest possible routing. See National Electrical Code Article 250-95, or the applicable local electrical code.

Before applying power to the controller, physically check all the power resistors and other components located in the resistor cabinet and inside the controller. Components loosened during shipment may cause damage. Please make sure that all the safety relays on the SC-SB2K board are properly seated in their sockets by pushing each relay gently into its socket.

You must **not** connect the output triacs **directly** to a hot bus (2, 3 or 4 bus). This can damage the triacs. PIs, direction arrows, and terminals 40 & 42 are examples of outputs that can be damaged this way. Note: miswiring terminal 39 into 40 can damage the fire warning indicator triac.

The HC-PI/O and HC-CI/O boards are equipped with quick disconnect terminals. During the initial installation, you may want to remove the terminal connector, hook up the field wires, test for no shorts to ground (1 bus) and to 2, 3 and 4 terminals before plugging these terminals back into the PC boards.

ENVIRONMENTAL CONSIDERATIONS: Keep the machine room clean. Controllers are generally in NEMA 1 enclosures. Do not install the controller in a dusty area. Do not install the controller in a carpeted area. Keep room temperature between 32° F to 104° F (0° to 40°C). Avoid condensation on the equipment. Do not install the controller in a hazardous location or where excessive amounts of vapors or chemical fumes may be present. Make sure power line fluctuations are within ± 10%.

CONTROLLER OR GROUP ENCLOSURES WITH AIR CONDITIONING

If your controller or group enclosure is equipped with an air conditioning unit, observe the following precautions (failure to do so can result in water condensation inside the enclosure):

- Ensure the integrity of the NEMA 12 or 4 enclosure is maintained by using sealed knockouts and by sealing any holes created during installation.
- Do not run the air conditioner unit when the doors are open.
- To avoid damaging the compressor, if the air conditioner is turned off while it is running, wait at least five minutes before turning power on again.
- Observe the manufacture's recommended maintenance and optimum thermostat setting of 75° F (see Operator's Manual).
- Ensure the air conditioner unit's drain hose remains open.

LIMITED WARRANTY

Motion Control Engineering (manufacturer) warrants its products for a period of 15 months from the date of shipment from its factory to be free from defects in workmanship and materials. Any defect appearing more than 15 months from the date of shipment from the factory shall be deemed to be due to ordinary wear and tear. Manufacturer, however, assumes no risk or liability for results of the use of the products purchased from it, including, but without limiting the generality of the forgoing: (1) The use in combination with any electrical or electronic components, circuits, systems, assemblies or any other material or equipment (2) Unsuitability of this product for use in any circuit, assembly or environment. Purchasers' rights under this warranty shall consist solely of requiring the manufacturer to repair, or in manufacturer's sole discretion, replace free of charge, F.O.B. factory, any defective items received at said factory within the said 15 months and determined by manufacturer to be defective. The giving of or failure to give any advice or recommendation by manufacturer shall not constitute any warranty by or impose any liability upon the manufacturer. This warranty constitutes the sole and exclusive remedy of the purchaser and the exclusive liability of the manufacturer, AND IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS, FOR PURPOSE SOLD, DESCRIPTION, QUALITY PRODUCTIVENESS OR ANY OTHER MATTER. In no event will the manufacturer be liable for special or consequential damages or for delay in performance of this warranty.

Products that are not manufactured by MCE (such as drives, CRT's, modems, printers, etc.) are not covered under the above warranty terms. MCE, however, extends the same warranty terms that the original manufacturer of such equipment provide with their product (refer to the warranty terms for such products in their respective manual).

SECTION 1
PRODUCT DESCRIPTION

1.0 GENERAL INFORMATION

MCE's VFMC-1000 Series M Traction Controller for AC Elevators is designed to exhibit the characteristics listed below in a traction elevator installation. The controller has been designed to save time in installation and troubleshooting, but it is still very important that the field personnel who work with this equipment familiarize themselves with this manual before attempting to install the equipment.

PRINCIPAL CHARACTERISTICS	
Number of Stops	32 (64 in the future)
Number of Cars in Group	12
Car Speed Speed Regulation Car Speed Speed Regulation	open loop - up to 150 fpm (no Encoder) ± 5% flux vector - up to 350 fpm (requires Encoder feedback) less than ± 5%
Rotating equipment	AC machine with VVVF Drive
Environment	32° to 104° F (0° to 40° C) ambient 12,000 ft altitude 95% humidity

EQUIPMENT CATEGORIES - The VFMC-1000 Series M traction controller consists of the following pieces of equipment:

- Controller Unit — Car Top Selector (Landing system)
- Peripherals — Group Supervisor (2 or more cars only)

1.1 CAR CONTROLLER PHYSICAL LAYOUT

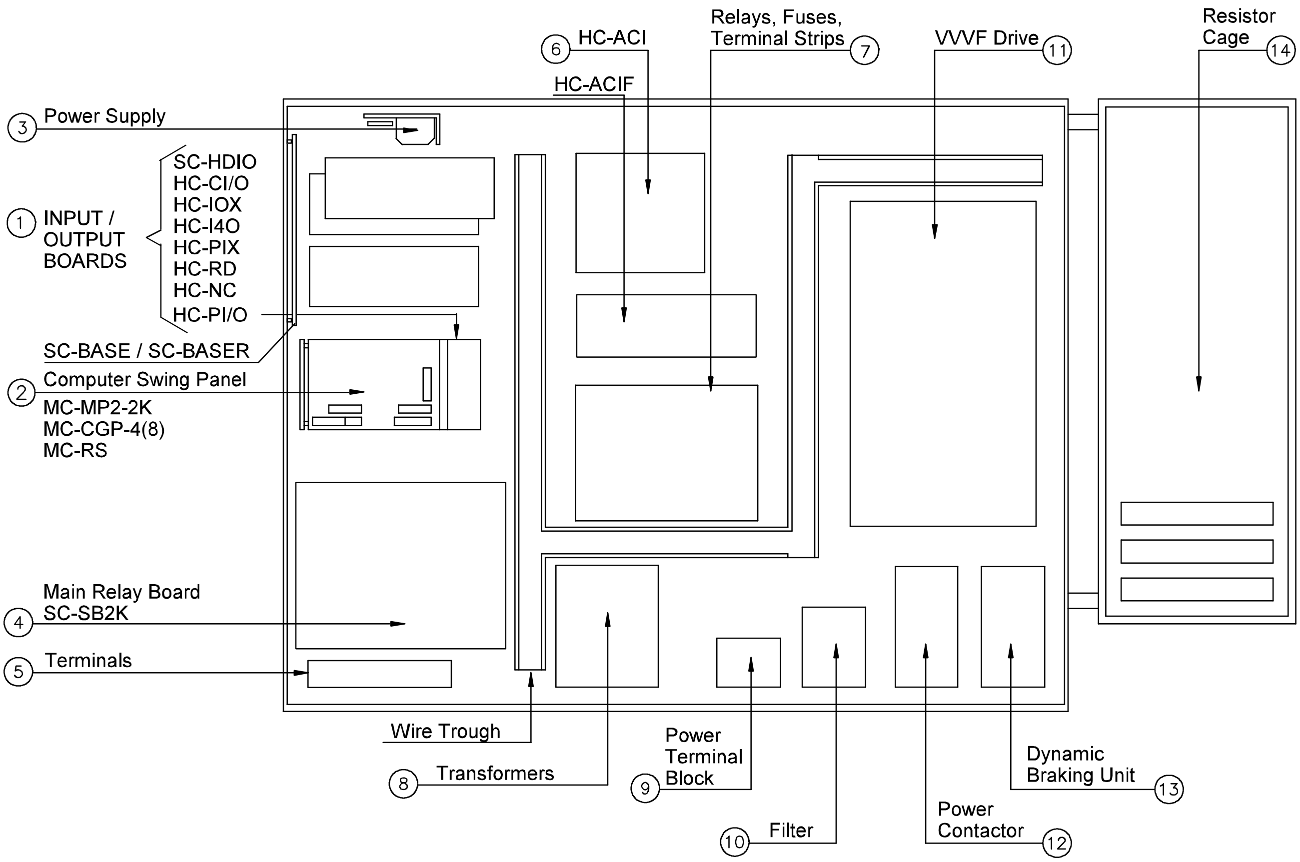
Figure 1.1 shows a typical layout of the Car Controller in a standard MCE traction cabinet. A brief description of each block follows:

1. **INPUT/OUTPUT BOARDS** - This block consists of a number of different Input/Output boards. The following is a list of boards that could be used in this block:

HC-PI/O	Power and Call Input/Output board
HC-CI/O	Call Input/Output board (optional)
HC-RD	Rear Door Logic board (optional)
HC-IOX	Input/Output Expander board (optional)
HC-I4O	Input/Output Expander board (optional)
MC-NC	Neuron Controller board (SmartLINK for Car Operating Panel option)
SC-BASE	Lock bypass, Access, Emergency Brake & Overspeed board
SC-BASER	Lock bypass, Access, Emergency Brake & Overspeed board with Rear Doors
SC-HDIO	High Density Input/Output board

Note that more than one HC-CI/O, HC-IOX and/or HC-I4O board may be required depending on system requirements (i.e., number of landings served).

FIGURE 1.1 Typical Physical Layout



For jobs where all components will not fit in this enclosure, a different enclosure may be used or some of the components may be mounted externally.

2. **COMPUTER SWING PANEL** - The Computer Swing Panel (see Figure 1.2) houses the following:

- MC-MP2-2K Main Processor Board
- MC-CGP-4(8) Communication Processor Board (optional)
- MC-RS Communication Interface Board (optional)

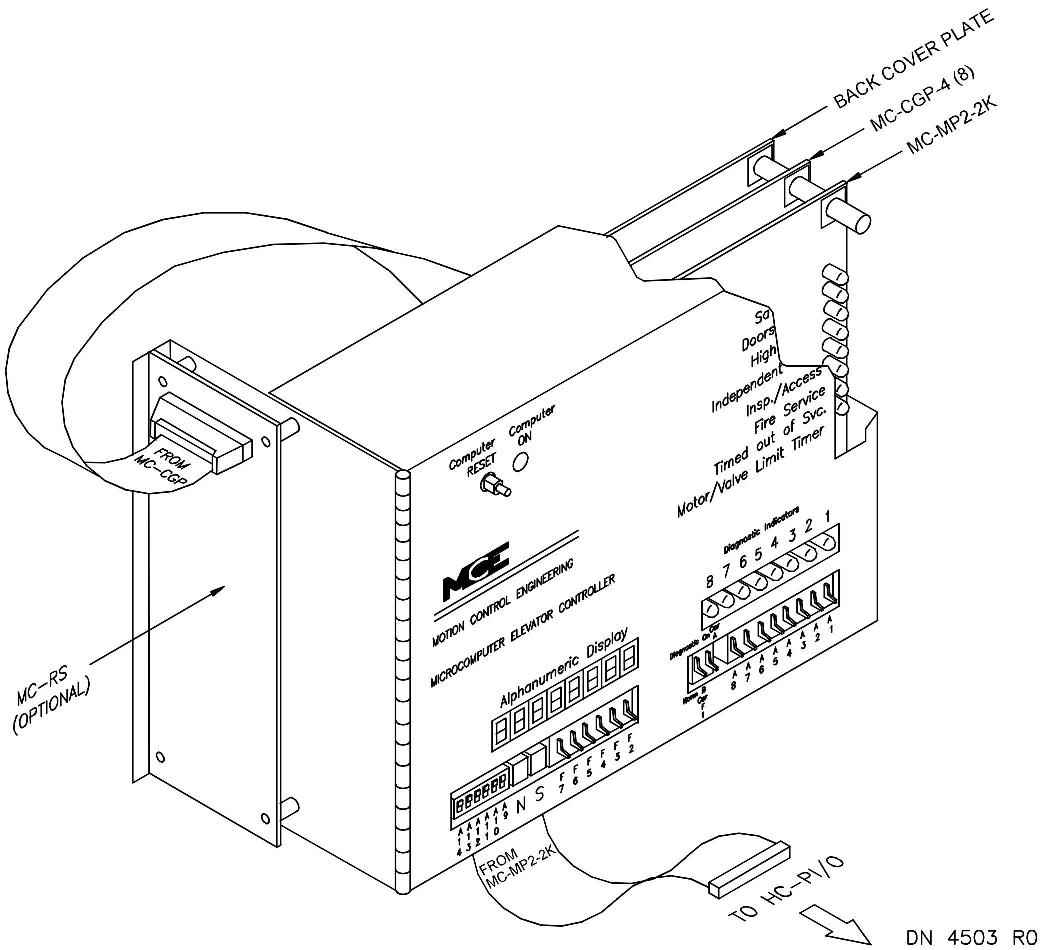
3. **POWER SUPPLY** - The power supply (single output linear) provides +5VDC power to the computer and its peripheral boards.

4. **MAIN SAFETY RELAY BOARD (SC-SB2K)** - This board typically contains a TEST/NORMAL switch, Inspection UP/DN switch and Relay Panel Inspection switch. Field wires come in to the bottom and right side of SC-SB2K board.

5. **TERMINALS** - For Field Connections.

6. **HC-ACI Drive Interface Board** - Provides the interface to the AC drive.
HC-ACIF Flux Vector Drive Interface Board - This board is used with the Flux Vector Controller or for jobs with intermediate speed.

FIGURE 1.2 Computer Swing Panel



7. **RELAYS, FUSES AND TERMINAL BLOCKS** - This block contains door operator circuitry, terminal blocks (for customer wiring), fuse holders, fuses, or any other circuitry needed for a specific job.

8. **TRANSFORMERS** - Transformers are provided, as necessary, according to the requirements of each individual car load and the available AC line voltage.

9. **POWER TERMINAL** - Input Power Connections.

10. **FILTER** - To reduce RFI noise (optional).

11. **VVVF DRIVE UNIT** - Provides a synthesized variable frequency, variable voltage, three phase AC output to run the hoist motor in response to speed and direction signals from the HC-ACI board.

12. **POWER CONTACTOR** - The contactor is usually in the lower right corner of the controller cabinet along with the associated terminal blocks for motor connections.

13. **DYNAMIC BRAKING UNIT** - (optional).

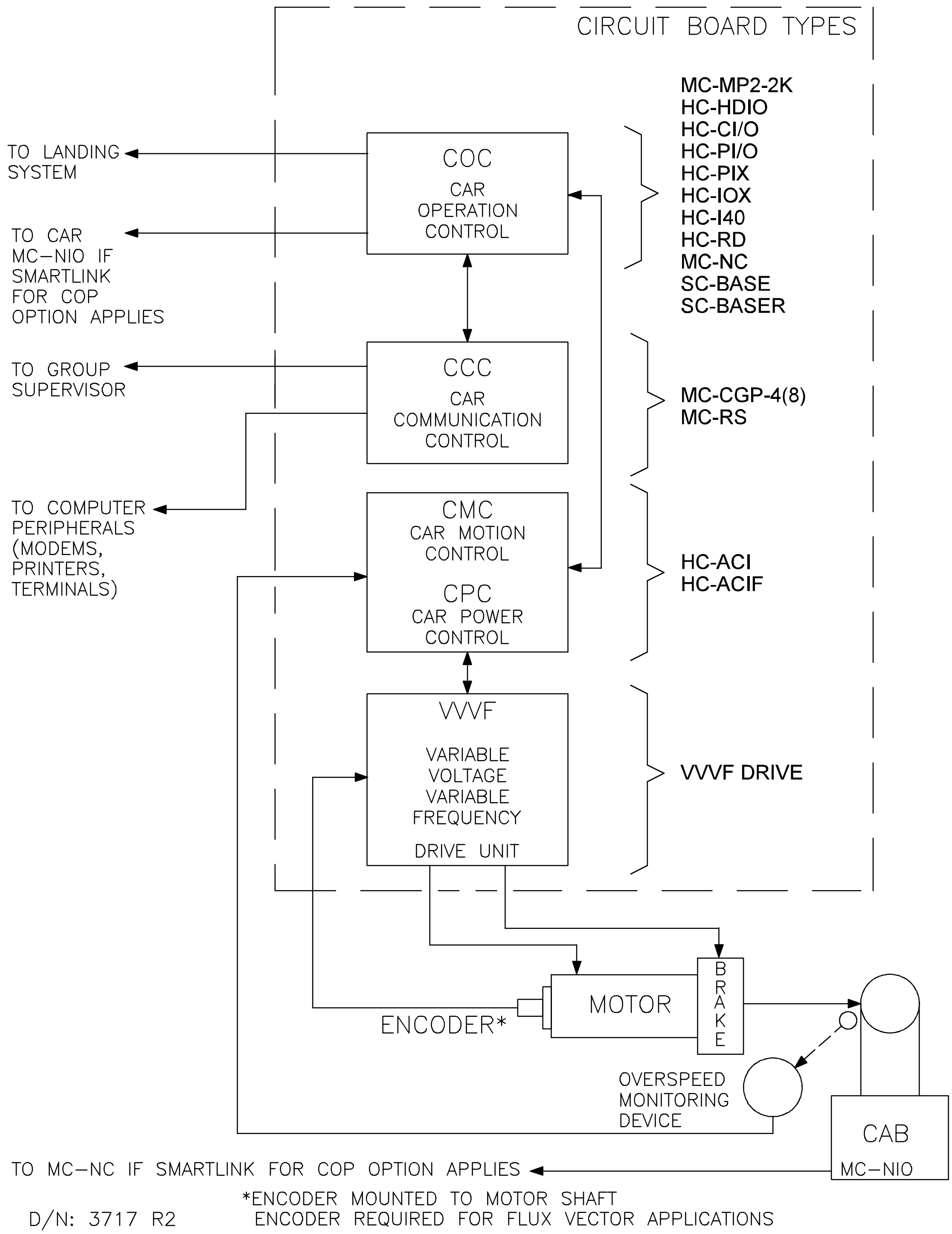
14. **RESISTOR CAGE** - The power resistor cage is mounted on the side or on the top of the controller cabinet.

1.2 CAR CONTROLLER FUNCTIONAL LAYOUT

The Control Unit is divided into four primary sections. Figure 1.3 shows these functional blocks and the printed circuit board types associated with each functional block:

- Car Operation Control (COC)
- Car Communication Control (CCC)
- Car Motion Control (CMC)
- Car Power Control (CPC) - VVVF Drive

FIGURE 1.3 Car Controller Functional Layout



CAR OPERATION CONTROL (COC) - This functional block covers logical car operation such as operation of the doors and response to hall and car call demands. This block also covers special operations such as Inspection/Access, Fire Service, etc. Additional special operations are provided as required per specifications.

The heart of the COC is the SC-SB2K (Main SafetyRelay board), which satisfies code-required safety functions and redundant relay backup functions. All computer functions can fail in an ON condition and the car will not move. Except for calls, most of the individual elevator inputs and outputs are handled through the Main Relay board and are routed to the HC-PI/O board, which is the main interface to the computer and SC-HDIO board.

Provisions for eight position indicator outputs are on the HC-PI/O board. If additional position indicators are required, HC-PIX boards are added as required. If independent (walk-through) rear doors are required, the HC-RD board acts as the interface between the computer and the Rear Door Relay board, which handles all functions associated with the rear doors. Some additional inputs and outputs, such as load weighers, are handled through the HC-IOX or HC-I4O board.

Hall calls are interfaced to the computer through the HC-CI/O boards which can handle up to 16 calls per board. Car calls are interfaced through the HC-CI/O boards or the MC-NC board if the controller is equipt with the SmartLink for Car Operating Panel option. Therefore, all the input/output boards (HC-PI/O, HC-PIX, HC-RD, HC-IOX, HC-I4O, HC-CI/O and MC-NC) act as the interface between the MC-MP2-2K Main Computer board and the user. These input/output boards are linked to the Main Computer board through the ribbon cable attached to the MC-MP2-2K board, which plugs into the HC-PI/O board. The Main Computer board contains the main elevator logic program.

CAR COMMUNICATION CONTROL (CCC) - This functional block coordinates the flow of information between the car controller and other equipment such as terminals, modems, printers and the Group Supervisor in an M3 Group System.

CAR MOTION CONTROL (CMC) - Car Motion Control (CMC) develops the speed command which dictates the car's speed. The speed signal is in the form of step input signals which are applied to the drive unit. The drive responds to the commanded step inputs and runs the elevator at predefined speed settings stored in the drive unit. The CMC also provides for Inspection/Leveling Overspeed (ILO) monitoring and Emergency Terminal Switch (ETS) monitoring. These functions are covered by the following devices:

- HC-ACI AC Drive Interface board
- HC-ACIF Additional Flux Vector Drive Interface board

The HC-ACI board creates the speed command, controls the brake, monitors overspeed conditions and is the interface between the COC, CPC and the power equipment such as the brake, VFAC Drive Unit and supporting devices.

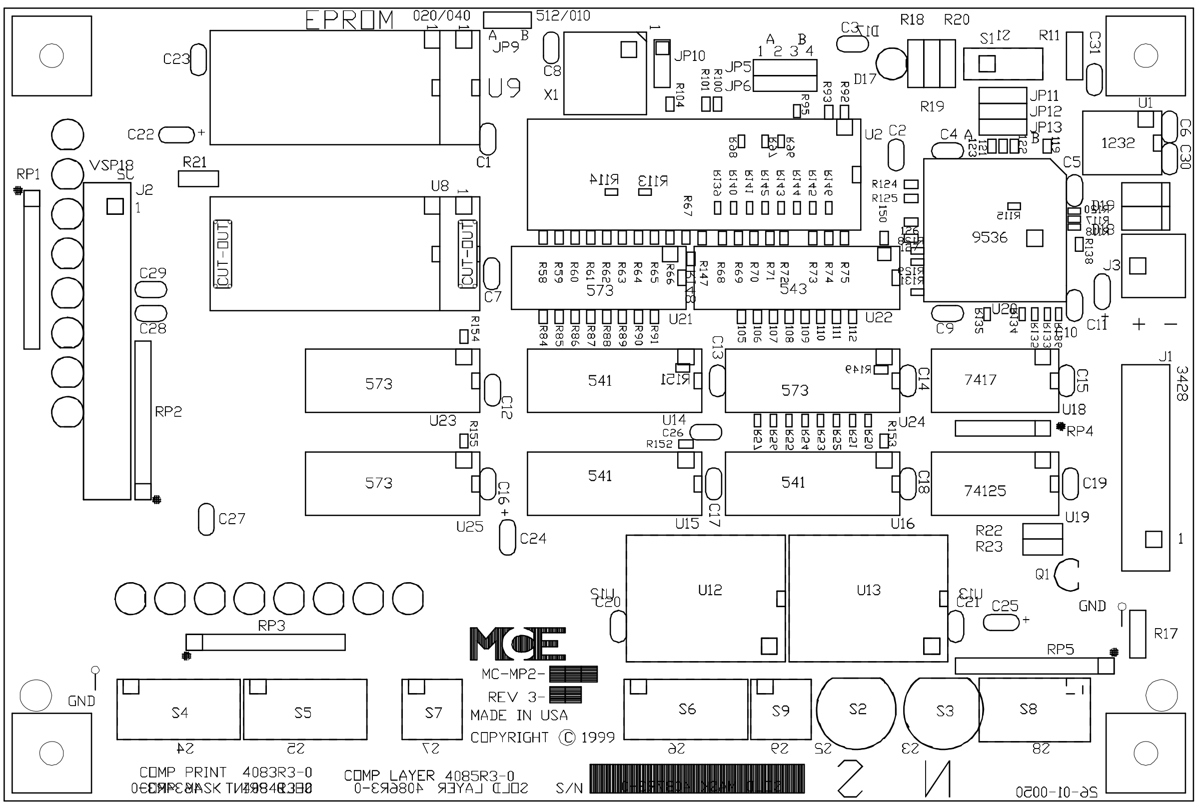
CAR POWER CONTROL (CPC) - VVVF DRIVE - Car Power Control (CPC) receives the direction command and speed signal from the CMC and produces the necessary outputs to the rotating equipment to achieve the desired elevator movement. The AC Drive Unit receives the direction(run) and speed command from the HC-ACI board, and provides the proper 3-phase voltage and frequency to create the required RPM and torque in the motor. It also provides for the dynamic braking when it is necessary.

1.2.1 CAR OPERATION CONTROL (COC) COMPONENTS

Car Operation Control involves such things as door operation, response to hall and car calls, and special operations such as Inspection/Access and Fire Service. The following boards are involved in the COC functions:

- MC-MP2-2K, Main Processor Board
- SC-SB2K, Main Relay Board
- SC-HDIO, High Density Board
- SC-BASE, Lock Bypass, Access, Overspeed and Emergency Brake Board
- SC-BASER, Lock Bypass, Access, Overspeed, Emergency Brake Board with Rear Doors
- HC-PI/O, Power Input / Output Board
- HC-PIX, Position Indicator Board
- HC-CI/O, Call Input / Output Board
- HC-IOX, Input / Output Expander Board
- HC-I4O, Input / Output Expander Board
- MC-NC, Neuron Controller Board

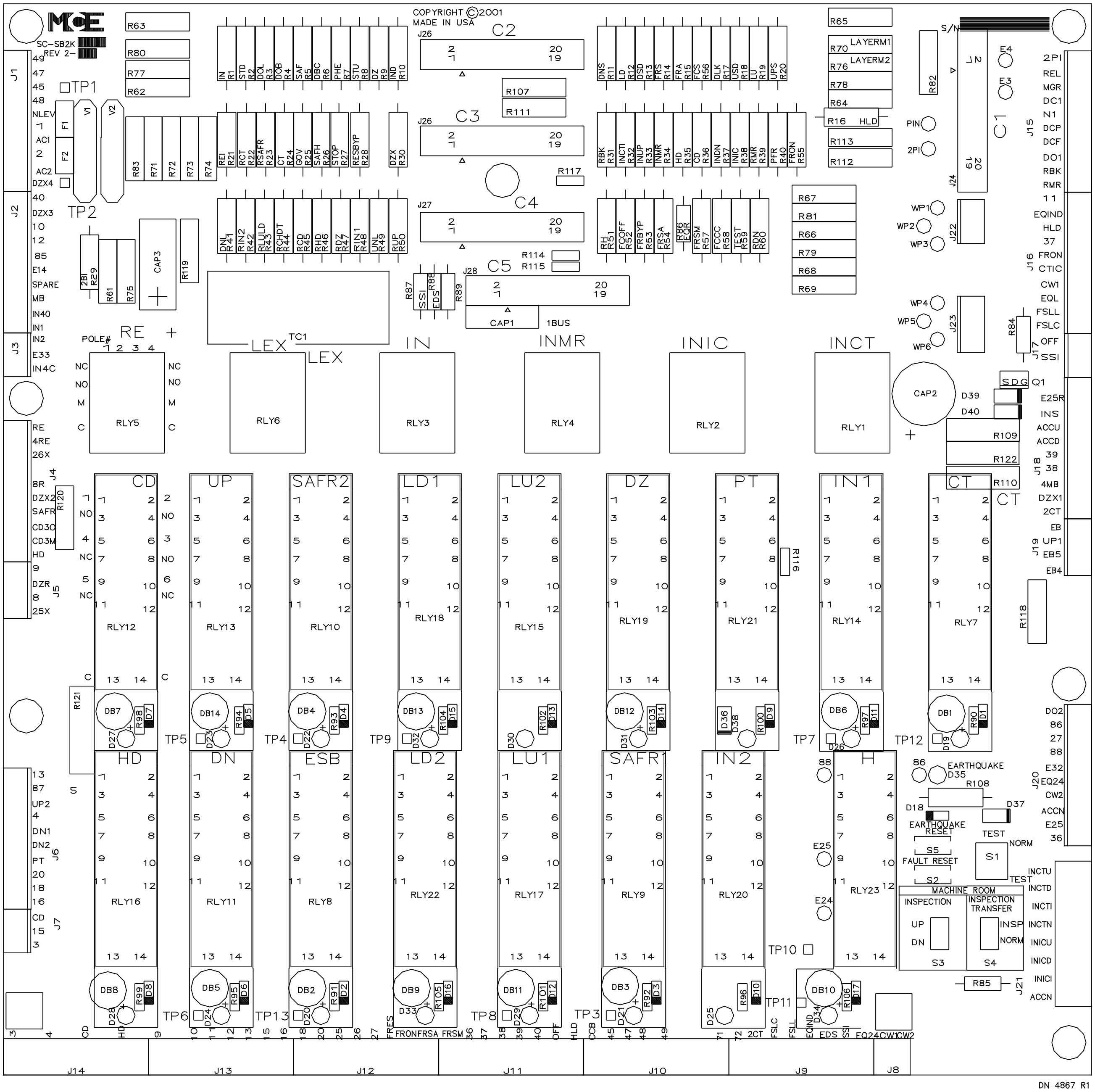
FIGURE 1.4 MC-MP2-2K Main Processor Board



MC-MP2-2K Main Processor board - The Main Processor board is located within the Computer Swing Panel and is responsible for Car Operation Control. This board is also responsible for the On-Board Diagnostics that provide interactive communication with the elevator mechanic. The board contains the alphanumeric display and all the LEDs, switches, and buttons found on the front of the Computer Swing Panel.

MAIN PROCESSOR SUBSYSTEM - This subsystem consists of many different input/output circuit boards. The layout and arrangement of these boards may vary from controller to controller. The following boards are typically included:

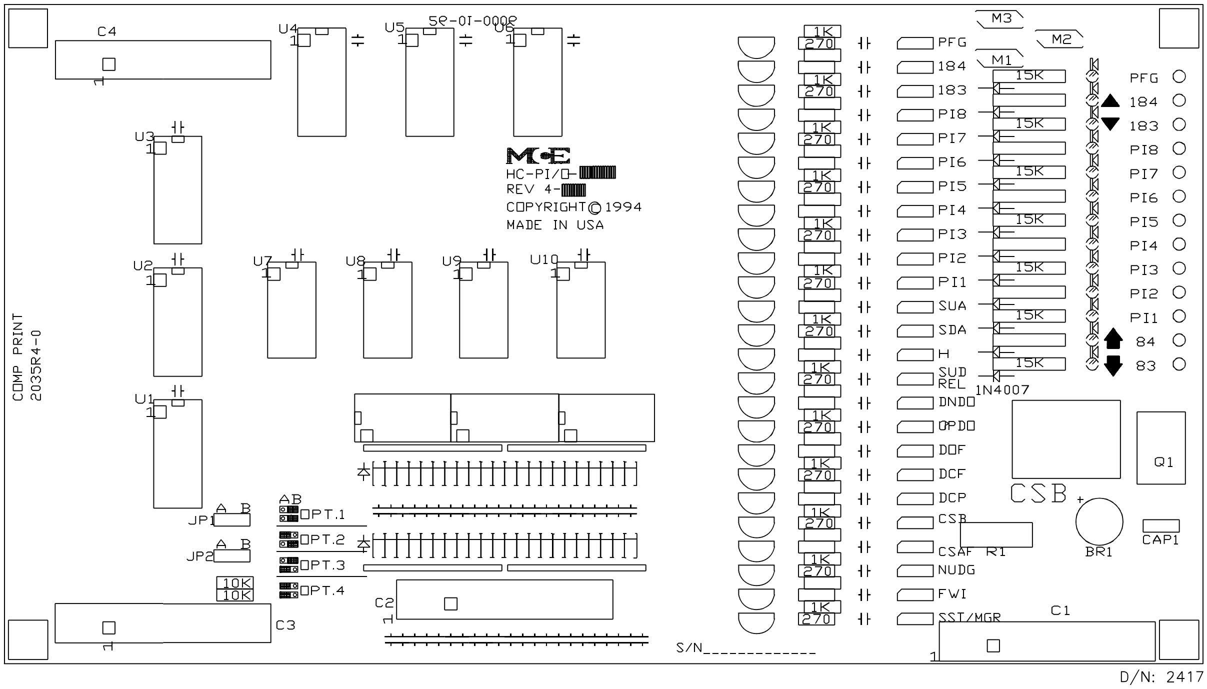
FIGURE 1.5 SC-SB2K Main Safety Relay Board



SC-SB2K Main Safety Relay Board - This board satisfies many of the code requirements for relay contact redundancy and the requirements for normal terminal stopping devices. It also provides the necessary circuitry for running the car on Inspection. This board, along with the HC-PI/O, and SC-HDIO boards, comprise the high voltage interface between the MC-MP2-2K computer and the individual car logic functions such as door operation, direction outputs, direction sensing, main safety circuits, leveling circuitry, etc.

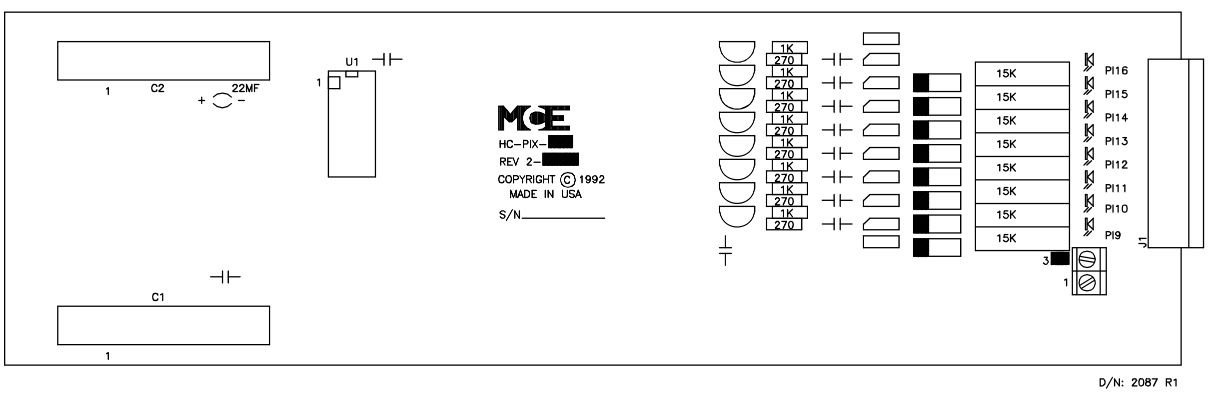
This board includes the MACHINE ROOM INSPECTION TRANSFER INSP/NORM switch, the MACHINE ROOM INSPECTION car movement UP/DN switch and the TEST/NORM switch.

FIGURE 1.6 HC-PI/O Power Input/Output Board



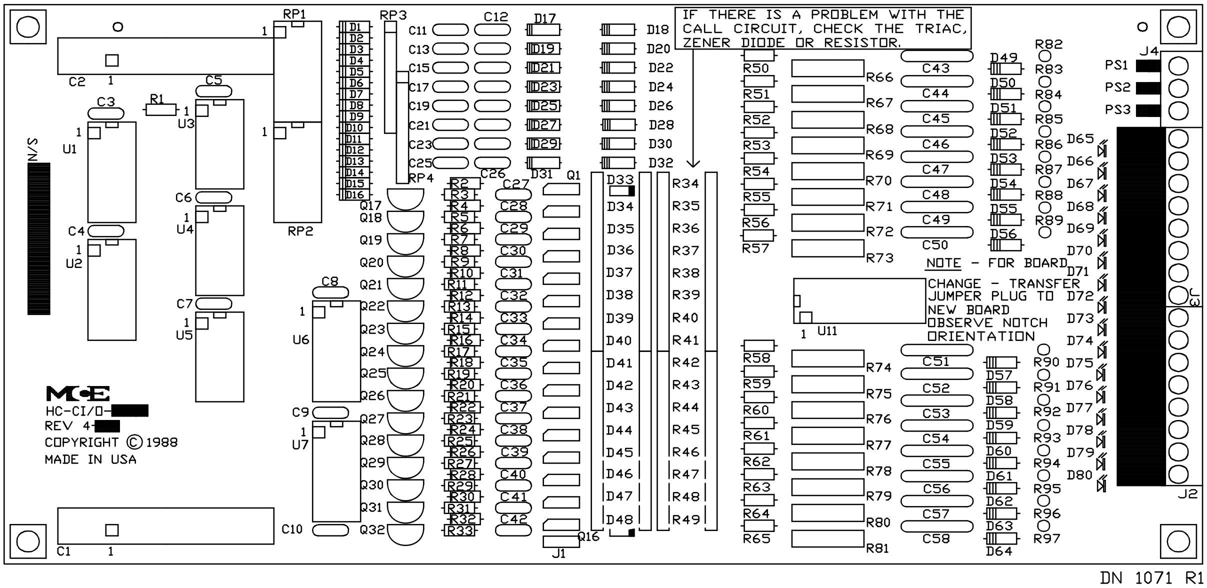
HC-PI/O Power Input/Output board - This board is typically located behind the Computer Swing Panel. The main function of this board is to receive inputs and provide outputs for individual car functions such as door operation, limit switches, direction sensing, position indicators, direction arrows and arrival gongs.

FIGURE 1.7 HC-PIX Position Indicator Expander Board



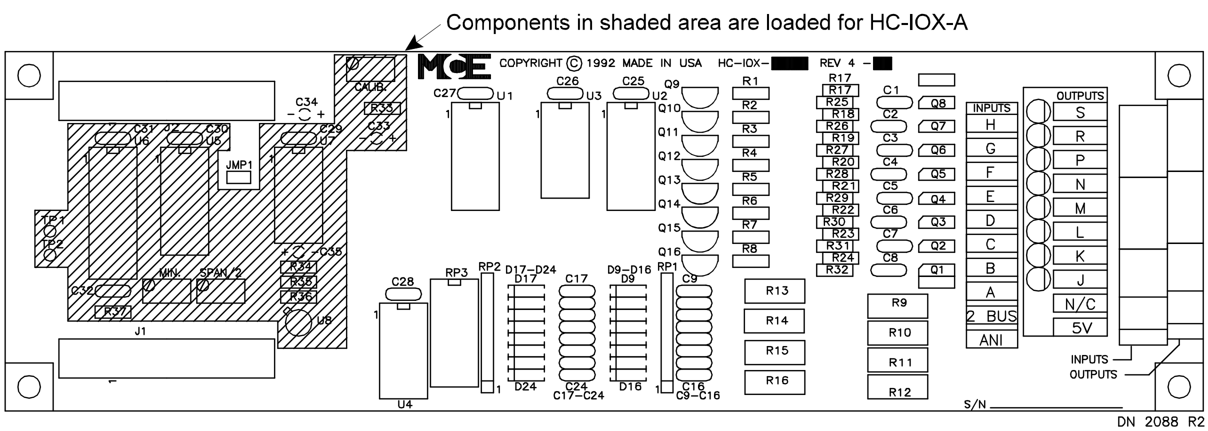
HC-PIX Position Indicator Expander board - This board provides additional PI outputs which are needed if there are more than eight floors in the building.

FIGURE 1.8 HC-CI/O Call Input/Output Board



HC-CI/O Call Input/Output board - This board processes hall call and car call inputs, call acknowledgment outputs, and displays the status of each call.

FIGURE 1.9 HC-IOX Input/Output Expander Board



HC-IOX / HC-I4O Input/Output Expander board - This is a multipurpose input/output board (Figure 1.9). Some installations have the HC-I4O board instead (Figure 1.10). Its functions are similar to the HC-IOX and HC-IOX-A.

FIGURE 1.10 HC-I4O Input/Output Expander Board

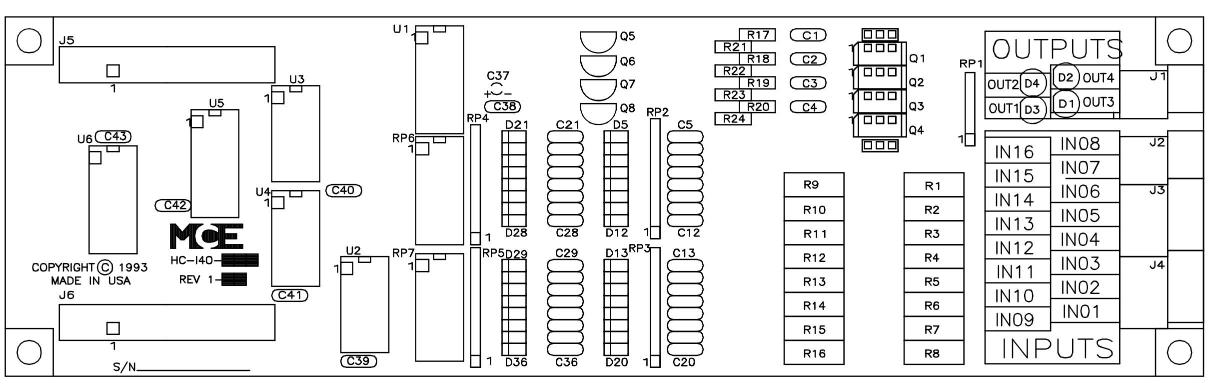
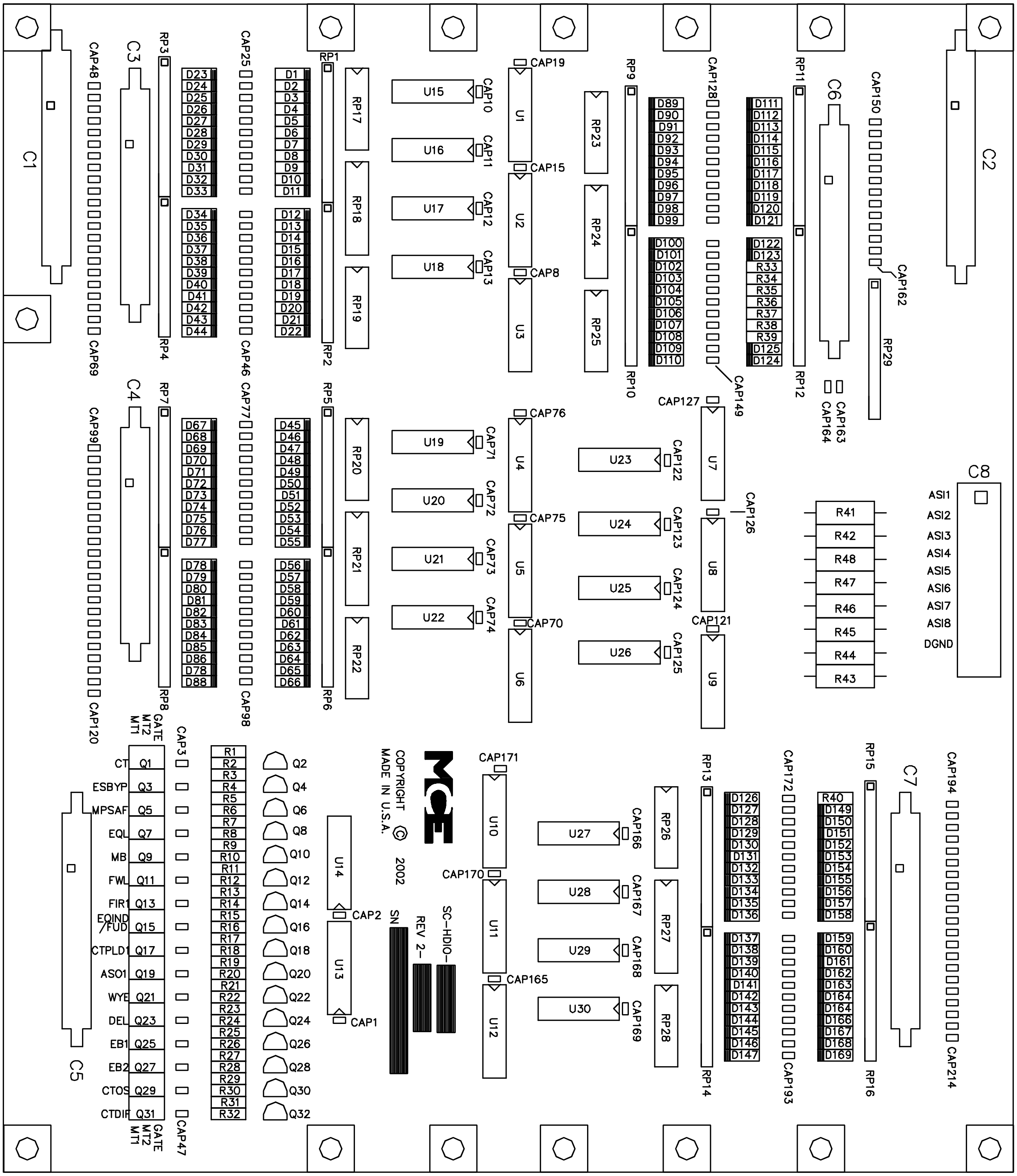


FIGURE 1.11 SC-HDIO High Density Input/Output board



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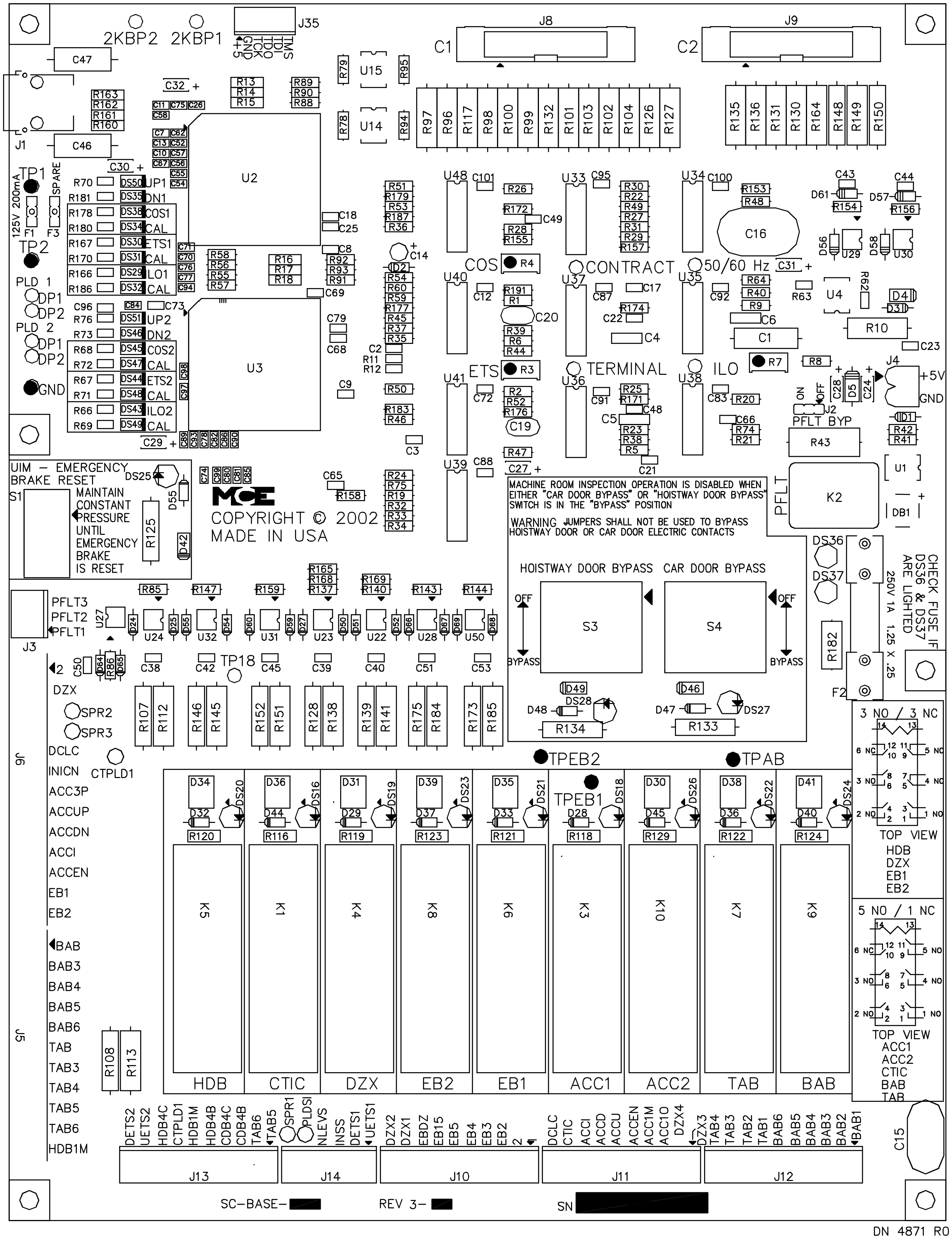
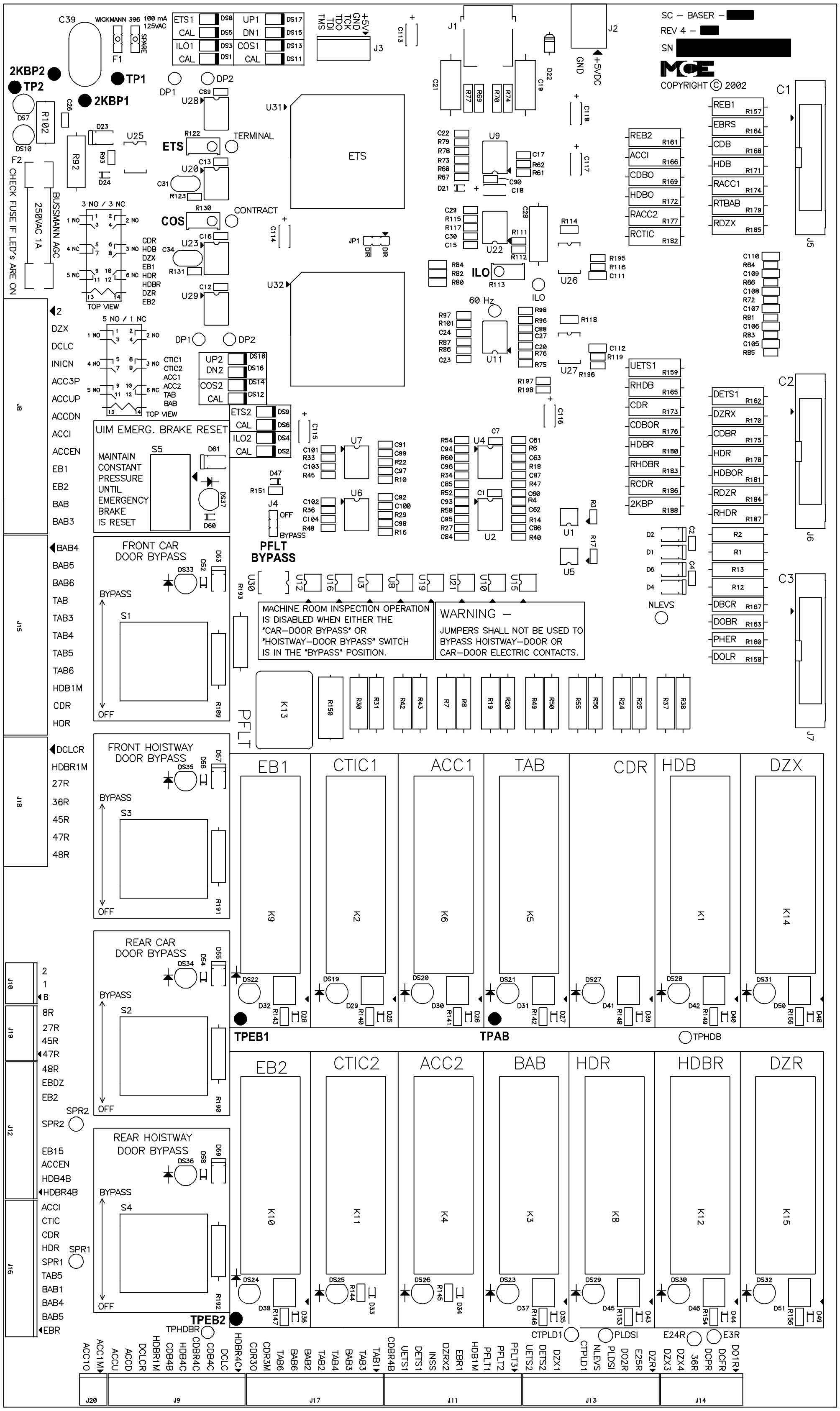
SC-HDIO High Density Input/Output board - This board is typically mounted behind PC Boards located near the Computer Swing Panel. The main function of this board is to receive inputs and provide outputs for the required safety functions carried out by the hardware located on the SC-BASE and SC-SB2K boards. There are no relays, switches or adjustments to be made on this board.



SC-BASE Bypass, Access, Overspeed and Emergency Brake board - This board has the necessary relays and hardware that is used to enable door lock bypass operation, inspection access, emergency brake activation and overspeed monitoring for access, inspection, leveling and emergency terminal speed limiting. Switches included on the board are for car and hoistway door lock bypass as well as emergency brake reset. Rear door bypass switches, if present, are located on the SC-BASER.

FIGURE 1.13 SC-BASER Lock Bypass, Access, Emerg. Brake, Overspeed Board with Rear Doors



SC-BASER Lock Bypass, Access, Overspeed, Emergency Brake Board with Rear Doors - This board is used in place of the SC-BASE board when the job has rear doors.

HC-RD Rear Door board - This board provides the necessary logic required when an additional independent rear door is present (board not pictured).

MC-NC Neuron Controller board (optional) - Control board for the SmartLink for Car Operating Panel option (board not pictured). See Appendix I, *Option* SmartLink for Car Operating Panel if applicable.

MC-NIO Neuron Input/Output board (optional) (board not pictured) - Located in the car, the MC-NIO board transfers COP signal values to and from the car controller node as network packets. COP signals include call buttons, door open button, door close button, call lockouts, etc. See Appendix I, *Option* SmartLink for Car Operating Panel if applicable.

1.2.2 CAR OPERATION CONTROL (COC) INPUTS AND OUTPUTS

COC INPUTS - This section describes the main signals received by the MC-MP2-2K Main Processor board.

The COC module is responsible for the “logical operation” of the elevator control system. For example, the COC may decide that the car should travel from one floor to another in response to a car call, but leaves the “speed control” (acceleration, deceleration, etc.) to the CMC module. The fundamental inputs that are required for the logical control of the elevator come to the Main Processor board through two boards: the HC-PI/O board (power input/output board) and the HC-CI/O board (call input/output board). Each VFMC-1000 control system has one HC-PI/O board, and as many HC-CI/O boards as are required to accommodate the number of calls in the particular installation. Additional “miscellaneous” inputs come to the Main Processor board through the HC-IOX or HC-I4O board (I/O expansion board, also as many as needed).

Primary Power inputs - HC-PI/O board

- **Door signals** - The HC-PI/O board receives the door-related signals through the main relay board (SC-SB2K). The door related signals include the door reopening devices (photo eye, safe edge), car operating panel buttons (door open button, door close button), and the door position contacts (door open limit, door lock).

- **Landing system signals** - The HC-PI/O board receives some of the signals generated by the landing system through the main relay board (SC-SB2K). The landing system signals read by the COC module are the door zone, level up and level down signals.

- **Operational mode signals** - The HC-PI/O board receives a few of the operational and safety mode signals through the main relay board (SC-SB2K). These signals include the safety string status, the inspection operation status, and the independent service status. Additionally, some of the fire service signals are also received by the HC-PI/O board through the relay board (fire sensors, in-car fire service switch).

- **Direction sensing inputs** - Two direction sensing inputs (up sense and down sense) are read by the COC processor, again through the HC-PI/O and SC-SB2K, and are used to process the car position indicator logic and motor protection timing logic.

Call inputs (car call and hall call) - HC-CI/O board

The call buttons and call indicators are wired to the control system and read by the COC processor through the call board(s) (HC-CI/O and/or MC-NC). The connection to the HC-CI/O board is a single wire connection for both the button and the indicator (the terminal acts as both an input and output terminal). In multi-car group arrangements, “system” hall calls are wired to the Group Supervisor (also to HC-CI/O boards), but “swing car” hall calls are wired to the call board of the individual car controller, along with the car calls.

COC OUTPUTS - This section describes the main signals generated by the MC-MP2-2K Main Processor board.

The fundamental outputs that are required for the logical control of the elevator emerge from the Main Processor board through the same two boards described above: the HC-PI/O board (power input/output board) and the HC-CI/O board (call input/output board). Additional "miscellaneous" outputs emerge from the Main Processor board through the HC-IOX or HC-I4O I/O Expansion boards, as many as are needed, and some "specialty" output boards which may be used to drive specific devices.

Primary Power Outputs - HC-PI/O board

- **Position indicators, direction arrows, and arrival fixture signals** - Eight position indicator outputs are provided on the HC-PI/O board. Should the particular installation have more than eight landings, additional position indicator outputs are provided through the use of HC-PIX boards (position indicator expansion boards). The up and down direction arrow indicators and the up and down arrival lantern outputs are also provided on the HC-PI/O board. The output terminals for these indicator outputs are located on the HC-PI/O board.

- **Fire service operation signals** - Two outputs associated with fire service operation are generated on the HC-PI/O board, and are routed through the main relay board. The fire warning indicator output generates the visual/audible signal in the elevator during fire phase I recall, and the in-car stop switch bypass output is used for rendering the in-car stop switch inoperative, also during fire phase I recall.

- **Door control signals** - Four signals are generated by the COC module to control the operation of the doors. These outputs are generated on the HC-PI/O board, but are routed through the main relay board for connection to external relays. These signals are the door open function, door close function, door close power, and nudging outputs. Should the installation have a floor with both front and rear openings, a rear door logic board (HC-RD) is used to generate the corresponding outputs for the rear door.

- **Car movement signals** - Four signals are generated by the COC module to perform the *logical control* of car movement. In hydraulic applications these signals directly control the valve solenoids to cause the car to move up and down at high and low speeds. In VFMC-1000 applications, however, these outputs are read by the CMC module, which applies the proper speed input to the AC drive. The four signals generated by the COC are up direction, down direction, high speed and relevel speed. As an example, a high speed run in the up direction would be *requested* by the COC by generating the high speed and up direction outputs.

Call outputs (car call and hall call) - HC-CI/O board

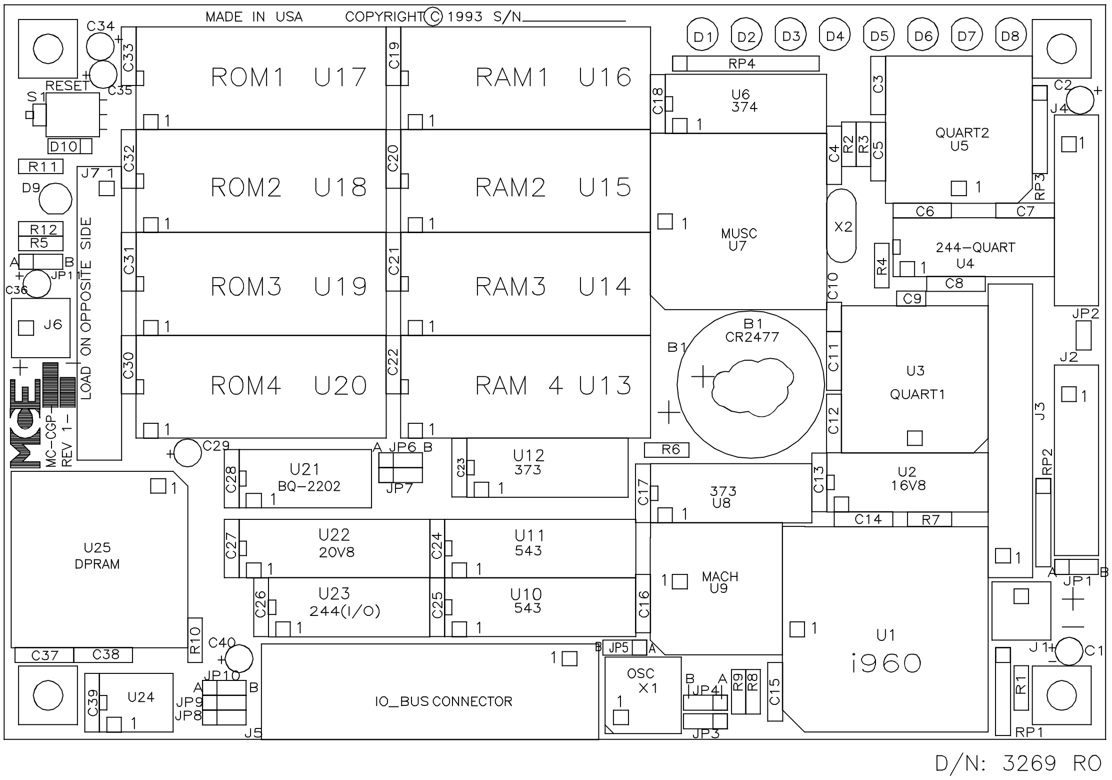
The call button indicators are wired to the control system and generated by the COC module through the HC-CI/O call board(s), or MC-NC and MC-NIO boards with the SmartLink for COP option (see Appendix I). The connection to the HC-CI/O call board is a single wire connection for both the indicator and the call button (the terminal acts as both an input and output terminal). In multi-car group arrangements, "system" hall calls are wired to the Group Supervisor, but "swing car" hall calls are wired to the call board of the individual car controller, along with the car calls.

1.2.3 CAR COMMUNICATION CONTROL (CCC) COMPONENTS

The flow of information between the car controller and other equipment such as terminals, modems, printers or Group Supervisor is controlled by the following boards:

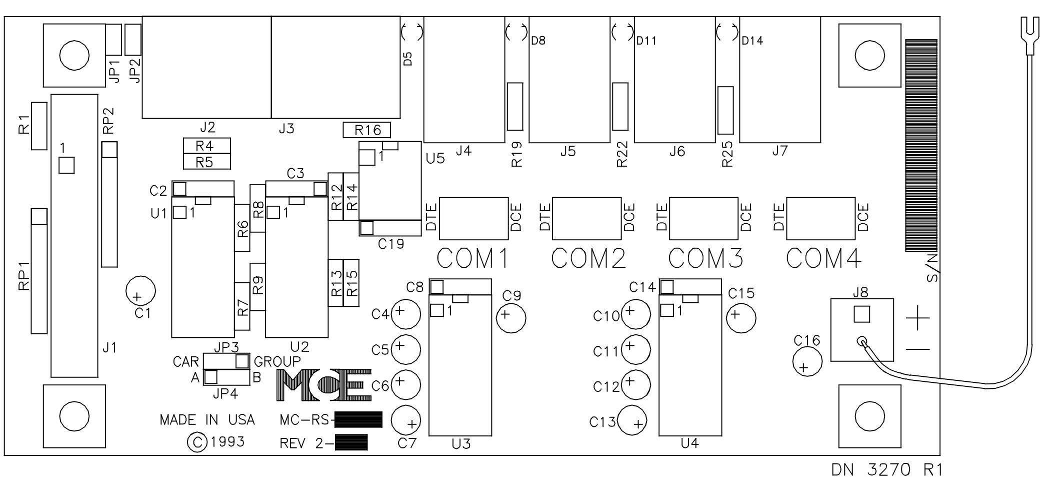
- MC-CGP-4(8), Communication Processor Board (optional)
- MC-RS, Communication Interface Board (optional)

FIGURE 1.14 MC-CGP-4(8) Communication Processor Board



MC-CGP-4(8) Communication Processor Board - This board contains a very powerful 32-bit embedded RISC microcontroller, and is located behind the Main Processor board inside the Computer Swing Panel. The primary function of this board is to co-ordinate the flow of information between the car controller and other equipment and peripherals, such as a CRT, modem, printer or a PC for diagnostics and data logging.

FIGURE 1.15 MC-RS Communication Interface Board



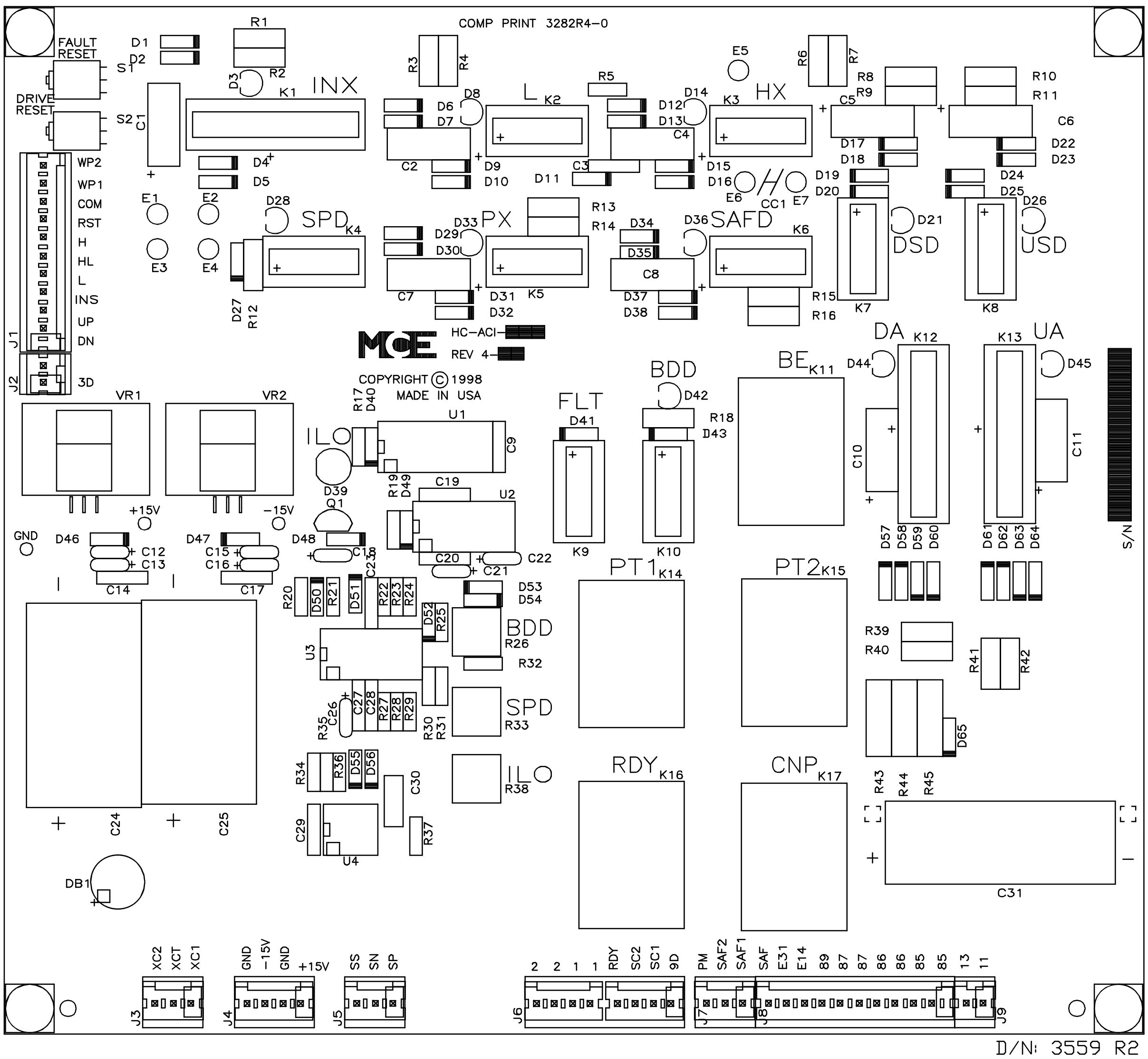
MC-RS Communication Interface Board - This board provides a high-speed RS-422 serial link between the individual car controller and the M3 Group Supervisor. It also provides four industry standard RS-232C serial ports to interface the car controller with a standard computer or data terminal, such as a printer, modem or CRT terminal.

1.2.4 CAR MOTION CONTROL (CMC) COMPONENTS

Car Motion Control involves a number of tasks including brake and speed signal coordination plus monitoring the car during Normal operation, Inspection operation and during slowdown at terminal landings, and stopping the car if a failure or unsafe condition is detected. The CMC components include the following boards:

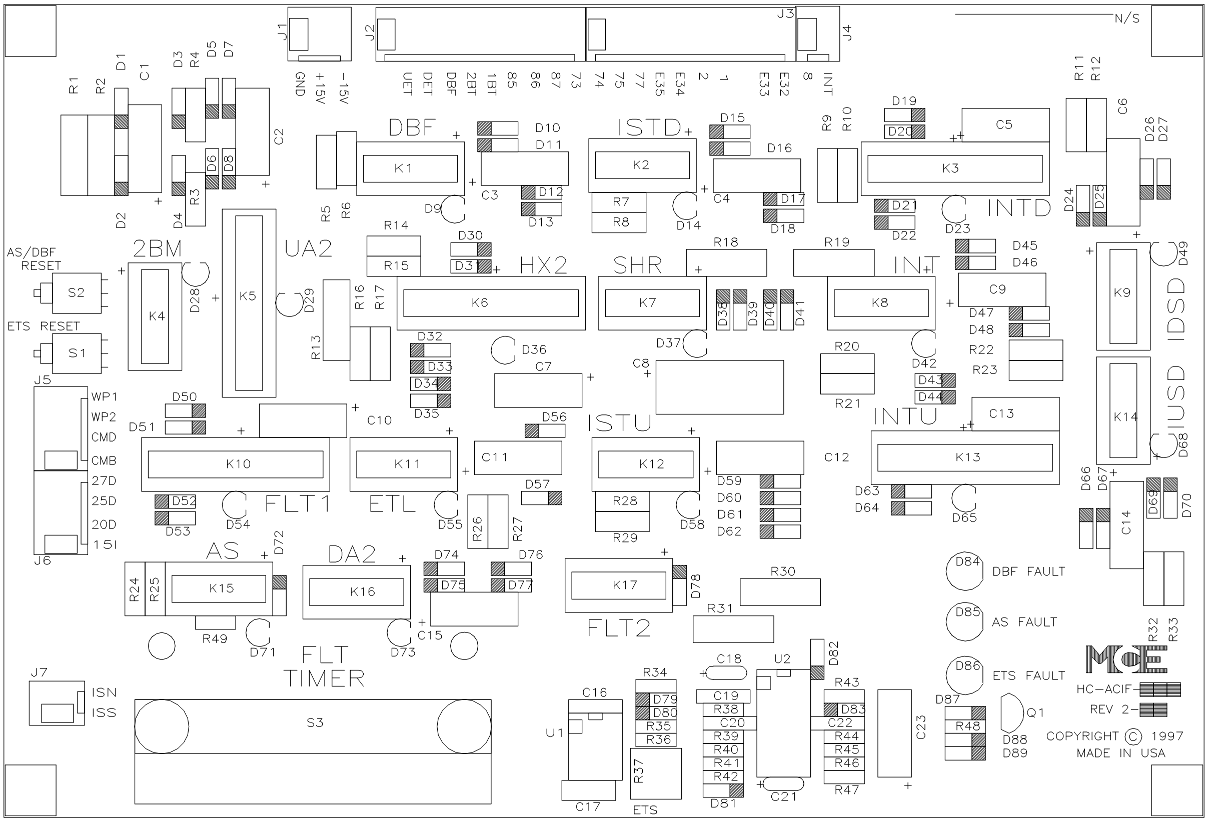
- HC-ACI, AC Drive Interface Board
- AC-ACIF, Additional Flux Vector Drive Interface Board

FIGURE 1.16 HC-ACI AC Drive Interface Board



HC-ACI AC Drive Interface Board - The HC-ACI board is the interface between the Main Relay board and the VVVF Drive Unit. It performs a variety of functions including providing speed inputs and performing certain elevator code requirements such as Inspection/Leveling overspeed detection and motor and brake contractor monitoring. Other functions include an independent motor speed monitoring circuit plus brake and speed signal coordination.

FIGURE 1.17 HC-ACIF Additional Flux Vector Drive Interface Board



D/N: 3560 R1

HC-ACIF Additional Flux Vector Drive Interface Board - This board is included when intermediate speed is required and/or when a flux vector drive is used. It includes the intermediate speed, ETS and Flux Vector Drive circuits.

1.2.5 CAR POWER CONTROL (CPC) COMPONENTS

The voltages required by the motor and brake are generated by the Car Power Control components, including:

- VVVF Drive Unit
- Power contactors
- Dynamic Braking Module (optional)
- Power resistors

VVVF Drive Unit - Provides a synthesized variable frequency, variable voltage, 3-phase AC output to run the hoist motor in response to speed and direction signals from the HC-ACI board.

Power contactors - These contactors are a code requirement to disconnect the hoist motor from the drive when the car is at the floor and stopped with the doors open.

. **Dynamic Braking Module** - Whenever required, a dynamic braking module will be provided to dissipate the power generated by the car in case of overhauling load.

Power resistors - Any power resistors that generate significant heat, such as door resistors or drive system resistors, are located in the power resistor cage so their heat does not affect other electrical components. Drive system resistors dissipate the power fed back into the VVVF Drive during regeneration, i.e., when the elevator is holding back the load during a full load down operation.

1.2.6 TYPICAL SEQUENCE OF OPERATION

To become familiar with the overall sequence of operation of this controller, we begin with a car call input and follow the signals as they progress through various parts of the control system.

At the end of each run the software system checks all force-guided relays for proper functionality and checks all other safety relay (EPD) devices. Once the checking is complete the main safety relays SAFR1 and SAFR2 are energized.

A car call is registered by grounding an input on the HC-CI/O board or, with SmartLINK for COP, by serial data sent from the MC-NIO board in the COP to the MC-NC board in the controller. On the HC-CI/O board the 120VAC signal is converted to a + 5V logic signal and is then read by the MC-MP2-2K Main Computer board. The Main Computer board acknowledges this signal by sending a logic signal back to the HC-CI/O board which then turns on a triac to illuminate the call registered light in the car panel and an LED on the HC-CI/O board. With the SmartLINK for COP option the Main Computer sends data to the MC-NC board which, in turn, sends serial data to the MC-NIO board in the COP. The MC-NIO board then turns ON the call registered light in the COP.

The Main Computer board determines where the call is in relation to the car position and sends a direction arrow signal to the HC-PI/O board, which operates an up or down arrow triac output. This illuminates the correct direction arrow in the car position indicator. No further action can take place unless additional conditions are met. Then, if the doors are closed DPM = high and DCL = low (Door Closed Limit is “broken”), the Main Computer board sends the correct direction output signal to the HC-PI/O board, which operates the correct direction triac. This signal is sent to the SC-SB2K Main Relay board which energizes the direction pilot relays. This direction signal then goes to the HC-ACI board and to one or more auxiliary running relays. The direction and high speed commands originate from the Main Computer board through the HC-PI/O and the Main Relay board. The CMC is ready to lift the brake and to provide control to the VFAC Drive Unit in response to a speed command provided by the CMC.

In summary, the call signal entered the COC was processed into direction and high speed acceleration sequence commands. The VFAC speed command and brake signals are then created by the CMC and the CPC moves the elevator according to the commanded speed.

1.3 LANDING SYSTEM CONTROL BOX

The Landing System is designed to be mounted on the car top. There are two types of landing systems that can be used with VFMC-1000 controllers: LS-STANx-2K and LS-QUTE-X-2K.

1.3.1 LS-STANx-2K LANDING SYSTEM

The LS-STANx-2K is the standard landing system. The car top control box uses VS-1A infrared proximity switches to sense vanes that are mounted in the hoistway.

FIGURE 1.18 LS-STAN5-2K Cartop Control Box

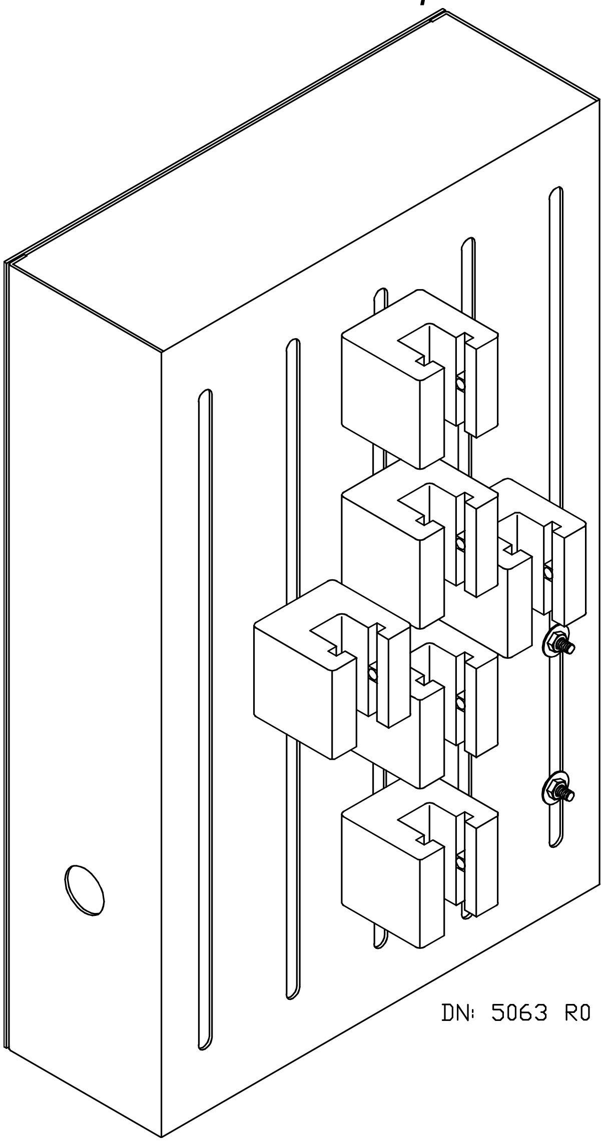
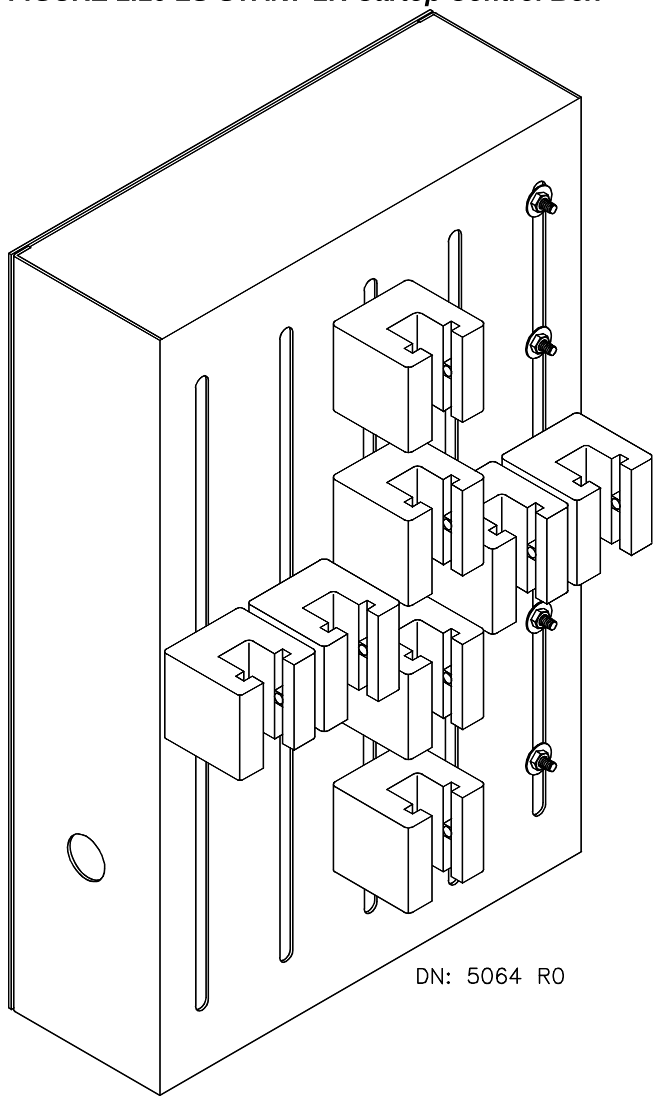


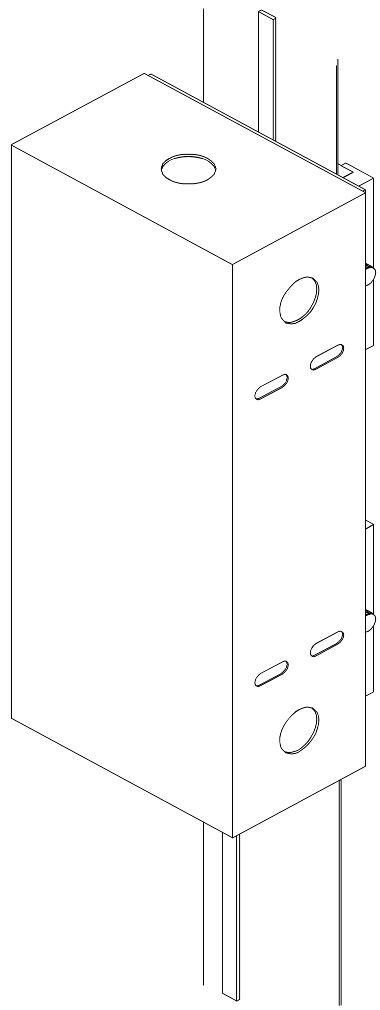
FIGURE 1.19 LS-STAN7-2K Cartop Control Box



1.3.2 LS-QUTE-x-2K LANDING SYSTEM

The LS-QUTE-x-2K is a tape-and-magnet-operated landing system, with a three inch wide steel tape mounted in the hoistway. The car top control box has a floating head that slides on the steel tape, and magnetic sensors for slow down, STU, STD, ISTU, ISTD, LU, LD and DZ. Optional absolute floor encoding is available. Refer to Appendix H, LS-QUTE-X-2K Landing System Assembly Drawings, for more information.

FIGURE 1.20 LS-QUTE-X-2K Car Top Control Box



1.4 DIAGNOSTIC TOOLS AND PERIPHERALS

Refer to Section 5, Human Interface, for more information about the diagnostic tools available using the controller's Computer Swing Panel. Refer to the Computer Peripherals Manual, MCE part number 42-02-CP00, for more information about the diagnostic tools available using a CRT or PC.

1.5 GROUP SUPERVISOR (2 OR MORE CARS)

If this controller is part of an M3 Group System, refer to the M3 Group Supervisor Manual, MCE part number 42-02-G004, for more information about group operation.

SECTION 2
INSTALLATION

2.0 GENERAL INFORMATION

This section contains important recommendations and instructions for site selection, environmental considerations, installation guidelines and other factors that will help ensure a successful installation.

2.0.1 SITE SELECTION

To help choose a proper location for the controller, the following factors should be considered:

- Provide adequate working space for comfort and efficiency.

- Mount the controller in a logical location taking into consideration the location of other equipment in the machine room and proper routing of electrical power and control wiring. Note that MCE controllers do not require rear access.

- Make sure that the controller is not installed in a hazardous location.

- Provide adequate space for future expansion, if possible.

- Install a telephone in the machine room. Remote diagnostics are available via the telephone which makes start-up and adjustment assistance easier to obtain.

- If areas in the machine room are subject to vibration, they should be reinforced or avoided to prevent the controller from being affected.

- Provide adequate lighting for the control cabinets and machines in the machine room. A good working space such as a workbench or table should also be provided.

- The location of the Drive Isolation Transformer (if used) is flexible, however, wiring is reduced if it is located near the controller.

2.0.2 ENVIRONMENTAL CONSIDERATIONS

Some important environmental considerations should be observed which will help provide for the longevity of the elevator equipment and reduce maintenance requirements. They are as follows:

- The ambient temperature should not exceed 32° to 104° F (0° to 40° C). Higher temperatures may shorten the life of the equipment. This means that adequate ventilation and/or air conditioning may be required.

- The air in the machine room should be free of excessive dust, corrosive elements or excessive moisture, to prevent condensation. A NEMA 4 or NEMA 12 enclosure may be provided to meet these requirements. If open windows exist in the machine room, the cabinets should be located away from these windows so that the equipment is not damaged by severe weather.

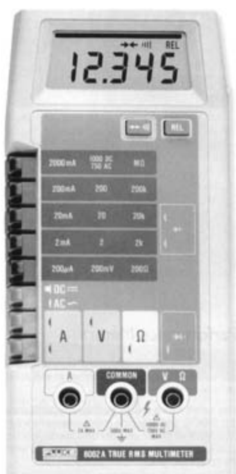
- High levels of radio frequency (RF) radiation from nearby sources may cause interference to the computers and other parts of the control system. Using hand-held communication devices in close proximity to the computers may also cause interference. The controller is designed to EN12016 RFI susceptibility and radiation standards.

- Power line fluctuation should not be greater than ±10%.

2.0.3 RECOMMENDED TOOLS AND TEST EQUIPMENT - For proper installation, use the following tools and test equipment:

- A digital multimeter, Fluke series 75, 76, 77 or equivalent.
- An oscilloscope (preferably storage type) or a strip chart recorder.
- A hand-held tachometer.
- A clamp-on AC ammeter.
- A DC loop ammeter.
- Hand held radios.
- A telephone.
- Test weights.
- Assorted soldering tools, rosin flux solder, electronic side cutters and long nose pliers, a flashlight and the MCE screwdriver (provided with controller).

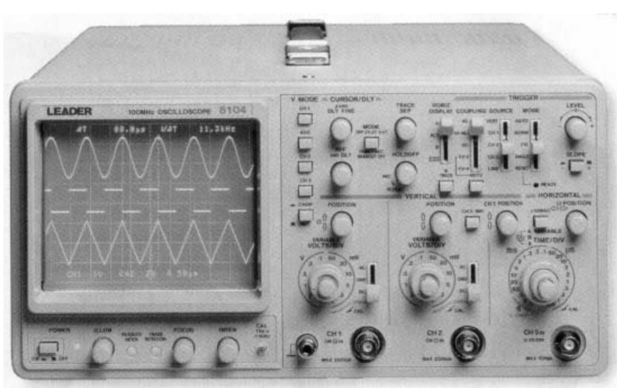
DIGITAL MULTIMETER



AMP-PROBE

MEGOHMETER

OSCILLOSCOPE

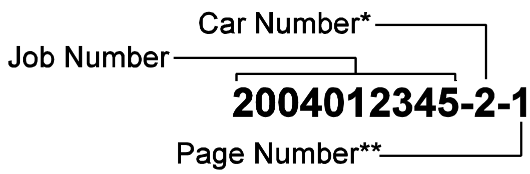


TELEPHONE

2.0.4 WIRING PRINTS

Become familiar with the following information as well as the wiring prints provided with this control system.

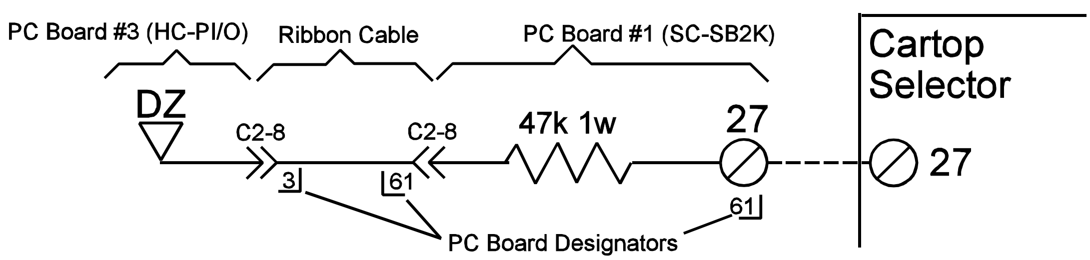
DRAWING NUMBER FORMAT - Each print has a drawing number indicated in the title block. The drawing number is comprised of the job number, car number and page number (see examples). In this manual the drawings will often be referred to by the last digit of the drawing number (page number). The following is the drawing number format currently in use.



* Car Number “G” = Group Controller
** Page Number “D” = Drive page
** an “X” after the page number = auxiliary page

> **NOTE:** DRAWING NAME - Some drawings have a drawing name directly above the title block or at the top of the drawing. The drawing name may be used to refer to a particular drawing.

NOMENCLATURE - The following is an example of the schematic symbols used to indicate that a signal either enters or exits a PC board.



A listing of PC boards and their designator numbers plus other schematic symbols used in the wiring prints can be found at the beginning of the Job Prints and in Appendix F of this manual.

- Become familiar with the "Elevator Car Wiring Print" drawing number -1.
- Become familiar with the "Elevator Hoistway Wiring Print" drawing number -2.
- The power connections are shown on drawing number -D.
- Group interconnects to individual car cabinets (two or more cars) are shown on the drawing titled “Group Interconnects to Individual Car Cabinets.”
- Review any additional wiring diagrams and details as may be required.
- The remainder are detailed drawings of the VFMC-1000 traction control system.
- A specific part of the schematic may be referred to by the *area number,* which is located at the left-hand margin of the schematic.

2.1 CONTROLLER INSTALLATION

NOTE: It is strongly recommended that you review the wiring guidelines in sections 2.1.1 and 2.2 before bringing wires into the controller.

Mount the controller(s) securely to the machine room floor and cut holes to permit bringing the wires into the cabinet as shown in Figure 2.2. There may be labels in the cabinet to help identify locations for wiring holes. Note that the standard MCE car control cabinet does not require rear access. Also, the doors are reversible and removable for ease of wiring.

CAUTION: Do not allow any metal chips to fall into the electronics.

Keep the covers on the AC Drive while wiring to prevent damage to the components.

2.1.1 CONTROLLER WIRING GUIDELINES

CAUTION: Power conductors from the fused disconnect, isolation transformer or other high voltage, high current conductors must be separated from the control wires. It is essential that the Encoder and Speed Sensor wires be placed in a separate conduit, away from high current conductors.

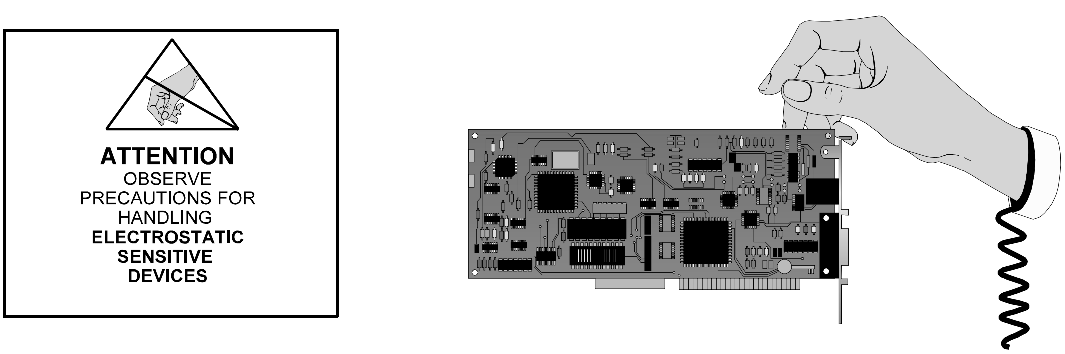
NOTE: Pay very close attention to the hierarchy of the inspection inputs. In order to maintain safe operation of the lift while on access, car top or in car inspection, the inspection circuits must be wired as shown in the prints.

Figure 2.2 shows the recommended routing for the field wiring. Observe the following:

a. PC boards can be easily damaged by Electrostatic Discharge (ESD). Use a properly grounded wrist strap, as shown in Figure 2.1, when touching the PC boards.

FIGURE 2.1 ESD - Electrostatic Sensitivity of PCBs

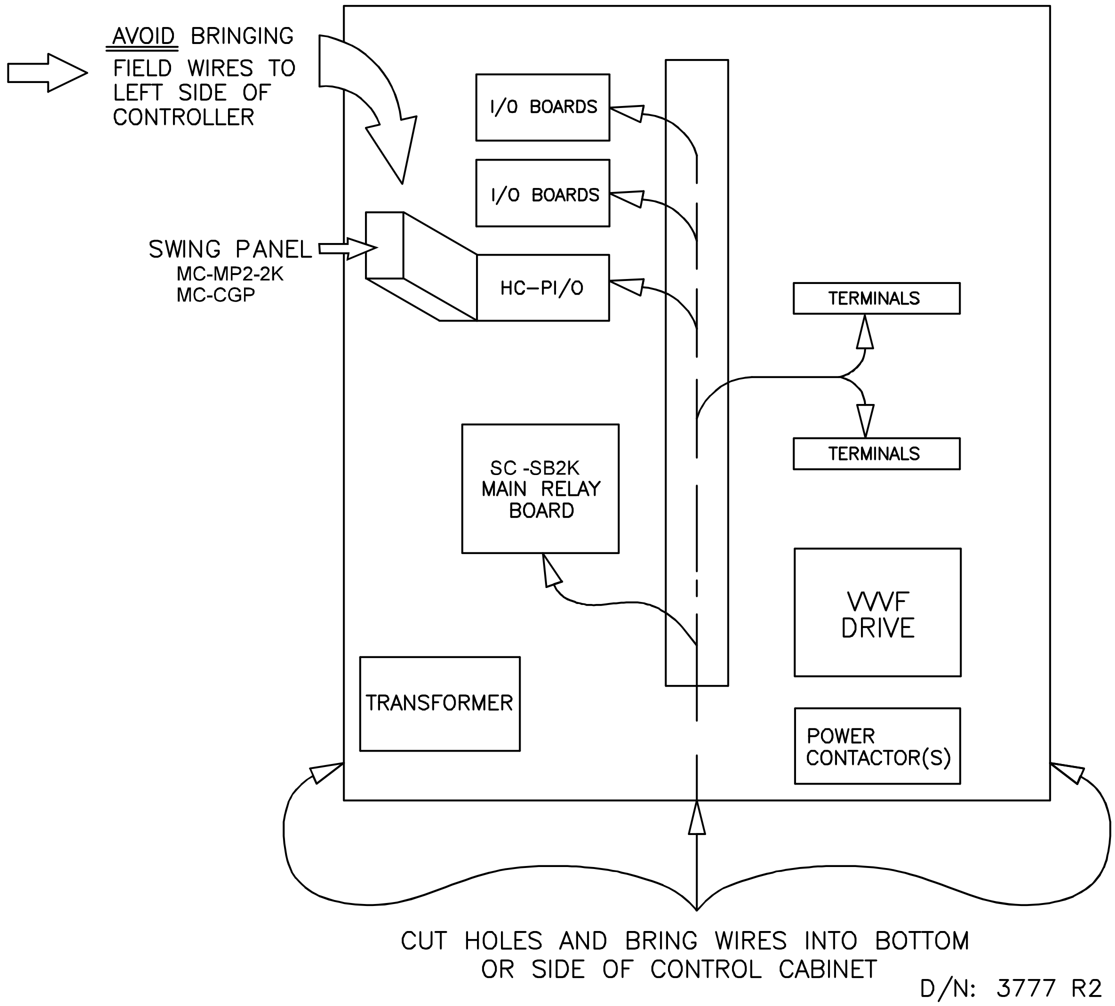
Do not touch PC Boards unless you are properly grounded.



b. Bring the wires in from a location that allows use of the wiring ducts inside the control cabinet. The terminals are located conveniently near wiring ducts.

c. When routing the field wiring or power hookups, avoid the *left* side of the HC-CI/O and HC-PI/O boards.

FIGURE 2.2 Field Wiring of Controller



- Call terminals are located on the HC-CI/O, HC-I4O and/or HC-IOX boards.
- All position indicators, arrows and gong enable terminals are located on the HC-PI/O and HC-PIX boards or, if a gong board is provided, position indicators are also provided on the gong board (HC-GB).
- Terminals 1-72 and 85, 86, 87, 88 and 89 are located on the SC-SB2K Main Relay Board.
- Terminals for the door operator are on respective door boards or on separate terminal blocks.
- Several 1 and 2 bus terminals are provided in various locations.
- Other terminals may be supplied on separate terminal blocks.

d. When it is time to hook up the wires to the controller, proceed to interconnect the wires according to the hoistway and car wiring prints.

e. If the car controller is part of a group system, a separate conduit or wiring trough must be provided for the high-speed serial link between the car controller cabinet and the Group Supervisor cabinet.

f. The main AC power supply wiring size must be determined by the electrical contractor. Proper motor branch circuit protection must be provided according to applicable electrical code by using a fused disconnect switch or a circuit breaker for each elevator. Each disconnect or breaker must be clearly labeled with the elevator number.

g. If the car is part of a group system, there are a number of details relating to the wiring of the interconnects between the individual cars. They are as follows:

- If a group controller cabinet is provided, refer to the drawing titled “Group Supervisor Field Wiring Print” in the job prints. Power for the M3 Group Supervisor cabinet comes from the local Car Controllers as shown in Controller drawing (-2). The main AC power supply wiring size must be determined by the electrical contractor.

> **WARNING:** Connecting the Group Supervisor directly to the building AC supply may cause damage to PC boards. Also, **connecting out-of-phase power *will* cause damage**. Check the “phasing” of the individual car 2-bus lines before connecting them to the Group Supervisor. With a voltmeter set to AC Volts, measure between adjacent car 2-bus terminals. The meter must read less than 10 VAC. If the reading is higher, reverse the power leads going to the car's T1 transformer at L1 and L2, and measure again.

- A separate conduit or wiring trough must be provided for the high speed serial link from each car controller to the Group Supervisor cabinet. The wiring details for the high speed communication link are fully detailed in the print titled “Instructions for Connection of High Speed Communication Cables”. Follow these instructions exactly. Again, note the requirement for routing the high-speed interconnect cables through a separate conduit or wiring trough.

- If applicable, also wire according to the drawing titled “Group Interconnects to Individual Car Cabinets.” Make sure to ground all cabinets according to Section 2.2.1.

- The field wiring to the Group Supervisor cabinet is found in the drawing titled “Group Supervisor Field Wiring Print.”

2.2 GENERAL WIRING GUIDELINES

Basic wiring practices and grounding requirements are discussed in this section.

2.2.1 GROUND WIRING

To obtain proper grounding, quality wiring materials and methods should be used.

All grounding in the elevator system must conform to all applicable codes. Proper grounding is essential for system safety and helps to reduce noise-induced problems. The following are some grounding guidelines:

- The grounding wire to the equipment cabinet should be as large as, or larger than, the primary AC power feeders for the controller and should be as short as possible.
- The grounding between equipment cabinets may be branching or a daisy chain, but the wire must terminate at the last controller and NOT loop back (see Figure 2.3).
- Direct solid grounding must be provided in the machine room to properly ground the controller and the motor (see Figure 2.4). Indirect grounding, such as the building structure or a water pipe, may not provide proper grounding and could act as an antenna radiating RFI noise, thus, disturbing sensitive equipment in the building. Improper grounding may also render an RFI filter ineffective.
- The conduit containing the AC power feeders must not be used for grounding.

FIGURE 2.3 Ground Wiring to Controller Cabinets

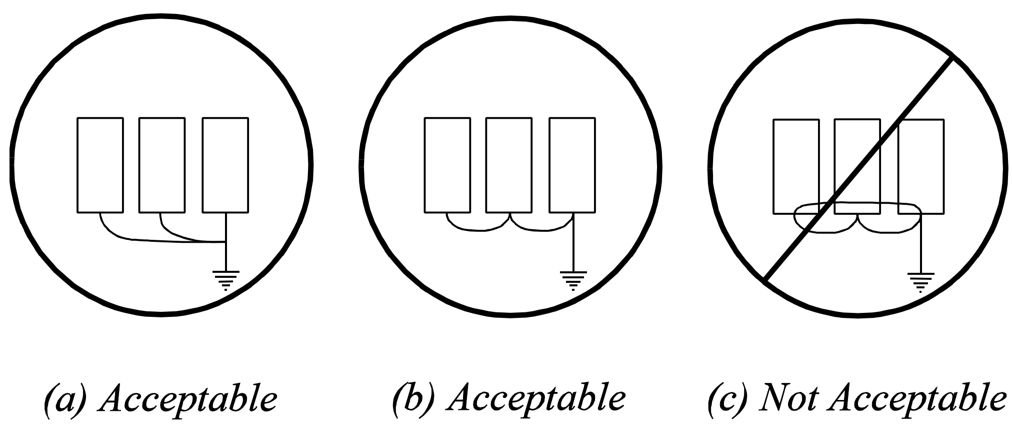
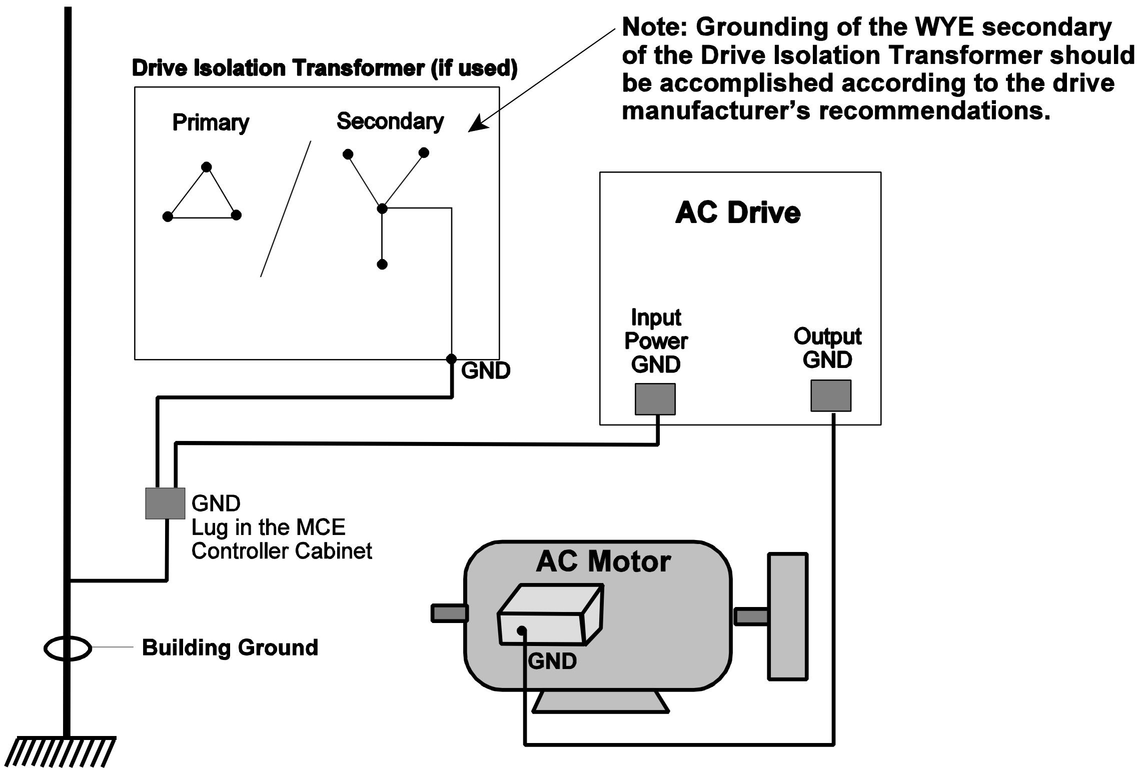


FIGURE 2.4 Ground Wiring



2.2.2 AC MOTOR AND BRAKE WIRING

a. If existing rotating equipment is being reused, it is strongly recommended to disconnect all of the wires from the terminals on the AC hoist motor and brake. This is to guarantee that the controller is dis-connected from the rotating equipment before the insulation test is performed.

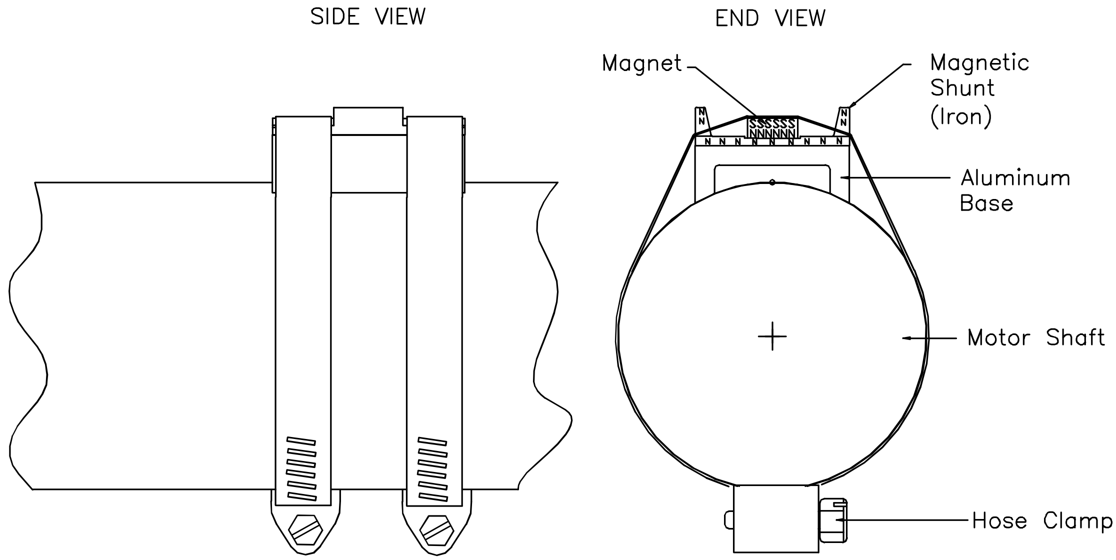
Using a Megohmmeter, check for insulation breakdown between of each piece of the motor and brake coil. A reading of 100K ohms or above is considered acceptable. Any insulation problems must be corrected before proceeding, as this may be an indication of a serious problem with the equipment.

NOTE: Incoming power to the controller and outgoing power wires must be in their respective grounded conduit and must be separate from control wires both inside and outside the control enclosure. The Encoder and speed sensor wiring must use a separate grounded conduit. The use of a shielded power cable between the MCE controller and the AC Motor is recommended to reduce RFI/EMI noise (Siemens Protoflex - EMV or equivalent).

2.2.3 INSTALLING AND WIRING THE SPEED SENSOR

a. **Mounting the magnet** - The speed sensor detects a magnet that passes the face of the sensor. Mount the magnet on the motor shaft so that it passes the sensor once per revolution of the motor (see Figure 2.5).

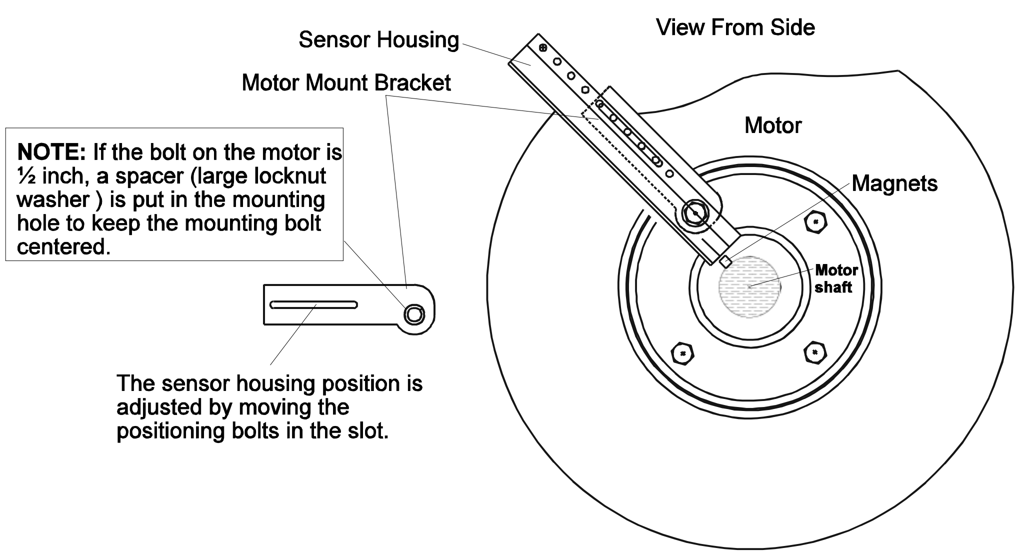
FIGURE 2.5 Speed Sensor Magnet Mounting on the Motor Shaft



> **CAUTION:** ***Do not drill any holes in the motor shaft*** to mount the magnet. This will weaken the shaft.

b. **Mounting the speed sensor -** Mount the speed sensor as shown in Figures 2.6 and 2.7 using the hardware provided. Take care not to over-tighten the nuts on the sensor mounting apparatus. Position the face of the sensor so there is 1/16" to 1/8" (1.6 to 3.18 mm) clearance from the magnet.

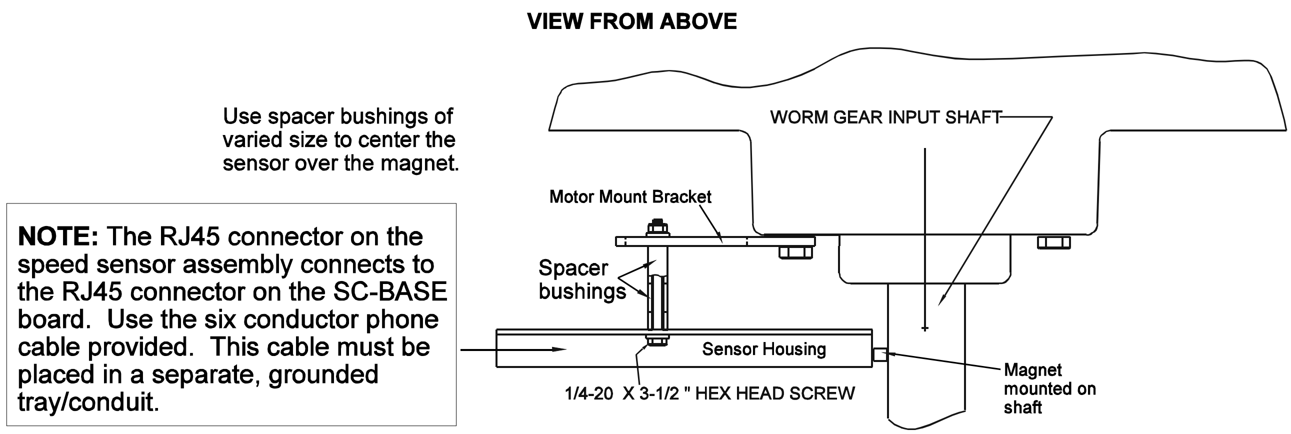
FIGURE 2.6 Speed Sensor Mounting Detail (side view)



NOTE: The speed sensor must be electrically isolated from the motor body. MCE has provided the required hardware to insulate the speed sensor from the motor body

CAUTION: **Ensure that the speed sensor is perfectly perpendicular to and not more than 1/8" (3.18 mm) away from the magnet.**

FIGURE 2.7 Speed Sensor Wiring Detail (view from above)



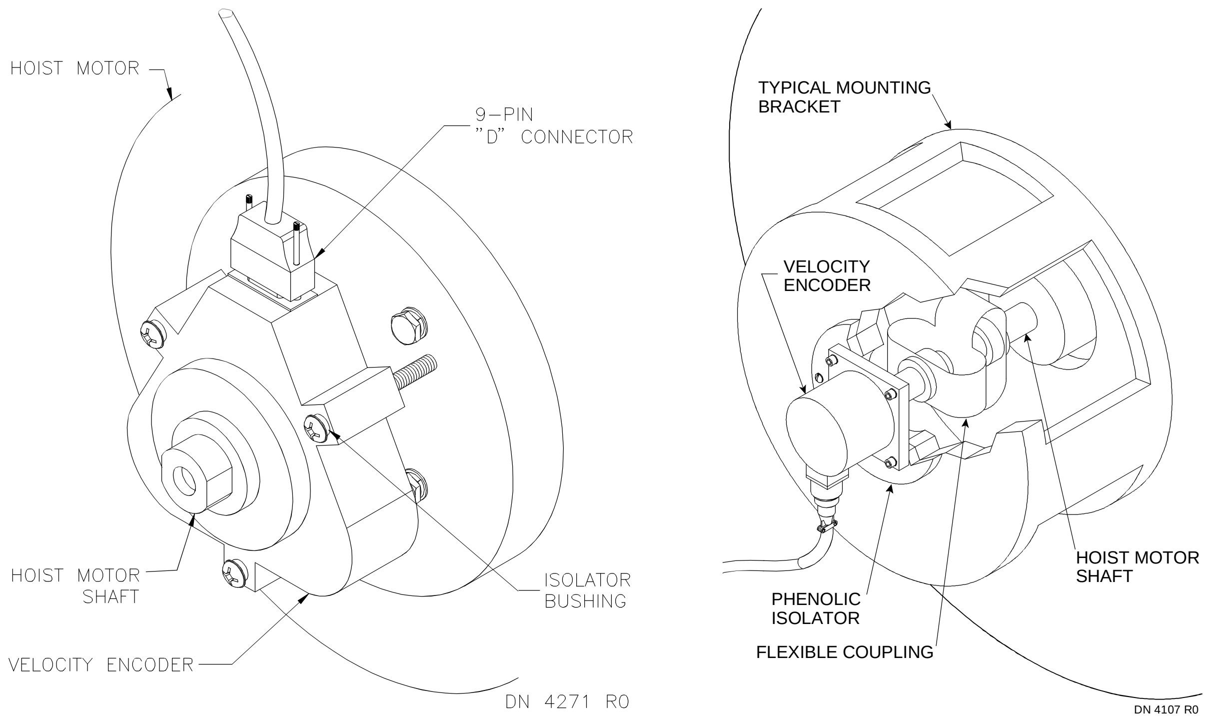
2.2.4 INSTALLING THE BRAKE SWITCH

A switch contact must be attached to the brake assembly if one does not already exist. This is needed for the brake monitor circuit that shuts down the car in the event of a brake failure. There are many types of switches that can be used and there is no way to anticipate all the methods of mounting them. Take all necessary precautions to not interfere with the normal brake design or operation. The contact must open when the brake is lifted and it should be rated for at least 1/4 amp 125VAC. There are many micro-switches suitable for this application.

2.2.5 INSTALLING AND WIRING THE ENCODER - The encoder is only required for Flux Vector applications.

a. The encoder must be mounted on the motor shaft and the encoder wiring should be completed according to the drawing. The purpose of the encoder is to determine the exact shaft speed and position. It is *very* important that the encoder does not slip, wobble, bounce, or vibrate due to poor installation of the shaft extension, coupling or encoder mounting. It is also important that the encoder housing be *electrically insulated* from the motor, machine or other grounds if the encoder is manufactured by BEI. An insulated encoder mount has been furnished with the BEI encoder. This type of mount, however, may not be practical for this application. Predicting which type of mounting will work best for all installations is impossible, therefore, the best method for mounting the encoder and coupling it to the motor must be determined at the job site.

FIGURE 2.8 *Typical Encoder Installations*



NOTE: The Encoder wiring must use a separate grounded conduit. Make sure that the encoder housing is electrically isolated from the machine (ground). To check this, place one ohmmeter lead on the frame of the machine and one lead on the case of the encoder.

b. Connect the Encoder to the Flux Vector Drive Unit using the *shielded* cable provided (see drawing -D in the job prints). Run this cable to the controller in a *separate* conduit. Connect the cable to the Encoder using the connector provided. Connect the other end of the cable to the AC Drive using the phoenix terminals provided. The cable shield will *not* be connected to any ground or case, but connected as shown on print -1-D.

CAUTION: Do not coil excess Encoder cable near high voltage components as noise may be induced. If necessary, shorten the cable at the Drive end. Do not cut and re-splice in the middle of the encoder cable or shorten at the Encoder end.

c. Do not route the encoder cable close to a magnetized area (the motor or brake coils), as this may induce AC in the encoder signal output. This can cause the AC Flux Vector Drive to miscount and cause erratic speed control at lower speeds.

2.3 HOISTWAY CONTROL EQUIPMENT INSTALLATION

This section covers the recommended procedures for installing the landing system, terminal slowdown switches, directional limit switches, hoistway access switches (if required), the hoistway access limit switch, and the emergency terminal slowdown switch.

2.3.1 INSTALLING THE LANDING SYSTEM - Refer to the installation drawings for the type of landing system provided.

2.3.2 INSTALLING THE HOISTWAY LIMIT SWITCHES

a. The terminal landing slowdown switches should be installed and adjusted to open approximately two inches beyond the point where a normal slowdown is initiated.

b. The direction limit switches should be installed and adjusted to open approximately one inch beyond the terminal landing.

c. The emergency terminal slowdown switch (if required) should open approximately 50% of the slowdown distance from the terminal. This switch should be installed and adjusted to achieve the required operation according to the applicable elevator code.

d. Make sure that the cam that operates the slowdown and limit switches maintains the terminal slowdown switch open until the direction limit switch and emergency terminal slowdown switches (if required) are open.

e. Make sure that the terminal slowdown, direction limit and emergency terminal slowdown switches are held open for the entire runby or overtravel of the elevator.

f. The hoistway access limit switch (if required) should be installed and adjusted to open and stop the elevator in the down direction when the top of the elevator is approximately level with the top landing (when the top hoistway access switch is activated while on Access or Inspection operation).

g. For faster geared elevators, the face of the cam operating the limit switches must be sufficiently gradual so that the impact of the switch rollers striking the cam is relatively silent.

2.3.3 INSTALLING THE LANDING SYSTEM CONTROL BOX (LS-QUTE-X-2K) - Refer to the drawings in the job prints.

- The location for the landing system box should have already been selected.

- Holes are available on both sides and on the bottom of the landing system box for mounting to any support brackets or structural channels. The mounting of the box should be very firm and solid so that knocking it out of alignment should be difficult. Use 1/4-20 hardware.

- To install the tape into the tape guides on the LS-QUTE-X-2K landing system box, remove the 2 thumbscrews on the 2 guide assemblies, insert the tape and reinstall the guides with the thumbscrews (tighten firmly). If the installation has the LS-QUTE-X-2K car top selector with the additional sensor bracket on the rear of the tape, first remove the three 8-32 screws holding the protective 1" wide channel. This channel covers the back of the Door Zone sensors on the upper tape guide bracket. Remove the single standoff that is in the way of the thumbscrew holding the tape guide. Remove the thumbscrews holding the upper and lower tape guides, insert the tape, and reinstall the guides with the thumbscrews (tighten firmly). Reinstall the standoff (do not over-tighten) and the protective channel.

- After inserting the steel tape into the tape guides, check the location of the landing system box. The car should be at the top of the hoistway to make it easier to see if the alignment is causing any stress or binding on the tape guides. Make sure that the box is *vertical* and plumb with the tape. This allows for easy tape movement and avoids excessive wear on the tape guides (using a level is helpful). *Be careful* so as to avoid premature failure of the tape guides.

- Move the elevator to the top and bottom of the hoistway to check for smooth tape movement and to make sure that there is no excessive pressure on the tape guides. Correct any problems immediately.

2.3.4 INSTALLING THE MAGNETIC STRIPS ON THE STEEL TAPE

a. Carefully, read and follow the Magnet Installation instructions in the job prints, but read the rest of these instructions before proceeding.

b. Before installing the magnets, clean the steel tape thoroughly with an appropriate solvent. No oil should be left on the tape as it will interfere with the adhesive backing on the magnets.

c. There are normally five lanes of magnets installed on the side of the tape facing the car. One lane consists of only the LU/DZ/LD and requires that a 6-inch magnet be installed at each floor. The other lanes have magnets which initiate slow downs.

d. If the installation has rear doors, it may have an LS-QUTE-X-2K landing system which has additional Door Zone sensors on the rear of the upper tape guide assembly. Follow the Magnet Installation instructions in the job prints and install the front and rear Door Zone magnets on the steel tape as shown.

2.3.5 DZX SWITCH

Depending on the type of landing system selector you have purchased we have installed a second door zone sensor called DZX. For the LS-STAN-X system a second vane switch is installed in the center door zone lane. On the LS-QUTE system a third door zone sensor is placed between the existing DZ sensors in the center lane. Since the DZX signal needs to be routed to the controller (SC-BASE board) you will need to connect DZX to your traveler.

2.3.6 TM SWITCH WIRING AND ADJUSTMENT (IF USED)

Refer to the drawing titled "Elevator Car Wiring Print" in the job prints for details on the wiring and setting of each contact in the TM switch. Carefully examine the functioning of this switch, especially if copper-to-carbon contacts are used. The current levels are quite low and may not be enough to burn the oxide off the contacts.

2.3.7 DOOR OPERATOR DIODE INSTALLATION (IF USED)

Certain door operators, such as G.A.L. models MOM or MOH, require the installation of diodes in the door operator on the car top. See the drawing titled "Elevator Car Wiring Print" in the job prints for any special instructions regarding these diodes.

2.3.8 DOOR POSITION MONITOR SWITCH (IF USED)

If you are in a jurisdiction where ASME A17.1 - 1996 or later is being enforced, Door Position Monitor switch(s) connected to the DPM and/or DPMR inputs, must be added to monitor the position of the closed doors. This must be a separate physical limit switch that makes up approximately 1 to 2 inches before the doors lock.

SECTION 3
START-UP

3.0 GENERAL INFORMATION

In this section, the car will be prepared for use by construction personnel so that they may complete the elevator installation. At this time the speed sensor must be properly installed as described in Section 2.2.3. This section covers the sequence of applying power to the controller and associated components, the AC hoist motor and brake, and completing the initial adjustment of the system to get basic car movement on Inspection operation.

3.1 GROUND CHECK

Conduct a ground test before powering up the system. Refer to Figure 1.1 and Figure 2.2 to help locate items as they are referred to in the ground check.

> **NOTE:** A short to ground is defined as having a resistance of less than 20 ohms between the 1-bus (common) and the terminal being checked.

a. Remove fuse F4 in the individual car controller cabinet. If this is a group system, consult the schematics and remove the fuse that powers terminal 2H (and 2F, if present).

b. Check for shorts to ground on all terminals on the bottom of the SC-SB2K Main Relay board.

c. Check for shorts to ground on all terminals on the HC-PI/O and HC-CI/O boards.

d. Check for shorts to ground on terminals F1, F2, A1, A2, and D5. If a G.A.L. MOD door operator is provided, remove door fuses F7 and F8. For other door operators, consult the prints as to which fuses to remove, then check the appropriate terminals for shorts to ground.

e. Check for shorts to ground on motor power terminals T1, T2 and T3. Also check for ground on brake terminals B1 and B2.

> **NOTE:** If existing rotating equipment is being reused, it is strongly recommended to disconnect all of the wires from the terminals on the AC hoist motor and brake. This is to guarantee that the controller is dis-connected from the rotating equipment before the insulation test is performed. Using a Megohmmeter, check for insulation breakdown between the frame of each piece of equipment and it's associated stator terminals and the brake field terminals. A reading of 100K ohms or above is considered acceptable. Any insulation problems must be corrected before proceeding, as this may be an indication of a serious problem with the equipment.

In the following instructions it is assumed that the hoist ropes are attached to the car sling, all hoistway doors are closed (but not necessarily locked), and all hoistway and machine room wiring is complete. The car safety *must* be adjusted to the manufacturer’s specifications, the governor installed and the governor rope attached to the car safety. Correct any malfunction before proceeding further.

3.2 BEFORE APPLYING POWER

WARNING: These instructions assume the elevator mechanic has adequate electrical troubleshooting experience. Follow the procedures carefully and if the elevator does not respond correctly, check the circuits and use the troubleshooting section in this manual (Section 6). Proceed cautiously. To become familiar with the procedure, read these instructions all the way through before starting the work.

Before applying power to the controller, perform the following:

a. Physically check all of the power resistors and any other components located in the resistor enclosure and inside the controller. Any components loosened during shipment may cause damage.

b. Remove one side of the ribbon cable connecting the SC-SB2K board to the HC-PI/O board at connector C1 by pushing open the two latches.

c. Unplug the screw terminal blocks from the HC-PI/O and any HC-CI/O, HC-IOX or HC-I4O boards by moving the blocks to the right. This is done to avoid damaging the boards by accidentally shorting one of the output devices to one of the power buses (terminals 2, 3, or 4) during the initial power-up of the system.

MCE's VFMC-1000 Series M controller is designed to be able to operate on Inspection and Access without the computers hooked up during start-up.

3.3 APPLYING POWER - PREPARING TO MOVE THE CAR ON INSPECTION

WARNING: This equipment contains rotating parts on motors and driven machines and voltages that may be as high as 800 volts. High voltage and moving parts can cause serious or fatal injury. Only qualified personnel familiar with this manual and any driven machinery should attempt to start-up or troubleshoot this equipment. Observe these precautions:

a. USE EXTREME CAUTION: DO NOT TOUCH any circuit board, the VFAC Drive, or a motor electrical connection without making sure that the unit is properly grounded and that no high voltage is present. DO NOT apply AC power before grounding per instructions herein.

b. Improper control operation may cause violent motion of the motor shaft and driven equipment. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment. Peak torques of several times rated motor torque can occur during a control failure.

c. The VFAC Drive, the AC motor, the braking unit and the field circuits may have high voltage present whenever AC power is applied, even when the motor is not rotating.

d. Make sure to use SHIELDED CABLE for the speed sensor, and wire it exactly as shown. Make sure to ground the controller cabinet according to local code.

This control system uses a Variable Frequency AC Drive Unit (VFAC) to run the 3-phase AC elevator motor. Drives from various manufacturers may be used. The VFAC Drive Unit varies the frequency as well as the voltage to run the AC elevator motor at slow speeds for improved stopping at the floor. Simplified instructions for getting the elevator moving are provided. This assumes the VFAC Drive Unit has been set up at the factory to provide a satisfactory match to the motor characteristics.

At this point, it is strongly recommended to read the manual for the VFAC Drive Unit. Specifically, refer to the section on the Digital Operator (drive keypad) to learn how to display the output current and output frequency. Also, learn how to display and set the parameter constants. The Drive is very flexible and can be programmed to accommodate many different motor characteristics.

3.3.1 INITIAL POWER UP

a. On the SC-SB2K board, turn the TEST/NORM switch to TEST, and turn the MACHINE ROOM INSPECTION TRANSFER switch to INSP. For jobs with a two pole IN-CAR inspection switch, temporarily remove and insulate any wire in terminal ACCN and label it so that it may be reinstalled later. Install a temporary jumper from terminal 2 to terminal ACCN **to bypass the Inspection Switch (COP Access Enable)**. For jobs with a three pole IN-CAR inspection switch, temporarily remove and insulate any wire in terminal INICN and label it so that it may be reinstalled later. Install a temporary jumper from terminal 2 to terminal INICN **to bypass the Inspection Switch (COP Access Enable)**.

> **WARNING:** If the wire to terminal ACCN (or INICN) is **not** removed (step ‘a’ above) and the jumper is installed between terminals 18 and ACCN (or INICN), **this will bypass the in car stop switch.**

b. Verify that fuse F4 is removed to disable the primary controller relay voltage.

c. Check the line side of the main power disconnect switch to make sure that all three legs are at the correct voltage.

d. Turn ON the main power disconnect switch and verify that the proper voltages are at the power terminals L1, L2 and L3 on the controller.

e. The VFAC Drive Unit provided with this controller should not display any fault on the drive keypad. If a fault is indicated, refer to the Drive Manual or Section 6.5 (for G5 / GPD515 Drive), Section 6.6 (for HPV 900 Drive) or Section 6.7 (for TORQMAX Drive) in this manual. The Drive Faults section of the Drive Manual provides a list of faults and recommended corrective action.

f. Turn OFF the power and replace fuse F4. If door fuses are provided, DO NOT replace them at this time.

g. Before moving the car, check for obstructions or hazards. Take whatever steps are necessary to make sure that there is sufficient brake tension to stop the car during any situation that may be encountered.

h. Check the pit switch, buffer switches (if present), car and car top stop switches and any other safety switches to make sure that they are ON.

i. If a field wire is connected to terminal ACCN on the SC-SB2K board, temporarily remove the wire, label and insulate it. This will ***disable the Car Top Inspection switch***.

Close the car door. Leave the hall doors closed, and lock the doors that are accessible to the public.

j. Install a temporary jumper between terminals 18 and ACCN on the SC-SB2K board.

k. Install a temporary jumper wire between terminals 2 and 9 on the SC-SB2K board ***to bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

l. If the door operator is not completely wired, remove wire from panel mount terminal DCL and place a jumper between 2 bus and terminal DPM to defeat door lock bypass monitoring.

m. We must bypass the A17.1 - 2000 faults as these have yet to be adjusted. Place a jumper between the single pin terminals labeled 2KBP1 and 2KBP2 on the SC-BASE board. Also, invoke the software bypass by entering system mode. Once in system mode place the F6 function switch in the UP position (ON) and set software option ABYP=ON (See section 5.3.2). Now we have two hours to run the car without worrying about nuisance shutdown due to the as yet unadjusted fault monitors. Once two hours have expired simply toggle the MACHINE ROOM INSPECTION TRANSFER switch from NORM to INSP and back to NORM to get two more hours of run time. Note that when the system is on inspection operation, with the switches set as described above, there is no time limit to running the car with the bypass function invoked. There is a 3-position PFLT Bypass Jumper on all the SC-BASE-x boards. The normal setting of this jumper is OFF. During initial installation when the landing system/speed sensors are not installed and the system is running with A17.1 bypassed, the PLDs can still generate a fault and shut down the system by dropping the PFLT relay. Therefor, set PFLT bypass jumper to the ON position to prevent PFLT relay fault conditions during the installation phase. Please exercise extreme caution when the fault monitors are bypassed.

CAUTION: Please exercise extreme caution when the fault monitors are bypassed.

NOTE: In order to allow the car to run during construction and adjustment of the controller, several ASME A17.1 - 2000 code required functions must be bypassed (refer to Section 5.3.2 ***ASME A17.1 - 2000 Bypass Function***).

3.3.2 DRIVE INTERFACE BOARD DETAILS

The HC-ACI board is the interface between the SC-SB2K main relay board and the VVVF Drive Unit. It performs a variety of functions including providing speed inputs, see Figure 1.13, HC-ACI (AC Drive Interface Board).

HC-ACI BOARD DETAILS

- **Trimpots:**

SPD - Speed Pick Delay. This trimpot controls the delay of the application of the Speed Command Signal from .002 seconds to .450 seconds. Clockwise (CW) rotation of the trimpot increases the time. This allows for proper coordination of the acceleration of the car with the picking of the brake.

> **NOTE:** Speed Pick Delay is not used on controllers with the TORQMAX drive. Turn the SPD trimpot fully CCW and then set it 1/8 turn in the CW direction (see Section 4.9.4 'd' and 'f').

BDD - Brake Drop Delay. Braking at the end of the run is delayed for a short time to allow the operation of the electric stop feature. This delay is adjustable from a minimum of 0.1 second fully CCW to 0.7 second fully CW.

ILO - Inspection Leveling Overspeed. The ILO trimpot on HC-ACI board is not used. Set the ILO trimpot (on HC-ACI) fully CCW. On ASME A17.1 - 2000 compliant controllers, the ILO trimpot on SC-BASE or SC-BASER board is used to set the Inspection Leveling Overspeed threshold.

- **Indicator:**

ILO - Inspection Leveling Overspeed indicator. This indicator should not come on as this circuit is not used on this product.

- **Push Buttons:**

FAULT RESET - If the ILO indicator is ON, this push button turns the fault indicator OFF and drops out the FLT relay.

DRIVE RESET - This push button resets VFAC drive faults. Drive faults are displayed on the drive keypad and can also be reset directly by pushing the drive reset button on the drive keypad. The Drive Reset button on the HC-ACI board is provided for convenience.

HC-ACIF BOARD DETAILS - This board is only used for vector applications or jobs with intermediate speed.

- **Trimpots:**

ETS - Emergency Terminal limit Speed adjust. The ETS trimpot on the HC-ACIF board is not used. Set the ETS trimpot (on HC-ACIF) fully CW. On ASME A17.1 - 2000 compliant controllers, the ETS trimpot on the SC-BASE board is used to set the Emergency Terminal limit Speed threshold.

- **Indicators:**

ETS FAULT - Emergency Terminal limit overspeed fault. This indicator should not come on as this circuit is not used on this product.

AS FAULT - At Speed Fault indicator. This indicator will turn ON if the elevator's speed exceeds the maximum or minimum limits set for contract speed.

DBF FAULT - Dynamic Braking Fault. This indicator will turn ON if the dynamic braking temperature exceeds its threshold.

- **Push Buttons:**

ETS RESET - This switch resets the Emergency Terminal Switch (ETS) Fault.

AS/DBF RESET - This switch resets the At Speed Fault (AS) and the Dynamic Braking Fault (DBF).

3.4 INSPECTION OPERATION - G5 / GPD515 DRIVE

For controllers with the MagneTek HPV 900 drive, see Section 3.5.
For controllers with the TORQMAX F4 drive, see Section 3.6.
For controllers with the Yaskawa F7 drive, see Section 3.7.
For controllers with the TORQMAX F5 drive, see Section 3.8.

NOTE: Before the initial inspection run, verify the following trimpot settings:

- COS trimpot on the SC-BASE or BASER board fully CW
- ETS trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the HC-ACI board fully CCW
- ETS trimpot on the HC-ACIF board fully CW

3.4.1 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets, and all of the field adjustable parameters have been entered into the drive unit based upon the provided field information. However, **it is essential to verify all drive parameter settings before start up.**

NOTE: The drive software has been modified for this application, therefore some of the parameters on the parameter sheet shipped with the controller are different from those shown in the drive manual. If a drive is replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

Refer to the instruction manual for the VFAC drive unit which is provided along with this manual as part of the documentation. Become familiar with the VFAC Drive Manual, particularly with the operation of the Digital Operator (keypad operation). Note that the way this VFAC drive unit is being used ignores many of its functions. Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.4.2 VERIFYING THE CRITICAL G5 / GPD515 DRIVE PARAMETERS

Table 3.1 lists the critical G5 / GPD515 drive parameters which must be verified before start up. Table 3.2 lists additional parameters applicable only to flux vector drives, which must be verified. A complete listing of drive parameters can be found in Appendix C.

CAUTION: The following are very critical G5 / GPD515 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **A1-02 = Setting 0 or 3 depending upon the type of controller (Open loop or Flux Vector)**
- **B1-01 = 0 (Operator)**
- **B1-02 = 1 (Terminals)**
- **D1-02 (H), D1-03 (HL), D1-05 (L), D1-07 (INT), D1-09 (INS) must be set to valid speed settings. None of these parameters may be set to zero value.**
- **H1-01 = 7 (Multi Acc/Dec rate)**
- **H1-02 = 14 (Fault reset)**
- **H1-03 = 80 (Multi step spd 1F)**
- **H1-04 = 81 (Multi step spd 2F)**
- **H1-05 = 82 (Multi step spd 3F)**
- **H1-06 = 6 (Jog ref - Inspection speed input terminal)**
- **H2-01 = 37 (During run 2) This parameter is very critical for the operation of the brake (terminal 9 & 10 contact)**

TABLE 3.1 Critical G5 / GPD515 Drive Parameters

CRITICAL G5 / GPD515 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
A1-01	Access Level	Parameter access level 0: Operation Only 1: User Program 2: Quick Start Level 3: Basic Level 4: Advanced Level	-	0 - 4	3	3
A1-02	Control Method	Control Method - motor 1 0: V/f Control 1: V/f w/PG Fdbk 2: Open Loop Vector 3: Flux Vector	-	0 - 3	0	0 = V/f Control - Open loop 3 = Flux Vector
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
C1-01	Accel time 1	Acceleration time 1	s	0 - 6000	1.96	1-3 sec
C1-02	Decel time 1	Deceleration time 1	s	0 - 6000	1.96	1-3 sec
C1-03	Accel time 2	Acceleration time 2	sec	0-6000	1.96	1.6
C1-04	Decel time 2	Deceleration time 2	sec	0-6000	0.01	0.1
C1-07	Accel time 4	Acceleration time 4	s	0-6000	1.96	1-3 sec
C1-08	Decel time 4	Deceleration time 4	s	0-6000	1.96	1-3 sec
D1-02	Ref. -2	Preset reference 2 (High speed)	Hz	0 - 80	**30 ✶**	**30 ✶**
	✶ This parameter will be changed to 60Hz later during final adjustment to run the car at H speed.					
D1-03	Ref. - 3	Preset speed 3 (HL speed)	Hz	0 - 15	8.0	6-10
D1-05	Ref. - 4	Preset speed 5 (Level)	Hz	0 - 10	1.3	1-3
D1-07	Ref. - 7	Preset speed 7(Intermediate) If applicable to the job	Hz	0 -55	**25 ✶**	**25 ✶**
	✶ This parameter will be adjusted later during final adjustment, but must be less than D1-02 for proper operation.					

TABLE 3.1 Critical G5 / GPD515 Drive Parameters

CRITICAL G5 / GPD515 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
D1-09	Jog ref.	Jog reference (Inspection speed)	Hz	0-40	10	10
E1-01	Input volt	Drive input voltage	V ✶✶			Drive input voltage.
E1-03	V/F Selection	Pattern selection (N/A to flux vector)	F	0-F	F	F
E1-04	Max Freq..	Maximum frequency	Hz	0-80	60	60
E1-05	Max volt	Motor voltage	v			Motor name plate voltage
E1-06	Base Freq..	Maximum volt output freq.	Hz	40/50/60 (Motor rated)	60	60
E1-07	Mid Freq..	Mid out put frequency (N/A to flux vector)	Hz	0- 80	3	3
E1-08	Mid volt	Mid out put voltage (N/A to flux vector)	V	17.2 ✶✶	16.1 ✶✶	16.0-25.0 ✶✶
E1-09	Min freq.	Minimum out put frequency (N/A to flux vector)	Hz	0-80	0.5	0.5
E1-10	Min volt	Minimum out put volt (N/A to flux vector)	V	0-255	10 ✶✶	8.0-12.0 ✶✶
E2-01	Motor FLA	Motor Full load amp	A	0-1500	Motor dependent	Motor FLA
E2-02	Motor slip	Motor Rated slip	Hz	0-15	Motor dependent	
E2-03	No load current	Motor no load current	A	0-150	30% -40% of Motor FLA	
H1-01	Terminal 3 Sel	Multi-function input (terminal 3) *7* = Mult-Accel/Decel 1	-	0-82	7	7
H1-02	Terminal 4 Sel	Multi-function input (terminal 4) *14 = Fault Reset*	-	0 - 82	14	14
H1-03	Terminal 5 Sel	Multi-function input (terminal 5) *80 = Mult-step spd 1F*	-	0 - 82	80	80
H1-04	Terminal 6 Sel	Multi-function input (terminal 6) *81 = Mult-step spd 2F*	-	0 - 82	81	81
H1-05	Terminal 7 Sel	Multi-function input (terminal 7) *82 = mult-step spd 3F*	-	0 - 82	82	82
H1-06	Terminal 8 Sel	Multi-function input (terminal 8) *6 = Jog Ref (In speed)*	-	0 - 82	6	6
H2	**Digital Outputs**					
H2-01	Terminal 9 sel	Multi-F output 1 (Ter. 9 -10) 37= During Run 2	-	0-3F	37	37
H2-02	Terminal 25 sel	Multi-F output 2 (Ter. 25 -27) 4 = Freq Det. 1	-	0-3F	4	4
✶✶ These values should be doubled for the 460 volt application.						

TABLE 3.2 Additional G5 / GPD515 Drive Parameters Applicable to Flux Vector Applications

ADDITIONAL G5 / GPD515 DRIVE PARAMETERS APPLICABLE TO FLUX VECTOR						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/ MCE settings**
C5	**ASR TUNING**					
C5-01	ASR P Gain1	ASR proportional gain 1	-	0.0-300	20.0	20.0
C5-02	ASR I Time 1	ASR integral time 1	s	0.00- 10.0	0.50	0.20
C5-03	ASR P Gain 2	ASR proportional gain 2	-	0.00-300.0	20.0	20.0
C5-04	ASR I Time 2	ASR integral time 2	s	0.0- 10.0	0.50	0.50
F1	**PG Option Setup**					
F1-01	PG pulse/Rev	PG constant	-	0-60000	1024	1024
F1-02	PG Fdbk Loss sel	Stopping method at PG line brake detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	1
F1-03	PG overspeed sel	Stopping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	1
F1-04	PG Deviation sel	Stopping method at DEV detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	1
F1-05	PG Rotation sel	PG rotation 0: CCW 1: CW	-	0/1	0	0 or 1
F1-06	PG output ratio	PG division rate	-	1-132	1	1
F1-07 - F1-13		Set at drive defaults.				
L4	**Ref detection**					
L4-01	Spd Agree Level	Speed agree det level (L4-01 = E1-06)	Hz	0-400	60	60
L4-02	Spd Agree width	Speed agree det width	Hz	0-20	5	5.0-8.0
L7-01 - L704	**Torque limits**	**Set at Factory defaults**	**-**	**0-300**	**300**	**300**

3.4.3 MOVING THE CAR ON INSPECTION OPERATION (G5 / GPD515)

WARNING:	The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. Do not open the drive cover for 5-10 minutes after removing the AC power, to allow the capacitors to discharge. Use extreme caution. Do not touch any circuit board, power device or electrical connection without ensuring that high voltage is not present.

Once all the steps described in Sections 3.3.1, 3.4.1 and 3.4.2 are accomplished then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn ON the main power disconnect. After few seconds the SAFR1 and SAFR2 relays should pick (the LED near the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between test pins TP1 and TP2 on the SC-SB2K Main Safety Relay board.

   If no problems are found, then briefly place a jumper between panel mount terminal 2 and PCB terminal 20 on the SC-SB2K board and confirm that the SAFR1 and SAFR2 relays turn ON after four seconds. If the SAFR1 and SAFR2 relays turn OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

b. All of the speed commands (acceleration, deceleration and the S curves) are adjusted by setting drive parameters using the drive key pad. A complete listing of the G5/GPD515 Drive Parameters is found in Appendix B. A parameter sheet, listing the parameter settings as shipped from MCE, is shipped with each controller.

c. If required, install a temporary jumper between terminals 2 and 9 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

d. For Flux Vector applications, the encoder must be mounted on the motor shaft and its connections must be complete according to the job prints at this time.

e. The **inspection speed** is set by drive parameter **D1-09 in Hz. For flux vector applications, set D1-09 = 4Hz as the initial setting to slowly move the car & to prevent arcing on the contactors during initial start up.** Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Verify that the drive is in OPERATION mode. Run the car in the desired direction by toggling the UP/DN toggle switch on the SC-SB2K board. The PM contactor and the BK contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

If the car moves in the opposite direction:

- for **open loop** applications, interchange two of the motor leads.
- for **flux vector** applications, display the OUTPUT CURRENT on the drive keypad by pressing the UP arrow (twice). Pick direction on Inspection and check the following:

1. If the car moves in the **opposite direction** and draws a **normal value** of current(less than the Motor FLA or approximately 30% to 40% of motor FLA), then perform the following steps:

   (a) Turn the controller power OFF. Interchange two of the motor connections.

   (b) Turn the controller power ON. Set parameter F1-05 = CCW if its original setting is CW. If the original setting was CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.

2. If the car moves in the **opposite direction** and draws **higher current** than normal:

   (a) Turn the controller power OFF. Interchange two of the motor leads.

   (b) Turn the controller power ON and check the direction and current. If the car moves in correct direction but still draws higher than normal current, go to step 3.

3. If the car moves in the **correct direction** and draws **higher current** than the Motor FLA and the value of current keeps increasing, stop the car and set parameter F1-05 = CCW if its original setting is CW. If the original setting is CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.

NOTE: If the elevator does not run on Inspection, refer to Section 6.5, Troubleshooting the G5 / GPD515 AC Drive.

f. The inspection speed in Hz should show on the drive key pad whenever the car moves at inspection speed. Adjust drive parameter D1-09 for a comfortable inspection speed. For proper brake operation, adjust the SPD trimpot on the HC-ACI board to coordinate the application of the speed command with the picking of the brake so that the car does not move under the brake or rollback at the start.

g. At this time the adjustment of the BDD trimpot on the HC-ACI board is also necessary. Otherwise the car may be stopping under the brake, causing a lot of current to be applied to the motor that might cause arcing on the main contactor during the stop. On Inspection operation, how quickly the car stops at the terminal landings is controlled by drive parameter C1-04. A higher value of this parameter will cause the car to overshoot at terminal landings and may drop the SAFR1 relay. Also, on Inspection operation the smoothness in the stop at intermediate landings is controlled by the normal deceleration parameter C1-02.

h. Test the safety by hand to make sure that it will hold the car.

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.1 (j), and reinstall the wire into terminal ACCN. Turn ON the main disconnect. Make sure that there is 115VAC on terminal ACCN with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the car top inspection switch is in the INSP position.

j. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that the SAFR1 relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.**

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 2 and 9, and from terminals 18 and ACCN (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

NOTE: If the car is not completely wired (temporary), check the following:

- wire removed from panel mount terminal DCL
- wire removed from terminal 47 on the SC-SB2K board
- jumper from 2 bus to terminal 36 on the SC-SB2K board
- jumper from 2 bus to terminal 38 on the SC-SB2K board
- jumper from 2 bus to panel mount terminal EPI (if present)

m. Check the counter weight balance. Make whatever corrections are necessary to make the counter weight correct. Check to see what the counter weighing should be before making any changes. If a drum machine is being used, follow the manufacturer's counterweighting recommendation, and test the drum machine's limit switches.

NOTE: On modernizations it is easy to overlook the typical 40% counter-weighting. Always put a 40% load in the car and check for equal motor current (up verses down) at Inspection speed in the middle of the hoistway. Equal current readings on the keypad display indicate that the counterweight is *close* to the correct value. Take whatever steps are necessary to achieve *proper* counterweighting. This is especially important since many traction installations do not have compensation cables or chains.

n. Turn the power OFF and reinstall the fuses that power terminals 2H and 2F. The controller installation should now be complete. Proceed to Section 4 *Final Adjustment.*

3.5 INSPECTION OPERATION - MAGNETEK HPV 900 DRIVE

For controllers with the G5 / GPD515 drive, see Section 3.4.
For controllers with the TORQMAX F4 drive, see Section 3.6.
For controllers with the Yaskawa F7 drive, see Section 3.7.
For controllers with the TORQMAX F5 drive, see Section 3.8.

NOTE: Before the initial inspection run, verify the following trimpot settings:

- COS trimpot on the SC-BASE or BASER board fully CW
- ETS trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the HC-ACI board fully CCW
- ETS trimpot on the HC-ACIF board fully CW

3.5.1 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets, and all of the field adjustable parameters have been entered into the drive unit based upon the provided field information. However, **it is essential to verify all drive parameter settings before start up.**

NOTE: The drive software has been modified for this application, therefore some of the parameters on the parameter sheet shipped with the controller are different from those shown in the drive manual. If a drive is replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

Refer to the instruction manual for the VFAC drive unit which is provided along with this manual as part of the documentation. Become familiar with the VFAC Drive Manual, particularly with the operation of the Digital Operator (keypad operation). Note that the way this VFAC drive unit is being used ignores many of its functions. Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.5.2 VERIFYING THE CRITICAL MAGNETEK HPV 900 DRIVE PARAMETERS

The AC drive parameters must be verified before moving the car on inspection operation. The Caution box below lists critical drive parameters which must be verified before start up. The remaining drive parameters must be verified with the Quick Reference for HPV 900 Drive Parameters for the Series M product which was shipped with the controller. This complete listing of drive parameters can also be found in Appendix D of this manual.

CAUTION: Do not change drive parameters while the elevator is running. The following are very critical HPV900 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **A1- Contract Car Spd** (Elevator contract speed).
- **A1- Contract Mtr Spd** (Motor Speed at elevator contract speed/ Motor Full load RPM)
- **A1- Response = 20** (Sensitivity of the speed regulator)
- **A1- Inertia = 2** (System inertia. This parameter will be adjusted during the adaptive tuning of the drive in Section 4.8.3, Adaptive Tuning)
- **A2- Accel Rate 0 = 3.0**
- **A2- Decel Rate 0 = 3.0**
- **A3- Multistep Ref (Inspection, Level, High Level , Intermediate and High speed)** must be set to the valid speed settings described in Section 4.5.1 (Table 4.4).
- **A5 - (Motor parameters)** Must be verified with the motor name plate and the parameter sheet filled out for the specific controller and shipped with the controller.
- **C2- Log In 1 TB1-1 = Drive Enable**
- **C2- Log In 2 TB1-2 = Run UP**
- **C2- Log In 3 TB1-3 = Run DOWN**
- **C2- Log In 4 TB1-4 = Fault reset**
- **C2- Log In 5 TB1-5 = Step Ref B0** (Inspection speed input)
- **C2- Log In 6 TB1-6 = Step Ref B1** (Level speed input)
- **C2- Log In 7 TB1-7 = Step Ref B2** (High Level speed input)
- **C2- Log In 8 TB1-8 = Step Ref B3** (High speed input)
- **C2- Log In 9 TB1-9 = S Curve Sel 0**
- **C3- Relay Coil 1 = Fault**
- **C3- Relay Coil 2 = Speed Reg Rls.** This parameter is very critical for the operation of the brake (terminal 54 and 55 contact)

3.5.3 MOVING THE CAR ON INSPECTION OPERATION (HPV 900)

WARNING: The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. Do not open the drive cover for 5-10 minutes after removing the AC power, to allow the capacitors to discharge. Use extreme caution. Do not touch any circuit board, power device or electrical connection without ensuring that high voltage is not present.

Once all the steps described in Sections 3.3.1, 3.5.1 and 3.5.2 are accomplished then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn the main power disconnect ON. There should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

```
SPEED COMMAND
D1         0.0
        ft/min
```

After few seconds, the SAFR1 and SAFR2 relays should pick (the LED on the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between panel mount terminals 1 and 2 on the controller backplate.

If no problems are found, then briefly place a jumper between terminals 2 and 20 on the SC-SB2K board and confirm that the SAFR1 and SAFR2 relays turn ON after four seconds. If the SAFR relays turn OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

b. All of the speed commands (acceleration, deceleration and the S curves) are adjusted by setting drive parameters using the drive key pad. A complete listing of the HPV 900 Drive Parameters is found in Appendix C. A parameter sheet, listing the parameter settings as programmed by MCE, is shipped with each controller.

c. If required, install a temporary jumper between terminals 2 and 9 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

d. At this time the encoder must be mounted on the motor shaft and its connections must be complete according to the job prints.

e. The **Inspection Speed** is set by the **A3 - Inspection / Speed Command 1, parameter** in **ft/min**. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Run the car by toggling the UP/DN toggle switch on the SC-SB2K board in the desired direction using constant pressure. The PM contactor and the BK contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

   If the car moves in the opposite direction, display the MOTOR CURRENT on the drive keypad under DISPLAY POWER DATA D2. Pick direction on Inspection and check for one of the following conditions:

   1. If the car moves in the correct direction and the drive draws normal current (30% to 40% of motor FLA) proceed to step f.

   2. If the car oscillates at zero speed, moves at slow speed, or a Torque Limit Drive Fault is tripped, interchange two of the motor leads to correct this problem.

   3. If the motor draws normal current but the car moves in the opposite direction, change the **C1- Motor Rotation parameter** from Forward to Reverse, or vice versa.

> **NOTE:** If the elevator does not run on Inspection, refer to Section 6.7, Troubleshooting the MagneTek HPV 900 AC Drive.

f. Verify the inspection speed using a hand held Tachometer. If the car moves slower than the set value of A3 - Inspection/Speed Command 1 then increase the **A1 - Contract Mtr Spd** rpm parameter. If the speed is higher, decrease the value of the **A1-Contract Mtr Spd** rpm parameter. The **A1- Contract Mtr Spd** parameter can be adjusted up to +/-5% of the motor rated F.L. RPM without having much effect on the performance.

The correct Inspection speed in feet per minute (ft/m) should now be displayed on the drive key pad whenever the car moves on Inspection. Adjust the Inspection Speed (**A3 - Inspection/Speed Command 1**) parameter for a comfortable inspection speed. For proper brake operation, adjust the SPD trimpot on the HC-ACI board to coordinate the application of the speed command with the picking of the brake so that the car does not move under the brake or rollback at the start.

g. At this time the adjustment of the BDD trimpot on the HC-ACI board is also necessary. Otherwise the car may be stopping under the brake, causing a lot of current to be applied to the motor that might cause arcing on the main contactor during the stop.

h. Test the safety by hand to make sure that it will hold the car.

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.1 (j), and reinstall the wire into terminal ACCN. Turn ON. the main disconnect. Make sure that there is 115VAC on terminal ACCN with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the car top inspection switch is in the INSP position.

j. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that the SAFR1 relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.**

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 2 and 9, and from terminals 18 and ACCN (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

NOTE: If the car is not completely wired (temporary), check the following:

- wire removed from panel mount terminal DCL
- wire removed from terminal 47 on the SC-SB2K board
- jumper from 2 bus to terminal 36 on the SC-SB2K board
- jumper from 2 bus to terminal 38 on the SC-SB2K board
- jumper from 2 bus to panel mount terminal EPI (if present)

NOTE: On modernizations it is easy to overlook the typical 40% counter-weighting. Always put a 40% load in the car and check for equal motor current (up verses down) at Inspection speed in the middle of the hoistway. Equal current readings on the keypad display indicate that the counterweight is *close* to the correct value. Take whatever steps are necessary to achieve *proper* counterweighting. This is especially important since many traction installations do not have compensation cables or chains.

m. Check the counter weight balance. Make whatever corrections are necessary to make the counter weight correct. Check to see what the counter weighing should be before making any changes. If a drum machine is being used, follow the manufacturer's counterweighting recommendation, and test the drum machine's limit switches.

n. Turn the power OFF and reinstall the fuses that power terminals 2H and 2F. The elevator controller installation should now be complete. Proceed to Section 4 *Final Adjustment.*

3.6 INSPECTION OPERATION - TORQMAX F4 DRIVE

For controllers with the G5 / GPD515 drive, see Section 3.4.
For controllers with the HPV 900 drive, see Section 3.5.
For controllers with the Yaskawa F7 drive, see Section 3.7.
For controllers with the TORQMAX F5 drive, see Section 3.8.

NOTE: Before the initial inspection run, verify the following trimpot settings:

- COS trimpot on the SC-BASE or BASER board fully CW
- ETS trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the HC-ACI board fully CCW
- ETS trimpot on the HC-ACIF board fully CW

3.6.1 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets, and all of the field adjustable parameters have been entered into the drive unit based upon the provided field information. However, **it is essential to verify all drive parameter settings before start up.**

NOTE: The drive software has been modified for this application, therefore some of the parameters on the parameter sheet shipped with the controller are different from those shown in the drive manual. If a drive is replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

Refer to the instruction manual for the VFAC drive unit which is provided along with this manual as part of the documentation. Become familiar with the VFAC Drive Manual, particularly with the operation of the Digital Operator (keypad operation). Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.6.2 VERIFYING THE CRITICAL TORQMAX F4 DRIVE PARAMETERS

The AC drive parameters must be verified before moving the car on Inspection operation. The Caution box below lists critical drive parameters which must be verified before start up. The remaining drive parameters must be verified with the Quick Reference for TORQMAX F4 Drive Parameters for Series M product which was shipped with the controller. This complete listing of drive parameters can also be found in Appendix E of this manual.

CAUTION: Do not change drive parameters while the elevator is running. The following are very critical TORQMAX F4 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **LF.02 = 2** (Operating mode)
- **LF.04 = 0** (Induction motor)
- **LF.07 = US** (Unit selection)
- **LF.10** Rated motor power (HP).
- **LF.11** Rated motor speed (RPM).
- **LF.12** Rated motor current (Amp).
- **LF.13** Rated motor frequency (Hz).
- **LF.14** Rated motor voltage.
- **LF.17** Encoder pulse number (PPR)**closed loop**
- **LF.20** Rated speed (FPM)
- **LF.21** Traction sheave diameter (inches)
- **LF.22** Gear Reduction ratio
- **LF.23** Roping Ratio
- **LF.24** Load (LBS)
- **LF.30 (2 = Closed loop: 0 = open loop)**
- **LF.31** Speed Prop gain
- **LF.32** Speed Int gain
- **LF.42** High Speed (FPM)
- **LF.43** Inspection speed (FPM)
- **LF.44** High level speed (FPM)
- **LF.45** Intermediate speed (FPM)
- **LF.51** Acceleration ft/s.s
- **LF.53** Deceleration ft/s.s

3.6.3 MOVING THE CAR ON INSPECTION OPERATION (TORQMAX F4)

WARNING: The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. Do not open the drive cover for 5-10 minutes after removing the AC power, to allow the capacitors to discharge. Use extreme caution. Do not touch any circuit board, power device or electrical connection without ensuring that high voltage is not present.

Once all the steps described in Sections 3.3.1, 3.6.1 and 3.6.2 are accomplished then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn ON the main power disconnect. Under normal conditions there should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

   After a few seconds, the SAFR1 and SAFR2 relay should pick (the LED on the relay will be lit). On the HC-ACI board, relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller’s back plate. Verify that there is 120 VAC between terminals 1 and 2 on the SC-SB2K main relay board.

   If no problems are found, then briefly place a jumper between panel mount terminal 2 and terminal 20 on the SC-SB2K board and confirm that the SAFR1 and SAFR2 relay turns ON after four seconds. If the SAFR relays turn OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is normal and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

b. All of the speed commands (acceleration, deceleration and the S curves) are adjusted by setting drive parameters using the drive key pad. A complete listing of the

TORQMAX F4 Drive Parameters is found in Appendix D. A parameter sheet, listing the parameter settings as programmed by MCE, is shipped with each controller.

c. If required, install a temporary jumper between terminals 2 and 9 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

d. For Flux Vector applications, the encoder must be mounted on the motor shaft and its connections must be complete according to the job prints at this time.

e. The **Inspection Speed** is set by drive parameter **LF.43.** Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the ON position. Run the car by toggling the UP/DN toggle switch on the SC-SB2K board in the desired direction using constant pressure. The PM and BK contactors should pick and the car should move.

If the car doesn't move, select drive parameter LF.86. The value of LF.86 changes from zero (0) to four (4) when direction is picked on Inspection. If the value remains zero (0), the drive is not receiving the Inspection speed command from the controller. Refer to Section 6.8 for troubleshooting information.

f. Verify that the car moves in the appropriate direction and the brake works properly.

- **Open loop applications** - If the car moves in the opposite direction, interchange two of the motor leads.
- **Flux vector applications** - Display the MOTOR CURRENT on the drive keypad by selecting parameter ru.9. Run the car on Inspection and check for one of the following conditions:
  1. If the car moves in the correct direction and the drive draws normal current (30% to 40% of motor FLA) proceed to step g.
  2. If the car oscillates at zero speed, moves at slow speed, or trips the **E.ENC fault** on the drive then set **LF.18 = ON or OFF** (change from previous value). This parameter will swap the encoder channels internally in the drive. It is not recommended to change the external encoder connections as the drive has the capability of changing them through software.
  3. If the motor draws normal current but the car moves in the opposite direction, turn OFF the power and wait until there is no voltage present on the DC bus. Then interchange two of the motor leads.

     Turn ON the power and set parameter LF18 = ON or OFF(change from previous value). The car should now move in the correct direction and draw normal current.

NOTE: If the elevator does not run on Inspection, refer to Section 6.8, Troubleshooting the TORQMAX F4 AC Drive.

g. Verify the inspection speed using a hand held tachometer. If the car moves slower than the set value of the Inspection speed parameter (LF.43) then verify the following:

- LF.11 Rated motor speed.
- LF.20 Rated system speed
- LF.21 Traction sheave diameter.
- LF.22 Gear reduction ratio.
- LF.30 (2 = Closed loop, 0 = Open loop)

<u>If the gear reduction ratio is not available from the machine name plate</u>, calculate the value by first measuring the motor revolutions using a marker on the motor shaft or brake drum. Reduce the inspection speed by decreasing LF.43, then determine the number of motor shaft revolutions required to complete one revolution of the sheave. Calculate the gear reduction ration using the formula: **Gear reduction ratio = Motor RPM / Sheave RPM**. Enter the calculated value in parameter LF.22.

Note: The drive has the capability of estimating the gear reduction ratio. Run the car on inspection and read the value parameter LF.25, the gear ratio estimated by the drive. The value of LF.25 can be used for LF.22. <u>However, the correct value of LF.22 is critical for overall system performance, therefore MCE/TORQMAX recommends calculating or measuring the gear reduction ratio and entering the calculated value in parameter LF.22 if it is not available from the machine name plate.</u>

Adjust the Inspection speed for a comfortable inspection speed using parameter LF.43. For proper brake operation, adjust the TORQMAX F4 drive parameter LF.70 Speed Pick Delay to coordinate the application of the speed command with the picking of the brake so that the car does not move under the brake or rollback at the start.

h. At this time the adjustment of the BDD trimpot on the HC-ACI board is also necessary. Otherwise the car may be stopping under the brake, causing a lot of current to be applied to the motor that might cause arcing on the main contactor during the stop.

i. Test the safety by hand to make sure that it will hold the car.

j. To make sure that the car top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.1 (j), and reinstall the wire into terminal ACCN. Turn ON the main disconnect. Make sure that there is 115VAC on terminal ACCN with respect to terminal 1 when the car top Inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the car top Inspection switch is in the INSP position.

k. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that the SAFR1 relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.**

l. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 2 and 9, and from terminals 18 and ACCN (if present).** Correct any problem with the door locks and the door closed contacts.

m. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

> **NOTE:** If the car is not completely wired (temporary), check the following:
> - wire removed from panel mount terminal DCL
> - wire removed from terminal 47 on the SC-SB2K board
> - jumper from 2 bus to terminal 36 on the SC-SB2K board
> - jumper from 2 bus to terminal 38 on the SC-SB2K board
> - jumper from 2 bus to panel mount terminal EPI (if present)

n. Check the counter weight balance. Make whatever corrections are necessary to make the counter weight correct. Check to see what the counter weighing should be before making any changes. If a drum machine is being used, follow the manufacturer's counterweighting recommendation, and test the drum machine's limit switches.

> **NOTE:** On modernizations it is easy to overlook the typical 40% counter-weighting. Always put a 40% load in the car and check for equal motor current (up verses down) at Inspection speed in the middle of the hoistway. Equal current readings on the keypad display indicate that the counterweight is *close* to the correct value. Take whatever steps are necessary to achieve *proper* counterweighting. This is especially important since many traction installations do not have compensation cables or chains.

o. Turn the power OFF and reinstall the fuses that power terminals 2H and 2F. The elevator controller installation should now be complete. Proceed to Section 4 *Final Adjustment.*

3.7 INSPECTION OPERATION - YASKAWA F7 DRIVE

For controllers with the G5 / GPD515 drive, see Section 3.4.
For controllers with the MagneTek HPV 900 drive, see Section 3.5.
For controllers with the TORQMAX F4 drive, see Section 3.6.
For controllers with the TORQMAX F5 drive, see Section 3.8.

NOTE: Before the initial inspection run, verify the following trimpot settings:

- COS trimpot on the SC-BASE or BASER board fully CW
- ETS trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the HC-ACI board fully CCW
- ETS trimpot on the HC-ACIF board fully CW

3.7.1 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets, and all of the field adjustable parameters have been entered into the drive unit based upon the provided field information. However, **it is essential to verify all drive parameter settings before start up.**

NOTE: The drive software has been modified for this application, therefore some of the parameters on the parameter sheet shipped with the controller are different from those shown in the drive manual. If a drive is replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

Refer to the instruction manual for the VFAC drive unit which is provided along with this manual as part of the documentation. Become familiar with the VFAC Drive Manual, particularly with the operation of the Digital Operator (keypad operation). Note that the way this VFAC drive unit is being used ignores many of its functions. Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.7.2 VERIFYING THE CRITICAL YASKAWA F7 DRIVE PARAMETERS

Table 3.1 lists the critical Yaskawa F7 drive parameters which must be verified before start up. Table 3.2 lists additional parameters applicable only to flux vector drives, which must be verified. A complete listing of drive parameters can be found in Appendix L.

CAUTION: The following are very critical Yaskawa F7 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **A1-02 = Setting 0 or 3 depending upon the type of controller (Open loop or Flux Vector)**
- **B1-01 = 0 (Operator)**
- **B1-02 = 1 (Terminals)**
- **O1-03 = Determines max FPM. This must be set before setting D1-02 thru D1-17)**
- **D1-02 (H), D1-03 (HL), D1-05 (L), D1-07 (INT), D1-17 (INS) must be set to valid speed settings. None of these parameters may be set to zero value.**
- **H1-01 = 9 (External BaseBlock N.C.)**
- **H1-02 = 14 (Fault reset)**
- **H1-03 = 80 (Multi step spd 1F)**
- **H1-04 = 81 (Muti step spd 2F)**
- **H1-05 = 82 (Multi step spd 3F)**
- **H1-06 = 6 (Jog ref - Inspection speed input terminal)**
- **H2-01 = 40 (During Run 3) This parameter is very critical for the operation of the brake (terminal M1 & M2 contact)**

TABLE 3.3 Critical Yaskawa F7 Drive Parameters

CRITICAL YASKAWA F7 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
A1-01	Access Level	Parameter access level 0: Operation Only 1: User Level 2: Advanced Level	-	0 - 2	2	2
A1-02	Control Method	Control Method - motor 1 0: V/F Control without PG 1: V/F Control with PG 2: Open Loop Vector 3: Flux Vector (closed loop)	-	0 - 3	0	0 = V/F Control - Open loop 3 = Flux Vector
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
C1-01	Accel Rate 1	Acceleration Rate 1	f/s^2	0.01 - 8.00	3.00	3.00
C1-02	Decel Rate 1	Deceleration Rate 1	f/s^2	0.01 - 8.00	3.00	3.00
C1-03	Accel Rate 2	Acceleration Rate 2	f/s^2	0.01 - 8.00	3.00	3.00
C1-04	Decel Rate 2	Deceleration Rate 2	f/s^2	0.01 - 8.00	6.00	6.00
C1-07	Accel Rate 4	Acceleration Rate 4	f/s^2	0.01 - 8.00	3.00	3.00
C1-08	Decel Rate 4	Deceleration Rate 4	f/s^2	0.01 - 8.00	3.00	3.00
✿ The maximum FPM is determined by O1-03. Set this parameter before setting D1-02 thru D1-17.						
D1-02	High	High Speed (must be > D1-07)	FPM	0.0 - ✿	50	✶
D1-03	High Level	High Level (must be > D1-05 and < D1-07)	FPM	0.0 - 30.0	13.0	✶
D1-05	Level	Level Speed (must be < D1-03)	FPM	0.0 - 15.0	2.5	✶
D1-07	Combination	Intermediate (must be > D1-03 and < D1-02)	FPM	0.0 - ✿	42	✶
D1-17	Jog Reference	Inspection speed)	FPM	0.0 - ✿	42	✶
✶ See Table 4.8 for suggested initial settings for these parameters.						

TABLE 3.3 Critical Yaskawa F7 Drive Parameters

CRITICAL YASKAWA F7 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
E1-01	Input volt	Drive Input Voltage	V ✶✶	180 - 460		Drive input voltage.
E1-03	V/F Selection	Pattern Selection (N/A to flux vector)	-	0 - F	F	F
E1-04	Max Frequency	Maximum Output Frequency	Hz	40.0 - 80.0	60.0	60.0
E1-05	Max Voltage	Motor Output Voltage	V	0.0 - 460.0		Motor name plate voltage
E1-06	Base Frequency	Maximum Voltage Output Freq.	Hz	40/50/60 (Motor rated)	60.0	60.0
E1-07	Mid Frequency A	Mid Output Frequency A (N/A to flux vector)	Hz	0.0 - 72.0	3.0	3.0
E1-08	Mid Voltage A	Mid Output Voltage A (N/A to flux vector)	V	0.0 - 255.0	16.1 ✶✶	16.0-25.0 ✶✶
E1-09	Min Frequency	Minimum Output Frequency (N/A to flux vector)	Hz	0.0 - 72.0	0.5	0.5
E1-10	Min Voltage	Minimum Output Voltage (N/A to flux vector)	V	0.0 - 255.0	10 ✶✶	8.0-12.0 ✶✶
✶✶ These values should be doubled for the 460 volt application.						
E2-01	Motor Rated FLA	Motor Full Load Amps	A	0.00 - 1500.0	Motor dependent	Motor FLA
E2-02	Motor Rated Slip	Motor Rated Slip Frequency	Hz	0.0 - 15.0	Motor dependent	
E2-03	No-load Current	Motor No Load Current	A	0 - 150	30% -40% of Motor FLA	
H1-01	Terminal S3 Sel	Multi-Function Input Terminal S3 Function Selection *9 = External BaseBlock N.C.*	-	0-82	9	9
H1-02	Terminal S4 Sel	Multi-Function Input Terminal S4 Function Selection *14 = Fault Reset*	-	0 - 82	14	14
H1-03	Terminal S5 Sel	Multi-Function Input Terminal S5 Function Selection *80 = Mult-step Ref 1F*	-	0 - 82	80	80
H1-04	Terminal S6 Sel	Multi-Function Input Terminal S6 Function Selection *81 = Mult-step Ref 2F*	-	0 - 82	81	81
H1-05	Terminal S7 Sel	Multi-Function Input Terminal S7 Function Selection *82 = Mult-step Ref 3F*	-	0 - 82	82	82
H1-06	Terminal S8 Sel	Multi-Function Input Terminal S8 Function Selection *6 = Jog Ref (Inspection speed)*	-	0 - 82	6	6
H2-01	Terminal M1-M2 Sel	Terminal M1-M2 Function Selection *40 = During Run 3*	-	0 - 40	40	40
H2-02	Terminal M3-M4 Sel	Terminal M1-M2 Function Selection *4 = Frequency Detection 1*	-	0 - 40	4	4

TABLE 3.3 Critical Yaskawa F7 Drive Parameters

CRITICAL YASKAWA F7 DRIVE PARAMETERS						
Parameter Number	Digital Operator Display	Parameter Description	Units	Setting Range	MCE drive default	Field/MCE settings
O1-03	Display Scaling	Digital Operator Display Selection Sets the units of the Frequency References (D1-01 to D1-17), the Frequency Reference Monitors (U1-01, U1-02, U1-05), and the Modbus communication frequency reference. Units are fixed at FPM (ft/Min) with a range of 10.0 to 999.9 FPM at max frequency. 10100 to 19999: User units e.g. (10100 = 10.0 FPM) (19999 = 999.9 FPM)	-	10110 - 19999	11000 (= 100 FPM)	Set to contract speed

TABLE 3.4 Additional Yaskawa F7 Drive Parameters Applicable to Flux Vector Applications

ADDITIONAL YASKAWA F7 DRIVE PARAMETERS APPLICABLE TO FLUX VECTOR						
Parameter Number	Digital Operator Display	Parameter Description	Units	Setting Range	MCE drive default	Field/ MCE settings
C5	**ASR TUNING**					
C5-01	ASR P Gain1	ASR Proportional Gain 1	-	0.0 - 300.0	20.00	20.00
C5-02	ASR I Time 1	ASR Integral Time 1	sec	0.00 - 10.00	0.200	0.200
C5-03	ASR P Gain 2	ASR Proportional Gain 2	-	0.00 - 300.0	20.00	20.00
C5-04	ASR I Time 2	ASR Integral Time 2	sec	0.0 - 10.00	0.500	0.500
F1	**PG Option Setup**					
F1-01	PG pulse/Rev	Encoder pulses per revolution	-	0 - 60000	1024	1024
F1-02	PG Fdbk Loss Sel	Stopping method at PG line brake detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-03	PG Overspeed Sel	Stopping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-04	PG Deviation Sel	Stopping method at DEV fault detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-05	PG Rotation Sel	PG rotation 0: CCW 1: CW	-	0, 1	0	0 or 1
F1-06	PG Output Ratio	PG Division Rate	-	1 - 132	1	1
F1-07 - F1-13		Set to drive defaults.				
L4	**Ref Detection**					
L4-01	Spd Agree Level	Speed Agreement Detection Level (L4-01 = E1-06)	Hz	0-400	60	60
L4-02	Spd Agree Width	Speed Agreement Detection Width	Hz	0-20	5	5.0-8.0
L7-01 - L704	**Torque Limits**	**Set at Factory defaults**	**-**	**0-300**	**300**	**300**

3.7.3 MOVING THE CAR ON INSPECTION OPERATION (YASKAWA F7)

WARNING: The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. Do not open the drive cover for 5-10 minutes after removing the AC power, to allow the capacitors to discharge. Use extreme caution. Do not touch any circuit board, power device or electrical connection without insuring that high voltage is not present.

Once all the steps described in Sections 3.3.1, 3.7.1 and 3.7.2 are accomplished then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn ON the main power disconnect. After a few seconds the SAFR1 and SAFR2 relays should pick (the LED near the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between test pins TP1 and TP2 on the SC-SB2K Main Safety Relay board.

   If no problems are found, then briefly place a jumper between panel mount terminal 2 and PCB terminal 20 on the SC-SB2K board and confirm that the SAFR1 & SAFR2 relays turn ON after four seconds. If the SAFR relays turn OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

b. All of the speed commands (acceleration, deceleration and the S curves) are adjusted by setting drive parameters using the drive key pad. A complete listing of the Yaskawa F7 Drive Parameters is found in Appendix L. A parameter sheet, listing the parameter settings as shipped from MCE, is shipped with each controller.

c. If required, install a temporary jumper between terminals 2 and 9 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

d. For Flux Vector applications, the encoder must be mounted on the motor shaft and its connections must be complete according to the job prints at this time.

e. The **inspection speed** is set by drive parameter **D1-17 in fpm. For flux vector applications, set the D1-17 initial setting to slowly move the car & to prevent arcing on the contactors during initial start up.** Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Verify that the drive is in OPERATION mode. Run the car in the desired direction by toggling the UP/DN toggle switch on the SC-SB2K board. The PM contactor and the BK contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

If the car moves in the opposite direction:

- for **open loop** applications, interchange two of the motor leads.
- for **flux vector** applications, display the OUTPUT CURRENT on the drive keypad by pressing the UP arrow (twice). Pick direction on Inspection and check the following:

  1. If the car moves in the **opposite direction** and draws a **normal value** of current(less than the Motor FLA or approximately 30% to 40% of motor FLA), then perform the following steps:

     (a) Turn the controller power OFF. Interchange two of the motor connections.

     (b) Turn the controller power ON. Set parameter F1-05 = CCW if its original setting is CW. If the original setting was CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.

  2. If the car moves in the **opposite direction** and draws **higher current** than normal:

     (a) Turn the controller power OFF. Interchange two of the motor leads.

     (b) Turn the controller power ON and check the direction and current. If the car moves in correct direction but still draws higher than normal current, go to step 3.

  3. If the car moves in the **correct direction** and draws **higher current** than the Motor FLA and the value of current keeps increasing, stop the car and set parameter F1-05 = CCW if its original setting is CW. If the original setting is CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.

> **NOTE:** If the elevator does not run on Inspection, refer to Section 6.8, Troubleshooting the Yaskawa F7 AC Drive.

f. The inspection speed in FPM should show on the drive key pad whenever the car moves at inspection speed. Adjust drive parameter D1-17 for a comfortable inspection speed. For proper brake operation, adjust the SPD trimpot on the HC-ACI board to coordinate the application of the speed command with the picking of the brake so that the car does not move under the brake or rollback at the start.

g. At this time the adjustment of the BDD trimpot on the HC-ACI board is also necessary. Otherwise the car may be stopping under the brake, causing a lot of current to be applied to the motor that might cause arcing on the main contactor during the stop. On Inspection operation, how quickly the car stops at the terminal landings is controlled by drive parameter C1-04. A higher value of this parameter will cause the car to overshoot at terminal landings and may drop the SAFR1 relay. Also, on Inspection operation the smoothness in the stop at intermediate landings is controlled by the normal deceleration parameter C1-02.

h. Test the safety by hand to make sure that it will hold the car.

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.1 (j), and reinstall the wire into terminal ACCN. Turn ON the main disconnect. Make sure that there is 115VAC on terminal ACCN with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the car top inspection switch is in the INSP position.

j. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that the SAFR1 relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.**

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 2 and 9, and from terminals 18 and ACCN (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

> **NOTE:** If the car is not completely wired (temporary), check the following:
> - wire removed from panel mount terminal DCL
> - 2-bus jumped to terminal DPM
> - wire removed from terminal 47 on the SC-SB2K board
> - jumper from 2 bus to terminal 36 on the SC-SB2K board
> - jumper from 2 bus to terminal 38 on the SC-SB2K board
> - jumper from 2 bus to panel mount terminal EPI (if present)

m. Check the counter weight balance. Make whatever corrections are necessary to make the counter weight correct. Check to see what the counter weighing should be before making any changes. If a drum machine is being used, follow the manufacturer's counterweighting recommendation, and test the drum machine's limit switches.

> **NOTE:** On modernizations it is easy to overlook the typical 40% counter-weighting. Always put a 40% load in the car and check for equal motor current (up verses down) at Inspection speed in the middle of the hoistway. Equal current readings on the keypad display indicate that the counterweight is *close* to the correct value. Take whatever steps are necessary to achieve *proper* counterweighting. This is especially important since many traction installations do not have compensation cables or chains.

n. Turn OFF the power and reinstall the fuses that power terminals 2H and 2F. The controller installation should now be complete. Proceed to Section 4 *Final Adjustment.*

3.8 INSPECTION OPERATION - TORQMAX F5 DRIVE

For controllers with the G5 / GPD515 drive, see Section 3.4.
For controllers with the HPV 900 drive, see Section 3.5.
For controllers with the TORQMAX F4 drive, see Section 3.6.
For controllers with the Yaskawa F7 drive, see Section 3.7.

NOTE: Before the initial inspection run, verify the following trimpot settings:

- COS trimpot on the SC-BASE or BASER board fully CW
- ETS trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the SC-BASE or BASER board fully CW
- ILO trimpot on the HC-ACI board fully CCW
- ETS trimpot on the HC-ACIF board fully CW

3.8.1 TORQMAX F5 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets, and all of the field adjustable parameters have been entered into the drive unit based upon the provided field information. However, **it is essential to verify all drive parameter settings before start up.**

NOTE: The drive software has been modified for this application, therefore some of the parameters on the parameter sheet shipped with the controller are different from those shown in the drive manual. If a drive is replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

Refer to the instruction manual for the VFAC drive unit which is provided along with this manual as part of the documentation. Become familiar with the VFAC Drive Manual, particularly with the operation of the Digital Operator (keypad operation). Note that the way this VFAC drive unit is being used ignores many of its functions. Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.8.2 VERIFYING THE CRITICAL TORQMAX F5 DRIVE PARAMETERS

The AC drive parameters must be verified before moving the car on inspection operation. The Caution box below lists critical drive parameters which must be verified before start up. The remaining drive parameters must be verified with the Quick Reference for TORQMAX F5 Drive Parameters for Series M product which was shipped with the controller. This complete listing of drive parameters can also be found in Appendix L of this manual.

CAUTION: Do not change drive parameters while the elevator is running. The following are very critical TORQMAX Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **LF.02 = bnSPd** (Signal Operating Mode)
- **LF.04 = 0** (Induction motor)
- **LF.10** Rated motor power (HP).
- **LF.11** Rated motor speed (rpm).
- **LF.12** Rated motor current (Amp).
- **LF.13** Rated motor frequency (Hz).
- **LF.14** Rated motor voltage.
- **LF.20** Contract speed (fpm)
- **LF.21** Traction sheave diameter (inches)
- **LF.22** Gear Reduction ratio
- **LF.23** Roping Ratio
- **LF.24** Load Weight (lbs)
- **LF.27** Encoder Pulse Number (ppr)**closed loop**
- **LF.30 (2 = Closed loop: 0 = open loop)**
- **A.LF.31** Kp Speed Accel: Proportional gain
- **d.LF.31** Kp Speed Decel: Proportional gain
- **A.LF.32** Ki Speed Accel: Integral gain
- **d.LF.32** Ki Speed Decel: Integral gain
- **A.LF.33** Ki Speed Offset Accel: Low speed gain
- **d.LF.33** Ki Speed Offset Decel: Low speed gain
- **LF.42** High Speed (FPM)
- **LF.43** Inspection speed (FPM)
- **LF.44** High leveling speed (FPM)
- **LF.45** Intermediate speed (FPM)
- **n.LF.51** Acceleration ft/s^2 (n = 0,1,2)
- **n.LF.54** Deceleration ft/s^2 (n = 0,1,2)

3.8.3 MOVING THE CAR ON INSPECTION OPERATION (TORQMAX F5)

WARNING: The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. Do not open the drive cover for 5-10 minutes after removing the AC power, to allow the capacitors to discharge. Use extreme caution. Do not touch any circuit board, power device or electrical connection without ensuring that high voltage is not present.

Once all the steps described in Sections 3.3.1, 3.6.1 and 3.6.2 are accomplished then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn ON the main power disconnect. Under normal conditions there should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

After a few seconds, the SAFR1 and SAFR2 relays should pick (the LED near the relay will be lit). On the HC-ACI board, relays RDY and CNP must also be picked. If none of the relays have picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between panel mount terminals 1 and 2.

If no problems are found, then briefly place a jumper between panel mount terminal 2 and 20 (on the SC-SB2K) and confirm that the SAFR1 and SAFR2 (SAFR relays) relays turn ON after four seconds. If the SAFR relays turn OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is normal and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

b. All of the speed commands (acceleration, deceleration and the S curves) are adjusted by setting drive parameters using the drive key pad. A complete listing of the TORQMAX F5 Drive Parameters is found in Appendix L. A parameter sheet, listing the parameter settings as programmed by MCE, is shipped with each controller.

c. If required, install a temporary jumper between terminals 2 and 9 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

d. For Flux Vector applications, the encoder must be mounted on the motor shaft and its connections must be complete according to the job prints at this time.

Auto-Tuning Induction Motors - For best performance with induction motors it is recommend to first perform the auto-tuning procedure as follows:

a. Make sure that the rated motor power (LF.10), rated motor speed (LF.11), rated motor current (LF.12), rated motor frequency (LF.13), rated motor voltage (LF.14) and rated power factor (LF.15) are entered into the drive before you begin. If the power factor is not on the name plate, use 0.90 as the value.

b. Remove one brake wire to prevent the brake from picking.

c. On the TORQMAX F5 drive keypad, set parameter LF.3 = S Lrn. This will start the learn process. The display will change to StArt.

d. With the controller on machine room inspection, pick and hold Up direction. The motor contactor should pull in and the brake should not pick. Motor current will begin to flow, an audible noise in the motor will be heard, and the drive display will change to LS103.

   The drive will measure various parameters in the motor as well as in the drive's own power stage. During each measurement the display will change to signify what is being measured. In the event of problems during the measurement phase, the factory can use the codes to determine what is happening. Continue to hold the inspection switch ON until the drive displays "done".

e. In the event that the drive cannot complete the measurements, two error messages may occur:
   - FAILd - the drive is not able to begin measurements due to a configuration error. Consult the factory to resolve.
   - FAIL - the measurement sequence was interrupted, e.g., the inspection switch was released prematurely, electrically the motor was not properly connected. Try the measurement again.

f. When "done" is displayed, release the inspection switch. The drive will finish by making several calculations, CALC is displayed, and updating the parameter values with the measured values.

g. Reinstall the brake wire removed in step 'b' above.

Verify proper car movement and brake operation:

a. The **Inspection Speed** is set by drive parameter **LF.43.** Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Run the car by toggling the UP/DN toggle switch on the SC-SB2K board in the desired direction using constant pressure. The PM and BK contactors should pick and the car should move.

b. Verify that the car moves in the appropriate direction and the brake works properly.

- **Open loop applications** - If the car moves in the opposite direction, interchange two of the motor leads.
- **Flux vector applications** - Display the MOTOR CURRENT on the drive keypad by selecting parameter LF.93. Run the car on Inspection and check for one of the following conditions:
  1. If the car moves in the correct direction and the drive draws normal current (30% to 40% of motor FLA) proceed to step g.
  2. If the car oscillates at zero speed, moves at slow speed, or trips the **E.ENC fault** on the drive, change parameter **LF.28** setting (see parameters quick reference in Appendix L). This parameter will swap the encoder channels internally in the drive. It is not recommended to change the external encoder connections as the drive has the capability of changing them through software.
  3. If the motor draws normal current but the car moves in the opposite direction, turn OFF the power and wait until there is no voltage present on the DC bus. Then interchange two of the motor leads.

     Turn ON the power and change parameter **LF.28** setting (see parameters quick reference in Appendix L). The car should now move in the correct direction and draw normal current.

NOTE: If the elevator does not run on Inspection, refer to Section 6.7, Troubleshooting the TORQMAX AC Drive.

c. Verify the inspection speed using a hand held tachometer. If the car moves slower than the set value of the Inspection speed parameter (LF.43) then verify the following:

- LF.11 Rated motor speed.
- LF.20 Contract speed
- LF.21 Traction sheave diameter.
- LF.22 Gear reduction ratio.
- LF.30 (2 = Close loop, 0 = Open loop)

<u>If the gear reduction ratio is not available from the machine name plate</u>, calculate the value by first measuring the motor revolutions using a marker on the motor shaft or brake drum. Reduce the inspection speed by decreasing LF.43, then determine the number of motor shaft revolutions required to complete one revolution of the sheave. Calculate the gear reduction ration using the formula: **Gear reduction ratio = Motor RPM / Sheave RPM**. Enter the calculated value in parameter LF.22.

Note: The drive has the capability of estimating the gear reduction ratio. Run the car on inspection and read the value parameter LF.25, the gear ratio estimated by the drive.

The value of LF.25 can be used for LF.22. <u>However, the correct value of LF.22 is critical for overall system performance, therefore MCE/TORQMAX recommends calculating or measuring the gear reduction ratio and entering the calculated value in parameter LF.22 if it is not available from the machine name plate.</u>

Adjust the Inspection Speed for a comfortable inspection speed using parameter LF.43. For proper brake operation, adjust the SPD trimpot on the HC-ACI board to coordinate the application of the speed command with the picking of the brake so that the car does not move under the brake or rollback at the start.

d. At this time the adjustment of the BDD trimpot on the HC-ACI board is also necessary. Otherwise the car may be stopping under the brake, causing a lot of current to be applied to the motor that might cause arcing on the main contactor during the stop.

e. Test the safety by hand to make sure that it will hold the car.

f. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.1 (j), and reinstall the wire into terminal ACCN. Turn ON the main disconnect. Make sure that there is 115VAC on terminal ACCN with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the car top inspection switch is in the INSP position.

g. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that the SAFR1 relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.**

h. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 2 and 9, and from terminals 18 and ACCN (if present).** Correct any problem with the door locks and the door closed contacts.

i. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

NOTE: If the car is not completely wired (temporary), check the following:

- wire removed from panel mount terminal DCL
- jumper placed between 2-bus and panel mount terminal DPM
- wire removed from terminal 47 on the SC-SB2K board
- jumper from 2 bus to terminal 36 on the SC-SB2K board
- jumper from 2 bus to terminal 38 on the SC-SB2K board
- jumper from 2 bus to panel mount terminal EPI (if present)

j. Check the counter weight balance. Make whatever corrections are necessary to make the counter weight correct. Check to see what the counter weighing should be before making any changes. If a drum machine is being used, follow the manufacturer's counterweighting recommendation, and test the drum machine's limit switches.

NOTE: On modernizations it is easy to overlook the typical 40% counter-weighting. Always put a 40% load in the car and check for equal motor current (up verses down) at Inspection speed in the middle of the hoistway. Equal current readings on the keypad display indicate that the counterweight is *close* to the correct value. Take whatever steps are necessary to achieve *proper* counterweighting. This is especially important since many traction installations do not have compensation cables or chains.

k. Turn OFF the power and reinstall the fuses that power terminals 2H and 2F. The elevator controller installation should now be complete. Proceed to Section 4 *Final Adjustment.*

SECTION 4
FINAL ADJUSTMENT

4.0 GENERAL INFORMATION

At this point, all the steps in Section 3 should have been completed. Please read Section 5 before proceeding; it explains the adjustment and troubleshooting tools available with the computer. This section is divided into three main parts:

1. Preparing to run on High Speed and Automatic operation - Section 4.1.
2. Final adjustment and testing procedures for controllers with:
   - EMS / IDM (G5) or MagneTek (GPD515) AC drive - Sections 4.2 thru 4.4.
   - MagneTek HPV 900 AC drive - Sections 4.5 thru 4.7.
   - TORQMAX F4 AC drive - Sections 4.8 thru 4.10
   - Yaskawa F7 AC drive - Sections 4.11 thru 4.13
   - TORQMAX F5 AC drive - Sections 4.14 thru 4.16
3. Compliance testing for ASME A17.1 2000 Code - Section 4.17

4.1 PREPARING TO RUN ON HIGH SPEED AND AUTOMATIC OPERATION

Move the car to the bottom landing on Inspection operation and disconnect all power. Reinsert connector C1 into receptacle C1 on the HC-PI/O board (if previously removed).

NOTE: Pin 1 on the ribbon cable connector and the header on the HC-PI/O board must match (designated with arrows on the connector and header). Press the connector in until the latches snap, securing the connector in place.

4.1.1 DOOR OPERATOR

If the door operator is not working, pull the door fuses and close the doors so that the door clutch will not hit any of the door lock rollers. Take whatever steps are necessary to keep the installation safe, but make sure that the car top is still accessible after closing all of the doors. Turn ON the AC power to the elevator.

4.1.2 HC-ACI AND HC-ACIF BOARD ADJUSTMENTS

In the process of preparing for running the elevator on high speed and automatic operation, the following trimpots may require adjustment.

- **SPD** trimpot (Speed Pick Delay) - This trimpot was adjusted in Section 3 on Inspection operation to coordinate application of the speed command with the picking of the brake. This trimpot may require readjustment when the car is adjusted for High speed.

NOTE: Speed Pick Delay is not used on controllers with the TORQMAX drive. Turn the SPD trimpot fully CCW and then set it 1/8 turn in the CW direction (see Section 4.9.4 'd' and 'f').

- **BDD** trimpot (Brake Drop Delay) - This trimpot may need readjustment. BDD controls the delay in dropping the brake so that the brake drops just as car motion ceases.

- **ILO** trimpot (Inspection Leveling Overspeed) on the HC-ACI board - **Not used on ASME A17.1-2000 compliant controllers.** Leave the ILO trimpot on the HC-ACI board fully CCW. Use the ILO trimpot on the SC-BASE or SC-BASER board to adjust the Inspection Leveling Overspeed threshold.

- **ETS** trimpot (Emergency Terminal Limit) on the HC-ACIF board - **Not used on ASME A17.1-2000 compliant controllers.** Leave the ETS trimpot on the HC-ACIF board fully CW. Use the ETS trimpot on the SC-BASE or SC-BASER board to adjust the Emergency Terminal Limit Speed threshold.

4.1.3 ONBOARD DIAGNOSTICS

Section 5 of this manual is dedicated to system diagnostics and an explanation of the human interface tools that are available with the Computer Swing Panel. These diagnostic tools simplify the adjustment and troubleshooting of the system. It is extremely important that Section 5 be read and understood before proceeding.

When the *Diagnostics On/Norm* switch is in the Norm position, the Diagnostic Indicators indicate when the system is ready for Normal operation. The Diagnostic Indicators must be scanning from right to left one light at a time. If the diagnostic lights are flashing any other way, an abnormal or special condition exists and the fault name will scroll on the alphanumeric display in English text. Tables 6.3 and 6.4 describe these faults and provide some troubleshooting tips.

The computer displays abnormal conditions in the same priority as they are evaluated. For example, if the safety string is open and the system is in Fire Service mode, the computer will show that the safety string is open and will expect the mechanic to correct this problem first since it is a higher priority condition. Once the safety string has been made up and the computer recognizes this, then the computer will show that the car is on Fire Service mode. After successfully bringing in the Fire Service input, the computer will then start its normal scan. Once scanning normally, it is then possible to place calls and run the elevator automatically.

4.1.4 A FEW WORDS ABOUT ABSOLUTE FLOOR ENCODING

NOTE: To avoid conflicts between the A17.1 fault monitors and the next several tests, place a jumper between 2KBP1 and 2KBP2 on SC-BASE(R). Enter System Mode on swing panel and set ABYP = ON (See Section 5.3.2).

All controllers are shipped with AFE as standard. If the car is not at a landing when power is turned ON, the controller will generate a down direction command and the car will move toward the closest landing, provided that all abnormal conditions have been corrected. When the car reaches a landing and is within the Door Zone (relay DZ picked) with leveling completed (relays LU1/2 and LD1/2 not picked) the controller reads the floor code vanes or magnets and corrects the Position Indicator. If the car is on Automatic Operation, and if a home floor has been designated, the car will move to the home landing at this time.

If the car is at a landing, within the Door Zone (relay DZ picked) with leveling completed (relays LU1/2 and LD1/2 not picked) when AC power is turned ON, the controller will read the floor code vanes or magnets at the landing and correct the Position Indicator. Again, if a home floor has been designated the car will move to this landing to park.

4.1.5 REGISTERING CAR CALLS

In the process of making final adjustments to the controller, periodically you will be asked to register car calls. A call or series of calls can be registered at the controller by momentarily placing a jumper between terminal 1 (system common) and the desired car call terminal or terminals on the HC-PI/O or HC-CI/O-E board, and then between terminal 2 and terminal 45 to allow the car to travel to each call. The car may move immediately after the first call is put in, or it may wait several seconds before moving. If a CRT is available, calls can be entered using the CRT terminal's F3 screen.

CAUTION: The call terminals on the HC-PI/O and HC-CI/O-E board should *never* be connected to any of the power terminals (such as 2, 3, 4, etc.). If this happens and the call is turned on, it will blow the resistor-fuse or triac which plugs into the Call board. Later versions of these boards may have plug-in zener diodes. These parts are designed to be field replaceable and spares are provided in unused positions on the Call board, or are available from MCE. DO NOT JUMPER THESE PLUG-IN COMPONENTS AS IT MAY DESTROY THE BOARD OR OTHER CONTROLLER COMPONENTS. If any of these components should blow, FIND OUT WHY instead of constantly replacing them, as the constant faults can eventually damage the board.

4.1.6 TEST MODE OPERATION

The purpose of Test mode is to allow easy and convenient operation of the car so that the final adjustments can be made without cycling the doors. When the elevator is operated in the TEST mode, the elevator doors do not open. The door open relays are disconnected automatically during Test mode operation.

The car is put into TEST mode by placing the TEST/NORMAL switch on the SC-SB2K (Main Safety Relay board) in the TEST position. Note that when the TEST/NORMAL switch is in the TEST position, it puts the car on Independent Service, provided that the Car Top Inspection and Relay Panel Inspection switches are in the OFF or normal positions. In that case, the Status Indicators should show *Independent Serv*. If the expected indication is not displayed, check to see what message is being displayed and correct the problem. Operation while in Test mode should be easy to understand by knowing the following:

a. Every time the car stops, a non-interference timer *must* elapse before the car can move again (the car will not move unless there is another car call). Note that after the timer has elapsed, the car will move immediately as soon as the next car call is placed (the car will not move if the system is a single button collective system and there is no jumper from terminal 2 to terminal 45). Placing a car call right after the car stops will require the non-interference timer to elapse before the car can move again.

b. Simply having one or more car calls registered will not necessarily cause the car to move. It will be necessary to jumper terminal 2 to terminal 45 to create a Door Close Button input to get the car to move. If the car is not a single button collective but is a selective-collective, the jumper from terminal 2 to 45 will not be necessary. Leave a jumper connected from terminal 1 to the last car call in the line of calls that have been placed. This will create a constant pressure signal on the car call which is an alternate means of creating a Door Close Button signal to get a car that is on Independent Service to leave the landing. However, the jumper from terminal 2 to terminal 45 may be more convenient.

c. If a jumper from terminal 1 is touched to the car call input for the floor where the car is located, it will reestablish the non-interference timer and it must elapse before the car can move again.

d. If the elevator is trying to level, it will not pick high speed and leave the landing until it has completed the leveling process. Drive Unit speed adjustments and direction limits at terminal landings may cause this problem.

e. If any of the inputs that open the door are active (Safety Edge On, Photo Eye On, Car Call input grounded to 1 for the floor matching the Position Indicator, etc.) the car will not leave the landing.

f. Both slowdown switch inputs (terminals 11 and 13) should *never* be dead at the same time when the doors are closed and locked and the safety circuit is good.

4.2 EXPLANATION OF G5 / GPD515 DRIVE PARAMETERS AND S CURVES

For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

While setting up the drive, set the Automatic Operation ASME A17.1-2000 Bypass Function, ABYP = ON (see Section 5.3.2). This provides two hours of run time with ASME A17.1-2000 functions bypassed. If necessary set ABYP = ON again for an additional two hours.

Before attempting to bring the car up to contract speed, or making any adjustments, it is important to verify the following control parameters in the VFAC Drive Unit. It is very important to become familiar with drive keypad operation to access the drive program. Review the use of the Digital Operator (drive keypad) in the VFAC Drive manual.

4.2.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.4.2. Incorrect values for these parameters can cause erratic elevator operation.

CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation. The Programming mode has to be accessed in order to change a drive parameter. The drive will not function in Programming mode, it must be in Operation mode to run the elevator.

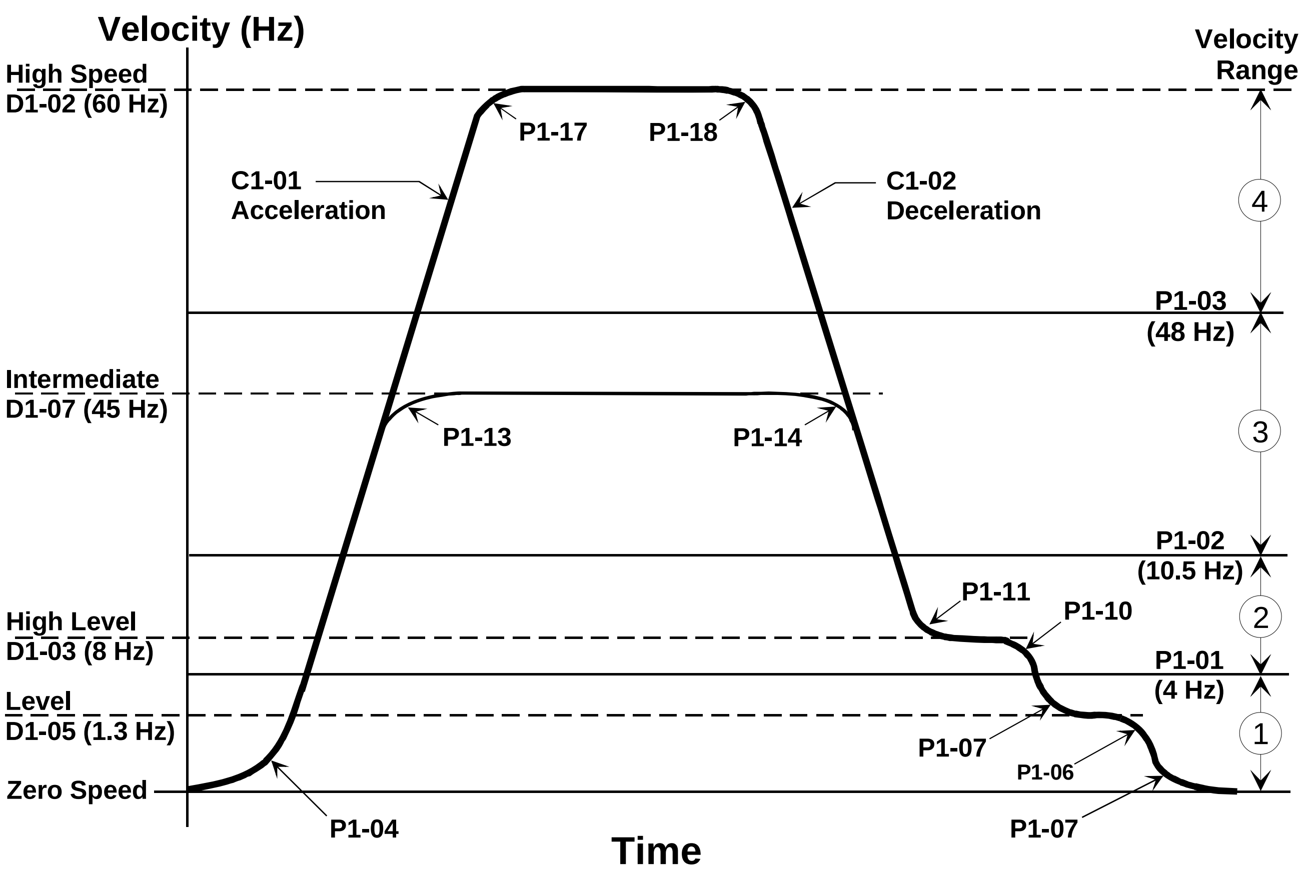
There are five speed levels (D1 parameters) that can be set in the drive software (see Table 4.1 and Figure 4.1). The drive software will not accept data entry to any D1 parameters other than those listed in Table 4.1. If you change a drive parameter and there is an OPE40 fault, the only way to correct this fault is to access the particular D1-D9 parameter again in the PROGRAM. You must enter a correct value and then reset the drive by pushing the drive fault reset button on the HC-ACI board or by pressing the drive reset button on the drive key pad.

> **CAUTION:** The drive will trip on **fault OPE40** or **OPE41** if the following conditions are not met: **D1-02 > D1-07 > D1-03 > D1-05 > 0.0 but less than the maximum specified value.**

TABLE 4.1 G5 / GPD515 Drive Speed Levels

SPEED LEVELS (G5 / GPD515)				
Speed	**D1 Parameter**	**Setting Range**	**MCE Default Value**	**Preferred setting in preparation for running the car at High speed.**
High	D1-02	0-80 Hz.	**30.0 ✶**	**30.0 ✶**
	✶ This parameter should be changed to 60Hz during final adjustment, to run the car on H speed.			
Intermediate	D1-07	0-55	**25 ✶✶**	**25 ✶✶**
	✶✶ This speed can be increased to 55Hz if required, but must be less than D1-02 for proper operation.			
High Level	D1-03	0-15	8.0	6 -10
Level	D1-05	0-10	1.3	1 - 3
Jog/ Inspection	D1-09	0-40	10	This speed can be increased to 40 Hz if required.

FIGURE 4.1 Velocity Curve and S Curve Parameters (G5 / GPD515)

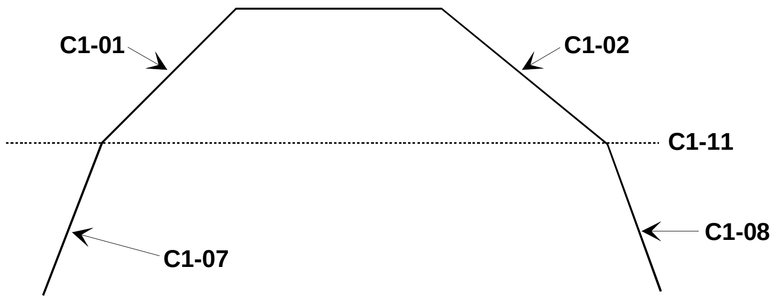


4.2.2 ADJUSTING ACCELERATION AND DECELERATION RATE

The acceleration (and deceleration) rate is programmed in seconds. This value is the amount of time to accelerate from Zero Speed to High Speed, or decelerate from High Speed to Zero Speed.

The drive has the capability to use a two sectioned acceleration / deceleration curve as shown in Figure 4.2. However, in this application, parameter C1-11 (Acceleration/Deceleration Switching Level) is set to 0.0 Hz. Therefore, parameter C1-01 defines the total acceleration time from Zero Speed to High Speed, and parameter C1-02 defines the total deceleration time from High Speed to Zero Speed. With parameter C1-11 set to 0.0 Hz, parameters C1-07 and C1-08 have no affect on acceleration or deceleration.

FIGURE 4.2 Acceleration and Deceleration Rate Parameters (G5 / GPD515)



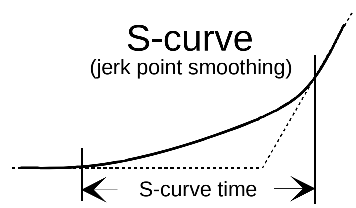
Acceleration : C1-01 = 1 to 3 seconds. Set initially to1.7 seconds.
C1-07 = C1–01

Deceleration : C1-02 = 1 to 3 seconds. Set initially to 2.0 seconds.
C1-08 = C1-02

Acceleration / Deceleration Switching Level : C1-11 = 0.0 Hz.

4.2.3 ADJUSTING THE S-CURVES (G5 / GPD515)

The S-curve parameters P1-04 thru P1-19 adjust the transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.1). **The S-curve parameter values are in seconds. Increasing the value causes a smoother (longer) transition.** Note: Setting deceleration S-curves too high will cause the car to overshoot.



Smooth operation of the elevator requires that different S-curves be used at different points on the velocity curve. The factor determining which S-curve is used is the velocity range. There are four velocity ranges defined by parameters P1-01, P1-02 and P1-03 (see Figure 4.1). It is important that the correct S-curve be selected for adjustment (see Table 4.2 and Figure 4.1).

TABLE 4.2 G5 / GPD515 S-Curve Selection Table

Table for Selection of S-Curves					
Range	**Velocity (Hz)**	**Start Accel**	**End Accel**	**Start Decel**	**End Decel**
①	Less than P1-01	**✶ P1-04**	P1-05	P1-06	**✶ P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	**✶ P1-10**	**✶ P1-11**
③	Between P1-02 and P1-03	P1-12	**✶ P1-13**	**✶ P1-14**	**✶ P1-15**
④	Greater than P1-03	P1-16	**✶ P1-17**	**✶ P1-18**	P1-19

✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.

The S-curve parameters listed below (also listed in the shaded area in Table 4.2) are the *only* S-curve parameters which require field adjustment for smoothing the elevator ride. Parameters P1-05, P1-06, P1-08, P1-09, P1-12, P1-16 and P1-19 should be set to the MCE Drive default values.

P1-04 = 1.2 - adjusts Speed Pick Delay at the start of motion (0.2 - 2.5)
P1-13 = 1.2 - adjusts the transition from Acceleration to Intermediate speed (0.2 - 2.5)
P1-17 = 1.2 - adjusts the transition from Acceleration to High Speed (0.2 - 2.5)
P1-18 = 0.5 - adjusts the transition from High Speed to Deceleration (0.2 - 2.5)
P1-14 = 0.5 - adjusts the transition from Intermediate Speed to Deceleration (0.2 - 2.5)
P1-11 = 1.0 - adjusts the transition from Deceleration to High Level Speed (0.2 - 2.5)
P1-10 = 1.5 - adjusts the transition from High Level Speed to Level Speed (0.2 - 2.5)
P1-06 = 0.2 - adjusts the smoothness at the start of Level Speed (preferred 0.2)
P1-07 = 1.0 - adjusts the smoothness at the end of Level Speed (0.2 - 2.5)
P1-15 = **0.9 -** Preferred setting, lower value might cause spotting before the stop.

For more information about the S-curve parameters refer Table 4.3:

TABLE 4.3 G5 / GPD515 S-Curve Parameters

G5 / GPD515 S-Curve Parameters							
The Field Adjustable Parameters are shown in the shaded rows.							
No.	**Digital Operator Display**	**Parameter Description**	**Unit**	**Setting Range**	**MCE Drive Defaults**	**V/f**	**Field/ MCE Set**
P1-01	S Crv Change P1	Frequency reference for S Curve #1 selection	Hz	0 - 400	4.0	B	4.0
P1-02	S Crv Change P2	Frequency reference for S Curve #2 selection	Hz	0 - 400	10.5	B	10.5
P1-03	S Crv Change P3	Frequency reference for S Curve #3 selection	Hz	0 - 400	48.0	B	48.0
P1-04	S Crv Acc Start 1	S Curve #1 at the Start of Acceleration	Sec	0.01 - 2.5	1.2		
P1-05	S Crv Acc End 1	S Curve #1 at the End of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-06	S CrvDec Start 1	S Curve #1 at the Start of Deceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-07	S Crv Dec End 1	S Curve #1 at the End of Deceleration	Sec	0.01 - 2.5	1.0	B	
P1-08	S Crv Acc Start 2	S Curve #2 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-09	S Crv Acc End 2	S Curve #2 at the End of Acceleration	Sec	0.01 -2.5	0.2	B	0.2
P1-10	S Crv Dec Start 2	S Curve #2 at the Start of Deceleration	Sec	0.01 - 2.5	1.5	B	
P1-11	S Crv Dec End 2	S Curve #2 at the End of Deceleration	Sec	0.01 - 2.5	1.0	B	
P1-12	S Crv Acc Start 3	S Curve #3 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-13	S Crv Acc end 3	S Curve #3 at the End of Acceleration	Sec	0.01 -2.5	1.2	B	
P1-14	S Crv Dec Start 3	S Curve #3 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	
P1-15	S Crv Dec End 3	S Curve #3 at the End of Deceleration	Sec	0.01 - 2.5	0.9	B	0.9
P1-16	S Crv Acc Start 4	S Curve #4 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-17	S Crv Acc End 4	S Curve #4 at the End of Acceleration	Sec	0.01 - 2.5	1.2	B	
P1-18	S Crv Dec Start 4	S Curve #4 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	
P1-19	S Crv Dec End 4	S Curve #4 at the End of Deceleration	Sec	0.01 -2.5	0.2	B	0.2

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals 23 (Output Frequency) and 22 (Com) on the drive terminals. The input can be seen at terminal 21 (Speed Reference) and 22 (Com). These two signals are 0 -10VDC.

The High Level speed (D1-03), Level speed (L1-05), Deceleration time (C1-02) and S-curve parameters (P1-11, P1-10, P1-06, P1-07) should be adjusted for correct approach to the floor.

The Acceleration time (C1-01), and the S-curve parameters (P1-04 and P1-17) can be adjusted for smooth starting and transition to High Speed. This will be addressed in the final adjustment section.

4.3 FINAL ADJUSTMENTS (G5 / GPD515)

For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

4.3.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (G5 / GPD515)

a. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

b. Move the car to the bottom terminal landing. Check to see if the DZ relay is picked. If not, move the car on Inspection to place it in the Door Zone.

4.3.2 SWITCHING TO AUTOMATIC OPERATION (G5 / GPD515)

Place the Relay Panel Inspection switch in the OFF position. If the car is not at a landing it will move to a landing at high leveling speed. If the car is at a landing but not in the door zone, leveling relays L and either LU1/2 or LD1/2 should pick and the car should perform a relevel. If the relevel in not successful, check the following:

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (D1-05) on the G5 / GPD515 AC Drive to get the car to move.
- If leveling relays L and LD1/2 are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.
- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

The Status Indicator lights should now display the indication for Independent Service operation. At this time the Position Indicator should match the actual car location. Note that all of the Position Indicators and direction arrows are conveniently displayed on the controller. All the calls are also displayed on the controller.

4.3.3 BRAKE ADJUSTMENT FOR 125% LOAD (G5 / GPD515)

Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car. Begin adding weights in 50 or 100 pound increments and move the car up and down on Inspection each time. Adjust the brake tension to stop and hold 125% of a contract load by tripping a stop switch open while running down on Inspection. Hold the DOWN button in while tripping open the stop switch (preferably on the Inspection station). KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS. If the VFAC Drive Unit trips off when the car is going down, but not while it is going up, refer to the manual for the VFAC Drive Unit and look up the failure indicated on the Drive display. If an over-voltage fault is indicated, there may be a problem in the regeneration (or braking) resistors or the braking module (if one is provided). If this problem cannot be solved, call MCE Technical Support. Remove all test weights from the car.

4.3.4 BRINGING THE CAR UP TO HIGH SPEED (G5 / GPD515)

a. Verify that all the steps described in Sections 4.1 and 4.2 regarding the adjustments and specifically the drive parameters are complete.

> **NOTE:** It is very important that the drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation so that there is no demand. To change a drive parameter, the Programming mode has to be accessed. When the drive is in Programming mode it will not function. The drive has to be in Operation mode to run the elevator.

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad should read 30HZ as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase the High speed parameter (D1-02) until contract speed is achieved. If the motor is designed for 60 Hz, contract speed should be reached when the keypad displays 60Hz. Some motors are designed for 50Hz or 40Hz. In those applications parameter D1-02 must be set according to the designed motor frequency, 50Hz or 40Hz. Contract speed should be reached when the keypad display reads 50Hz or 40Hz, respectively.

c. The Position Indicator will step at the slowdown distance from the next floor. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed parameter (D1-03) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car decelerates to Level speed. The Level speed can be adjusted using parameter D1-05 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

> **NOTE:** The active speed frequency in Hz will show on the drive key pad corresponding to the setting of the D parameters.

d. Adjust the SPD (Speed Pick Delay) trimpot by first turning it far enough clockwise so that the empty car rolls back in the direction of the counterweight (if it can). Then adjust SPD so that the brake is fully picked just as the motor first moves. The goal is to delay long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

e. Run the car again and verify that the car will start, accelerate, decelerate and run at High Level and Level speeds into the floor and stop. Place calls for all of the landings. Verify that all of the calls work. Verify the operation and placement of all vanes or magnets and vane or magnet switches and verify that the car steps the Position

Indicators correctly. The slowdown distance for the elevator is measured from the point where the STU sensor (or STD sensor, if going down) is activated by a metal vane or magnetic strip to the position where the car is stopped at the floor with the DZ sensor centered on the leveling target with LU or LD sensors *not* engaged.

The slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate parameters (C1-02 and C1-08) to get the car to approach the floor correctly as the car speed increases. Adjust the Acceleration rate parameters (C1-01 and C1-07) until the desired acceleration is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

f. If the job is a modernization, contract speed should correspond to a VFAC Drive output frequency of 60 Hz (± 8 Hz). The frequency may vary with direction and load. Arrange the VFAC Drive Unit to display the output frequency to verify this.

NOTE: To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminals 21 and 23 with respect to 22. These are 0 -10 VDC signals. Take all necessary precautions while measuring the voltage signals.

CAUTION: Most oscilloscopes have a grounding pin on their power plug. We recommend defeating the grounding pin with one of the commonly available ground isolation adapter plugs so that the case of the oscilloscope is *not* at ground potential, but at whatever potential the negative probe lead is connected to. TREAT THE CASE OF THE OSCILLOSCOPE AS A LETHAL SHOCK HAZARD, DEPENDING ON WHERE THE NEGATIVE PROBE IS CONNECTED. This recommendation is being made because the ground potential on the grounding pin of the power outlet may not be the same as the controller cabinet ground. If it is not, substantial ground loop current may flow between the negative probe and the power plug grounding pin which can ruin the oscilloscope.

g. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal has been provided by adjusting trimpot SPD (Speed Pick Delay). Trimpot SPD must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check trimpot SPD again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals 21 and 23 with respect to 22. These signals are 0-10 volt. Terminal 21 is programmed for the drive input speed reference and terminal 23 is programmed for the drive output frequency.

For flux vector applications only: To improve the car's response the following drive parameters can be adjusted as described below, provided that the Motor data slip parameter (E2-02) and Motor No load current (E2-03) are set correctly.

1. ASR Proportional Gain 1, (C5-01) - The ASR Proportional Gain 1 controls the response of the car to the speed command. Increasing C5-01 results in tighter control. A low value may result in a speed deviation error. A too high value may result in oscillation.

2. ASR Integral Time 1, (C5-02) - The ASR Integral Time 1 adjusts the amount of time for the drive to respond to a change in speed command. Response time is increased when C5–02 is decreased. However, the car may become unstable if the ASR Integral Time is set too low.

3. Parameters C5-03 (ASR P Gain 2) , and C5-04 (ASR Integral Time 2) are not used and must be set to the factory default values.

h. The car should be running well now, except possibly for the final stop. Since the speed reference goes to zero when the car stops, the VFAC Drive Unit will cause the machine to stop electrically. Enough delay in the setting of the brake (BDD) will have to be provided to allow the sheave to stop turning before setting the brake firmly on the brake drum.

NOTE: If the job has **Intermediate Speed** , first adjust the multi-floor runs. Then make one floor runs and adjust parameter D1-07 to reach the correct intermediate speed. Do not change any other parameter except P1-13 or P1-14, if required, as described in Figure 4.1

When the elevator slows down to leveling speed and travels to door zone, the speed command will drop to zero before the brake drops. This is adjustable by the BDD (Brake Drop Delay) trimpot. For open loop applications, the car stop will be accomplished with injection braking current supplied by the VFAC Drive Unit at the end of the run. The strength and duration of this DC braking current is programmable using parameters B2-02 and B2-04 on the VFAC Drive Unit and, to start with, should be set at 50 and 0.5 respectively (50% current and 0.5 second duration). A sharper and stronger electric stop is provided by increasing B2-02 and a softer stop by decreasing B2-02. The duration of the DC injection braking *must be less* than the dropout time of the contactor(s) which disconnect the motor from the VFAC Drive Unit. This assumes that the contactor(s) will open under zero current conditions. For Flux Vector applications, DC injection braking is not required for stopping. All B2 parameters must be set to the factory default settings.

With the method of providing an electric stop as indicated above, provide a delay in dropping the brake by turning the BDD (Brake Drop Delay) trimpot clockwise. The idea is to hold the brake up long enough to allow the motor to be stopped electrically and then drop the brake immediately the instant the motor has stopped.

If there is too long of a delay before dropping the brake, the control system will release its control of the motor and the motor will drift briefly in the direction of the load before the brake is forced to drop by the PT relay. The BDD trimpot controls the dropping of the brake through the BE relay. Move the LU and LD sensors or switches closer together (or further apart) so the car stops at the same location, up or down. Then move the floor (leveling) magnet strips or vanes so the car stops accurately at each floor.

i. The adjustment is almost complete. The acceleration rate setting on drive parameter C1-01 should be at least as great as the deceleration rate parameter C1-02, but it should not be so high that it substantially exceeds the value of C1-02. Excessive acceleration will probably cause the VFAC Drive Unit circuits to saturate and therefore, lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the C1-02 parameter. Increase the value of C1-02 and run the car. Continue to increase the value of C1-02 until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the C1-02 parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls, you might have to increase the leveling speed.

4.3.5 LOAD TESTING (G5 / GPD515)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the VFAC Drive Unit current on its display and check to see if there is an OC (Over Current) error indication as the car accelerates to full speed. If so, this indicates that the VFAC unit is being pushed close to its limits and may require one or more of the following actions:

1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by increasing parameter C1-01. The more time spent in acceleration, the lower the current demand.

2. A more gradual transition from acceleration to high speed may be made by increasing drive parameter P1-17 for contact speed and P1-13 for intermediate speed.

3. **For Open loop applications** - Adjust parameter C4-01(Torque Compensation Gain) between 1.0 - 2.0. The maximum setting for this parameter is 2.5. Display the output current on the drive key pad in the Operation mode by pressing the up arrow twice. The drive keypad will display OUTPUT CURRENT U1-03= 0.0A. The G5 drive can provide 150% of its full load rated current for 1 minute. Run the car and monitor the current on the drive keypad. **If the motor is stalling but does not trip on OC faults, and if the value of the output current is more than or close to the motor rated current but less than the maximum drive output current, check the motor winding configuration.** Most elevator motors are connected in Y configuration. But sometimes the DELTA configuration is used in order to pick the full load. The motor manufacturer’s recommendations must be taken into consideration. If the field survey data was inaccurate, the Drive Unit may be undersized in relation to the motor. Call MCE Technical Support so that the job data can be reviewed.

   For Flux Vector Applications -The Torque Compensation Gain parameter is not available for flux vector applications. ASR Tuning (C5 parameters), as described in Section 4.3.4 (g), can be adjusted to pick the full load.

4. The motor may be underrated. It may be possible to get excellent results if the speed is reduced slightly.

5. The elevator may be improperly counter weighted. This possibility should be thoroughly investigated.

6. Make a copy of the Table in Appendix B, Quick Reference for G5 / GPD515 Drive Parameters and use the digital operator on the VFAC Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

b. If there is a full load in the car and there is trouble slowing in the down direction, or if the VFAC Drive Unit is tripping off and there is an OV (over voltage) fault displayed, it may mean that there is a problem with the regeneration (braking) resistors and/or the braking unit (if supplied separately). Check for DC bus voltage. There are two methods to check the DC bus voltage as described below:

1. Through the drive display: When the drive is in Operation mode, press the up arrow until Monitor function U1 is displayed, press enter and then use the up arrow to access the U1-07 (DC bus voltage). Then run the elevator and watch the voltage reading.

2. Actual measurement of voltage: Use extreme care when measuring the DC voltage across the drive power terminals (-) and (+ 2 or +3) under the above conditions.

If the bus voltage is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.4 FINAL ELEVATOR INSPECTION PROCEDURE (G5 / GPD515)

For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7. and 4.17
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10. and 4.17
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

WARNING:	The following tests should be performed only by the qualified elevator personnel skilled in final adjustment and inspections.

4.4.1 INSPECTION LEVELING OVER SPEED TEST (G5 / GPD515)

Note: Before performing tests 4.4.1 and 4.4.3, please remove the jumper between pins labeled 2KBP1 and 2KBP2 on the SC-BASE(R) board. Also rotate trimpots ILO, ETS and COS fully CW.

The SC-BASE(R) board is equipped with an independent low speed monitoring system which can shut down the system if the car runs faster than a trimpot adjustable preset speed on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (LU1/LU2, LD1/LD2) relays are picked or when the Access/Inspection relay (IN1) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the SC-BASE(R) board. The circuit looks at pulses coming from the speed sensor, sensing a magnet on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Place the car on Inspection operation by placing the MACHINE ROOM INSPECTION TRANSFER switch in the INSP position on the SC-SB2K.

b. Run the car on Inspection (up or down) and record the actual values for parameter D1-09 ________. D1-09 must be returned to the original value when this test is complete.

Now, run the car on Inspection and adjust the IN speed (Parameter D1-09) for the preferred maximum leveling speed (something below 150 fpm).

c. While running the car at the adjusted maximum leveling speed, slowly turn the ILO trimpot CCW until the ILO1/ILO2 indicators turn ON. The car should come to an immediate stop and the MC-MP-2K should indicate “ILO Fault”. The ILO fault will self reset in a moment.

d. Now set D1-09 to a lower value. Run the car on Inspection and increase the inspection speed by increasing parameter D1-09 to show that this low speed safety monitor circuit will trip at no higher than 150 fpm (or no higher than the desired maximum inspection speed). Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Return parameter D1-09 to the value recorded in Step (b).

4.4.2 TERMINAL SLOWDOWN LIMIT SWITCHES (G5 / GPD515)

Make sure that the terminal slowdown limit switches are working properly by doing the following:

a. Place the TEST/NORMAL switch on the SC-SB2K board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom) from the controller. The car should make a normal slowdown at both terminal landings except that there may be a slight relevel, which is okay. If the car goes more than an inch past the floor, move the slowdown limit until the approach is normal.

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the SC-SB2K board and return the TEST/NORMAL switch to the NORMAL position.

4.4.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (G5 / GPD515)

All jobs under the requirements of ANSI A17.1 -2000 Articles 2.25.4.1. or 2.25.4.2 must have a means to insure that the car speed is below contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

The SC-BASE or SC-BASER board carries out ETS monitoring functions via a speed senor that monitors a magnet installed on the motor shaft or brake drum as described in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that shielded phone cable from the sensor to the SC-BASE(R) board is securely seated in the connectors at both ends and is also enclosed in conduit.

b. On the SC-BASE(R) board verify that the ETS trimpot is fully CW.

c. Record the value of drive parameter D1-02 (High Speed). Then, on a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting parameter D1-02.

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminals UETS1 and UETS2 on the SC-BASE(R) board. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS1/ETS2 indicators turn ON and the car stops. An “ETS Fault” message should be displayed on the MC-MP2-2K alphanumeric display.

e. Press the fault reset push button on the SC-SB2K board to reset the fault.

f. Repeat (d) and (e) in the down direction with the wire from terminals DETS1 and DETS2 removed. When the calibration is complete, reconnect the wires removed from the UETS and DETS terminals and return drive parameter D1-02 (High Speed) to its original value.

g. Verify the calibration by turning OFF the inspection transfer switch. Place a call, and with the car running at contract speed, remove the field wires from the UETS1 and UETS2 terminals on the SC-BASE(R) board. The car must execute an emergency slowdown. To restore normal operation, replace the wires and press the Fault Reset pushbutton on the SC-SB2K board. Repeat for terminals DETS1 and DETS2.

4.4.4 CONTRACT SPEED BUFFER TEST (G5 / GPD515):

4.4.4.1. COUNTERWEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

NOTE: The car should be at the bottom landing with the TEST/ NORM switch on the SC-SB2K board in the TEST position.

To conduct the empty car buffer test going UP, a number of functions need to be bypassed using jumpers. Follow the steps below:

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter system mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Up Limits***, if provided, by placing jumpers between terminals 2 and UETS1 / UETS2 on the SC-BASE(R) board.

e. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 9 and 10 and terminals 10 and 11 on the SC-SB2K board.

f. Register a car call for the top terminal landing from the controller. ***The counterweight will strike the buffer.***

g. Put the elevator on Inspection and pick the down direction to move the car.

h. Remove the jumpers between terminals 9 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the SC-SB2K board.

i. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter system mode and then select option **ABYP = OFF.**

4.4.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter system mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Down Limits***, if provided, by placing jumpers between terminals 2 and DETS1 / DETS2 on the SC-BASE(R) board.

e. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 9 and 12 and terminals 12 and 13 on the SC-SB2K board.

f. Position the elevator several floors above the bottom landing with a full load in the car. Then register a car call for the bottom landing. ***The car will strike the buffer.***

g. Put the elevator on Inspection and pick the up direction to move the car.

h. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

i. Remove the jumpers between terminals 9 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the SC-SB2K board. ***Remove all of the jumpers installed in this section.***

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter system mode and then select option **ABYP = OFF.**

4.4.5 GOVERNOR AND CAR SAFETY TESTS (G5 / GPD515)

4.4.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVER SPEED switch contact manually and verify that the main safety circuit drops out. Use which ever method is most familiar to verify the actual electrical and mechanical tripping speeds.

4.4.5.2 GOVERNOR AND CAR SAFETY OVERSPEED TEST WITH FULL LOAD GOING DOWN.

NOTE: If the governor overspeed trip point is less than 133% of contract speed then perform the test as described below. If the trip point is greater than 133% of contract speed then use other means to overspeed the car.

a. Move the fully loaded car to the top terminal landing. Record the value of parameters D1-02 (High Speed) ________ and E1-04(Maximum output frequency)_________ which are set to run the car on High speed. These parameters will be returned to their recorded values later in the adjustments.

b. Set parameter E1-04 = 80Hz and parameter D1-02 = 80Hz. This should run the car at approximately 133% of the motor contract speed, if the motor is designed for 60Hz.

c. Turn the power OFF. On the SC-BASE(R) board, place the PFLT BYP jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions.**

d. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets. Keep them separate! ETL is 48 VDC and AS is 12 VDC.

e. Connect a jumper between terminals EBS1 and EBS2 to **bypass the governor overspeed switch**.

f. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 on the SC-SB2K board and panel mount terminal 17 to ***bypass the safety plank (SOS) switch***.

g. Turn the power ON and verify that controller is functional.

h. On the SC-BASE(R) board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode on MC-MP2-2K board and set option **ABYP = ON** to activate the ASME A17.1 - 2000 bypass function (see Section 5.3.2).

i. Register a car call in the down direction, but not for the bottom landing. The car should travel at 133% of contract speed. The governor should trip and set the safety and stop the car.

j. Put the car on Inspection.

k. Return parameters E1-04 and D1-02 to their recorded values.

l. Reset the mechanical governor and inspect the hoist ropes to make sure they are in the proper grooves.

m. Move the car UP on Inspection to release the flexible guide clamp safety or release the car safety by hand if it is a wedge clamp type.

n. ***Remove the jumper from terminals EBS1 and EBS2 which bypasses the governor overspeed switch.***

o. ***Remove the jumper from terminals 16 and panel mount terminal 17 which bypasses the safety plank (SOS) switch).***

p. Properly reinstall the relays AS and ETL on HC-ACIF board (if used).

q. Remove jumper between 2KBP1 and 2KBP2 on the SC-BASE(R) board. Also, enter System Mode and set **ABYP = OFF** (see Section 5.3.2).

r. On the SC-BASE(R) board, place the PFLT BYP jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions.**

s. Put the car on Normal operation by taking the car off Inspection. After the elevator finds a floor, verify the operation of the elevator by registering calls and checking the speed.

4.4.6 PHASE LOSS DETECTION TESTS (G5 / GPD515)

The VFAC Drive Unit is programmed to detect a motor phase loss. Parameters L8-05 and L8-07 are enabled, which will activate the drive input and output phase loss detection.

To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display LF (Output phase loss). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

If input phase loss is required, disconnect any one of the three legs of the three phase MCE controller. When either L1 or L2 is removed the drive will not function because the drive's control supply comes from L1 and L2. If either L2 or L3 is removed then the MCE controller will not function because the controller transformer is supplied by L2 and L3. If the controller and drive are normal but the controller wiring is not done as described above and one of the input power wires is disconnected, then the drive will trip on fault PF (Input open phase) provided that the drive out current is greater than 30% of the drive full load current.

The drive adjustments and tests are complete. Now complete the A17.1 Code Compliant Functions and Testing (Section 4.17) then fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

WARNING: Before the Elevator can be turned over to normal use, it is very important that no safety circuit is bypassed. The items to be checked include, but are not limited to:

* Check that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumpers between terminals 2 and UETS1/2 or DETS1/2.
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 2 and 9 (SC-SB2K).
* No jumper between terminals 8 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Set option ABYP and LTAB to OFF and return controller to normal mode.
* Set PFLT Bypass Jumper to the OFF position.
* Drive parameter D1-02 and E1-04 must be set to original value for High speed.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

NOTE: If this car is part of an M3 Group System, refer to Section 4.18 for instructions on setting the Car Network ID.

4.5 EXPLANATION OF HPV 900 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4. and 4.17
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10. and 4.17
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

While setting up the drive, set the Automatic Operation ASME A17.1-2000 Bypass Function, ABYP = ON (see Section 5.3.2). This provides two hours of run time with ASME A17.1-2000 functions bypassed. If necessary set ABYP = ON again for an additional two hours.

Before attempting to bring the car up to contract speed, or making any adjustments, it is important to verify the following control parameters in the VFAC Drive Unit. It is very important to become familiar with drive keypad operation to access the drive program.

NOTE: In order to access the parameter values, review the use of the Digital Operator in Section 3, *Parameter Adjustments* in the MagneTek HPV 900 AC Vector Elevator Drive Technical Manual.

4.5.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.5.2. Incorrect values for these parameters can cause erratic elevator operation.

CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation.

The PTC Series M controller uses the ***A3 - Multistep Ref*** parameters for setting the five speed levels described in Table 4.4 and Figure 4.3. The controller selects the desired speed using the HPV 900 Logic Inputs as described in Section 3.5.2 (C2 parameters). The Speed Command parameters should be set as shown in Table 4.4 in preparation for running the elevator at High speed.

TABLE 4.4 HPV900 Speed Levels

HPV 900 SPEED LEVELS			
Speed	**A3 - Multistep Ref Parameter**	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	Inspection Speed Command 1	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	Level Speed Command 2	2 to 5% of Contract Speed	ft/m
High Level	High Level Speed Command 4	5 to 10% of Contract Speed	ft/m
Intermediate	Intermediate Speed Command 6	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	High speed Speed Command 8	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

4.5.2 ADJUSTING ACCELERATION AND DECELERATION RATES

The acceleration and deceleration rates are programmed in feet per second per second (ft/s^2) using the A2 - S-Curve parameters (see Figure 4.3 and Table 4.5). The acceleration rate is set using the ***A2 - Accel Rate 0*** parameter. The deceleration rate is set using the ***A2 - Decel Rate 0*** parameter. Increasing the value increases the acceleration (deceleration) rate (steeper curve). The default value is 3.00 ft/s^2.

4.5.3 ADJUSTING THE JERK PARAMETERS

The jerk parameters adjust the rate of change transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.3). (See Table 4.5 for a description of the **Accel Jerk In 0**, **Accel Jerk Out 0**, **Decel Jerk In 0** and **Decel Jerk Out 0** parameters). The jerk parameter values are in feet per second per second per second (ft/s^3) using the A2 - S-Curve parameters. Decreasing the value decreases the rate of change and causes a smoother (longer) transition.

The ***Jerk Rate 0*** parameter is used for all jerk points except for the final transition from deceleration to stop. This final transition uses the ***Lev Jerk Rate 0*** parameter (see Figure 4.3). The default value for these parameters is shown in Table 4.5.

FIGURE 4.3 Velocity Curve and S Curve Parameters (HPV 900 software version A2950-C10304)

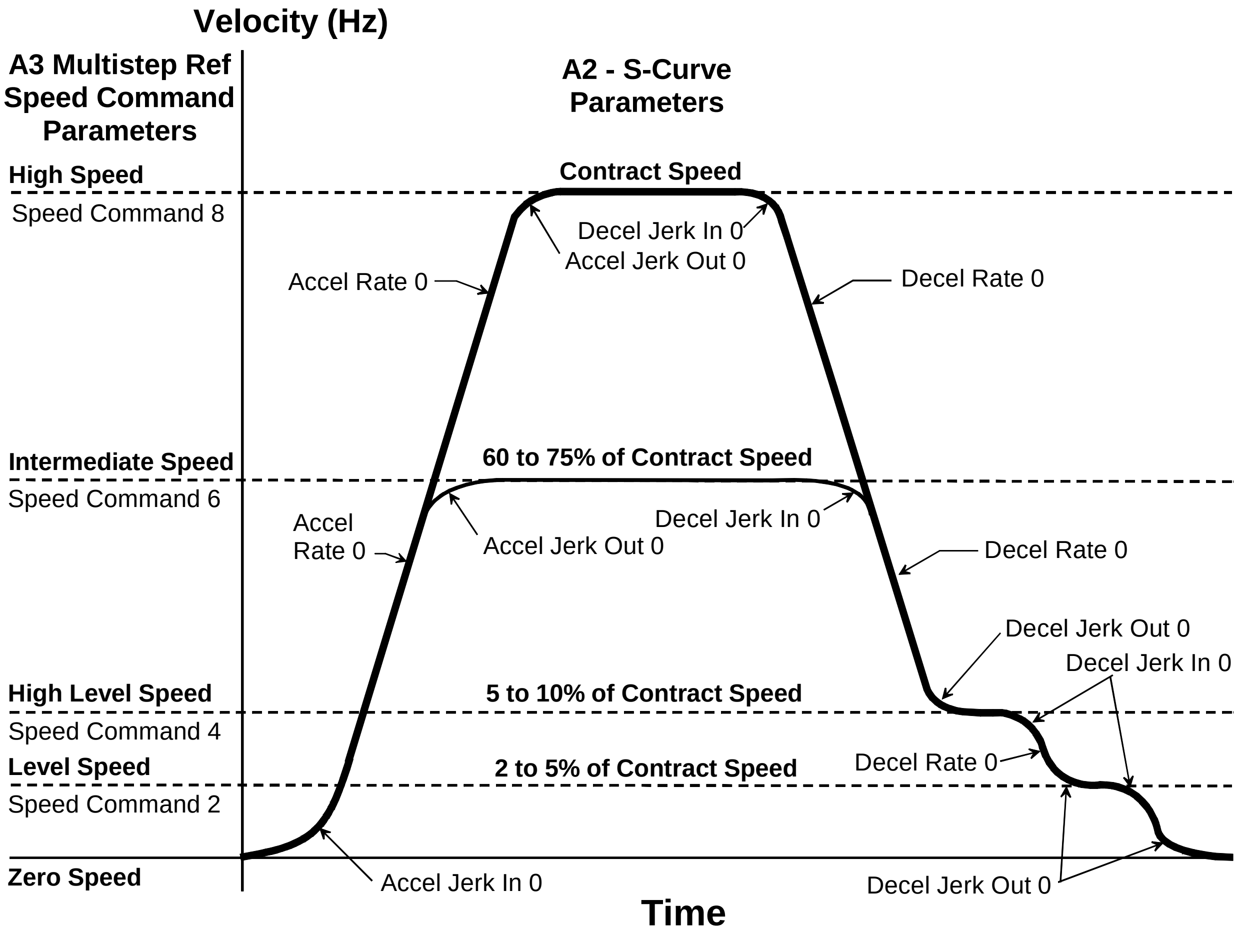


TABLE 4.5 HPV 900 Velocity Curve Parameters

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/ MCE Set
A2	***S-Curves***					
	Accel Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	3.00	3.00
	Accel Jerk In 0	Rate of increase of acceleration, up to Accel Rate, when increasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 0	Rate of decrease of acceleration to zero when approaching elevator contract speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 0	Rate of increase of deceleration, to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 29.9	8.0	2.0
A3	***Multistep Ref***					
	Inspection	Speed command #1 (Inspection)	ft/m	0 - 66% *	0	
	Level	Speed command #2 (Level)	ft/m	0 -16% *	0	
	Speed Command 3	Speed command #3	ft/m	0% *	0	0
	High Level	Speed command #4 (High Level)	ft/m	0 -25% *	0	
	Speed Command 5	Speed command #5	ft/m	0% *	0	0
	Intermediate	Speed command #6(Intermediate)	ft/m	0 -91% *	0	
	Speed Command 7	Speed command #7	ft/m	0 % *	0	0
	High Speed	Speed command #8 (High speed)	ft/m	0 -100% *	0	

*** The maximum speed range is described as a Percentage of the contract speed. The actual speed value entered is in FPM. Any speed, other than defined values will trip the drive SET UP FAULT 6. To clear this fault, enter the correct value of the parameter and then reset the drive by pressing reset button on HC-ACI board.**

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals 35 (Output Frequency) and 34 (Com) on the HPV 900 drive. The input can be seen at terminal 33 (Speed Reference) and 34 (Com). The output signal is 0 -10VDC.

The High Level speed (A3 - Speed Command 4), Level speed (A3 - Speed Command 2), Deceleration rate (A2 - Decel Rate 0) and Deceleration Jerk (A2 - Decel Jerk In 0, A2 - Decel Jerk Out 0) parameters should be adjusted for correct approach to the floor.

The Acceleration rate (A2 - Accel Rate 0), and the Acceleration Jerk (A2 - Accel Jerk In 0, A2 - Accel Jerk Out 0) parameters can be adjusted for smooth starting and transition to High speed. This will be addressed in the final adjustment section.

4.6 FINAL ADJUSTMENTS (HPV 900)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

4.6.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (HPV 900)

a. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

b. Move the car to the bottom terminal landing. Check to see if the DZ relay is picked. If not, move the car on Inspection to place it in the Door Zone.

4.6.2 SWITCHING TO AUTOMATIC OPERATION (HPV 900)

Place the Relay Panel Inspection switch in the OFF position. If the car is not at a landing it will move to a landing. If the car is at a landing but not in the door zone, relays L and either LU1, LU2, LD1 or LD2 should pick and the car should perform a relevel. If the relevel is not successful, check the following:

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (A3 - Speed Command 2) on the HPV 900 AC Drive to get the car to move.
- If relays L and LD1/2 are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.
- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

The Status Indicator lights should now display the indication for Independent Service operation. At this time the Position Indicator should match the actual car location. Note that all of the Position Indicators and direction arrows are conveniently displayed on the controller. All the calls are also displayed on the controller.

4.6.3 BRAKE ADJUSTMENT FOR 125% LOAD (HPV 900)

Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car. Begin adding weights in 50 or 100 pound increments and move the car up and down on Inspection each time. Adjust the brake tension to stop and hold 125% of a contract load by tripping a stop switch open while running down on Inspection. Hold the DOWN button in while tripping open the stop switch (preferably on the Inspection station). KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS. If the VFAC Drive Unit trips off when the car is going down, but not while it is going up, refer to the manual for the VFAC Drive Unit and look up the failure indication on the Drive display. If it is the display for an over-voltage fault, there may be a problem in the regeneration (or braking) resistors, the braking module (if one is provided), or in the fuses that may be in series with the wires to the braking resistors. If this problem cannot be solved, call MCE Technical Support. Remove all test weights from the car.

4.6.4 BRINGING THE CAR UP TO HIGH SPEED (HPV 900)

a. Verify that all the steps described in Sections 4.1 and 4.5 regarding the adjustments and specifically the drive parameters are complete.

> **NOTE:** It is very important that the drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation so that there is no demand.

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad display should read 50% of Contract Speed as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase High speed by increasing the A3 - Speed Command 8 parameter until Contract Speed is achieved. If there is a problem reaching Contract Speed, see the following note.

> **NOTE:** **Drive gain adjustments** - The default values for the gain parameters (A-1 Response, A1-Inertia and A1-Inner Loop Xover) are sufficient to run the car on High speed. However, for optimum performance and to help in achieving Contract Speed, adaptive tuning of the drive as described in Section 4.6.5 is strongly recommended.

c. At the slowdown distance from the next floor the Position Indicator will step. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed (A3 - Speed Command 4) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car speed should decelerate to Level speed. The Level speed can be adjusted using the A3 - Speed Command 2 parameter so that the car levels into the floor and stops. Level speed should be 5 - 7 fpm, or a reasonable leveling speed (use personal judgement). If the car relevels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone (usually 1/4" to 3/8" is sufficient).

d. Adjust the SPD (Speed Pick Delay) trimpot by first turning it far enough clockwise so that the empty car rolls back in the direction of the counterweight (if it can). Then adjust SPD so that the brake is fully picked just as the motor first moves. The goal is to delay long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

e. Run the car again and verify that the car will start, accelerate, decelerate and run at High Level and Level speeds into the floor and stop. Place calls for all of the landings. Verify that all of the calls work. Verify the operation and placement of all vanes or magnets and vane or magnet switches and verify that the car steps the Position Indicators correctly. The slowdown distance for the elevator is measured from the point where the STU sensor (or STD sensor, if going down) is activated by a metal vane or magnetic strip to the position where the car is stopped at the floor with the DZ sensor centered on the leveling target with LU or LD sensors *not* engaged.

This slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate (A2 - Decel Rate 0) and Deceleration Jerk (A2 - Decel Jerk In 0, A2 - Decel Jerk Out 0) parameters to get the car to approach the floor correctly as the car speed increases. Adjust the Acceleration rate (A2 - Accel Rate 0) and Acceleration Jerk (A2 - Accel Jerk In 0, A2 - Accel Jerk Out 0) parameters until the desired acceleration rate is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

NOTE: To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminal 33 and 35 with respect to 34. Take all necessary precautions while measuring the voltage signals.

CAUTION: Most oscilloscopes have a grounding pin on their power plug. We recommend defeating the grounding pin with one of the commonly available ground isolation adapter plugs so that the case of the oscilloscope is *not* at ground potential, but at whatever potential the negative probe lead is connected to. TREAT THE CASE OF THE OSCILLOSCOPE AS A LETHAL SHOCK HAZARD, DEPENDING ON WHERE THE NEGATIVE PROBE IS CONNECTED. This recommendation is being made because the ground potential on the grounding pin of the power outlet may not be the same as the controller cabinet ground. If it is not, substantial ground loop current may flow between the negative probe and the power plug grounding pin which can ruin the oscilloscope

f. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal has been provided by adjusting trimpot SPD (Speed Pick Delay). Trimpot SPD must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check trimpot SPD again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals 33 and 35 with respect to 34. These signals are 0 -10 and 0 - 8 volts respectively. Terminal 33 is programmed for the drive input speed reference and terminal 35 is programmed for the drive output frequency.

g. The car should be running well now, except possibly for the final stop. Since the speed reference goes to zero when the car stops, the VFAC Drive Unit will cause the machine to stop electrically. Enough delay in the setting of the brake (BDD) will have to be provided to allow the sheave to stop turning before setting the brake firmly on the brake drum.

When the elevator slows down to leveling speed and travels to door zone, the speed command will drop to zero before the brake drops. This is adjustable by the BDD (Brake Drop Delay) trimpot. The idea is to hold the brake up long enough to allow the motor to be stopped electrically and then drop the brake immediately the instant the motor has stopped.

If there is too long of a delay before dropping the brake, the control system will release its control of the motor and the motor will drift briefly in the direction of the load before the brake is forced to drop by the PT relay. The BDD trimpot controls the dropping of the brake through the BE relay. Move the LU and LD sensors or switches closer together (or further apart) so the car stops at the same location, up or down. Then move the floor (leveling) magnet strips or vanes so the car stops accurately at each floor.

h. The adjustment is almost complete. The acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but it should not be so high that it substantially exceeds the value of the deceleration rate parameter. Excessive acceleration may cause the VFAC Drive circuits to saturate and thereby lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the A2 - Decel Rate 0 parameter. Increase the value of A2 - Decel Rate 0 and run the car. Continue to increase the value of A2 - Decel Rate 0 until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the A2 - Decel Rate 0 parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls then you might have to increase the leveling speed.

4.6.5 ADAPTIVE TUNING (HPV 900)

To tune this drive for optimum performance, follow the procedure in Section 5.5 in the MagneTek HPV 900 AC Vector Drive Technical Manual. Adaptive tuning automatically adjusts the no load current, slip, RPM (to run at Contract speed) and inertia (tunes up the speed regulator).

Note: In the adaptive tuning procedure, to achieve 70% of contract speed, adjust only the <u>High Speed</u> parameter to 70% of contract speed (A3 - Multistep Ref).

NOTE: After performing the test in Section 5.5.1.2 (TUNING MOTOR NO LOAD CURRENT), the motor torque reading may not equal ±15%. If so, proceed to the next step in the test.

4.6.6 LOAD TESTING (HPV 900)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the VFAC Drive Unit current on its display and check to see if there is an OC (Over Current) error indication as the car accelerates to full speed. If so, this indicates that the VFAC unit is being pushed close to its limits and may require one or more of the following actions:

1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by decreasing the A2 - Accel Rate 0 parameter. The lower the rate of acceleration, the lower the current demand.

2. A more gradual transition from acceleration to high speed may be made by decreasing the A2 - Accel Jerk Out 0 parameter.

3. The motor may be underrated. It may be possible to get excellent results if the speed is reduced slightly.

4. The elevator may be improperly counter weighted. This possibility should be thoroughly investigated.

5. Make a copy of the table in Appendix C, *Quick Reference for MagneTek HPV 900 Drive Parameters* and use the digital operator on the HPV 900 Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

b. If there is a full load in the car and there is trouble slowing in the down direction, or if the VFAC Drive Unit is tripping off and there is an OV (over-voltage) fault displayed, it may mean that there is a problem with the regeneration (braking) resistors and/or the braking unit (if supplied separately). Check for DC bus voltage. There are two methods to check the DC bus voltage as described below:

1. Through the drive keypad display: When the drive is in Operation mode, access the D2 Power Data - ***DC bus voltage*** parameter. You can then run the elevator and watch the voltage reading.

2. Actual measurement of voltage: <u>Use extreme care when measuring the DC voltage across the drive power terminals (-) and (+ 3 or +4) under the above conditions.</u>

If the bus voltage is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.7 FINAL ELEVATOR INSPECTION PROCEDURE (HPV 900)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4. and 4.17
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10. and 4.17
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

WARNING: The following tests should be performed only by qualified elevator personnel skilled in final adjustment and inspections.

4.7.1 INSPECTION LEVELING OVER SPEED TEST (HPV 900)

Note: Before performing tests 4.7.1 and 4.7.3, please remove the jumper between pins labeled 2KBP1 and 2KBP2 on the SC-BASE(R) board. Also rotate trimpots ILO, ETS and COS fully CW.

The SC-BASE(R) board is equipped with an independent low speed monitoring system which can shut down the system if the car runs faster than a trimpot adjustable preset speed on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (LU1/LU2, LD1/LD2) relays are picked or when the Access/Inspection relay (IN1) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the SC-BASE(R) board. The circuit looks at pulses coming from the speed sensor, sensing a magnet on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K Main Safety Relay board in the INSP position.

b. Run the car on Inspection (up or down) and record the actual values for parameter A3-Speed Command 1 ________. A3 - speed command 1 must be returned to the original value when this test is complete. Now, run the car on Inspection and adjust the IN speed (A3) until the car is running at the desired tripping speed for ILO.

c. Next, adjust the ILO trimpot CCW until the ILO1/ILO2 indicators turn on. The car should come to an immediate stop and the MC-MP2-2K display should read “ILO Fault”. The ILO fault should self reset in a moment.

d. Reduce inspection speed with A3 - speed command 1. Run the car on Inspection and increase the inspection speed by increasing A3 -speed command 1 to show that this low speed safety monitor circuit will trip at no higher than 150 fpm (or no higher than the setting you calibrated in (b)). Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Return parameter A3 -speed command 1 to the value recorded in Step (b).

4.7.2 TERMINAL SLOWDOWN LIMIT SWITCHES (HPV 900)

Make sure that the terminal slowdown limit switches are working properly by doing the following:

a. Place the TEST/NORMAL switch on the SC-SB2K board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom) from the controller. The car should make a normal slowdown at both terminal landings except that there may be a slight relevel, which is okay. If the car goes more than an inch past the floor, move the slowdown limit until the approach is normal.

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the SC-SB2K board and return the TEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.7.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (HPV 900)

All jobs under the requirements of ANSI A17.1 -2000 Articles 2.25.4.1. or 2.25.4.2 must have a means to insure that the car speed is below contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

The SC-BASE(R) board carries out ETS monitoring functions via a speed senor that monitors a magnet installed on the motor shaft or brake drum as described in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that shielded phone cable from the sensor to the SC-BASE(R) board is securely seated in the connectors at both ends and is also enclosed in conduit.

b. On the SC-BASE(R) board, verify that the ETS trimpot is fully CW.

c. Record the value of the High Speed parameter (A3 - speed command 8). Then, on a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the High Speed parameter (A3 - speed command 8).

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminals UETS1 and UETS2 on the SC-BASE(R) board. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS1/ETS2 indicators turn ON and the car stops. An “ETS Fault” message should be displayed on the MC-MP2-2K alphanumeric display.

e. Press the fault reset push button on the SC-SB2K board to reset the fault.

f. Repeat (d) and (e) in the down direction with the wire from terminals DETS1 and DETS2 removed. When the calibration is complete, reconnect the wires removed from the UETS and DETS terminals and return High Speed parameter (A3 - speed command 8) to its original value.

g. Verify the calibration by turning OFF the inspection transfer switch. Place a call, and with the car running at contract speed, remove the field wires from the UETS1 and UETS2 terminals on the SC-BASE(R) board. The car must execute an emergency slowdown. To restore normal operation, replace the wires and press the Fault Reset pushbutton on the SC-SB2K board. Repeat for terminals DETS1 and DETS2.

4.7.4 CONTRACT SPEED BUFFER TEST (HPV 900):

4.7.4.1. COUNTERWEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Up Limits***, if provided, by placing jumpers between terminals 2 and UETS1 / UETS2 on the SC-BASE(R) board.

e. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 9 and 10 and terminals 10 and 11 on the SC-SB2K board.

f. Register a car call for the top terminal landing from the controller. ***The counterweight will strike the buffer.***

g. Put the elevator on Inspection and pick the down direction to move the car.

h. Remove the jumpers between terminals 9 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the SC-SB2K board.

i. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = OFF.**

4.7.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Down Limits***, if provided, by placing jumpers between terminals 2 and DETS1 / DETS2 on the SC-BASE(R) board.

e. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 9 and 12 and terminals 12 and 13 on the SC-SB2K board.

f. Position the elevator several floors above the bottom landing with a full load in the car. Then register a car call for the bottom landing. ***The car will strike the buffer.***

g. Put the elevator on Inspection and pick the up direction to move the car.

h. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

i. Remove the jumpers between terminals 9 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the SC-SB2K board. ***Remove all of the jumpers installed in this section.***

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = OFF.**

4.7.5 GOVERNOR AND CAR SAFETY TESTS (HPV 900)

4.7.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVER SPEED switch contact manually and verify that the main safety circuit drops out. Use which ever method is most familiar to verify the actual electrical and mechanical tripping speeds.

4.7.5.2 GOVERNOR AND CAR SAFETY OVERSPEED TEST WITH FULL LOAD GOING DOWN.

a. Move the fully loaded car to the top terminal landing and turn the power OFF.

b. On the SC-BASE(R) board, place the PFLT BYP jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions.**

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets. Keep them separate! ETL is 48 VDC and AS is 12 VDC.

d. Connect a jumper between terminals EBS1 and EBS2 to **bypass the governor overspeed switch.**

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 on the SC-SB2K board and panel mount terminal 17 to ***bypass the safety plank (SOS) switch***.

f. Turn the power ON and verify that the controller is functional.

g. On the SC-SB2K board, install a jumper between pins 2KBP1 and 2KBP2. Also, enter System Mode and set option **ABYP = ON** to activate the ASME A17.1 - 2000 bypass function (see section 5.3.2).

h. Set the AC drive parameter **A1 - Overspeed Mult** to 125% or to the required tripping speed. If the trip point is greater than 150% of contract speed, it will be necessary to increase the A1 - Contract Mtr Speed parameter as well (note the original value).

i. Enable the over speed test by setting the **U4 - OVERSPEED TEST** parameter to **YES** using the drive keypad (see Section 3.6.4.3, *Overspeed Test via Operator*, in the MagneTek HPV 900 Drive Manual). This setting changes back to NO immediately after the test run. It is necessary to repeat this step if another test run is required.

j. Register a car call in the down direction, but not for the bottom landing. The car should travel at 125%* of Contract Speed (* the value of the A1 - Overspeed Mult parameter). The governor should trip and set the safety and stop the car.

k. Put the car on Inspection.

l. Reset the AC drive parameter **A1 - Overspeed Mult** to 100% and verify that the **U4 - OVERSPEED TEST** parameter = **NO.** Return the A1 - Contract Mtr Speed parameter to the original value (if changed).

m. Reset the mechanical governor and inspect the hoist ropes to make sure they are in the proper grooves.

n. Move the car UP on Inspection to release the flexible guide clamp safety or release the car safety by hand if it is a wedge clamp type.

o. ***Remove the jumper from terminals EBS1 and EBS2 which bypasses the governor overspeed switch.***

p. ***Remove the jumper from terminal 16 and panel mount terminal 17 which bypasses the safety plank (SOS) switch.***

q Properly reinstall relays AS and ETL on the HC-ACIF board (if used). Remember, AS and ETL have different voltages.

q. **Remove the jumper between pins 2KBP1 and 2KBP2 on the SC-SB2K board**. Also, enter System Mode and set **ABYP = OFF** (see Section 5.3.2).

r. On the SC-BASE(R) board, place the PFLT BYP jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions.**

s. Put the car on Normal operation by taking the car off Inspection. After the elevator finds a floor, verify the operation of the elevator by registering calls and checking the speed.

4.7.6 PHASE LOSS DETECTION TESTS (HPV 900)

The VFAC Drive Unit is programmed to detect a motor phase loss. To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display *Curr Reg Flt* (Current Regulation Fault). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

The drive adjustments and tests are complete. Now complete the A17.1 Code Compliant Functions and Testing (Section 4.17) then fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

WARNING: Before the Elevator can be turned over to normal use, it is very important that no safety circuit is bypassed. The items to be checked include, but are not limited to:

* Check that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumpers between terminals 2 and UETS1/2 or DETS1/2.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE(R).
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 4 and 9 (SC-SB2K).
* No jumper between terminals 9 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Option **ABYP** is set to **OFF** and controller is in normal mode.
* Set PFLT Bypass Jumper to the OFF position.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

NOTE: If this car is part of an M3 Group System, refer to Section 4.18 for instructions on setting the Car Network ID.

4.8 EXPLANATION OF TORQMAX F4 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4. and 4.17.
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7. and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

Before attempting to bring the car up to contract speed, or making any adjustments, it is important to verify the following control parameters in the VFAC Drive Unit. It is very important to become familiar with drive keypad operation to access the drive program.

NOTE: In order to access the parameter values, review the use of the Digital Operator in Section 3, *Parameter Adjustments* in the TORQMAX F4 Drive Technical Manual.

4.8.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.6.2. Incorrect values for these parameters can cause erratic elevator operation.

CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation.

The PTC Series M controller uses drive parameters for setting the five speed levels described in Table 4.6 and Figure 4.4. The controller selects the desired speed using the TORQMAX F4 drive logic inputs. The Speed Command parameters should be set as shown in Table 4.6 in preparation for running the elevator at High speed.

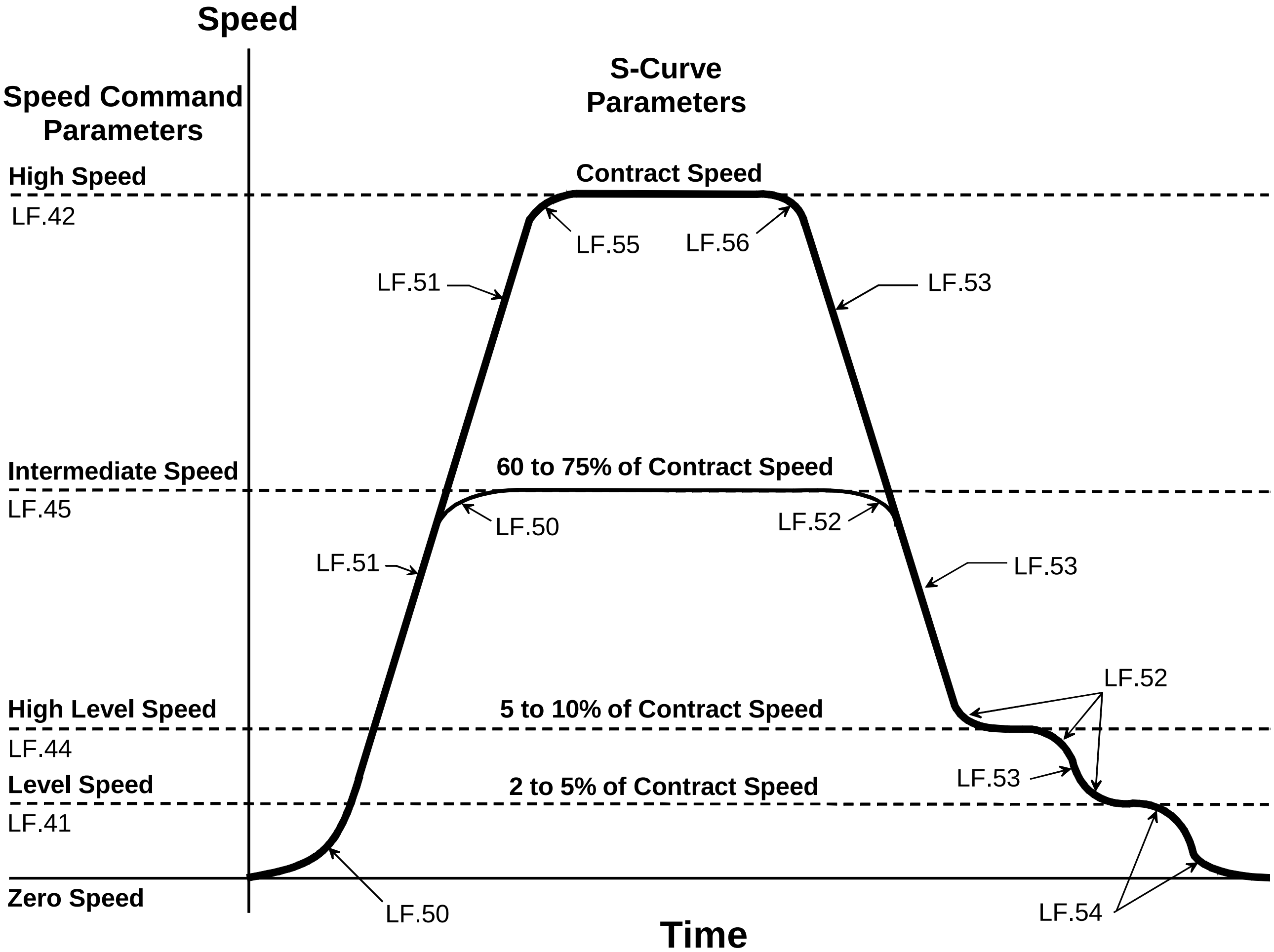
TABLE 4.6 TORQMAX F4 Drive Speed Levels

TORQMAX F4 Drive Speed Levels			
Speed	Speed/Drive parameter	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	Inspection Speed (LF.43)	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	Level (LF.41)	2 to 5% of Contract Speed	ft/m
High Level	High Level (LF.44)	5 to 10% of Contract Speed	ft/m
Intermediate	Intermediate (LF.45)	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	High speed (LF.42)	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

When parameter LF.86 is selected, the drive display indicates which speed is selected.

LF.86 Display	Speed	LF.86 Display	Speed
0 or 7	No speed	4	Inspection Speed
2	Leveling Speed	5	High Leveling Speed
3	High Speed	6	Intermediate Speed

FIGURE 4.4 S Curve Parameters and Recommended Speed Settings (TORQMAX F4)



4.8.2 ADJUSTING ACCELERATION AND DECELERATION RATES

The acceleration and deceleration rates are programmed in feet per second per second (ft/s^2) using the S-Curve parameters (see Figure 4.4 and Table 4.7). The acceleration rate is set using the ***LF.51*** parameter. The deceleration rate is set using the ***LF.53*** parameter. Increasing the value increases the acceleration (deceleration) rate (steeper curve). The default value is 3.00 ft/s^2.

4.8.3 ADJUSTING THE JERK PARAMETERS

The jerk parameters adjust the rate of change transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.4). The jerk parameter values are in feet per second per second per second (ft/s^3). Decreasing the value decreases the rate of change and causes a smoother (longer) transition.

The parameters used for the jerk points at the start and during acceleration are **LF.50** and **LF.55**. The parameters used for the jerk points during deceleration and stop are **LF.52, LF.54** and **LF.56.** Parameter **LF.55** is used for the transition from acceleration to contract speed and parameter **LF.56** is used for the transition from contract speed to deceleration.

TABLE 4.7 TORQMAX F4 S Curve Parameters

Drive parameter	Parameter Description	Unit	Setting Range	MCE/ Drive Defaults	Field/ MCE Set
S-Curves					
LF.51	Acceleration rate	ft/s^2	0.30 - 8.00	3.00	3.00
LF.53	Deceleration rate	ft/s^2	0.30 - 8.00	3.00	3.00
LF. 50	Start Jerk - used for the transitions at the start and end of acceleration (except, see LF.55)	ft/s^3	0.31 - 32.00	2.00	3.00
LF. 52	Flare Jerk - used for the transitions at the start and end of deceleration (except, see LF.56)	ft/s^3	0.31 - 32.00	3.28	3.00
LF.54	Stop Jerk - used for the final transitions from leveling speed to zero speed	ft/s^3	off, 0.02- 32.00	OFF	1.00
LF.55	Acceleration Jerk - used for the transition from acceleration to contract speed	ft/s^3	0.30 - 32.00	3.28	4.00
LF.56	Deceleration Jerk - used for the transition from contract speed to deceleration	ft/s^2	0.30 - 8.00	3.00	4.00
Speed parameters					
LF.42	High speed	ft/m	0 -100% *	0	
LF.45	Intermediate	ft/m	0 -91% *	0	
LF.44	High Level	ft/m	0 -25% *	0	
LF.41	Level	ft/m	0 -16% *	0	
LF.43	Inspection	ft/m	0 - 66% *	0	

The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. The drive will not accept any speed, higher than the defined values.

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals X2.19 (Output speed) and X2.13 (Com) on the TORQMAX F4 drive. The input can be seen at terminal X2.18 (Speed reference) and X2.13 (Com). The output signals are ±10V for X2.19 and 0 - 10V for X2.18.

The High Level speed **LF.44**, Level speed **LF.41**, Deceleration rate **LF.53** and Jerk rate parameters **LF.52** and **LF.54** should be adjusted for correct approach to the floor.

The Acceleration, deceleration and the Jerk rates parameters can be adjusted for smooth starting and transition to High speed. This will be addressed in the final adjustment section.

4.9 FINAL ADJUSTMENTS (TORQMAX F4)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4. and 4.17.
For controllers with the HPV 900 Drive, see Sections 4.5 thru 4.8. and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

4.9.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (TORQMAX F4)

a. Temporarily take the car off of Inspection operation. If the Diagnostic Indicators do not show Test Mode, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

b. Move the car to the bottom terminal landing. Check to see if the DZ relay is picked. If not, move the car on Inspection to place it in the Door Zone.

4.9.2 SWITCHING TO AUTOMATIC OPERATION (TORQMAX F4)

Place the Relay Panel Inspection switch in the OFF position. If the car is not at a landing it will move to a landing. If the car is at a landing but not in the door zone, relays L and either LU1, LU2, LD1 or LD2 should pick and the car should perform a relevel. If the relevel in not successful, check the following:

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (LF.41) on the TORQMAX F4 Drive to get the car to move.
- If relays L (on HC-ACI) and LD1/2 and LEX (on SC-SB2K) are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.
- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

The Status Indicator lights should now display the indication for Independent Service operation. At this time the Position Indicator should match the actual car location. Note that all of the Position Indicators and direction arrows are conveniently displayed on the controller. All the calls are also displayed on the controller.

4.9.3 BRAKE ADJUSTMENT FOR 125% LOAD (TORQMAX F4)

Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car. Begin adding weights in 50 or 100 pound increments and move the car up and down on Inspection each time. Adjust the brake tension to stop and hold 125% of a contract load by tripping a stop switch open while running down on Inspection. Hold the DOWN button in while tripping open the stop switch (preferably on the Inspection station). KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS. If the AC Drive Unit trips on a fault when the car is going down, but not while it is going up, refer to the manual for the VFAC Drive Unit and look up the failure indicated on the Drive display. If the displayed fault is **E.OP** (over-voltage fault), there may be a problem in the regeneration (or braking) resistors, the braking module (if one is provided), or in the fuses that may be in series with the wires to the braking resistors.

If there is a problem lifting the load, Set parameter LF.38 = 0 (PWM = 8KHz). Then increase the drive gain using parameters LF.31 and LF.32. If this problem cannot be solved, call MCE Technical Support.

4.9.4 BRINGING THE CAR UP TO HIGH SPEED (TORQMAX F4)

a. Remove all test weights from the car. Verify that all the steps described in Sections 4.1 and 4.8 regarding the adjustments and specifically the drive parameters are complete.

> **NOTE:** It is very important that the drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation so that there is no demand.

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad display should read 50% of Contract Speed as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase High speed by increasing parameter LF.42 until Contract Speed is achieved. If there is a problem reaching Contract Speed, see the following note.

> **NOTE:** **Drive gain adjustments** - The default values for the gain parameters (LF.31 Speed Prop Gain and LF.32 Speed Integral Gain) may not be sufficient to run the car on High speed. It may be necessary to increase the value of these parameters.

c. At the slowdown distance from the next floor the Position Indicator will step. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed (LF.44) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car should decelerate to Level speed. The Level speed can be adjusted using parameter LF.41 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

d. Turn the Speed Pick Delay (SPD) trimpot fully CCW (fully OFF) and then set it 1/8 turn in the CW direction. The speed pick delay is achieved using the TORQMAX F4 drive parameter LF.70. Adjust LF.70 so that the brake is fully picked just as the motor first moves. The goal is to delay the speed command long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

e. Run the car again and verify that the car will start, accelerate, decelerate and run at High Level and Level speeds into the floor and stop. Place calls for all of the landings. Verify that all of the calls work. Verify the operation and placement of all vanes or magnets and vane or magnet switches and verify that the car steps the Position Indicators correctly. The slowdown distance for the elevator is measured from the point where the STU sensor (or STD sensor, if going down) is activated by a metal vane or magnetic strip to the position where the car is stopped at the floor with the DZ sensor centered on the leveling target with LU or LD sensors *not* engaged.

This slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate (LF.53) and deceleration jerk rate (LF.52) to stop the car at the floor. Adjust the Acceleration rate parameter (LF.51) until the desired acceleration rate is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

> **NOTE:** To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminal X2.18 and X2.19 with respect to X2.13. Take all necessary precautions while measuring the voltage signals.

CAUTION: Most oscilloscopes have a grounding pin on their power plug. We recommend defeating the grounding pin with one of the commonly available ground isolation adapter plugs so that the case of the oscilloscope is *not* at ground potential, but at whatever potential the negative probe lead is connected to. TREAT THE CASE OF THE OSCILLOSCOPE AS A LETHAL SHOCK HAZARD, DEPENDING ON WHERE THE NEGATIVE PROBE IS CONNECTED. This recommendation is being made because the ground potential on the grounding pin of the power outlet may not be the same as the controller cabinet ground. If it is not, substantial ground loop current may flow between the negative probe and the power plug grounding pin which can ruin the oscilloscope

f. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal is provided using drive parameter LF.70. Parameter LF.70 must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check parameter LF.70 again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals X2.18 and X2.19 with respect to X2.13. These signals are ±10V and 0-10 V respectively. Terminal X2.18 is assigned to the drive input speed reference and terminal X2.19 is assigned to the drive output frequency.

g. The car should be running well now, except possibly for the final stop. Since the speed reference goes to zero when the car stops, the VFAC Drive Unit will cause the machine to stop electrically. Enough delay in the setting of the brake (BDD) will have to be provided to allow the sheave to stop turning before setting the brake firmly on the sheave .

NOTE: During High speed, if the speed change-over can be felt in the car, increase parameter LF.33 in steps of 100. This will help in achieving a smoother transition.

When the elevator slows down to leveling speed and travels to door zone, the speed command will drop to zero before the brake drops. This is adjustable using the BDD (Brake Drop Delay) trimpot. The idea is to hold the brake up long enough to allow the motor to be stopped electrically and then drop the brake immediately the instant the motor has stopped.

If there is too long of a delay before dropping the brake, the control system will release its control of the motor and the motor will drift briefly in the direction of the load before the brake is forced to drop by the PT relay. The BDD trimpot controls the dropping of the brake through the BE relay. Move the LU and LD sensors or switches closer together (or further apart) so the car stops at the same location, up or down. Then move the floor (leveling) magnet strips or vanes so the car stops accurately at each floor.

h. The adjustment is almost complete. The acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but it should not be so high that it substantially exceeds the value of the deceleration rate parameter. Excessive acceleration may cause the AC Drive circuits to saturate and thereby lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the deceleration parameter **LF. 53** and run the car. Continue to decrease the value of **LF.53** until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the **LF.53** parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls then you might have to increase the leveling speed.

4.9.5 LOAD TESTING (TORQMAX F4)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the AC Drive Unit current on its display **ru.9** and check to see if there is an **E.OL or E.OL2** (Overload) error indication as the car accelerates to full speed. If so, it is an indication that the AC drive unit is being pushed close to its limits and may require one or more of the following actions:

   1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by decreasing the **LF.51** parameter. The lower the rate of acceleration, the lower the current demand.

   2. A more gradual transition from acceleration to high speed may be made by decreasing the **LF.55** (Acceleration Jerk) parameter.

   3. Verify that LF.38 = 0 (PWM = 8KHz). The drive gains (parameters **LF.31** and **LF.32**) may need to be increased.

   4. The motor may be underrated. It may be possible to get excellent results if the speed is reduced slightly.

   5. The elevator may be improperly counter weighted. This possibility should be thoroughly investigated.

   6. Make a copy of the table in Appendix E, *Quick Reference for TORQMAX F4 Drive Parameters*. Use the digital operator on the Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

b. If there is a full load in the car and there is trouble slowing in the down direction, or if the AC Drive Unit is tripping off and there is an **E.OP** (over voltage) fault displayed, it may mean that there is a problem with the regeneration (braking) resistors and/or the braking unit (if supplied separately). Verify the DC bus voltage. Two methods to check the DC bus voltage are described below:

   1. Through the drive keypad display: When the drive is in Operation mode, access parameter **ru.11** (DC bus) voltage or parameter **ru.12** (Peak DC bus) voltage. You can then run the elevator and watch the voltage reading,

   2. Actual measurement of voltage: Use extreme care when measuring the DC voltage across the drive power terminals (-) and (PA or ++) under the above conditions.

The 230V drive will trip on E.OP (Over voltage in the DC bus circuit) if the **ru.12** reading is close to 400VDC. The 460V drive will trip on E.OP if the **ru.12** reading is close to 800VDC. If the DC bus voltage reading **(ru.11)** is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.9.6 ELECTRICAL NOISE (TORQMAX F4)

If the motor emits excessive electrical noise at Inspection or Contract speeds, or if the motor draws higher than normal current, perform the following:

a. Verify the actual traction sheave diameter. Enter the measured value in parameter LF.21.

b. Verify the gear reduction ratio, parameter LF.22.

c. Verify the Rated Motor speed, parameter LF.11. This value is the full load motor RPM.

NOTE: The Imperial motors name plate has full load RPM information which should be entered in parameter LF.11.

Full load RPM information may not be available for Reuland motors. The motor name plate lists the Synchronous RPM, i.e. 900, 1200, 1500 or 1800. In flux vector applications Reuland motors have slip between 1.8% and 2.0%. Set LF.11 = Motor Synchronous RPM - (0.018 x Motor Synchronous RPM).

This calculation gives a very reasonable value for LF.11. Its effect can be verified by observing the motor current, parameter ru.09. If ru.09 is normal, compared to the motor FLA, when the car is running at contract speed, the motor slip is correct. If required, LF.11 can be adjusted in small increments (5-10 RPM). However, higher values close to the Synchronous RPM will trip the E.ENC drive fault.

d. Lower the Speed Prop. Gain, LF.31 (do not set below 1200). Refer to section 3.6.3.g of this manual for more detailed information.

4.10 FINAL ELEVATOR INSPECTION PROCEDURE (TORQMAX F4)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4. and 4.17.
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7. and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the TORQMAX F5 AC Drive, see Sections **4.14 thru 4.16 and 4.17**

WARNING: The following tests should be performed only by the qualified elevator personnel skilled in final adjustment and inspections.

4.10.1 INSPECTION LEVELING OVER SPEED TEST (TORQMAX F4)

Note: Before performing tests 4.10.1 and 4.10.3, please remove the jumper between pins labeled 2KBP1 and 2KBP2 on the SC-BASE(R) board. Also rotate trimpots ILO, ETS and COS fully CW.

The SC-BASE(R) board is equipped with an independent low speed monitoring system which can shut down the system if the car runs faster than a trimpot adjustable preset speed on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (LU1/LU2, LD1/LD2) relays are picked or when the Access/Inspection relay (IN1) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the SC-BASE(R) board. The circuit looks at pulses coming from the speed sensor, sensing a magnet on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Place the car on Inspection operation by placing the MACHINE ROOM INSPECTION TRANSFER switch in the INSP position on the SC-SB2K.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and increase the Inspection speed parameter **LF.43** until you are running at the speed that you want the system to trip off on inspection leveling overspeed (ILO - something below 150 fpm).

c. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot CCW until ILO1/ILO2 indicators just turn ON. After stopping, set **LF.43** parameter to a lower value. Run the car on Inspection and increase the inspection speed by increasing the parameter **LF.43** to verify that this low speed safety monitor circuit will trip at no higher than 150 fpm (or no higher than the previous setting).

d. Place a call for a landing several floors away and as the car accelerates connect a jumper between test pin **TP8** and **TP2** (fused 2-bus). Relays LU1 and LU2 should pick. The system should make an emergency stop. Repeat for **TP9** and **TP2.** Relays LD1 and LD2 should pick. These test pins are located on the SC-SB2K board. Restore normal operation by removing jumpers.

The circuit should trip in *both* directions. The inspection/leveling overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the Inspection speed parameter **LF.43** back to the value recorded in 4.10.1 (b).

4.10.2 TERMINAL SLOWDOWN LIMIT SWITCHES (TORQMAX F4)

Make sure that the terminal slowdown limit switches are working properly by performing the following steps:

a. Place the TEST/NORMAL switch on the SC-SB2K board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom) from the controller. The car should make a normal slowdown at both terminal landings except that there may be a slight relevel, which is permitted. If the car goes more than an inch past the floor, move the slowdown limit until the approach is quite close tonormal.

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the SC-SB2K board and return the TEST/NORMAL switch to the NORMAL position.

4.10.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (TORQMAX F4)

All jobs under the requirements of ANSI A17.1 - 2000 Articles 2.25.4.1. or 2.25.4.2 must have a means to insure that the car speed is below contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

The SC-BASE(R) board carries out ETS monitoring functions via a speed sensor that monitors a magnet installed on the motor shaft or brake drum as described in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that shielded phone cable from the sensor to the SC-BASE(R) board is securely seated in the connectors at both ends and is also enclosed in conduit.

b. On the SC-BASE(R), Check that the ETS trimpot is fully CW.

c. Record the value of drive parameter **LF.42 (**High speed). Then, on a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting parameter **LF. 42**.

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminals UETS1 and UETS2 on the SC-BASE(R) board. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS1/ETS2 indicators turn ON and the car stops. An “ETS Fault” message should be displayed on the MC-MP2-2K alphanumeric display.

e. Press the fault reset push button on the SC-SB2K board to reset the fault.

f. Repeat (d) and (e) in the down direction with the wire from the DETS1 and DETS2 removed. When the calibration is complete, reconnect the wires removed from the UETS and DETS terminals and return the drive parameter **LF.42** (High speed) to its original value.

g. Verify the calibration by turning OFF the inspection transfer switch. Place a call, and with the car running at contract speed, remove the field wires from the UETS1 and UETS2 terminals on the SC-BASE(R) board. The car must execute an emergency slowdown. To restore normal operation, replace the wires and press the Fault Reset pushbutton on the SC-SB2K board. Repeat for terminals DETS1 and DETS2.

4.10.4 CONTRACT SPEED BUFFER TEST (TORQMAX F4)

4.10.4.1. COUNTERWEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

> **NOTE:** The car should be at the bottom landing with the TEST/ NORM switch on the SC-SB2K board in the TEST position.

To conduct the empty car buffer test going UP, a number of functions need to be bypassed using jumpers. Follow the steps below:

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Up Limits***, if provided, by placing jumpers between terminals 2 and UETS1 / UETS2 on the SC-BASE(R) board.

e. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 9 and 10 and terminals 10 and 11 on the SC-SB2K board.

f. Register a car call for the top terminal landing from the controller. ***The counterweight will strike the buffer.***

g. Put the elevator on Inspection and pick the down direction to move the car.

h. Remove the jumpers between terminals 9 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the SC-SB2K board.

i. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = OFF.**

4.10.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = ON** (See section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Down Limits***, if provided, by placing jumpers between terminals 2 and DETS1 / DETS2 on the SC-BASE(R) board.

e. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 9 and 12 and terminals 12 and 13 on the SC-SB2K board.

f. Position the elevator several floors above the bottom landing with a full load in the car. Then register a car call for the bottom landing. ***The car will strike the buffer.***

g. Put the elevator on Inspection and pick the up direction to move the car.

h. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

i. Remove the jumpers between terminals 9 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the SC-SB2K board. ***Remove all of the jumpers installed in this section.***

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and then select option **ABYP = OFF.**

4.10.5 GOVERNOR AND CAR SAFETY TESTS (TORQMAX F4)

4.10.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVER SPEED switch contact manually and verify that the main safety circuit drops out. Use which ever method is most familiar to verify the actual electrical and mechanical tripping speeds.

4.10.5.2 GOVERNOR AND CAR SAFETY OVERSPEED TEST WITH FULL LOAD GOING DOWN.

a. Move the fully loaded car to the top terminal landing and turn the power OFF.

b. On the SC-BASE(R) board, place the PFLT BYP jumper in the ON position to ***bypass the PLD ILO, ETS and contract overspeed fault functions.***

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets. Keep them separate! ETL is 48 VDC and AS is 12 VDC.

d. Connect a jumper between terminals EBS1 and EBS2 to ***bypass the governor overspeed switch.***

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminal 16 on the SC-SB2K board and panel mount terminal 17 to ***bypass the safety plank (SOS) switch***.

f. Turn the power ON and verify that the controller is functional.

g. On the SC-BASE(R) board, install the jumper between pins 2KBP1 and 2KBP2. Also enter System Mode and set option **ABYP = ON** to activate the ASME A17.1 - 2000 bypass function (See section 5.3.2).

h. Record the value of drive parameters LF.20 ________and LF.42 ________. In order to run the car at 125% of its original speed set parameters LF.20 and LF.42 to 125% of the original setting. If the trip point is greater than 150%, skip steps (g), (h) and (i) and use other means to over speed the car.

i. Register a car call in the down direction, but not for the bottom landing. The car should travel at 125% of Contract Speed. The governor should trip and set the safety and stop the car.

j. Put the car on Inspection.

k. Reset the AC drive parameters **LF.20** and **LF.42** to their original value (contract speed value).

l. Reset the mechanical governor and inspect the hoist ropes to make sure they are in the proper grooves.

m. Move the car UP on Inspection to release the flexible guide clamp safety or release the car safety by hand if it is a wedge type clamp.

n. ***Remove the jumper from terminals EBS1 and EBS2 which bypasses the governor overspeed switch.***

o. ***Remove the jumper from PC board terminal 16 and panel mount terminal 17 which bypasses the safety plank (SOS) switch.***

p. Properly reinstall relays AS and ETL on HC-ACIF board. Remember, the voltages are different.

q. ***Remove the jumper between pins 2KBP1 and 2KBP2 on the SC-BASE(R) board***. Also, enter System mode and set option ***ABYP = OFF*** (see Section 5.3.2).

r. On the SC-BASE(R) board, place the PFLT BYP jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions.**

s. Put the car on Normal operation by taking the car off Inspection. After the elevator finds a floor, verify the operation of the elevator by registering calls and checking the speed.

4.10.6 PHASE LOSS DETECTION TESTS (TORQMAX F4)

The VFAC Drive Unit is programmed to detect a motor phase loss. To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display **E.LC** (no current flows to the motor). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

The drive adjustments and tests are complete. Now complete the A17.1 Code Compliant Functions and Testing (Section 4.17) and fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

WARNING: Before the Elevator can be turned over to normal use, it is very important that no safety circuit is bypassed. The items to be checked include, but are not limited to:

* Check that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumpers between terminals 2 and UETS1/2 or DETS1/2.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE(R).
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 4 and 9 (SC-SB2K).
* No jumper between terminals 9 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Option **ABYP** is set to **OFF** and controller is in normal mode.
* Set PFLT Bypass Jumper to the OFF position.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

NOTE: If this car is part of an M3 Group System, refer to Section 4.18 for instructions on setting the Car Network ID.

4.11 EXPLANATION OF YASKAWA F7 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

While setting up the drives, set the Automatic Operation ASME A17.1-2000 Bypass Function, ABYP = ON (see Section 5.3.2). This provides two hours of run time with ASME A17.1-2000 functions bypassed. If necessary set ABYP = ON again for an additional two hours.

Before attempting to bring the car up to contract speed, or making any adjustments, it is important to verify the following control parameters in the VFAC Drive Unit. It is very important to become familiar with drive keypad operation to access the drive program. Review the use of the Digital Operator (drive keypad) in the VFAC Drive manual.

4.11.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.7.2. Incorrect values for these parameters can cause erratic elevator operation.

CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation. The Programming mode has to be accessed in order to change a drive parameter. The drive will not function in Programming mode, it must be in Operation mode to run the elevator.

There are five speed levels (D1 parameters) that can be set in the drive software (see Table 4.8 and Figure 4.5). The drive software will not accept data entry to any D1 parameters other than those listed in Table 4.8. If you change a drive parameter and there is an OPE40 fault, the only way to correct this fault is to access the PROGRAM mode again and access the particular D1-D9 parameter. You must enter a correct value and then reset the drive by pushing the drive fault reset button on the HC-ACI board or by pressing the drive reset button on the drive key pad.

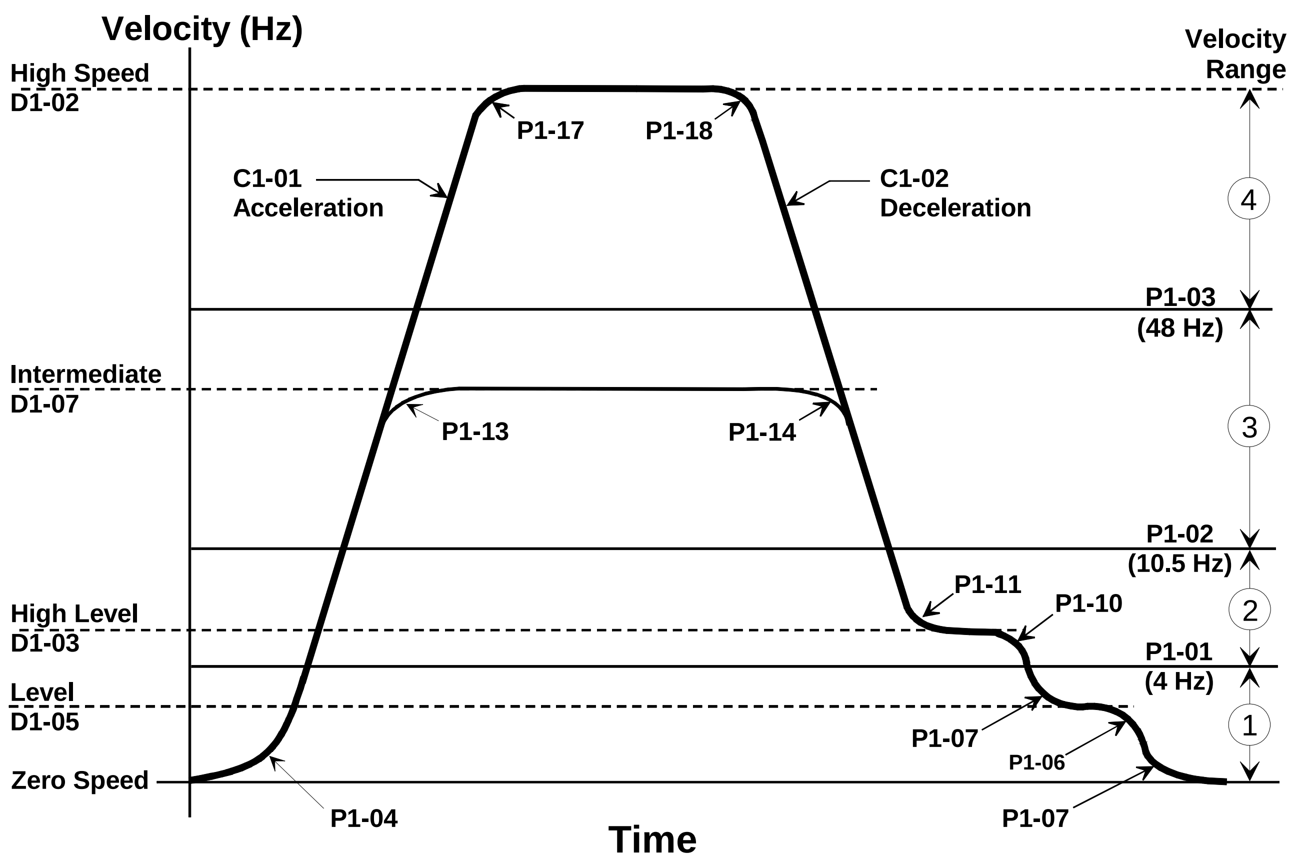
CAUTION: The drive will trip on **OPE40** or **OPE41 fault** if the following conditions are not met while setting the D1-D9 parameters:

D1-02 > D1-07 > D1-03 > D1-05 > 0.0 but less than the maximum specified value.

TABLE 4.8 Yaskawa F7 Drive Speed Levels

YASKAWA F7 SPEED LEVELS				
Speed	**Number**	**Display**	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	D1-17	Jog Reference	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	D1-05	Level	2 to 5% of Contract Speed	ft/m
High Level	D1-03	High Level	5 to 10% of Contract Speed	ft/m
Intermediate	D1-07	Combination	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	D1-02	High	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

FIGURE 4.5 Velocity Curve and S Curve Parameters (Yaskawa F7)

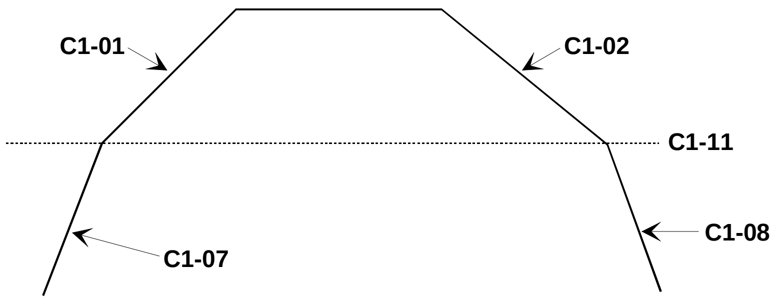


4.11.2 ADJUSTING ACCELERATION AND DECELERATION RATE

The acceleration (and deceleration) rate is programmed in f/s^2. This value is the amount of time to accelerate from Zero Speed to High Speed, or decelerate from High Speed to Zero Speed.

The drive has the capability to use a two sectioned acceleration / deceleration curve as shown in Figure 4.6. However, in this application, parameter C1-11 (Acceleration/Deceleration Switching Level) is set to 0.0. Therefore, parameter C1-01 defines the acceleration rate from Zero Speed to High Speed, and parameter C1-02 defines the deceleration rate from High Speed to Zero Speed. With parameter C1-11 set to 0.0 Hz, parameters C1-07 and C1-08 have no affect on acceleration or deceleration.

FIGURE 4.6 Acceleration and Deceleration Rate Parameters (Yaskawa F7)



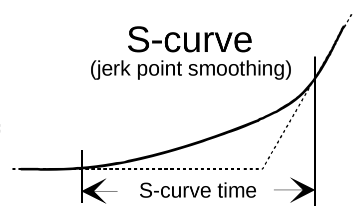
Acceleration : C1-01 = 3.00 f/s^2 (default) [range = 0.01 to 8.00]
C1-07 = C1–01

Deceleration : C1-02 = 3.00 f/s^2 (default) [range = 0.01 to 8.00]
C1-08 = C1-02

Acceleration / Deceleration Switching Level : C1-11 = 0.0.

4.11.3 ADJUSTING THE S-CURVES (YASKAWA F7)

The S-curve parameters P1-04 thru P1-19 adjust the transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.5). **The S-curve parameter values are in ft/s^3. Decreasing the value decreases the rate of change and causes a smoother (longer) transition.** Note: Setting deceleration S-curves too low will cause the car to overshoot.



Smooth operation of the elevator requires that different S-curves be used at different points on the velocity curve. The factor determining which S-curve is used is the velocity range. There are four velocity ranges defined by parameters P1-01, P1-02 and P1-03 (see Figure 4.5). It is important that the correct S-curve be selected for adjustment (see Table 4.9 and Figure 4.5).

TABLE 4.9 Yaskawa F7-Curve Selection Table

Table for Selection of S-Curves					
Range	**Velocity (Hz)**	**Start Accel**	**End Accel**	**Start Decel**	**End Decel**
①	Less than P1-01	**✶ P1-04**	P1-05	**✶ P1-06**	**✶ P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	**✶ P1-10**	**✶ P1-11**
③	Between P1-02 and P1-03	P1-12	**✶ P1-13**	**✶ P1-14**	**✶ P1-15**
④	Greater than P1-03	P1-16	**✶ P1-17**	**✶ P1-18**	P1-19
✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.					

The S-curve parameters listed below (also listed in the shaded area in Table 4.9) are the *only* S-curve parameters which require field adjustment for smoothing the elevator ride. Parameters P1-05, P1-08, P1-09, P1-12, P1-16 and P1-19 should be set to the MCE default values.

P1-04 = 2.50 - adjusts Speed Pick Delay at the start of motion
P1-13 = 2.50 - adjusts the transition from Acceleration to Intermediate speed
P1-17 = 2.50 - adjusts the transition from Acceleration to High Speed
P1-18 = 6.00 - adjusts the transition from High Speed to Deceleration
P1-14 = 6.00 - adjusts the transition from Intermediate Speed to Deceleration
P1-11 = 3.00 - adjusts the transition from Deceleration to High Level Speed
P1-10 = 2.00 - adjusts the transition from High Level Speed to Level Speed
P1-06 = 5.00 - adjusts the smoothness at the start of Level Speed
P1-07 = 3.00 - adjusts the smoothness at the end of Level Speed
P1-15 = **3.50 -** Preferred setting, lower value might cause spotting before the stop.

TABLE 4.10 Yaskawa F7 S-Curve Parameters

YASKAWA F7 S-Curve Parameters						
The Field Adjustable Parameters are shown in the shaded rows.						
No.	**Digital Operator Display**	**Parameter Description**	**Unit**	**Setting Range**	**MCE Defaults**	**Field/MCE Set**
P1-01	Jerk Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	4.0
P1-02	Jerk Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	10.5
P1-03	Jerk Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	48.0
P1-04	Accel Jerk In 1	S Curve #1 at the Start of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-05	Accel Jerk Out 1	S Curve #1 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-06	Decel Jerk In 1	S Curve #1 at the Start of Deceleration	f/s^3	0.01 - 30.00	5.00	✶
P1-07	Decel Jerk Out 1	S Curve #1 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✶
P1-08	Accel Jerk In 2	S Curve #2 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-09	Accel Jerk Out 2	S Curve #2 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-10	Decel Jerk In 2	S Curve #2 at the Start of Deceleration	f/s^3	0.01 - 30.00	2.00	✶
P1-11	Decel Jerk Out 2	S Curve #2 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✶
P1-12	Accel Jerk In 3	S Curve #3 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-13	Accel Jerk Out 3	S Curve #3 at the End of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-14	Decel Jerk In 3	S Curve #3 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.00	✶
P1-15	Decel Jerk Out 3	S Curve #3 at the End of Deceleration	f/s^3	0.01 - 30.00	3.50	3.5
P1-16	Accel Jerk In 4	S Curve #4 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-17	Accel Jerk Out 4	S Curve #4 at the End of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-18	Decel Jerk In 4	S Curve #4 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.00	✶
P1-19	Decel Jerk Out 4	S Curve #4 at the End of Deceleration	f/s^3	0.01 - 30.00	15.00	15.00

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals AM (Output Frequency) and AC (Com) on the drive terminals. The input can be seen at terminal FM (Speed Reference) and AC (Com). These two signals are 0 -10VDC.

The High Level speed (D1-03), Level speed (L1-05), Deceleration time (C1-02) and S-curve parameters (P1-11, P1-10, P1-06, P1-07) should be adjusted for correct approach to the floor.

The Acceleration time (C1-01), and the S-curve parameters (P1-04 and P1-17) can be adjusted for smooth starting and transition to High Speed. This will be addressed in the final adjustment section.

4.12 FINAL ADJUSTMENTS (YASKAWA F7)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 Drive, see Sections 4.8 thru 4.10 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

4.12.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (YASKAWA F7)

a. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

b. Move the car to the bottom terminal landing. Check to see if the DZ relay is picked. If not, move the car on Inspection to place it in the Door Zone.

4.12.2 SWITCHING TO AUTOMATIC OPERATION (YASKAWA F7)

Place the Relay Panel Inspection switch in the OFF position. If the car is not at a landing it will move to a landing. If the car is at a landing but not in the door zone, relays L and either LU or LD should pick and the car should perform a relevel. If the relevel in not successful, check the following:

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (D1-05) on the Yaskawa F7 AC Drive to get the car to move.

- If relays L and LD are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.

- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

The Status Indicator lights should now display the indication for Independent Service operation. At this time the Position Indicator should match the actual car location. Note that all of the Position Indicators and direction arrows are conveniently displayed on the controller. All the calls are also displayed on the controller.

4.12.3 BRAKE ADJUSTMENT FOR 125% LOAD (YASKAWA F7)

Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car. Begin adding weights in 50 or 100 pound increments and move the car up and down on Inspection each time. Adjust the brake tension to stop and hold 125% of a contract load by tripping a stop switch open while running down on Inspection. Hold the DOWN button in while tripping open the stop switch (preferably on the Inspection station). KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS. If the VFAC Drive Unit trips off when the car is going down, but not while it is going up, refer to the manual for the VFAC Drive Unit and look up the failure indicated on the Drive display. If an over-voltage fault is indicated, there may be a problem in the regeneration (or braking) resistors, the braking module (if one is provided). If this problem cannot be solved, call MCE Technical Support. Remove all test weights from the car.

4.12.4 BRINGING THE CAR UP TO HIGH SPEED (YASKAWA F7)

a. Verify that all the steps described in Sections 4.1 and 4.11 regarding the adjustments and specifically the drive parameters are complete.

> **NOTE:** It is very important that the drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation so that there is no demand. To change a drive parameter, the Programming mode has to be accessed. When the drive is in Programming mode it will not function. The drive has to be in Operation mode to run the elevator.

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad should read 50% of contract speed as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase the High speed parameter (D1-02) until contract speed is achieved.

c. The Position Indicator will step at the slowdown distance from the next floor. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed parameter (D1-03) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car decelerates to Level speed. The Level speed can be adjusted using parameter D1-05 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

> **NOTE:** The active speed will show on the drive key pad corresponding to the setting of the D parameters.

d. Adjust the SPD (Speed Pick Delay) trimpot by first turning it far enough clockwise so that the empty car rolls back in the direction of the counterweight (if it can). Then adjust SPD so that the brake is fully picked just as the motor first moves. The goal is to delay long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

e. Run the car again and verify that the car will start, accelerate, decelerate and run at High Level and Level speeds into the floor and stop. Place calls for all of the landings. Verify that all of the calls work. Verify the operation and placement of all vanes or magnets and vane or magnet switches and verify that the car steps the Position

Indicators correctly. The slowdown distance for the elevator is measured from the point where the STU sensor (or STD sensor, if going down) is activated by a metal vane or magnetic strip to the position where the car is stopped at the floor with the DZ sensor centered on the leveling target with LU or LD sensors *not* engaged.

The slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate parameters(C1-02 and C1-08) to get the car to approach the floor correctly as the car speed increases. Adjust the Acceleration rate parameters(C1-01 and C1-07) until the desired acceleration is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

f. Arrange the VFAC Drive Unit to display the output speed (parameter U1-02) to verify that contract speed is being reached.

NOTE: To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminals FM and AM with respect to AC. These are 0 -10 VDC signals. Take all necessary precautions while measuring the voltage signals.

CAUTION: Most oscilloscopes have a grounding pin on their power plug. We recommend defeating the grounding pin with one of the commonly available ground isolation adapter plugs so that the case of the oscilloscope is *not* at ground potential, but at whatever potential the negative probe lead is connected to. TREAT THE CASE OF THE OSCILLOSCOPE AS A LETHAL SHOCK HAZARD, DEPENDING ON WHERE THE NEGATIVE PROBE IS CONNECTED. This recommendation is being made because the ground potential on the grounding pin of the power outlet may not be the same as the controller cabinet ground. If it is not, substantial ground loop current may flow between the negative probe and the power plug grounding pin which can ruin the oscilloscope.

g. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal has been provided by adjusting trimpot SPD (Speed Pick Delay). Trimpot SPD must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check trimpot SPD again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals FM and AM with respect to AC. These signals are 0 -10 volt. Terminal FM is programmed for the drive input speed reference and terminal AM is programmed for the drive output frequency.

For flux vector applications only: To improve the car's response the following drive parameters can be adjusted as described below, provided that the Motor data slip parameter (E2-02) and Motor No load current (E2-03) are set correctly.

1. ASR Proportional Gain 1, (C5-01) - The ASR Proportional Gain 1 controls the response of the car to the speed command. Increasing C5-01 results in tighter control. A low value may result in a speed deviation error. A too high value may result in oscillation.

2. ASR Integral Time 1, (C5-02) - The ASR Integral Time 1 adjusts the amount of time for the drive to respond to a change in speed command. Response time is increased when the C5–02 is decreased. However, the car may become unstable if the ASR Integral Time is set too low.

3. Parameters C5-03 (ASR P Gain 2) , and C5-04 (ASR Integral Time 2) are not used and must be set to the factory default values.

h. The car should be running well now, except possibly for the final stop. Since the speed reference goes to zero when the car stops, the VFAC Drive Unit will cause the machine to stop electrically. Enough delay in the setting of the brake (BDD) will have to be provided to allow the sheave to stop turning before setting the brake firmly on the brake drum.

NOTE: If the job has **Intermediate Speed (SHR Relay)**, first adjust the multi-floor runs. Then make one floor runs and adjust parameter D1-07 to reach the correct intermediate speed. Do not change any other parameter except P1-13 or P1-14, if required, as described in Figure 4.6

When the elevator slows down to leveling speed and travels to door zone, the speed command will drop to zero before the brake drops. This is adjustable by the BDD (Brake Drop Delay) trimpot. For open loop applications, the car stop will be accomplished with injection braking current supplied by the VFAC Drive Unit at the end of the run. The strength and duration of this DC braking current is programmable using parameters B2-02 and B2-04 on the VFAC Drive Unit and, to start with, should be set at 50 and 0.5 respectively (50% current and 0.5 second duration). A sharper and stronger electric stop is provided by increasing B2-02 and a softer stop by decreasing B2-02. The duration of the DC injection braking *must be less* than the dropout time of the contactor(s) which disconnect the motor from the VFAC Drive Unit. This assumes that the contactor(s) will open under zero current conditions. For Flux Vector applications, DC injection braking is not required for stopping. All B2 parameters must be set to the factory default settings.

With the method of providing an electric stop as indicated above, provide a delay in dropping the brake by turning the BDD (Brake Drop Delay) trimpot clockwise. The idea is to hold the brake up long enough to allow the motor to be stopped electrically and then drop the brake immediately the instant the motor has stopped.

If there is too long of a delay before dropping the brake, the control system will release its control of the motor and the motor will drift briefly in the direction of the load before the brake is forced to drop by the PT relay. The BDD trimpot controls the dropping of the brake through the BE relay. Move the LU and LD sensors or switches closer together (or further apart) so the car stops at the same location, up or down. Then move the floor (leveling) magnet strips or vanes so the car stops accurately at each floor.

i. The adjustment is almost complete. The acceleration rate setting on drive parameter C1-01 should be at least as great as the deceleration rate parameter C1-02, but it should not be so high that it substantially exceeds the value of C1-02. Excessive acceleration will probably cause the VFAC Drive Unit circuits to saturate and therefore, lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the C1-02 parameter. Increase the value of C1-02 and run the car. Continue to increase the value of C1-02 until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the C1-02 parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls, you might have to increase the leveling speed.

4.12.5 LOAD TESTING (YASKAWA F7)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the VFAC Drive Unit current on its display and check to see if there is an OC (Over Current) error indication as the car accelerates to full speed. If so, this indicates that the VFAC unit is being pushed close to its limits and may require one or more of the following actions:

1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by increasing parameter C1-01. The more time spent in acceleration, the lower the current demand.

2. A more gradual transition from acceleration to high speed may be made by increasing drive parameter P1-17 for contact speed and P1-13 for intermediate speed.

3. **For Open loop applications** - Adjust parameter C4-01(Torque Compensation Gain) between 1.0 - 2.0. The maximum setting for this parameter is 2.5. Display the output current on the drive key pad in the Operation mode by pressing the up arrow twice. The drive keypad will display OUTPUT CURRENT U1-03= 0.0A. The F7 drive can provide 150% of its full load rated current for 1 minute. Run the car and monitor the current on the drive keypad. **If the motor is stalling but does not trip on OC faults, and if the value of the output current is more than or close to the motor rated current but less than the maximum drive output current, check the motor winding configuration.** Most elevator motors are connected in Y configuration. But sometimes the DELTA configuration is used in order to pick the full load. The motor manufacturer's recommendations must be taken into consideration. If the field survey data was inaccurate, the Drive Unit may be undersized in relation to the motor. Call MCE Technical Support so that the job data can be reviewed.

   For Flux Vector Applications -The Torque Compensation Gain parameter is not available for flux vector applications. ASR Tuning (C5 parameters), as described in Section 4.12.4 (g), can be adjusted to pick the full load.

4. The motor may be underrated. It may be possible to get excellent results if the speed is reduced slightly.

5. The elevator may be improperly counter weighted. This possibility should be thoroughly investigated.

6. Make a copy of the Table in Appendix J, Quick Reference for Yaskawa F7 Drive Parameters and use the digital operator on the VFAC Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

b. If there is a full load in the car and there is trouble slowing in the down direction, or if the VFAC Drive Unit is tripping off and there is an OV (over voltage) fault displayed, it may mean that there is a problem with the regeneration (braking) resistors and/or the braking unit (if supplied separately). Check for DC bus voltage. There are two methods to check the DC bus voltage as described below:

1. Through the drive display: When the drive is in Operation mode, press the up arrow until Monitor function U1 is displayed, press enter and then use the up arrow to access the U1-07 (DC bus voltage). Then run the elevator and watch the voltage reading.

2. Actual measurement of voltage: <u>Use extreme care when measuring the DC voltage across the drive power terminals (-) and (+ 2 or +3) under the above conditions</u>.

If the bus voltage is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.13 FINAL ELEVATOR INSPECTION PROCEDURE (YASKAWA F7)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
***For controllers with the TORQMAX F5 AC Drive, see Sections* 4.14 thru 4.16 and 4.17**

WARNING: The following tests should be performed only by the qualified elevator personnel skilled in final adjustment and inspections.

4.13.1 INSPECTION LEVELING OVER SPEED TEST (YASKAWA F7)

Note: Before performing tests 4.13.1 and 4.13.3, please remove the jumper between pins labeled 2KBP1 and 2KBP2 on the SC-BASE board. Also rotate trimpots ILO, ETS and COS fully CW.

The SC-BASE board is equipped with an independent low speed monitoring system which can shut down the system if the car runs faster than a trimpot adjustable preset speed on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (LU1/LU2, LD1/LD2) relays are picked or when the Access/Inspection relay (IN1) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the SC-BASE board. The circuit looks at pulses coming from the speed sensor, sensing a magnet on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Place the car on Inspection operation by placing the MACHINE ROOM INSPECTION TRANSFER switch in the INSP position on the SC-SB2K.

b. Run the car on Inspection (up or down) and record the actual values for parameter D1-17 ________. D1-17 must be returned to the original value when this test is complete. Now, run the car on Inspection and adjust parameter D1-17 (Inspection speed) for the preferred maximum leveling speed (something below 150 fpm).

c. While running the car at the adjusted maximum leveling speed, slowly turn the ILO trimpot CCW until the ILO1/ILO2 indicators turn ON. The car should come to an immediate stop and the MC-PCA LCD display should read “ILO Fault”. The ILO fault will self reset in a moment.

d. Now set D1-17 to a lower value. Run the car on Inspection and increase the inspection speed by increasing parameter D1-17 to show that this low speed safety monitor circuit will trip at no higher than 150 fpm (or no higher than the desired maximum inspection speed). Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Return parameter D1-17 to the value recorded in Step (b).

4.13.2 TERMINAL SLOWDOWN LIMIT SWITCHES (YASKAWA F7)

Make sure that the terminal slowdown limit switches are working properly by doing the following:

a. Place the TEST/NORMAL switch on the SC-SB2K board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom) from the controller. The car should make a normal slowdown at both terminal landings except that there may be a slight relevel, which is okay. If the car goes more than an inch past the floor, move the slowdown limit until the approach is normal.

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the SC-SB2K board and return theTEST/NORMAL switch to the NORMAL position.

4.13.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (YASKAWA F7)

All jobs under the requirements of ANSI A17.1 -2000 Articles 2.25.4.1. or 2.25.4.2 must have a means to ensure that the car speed is below contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

The SC-BASE board carries out ETS monitoring functions via a speed senor that monitors a magnet installed on the motor shaft or brake drum as described in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that shielded phone cable from the sensor to the SC-BASE board is securely seated in the connectors at both ends and is also enclosed in conduit.

b. Check that the ETS trimpot is fully CW.

c. Record the value of parameter **D1-02**. Then, on a multi-floor run, adjust the speed of the car to 90% of the contract speed by adjusting the H speed (Drive parameter D1-02).

d. Remove both the Up Emergency and Terminal Limit Switch wires where they connect to the controller at terminals UETS1 and UETS2 on the SC-BASE board. Start the car at the bottom of the hoistway and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and the car stops. A fault message should be displayed on the MC-PCA board's LCD display.

e. Press the fault reset push button on the SC-SB2K board to reset the fault.

f. Repeat (d) and (e) in the down direction with the wires from the DETS terminals removed. When the calibration is complete, reconnect the wires removed from the UETS and DETS terminals and return the H speed parameter **D1.02** to its original value.

g. Verify the calibration by turning OFF the inspection transfer switch. Place a call, and with the car running at contract speed, remove the field wires from the UETS1 and UETS2 terminals on the SC-BASE board. The car must execute an emergency slowdown. To restore normal operation, replace the wires and press the Fault Reset pushbutton on the SC-SB2K board. Repeat for terminals DETS1 and DETS2.

4.13.4 CONTRACT SPEED BUFFER TEST (YASKAWA F7):

4.13.4.1. COUNTER WEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

NOTE: The car should be at the bottom landing with the TEST/ NORM switch on the SC-SB2K board in the TEST position.

To conduct the empty car buffer test going UP, a number of functions need to be bypassed using jumpers. Follow the steps below:

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also set the ASME A17.1-2000 Bypass Function, **ABYP = ON** (see Section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Up Limits***, if provided, by placing jumpers between terminals 2 and UETS1 / UETS2 on the SC-BASE(R) board.

e. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 9 and 10 and terminals 10 and 11 on the SC-SB2K board.

f. Register a car call for the top terminal landing from the controller. ***The counterweight will strike the buffer.***

g. Put the elevator on Inspection and pick the down direction to move the car.

h. Remove the jumpers between terminals 9 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the SC-SB2K board.

i. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also set the ASME A17.1-2000 Bypass Function, **ABYP = OFF** (see Section 5.3.2).

4.13.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also set the ASME A17.1-2000 Bypass Function, **ABYP = ON** (see Section 5.3.2).

b. On the SC-BASE(R) board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the SC-SB2K board and tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Down Limits***, if provided, by placing jumpers between terminals 2 and DETS1 / DETS2 on the SC-BASE(R) board.

e. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 9 and 12 and terminals 12 and 13 on the SC-SB2K board.

f. Position the elevator several floors above the bottom landing with a full load in the car. Then register a car call for the bottom landing. ***The car will strike the buffer.***

g. Put the elevator on Inspection and pick the up direction to move the car.

h. On the SC-BASE(R) board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

i. Remove the jumpers between terminals 9 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the SC-SB2K board.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also set the ASME A17.1-2000 Bypass Function, **ABYP = OFF** (see Section 5.3.2). ***Remove all of the jumpers installed in this section.***

4.13.5 GOVERNOR AND CAR SAFETY TESTS (YASKAWA F7)

4.13.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVER SPEED switch contact manually and verify that the main safety circuit drops out. Use which ever method is most familiar to verify the actual electrical and mechanical tripping speeds.

4.13.5.2 GOVERNOR AND CAR SAFETY OVERSPEED TEST WITH FULL LOAD GOING DOWN.

NOTE: If the governor overspeed trip point is less than 133% of contract speed then perform the test as described below. If the trip point is greater than 133% of contract speed then use other means to overspeed the car.

a. Move the fully loaded car to the top terminal landing. Record the value of parameters D1-02 (High Speed) ________ , E1-04(Maximum Output Frequency)_________ and O1-03 (Display Scaling) _________which are set to run the car on High speed. These parameters will be returned to their recorded values later in the adjustments.

b. Set parameter E1-04 = 80Hz, parameter D1-02 = governor tripping speed (fpm) and parameter O1-03 - 1XXX00, where XXX = governor trip speed. This should run the car at governor tripping speed, if the motor is designed for 60Hz.

c. On the SC-BASE(R) board, place the PFLT BYP jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions.**

d. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets. Keep them separate! ETL is 48 VDC and AS is 12 VDC.

e. Connect a jumper between terminals EBS1 and EBS2 to ***bypass the governor overspeed switch***. Also, place a jumper between F7 Drive terminals SN and S3.

f. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminal 16 on the SC-SB2K board and panel mount terminal 17 to ***bypass the safety plank (SOS) switch***.

g. Turn the power ON and verify that controller is functional.

h. On the SC-BASE(R) board, install the jumper between pins 2KBP1 and 2KBP2. Also set the ASME A17.1-2000 Bypass Function, **ABYP = ON** (see Section 5.3.2).

i. Register a car call in the down direction, but not for the bottom landing. The car should travel at 133% of contract speed. The governor should trip and set the safety and stop the car.

j. Put the car on Inspection.

k. Return parameters E1-04, D1-02 and O1-03 to their recorded values.

l. Reset the mechanical governor and inspect the hoist ropes to make sure they are in the proper grooves.

m. Move the car UP on Inspection to release the flexible guide clamp safety or release the car safety by hand if it is a wedge clamp type.

n. ***Remove the jumper between terminals EBS1 and EBS2 which bypasses the governor overspeed switch.*** Also remove the jumper between F7 Drive terminals SN and S3.

o. ***Remove the jumper from terminal 16 and panel mount terminal 17 which bypasses the safety plank (SOS) switch).***

p. Properly reinstall the relays AS and ETL on HC-ACIF board, if applicable. Remove jumper between 2KBP1 and 2KBP2 on SC-BASE(R) and set the ASME A17.1-2000 Bypass Function, **ABYP = OFF** (see Section 5.3.2).

q. On the SC-BASE(R) board, place the PFLT BYP jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions.**

r. Put the car on Normal operation by taking the car off Inspection. After the elevator finds a floor, verify the operation of the elevator by registering calls and checking the speed.

4.13.6 PHASE LOSS DETECTION TESTS (YASKAWA F7)

The VFAC Drive Unit is programmed to detect a motor phase loss. Parameters L8-05 and L8-07 are enabled, which will activate the drive input and output phase loss detection.

To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display LF (Output phase loss). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

If input phase loss is required, disconnect any one of the three legs of the three phase MCE controller. When either L1 or L2 is removed the drive will not function because the drive's control supply comes from L1 and L2. If either L2 or L3 is removed then the MCE controller will not function because the controller transformer is supplied by L2 and L3. If the controller and drive are normal but the controller wiring is not done as described above and one of the input power wires is disconnected, then the drive will trip on fault PF (Input open phase) provided that the drive out current is greater than 30% of the drive full load current.

The adjustments and tests are complete. Now complete the A17.1 Code Compliant Functions and Testing (Section 4.17) and fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

WARNING: Before the Elevator can be turned over to normal use, it is very important that no safety circuit is bypassed. The items to be checked include, but are not limited to:

* Check that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relay FLT on HC-ACI board and relays AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE
* No jumpers between terminals 2 and UETS1/2 or DETS1/2.
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 2 and 9 (SC-SB2K)
* No jumper between terminals 9 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Option **ABYP** is set to **OFF** and the controller is in normal mode.
* Set the PFLT Bypass Jumper to the OFF position.
* Drive parameter D1-02, E1-04 and O1-03 must be set to original value for High speed and the jumper between F7 Drive terminals SN and S3 removed.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

NOTE: If this car is part of an M3 Group System, refer to Section 4.18 for instructions on setting the Car Network ID.

4.14 EXPLANATION OF TORQMAX F5 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.

Before attempting to bring the car up to contract speed, or making any adjustments, it is important to verify the following control parameters in the VFAC Drive Unit. It is very important to become familiar with drive keypad operation to access the drive program.

NOTE: In order to access the parameter values, review the use of the Digital Operator in Section 3, *Parameter Adjustments* in the TORQMAX F5 Drive Technical Manual.

4.14.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.6.2. Incorrect values for these parameters can cause erratic elevator operation.

CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation.

The PTC Series M controller uses drive parameters for setting the five speed levels described in Table 4.11 and Figure 4.7. The controller selects the desired speed using the TORQMAX F5 drive logic inputs. The Speed Command parameters should be set as shown in Table 4.11 in preparation for running the elevator at High speed.

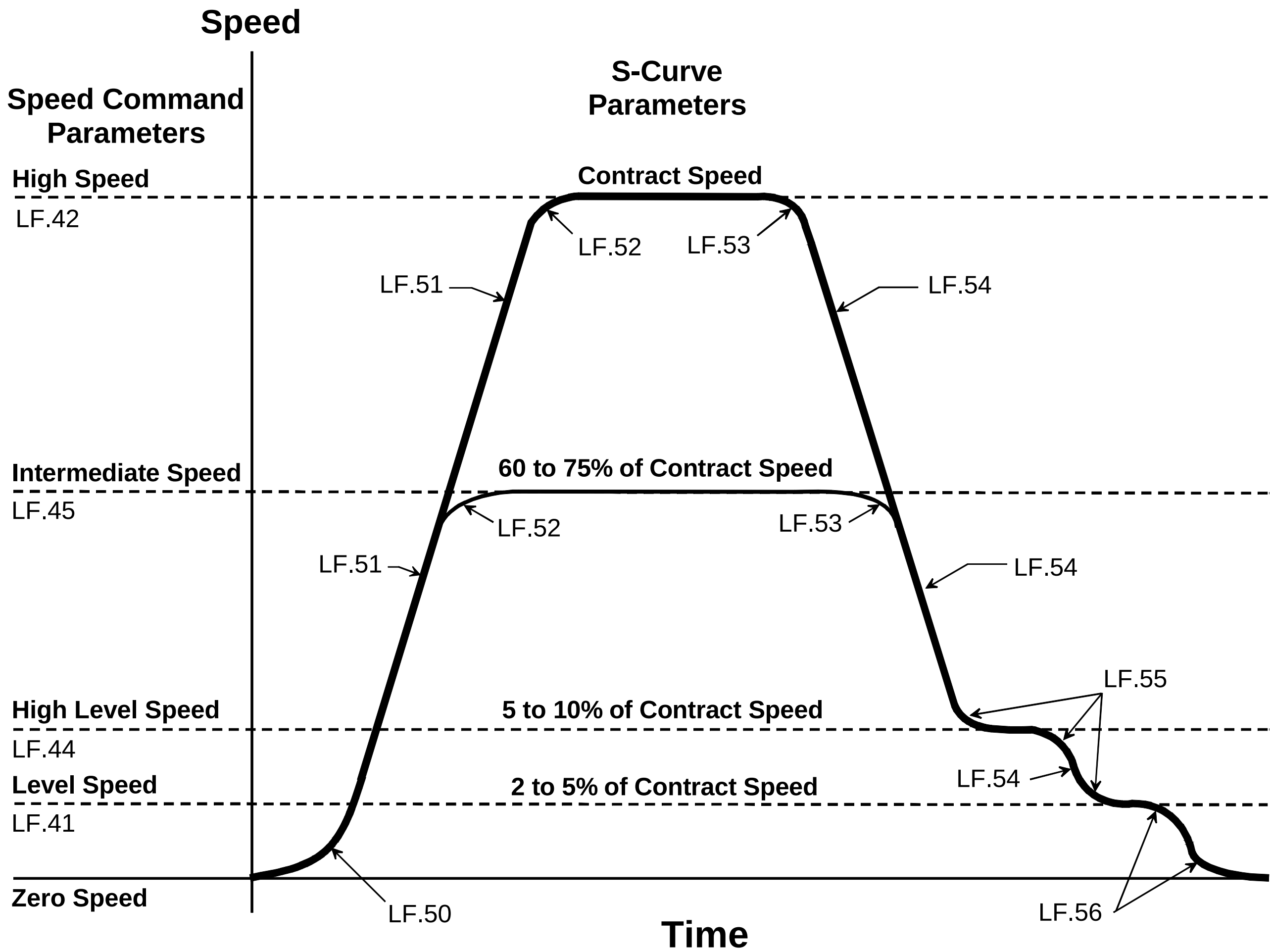
TABLE 4.11 TORQMAX F5 Drive Speed Levels

TORQMAX F5 Drive Speed Levels			
Speed	Speed/Drive parameter	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	Inspection Speed (LF.43)	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	Level (LF.41)	2 to 5% of Contract Speed	ft/m
High Level	High Level (LF.44)	5 to 10% of Contract Speed	ft/m
Intermediate	Intermediate (LF.45)	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	High speed (LF.42)	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

When parameter LF.86 is selected, the drive display indicates which speed is selected.

LF.86 Display	Speed	LF.86 Display	Speed
0 or 7	No speed	4	Inspection Speed
2	Leveling Speed	5	High Leveling Speed
3	High Speed	6	Intermediate Speed

FIGURE 4.7 S Curve Parameters and Recommended Speed Settings (TORQMAX F5)



4.14.2 ADJUSTING ACCELERATION AND DECELERATION RATES

The acceleration and deceleration rates are programmed in feet per second per second (ft/s^2) using the S-Curve parameters (see Figure 4.7 and Table 4.12). The acceleration rate is set using the ***LF.51*** parameter. The deceleration rate is set using the ***LF.54*** parameter. Increasing the value increases the acceleration (deceleration) rate (steeper curve). The default value is 3.00 ft/s^2.

4.14.3 ADJUSTING THE JERK PARAMETERS

The jerk parameters adjust the rate of change transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.7). The jerk parameter values are in feet per second per second per second (ft/s^3). Decreasing the value decreases the rate of change and causes a smoother (longer) transition.

The parameters used for the jerk points at the start and during acceleration are **LF.50** and **LF.52**. The parameters used for the jerk points during deceleration and stop are **LF.53, LF.55** and **LF.56.** Parameter **LF.52** is used for the transition from acceleration to contract speed and parameter **LF.53** is used for the transition from contract speed to deceleration.

TABLE 4.12 TORQMAX F5 S Curve Parameters

Drive parameter	Parameter Description	Unit	Setting Range	Default Settings	Factory Settings
***S-Curves* (Profile 0)**					
0.LF.50	Start Jerk - used for the transition at the start of acceleration	ft/s^3	0.30 - 32.00	3.00	3.00
0.LF.51	Acceleration rate	ft/s^2	0.30 - 12.00	3..50	3.50
0.LF.52	Acceleration Jerk - used for the transition from acceleration to contract speed	ft/s^3	0.30 - 32.00	4.00	4.00
0.LF.53	Deceleration Jerk - used for the transition from contract speed to deceleration	ft/s^2	0.30 - 32.00	4.50	4.50
0.LF.54	Deceleration rate	ft/s^2	0.30 - 12.00	3.50	3.50
0.LF.55	Approach Jerk - used for the transitions at the end of deceleration	ft/s^3	0.30 - 32.00	2.50	2.50
LF.56	Stop Jerk - used for the final transitions from leveling speed to zero speed	ft/s^3	off, 0.30 -32.00	1.00	1.50
Speed parameters					
LF.42	High speed	ft/m	0 -100% *	0	
LF.45	Intermediate speed	ft/m	0 -91% *	0	
LF.44	High Leveling speed	ft/m	0 -25% *	0	
LF.41	Leveling speed	ft/m	0 -16% *	0	
LF.43	Inspection speed	ft/m	0 - 66% *	0	

The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. The drive will not accept any speed, higher than the defined values.

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals X2A.6 (Motor torque) and X2A.8 (Com) on the TORQMAX F5 drive. The input can be seen at terminal X2A.5 (Actual speed) and X2A.8 (Com). The output signals are ±10V for X2A.6 and 0 - 10V for X2A.5.

The High Level speed **LF.44**, Level speed **LF.41**, Deceleration rate **LF.54** and Jerk rate parameters **LF.53** and **LF.55** should be adjusted for correct approach to the floor.

The Acceleration, deceleration and the Jerk rates parameters can be adjusted for smooth starting and transition to High speed. This will be addressed in the final adjustment section.

4.15 FINAL ADJUSTMENTS (TORQMAX F5)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.

4.15.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (TORQMAX F5)

a. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the SC-SB2K board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

b. Move the car to the bottom terminal landing. Check to see if the DZ relay is picked. If not, move the car on Inspection to place it in the Door Zone.

4.15.2 SWITCHING TO AUTOMATIC OPERATION (TORQMAX F5)

Place the Relay Panel Inspection switch in the OFF position. If the car is not at a landing it will move to a landing. If the car is at a landing but not in the door zone, relays L and either LU1/2 or LD1/2 should pick and the car should perform a relevel. If the relevel in not successful, check the following:

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Leveling Speed parameter (LF.41) on the TORQMAX F5 Drive to get the car to move.

- If relays L (on HC-ACI) and LD1/2 and LEX (on SC-SB2K) are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.

- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

The Status Indicator lights should now display the indication for Independent Service operation. At this time the Position Indicator should match the actual car location. Note that all of the Position Indicators and direction arrows are conveniently displayed on the controller. All the calls are also displayed on the controller.

4.15.3 BRAKE ADJUSTMENT FOR 125% LOAD (TORQMAX F5)

Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car. Begin adding weights in 50 or 100 pound increments and move the car up and down on Inspection each time. Adjust the brake tension to stop and hold 125% of a contract load by tripping a stop switch open while running down on Inspection. Hold the DOWN button in while tripping open the stop switch (preferably on the Inspection station). KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS. If the AC Drive Unit trips on a fault when the car is going down, but not while it is going up, refer to the manual for the VFAC Drive Unit and look up the failure indicated on the Drive display. If the displayed fault is **E.OP** (over-voltage fault), there may be a problem in the regeneration (or braking) resistors, the braking module (if one is provided), or in the fuses that may be in series with the wires to the braking resistors.

If there is a problem lifting the load, Set parameter LF.38 = 0 (PWM = 8KHz). Then increase the drive gain using parameters A.LF.31 KP Speed Accel: Proportional Gain and A.LF.32 Ki Speed Accel: Integral Gain. If this problem cannot be solved, call MCE Technical Support.

4.15.4 BRINGING THE CAR UP TO HIGH SPEED (TORQMAX F5)

a. Remove all test weights from the car. Verify that all the steps described in Sections 4.1 and 4.14 regarding the adjustments and specifically the drive parameters are complete.

> **NOTE:** It is very important that the drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation so that there is no demand.

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad display should read 50% of Contract Speed as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase High speed by increasing parameter LF.42 until Contract Speed is achieved. If there is a problem reaching Contract Speed, see the following note.

NOTE: **Drive gain adjustments** - The default values for the gain parameters (A.LF.31 Kp Speed Accel: Proportional Gain and A.LF.32 Speed Accel: Integral Gain) may not be sufficient to run the car on High speed. It may be necessary to increase the value of these parameters.

c. At the slowdown distance from the next floor the Position Indicator will step. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed (LF.44) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car should decelerate to Level speed. The Level speed can be adjusted using parameter LF.41 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

d. Turn the Speed Pick Delay (SPD) trimpot fully CCW (fully OFF) and then set it 1/4 turn in the CW direction. The speed pick delay is achieved using the TORQMAX F5 drive parameter LF.70. Adjust LF.70 so that the brake is fully picked just as the motor first moves. The goal is to delay the speed command long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

e. Run the car again and verify that the car will start, accelerate, decelerate and run at High Level and Level speeds into the floor and stop. Place calls for all of the landings. Verify that all of the calls work. Verify the operation and placement of all vanes or magnets and vane or magnet switches and verify that the car steps the Position Indicators correctly. The slowdown distance for the elevator is measured from the point where the STU sensor (or STD sensor, if going down) is activated by a metal vane or magnetic strip to the position where the car is stopped at the floor with the DZ sensor centered on the leveling target with LU or LD sensors *not* engaged.

This slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate (LF.54) and deceleration jerk rate (LF.55) to stop the car at the floor. Adjust the Acceleration rate parameter (LF.51) until the desired acceleration rate is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

NOTE: To observe the Actual speed and the motor torque with an oscilloscope or a chart recorder, monitor drive terminal X2A.5 and X2A.6 with respect to X2A.8. Take all necessary precautions while measuring the voltage signals.

CAUTION: Most oscilloscopes have a grounding pin on their power plug. We recommend defeating the grounding pin with one of the commonly available ground isolation adapter plugs so that the case of the oscilloscope is *not* at ground potential, but at whatever potential the negative probe lead is connected to. TREAT THE CASE OF THE OSCILLOSCOPE AS A LETHAL SHOCK HAZARD, DEPENDING ON WHERE THE NEGATIVE PROBE IS CONNECTED. This recommendation is being made because the ground potential on the grounding pin of the power outlet may not be the same as the controller cabinet ground. If it is not, substantial ground loop current may flow between the negative probe and the power plug grounding pin which can ruin the oscilloscope

f. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal is provided using drive parameter LF.70 Speed Pick Delay. Parameter LF.70 must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check parameter LF.70 again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals X2A.5 and X2A.6 with respect to X2A.8. These signals are ±10V and 0-10 V respectively. Terminal X2A.5 is assigned to the drive Actual speed reference and terminal X2A.6 is assigned to the drive motor torque.

g. The car should be running well now, except possibly for the final stop. Since the speed reference goes to zero when the car stops, the VFAC Drive Unit will cause the machine to stop electrically. Enough delay in the setting of the brake (BDD) will have to be provided to allow the sheave to stop turning before setting the brake firmly on the sheave .

NOTE: During High speed, if the speed change-over can be felt in the car, increase parameter A.LF.33 Ki Speed Offset Accel and d.LF.33 Ki Speed Offset Decel in steps of 100. This will help in achieving a smoother transition.

When the elevator slows down to leveling speed and travels to door zone, the speed command will drop to zero before the brake drops. This is adjustable using the BDD (Brake Drop Delay) trimpot. The idea is to hold the brake up long enough to allow the motor to be stopped electrically and then drop the brake immediately the instant the motor has stopped.

If there is too long of a delay before dropping the brake, the control system will release its control of the motor and the motor will drift briefly in the direction of the load before the brake is forced to drop by the PT relay. The BDD trimpot controls the dropping of the brake through the BE relay. Move the LU and LD sensors or switches closer together (or further apart) so the car stops at the same location, up or down. Then move the floor (leveling) magnet strips or vanes so the car stops accurately at each floor.

h. The adjustment is almost complete. The acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but it should not be so high that it substantially exceeds the value of the deceleration rate parameter. Excessive acceleration may cause the AC Drive circuits to saturate and thereby lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the deceleration parameter **LF.54** and run the car. Continue to decrease the value of **LF.54** until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the **LF.54** parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls then you might have to increase the leveling speed.

4.15.5 LOAD TESTING (TORQMAXF5)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the AC Drive Unit current on its display **LF.93** and check to see if there is an **E.OL or E.OL2** (Overload) error indication as the car accelerates to full speed. If so, it is an indication that the AC drive unit is being pushed close to its limits and may require one or more of the following actions:

    1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by decreasing the **LF.51** parameter. The lower the rate of acceleration, the lower the current demand.

    2. A more gradual transition from acceleration to high speed may be made by decreasing the **LF.52** (Acceleration Jerk) parameter.

    3. Verify that LF.38 = 0 (PWM = 8KHz). The drive gains (parameters **LF.31** and **LF.32**) may need to be increased.

    4. The motor may be underrated. It may be possible to get excellent results if the speed is reduced slightly.

    5. The elevator may be improperly counter weighted. This possibility should be thoroughly investigated.

    6. Make a copy of the table in Appendix D, *Quick Reference for TORQMAX F5 Drive Parameters*. Use the digital operator on the Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

b. If there is a full load in the car and there is trouble slowing in the down direction, or if the AC Drive Unit is tripping off and there is an **E.OP** (over voltage) fault displayed, it may mean that there is a problem with the regeneration (braking) resistors and/or the braking unit (if supplied separately). Verify the DC bus voltage. Two methods to check the DC bus voltage are described below:

    1. Through the drive keypad display: When the drive is in Operation mode, access parameter **LF.95** (DC bus) voltage or parameter **LF.96** (Peak DC bus) voltage. You can then run the elevator and watch the voltage reading,

    2. Actual measurement of voltage: Use extreme care when measuring the DC voltage across the drive power terminals (-) and (PA or ++) under the above conditions.

The 230V drive will trip on E.OP (Over voltage in the DC bus circuit) if the **LF.96** reading is close to 400VDC. The 460V drive will trip on E.OP if the **LF.96** reading is close to 800VDC. If the DC bus voltage reading **(LF.95)** is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.15.6 ELECTRICAL NOISE (TORQMAX F5)

If the motor emits excessive electrical noise at Inspection or Contract speeds, or if the motor draws higher than normal current, perform the following:

a. Verify the actual traction sheave diameter. Enter the measured value in parameter LF.21.

b. Verify the gear reduction ratio, parameter LF.22.

c. Verify the Rated Motor speed, parameter LF.11. This value is the full load motor RPM.

NOTE: The Imperial motors name plate has full load RPM information which should be entered in parameter LF.11.

Full load RPM information may not be available for Reuland motors. The motor name plate lists the Synchronous RPM, i.e. 900, 1200, 1500 or 1800. In flux vector applications Reuland motors have slip between 1.8% and 2.0%. Set LF.11 = Motor Synchronous RPM - (0.018 x Motor Synchronous RPM).

This calculation gives a very reasonable value for LF.11. Its effect can be verified by observing the motor current, parameter ru.09. If ru.09 is normal, compared to the motor FLA, when the car is running at contract speed, the motor slip is correct. If required, LF.11 can be adjusted in small increments (5-10 RPM). However, higher values close to the Synchronous RPM will trip the E.ENC drive fault.

d. Lower the Kp Speed Accel/Decel Proportional Gain, A.LF.31 / d.LF.31 (do not set below 1200). Refer to section 3.6.3.g of this manual for more detailed information.

4.16 FINAL ELEVATOR INSPECTION PROCEDURE (TORQMAX F5)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4 and 4.17.
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7 and 4.17.
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10 and 4.17.
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13 and 4.17.

WARNING: The following tests should be performed only by qualified elevator personnel skilled in final adjustment and inspections.

4.16.1 INSPECTION LEVELING OVER SPEED TEST (TORQMAX F5)

Note: Before performing tests 4.16.1 and 4.16.3, please remove the jumper between pins labeled 2KBP1 and 2KBP2 on the SC-BASE board. Also rotate trimpots ILO, ETS and COS fully CW.

The SC-BASE board is equipped with an independent low speed monitoring system which can shut down the system if the car runs faster than a trimpot adjustable preset speed on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (LU1/LU2, LD1/LD2) relays are picked or when the Access/Inspection relay (IN1) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the SC-BASE board. The circuit looks at pulses coming from the speed sensor, sensing a magnet on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Place the car on Inspection operation by placing the MACHINE ROOM INSPECTION TRANSFER switch in the INSP position on the SC-SB2K.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and increase the Inspection speed parameter **LF.43** until you are running at the speed that you want the system to trip off on inspection leveling overspeed (ILO - something below 150 fpm).

c. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot CCW until ILO1/ILO2 indicators just turn ON. After stopping, set **LF.43** parameter to a lower value. Run the car on Inspection and increase the inspection speed by increasing the parameter **LF.43** to verify that this low speed safety monitor circuit will trip at no higher than 150 fpm (or no higher than the previous setting).

d. Place a call for a landing several floors away and as the car accelerates connect a jumper between test pin **TP8** and **TP2** (fused 2-bus). Relays LU1 and LU2 should pick. The system should make an emergency stop. Repeat for **TP9** and **TP2.** Relays LD1 and LD2 should pick. These test pins are located on the SC-SB2K board. Restore normal operation by removing jumpers.

The circuit should trip in *both* directions. The inspection/leveling overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the Inspection speed parameter **LF.43** back to the value recorded in 4.16.1 (b).

4.16.2 TERMINAL SLOWDOWN LIMIT SWITCHES (TORQMAX F5)

Make sure that the terminal slowdown limit switches are working properly by performing the following steps:

a. Place the TEST/NORMAL switch on the SC-SB2K board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom) from the controller. The car should make a normal slowdown at both terminal landings except that there may be a slight relevel, which is permitted. If the car goes more than an inch past the floor, move the slowdown limit until the approach is quite close to normal.

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the SC-SB2K board and return the TEST/NORMAL switch to the NORMAL position.

4.16.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (TORQMAX F5)

All jobs under the requirements of ANSI A17.1 - 2000 Articles 2.25.4.1. or 2.25.4.2 must have a means to insure that the car speed is below contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

The SC-BASE board carries out ETS monitoring functions via a speed senor that monitors a magnet installed on the motor shaft or brake drum as described in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that shielded phone cable from the sensor to the SC-BASE board is securely seated in the connectors at both ends and is also enclosed in conduit.

b. On the SC-BASE board, verify that the ETS trimpot is fully CW.

c. Record the value of parameter **LF.42**. Then, on a multi-floor run, adjust the speed of the car to 90% of the contract speed by adjusting the High speed parameter **LF. 42**.

d. Remove both the Up Emergency and Terminal Limit Switch wires where they connect to the controller at terminals UETS1 and UETS2 on the SC-BASE board. Start the car at the bottom of the hoistway and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and the car stops. A fault message should be displayed on the MC-PCA board’s LCD display.

e. Press the fault reset push button on the SC-SB2K board to reset the fault.

f. Repeat (d) and (e) in the down direction with the wires from the DETS terminals removed. When the calibration is complete, reconnect the wires removed from the UETS and DETS terminals and return the High speed parameter **LF.42** to its original value.

g. Verify the calibration by turning OFF the inspection transfer switch. Place a call, and with the car running at contract speed, remove the field wires from the UETS1 and UETS2 terminals on the SC-BASE board. The car must execute an emergency slowdown. To restore normal operation, replace the wires and press the Fault Reset pushbutton on the SC-SB2K board. Repeat for terminals DETS1 and DETS2.

4.16.4 CONTRACT SPEED BUFFER TEST (TORQMAX F5):

4.16.4.1. COUNTER WEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

NOTE: The car should be at the bottom landing with the TEST/ NORM switch on the SC-SB2K board in the TEST position.

To conduct the empty car buffer test going UP, a number of functions need to be bypassed using jumpers. Follow the steps below:

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS ON** (see section 5.6.5.1).

b. On the SC-BASE board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the SC-SB2K board. Tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Up Limits***, if provided, by placing jumpers between terminals 2 and UETS1 / UETS2 on the SC-BASE board.

e. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 9 and 10 and terminals 10 and 11 on the SC-SB2K board.

f. Register a car call for the top terminal landing from the controller. ***The counterweight will strike the buffer.***

g. Put the elevator on Inspection and pick the down direction to move the car.

h. Remove the jumpers between terminals 9 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the SC-SB2K board.

i. On the SC-BASE board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS OFF** (see Section 5.6.5.1).

4.16.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS ON** (see section 5.6.5.1).

b. On the SC-BASE board, place the PFLT Bypass jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions**.

c. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the SC-SB2K board and tape the wire to prevent shorting.

d. ***Bypass the Emergency Terminal Down Limits***, if provided, by placing jumpers between terminals 2 and DETS1 / DETS2 on the SC-BASE board.

e. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 9 and 12 and terminals 12 and 13 on the SC-SB2K board.

f. Position the elevator several floors above the bottom landing with a full load in the car. Then register a car call for the bottom landing. ***The car will strike the buffer.***

g. Put the elevator on Inspection and pick the up direction to move the car.

h. On the SC-BASE board, place the PFLT Bypass jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions**.

i. Remove the jumpers between terminals 9 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the SC-SB2K board.

j. On the SC-SB2K board, remove the jumper between pins 2KBP1 and 2KBP2. Also set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS OFF** (see Section 5.6.5.1). ***Remove all of the jumpers installed in this section.***

4.16.5 GOVERNOR AND CAR SAFETY TESTS (TORQMAX F5)

4.16.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVER SPEED switch contact manually and verify that the main safety circuit drops out. Use whichever method is most familiar to verify the actual electrical and mechanical tripping speeds.

4.16.5.2 GOVERNOR AND CAR SAFETY OVERSPEED TEST WITH FULL LOAD GOING DOWN.

a. Move the fully loaded car to the top terminal landing and turn the power OFF.

b. On the SC-BASE board, place the PFLT BYP jumper in the ON position to **bypass the PLD ILO, ETS and contract overspeed fault functions.**

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets.

d. Connect a jumper between terminals EBS1 and EBS2 to ***bypass the governor overspeed switch***.

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminal 16 on the SC-SB2K board and panel mount terminal 17 to ***bypass the safety plank (SOS) switch***.

f. Turn the power ON and verify that the controller is functional.

g. On the SC-SB2K board, install the jumper between pins 2KBP1 and 2KBP2. Also set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS ON** (see section 5.6.5.1).

h. Make note of the value of drive parameters LF.20 and LF.42 . To run the car at 125 % of its original speed set parameters LF.20 and LF.42 to 125% of the original setting. If the trip point is greater than 150%, skip steps (g), (h) and (i) and use other means to over speed the car.

i. Register a car call in the down direction, but not for the bottom landing. The car should travel at 125% of Contract Speed. The governor should trip and set the safety and stop the car.

j. Put the car on Inspection.

k. Reset the AC drive parameters **LF.20** and **LF.42** to their original value (contract speed value).

l. Reset the mechanical governor and inspect the hoist ropes to make sure they are in the proper grooves.

m. Move the car UP on Inspection to release the flexible guide clamp safety or release the car safety by hand if it is a wedge type clamp.

n. ***Remove the jumper between terminals EBS1 and EBS2 which bypasses the governor overspeed switch.***

o. ***Remove the jumper from PC board terminal 16 and panel mount terminal 17 which bypasses the safety plank (SOS) switch).***

p. Reinstall relays AS and ETL on HC-ACIF board, if applicable. Also, remove jumper between SC-BASE terminals 2KBP1 and 2KBP2 and set the **ASME A17.1-2000 REDUNDANCY BYPASS** to **BYPASS OFF** (see Section 5.6.5.1).

q. On the SC-BASE board, place the PFLT BYP jumper in the OFF position to **enable the PLD ILO, ETS and contract overspeed fault functions.**

r. Put the car on Normal operation by taking the car off Inspection. After the elevator finds a floor, verify the operation of the elevator by registering calls and checking the speed.

4.16.6 PHASE LOSS DETECTION TESTS (TORQMAX F5)

The VFAC Drive Unit is programmed to detect a motor phase loss. To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display **E.LC** (no current flows to the motor). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

The drive adjustments and tests are complete. Now complete the A17.1 Code Compliant Functions and Testing (Section 4.17) and fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

WARNING: Before the Elevator can be turned over to normal use, it is very important to verify that no safety circuit is bypassed. The items to be checked, include, but are not limited to:

* Verify that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumpers between terminals 2 and UET or DET.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 4 and 9 (SC-SB2K).
* No jumper between terminals 9 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Speed Command 9 and Overspeed Level parameters must be set to original value for high speed.
* Option **ASME A17.1-2000 REDUNDANCY BYPASS** is set to **BYPASS OFF** and F3 switch down (OFF) on MC-PCA.
* Set the PFLT Bypass Jumper to the OFF position.
* Parameters LF.20 and LF.42 set to 100% of contract speed.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

NOTE: If this car is part of an M3 Group System, refer to Section 4.18 for instructions on setting the Car Network ID.

4.17 ASME A17.1 - 2000 CODE COMPLIANT FUNCTIONS AND TESTING

This section of the manual outlines the calibration and testing of the portion of the control system used to meet the requirements of the ASME A17.1-2000 code. After completing the overspeed test, test both the ascending car overspeed and unintended car movement protection.

First, verify that the overspeed functions for ETS and ILO have been calibrated.

4.17.1 OVERSPEED CALIBRATION AND TESTING

Refer to one of the following sections:

- Section 4.4 for G5 / GPD515 drives,
- Section 4.7 for MagneTek HPV 900 drives,
- Section 4.10 for TORQMAX F4 drives or
- Section 4.13 for Yaskawa F7 drives.

4.17.2 ASCENDING CAR OVERSPEED PROTECTION

Prior to this test the governor overspeed switch velocity setting needs to be checked by whatever means is normally used. The emergency brake must be installed and adjusted per manufacturer's specifications. Note that it is critical for the Hollister-Whitney Rope Gripper, that the brake shoes are properly "arced-in" to conform with the curvature of the ropes (refer to the Hollister-Whitney Rope Gripper instructions).

a. On the SC-BASE board, place a jumper between 2KBP1 and 2KBP2.

b. Also set the Automatic Operation ASME A17.1-2000 Bypass Function, ABYP = ON (see Section 5.3.2).

c. On SC-SB2K board, place TEST/NORMAL switch in TEST position.

d. Run empty car to bottom landing and have a technician monitor car speed with a hand operated tachometer. With doors closed, use what ever method you are familiar with to overspeed the car in the up direction. As the car accelerates have the technician call out car speed so that the car can be stopped if the governor overspeed switch does not activate when required.

e. Once the governor overspeed switch opens the Emergency Brake should immediately apply and bring the car to a rapid stop.

f. To restore normal operation, reset GOV overspeed switch. Remove all jumpers and set the ASME A17.1-2000 Bypass Function, ABYP = OFF (see Section 5.3.2) and place the F6 switch OFF (down). Turn Inspection OFF and place TEST/NORMAL on NORMAL.

4.17.3 UNINTENDED CAR MOVEMENT PROTECTION

a. For safety, station a mechanic at the landing where the test is to be performed.

b. Bring the car to the mechanic and arrange to open both the car and hoistway doors. Place barricades in front of the open car and hoistway doors.

c. Meanwhile, back in the machine room, use whatever method you are familiar with to allow the car to drift away from the landing with doors open.

d. As the car moves away from the floor, observe that the emergency brake stops and holds the car within 48" of floor level.

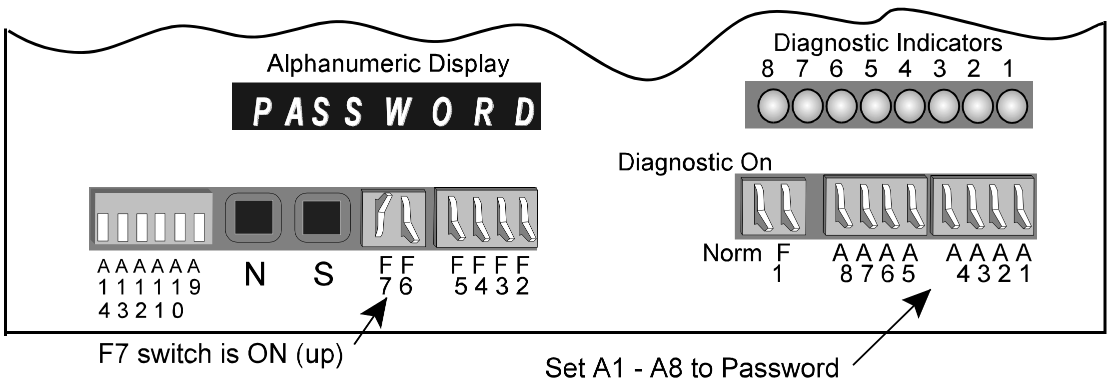
e. To restore normal operation, close and lock both the car and hoistway doors and then press and hold the Emergency Brake Reset pushbutton (SC-BASE(R) board) until the emergency brake resets.

4.18 SETTING THE CAR NETWORK ID

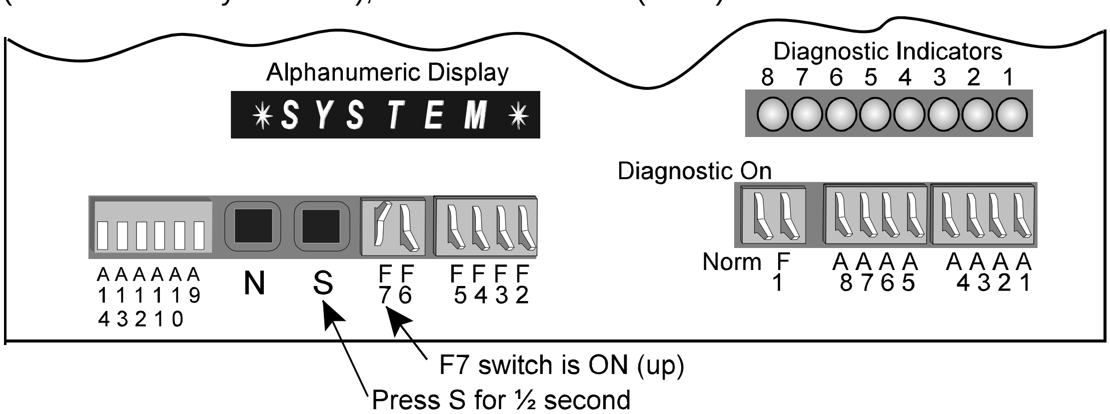
The Car Network ID identifies each local car controller to the Group Supervisor for communication purposes. With Release 4 Communication software this parameter is programmable and must be set for each local car in the Group System.

Using the optional CRT terminal - The optional CRT terminal connected to the local car controller may be used to set CNID Car Network ID. For instructions on using the CRT terminal, refer to the section in the Computer Peripherals Manual, MCE part #42-02-CP00 titled *Using the CRT Terminal*.

Using the Computer Swing Panel - The Car Network ID may be set using the Computer Swing Panel EOD in System Mode. To enter the System Mode, set the switches as follows:

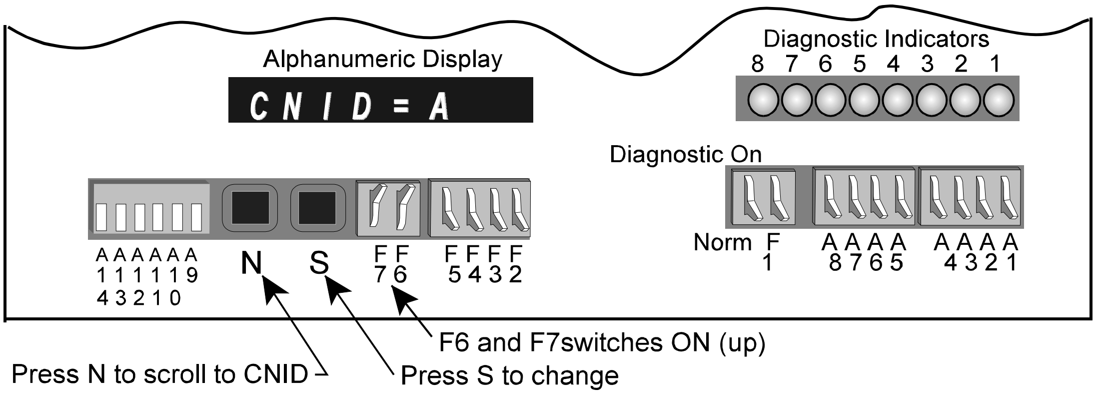


With the F7 switch in the ON position, the alphanumeric display shows **PASSWORD**. Set the A1 - A8 switches to the password value. If no password has been programmed for this job (which is normally the case), set A1 - A8 to OFF (down).



Press the **S** pushbutton for ½ second. The alphanumeric display changes to **SYSTEM**. While in System Mode, the group of eight vertical status LEDs scan from bottom to top indicating that System Mode is active.

SETTING THE CNID SOFTWARE OPTION - Once in System Mode, place the F6 switch in the ON (up) position. The first software option will be shown on the display. Press **N** to scroll to the CNID Car Network ID option. Then press **S** to change the setting.



Once the desired CNID setting is displayed, exit System Mode by placing switches F6 and F7 in the OFF (down) position.

WARNING: Before the Elevator can be turned over to normal use, it is very important that no safety circuit is bypassed. The items to be checked include, but are not limited to:

* Check that the hierarchy of the inspection inputs is correct. Car top inspection must take priority over in car, hoistway access and machine room inspection modes. In car must take precedence over hoistway access and machine room inspection. Hoistway access must take priority over machine room inspection.
* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* No jumpers between terminals 2 and UETS1/2 or DETS1/2.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE(R).
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumper between terminals 4 and 9 (SC-SB2K).
* No jumper between terminals 9 and 10 or 12 (SC-SB2K).
* No jumper between terminals 10 and 11 (SC-SB2K).
* No jumper between terminals 12 and 13 (SC-SB2K).
* No jumper between terminals 16 and 17 (SC-SB2K).
* No jumper between terminals EBS1 and EBS2.
* Option **ABYP** is set to **OFF** and controller is in normal mode.
* Set PFLT Bypass Jumper to the OFF position.
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

SECTION 5
ONBOARD DIAGNOSTICS

5.0 GENERAL INFORMATION

The VFMC-1000 Series “M” AC traction controller includes user-friendly diagnostic tools that help the mechanic install and service the equipment. The diagnostic tools available on the controller include an optional CRT terminal and the Enhanced Onboard Diagnostics (EOD). The CRT terminal provides the elevator mechanic with a set of easy-to-use menus for the purpose of servicing and troubleshooting the controller. More information about the CRT is available from the MCE Computer Peripherals manual. This section covers the Computer Swing Panel's Enhanced On-Board Diagnostics.

5.1 ENHANCED ONBOARD DIAGNOSTICS (EOD) OVERVIEW

The Computer Swing Panel provides the Enhanced Onboard Diagnostics (EOD). A quick look at the switches and LEDs provides an overview of the elevator and its functions. Once familiar with the equipment, an elevator mechanic can understand the current operating conditions of the elevator and diagnose a problem using the EOD. No external devices are required to view the status of the elevator and see what the elevator control system is actually trying to do. The Enhanced Onboard Diagnostics operate in three modes, Normal, System and Diagnostic. All three modes are discussed in detail in this section.

5.1.1 DESCRIPTION OF EOD LIGHTS AND SWITCHES

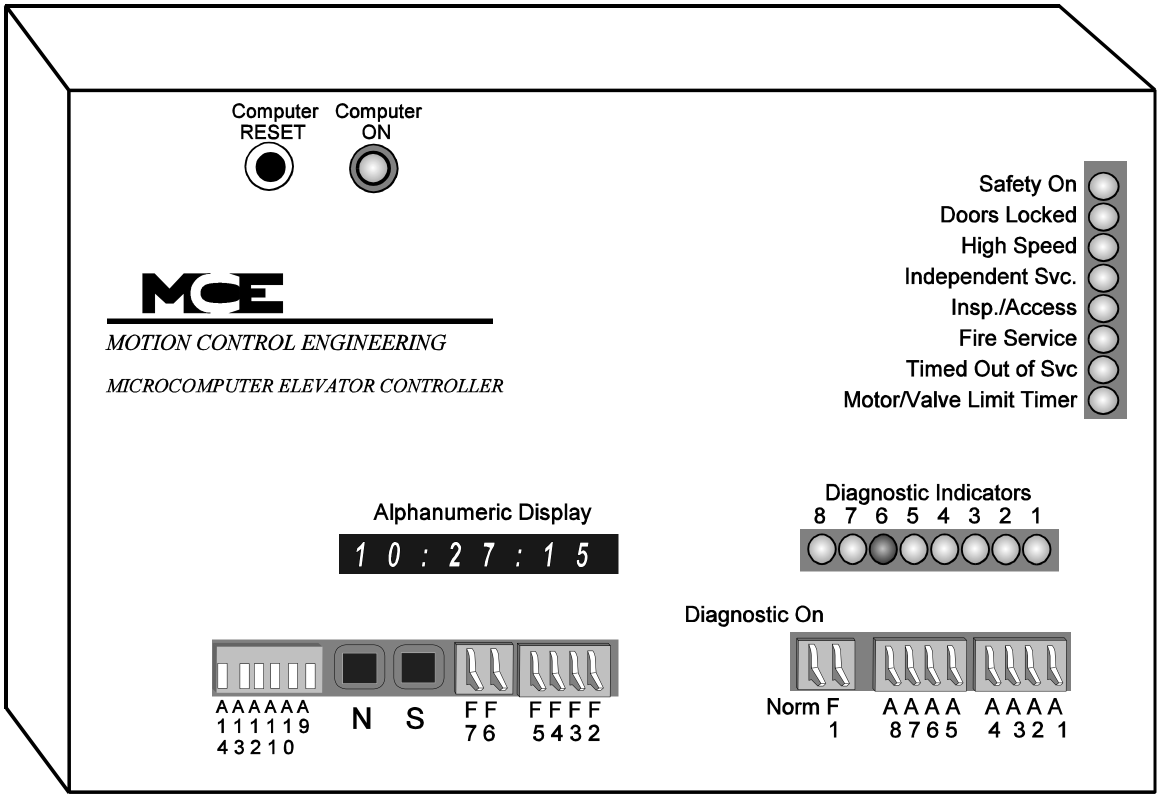
The following is a description of the EOD indicators and switches (see Figure 5.1)

COMPUTER ON LED - The Computer ON LED, when it is ON continuously, indicates that the MC-MP2-2K software system is functioning normally and is completing its program loop successfully. If the Computer ON LED flashes ON and OFF, it means that the program is not looping successfully. When this happens the SAFR2 relay is dropped and all further operation is shut down. Make sure the EPROM chip is installed properly. Refer to Appendix A, *Disassembling the Computer Swing Panel* and Appendix B, *Changing PC Boards or EPROMS*.

COMPUTER RESET BUTTON - Pressing the Computer RESET button on the front of the Swing Panel causes the MC-MP2-2K (Main Processor board) and the optional MC-CGP-4(8) Communication Processor board to reset. If the elevator is running, resetting drops the SAFR1 and SAFR2 safety relays and brings the elevator to an immediate stop. After release of the reset button, the elevator then proceeds to the nearest floor to correct its position before responding to any calls. Existing call and PI information is lost when the microcomputer is reset.

Pressing the Computer RESET button on the Computer Swing Panel turns the Computer ON LED OFF and it will remain OFF while the RESET button is depressed. The Computer ON LED turns back ON when the RESET button is released. The Main Processor board is also equipped with software system monitor that drops relay SAFR2 if for any reason the software system fails to execute its program.

FIGURE 5.1 Computer Swing Panel, Front View



STATUS INDICATORS - (vertical LEDs on the front of the Swing Panel) - These lights indicate the elevator's status. When these lights are ON, they mean the following:

Safety On	-	the safety circuit is closed.
Doors Locked	-	the door lock contacts are closed.
High Speed	-	the elevator is running at high speed.
Independent Svc.	-	the elevator is on Independent Service.
Insp./Access	-	the elevator is on Hoistway Access, Car Top or Relay Panel Inspection operation.
Fire Service	-	the elevator is on Fire Service operation.
Timed Out of Svc	-	the TOS timer has elapsed.

Motor/Valve Limit Timer - the Motor or Valve Limit Timer has elapsed.

DIAGNOSTIC INDICATORS - The eight horizontal diagnostic indicator lights (MP Diagnostic Indicators) have two functions. When in Normal mode, they indicate the current status or error condition (see Section 5.2.2), and when in Diagnostic mode, they indicate the contents of computer memory (see Section 5.4.1).

ALPHANUMERIC DISPLAY - The eight character alphanumeric display is used to provide user friendly interaction between the control equipment and the elevator mechanic by displaying alphanumeric messages (see Section 5.2.1).

ADDRESS SWITCHES (A1 - A8) - These switches enable the mechanic to look at the memory on the MC-MP2-2K Main Processor board (see Section 5.4.1). They are also used for entering calls into the system (see Section 5.4.2). These switches are ON in the up position and OFF in the down position.

ADDRESS SWITCHES (A9 - A14) - These address switches, on the left side, are primarily used by the factory.

CAR A/CAR B (F1) SWITCH - In a duplex configuration, this switch selects which car's information is being displayed and can be accessed by the A1 - A8 switches. This switch is also used to access the COM Ports when in SYSTEM mode.

DIAGNOSTIC ON/NORMAL SWITCH - This switch puts the system in Diagnostic mode in the up position and in Normal mode in the down position (see Section 5.4).

FUNCTION SWITCHES (F2 - F7) - These switches are used to access diagnostic information for viewing and changing settings in the Normal and System modes of operation (see Sections 5.2 and 5.3).

PUSH-BUTTONS N AND S - These push-buttons are used in different diagnostic modes to scan through the choices available and to make selections.

CP COMPUTER ON INDICATOR LIGHT - The CP Computer ON LED on the optional MC-CGP-4(8) board indicates that the Communication Processor board is functioning normally and is completing its program loop successfully. The MC-CGP-4(8) board is equipped with an auto reset feature that will cause the elevator to go through a resetting process if, for any reason, the program loop cannot be completed.

5.2 NORMAL MODE (EOD)

The following is a description of the indicators and switches used in Normal mode, and the settings which can be viewed and changed. Begin with all switches in the OFF (down) position as shown in Figure 5.1. Specifically, the Diagnostic On/Norm and the F7 switches *must* be in the down position. In the Normal Mode, the F2, F4 and F5 switches are used to access and set the following:

F2 - Adjustment of Elevator Timers (see Section 5.2.3)
F4 - Setting the Real Time Clock (see Section 5.2.4)
F5 - Viewing the MP Internal Flags (see Section 5.2.5)
F2 thru F7 - Resetting the MC-CGP parameters (see Section 5.2.6)

5.2.1 ALPHANUMERIC DISPLAY (DEFAULT DISPLAYS)

> **NOTE:** Upon power up, controllers with the MC-MP2 board scroll the message ***MP2 VERSION NUMBER: 8.xx.xx*** across the alphanumeric display. If the message ***PASSCODE REQUEST...*** is then scrolled across the display, refer to Section 5.3.6 *Setting and Resetting the Passcode Option*.

The alphanumeric display is used for a number of special diagnostic functions that are available on the controller. Depending on the configuration of the control system, the available displays include the following:

- scrolling status and error messages
- temperature (Celsius)
- temperature (Fahrenheit)
- measured load
- trip counter
- software versions
- time of day

To scroll through the available displays (change what is currently being displayed on the alphanumeric display), press and hold the N push-button.

N O R M A L   O P

STATUS AND ERROR MESSAGES - On controllers with the MC-MP2 Main Processor board, status and error messages are scrolled across the alphanumeric display. The message NORMAL OPERATION is scrolled when no other status or error condition(s) exist. Table 6.1 provides a list of standard messages and Table 6.3 *Status and Error Messages* provides descriptions and troubleshooting information. Table 6.4 provides a list of ASME A17.1-2000 status and error messages.

Note that at any time, more than one status or error condition may exist. But the Alphanumeric Display can show only one message at a time. The message considered to be of highest priority will be displayed first. For example, if the car is on Independent Service *and* the safety circuit is open, the display will scroll SAFETY CIRCUIT IS OPEN. Once the problem with the safety circuit is corrected, the display will scroll the message INDEPENDENT SERVICE OPERATION. When Independent Service is turned OFF, NORMAL OPERATION will again be displayed.

TEMPERATURE (CELSIUS) - This mode displays the temperature in degrees Celsius. This mode is available only if the controller has been configured with the ability to connect a temperature sensor. In the examples, 45C represents 45° Celsius and -15C represents -15° Celsius.

TMP= 45C

TMP=-15C

TEMPERATURE (FAHRENHEIT) - This mode displays the temperature in degrees Fahrenheit. This mode is available only if the controller has been configured with the ability to connect a temperature sensor. In the examples, 104F represents 104° Fahrenheit and -27F represents -27° Fahrenheit.

TMP=104F

TMP=-27F

MEASURED LOAD - This feature is only available for controllers that use an analog load sensing device (load weigher). In the example on the right, the measured value is 100% of the learned value. If the load weigher learn process has not yet been successfully performed, the measured load will not be displayed; the computer has no reference values from which to calculate the load. Instead, the following status message will be displayed: **LOAD WEIGHER NOT YET LEARNED**.

LW= 100%

TRIP COUNTER - This mode provides the ability to view and/or reset a six-figure trip counter. The trip counter records the number of high speed runs made by the elevator since the last time the counter was reset to zero. The example on the right indicates that the car has made two thousand runs since the counter was last reset.

T=002000

RESETTING THE TRIP COUNTER - A trip counter may be reset to zero by pressing and holding the S push-button while the trip counter is displayed. Once the S push-button is pressed, the alphanumeric display will display **CLEAR: 5**, indicating that the counter will be cleared in 5 seconds. If the button is held for 5 seconds, the timer will count down from 5 to 0 and the counter will be reset to zero. The 5-second delay is provided to prevent an accidental reset of the counter. Once cleared, the counter will display the value zero.

T=000000

SOFTWARE VERSIONS - On local car controllers the version number of the MP Main Processor and CGP Communication Processor software are displayed. The following messages are scrolled across the alphanumeric display:

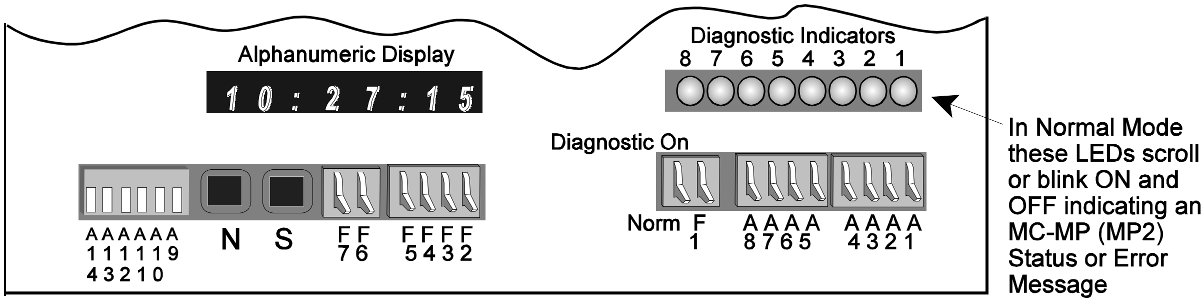
MP VERSION NUMBER:	X.XX.XX	(X.XX.XX is the version number)
CGP VERSION NUMBER:	X.XX.XX	(X.XX.XX is the version number)

TIME OF DAY - This mode displays the time of day in a 24-hour military format (hours, minutes and seconds). Refer to Section 5.2.4 to change or adjust the time. The example shown on the right represents the time 1:30 p.m.

13:30:00

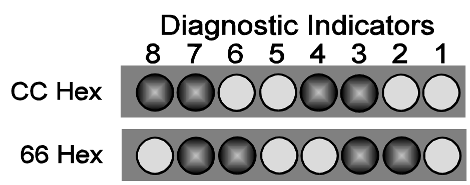
5.2.2 DIAGNOSTIC INDICATORS

The Diagnostic Indicators are located on the front of the Computer Swing Panel.

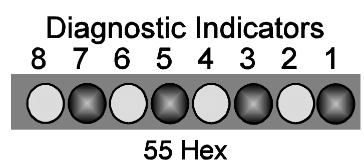


MP2 DIAGNOSTIC INDICATORS - The MP2 Diagnostic Indicators are located on the front of the Computer Swing Panel. During normal operation these lights scan from right to left (indicating that the MP program is looping properly) or flash ON and OFF to indicate an error or status condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

When a status or error condition exists, the Diagnostic Indicators flash one of several messages depending on the software version (MP2 version number scrolls on boot up):



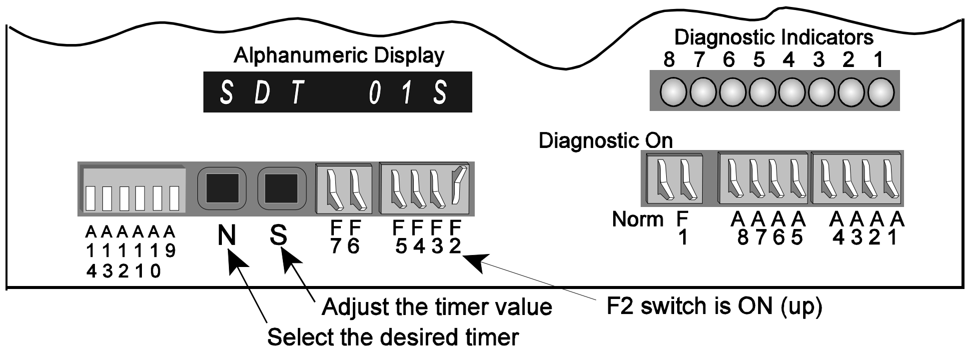
- Software versions 8.02.00 or earlier flash the MC-MP-1ES messages.
- Software version 8.03.00 flashes CC Hex.
- Software versions 8.04.00 or later flash 66 Hex. Set the alphanumeric display to scroll the status or error message. Refer to Table 6.1 *MC-MP2 Scrolling Messages Lookup* or find the message in the Index and then refer to Table 6.3 *Status and Error Messages* for a description and troubleshooting information for the scrolling message.
- ASME A17.1 - 2000 status and error conditions are indicated by the diagnostic indicators flashing 55 Hex. Set the alphanumeric display to scroll the status or error message. Refer to Table 6.4 *ASME A17.1 - 2000 Status and Error Messages* for a description and troubleshooting information for the scrolling message.



If the scrolling status or error message is not immediately displayed, press the N pushbutton until the scrolling message appears (see Section 5.2.1 ALPHANUMERIC DISPLAY - STATUS AND ERROR MESSAGES).

5.2.3 ADJUSTMENT OF THE ELEVATOR TIMERS

To view or adjust the elevator timing functions, set the switches as shown. When the F2 switch is ON the timer settings are displayed and the values can be changed.



For example, when the F2 switch is turned ON, the display reads **SDT 01S**. SDT is the flag for Short Door Dwell Timer. The number (01S) means that the Short Door Dwell Timer has been set for 01 second. If the value had been in minutes, the last letter displayed would be M instead of S. Pressing the N push-button (for next) advances the display to the next available programmable timer. Constant pressure on the N push-button causes the display to scroll through all the available programmable timers. Table 5.1 provides a listing of the programmable timers and their ranges.

Once a programmable timer has been selected using the N push-button, the timer can be adjusted to a desired value by using the S (for select) push-button. The adjustment range for each timer is pre-set (see Table 5.1). Constant pressure on the S push-button increases the timer value by one (second or minute) and causes the display to flash until the value reaches the upper limit, at which point it automatically starts over from the lower limit. When the A1 switch is placed in the ON (Up) position, pressing the S push-button causes the timer value to decrease. Release the S push-button when the desired value is displayed. When the S push-button is released, the display flashes for three seconds. After the display stops flashing, the new timer value has replaced the old value.

NOTE: Timers listed in Table 5.1 are not included if the corresponding inputs/outputs/options are not available on your controller.

TABLE 5.1 Timers and their Ranges*

Timer	Description	Timer Range
ADAC	**ADA Car Call Door Dwell Timer.** This timer provides the minimum door dwell time when responding to a car call, as required by the ADA. This timer is not shortened by the activation of a button or door reopening device.	01-120 seconds
ADAH	**ADA Hall Call Door Dwell Timer.** This timer provides the minimum door dwell time when responding to a hall call, as required by the ADA. This timer is not shortened by the activation of a button or door reopening device.	01-120 seconds
ASTP	**Automatic Stop Door Dwell Timer.** This timer defines the amount of time the doors will stay open when the car has performed an “automatic stop”. This timer will only appear if the controller software has been configured to perform the “auto stop” function.	01-30 seconds
CCT	**Car Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to a car call.	01-120 seconds
DHLD	**Door Hold Timer.** This timer defines the amount of time the doors will stay open when the door hold button is pressed. This timer will only appear if the controller has been configured with a door hold button (DHLD input).	01-240 seconds

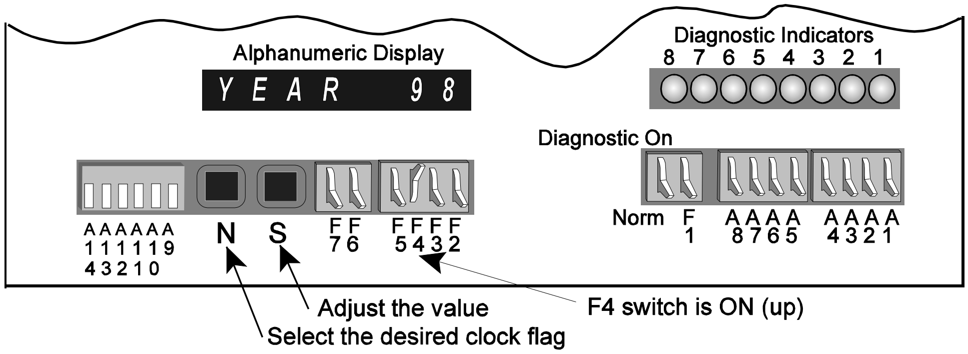
TABLE 5.1 Timers and their Ranges*

Timer	Description	Timer Range
DRBZ	**Door Buzzer Timer.** This timer indicates the length of time that the door buzzer output should be active before door closing is initiated.	0-30 seconds
FLO	**Fan and Light Output Timer.** This timer defines the amount of time that the fan and light output (FLO) will keep the car fan and lights operative in the absence of demand on the car. This timer will only appear if the controller has been configured with a fan and light output (FLO output).	01-25 minutes
HCT	**Hall Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to a hall call.	01-120 seconds
HOS2	**In-car Hospital Service Timer.** This timer defines the amount of time that the car will remain at a floor in response to a hospital emergency call. If the timer elapses before the car is placed into "in-car hospital service", the car will revert back to normal operation. This timer will only appear if the controller has been configured with hospital emergency service.	01-120 seconds
IDLE	**Idle Demand Timer.** This timer defines the amount of time that will pass before an idle car is automatically moved to the next floor. This feature is useful in applications in which it is desirable to lubricate the bearings and/or exercise the brake mechanism periodically to prevent friction at initial car movement. This timer may be turned OFF to disable this function.	01-60 minutes
LOT	**Lobby Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to either a car call or a hall call at the lobby landing (as specified by the adjustable control variable "LBBY").	01-120 seconds
MBWR	**Motor Blower Output.** This timer defines the amount of time that the Motor Blower output (MBWR) stays on after the car has stopped running.	01 - 26 minutes
MGT	**Motor Generator Shut Down Timer.** This timer defines the amount of time that will pass before the motor generator is turned OFF on a car that is idle.	01-10 minutes
PHEB	**Photo Eye Bypass Timer.** This timer defines the amount of time that will pass before an active optical door reopening device is ignored and/or nudging is activated. The computer monitors the PHE input for continuous activation and, should the PHE input remain active for the amount of time defined by the PHEB timer, the PHE input is ignored and/or nudging operation invoked (depending upon the controller configuration).	10-240 seconds
PRIS	**In-car Priority Service Phase II Timer.** This timer defines the amount of time that the car will remain at a floor in response to a Priority Service call. If the timer elapses before the car is placed into "In-car Priority Service", the car will revert back to normal operation. This timer will only appear if the controller has been configured with In-car Priority Service.	01-120 seconds
PRKD	**Parking Delay Timer.** This timer represents the amount of time that will pass before an idle car will park at the specified parking floor (if applicable).	01-120 seconds
SDT	**Short Door Dwell Timer.** This timer defines the door dwell time that will be provided when a door reopening device has been activated.	01-120 seconds
SEPT	**Mechanical Safety Edge Protection Timer.** This timer defines the amount of time that will pass before an active mechanical safety edge is ignored and/or nudging is activated. If a mechanical safety edge is used (as specified by the adjustable control variable MSAF), the computer monitors the SE input for continuous activation and, should the SE input remain active for the amount of time defined by the SEPT timer, the SE input is ignored and/or nudging operation invoked (if applicable).	01-240 seconds
TOS	**Time Out of Service Timer.** This timer is used to determine that a car has been prevented from responding to a car or hall call demand. Once this timer elapses, the car's "in service" status is removed to allow hall calls assigned to the car to be reassigned to another car.	15-240 seconds

**Some timers are not included if the corresponding inputs/outputs are not programmed.*

5.2.4 SETTING THE REAL TIME CLOCK

To adjust the real time clock, set the switches as shown. The F4 function switch is used to access the clock parameters located on the Main Processor board.



Placing the F4 switch in the ON (up) position causes the alphanumeric display to show the current year. The following table lists all the clock parameters and their adjustment ranges.

TABLE 5.2 Clock Parameters and their Ranges

Parameter	Range	Parameter	Range
YEAR	00 - 99	DATE	01 - 31
MONTH	01 - 12	HOUR	00 - 23
DAY	MON. - SUN.	MIN (MINUTE)	00 - 59

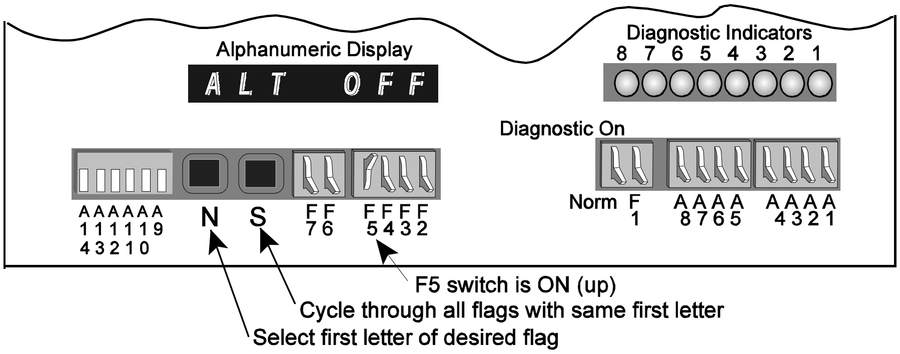
Press the N push-button to select the next parameter. Constant pressure on the N push-button causes the display to scroll through all of the real time clock parameters. Once a parameter has been selected, the value can be changed by pressing the S push-button. Constant pressure on the S push-button increases the value by one, until the value reaches the upper limit, at which point it automatically starts over from the lower limit. When the A1 switch is placed in the ON (up) position, pressing the S push-button causes the timer value to decrease. Release the S push-button when the desired value is displayed. The new value is saved immediately. Return the F4 switch to the OFF (down) position to exit the clock parameter adjustment menu.

5.2.5 ALPHANUMERIC DISPLAY - VIEWING THE MP2 INTERNAL FLAGS / INPUTS

This function is used to display the status of many of the input/output and internally generated flags related to the MC-MP2-2K computer. To access these flags, set the switches as shown.

MC-MP2-2K Flags - With the MC-MP2-2K software, after moving the F5 switch to the ON position, the alphanumeric display scrolls the message ***FLAGS STATUS...*** and then displays abbreviation and status of the first available flag beginning with the letter A.

To access the MC-MP2-2K flags, set the switches as shown.



Tables 5.8 and 5.10 provide a listing of the available flags. To select a flag, press the **N** pushbutton until the first letter of the flag displayed is the same as the first letter of the desired flag. Release the **N** pushbutton and press the **S** pushbutton until the desired flag is displayed. The flag's abbreviation and current status is displayed (0 = OFF, 1 = ON).

MC-MP2-2K Inputs - With the MC-MP2-2K software the status of many system inputs may be viewed on the alphanumeric display. To view the inputs, the F5 switch plus various additional switches must be placed in the ON (up) position as follows:

- F5, A9 HC-PIO board inputs
- F5, A10 HC-RD board inputs
- F5, A9, A10 HC-IOX / HC-I4O board inputs
- F5, A11 HC-CIO board inputs
- F5, A9, A11 MC-NC board inputs
- F5, A10, A11 SC-SB2K board inputs
- F5, A9, A10, A11 SC-BASE board inputs
- F5, A9, A10, A11, A12 SC-HDIO board inputs

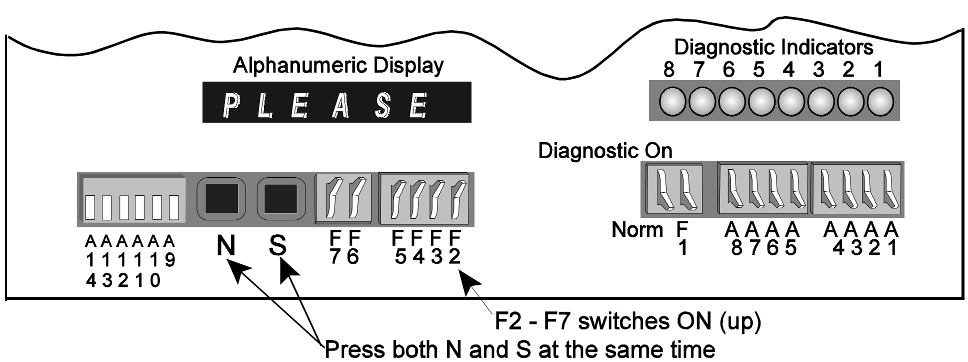
Press the **N** pushbutton to scroll through the inputs available for this job. They are displayed in the order they are arranged on the board. The abbreviation and status of each input is displayed (0 = OFF, 1 = ON).

5.2.6 RESETTING THE CGP PARAMETERS

When an MC-CGP-4(8) EPROM or PC board are changed it may be necessary to reset the CGP parameters to their default values. This can be done using either the optional CRT terminal or via the Computer Swing Panel.

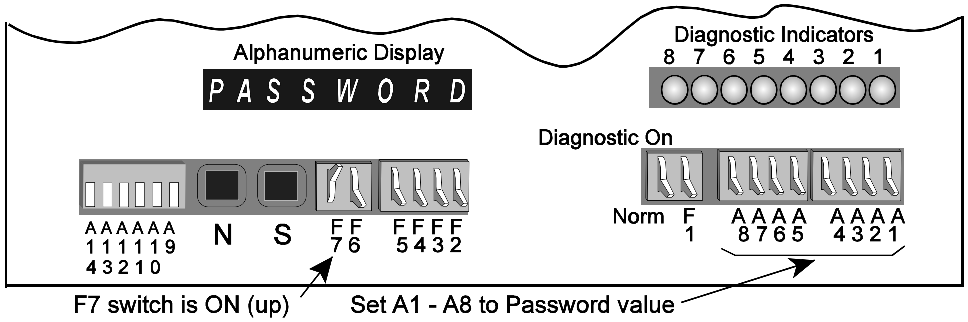
Using the optional CRT terminal - The optional CRT terminal connected to the local car controller may be used to reset the CGP parameters using ODPC Reset CGP Parameters. For instructions on using the CRT terminal, refer to the section in the Computer Peripherals Manual, MCE part #42-02-CP00 titled *Using the CRT Terminal*.

Using the Computer Swing Panel - The CGP parameters can be reset to their default values using the Computer Swing Panel. Set the toggle switches as shown, then press both the **N** and **S** pushbuttons at the same time.



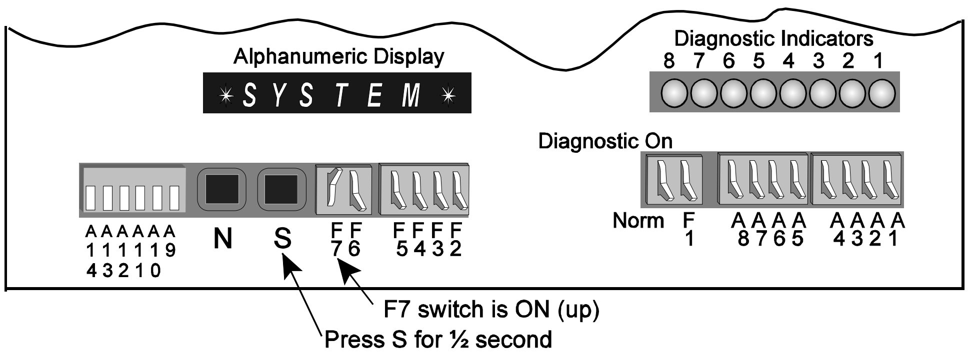
5.3 SYSTEM MODE (EOD)

The System Mode provides a level of security (if programmed) so that an unauthorized person cannot modify or change the system parameters either intentionally or by mistake. To enter the System Mode, set the switches as shown



.

With the F7 switch in the ON position, the alphanumeric display shows **PASSWORD**. Set the A1 - A8 switches to the password value. If no password has been programmed for this job (which is normally the case), set A1 - A8 to OFF (down).



Press the **S** push-button for ½ second. The alphanumeric display changes to **SYSTEM**. While in System Mode, the group of eight vertical status LEDs scan from bottom to top indicating that System Mode is active. If no function switch is moved or push-button is pressed for a period of two minutes, the computer will automatically exit from System Mode and go into the Normal Mode of operation. Placing the F7 switch in the OFF (down) position also causes the EOD to exit the System Mode.

In System Mode, the Function Keys are used to access and set the following system parameters:

- F1 - Communication Port Settings (see Section 5.3.1)
- F3 - Security Codes (see Section 5.3.2)
- F4 - Not used
- F5 - MSK: Master Software Key (Simplex only) (see Section 5.3.3)
- F6 - Software Options - adjustable control variables (see Section 5.3.4)
- F7 - Turns System Mode ON and OFF
- Diagnostic On/Norm - Load Weigher Learn Operation (see Section 5.3.5)
- A8 - Setting and Resetting the Passcode Option (see Section 5.3.6)

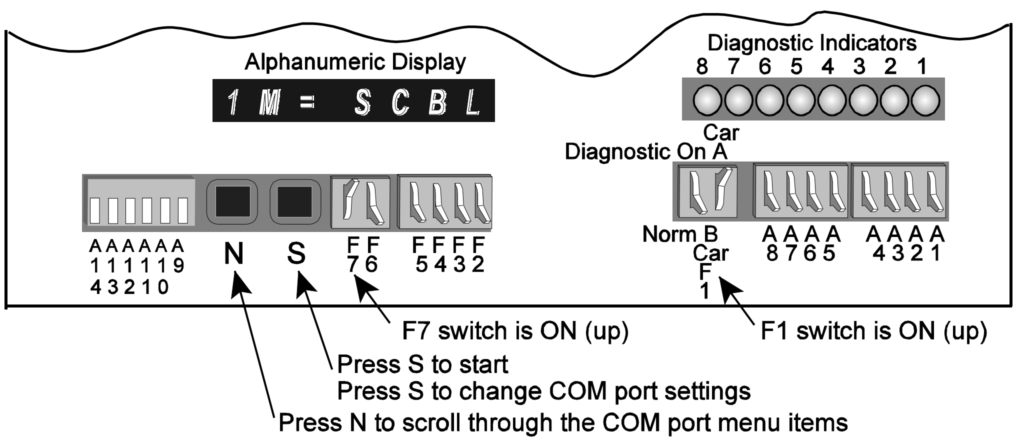
5.3.1 PROGRAMMING THE COMMUNICATION PORTS

The communication ports are field programmable through the Computer Swing Panel's Enhanced Onboard Diagnostics (EOD). MCE's Computer Peripherals Manual covers connecting a CRT terminal to a COM Port on the MC-RS board and set-up of the CRT terminal.

The communication ports were programmed (at the factory) for the original hardware, based on customer-provided information. It may be necessary to reprogram a communication port for one of the following reasons:

- changing from a monochrome to a color CRT
- adding a lobby CRT or CRT with keyboard.
- adding a modem.

The new hardware will not work correctly until the communication port is reprogrammed. To reconfigure the communication port, enter the System Mode as described at the beginning of Section 5.3 and set the switches as shown.



When the F1 switch is placed in the ON (up) position, the alphanumeric display shows the following scrolling message: **COMPORT MENU PRESS S TO START**. Press the **S** push-button for ½ second and the display will show the current setting for the first item on the COM port menu, in this case **1M=SCBL**. The *1M* stands for *COM Port 1 Media* and *SCBL* stands for *Serial Cable* (see Tables 5.3 and 5.4) To change a communication port setting, press the **N** push-button to scroll through the Communication Port Menu until the desired item is shown on the alphanumeric display. Table 5.3 lists the items on the COM port menu.

CHANGING THE MEDIA SETTING - To change the *media* setting for COM Port #2, press the **N** push-button to scroll through the items on the Communications Port Menu (see Table 5.3) and release N when **2M** is displayed. Then press the **S** push-button to scroll through the Media Menu (see Table 5.4). Release S when the desired media is displayed. After selecting the desired media, press N to again scroll through the Communications Port Menu.

CHANGING THE DEVICE SETTING - To change the *device* setting for COM Port #2, press the **N** push-button to scroll through the Communications Port Menu and release N when **2D** is displayed. Then press the **S** push-button to scroll through the Device Menu (see Table 5.5). Release S when the desired device is displayed. After selecting the desired device, press N to again scroll through the Communications Port Menu.

SAVING THE CHANGES - When you have finished making changes, press the N push-button until, **SEVEN/S** is displayed. Pressing **S** will save the changes and **SAVED...** will be displayed. If **N** is pressed the program will continue to scroll through the Communications Port Menu. To exit the Communications Port Menu, place the F1 switch in the OFF (down) position. If you exit the Communication Port Menu without choosing SEVEN/S and pressing S, any changes made to settings will be ignored.

TABLE 5.3 Communication Port Menu

EOD Display	Description
NO COM	No COM port option has been enabled
1M	COM Port 1 Media
1D	COM Port 1 Device
2M	COM Port 2 Media
2D	COM Port 2 Device
3M	COM Port 3 Media
3D	COM Port 3 Device
4M	COM Port 4 Media
4D	COM Port 4 Device
SEVEN/S	Save the changes? N for no or continue, S for save

TABLE 5.4 Media Menu

EOD Display	Description
NONE	NO MEDIA - Select when removing a computer terminal from a port.
SCBL	SERIAL CABLE - Select when setting up a CRT/terminal with a keyboard.
LDRV	LINE DRIVER - Used when setting up a CRT at a distance over 40 feet.
MODM	MODEM - Select when attaching a modem to a computer.

TABLE 5.5 Device Menu

EOD Display	Description
NONE	No Device
CRTMK	Use for these terminals or emulators with keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
CRTM	Use for these terminals or emulators without keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
PC	Personal Computer with CMS / MSD
PCGD	Personal Computer Graphic Display (no longer used)
CRTCK	Use for these terminals with keyboard (Link MC-70, Wyse WY-370)
CRTC	Use for these terminals without keyboard (Link MC-70, Wyse WY-370)

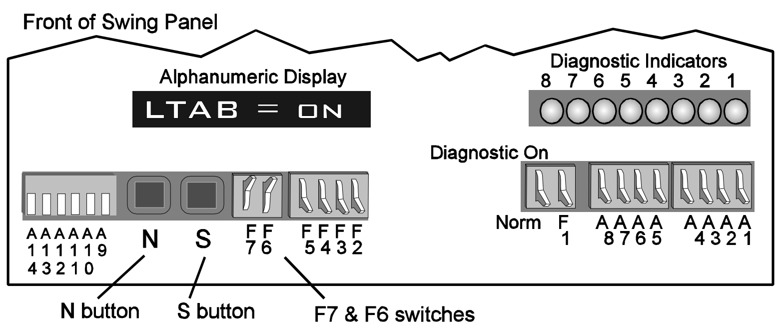
5.3.2 ASME A17.1 - 2000 BYPASS FUNCTION

To allow the car to run during construction and adjustment of the controller, we need to bypass several of the code required functions. Two modes of ANSI Bypass are available:

- One mode is for inspection operation only and provides for the bypass of the ANSI fault monitoring for an indefinite amount of time. Three steps are required to turn on this option.
- Another mode is for use on automatic operation and provides for two hours of bypass operation. Three steps are necessary to invoke this mode as well.

For bypass with unlimited time in Inspection mode:

1. Place a jumper between 2KBP1 and 2KBP2 on the SC-BASE(R) board.
2. Place the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board to the INSP position.
3. Enter system mode (**F7** switch up, press and hold **S** button for 1 second).
4. Access Software option LTAB (**F6** switch up, press **N** button to scroll to LTAB = OFF).
5. Change LTAB = ON (press **S** button)



For bypass for 2 hours in Automatic Operation:

1. Place a jumper between 2KBP1 and 2KBP2 on the SC-BASE(R) board.
2. Place the TEST/NORM switch on TEST on the SC-SB2K board.
3. Enter system mode (**F7** switch up, press and hold **S** button for 1 second).
4. Access Software option ABYP (**F6** switch up, press **N** button to scroll to ABYP = OFF).
5. Change ABYP = ON (press **S** button)

Please exercise extreme caution when the 2000 bypass function has been invoked. Note that, regardless of this bypass function, the emergency brake still functions.

NOTE:	A jumper must be placed between terminals 2KBP1 and 2KBP2 on the SC-BASE(R) board to bypass the ASME A17.1 - 2000 faults.

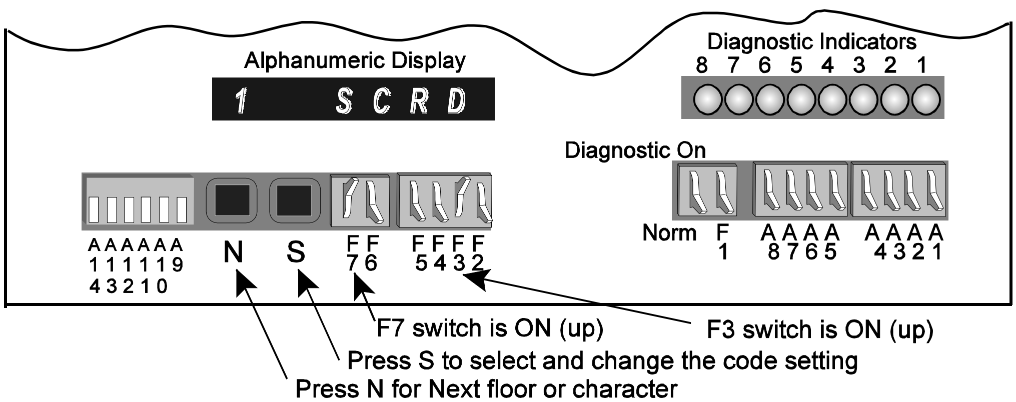
5.3.3 VIEWING AND CHANGING THE SECURITY CODES

For jobs with the MCE SECURITY, either Basic Security or Basic Security with CRT, this function allows the security codes to be viewed or changed. If the job does not have MCE SECURITY, the alphanumeric display will show **NOT USED**.

With MCE's Basic Security, the Building Security Input (BSI) is used to turn security ON and OFF. Refer to the job prints to find the BSI input. When *Security* is ON, all car calls are screened by the computer and become registered only if: (1) the call is to a floor that is not a secured floor, or (2) the floor is a secured floor and its Security Code is correctly entered within 10 seconds.

With MCE's Basic Security with CRT, additional programming options are available via the CRT terminal. Refer to MCE part # 42-02-S024 Elevator Security User's Guide, Section 3, *Basic Security with CRT - Swing Panel* for additional information and programming instructions. For both Basic Security and Basic Security with CRT, the security codes for each floor are programmed as described below.

The Security Codes are viewed and changed using the Computer Swing Panel. To view and change the security codes, place the F3 Switch in the *On* or up position while in "System" mode. Not all elevator systems are equipped with the SECURITY option. If the system does not have MCE SECURITY, the Alphanumeric Display will show "NOT USED" when the F3 switch is turned On.



The security code for each floor may consist of from one to eight characters, where each character is one of the floor buttons found in the elevator car. Each floor may have a different length code. Table 5.6, *Changing Floor Security Status and Security Code*, describes the steps required to view and change a floor's security code. **A floor can not be *Secured* unless a *Security Code* has been programed.**

Appendix J, *Security Information and Operation*, provides instructions for elevator passengers who will be using the elevator while Security is ON. Space has been provided for listing the security codes for each floor.

TABLE 5.6 Changing the Floor Security Status and Security Code

Switch	Explanation	Alphanumeric Display
Step 1 **F3 *On***	**To begin, display the 1st floor's status** While in the *System* mode, turn function switch F3 *On, "Up".*	**Example:** B NSCR B = basement NSCR = not secured
Step 2 **Press N**	**To display another floor's security status** Steps to the next floor's security status. Press N again for the next floor, etc.	**Example:** 1 SCRD 1 = floor #1 SCRD = secured
Step 3 **Press S**	**To select a floor to view or change a code** With the floor's security status displayed, press S. The first character of the floor's security code is then displayed.	**Example:** 2 1=3 For floor 2, the first character in the code is 3.
Step 4 **Press S**	**To change a code character** Steps through the available code characters. When the desired character is displayed, go to Step 5.	**Example :** 2 1=5 For floor 2, the first security character is now 5.
Step 5 **Press N**	**To display the next code character** Steps to the next character in the code. To change more characters, repeat steps 4 and 5. The last character of a code must be the word END if the code is less than eight characters long.	**Example 1:** 2 2=4 For floor 2, the second character in the code is 4. **Example 2:** 2 1=END For floor 2, the first character in the security code is the word END. Floor 2 is unsecured.
Step 6 **Press N**	**To end and save** If END is chosen as a code character or if this is the eighth character, when N is pressed the computer saves the code and displays the current floor's security status. To view or change the code for another floor, return to step 2.	**Example :** 2 NSCR If END was chosen for first character, this floor has no security code and is unsecured. Using END for any other character just ends that code, but the floor is still secured.
F3 and F7 switches *Off*, down position	**To exit System mode** Every security code must end with the word END or be 8 characters long. If not, the processor remains in System mode.	**Example:** 11:04:27 The time displayed

5.3.4 SETTING MSK: MASTER SOFTWARE KEY

On a simplex car, the Master Software Key is used in conjunction with the Basic Security with CRT option. To view or change MSK, log into System Mode as described at the beginning of Section 5.3 and then place the F5 switch in the ON (Up) position. If this is not a simplex car or if this job does not have Basic Security with CRT enabled, the alphanumeric display will show NOT USED. Additional information about the Master Software Key (MSK) can be found in MCE Part # 42-02-S024 Elevator Security User's Guide, Section 3, *Basic Security with CRT - Swing Panel*.

5.3.5 SETTING THE SOFTWARE OPTIONS - ADJUSTABLE CONTROL VARIABLES

Table 5.7 provides a listing of the software options - adjustable control variables. Not all of the options are available on all controllers. To view or set the adjustable control variables, log into System Mode as described at the beginning of Section 5.3 and place the F6 switch in the ON (Up) position.

The first available variable will be shown on the display. Press the S push-button to change the setting. Press the N push-button to scroll to the next available variable. Table 5.7 lists the variables in alphabetic order, not in the order in which they are displayed on the controller.

TABLE 5.7 Software Options

VARIABLE	NAME	DEFINITION
ABYP	*A17.1-2000 Bypass*	Allows the car to run without A17.1-2000 (monitors for 2 hours).
AFR	*Alternate Fire Floor Recall*	Determine the designated recall floor for alternate Fire Service Operation.
AFR2	*Second Alternate Fire Floor Recall*	Determine the designated recall floor for the second alternate Fire Service operation (Detroit Fire code).
AGNG	*Alternate Gong Option*	Causes an arrival lantern to be illuminated whenever the car's doors are open at a non-lobby landing. In the absence of actual call demand, the direction selected is a reflection of the car's last direction of travel. If the car is located at a terminal landing, the appropriate lantern will be illuminated.
APP1	*Alternate Primary (lower) Parking Floor*	When on, the car will no longer park at the original parking floor (PPF). Instead the car will park at the first alternate parking floor specified by the landing stored in this variable.
APP2	*Alternate Primary (lower) Parking Floor #2*	When ON, the car will no longer park at the original parking floor (PPF). Instead the car will park at the second alternate parking floor specified by the landing stored in this variable.
ASP1	*Alternate Secondary (upper) Parking Floor*	When ON, the car will no longer park at the original secondary parking floor (SPF). Instead the car will park at the secondary parking floor specified by the landing stored in this variable. This variable is only available on a duplex system.
ASP2	*Alternate Secondary (upper) Parking Floor #2*	When ON, the car will no longer park at the original secondary parking floor (SPF). Instead the car will park at the secondary parking floor specified by the landing stored in this variable. This variable is only available on a duplex system.
CCBC	*Cancel Car Call Behind Car Option*	If ON, and if the car has a direction arrow (SUA/SDA), no car calls can be registered behind the car's current position. For example, if a car is at the fifth floor, moving down, then no car calls can be registered for any floors above the fifth floor.
CNID	*Car Network ID*	(A thru L) The Car Network ID identifies this controller to the Group Supervisor.
CPPB	*Constant/Momentary Pressure Photo Eye/Safety Edge Bypass*	This option, when turned “OFF”, will disable photo eye/safety edge bypass logic for cars that are on Independent Service, Attendant Service, Hospital Service Phase 2, and any other non-automatic door closing conditions (CPCLOSE, MPCLOSE, etc.).
CSAR	*CSA Redundancy Check Option*	When ON, CSA redundancy checking logic is invoked. When OFF, the LSR, CNP and UDF inputs are ignored, and CSA redundancy checking logic is not performed.
DCFL	*Door Close Front Latch*	Maintains the Door Close Function on the front doors continuously as long as a door open command is absent.
DCRL	*Door Close Rear Latch*	Maintains the Door Close Function on the rear doors continuously as long as a door open command is absent.
DDOP	*Double Ding on Down Option*	When ON, the gong output dings twice for down direction travel and once for up direction travel. If OFF, the gong output will only ding once for both up and down direction of travel.

TABLE 5.7	*Software Options*	
VARIABLE	**NAME**	**DEFINITION**
DDPO	*Door Lock Direction Preference Option*	Causes the car to hold its direction preference until the doors are closed. When OFF, the car will be allowed to change direction preference with the doors open (when the hall call door time elapses).
DGNG	*Door Lock Gong Option*	Determines when the arrival gong outputs are activated. The arrival gong outputs are activated after the doors begin to open. When OFF, the arrival gong outputs are activated when the car steps into the floor. This option should be OFF when hall mounted arrival fixtures are used and turned ON when car-riding arrival fixtures are used.
DOFL	*Door Open Front Latch*	Maintains the Door Open Function on the front doors continuously as long as a door close command is absent.
DORL	*Door Open Rear Latch*	Maintains the Door Open Function on the rear doors continuously as long as a door close command is absent.
FTLF	*Failure to leave the floor*	The value set ibn this option determines the maximum number of times High speed may "pick" consecutively at the same landing before the car is shut down with an MLT fault. Set this option to OFF if it is desired to disable the shutdown due to this fault.
HNDZ	*Initiate high speed run while releveling (high speed while not in “dead zone”)*	This option is only available on those controllers which have been designed with a “rope stretch relevel” relay (RSR), which actively manipulates the “dead zone” perceived by the controller. Enabling this option will allow the controller to initiate a run while the car is still in the “releveling zone” (it will not have to relevel to “dead zone” before initiating a high speed run). The run is initiated only if the doors are locked and a car call has been registered.
HREO	*Reopen doors with hall button*	If enabled, this option will allow the activation of a hall call button to cause a car’s doors to reopen (if in the process of closing). If the option is turned OFF, the doors will not reopen if the doors are closing and a car call has been registered for that car.
INBP	*A17.1-2000 Bypass*	Allows the car to run on inspection without A17.1-2000 (indefinite).
KCE	*Keyboard Control of Elevators*	MCE’s Elevator Central Monitoring System software, CMS for Windows, allows monitoring of elevators and control of certain elevator functions using a PC. The CMS option, KCE can be enabled or disabled at the local car or group level by turning the controller’s Adjustable Control Variable, KCE, ON or OFF. Changing the KCE setting in the individual car’s controller affects only that car. Changing the KCE setting in the Group controller affects all of the cars in that group. Consult the CMS for Windows manual for additional information.
LBBY	*Lobby Floor*	Determines the location of the lobby floor in the building.
LGNG	*Lobby Alternate Gong Option*	Causes an arrival lantern to be illuminated whenever the car's doors are open at the lobby landing. In the absence of actual call demand, the up direction lantern will be illuminated.
LLCC	*Light Load Call Cancel*	When the light load input (LLI) is ON, this variable sets the threshold above which an additional car call will cause all previous calls to be canceled with the exception of the last call entered in the system.
MFR	*Main Fire Floor Recall*	Determine the designated recall floor for main Fire Service operation.
MSAF	*Mechanical Safety Edge*	Determine if the car has Mechanical Safety Edge. This option must be turned ON if the car has Mechanical Safety Edge, otherwise it should be OFF when an infrared detector is used.
NPRE	*No Pre-opening Option*	When ON, prevents pre-opening of the doors on an approach to any landing. When OFF, the doors will start to open as soon as the car is 3" (76 mm) from level at the target floor.
PECC	*Anti-nuisance Call Cancel*	Sets the threshold for the number of car call stops without an interruption of the photo eye. If no photo eye interruption is detected when the car answers the fourth car call, the controller will cancel any additional car calls registered in the system. This function is normally referred to as anti-nuisance.
PHEP	*Photo Eye Protection*	When this variable is set to ON, it will prevent the photo eye from ever being bypassed except on Fire Service. When set to OFF, this option will enable the stuck photo eye protection logic and the photo eye will be bypassed after the car times out of service. This option must be turned ON for all jobs that use the PHE input for the door hold key switch.
PPF	*Primary (lower) Parking Floor*	Determines where the car will park in the absence of call demand. In a duplex system, this variable must be programmed as one of the landings in the building, and is set at the factory before shipment. In group systems, this variable only takes effect when the car is operating independently of the group supervisor or if there is a loss of communication with the group supervisor.
RCCD	*Reversal CCD Option*	When ON, all registered car calls are canceled when the car reverses direction.
SPF	*Secondary (upper) Parking Floor*	Determines which landing is used as the second parking floor. This variable is only available on a duplex system.

5.3.6 LOAD WEIGHER LEARN OPERATION (CALIBRATION)

The load weigher (isolated platform or crosshead deflection) provides a signal that corresponds to the perceived load. This signal is brought to the control system where it is conditioned, sampled and digitized, and the value is used to calculate the actual load *inside* the elevator. This load value is then used for logical operations such as anti-nuisance and hall call bypass.

With the isolated platform load weigher (MCE), the system simply learns the reference values of the empty and fully loaded car weight, which are then used to calculate the current load (as a percentage of full load). However, with the crosshead deflection load weigher (K-Tech), the magnitude of the signal generated by the load sensor represents the perceived load *at the crosshead*, which includes the weight of the car itself, the load inside the car, the traveling cable, and any compensation cables that might be attached to the car. Therefore it is necessary for the controller to use the measured load value in a calculation to determine the load inside the elevator (the raw load value cannot be used as is).

Due to the dynamics of the elevator system, the load represented by the traveling cable and compensation cables will vary with the position of the car in the hoistway. The load weighing system accounts for these variances by performing a process which learns empty car and full car load values at each floor in the building. The load in the car can then be determined by reading the value at a given floor and, using the learned values for that floor, performing a linear interpolation to approximate the load inside the car (as a percentage of full load). The calculated load percentage is then used to initiate logical operations, i.e., hall call bypass at 80% of capacity.

Logical operations that use the load information include: light load weighing (anti-nuisance), advance car dispatch (reduction of door dwell time), heavy load weighing (hall call bypass), and overloaded car detection. Each threshold is user-programmable, and will determine when each of these logical operations should be performed.

The measurement of the load will only take place when the car is stopped at a landing with the doors open. This is the only time that we would anticipate a change in load upon which a logical operation should be initiated. The measurement is not taken when the car is running because the acceleration and deceleration of the car would be interpreted as a change in load.

Functional Description of Load Thresholds - The four load thresholds are:

- **LLW** (Light load weigher threshold): This threshold value is used to define the load at which a limited number of car calls is to be registered. If the programmed number of car calls is exceeded, all car calls will be canceled.

  Example: LLW=20%. If the measured load in the car is less than 20%, the computer will only allow a certain number of car calls to be registered (defined by a field-programmable value LLCC). If LLCC is programmed at a value of 3, the computer will only allow 3 calls to be registered if the load is less than 20%. If a fourth call is registered, all car calls will be canceled.

- **DLW** (Dispatch load weigher threshold): This threshold value is used to define the load at which the lobby landing door timer is reduced. This threshold should be set to a value (defined in many specifications as 60%) at which it is appropriate to initiate the process of moving the car out of the lobby.

- **HLW** (Heavy load weigher threshold): This threshold value is used to define the load value at which hall calls should be bypassed.

- **OLW** (Overloaded car threshold): This threshold value is used to define the load value at which it is considered unsafe to move the elevator. When this threshold is exceeded, the car will remain at the floor with doors open. Typically an application that requires OLW will use some type of visual and/or audible indicator to alert elevator passengers that the car is overloaded.

- **OLW2** (Overloaded car threshold 2): When on Fire Service, this threshold value is used instead of the OLW value (see OLW above).

Learn Modes - With the isolated platform load weigher (MCE), the system simply learns the reference values of the empty and fully loaded car weight. However, with the crosshead deflection load weigher (K-Tech), the system must learn the reference values of empty and fully loaded car weight at each floor. This is necessary because the perceived load at the crosshead varies with the position of the car in the hoistway due to the changing proportion of the traveling cable hanging beneath the car and the position of the compensation cables. Examples of the causes fo load variance include:

- The position of the traveling cable will present a varying load (a changing proportion of the traveling cable hanging directly beneath the car).

- The position of the compensation cables will present a varying load (a changing proportion of the compensation cable hanging directly beneath the car). Note that the compensation cables are intended to equalize the load at the motor sheave, not at the crosshead.

- Variances in the alignment of the hoistway guide rails will present varying amounts of resistance to elevator movement. An added amount of resistance or friction may result in an increased perceived load at the crosshead.

The values learned for the empty car and full car at a particular floor are used to calculate the load when the car is positioned at that floor.

The Learn Process - The learn process consists of three functions:

- Learning the measured load value for an empty car at each landing.

- Learning the measured load value for a fully loaded car at each landing.

- Establishing the load thresholds which will initiate the logical operations.

Each of these functions can be performed separately. All three functions must be performed before the load weigher system will perform properly. **To enter the learn function, the car must be placed on Independent Service.** If an independent service switch is available in the car, use it. If not, the car can be placed on Independent Service by connecting a jumper between terminals 2 and 49 on the controller main relay board. A further option is to use the TEST/NORM switch on the SC-SB2K relay board, but this will electrically disconnect the door open relays, and is therefore **not recommended**.

5.3.6.1 GETTING INTO LOAD WEIGHER LEARN MODE

a. Enter the SYSTEM mode of operation on the Computer Swing Panel by following the steps described at the beginning of Section 5.3.

b. Once in SYSTEM mode, access the load weigher learn function by turning the Diagnostic On switch ON (the F7 switch should remain in the ON position). The computer will respond with one of three scrolling messages:

- *NOT USED* - The software has not been configured to provide the "analog load weighing function". Contact MCE if you believe this to be in error.
- *CAR NOT READY TO LEARN* - Verify that the car has been placed on Independent Service.
- *PRESS N FOR K-TECH CROSSHEAD OR S FOR MCE PLATFORM...* - Select the type of load weigher by pressing N for K-Tech crosshead deflection or S for MCE isolated platform load weigher.

The following message is then displayed:

- *ANALOG LOAD WEIGHER LEARN FUNCTION...PRESS N TO CONTINUE* - The system is ready to learn, you have successfully placed the elevator in "load weigher learn mode".

c. Once the elevator has successfully been placed in "load weigher learn mode" one or all three of the learn functions can be performed as described in sections to follow. The system will display one of three main prompts:

- READY TO LEARN EMPTY CAR VALUES? PRESS S TO CONFIRM - Press the S push-button to begin this process. The car must be empty before beginning.
- READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM - Press the S push-button to begin this process. Place the full load weights in the car before beginning.
- ADJUST THE LOAD THRESHOLDS? PRESS S TO CONFIRM - Press the S push-button to adjust the load threshold values.

Press the N push-button to cycle through these three different prompts. To exit the load weigher learn mode, turn the Diagnostic On function switch on the computer Swing Panel to OFF.

5.3.6.2 LEARNING THE EMPTY AND FULLY LOADED CAR VALUES

Learning the empty and loaded car values is an automated process that requires only that the appropriate load be present in the car before beginning each process. **It is best to have two persons available, one in the machine room at the elevator controller and one positioned at a floor with test weights available.** The test weights must represent the full load value.

If the K-Tech crosshead deflection load weigher was selected, the learn process will automatically run the car from floor to floor, stopping at each landing. The car will first travel to the bottom landing, stop and pause there for a period of time. The car will then move in the UP direction, stopping at each floor on the way to the car's highest landing served. Each time the car stops at a landing a value is learned for that landing (either the empty or full load value). Once all floors have been learned, the car will automatically return to its point of origin and open its doors. The learn process must be performed twice, once for empty car load and once for full car load.

Learning the Empty Car Load Values:

a. With the system in "load weigher learn mode", press the N push-button until the following prompt is displayed: "READY TO LEARN EMPTY CAR VALUES? PRESS S TO CONFIRM...".

b. Verify that the car is empty.

c. Press the S push-button to begin the learn process.

   1. When the S push-button is pressed, the car will automatically close its doors and commence the learn operation. During this process, the doors will remain closed and the car will not respond to car or hall call demand. If the K-Tech crosshead deflection load weigher was selected, the car will move to the bottom floor, record the empty car value and then move up, stopping at each floor to record the empty car value. When the top floor has been reached, the car will move back to the floor at which the Load Weigher Learn procedure was begun.

   2. During the learn process the computer will display the scrolling message: *LEARNING EMPTY CAR VALUES...PRESS N TO ABORT....* The learn process may be aborted by pressing the N push-button any time during the process.

   3. Once the learn process is completed for the empty car, the computer will briefly display the message: "EMPTY CAR LEARN PROCESS COMPLETED...". At that time, the car should be positioned at the floor where the learn process was begun, with the doors fully open.

   4. The computer will then display the message: "READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM...". Refer to the next section if you wish to learn the fully loaded car values. **[Do not press the S push-button at this time!]**

Learning the Fully Loaded Car Load Values:

a. With the system in "load weigher learn mode", press the N push-button until the following prompt is displayed: "READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM...".

b. Using a car call, call the car to the floor where the test weights are located. Load the test weights, that represent the full load value, into the car.

c. Once the test weights have been loaded, press the S push-button to begin this learn process. The process is identical to the empty car learn process described above. The computer will display the scrolling message: "LEARNING FULL CAR VALUES...PRESS N TO ABORT...".

   1. The learn process may be aborted by pressing the N push-button any time during the process.

   2. Once the learn process is completed for the fully loaded car, the computer will briefly display the message: "FULL CAR LEARN PROCESS COMPLETED...". At that time, the car should be positioned at the floor where the learn process began, with the doors fully open. The test weights may now be removed from the car.

3. The computer will then display the message: “ADJUST THE LOAD WEIGHER THRESHOLDS? PRESS S TO CONFIRM...”. Refer to the next section if you wish to adjust the load weigher threshold values.

5.3.6.3 ADJUSTING THE LOAD THRESHOLDS

The load thresholds are preset, at the MCE factory, to values based upon the job specification. However, these thresholds are user-adjustable and may be changed at any time. To adjust these thresholds, enter the SYSTEM mode of operation as described at the beginning of Section 5.3, and select the load weigher learn function. The car must be on Independent Service to enter the load weigher learn function.

a. With the system in the “load weigher learn mode”, press the N push-button until the computer responds with the scrolling message: “ADJUST THE LOAD WEIGHER THRESHOLDS? PRESS S TO CONFIRM...”.

b. Press the S push-button to adjust the thresholds.

c. Once the S push-button is pushed, the computer will respond by displaying mnemonics that represent the load values. The value shown next to the mnemonic is the current threshold value for that parameter expressed as a percentage of the full load value.

Dispatching Threshold	**Typical Value**	**Range**
• LLW = light load (anti-nuisance) threshold	20%	0 - 40%
• DLW = dispatch load threshold	50%	20 - 80%
• HLW = heavy load (hall call bypass) threshold	80%	50 - 100%
• OLW = overloaded car threshold	105%	80 - 125%
• OLW2 = overloaded car threshold 2	125%	100 - 140%

d. Choose the parameter to be adjusted by pressing the N push-button. The mnemonics and values will scroll as long as the N push-button is depressed.

e. The desired value may be adjusted by pressing the S push-button. The value will be incremented until the upper limit value is reached. The value will then roll over to the lower limit value. These limit values are predetermined at MCE, and must be modified with an EPROM change, if necessary.

f. After the last parameter is displayed, pressing the N push-button will cause the computer to display the prompt: DONE ADJUSTING THRESHOLDS? PRESS S TO CONFIRM... At this prompt, pressing the S push-button will exit the threshold adjustment function; pressing the N push-button will return the prompt to the first threshold parameter.

The thresholds can be set to the desired values, as a percentage of full load. Setting the value to 00% will disable the corresponding function. Example: setting the HLW threshold to 00% will disable the hall call bypass function.

Exiting the Load Weigher Learn Mode

Exit the load weigher learn mode by placing the Diagnostic On/Normal switch in the Normal (down) position. Exit System Mode of diagnostics by turning the F7 switch OFF (down).

5.3.7 SETTING AND RESETTING THE PASSCODE OPTION (NOT ON ALL CONTROLLERS)

The Passcode Requested option can be used to require that a passcode be entered in order to run the car on any mode of operation other then Inspection. If a passcode has not been pre-programmed for the controller, the Passcode Requested option is not available and will not appear.

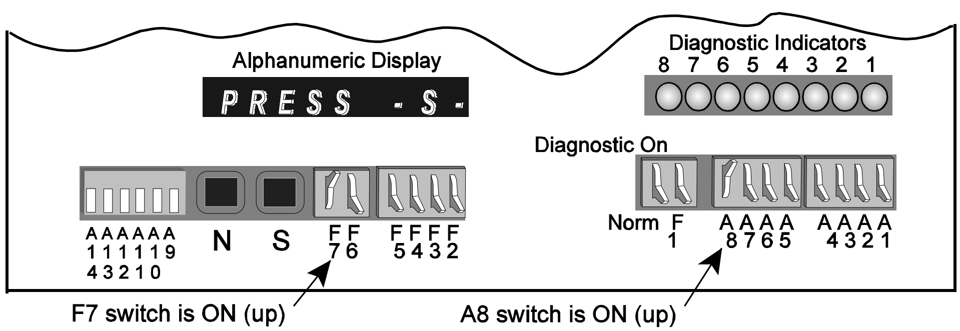
Upon power up, the message ***MP2 VERSION NUMBER: 8.00.0*** will scroll across the alphanumeric display. If a passcode has been pre-programmed and the Passcode Requested option has been activated, the message ***PASSCODE REQUESTED...*** is then scrolled. This means a passcode is required in order to run the elevator on any mode other than Inspection.

In order to set the passcode (to run the car on Normal operation) or reset the passcode (to disallow Normal Operation and run on Inspection only), the controller must first be placed in the System Mode as described at the beginning of Section 3.

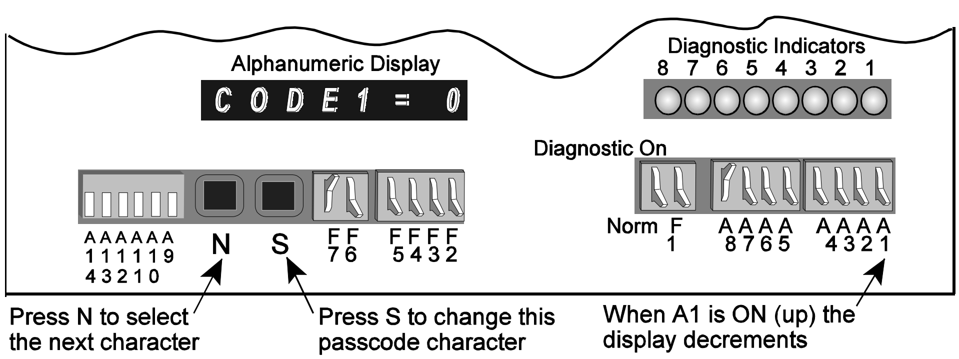
> **NOTE:** PASSWORD is not the same as PASSCODE. The PASSWORD is used to limit access to System Mode. The PASSCODE, when activated, requires that a passcode be set in order to run on any mode other than Inspection.

SETTING THE PASSCODE (to run the car on Normal operation)

Once in System Mode, place the A8 switch in the ON (up) position as shown.



The message ***PRESS -S- TO SET PASSCODE OR -N- TO CLEAR PASSCODE...*** will scroll across the display. Press the **S** pushbutton. The message ***CODE 1 = 0*** is displayed.



The passcode consists of eight alphanumeric characters. The display indicates the value of code character #1. Press the **S** pushbutton to change the value. Press the **N** pushbutton to select the next passcode character. When the A1 switch is ON (up) the display will decrement when either **N** or **S** are pressed.

When the eighth passcode character is displayed, pressing the **N** pushbutton causes the display to change to ***SAVE? N/S***. Press **N** continue setting / changing the passcode. Press **S** to save the passcode. If the passcode is set correctly the display will show ***SAVED...***. If the passcode is not set correctly the message ***INVALID PASSCODE. PRESS N TO CONTINUE*** is scrolled across the display. Pressing **N** causes ***CODE1= (x)*** to be displayed so that the passcode can be corrected.

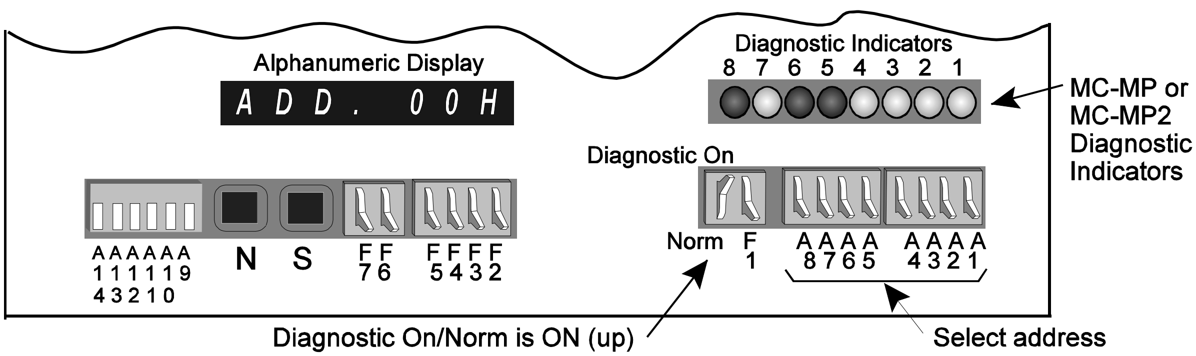
Once the passcode is set correctly and saved, exit System Mode by placing the F7 and A8 switches in the OFF (down) position. The car can then be run on Normal operation.

ACTIVATING THE PASSCODE REQUESTED OPTION (Disallows normal operation, run on inspection only)

The Passcode Requested option can be re-activated by clearing the valid passcode setting. To clear the passcode, enter System Mode as described in Section 0.1 and place the A8 switch in the ON (up) position. Press the **N** pushbutton while the message ***PRESS -S- TO SET PASSCODE OR -N- TO CLEAR PASSCODE...*** is being scrolled. The display changes to ***CLEARED***. Exit System mode by placing the F7 and A8 switches in the OFF (down) position. The message ***PASSCODE REQUESTED...*** is scrolled across the display and the car is only allowed to run on Inspection operation.

5.4 DIAGNOSTIC MODE (EOD)

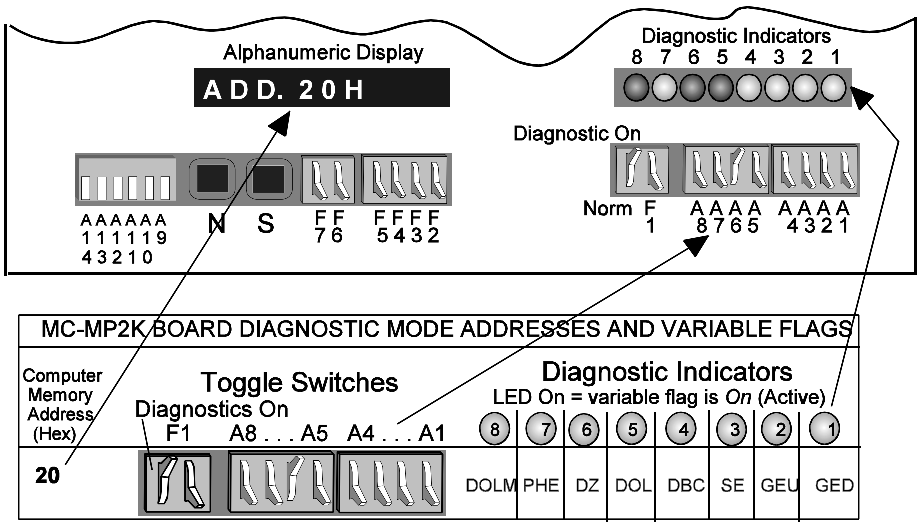
In the Diagnostic Mode, the A1 thru A8 switches allow the elevator mechanic to access the MC-MP2-2K computer memory locations. To access Diagnostic mode, set the switches as shown.



5.4.1 VIEWING THE MC-MP2-2K COMPUTER FLAGS

The A1-A8 switches enable an elevator mechanic to look at the MC-MP2-2K flags when troubleshooting a problem. Figure 5.2 describes the procedure for viewing the computer flags, in this case at address 20H (selected from 5.10). The MC-MP2 flags can also be viewed in Normal mode (see Section 5.2.5) *Alphanumeric Display - Viewing the MP Computer Flags*.

FIGURE 5.2 Viewing the flags at Address 20H (from Table 5.9)



In this example, address 20 has been selected from Table 5.9 in the back of this section. The Diagnostic On/Norm switch and the A6 switch are UP; all other A switches are down. The display reads ADD.20H. The flags that can be viewed from this address are listed on the right. A complete list of these flags can be found in Table 5.8. Check the Diagnostic Indicators on the front of the Swing Panel. If an LED is ON, it means that flag is ON. For example, if Diagnostic Indicator #6 is ON, this means the Door Zone Input (DZ) is ON.

LED	Flag	Description
8	DOLM	Door open limit memory flag
7	PHE	Photo eye input
6	DZ	Door zone input
5	DOL	Door open limit input
4	DBC	Door close button input
3	SE	Safety edge input
2	GEU	Gong enable up output
1	GED	Gong enable down output

Table 5.8 and 5.10 provides a listing of the MC-MP-2K flags and the abbreviation assigned to each flag. Tables 5.9, 5.10 and 5.12 show the memory address locations for the flags. Access a flag’s address by setting the A1 - A8 switches as shown in Table 5.9. Once an address has been selected, the diagnostic indicators, on the front of the Swing Panel, show the status of the flags at that computer memory address. Table 5.8 shows the abbreviations for the flags in the columns ❶ thru ❽ (corresponding to Diagnostic Indicators 1 thru 8) in each row.

ALTERNATE ADDRESS SELECTION METHOD - There is an alternate way of selecting the computer memory address, without using the A1-A8 switches. To do so, regardless of the position of A1-A8 switches, press the N push-button. The alphanumeric display automatically reads **ADD. 20H**, which is the first diagnostic address for the MC-MP2-2K flags. The Computer Swing Panel's Diagnostic Indicators show the contents of the address displayed. Constant pressure on the N push-button automatically increases the address shown on the alphanumeric display, and the state of the indicator lights changes respectively. Once the address reaches 33H, it automatically goes back to 20H. Releasing the N push-button holds the last address displayed on the alphanumeric display for an additional 3 seconds before changing the display to reflect the address selected by the A1-A8 switches.

TABLE 5.8 MC-MP(2) Computer Variable Flags

ABBREV	FULL NAME	ABBREV	FULL NAME
ADAC	ADA Car Call Timer	FRA	Alternate Fire Phase I Input
ADACR	Rear ADA Car Call Timer	FRC	Fire Phase II
ADAH	ADA Hall Call Timer	FRM	Fire Service Phase I
ADAHR	Rear ADA Hall Call Timer	FRS	Fire Phase I Input
ALT	Alternate Service	FWI	Fire Warning Indicator Output
ATS	Attendant Service Input	GED	Gong Enable Down Output
ATSF	Attendant Service Function	GEU	Gong Enable Up Output
BFD	Bottom Floor Demand	H	High Speed Output
CAC	Car Above Counterweight	HCDX	Hall Call Disconnect
CBC	Car Below Counterweight	HCR	Hall Call Reject
CC	Car Call	HCT	Hall Call Door Time
CCA	Car Call Above	HLD	Hold Input Fire Phase II
CCB	Car Call Below	HLI	Heavy Load Input
CCD	Car Call Disconnect	HLW	Heavy Load Weigher
CCT	Car Call Door Time	HML	Home Landing Select Input
CD	Car Done	HSEL	Hospital Emergency Select
CODE 3	Third Bit in Absolute PI Code	IN	Inspection or Access Input
CSAF	Computer safe	IND	Independent Service Input
CSB	Car Stop Switch Bypass Output	INT	Intermediate Speed Input
CTL	Car to Lobby Input	ISR	In Service and Ready
CTLF	Car to Lobby Function Flag	ISRT	In Service Truly
CWI	Counterweight Input	ISV	In Service
CWIL	Counterweight Input Latch	LD	Level Down Input
DBC	Door Button Close Input	LFP	Lower Floor Parking
DC	Down Call	LLI	Light Load Input
DCA	Down Call Above	LLW	Light Load Weigher
DCB	Down Call Below	LOT	Lobby Door Time
DCC	Door Close Complete	LU	Level Up Input
DCF	Door Close Function Output	MGR	Motor Generator Run Output
DCL	Door Close Limit	MLT	Motor Limit Timer
DCLR	Rear Door Close Limit	NSI	Non-Stop Input
DCLC	Door Closed Contact	NUDG	Nudging Output
DCLCR	Rear Door Closed Contact	PFG	Passing Floor Gong
DCP	Door Closed Power Output	PHE	Photo Eye Input
DDP	Down Direction Preference	PK	Parking
DELSIM	Delta Simulation	PSTX	Preliminary Stepping Function Complete
DHO	Door Hold Open	PTR	Permission To Run *(from Supervisor)*
DLK	Door Lock Input	PTS	Permission To Start *(from Supervisor)*
DMD	Demand Down	PUSD	Earthquake Power Up Shut Down
DMU	Demand Up	REL	Releveling Output
DNDO	Down Direction Output	RUN	Run
DNI	Down Direction Input	SAF	Safety String Input
DNS	Down Direction Sense Input	SD	Supervisory Down
DOF	Door Open Function Output	SDA	Down Direction Arrow Output
DOI	Door Open Intent	SDT	Short Door Time
DOL	Door Open Limit Input	SE	Safety Edge Input
DOLM	Door Open Limit Memory	SLV	Slaved
DPM	Door Position Monitor	STC	Stepping Complete
DPMR	Rear Door Position Monitor	STD	Step Down Input
DSD	Down Slow Down Input	STU	Step Up Input
DSH	Door Shortening (Car Call Button Pushed)	SU	Supervisory Up
DSHT	Door Shortening (Final)	SUA	Up Direction Arrow Output
DZ	Door Zone Input	TFD	Top Floor Demand
DZORDZ	Door Zone or Rear Door Zone	TOS	Timed Out of Service
ECRN	Emergency Power Running Car	UC	Up Call
EDS	Earthquake Direction Switch	UCA	Up Call Above
EPI	Emergency Power Input	UCB	Up Call Below
EPR	Emergency Power Return Function	UDP	Up Direction Preference
EPS	Emergency Power Select Input	UFP	Upper Floor Parking
EQA	Earthquake Function Active	UPDO	Up Direction Output
EQI	Earthquake Input	UPI	Up Direction Input
EQIND	Earthquake Indicator Output	UPS	Up Direction Sense Input
EQN	Earthquake Normal	USD	Up Slow Down Input
ESTE	Earthquake Stop Time Elapsed	YRQ	Wye Request
FCS	Fire Phase II Input	YSIM	Wye Simulation

TABLE 5.9 MC-MP2-2K Diagnostic Mode Addresses and Computer Variable Flags

MC-MP(2) DIAGNOSTIC MODE ADDRESSES AND COMPUTER VARIABLE FLAGS									
Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8.......A5 A4.......A1	Diagnostic Indicators LED *On* = variable flag is On or Active							
		8	7	6	5	4	3	2	1
20		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
21			DC	UC	CC			DHO	DOI
22		DCF	DCP	DOF	LOT		HCT	CCT	SDT
23				HSEL	CSB	DCC	NUDG		DSHT
24		INT/ DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
25				HLW	HLI			FWI	
26		LFP	UFP						
27				EQI	IND	IN		DEL SIM	YSIM
28		LLW	DLK		DZO RDZ			PK	LLI
29		DNDO	LD		DDP	UPDO	LU		UDP
2A		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
2B		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
2C			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
2D						FRM			FRC
2E		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
2F*		HLD		EQA	ATSF		ECRN	CD	EPR
2F		HLD	EPI	EPR	SLV	ISR	YRQ	PTR	PTS
30						EPS	EPI	HML	ALT
32*		CAC	CBC	CWI		EDS	ESTE	EQN	PUSD
32		CAC	CBC	CWI	EQA	EDS	ESTE	EQN	PUSD
33			CWIL						
3B**				DCLR				DCL	
3F**				ADAHR	ADACR			ADAH	ADAC
48**				DPMR	DCLCR			DPM	DCLC

* Simpex Ver. 3.59 or earlier software ** MC-MP2 Ver. 8.0 or later software. DNmd 033

TABLE 5.10 ASME A17.1 - 2000 Variable and Flag Descriptions

2BI	2 Bus Input	HDBR	Hoistway Car Door Rear Bypass Switch - Bypass Position
2KBP	ANSI 2000 Bypass Input	HDR	Hoistway Door Rear
ACCI	Inspection Access	ILO1	Overspeed - Inspection / Leveling, Pld #1
ASI	Assigned	ILO2	Overspeed - Inspection / Leveling, Pld #2
ASI1	Assigned	IMEM	Inspection Memory
ASI2	Assigned	INCTI	Inspection Car Top
ASI3	Assigned	INDN	Inspection Down Input
ASI4	Assigned	INICI	Inspection in Car
ASI5	Assigned	INMR	Inspection Machine Room
ASI6	Assigned	INUP	Inspection up Input
ASI7	Assigned	MB	Motor / Brake Output
ASI8	Assigned	MPSAF	Main Processor Safety Output
CD	Car Door Closed	ONE 2TWO	Indicates Switching from Eb1 to Eb2
CDB	Car Door Bypass Switch - Bypass Position	RACC1	Redundancy Access Inspection Relay #1
CDBO	Car Door Bypass Switch - off Position	RACC2	Redundancy Access Inspection Relay #2
CDBR	Car Door Rear Bypass Switch - Bypass Position	RBK	Redundancy Brake Relay
CDR	Car Door Rear	RCD	Redundancy Car Door Closed Relay
COS1B	Overspeed - Contract, Pld #1	RCDR	Redundancy Car Door Rear
COS2	Overspeed - Contract, Pld #2	RCHDT	Redundancy Car / Hoistway Door Timed Relay
CT	Cycle Test Output	RCTIC	Redundancy Car Top/ in Car Inspection
CTDIF	Cycle Test - Dp Differential	RDN	Redundancy down Relay
CTOS	Cycle Test - Overspeed	RDZ	Redundancy Door Zone Relay
CWI	Counterweight Input	RDZR	Redundancy Door Zone Rear Auxiliary
DCBOR	Car Door Rear Bypass Switch - off Position	RDZX	Redundancy Door Zone Auxiliary
DETS	Down Emergency Terminal Switch	REB1	Emergency Brake Relay #1
DNDIR	Down Direction Detected	REB2	Emergency Brake Relay #2
DNL	Down Normal Limit	REI	Run Enable Input
DZRX	Door Zone Rear Auxiliary	RESBYP	Redundancy Emergency Stop Switch Bypass Relay
DZX	Door Zone Auxiliary	RFR	Redundancy Fault Reset
EB1	Redundancy Emergency Brake Relay #1	RFRM	Redundancy Fault Reset Memory
EB2	Redundancy Emergency Brake Relay #2	RGOV	Redundancy Governor Relay
EBR	Emergency Brake Reset	RH	Redundancy High Speed Relay
EBRM		RHD	Redundancy Hoistway Door Closed Relay
EDS	Earthquake Direction Switch	RHDB	Redundancy Hoistway Door Bypass
EQIND	Earthquake Indicator	RHDBR	Redundancy Hoistway Door Bypass Rear
EQL	Earthquake Latch	RHDR	Redundancy Hoistway Door Rear
EQLED	Earthquake Light	RIN1	Redundancy Inspection Relay #1
EQR	Earthquake Reset Switch	RIN2	Redundancy Inspection Relay #2
EQRM	Earthquake Memory Switch	RLULD	Redundancy Level up / Level Down Relays
ESBYP	Emergency Stop Switch Bypass	RMR	Redundancy Motor Relay
ETS1	Overspeed - Emergency Terminal Switch, Pld #1	RSAFR	Redundancy Safety Relay Input
ETS2	Overspeed - Emergency Terminal Switch, Pld #2	RTBAB	Redundancy Top / Bottom Access Buttons Relay
FCCC	Fire Phase 2 - Car Call Cancel	RUP	Redundancy up Relay
FCOFF	Fire Phase 2 Switch - off Position	RUPM	Redundancy up Relay Memory
FIR1	Fire Phase 1 Active - Main or Alternate	SAFC	Safety Circuit Car
FRBYP	Fire Phase 1 Switch - Bypass Position	SAFH	Safety Circuit Hoistway
FRSA	Fire Phase 1 - Mr / Htw Sensor - Alternate Recall	SSI	Seismic Switch Input
FRSM	Fire Phase 1 - Mr / Htw Sensor - Main Recall	STOP	Stop Switch Input
FWL	Fire Warning Light	TEST	Test Input
GOV	Governor Switch Input	TWO2ONE	Indicates Switching from Eb2 to Eb1
HD	Hoistway Door Closed	UETS	Up Emergency Terminal Switch
HDB	Hoistway Door Bypass Switch - Bypass Position	UNL	Up Normal Limit
HDBO	Hoistway Door Bypass Switch - Off Position	UPDIR	Up Direction Detected
HDBOR	Hoistway Car Door Rear Bypass Switch -Off Postion		

TABLE 5.11 MC-MP2 ASME - 2000 Flags and Variables [F2, A9, A10 and A11 must also be ON *(up)*]

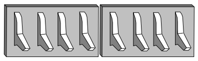
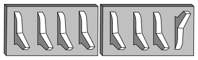
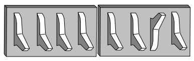
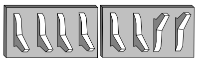
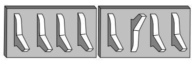
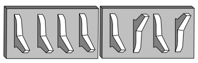
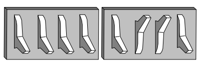
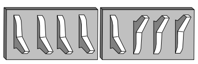
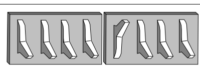
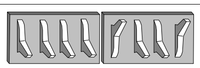
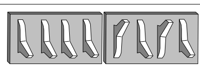
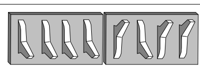
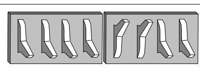
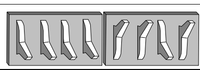
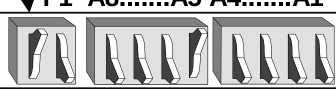
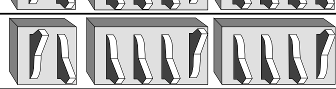
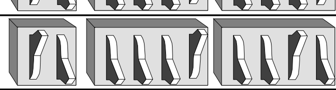
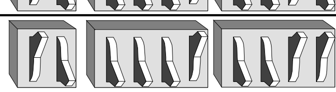
ADDR	Switch Setting A1 - A8	LED8	LED7	LED6	LED5	LED4	LED3	LED2	LED1
0700H		2 BI M	MPSAF	STOP	SAFC	SAFH	GOV	RSAFR	2 BI
0701H		TEST	INDN	INUP	RIN2	RIN1	INMR	INICI	INCTI
0702H		IN M TRUE			RTBAB	RACC2	RACC1	ACCI	RCTIC
0703H		EQL	EQRM	EQLED	EQIND	SSI	CWI	EQR	EDS
0704H		HDBO	HDB	CDBO	CDB	RHD	RCD	HD	CD
0705H			FIR1	FWL	FRSA	FRSM	FRBYP	FCCC	FCOFF
0706H		CTDIF	CTOS	ILO2	ETS2	COS2	ILO1	ETS1	COS1
0707H		RESBYP	ESBYP		RMR	RBK	RPT	REI	MB
0708H		TWO 2 ONE	ONE 2 TWO	EB2	EB1	EBRM	EBR	REB2	REB1
0709H		DNDIR	UPDIR	CTPLD1	RUPM	RDN	RUP	DNL	UNL
070AH		RFR	RFRM	A2KBP	CT	RCT	RH	RLULD	RDZ
070BH		HDBOR	HDBR	CDBOR	CDBR	RHDR	RCDR	HDR	CDR
070CH		DETS1	UETS1	RHDBR	RHDB	RDZR	DZRX	RDZX	DZX
070DH		ASI8	ASI7	RUDX2	FUDX1	ASI4	DETS2	UETS2	PFLT

TABLE 5.12 MC-MP2-2K Diagnostic Mode Rear Door Addresses and Computer Variable Flags

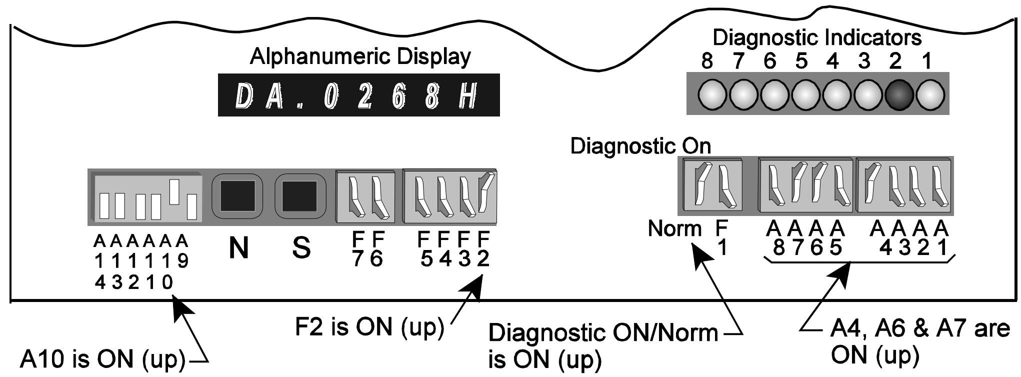
MC-MP DIAGNOSTIC MODE REAR DOOR ADDRESSES AND VARIABLE FLAGS									
Computer Memory Address (Hex)	**Toggle Switches** Diagnostic On F1 A8.......A5 A4.......A1	**Diagnostic Indicators** LED *On* = variable flag is On or Active **8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
10		**DOLMR**	**PHER**	**DZR**	**DOLR**	**DBCR**	**SER**	**GEUR**	**GEDR**
11			**DCR**	**UCR**	**CCR**			**DHOR**	**DOIR**
12		**DCFR**	**DCPR**	**DOFR**	**LOTR**		**HCTR**	**CCTR**	**SDTR**
13						**DCCR**	**NUDGR**		**DSHTR**

DNmd 011

5.4.2 VIEWING EXTERNAL MEMORY EXAMPLE: DOOR CLOSED LIMIT (DCL) FLAGS

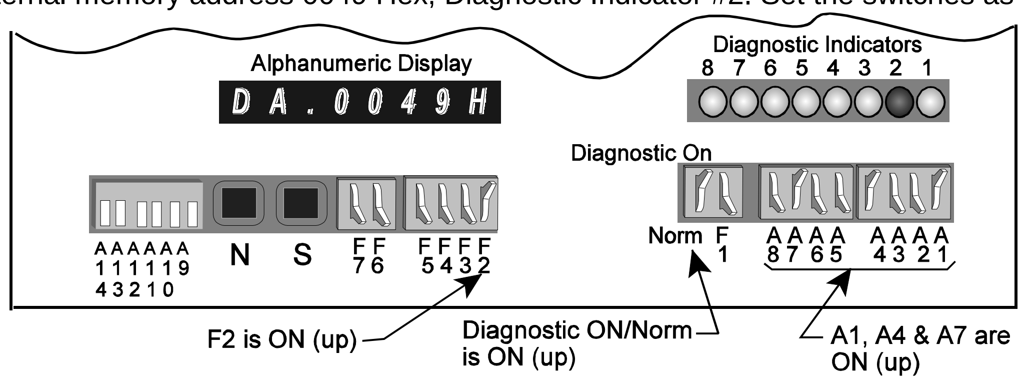
NOTE: With the MC-MP2 Main Processor board these flags may be viewed using the Alphanumeric Display as described in Section 5.2.5.

DCL INPUT - LOCAL TRACTION (MPOLTM software) - The memory flag for DCL is at external memory address 0268 Hex, Diagnostic Indicator #2. Set the switches as shown.

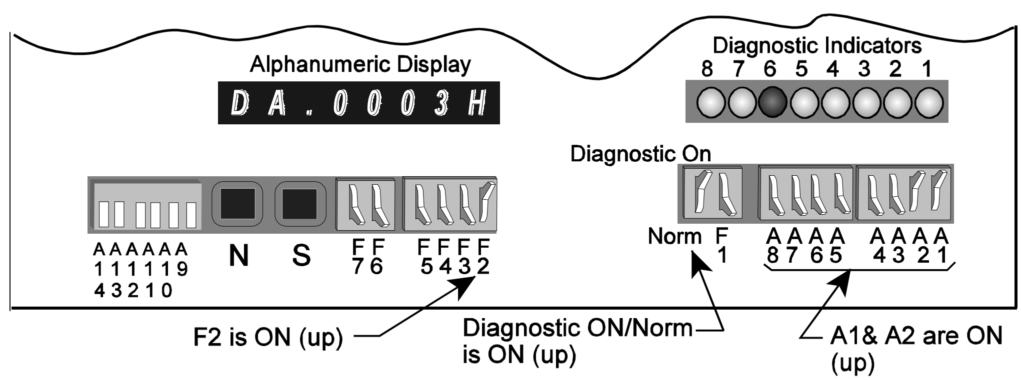


Switch F2 selects external memory. Switches A13 and A14 select the first digit (0), A9 thru A12 select the second digit (2), A5 thru A8 select the third digit (6) and A1 thru A4 select the last digit of the address (8). The Alphanumeric Display indicates that external memory address 0268 Hex is selected (DA.0268H). Diagnostic Indicator #2 shows the status of the DCL input (LED ON = high, LED OFF = low).

DCL INPUT - SIMPLEX TRACTION (MPODT software) - The memory flag for DCL is at external memory address 0049 Hex, Diagnostic Indicator #2. Set the switches as shown.



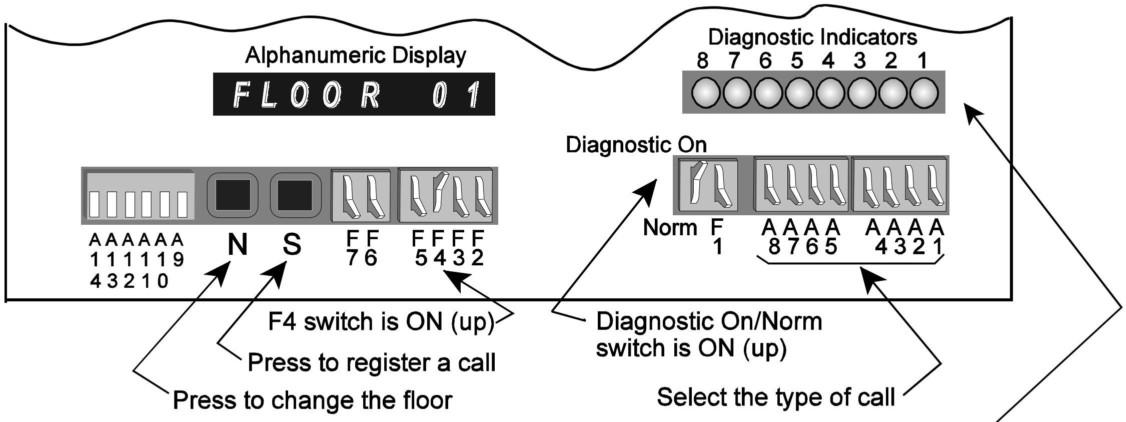
DCLR INPUT - (all software) - The memory flag for DCLR is at external memory address 0003 Hex, Diagnostic Indicator #6. Set the switches as shown.



5.4.3 VIEWING AND ENTERING CALLS

This function allows the user to view all the calls registered per floor, and to enter calls as desired. To view or enter calls, set the switches as shown.

FIGURE 5.3 Viewing and Entering Hall & Car Calls via the EOD



Diagnostic Indicators show current calls	Diagnostic Indicators							
	❽	❼	❻	❺	❹	❸	❷	❶
Call type ➪	Hall Call UP Rear	Hall Call UP Front	Hall Call DOWN Rear	Hall Call DOWN Front			Car Call Rear	Car Call Front
To register calls, turn the address switch ON and press "S"	A8	A7	A6	A5	A4	A3	A2	A1
	Address Switches							

VIEWING CALLS - With the F4 switch in the ON position, the alphanumeric display shows **FLOOR 01** and the Diagnostic Indicators light up with the calls that have been registered. The format for the call indication is shown in Figure 5.3. To advance the floor number press the **N** push-button. The Diagnostic Indicator LEDs will show the calls entered at the floor shown in the alphanumeric display. When the top floor number is displayed, pressing N will cause the display to cycle to the bottom floor.

ENTERING CALLS - To enter calls, select the desired floor as described above. Use the A1-A8 switches to select the type of call to enter (see Figure 5.3). For example, set the A1 switch up to register a front car call. Then press and hold the ***S*** push-button until the call has been registered. Notes: (1) A call type which does not exist in the system cannot be entered, (2) if this car is part of a group, only car calls can be entered.

SECTION 6
TROUBLESHOOTING

6.0 GENERAL INFORMATION

VFMC-1000-Series M controllers are equipped with certain features that can help speed up troubleshooting. Often the controller will indicate the nature of the problem in the form of a status or error message scrolling on the Computer Swing Panel's display. The optional CRT terminal connected to either the car controller or the Group Supervisor can provide useful diagnostics in the form of View Hoistway (F3 screen) messages and/or Special Events Calendar Fault Log (F7, 1 screen) messages. Table 6.3 and 6.4 provide a complete listing of these messages, a description and recommended corrective actions to be taken.

Troubleshooting often involves determining the status of specific inputs, outputs or computer variable flags. This information is stored in the controller's memory and the status of these memory locations can be viewed using the Computer Swing Panel's Enhanced Onboard Diagnostics (EOD), described in Section 5. In addition, the system is designed so that tracing signals from the field wires onto various boards and into the computer can be achieved without the need for mechanical removal of any components or for rear access to the boards.

The troubleshooting section is arranged as follows:

Troubleshooting Topic:	**Go to:**
Status and Error Messages table and look-up table for the MC-MP2-2K Diagnostic Indicator and F3 screen messages.	Section 6.1
How to use the Special Events Calendar and setup for reporting emergency messages to a PC running CMS software.	Section 6.2
Using the Controller Diagnostics screens	Section 6.3
Troubleshooting Car Operation Control (COC), Door Logic, Call Logic, and Quick References for the HC-PI/O and HC-CI/O boards.	Section 6.4
PC Board Quick References	Section 6.5
Troubleshooting the G5 / GPD515 AC Drive	Section 6.6
Troubleshooting the MagneTek HPV900 AC Drive	Section 6.7
Troubleshooting the TORQMAX F4 AC Drive	Section 6.8
Troubleshooting the Yaskawa F7 AC Drive	Section 6.9
Troubleshooting the TORQMAX F5 AC Drive	Section 6.10
Using the MLT Data Trap	Section 6.11
ASME A17.1 - 2000 Fault Troubleshooting Tables	Section 6.12

6.1 STATUS AND ERROR MESSAGES

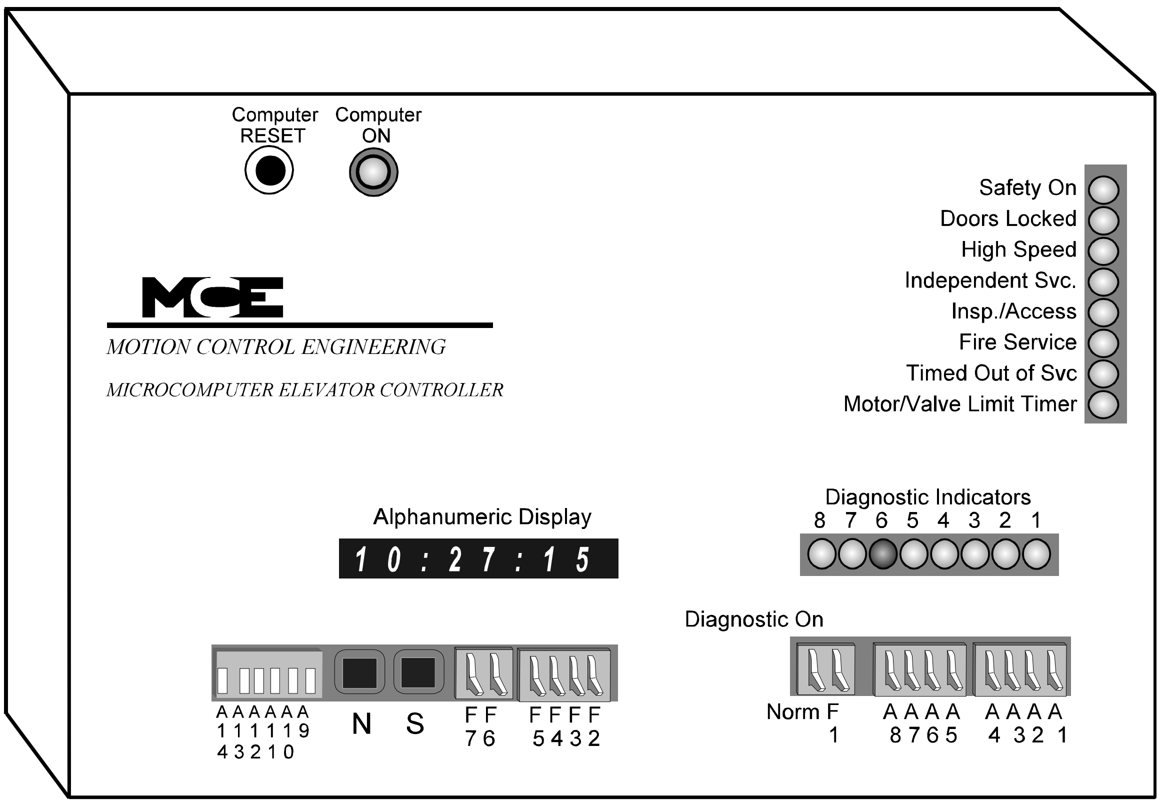
There are four locations where status and error messages are reported. They are:

- The Computer Swing Panel Status Indicators (Section 6.1.1)
- The Computer Swing Panel (MP) Diagnostic Indicators (Section 6.1.1)
- The Computer Swing Panel Alphanumeric Display (Section 6.1.2)
- The Special Events Calendar Fault Log (Section 6.1.3)
- The View Hoistway (F3) screen (Section 6.1.4)

6.1.1 COMPUTER SWING PANEL STATUS AND DIAGNOSTIC INDICATORS

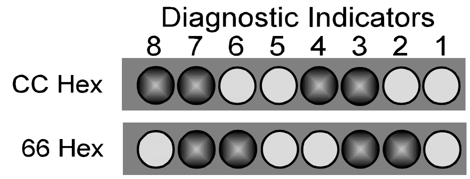
The Computer Swing Panel has two sets of eight indicators that can provide status and error information (Figure 6.1). The Status Indicators (vertical row of eight LEDs) provide information on the current status of the controller.

FIGURE 6.1 Computer Swing Panel, Front View

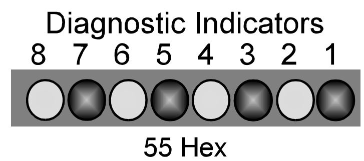


MC-MP2 DIAGNOSTIC INDICATORS - During normal operation these lights scan from right to left (indicating that the MP2 program is looping properly) or flash ON and OFF to indicate a status or error condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

When a status or error condition exists, the Diagnostic Indicators flash one of several messages depending on the software version (MP2 version number scrolls on boot up):



- Software versions 8.02.00 or earlier flash the MC-MP-1ES messages.
- Software version 8.03.00 flashes CC Hex.
- Software versions 8.04.00 or later flash 66 Hex. Set the alphanumeric display to scroll the status or error message. Refer to Table 6.3 *Status and Error Messages* for a description and troubleshooting information for the scrolling message.
- ASME A17.1 - 2000 status and error conditions are indicated by the diagnostic indicators flashing 55 Hex. Set the alphanumeric display to scroll the status or error message. Refer to Table 6.4 *ASME A17.1 - 2000 Status and Error Messages* for a description and troubleshooting information for the scrolling message.



If the scrolling status or error message is not displayed when the Diagnostic Indicators flash, press the N pushbutton until the scrolling message appears (see Section 5.2.1 ALPHANUMERIC DISPLAY - STATUS AND ERROR MESSAGES).

6.1.2 ALPHANUMERIC DISPLAY - STATUS AND ERROR MESSAGES

Status and error messages are scrolled across the alphanumeric display. Table 6.1 provides a list of standard status and error messages and their associated Special Event Message names. A description and troubleshooting information for the scrolling message is listed in Table 6.3 under the Special Event Message name. Table 6.4 provides a list of ASME A17.1-2000 status and error messages, including descriptions and troubleshooting information.

NOTE: There are two ways to access detailed information about the scrolling Status and Error messages:

- Look for the message in the Index to find the page on which the message description and troubleshooting information is located.
- Refer to Table 6.1, *MC-MP2 Scrolling Messages Lookup* to find the message being scrolled on the Alphanumeric Display. Then look for the message by the Event Message name in Table 6.3 *Status and Error Messages.* Look for messages not found in Table 6.1 in Table 6.4 *ASME A17.1 - 2000 Status and Error Messages*.

TABLE 6.1 MC-MP2 Scrolling Messages Lookup

Scrolling Message	Event Message (see Table 6.3)
2ND LANDING AUX. ACCESS FAULT *(non ASME-2000 only)*	2nd Landing Aux. Access Fault
ATTENDANT SERVICE OPERATION	Attendant Service Operation
AUX. INSPECTION ACCESS FAULT *(non ASME-2000 only)*	Aux. Inspection Access Fault
BOTH LEVELING SWITCHES ARE ON (SETUP ERROR), LEARN MODE (*IMC only*)	Both Leveling Switches are ON (Learn Mode Setup Error)
BOTH USD AND DSD INPUTS ARE ACTIVE	Both USD and DSD are Open
BOTTOM FLOOR OR TOP FLOOR DEMAND	Bottom Floor Demand Top Floor Demand
BOTTOM LANDING AUX. ACCESS FAULT *(non ASME-2000 only)*	Bottom Landing Aux Access Fault
BRAKE PICK FAILURE *(Traction only)*	Brake Pick Failure
CAR CALL BUS IS DISCONNECTED	Car Call Bus Fuse Blown
CAR IN TEST MODE	Test Mode Operation
CAR NOT AT BOTTOM LANDING (SETUP ERROR), LEARN MODE *(IMC only)*	Car not at Bottom Landing (Learn Mode Setup Error)
CAR NOT BELOW DOOR ZONE (SETUP ERROR), LEARN MODE *(IMC only)*	Car Not Below Door Zone (Learn Mode Setup Error)
CAR NOT ON INSPECTION (SETUP ERROR), LEARN MODE *(IMC only)*	Car Not On Inspection (Learn Mode Setup Error)
CAR NOT ON LEVEL DOWN (SETUP ERROR), LEARN MODE (IMC only)	Level Down ON (Learn Mode Setup Error)
CAR NOT ON LEVEL UP (SETUP ERROR), LEARN MODE *(IMC only)*	Car Not On Level Up (Learn Mode Setup Error)
CAR SAFETY DEVICE OPEN	Car Safety Device Open
CAR TO LOBBY OPERATION	Car To Lobby
CONTACTOR PROOFING REDUNDANCY FAILURE	Contactor Proofing M Contactor Proofing Redundancy Failure MX and PT1 Redundancy Failure PT2 & PT3 Redundancy Failure
DIRECTION RELAY REDUNDANCY FAILURE	Direction Relay Redundancy Failure
DOL AND DLK BOTH ACTIVE	Doors Open and Locked
DOOR CLOSE FAILURE	Door Close Protection
DOOR LOCK FAILURE	Door Lock Failure
DOOR LOCK SWITCH FAILURE	Door Lock Contact Failure
DOOR OPEN LIMIT FAILURE	Door Open Limit Failure
DOOR ZONE SENSOR FAILURE	Door Zone Sensor Failure - On position
DOOR ZONE SENSOR FAILURE - OFF POSITION	Door Zone Sensor Failure - Off position
DPM REDUNDANCY FAULT	DPM Redundancy Fault
DPMR REDUNDANCY FAULT	DPMR Redundancy Fault
DRIVE FAILED TO RESPOND	Drive Failed to Respond
DRIVE FAULT 2 *(IMC only)*	Loss of Position Feedback Parity Sensor Failure (Floor Code) Pattern Door Zone Failure Position Error at DETS Position Error at DNTx Position Error at UETS Position Error at UNTx Read Sensor Failure (Floor Code)
DRIVE FORCED MOTOR LIMIT TIMER *(Traction only)*	Brake Failure Brake IGBT Failure MLT - Drive Forced MLT-Drive Forced (ALT) Pattern Detected Overspeed
DRIVE TEMPERATURE SENSOR FAULT *(IMC Traction only)*	Drive Temperature Sensor Fault
EARTHQUAKE OPERATION *(Traction only)*	Earthquake
EARTHQUAKE - REDUCED SPEED OPERATION *(Traction only)*	Earthquake Normal Operation
ELEVATOR SHUTDOWN SWITCH OR POWER TRANSFER INPUT ACTIVE	Elevator Shutdown or Power Transfer
EMERGENCY POWER OPERATION	Emergency Power
EMERGENCY POWER SHUTDOWN	Emergency Power Shutdown
EMERGENCY STOP INPUT 1 ACTIVATED	Emergency Stop Input 1 Activated
EMERGENCY STOP INPUT 2 ACTIVATED	Emergency Stop Input 2 Activated
ENTER SECURITY CODE	Security
EXCESSIVE HEAT IN SMB UNIT *(IMC Performa only)*	Excessive Heat in SMB Unit
EXCESSIVE HEAT IN SYSTEM 12 *(IMC SCR only)*	Excessive Heat in System 12
FAILURE TO LEAVE THE FLOOR	MLT - Failed to Leave Floor
FIRE SERVICE PHASE 1 - ALTERNATE	Fire Service Alternate

TABLE 6.1 MC-MP2 Scrolling Messages Lookup

Scrolling Message	Event Message (see Table 6.3)
FIRE SERVICE PHASE 1 - MAIN	Fire Service Main
FIRE SERVICE PHASE 2	Fire Service Phase 2
FLT RELAY DROPPED	FLT Relay Dropped
FRONT DOOR IS LOCKED BUT NOT FULLY CLOSED	Doors Locked but not fully Closed - Front
GATE SWITCH FAILURE *(non ASME-2000 only)*	Gate Switch Failure
GOVERNOR SWITCH OPEN *(Traction only)*	Governor Switch Open
HALL CALL BUS IS DISCONNECTED	Hall Call Bus Fuse Blown
HEAVY LOAD WEIGHER CONDITION	Heavy Load
HOISTWAY SAFETY DEVICE OPEN	Hoistway Safety Device Open
HOSPITAL PHASE 1 OPERATION	Hospital Service
HOSPITAL PHASE 2 OPERATION	Hospital Service Phase 2
IMC SUB-SYSTEM NOT READY *(IMC only)*	IMC Sub-System Not Ready
IN CAR STOP SWITCH ACTIVATED	In-car Stop Switch
INDEPENDENT SERVICE OPERATION	Independent Service
INSPECTION / LEVELING OVERSPEED FAILURE *(IMC Traction only)*	Inspection/ Leveling Overspeed
INSPECTION OPERATION	Inspection
LANDING SYSTEM REDUNDANCY FAILURE *(non ASME-2000 only)*	Landing System Redundancy Failure
LEVELING DOWN	Level Down
LEVELING SENSOR FAILED - OFF POSITION	Leveling Sensor Failure (Inactive State)
LEVELING SENSOR FAILED - ON POSITION	Leveling Sensor Failure (Active State)
LEVELING SENSOR FAILURE	Leveling Sensor Redundancy Failure
LEVELING UP	Level Up
LIGHT LOAD WEIGHER CONDITION	Light Load
LOSS OF INSPECTION DURING LEARN MODE *(IMC only)*	Loss of IN During Learn (Learn Mode Setup Error)
MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED	MLT - Excessive PI Correction (*Traction*) MLT - Excessive Releveling at Floor- MLT - Timer Expired Motor Limit Timer (*Traction*) Motor Limit Timer (INT) (*Traction*) Motor Limit Timer (LI) (*IMC Traction*) Motor Limit Timer (LI & INT) (IMC *Traction*) External Motor Limit Timer (*Hydro*) Low Oil Switch (*Hydro*)
NO RESPONSE FROM PATTERN GENERATOR (SETUP ERROR), LEARN MODE (*IMC only)*	No Response from Pattern Generator (Learn Mode Setup Error)
NORMAL OPERATION	
OVERLOAD CONDITION	Car is Overloaded
PASSCODE REQUEST	Passcode Requested
PG NOT READY *(IMC Traction only)*	Pattern Generator not Ready
PHOTO EYE FAILURE	Photo-Eye Failure (Front) Photo-Eye Failure (Rear)
PRESSURE SWITCH ACTIVATED (*Hydro only*)	Pressure Switch Activated
PRE-TEST MODE	Pre-test Mode
PRIORITY / VIP SERVICE - PHASE 1	Priority/VIP Service Phase 1
PRIORITY / VIP SERVICE - PHASE 2	Priority/VIP Service Phase 2
REAR DOOR IS LOCKED BUT NOT FULLY CLOSED	Doors Locked but not fully Closed - Rear
REDUNDANCY DOOR LOCK RELAY FAILURE	Door Lock Relay Redundancy Failure
REDUNDANCY GATE SWITCH FAILURE *(non ASME-2000 only)*	Gate Switch Relay Redundancy Failure
SAFETY CIRCUIT IS OPEN	Safety Relay Circuit Open
SHUTDOWN OPERATION	MG Shutdown Operation/Shutdown Switch
TIME OUT OF SERVICE	Timed Out of Service
VALVE LIMIT TIMER ELAPSED *(Hydro only)*	Valve Limit Timer Elapsed
VISCOSITY CONTROL FUNCTION ACTIVE *(Hydro only)*	Viscosity Control Function

3-1-05

6.1.3 SPECIAL EVENTS CALENDAR FAULT LOG

The Special Events Calendar can document the most recent 250 important fault conditions or events and display them in chronological order. They can be viewed on the optional CRT terminal connected to either the car controller or the Group Supervisor. The data displayed includes the type of event or fault, the date and time the fault/event occurred, the date and time the fault/event was corrected, as well as other information about the status of the elevator when the fault or event occurred.

The Special Events Calendar is accessed from the Special Events Calendar Menu. Press the **F7** key while the Main Menu is displayed.

View Fault Log (F7, 1 or F7) - From the Special Events Calendar Menu (F7) screen press **1** or **F7** to display the events logged to the Special Events Calendar (Figure 6.2). This screen makes it possible to examine the documented faults and events. The latest 14 faults and events are displayed in the bottom half of the screen, including the date and time the event occurred.

FIGURE 6.2 Special Events Calendar (F7 - 1) screen

```
                                12/4/2000, 10:25:30 AM,   F4=Main Menu

                         Special Events Calendar (F7, F7)
STATUS                   SPEED (ft/Mmin)    VOLTAGE (volts)    CURRENT (amps)
Direction   : N/A        Command  : N/A     Armature : N/A     Armature : N/A
High Speed  : N/A        Tach/Enc : N/A     Motor Fld: N/A     Command  : N/A
Start Floor : N/A        Terminal : N/A     Brake    : N/A
Stop Floor  : N/A        Safety   : N/A
Step Floor  : N/A        Pattern  : N/A     SENSOR (volts)     POSITION (ft)
Switch      : N/A                           Motor Fld: N/A     Absolute : N/A
PI          : 3                             Brake    : N/A
Event Code  : 0x03 ( Communication )

This fault indicates that the car was previously communicating with the Group
Supervisor but is now unable to communicate.

DATE             TIME           DESCRIPTION
12/4/2000        10:05:28 AM    Communication Loss
                 10:07:37 AM    Communication Loss [OFF]
                 2:36:18 PM     Sub-System(s) Reset

   ARROWS: Move Cursor, HOME: Oldest, END: Newest, CTRL-T: Troubleshoot
                                                                  dnID208c
```

When this screen is first displayed, the most recent event is displayed at the bottom of the screen. Use the **Up / Down Arrow** keys to scroll one event at a time, the **Page Up / Page Down** keys to scroll a page at a time, or the ***Home / End*** key to scroll to event 1 or 250.

As each event is selected (reverse video), the description of the event and any other logged data is displayed in the top half of the screen. Additional troubleshooting information for each event can be displayed by pressing **Ctrl + T**.

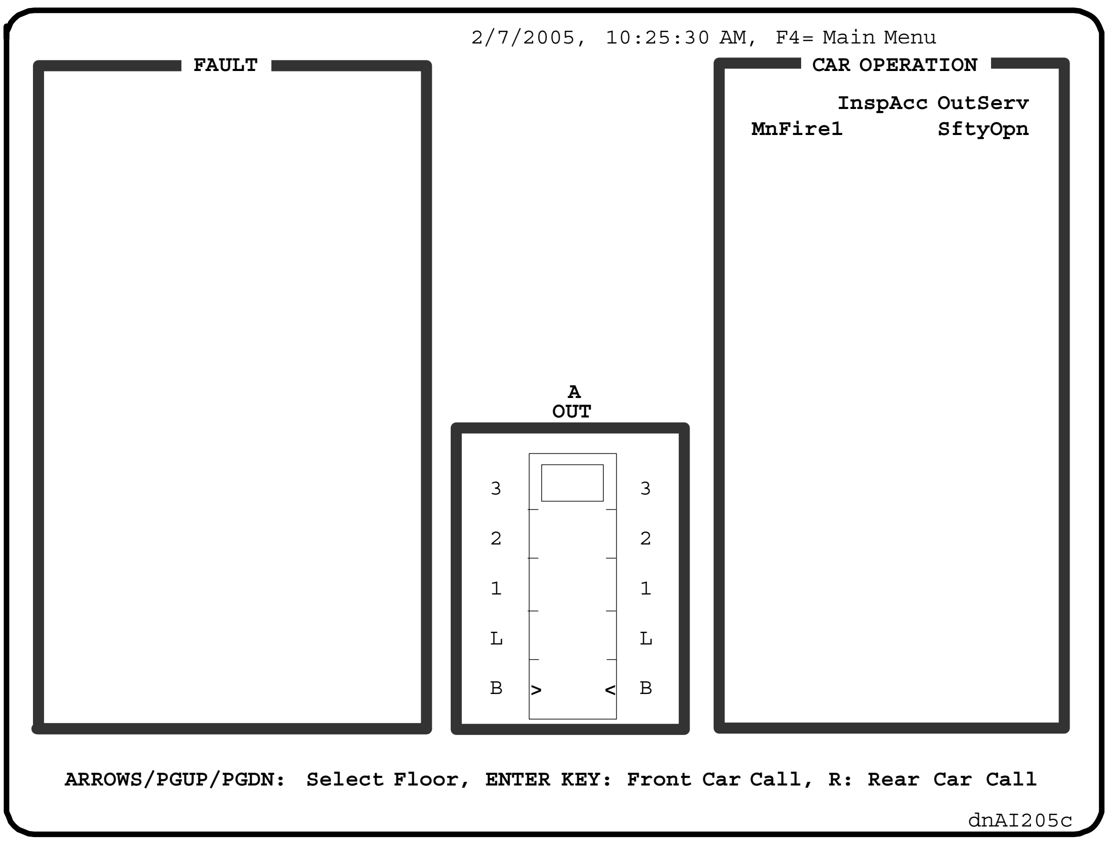
> **NOTE:** Tables 6.3 and 6.4 list all of the events which can be recorded in the Special Events Calendar Fault Log, with a description of the event and the recommended troubleshooting actions to be taken.

Clear Fault Log (F7, 2) - While the Special Event Calendar Menu (F7) screen is displayed, if the **2** key is pressed, the message **`Delete All Events? (Y/N)`** is displayed. Press **Y** to clear the Special Events Calendar Fault Log of all events.

6.1.4 VIEW HOISTWAY (F3) SCREEN FAULT FLAGS

The View Hoistway (F3) screen provides information about the status of the controller. The messages in the CAR OPERATION section of the F3 screen are listed in Table 6.2. and a description and recommend troubleshooting actions can be found in Tables 6.3 and 6.4, *Status and Error Messages*.

FIGURE 6.3 View Hoistway (F3) Screen



> **NOTE:** Table 6.3, *Status and Error Messages*, provides a description of the messages shown in the CAR OPERATION section of the View Hoistway (F3) screen, including recommended troubleshooting actions to be taken. Refer to Table 6.2, *View Hoistway (F3) Screen - CAR OPERATION* to find the desired flag, then look for the fault message by name in Table 6.3.

TABLE 6.2 View Hoistway (F3) Screen - CAR OPERATION

The flags appear only when the car condition exists.			
AlmNoDZ	Alarm - No Door Zone	**IndSrv**	Independent Service
AlmNoMv	Alarm - No Car Movement	**InServ**	In Service
AltFir1	Fire Service Alternate	**InspAcc**	Inspection
AntiNui	Anti-Nuisance Operation	**MLT**	MLT - Timer Expired
AttnSrv	Attendant Service Operation	**MnFire1**	Fire Service Main
AutoOps	Automatic Operation	**Nudging**	Nudging
BflrDem	Bottom Floor Demand	**OutServ**	Out of Service
Byp-HLW	Hall Call Bypass Operation	**SftyOpn**	Car Safety Device Open
EmrgPwr	Emergency Power	**SwngOpr**	Swing Car Operation
Eqactv	Earthquake	**TflrDem**	Top Floor Demand
FirePh2	Fire Service Phase 2	**TOS**	Timed Out of Service
HospEmr	Hospital Service		

6.1.5 STATUS AND ERROR MESSAGES TABLE

Table 6.3 *Status and Error Messages* and Table 6.4 *A17.1 - 2000 Status and Error Messages* provide a listing of the status and error messages from the following:

- Computer Swing Panel (MP2) Scrolling messages
- Special Events Calendar Fault Log
- View Hoistway (F3) Screen - CAR OPERATION section

FIGURE 6.4 Legend for Table 6.3, Status and Error Messages

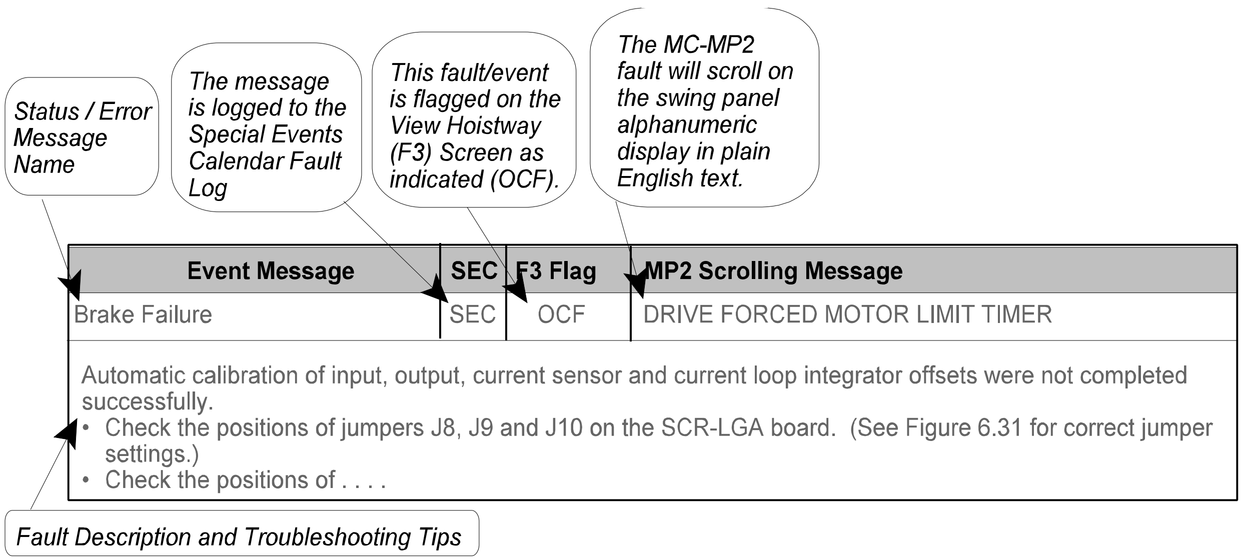


TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>2nd Landing Aux. Access Fault</td><td></td><td></td><td>2ND LANDING AUX. ACCESS FAULT</td></tr>
<tr><td colspan="4">The inputs “Second Landing Access Bypass” (2AB) and “Redundant Second Landing Access Bypass” (R2AB) are compared. The car is shut down and this fault is generated if both inputs have the same status.</td></tr>
<tr><td>Alarm - No Car Movement</td><td>SEC</td><td>AlmNoMv</td><td></td></tr>
<tr><td colspan="4">This status indicates that the alarm bell pushbutton was pressed when the car was not moving (ABI).</td></tr>
<tr><td>Alarm - No Door Zone</td><td>SEC</td><td>AlmNoDz</td><td></td></tr>
<tr><td colspan="4">This status indicates that the alarm bell pushbutton was pressed when the car was not in door zone (ABIZ).</td></tr>
<tr><td>Anti-Nuisance Operation</td><td></td><td>AntiNui</td><td></td></tr>
<tr><td colspan="4">This status indicates that the load weigher is detecting a minimal load in the car; therefore anti-nuisance logic is in effect allowing only a few car calls to be registered.</td></tr>
<tr><td>Attendant Service Operation</td><td></td><td>AttnSrv</td><td>ATTENDANT SERVICE OPERATION</td></tr>
<tr><td colspan="4">This status indicates that the attendant service input (ATS) is activated. Attendant service is maintained as long as the ATS input is activated, and there are no “emergency service” (e.g., fire service) demands.
• Check the status of the ATS input. When the car is in Attendant Service operation the input should be high.</td></tr>
<tr><td>Automatic Operation</td><td></td><td>AutoOps</td><td></td></tr>
<tr><td colspan="4">This status indicates that the car is running on Automatic Operation.</td></tr>
<tr><td>Aux. Inspection Access Fault</td><td></td><td></td><td>AUX. INSPECTION ACCESS FAULT</td></tr>
<tr><td colspan="4">The inputs “Inspection Access” (INA) and “Redundant Inspection Access” (RINA) are compared. The car is shut down and this fault is generated if both inputs have the same status.</td></tr>
<tr><td>Both USD and DSD Are Open</td><td>SEC</td><td></td><td>BOTH USD AND DSD INPUTS ARE ACTIVE</td></tr>
<tr><td colspan="4">This fault indicates that the Up Slow Limit Switch (USD input) and Down Slow Limit Switch (DSD input) are simultaneously open. This usually indicates a problem with one of the terminal landing limit switches. The MP detects this condition when USD=0, DSD=0, DLK=1.
• Inspect both limit switches and associated wiring.
• Measure voltages at relay board terminals 11 (USD) and 13 (DSD). Reference the job prints and verify measured voltages against the status of the limit switches.
• If voltages are appropriate, possible causes may be a defective:
1. 47Kohm resistors on top of the main relay board, HC-RB4-x (for USD/DSD inputs).
2. C2 ribbon cable between HC-RB4-x and HC-PI/O boards.
3. Input circuit on the HC-PI/O board.</td></tr>
<tr><td>Bottom Floor Demand</td><td>SEC</td><td>BflrDem</td><td>BOTTOM FLOOR OR TOP FLOOR DEMAND</td></tr>
<tr><td colspan="4">This status is generated either when the established PI value corresponds to the top terminal landing, but the Up Slow Limit Switch is closed or when a valid PI value can not be found. A Bottom Floor Demand is generated to move the car away from the landing and establish a car position. Possible causes are:
• The COMPUTER RESET button was pressed.
• Initial Power-up.
• The state of the limit switch contacts do not correspond to the current PI value (example: the car is in door zone and the PI value corresponds to the bottom terminal landing, but the Down Slow Limit Switch is closed).
• The car was placed on Inspection (the computer does not attempt to maintain the PI value while the car is being moved in a “manual” fashion; Bottom Floor Demand is declared when the car is placed back into automatic operation).
Troubleshooting:
• If the floor encoding is invalid, the car should move to one of the terminal landings to establish car position.
• If the floor encoding is valid and the car is level at a landing, check the floor encoding magnets or vanes (perhaps a valid code cannot be read).
• If the floor encoding is invalid, check the terminal limit switches and associated wiring.
• Verify that the input circuits for USD and DSD are not failing by checking for defective:
1. 47Kohm resistors on top of the main relay board, HC-RB4-x.
2. C2 ribbon cable between HC-RB4-x and HC-PI/O boards.
3. HC-PI/O board.
4. Short circuit on HC-RB4-x board.</td></tr>
<tr><td>Bottom Landing Aux. Access Fault</td><td>SEC</td><td></td><td>BOTTOM LANDING AUX. ACCESS FAULT</td></tr>
<tr><td colspan="4">The inputs “Bottom Landing Access Bypass” (BAB) and “Redundant Bottom Landing Access Bypass” (RBAB) are compared. The car is shut down and this fault is generated if both inputs have the same status.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Brake Pick Failure (Traction only)</td><td></td><td></td><td>BRAKE PICK FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the Brake Pick Sensor (BPS) input was high (indicating the brake was not fully picking) during three consecutive runs. The car is shut down.
• Check the brake pick switch for proper operation (the contact should open when the brake is fully picked).
• Check the status of the BPS input. It should be low when the brake is picked.</td></tr>
<tr><td>Car Call Bus Fuse Blown</td><td>SEC</td><td></td><td>CAR CALL BUS IS DISCONNECTED</td></tr>
<tr><td colspan="4">This fault indicates that there is no power to the car call circuits on the HC-CI/O board(s). A problem may exist with the Car Call Bus fuse (F2CC) or the car call common wiring (bus 2CC).
• Check the Car Call Bus fuse (F4) in the controller.
• Check the wires that go to the Car Call Power inputs (labeled PS1/PS2/PS3) on the HC-CI/O board(s) in the controller.
• Check for the proper installation of the call board “jumper plug” on the HC-CI/O board(s). Look at the notch on the chip and match it up according to the notch orientation label on the HC-CI/O board.</td></tr>
<tr><td>Car is Overloaded</td><td></td><td></td><td>OVERLOAD CONDITION</td></tr>
<tr><td colspan="4">This status indicates that the Overload input (OLW) is activated, or the perceived load in the car has exceeded the threshold value set for an overload condition.
• For a discrete OLW input: check the status of the OLW input (wired to a load weigher contact), and determine if the status of the input is appropriate relative to the load in the car.
• For an analog load weigher: check the perceived load percentage using the on-board diagnostic station. Determine if the value displayed (percentage) is appropriate relative to the load in the car.</td></tr>
<tr><td>Car Out of Service with Doors Locked</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that the car was shut down because it was delayed from leaving the landing for a predetermined time (default 5 minutes) after it timed out of service. The doors were locked when the timer elapsed.
• Correct the problem that caused the car to time out of service. Refer to the Special Event Calendar for the event name, then troubleshoot that event.</td></tr>
<tr><td>Car Out of Service without Doors Locked</td><td>SEC</td><td>SftyOpn</td><td></td></tr>
<tr><td colspan="4">This fault indicates that the car was shut down because it was delayed from leaving the landing for a predetermined time (default 5 minutes) after it timed out of service. Doors were not locked when the timer elapsed.
• Suspect an obstruction that has kept the doors from closing, thus preventing the car from leaving.
• Verify that controller terminal #48, on the HC-RB4-x board, has zero voltage.
• Correct the problem that caused the car to time out of service. Refer to the Special Events Calendar for the event name, then troubleshoot that event.</td></tr>
<tr><td>Car Safety Device Open</td><td>SEC</td><td></td><td>CAR SAFETY DEVICE OPEN</td></tr>
<tr><td colspan="4">This fault indicates that one or more of the car safety circuit devices is open (e.g., emergency exit contact, safety clamp switch, car-top emergency stop switch). This error is generated when the safety string input (SAF) is low, and the safety circuit has been opened “upstream” of the SAFC input.
• Check the applicable car safety devices. Refer to controller wiring prints for applicable devices.</td></tr>
<tr><td>Car to Lobby</td><td></td><td></td><td>CAR TO LOBBY OPERATION</td></tr>
<tr><td colspan="4">This status indicates that the Car To Lobby input (CTL) has been activated.
• Check the status of the CTL input. It should be high.</td></tr>
<tr><td>Communication Loss</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that the car was previously communicating with the Group Supervisor but is now unable to communicate.
• Verify that the RS-422 communication cable is not removed from the Car’s MC-RS board.
• Verify the jumpers on all of the controllers’ MC-RS boards.
• Check for a defective MC-RS board on any of the controllers.</td></tr>
<tr><td>Contactor Proofing Redundancy Failure</td><td>SEC</td><td></td><td>CONTACTOR PROOFING REDUNDANCY FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that one (or more) of the main power contactors has not dropped out properly after the car stopped moving. The computer generates this error when either the CNPB or CNPM input remains low after the car has stopped.
• This failure is only logged on the Group CRT and will occur in conjunction with one of the three local redundancy failures: PM Contactor Redundancy Failure, MX & PT1 Redundancy Failure, or PT2 & PT3 Redundancy Failure.
• Verify that the CNP input is high when the car is not in motion.
• Look for troubleshooting tips in the description of these specific redundancy failures.</td></tr>
<tr><td>Direction Relay Redundancy Failure</td><td>SEC</td><td></td><td>DIRECTION RELAY REDUNDANCY FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that one of the direction relays appears to have failed in the picked state. The computer has detected that the Direction Pilot input (UDF) is high without a direction output. Ensure that, when the car is not in motion, the UDF input is low.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Door Close Protection</td><td>SEC</td><td></td><td>DOOR CLOSE FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the doors were unable to close in. typically. 60 seconds.
• Check door lock contacts for proper closure and conductivity.
• Check individual doors and door tracks for physical obstructions.
• Verify that the Door Close Limit contact functions properly.
• Check for a faulty Door Lock Sensor input (DLS) or Door Close Limit input (DCL).</td></tr>
<tr><td>Door Lock Contact Failure</td><td>SEC</td><td></td><td>DOOR LOCK SWITCH FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that a door lock contact appears to have failed in the closed state. The computer compares the state of the landing Door Lock Sensor input (DLS or DLSR) with the state of the Door Close Limit input (DCL). If DLS or DLSR remains high after the doors have opened (DCL=1), this failure will be declared. (It appears that the door lock contact is shunted or has remained closed).
• Measure the voltage on the DLS or DLSR input, with doors open.
• If voltage exists on DLS or DLSR while the doors are open, trace the source of the voltage.
• If no voltage exists on the DLS or DLSR, suspect faulty DLS or DLSR input circuit. Check the HC-IOX and HC-I4O boards.</td></tr>
<tr><td>Door Lock Failure</td><td>SEC</td><td></td><td>DOOR LOCK FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the doors have closed, DCL = 0 (or DCLC = 1 if retiring cam), a demand exists for the car to move (DCP = 1), but the doors did not lock (DLK = 0) within 80 seconds with the door close power output (DCP) turned on.
• If no Retiring Cam is used, verify that the door lock contacts are closed to provide power to the door lock input (DLK = 1).
• If the Retiring Cam option is set:
1. Verify that the Retiring Cam relay is activated (DCP=1, DCL=0 or DCLC=1) and the doors are locked (DLK=1).
2. Momentarily place the car on Inspection to reset the Door Lock Failure.
3. Verify the proper operation of the Retiring Cam circuitry and mechanism.</td></tr>
<tr><td>Door Lock Relay Redundancy Failure</td><td>SEC</td><td></td><td>REDUNDANCY DOOR LOCK RELAY FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that one of the door lock relays has failed to drop out.
• Verify that, with the hoistway doors open, there is no power on the Door Lock Sensor Relay input (RDLS or RDLSR, if the car has rear doors).
• If the RDLS or RDLSR input is high and the doors are open, then a door lock relay has failed to drop.
• Verify that the door lock relay(s) operates properly.
• If no voltage appears on the RDLS (or RDLSR) input, suspect a faulty RDLS (or RDLSR) input circuit. Replace the HC-IOX and/or HC-I4O boards.</td></tr>
<tr><td>Door Open Limit Failure</td><td>SEC</td><td></td><td>DOOR OPEN LIMIT FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that a door open limit contact appears to have failed in the open state. This means that the Door Open Limit input (DOL or DOLR) is low--indicating an open door--while the Gate Switch (GS) or Door Lock Sensor (DLS) inputs are high--indicating a closed and locked door.
• Verify that, with the doors closed, there is power on the Door Open Limit input (DOL or DOLR). DOL or DOLR must be high when DLS and/or GS is high.
• Check the wire, in the controller, to terminal #36 on HC-RB4-x to verify DOL.
• If there is a rear door, check terminal #36 on the rear door board to verify DOL.</td></tr>
<tr><td>Door Open Protection</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that the doors were unable to open in typically 12 seconds.
• Check door lock contacts for proper closure and conductivity.
• Check individual doors and door tracks for physical obstructions.
• Verify that the Door Open Limit contact functions properly.</td></tr>
<tr><td>Doors Locked but not fully Closed - Front</td><td></td><td></td><td>FRONT DOOR IS LOCKED BUT NOT FULLY CLOSED</td></tr>
<tr><td colspan="4">This fault indicates that the Door Lock input (DLK) was high (doors locked) and the Door Closed Limit input (DCL) was high (doors not fully closed). DCL should be low when doors are locked.
• Determine the state of the doors.
• If the doors are closed, check the voltage on the DCL input terminal. If the voltage is high, adjust the Door Closed Limit switch so the switch opens prior to DLK.
• Check for a faulty door close limit contact or associated wiring.</td></tr>
<tr><td>Doors Locked but not fully Closed - Rear</td><td></td><td></td><td>REAR DOOR IS LOCKED BUT NOT FULLY CLOSED</td></tr>
<tr><td colspan="4">This fault indicates the Door Lock input (DLK) was high (doors locked) and Door Closed Limit Rear input (DCLR) was high (doors not fully closed). DCLR must be low when doors are locked.
• Determine the state of the doors.
• If the doors are closed, check the voltage on the DCLR input terminal. If the voltage is high, adjust Rear Door Closed Limit switch so the switch opens prior to DLK.
• Check for a faulty door close limit contact or associated wiring.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Doors Open And Locked</td><td>SEC</td><td></td><td>DOL AND DLK BOTH ACTIVE</td></tr>
<tr><td colspan="4">This fault indicates that the Door Open Limit input (DOL) was low while the Door Lock input (DLK) was high. The leveling inputs (LU and LD) must also be low to log this fault.
• Determine the state of the doors.
• If the doors are open, check the voltage on terminal #8 (DLK), on the HC-RB4-x board.
• If voltage exists, determine source of voltage (there should be no voltage on terminal 8 if doors are open and car is not leveling).
• If the doors are closed, check the voltage on terminal #36 (DOL), on the HC-RB4-x board. The voltage should be high.
• If voltage does not exist, check for faulty door open limit contact (contact should be closed if doors are not fully open) or associated wiring.
• If voltages are appropriate, suspect faulty input circuit (either DLK or DOL input circuit). Check the 47Kohm resistors on the HC-RB4-x and HC-PI/O boards.</td></tr>
<tr><td>Door Zone Sensor Failure (active state)</td><td></td><td></td><td>DOOR ZONE SENSOR FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the Door Zone input (DZ) did not deactivate during the run. Probable causes are: shorted door zone sensor or associated circuitry (within the landing system assembly); faulty wiring from the landing system to the controller; or a faulty computer input circuit (main relay board or HC-PI/O board).
• Check the operation of the door zone sensors and associated wiring (place the car on inspection, move the car away from the floor, noting the transitions in the door zone signal(s) coming from the landing system).
• Verify that the computer diagnostic display of DZ (or DZ rear) matches the state of the sensor signals at the main relay board (or rear door relay board).</td></tr>
<tr><td>DPM Redundancy Fault</td><td>SEC</td><td></td><td>DPM REDUNDANCY FAULT</td></tr>
<tr><td colspan="4">A failure of a front door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPM (door position monitor) input.
• Valid when SAF=1. When DLK is ON (1) then input DPM must also be ON (1). When DOL=0, DPM=0. If this is not the case, then a DPM redundancy fault is recorded and the car is prevented from operating</td></tr>
<tr><td>DPMR Redundancy Fault</td><td>SEC</td><td></td><td>DPMR REDUNDANCY FAULT</td></tr>
<tr><td colspan="4">A failure of a rear door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPMR (door position monitor rear) input.
• Valid when SAF=1. When DLK is ON (1), input DPMR must also be ON (1). When DOLR=0, DPMR=0. If not, a DPMR redundancy fault is recorded and the car is prevented from operating.</td></tr>
<tr><td>Drive Failed to Respond</td><td></td><td></td><td>DRIVE FAILED TO RESPOND</td></tr>
<tr><td colspan="4">Monitors the Drive On status of the drive. The DRON input must be ON when the elevator is stopped and OFF when the elevator is in motion. If this condition is not true, the Drive Failed To Respond fault will be logged. The elevator will attempt to recover from this fault up to four consecutive times after which this fault will latch and require a manual reset by toggling the inspection switch.
• Check the circuitry associated with the DRON input for proper operation.</td></tr>
<tr><td>Earthquake (Traction only)</td><td>SEC</td><td>Eqactv</td><td>EARTHQUAKE OPERATION</td></tr>
<tr><td colspan="4">This fault indicates that one or both of the earthquake inputs (EQI, CWI) is high. The appropriate code-mandated earthquake operation is applied, for ANSI and California Earthquake Operation the car is brought to a floor and then shut down.
• The elevator may be returned to normal service by means of momentary reset button on the earthquake board (HC-EQ2). This should be done by authorized personnel, after it has been determined that it is safe to do so.
• Should the system remain in this mode of operation after the reset button has been pressed, check the status of the earthquake sensing devices (seismic switch or counterweight derailment device).</td></tr>
<tr><td>Earthquake Normal Operation (Traction only)</td><td></td><td></td><td>EARTHQUAKE- REDUCED SPEED OPERATION</td></tr>
<tr><td colspan="4">This status allows the car to run after an Earthquake fault. To run at reduced speed on Earthquake Normal Operation the Earthquake fault timer must expire and the counterweight must not be derailed during the earthquake. (EQI is high, CWI is low; used for ANSI earthquake operation only.) Otherwise, the car remains shut down.
• The elevator may be returned to normal service by pressing the RESET button on the earthquake board (HC-EQ2). This should be done by authorized personnel, after it has been determined that it is safe to do so.
• Should the system remain in this mode of operation after the RESET button has been pressed, check the status of the EQI input.</td></tr>
<tr><td>Elevator Shutdown or Power Transfer</td><td></td><td></td><td>ELEVATOR SHUTDOWN SWITCH OR POWER TRANSFER INPUT ACTIVE</td></tr>
<tr><td colspan="4">This status indicates that either the Elevator Shutdown input (ESS) has been activated or the Power Transfer input (PTI) has been activated. The car is stopped at the next available floor and then shut down.
• Verify that the status of the computer inputs (ESS) and (PTI) is appropriate relative to the status of the switch or contact that feeds the input.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

Event Message	SEC	F3 Flag	MP2 Scrolling Message
Emergency Power	SEC	EmrgPwr	**EMERGENCY POWER OPERATION**
This event indicates that the system is on Emergency Power operation. The Emergency Power input (EPI) is low, which indicates that the system is being powered by an emergency-power generator. • If system is not running on an emergency-power generator, check the voltage on the EPI terminal (this terminal is generally found in the group supervisor controller in multi-group applications). • If voltage does not exist on EPI, check contact and associated wires that feed the EPI input. • If voltage does exist on the EPI terminal, suspect faulty EPI input circuitry (HC-IOX or HC-I4O board). [Note: In some applications, the EPI input resides in the individual elevator controller. Refer to specific job prints for details.] • If this is a group system with emergency power, and the Group Supervisor has yet to be installed, place a jumper from the 2 bus to the EPI input on each local car's HC-IOX board. Remove the jumper when the Group Supervisor is installed.			
Emergency Power Shutdown	SEC		**EMERGENCY POWER SHUTDOWN**
This status indicates that the car is shutdown during Emergency Power Operation when the controller is unable to communicate with the Group Supervisor. When the Group Supervisor is unable to coordinate running the elevators on Emergency Power, this shutdown occurs in order to prevent the cars from running all at the same time and possibly overloading the generator.			
Emergency Stop Input 1 Activated			**EMERGENCY STOP INPUT 1 ACTIVATED**
This message is displayed when the Emergency Stop Input 1 (ESTP1) goes high.			
Emergency Stop Input 2 Activated			**EMERGENCY STOP INPUT 2 ACTIVATED**
This message is displayed when the Emergency Stop Input 2 (ESTP2) goes high.			
External Motor Limit Timer (Hydro only)	SEC		**MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED**
This fault indicates that the EXMLT input is active. This is an MLT shutdown wtih an External Motor Limit Timer (EXMLT).			
Fire Service Alternate	SEC	AltFir1	**FIRE SERVICE PHASE 1 - ALTERNATE**
This event indicates that the system is on Fire Recall Operation (Fire Service Phase I), using the alternate fire recall floor. This recall is generally initiated by the activation of a smoke detector at the main fire recall floor. In some applications, an alternate fire recall switch may be specified (FRAON input). • Inspect the fire sensors (especially the main floor sensor) and the Fire Phase I switch wiring. For some fire codes including ANSI, the Fire Phase I switch must be turned to the BYPASS position and then back to OFF to clear the fire service status, if activated by a smoke sensor. • If this is a group System and the Group Supervisor has yet to be installed, make sure the 2-bus is jumpered to terminal #38 on the HC-RB4-x. Remove the jumper when the Fire Service wiring is complete.			
Fire Service Main	SEC	MnFire1	**FIRE SERVICE PHASE 1 - MAIN**
This event indicates that the system is on Fire Recall Operation (Fire Service Phase I), using the main fire recall floor. This recall is generally initiated by the activation of a smoke detector at a landing other than the main fire recall floor. Fire recall operation to the main floor can also be initiated by the activation of the fire recall switch (input FRON or FRON2). • Inspect the fire sensors and the Fire Phase I switch wiring. For some fire codes including ANSI, the Fire Phase I switch must be turned to the BYPASS position and then back to OFF to clear the fire service status if activated by a smoke sensor. • If this is a group installation and the group has yet to be installed, make sure the 2-bus is jumpered to terminal #38 on the HC-RB4-x. • If this installation must comply with the requirements of the 1998 Addendum to the ASME A17.1-1996 or later code, and the machine room and hoistway sensors have not yet been installed, or if this is a group system and the Group Supervisor has yet to be installed, make sure the FRMR and FRHTW inputs on the HC-IOX boards in each simplex or local car controller are jumpered to the 2/2F bus, as applicable			
Fire Service Phase 2	SEC	FirePh2	**FIRE SERVICE PHASE 2**
This event indicates that the car is on In-car Fireman's Service (Fire Phase 2). The in-car fire service switch has been placed in the on (FCS) or hold (HLD) position. • Inspect the phase 2 switch and wiring. In most fire jurisdictions, the car must be returned to the fire floor at which Fire Phase 2 was activated, the doors must be fully open, and the phase 2 switch must be turned OFF to remove the elevator from Fire Phase 2 operation.			
FLT Relay Dropped			**FLT RELAY DROPPED**
The FLT relay is dropped as a result of one or more of many possible fault conditions. • Check the Event Calendar to determine what has caused the FLT Relay Dropped message. Then look up that message or messages in this table to determine the appropriate troubleshooting and/or corrective action.			
Gate Switch Failure	SEC		**GATE SWITCH FAILURE**
This fault indicates that a car gate contact failed to open when the car doors opened. The computer checks the gate switch contact input (GS or GSR) against the door close limit input (DCL). If the gate switch contact remains closed (GS=1 or GSR=1) while the door is open (DCL=1) the fault is logged. Such a state would indicate that the gate switch contact has been shunted, or a contact or associated wiring is faulty. • Verify that, with the doors open, there is no power on the GS input (GS must be low when DCL is high). • If no voltage exists on the GS input, suspect a faulty GS input circuit (HC-IOX or HC-I4O board). • If there is a rear door perform the same tests for the GSR input.			

TABLE 6.3 Status and Error Messages

Event Message	SEC	F3 Flag	MP2 Scrolling Message
Gate Switch Relay Redundancy Failure	SEC		**REDUNDANCY GATE SWITCH FAILURE**
This fault indicates that a car gate switch relay failed to release when the doors opened. • Verify that, with the car gate open, there is no power on the RGS input (or RGSR, if rear doors). • If the RGS input is high, suspect a stuck or welded gate switch relay. • Verify that the gate switch relay(s) operates properly. • If no voltage appears on the RGS (or RGSR) input, suspect a faulty RGS (or RGSR) input circuit.			
Governor Switch Open (Traction only)	SEC	SftyOpn	**GOVERNOR SWITCH OPEN**
This fault indicates that the governor switch is open. This error is generated when the safety string input (SAF) is low, and the safety circuit has been opened "upstream" of the GOV input. • Check the governor overspeed switch.			
Hall Call Bus Fuse Blown	SEC		**HALL CALL BUS IS DISCONNECTED**
This fault indicates that there is no power to the hall call circuits on the HC-CI/O board(s). A problem may exist with the Hall Call Bus fuse or the hall call common wiring. • Check the Hall Call Bus fuse in the controller. • Check the wires that go to the Hall Call Power inputs on the HC-CI/O board(s) in the controller. • Check for proper installation of the call board "jumper plug" on the HC-CI/O board(s).			
Hall Call Bypass Operation		Byp-HLW	
This status indicates that the load weigher is detecting a significant load in the car so hall calls will be bypassed.			
Heavy Load			**HEAVY LOAD WEIGHER CONDITION**
This status indicates that the Heavy Load (HLI) input has been high. • For a discrete HLI input (wired to a load weigher contact): Check the status of the HLI input, and determine if the status of the input is appropriate relative to the load in the car. • For an analog load weigher: Check the perceived load percentage using the on-board diagnostic station. Determine if the value displayed (percentage) is appropriate relative to the load in the car.			
Hoistway Safety Device Open	SEC	SftyOpn	**HOISTWAY SAFETY DEVICE OPEN**
This fault indicates that one or more of the Hoistway Safety Circuit Devices is open (e.g., pit stop switch, car and cwt buffers switches, up/down final limit switches). This error is generated when the safety string input (SAF) is low, and the safety circuit has been opened "upstream" of the SAFH input. • Check the applicable items (e.g., pit stop switch, car and cwt buffers switches, up/down final limit switches). Refer to the specific controller wiring prints for applicable devices.			
Hospital Service	SEC		**HOSPITAL PHASE 1 OPERATION**
This status indicates that the car was placed on Hospital Service. • Hospital Service can be initiated by the registration of a hospital call, or by the activation of the in-car Hospital Service switch (HOSP input). • Verify that the status of the in-car hospital switch computer input (HOSP) is appropriate relative to the status of the key-switch.			
Hospital Service Phase 2	SEC		**HOSPITAL PHASE 2 OPERATION**
This status indicates that the car has answered a hospital emergency call or the in car hospital emergency key switch has been activated (HOSP2 is high). • The car has been placed on in-car Hospital Emergency Service. The car will remain in this mode until the in-car Hospital Service key-switch is turned off. • Verify that the status of the in-car hospital switch computer input (HOSP2) is appropriate relative to the status of the key-switch.			
In-car Stop Switch	SEC	SftyOpn	**IN CAR STOP SWITCH ACTIVATED**
This fault indicates that the in-car stop switch has opened the safety circuit. • Check the status of the in-car emergency stop switch and associated wiring.			
Inconspicuous Riser	SEC		
This event indicates that the System is on Swing operation or the Inconspicuous Riser is functional. • Check Swing Car Operation. • Inspect the SWG switch on the controller.			

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Independent Service</td><td>SEC</td><td>IndSrv</td><td>INDEPENDENT SERVICE OPERATION</td></tr>
<tr><td colspan="4">This event indicates that the Independent Service switch has been turned on, or the TEST/NORMAL switch on the Relay board is in the TEST position.
• Check the Independent Service switch.
• Inspect the TEST/NORMAL switch on the Relay board on the controller.
• Check the wiring to the relay board (HC-RB4-x) terminal #49.</td></tr>
<tr><td>Inspection</td><td>SEC</td><td>InspAcc</td><td>INSPECTION OPERATION</td></tr>
<tr><td colspan="4">This event indicates that the hoistway access, car top inspection or relay panel inspection switch is ON or the hoistway and/or car-door bypass switch is on bypass. The Inspection input (IN) is low.
• Check all of the inspection switches and associated wiring.
• Check the wiring to the relay board (HC-RB4-x) terminal #59.</td></tr>
<tr><td>Landing System Redundancy Failure</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that one of the landing system sensors or associated relays has malfunctioned. A Landing System Redundancy Failure will be declared if the LSR input remains high throughout a run.
• Verify proper operation of the Door Zone (DZ), Level Up (LU) and Level Down (LD) relays while the car is moving in the hoistway.
• The LSR signal must go low at least once during a run.</td></tr>
<tr><td>Level Down</td><td></td><td></td><td>LEVELING DOWN</td></tr>
<tr><td colspan="4">This status is normally on when the car is just above a floor. If the car is level with the floor and this message appears, it is usually the result of a switch or sensor problem.
• Inspect the LD switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.</td></tr>
<tr><td>Level Up</td><td></td><td></td><td>LEVELING UP</td></tr>
<tr><td colspan="4">This status is normally on when the car is just below a floor. If the car is level with the floor and this message appears, it is usually the result of a switch or sensor problem.
• Inspect the LU switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.</td></tr>
<tr><td>Leveling Sensor Failure (Active State)</td><td></td><td></td><td>LEVELING SENSOR FAILED - ON POSITION</td></tr>
<tr><td colspan="4">This fault indicates that the MP detected a LU or LD input that is stuck in the active state.
• Computer input circuit (main relay board or HC-PI/O board).
Troubleshooting tips:
• Verify that the computer diagnostic display (ADDR 29H bits 3 & 7) of LU and LD matches the state of the sensor signals at the main relay board (terminals 25X and 26X).
• Check also the operation of any contacts that may be placed at the “low side” (the “1-bus” side) of the LU and LD relay coils (e.g., H, INT). Check that such contacts close properly when appropriate.</td></tr>
<tr><td>Leveling Sensor Failure (Inactive State)</td><td></td><td></td><td>LEVELING SENSOR FAILED - OFF POSITION</td></tr>
<tr><td colspan="4">This fault indicates that the MP detected a LU or LD input that is stuck in the inactive state.
• Check operation of the leveling sensors and associated wiring.
• Move above and below a landing, noting the transitions in the leveling signal(s) coming from the landing system.
• Verify that the computer diagnostic display of LU and LD matches the state of the sensor signals at the main relay board.</td></tr>
<tr><td>Leveling Sensor Redundancy Failure</td><td>SEC</td><td></td><td>LEVELING SENSOR FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that one of the LU or LD sensors appears to have failed.
The MP has observed one of the following faults:
• One of the leveling inputs was active continuously throughout a floor-to-floor run
• The appropriate leveling input was not seen prior to the arrival of the car at a door zone
Troubleshooting Tips:
• Verify the proper operation of the leveling sensor signals when moving the car in the hoistway.
• Check for a LU or LD input circuit failure by looking for defective:
  • 47kohm resistor on top of the main relay board, HC-RB4-x.
  • C2 ribbon cable.
  • HC-PI/O board input circuit.
  • Inputs at terminals 25 and 26 on the HC-RB4-x board.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Light Load</td><td></td><td></td><td>LIGHT LOAD WEIGHER CONDITION</td></tr>
<tr><td colspan="4">This status indicates that the Light Load Weighing (LLI) input is activated. The Light Load error message is generated whenever the load inside the car is less than the threshold specified to activate Anti-Nuisance operation, and car calls are registered.
• Response is only required if the anti-nuisance function (cancellation of car calls) appears to activate even when the car is loaded to a value above the threshold load value.
• For a discrete (LLI) input (wired to a load weigher contact): check the status of the (LLI) input and determine if the status is appropriate relative to the load in the car.
• For an Analog Load Weigher: check the perceived load percentage using the on-board diagnostic station. Determine if the percentage displayed is appropriate relative to the load in the car.</td></tr>
<tr><td>Lost Door Lock During Run</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that the Door Lock input was lost while the car was traveling through the hoistway.
• Check door lock adjustment to prevent clipping of door lock mechanism when car passes a floor.
• If logged with another fault, this event may be a side effect of the other fault.</td></tr>
<tr><td>Low Oil Switch (Hydro only)</td><td>SEC</td><td></td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">This fault indicates that the Low Oil Switch (LOS) input is active. This MLT shutdown gets latched until the car is momentarily on Inspection or reset.</td></tr>
<tr><td>MG Shutdown Operation/ Shutdown Switch</td><td></td><td></td><td>SHUTDOWN OPERATION</td></tr>
<tr><td colspan="4">This status indicates that the car is on MG Shutdown Operation or that another Shutdown Switch is activated. If the MGS input is high see job prints to determine what switch is connected to the input. This shutdown will bring the car to the lobby first then shut down the car.
• Check the status of the Motor Generator Shutdown Switch input.
• Verify that the status of the computer input (MGS) is appropriate relative to the status of the switch or contact that feeds the input (see job prints).</td></tr>
<tr><td>MLT - Excessive PI Correction (Traction only)</td><td>SEC</td><td></td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">This fault indicates that the logical PI value (obtained from the landing system) and the floor encoding are inconsistent.
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• Call MCE for troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
<tr><td>MLT - Excessive Releveling at Floor</td><td>SEC</td><td>MLT</td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">This fault indicates that the car has releveled 25 times at the same floor.
• Check the brake releveling motor adjustment.
• If the job is using a sleeve bearing motor, turn the Idle option ON. (See Timers and their Ranges, in Section 5 for details on the Idle option).
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
<tr><td>MLT - Failed to Leave Floor</td><td>SEC</td><td>MLT</td><td>FAILURE TO LEAVE THE FLOOR</td></tr>
<tr><td colspan="4">This fault is generated when the controller has picked high speed a number of times but failed to leave the floor. The number of tries allowed is a field-programmable value, programmed through the MC-MP2 enhanced on-board diagnostics (“System Mode”).
• The field adjustable option FTLF in the MP2's EOD may be used to turn the option OFF or to change the number of times H picks before shutdown.
• Check for an intermittent Door Lock.
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
<tr><td>MLT - Timer Expired</td><td>SEC</td><td>MLT</td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">The motor limit timer has elapsed before the car has completed its movement. This condition can occur because the MC-MP computer receives a direction sensing (UPS or DNS) input for a sufficient amount of time to cause the MLT timer to elapse. This usually happens due to the system's failure to respond to a 120 VAC direction signal appearing on terminals 85(up) or 87 (down) on the HC-RB4-X Relay board.
• Check Up and Down Sense inputs.
• If the OLM, DZ, or LEV input signal is stuck on during a correction run, the car may not be able to reach the next landing before the Motor Limit Timer elapses. Check these input signals.
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
</table>

TABLE 6.3 Status and Error Messages

<table>
<tr><th>Event Message</th><th>SEC</th><th>F3 Flag</th><th>MP2 Scrolling Message</th></tr>
<tr><td>Motor Limit Timer (Traction only)</td><td>SEC</td><td></td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">The motor limit timer has elapsed before the car completed its movement. This fault is logged with an explanation of the type MLT, which is in the form “MLT - XXX”.
• Check the Special Event Calendar for the additional MLT - XXX fault information and troubleshoot that specific type of MLT.
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
<tr><td>Motor Limit Timer (INT) (Traction only)</td><td>SEC</td><td></td><td>MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED</td></tr>
<tr><td colspan="4">This fault indicates that the intermediate speed flag (INT) was active when the Motor Limit Timer elapsed. This fault is logged with an explanation of the type MLT, which is in the form “MLT - XXX”.
• Verify that the INT relay is dropped(on the SCR-RI board) and the MP status flag for INT is low, once the car drops below the speed set by the MINT parameter, on the Pattern (Shift F4) page.
• Check the Special Event Calendar for the additional MLT - XXX fault information and troubleshoot that specific type of MLT.
• See “Using the MLT Data Trap” in Section 6, Troubleshooting.
• To clear the condition, the car can be placed momentarily on Inspection.</td></tr>
<tr><td>Nudging</td><td></td><td>Nudging</td><td></td></tr>
<tr><td colspan="4">This status indicates that the door nudging operation has commenced. Doors will be closed with reduced speed and torque as required by code.</td></tr>
<tr><td>Out of Service</td><td></td><td>OutServ</td><td></td></tr>
<tr><td colspan="4">This status indicates that the car is not available for normal passenger service.</td></tr>
<tr><td>Passcode Requested</td><td>SEC</td><td></td><td>PASSCODE REQUEST</td></tr>
<tr><td colspan="4">This status indicates that the Passcode Requested option has been activated and that a passcode is required in order to run the car on any mode other than Inspection. Refer to the instructions titled Setting the Passcode in Section 5.</td></tr>
<tr><td>Photo-Eye Failure</td><td>SEC</td><td></td><td></td></tr>
<tr><td colspan="4">This fault indicates that the one of the photo-eye inputs has been active for a considerable amount of time.
• Check for abnormal blockage of the optical device.
• Check for a failure of the device itself, or of the photo-eye input (PHE or PHER) circuit.
• Ensure that the safety edge has power.</td></tr>
<tr><td>Photo-Eye Failure (Front)</td><td>SEC</td><td></td><td>PHOTO EYE FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the front-door, photo-eye input (PHE) was activated during a run.
• Check for abnormal blockage of the optical device.
• Check for a failure of the device itself, or of the photo-eye input (PHE) circuit.
• Ensure that the safety edge has power.</td></tr>
<tr><td>Photo-Eye Failure (Rear)</td><td>SEC</td><td></td><td>PHOTO EYE FAILURE</td></tr>
<tr><td colspan="4">This fault indicates that the rear-door, photo-eye input (PHER) was activated during a run.
• Check for abnormal blockage of the optical device.
• Check for a failure of the device itself, or of the photo-eye input (PHER) circuit.
• Ensure that the safety edge has power.</td></tr>
<tr><td>Pre-test Mode</td><td></td><td></td><td>PRE-TEST MODE</td></tr>
<tr><td colspan="4">This status indicates that the car is bypassing hall calls and disabling the gongs. However, car calls may still be entered and will be answered. Once the last car call is answered, the car will park with doors closed. This function is normally used to capture a car.</td></tr>
<tr><td>Power Down</td><td></td><td></td><td></td></tr>
<tr><td colspan="4">This event indicates that the entire controller lost power or was manually reset. This event is logged when the MC-CGP-4P board loses power or is reset while running.</td></tr>
<tr><td>Priority/VIP Service Phase 1</td><td></td><td></td><td>PRIORITY VIP SERVICE - PHASE I</td></tr>
<tr><td colspan="4">This status indicates that a Priority/VIP Service momentary call switch was activated at any floor.
• The car has been assigned a Priority/VIP Service call. The car can be removed from Priority/VIP Service by toggling (On-Off) the in-car Priority/VIP Service key-switch. The car should automatically return to normal service after a pre-determined period of time (typically 60 seconds) if the in-car switch is not activated.</td></tr>
<tr><td>Priority/VIP Service Phase 2</td><td></td><td></td><td>PRIORITY VIP SERVICE - PHASE II</td></tr>
<tr><td colspan="4">This status indicates that the car has answered a Priority/VIP call or the in car Priority/VIP Service key switch has been activated (PRIS is high).</td></tr>
</table>

TABLE 6.3 Status and Error Messages

Event Message	SEC	F3 Flag	MP2 Scrolling Message
Releveling	SEC		
This event indicates that the car has traveled through the Dead Zone on an approach to the floor, and has had to relevel. • The drive must be properly adjusted to track the velocity profile. • Widen the dead zone by moving the LU and LD sensors farther apart.			
RS-422 Network Down	SEC		
This fault indicates that the Group Supervisor was previously communicating with one or more local cars but is now unable to communicate with any cars. • Verify that the RS-422 communication cable is not removed from the Group's MC-RS board. • Verify the jumpers on all of the controllers' MC-RS boards. • Check for a defective MC-RS board on any of the controllers by replacing it.			
RS-422 Network OK	SEC		
This event indicates that the Group Supervisor has recovered from an RS-422 Network Down event.			
Safety Relay Circuit Open	SEC	SftyOpn	**SAFETY STRING OPEN**
This fault indicates that a contact in the safety relay circuit is open. This message is generated when the safety string input (SAFR1) is low and all safety devices through the in-car stop switch are closed (STOP=1). This indicates that a device “below” terminal #20 has opened. • Refer to the job prints to determine all components that make up the safety relay circuit (between terminal 20 and the CSAF output device). • Check each of these devices to determine the cause of the fault.			
Security	SEC		**ENTER SECURITY CODE**
This event indicates that the secured car call button has been pressed, and the controller is awaiting proper security code to be entered through the car call buttons. A 10-second period of time is allowed to enter the correct code. • Enter floor pass code with car call buttons on COP. • See Section 5.3.3 or the appropriate security appendix for instructions on how to program or change security pass codes.			
Swing Car Operation		SwngOpr	
This status indicates that the car is operating as a swing car, independently from the Group Supervisor. This car should be servicing a riser of hall calls dedicated to that car.			
Synch Function (Hydro only)			
This event indicates that the SYNCI input has been momentarily activated and the car will be taken to the buffer in order to equalize the hydraulic pressure in systems that use more than one piston to move the car. The down normal limit switch is bypassed (by activation of a relay connected to the SYNC output) and the car is moved at slow speed in the down direction. The down slow valve circuits are energized for 30 seconds to ensure that the car has been lowered all the way to the buffer. Once this timer elapses, the car is moved back up to the bottom landing.			
System Power Up/Reset	SEC		
This event indicates that the Communication processor detected that all the individual system processors successfully powered up. If one or more processors fail to successfully power up, then this event will be replaced by one or more Sub-System Reset events detailing which individual processors successfully powered up.			
Test Mode Operation			**CAR IN TEST MODE**
This status indicates that the TEST/NORM switch on the HC-RB4-SCRI board is in the TEST position. • Check the TEST/NORM switch on the HC-RB4-x board.			
Timed Out of Service	SEC	TOS	**TIME OUT OF SERVICE**
This fault indicates that the car delayed reaching its destination (direction arrow established - SUA/SDA). In most cases, the car is delayed at a floor because the doors are prevented from closing. When the timed out of service (TOS) status is generated, the car is removed from hall call service until it is allowed to leave the landing. • The timer is used to take the car out of service when the car is held excessively. Typically this occurs when the doors are held open by continuous activation of the photo-eye, a call button, or another reopening device. The TOS timer is a field-adjustable timer, which can be lengthened or shortened to suit the specific installation (via the MP diagnostics).			
Timed Photo-Eye Failure	SEC		
The photo-eye was on longer than the predetermined time (default 60 seconds). • Check for an abnormal blockage of the optical device. • Check for a failure of the device itself, or of the photo-eye input (PHE or PHER) circuit.			

TABLE 6.3 Status and Error Messages

Event Message	SEC	F3 Flag	MP2 Scrolling Message
Top Floor Demand	SEC	TflrDem	**BOTTOM FLOOR OR TOP FLOOR DEMAND**

This status is generated either when the established PI value corresponds to the bottom terminal landing, but the Down Slow Limit Switch is closed or when a valid PI value can not be found. A top-floor demand is generated to move the car away from the landing to establish car position. Possible causes are:• The COMPUTER RESET button was pressed.
• Initial Power-up.
• The state of the limit switch contacts do not correspond to the current PI value (example: the car is in door zone and the PI value corresponds to the bottom terminal landing, but the Dn Slow Limit Switch is closed).
• The car was placed on Inspection (the computer does not attempt to maintain the PI value while the car is being moved in a “manual” fashion (Top Floor Demand is declared when the car is placed back into automatic operation).
Troubleshooting tips:
• If no floor encoding exists, car should move to one of the terminal landings to establish car position.
• If floor encoding system exists and car is level at a landing, check the floor encoding magnets or vanes (perhaps a valid code cannot be read).
• If floor encoding does not exist, check the terminal limit switches and associated wiring.
• Verify the input circuits for USD and DSD by looking at:
  • 47Kohm resistors on top of the HC-RB4-x.
  • C2 ribbon cable on top of the HC-RB4-x.
  • HC-PI/O board.
  • Short circuit on relay board.			

Valve Limit Timer Elapsed (Hydro only)			**VALVE LIMIT TIMER ELAPSED**
The Valve Limit Timer starts whenever the controller attempts to move the car in the down direction. The timer is reset when the car reaches its destination floor. This message is generated if the timer expires before the car reaches its destination, and the controller will stop trying to move the car in order to protect the valves. Verify that the Down Sense Input (DNS) is high when the car moves in the down direction. Inspect the valves, valve solenoids and associated wiring.			
Viscosity Control Function (Hydro only)	SEC		**VISCOSITY CONTROL FUNCTION ACTIVE**
This message indicates that the VCI input is activated and the car is executing the Viscosity Control Function. The car is moved to the bottom landing and the computer periodically runs the motor (not the valves) to warm the oil in the system. The pump is turned ON for three minutes, OFF for nine minutes, ON for three minutes, etc. until the VCI input is deactivated. Registration of any call will preempt the Viscosity Control Function, as will any special operation, e.g., fire service, independent service, etc. Check the device that is wired to the VCI input (usually an oil temperature sensor.			

3-1-05

6.1.6 ASME A17.1 - 2000 STATUS AND ERROR MESSAGES

The following Note Boxes apply to the messages listed in Table 6.4 *ASME A17.1 - 2000 Status and Error Messages*

NOTE: Remember that 90% of the redundancy faults are the result of a relay failing to release. A normally closed (NC) contact of each critical relay is monitored, and after a run has been completed, is expected to drop out (release). The normally closed monitoring contact must make up. This means that the redundancy inputs should be ON (1) when the car has stopped at a landing. Relays that are normally picked (GOV), are “cycle-tested,” forcing them to drop after every operating cycle.

For troubleshooting the redundancy faults, the first few letters of the fault name are the same as the input terminal or dropping resistor designation. Use the prints to locate the board. For example, if the RBK redundancy fault is displayed, measure the voltage at resistor RBK on the SC-SB2K-x (board #61) and expect, when stopped at a floor, at least 100 VAC on the input side and close to 5.0 volts on the output side of the resistor.

If the voltage at the associated terminal or resistor is as expected, try swapping the ribbon cable connectors. If the voltage is low at the 47K dropping resistor then replace the board (SC-SB2K-x or SC-BASE). If the problem persists replace the SC-HDIO signal processing board.

For outputs, if the fault doesn’t clear, swap out associated output TRIACs and finally replace the offending board. Because the code required force-guided relays are soldered to the boards and cannot be replaced individually, the board must be replaced when the relay fails. Sockets for these code-required relays are as yet, unavailable.

The redundant “force-guided” relays are loaded on the two primary boards called the SC-SB2K-x and the SC-BASE. A third board, the SC-HDIO processes the input and output signals that go to and from the two primary boards and is located behind boards in the upper left of the control enclosure.

NOTE: The term “operating cycle” is used to define a complete run. After a call is placed, the time between the picking of direction to dropping direction at the target floor, is defined as an operating cycle. This could be either a one-floor or multi-floor run.

NOTE: Many of the inputs are checked via process called “Cycle Testing”. If any of the inputs tested fail the fault is termed a “cycle test” fault. Cycle testing is simply cycling a portion of the hardware to ensure that the input structure (solid state devices and software) are still operational. Cycle tests are performed at the end of an operating cycle when we turn OFF relays SAFR1, SAFR2 (the four bus is turned OFF) and output CT. Thus all of the devices associated with the four bus and Triac CT (GOV) must go low (OFF). If any input fails to transition *OFF,* a cycle test fault is logged.

NOTE: **PFLT Relay:** The PFLT relay is mounted on the SC-BASE-x board and has a single normally open contact in the safety string, immediately following IDC 20 and before the OL contact which feeds the power to the SAFR1 & SAFR2 relays. The normally open contact of the PFLT relay is directly monitored by the Main Processor board (MC-MP2-2K or MC-PCA-OA2K) through the PFLT input from and through the SC-HDIO board on IDC ASI1. The PFLT relay should remain energized during Normal operation. This relay drops and causes the Emergency shut down and stops the car under the following conditions: ILO, ETS and contract overspeed. The PFLT relay also turns *OFF* during PLD1 cycle testing.

In Table 6.4, *ASME A17.1 - 2000 Status and Error Messages,* the faults are listed alphabetically as they would appear on the Swing Panel Alphanumeric Display. The Special Event Calendar event name (sometimes different) is in the right column. If the SEC name is different, then the fault is one of several that share that Special Event name as part of a logical group. The SEC event names are listed in the manual index for easy location in this table.

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
2BI REDUNDANCY FAULT	**2BI Redundancy Fault**
Description: If the F4 fuse blows, inputs GOV (0700 bit 3) and RSAFR (0707 bit 8) should be 0. If either of these two inputs fail to go low, this fault is generated. ASME 2000 event. **Troubleshooting Tips:** • Check fuse F4 if OK swap ribbon cable at C3 on SC-SB2K(-H). If problem persists, replace SC-SB2K(-H) and then SC-HDIO. • Also check input resistor 2BI at top left of the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if 2BI resistor is defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
4 BUS CYCLE TEST FAULT	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. At the end of an operating cycle, outputs MPSAF and CSAF are cycled OFF. This removes power from the four bus. ASME 2000 event. Troubleshooting: The following inputs must respond as listed or the 4 bus cycle test fault will be logged and further operation of the lift will be prohibited. Note that 0 = OFF and 1 = ON SAF = 0 RMR = 0 RBRK = 0 REI = 0 RIN1 = 1 RIN2 = 1 UPS = 0 USD = 0 DNS = 0 RPT = 1 DSD = 0 RH = 1 UNL = 0 DNL = 0 • Cycle testing is simply cycling a portion of the hardware to ensure that the input structure (solid state devices and software) are still operational. Cycle tests are performed at the end of an operating cycle when we turn OFF relays SAFR1, SAFR2 (the four bus is turned OFF) and output CT. Thus all of the devices associated with the four bus and Triac CT must go low (OFF). If any input fails to transition OFF, a cycle test fault is logged. • Also check input resistors ASI1/PFLT, SAF, STOP, REB1, REB2 or RSAFR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
ACCI REDUNDANCY FAULT	**Hoistway Access Input Fault**
Description: This verifies that all inspection inputs downstream of ACCI (hoistway access inspection is third highest priority) are OFF (0) when this input is ON (1). ASME 2000 event. **Troubleshooting:** If you have this fault logged use the controller prints to locate input resistors IN and INMR on the SC-SB2K(-H) board, voltage must be OFF when ACCI is ON otherwise the ACCI redundancy fault is logged and the system is shut down.	
CAR TOP INSPECTION	**Car Top Inspection**
Description: The Car Top Inspection switch has been activated. ASME 2000 event. **Troubleshooting:** • Confirm that INCTI = 1 (0701 bit 1). • Check input resistor INCTI on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistor are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
CD REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door lock input, relay or associated circuitry has been detected. The status of the car door lock input CD is constantly monitored. CD and DPM must be ON (1) when DLK is ON and the car is not in door zone. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Expect CD to be ON when hoistway access has been activated (input ACCI is ON) and either the top (TAB) or bottom (BAB) access switches are activated. If the Car Door Bypass switch is turned to the bypass position during car top or in car inspection, expect CD = ON also. If the above conditions are not true, the CD redundancy fault is logged. Check the voltage on the terminals used by the offending fault to determine the problem. If terminal voltages are correct, first swap the ribbon cables connected between the SC-SB2K(-H) board and the SC-HDIO board, then swap out the board; first try SC-SB2K(-H) followed by the SC-HDIO.	
CDB REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door input, relay or associated circuitry has been detected. Both the OFF and BYPASS positions of the Car Door Bypass switch are monitored. The OFF position feeds input CDBO and the BYPASS position feeds input CDB. If the CDB switch is OFF the CDBO input will be ON (1) and the CDB input will be OFF (0). In effect CDB = not CDBO. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. NOTE: This redundancy fault detects the failure of an input by comparing two inputs against each other. In every case the inputs have opposite polarity (when one is ON the other must be OFF). Check the voltage on the terminals used by the offending fault to determine the problem. If terminal voltages are correct, try swapping the ribbon cables connecting the SC-BASE(-D) to the SC-HDIO board. Finally replace SC-HDIO or SC-BASE(-D).	
CDBR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. Both the OFF and BYPASS positions of the Car Door Bypass switch are monitored. The OFF position feeds input CDBOR and the BYPASS position feeds input CDBR. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. If input CDBR switch is OFF then input CDBOR will be ON and the CDBR input will be OFF (0). If CDBOR does not reflect the opposite state of CDBR then the CDBR redundancy fault is logged and the car shut down. NOTE: This redundancy fault detects the failure of an input by comparing two inputs against each other. In every case the inputs have opposite polarity (when one is ON the other must be OFF). Check the voltage on the terminals used by the offending fault to determine the problem. If terminal voltages are correct, try swapping the ribbon cables connecting the SC-BASE(-D) to the SC-HDIO board. Finally replace SC-HDIO or SC-BASE(-D).	
CDR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. The status of the car door lock input CDR is constantly monitored. CDR should be ON (1) when rear DLK is ON and the car is not in the rear door zone. Expect CDR to be ON when hoistway access has been activated (input ACCI is ON) and either the top (TAB) or bottom (BAB) access switches are activated. If the Car Door Bypass switch is turned to the bypass position during car top or in car inspection, expect CDR = ON also. If these conditions are not true, the CDR redundancy fault is logged. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Expect CD to be ON when hoistway access has been activated (input ACCI is ON) and either the top (TAB) or bottom (BAB) access switches are activated. If the Car Door Bypass switch is turned to the bypass position during car top or in car inspection, expect CD = ON also. If the above conditions are not true, the CD redundancy fault is logged. Check the voltage on the terminals used by the offending fault to determine the problem. If terminal voltages are correct, first swap the ribbon cables connected between the SC-BASE(-D) board and the SC-HDIO board, then the SC-BASE(-D) followed by the SC-HDIO.	
CONTACTOR FAILURE TO PICK *(Hydro only)*	**Contactor Failure to Pick**
Description: Indicates that one or more contactors have failed to energize when the car attempted to move in the UP direction. **Troubleshooting:** Reset this fault by pressing the Fault Reset button. Place the car on Inspection and move the car in the up direction. Watch the contactors to determine which one is failing to pick. Inputs RWYE, RDEL and RM are monitored and expected to go low when the contactors pick.	
COS1 FAULT (Future Use) *(Traction only)*	**Overspeed Fault**
Description: Contract overspeed 1 fault. The main processor monitors the COS1 signal coming from PLD1. ASME 2000 event. **Troubleshooting:** Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. On SC-BASE(-D) try turning COS trimpot fully clockwise.	
COS2 FAULT (Future Use) *(Traction only)*	**Overspeed Fault**
Description: Contract overspeed 2 fault. The main processor inspects the COS2 signal coming from PLD2. ASME 2000 event. **Troubleshooting:** Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. On SC-BASE(-D) try turning COS trimpot fully clockwise.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
CT CYCLE TEST FAULT	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. This fault signifies that the functionality of the circuitry associated with the CT relay has failed to operate correctly. ASME 2000 event. **Troubleshooting:** At the end of an operating cycle, output CT is cycled OFF. Relay CT should drop out, this functionality is monitored via inputs CD/HD and DLK. When output CT is OFF, inputs CD, HD and DLK will be OFF. If not, the CT cycle test fault will be logged and further operation of the lift will be suspended. • Cycle testing is simply cycling a portion of the hardware to ensure that the input structure (solid state devices and software) are still operational. Cycle tests are performed at the end of an operating cycle when we turn OFF relays SAFR1, SAFR2 (the four bus is turned OFF) and output CT. Thus all of the devices associated with the four bus and Triac CT must go low (OFF). If any input fails to transition OFF, a cycle test fault is logged. • Also check input resistors PFLT, SAF, or RSAFR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
CTDIF REDUNDANCY FAULT *(Traction only)*	**CTDIF Redundancy Fault**
Description: An internal check performed by the software system to ensure that the differential cycle-testing (CTDIF) flag is only turned ON at the end of an operating cycle. ASME 2000 event. **Troubleshooting:** • If CTDIF (0706 bit 8) is turned ON any time other than at the end of an operating cycle, the system is shut down with the CTDIF redundancy fault. • NOTE: This fault would indicate a failure of the software system or SC-BASE(-D) board. So first try swapping SC-BASE(-D) ribbon cables then replace SC-BASE(-D), SC-HDIO and finally the MC-MP2-2K or MC-PCA-OA-2K.	
CTOS REDUNDANCY FAULT *(Traction only)*	**CTOS Redundancy Fault**
Description: An internal check performed by the software system to ensure that the overspeed cycle-testing (CTOS) flag is only turned ON at the end of an operating cycle. ASME 2000 event. **Troubleshooting:** • If CTOS (0706 bit 7) is turned on any time other than at the end of an operating cycle, the system is shut down with the CTOS redundancy fault. • This fault would indicate a failure of the SC-BASE(-D) board. First swap out ribbon cables and then try swapping SC-BASE(-D) and then SC-HDIO.	
CYCLE TEST	**Cycle Test**
Description: Indicates the car is performing the end of run cycle test. **Troubleshooting:** Verify the car is in door zone and does not relevel during the cycle test.	
DCL REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front doorlock input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DCL (door close limit) input. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. When DLK is ON (1) then input DCL must be OFF (0). When DOL=0, verify DCL=1. If not, then a DCL redundancy fault is recorded and the car is prevented from operating. Check voltages on associated dropping resistors, swap ribbon cables and swap SC-SB2K(-H) or SC-HDIO.	
DCLR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. Detects the failure of the input structure and hardware associated with the DCLR (door close limit rear) input. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. When DLK is ON (1) then input DCLR must be OFF (0). When DOLR=0, verify DCLR=1. If this is not the case then a DCLR redundancy fault is recorded and the car is prevented from operating. Check voltages on associated dropping resistors, swap ribbon cables and swap SC-SB2K(-H) or SC-HDIO.	
DETS REDUNDANCY FAULT	**DETS Redundancy Fault**
Description: This fault is displayed when an inconsistency is detected between the Down Emergency Terminal Switches. ASME 2000 event. **Troubleshooting**: • Check the condition of the ETS switches. The DETS1/2 limit switches must operate simultaneously!!! . • Check the wiring to the relay board (SC-SB2K) and IO board (SC-HDIO). • Verify DETS1 (070C bit 8) equals DETS2 (070D bit 3) and the car is in door zone. • Also check input resistors DETS1 and ASI3/DETS2 on the associated board (refer to prints). Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
DFV REDUNDANCY FAULT *(Hydro only)*	
Description: Input DFV checks the status of the down terminal speed reducing switches. We simply compare input DFV against input DTSRL. IF DFV not equal to DTSRL we assert this fault. Hence these switches must open up simultaneously. ASME 2000 event. **Troubleshooting:** Check that the limit switches are opening within one second of each other as the car approaches the bottom terminal landing. If they are, then use diagnostics to determine the status of the inputs. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON expect 5 VAC. When OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	
Direction Input Fault (not scrolled, Event Calendar only)	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Look to the scrolling message to see which fault is active: RDN, DNS, UPDIR, UPS, RUP, DNDIR REDUNDANCY FAULT or UP / DOWN NORMAL LIMIT SWITCH OPEN. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	
DLK REDUNDANCY FAULT	**DLK Redundancy Fault**
Description: A failure of the DLK input or associated circuitry has been detected. ASME 2000 event. **Troubleshooting Tips:** • DLK should be high (28 bit 7) when we are leveling and in door zone [DZ is high (20 bit 6) or DZR is high (10 bit 6) and either LU (29 bit 3) or LD (29 bit 7)is high]. • DLK should also be high when all of the car and hoistway door lock inputs are made active [CD is high (0704 bit 1) and HD is high (0704 bit 2) and CDR is high (070B bit 1) and HDR is high (070B bit 2)]. If DLK is ON and any of these other relationships are not true, the DLK redundancy fault is set and disables further operation of the lift. Note that DLK is high when either or both of the car door or hoistway door lock bypass functions are active. • Also check input resistors DLK, DZR, CD, HD, CDR and HDR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) or SC-BASER(-D) (for DZR) board. Otherwise replace SC-HDIO board.	
DNDIR REDUNDANCY FAULT	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Valid when SAF=1. Input DNDIR is created by the SC-BASE(-D) board and represents resolved direction from the speed sensor. Input DNDIR must always be the opposite of RDN. If the main processor detects that the resolved direction (DNDIR from BASE board) does not agree with the intended direction (RDN from MP2 / PCA), the system is shut down with the DNDIR redundancy fault. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. • Verify that the UP LED on the SC-BASE(-D) is ON when car motion is up and OFF when car motion is down. If not, the speed sensor is reversed (rotate the sensor 180 degrees with respect to the magnet). • Swap Ribbons, check 95 and 96 signals (0 to 55VDC) swap SC-BASE(-D) or SC-HDIO.	
DNS REDUNDANCY FAULT	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Valid when SAF=1. Verifies that the down sense input DNS is valid. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Once DLK is ON (1), if DNS is ON (1), then RDN must be OFF (0). Check associated input resistors, swap boards or ribbon cables to correct.	
Door Zone Input Fault (not scrolled, Event Calendar only)	**Door Zone Input Fault**
Description: A failure of a door zone related input, relay or associated circuitry has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: DZX, DZRX, RDZ, RDZX, or RDZR REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, find that particular fault in this table. See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table.	
DOWN NORMAL LIMIT SWITCH OPEN	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. A failure of a direction related input, relay or associated circuitry has been detected. If SAF=1 and DLK=1 and the car is below the Down Normal Limit Switch (DNL=0), then this status is displayed. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Verify SAF=1 and DLK=1 and move the car above the Down Normal Limit (DNL=1). Car should never automatically travel on to this limit switch. Possibility that switch is not far enough into terminal.. Please move limit switch.	
DP SENSOR / DIFFERENTIAL FAULT *(Traction only)*	**DP Sensor / Differential Fault**
Description: This fault indicates that one of the PLDs (on the SC-BASE/SC-BASER) has detected a count difference in the pulse signal generated from Speed Sensor and magnet mounted on the motor. **Troubleshooting:** Verify that for up direction travel, LEDS UP1 and UP2 turn ON, and for down direction, that LEDs DN1 and DN2 turn ON. If not: • Verify that the sensor is 1/16" away from the magnet on the motor shaft. Also verify that the magnet assembly is perpendicular to the sensor. • Check the shielded cable that connects sensor assembly to SC-BASE/R board. Swap the cable. • Replace the sensor, followed by the SC-BASE/R board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
DPM REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPM (door position monitor) input. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Valid when SAF=1. When DLK is ON (1) then input DPM must also be ON (1). When DOL=0, DPM=0. Make sure that DPM makes (120 VAC) 1 to 2" prior to door lock. If this is already the case then check associated input resistors, ribbon cable or boards and replace as deemed necessary.	
DPMR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPMR (door position monitor rear) input. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Valid when SAF=1. When DLK is ON (1), input DPMR must also be ON (1). When DOLR=0, DPMR=0. Make sure that DPMR makes (120 VAC) 1 to 2" prior to door lock. If this is already the case then check associated input resistors, ribbon cable or boards and replace as deemed necessary.	
DRIVE FAULT / REI REDUNDANCY FAULT *(Traction only)*	**REI Redundancy Fault**
Description: A failure of the RE relay has been detected. ASME 2000 event. **Troubleshooting:** If FLT relay is picked, then check the following: • If SAF is low (2C bit 6), REI should be low (0707 bit 2), otherwise this fault is generated. • If UPS is high (24 bit 3) or DNS is high (24 bit 4), REI should be high (0707 bit 2), otherwise this fault is generated. • Verify REI = 0 (0707 bit 2), otherwise this fault is generated. • Also check input resistor REI at top left of the SC-SB2K board. Swap ribbon cables between SC-SB2K and SC-HDIO. If swapping ribbons has no effect or if REI resistor is defective, replace SC-SB2K board. Otherwise replace SC-HDIO board. • Confirm FLT relay is picked when a run is initiated. If not, then a DDP generated failure has occurred. Bypass ASME A17.1 faults and initiate a run. Check event calendar to determine which DDP fault has occurred and troubleshoot accordingly.	
DZRX REDUNDANCY FAULT *(Traction only)*	**Door Zone Input Fault**
Description: A failure of rear door zone input, relay or associated circuitry has been detected. This logic checks the integrity of the relay used for the auxiliary rear door zone function (DZX). ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Note that one DZX relay is used for both front and rear auxiliary door zone sensing. If DZR input is OFF, the DZX relay should be dropped out, which is checked by inspecting a NC contact of relay DZX with input RDZX. If input DZR is OFF and the “checking” input RDZX is ON, all is well. If this relationship is not true, the DZRX redundancy fault is logged and the car is shut down. Check associated input resistors, ribbon cable or boards and replace as deemed necessary.	
DZX REDUNDANCY FAULT *(Traction only)*	**Door Zone Input Fault**
Description: A failure of a door zone related input, relay or associated circuitry has been detected. Verifies that the “standard” door zone input DZ and the “auxiliary” door zone input DZX both agree. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. If DZX is ON, then DZ should be ON and RDZX should be OFF. When DZX = OFF, DZ will also be OFF and RDZX will be ON. Check associated input resistors, ribbon cable or boards and replace as deemed necessary.	
EBR Button Fault (not scrolled, Event Calendar only)	**EBR Button Fault**
Description: A failure of the Emergency Brake Reset Pushbutton or EBR input has been detected. Look at the Swing Panel Alphanumeric Display to see what fault is active, EBR STUCK or EBR FLICKERING FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that particular fault in this table.	
EBR FLICKERING FAULT *(Traction only)*	**EBR Button Fault**
Description: A failure of the Emergency Brake Pushbutton or EBR input has been detected. If the EBR input transitions from low (0) to high (1) six times or more per second, the EBR flickering fault will take the car out of service. ASME 2000 event. **Troubleshooting:** Check the EBR input (0708 bit 3) and confirm that it is changing state rapidly. If so, replace the SC-BASE(-D) board. If this does not correct the problem, then replace the SC-HDIO board. Otherwise press the Redundancy Fault Reset pushbutton to clear the fault.	
EBR STUCK FAULT *(Traction only)*	**EBR Button Fault**
Description: A failure of the Emergency Brake Pushbutton or EBR input has been detected. If the EBR input remains high (1) continuously for 30 seconds the EBR stuck fault will take the car out of service. ASME 2000 event. **Troubleshooting:** Confirm that EBR = 1 (0708 bit 3). The EBR input must be continuously active for 30 seconds to generate this fault. To determine which board has failed, check the EBR resistor on the SC-BASE(-D) board for 0 VAC on the bottom end, if so then replace SC-HDIO board. If there is 120 VAC, then inspect the EBR reset pushbutton and determine if it is truly stuck. If stuck replace SC-BASE(-D), otherwise swap out associated ribbon cable.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
EMERGENCY BRAKE ACTIVATED *(Traction only)*	**Emergency Brake Activated**
Description: The Emergency Brake has been activated. ASME 2000 event. **Troubleshooting:** • Due to ascending car overspeed (GOV=0, RUP=0) or unintended motion (car out of floor zone with both doors open) this fault is logged and the car is shutdown. Note that there is separate hardware that can set the emergency brake by removing power from the emergency brake power supply. The software system can also set the Emergency Brake by monitoring the same logic (DZ, LU, CD, etc) by dropping the outputs labeled EB1 and EB2. This fault can only be reset by pushing the Emergency Brake Reset pushbutton on the SC-BASE(-D) board. • Also check input resistors GOV, REB1, REB2, RDZX, RDZ, RDZR, RLU, RLD, RCD, RHD, RCDR and RHDR on the associated board (refer to prints). If both relays EB1 and EB2 are dropped try replacing the EB1/EB2 triacs on the SC-HDIO board. Swap ribbon cables between SC-SB2K and SC-HDIO as well as the ribbons between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if input resistors are defective, replace SC-SB2K board or SC-BASE(-D). Otherwise replace SC-HDIO board.	
EMERGENCY BRAKE CYCLE TEST FAULT *(Traction only)*	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. Indicates that either the input or output structure associated with the emergency brake has failed. At the end of an operating cycle, outputs EB1 and EB2 are sequentially cycled OFF (one at a time). During this process inputs REB1 and REB2 are checked. ASME 2000 event. **Troubleshooting:** If EB1 output is OFF, then input REB1 will be ON. If not, the Emergency brake cycle test fault is generated and further operation of the lift is prevented. The same test is repeated for EB2 and REB2. Check input resistors ASI1/PFLT, SAF, STOP, REB1, REB2 or RSAFR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K, SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K board. Otherwise replace SC-HDIO or SC-BASE(-D) board.	
End of Run Cycle Test Fault (not scrolled, Event Calendar only)	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. Look at the Swing Panel Alphanumeric Display to see which faults is active (PLD, CT, ESBYP or EMERGENCY BRAKE CYCLE TEST FAULT or RSAFR CYCLE TEST FAULT or 4 BUS CYCLE TEST FAULT). ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	
EQR Button Fault (not scrolled, Event Calendar only)	**EQR Button Fault**
Description: A failure of the Earthquake Reset Pushbutton or EQR input has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: EQR STUCK or EQR FLICKERING FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	
EQR FLICKERING FAULT	**EQR Button Fault**
Description: A failure of the Earthquake Reset Pushbutton or EQR input has been detected. If the EQR input transitions from low (0) to high (1) six times or more per second, the EQR flickering fault will take the car out of service. ASME 2000 event. **Troubleshooting:** • Check the EQR input (0703 bit 2) and confirm that it is changing state rapidly. If so, replace the SC-HDIO board. If this does not correct the problem, then replace the SC-SB2K(-H) board. Otherwise press the Redundancy Fault Reset pushbutton to clear the fault. • Also check input resistors CWI, EQR, SSI and EDS on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
EQR STUCK FAULT	**EQR Button Fault**
Description: A failure of the Earthquake Reset Pushbutton or EQR input has been detected. The Earthquake Reset pushbutton input is constantly monitored for correct functionality. If the EQR input remains high (1) continuously for 30 seconds the EQR stuck fault will take the car out of service. ASME 2000 event. **Troubleshooting**: • Confirm that EQR = 1 (0703 bit 2). The EQR input must be continuously active for 30 seconds to generate this fault. • To determine which board has failed, check the EQR resistor for 0 VAC on the bottom end, if so then replace SC-HDIO board. If there is 120VAC, then inspect the EQR reset pushbutton and determine if it is truly stuck, otherwise replace the SC-SB2K(-H) board. • Also check input resistors CWI, EQR, SSI and EDS on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
ESBYP CYCLE TEST FAULT	**End of Run Cycle Test Fault**
Description:. This fault indicates that either the output, relay or input associated with ESBYP has failed to function as required. At the end of an operating cycle, output ESBYP is cycled ON and then OFF. We expect that relay ESB will pick and drop and we monitor this functionality via input RESBYP. ASME 2000 event. **Troubleshooting:** When ESB is OFF, expect that input RESBYP will be ON and visa versa. If not, the ESBYP cycle test fault will be logged and further operation of the lift will be prevented. Check input resistors ASI1/PFLT, SAF, STOP, REB1, REB2 or RSAFR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
ESBYP REDUNDANCY FAULT	**ESBYP Redundancy Fault**

Description: A failure of emergency stop bypass (the ESB relay or ESBYP output) has been detected. ASME 2000 event. If both the ESBYP output (picks relay ESB) and the SAFC input are activated (both ON), the input STOP will be ON (1). If not, an ESBYP redundancy failure is logged. ASME 2000 event.
Troubleshooting:
- If ESBYP = 1 (0707 bit 7) and SAFC = 1 (0700 bit 5), STOP should be 1 (0700 bit 6), otherwise this fault is generated.
- Also check input resistors RESBYP and SAFC on the associated board (refer to prints).
- Swap ribbon cables between SC-SB2K(-H), SC-HDIO.
- If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.

Scrolling Message	Special Event Message
ETS1 FAULT *(Traction only)*	**Overspeed Fault**

Description: Emergency terminal overspeed fault 1. The main processor monitors the ETS1 signal coming from PLD1. If this signal, which is normally high goes low, the MP2 / PCA looks at its ETS limit switch inputs to determine if a fault should be logged. If so, the carshuts down and logs the ETS1 fault. ASME 2000 event.
Troubleshooting: Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. The UETS1/2, DETS1/2 limit switches must operate simultaneously!

Scrolling Message	Special Event Message
ETS2 FAULT *(Traction only)*	**Overspeed Fault**

Description: Emergency terminal overspeed fault 2. The main processor inspects the ETS2 signal coming from PLD2. If this signal, which is normally high goes low, the MP2 / PCA looks at its ETS limit switch inputs to determine if a fault should be logged. If so, the car shuts down and logs the ETS2 fault. ASME 2000 event.
Troubleshooting: Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. The UETS1/2 , DETS1/2 limit switches must operate simultaneously!

Scrolling Message	Special Event Message
Front Door Input Fault (not scrolled, Event Calendar only)	**Front Door Input Fault**

Description: A failure of a front door input, relay or associated circuitry has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: DCL, DPM, CD, RCD, CDB, HD, RHD, HDB or RHDB REDUNDANCY FAULT. ASME 2000 event.
Troubleshooting Tips: See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table.

Scrolling Message	Special Event Message
GOV REDUNDANCY FAULT *(Traction only)*	**GOV Redundancy Fault**

Description: A failure of the safety string between input GOV and input SAFH has been detected. ASME 2000 event.
Troubleshooting Tips:
- If GOV = 0 (0700 bit 3), SAFH should be 0 (0700 bit 4), otherwise this fault is generated.
- Check wiring connections to terminals 15, 15A, 15B and 16.
- Check wiring connections to all safety devices between terminals 15, 15A, 15B and 16.
- Also check input resistors GOV and SAFH. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.

Scrolling Message	Special Event Message
H REDUNDANCY FAULT	**H Redundancy Fault**

Description: Checks the status of the H (high speed) output against the RH input. ASME 2000 event. If relay H is OFF, then the back contact of the H relay, used for monitoring purposes, should close power into input RH (ON). **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Use diagnostics to determine which is the offending input. Look at the top of the input resistor and measure either 0 or 5 VAC. If voltage is wrong replace SC-SB2K(-H). If OK swap C1 or C4 ribbons, H triac on HC-PI/O or SC-HDIO.

Scrolling Message	Special Event Message
HD REDUNDANCY FAULT	**Front Door Input Fault**

Description: A failure of a front door lock input, relay or associated circuitry has been detected. HD should be ON (1) when DLK is ON and the car is not in door zone. And, if HD is ON (1), DPM must also be ON (1). ASME 2000 event.
Troubleshooting: See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Expect HD to be ON when hoistway access has been activated (input ACCI is ON) and either the top (TAB) or bottom (BAB) access switches are activated. If the Hoistway Door Bypass switch has been turned to the bypass position, expect HD = ON also. If the above conditions are not true, the HD redundancy fault is logged. First swap the ribbon cables connected between the SC-BASE(-D) board and the SC-HDIO board, then replace the boards SC-BASE(-D) followed by the SC-HDIO (if the problem persists).

Scrolling Message	Special Event Message
HDB REDUNDANCY FAULT	**Front Door Input Fault**

Description: A failure of a front door input, relay or associated circuitry has been detected. The OFF position feeds input HDBO and the BYPASS position feeds input HDB. So if the switch is OFF, the HDBO input will be ON (1) and the HDB input will be OFF (0).ASME 2000 event.
Troubleshooting: See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. First swap the ribbon cables connected between the SC-BASE(-D) board and the SC-HDIO board, then replace the boards SC-BASE(-D) followed by the SC-HDIO.

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
HDBR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door input, relay or associated circuitry has been detected. Both the OFF and BYPASS positions of the Rear Hoistway Door Bypass switch are monitored. The OFF position feeds input HDBOR and the BYPASS position feeds input HDBR. So if the switch is OFF, the HDBOR input will be ON (1) and the HDBR input will be OFF (0). ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. First swap the ribbon cables connected between the SC-BASE(-D) board and the SC-HDIO board, then replace the boards SC-BASE(-D) followed by the SC-HDIO.	
HDR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. The status of the rear hoistway door lock input HDR is constantly verified. HDR should be ON (1) when DLK is ON and the car is not in door zone.Expect HDR to be ON when hoistway access has been activated (input ACCI is ON) and either the top (TAB) or bottom (BAB) access switches are activated. If the Hoistway Door Bypass switch has been turned to the bypass position, expect HDR = ON also. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. First swap the ribbon cables connected between the SC-BASER(-D) board and the SC-HDIO board, then swap out the SC-BASER(-D) followed by the SC-HDIO.	
HOISTWAY ACCESS	**Hoistway Access**
Description: The hoistway access switch has been activated. ASME 2000 event. **Troubleshooting:** • Confirm that ACCI = 1 (0702 bit 2). • Also check input resistor ACCI on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistor are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
Hoistway Access Input Fault (not scrolled, Event Calendar only)	**Hoistway Access Input Fault**
Description: A failure of the Hoistway Access input or an Inspection input has been detected. Two Inspection Inputs should never be active at the same time. ASME 2000 event. **Troubleshooting Tips:** • Confirm ACCI = 1 (0702 bit 2), INMR = 0 (0701 bit 3) and IN = 0 (27 bit 4), otherwise this fault is displayed. • Also check input resistors ACCI, INMR and IN on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
ILO1 FAULT *(Traction only)*	**Overspeed Fault**
Description: Inspection leveling overspeed 1 fault. The main processor monitors the ILO1 signal coming from PLD1. If ILO1 = OFF and IN or LEV are ON we log this fault. ILO stands for Inspection Leveling Overspeed. ASME 2000 event. **Troubleshooting:** Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. Also check for noise on 95/96 (DP1/2) is shield grounded?	
ILO2 FAULT *(Traction only)*	**Overspeed Fault**
Description: Inspection leveling overspeed 2 fault. The main processor monitors the ILO2 signal coming from PLD2. ASME 2000 event. **Troubleshooting:** Run the car and observe if the car does indeed overspeed. If no overspeed condition is truly present we need to re-calibrate the overspeed function that is tripping (ILO, COS, ETS). For the SC-BASE(-D) simply check the 120 Hz reference test point with a scope. For the SC-BASE(-D), simply follow directions in section #4 of the adjustment manual. If neither of these attempts proves fruitful at eliminating the fault then first swap out the ribbon cable between the SC-BASE(-D) and SC-HDIO and finally replace the SC-BASE(-D). If the fault still occurs replace the SC-HDIO. Also check for noise on 95/96 (DP1/2); is shield grounded at the controller?	
IN CAR INSPECTION	**In Car Inspection**
Description: The In Car Inspection switch has been activated. ASME 2000 event. **Troubleshooting:** • Confirm that INICI = 1 (0701 bit 2). • Also check input resistor INICI on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistor are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
IN REDUNDANCY FAULT	**Inspection Input Fault**
Description: A failure of the Inspection Inputs has been detected. Two Inspection Inputs should never be active at the same time. ASME 2000 event. **Troubleshooting:** If IN = 1 (27 bit 4) and SAF = 1 (2C bit 6), INUP should be 1 (0701 bit 6) and INDN should be 1 (0702 bit 7), otherwise this fault is generated. Locate dropping resistor INMR on the SC-SB2K(-H) board. INMR must be at zero volts when IN is ON. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
INCTI REDUNDANCY FAULT	**Inspection Input Fault**
Description: A failure of the Inspection Inputs has been detected. Two Inspection Inputs should never be active at the same time. ASME 2000 event. **Troubleshooting:** Confirm INCTI = 1 (0701 bit 1), INICI = 0 (0701 bit 2), ACCI = 0 (0702 bit 2), INMR = 0 (0701 bit 3) and IN = 0 (27 bit 4), otherwise this fault is displayed. Use the controller prints to locate dropping resistors IN, INMR and INICI on the SC-SB2K(-H) board and ACCI resistor on the SC-BASE(-D) board, voltage must be OFF when INCTI is ON otherwise the INCTI redundancy fault is logged and the system is shut down. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
INDN REDUNDANCY FAULT	**INDN Redundancy Fault**
Description: A failure of the INDN input has been detected. It may either be high when expected low or low when expected high. ASME 2000 event. **Troubleshooting Tips:** • If IN is high (27 bit 4) and SAF is low (2C bit 6), INDN should be low (0701 bit 7), otherwise this fault is generated. • If IN is high (27 bit 4) and SAF is high (2C bit 6), INDN should be high (0701 bit 7), otherwise this fault is generated. • If RDN is low (0709 bit 3), INDN should be high (0701 bit 6), otherwise this fault is generated. • If RDN is high (0709 bit 3), INDN should be low (0701 bit 6), otherwise this fault is generated. • Also check input resistors DLK, SAF, IN and INDN on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
INICI REDUNDANCY FAULT	**Inspection Input Fault**
Description: A failure of the Inspection Inputs has been detected. Two Inspection Inputs should never be active at the same time. ASME 2000 event. **Troubleshooting:** Confirm INICI = 1 (0701 bit 2), ACCI = 0 (0702 bit 2), INMR = 0 (0701 bit 3) and IN = 0 (27 bit 4), otherwise this fault is displayed. Use the controller prints to locate dropping resistors IN and INMR on the SC-SB2K(-H) board and ACCI input resistor on the SC-BASE(-D) board. Voltage must be OFF when INICI is ON, otherwise the INICI redundancy fault is logged and the system is shut down. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
INMR REDUNDANCY FAULT	**Inspection Input Fault**
Description: A failure of the Inspection Inputs has been detected. Two Inspection Inputs should never be active at the same time. ASME 2000 event. **Troubleshooting:** If IN = 1 (27 bit 4) and SAF = 1 (2C bit 6), INUP should be 1 (0701 bit 6) and INDN should be 1 (0702 bit 7), otherwise this fault is generated. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if associated 47 K dropping resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
Inspection Input Fault (not scrolled, Event Calendar only)	**Inspection Input Fault**
Description: A failure of the Inspection Inputs has been detected. Two Inspection Inputs should never be active at the same time. Look at the Swing Panel Alphanumeric Display to see which fault is active: INCTI, INICI, INMR or IN REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	
INUP REDUNDANCY FAULT	**INUP Redundancy Fault**
Description: A failure of the INUP input has been detected. It may either be high when expected low or low when expected high. ASME 2000 event. **Troubleshooting:** • If IN = 1 (27 bit 4) and SAF = 0 (2C bit 6), INUP should be 0 (0701 bit 6), otherwise this fault is generated. • If IN = 1 (27 bit 4) and SAF = 1 (2C bit 6), INUP should be 1 (0701 bit 6), otherwise this fault is generated. • If RUP = 0 (0709 bit 3), INUP should be 1 (0701 bit 6), otherwise this fault is generated. • If RUP = 1 (0709 bit 3), INUP should be 0 (0701 bit 6), otherwise this fault is generated. • Also check input resistors IN, SAF, RUP and INUP on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
MOTOR UP TO SPEED FAILURE *(Hydro only)*	**Motor Up to Speed Failure**
Description: Indicates that the solid state starter failed to detect the motor was up to speed. ASME 2000 event. **Troubleshooting:** For Solid State Starters Only. Increase the Up to Speed Timer in the ASME A17.1 Options Menu. Verify UTS is programmed as a spare input and that it is connected to the proper terminal on the starter.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
MPSAF REDUNDANCY FAULT	**MPSAF Redundancy Fault**
Description: A failure of the SAFR1 relay has been detected. ASME 2000 event. This verifies that when output MPSAF has turned OFF, that relay SAFR1 and TRIAC MPSAF have both released as intended. **Troubleshooting:** If the relay and triac have released then input SAF will be OFF(0). If input SAF = ON, the car is shut down with the MPSAF redundancy fault. Verify MPSAF output = 0 (0700 bit 7) also verify SAFR1 relay is dropped und finally verify SAF input = 0 (2C bit 6). If swapping ribbons has no effect or if associated 47 K dropping resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
Overspeed Fault (not scrolled, Event Calendar only)	**Overspeed Fault**
Description: Look at the Swing Panel Alphanumeric Display to see which fault is active: IL01, IL02, ETS2, ETS1, COS1, or COS2 OVERSPEED FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	
PFLT FAULT *(Traction only)*	**PFLT Relay Dropped**
Description: Indicates that PLD1 has dropped the PFLT relay. ASME 2000 event. **Troubleshooting Tips:** • If STOP = 1 (0700 bit 6) and PFLT = 0 (070D bit 1), then this fault is generated and PLD1 has dropped the PFLT relay. • Swap ribbon cables between SC-BASE-(D) and SC-HDIO. If swapping cables has no effect, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
PFLT RELAY DROPPED *(Traction only)*	**PFLT Relay Dropped**
Description: Indicates that PLD1 has dropped the PFLT relay. ASME 2000 event. **Troubleshooting Tips:** • If STOP = 1 (0700 bit 6) and PFLT = 0 (070D bit 1), then this fault is generated and PLD1 has dropped the PFLT relay. • Swap ribbon cables between SC-BASE-(D) and SC-HDIO. If swapping cables has no effect, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
PLD CYCLE TEST FAULT *(Traction only)*	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. At the end of an operating cycle outputs CTOS and CTDIF are activated in sequence. Inputs COS1, COS2, ETS1, ETS2, ILO1 and ILO2 must go low. ASME 2000 event. **Troubleshooting:** If any of the listed inputs fail to transition to *OFF*, the PLD cycle test fault will be logged and further operation of the lift will be suspended. If the PFLT Bypass Jumper on the SC-BASE(-D) board is left in the ON position and the controller is switched to normal operation, then the controller will find the landing and then during the cycle test it will latch this fault to prevent the system from running. Make sure the PFLT Bypass Jumper is in the OFF position. Check input resistors ASI1/PFLT, SAF, STOP, REB1, REB2 or RSAFR on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RACC1 REDUNDANCY FAULT	**Redundancy Access Input Fault**
Description: A failure of a hoistway access related input, relay or associated circuitry has been detected. The RACC1 input monitors an NC contact of relay ACCI. If ACCI input is OFF (0) the input RACC1 should be ON (1). Hence RACC1 is not equal to ACCI. ASME 2000 event. **Troubleshooting:** • If ACCI = 1 (0702 bit 2), RACC1 should be 0 (0702 bit 3), otherwise this fault is generated. • Or if ACCI = 0 (0702 bit 2), RACC1 should be 1 (0702 bit 3), otherwise this fault is generated. • Check input resistors RTBAB, RACC1, RACC2, INUP, INDN, ACCI on associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H), SC-BASE(-D) and SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) or SC-BASE(-D) (for RACC1, RACC2) board. Otherwise replace SC-HDIO board.	
RACC2 REDUNDANCY FAULT	**Redundancy Access Input Fault**
Description: A failure of a hoistway access related input, relay or associated circuitry has been detected. The RACC2 input monitors an NC contact of relay ACC2. If ACCI input is OFF (0) the input RACC2 should be ON (1). Hence this fault indicates that RACC2 is not equal to ACCI, not a good thing. ASME 2000 event. **Troubleshooting:** • If ACCI = 1 (0702 bit 2), RACC2 should be 0 (0702 bit 4), otherwise this fault is generated. • If ACCI = 0 (0702 bit 2), RACC2 should be 1 (0702 bit 4), otherwise this fault is generated. • Check input resistors RTBAB, RACC1, RACC2, INUP, INDN, ACCI on associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H), SC-BASE(-D) and SC-HDIO. • If swapping ribbons has no effect or if associated 47 K input resistors are defective, replace SC-SB2K-(H) or SC-BASE(-D) (for RACC1, RACC2) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RBRK REDUNDANCY FAULT *(Traction only)*	**RBRK Redundancy Fault**
Description: A failure of the BK relay or RBK input has been detected. This means a failure to activate when expected or a failure to drop when expected. ASME 2000 event. **Troubleshooting:** • If SAF = 0 (2C bit 6), RBK should be 1 (0708 bit 4), otherwise this fault is generated. • If MB = 0 (0707 bit 1), RBK should be 1 (0708 bit 4), otherwise this fault is generated. • If REI = 1 (0707 bit 2) and RPT = 0 (0707 bit 3) and RMR = 0 (0707 bit 5), RBK should be 0 (0708 bit 4), otherwise this fault is generated. • Check the NC aux contact of relay BK. It must make up when the relay drops out. • Also check input resistors RBK, REI and RPT on the SC-SB2K board. Swap ribbon cables between SC-SB2K and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K board. Otherwise replace SC-HDIO board.	
RCD REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door lock input, relay or associated circuitry has been detected. The RCD input monitors a normally closed contact of relay CD. If the CD input is OFF (0), then the NC contact of CD will be made up and input RCD will be ON. If CD is ON, RCD will be OFF. (CD = not RCD). CD should always be the opposite of RCD. If not, the RCD redundancy fault is logged and the controller is shut down. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RCDR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. The RCDR input monitors a normally closed contact of relay CDR. If the CDR input is OFF (0), then the NC contact of CDR will be made up and input RCDR will be ON. If CDR is ON, RCDR will be OFF. (CDR = not RCDR). ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RCT REDUNDANCY FAULT *(Traction only)*	**RCT Redundancy Fault**
Description: A failure of the CT (Cycle Test) relay has been detected. ASME 2000 event. **Troubleshooting Tips:** • If CT = 1 (070A bit 5), RCT should be 0 (0704 bit 4), otherwise this fault is generated. • If CT = 0, RCT should be 1, otherwise this fault is generated. • Check the condition of the CT relay. Replace if defective. • Also check input resistor RCT. Swap ribbon cables between SC-SB2K and SC-HDIO. If swapping ribbons has no effect or if relay CT is defective replace SC-SB2K board. Otherwise replace SC-HDIO board.	
RCTIC REDUNDANCY FAULT	**Redundancy Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. ASME 2000 event. **Troubleshooting:** • If INCTI = 0 (0701 bit 1) and INICI = 0 (0700 bit 2), RCTIC should be 1 (0702 bit 1), otherwise this fault is generated. • Otherwise RCTIC should be 0 (0702 bit 1) if not this fault is generated. • Check input resistors RCTIC, RIN1, RIN2, IN, SAF, INCTI and INICI on the associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H),and SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RDEL1, RDEL2, RDEL3 REDUNDANCY FAULT *(Hydro only)*	**RDEL1, RDEL2, RDEL3 Redundancy Fault**
Description: Only for WYE-DELTA starters. This function checks the status of a normally closed auxiliary contact of relay DELTA. When the car is not running we expect input RDELX to be active (1). When we are running we expect input RDELX to be OFF (0). A few jobs may have more than one DELTA contactor (DELTA1, DELTA2, DELTAX, etc) in this case, when a failure occurs, we display the number of the problematic contactor, ie. RDEL3 Redundancy Fault. ASME 2000 Event. **Troubleshooting**: First check the contacts of the normally closed auxiliary that feed the associated input. The logic is written to check for input RDELX to be OFF (0, that is RDEL1 =0) when we have a valid run command as determined by checking that inputs RPM= UNL=SAF= RWYE= DEL1= 1 and RM1 = WYEX = RDELX =0. If no run command, then RDELX had better be = 1. Check voltage at top of associated input resistors on SC-SB2K-H. For those inputs that are ON expect 5 VAC. For those inputs that are OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
RDFV REDUNDANCY FAULT *(Hydro only)*	**RDFV Redundancy Fault**
Description: Only for jobs with multiple valves. This logic checks input RDFV = 0 when DSD = VEU = FUD = 1 and RDN = RH = 0. It also checks that RDFV = 1 when there is no demand to run the car Down. ASME 2000 Event. **Troubleshooting:** Use diagnostics to check on status of above signals. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON expect 5 VAC. When OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	

TABLE 6.4   ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RDN REDUNDANCY FAULT	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Verifies the DN relay, DN relay activation circuits and RDN input are functioning as required. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. If a direction is not invoked on either automatic or inspection operation, then the NC contact of the DN relay, that feeds input RDN, should be closed. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RDSV REDUNDANCY FAULT *(Hydro only)*	**RDSV Redundancy Fault**
Description: Only for jobs with multiple valves. This logic checks input RDSV = 0 when SU, SD or RLULD = 1 and DNS = 1. It also checks that RDSV = 1 when there is no demand to run the car Down. ASME 2000 Event. **Troubleshooting.** Use diagnostics to check on status of above signals. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON expect 5 VAC. When OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	
RDZ REDUNDANCY FAULT	**Door Zone Input Fault**
Description: A failure of a door zone related input, relay or associated circuitry has been detected. The RDZ input monitors an NC contact of relay DZ. If the DZ input is OFF (0), the NC contact of DZ will be made up and input RDZ will be ON. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RDZR REDUNDANCY FAULT	**Door Zone Input Fault**
Description: A failure of the rear door zone related input, relay or associated circuitry has been detected. This logic checks the integrity of the relay used for the rear door zone function (DZR). If DZR input is OFF, the DZR relay should be dropped out, which is checked by inspecting a NC contact of relay DZR with input RDZR. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-BASER(-D) board. Swap ribbon cables between SC-BASER(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASER(-D) board. Otherwise replace SC-HDIO board.	
RDZX REDUNDANCY FAULT *(Traction only)*	**Door Zone Input Fault**
Description: A failure of a door zone related input, relay or associated circuitry has been detected. The RDZX input monitors a NC contact of relay DZX. If the car is not located in either a front or rear door zone (flag DZORDZ = OFF), the NC contact of DZX will be made up and input RDZX will be ON. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-BASE(-D) board. Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
Rear Door Input Fault (not scrolled, Event Calendar only)	**Rear Door Input Fault**
Description: A failure of a rear door input, relay or associated circuitry has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: DCLR, DPMR, CDR, RCDR, CDBR, HDR, RHDR, HDBR or RHDBR REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	
REB1 REDUNDANCY FAULT *(Traction only)*	**Redundancy Emergency Brake Fault**
Description: A failure of relay EB1 has been detected. REB1 Redundancy Fault is generated if EB1 = 0 (0708 bit 5) and REB1 is not 1 (0708 bit 1) OR if EB1 = 1 (0708 bit 5) and REB1 is not 0 (0708 bit 1). Also, if GOV = 0 (0700 bit 3), REB1 should be 1 (0708 bit 1) and REB2 should be 1 (0708 bit 2), indicating both relays are dropped. ASME 2000 event. **Troubleshooting Tip:** • Check input resistors REB1 and REB2 on the SC-BASE(-D) board. Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
REB2 REDUNDANCY FAULT *(Traction only)*	**Redundancy Emergency Brake Fault**
Description: A failure of relay EB2 has been detected. REB2 Redundancy Fault is generated if EB2 = 0 (0708 bit 6) and REB2 is not 1 (0708 bit 2) OR if EB2 = 1 (0708 bit 6) and REB2 is not 0 (0708 bit 2). Also, if GOV = 0 (0700 bit 3), REB1 should be 1 (0708 bit 1) and REB2 should be 1 (0708 bit 2), indicating both relays are dropped. ASME 2000 event. **Troubleshooting Tips** • Check input resistors REB1 and REB2 on the SC-BASE(-D) board. Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
Redundancy Access Input Fault (not scrolled, Event Calendar only)	**Redundancy Access Input Fault**
A failure of a hoistway access related input, relay or associated circuitry has been detected. Look to the Swing Panel Alphanumeric Display to see which fault is active: RACC1, RACC2 or RTBAB REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

<table>
<tr><th>Scrolling Message</th><th>Special Event Message</th></tr>
<tr><td>Redundancy Emergency Brake Fault (not scrolled, Event Calendar only)</td><td>Redundancy Emergency Brake Fault</td></tr>
<tr><td colspan="2">Description: A failure of EB1 relay or EB2 relay has been detected. Look at the Swing Panel Alphanumeric Display to see if REB1 or REB2 REDUNDANCY FAULT is active. ASME 2000 event.
Troubleshooting: Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.</td></tr>
<tr><td>Redundancy Inspection Input Fault (not scrolled, Event Calendar only)</td><td>Redundancy Inspection Input Fault</td></tr>
<tr><td colspan="2">Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: RIN1, RIN2 OR RCTIC REDUNDANCY FAULT. ASME 2000 event.
Troubleshooting: Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.</td></tr>
<tr><td>REI REDUNDANCY FAULT (Traction only)</td><td>REI Redundancy Fault</td></tr>
<tr><td colspan="2">Description: A failure of the RE relay has been detected. ASME 2000 event.
Troubleshooting: If FLT relay is picked, then check the following:
• If SAF is low (2C bit 6), REI should be low (0707 bit 2), otherwise this fault is generated.
• If UPS is high (24 bit 3) or DNS is high (24 bit 4), REI should be high (0707 bit 2), otherwise this fault is generated.
• Verify REI = 0 (0707 bit 2), otherwise this fault is generated.
• Also check input resistor REI at top left of the SC-SB2K board. Swap ribbon cables between SC-SB2K and SC-HDIO. If swapping ribbons has no effect or if REI resistor is defective, replace SC-SB2K board. Otherwise replace SC-HDIO board.
• Confirm FLT relay is picked when a run is initiated. If not, then a DDP generated failure has occurred. Bypass ASME A17.1 faults and initiate a run. Check event calendar to determine which DDP fault has occurred and troubleshoot accordingly.</td></tr>
<tr><td>RESBYP REDUNDANCY FAULT</td><td>RESBYP Redundancy Fault</td></tr>
<tr><td colspan="2">Description: A failure of the ESB relay has been detected. The fault will be generated if SAFC = 0 (0700 bit 5) and RESBYP is not 1 (0707 bit 8), OR if ESBYP = 1 (0707 bit 7) and RESBYP is not 0 (0707 bit 8), OR if ESBYP = 0 (0707 bit 7) and RESBYP is not 1 (0707 bit 8). ASME 2000 event.
Troubleshooting: Check input resistor RESBYP on SC-SB2K(-H). Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistor is defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.</td></tr>
<tr><td>RFR Button Fault (not scrolled, Event Calendar only)</td><td>RFR Button Fault</td></tr>
<tr><td colspan="2">Description: A failure of the Redundancy Fault Reset Pushbutton or RFR input has been detected. Look at the Swing Panel Alphanumeric Display to see which fault is active: RFR STUCK or RFR FLICKERING FAULT. ASME 2000 event.
Troubleshooting: Once the Swing Panel Alphanumeric Display fault is identified, look up that fault in this table.</td></tr>
<tr><td>RFR FLICKERING FAULT</td><td>RFR Button Fault</td></tr>
<tr><td colspan="2">Description: A failure of the Redundancy Fault Reset Pushbutton or RFR input has been detected. If the RFR input transitions from low (0) to high (1) six times or more per second, the RFR flickering fault will take the car out of service. ASME 2000 event.
Troubleshooting: Check the RFR input (070A bit 8) and confirm that it is changing state rapidly. If so, try swapping the ribbon cables between the SC-SB2K(-H) and SC-HDIO. If this does not correct the problem, then replace the SC-HDIO / SC-SB2K(-H) board. Otherwise reset the swing panel to clear the fault.</td></tr>
<tr><td>RFR STUCK FAULT</td><td>RFR Button Fault</td></tr>
<tr><td colspan="2">Description: A failure of the Redundancy Fault Reset Pushbutton or RFR input has been detected. If the RFR input remains high (1) continuously for 30 seconds the RFR stuck fault will take the car out of service. ASME 2000 event.
Troubleshooting: Confirm that RFR = 1 (070A bit 8). To determine which board has failed, check the RFR resistor on board SC-SB2K(-H) for 0 VAC on the bottom end, if so then replace SC-HDIO board. If there is 120 VAC, then inspect the EBR reset pushbutton and determine if it is truly stuck, if so replace the SC-SB2K(-H). Try swapping the ribbon cables between the SC-SB2K(-H) and SC-HDIO. Otherwise replace the SC-SB2K(-H) board.</td></tr>
<tr><td>RH REDUNDANCY FAULT</td><td>Front Door Input Fault</td></tr>
<tr><td colspan="2">Description: A failure of the H relay or RH input has been detected.When output H is OFF (2B bit 4), input RH should be 1 (070A bit 3). If relay H's NO contacts weld closed, the monitoring contact will not make up when the H output is turned OFF at the end of a run. If this happens the RH redundancy fault will be logged and the system shut down.If SAF = 0 (2C bit 6) and DLK = 0 (28 bit 7), RH should be 1 (070A bit 3), otherwise this fault is generated.If H = 1 (2B bit 4) and RLULD = 1 (070A bit 2) and RIN2 = 0 (0701 bit 5)AND there is an intent to move up/down UP - if UNL = 1 (0709 bit 1) and RUP = 0 (0709 bit 3) and USD = 1 (2E bit 2)DOWN - if DNL = 1 (0709 bit 2) and RDN = 0 (0709 bit 4) and DSD = 1 (2E bit 6)RH should be 0 (070A bit 3), otherwise this fault is generated. If RH should be 1 (070A bit 3), otherwise this fault is generated.
Troubleshooting: Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K(-H) board. Otherwise replace SC-HDIO board.</td></tr>
</table>

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RHD REDUNDANCY FAULT *(Traction only)*	**RHD Redundancy Fault**
Description: A failure of a front door lock input, relay or associated circuitry has been detected. The RHD input monitors an NC contact of relay HD. If the HD input is OFF (0), the NC contact of HD will be made up and input RHD will be ON. If HD is ON, RHD will be OFF (HD = not RHD). HD should always be the opposite of RHD. Otherwise, the RHD redundancy fault is logged and the controller is shut down. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K(-H) board. Otherwise replace SC-HDIO board.	
RHDB REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door bypass input, relay or associated circuitry has been detected. The RHDB input monitors an NC contact of relay HDB. If the HDB input is OFF (0), the NC contact of HDB will be made up and input RHDB will be ON. If HDB is ON, RHDB will be OFF (HDB = not RHDB). HDB should always be the opposite of input RHDB. Otherwise, the RHDB redundancy fault is logged and the controller is shut down. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-BASE(-D) board. Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
RHDBR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door bypass input, relay or associated circuitry has been detected. The RHDBR input monitors an NC contact of relay HDBR. If the HDBR input is OFF (0), the NC contact of HDBR will be made up and input RHDBR will be ON. If HDBR is ON, RHDBR will be OFF (HDBR = not RHDBR). HDBR should always be the opposite of input RHDBR. Otherwise, the RHDBR redundancy fault is logged and the controller is shut down. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Check associated input resistors on the SC-BASER(-D) board. Swap ribbon cables between SC-BASER(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASER(-D) board. Otherwise replace SC-HDIO board.	
RHDR REDUNDANCY FAULT	**Rear Door Input Fault**
Description: A failure of a rear door lock input, relay or associated circuitry has been detected. The RHDR input monitors an NC contact of relay HDR. If the HDR input is OFF (0), the NC contact of HDR will be made up and input RHDR will be ON. If HDR is ON, RHDR will be OFF (HDR = not RHDR). HRD should always be the opposite of RHDR. Otherwise, the RHDR redundancy fault is logged and the controller is shut down. If HDR input is OFF the HDR relay should drop out. This is checked by inspecting a normally closed contact of relay HDR with input RHDR. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table.Check associated input resistors on the SC-BASER(-D) board. Swap ribbon cables between SC-BASER(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASER(-D) board. Otherwise replace SC-HDIO board.	
RIN1 REDUNDANCY FAULT	**Redundancy Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. If SAF = 0 (2C bit 6), RIN1 should be 1 (0701 bit 4), otherwise this fault is generated. Or if IN = 1 (27 bit 4), RIN1 should be 0 (0701 bit 4), otherwise this fault is generated. Or if IN = 0 (27 bit 4), RIN1 should be 1 (0701 bit 4), otherwise this fault is generated. ASME 2000 event. **Troubleshooting:** • Check input resistors RCTIC, RIN1, RIN2, IN, SAF, INCTI and INICI on the associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H),and SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RIN2 REDUNDANCY FAULT	**Redundancy Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. If SAF = 0 (2C bit 6), RIN2 should be 1 (0701 bit 4), otherwise this fault is generated. Or if IN = 1 (27 bit 4), RIN2 should be 0 (0701 bit 4), otherwise this fault is generated. Or if IN = 0 (27 bit 4), RIN2 should be 1 (0701 bit 4), otherwise this fault is generated. ASME 2000 event. **Troubleshooting:** • Check input resistors RCTIC, RIN1, RIN2, IN, SAF, INCTI and INICI on the associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H),and SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RLULD REDUNDANCY FAULT	**RLULD Redundancy Fault**
Description: A failure of the LU1, LU2, LD1 or LD2 relays or associated circuitry has been detected. If both of the LU and LD inputs = 0, input RLULD should be 1 (070A bit 2). RLULD is also verified "OFF" when running at high (RH = 0, 070A bit 3) or intermediate speed (INT = 1, 02DC bit 1) or the car is on any form of inspection operation as all of these conditions prevent the LU/LD family of relays from picking. Basically, if the leveling inputs are OFF the NC monitoring contacts of these relays should be MADE or the RLULD redundancy fault is logged. ASME 2000 event. **Troubleshooting:** Check input resistors LU, LD and RLULD on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RM1, RM2, RM3 REDUNDANCY FAULTS *(Hydro only)*	**RM1, RM2, RM3 Redundancy Faults**
Description: Only for jobs with M contactors. This function checks the status of a normally closed auxiliary contact of relay MX. When the car is not running we expect input RMX to be active (1). When we are running we expect input RMX to be OFF (0). A few jobs may have more than one M contactor (M1, M2, MX, etc) in this case, when a failure occurs, we would display the number of the problematic contactor, ie. RM2 Redundancy Fault. ASME 2000 Event. **Troubleshooting**: First, check the contacts of the normally closed auxiliary that feed the associated input. The logic is written to check for input RMX to be OFF (0, that is RM1=0) when we have a valid run command as determined by checking that inputs RPM=UNL=SAF= M1 = 1. If no run command, then RMX must = 1. Check voltage at top of associated input resistors on SC-SB2K-H. For those inputs that are ON expect 5 VAC. For those inputs that are OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
RMR REDUNDANCY FAULT *(Hydro only)*	**RMR Redundancy Fault**
Description: A failure of the PM1, PM2 or PM12 relays or RMR input has been detected. This means a failure to activate when expected or a failure to drop when expected. If SAF = 0 (2C bit 6), RMR should be 1 (0708 bit 5), otherwise this fault is generated. If MB = 0 (0707 bit 1), RMR should be 1 (0708 bit 5), otherwise this fault is generated. ASME 2000 event. **Troubleshooting:** • Check the NC aux contacts of relays PM12, PM1 and PM2. They must make up when the contactor drops out. • Also check input resistor RMR on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K(-H) board. Otherwise replace SC-HDIO board.	
ROFRT REDUNDANCY FAULT *(Hydro only)*	
Description: Monitors the OFRT relay for proper operation. If the OFRT relay is ON , the ROFRT input will be OFF. ROFRT should always be the opposite of OFRT, otherwise the ROFRT Redundancy Fault is logged and the elevator shuts down. The elevator will attempt to recover from this fault up to four consecutive times after which this fault will latch and require a manual reset by pressing the fault reset button. **Troubleshooting Tips:** Check the OFRT relay for proper operation (Some times we relabel the spare relay on the SC-BAH or SC-BAHR and some times we use a small contactor mounted on backplate). Also check the prints to see where the input ROFRT comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or SC-HDIO.	
RPLT REDUNDANCY FAULT *(Hydro only)*	**RPLT Redundancy Fault**
Description: Only for jobs with multiple starters. This function checks the status of a normally closed contact of starter pilot relays PLT. When the car is not running, we expect input RPLT to be active (1). When we are running, we expect input RPLT to be OFF (0). ASME 2000 Event. **Troubleshooting**: First, check the normally closed contact of relay PLT that feeds the input RPLT. Check voltage at top of associated input resistors on SC-SB2K-H. For stopped condition (no demand), expect 5 VAC. For running, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
RPM REDUNDANCY FAULT *(Hydro only)*	**RPM Redundancy Fault**
Description: Verifies that input RPM is OFF when it should be by comparing RPM to inputs SAF=0= DLK= UNL=RPM. Also, if VC=1, RPM should also =1. Finally, we verify that RPM=1 when RUP=0 and either SU=1, RLULD=0 or VEU=0 or INUP=1 and IN=0. ASME 2000 Event. **Troubleshooting:** Use diagnostics to verify the status of the above mentioned inputs. For those inputs that should be OFF, check for 0 VAC at top of associated resistor on SC-SB2K-H and check for 5 VAC at top of resistors for active (ON) inputs. If not present, replace SC-SB2K-H. Otherwise swap associated ribbon cable or SC-HDIO.	
RPT REDUNDANCY FAULT	**RPT Redundancy Fault**
Description: A failure with the RPT input, PT relay or associated circuitry has been detected. If SAF = 0 or DLK = 0 or REI = 0 (0707 bit 2) then verify RPT = 1 (0707 bit 3). If RUP = 1 (0709 bit 3) and RDN = 1 (0709 bit 4) then verify RPT = 1. Else verify RPT = 0. ASME 2000 event. **Troubleshooting Tip:** • Check input resistors SAF, DLK, REI, RUP, RDN, and RPT on the associated board (refer to prints). Swap ribbon cables between SC-SB2K(-H), SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RSAFM REDUNDANCY FAULT *(Traction only)*	**RSAFM Redundancy Fault**
Description: Monitors the SAFM relay for proper operation. If the SAFM relay is ON , the RSAFM input will be OFF. RSAFM should always be the opposite of SAFM, otherwise the RSAFM Redundancy Fault is logged and the elevator shuts down. The elevator will attempt to recover from this fault up to four consecutive times after which this fault will latch and require a manual reset by pressing the fault reset button. **Troubleshooting Tips:** Check the SAFM relay for proper operation. Also check the prints to see where the input RSAFM comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or HC-IOX.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RSAFR CYCLE TEST FAULT	**RSAFR Cycle Test Fault**
Description: RSAFR Redundancy Fault; A failure of the either the RSAFR1 or RSAFR2 relays has been detected. ASME 2000 event. **Troubleshooting:** During cycle test check operation of RSAFR1/2 relays. Next check for 5 VAC at top of RSAFR resistor on the SC-SB2K(-H) board when both are dropped and 0 VAC when either picks. If not present replace SC-SB2K(-H). If present swap C3 ribbon cable or SC-HDIO.	
RSAFR REDUNDANCY FAULT	**End of Run Cycle Test Fault**
Description: A failure of the End of Run Cycle Test has been detected. A failure of the SAFR1 or SAFR2 relays, OR a failure of the CSAF or MPSAF outputs, OR a failure of the RSAFR input has been detected. ASME 2000 event. **Troubleshooting Tips:** • If MPSAF = 1 (0700 bit 7 and 0 VAC @ TP3) and 120 VAC is present at terminal 20, then verify relay SAFR2 is picked. If SAFR2 is not picked, then check devices between terminal 20 and right coil side of relay SAFR2 for continuity. • If CSAF output is active (0 VAC @ TP4) and 120 VAC is present at terminal 20, then verify relay SAFR1 is picked. If SAFR1 is not picked, then check devices between terminal 20 and right coil side of relay SAFR1 for continuity. • If relays SAFR1 and/or SAFR2 are picked, RSAFR should be 0 (0700 bit 2), otherwise this fault is generated. • Also check input resistor RSAFR. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect, swap triacs on SC-HDIO labeled MPSAF. Or, if RSAFR resistor is defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
RSTOP REDUNDANCY FAULT	**RSTOP Redundancy Fault**
Description: A failure of the In Car Stop Switch has been detected. If RSTOP = 0 (070D bit 4 for Tractions / 070D bit 1 for Hydros) and SAFC = 1 (0700 bit 5), STOP (0700 bit 6) should be 1, otherwise this fault is generated. If RSTOP = 1 (070D bit 4 for Tractions / 070D bit 1 for Hydros) and ESBYP = 0 (0707 bit 7), STOP (0700 bit 6) should be 0, otherwise this fault is generated. ASME 2000 event. **Troubleshooting Tips:**• If the In Car Stop Switch is in the RUN position, then the expected results are SAFC = 1, STOP = 1 and RSTOP = 0. • If this is not the case, then trace the signal from the source to determine the failed component. • Begin at the input terminal. If the voltage here is not correct (120VAC for high signals and 0VAC for low signals), then the problem lies outside of the controller equipment. • Next check the voltage at the similarly named input resistor. If the voltage here is not correct (5VAC for high signals and 0VAC for low signals), then the problem lies on this board. If the resistor is still good (typically 47kOhms), then the board should be replaced. • Check for a defective ribbon cable by swapping it. • Finally, replace the input board (HC-PIO, SC-HDIO, IOX, I4O depending on the input). • If the In Car Stop Switch is in the STOP position, then the expected results are ESBYP = 0, STOP = 0 and RSTOP = 1. • Follow the above checks with the additional step for validating ESBYP. ESBYP must be low for this event to occur so, confirm that relay ESBYP is dropped. If it isn't, then replace the ESBYP triac, ribbon cable, SC-HDIO board, or SC-SB2K(-H) board one at a time until the problem is corrected.	
RSYNC REDUNDANCY FAULT *(Hydro only)*	
Description: Monitors the SYNC relay for proper operation. If the SYNC relay is ON , the RSYNC input will be OFF. RSYNC should always be the opposite of SYNC, otherwise the RSYNC Redundancy Fault is logged and the elevator shuts down. **Troubleshooting Tips: :** Check the SYNC relay for proper operation (Some times we relabel the spare relay on the SC-BAH or SC-BAHR and some times we use a small contactor mounted on backplate). Also check the prints to see where the input RSYNC comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or SC-HDIO.	
RTBAB REDUNDANCY FAULT	**Redundancy Access Input Fault**
Description: A failure of a hoistway access related input, relay or associated circuitry has been detected. The RTBAB input monitors NC contacts of relays TAB and BAB. If RACC1 input is ON (1) then input RACC2 should be ON (1). Hence RACC1 = RTAB. If RACC1 = 1 (0702 bit 3), RTBAB should be 1 (0702 bit 5), otherwise this fault is generated. If INUP = 0 (0701 bit 6) and INDN = 0 (0701 bit 7), RTBAB should be 1 (0702 bit 5), otherwise this fault is generated. Else RTBAB should be 0 (0702 bit 5), otherwise this fault is generated. ASME 2000 event. **Troubleshooting:** • Check input resistors RTBAB, RACC1, RACC2, INUP, INDN, ACCI on associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H), SC-BASE(-D) and SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) or SC-BASE(-D) (for RACC1, RACC2) board. Otherwise replace SC-HDIO board.	
RUDX1 REDUNDANCY FAULT *(Traction only)*	**RUDX1 Redundancy Fault**
Description: Monitors the UP2 and DN2 relays. When the elevator is in motion either the UP2 or DN2 relays will be picked, depending on the direction of the car. Therefore the RUDX1 input must be active while the car is in motion and inactive when the car is stopped. **Troubleshooting Tips:** Check UP2 and DN2 relays. Also check RUDX1/ASI5 input resistor on the SC-HDIO board (refer to prints). If 47 K resistor is defective, replace SC-HDIO board. Otherwise replace UP2 or DN2 relays.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RUDX2 REDUNDANCY FAULT *(Traction only)*	**RUDX2 Redundancy Fault**
Description: Monitors the UP2 and DN2 relays. When the elevator is in motion either the UP2 or DN2 relays will be picked, depending on the direction of the car. Therefore the RUDX2 input must be active while the car is in motion and inactive when the car is stopped. **Troubleshooting Tips:** Check UP2 and DN2 relays. Also check RUDX2/ASI6 input resistor on SC-HDIO board (refer to prints). If 47 K resistor is defective, replace SC-HDIO board. Otherwise replace UP2 or DN2 relays.	
RUDX3 REDUNDANCY FAULT *(Traction only)*	**RUDX3 Redundancy Fault**
Description: Monitors the UP2 and DN2 relays. When the elevator is in motion either the UP2 or DN2 relays will be picked, depending on the direction of the car. Therefore the RUDX3 input must be active while the car is in motion and inactive when the car is stopped. **Troubleshooting Tips:** Check UP2 and DN2 relays. Also check RUDX3/ASI7 input resistor on SC-HDIO board (refer to prints). If 47 K resistor is defective, replace SC-HDIO board. Otherwise replace UP2 or DN2 relays.	
RUDX4 REDUNDANCY FAULT *(Traction only)*	**RUDX4 Redundancy Fault**
Description: Monitors the UP2 and DN2 relays. When the elevator is in motion either the UP2 or DN2 relays will be picked, depending on the direction of the car. Therefore the RUDX4 input must be active while the car is in motion and inactive when the car is stopped. **Troubleshooting Tips:** Check UP2 and DN2 relays. Also check RUDX4/ASI8 input resistor on SC-HDIO board (refer to prints). If 47 K resistor is defective, replace SC-HDIO board. Otherwise replace UP2 or DN2 relays.	
RUFV REDUNDANCY FAULT *(Hydro only)*	**RUFV Redundancy Fault**
Description: Only for jobs with multiple valves. This logic checks input RUFV = 0 when USD = VEU = FUD = 1 and RUP= RH = 0. It also checks that RUFV = 1 when there is no demand to run the car Up. ASME 2000 Event. **Troubleshooting:** Use diagnostics to check on status of above signals. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON, expect 5 VAC. When OFF, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	
RUP REDUNDANCY FAULT	**Direction Input Fault**
Description: A failure of a UP direction related input, relay or associated circuitry has been detected. Checks that the UP relay, UP relay activation circuits and RUP input are functioning as required. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. If a direction is not invoked on either automatic or inspection operation, then the NC contact of the UP relay, that feeds input RUP, should be closed. Thus RUP = ON. Check associated input resistors on the SC-SB2K(-H) board. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K(-H) board. Otherwise replace SC-HDIO board.	
RUSV REDUNDANCY FAULT *(Hydro only)*	**RUSV Redundancy Fault**
Description: Only for jobs with multiple valves. This logic checks input RUSV = 0 when SU, SD or RLULD = 1 and UPS = 1. It also checks that RUSV = 1 when there is no demand to run the car Up. ASME 2000 Event. **Troubleshooting.** Use diagnostics to check on status of above signals. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON, expect 5 VAC. When OFF, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
RWYE1, RWYE2, RWYE3 REDUNDANCY FAULTS *(Hydro only)*	**RWYE1, RWYE2, RWYE3 Redundancy Faults**
Description: This function checks the status of a normally closed auxiliary contact of relay WYE (or A for Across the Line Starters). When the car is not running, we expect input RWYEX to be active (1). When we are running we expect input RWYEX to be OFF (0). A few jobs may have more than one WYE contactor (WYE1, WYE2, WYEX, etc). In this case, when a failure occurs, we display the number of the problematic contactor, ie. RWYE2 Redundancy Fault. ASME 2000 Event. **Troubleshooting**: First check the contacts of the normally closed auxiliary that feed the associated input. The logic is written to check for input RWYEX to be OFF (0, that is RWYE1=0) when we have a valid run command as determined by checking that inputs UNL=SAF= M1 = WYEX = RDELX (if wye-delta starter) = 1. If no run command, then RWYEX had better be = 1. Check voltage at top of associated input resistors on SC-SB2K-H. For those inputs that are ON, expect 5 VAC. For those inputs that are OFF, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
SAFC REDUNDANCY FAULT	**SAFC Redundancy Fault**
Description: A failure of the safety string between input SAFC and input STOP has been detected. If SAFC = 0 (0700 bit 5), STOP should be 0 (0700 bit 6), otherwise this fault is generated. ASME 2000 event. **Troubleshooting Tips:** • Check wiring connections to terminals 18 and 20. • Check wiring connections to the IN-CAR STOP SWITCH. • Also check input resistors STOP and SAFC. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	

TABLE 6.4 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
SAFH REDUNDANCY FAULT	**SAFH Redundancy Fault**
Description: A failure of the safety string between input SAFH and input SAFC has been detected. If SAFH = 0 (0700 bit 4), SAFC should be 0 (0700 bit 5), otherwise this fault is generated. ASME 2000 event. **Troubleshooting Tips:**• Check wiring connections to terminals 16, 17 and 18. • Check wiring connections to all safety devices between terminals 16, 17 and 18. • Also check input resistors SAFH and SAFC. Swap ribbon cables between SC-SB2K(-H) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
STARTER FAULT RELAY DROPPED *(Hydro only)*	**Starter Fault Relay Dropped**
Description: Indicates that the solid state starter has dropped the fault relay. ASME 2000 Event. **Troubleshooting:** For Solid State Starters Only. Confirm that the Fault Relay has truly dropped. If not, then check the wiring. Otherwise refer to the Starter Manufacturers manual.	
TEST REDUNDANCY FAULT	**TEST Redundancy Fault**
Description: A failure of the TEST/NORMAL switch, input or associated circuitry has been detected. ASME 2000 event. **Troubleshooting:** The switch can't be in the NORMAL and TEST positions at the same time. • If TEST = 0 (02D9 bit 7), meaning the switch is in the TEST position, IND should be 1 (27 bit 5), otherwise this fault is generated. • Check input resistors TEST and IND on the associated board (refer to prints). • Swap ribbon cables between SC-SB2K(-H), SC-HDIO. • If swapping ribbons has no effect or if resistors are defective, replace SC-SB2K-(H) board. Otherwise replace SC-HDIO board.	
UETS REDUNDANCY FAULT *(Traction only)*	**UETS Redundancy Fault**
Description: This fault is displayed when an inconsistency is detected between the Up Emergency Terminal Switches. ASME 2000 event. **Troubleshooting**: • Check the condition of the ETS switches. The UETS1/2 limit switches must operate simultaneously. • Check the wiring to the relay board (SC-SB2K(-H)) and IO board (SC-HDIO). • Verify UETS1 (070C bit 7) equals UETS2 (070D bit 2) and the car is in door zone. • Also check input resistors UETS1 and ASI2/UETS2 on the associated board (refer to prints). Swap ribbon cables between SC-BASE(-D) and SC-HDIO. If swapping ribbons has no effect or if resistors are defective, replace SC-BASE(-D) board. Otherwise replace SC-HDIO board.	
UFV REDUNDANCY FAULT *(Hydro only)*	**UFV Redundancy Fault**
Description: Input UFV checks the status of the up terminal speed reducing switches. We simply compare input UFV against input UTSRL. If UFV is not equal to UTSRL, we assert this fault. Hence these switches must open up simultaneously. ASME 2000 event. **Troubleshooting:** Check that the limit switches are opening within one second of each other as the car approaches the top terminal landing. If they are, then use diagnostics to determine the status of the inputs. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON, expect 5 VAC. When OFF, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO.	
UNL REDUNDANCY FAULT *(Hydro only)*	**Direction Input Fault**
Description: Input UNL checks the status of the UNL relay against the up normal limit switch when the doors are locked. We simply compare input UNL against input UNLS. If UNL is not equal to UNLSL, we assert this fault. Hence these switches must open up simultaneously. ASME 2000 Event. **Troubleshooting:** Check that both the limit switch and relay are activating/deactivating within one second of each other as the car approaches the top terminal landing. If they are, then use diagnostics to determine the status of the inputs. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON expect 5 VAC. When OFF expect 0 VAC. If this is not the case replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	
UP NORMAL LIMIT SWITCH OPEN	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. If SAF=1 and DLK=1 and the car is above the Up Normal Limit Switch (UNL=0), then this status is displayed. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Verify SAF=1 and DLK=1 and move the car below the Up Normal Limit (UNL=1). In most cases we simply need to move the limit switch further into the terminal.	

TABLE 6.4   ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
UPDIR REDUNDANCY FAULT *(Traction only)*	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Valid when SAF=1. Input UPDIR is created by the SC-BASE(-D) board and represents resolved direction from the speed sensor. Input UPDIR must always be the opposite of RUP. If the main processor detects that the resolved direction (UPDIR form SC-BASE(-D)) does not agree with the intended direction (RUP from MP2 / PCA), the system is shut down with the UPDIR redundancy fault. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. • Verify that the UP LED on the SC-BASE(-D) is ON when car motion is up and OFF when car motion is down. If not, the speed sensor is reversed (rotate the sensor 180 degrees with respect to the magnet). • Swap associated Ribbons cables between SC-BASE(-D) and SC-HDIO, check 95 and 96 signals (0 to 55VDC), swap SC-BASE(-D) or SC-HDIO.	
UPS REDUNDANCY FAULT	**Direction Input Fault**
Description: A failure of a direction related input, relay or associated circuitry has been detected. Valid when SAF=1. Determines if the up sense input (UPS) agrees with the intended direction (RUP) once the doors are closed and locked (DLK). ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. Once DLK is ON (1), if UPS is ON (1), then RUP must be OFF (0). If this is not the case, the system is shut down with the UPS redundancy fault. Check associated input resistors, swap boards or ribbon cables to correct.	
UTS REDUNDANCY FAULT *(Hydro only)*	**UTS Redundancy Fault**
Description: Only for solid state starters. This input validates that the “Up To Speed” (UTS) signal is low (OFF) when either WYE or DEL are OFF (0). If UTS is ON, we set this fault. For jobs with multiple starters, we have UTS1, UTS2, etc. ASME 2000 Event. **Troubleshooting.** Use diagnostics to check on status of WYE, DEL and UTS as above. Check voltage at top of associated input resistors on SC-SB2K-H. When the inputs are ON, expect 5 VAC. When OFF, expect 0 VAC. If this is not the case, replace the SC-SB2K-H. If voltages are good, swap associated ribbon cable and finally swap the SC-HDIO	

4-19-04

6.2 USING THE SPECIAL EVENTS CALENDAR

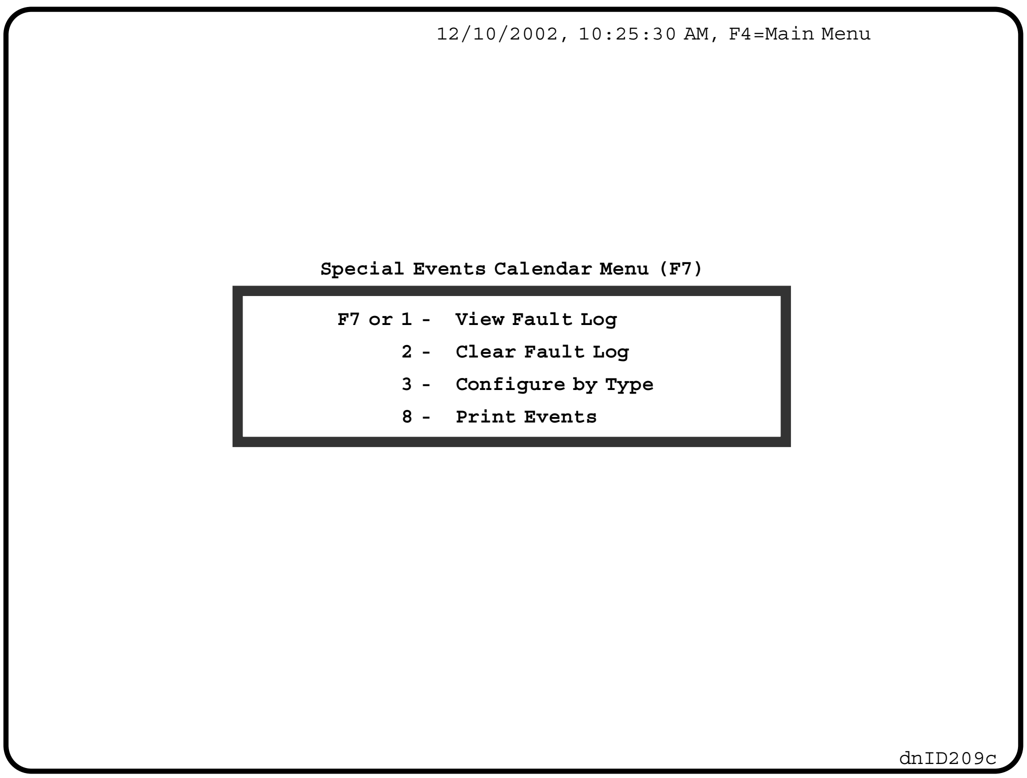
The Special Events Calendar documents the 250 most recent fault conditions or events and displays them in chronological order. They can be viewed on the optional CRT terminal connected to either the car controller or the Group Supervisor. The data displayed includes the type of event or fault, the date and time the fault/event occurred, the date and time the fault/event was corrected, as well as other information about the status of the elevator when the fault or event occurred.

The Special Events Calendar Fault Log is accessed from the Special Events Calendar Menu (Figure 6.5). Press the **F7** key while the Main Menu is displayed.

VIEW FAULT LOG

From the Special Events Calendar Menu (F7) screen press **1** or **F7** to display the events logged to the Special Events Calendar (Figure 6.6). This screen makes it possible to examine the documented faults and events. The latest 14 faults and events are displayed in the bottom half of the screen, including the date and time the event occurred.

FIGURE 6.5 Special Events Calendar Menu (F7) screen



When this screen is first displayed, the most recent event is displayed at the bottom of the screen. Use the **Up / Down Arrow** keys to scroll one event at a time, the **Page Up / Page Down** keys to scroll a page at a time, or the ***Home / End*** key to scroll to event 1 or 250. As each event is selected (reverse video), the description of the event and any other logged data is displayed in the top half of the screen. Additional troubleshooting information for each event can be displayed by pressing **Crtl + T** (see Figure 6.6). Tables 6.3 and 6.4, *Status and Error Messages* list the faults or events which are recorded, including a description and recommended troubleshooting actions.

FIGURE 6.6 Special Events Calendar (F7 - 1) screen

```
                              12/4/2000,  10:25:30 AM,    F4=Main Menu

                    Special Events Calendar (F7, F7)
STATUS                SPEED (ft/Mmin)   VOLTAGE (volts)    CURRENT (amps)
Direction   : N/A     Command  : N/A    Armature : N/A     Armature : N/A
High Speed  : N/A     Tach/Enc : N/A    Motor Fld: N/A     Command  : N/A
Start Floor : N/A     Terminal : N/A    Brake    : N/A
Stop Floor  : N/A     Safety   : N/A
Step Floor  : N/A     Pattern  : N/A    SENSOR (volts)     POSITION (ft)
Switch      : N/A                       Motor Fld: N/A     Absolute : N/A
PI          : 3                         Brake    : N/A
Event Code  : 0x03 ( Communication )

This fault indicates that the car was previously communicating with the Group
Supervisor but is now unable to communicate.

DATE             TIME             DESCRIPTION
12/4/2000        10:05:28 AM      Communication Loss
                 10:07:37 AM      Communication Loss [OFF]
                 2:36:18 PM       Sub-System(s) Reset

 ARROWS: Move Cursor, HOME: Oldest, END: Newest,  CTRL-T: Troubleshoot
                                                                 dnID208c
```

FIGURE 6.7 Special Events Calendar Troubleshooting (F7 - 1 - Crtl +T) screen

```
                              2/16/2000,  10:25:30 AM,  F4= Main Menu

          Special Events Calendar Troubleshooting Tips

          12/4/2000,  10:05:28 AM, Communication Loss

--Verify that the RS-422 communication cable is not removed from the Car's
MC-RS board.
--Verify the jumpers on all of the controllers' MC-RS boards.
--Check for a defective MC-RS board on any of the controllers.

                 ESC or CTRL-T: Special Events Calendar
                                                                 dnID248b
```

CLEAR FAULT LOG

While in the Special Event Calendar Menu (F7) screen is displayed, if the **2** key is pressed, the message **`Delete All Events? (Y/N)`** is displayed. Press **Y** to clear the Special Events Calendar of all events.

SPECIAL EVENTS - CONFIGURE BY TYPE

In order to aid in troubleshooting, the list of events which are logged to the Special Events Calendar can be configured based on the event type.

While in the Special Event Calendar Menu (F7) screen is displayed, press the **3** key to access the Special Events - Configure by Type (F7, 3) screen (see Figure 6.8). The ***Log*** column controls which events are logged to the Special Events Calendar Fault Log. Place an 'X' in this column if you want the event type listed in the selected row to be logged to the Special Events Calendar. When the Event Description is highlighted, a description of the event type is displayed above the column headings (see Figure 6.9). Tables 6.3 and 6.4, *Status and Error Messages* provide a complete listing of events. The event messages that are logged to the Special Event Calendar are shown with SEC in the *Location* column.

FIGURE 6.8 Special Events - Configure by Type (F7, 3) screen

12/5/2000, 10:25:30, F4= Main Menu

Special Events - Configure by Type (F7, 3)

The Log column controls which events are logged to the Special Events Calendar. Place an X in the Log column to have events of the type specified by this row to be logged to the Special Events Calendar. Events with a "." in the Log column will not be logged.

Log	**Process**	**Event Description**	**1 of 39**
X	Communication	Alarm - No Car Movement	
X	Communication	Alarm - No Door Zone	
X	Communication	Both USD and DSD Are Open	
X	Communication	Bottom Floor Demand	
X	Communication	Car Call Bus Fuse Blown	
X	Communication	Car Out of Service with Doors Locked	
X	Communication	Car Out of Service without Doors Locked	
X	Operation	Car Safefy Device Open	
X	Communication	Communication Loss	
X	Communication	Contactor Proofing Redundancy Failure	
X	Communication	Direction Relay Redundancy Failure	
X	Communication	Door Close Protection	
X	Communication	Door Lock Contact Failure	
X	Communication	Door Open Limit Failure	
X	Communication	Doors Open and Locked	
X	Operation	Earthquake	
X	Communication	Fire Service Phase 2	
X	Communication	Gate Switch Relay Redundancy Failure	
X	Operation	Governor Switch Open	
X	Operation	Hoistway Safety Devide Open	

ARROWS: Select, ENTER KEY: Edit, S: Saves

dnID239d

FIGURE 6.9 Special Events - Configure by Type - Event Description (F7, 3) screen

12/5/2000, 10:25:30, F4= Main Menu

Special Events - Configure by Type (F7, 3)

This event indicates that one or more of the car safety circuit devices is open (e.g., emergency exit contact, safety clamp switch, car-top emergency stop switch). This error is generated when the safety string input (SAF) is low, and the safety circuit has been opened "upstream" of the SAFC input.

Log	**Process**	**Event Description**	**1 of 39**
X	Communication	Alarm - No Car Movement	
X	Communication	Alarm - No Door Zone	
X	Communication	Both USD and DSD Are Open	
X	Communication	Bottom Floor Demand	
X	Communication	Car Call Bus Fuse Blown	
X	Communication	Car Out of Service with Doors Locked	
X	Communication	Car Out of Service without Doors Locked	
X	Operation	Car Safefy Device Open	
X	Communication	Communication Loss	
X	Communication	Contactor Proofing Redundancy Failure	
X	Communication	Direction Relay Redundancy Failure	
X	Communication	Door Close Protection	
X	Communication	Door Lock Contact Failure	
X	Communication	Door Open Limit Failure	
X	Communication	Doors Open and Locked	
X	Operation	Earthquake	
X	Communication	Fire Service Phase 2	
X	Communication	Gate Switch Relay Redundancy Failure	
X	Operation	Governor Switch Open	
X	Operation	Hoistway Safety Devide Open	

ARROWS: Select, ENTER KEY: Edit, S: Saves

dnID239e

FIGURE 6.10 Special Events - Print Events (F7, 8) screen

12/19/2002, 10:25:30, F4= Main Menu

Event Calendar Print Setup (F7, 8)

Print Range: **ALL EVENTS**

Start Date: **-- N/A --**
End Date: **-- N/A --**

Events Per Page: **8**

ARROWS: Select Item, +/- KEYS: Change Value, P: Print

dnID272

6.3 USING THE DIAGNOSTICS

System diagnostics are available using the optional CRT terminal with Release 4 Communication software. Diagnostics are accessed via the Diagnostics Menu (F11) screen .

FIGURE 6.11 Diagnostics Menu (F11) screen

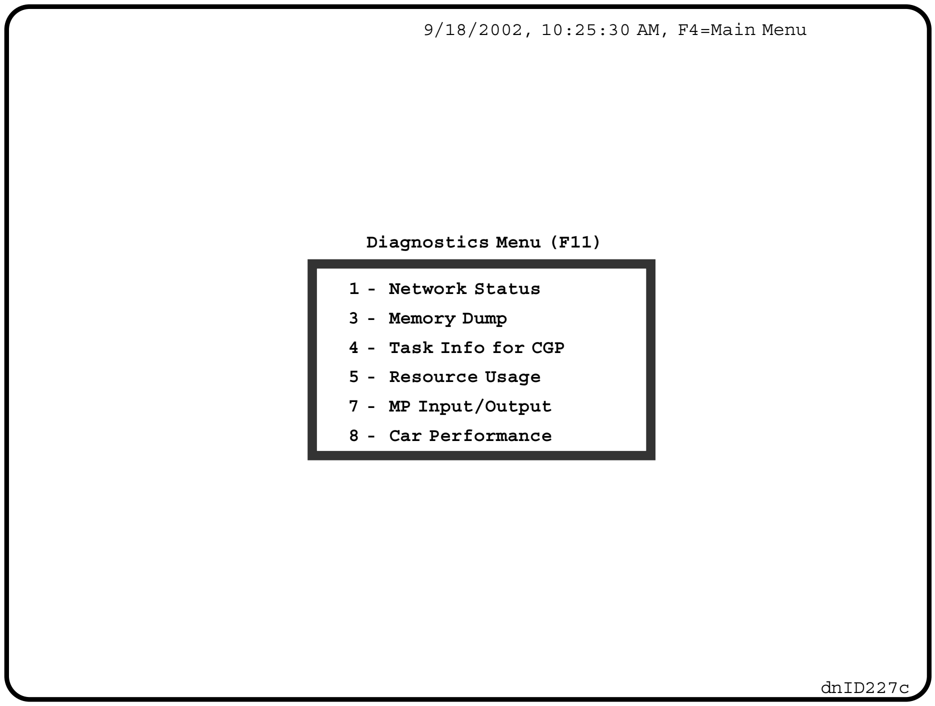
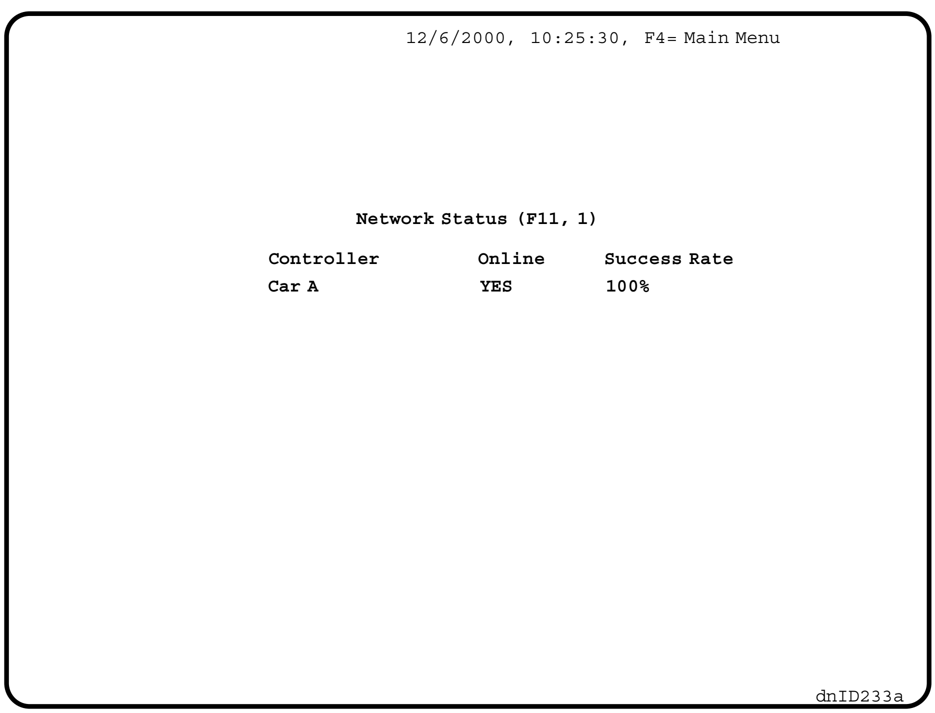


FIGURE 6.12 Network Status (F11, 1) screen



Network Status - The status of communication between the car controller and the Group Supervisor can be verified using the Network Status (F11, 1) screen. A Success Rate of less than 100% indicates possible improper termination of the High-Speed Serial Communication Link. Proper termination is achieved by installing or removing shunts on jumpers JP1 and JP2 on the MC-RS Communication Interface boards at the ends of the communication chain while observing the Success Rate percentage for each local Car. The goal is to achieve 100% Success Rate for each car, or the highest percentage possible. This diagnostic screen is also available on the M3 Group Supervisor (see Section 3.9.2 *Using the Network Status Diagnostics Screen* in the M3 Group Supervisor manual, part #42-02-G004)

Memory Dump - (screen not shown) This diagnostic screen shows the status of memory locations within the controller's computers. MCE Technical Support personnel may request information from this screen while troubleshooting a problem.

Task Info for CGP - (screen not shown) This diagnostic screen shows the status of various tasks performed by the MC-CGP-4(8) Communication Processor Board. MCE Technical Support personnel may request information from this screen while troubleshooting a problem.

Resource Usage - (screen not shown) This diagnostic screen shows resource usage in the MC-CGP-4 Communication Processor Board. MCE Technical Support personnel may request information from this screen while troubleshooting a problem.

MP Input / Output - Displays the status of the MP inputs and outputs (Figure 6.13).

FIGURE 6.13 MP2 Input/Output (F11,7) screen

7/19/2000, 10:25:30 AM, F4=Main Menu

MP Diagnostic Input/Output Flags

20	DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
21		DC	UC	CC			DHO	DOI
22	DCF	DCP	DOF	LOT		HTC	CCT	SDT
23			HSEL	CSB	DCC	NUDG		DSHT
24	INT	FRA	FCS	FRS	DNS	UPS	STD	STU
25			HLW	HLI			**FWI**	
26	LFP	UFP						
27			EQI	IND	IN		DEL	YSIM
28	LLW	DLK		DZORDZ			PK	LLI
29	DNDO	LD		DDP	UPDO	LU		UDP
2A	DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
2B	TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
2C		STC	SAF	**HCR**	**HCDX**	**CCD**	ISV	ISRT
2D					**FRM**			FRC
2E	SD	SDA	DSD	BFD	SU	SUA	USD	TFD
2F	HLD		EQA	ATSF		ECRN	CD	EPR

dnID265

FIGURE 6.14 Car Performance Graph (F11, 8) screen

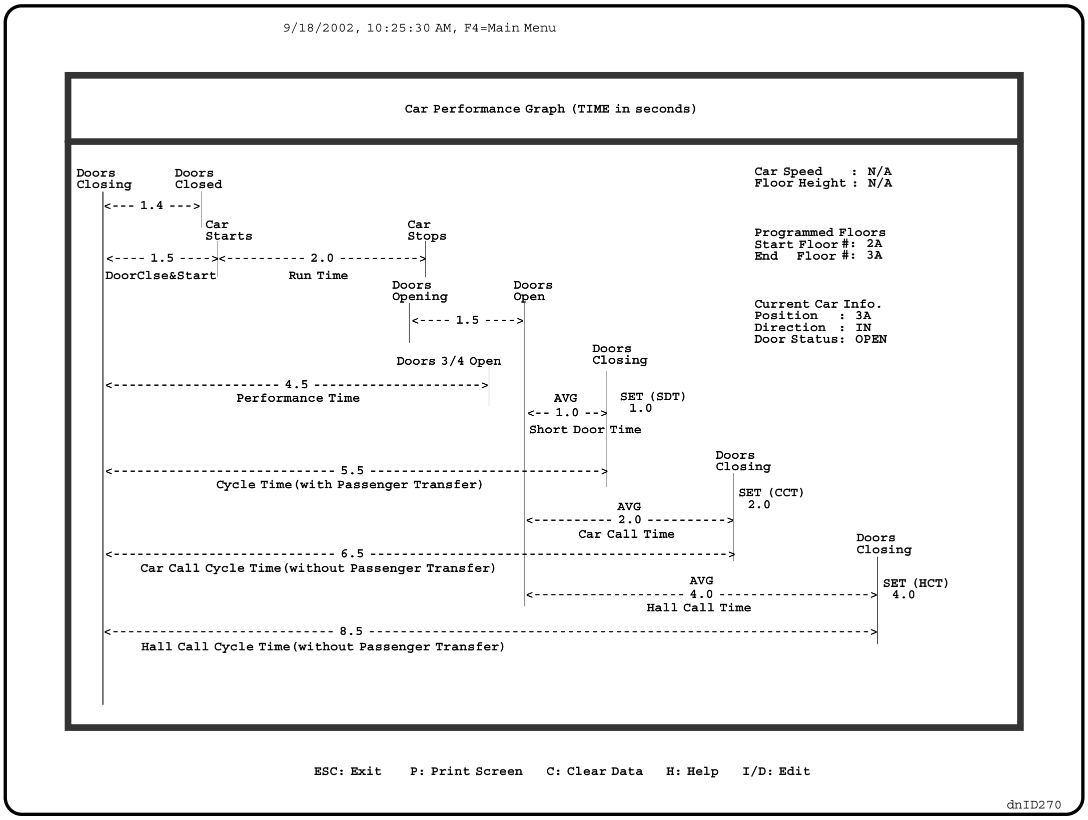
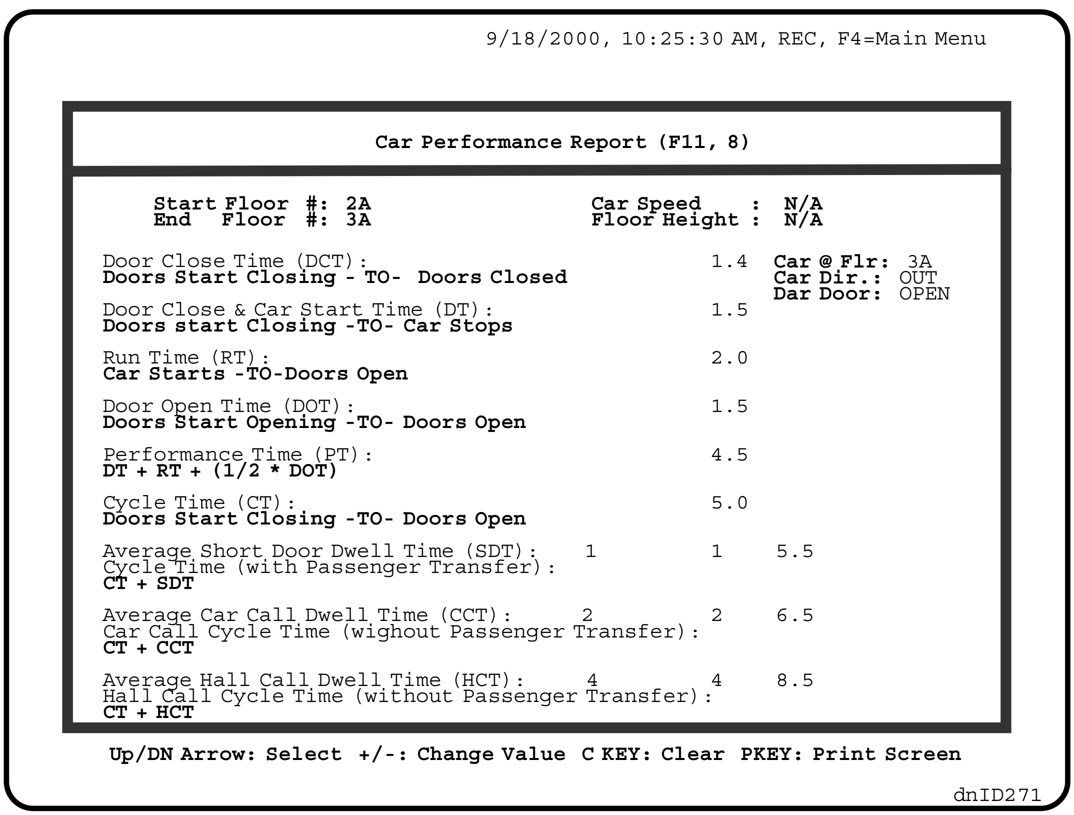


FIGURE 6.15 Car Performance Report (F11, 8, H) screen



9/18/2000, 10:25:30 AM, REC, F4=Main Menu

Car Performance Report (F11, 8)

Start Floor #: 2A **Car Speed : N/A**
End Floor #: 3A **Floor Height : N/A**

Car @ Flr: 3A
Car Dir.: OUT
Dar Door: OPEN

Door Close Time (DCT): **Doors Start Closing - TO- Doors Closed**		1.4	
Door Close & Car Start Time (DT): **Doors start Closing -TO- Car Stops**		1.5	
Run Time (RT): **Car Starts -TO-Doors Open**		2.0	
Door Open Time (DOT): **Doors Start Opening -TO- Doors Open**		1.5	
Performance Time (PT): **DT + RT + (1/2 * DOT)**		4.5	
Cycle Time (CT): **Doors Start Closing -TO- Doors Open**		5.0	
Average Short Door Dwell Time (SDT): Cycle Time (with Passenger Transfer): **CT + SDT**	1	1	5.5
Average Car Call Dwell Time (CCT): Car Call Cycle Time (wighout Passenger Transfer): **CT + CCT**	2	2	6.5
Average Hall Call Dwell Time (HCT): Hall Call Cycle Time (without Passenger Transfer): **CT + HCT**	4	4	8.5

Up/DN Arrow: Select +/-: Change Value C KEY: Clear PKEY: Print Screen

dnID271

Car Performance - The Car Performance Graph (F11, 8) screen and the Car Performance Report (F11, 8, H) screen provide car performance data including:

- Door Close Time (DCT)
- Door Close & Car Start Time (DT)
- Run Time (RT)
- Door Open Time (DOT)
- Performance Time (PT)
- Cycle Time (CT)
- Average Short Door Dwell Time (SDT)
- Average Car Call Dwell Time (CCT)
- Average Hall Call Dwell Time (HCT)

6.4 TROUBLESHOOTING CAR OPERATION CONTROL (COC)

Usually, a malfunction is due to a faulty input or output signal. Inputs are signals generated outside the controller cabinet that connect to terminals inside the cabinet, and are subsequently read by the computer during its input scan. Outputs are signals generated by the computer that energize relays or turn on indicators during the computer's normal output scan. Since an incorrect input or output can cause a system malfunction, tracing these signals to find the source of the problem is essential. Read the example problem under *Tracing Signals in the Controller* to become familiar with signals generated in the system.

6.4.1 DOOR LOGIC

As complex as it is, the door logic basically answers one simple question; should the doors be open? The computer looks at certain inputs and then calls upon specific logic to answer this question. All of the inputs and flags generated by the specific logic are available for viewing through the EOD. When troubleshooting a door problem, inspecting the action and sequence of these flags and inputs is important. The status of these logic flags will generally point toward the root of the problem. Once the computer has determined the answer to the door status question, the appropriate outputs are turned ON or OFF, so the doors are in the desired state.

The computer looks at the following inputs:

- DBC - Door Close Button input
- DCLC - Door Closed Contacts input (Retiring Cam only)
- DLK - Door Locks input
- SE - Safety Edge input
- DOL - Door Open Limit input
- DZ - Door Zone input
- PHE - Photo Eye input

The computer generates the following outputs:

- DCF - Door Close Function output
- DCP - Door Close Power output
- DOF - Door Open Function output

NUDG - Nudging output

TRACING SIGNALS IN THE CONTROLLER

The following example shows how an input signal can be traced from its source (field wire) to its destination inside the computer (EOD). Monitor the Door Zone (DZ) flag. The DZ flag can be monitored using the Computer Swing Panel Diagnostic Indicators as described in Section 5.4.1, *Viewing the MC-MP2-2K Computer Variable Flags.* The door flags can also be viewed on the MP2 Input/Output (F11, 7) screen (see Figure 6.13) Moving the car in the hoistway should cause this flag to turn ON and OFF whenever the car goes through a floor. If the flag (LED) does not turn ON and OFF, the following could be causing the problem.

1. Defective Door Zone sensor.
2. Incorrect hoistway wiring.
3. Faulty termination of hoistway wiring to the (DZ) terminal inside the controller.
4. Defect on the SC-SB2K or HC-PI/O board.

NOTE: If this installation has rear doors and at least one floor where both openings exist, look up the rear door zone flag (DZR). To do so, the Diagnostic On/Norm switch and the A5 switch must be up. All other switches are down. Diagnostic Indicator 6 shows the status of DZR.

First, determine whether the problem is inside or outside the controller. With a voltmeter, probe the Door Zone terminal (27). This terminal is in Area 3 of the job prints. Moving the car in the hoistway should cause the voltmeter to read 120VAC when the car is in the door zone. If when the car passes through the door zone the voltmeter does not read 120VAC the problem is external to the controller (see items 1, 2, and 3 above). If the voltmeter does read 120VAC when the car passes through the door zone the problem is internal to the controller (see item 4 above). The job prints show the DZ signal goes to the right hand side of the DZ relay to a 47K 1W resistor, to pin 8 of connector C2 on the SC-SB2K Relay board, and then to pin 8 of connector C2 on the HC-PI/O board.

Figures 6.16 and 6.17 show the HC-PI/O and SC-SB2K boards and the location of the DZ signal in the controller. Notice that if terminal 27 is powered, approximately 120VAC will be present at the bottom of the 47K 1W resistor corresponding to DZ. The top of the same resistor should read about 5VAC with respect to COM.

The SC-SB2K board has test pads on the front of the board which surround every relay and connector. Relays IN2 and SAFR1 each have a legend that indicates which pad corresponds to which contact or its coil on this board. To be sure that the input from terminal 27 is making its way to the relay coil, probe the test pad on the lower right hand side of the DZ relay.

It is not necessary to remove the relay or get to the back of the SC-SB2K board to trace signals on the board. Signals can be traced on the HC-PI/O board. If the signal gets to the HC-PI/O board but does not get to the computer, it is safe to assume that the problem is on the HC-PI/O board.

Important computer-generated logic flags:

- CCT - Car Call Time flag
- DOI - Door Open Intent flag
- DSH - Door Shortening (Intermediate) flag
- DSHT - Door Shortening (Final) flag
- HCT - Hall Call Time flag
- LOT - Lobby Time flag
- SDT - Short Door Time flag

Using the logic flags listed above, the computer makes a decision regarding the doors. The Door Open Intent flag's (DOI) status reflects the computer's decision. If the computer recognizes the necessity of either opening the doors or keeping the doors open, this flag will come ON. This flag can be found using the EOD. When viewing this flag, the corresponding Diagnostic Indicator will turn ON when the computer decides that the doors should be open.

The DOI flag is a useful flag to inspect when troubleshooting door problems. Remember if DOI is ON, it will turn the DOF output ON which should pick the DO relay. The door should stay open until the DOL (Door Open Limit) turns OFF. The absence of DOL will turn the DOF output OFF. DOI will remain ON for the door dwell time (CCT, HCT, etc.). When DOI turns OFF, the DCF output turns ON and the DC relay will close the car doors. The signal that turns the DCF output OFF is DLK (Doors Locked) or possibly DCLC if the car has a retiring cam. After the doors are locked there is approximately a two-second delay before the DCF output turns OFF.

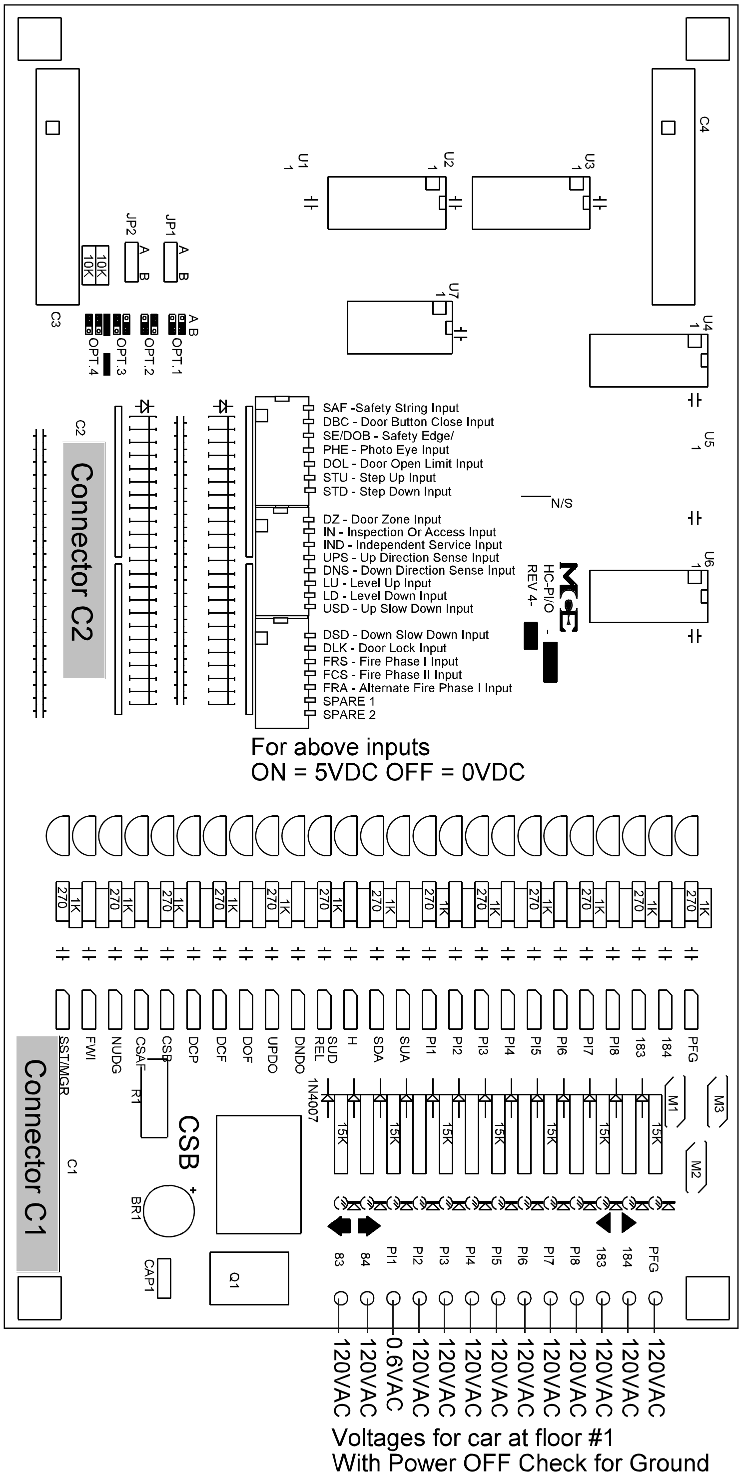
If there is a demand for the car (as is evidenced by the DMU or DMD flags being on) and if the DOI flag is *not* ON, then the DCP (Door Close Power) output will be turned ON regardless of the position of the door. The DCP output is used to provide door closing power while the car runs through the hoistway for those door operators requiring it, such as those made by the G.A.L. corporation.

If the doors get stuck because the door interlock keeper failed to lift high enough to clear the door interlock during the opening cycle, then the doors cannot complete opening, which could damage the door motor. The Door Open Protection Timer will eventually stop trying to open the doors and the car will then go on to the next call. Similarly, if the doors do not close all the way, the computer recycles the doors at a programmed interval in an attempt to clear the problem.

FIGURE 6.16 HC-PI/O Power Input/Output Board Quick Reference

42-QR-HC-PI/O Rev. 1

HC-PI/O QUICK REFERENCE CARD (Board 3)



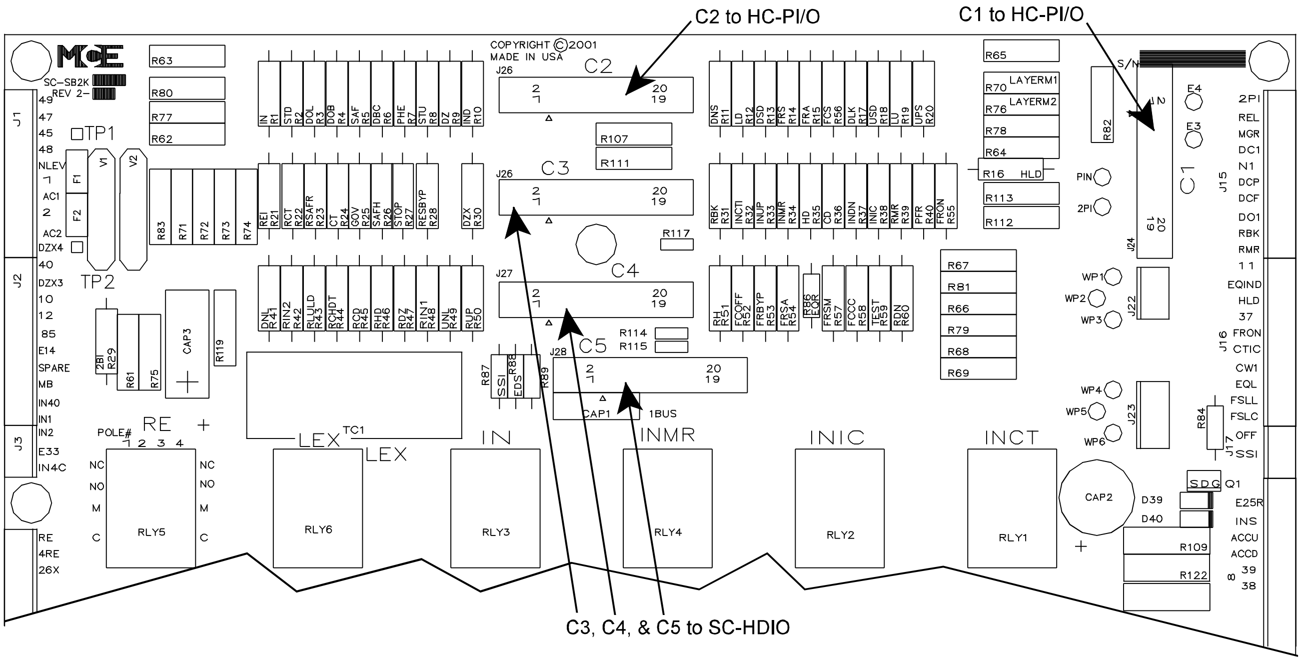
Connector C2

INPUT	PIN
SAF	1
DBC	2
SE/DOB	3
PHE	4
DOL	5
STU	6
STD	7
DZ	8
IN	9
IND	10
UPS	11
DNS	12
LU	13
LD	14
USD	15
DSD	16
DLK	17
FRS	18
FCS	19
FRA	20
SPARE 1	21
SPARE 2	22

Connector C1

OUTPUT	PIN
SST/MGR	1
FWI	2,4
SPARE 2 input	3
SPARE 1 input	5
NUDG	6
Lamp Common	7
CSAF	8
SUB/REL	9,11
DCP	10
DCF	12
Stop SW Out	13,15
DOF	14
UPDO	16
DNDO	18
Stop SW Source	17,19
H	20

FIGURE 6.17 SC-SB2K Main Relay Board Details



The computer basically looks for a reason to open the doors. If a valid reason to open the doors is *not* found, or if conditions are detected that prohibit the opening of the doors, the logic will close the doors (reset, or turn DOI OFF). To open the doors, the car must be in a door zone and not running at high or intermediate speed. Once the car has settled into a proper position to open the doors, a condition must exist that indicates that the doors should be open. Some of these conditions are listed below:

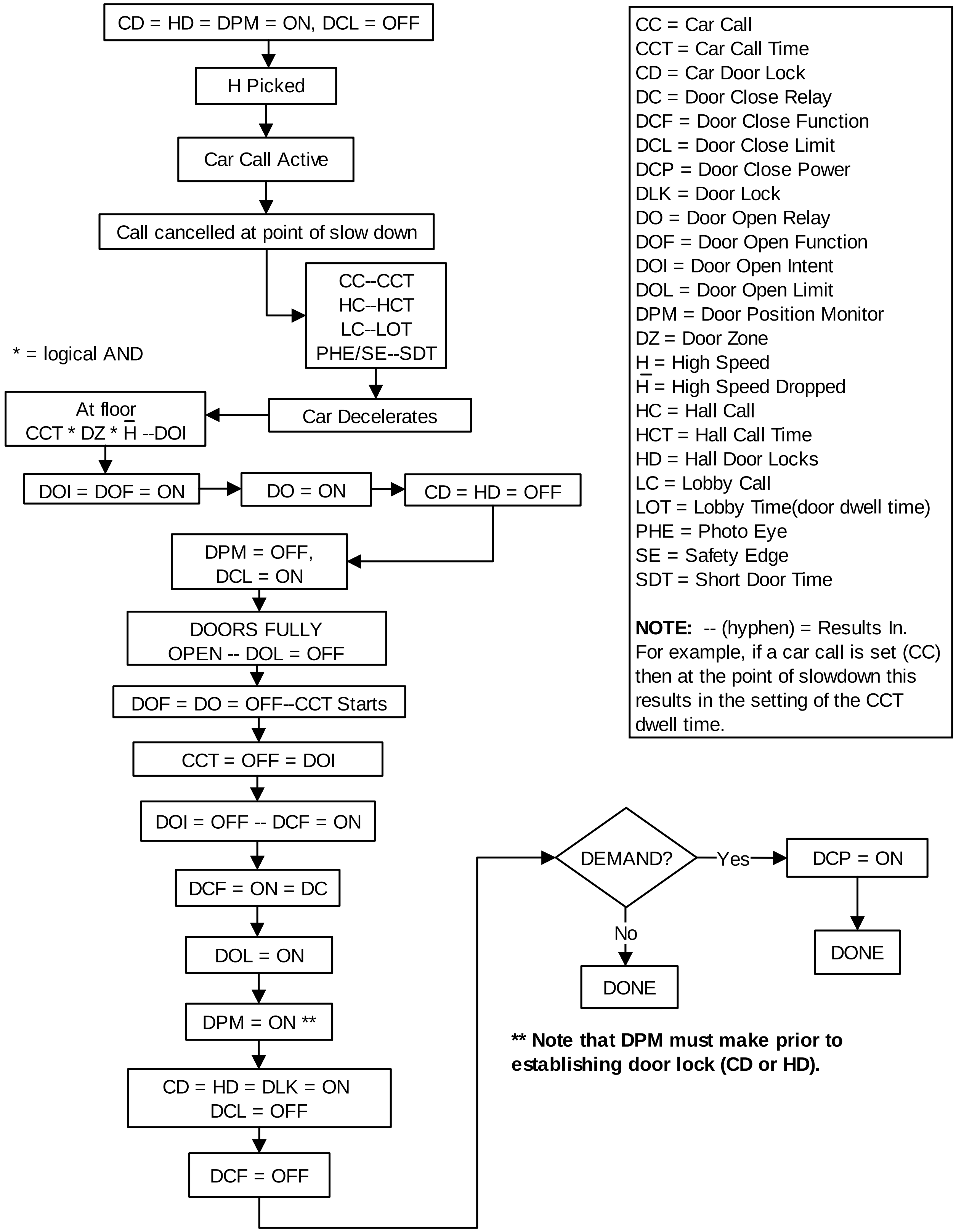
- Call demand at the current landing (or a call has just been canceled)
- Safety Edge/Door Open Button (DOB) input
- Emergency/Independent Service conditions
- Photo Eye input

When a call is canceled, one of the following door time flags should be turned ON: CCT, HCT, or LOT. When one of the reopening devices (SE or DOB) is active, the SDT flag is turned ON. When an Emergency or Independent Service condition exists, the presence of the particular condition will cause the DOI flag to be set. Some of these conditions include: Fire Service, Emergency Power operation, Independent Service, Attendant Service, etc.

Once the state of the computer flags has been determined, inspect the high voltage hardware to see if the appropriate functions are being carried out. For example, if the doors are closed and the DOI flag is set, the doors should be opening (the DO relay picked). If the doors are open and the DOI flag is cleared (turned OFF), the doors should be closing (the DC relay picked).

It is vital to determine whether or not *the control system* is doing what *its* logic determines it should be doing. If the control system is doing what the logic intended it to do, then it is important to determine how the logic came to its conclusions. If the control system is *not* doing what the logic intended it to do, then it is important to determine what is preventing the desired function from being carried out. The diagnostics on the Computer Swing Panel and/or the CRT can help determine which situation is present. The output flags will show which outputs the computer is attempting to turn ON/OFF. Compare the flags with what is actually happening in the high voltage hardware.

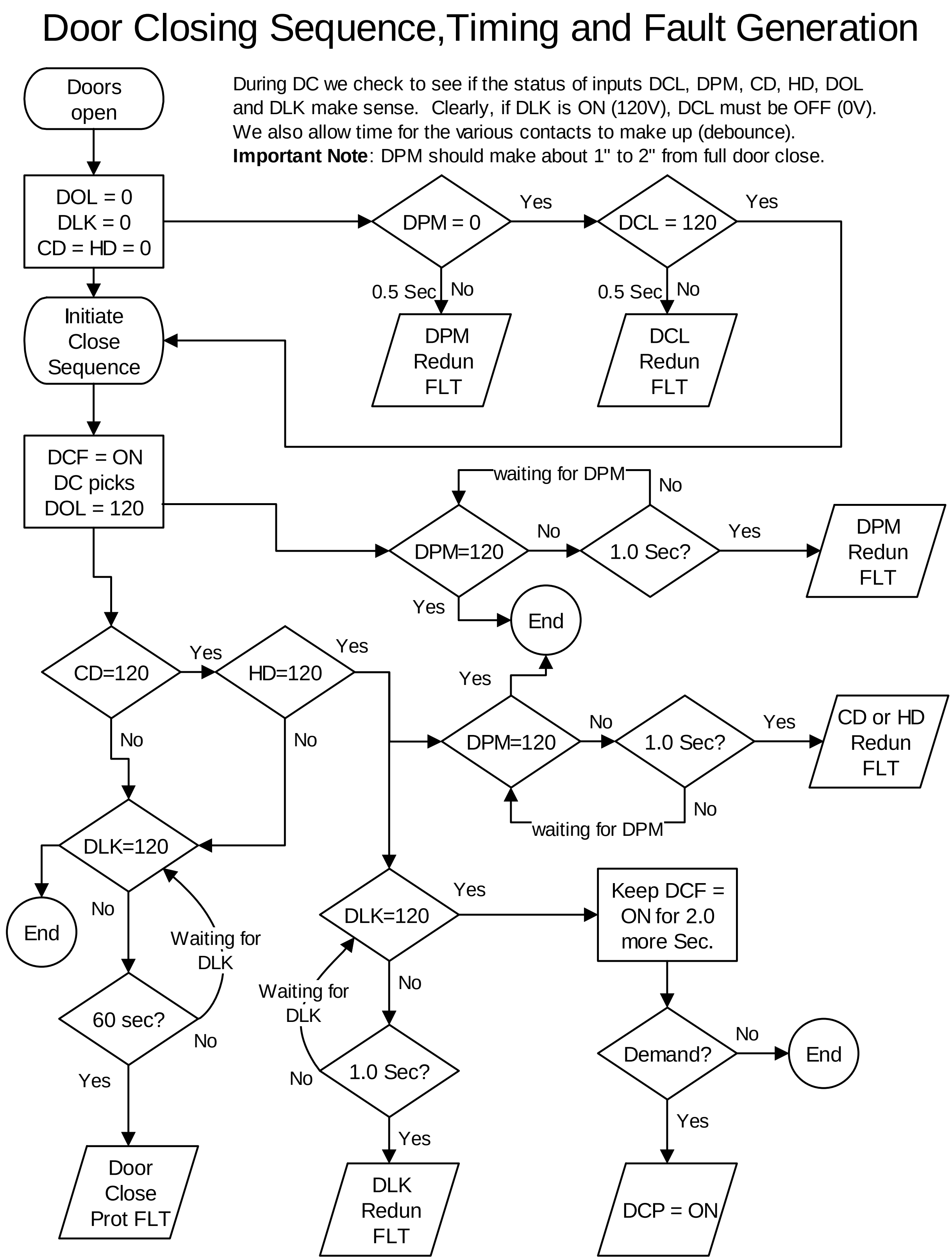
Door Sequence of Operation



CC = Car Call
CCT = Car Call Time
CD = Car Door Lock
DC = Door Close Relay
DCF = Door Close Function
DCL = Door Close Limit
DCP = Door Close Power
DLK = Door Lock
DO = Door Open Relay
DOF = Door Open Function
DOI = Door Open Intent
DOL = Door Open Limit
DPM = Door Position Monitor
DZ = Door Zone
H = High Speed
$\overline{H}$ = High Speed Dropped
HC = Hall Call
HCT = Hall Call Time
HD = Hall Door Locks
LC = Lobby Call
LOT = Lobby Time(door dwell time)
PHE = Photo Eye
SE = Safety Edge
SDT = Short Door Time

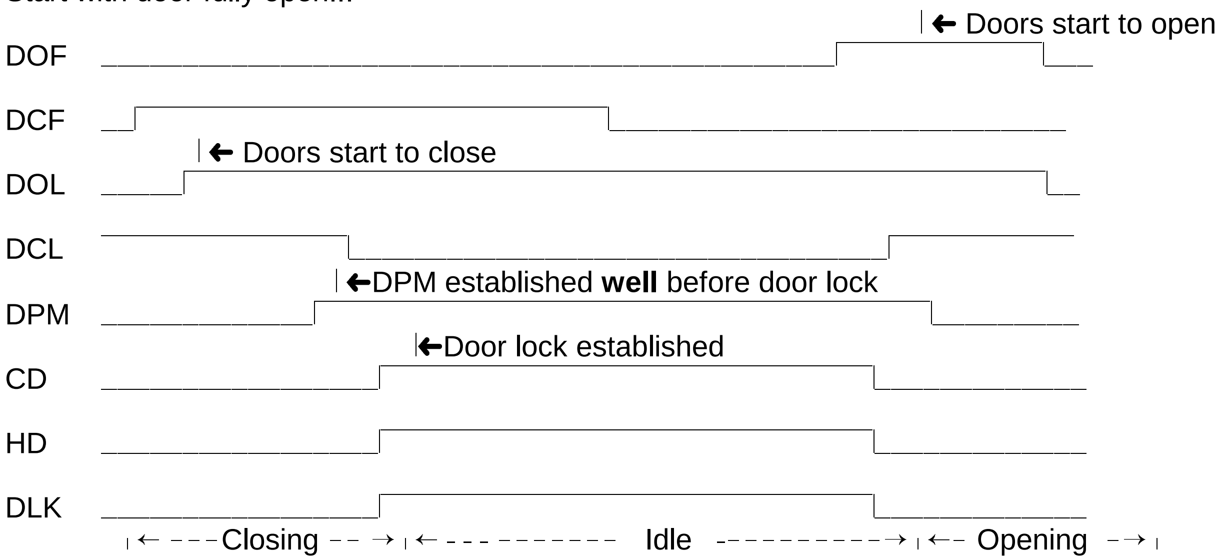
NOTE: -- (hyphen) = Results In. For example, if a car call is set (CC) then at the point of slowdown this results in the setting of the CCT dwell time.

**** Note that DPM must make prior to establishing door lock (CD or HD).**


Door Closing Sequence,Timing and Fault Generation
During DC we check to see if the status of inputs DCL, DPM, CD, HD, DOL and DLK make sense. Clearly, if DLK is ON (120V), DCL must be OFF (0V). We also allow time for the various contacts to make up (debounce).
Important Note: DPM should make about 1" to 2" from full door close.
Doors open
DOL = 0
DLK = 0
CD = HD = 0
DPM = 0
Yes
DCL = 120
Yes
0.5 Sec
No
0.5 Sec
No
DPM Redun FLT
DCL Redun FLT
Initiate Close Sequence
DCF = ON
DC picks
DOL = 120
waiting for DPM
No
DPM=120
No
1.0 Sec?
Yes
DPM Redun FLT
Yes
End
CD=120
Yes
HD=120
Yes
No
No
Yes
DPM=120
No
1.0 Sec?
Yes
CD or HD Redun FLT
No
waiting for DPM
DLK=120
End
No
Waiting for DLK
60 sec?
No
Yes
Door Close Prot FLT
DLK=120
Yes
Keep DCF = ON for 2.0 more Sec.
No
Waiting for DLK
No
1.0 Sec?
Yes
DLK Redun FLT
Demand?
No
End
Yes
DCP = ON

Door Operation Timing Diagram

Start with door fully open...



6.4.2 CALL LOGIC - NORMAL OPERATION

> **NOTE:** If the controller is equipt with the SmartLink for Car Operating Panel option, see Appendix G, *Option* SmartLink for Car Operating Panel, for troubleshooting information.

Calls are input to the system by grounding the appropriate call input, as labeled on the Call Input/Output board (Figure 6.20, HC-CI/O Call Input/Output Board Quick Reference). The act of physically grounding the call input terminal turns on the corresponding LED on the Call board. Recognition and acceptance of the call by the computer will cause the indicator to remain lit on the board. Cancellation of the call turns the indicator off. The single input/output terminal on the Call board accepts call inputs from the call fixture pushbuttons, and also serves as the output terminal illuminating the call fixtures to indicate registration of a call. This means that the field wiring is identical to that used for a standard relay controller.

The computer may intentionally block call registration. When the computer prevents car call registration, it turns ON the Car Call Disconnect flag (CCD) for that car. Inspection of this flag in the diagnostics (ADDR 2C, Diagnostic Indicator #3) will tell if the computer is preventing the acceptance of calls. If the CCD flag is ON, the reason for this condition must be discovered. CCD condition is caused by: Fire Service, motor limit timer elapsed, bottom or top floor demand, etc.

A corresponding flag exists for hall call registration prevention. The computer may detect conditions that prevent hall calls from registering, and set the Hall Call Disconnect Flag (HCDX). This is a system flag (as opposed to a per car flag) but is available for viewing in the diagnostic display along with each car's operating flags. There are many reasons for the computer to reject hall call registration: Fire service, a hall call bus problem, no available cars in service to respond to hall calls, etc.

If a call circuit becomes damaged or simply stuck ON as the result of a stuck push-button, the elevator will release itself from the stuck call automatically. If the pushbutton remains stuck, the car will stop at the floor each time it passes. Again, the computer will release itself automatically, thereby allowing continued service in the building.

6.4.3 TROUBLESHOOTING THE CALL CIRCUITS

If there is a problem with a call, first disconnect the field wire or wires from that call terminal to determine if the problem is on the board or in the hoistway wiring or fixtures. Disconnect the calls by unplugging the terminals, or removing individual wires. If the individual field wire is disconnected, lightly tighten the screw terminal since it may not make contact if an attempt is made to ground the terminal using a jumper when the screw on the terminal is loose.

NOTE: Call terminal voltage must be ≥ 85% of call supply voltage.
Example: If supply is 100VAC, terminal voltage may be 85VAC to 100VAC. 80VAC is insufficient.

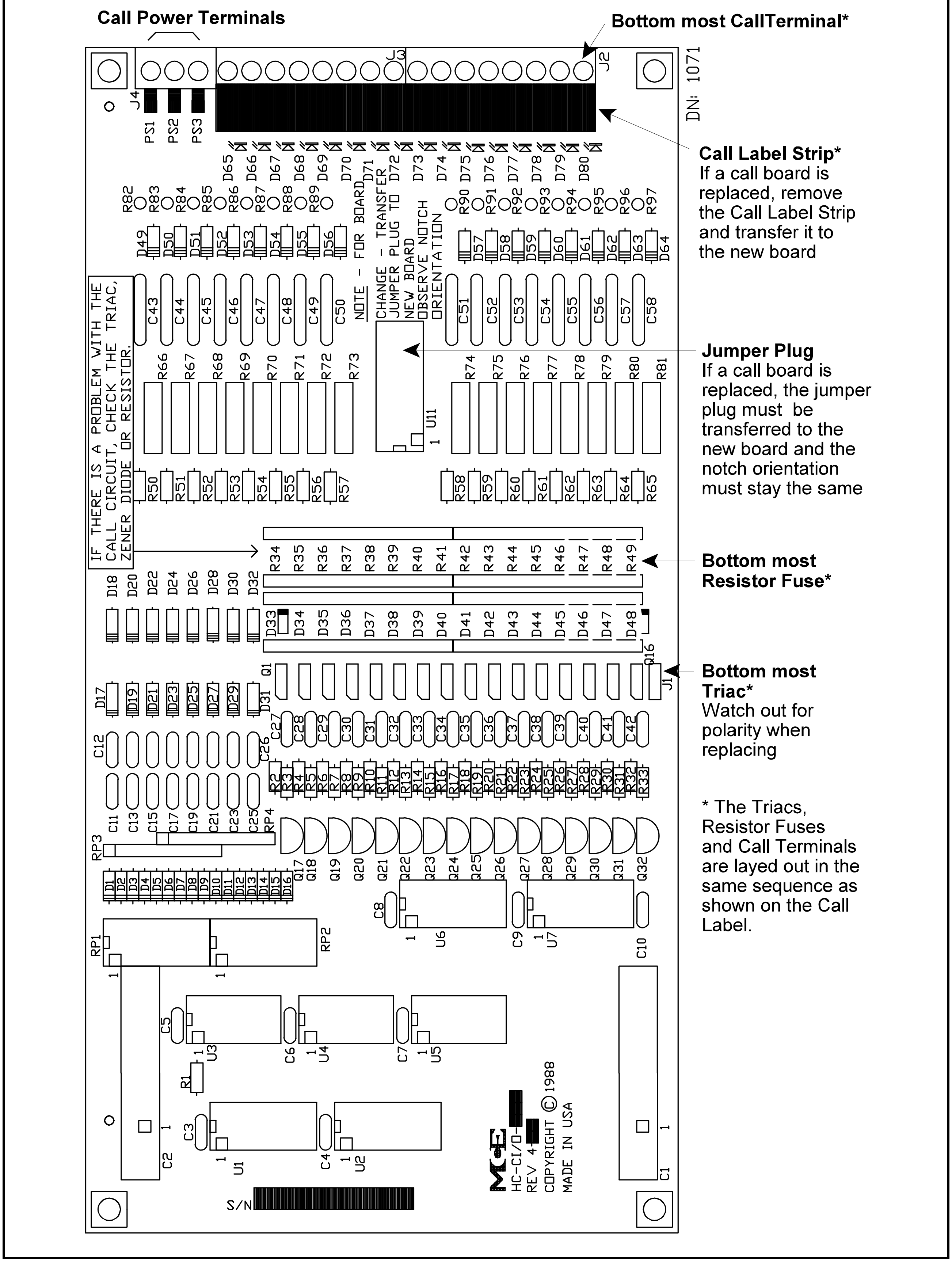
TABLE 6.5 Call Board Troubleshooting

Problem	Recommended steps to resolve the problem
Call Terminal Voltage is insufficient	1. Turn OFF the power and remove the resistor fuse associated with that terminal. 2. Turn ON the power and check terminal voltage again. 3. If no voltage is present on the terminal: a. Check the jumper plug (header) on the HC-CI/O Call board. The jumper plug socket is located on the right hand side near the call indicators. If a Call board is replaced, this jumper plug must be transferred to the new board and stay in the same board position (more than one Call board on the controller). b. Verify that the correct incoming power is on terminals marked PS1, PS2 and PS3. NOTE: Power will exist on *at least one* and possibly more of these terminals.
Call LED is ON even though the field wire is removed	1. Reset the computer (Computer Reset pushbutton on Swing Panel). 2. Run the car to the nearest landing to reset PI. 3. It may be necessary to reset the computer in the Group Supervisor in order to reset a latched hall call. 4. If the call does not cancel under these conditions--replace the call board
Cannot register a hall call at the call board	To discover whether the problem is with the call board or the field wiring: 1. First remove the resistor fuse and disconnect the field wire(s). 2. Verify that the HCDD, Hall Call Disconnect Computer Variable Flag is OFF (Address 2C, LED 6). 3. Verify that there is proper voltage on the call terminal. 4. Register a call by shorting the call terminal to terminal 1 or GND and verify with EOD as described in Section 5.4.3, *Viewing and Entering Calls* (the call registered light on the call board may not work correctly). 5. If the call does not register under these conditions--replace the call board. 6. If the call circuit works with field wires removed, before connecting wires, jumper the wire(s) to ground or terminal 1 and press the call pushbutton. If a fuse blows, there is a field wiring problem. If connecting the call wires causes a problem, the call board may be damaged.
Call remains latched even though the car arrives at that landing	Remove the associated resistor fuse. If the call cancels, replace the bad resistor fuse.

FIGURE 6.20 HC-CI/O Call Input/Output Board Quick Reference

42-QR-HC-CI/O Rev. 2

HC-CI/O QUICK REFERENCE CARD (BOARD 2)



6.4.4 TROUBLESHOOTING THE CALL INDICATORS

When working correctly, a call indicator glows brightly when a call is registered and glows dimly or not at all when a call is not registered.

NOTE: Before troubleshooting the call indicators, ensure that the call circuit is working correctly, the field wires are connected and the resistor fuses are plugged in. If the board is arranged for neon (or LED) indicators (HC-CI/O-N), the board indicators are not affected by the fixture bulbs.

TABLE 6.6 Call Indicator Troubleshooting

Problem	Recommended steps to resolve the problem
With a call registered, the Call Indicator is dimly lit (Call Board is HC-CI/O)	Incandescent bulb in the fixture for the call is burned out or missing. Replace the bulb.
Indicator glows bright whether or not there is a call registered	Bad triac or triac driver transistor. Check triac with power OFF and field wire removed. Failed triac usually measures a short circuit from the metal back (collector) to terminal 1. If board is not in system, measure short between metal back and pad area around mounting hole. Be careful, the metal back of the triac is connected to AC when power is ON. NOTE: bottom triac corresponds to bottom terminal.

6.5 PC BOARD QUICK REFERENCES

This section contains a quick reference for the PC boards found in the typical VFMC-1000 Series M controller. They are as follows:

- Standard Board Layout . . . . Figure 6.21
- MC-MP2 Main Processor Board Quick Reference . . . . Figure 6.22
- HC-PI/O Power Input/Output Board Quick Reference . Figure 6.16 in Section 6.4.1
- HC-CI/O Call Input/Output Board Quick Reference . . . Figure 6.20 in Section 6.4.2
- MC-CGP-4 Communication Processor Board Quick Reference . . . . Figure 6.23
- MC-RS Communication Interface Board Quick Reference . . . . Figure 6.24
- SC-SB2K Main Safety Relay Board . . . . Figure 6.25
- SC-HDIO High Density I/O Board . . . . Figure 6.26
- SC-BASE Lock Bypass, Access, Overspeed, Emergency Brake Bd . . . Figure 6.27
- SC-BASER Lock Bypass, Access, Overspeed, Emergency Brake board with Rear Doors . . . . Figure 6.28
- HC-ACI-D Drive Interface Board Quick Reference . . . . Figure 6.29
- HC-ACIF Additional Drive Interface Board . . . . Figure 6.30

FIGURE 6.21 Standard Board Layout

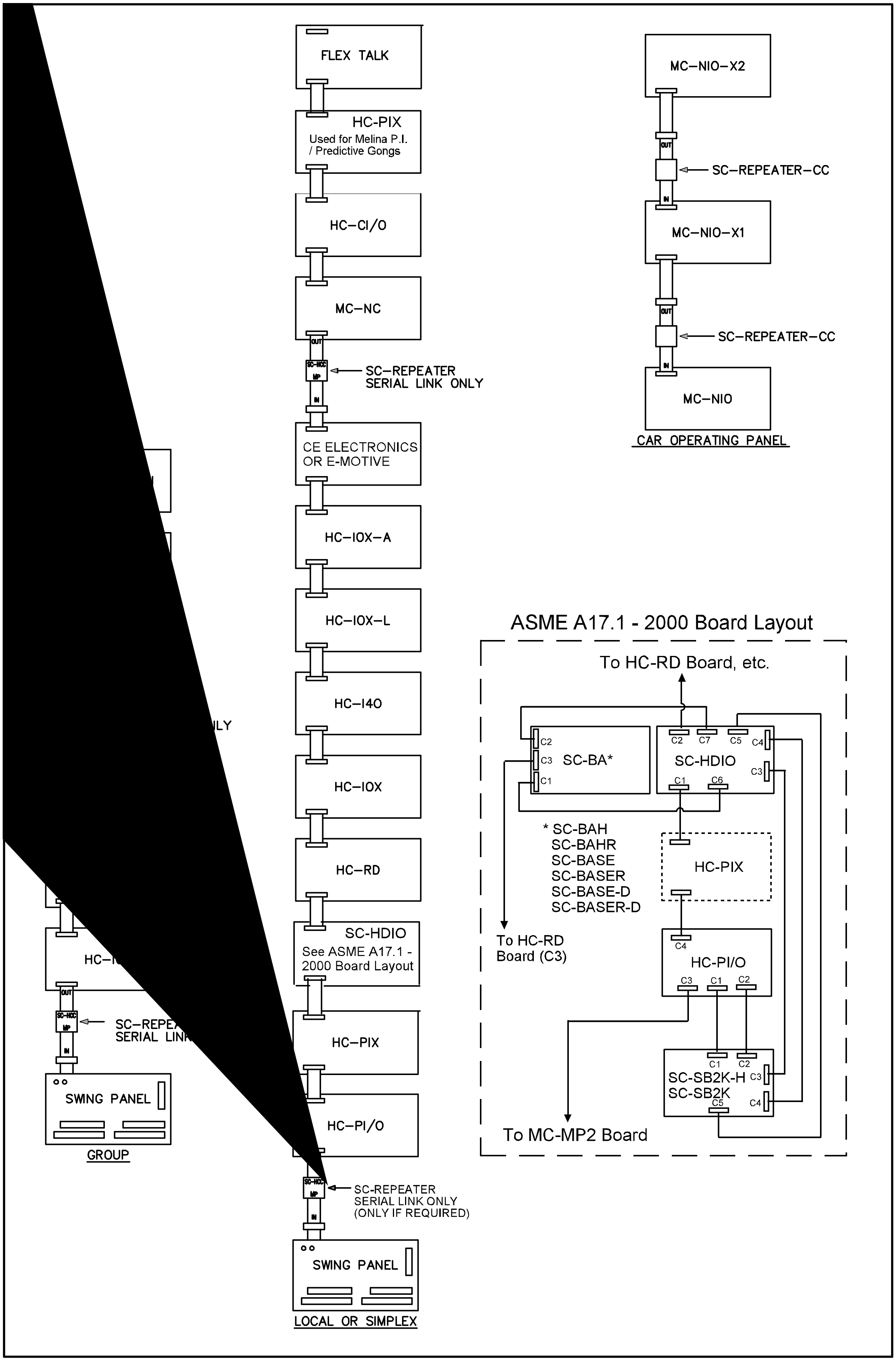
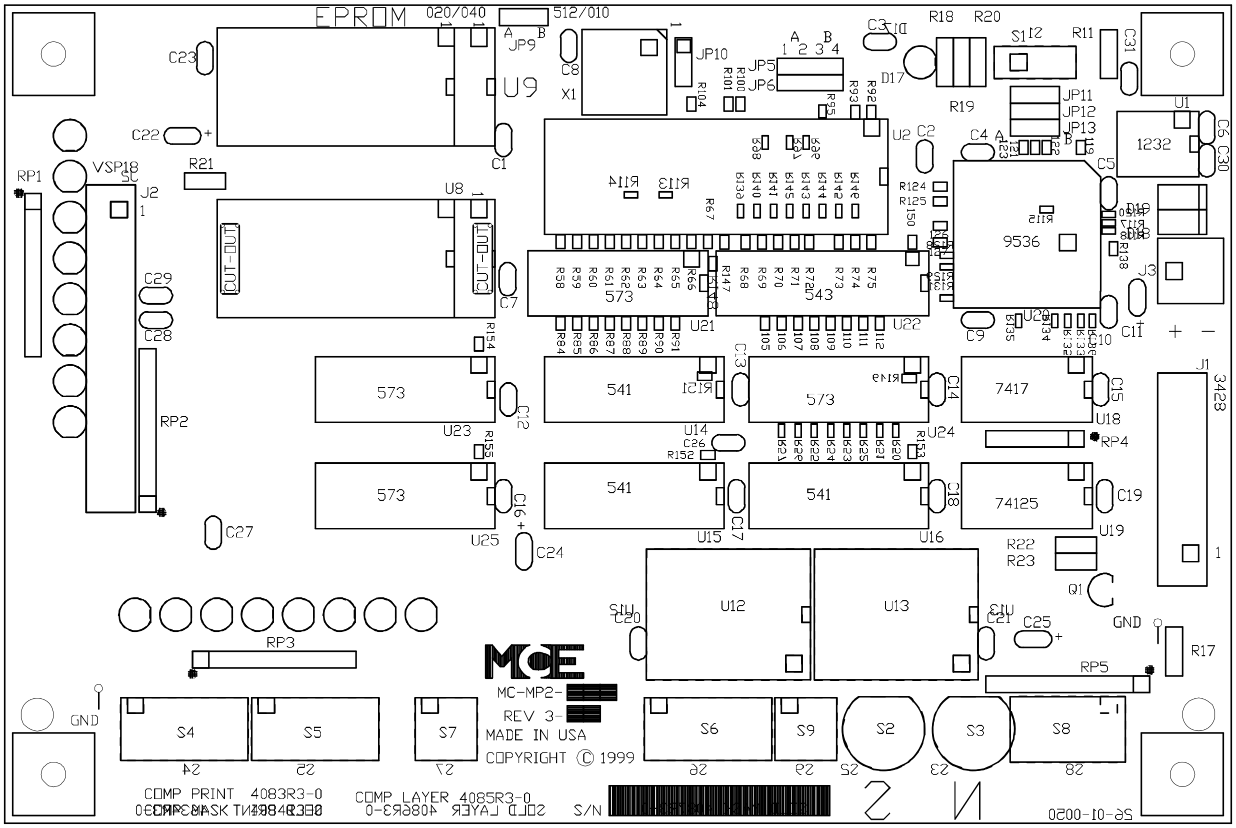


FIGURE 6.22 MC-MP2 Main Processor Board Quick Reference

42-02-MC-MP2-2K **MC-MP2-2K QUICK REFERENCE**

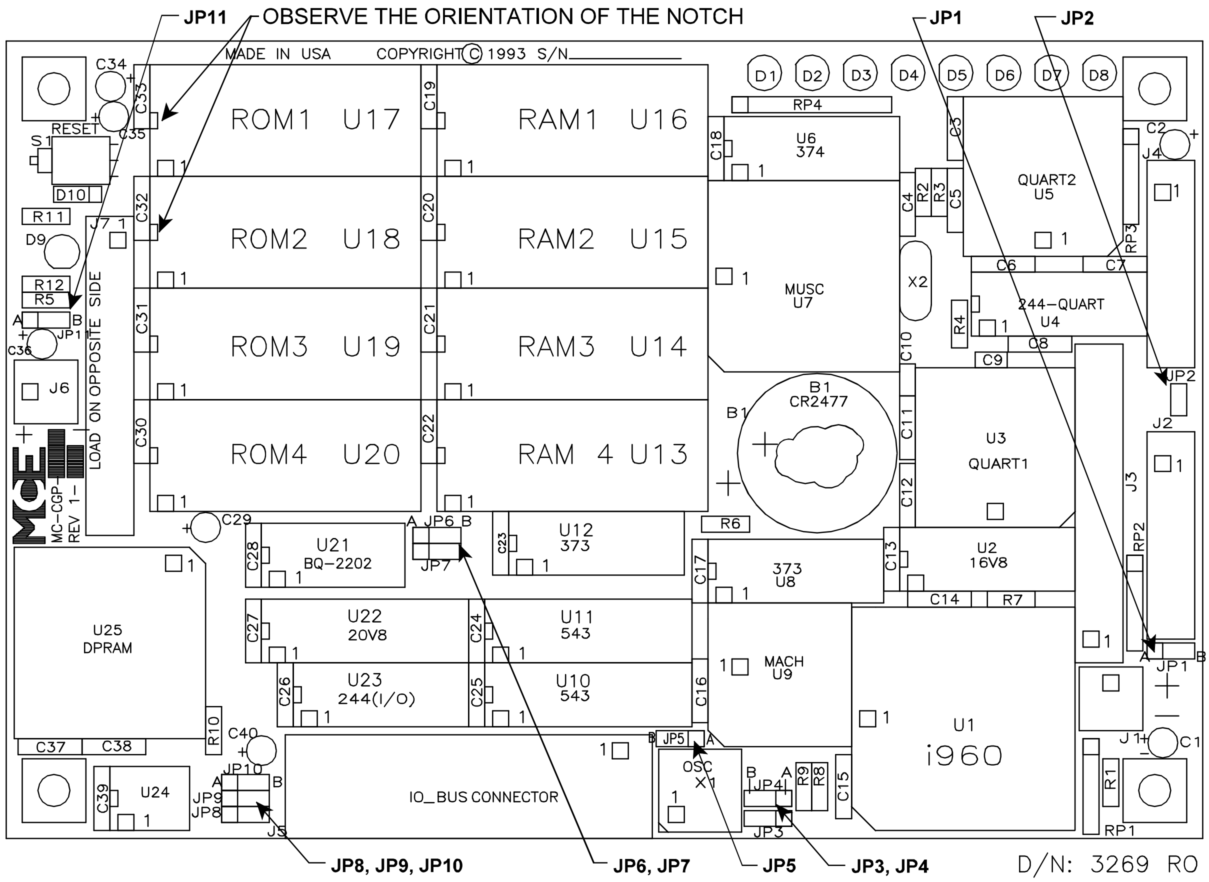


JUMPER	TYPICAL SETTING	DESCRIPTION
JP5	see Description	N/C = Car Controller A pins 1 & 2 = M3 Group Supervisor
JP6	N/C	Jumper not loaded
JP9	A	A = 27C020 or MC27C2001 EPROM B = 27C512, 27C010 or MC27C1001EPROM
JP10	N/C	Jumper not loaded
JP11	A	A = SRAM A16 Bank select enabled, B = Bank select disabled
JP12	A	A = ROM A17 Bank select enabled, B = Bank select disabled
JP13	A	A = ROM A16 Bank select enabled, B = Bank select disabled

FIGURE 6.23 MC-CGP-4 Communication Processor Board Quick Reference

42-QR-MC-CGP Rev 3

MC-CGP-x QUICK REFERENCE CARD



JUMPER TABLE

JUMPER	CGP	CGP-4 CGP-8	DESCRIPTION
JP1	A	A	Communication Clock Rate: set to A if JP4 = B, set to B if JP3 = A or B or if JP4 = A.
JP2	ON	ON	Master Clock Rate: ON = Enabled, N/C = Disabled. Set to ON if JP4 = B. Set to N/C if JP3 = A or B or if JP4 = A.
JP3	N/C	N/C	Communication Clock: A = 16 MHz, B = 4 MHz (if JP3 = A or B, JP4 must = N/C).
JP4	B	B	Communication Clock: A = 8 MHz, B = 2 MHz (if JP4 = A or B, JP3 must = N/C).
JP5	B	B	This jumper relates to the I/O Bus Connector (J5), which is currently not used. I/O Connector J5 Pin 38 function: A = i960 Interrupt INT3# input, B = IO_CS1# output.
JP6	B	B	EPROM Size (27Cxxx): set to A for xxx = 512, set to B for xxx = 010, 020, 040 or 080.
JP7	A	A	Off Board Reset Signal: A = Enabled, B = Disabled.
JP8	A or hard wired	A or hard wired	EPROM Size (27Cxxx): set to A for xxx = 010, 020, 040 or 080, set to B for xxx = 512.
JP9	B	B	EPROM or Flash Memory: A = Flash, B = EPROM.
JP10	B	B	EPROM or Flash Memory: A = Flash, B = EPROM.
JP11	B or hard wired	B or hard wired	SRAM Size (68xxx): set to A for 1Mb SRAM, set to B for 4Mb SRAM.

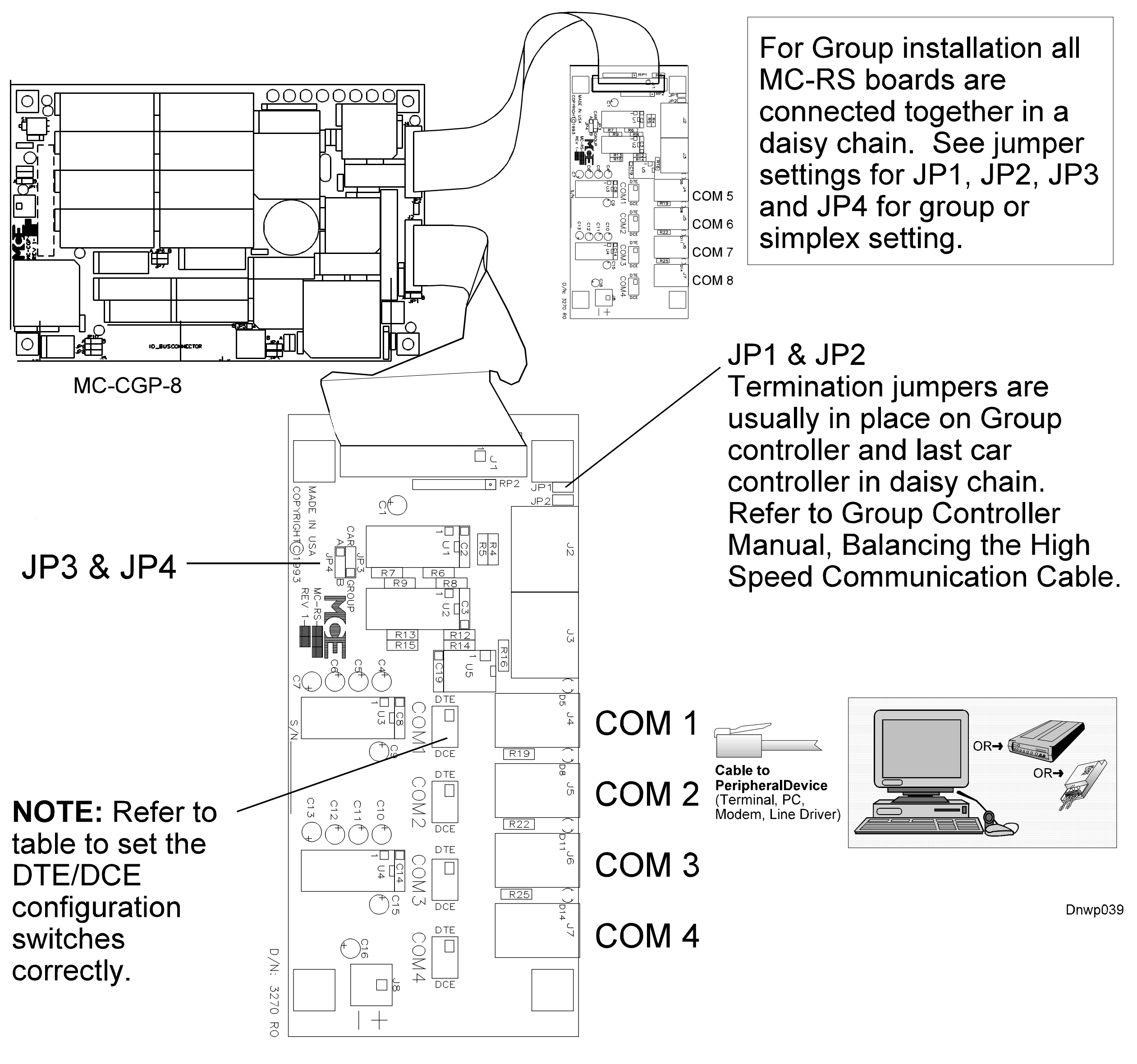
FIGURE 6.24 MC-RS Communication Interface Board Quick Reference

42-QR-MC-RS Rev.3

MC-RS QUICK REFERENCE CARD

MC-RS COM Port Toggle Switches

Port Switch Setting	Cable Connects to
DCE	CRT Terminal or PC
DTE	Line Driver or Modem

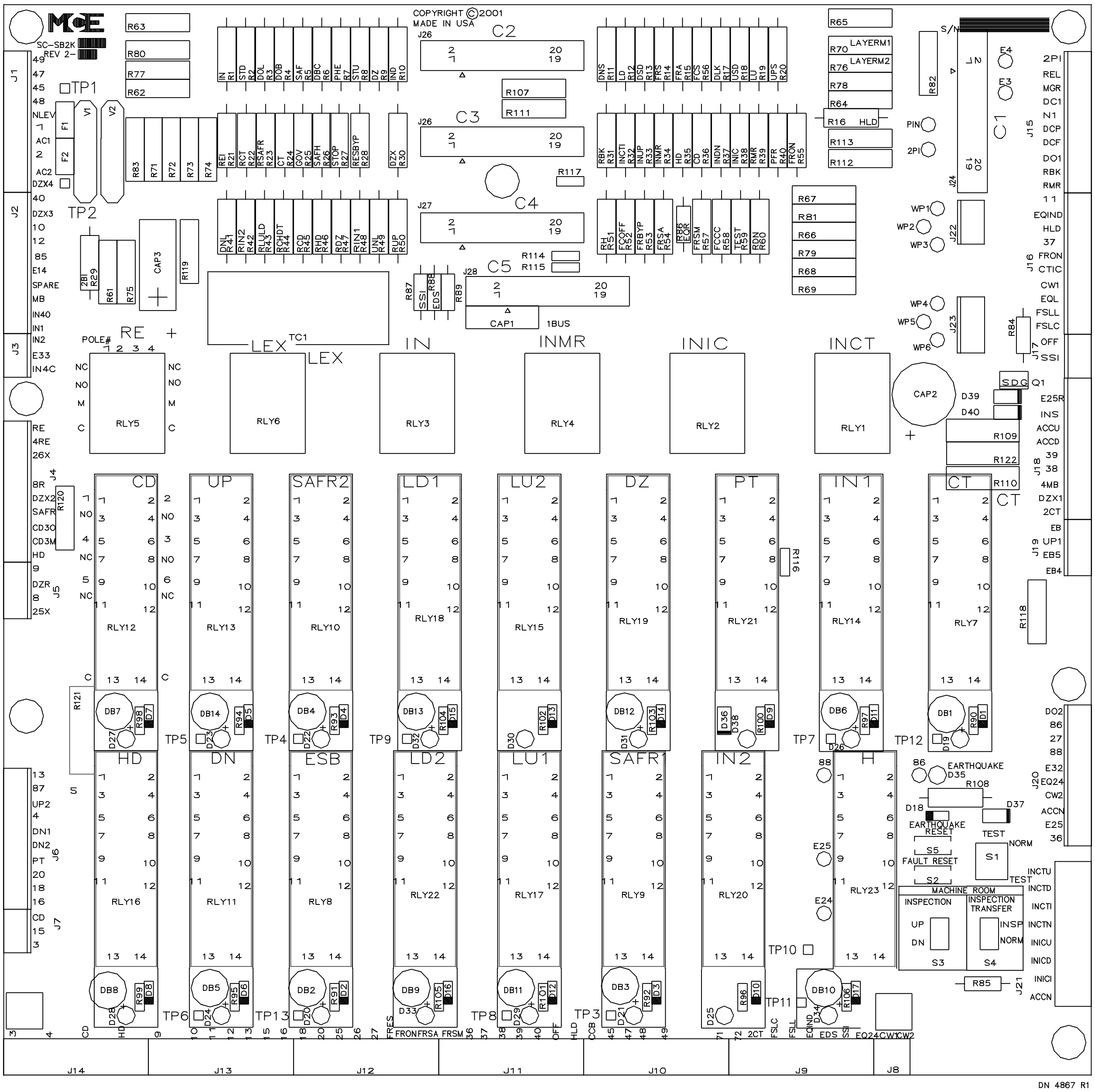


Jumper	Setting	Description
JP3	Car	Setting for car controllers (Simplex or Local).
	Group	Setting for Group controller. **Only the Group MC-RS board should be set to Group.**
JP4	B	Set to B on all car controller MC-RS boards.
	B	Set to B on the Group controller MC-RS board.

FIGURE 6.25 SC-SB2K Main Safety Relay Board Quick Reference

42-QR-SC-SB2K Rev. 2

SC-SB2K QUICK REFERENCE



INDICATORS	TROUBLESHOOTING TEST POINTS		
Earthquake:	CT: TP1 and TP12	IN1, IN2: TP7 and TP2	H: TP1 and TP11 and TP10 and screw terminal 11
SWITCHES	ESB: TP1 and TP13	LU1, LU2: TP8 and TP2	EB1: TP1 and TPEB1
Earthquake Reset Pushbutton:	SAFR1: TP1 and TP3	LD1, LD2: TP9 and TP2	EB2: TP1 and TPEB2
Fault Reset Pushbutton:	SAFR2: TP1 and TP4	CD: TP1 and TP12, with CD and TP2	CTIC: terminal INCTI and TP2
Machine Room Inspection Transfer INSP/NORM:	UP: TP1 and TP5	HD: TP1 and TP12, with HD and TP2	TAB: TP1 (fused 1-bus) and TPAB, with TAB and TP2
Machine Room Inspection Up/Dn:	DN: TP1 and TP6	CHDT: terminal 9 and TP2	BAB: TP1 (fused 1-bus) and TPAB, with BAB and TP2
Machine Room Inspection Up/Dn:	DN: TP1 (fused 1-bus) and TP6	PT: terminal 9 and TP2 (fused 2-bus)	BAB: TP1 (fused 1-bus) and TPAB, with BAB and TP2 (fused 2-bus, 120VAC)

FIGURE 6.26 SC-HDIO High Density I/O Board Quick Reference

42-QR-SC-HDIO

SC-HDIO QUICK REFERENCE

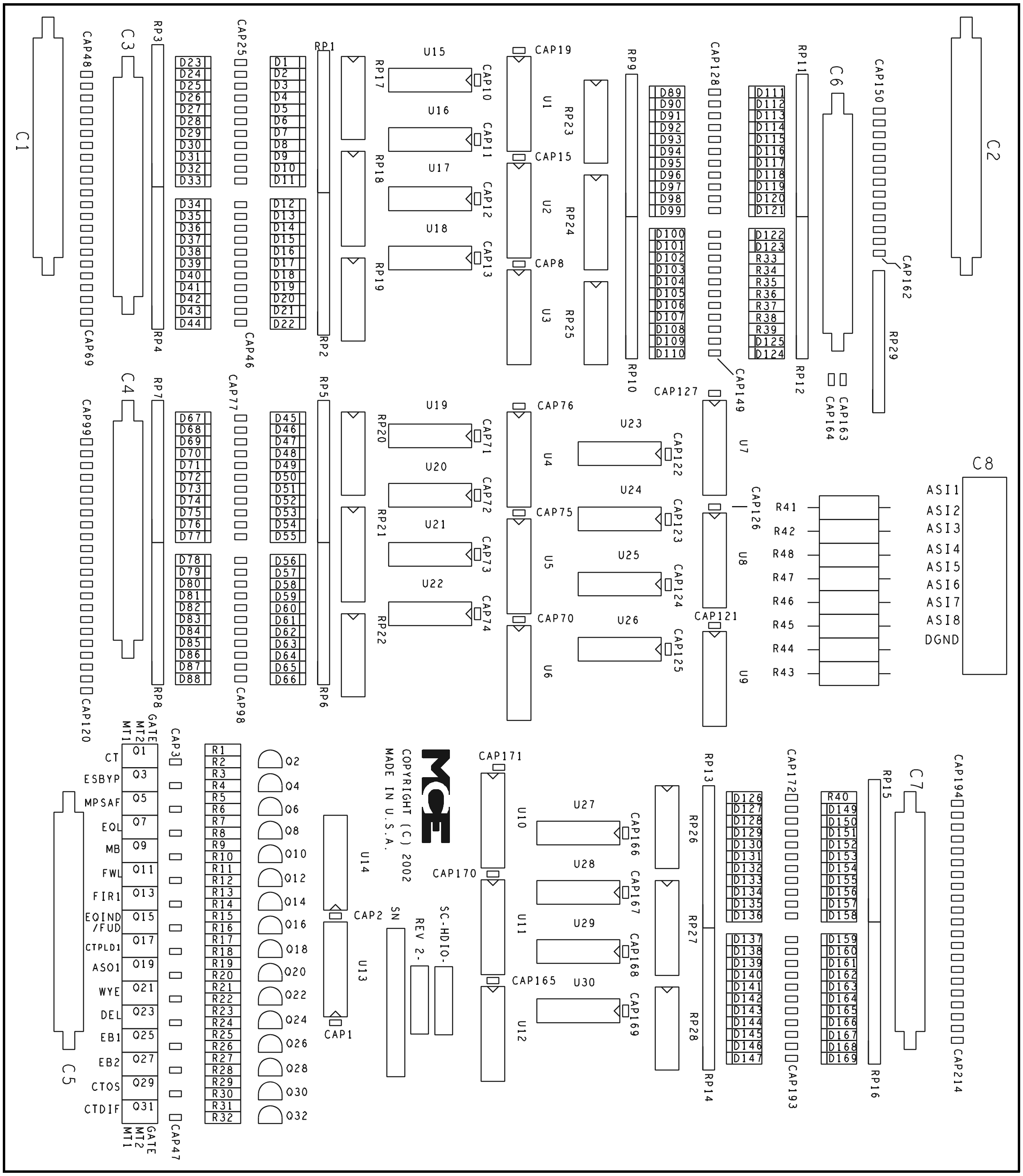
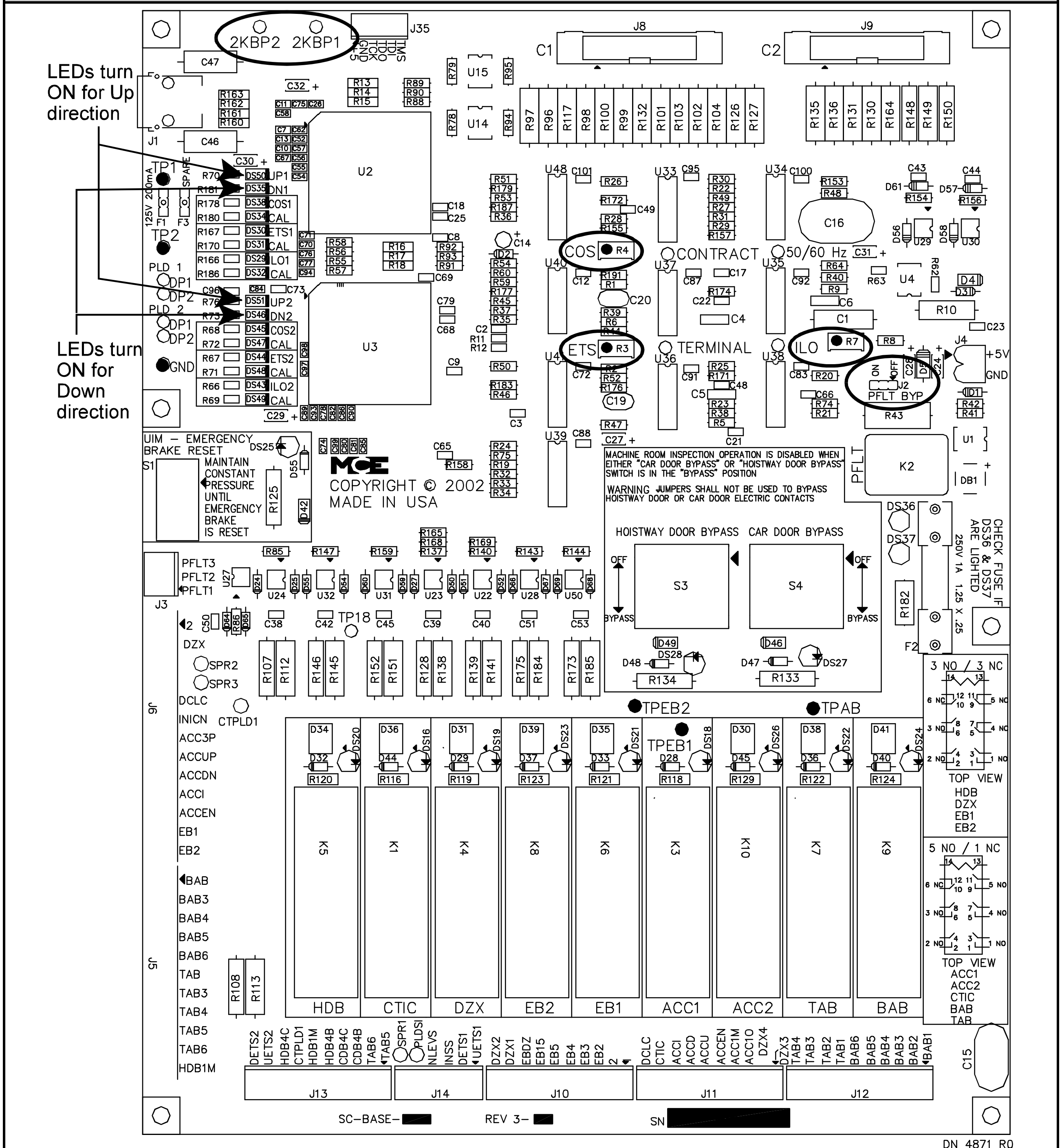


FIGURE 6.27 SC-BASE Board Quick Reference

42-QR-SC-BASE Rev. 2

SC-BASE QUICK REFERENCE

Board 64



JUMPERS
2KBP1, 2KBP2, PFLT BYP - Used when performing the buffer and overspeed tests.

SWITCHES	TRIMPOTS	
Emergency Brake Reset	COS	Contract Overspeed - **Not used, set fully CW**
Car Door Bypass Switch	ETS	Emergency Terminal Limit Speed (CW raises threshold)
Hoistway Door Bypass Switch	ILO	Inspection Leveling Overspeed (CW raises threshold)

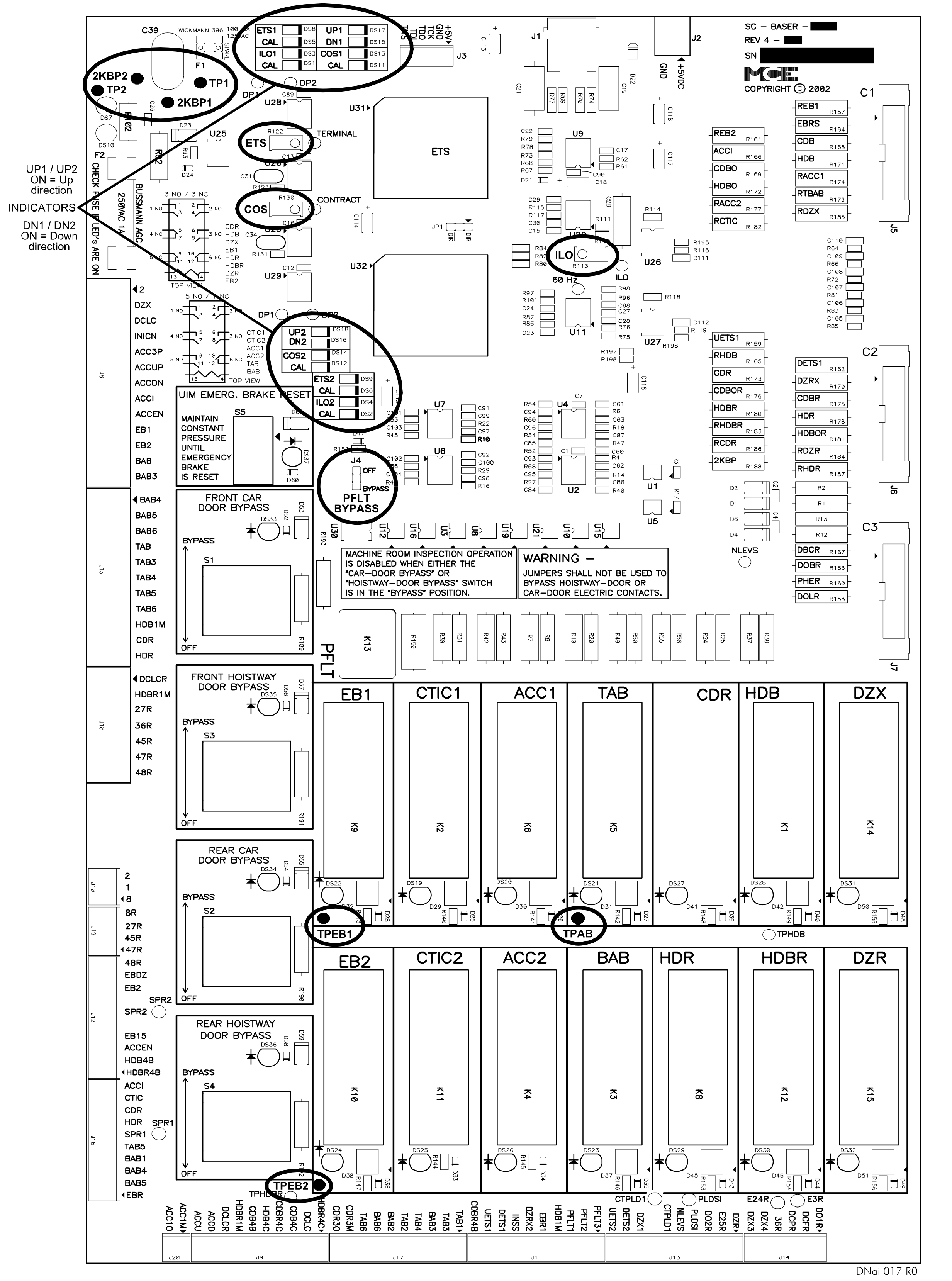
INDICATORS			
UP1 - UP2	ON = Up direction	ETS1 - ETS2	ON = Emergency Terminal Overspeed
DN1 - DN2	ON = Down direction	ILO1 - ILO2	ON = Inspection Leveling Overspeed
COS1 - COS2	ON = Contract overspeed		

FIGURE 6.28   SC-BASER Board Quick Reference

42-QR-SC-BASER Rev. 2

SC-BASER QUICK REFERENCE

Board 66



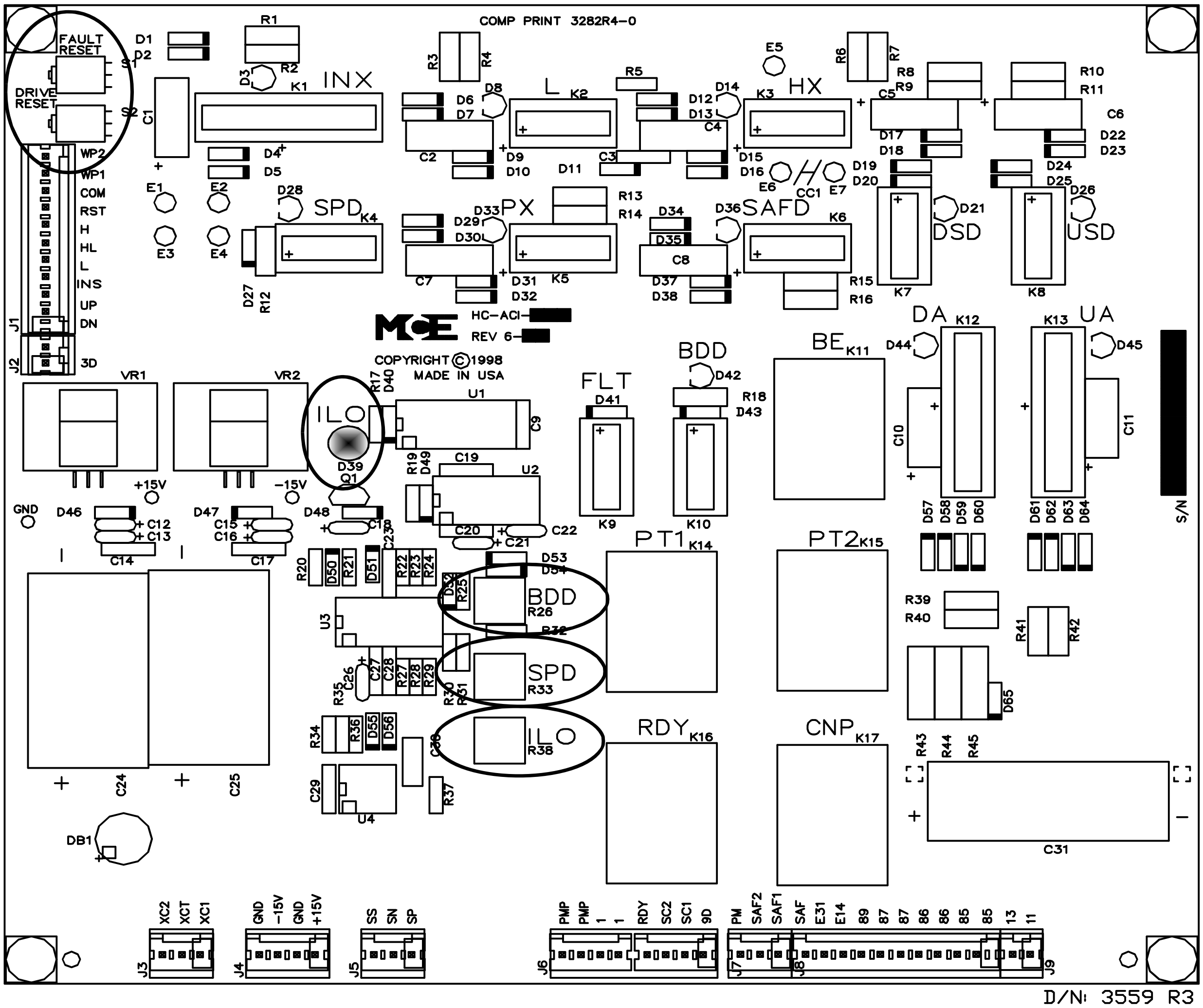
See SC-BASE Quick reference for a description of switches, jumpers, test points and settings.

FIGURE 6.29 HC-ACI AC Drive Interface Board Quick Reference

42-QR-HC-ACI

HC-ACI QUICK REFERENCE

BOARD 51



SWITCHES	
Falt Reset	If the ILO indicator is ON, this push button turns the indicator OFF and drops out the FLT relay.
Drive Reset	This pushbutton resets VFAC drive faults.

INDICATOR	
ILO	Inspection Leveling Overspeed - Turns ON when the car speed exceeds the threshold set by the ILO trimpot. **Not used on ASME A17.1-2000 compliant controllers**

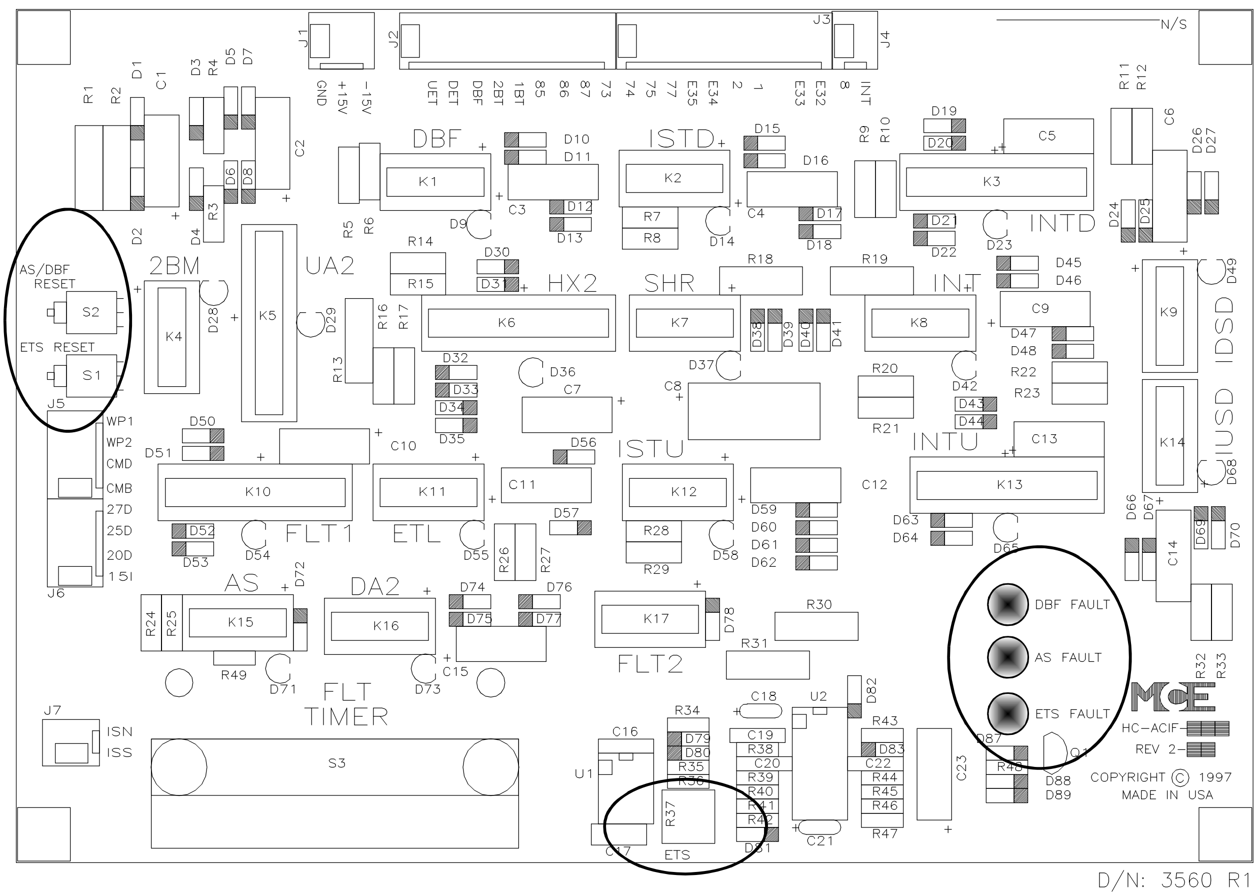
TRIMPOTS	
BDD	Brake Drop Delay - CW increases delay (fully CCW = 0.1 sec., fully CW = 0.7 sec.)
SPD	Speed Pick Delay - CW increases delay (fully CCW - .002 sec., fully CW = 0.450 sec.)
ILO	Inspection Leveling Overspeed - CCW sets the speed threshold higher. **Not used on ASMEA17.1-2000 compliant controllers** - Set the ILO trimpot on the HC-ACI board fully CCW. Use the ILO trimpot on the SC-BASE or SC-BASER board to adjust the ILO speed threshold.

FIGURE 6.30 HC-ACIF Additional Flux Vector Drive Interface Board Quick Reference

42-QR-HC-ACIF

HC-ACIF QUICK REFERENCE

BOARD 52



SWITCHES

AS/DBF Reset	Resets the At Speed Fault (AS) and/or the Dynamic Braking Fault (DBF).
ETS Reset	Resets the Emergency Terminal Switch Fault (ETS).

TRIMPOT

ETS Emergency Terminal Switch speed threshold adjust - (CW sets the speed threshold higher)

Not used on ASME A17.1-2000 compliant controllers. - Set the ETS trimpot on the HC-ACIF board fully CW. Use the ETS trimpot on the SC-BASE or SC-BASER board to adjust the ETS speed threshold.

INDICATORS

ETS Fault Emergency Terminal Switch overspeed Fault - Turns on when the car speed exceeds the threshold speed set by the ETS trimpot.

Not used on ASME A17.1-2000 compliant controllers.

AS Fault At Speed Fault - Turns on if the car speed exceeds the maximum or minimum limits set for contract speed. Increase the speed error threshold to desensitize this fault, provided that the Speed Proportional Gain is set correctly:

G5 / GPD515 Drive - verify / adjust L4-01 and L4-02

HPV 900 Drive - verify / adjust A1 Drive parameters “Spd Dev Lo Level” and Spd Dev Time”

TORQMAX - verify / adjust LF.58 and LF.59

DBF Fault Dynamic Braking Fault - Turns on if the dynamic braking temperature exceeds its threshold.

6.6 TROUBLESHOOTING THE G5 / GPD515 AC DRIVE

The VFAC drive's digital operator display must read as follows during power up: Frequency reference U1-01=0. If any fault or problem is detected, then turn off the power and refer to the *Alarms and Fault Displays* section of the EMS/Yaskawa AC Drive Manual.

6.6.1 CAR DOES NOT MOVE ON INSPECTION

NOTE: The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that contactors PM (Main) and BR (Brake) pick when the direction relays, U1 and U2 or D1 and D2, are picked). If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 9, 10 and 12 on the SC-SB2K Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays CNP and RDY should also be picked.

2. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded Hz (Parameter D1-09 value), and the DRIVE and FWD or REV indicator should turn ON when direction is picked on Inspection. If this is not true then check the following:

   a. Verify that the CNP, RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

   b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 15VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

      If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

Parameter	Description	Setting value
A1-02	Control method selection	0 = V/F control 3 = Flux Vector
B1-01	Reference selection	0 = Operator
B1-02	Run source	1 = Terminals
B1-03	Stopping method	0 = Ramp to stop.
C1-01	Acceleration time	1.0 - 3.0 Setting described in Section 4.2.2
C1-02	Deceleration time	1.0 - 3.0 Setting is described in Section 4.2.2
D1-09	Inspection (Jog reference) Hz	4 -10 Hz or as described in Section 4.2.1
E1-01	Input voltage	Drive input voltage.
E1-03	V/F pattern selection	F - User defined pattern
E1-04 to E1-10	V/F pattern voltage at different points.	Should be according to MCE setting, but verify them.
E2-01	Motor rated FLA	Motor name plate value
E2-02	Motor rated slip frequency	Should be according to MCE setting, but verify. Ref. to the drive parameter sheet or the drive manual which explain how to calculate parameter E2-02.
E2-03	Motor rated No load current	Normally (30 - 40) % of Motor Full load current.
H1-06	Inspection (Jog reference)	6

If the parameters are set at the correct values and the car still does not move, call MCE Technical Support.

6.6.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
D1-02	High speed reference	60 Hz or as described in Section 4.3.4
H1-03	Terminal 5 select	80 (Mult -step spd 1F) for high speed input.

The D1-02 and H1-03 parameters are for High speed selection. When the H relay on the SC-SB2K board is picked, the HX relay on the HC-ACI should also pick. If parameter D1-02 is set at 60Hz then the drive keypad should display 60Hz and the DRIVE, FWD or REV indicator should be illuminated. If not, verify that the voltage between the COM and H terminals on the HC-ACI board are zero when the H relay is picked. Also check the wiring between the SC-SB2K board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.6.3 CAR OVERSHOOTS OR THE DRIVE TRIPS "OVER VOLTAGE" ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Adjust the ACC (Drive parameter C1-01, C1-07) and increase acceleration time.

2. Verify that parameter E2-02 and D1-02 are set correctly. Adjust parameter P1-14 if required as described in section 4.2.3 and Figure 4.1. For Flux Vector applications adjust the gain parameters as described in Section 4.3.4 (g).

3. Turn the power OFF and wait for at least 5 minuets so that the DC BUS voltage is not present in the dynamic braking circuit. Verify this by using a multi-meter to check the fuse, the value of the resistance, and to check for any open or loose connections in the dynamic braking circuit. Verify the voltage jumper setting inside the braking unit. If MCE's ACBU-L50 or ACBU-L75 braking unit is provided, then the jumper must be set at a value 10 volts less than the incoming AC line voltage to the drive unit. If Yaskawa's braking unit is provided, then the voltage selector jumper should be set to the same value as that of incoming AC line voltage to the drive unit.

NOTE: Refer to Section 4.3.5 b. for more details regarding over-voltage trip.

6.6.4 DRIVE TRIPS "OVER VOLTAGE" OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.6.3 items 2, 3 and the counter weight are set properly.

2. Verify that parameters D1-03 (High Level speed), D1-05(Level speed) and D1-07 (Intermediate speed if required) are set as described in section 4.2.1. Verify that parameters H1-04, H1-05 are set according to the drive parameter sheet.

3. Adjust the deceleration time (Parameter C1-02, C1-08) and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed. A very low leveling speed (less than 7 fpm) might cause this overshoot problem. These speed settings are very sensitive and should be adjusted in small increments (0.01) and carefully.

4. A value that is too high in a deceleration S-curve parameter (P1-18, P1-11, P1-10, P1-07 or P1-06) can cause the car to overshoot and relevel.

5. The coordination of the dropping of the brake and DC injection is very critical. The dropping of the brake is adjusted by trimpot BDD on the HC-ACI board and the DC injection is adjusted by the drive parameters B2-01, B2-02, and B2-04. Refer to drive parameter sheet for the correct settings. Increasing B2-02 will increase the DC injection current and you might start hearing a humming noise from motor before the car stops and brake drops.

NOTE: Refer to Section 4.3.5 b. for more details regarding over-voltage trip.

6. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these two floors at high speed and stop the car properly.

6.6.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED - CLOSED LOOP SYSTEM ONLY (FLUX VECTOR APPLICATIONS)

For a closed loop system, if there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters C5-01 and C5-02 are set very high? The default settings are C5-01= 20 and C5-02 = 0.2.

2. Is the Motor Slip parameter E2-02 set correctly?

3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.6.6 OSCILLATIONS IN THE CAR - OPEN LOOP SYSTEM

For open loop systems, if there are oscillations in the car, check the commanded speed input to the drive unit. Verify the motor slip parameter (E2-02) and the Slip Compensation Gain parameter (C3-01).

6.6.7 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameter L5-01=1 and parameter L5-02 = 0.

6.6.8 ALARMS AND FAULTS

The *Alarms & Fault Displays* section in the EMS/Yaskawa AC Drive manual explains the fault conditions, and suggests corrective actions to be taken if the AC Drive malfunctions. There are some faults which are not listed in the drive manual, such OPE40 AND OPE41, which are described in Table 6.7.

AC Drive Alarms & Faults - When the AC Drive detects a fault, the fault is displayed on the digital operator and activates a fault contact output, after which the motor coasts to a stop. Check the causes listed in the *Alarms & Fault Displays* section in the EMS/Yaskawa AC Drive manual and take the corresponding corrective actions. To restart the inverter, remove any run command and turn ON the reset input signal, or press the RESET key on the digital operator, or cycle power to reset the stop status. If taking the recommended corrective actions described does not solve the problem, contact MCE immediately.

Unlike faults, alarms do not activate fault contact outputs. After the cause of the alarm is corrected, the inverter returns to its former operation status automatically.

In the *Fault Diagnosis and Corrective Actions* table in the EMS/Yaskawa AC Drive manual, faults and alarms are classified in the as follows:

FAULT AND ALARM CLASSIFICATIONS		
Class	**Description**	**Result**
A	Major Fault	Motor coasts to a stop, operation indicator lights, and fault contact output (terminals 18 & 19) is activated.
B	Fault	Operation continues, operation indicator lights, and multi-function fault signal is output (when multi-function output is selected). Fault contact output is *not* activated.
C	Alarm (warning)	Operation cannot be performed, and operation indicator lights, but *no* fault signal is output.

TABLE 6.7 Fault Diagnosis and Corrective Actions (supplement to table in Drive manual)

Fault Display	Name	Description	Corrective Action	Class
OPE40 D1-XX > LIMIT	Invalid Parameter D1-01 - D1-09	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 and within the Maximum specified values. Enter the correct value of the parameter while accessing the program mode and then reset the drive. The fault should clear.	C
OPE41 Case Fault 2	Invalid Parameter D1-01 - D1-09	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 condition is not met.	C

Motor Faults - If a motor fault occurs, consult the *Motor Faults and Corrective Actions* table in the EMS/Yaskawa AC Drive manual and take the corresponding corrective actions. The following motor faults are addressed in this table:

- Motor does not rotate
- Motor rotation reverses
- Motor rotates, but variable speed not available
- Motor RPM too high or too low
- Motor RPM not stable during operation

If taking the corrective actions described does not solve the problem, contact your EMS/Yaskawa representative immediately.

6.7 TROUBLESHOOTING THE MAGNETEK HPV900 AC DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault refer to the fault Section 3.7 of the MagneTek HPV 900 AC Drive Technical Manual.

6.7.1 CAR DOES NOT MOVE ON INSPECTION

NOTE: The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that contactors PM (Main) and BR (Brake) pick when the direction relays, U1 and U2 or D1 and D2, are picked. If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 9, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays CNP and RDY should also be picked.

2. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded speed and the drive RUN, DRO indicators should turn ON when direction is picked on Inspection. If this is not true then check the following:

    a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

    b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

    If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

CAUTION: The following are very critical HPV900 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **A1- Contract Car Spd** (Elevator contract speed).
- **A1- Contract Mtr Spd** (Motor Speed at elevator contract speed/ Motor Full load RPM)
- **A1- Response = 20** (Sensitivity of the speed regulator)
- **A1-Inertia = 2** (System inertia. This parameter will be adjusted during the adaptive tuning of the drive in Section 4.6.5, Adaptive Tuning)
- **A2- Accel Rate 0 = 3.0**
- **A2- Decel Rate 0 = 3.0**
- **A3- Multistep Ref (Inspection, Level, High Level , Intermediate and High speed)** must be set to the valid speed settings described in Section 4.5.1 (Table 4.4).
- **A5 - (Motor parameters)** Must be verified with the motor name plate and the parameter sheet filled out for the specific controller and shipped with the controller.
- **C2-Log In 1 TB1-1 = Drive Enable**
- **C2-Log In 2 TB1-2 = Run Up**
- **C2-Log In 3 TB1-3 = Run Down**
- **C2-Log In 4 TB1-4 = Fault reset**
- **C2-Log In 5 TB1-5 = Step Ref B0** (Inspection speed input)
- **C2-Log In 6 TB1-6 = Step Ref B1** (Level speed input)
- **C2-Log In 7 TB1-7 = Step Ref B2** (High Level speed input)
- **C2-Log In 8 TB1-8 = Step Ref B3** (High speed input)
- **C2-Log In 9 TB1-9 = S Curve Sel 0**
- **C3- Relay Coil 1 = Fault**
- **C3- Relay Coil 2 = Speed Reg Rls.** This parameter is very critical for the operation of the brake (terminal 54 and 55 contact)

If the parameters are set at the correct values and the car still does not move, then call MCE Technical Support.

6.7.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
C2- Log In TB1-8	Terminal 8 selection	Step Ref B3 (High speed input)
A1- Contract Car Spd	Elevator contract speed	Contract speed in ft/min
A1 - Contract speed RPM	Motor Spd at contract speed	Motor Full load RPM
A3- High speed	Speed command #8	Contract speed ft/min

The above described parameters are for High speed selection. When the H relay on the SC-SB2K board is picked, the HX relay on the HC-ACI should also pick and the drive keypad should display the contract speed. If not, verify that the voltage between the COM and H terminals on the HC-ACI board should be zero when the HX relay is picked. Also check the wiring between the SC-SB2K board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.7.3 CAR OVERSHOOTS OR THE DRIVE TRIPS "OVER VOLTAGE" ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Decrease drive parameter A2- ACC Rate 0 to decrease the acceleration.
2. Verify the parameters described in section 6.7.1, A1-Response, A1-Inertia, A1- Inner Loop Xover are set correctly.
3. Turn off the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using an voltmeter verify that not voltage is present, then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.7.4 DRIVE TRIPS "OVER VOLTAGE" OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.7.3 items 2 and 3 and the counter weight are set properly.
2. Verify that High Level speed, Level speed (Intermediate speed if required) are set as described in Section 4.5.1.
3. Increase the deceleration parameter A2- Decel Rate 0 and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.
4. If the value of parameter A2- Lev Jerk Rate 0 is too high it can cause the car to overshoot and relevel.
5. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these floors at high speed and stop the car properly.

6.7.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The HPV 900 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters are set two high (A1-Response, A1-Inner Loop Xover)?
2. Are the Motor parameters (A5 - Motor) set correctly?
3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.7.6 DRIVE TRIPS "OVER VOLTAGE" BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameters A1- Flt Reset Delay = 5 , A1 - Flt Reset / Hour = 3 .

6.7.7 ALARMS AND FAULTS

Refer to the fault section 3.7 in the MagneTek HPV 900 AC Drive Technical Manual.

6.8 TROUBLESHOOTING THE TORQMAX F4 AC DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault displayed, refer to Section 6.8.7 in this manual or the fault section in TORQMAX F4 Drive Technical Manual.

6.8.1 CAR THE DOES NOT MOVE ON INSPECTION

> **NOTE:** The TORQMAX F4 drive software has been modified for use in MCE controllers. Some of the parameters in the drive are different from those listed in the standard drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that relay CNP and RDY on the HC- ACI board are ON (if not refer to step 2.a below). Contactors PM (Main) and BR (Brake) should pick when the direction relays U1 and U2 or D1 and D2, are picked. If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check to see if any fault is displayed on the drive keypad before and after picking direction on Inspection. When direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should pick. If these relays are not picking, check for 120VAC on terminals 9, 10 and 12 on the SC-SB2K Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem.

2. To verify that the drive receives the direction, enable and inspection speed command signals from the (HC-ACI) board, do the following:

   - To verify the drive enable signal, select parameter LF.98 and pick direction on Inspection. The drive display should change from STOP to RUN. If it does not display RUN, follow the controller drawings and verify the connection to terminal X2.1 (Enable terminal).

   - To verify the commanded speed signal, select either parameter LF.88 or LF.86 and pick direction on Inspection. If LF 88 is selected, the drive key pad should display the inspection speed (Motor RPM) value. If LF.86 is selected the drive keypad should display a four (4).

   - To verify the direction input signal, display parameter LF.99 and pick UP direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **Facc** (forward acceleration) and then to **Fcon** (forward constant running).

     Pick DOWN direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **rAcc** (reverse acceleration) and then to **rCon** (reverse constant running).

When direction is picked on Inspection, the DRO relay should pick. If this is not true, check the following:

a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If these relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

b. To verify the UP, DN , Enable and speed inputs to the drive, measure the DC voltage between terminals X2.10 and the respective drive terminals. In the down direction the voltage between X2.10 and X2.4 should be zero. In the up direction the voltage between X2.10 and X.2.4 should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked.

If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

CAUTION: The following are very critical TORQMAX F4 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **LF.02 = 2** (Operating mode)
- **LF.04 = 0** (Induction motor)
- **LF.07 = US** (Unit selection)
- **LF.10** Rated motor power (HP).
- **LF.11** Rated motor speed (RPM).
- **LF.12** Rated motor current (Amp).
- **LF.13** Rated motor frequency (Hz).
- **LF.14** Rated motor voltage.
- **LF.17** Encoder pulse number (PPR)
- **LF.20** Rated speed (FPM)
- **LF.21** Traction sheave diameter (inches)
- **LF.22** Gear Reduction ratio
- **LF.23** Roping Ratio
- **LF.24** Load (LBS)
- **LF.30 (2 = Close loop: 0 = open loop)**
- **LF.31** Speed Prop gain
- **LF.32** Speed Int gain
- **LF. 42** High Speed (FPM)
- **LF.43** Inspection speed (FPM)
- **LF.44** High level speed (FPM)
- **LF.45** Intermediate speed (FPM)
- **LF.51** Acceleration ft/s.s
- **LF.53** Deceleration ft/s.s

If all the parameters are correct, relay DRO turns ON (when direction is picked), and car still does not move, then call MCE technical support.

6.8.2 CAR DOES NOT RUN / REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
LF.11	Motor RPM	
LF.20	Contract speed in FPM	
LF.21	Traction Sheave diameter inches	
LF.22	Gear reduction ratio	
LF.23	Roping ratio	
LF.31	Speed Prop gain	
LF.32	Speed Int gain	
LF.42	High speed FPM	

Verify that the drive is getting the High speed command signal - To verify that the drive is getting the High speed command signal from the controller, select parameter LF.86 and make a multi-floor run. The display should change from zero (0) to three (3) when high speed is picked. If the value remains zero (0), the drive is not getting the high speed command signal. Check the following:

- Verify that relay H on the SC-SB2K board and relay HX on the HC-ACI board are both picked.
- Verify that the voltage between terminal H and COM on the HC-ACI board is zero when relay HX is picked. If not, check the wiring between the HC-ACI board and the drive.
- Verify the operation of relay USD / DSD on the HC-ACI board. The normally open contacts of these relays are in series with the High speed command to the drive.

When parameter LF.86 is selected, the drive display indicates which speed is selected.

LF.86 Display	Speed	LF.86 Display	Speed
0 or 7	No speed	4	Inspection Speed
2	Leveling Speed	5	High Leveling Speed
3	High Speed	6	Intermediate Speed

If the car does not reach Contract speed - If the drive is getting the High speed command signal but the car does not reach Contract speed, perform one of the following checks:

New motor - If the hoist motor is new, verify the following:

- LF.20 and LF.42 are set to the correct value in FPM.
- Rated motor speed (LF.11) is set to motor full load RPM.
- LF.22 (Gear reduction ratio) is set correctly.

Old motor - If the hoist motor is old, and the car does not reach contract speed (empty car down), display LF.90 and do the following:

1. Decrease the field weakening speed LF.16 to approximately 2/3 of the motor synchronous speed.
2. Set the power factor parameter LF.15 = 0.9.
3. Decrease the rated motor speed parameter LF.11 in steps of 20 until the rated speed is reached (empty car down).
4. If the current drawn by the motor is too high (parameter ru.90) then increase parameter LF.11 in steps of 10.

6.8.3 CAR OVERSHOOTS OR THE DRIVE TRIPS on 'E. OL' or 'E. OP' ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Decrease drive parameters LF.51 Acceleration Rate and LF.50 Acceleration Jerk .
2. Increase the drive gains by increase parameters LF. 31 and LF.32.
3. Turn OFF the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using a voltmeter, verify that no voltage is present. Then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.8.4 DRIVE TRIPS 'E.OP' OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on 'E.OP' during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.8.3 and the counter weight are set properly.
2. Verify that the High Level speed, Level speed and Intermediate speed (if required) are set as described in Sections 4.8.1 and 4.9.4 'c'..
3. Increase the deceleration parameter LF.53 and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.
4. If the value of parameter LF.52 is too high it can cause the car to overshoot and relevel.
5. If all the items above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these floors at high speed and stop the car properly.

6.8.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The HPV 900 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters set two high (LF.31 and LF.32)?.
2. Are the Motor parameters set correctly?
3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.8.6 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit.

6.8.7 ALARMS AND FAULTS

Following are some of the faults and drive errors. For more details and corrective actions, refer to the drive manual.

TABLE 6.8 TORQMAX F4 Drive Fault Messages

Display	Value	Description
E.buS	18	Error, bus, failure in serial communication
E.dOH	9	Error, drive-overheat, motor overheats and prewarning time has run out
E.dSP	51	Error, digital signal processor, error in signal processor
E.PrF	46	Error, prohibited rotation forward, error in the software limit switch (when the set direction of rotation is forward, the software limit switch for forward is inactive)
E.Prr	47	Error, prohibited rotation reverse, error in the software limit switch (when the set direction of rotation is reverse, the software limit switch for reverse is inactive)
E.hyb	52	Error, hybrid, error in the encoder input card
E.EnC	32	Error, encoder, error in the encoder signal-bad connection (reset only possible with Power-On-Reset)
E.LSF	15	Error, charging circuit of the inverter
E.OC	4	Error, overcurrent, short-circuit or ground fault on the output of the inverter
E.OH	8	Error, overheated, overheating of the inverter
E.OH2	30	Error, overheat 2, electronic motor overload protection
E.nOH	36	Error, no overheat, overheating no longer present, can be reset (valid for malfunction E.OH or E.OH2
E.OL	16	Error, overload, continuous overload, for cooling down the inverter has to stay supplied with power, the cooling time depends on the previous overload time
E.OL2	53	Error overload, overloading of the inverter at output frequency < 3 Hz
E.nOL	17	Error, no overload, cooling time has run out, error can be reset
E.OP	1	Error, over-potential, overvoltage in the DC voltage circuit
E.OS	105	Error, overspeed, overspeed (can only be reset with Power-On-Reset)
E.PuC	49	Error, power unit code, invalid power circuit recognition
E.SEt	39	Error, set, set selection error, check LF.02
E.UP	2	Error, under-potential, undervoltage in DC voltage circuit
E.hSd	-	Error, this error occurs when there is a difference between the commanded speed and the actual motor speed for a certain period of time. Verify parameter LF.58 and LF.59. Lower Speed Prop (LF.31) and Integral Gain (LF.32) parameters. Verify LF.17 (Encoder pulse count). Verify LF.11 (Motor speed/RPM). Reaching Torq limit - caused by higher acceleration. Load is too high - lower the value of LF.36.
E.LC	-	no current flows to the motor, check the wiring between motor and inverter

TABLE 6.9 TORQMAX F4 Drive Error State

Display	Significance
StOP	no speed selection
S.Co	speed selection without contactor control
S.IO	speed selection without drive enable
S.nC	no current flows to the motor, check the wiring between motor and inverter
S.bd	both direction inputs are selected simultaneously
run	starting procedure is completed

TABLE 6.10 TORQMAX F4 Drive Inverter State

Display	Value	Significance
bbl	76	base-block-time runs out, power modules are blocked for 3s (always when control release is cleared)
Facc	64	forward acceleration
Fcon	66	forward constant running
FdEc	65	forward deceleration
nOP	0	no operation, terminal X2.1 is not set.
LS	70	low speed, control release is switched but no direction of rotation is adjusted, modulation disabled
rAcc	67	reverse acceleration
rCon	69	reverse constant running
rdEc	68	reverse deceleration

6.8.8 TROUBLESHOOTING FLOWCHARTS - TORQMAX F4 DRIVE

FIGURE 6.31 TORQMAX F4 Troubleshooting Flowchart - Drive Key Pad

Drive Key Pad

Series M TORQMAX
ASME A17.1 - 2000

How to change and save drive parameters.

Start

There are four push buttons on the drive key pad

.

1. Enter / (F/R): Saves the selected parameter. In addition it is also used for selecting parameter groups.
2. UP/Star : Increases the selected parameter value. In addition it is also used to find the parameter group.
3. DN/STOP: Decreases the selected parameter value. In addition it is also used to find the parameter group.
4. FUNC/SPEED: Displays (reads) the parameter value.

1. Select the parameter group (Press the **Enter** key. The blinking dot next to the parameter number should flash).
2. Use **UP** or **DN** arrow to select the desired LF.xx parameter.
3. Press the **FUNC** key to see the parameter value.
4. Use the **UP** or **DN** arrow to change the parameter value.
5. Press **Enter** to save the parameter value (Important, without this step parameter will not be saved).

Stop

FIGURE 6.32 TORQMAX F4 Troubleshooting Flowchart - Critical Drive Parameters

Critical Drive Parameters

Series M TORQMAX
ASME A17.1 - 2000

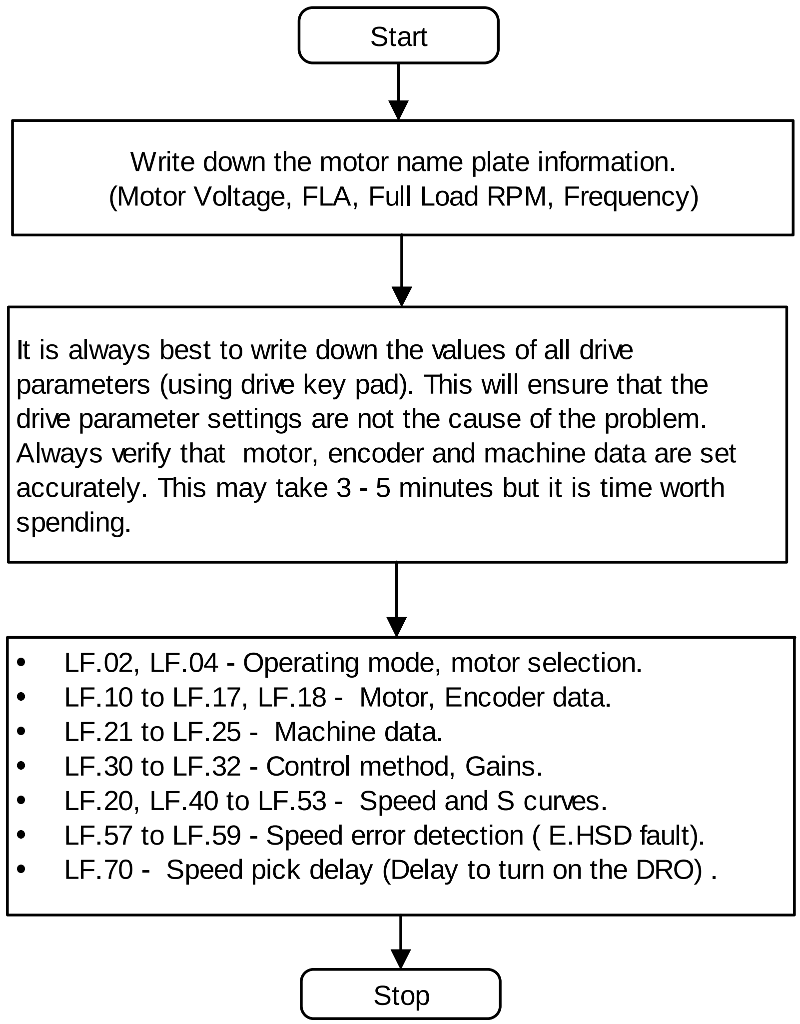
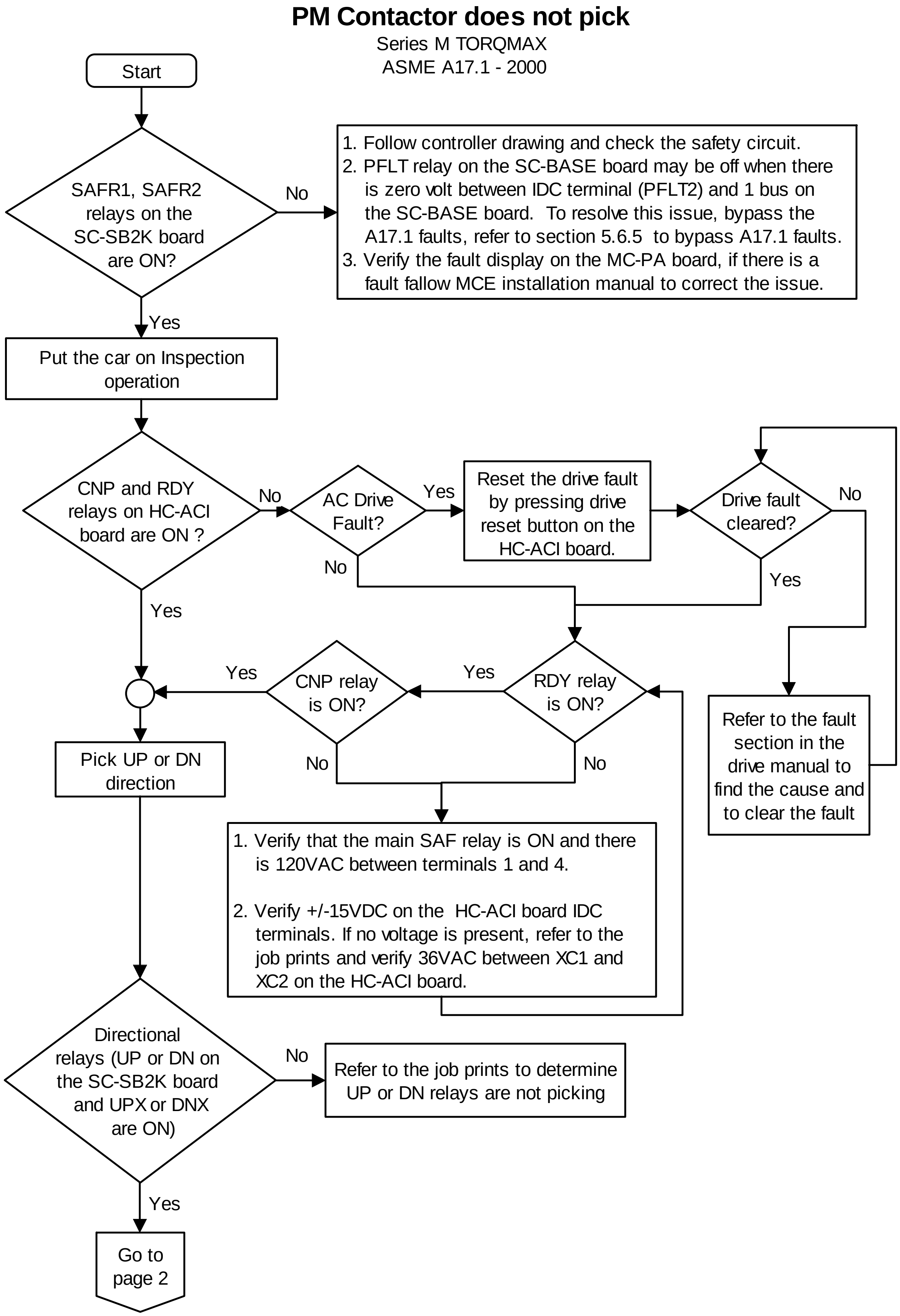
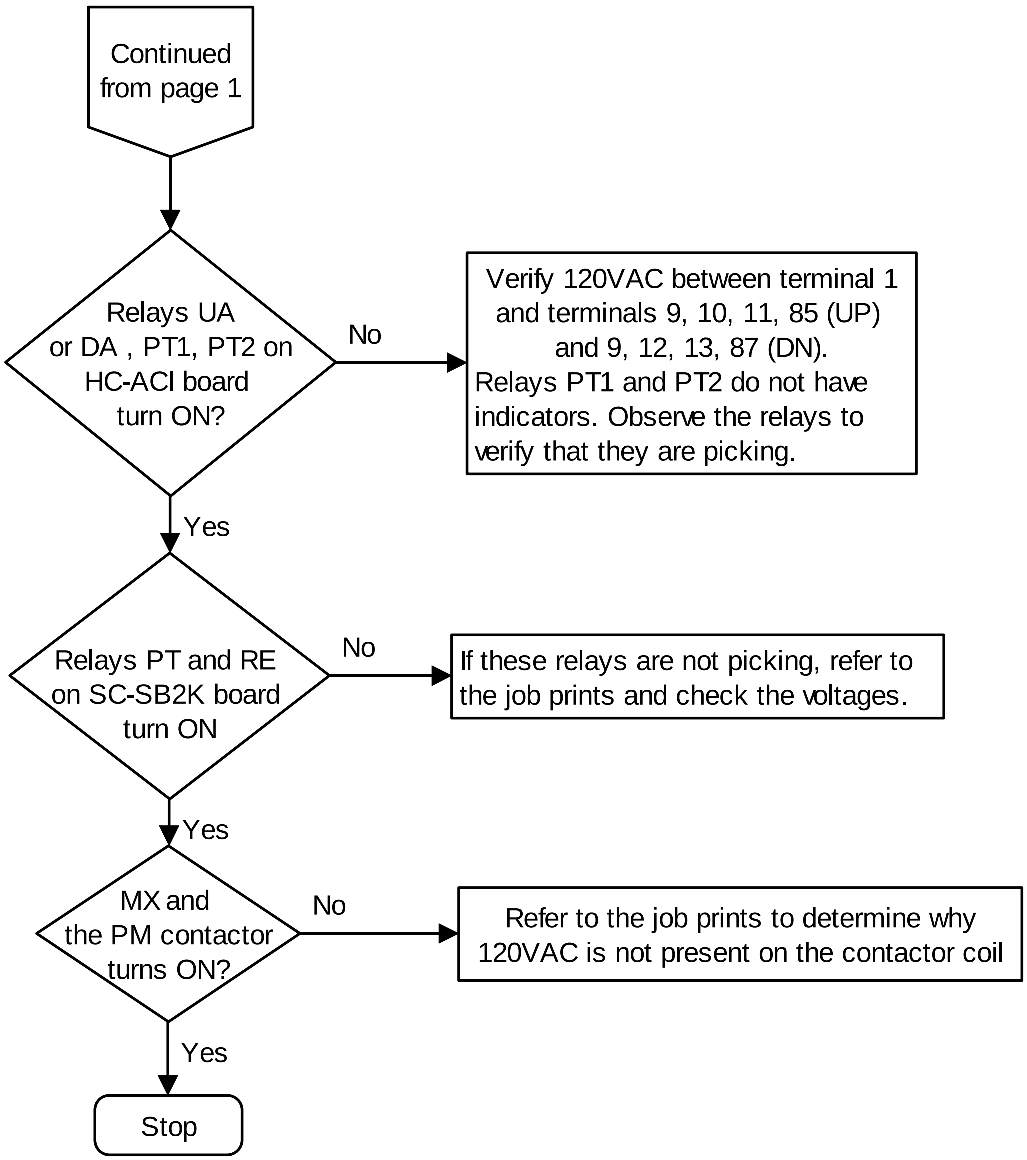


FIGURE 6.33 TORQMAX F4 Troubleshooting Flowchart - PM Contactor does not pick



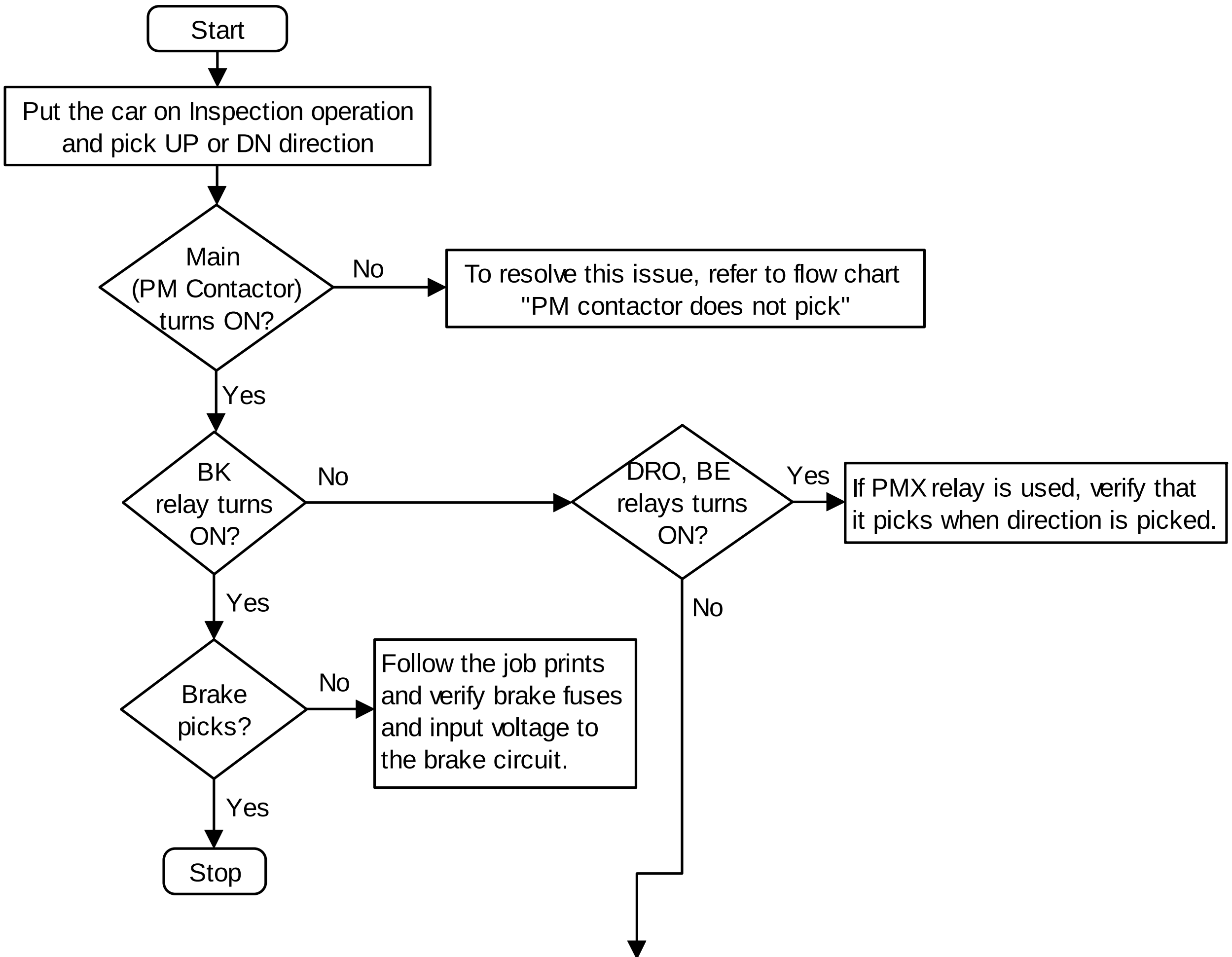
PM Contactor does not pick

Series M TORQMAX
ASME A17.1 - 2000
Page 2



Brake does not pick

Series M TORQMAX
ASME A17.1 - 2000



1. Verify that all drive parameters are set correctly.
2. Relay BE on the HC-ACI board turns ON when a direction is picked on inspection.
3. Select LF.82. The value should change from 0 to 5 or 9 when a direction is picked on Inspection (0 = No signal, 5 = Enable and Forward(UP) inputs are ON, 9 = Enable and Reverse(DN) inputs are ON). If this is not true, the drive is not getting the enable and direction input signals.
4. Select LF.84. The value should change from 0 to 16 when direction is picked on Inspection. (0 = No speed, 16 = Inspection speed). If this is not true, the drive is not receiving the speed input.
5. To verify the drive input signals, refer to the job prints and measure the DC voltage between drive common "X2.11" and the respective input (X2.3 - Forward, X2.4 - Reverse , X3.5 - Inspection speed). The voltage should read 18VDC when the respective input is ON.
6. Select LF.85, The value should change to 5309 when direction on inspection is picked (Drive is running below High or INT speed).
7. If all the above are true, follow the drawings and verify the voltage at various points in the DRO coil circuit.

FIGURE 6.35 TORQMAX F4 Troubleshooting Flowchart - Car does not move

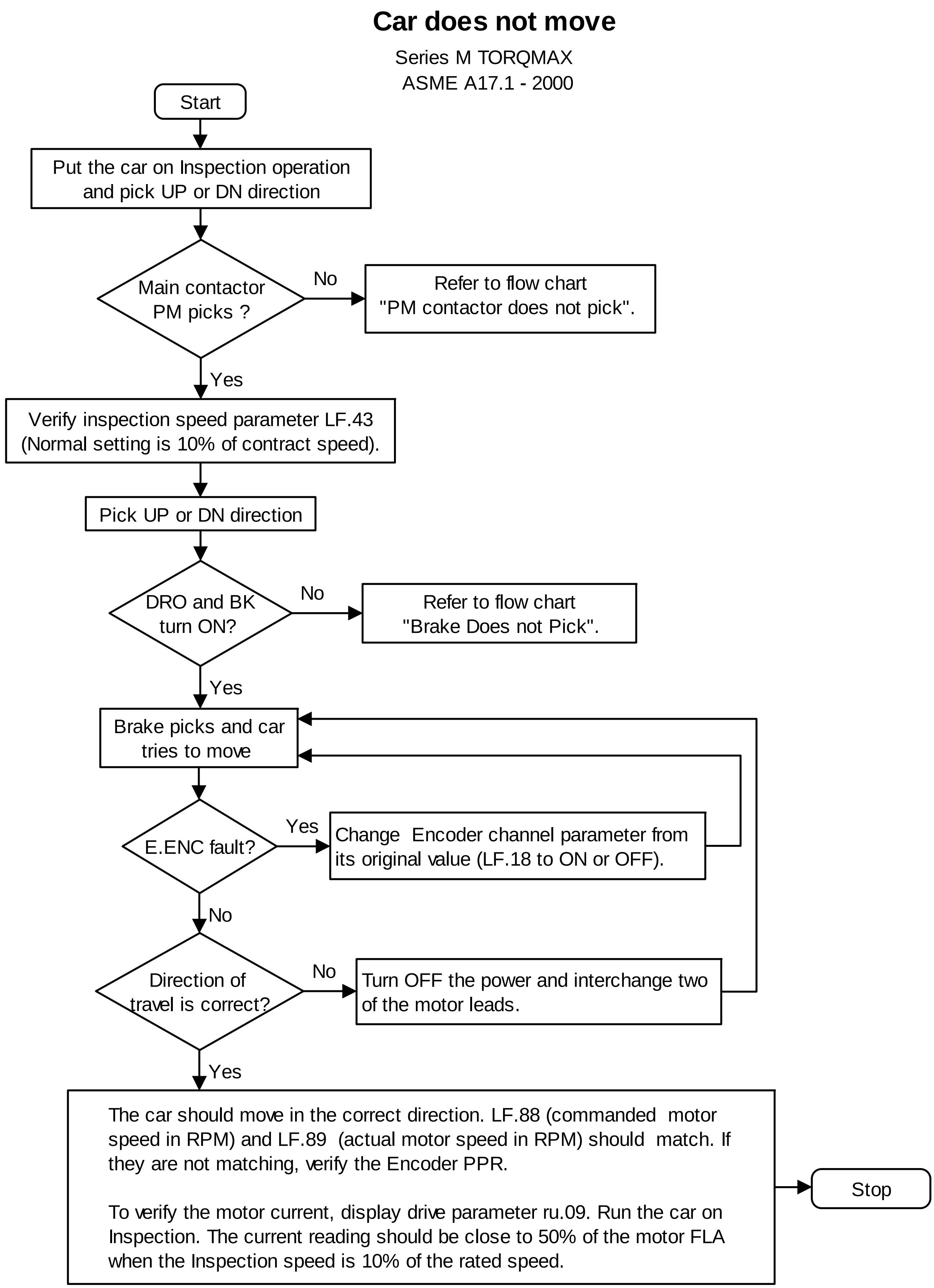


FIGURE 6.36 TORQMAX F4 Troubleshooting Flowchart - Encoder fault

Encoder Fault

Series M TORQMAX
ASME A17.1 - 2000

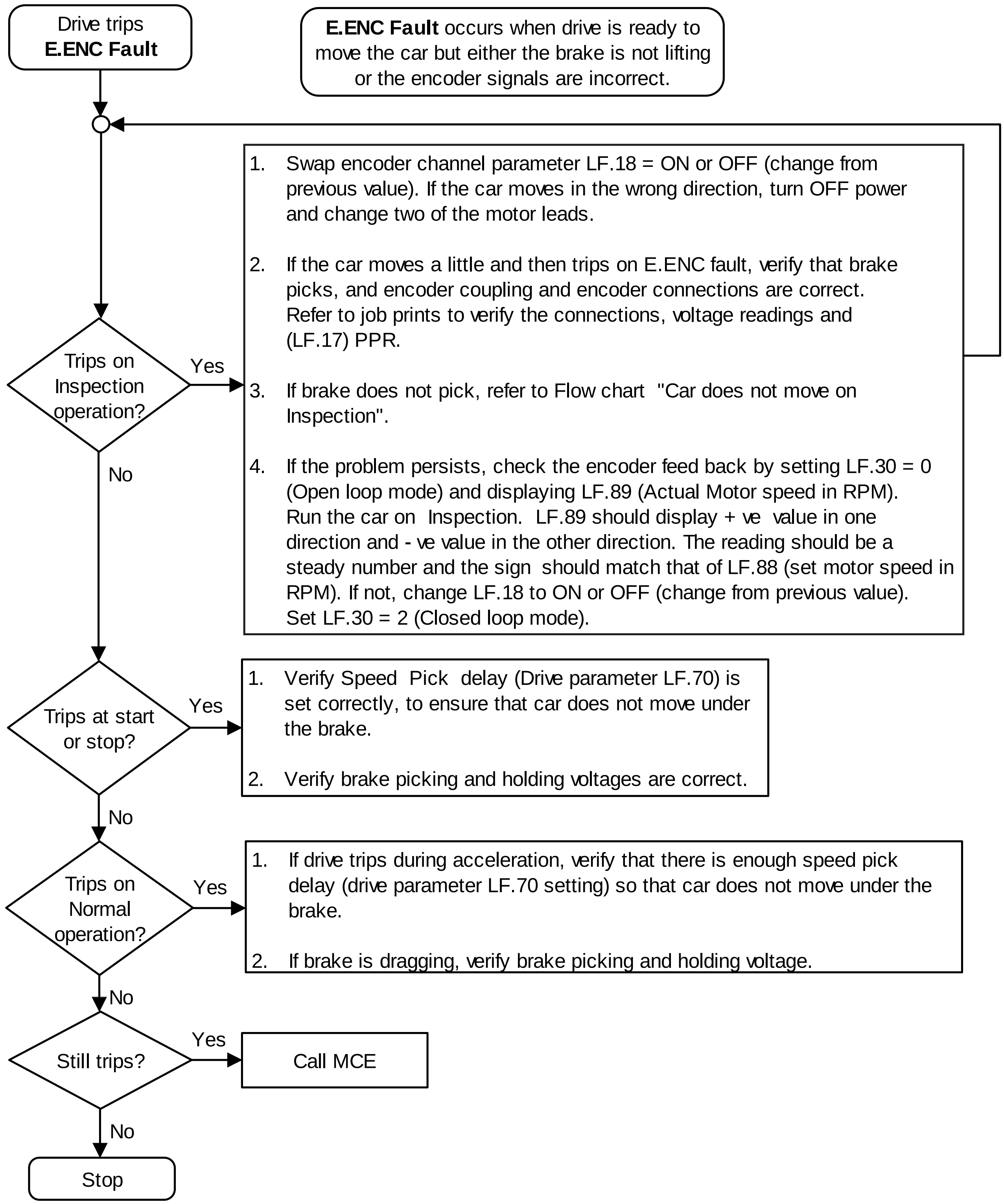


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FIGURE 6.37 TORQMAX F4 Troubleshooting Flowchart - E.LC fault

E.LC Fault

Series M TORQMAX
ASME A17.1 - 2000

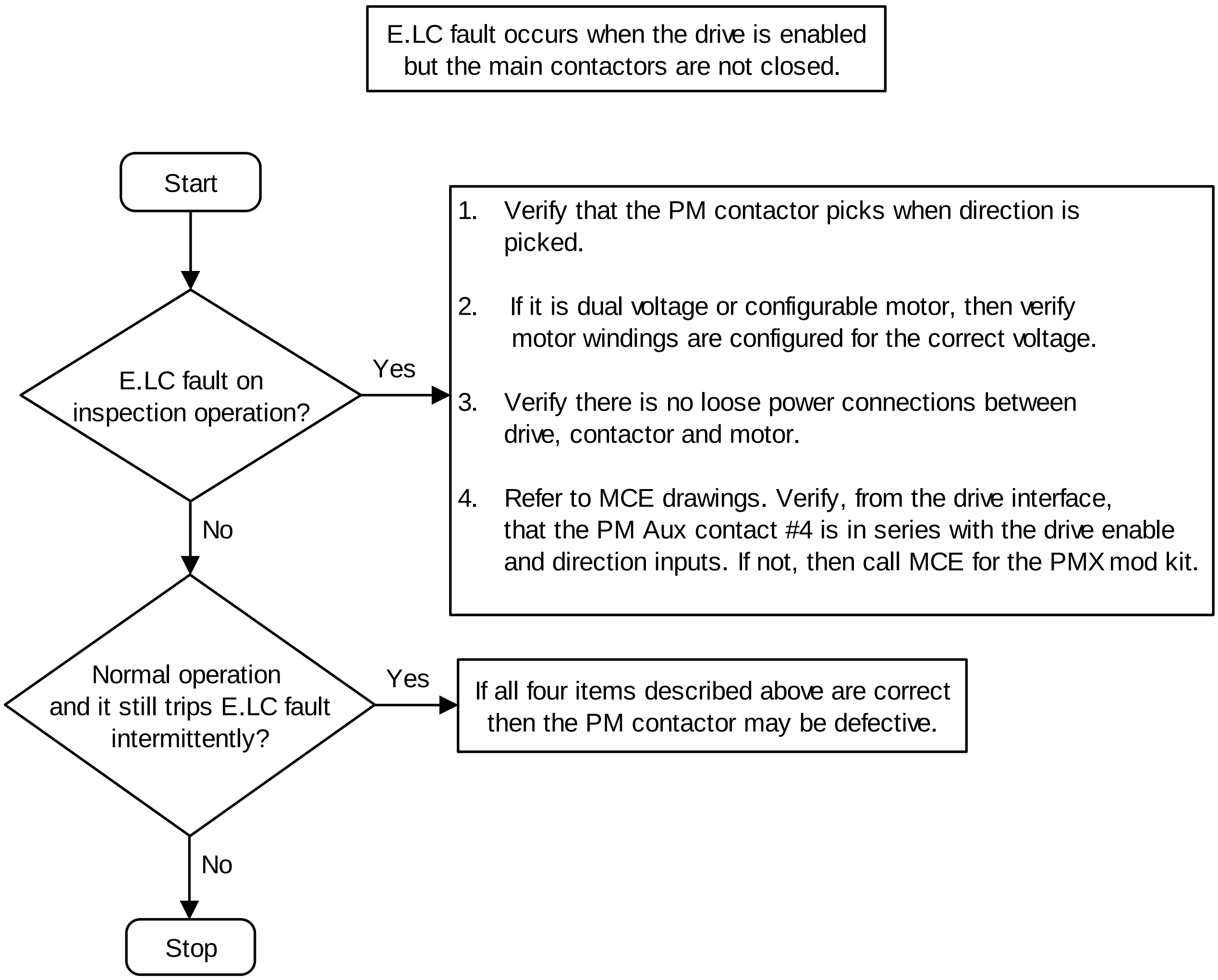
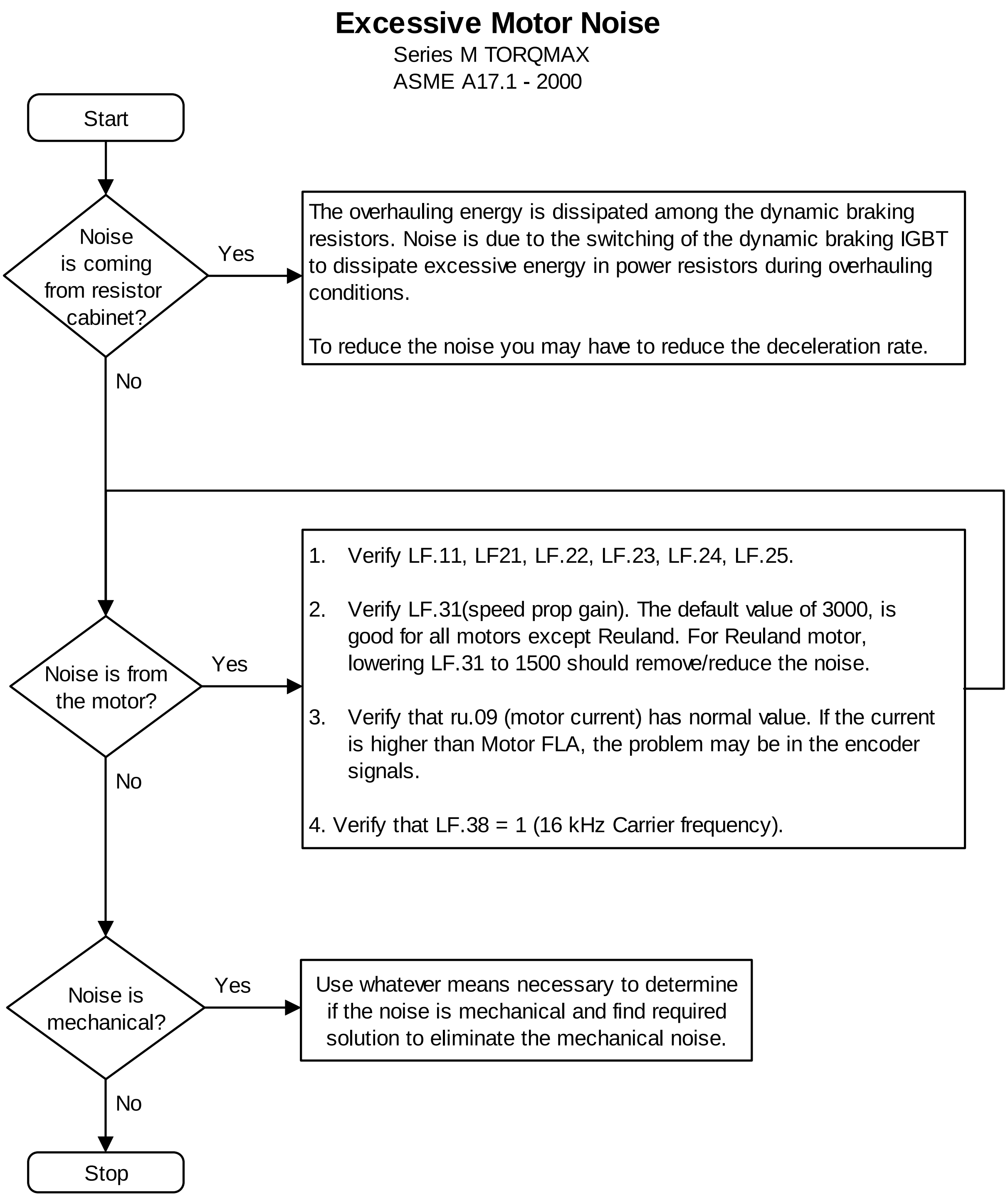


FIGURE 6.38 TORQMAX F4 Troubleshooting Flowchart - Excessive motor noise



6.9 TROUBLESHOOTING THE YASKSWA F7 AC DRIVE

The VFAC drive's digital operator display must read as follows during power up: Frequency reference U1-01=0. If any fault or problem is detected, then turn off the power and refer to the *Alarms and Fault Displays* section of the Yaskawa F7 AC Drive Manual.

6.9.1 CAR DOES NOT MOVE ON INSPECTION

> **NOTE:** The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Relays SAFR1 and SAFR2 will drop and pick back up at the end of every run, but only if the code mandated "cycle tests" function as required. This means that after every run the critical relays are dropped out to ensure that no contacts have welded. If a failure of the relays or overspeed logic is detected both SAFR1 and SAFR2 will not be allowed to pick. If this is the case, inspect the message scrolling on the MC-MP2 display to determine which section of the hardware has failed.

   PFLT Relay - The PFLT relay is mounted on the SC-BASE-x board and has a single normally open contact in the safety string, immediately following IDC20 and before the OL contact which feeds power to relays SAFR1 and SAFR2. The normally open contact of the PFLT relay is directly monitored by the MC-PCA Main Processor through the PFLT input from and through the SC-HDIO board on IDC ASI1. The PFLT relay should remain energized during Normal operation. This relay drops and causes an Emergency Shutdown and stops the car under the following conditions: ILO, ETS and contract overspeed. The PFLT relay also turns OFF during PLD1 cycle testing.

> **NOTE:** Many of the safety relays that populate the main PC boards (SC-SB2K and SC-BASE) are soldered to the board, therefore it will be necessary to replace the entire board when any relay fails to operate as intended.

2. Verify that contactors PM (Main) and BK (Brake) pick when the direction relays, U and D, are picked). If PM and BK do not pick, check the related circuit (MB) as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relay RE on the SC-SB2K board should be picked. Also relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 9, 10,12 and 20 on the SC-SB2K Main Safety Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays SAFR1, SAFR2, CNP and RDY should also be picked.

3. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded speed (parameter D1-17 value), and the DRIVE and FWD or REV indicator should turn ON when direction is picked on Inspection. If this is not true then check the following:

a. Verify that the CNP, RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the main contactor is picking when the direction is picked, the SAFD relay on the HC-ACI board must pick. All the command signals to the VFAC drive are qualified by the normally open contact of the SAFD relay. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 15VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

Parameter	**Description**	**Setting value**
A1-02	Control method selection	0 = V/F control 3 = Flux Vector
B1-01	Reference selection	0 = Operator
B1-02	Run source	1 = Terminals
B1-03	Stopping method	0 = Ramp to stop.
C1-01	Acceleration time	3.00 Setting described in Section 4.11.2
C1-02	Deceleration time	3.00 Setting is described in Section 4.11.2
D1-17	Inspection (Jog reference) fpm	Inspection speed as described in Section 4.11.1
E1-01	Input voltage	Drive input voltage.
E1-03	V/F pattern selection	F - User defined pattern
E1-04 to E1-10	V/F pattern voltage at different points.	Should be according to MCE setting, but verify them.
E2-01	Motor rated FLA	Motor name plate value
E2-02	Motor rated slip frequency	Should be according to MCE setting, but verify. Ref. to the drive parameter sheet or the drive manual which explain how to calculate parameter E2-02.
E2-03	Motor rated No load current	Normally (30 - 40) % of Motor Full load current.
H1-06	Inspection (Jog reference)	6

If the parameters are set at the correct values and the car still does not move, call MCE Technical Support.

6.9.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
D1-02	High speed reference	Contract speed as described in Section 4.12.4
H1-03	Terminal 5 select	80 (Mult -step spd 1F) for high speed input.

The D1-02 and H1-03 parameters are for High speed selection. When the H relay on the SB-SB2K board is picked, the HX relay on the HC-ACI should also pick. If parameter D1-02 is set to contract speed then the drive keypad (parameter U1-02) should display contract speed in fpm and the DRIVE, FWD or REV indicator should be illuminated. If not, verify that the voltage between the COM and H terminals on the HC-ACI board are zero when the H relay is picked. Also check the wiring between the SB-SB2K board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.9.3 CAR OVERSHOOTS OR THE DRIVE TRIPS “OVER VOLTAGE” ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Adjust the ACC (Drive parameter C1-01, C1-07) and increase acceleration time.

2. Verify that parameter E2-02 and D1-02 are set correctly. Adjust parameter P1-14 if required as described in section 4.11.3 and Figure 4.9. For Flux Vector applications adjust the gain parameters as described in Section 4.12.4 (g).

3. Turn the power OFF and wait for at least 5 minuets so that the DC BUS voltage is not present in the dynamic braking circuit. Verify this by using a multi-meter to check the fuse, the value of the resistance, and to check for any open or loose connections in the dynamic braking circuit. Verify the voltage jumper setting inside the braking unit. If MCE's ACBU-L50 or ACBU-L75 braking unit is provided, then the jumper must be set at a value 10 volts less than the incoming AC line voltage to the drive unit. If Yaskawa's braking unit is provided, then the voltage selector jumper should be set to the same value as that of incoming AC line voltage to the drive unit.

NOTE: Refer to Section 4.12.5 b. for more details regarding over-voltage trip.

6.9.4 DRIVE TRIPS “OVER VOLTAGE” OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.9.3 items 2, 3 and the counter weight are set properly.

2. Verify that parameters D1-03 (High Level speed), D1-05(Level speed) and D1-07 (Intermediate speed if required) are set as described in section 4.11.1. Verify that parameters H1-04, H1-05 are set according to the drive parameter sheet.

3. Adjust the deceleration rate (Parameter C1-02, C1-08) and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed. A very low leveling speed (less than 7 fpm) might cause this overshoot problem. These speed settings are very sensitive and should be adjusted in small increments (0.01) and carefully.

4. A value that is too high in a deceleration S-curve parameter (P1-18, P1-11, P1-10, P1-07 or P1-06) can cause the car to overshoot and relevel.

5. The coordination of the dropping of the brake and DC injection is very critical. The dropping of the brake is adjusted by trimpot BDD on the HC-ACI board and the DC injection is adjusted by the drive parameters B2-01, B2-02, and B2-04. Refer to drive parameter sheet for the correct settings. Increasing B2-02 will increase the DC injection current and you might start hearing a humming noise from motor before the car stops and brake drops.

NOTE: Refer to Section 4.12.5 b. for more details regarding over-voltage trip.

6. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these two floors at high speed and stop the car properly.

6.9.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED - CLOSED LOOP SYSTEM ONLY (FLUX VECTOR APPLICATIONS)

For a closed loop system, if there are OSCILLATIONS in the car at contract speed, verify the following:

1. Are the gain parameters C5-01 and C5-02 set very high? The default settings are C5-01 = 20 and C5-02 = 0.2.

2. Is the Motor Slip parameter E2-02 set correctly? Check this by observing the motor stator voltage empty car up vs down. A ten percent variance is considered acceptable. If the voltage difference is outside this range adjust slip to bring up vs down motor voltage closer together.

3. Is the encoder properly mounted? If it is properly mounted it should not wobble.

6.9.6 OSCILLATIONS IN THE CAR - OPEN LOOP SYSTEM

For open loop systems, if there are oscillations in the car, check the commanded speed input to the drive unit. Verify the motor slip parameter (E2-02) and the Slip Compensation Gain parameter (C3-01).

6.9.7 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameter L5-01=1 and parameter L5-02 = 0.

6.9.8 ALARMS AND FAULTS

The *Alarms & Fault Displays* section in the Yaskawa F7 AC Drive manual explains the fault conditions, and suggests corrective actions to be taken if the AC Drive malfunctions. There are some faults which are not listed in the drive manual, such OPE40 AND OPE41, which are described in Table 6.11.

AC Drive Alarms & Faults - When the AC Drive detects a fault, the fault is displayed on the digital operator and activates a fault contact output, after which the motor coasts to a stop. Check the causes listed in the *Alarms & Fault Displays* section in the Yaskawa F7 AC Drive manual and take the corresponding corrective actions. To restart the inverter, remove any run command and turn ON the reset input signal, or press the RESET key on the digital operator, or cycle power to reset the stop status. If taking the recommended corrective actions described does not solve the problem, contact MCE immediately.

Unlike faults, alarms do not activate fault contact outputs. After the cause of the alarm is corrected, the inverter returns to its former operation status automatically.

In the *Fault Diagnosis and Corrective Actions* table in the Yaskawa F7 AC Drive manual, faults and alarms are classified in the as follows:

FAULT AND ALARM CLASSIFICATIONS		
Class	**Description**	**Result**
A	Major Fault	Motor coasts to a stop, operation indicator lights, and fault contact output (terminals MA & MB) is activated.
B	Fault	Operation continues, operation indicator lights, and multi-function fault signal is output (when multi-function output is selected). Fault contact output is *not* activated.
C	Alarm (warning)	Operation cannot be performed, and operation indicator lights, but *no* fault signal is output.

TABLE 6.11 Fault Diagnosis and Corrective Actions (supplement to table in Drive manual)

Fault Display	Name	Description	Corrective Action	Class
OPE40 D1-XX > LIMIT	Invalid Parameter D1-01 - D1-17	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 and within the Maximum specified values. Enter the correct value of the parameter while accessing the program mode and then reset the drive. The fault should clear.	C
OPE41 Case Fault 2	Invalid Parameter D1-01 - D1-17	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 condition is not met.	C

Motor Faults - If a motor fault occurs, consult the *Motor Faults and Corrective Actions* table in the Yaskawa F7 AC Drive manual and take the corresponding corrective actions. The following motor faults are addressed in this table:

- Motor does not rotate
- Motor rotation reverses
- Motor rotates, but variable speed not available
- Motor RPM too high or too low
- Motor RPM not stable during operation

If taking the corrective actions described does not solve the problem, contact your Yaskawa representative immediately.

6.10 TROUBLESHOOTING THE TORQMAX F5 AC DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault displayed, refer to fault section in TORQMAX F5 Drive Technical Manual.

6.10.1 CAR THE DOES NOT MOVE ON INSPECTION

> **NOTE:** The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on Inspection, check the following:

1. Relays SAFR1 and SAFR2 will drop and pick back up at the end of every run, but only if the code mandated "cycle tests" function as required. This means that after every run the critical relays are dropped out to ensure that no contacts have welded. If a failure of the relays or overspeed logic is detected both SAFR1 and SAFR2 will not be allowed to pick. If this is the case, inspect the message scrolling on the MC-PCA-OA2K display to determine which section of the hardware has failed.

   PFLT Relay - The PFLT relay is mounted on the SC-BASE-x board and has a single normally open contact in the safety string, immediately following IDC20 and before the OL contact which feeds power to relays SAFR1 and SAFR2. The normally open contact of the PFLT relay is directly monitored by the MC-PCA-OA2K Main Processor through the PFLT input from and through the SC-HDIO board on IDC ASI1. The PFLT relay should remain energized during Normal operation. This relay drops and causes an Emergency Shutdown and stops the car under the following conditions: ILO, ETS and contract overspeed. The PFLT relay also turns OFF during PLD1 cycle testing.

> **NOTE:** Many of the safety relays that populate the main PC boards (SC-SB2K and SC-BASE) are soldered to the board, therefore it will be necessary to replace the entire board when any relay fails to operate as intended.

2. Verify that contactors PM (Main) and BK (Brake) pick when the direction relays, U and D, are picked). If PM and BK do not pick, check the related circuit (MB) as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays RE and CHDT on the SC-SB2K board should be picked. Also relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 9, 10,12 and 20 on the SC-SB2K Main Safety Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays SAFR1, SAFR2, CNP and RDY should also be picked.

3 To verify that the drive receives the direction, enable and inspection speed command signals from the (HC-ACI) board, do the following:

- To verify the drive enable signal, select parameter LF.99 and pick direction on Inspection. The drive display should change from **noP** to **Facc** or **rAcc**. If it does not display **Facc** or **rAcc**, follow the controller drawings and verify the connection to terminal X2A.16 (Enable terminal).

- To verify the commanded speed signal, select either parameter LF.88 or LF.86 and pick direction on Inspection. If LF 88 is selected, the drive key pad should display the inspection speed (Motor RPM) value.

- To verify the direction input signal, display parameter LF.99 and pick UP direction on Inspection. The drive keypad display should change from **noP** (no operation) to **Facc** (forward acceleration) and then to **Fcon** (forward constant running).

  Pick DOWN direction on Inspection. The drive keypad display should change from **nP** (no operation) to **rAcc** (reverse acceleration) and then to **rCon** (reverse constant running).

When direction is picked on Inspection, the DRO relay should pick. If this is not true, check the following:

a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the main contactor is picking when the direction is picked, the SAFD relay on the HC-ACI board must pick. All the command signals to the VFAC drive are qualified by the normally open contact of the SAFD relay. If these relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

b. To verify the UP, DN , Enable and speed inputs to the drive, measure the DC voltage between terminals X2.10 and the respective drive terminals. In the down direction the voltage between X2.10 and X2.4 should be zero. In the up direction the voltage between X2.10 and X.2.4 should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked.

   If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

> **CAUTION: Do not change drive parameters while the elevator is running. The following are very critical TORQMAX F5 parameters. Incorrect values for these parameters can cause erratic elevator operation:**
>
> - **LF.02 = bnSPd** (Signal Operating Mode)
> - **LF.04 = 0** (Induction motor)
> - **LF.10** Rated motor power (HP).
> - **LF.11** Rated motor speed (rpm).
> - **LF.12** Rated motor current (Amp).
> - **LF.13** Rated motor frequency (Hz).
> - **LF.14** Rated motor voltage.
> - **LF.20** Contract speed (fpm)
> - **LF.21** Traction sheave diameter (inches)
> - **LF.22** Gear Reduction ratio
> - **LF.23** Roping Ratio
> - **LF.24** Load Weight (lbs)
> - **LF.27** Encoder Pulse Number (ppr)**closed loop**
> - **LF.30 (2 = Closed loop: 0 = open loop)**
> - **A.LF.31** Kp Speed Accel: Proportional gain
> - **d.LF.31** Kp Speed Decel: Proportional gain
> - **A.LF.32** Ki Speed Accel: Integral gain
> - **d.LF.32** Ki Speed Decel: Integral gain
> - **A.LF.33** Ki Speed Offset Accel: Low speed gain
> - **d.LF.33** Ki Speed Offset Decel: Low speed gain
> - **LF.42** High Speed (FPM)
> - **LF.43** Inspection speed (FPM)
> - **LF.44** High leveling speed (FPM)
> - **LF.45** Intermediate speed (FPM)
> - **n.LF.51** Acceleration ft/s^2 (n = 0,1,2)
> - **n.LF.54** Deceleration ft/s^2 (n = 0,1,2)

If all the parameters are correct, relay DRO turns ON (when direction picked), and car still does not move, then call MCE technical support.

6.10.2 CAR DOES NOT RUN / REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
LF.11	Motor RPM	
LF.20	Contract speed in FPM	
LF.21	Traction Sheave diameter inches	
LF.22	Gear reduction ratio	
LF.23	Roping ratio	
A.LF.31	Kp Speed Accel Proportional gain	
d.LF.31	Kp Speed Decel Proportional gain	
A. LF.32	Ki Speed Accel Integral gain	
d:LF.32	Ki Speed Decel Integral gain	
LF.42	High speed FPM	

Verify that the drive is getting the High speed command signal - To verify that the drive is getting the High speed command signal from the controller, select parameter LF.86 and make a multi-floor run. The display should change from zero (0) to three (3) when high speed is picked. If the value remains zero (0), the drive is not getting the high speed command signal. Check the following:

- Verify that relay H on the SC-SB2K board and relay HX on the HC-ACI board are both picked.
- Verify that the voltage between terminal H and COM on the HC-ACI board is zero when relay HX is picked. If not, check the wiring between the HC-ACI board and the drive.
- Verify the operation of relay USD / DSD on the HC-ACI board. The normally open contacts of these relays are in series with the High speed command to the drive.

If the car does not reach Contract speed - If the drive is getting the High speed command signal but the car does not reach Contract speed, perform one of the following checks:

New motor - If the hoist motor is new, verify the following:

- LF.20 and LF.42 are set to the correct value in FPM.
- Rated motor speed (LF.11) is set to motor full load RPM.
- LF.22 (Gear reduction ration) is set correctly.

Old motor - If the hoist motor is old, and the car does not reach contract speed (empty car down), display LF.90 and do the following:

1. Decrease the field weakening speed LF.16 to approximately 2/3 of the motor synchronous speed.
2. Set the power factor parameter LF.15 = 0.9.
3. Decrease the rated motor speed parameter LF.11 in steps of 20 until the rated speed is reached (empty car down).
4. If the current drawn by the motor is too high (parameter ru.90) then increase parameter LF.11 in steps of 10.

6.10.3 CAR OVERSHOOTS OR THE DRIVE TRIPS on 'E. OL' or 'E. OP' ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Decrease drive parameters LF.51 Acceleration Rate and LF.52 Acceleration Jerk .
2. Increase the drive gains by increase parameters LF. 31 and LF.32.
3. Turn OFF the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using a voltmeter, verify that no voltage is present. Then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.10.4 DRIVE TRIPS 'E.OP' OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on 'E.OP' during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.10.3 and the counter weight are set properly.
2. Verify that the High Level speed, Level speed and Intermediate speed (if required) are set as described in Sections 4.8.1 and 4.9.4 'c'..
3. Increase the deceleration parameter LF.54 and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.
4. If the value of parameter LF.55 Approach Jerk is too high it can cause the car to overshoot and relevel.
5. If all the items above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of

floors so that you can run the car between these floors at high speed and stop the car properly.

6.10.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The TORQMAX F5 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters are set two high (A.LF.31, d.LF.31, A.LF.32 and d.LF.32)?
2. Are the Motor parameters set correctly?
3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.10.6 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit.

6.10.7 ERROR MESSAGES AND THEIR CAUSES

Refer to the table titled ***Error Messages and Their Causes*** in the TORQMAX F5 Drive manual for a listing of messages and suggested cause and solution.

TABLE 6.12 TORQMAX F5 Drive Inverter State

Display	Value	Significance
bbl	76	base-block-time runs out, power modules are blocked for 3s (always when control release is cleared)
Facc	64	forward acceleration
Fcon	66	forward constant running
FdEc	65	forward deceleration
noP	0	no operation, terminal X2.1 is not set
LS	70	low speed, control release is switched but no direction of rotation is adjusted, modulation disabled
rAcc	67	reverse acceleration
rCon	69	reverse constant running
rdEc	68	reverse deceleration

6.10.8 TROUBLESHOOTING FLOWCHARTS - TORQMAX F5 DRIVE

FIGURE 6.39 TORQMAX F5 Troubleshooting Flowchart - Drive Key Pad

Drive Key Pad

Series M TORQMAX
ASME A17.1 - 2000

How to change and save drive parameters.

Start

There are four push buttons on the drive key pad

.

1. Enter / (F/R): Saves the selected parameter. In addition it is also used for selecting parameter groups.
2. UP/Star : Increases the selected parameter value. In addition it is also used to find the parameter group.
3. DN/STOP: Decreases the selected parameter value. In addition it is also used to find the parameter group.
4. FUNC/SPEED: Displays (reads) the parameter value.

1. Select the parameter group (Press the **Enter** key. The blinking dot next to the parameter number should flash).
2. Use **UP** or **DN** arrow to select the desired LF.xx parameter.
3. Press the **FUNC** key to see the parameter value.
4. Use the **UP** or **DN** arrow to change the parameter value.
5. Press **Enter** to save the parameter value (Important, without this step parameter will not be saved).

Stop

FIGURE 6.40 TORQMAX F5 Troubleshooting Flowchart - Critical Drive Parameters

Critical Drive Parameters

Series M TORQMAX

ASME A17.1 - 2000

Start

↓

Write down the motor name plate information.
(Motor Voltage, FLA, Full Load RPM, Frequency)

↓

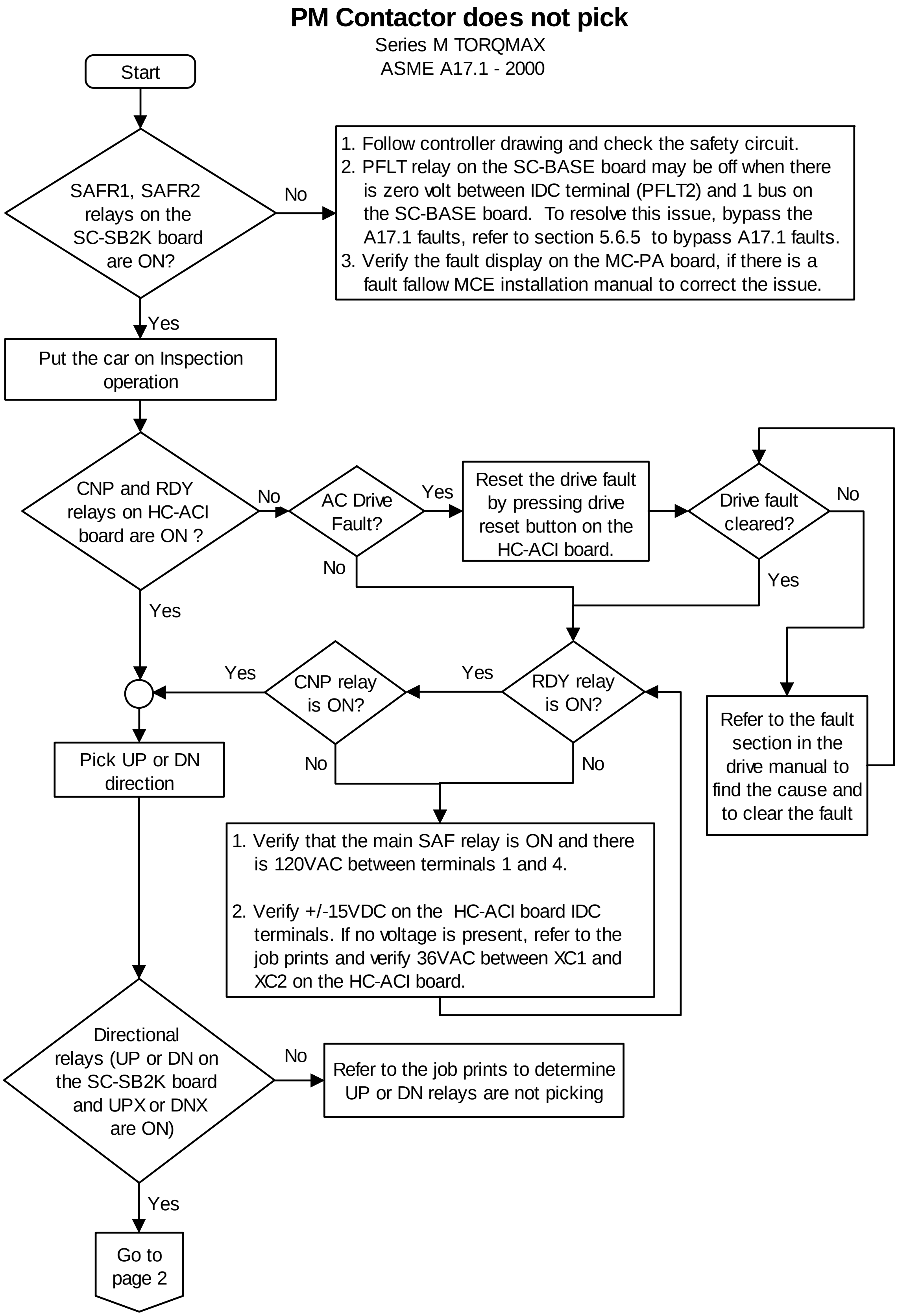
It is always best to write down the values of all drive parameters (using drive key pad). This will ensure that the drive parameter settings are not the cause of the problem. Always verify that motor, encoder and machine data are set accurately. This may take 3 - 5 minutes but it is time worth spending.

↓

- LF.02, LF.04 - Operating mode, motor selection.
- LF.10 to LF.17, LF.18 - Motor, Encoder data.
- LF.21 to LF.25 - Machine data.
- LF.30 to LF.32 - Control method, Gains.
- LF.20, LF.40 to LF.53 - Speed and S curves.
- LF.57 to LF.59 - Speed error detection (E.HSD fault).
- LF.70 - Speed pick delay (Delay to turn on the DRO) .

↓

Stop


PM Contactor does not pick
Series M TORQMAX
ASME A17.1 - 2000
Start
SAFR1, SAFR2 relays on the SC-SB2K board are ON?
No
1. Follow controller drawing and check the safety circuit.
2. PFLT relay on the SC-BASE board may be off when there is zero volt between IDC terminal (PFLT2) and 1 bus on the SC-BASE board. To resolve this issue, bypass the A17.1 faults, refer to section 5.6.5 to bypass A17.1 faults.
3. Verify the fault display on the MC-PA board, if there is a fault fallow MCE installation manual to correct the issue.
Yes
Put the car on Inspection operation
CNP and RDY relays on HC-ACI board are ON ?
No
AC Drive Fault?
Yes
Reset the drive fault by pressing drive reset button on the HC-ACI board.
Drive fault cleared?
No
Yes
No
Refer to the fault section in the drive manual to find the cause and to clear the fault
Yes
RDY relay is ON?
Yes
CNP relay is ON?
Yes
No
No
Pick UP or DN direction
1. Verify that the main SAF relay is ON and there is 120VAC between terminals 1 and 4.
2. Verify +/-15VDC on the HC-ACI board IDC terminals. If no voltage is present, refer to the job prints and verify 36VAC between XC1 and XC2 on the HC-ACI board.
Directional relays (UP or DN on the SC-SB2K board and UPX or DNX are ON)
No
Refer to the job prints to determine UP or DN relays are not picking
Yes
Go to page 2

PM Contactor does not pick

Series M TORQMAX
ASME A17.1 - 2000
Page 2

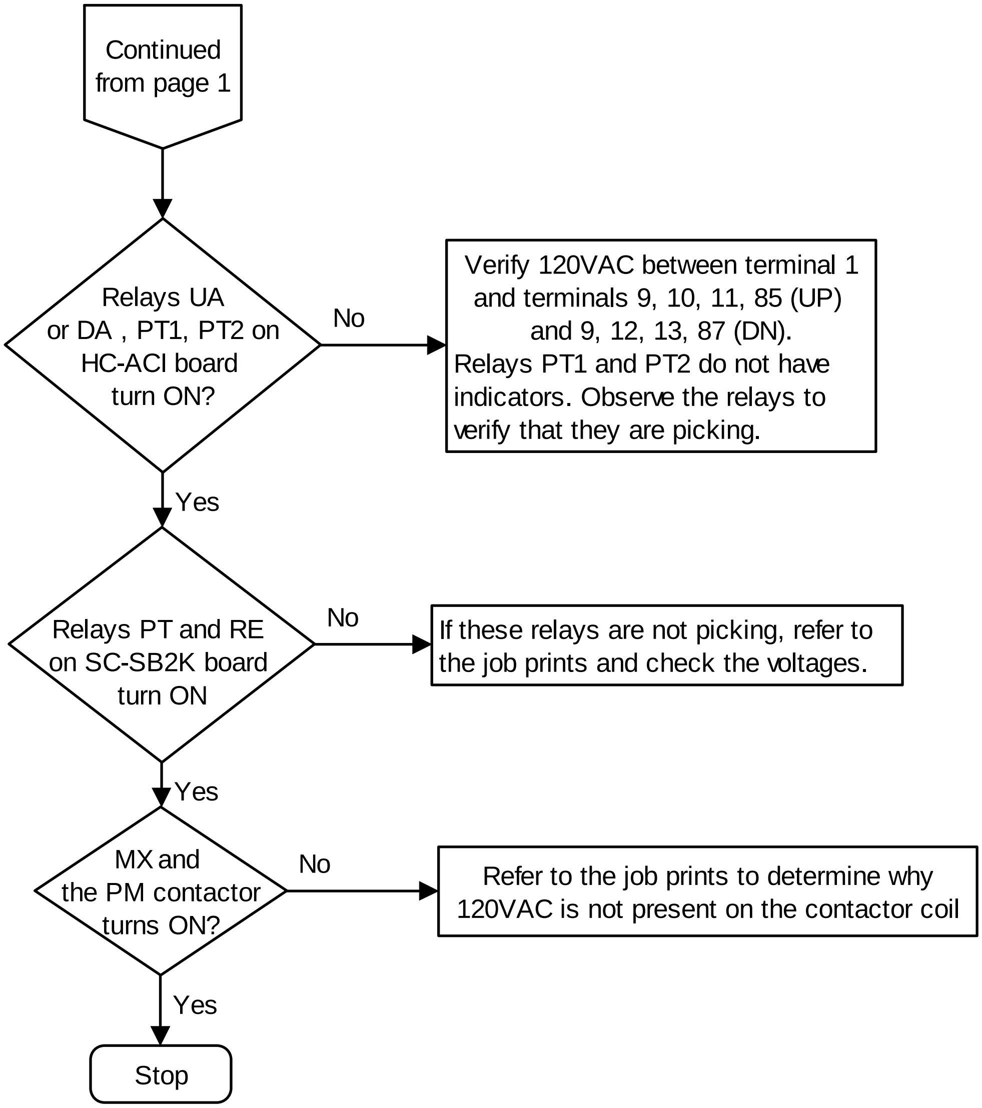
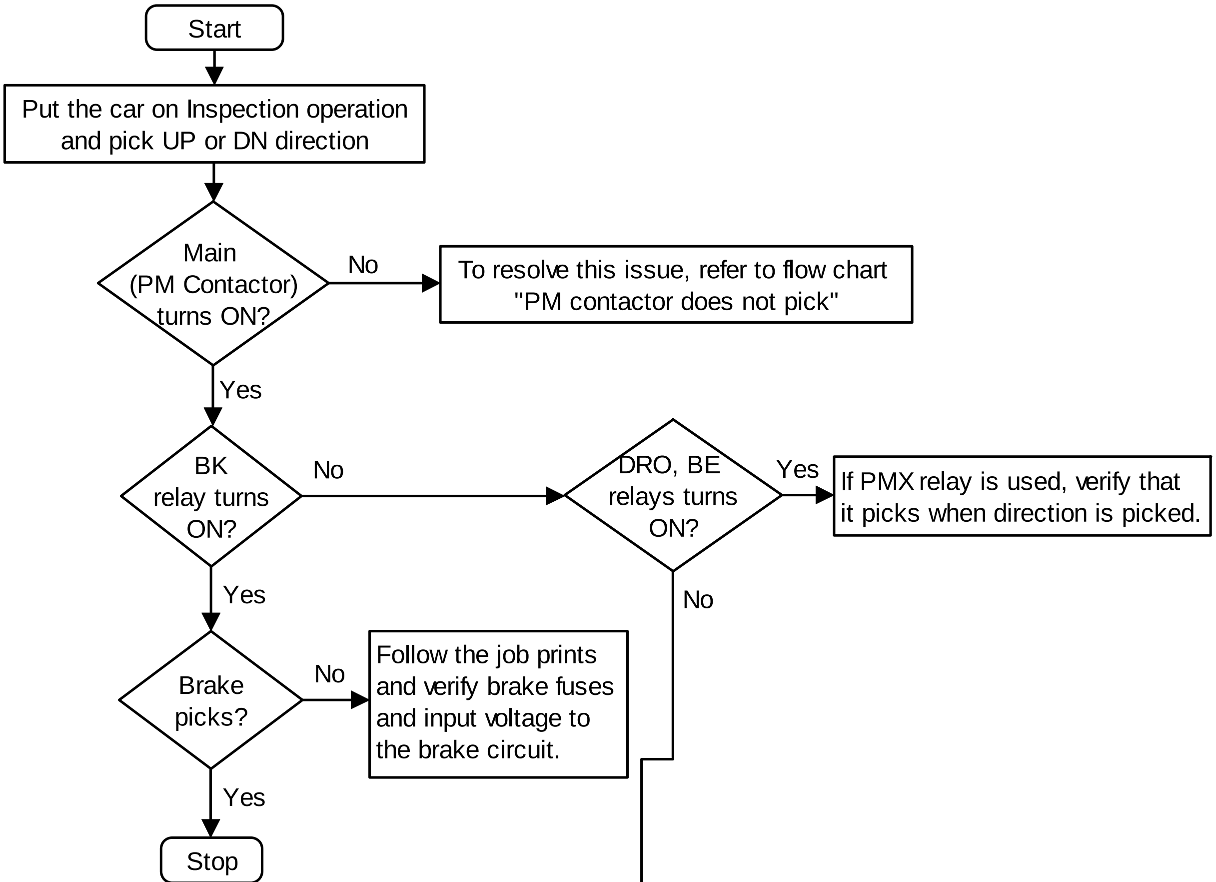


FIGURE 6.42 TORQMAX F5 Troubleshooting Flowchart - Brake does not pick

Brake does not pick

Series M TORQMAX
ASME A17.1 - 2000



1. Verify that all drive parameters are set correctly.
2. Relay BE on the HC-ACI board turns ON when a direction is picked on inspection.
3. Select LF.82. The value should change from 0 to 37 or 41 when a direction is picked on Inspection (0 = No signal, 37 = Enable, Inspection and Forward(UP) inputs are ON, 41 = Enable, Inspection and Reverse(DN) inputs are ON). If this is not true, the drive is not getting the enable and direction input signals.
4. To verify the drive input signals, refer to the job prints and measure the DC voltage between drive common "X2A.22" and the respective input (X2A.14 - Forward, X2A.15 - Reverse, X3A.11.5 - Inspection speed). The voltage should read 18VDC when the respective input is ON.
5. If all the above are true, follow the drawings and verify the voltage at various points in the DRO coil circuit.

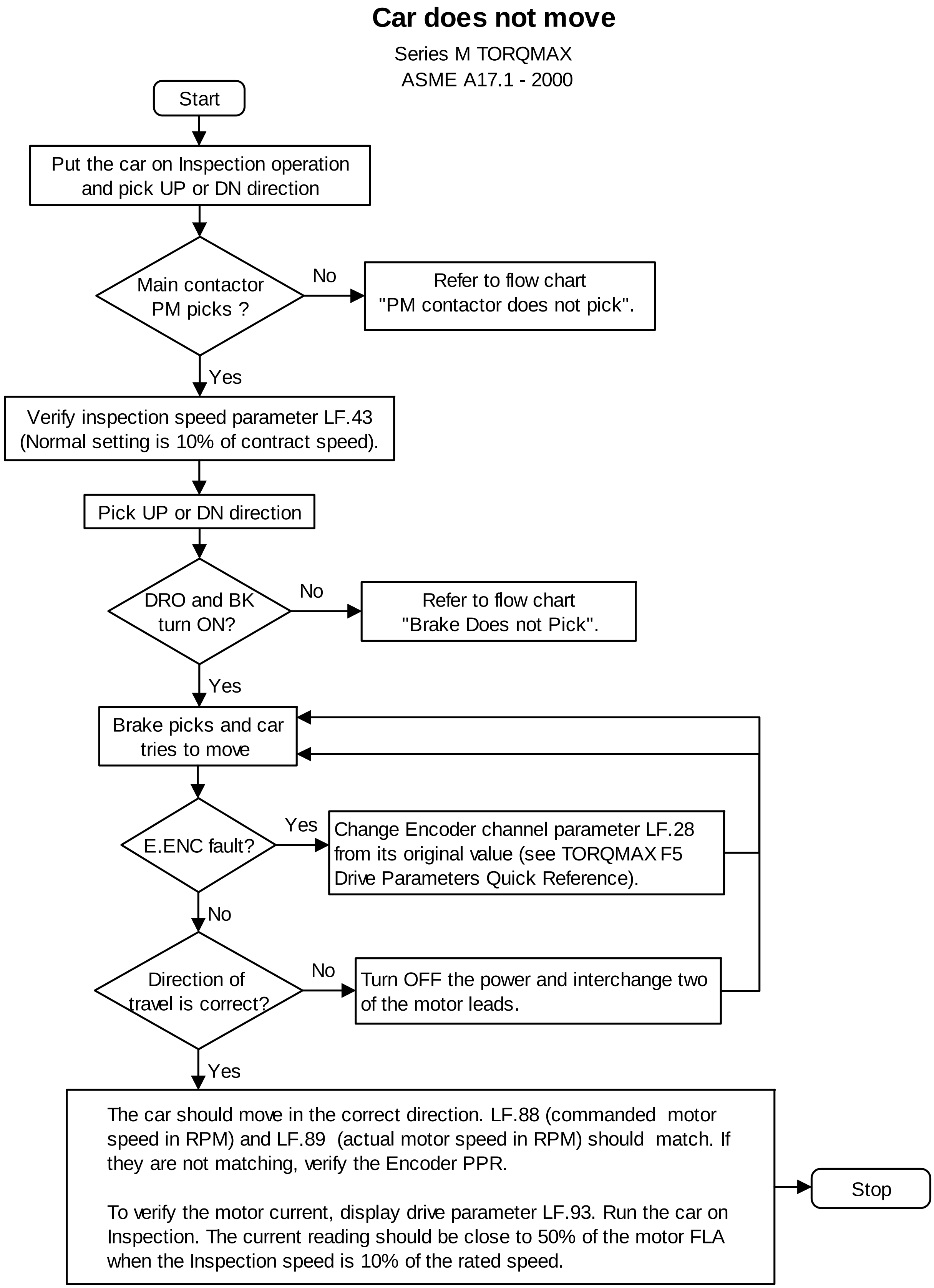

Car does not move
Series M TORQMAX
ASME A17.1 - 2000
Start
Put the car on Inspection operation and pick UP or DN direction
Main contactor PM picks ?
No
Refer to flow chart "PM contactor does not pick".
Yes
Verify inspection speed parameter LF.43 (Normal setting is 10% of contract speed).
Pick UP or DN direction
DRO and BK turn ON?
No
Refer to flow chart "Brake Does not Pick".
Yes
Brake picks and car tries to move
E.ENC fault?
Yes
Change Encoder channel parameter LF.28 from its original value (see TORQMAX F5 Drive Parameters Quick Reference).
No
Direction of travel is correct?
No
Turn OFF the power and interchange two of the motor leads.
Yes
The car should move in the correct direction. LF.88 (commanded motor speed in RPM) and LF.89 (actual motor speed in RPM) should match. If they are not matching, verify the Encoder PPR.
To verify the motor current, display drive parameter LF.93. Run the car on Inspection. The current reading should be close to 50% of the motor FLA when the Inspection speed is 10% of the rated speed.
Stop

FIGURE 6.44 TORQMAX F5 Troubleshooting Flowchart - Encoder fault

Encoder Fault

Series M TORQMAX
ASME A17.1 - 2000

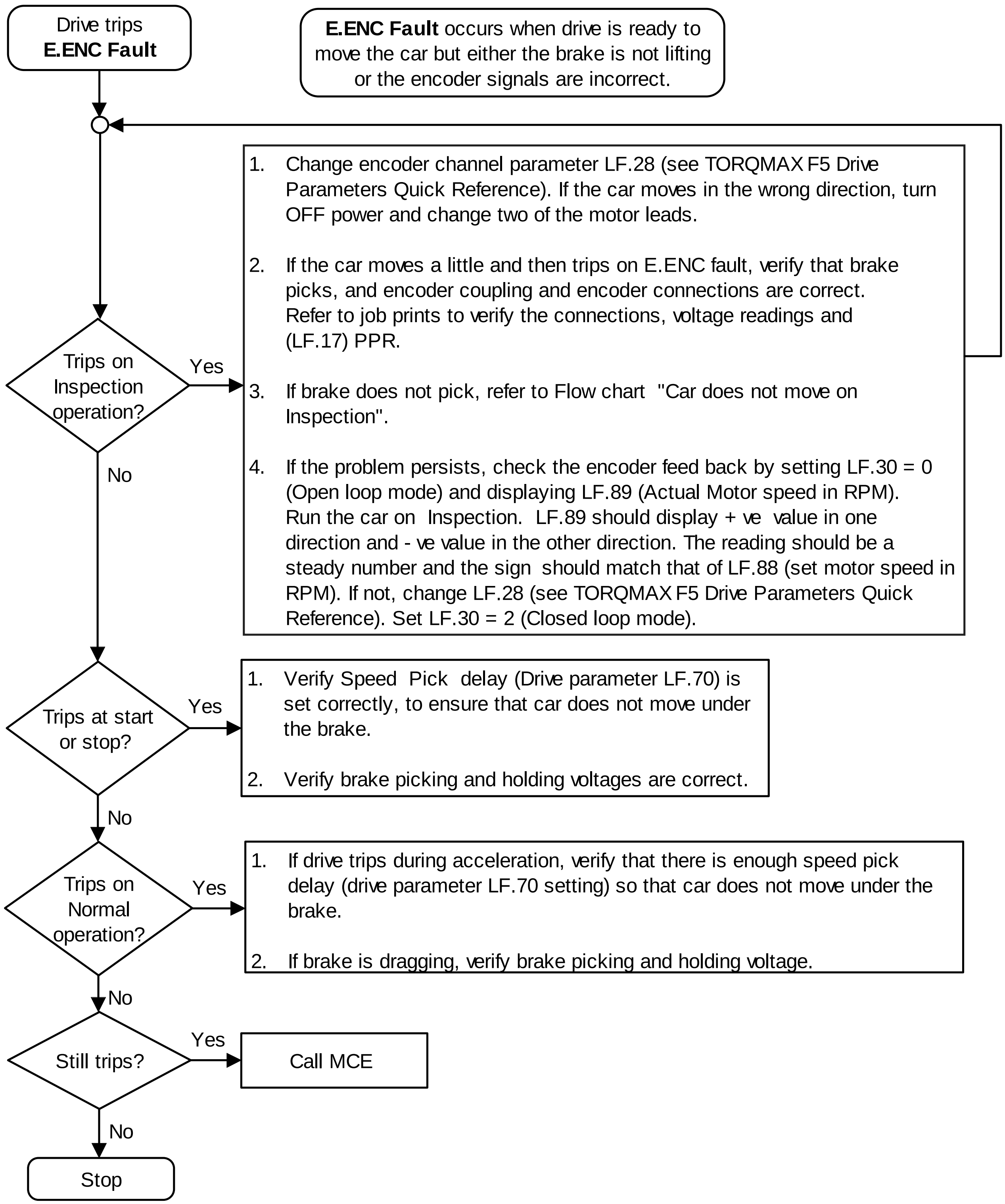
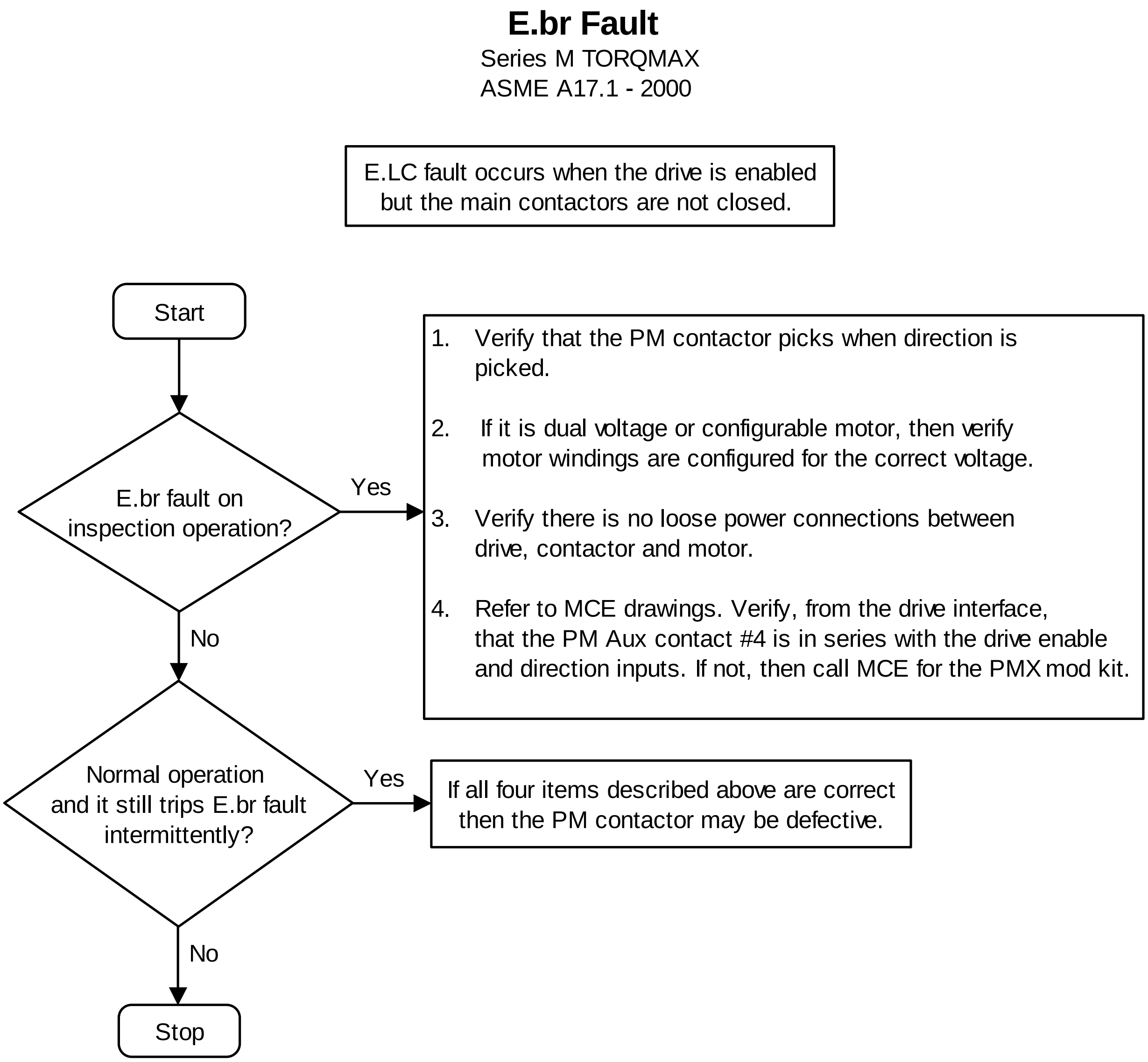
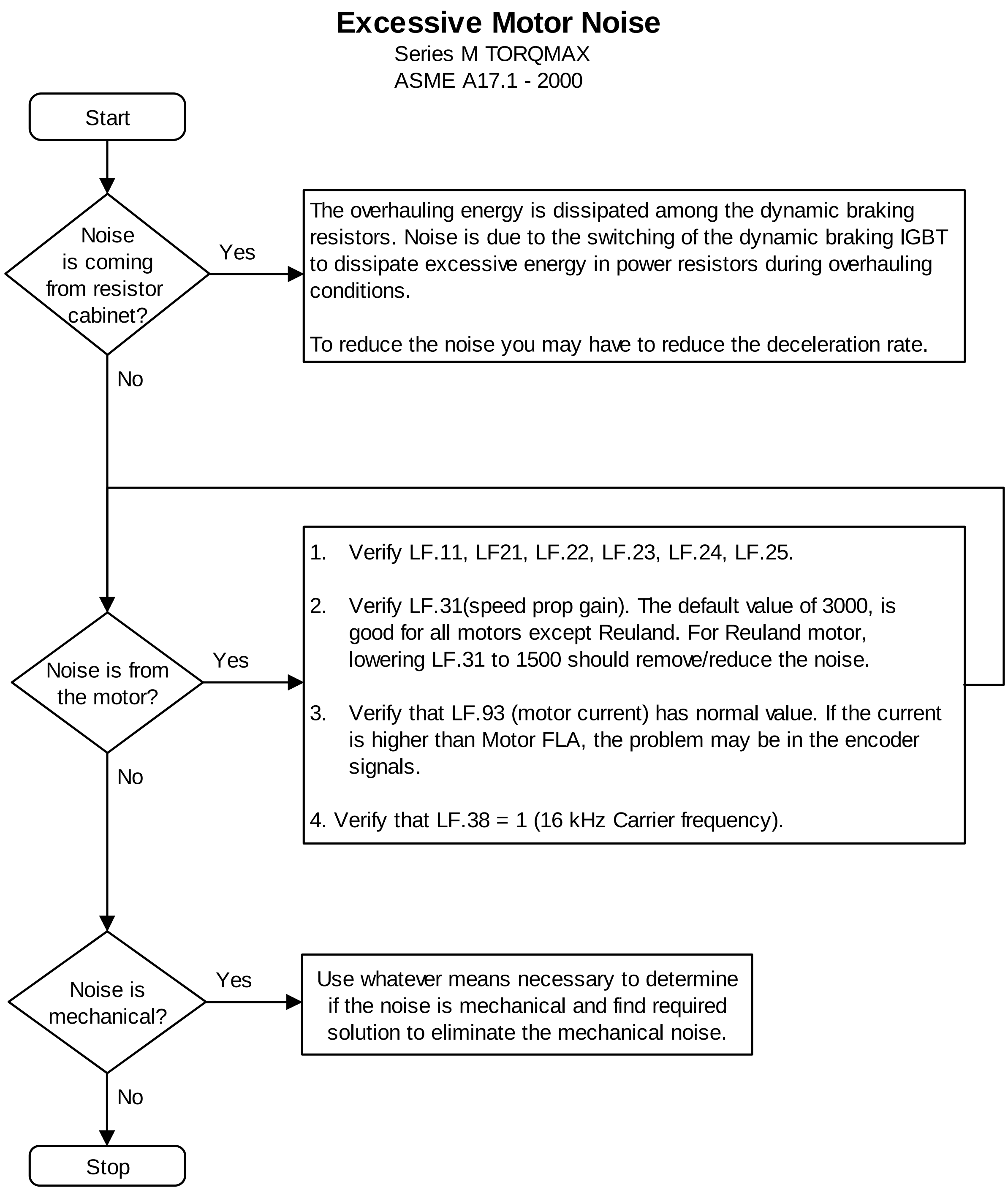


FIGURE 6.45 TORQMAX F5 Troubleshooting Flowchart - E.br fault




Excessive Motor Noise
Series M TORQMAX
ASME A17.1 - 2000
Start
Noise is coming from resistor cabinet?
Yes
The overhauling energy is dissipated among the dynamic braking resistors. Noise is due to the switching of the dynamic braking IGBT to dissipate excessive energy in power resistors during overhauling conditions.
To reduce the noise you may have to reduce the deceleration rate.
No
Noise is from the motor?
Yes
1. Verify LF.11, LF21, LF.22, LF.23, LF.24, LF.25.
2. Verify LF.31(speed prop gain). The default value of 3000, is good for all motors except Reuland. For Reuland motor, lowering LF.31 to 1500 should remove/reduce the noise.
3. Verify that LF.93 (motor current) has normal value. If the current is higher than Motor FLA, the problem may be in the encoder signals.
4. Verify that LF.38 = 1 (16 kHz Carrier frequency).
No
Noise is mechanical?
Yes
Use whatever means necessary to determine if the noise is mechanical and find required solution to eliminate the mechanical noise.
No
Stop

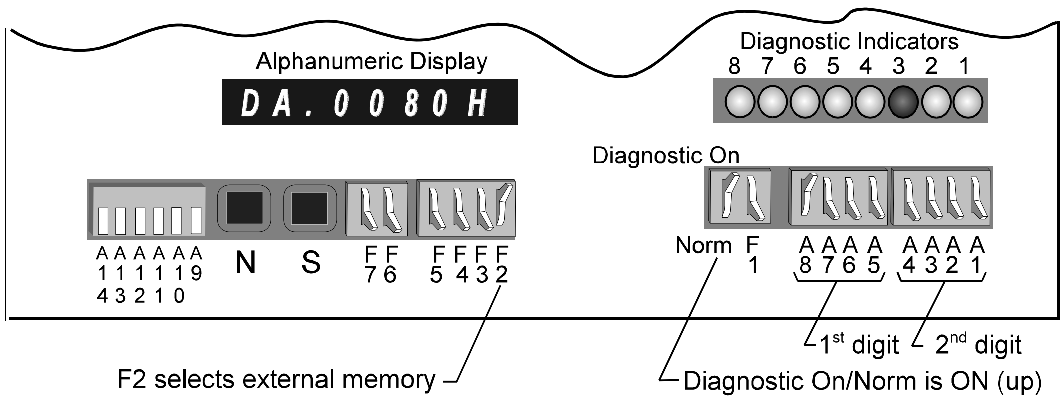
6.11 USING THE MLT DATA TRAP

The MLT "data trap" records many of the controller's operation “flags” at the moment the MLT occurs. This allows you to see what flags led up to the fault. Note: Direction must be on (inputs UPS or DNS) for two minutes before MLT will occur.

Once an MLT shuts down the car, use these steps to look at the stored flags.

1. Do not reset the computer, as this will clear the data trap on controllers with older software versions.* To return the car to service and not harm the data, simply toggle the relay panel inspection switch from OFF to ON and back to OFF.

2. On the Computer Swing Panel, place the Diagnostic On/Norm switch and the F2 switch up (ON) as shown.



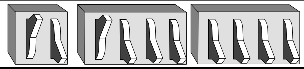
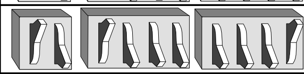
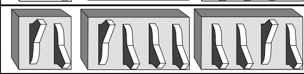
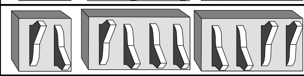
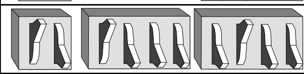
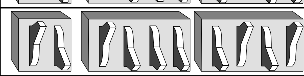
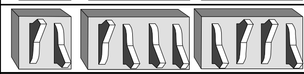
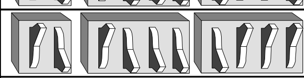
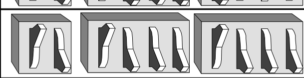
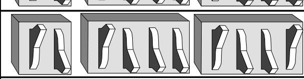
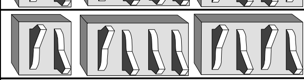
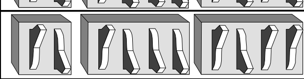
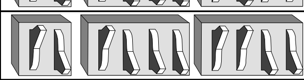
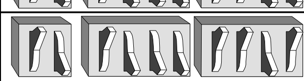
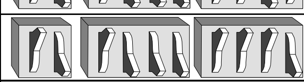
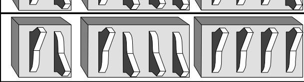
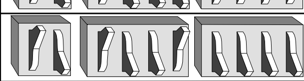
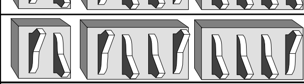
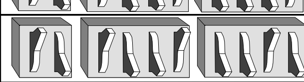
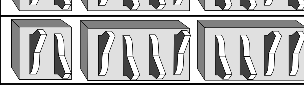
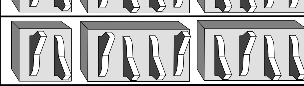
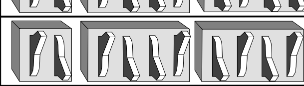
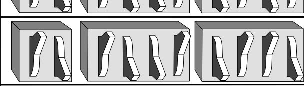
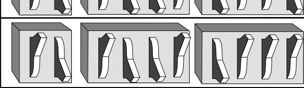
3. Use the DATA TRAP MEMORY CHART to look at the saved MLT data. Set the address switches A1 thru A8 as shown in the Data Trap Memory Chart which is appropriate for your controller type (Local - part of a group or Simplex - stand alone car). Switches A5 thru A8 select the first digit and switches A1 thru A4 select the second digit of the Hex address. The picture above shows the switches set for the first address in the local controller chart.

4. Record the data displayed on the Diagnostic Indicators for all rows (addresses) shown on the chart. It helps if you have a few photocopies of the chart. Simply mark the positions in the chart for the Diagnostic Indicators that are ON. The first 20 addresses contain car status flags. The last four addresses contain the car's position indicator value at the instant the MLT condition occurred, MLT counter, PG flags and MLT Code number. Only the labeled positions are important to mark.

5. Use the recorded values to help determine the root of the problem. Call MCE for assistance if any is needed.

   * Note: If the data trap has been cleared and/or no MLT has occurred, all of the flags in the data trap memory addresses will be set (LEDs will be ON). Each time a new MLT occurs, the new data overwrites the old data.

TRACTION (LOCAL) MLT DATA TRAP MEMORY CHART

Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8.......A5 A4.......A1	Diagnostic Indicators LED *On* = variable flag is On or Active 8	7	6	5	4	3	2	1
80		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
81			DC	UC	CC			DHO	DOI
82		DCF	DCP	DOF	LOT		HCT	CCT	SDT
83				HSEL	CSB	DCC	NUDG		DSHT
84		INT/DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
85				HLW	HLI			FWI	
86		LFP	UFP						
87				EQI	IND	IN		DELSIM	YSIM
88		LLW	DLK		DZORDZ			PK	LLI
89		DNDO	LD		DDP	UPDO	LU		UDP
8A		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
8B		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
8C			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
8D						FRM			FRC
8E		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
8F		HLD	EPI	EPR	SLV	ISR	YRQ	PTR	PTS
90								HML	ALT
91		ATSF	NSI	DNI	UPI	ATS	CTLF	CTL	PFG
92		CAC	CAB	CWI	EQA	EDS	ESTE	EQN	PUSD
93			CWIL						
94		PI	PI	PI	PI	PI	PI	PI	PI
95		Counter	Counter	Counter	Counter	Counter	Counter	Counter	Counter
96		LRARN	IN	CORR	SHRTRUN	DANGER	PH2	PH1	PHS0
97		CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #

DNmd 025

TRACTION (SIMPLEX CAR A) MLT DATA TRAP MEMORY CHART

Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8.......A5 A4.......A1	Diagnostic Indicators LED *On* = variable flag is On or Active 8	7	6	5	4	3	2	1
C0		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
C1			DC	UC	CC			DHO	DOI
C2		DCF	DCP	DOF	LOT		HCT	CCT	SDT
C3				HSEL	CSB	DCC	NUDG		DSHT
C4		INT/DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
C5				HLW	HLI			FWI	
C6		LFP	UFP						
C7				EQI	IND	IN		DELSIM	YSIM
C8		LLW	DLK		DZORDZ			PK	LLI
C9		DNDO	LD		DDP	UPDO	LU		UDP
CA		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
CB		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
CC			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
CD						FRM			FRC
CE		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
CF		HLD		EQA	ATSF		ECRN	CD	EPR
D0					ESP2	EPS1	EPI	HML	ALT
D1		SDAM	CTLM	SUAM	DOLL	RDEMD	CTLF	CTL	PFG
D2		CAC	CBC	CWI	EQA	EDS	ESTE	EQN	PUSD
D3			CWIL						
D4		PI	PI	PI	PI	PI	PI	PI	PI
D5		Counter	Counter	Counter	Counter	Counter	Counter	Counter	Counter
D6		LEARN	IN	CORR	SHRTRUN	DANGER	PH2	PH1	PHS0
D7		CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #

DNmd 026

6.12 ASME A17.1 - 2000 FAULT TROUBLESHOOTING TABLES

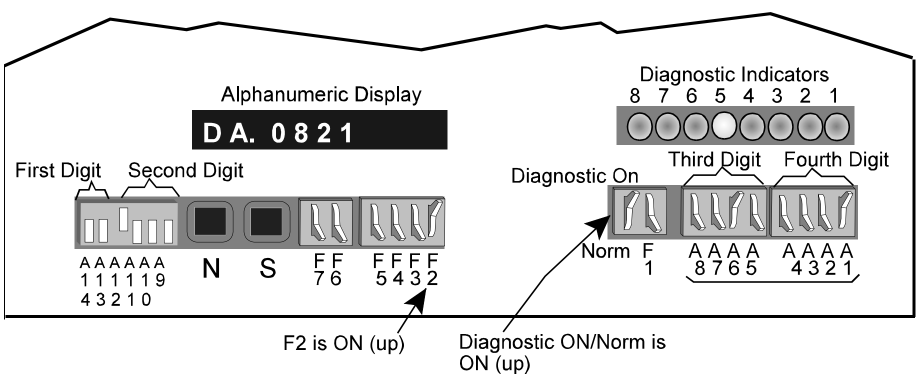
Refer to Section 5.4 *Diagnostic Mode* for detailed information. Diagnostic mode is initiated by placing the Diagnostics On switch up with all other switches down.

TABLE 6.13 ASME A17.1 - 2000 Redundancy Fault Established Map

HEX ADDRESS	FAULT							
0800	PFLT	RESBYP	RSAFR	RSTOP	GOV	SAFH	SAFC	RCT
0801	RFR_FLKR	RFR_STK	EBR_FLKR	EBR_STK	REB2	REB1	REI	2BI
0802	INUP	IN	INMR	ACCI	INICI	INCTI	RMR	RBK
0803	RHD	RCD	DLK	HDB	CDB	HD	CD	INDN
0804	RACC1	RIN2	RIN1	RLULD	DZX	RDZX	RDZ	RPT
0805	ETS2	COS2	ILO1	ETS1	COS1	RCTIC	RTBAB	RACC2
0806	RUP	DNS	DNL	UNL	UPS	DNDIR	UPDIR	ILO2
0807	MGR	MPSAF	ESBYP	TEST	DCL	DPM	RH	RDN
0808	DPDIF	EQR_FLKR	EQR_STK	RHDB	H	CTDIF	CTOS	REL
0809	--	--	--	--	RUDX2	RUDX1	DETS1	UETS1
080A	DZRX	RDZR	RHDR	RCDR	HDBR	CDBR	HDR	CDR
080B	--	--	--	RUDX4	RUDX3	RHDBR	DCLR	DPMR
080F	PLD	CT	ESBYP	EB	4BUS	RSAFR	--	--

6.12.1 ASME A17.1 - 2000 REDUNDANCY FAULT DATA TRAP (F2 is UP)

This Data Trap records the state of the Redundancy Fault Established Map and the SC-HDIO Board Input Map when the MPSAF Output is turned OFF, indicated by the SAFR1 Relay.



Switch F2 selects external memory. Switches A13 and A14 select the first digit (0), A9 thru A12 select the second digit (8), A5 thru A8 select the third digit (2) and A1 thru A4 select the last digit of the address (1). The Alphanumeric Display shows the address 0821 and the diagnostic indicators show the state (on or off) of the data at that address. Looking at the table below note that Diagnostic Indicator 5 (which is on in this example) stands for EBR_STK data.

TABLE 6.14 Redundancy Fault Established Data Trap

HEX ADDRESS	FAULT DATA SHOWN ON DIAGNOSTIC INDICATORS 8	7	6	5	4	3	2	1
0820	PFLT	RESBYP	RSAFR	RSTOP	GOV	SAFH	SAFC	RCT
0821	RFR_FLKR	RFR_STK	EBR_FLKR	EBR_STK	REB2	REB1	REI	2BI
0822	INUP	IN	INMR	ACCI	INICI	INCTI	RMR	RBK
0823	RHD	RCD	DLK	HDB	CDB	HD	CD	INDN
0824	RACC1	RIN2	RIN1	RLULD	DZX	RDZX	RDZ	RPT
0825	ETS2	COS2	ILO1	ETS1	COS1	RCTIC	RTBAB	RACC2
0826	RUP	DNS	DNL	UNL	UPS	DNDIR	UPDIR	ILO2
0827	MGR	MPSAF	ESBYP	TEST	DCL	DPM	RH	RDN
0828	DPDIF	EQR_FLKR	EQR_STK	RHDB	H	CTDIF	CTOS	REL
0829	--	--	--	--	RUDX2	RUDX1	DETS1	UETS1
082A	DZRX	RDZR	RHDR	RCDR	HDBR	CDBR	HDR	CDR
082B	--	--	--	RUDX4	RUDX3	RHDBR	DCLR	DPMR
082F	PLD	CT	ESBYP	EB	4BUS	RSAFR	--	--

6.12.2 ASME A17.1 - 2000 SC-HDIO BOARD INPUT DATA TRAP

TABLE 6.15 ASME A17.1 - 2000 SC-HDIO Board Input Data Trap

HEX ADDRESS	INPUT DATA (1 = ON, 0 = OFF)							
0830	2BI	RCT	RESBYP	RSAFR	STOP	SAFC	SAFH	GOV
0831	INUP	INICI	INCTI	RMR	RBK	RFR	DZX	REI
0832	--	--	RHD	RCD	CD	INDN	INMR	HD
0833	RUP	DNL	UNL	RIN2	RIN1	RLULD	RDZ	RPT
0834	FRSA	FRSM	FRBYP	FCCC	FCOFF	TEST	RH	RDN
0835	--	--	--	--	SSI	CWI	EQR	EDS
0836	HDBO	HDB	CDBO	CDB	ACCI	EBR	REB2	REB1
0837	ILO1	ETS1	COS1	RDZX	RCTIC	RTBAB	RACC2	RACC1
0838	--	--	UETS2	PFLT	ILO2	COS2	ETS2	UPDIR
0839	CDBOR	CDBR	CDR	DZRX	RHDB	DETS1	UETS1	DNDIR
083A	A2KBP	RHDR	RCDR	RDZR	RHDBR	HDBOR	HDBR	HDR
083B	--	--	DETS2	RSTOP	RUDX2	RUDX4	RUDX3	RUDX1

6.12.3 RAW ASME A17.1 2000 SC-HDIO BOARD INPUT MAP

The *RAW* data for the ASME A17.1 - 2000 HDIO Board Input Map table that follows, is data that has not been modified by the controller. To see these inputs select the address in Diagnostic mode (refer to Section 5.3.1)

TABLE 6.16 RAW ASME A17.1 2000 SC-HDIO Board Input Map

HEX ADDRESS	INPUTS							
03E0	2BI	RCT	RESBYP	RSAFR	STOP	SAFC	SAFH	GOV
03E1	INUP	INICI	INCTI	RMR	RBK	RFR	DZX	REI
03E2	--	--	RHD	RCD	CD	INDN	INMR	HD
03E3	RUP	DNL	UNL	RIN2	RIN1	RLULD	RDZ	RPT
03E4	FRSA	FRSM	FRBYP	FCCC	FCOFF	TEST	RH	RDN
03E5	--	--	--	--	SSI	CWI	EQR	EDS
03E6	HDBO	HDB	CDBO	CDB	ACCI	EBR	REB2	REB1
03E7	ILO1	ETS1	COS1	RDZX	RCTIC	RTBAB	RACC2	RACC1
03E8	--	--	UETS2	PFLT	ILO2	COS2	ETS2	UPDIR
03E9	CDBOR	CDBR	CDR	DZRX	RHDB	DETS	UETS	DNDIR
03EA	2KBP	RHDR	RCDR	RDZR	RHDBR	HDBOR	HDBR	HDR
03EB	--	--	DETS2	RSTOP	RUDX2	RUDX4	RUDX3	RUDX1

6.12.4 FORMATTED ASME A17.1 - 2000 SC-HDIO BOARD INPUT / OUTPUT MAP

Refer to Section 5.4 *Diagnostic Mode* for detailed information about Diagnostics mode. Diagnostic mode is initiated by placing the F1-F8 switches in the down position.

TABLE 6.17 Formatted ASME A17.1 - 2000 SC-HDIO Board Input / Output Map

HEX ADDRESS	INPUTS / OUTPUTS							
0700	2_BI_M	MPSAF	STOP	SAFC	SAFH	GOV	RSAFR	2_BI
0701	TEST	INDN	INUP	RIN2	RIN1	INMR	INICI	INCTI
0702	IN_M_TRUE	--	--	RTBAB	RACC2	RACC1	ACCI	RCTIC
0703	--	EQR_M	EQLED	EQIND	SSI	CWI	EQR	EDS
0704	HDBO	HDB	CDBO	CDB	RHD	RCD	HD	CD
0705	--	FIR1	FWL	FRSA	FRSM	FRBYP	FCCC	FCOFF
0706	CTDIF	CTOS	ILO2	ETS2	COS2	ILO1	ETS1	COS1
0707	RESBYP	ESBYP	–	RMR	RBK	RPT	REI	MB
0708	TWO_2_ONE	ONE_2_TWO	EB2	EB1	EBRM	EBR	REB2	REB1
0709	DNDIR	UPDIR	CTPLD1	RUP_M	RDN	RUP	DNL	UNL
070A	RFR	RFRM	A2KBP	CT	RCT	RH	RLULD	RDZ
070B	HDBOR	HDBR	CDBOR	CDBR	RHDR	RCDR	HDR	CDR
070C	DETS1	UETS1	RHDBR	RHDB	RDZR	DZRX	RDZX	DZX
070D	RUDX4	RUDX3	RUDX2	RUDX1	RSTOP	DETS2	UETS2	PFLT

TABLE 6.18 Mnemonic Definitions for Tables 6.13 thru 6.17

A2KBP	ANSI 2000 Bypass Input	INICI	Inspection - In Car Inspection
ACCI	Inspection Access	INMR	Inspection - Machine Room
ASI4		IN_M_TRUE	True Inspection Memory
ASI7		INUP	Inspection - Up Input
ASI8		MB	Motor / Brake Output
CD	Car Door	MPSAF	Main Processor - Safety Output
CDB	Car Door Bypass Switch - Bypass Position	ONE_2_TWO	Indicates Switching from EB1 to EB2
CDBO	Car Door Bypass Switch - Off Position	PFLT	PLD Fault Input
CDBOR	Car Door Rear Bypass Switch - Off Position	RACC1	Redundancy Access Inspection Relay #1
CDBR	Car Door Rear Bypass Switch - Bypass Position	RACC2	Redundancy Access Inspection Relay #2
CDR	Car Door Rear	RBK	Redundancy Brake Relay
COS1	Overspeed - Contract, PLD #1	RCD	Redundancy Car Door Relay
COS2	Overspeed - Contract, PLD #2	RCDR	Redundancy Car Door Rear Relay
CT	Cycle Test Output	RCT	Redundancy Cycle Test Relay
CTDIF	Cycle Test - DP Differential	RCTIC	Redundancy Car Top / In Car Inspection Relay
CTOS	Cycle Test - Overspeed	RDN	Redundancy Down Relay
CWI	Counterweight Input	RDZ	Redundancy Door Zone Relay
DETS1	Down Emergency Terminal Switch #1	RDZR	Redundancy Door Zone Rear Auxiliary Relay
DETS2	Down Emergency Terminal Switch #2	RDZX	Redundancy Door Zone Auxiliary Relay
DNDIR	Down Direction Detected	REB1	Emergency Brake Relay #1
DNL	Down Normal Limit	REB2	Emergency Brake Relay #2
DZRX	Door Zone Rear Auxiliary	REI	Run Enable Input
DZX	Door Zone Auxiliary	RESBYP	Redundancy Emergency Stop Switch Bypass Relay
EB1	Emergency Brake Relay #1 Output	RFR	Redundancy Fault Reset
EB2	Emergency Brake Relay #2 Output	RFRM	Redundancy Fault Reset Memory
EBR	Emergency Brake Reset	RH	Redundancy High Speed Relay
EBRM	Emergency Brake Reset Memory	RHD	Redundancy Hoistway Door Relay
EDS	Earthquake Direction Switch	RHDB	Redundancy Hoistway Door Bypass Relay
EQIND	Earthquake Indicator	RHDBR	Redundancy Hoistway Door Bypass Rear Relay
EQLED	Earthquake Light	RHDR	Redundancy Hoistway Door Rear Relay
EQR	Earthquake Reset Switch	RIN1	Redundancy Inspection Relay #1
EQRM	Earthquake Reset Switch Memory	RIN2	Redundancy Inspection Relay #2
ESBYP	Emergency Stop Switch Bypass	RLULD	Redundancy Level Up / Level Down Relays
ETS1	Overspeed - Emergency Terminal Switch, PLD #1	RMR	Redundancy Motor Relay
ETS2	Overspeed - Emergency Terminal Switch, PLD #2	RPT	Redundancy Car / Hoistway Door Timed Relay
FCCC	Fire Phase 2 - Car Call Cancel	RSAFR	Redundancy Safety Relay Input
FCOFF	Fire Phase 2 Switch - Off position	RTBAB	Redundancy Top / Bottom Access Buttons Relay
FIR1	Fire Phase 1 Active - Main or Alternate	RUDX1	Redundancy Up/Down Auxiliary #1
FRBYP	Fire Phase 1 Switch - Bypass Position	RUDX2	Redundancy Up/Down Auxiliary #2
FRSA	Fire Phase 1 - MR / HTW Sensor - Alternate Recall	RUP	Redundancy Up Relay
FRSM	Fire Phase 1 - MR / HTW Sensor - Main Recall	RUP_M	Redundancy Up Relay Memory
FWL	Fire Warning Light	SAFC	Safety Circuit - Car
GOV	Governor Switch Input	SAFH	Safety Circuit - Hoistway
HD	Hoistway Door	SSI	Seismic Switch Input
HDB	Hoistway Door Bypass Switch - Bypass Position	STOP	Stop Switch Input
HDBO	Hoistway Door Bypass Switch - Off Position	TEST	Test Input
HDBOR	Hoistway Door Rear Bypass Switch - Off Position	TWO_2_ONE	Indicates Switching from EB2 to EB1
HDBR	Hoistway Door Rear Bypass Switch - Bypass Position	TWO_BI	2 Bus Input
HDR	Hoistway Door Rear	TWO_BI_M	2 Bus Input Memory
ILO1	Overspeed - Inspection / Leveling, PLD #1	UETS1	Up Emergency Terminal Switch #1
ILO2	Overspeed - Inspection / Leveling, PLD #2	UETS2	Up Emergency Terminal Switch #2
INCTI	Inspection - Car Top Inspection	UNL	Up Normal Limit
INDN	Inspection - Down Input	UPDIR	Up Direction Detected

APPENDIX

APPENDIX A
DISASSEMBLING THE COMPUTER SWING PANEL

MCE Technical Support may advise an installer to remove a circuit board from the Computer Swing Panel (Figure 1.2) for troubleshooting, replacement of the board or an EPROM. If so, remove the thumbscrew holding the Swing Panel to the bracket on the back plate. Rotate the Swing Panel so that the boards are accessible.

Loosen and remove the four nuts securing the back cover plate. This may require the use of a 11/32 nut driver.

CAUTION:	Components on the PC boards can be damaged by ESD. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

Disconnect the 20 pin ribbon cables from the HC-PI/O and MC-RS boards.

Remove the circuit boards from the Swing Panel. Put the nuts back on the bolts for safekeeping.

Unsnap the boards from each other and replace/repair the boards as necessary.

FIGURE A.1 Computer Swing Panel Boards, Unsnapped

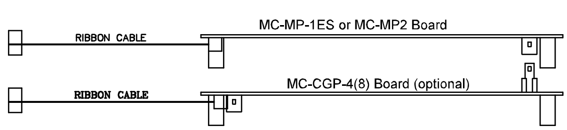


FIGURE A.2 Computer Swing Panel Boards, Snapped Together

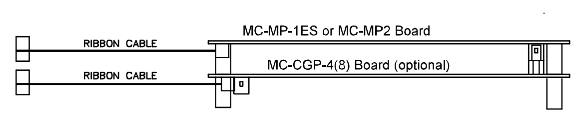
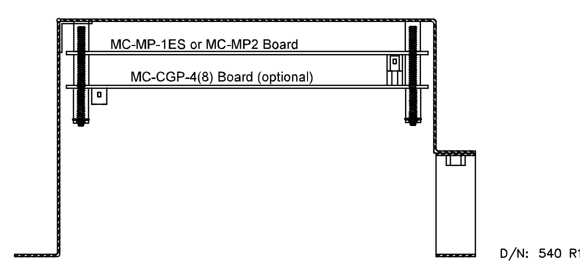


FIGURE A.3 Computer Swing Panel Without Boards (Top View)

FIGURE A.4 Computer Swing Panel With Boards (Top View)



APPENDIX B
CHANGING PC BOARDS OR EPROMS

With directions from MCE Technical Support, a PC board, EPROMs or Microcontroller may need to be reinstalled in the field. Great care should be taken when changing any of these items. The EPROM stores the computer program, the microcontroller both stores and executes the program and all three are subject to damage by ESD (see CAUTION). These instructions should be followed step-by-step.

CAUTION: Components on the PC boards can be damaged by ESD. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

B.1 REPLACING THE MAIN PROCESSOR BOARD OR EPROMS

Normally the microprocessor on the Main Processor board MC-MP2-2K is not replaced in the field. Sometimes the EPROM is replaced to upgrade the program and occasionally the complete board must be replaced due to a component failure.

Replacing the EPROM - The EPROM for the MC-MP2-2K board is labeled S-MP2-xx-1. The "xx" represents the controller type. If the new EPROM has the same job number as the old EPROM, the user settings for timers and adjustable control variables, etc., are retained. Any new timers or variables added to the new EPROM will be set to their default values.

If the job number on the new EPROM is different from the job number on the old EPROM, all of the timers and variables will be set to their default values. The user settings should be documented before the old EPROM is removed so that they can be re-entered when the new EPROM is installed.

Replacing the Main Processor board - The user settings for timer and adjustable control variables are stored in battery backed RAM on the Main Processor board. If the new board was previously installed in another car controller, the user settings from that car will be retained. If the new board is a replacement from MCE, all of the user programmable values will be set to their default values. Therefore, the current user settings should be documented before the old board is removed so that they can be re-entered when the new board is installed. The following is a list of the user settings:

- Elevator Timers (see Section 5.2.3)
- Real Time Clock Flags (see Section 5.2.4)
- Communications Port Settings (see Section 5.3.1)
- Security Codes (see Section 5.3.3)
- Master Software Key (MSK) (see Section 5.3.4)
- Software Options - Adjustable Control Variables (see Section 5.3.5)

Replacement Procedure

1. Document the current settings for the items listed above.

2. Turn power OFF at the main disconnect and verify that no lights are operating on the microprocessor panel. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

3. Remove the Main Processor board MC-MP2-2K from the Swing Panel. Refer to Appendix A for instructions on unloading the boards from the Swing Panel. If you are replacing the PC board, proceed to step 6 below (refer to Figure 6.22 MC-MP2 Board Quick Reference for proper jumper settings).

4. Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket, *not* between the socket and the board (see Figure 6.22). Gently pry the existing EPROM out from the socket. Do this very slowly, taking care not to bend the leads. If they become bent, straighten them carefully with needlenose pliers.

5. Place the new EPROM lightly (do not plug it in yet) into the socket and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the orientation of the notch should also correspond to the notches on all of the other chips on the board). Now push the EPROM firmly into the socket and make sure that *none* of the pins are bent during the insertion. Inspect the EPROM to make sure that no pins are bent outward or under the EPROM.

6. Reassemble the Swing Panel assembly and close the Swing Panel. Refer to the instructions in Appendix A.

7. Turn power ON at the main disconnect. Verify the proper operation of all boards by inspecting the diagnostic indicators and Computer ON LEDs on the individual processor boards.

    - If the Computer ON LEDs are not illuminated on all boards, the EPROMs may not have been installed properly. Repeat the above steps 2 through 7.

8. Re-enter the user settings documented in step 1 above.

B.2 REPLACING THE MC-CGP-4 (8) BOARD OR EPROMS

Sometimes the EPROMs are replaced to upgrade the program to a new software version and occasionally the complete board must be replaced for a software upgrade or a component failure.

Replacing the EPROMs - The EPROMs for the MC-CGP-4 (8) board are labeled S-CGP-C-1 and S-CGP-C-2.

i) EPROMs with the same software version number will not cause the loss of user data. Follow steps **2 thru 7** in the Replacement Procedure below.

ii) EPROMs with a new software version number will result in loss of user data. Follow the **entire** Replacement Procedure below.

Replacing the MC-CGP-4 (8) board - The user settings for the items listed below are stored in battery backed RAM on the MC-CGP-4 (8) board. If the new board was previously installed in another car controller, the user settings from that car will be retained. Follow the **entire**

Replacement Procedure below when using a board from another car controller which has different settings from those of the car being replaced or when installing a board from MCE.

NOTE: The Fault Log and Performance Reports will all be lost and can not be recovered.

Replacement Procedure

1. Document the current settings for the items listed below.

   - M3 Group Parameters or Car ID parameter CNID on F1 -1 screen for local cars only
   - Security - timer tables, security configurations, passenger names and access codes (simplex car and group only)
   - Special Events Calendar Menu options Configure by Type, Configure by Controller, and CMS Com Port Setup (if available)
   - Job Configuration data used for display - job name, car label and landing labels

2. Turn power OFF at the main disconnect and verify that no lights are operating on the microprocessor panel. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

3. Remove the MC-CGP-4 (8) board from the Swing Panel. Refer to Appendix A for instructions on unloading the boards from the Swing Panel. If you are replacing the PC board, proceed to step 6 below (refer to Figure 6.23 MC-CGP-4 Board Quick Reference for proper jumper settings).

4. The two EPROMs on the MC-CGP-4 (8) board are labeled ROM1-U17 and ROM2-U18 (see Figure 6.23) Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket, *not* between the socket and the board. Gently pry the existing EPROMs out from the socket. Do this very slowly, taking care not to bend the leads. If they become bent, straighten them carefully with a needlenose pliers.

5. Place the new EPROMs lightly (do not plug it in yet) into the sockets and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the orientation of the notch should also correspond to the notches on all of the other chips on the board). Now push the EPROMs firmly into the socket and make sure that *none* of the pins are bent during the insertion. Inspect the EPROMs to make sure that no pins are bent outward or under the EPROM.

6. Reassemble the Swing Panel assembly and close the Swing Panel. Refer to the instructions in Appendix A.

7. Turn power ON at the main disconnect. Verify the proper operation of all boards by inspecting the diagnostic indicators and Computer ON LEDs on the individual processor boards.

   - If the Computer ON LEDs are not illuminated on all boards, the EPROMs may not have been installed properly. Repeat the above steps 2 through 7.
   - Verify that the group controller is communicating with the cars by looking at the LEDs in the front of the group swing panel.

8. Set ODPC=ON, on the General F1-1 screen, and save the parameter, or reset the MC-CGP parameters as described in Section 5.2.6.

9. Re-enter the user settings documented in step 1 above.

B.3 REPLACING THE EPROM ON THE SMARTLINK MC-NC / MC-NIO BOARD

With directions from MCE Technical Support, an EPROM may need to be reinstalled in the field. Great care should be taken as printed circuit (PC) boards and integrated circuits (ICs), such as an EPROM, are subject to damage by ESD (see CAUTION). These instructions should be followed step-by-step.

> **CAUTION:** Components on the PC boards can be damaged by ESD. Wear an ESD grounding strap on your wrist and connect it to ground before handling the PC boards.

Identification of the EPROMs - The EPROM for the MC-NC board is labeled S-NC-C (see Figure I.9, MC-NC Board Quick Reference). The EPROM for the MC-NIO board is labeled S-NIO-C (see Figure I.10, MC-NIO Board Quick Reference).

Replacement Procedure

1. Turn controller power OFF and verify that no lights are operating on the processor boards. Wear an ESD grounding strap on your wrist and connect it to ground before handling the PC boards.

2. Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket (***not*** between the socket and the board). Gently pry the existing EPROM out from the socket. Do this very slowly, taking care not to bend the leads.

3. Position the new EPROM into the socket (do not plug it in yet) and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the notch orientation of all the ICs on the board are the same). Once these checks have been made, push the EPROM slowly, evenly and firmly into the socket and make sure that the pins are not bent during the insertion. Inspect the EPROM for pins bent outward or under the EPROM and correct any bent pins found.

4. Disconnect Network cable NETA and NETB. Turn power ON. Verify the proper operation of the board by inspecting the diagnostic indicators (COMPUTER ON and SERVICE LEDs) on the respective processor boards:

   MC-NC Board - If installed properly, the COMPUTER ON LED will be ON continuously and the SERVICE LED will be OFF, plus both will blink together approximately once every 10 seconds. This pattern repeats continuously. If the EPROM has been installed incorrectly, both the Computer ON and the SERVICE LEDs will blink simultaneously once per second. A similar pattern is observed if no EPROM is installed. Repeat the above steps 1 through 3. Check for notch orientation and look for bent pins.

   MC-NIO Board - If properly installed, the SERVICE LED should not illuminate and the COMPUTER ON LED should stay ON continuously. If the SERVICE LED stays illuminated, the EPROM may not be installed properly. Repeat the above steps 1 through 3. Check for notch orientation and look for bent pins.

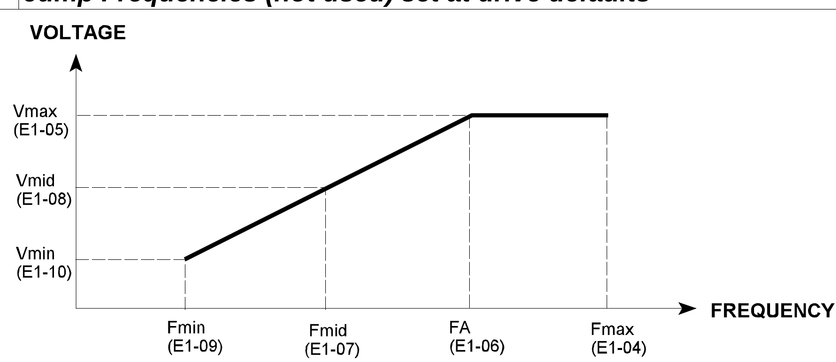
APPENDIX C
QUICK REFERENCE FOR G5+, GPD515 + DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

Field Adjustable Parameters are shown in shaded rows. All other parameters should be set to the values shown below in the “Field/MCE Set” column.

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
Initialize							
A1-00	Select Language	Language Selection 0: English 1: Japanese	-	0 - 1	0	B	0
A1-01	Access Level	Parameter access level 0: Operation Only 3: Basic Level 1: User Program 4: Advanced Level 2: Quick Start Level	-	0 - 4	3	B	3
A1-02 or U1-04 ******	Control Method (for MagneTek drive, use U1-4 to verify the control method)	Control Method selection - motor 1 0: V/f Control 2: Open Loop Vector 1: V/f w/PG Fdbk 3: Flux Vector	-	0 - 3	0	B	✿
		✿ V/F Control - Open Loop = 0 Flux Vector = 3					
A1-03 *******	Inlt Parameters	Operator status 0: No Initialize 2220: 2-Wire Initial 1110: User Initialize 3330: 3-Wire Initial	-	0 - 9999	0**	B	0**
A1-04	Enter Password	Password (for entry)	-	0000 - 9999	-	B	0
A2	User Contents	Not used					
Programming							
B	**Application**						
B1	***Sequence***						
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	B	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	B	1
B1-03	Stopping Method	Stopping Method 0: Ramp to Stop 2: DC Injection to Stop 1: Coast to Stop 3: Coast w/Timer	-	0 - 3	0	B	0
B1-04	Reverse Oper	Prohibition of reverse operation 0: Reverse Enabled 1: Reverse Disabled	-	0/1	0	B	0
B2	***DC braking***						
B2-01	DCInj Start Freq	DC braking frequency (speed level)	Hz	0.0 - 10.0	1.5	B	1.5
B2-02	DCInj Current	DC braking current *(N/A to Flux Vector)*	%	0 - 100	50	B	50
B2-03	DCInj Time@Start	DC braking time at start	s	0.00 - 10.00	0.0	B	✿
		✿ V/F Control - Open Loop = 0.20 Flux Vector = 0.0					
B2-04	DCInj Time@Stop	DC Braking time at stop	s	0.00 - 10.00	1.0	B	0.5
C	**Tuning**	**Field Adjustable Parameters are shown in the shaded rows.**					
C1	***Accel/Decel***						
C1-01	Accel Time 1	Acceleration time 1	s	0.00 - 6000.0	1.96	B	✳
C1-02	Decel Time 1	Deceleration time 1	s	0.00 - 6000.0	1.96	B	✳
C1-03	Accel Time 2	Acceleration time 2	s	0.00 - 6000.0	1.96	B	1.60

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
C1-04	Decel Time 2	Deceleration time 2	s	0.00 - 6000.0	0.01	B	0.1
C1-05	Accel Time 3	Acceleration time 3	s	0.00-6000	1.0	A	1.0
C1-06	Decel Time 3	Deceleration time 3	s	0.00-6000	1.0	A	1.0
C1-07	Accel Time 4	Acceleration time 4	s	0.00-6000	1.96	B	✳
C1-08	Decel Time 4	Deceleration time 4	s	0.00-6000	1.96	B	✳
C1-09	Fast Stop Time	Fast Stop Time	s	0.00-6000	1.0	A	1.0
C1-10	Acc/Dec units	Accel/Decel time 0:0.01, 1:0.1	S	0/1	0	A	0
C1-11	Acc/Dec SW fre	Accel/Decel switching level	Hz	0.00-400	0.0	B	0.0
C3	***Motor-Slip Comp***						
C3-01	Slip Comp Gain	Slip compensation gain	-	0.0 - 2.5	1.0	B	1.0
C3-02	Slip Compensation	Primary Time Delay *(N/A to Flux Vector)*	-	0 - 2000	200	B	200
C3-04	Slip comp regen	Slip compensation during regen (*N/A to Flux Vector)*		0, 1	1	B	1
C4	***Torque Comp***						
C4-01	Torque Comp Gain	Torque compensation gain *(N/A to Flux Vector)*	-	0.00 - 2.50	1.00	B	1.0
C4-02	Torque Comp Time	Torque Compensation Time Constant *(N/A to Flux Vector)*	ms	0 - 1000	200	B	200
C5	***ASR Tuning (Flux Vector only)***						
C5-01	ASR P Gain1	ASR proportional gain 1 *(Flux Vector only)*	-	0.0-300	20	B	20.0
C5-02	ASR I Time 1	ASR integral time 1 *(Flux Vector only)*	s	0.00- 10.0	.200	B	0.20
C5-03	ASR P Gain 2	ASR proportional gain 2 *(Flux Vector only)*	-	0.00-300.0	20.0	B	20.0
C5-04	ASR I Time 2	ASR integral time 2 *(Flux Vector only)*	s	0.0- 10.0	0.50	B	0.50
C6	***Carrier Freq***						
C6-01	Carrier Freq Max	Carrier frequency upper limit	kHz	0.4 - 15.0	KVA dependent	B	10
D	**Reference**	**Field Adjustable Parameters are shown in the shaded rows.**					
D1	***Preset Reference***						
D1-01	Reference 1	Preset reference 1 (Not used)****	Hz	0.0	0.0	B	0.0
D1-02	Reference 2	Preset reference 2 (H Speed)****	Hz	0.0-80	30	B	✳
D1-03	Reference 3	Preset reference 3 (H Level)****	Hz	0.0-15	8.0	B	✳
D1-04	Reference 4	Preset reference 4 (Not used)****	Hz	0.0	0.0	B	0.0
D1-05	Reference 5	Preset reference 5 (Level)****	Hz	0-10	1.3	B	✳
D1-06	Reference 6	Preset reference 6 (Not used)****	Hz	0.0	0.0	B	0.0
D1-07	Reference 7	Preset reference 7 (Intermediate Speed)****	Hz	0-55	25	B	✳
D1-08	Reference 8	Preset reference 8 (Not used)****	Hz	0.0	0.0	B	0.0
D1-09	Reference 9	Preset reference 9 (Inspection Speed)**** (Jog Reference)	Hz	0-40	10	B	✳
D2	***Reference Limits***						
D2-01	Ref Upper Limit	Reference upper limit	%	0.0 - 100.0	100.0	B	100
D2-02	Ref Lower Limit	Reference lower limit	%	0.0 - 100.0	0.0	B	0
D3	***Jump Frequencies (not used) set at drive defaults***						



No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
E	**Motor**	**Field Adjustable Parameters are shown in the shaded rows.**					
E1	***V/f Pattern***						
E1-01	Input Voltage	Input voltage	V	180 - 460	230/460	B	✳
E1-02	Motor Selection	Motor selection 0: Fan-Coded 1: Blower-Coded	-	0/1	0	B	0
E1-03	V/f Selection *(N/A to Flux Vector)*	V/f pattern selection 0: 50Hz 1: 60Hz Saturation 2: 50Hz Saturation 3: 72Hz 4: 50Hz Variable Torque 1 5: 50Hz Variable Torque 2 6: 60Hz Variable Torque 1 7: 60Hz Variable Torque 2 8: 50Hz High Starting Torque 1 9: 50Hz High Starting Torque 2 A: 60Hz High Starting Torque 1 B: 60Hz High Starting Torque 2 C: 90Hz (N/A)*** D: 120Hz (N/A)*** E: 180Hz (N/A)*** F: User-defined V/f pattern	-	0 - F	F	B	F
E1-04	Max Frequency	Maximum frequency	Hz	0.0-80.0	60.0	B	✳
E1-05	Max Voltage	Maximum voltage (Motor Voltage)	V	0.0 - 460.0	230/460	B	✳
E1-06	Base Frequency	Maximum voltage output frequency	Hz	0.0-72.0	60.0	B	✳
E1-07	Mid Frequency A	Mid. output frequency *(N/A to Flux Vector)*	Hz	0.0-72.0	3.0	B	3.0
E1-08	Mid Voltage A	Mid. output voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	16.1/32.2	B	✳
E1-09	Min Frequency	Minimum output frequency *(N/A to Flux Vector)*	Hz	0.0-72.0	0.5	B	0.5
E1-10	Min Voltage	Minimum output voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	10.0/20.0	B	✳
E2	***Motor Setup***						
E2-01	Motor Rated FLA	Motor rated current	A	0.00 - 1500.0	Motor rated FLA	B	✳
E2-02	Motor Rated Slip***	Motor rated slip frequency - Note: Refer to the attached table to calculate the slip frequency.	Hz	0 - 15.0	kVA dependent	B	✳
E2-03	No load current	Motor No Load Current	A	0-150	30 - 50% Motor FLA	B	✳
E2-04	Number of Poles	Number of Motor Poles *(Flux Vector only)*	-	2 - 48	6	B	✳
F	**Option**	**Field Adjustable Parameters are shown in the shaded rows.**					
F1	***PG Option Setup (Flux Vector only)***						
F1-01	PG pulse/Rev.	PG constant *(Flux Vector only)*	-	0-60000	1024	B	1024
F1-02	PG Feedback Loss selection *(Flux Vector only)*	Stoping method at PG line brake detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-03	PG overspeed selection *(Flux Vector only)*	Stoping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-04	PG Deviation selection *(Flux Vector only)*	Stoping method at DEV detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-05	PG Rotation sel.	PG rotation 0: CCW 1: CW *(Flux Vector only)*	-	0/1	0	B	0 or 1
F1-06	PG output ratio	PG division rate *(Flux Vector only)*	-	1-132	1	B	1
F1-07 thru F1-13	*(Flux Vector only)*	Set to drive defaults.				B	

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
H	**Terminal**						
H1	***Digital Inputs***						
H1-01	Terminal 3 Sel	Terminal 3 selection (Ref to H1-01 in drive manual) *7 = Multi Accel/Decel 1*	-	0 - 7F	7	B	7
H1-02	Terminal 4 Sel	Multi-function input (terminal 4) *14 = Fault Reset*	-	0 - 7F	14	B	14
H1-03	Terminal 5 Sel	Multi-function input (terminal 5) *80 = Mult-step spd 1F*	-	0 - 7F	80	B	80
H1-04	Terminal 6 Sel	Multi-function input (terminal 6) *81 = Mult-step spd 2F*	-	0 - 7F	81	B	81
H1-05	Terminal 7 Sel	Multi-function input (terminal 7) *82 = mult-step spd 3F*	-	0 - 7F	82	B	82
H1-06	Terminal 8 Sel	Multi-function input (terminal 8) *6 = Jog Ref (Inspection speed)*	-	0 - 7F	6	B	6
H2	***Digital Outputs***						
H2-01	Terminal 9 Sel	Multi-function input (terminal 9, terminal 10) *(same as F5-01) 37 = During Run 2*	-	0 - 3F	37	B	37
H2-02	Terminal 25 Sel	Multi-function input (terminal 25, terminal 27) *(same as F5-01) 4 = Freq. Detection 1*	-	0 - 3F	4	B	4
H2-03	Terminal 26 Sel	Multi-function input (terminal 26, terminal 27) *(same as F5-01) F = not used*	-	0 - 3F	F	B	F
H3	***Analog Inputs***						
H3-01	Term 13 Signal	Signal selection (terminal 13) 0: 0 to 10VDC 1: -10 to +10VDC	-	0/1	0	B	0
H3-02	Terminal 13 Gain	Reference % gain (terminal 13)	%	0.0 - 1000.0	100.0	B	100
H3-03	Terminals 13 Bias	Reference ±% bias (terminal 13)	%	-100.0 - 100.0	0.0	B	0
H3-04	Term 16 Signal	Signal selection (terminal 16) 0: 0 to 10VDC 1: -10 to +10VDC	-	0/1	0	B	0
H3-05	Terminal 16 Sel	Multi-function analog input selection (terminal 16) 1F = Not Used	-	0 - 1F	1F	B	1F
H3-06	Terminal 16 Gain	Reference % gain (terminal 16)	%	0.0 - 1000.0	100.0	B	100
H3-07	Terminal 16 Bias	Reference ±% bias (terminal 16)	-	-100.0 - 100.0	0.0	B	0
H4	***Analog Outputs***						
H4-01	Terminal 21 Sel	Analog output selection (terminal 21) *(same as F4-01)* 1 = Frequency Ref.	-	1 - 31	1	B	1
H4-02	Terminal 21 Gain	Analog output gain (terminal 21)	-	0.00 - 2.50	1.00	B	1.0
H4-03	Terminal 21 Bias	Analog output bias (terminal 21)	%	-10.0 - 10.0	0.0	B	0.0
H4-04	Terminal 23 Sel	Analog output selection (terminal 23) 2 = Output Freq.	-	1 - 31	2	B	2
H4-05	Terminal 23 Gain	Analog output gain (terminal 23)	-	0.00 - 2.50	1.00	B	1.0
H4-06	Terminal 23 Bias	Analog output bias (terminal 23)	%	-10.0 - 10.0	0.0	B	0.0
H4-07	AO Level Select	Analog output level selection 0: 0 to 10V 1: -10 to +10V	-	0/1	0	B	0
PROTECTION							
L1	***Motor Overload***						
L1-01	MOL Fault Select	Motor protection fault selection - OL1 0: Disabled 1: Coast to Stop	-	0/1	0	B	1
L1-02	MOL Time Const	Motor protection time constant	min	1.0 - 20.0	1.0	B	1.0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
L2	***PwrLoss Ridethru***						
L2-01	PwrL Selection	Momentary power loss ridethrough selection 0: Disabled 1: Ridethrough (for time set in L2-02) 2: Ridethrough while CPU has power	-	0 - 2	0	B	0
L2-02	PwrL RideThru t	Momentary power loss time	s	0.0 - 2.0	2.0	B	2.0
L2-03	PwrL Baseblock t	Minimum baseblock time	s	0.0 - 5.0	0.7	B	0.7
L3	***Stall Prevention***						
L3-01	StallP Accel Sel (N/A to Flux vector drive)	Stall prevention selection during accel 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	1	B	1
L3-02	StallP Accel Lvl *(N/A to Flux Vector)*	Stall Prevention level during accel	%	0 - 200	180	B	180
L3-04	StallP Decel Sel	Stall prevention selection during decel 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	0	B	0
L3-05	StallP Run Sel *(N/A to Flux Vector)*	Stall prevention selection during running 0: Disabled 1: Decel 1 2: Decel 2	-	0 - 2	0	B	0
L3-06	StallP Run Level *(N/A to Flux Vector)*	Stall prevention level during running	%	30 - 200	160	B	160
L4	***Ref Detection (Flux Vector only)***	***set to drive default for V/f***					
L4-01	Spd Agree Level	Speed agree det level *(Flux Vector only)* (L4-01 = E1-04)	Hz	0-400	0	B	60
L4-02	Spd Agree width	Speed agree det width *(Flux Vector only)*	Hz	0-20	2	B	5.0-8.0
L5	***Fault Restart***						
L5-01	Num of Restarts	Number of automatic restart attempts	-	0 - 10	0	B	0
L5-02	Restart Sel	Automatic restart operation selection 0: No Fault Relay 1: Fault Relay Active	-	0/1	1	B	1
L6	***Torque Detection***						
L6-01	Torq Det 1 Sel	Torque detection 1 selection 0: Disabled 1: Alarm at Speed Agree 2: Alarm at Run 3: Fault at Speed Agree 4: Fault at Run	-	0 - 4	0	B	0
L6-02	Torq Det 1 Lvl	Torque detection 1 level	%	0 - 300	150	B	150
L6-03	Torq Det 1 Time	Torque detection 1 time	s	0.0 - 10.0	0.1	B	0.1
L7	***Torque Limits (Flux Vector only)***						
L7-01 thru L7-04	Torque Limits *(Flux Vector only)*	Set to Factory Defaults	-	0 - 300	200	B	200
L8	***Hdwe Protection***						
L8-01	DB Resistor Prot	Protection selection for internal DB resistor	-	0/1	0	B	0
L8-05	Ph Loss In Sel ***	Input phase loss protection 0: Disabled 1: Enabled	-	0/1	1	B	1
L8-07	Ph Loss Out Sel ***	Output phase loss protection 0: Disabled 1: Enabled	-	0/1	1	B	1
Operator							
O1	***Monitor Select***						
O1-01	User Monitor Sel	Monitor selection 6 = Output voltage	-	4 - 28	6	B	6
O1-02	Power-On Monitor	Monitor selection after power-up 1: Frequency reference 2: Output Frequency 3: Output Current 4: User monitor	1	1 - 4	1	B	1
O1-03	Display Scaling	Scale units for setting and monitoring frequency	-	0 - 39999	0	B	0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
O2	***Key Selections***						
O2-01	Local/Remote Key	Local/Remote Key 0: Disabled 1: Enabled	-	0/1	0	B	0
O2-02	Oper Stop Key	Stop key during external terminal operation 0: Disabled 1: Enabled	-	0/1	1	B	1
O2-03	User Default *****	User(MCE) defined default value settings 0 = No change 1= Set defaults 2 = Clear all	-	0-2	0	B	1 *****
P	**Elevator**	**Field Adjustable Parameters are shown in the shaded rows.**					
P1	***S Curve Control***	REFER SECTION 4.2.3, S CURVE ADJUSTMENTS FOR MORE DETAILS					
P1-01	Scrv Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	B	4.0
P1-02	Scrv Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	B	10.5
P1-03	Scrv Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	B	48.0
P1-04	Scrv Acc Start 1	S Curve #1 at the Start of Acceleration	Sec	0.01 - 2.5	1.2		✳
P1-05	Scrv Acc End 1	S Curve #1 at the End of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-06	S CrvDec Start 1	S Curve #1 at the Start of Deceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-07	S Crv Dec End 1	S Curve #1 at the End of Deceleration	Sec	0.01 - 2.5	1.10	B	✳
P1-08	S Crv Acc Start 2	S Curve #2 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-09	S Crv Acc End 2	S Curve #2 at the End of Acceleration	Sec	0.01 -2.5	0.2	B	0.2
P1-10	S Crv Dec Start 2	S Curve #2 at the Start of Deceleration	Sec	0.01 - 2.5	1.5	B	✳
P1-11	S Crv Dec End 2	S Curve #2 at the End of Deceleration	Sec	0.01 - 2.5	1.05	B	✳
P1-12	S Crv Acc Start 3	S Curve #3 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-13	S Crv Acc end 3	S Curve #3 at the End of Acceleration	Sec	0.01 -2.5	1.2	B	✳
P1-14	S Crv Dec Start 3	S Curve #3 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	✳
P1-15	S Crv Dec End 3	S Curve #3 at the End of Deceleration	Sec	0.01 - 2.5	0.9	B	0.9
P1-16	S Crv Acc Start 4	S Curve #4 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-17	S Crv Acc End 4	S Curve #4 at the End of Acceleration	Sec	0.01 - 2.5	1.2	B	
P1-18	S Crv Dec Start 4	S Curve #4 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	
P1-19	S Crv Dec End 4	S Curve #4 at the End of Deceleration	Sec	0.01 -2.5	0.2	B	0.2
P2	***Stop /Start***	Do not change these parameters. They are not used for elevator applications.					
P3	***Fault Auto-Reset***						
P3-01	Num Auto-Resets	Number of Automatic Resets	-	0 - 10	3	A	3
P3-02	Auto-Reset Time	Time Delay Between Automatic resets	sec	0.5 - 10.0	3.0	A	3.0

NOTE: The MagneTek and IDM drive software has been modified for this application, some of the parameters in this sheet are different and are not available in the drive manuals. If a drive has been replaced in the field then all the drive parameters should be entered manually and should be verified according to this parameter sheet. A = Advance, B = Basic

***** Must be set correctly for your specific motor/machine/job. Refer to the adjustment manual.

****** Do not initialize the drive in the field if it is not required. Setting A1-03 =1110 and pressing enter will initialize the Drive and will set all of the drive parameters to the MCE Drive default values. Parameter A1-03 will display 0 after Initialization.

******* All the required advanced parameters are accessible in the Basic mode because of modified drive software.

******** OPE40 error will occur, if D1-01 through D1-09 selected above MCE default values (IDM drive will display Min ans Max values) . Refer to final adjustments or drive fault section in the MCE manual.

********* At the factory, MCE will set the drive parameters to the values shown in the *MCE Set* column above, and will save those values as “User Default” by setting parameter O2-03 = 1. In the field, the drive parameters can be *reset* to the MCE Set values by setting parameter A1-03 = 1110. The Field Adjustable parameters can then be re-entered.

****** To verify Open loop or Flux Vector Mode: IDM drive use A1-02, MagneTek drive use U1-04.

******* Two wire initialization on an IDM drive will select Flux Vector mode (A1-02 = 3). For open loop controller, after the two wire initialization, verify/set A1-02 = 0.

Once all the above described steps are complete then all the modified parameters can be viewed and changed by accessing the modified constant.

FIGURE C.1 Velocity Curve and S Curve Parameters (G5 / GPD515)

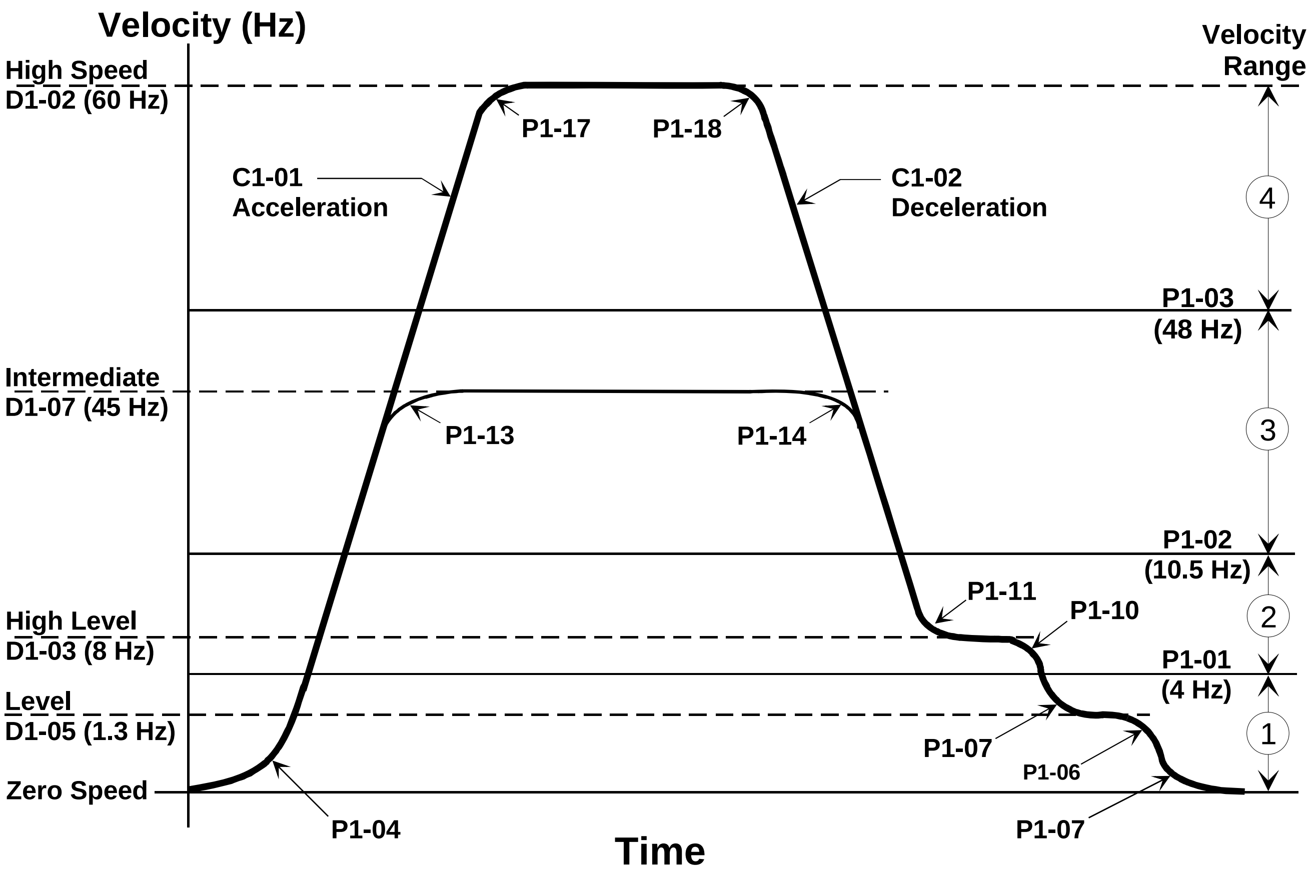


Table for Selection of S-Curves

(Increasing the value (time) of an S-curve parameter causes a longer (smoother) transition)

Range	Velocity (Hz)	Start Accel	End Accel	Start Decel	End Decel
①	Less than P1-01	✶ **P1-04**	P1-05	P1-06	✶ **P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	✶ **P1-10**	✶ **P1-11**
③	Between P1-02 and P1-03	P1-12	✶ **P1-13**	✶ **P1-14**	✶ **P1-15**
④	Greater than P1-03	P1-16	✶ **P1-17**	✶ **P1-18**	P1-19

✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.

Motor Rated Slip Frequency = E2-02

$E2\text{-}02 = f_s = f - (N \times P/120)$

where...

f_s: slip frequency (Hz)
f: motor rated frequency (Hz)
N: motor rated speed (F.L - rpm)
P: number of motor poles

P	Synchronous RPM	
	60Hz Motor	**50Hz Motor**
8	900	750
6	1200	1000
4	1800	1500

Job #:	
Drive Model #:	
Drive Manufacturer:	
Drive Serial Number:	
Drive Software (U1-14):	
Line #:	
Tested By:	
Approved:	

PARAMETER TREE

MENU	Sub-menu	Group	Function	Parameter No. Quick-start	Basic	Advanced
Operation	U Monitor	U1	Monitor	01-14	15-19	
		U2	Fault trace	01-14		
		U3	Fault history	01-08		
A Initialize		A1	Initialize	00-04		
		A2	User constants			01-32
Programming	B Application	B1	Sequence	01-03	04	05-07
		B2	DC braking		01-04	
		B3	Speed search			01-03
		B4	Delay timers			01,02
		B5	PID control			01-08
		B6	Reference hold			01-04
		B7	Droop control			01,02
		B8	Energy saving			01,02
		B9	Zero servo			01,02
	C Tuning	C1	Accel/Decel	01, 02	03, 04, 09	05-06,10,11
		C2	S-curve accel/decel			01-04
		C3	Motor slip compensation		01	02-04
		C4	Torque compensation		01	02
		C5	ASR tuning		01-04	05-07
		C6	Carrier frequency		01	02,03
		C7	Hunting prevention			01
	D Reference	D1	Preset reference	01-04, 09	05-08	
		D2	Reference limit		01, 02	
		D3	Jump frequency		01-04	
		D4	Sequence			01,02
		D5	Torque control			01-04
	E Motor	E1	V/f pattern 1	01-10		11-13
		E2	Motor set-up 1	01-04		05-09
	F Option	F1	PG option set-up	01	02-07	08-13
		F2	AI-14 set-up		01	
		F3	DI-08, 16 set-up		01	
		F4	AO-08, 12 set-up		01-04	
		F5	DO-02 set-up		01, 02	
		F6	DO-08 set up		01	
		F7	PO-36F set up		01	
	H Terminal	H1	Digital inputs		01-06	
		H2	Digital outputs		01-03	
		H3	Analog inputs		01-07	08-12
		H4	Analog outputs		01-06	
		H5	Serial communication set-up			01-04
	L Protection	L1	Motor overbad		01-02	
		L2	Power loss ride through		01-03	04,05
		L3	Stall prevention		01,02,04-06	03
		L4	Reference detection		01,02	03-05
		L5	Fault restart		01,02	
		L6	Torque detection		01-03	04,05
		L7	Torque limit	01-04		
		L8	Hardware protection		01	02,03,05,07
	O Operator	O1	Monitor select		01-04	05
		O2	Key select		01-04	05-08
	P Elevator	P1	S Curve Control		P1-01 - P1-19	
Modified Constants						
Auto-tuning						

APPENDIX D
QUICK REFERENCE FOR HPV 900 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

Field adjustable parameters are shown in shaded rows. All other parameters should be set to the values shown below in the “Field/MCE Set” column.

WARNING: ***Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.***

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
Adjust A0						
A1	***Drive***					
	Contract Car Spd	Elevator Contract Speed	fpm	0 - 3000	0.1	✳
	Contract Mtr Spd	Motor Speed at elevator contract speed	rpm	50 - 3000	1130	✳
	Respone	Sensitivity of the speed regulator	rad/ sec	1.0 - 20.0	10	20
	Inertia	System inertia	sec	0.25 - 50.00	2.0	✳
	Inner Loop Xover	Inner speed loop crossover frequency (only with Ereg speed regulator)	rad/ sec	0.1 - 20.0	2.0	2.0
	Gain Reduce Mult	Percent of response of the speed regulator using when in the low gain Mode	%	10 - 100	100	80
	Gain Chng Level	Speed level to change to low gain mode (only with internal gain switch)	%	0 - 100.0	100	10
	Tach Rate Gain	Helps with the effects of rope resonance	%	0 - 30.0	0	0
	Spd Phase Margin	Sets phase margin of speed regulator (only with PI speed regulator)	º	45 - 90	80	80
	Ramped Stop Time	Time to ramp torque from rated torque to zero (only with torque ramp down stop function)	sec	0 - 2.50	0.20	0.20
	Contact Flt Time	Time before a contactor fault is declared	sec	0.10 - 5.00	0.50	0.50
	Brake Pick Time	Time before a brake pick fault is declared	sec	0 - 5.00	0.00	0.00
	Brake Hold Time	Time before a brake hold fault is declared	sec	0 - 5.00	0.00	0.00
	Overspeed Level	Threshold for detection of overspeed fault	%	100.0 - 150.0	125.0	125.0
	Overspeed Time	Time before an overspeed fault is declared	sec	0 - 9.99	1.00	1.00
	Overspeed Mult	Multiplier for overspeed test	%	100 - 150	100	100
	Encoder Pulses	Encoder counts per revolution	ppr	600 - 10000	1024	1024
	Spd Dev Lo Level	Range around the speed reference for speed deviation low logic output	%	00.1 - 10.0	10	10
	Spd Dev Time	Time before speed deviation low logic output is true	sec	0 - 9.99	1.00	1.00
	Spd DevHi Level	Level for declaring speed deviation alarm	%	0 - 99.9	20.0	20.0
	Spd Command Bias	Subtracts an effective voltage to actual speed command voltage	volts	0 - 6.00	0.00	0.00
	Spd Command Mult	Scales analog speed command	-	0.90 - 3.00	1.00	1.00
	Pre Torque Bias	Subtracts an effective voltage to actual pre torque command voltage	volts	0 - 6.00	0.00	0.00
	Pre Torque Mult	Scales pre-torque command	-	-10.00-10.00	1.00	1.0
	Zero Speed Level	Threshold for zero speed logic output	%	0 - 99.99	1.00	0.00

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Zero Speed Time	Time before zero speed logic output is declared true	sec	0 - 9.99	0.10	0.10
	Up/Dwn Threshold	Threshold for detection of up or down direction	%	0 - 9.99	1.00	1.00
	Mtr Torque Limit	Motoring torque limit	%	0 - 250.0	250.0	250.0
	Regen Torq Limit	Regenerating torque limit	%	0 - 250.0	250.0	250.0
	Flux Wkn Factor	Defines the torque limit at higher speeds	%	60.0 - 100.0	75.0	75.0
	Ana Out 1 Offset	Subtracts an effective voltage to actual analog output 1	%	-99.9 - 99.9	0.00	0.00
	Ana Out 2 Offset	Subtracts an effective voltage to actual analog output 2	%	-99.9 - 99.9	0.00	0.00
	Ana Out 1 Gain	Scaling factor for analog output 1	-	0 - 10.0	1.0	1.0
	Ana Out 2 Gain	Scaling factor for analog output 2	-	0 - 10.0	1.0	1.0
	Flt Reset Delay	Time Before a fault is automatically reset	sec	0 - 120	5	5
	Flt Reset / Hour	Number of faults that is allowed to be automatically reset per hour	faults	0 - 10	3	3
	Up to SPD. Level	The logic output function is true when the motor speed is above the user specified speed defined by this parameter	%	0 - 110.00	080.00	080.00
	Mains DIP Speed	When enabled by the Main DIP Speed (A1) parameter, speed is reduced by this percent when a UV alarm (low voltage) is declared	%	5 - 99.9	25.00	25.00
	Run Delay Timer	Delays the Drive's recognition of the RUN signal.	sec	0.00 - 0.99	0.00	0.10
	AB Zero Spd Lev	Auto Brake Function - N/A to MCE products	%	0.00 - 2.00	0.00	0.00
	AB Off Delay	N/A to MCE products	sec	0.00 - 9.99	0.00	0.00
	Contactor DO Delay	N/A to MCE products	sec	0.00 - 5.00	0.00	0.00
	TRQ Lim Msg Dly	Determines the amount of time the drive is in torque limit before the Hit Torque Limit message is displayed.	sec	0.50 - 10.00	0.50	2.00
	SER2 Insp Spd	Defines the serial mode 2 inspection (only serial mode 2)	ft/min	0 - 100	000.0	000.0
	SER2 RS Crp Spd	Defines the creep speed that will be used in the "rescue mode."	ft/min	0 - 100	000.0	000.0
	SER2 RS Cpr Time	Defines the maximum time the drive will continue to run at rescue creep speed (only serial mode 2)	ft/min	0 - 100	180	180
	SER2 FLT Tol	Defines the maximum time that may elapse between valid run time messages before a serial fault is declared (only serial mode 2)	sec	0.0 - 2.0	0.04	0.4
	Rollback Gain	Anti-rollback gain	-	1 - 99	1	1
	Notch Filter Frq	Notch filter center frequency	Hz	5 - 60	20	20
	Notch Filt Depth	Notch filter maximum attenuation	%	0 - 100	0	0
	MSPD Delay 1 - 4	Determines the recognition time delay for a defined multistep speed command	sec	0.00 - 10.0	0.00	0.00
A2	***S-Curves***					
	Acc Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	3.00	3.00
	Accel Jerk In 0	Rate of increase of acceleration, up to Accel Rate, when increasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 0	Rate of decrease of acceleration to zero when approaching elevator contract speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 0	Rate of increase of deceleration, to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 29.9	8.0	2.0
	Acc Rate 1	Acceleration rate #1	ft/s^2	0 - 7.99	3.00	3.00

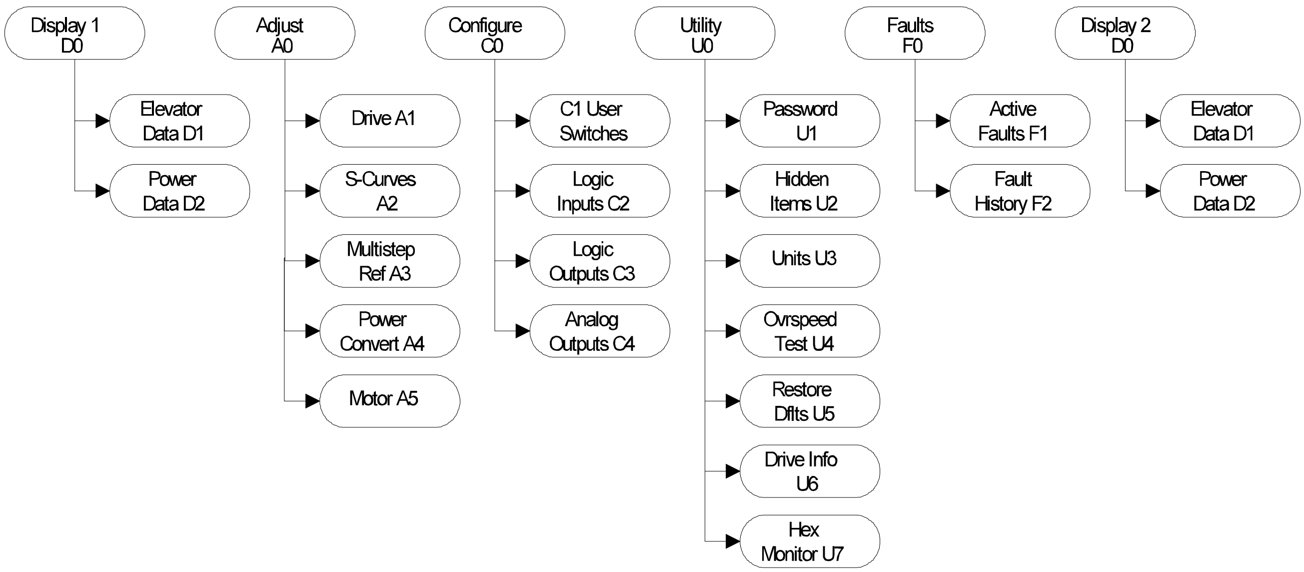
No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Decel Rate 1	Deceleration rate #1	ft/s^2	0 - 7.99	3.00	3.00
	Accel Jerk In 1	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	00.0	2.0
	Accel Jerk Out 1	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	00.0	2.0
	Decel Jerk In 1	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	00.0	2.0
	Decel Jerk Out 1	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Acc Rate 2	Acceleration rate #2	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 2	Deceleration rate #2	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 2	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 2	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 2	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 2	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Acc Rate 3	Acceleration rate #3	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 3	Deceleration rate #3	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 3	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 3	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 3	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 3	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
A3	***Multistep Ref***					
	Inspection	Speed command #1 (Inspection)	ft/m	0 - 66% *	0	✳
	Level	Speed command #2 (Level)	ft/m	0 - 16% *	0	✳
	Speed Command 3	Speed command #3	ft/m	0 % *	0	0
	High Level	Speed command #4 (High Level)	ft/m	0 - 25% *	0	✳
	Speed Command 5	Speed command #5	ft/m	0 % *	0	0
	Intermediate	Speed command #6 (Intermediate)	ft/m	0 - 91% *	0	✳
	Speed Command 7	Speed command #7	ft/m	0 % *	0	0
	High Speed	Speed command #8 (High Speed)	ft/m	0 -100% *	0	✳
	Speed Command 9	Speed command #9	ft/m	0 % *	0	0
	Speed Command 10	Speed command #10	ft/m	0 % *	0	0
	Speed Command 11	Speed command #11	ft/m	0 % *	0	0
	Speed Command 12	Speed command #12	ft/m	0 % *	0	0
	Speed Command 13	Speed command #13	ft/m	0 % *	0	0
	Speed Command 14	Speed command #14	ft/m	0 % *	0	0
	Speed Command 15	Speed command #15	ft/m	0 % *	0	0
	The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. Any speed, other than the defined values will trip the drive SET UP FAULT 6. To clear this fault, enter the correct value of the parameter, and then reset the drive by pressing reset button on HC-ACI board.					
A4	***Power Convert***					
	Id Reg Diff gain	Flux Current regulator differential gain	-	0.80 - 1.20	1.00	1.00
	Id Reg Prop Gain	Flux current regulator proportional gain	-	0.20 - 0.40	0.30	0.30
	Iq Reg Diff Gain	Torque current regulator differential gain	-	0.80 - 1.20	1.00	1.00
	Iq Reg Prop Gain	Torque current regulator proportional gain	-	0.20 - 0.40	0.30	0.30
	PWM Frequency	Carrier frequency	kHz	2.5 - 16.0	10.0	10.0
	UV Alarm Level	Voltage level for undervoltage alarm	%	80 - 99	80	80
	UV Fault Level	Voltage level for undervoltage fault	%	50 - 88	80	80
	Extern Reactance	External choke reactance	%	0 - 10	0	0
	Input L-L Volts	Nominal line-line AC input Voltage, RMS	volts	110 - 480	Drive dep.	
A5	***Motor***					
	Motor ID	Motor Identification	-	4 PoleDFLT, 6 Pole DFLT, MCE Test	MCE Test	✳
	Rated Mtr Power	Rated motor output power	HP	1.0 - 500	5.0	✳

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Rated Mtr Volts	Rated motor terminal RMS voltage	volts	190.0 - 575.0	460	✴
	Rated Excit Freq	Rated excitation frequency	Hz	5.0 - 400.0	60	✴
	Rated Motor Curr	Rated motor current	amps	1.00 - 800.00	6.8	✴
	Motor Poles	Motor poles	-	2 - 32	6	✴
	Rated Mtr Speed	Rated motor speed at full load	RPM	50.0 - 3000.0	1130	✴
	% No Load Curr	Percent no load current	%	10.0 - 60.0	35.0	✴
	Stator Leakage X	Stator leakage reactance	%	0 - 20.0	9.0	9.0
	Rotor Leakage X	Rotor leakage reactance	%	0 - 20.0	9.0	9.0
	Stator Resist	Stator resistance	%	0 - 20.0	1.5	1.5
	Motor Iron Loss	Iron loss at rated frequency	%	0 - 15.0	0.5	0.5
	Motor Mech Loss	Mechanical loss at rated frequency	%	0 - 15.0	1.0	1.0
	Ovld Start Level	Maximum continuous motor current	%	100 - 150	110	110
	Ovld Time Out	Time that defines motor overload curve	sec	5.0 - 120.0	60.0	60.0
	Flux Sat Break	Flux saturation curve slope change point	%	0 - 100	75	75
	Flux Sat Slope 1	Flux saturation curve slope for low fluxes	%	0 - 200.0	0	0
	Flux Sat Slope 2	Flux saturation curve slope for high fluxes	%	0 - 200.0	50	50
Configure C0						
C1	***User Switches***					
	Spd Command Src	Speed Command Source	-	Analog input Multi-step Serial	Multi-step	Multi-step
	Run Command Src	Run Command Source	-	External TB Serial Serial+extern	External TB	External TB
	Hi/Lo Gain Src	High / low gain change switch source	-	External TB Serial Internal	Internal	Internal
	Speed Reg Type	Chooses speed regulator	-	Elev spd reg Pi speed reg	Elev spd reg	Elev spd reg
	Motor Rotation	Allows user to reverse direction of motor rotation	-	Forward Reverse	Forward	Forward or Reverse
	Spd Ref Release	Determines when speed reference release is asserted	-	Reg release Brake picked	Reg release	Reg release
	Cont Confirm Src	Determines if an external logic input is used for contactor confirmation.	-	None External TB	None	None
	Pre Torque Source	Determines if a pre torque command is used and if used, it determines the source of the pre torque command	-	None Analog input Serial	None	None
	Pre Torque Latch	Chooses if analog pre-torque command is latched	-	Not latched Latched	Not latched	Not latched
	PTtorq Latch Clck	Determines source of pre torque latch control (if used)	-	External TB Serial	External TB	External TB
	Fault Reset Src	Fault reset source	-	External TB Serial Automatic	External TB	Automatic
	Overspd Test Src	Determines external logic source to trigger overspeed test	-	External TB Serial	External TB	External TB
	Brake Pick Src	If drive controls the mechanical brake, this determines the source of the brake pick command	-	Internal Serial	Internal	Internal
	Brake Pick Cnfrm	Determines if a logic input is used for brake pick confirm	-	None External TB	None	None

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Brake Hold Src	If drive controls the mechanical brake, this determines the source of the brake hold command	-	Internal Serial	Internal	Internal
	Ramped Stop Sel	Chooses between normal stop and torque ramp down stop	-	None Ramp on stop	None	None
	Ramp Down En Src	Determines the source that signals the torque ramp down stop (if used)	-	External TB Run logic Serial	External TB	External TB
	Brk Pick Flt Ena	Brake pick fault enable	-	Enable Disable	Disable	Disable
	Brk Hold Flt Ena	Brake hold fault enable	-	Enable Disable	Disable	Disable
	Ext Torq Cmd Src	When Speed Reg Type = External Reg, this sets the source of the torque command	-	None Serial	None	None
	Dir Confirm Ena	Confirms proper analog signal polarity when set to Enable and a logic input is programmed to Run Up and Run Down	-	Enabled Disabled	Disabled	Disabled
	S-Curve Abort	Addresses how the S-Curve Speed Reference Generator handles a *reduction* in the speed command before the S-Curve Generator has reached its target speed.	-	Enabled Disabled	Disabled	Disabled
	Fast Flux	Reduces starting takeoff time by reducing motor fluxing time	-	Enabled Disabled	Disabled	Enabled
	Main DIP Ena	Enables the Mains DIP Speed (A1) parameter which reduces speed when a UV alarm (low voltage) is declared	-	Enable Disable	Disable	Disable
	DB Protection	Dynamic braking protection fault or alarm selection	-	Fault Alarm	Fault	Fault
	Encoder Fault	Temporarily disables the Encoder Fault	-	Enable Disable	Enable	Enabled
	Stopping Mode	Determines the stopping mode when Spd Command Src = multi-step	-	Immediate Ramp to stop	Immediate	Immediate
	Motor Ovrld Sel	Motor overload selection	-	Alarm Flt Immediate Fault at stop	Alarm	Flt Immediate
	Auto Stop	Auto stop function enable	-	Disable Enable	Disable	Disable
	Serial Mode	Serial protocol selection	-	None, Mode1 Mode 2 Mode 2 test	Mode 1	None
	Ser2 Flt Mode	Defines the reaction to a serial communication fault while in Serial Mode 2 (only serial mode 2)	-	Immediate Run remove Rescue	Immediate	Immediate
	DRV Fast Disable	Addresses how fast the drive responds to removal of drive enable logic input	-	Disable Enable	Disable	Disable
	MLT-Spd to DLY 1	Assigns multi-step speed command to recognition delay timer 1	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 2	Assigns multi-step speed command to recognition delay timer 2	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 3	Assigns multi-step speed command to recognition delay timer 3	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 4	Assigns multi-step speed command to recognition delay timer 4	-	None mspd1- mspd15	None	None

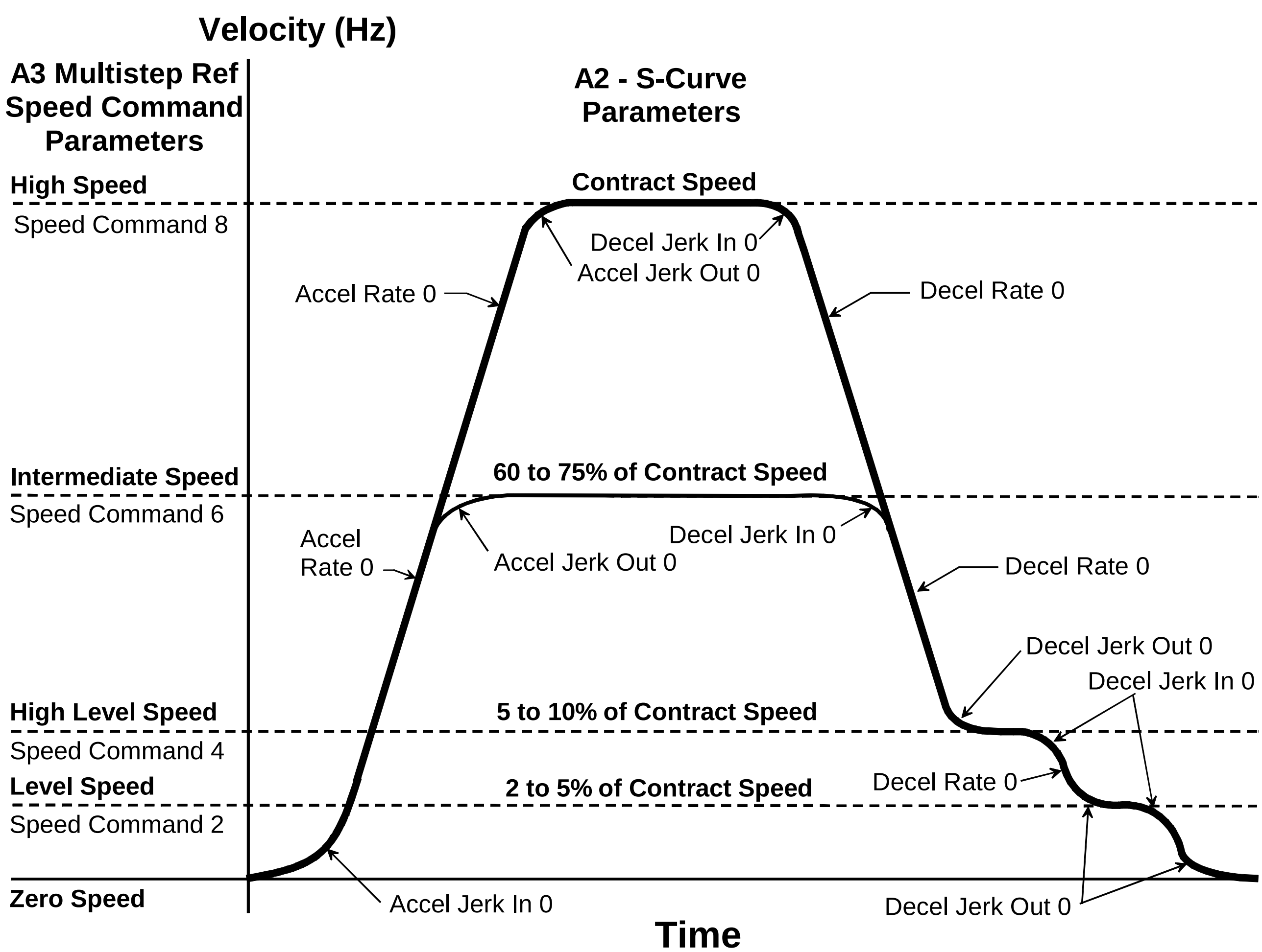
No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
C2	***Logic Inputs***					
	Log In 1 TB1-1	Terminal 1 Selection	-	-	DRIVE ENABLE	DRIVE ENABLE
	Log In 2 TB1-2	Terminal 2 Selection	-	-	RUN UP	RUN UP
	Log In 3 TB1-3	Terminal 3 Selection	-	-	RUN DOWN	RUN DOWN
	Log In 4 TB1-4	Terminal 4 Selection	-	-	FAULT RESET	FAULT RESET
	Log In 5 TB1-5	Terminal 5 Selection	-	-	STEP REF B0	STEP REF B0
	Log In 6 TB1-6	Terminal 6 Selection	-	-	STEP REF B1	STEP REF B1
	Log In 7 TB1-7	Terminal 7 Selection	-	-	STEP REF B2	STEP REF B2
	Log In 8 TB1-8	Terminal 8 Selection	-	-	STEP REF B3	STEP REF B3
	Log In 9 TB1-9	Terminal 9 Selection	-	-	S-CURVE SEL 0	S-CURVE SEL 0
C3	***Logic Outputs***					
	Log Out 1 tb1-14	Terminal 14 Selection	-	-	SPEED DEV LOW	SPEED DEV LOW
	Log Out 2 tb1-15	Terminal 15 Selection	-	-	RUN COMMAND	RUN COMMAND
	Log Out 3 tb1-16	Terminal 16 Selection	-	-	MTR OVERLOAD	MTR OVERLOAD
	Log Out 4 tb1-17	Terminal 17 Selection	-	-	ENCODER FAULT	ENCODER FAULT
	Relay Coil 1	Relay 1 Function Selection	-	-	FAULT	FAULT
	Relay Coil 2	Relay 2 Function Selection	-	-	SPEED REG RLS	SPEED REG RLS
C4	***Analog Outputs***					
	Ana Out 1 tb1-33	Terminal 33 Selection	-	-	SPEED CMD	SPEED CMD
	Ana Out 2 tb1-35	Terminal 35 Selection	-	-	SPEED FEEDBK	SPEED FEEDBK
Utility U0						
U1	***Password***	Password	-	-	000000	000000
U2	***Hidden Items***	Enable or disable hidden parameters Enable Disable	-	-	ENABLE	ENABLE
U3	***Unit***	Unit for parameters English Metric	-	-	ENGLISH	ENGLISH
U4	***Overspeed Test***	Allows overspeed test during inspection Yes No	-	-	No	No
U5	***Restore Dflts***	Reset all parameters to default values				
	Restore Motor Defaults?	Reset all parameters to default values except parameters in MOTOR A5				
	Restore Device Defaults?	Resets the parameters in MOTOR A5 to the defaults defined by the MOTOR ID				
U6	***Drive Info***	Drive information (Drive Version, Boot Version and Cube ID)				
U7	***HEX Monitor***	Hex Monitor				
Drive Version: A2950-C10304						

FIGURE D.1 HPV 900 Parameter Menu Trees



For more information refer to Section 3, *Parameter Adjustments* in the MagneTek HPV 900 AC Vector Elevator Drive Technical Manual.

FIGURE D.2 Velocity Curve and S Curve Parameters (HPV 900 software version A2950-C10304)



APPENDIX E
QUICK REFERENCE FOR TORQMAX F4 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

WARNING: ***Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.***

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.00	Password; (-5 = read & write, -4 = read only)	-	0 - 9999	-5	-5
LF.01	User defined Password	-	0 - 9999	440	440
LF.02	Operating Mode: 2 =Input coded terminals	-	1-4	2	2
LF.03	Incremental Encoder output (Not used)	-	1-128	1	1
LF.04	Motor selection: 1=Synchronous, 0= Induction	-	0 - 1	0	0
LF.05	Drive Fault Auto Reset	-	0 - 10	3	10
LF.07	Unit system	-	SI, US	US	US
LF.08	Electronic Motor Protection:	-	off, 1 - 4	off	3
LF.09	Electronic Motor Protection Current	A	1.0 - 110%Rtd	8.0	
LF.10	IM- Rated Motor Power	HP	0.00 - 100.00	5.00	✳
LF.11	IM-Rated Motor speed	rpm	75-6000	1165	✳
LF.12	IM- Rated Motor current	A	1.0 - 110% Drive rated	8	✳
LF.13	IM-Rated Motor Frequency	Hz	5 - 100	60	✳
LF.14	IM-Rated Motor voltage	V	1 - 650	230/460	✳
LF.15	IM-Rated power factor	-	0.01 - 1.00	0.83	0.83 - 0.90
LF.16	IM Field Weakening Speed	rpm	0.0 - 6000.0	set @ 80% of LF.11	✳
LF.17	Encoder Pulse Number	ppr	256 - 10000	1024	1024
LF.18	Swap Encoder channel: 0=OFF, 1 =ON	-	off - on	off	off
LF.19	DC voltage compensation (used for open loop)	V	150 - 500	230/460	-
LF.20	Contract Speed	fpm	0.0 - 2000.0	0	✳
LF.21	Traction Sheave Diameter	inch	7.0 -80.0	24	✳ 24
LF.22	Gear Reduction Ratio	-	1-99.9	30	✳ 30
LF.23	Roping ratio	-	1-8	1	✳ 1
LF.24	Load	lbs	0-65535	0	✳
LF.25	Estimated Gear Reduction	-	-	-	-
LF.30	Control method: 0= open loop, 2 = closed loop	-	0-3	0	✳
LF.31	IM-KP Speed (proportional gain)	-	1 - 65535	3000	✳✳ 3000
LF.32	IM-KI Speed (integral gain)	-	1 - 65535	1000	✳✳ 1000
LF.33	IM-KI Speed offset	-	0 - 65535	1000	✳✳ 3000
LF.34	IM-KP Current (proportional gain)	-	1 - 65535	1500	1500
LF.35	IM-KI Current (integral gain)	-	1 - 65535	500	500

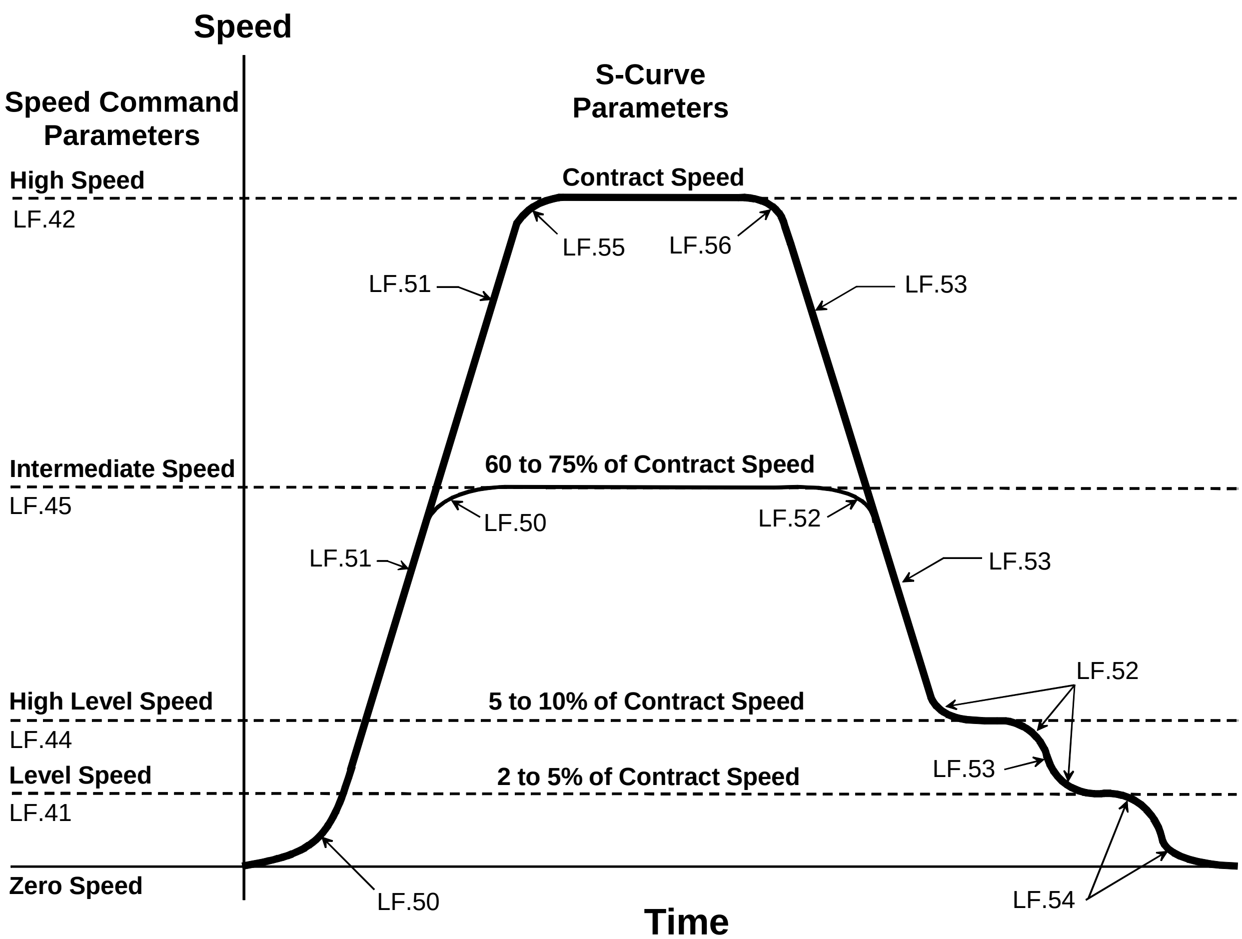
Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.36	Maximum torque **Automatically calculated by the drive). This value should be 3 times LF**	lbft	0-500	200	300% of LF.91 ✳________
LF.37	Low speed torque boost	%	0 - 25.5	10.0	10.0
LF.38	Switching frequency; 0= 8 KHz , 1= 16KHz (**Note: set LF.38 = 0 if E.OL2 error on drive*)***	-	0, 1	1	1
LF.40	Re-leveling Speed (Not used, but must be set to 0)	fpm	0.0 - 16% of LF.20	0.0	0.0
LF.41	Leveling speed	fpm	0 -16% of LF.20	0	✳✳ 3 - 5 __________
LF.42	High Speed	fpm	0 -LF.20	0	✳
LF.43	Inspection speed	fpm	0-66% of LF.20	0	✳
LF.44	High level Speed	fpm	0-25% of LF.20	0	✳✳ 10 -18 __________
LF.45	Intermediate speed	fpm	0-91% of LF.20	0	
LF.50	Start Jerk - used for the transitions at the start and end of acceleration (except, see LF.55)	ft/s^3	0.31 - 32.00	2.00	✳✳ 2.0 - 5.0 __________
LF.51	Acceleration rate	ft/s^2	0.30 - 8.00	3.00	✳✳ 2.0 - 5.0 __________
LF.52	Flare Jerk - used for the transitions at the start and end of deceleration (except, see LF.56)	ft/s^3	0.31 - 32.00	3.28	✳✳ 2.0 - 5.0 __________
LF.53	Deceleration rate	ft/s^2	0.30 - 8.00	3.00	✳✳ 2.0 - 5.0 __________
LF.54	Stop Jerk - used for the final transitions from leveling to zero speed (off = LF.52 is used instead)	ft/s^3	off, 0.02 - 32.00	off	✳✳ 1.00 __________
LF.55	Acceleration Jerk - used for the transition from acceleration to contract speed	ft/s^3	0.31 - 32.00	3.28	✳✳ 4.00 __________
LF.56	Deceleration Jerk - used for the transition from contract speed to deceleration	ft/s^2	0.30 - 8.00	3.00	✳✳ 4.00 __________
LF.57	Speed following error (0=off, 1 = on, 2=alarm)	-	0 - 2	1	1
LF.58	Speed Difference	%	0 - 30	10	10
LF.59	Following error timer	sec	0.000-10.000	3.000	3.000
LF-60 to LF-66	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
LF.67	Pretorque Gain	-	0.50 - 1.50	1.00	1.00
LF.68	Pretorque Offset	%	-25.0 - 25.0	0	0
LF.69	Pretorque Direction (0 = off, 1 = on)	-	0, 1	0 (off)	0 (off)
LF-70	Brake Release Time (Delay to turn on DRO).	sec	.001 - 3.0	0.200	0.200
LF.71 to LF-78	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
LF.A0 to LF.C5	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
Monitor Parameters (Read only parameters)					
LF.25	Estimated gear ratio				
LF.80	Software version				
LF.81	Software date				
LF.82	Terminal X2 - Input states (refer to table x.x)				
LF.83	Terminal X2- output states (refer to table x.x)				
LF.84	Terminal X3 - input states (refer to table x.x)				
LF.85	Terminal X2- output states (refer to table x.x)				
LF.86	Selected speed				
LF.87	Actual inverter load	%			
LF.88	Actual set speed (commanded motor RPM)	rpm			
LF.89	Actual speed (actual motor RPM)	rpm			
LF.90	Elevator speed	fpm			
LF.91	Rated motor torque	lbft			

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.92	Positioning drive	inch			
LF.98	Starting sequence state				
LF.99	Inverter state				
ru.09	Apparent Current (actual motor current)	A			
ru.11	Actual DC Voltage (DC bus voltage)	V			
ru.12	Peak DC Voltage (max. DC bus voltage measured)	V			
Fr.0	Parameter reset		0 - init	0	✳✳✳ 0

The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. The drive will not accept any speed, higher than the defined values.
✳ Parameters are motor / machine / job dependent.
✳✳ Recommended but field adjustable.

Parameters for Drive Software Version C31A (LF.81 date code = 0209.4)

FIGURE E.1 Velocity Curve and S Curve Parameters (TORQMAX)



Job #:	
Drive Model #:	
Drive Manufacturer:	
Drive Serial Number:	
Drive Software:	
Line #:	
Tested By:	
Approved:	

APPENDIX F
NOMENCLATURE

MCE Motion Control Engineering, Inc.	NOMENCLATURE Effective Date: 03/06/02 3 Pages

#	PC BOARD	DESCRIPTION
1	HC-RB4	Traction Controller Main Relay Board
1	HC-RBH	Hydraulic Controller Main Relay Board
2	HC-CI/O	Non Programmable Controller Call I/O Board
2	HC-CI/O-E	Programmable Controller Call I/O Expander Board
3	HC-PI/O	Non Programmable Controller Power I/O Board (Car A) ①
3	HC-PCI/O	Programmable Controller Power And Call I/O Board
4	HC-PI/O	Non Programmable Controller Power I/O Board (Car B) ①
6	HC-TAB	Traction Adapter Board
7	HC-RDRB	Rear Door Relay Board
8	HC-RD	Rear Door Logic Board (Car A) ①
9	HC-RD	Rear Door Logic Board (Car B)
10	HC-DB-MOD	Front G.A.L. MOD Door Interface Board
11	HC-DB-MOD-R	Rear G.A.L. MOD Door Interface Board
12	HC-DPS	Door Power Supply Board
13	HC-PIX	Position Indicator Expander Board (Car A) ①
14	HC-PIX	Position Indicator Expander Board (Car B)
15	HC-SRT	Suicide Relay Timing Board
16	HC-SCR	SCR Interface Board
17	HC-EQ	Earthquake Board
18	HC-IOX	I/O(8 Input / 8 Output) Expander Board (Car A) ①
19	HC-IOX	I/O(8 Input / 8 Output) Expander Board (Car B)
20	HC-IOX	Additional I/O(8 Input / 8 Output) Expander Board (Car A) ①
21	HC-IOX	Additional I/O(8 Input / 8 Output) Expander Board (Car B)
26	HC-DYNA	Dynalift Interface Board
27	MC-ACFR	AC Feedback Relay Board
28	IMC-GIO	General Turbo DF I/O Board
29	IMC-RB	Turbo DF Relay Board
30	HC-DB-MOM/H	Front G.A.L. MOM/MOH Door Interface Board
31	HC-DB-MOM/H-R	Rear G.A.L. MOM/MOH Door Interface Board
32	HC-OA	Output Adapter Board
33	IMC-RI	M/G Relay Interface Board
34	IMC-PRI	M/G Power Relay Interface Board
35	IMC-DIO	Digital I/O Board
36	IMC-DAS	Data Acquisition Board
37	HC-I4O	I/O(16 Input /4 Output) Expander Board (Car A) ①
38	HC-I4O	I/O(16 Input /4 Output) Expander Board (Car B)
39	HC-I4O	Additional I/O(16 Input / 4 Output) Expander Board (Car A) ①
40	HC-I4O	Additional I/O(16 Input /4 Output) Expander Board (Car B)
41	SCR-RI	SCR/AC Relay Interface Board

Motion Control Engineering, Inc.	NOMENCLATURE
	Effective Date: 03/06/02 3 Pages

#	PC BOARD	DESCRIPTION
42	SCR-PRI	SCR/AC Power Relay Interface Board
43	HC-LB	Lock Bypass Board
44	HC-GB	Gong Board
45	HC-GB	Additional Gong Board
46	HC-SIB	Selectable Input Buffer Board (Car A) ①
47	HC-SIB	Selectable Input Buffer Board (Car B)
48	HC-RT	Relay Tester Board
49	IMC-ACIB	AC Baldor Interface Board
50	HC-DPS-MOM/H	Front G.A.L. MOM/MOH Door Interface and Power Supply Board
51	HC-ACI	AC Drive Interface Board
52	HC-ACIF	AC Flux Vector Interface Board
53	HC-DPS-MOM/H-R	Rear G.A.L. MOM/MOH Interface and Power Supply Board
54	IMC-MBX	IMC Enhanced Motherboard
55	SCR-RIX	SCR Relay Interface Extension Board
56	HC-HBF	A.S.M.E. Front Door Lock Bypass Board
57	HC-HBFR	A.S.M.E Front and Rear Door Lock Bypass Board
58	IMC-ACIM	AC MagneTek Interface Board
59	HC-TACH-MG	Tach Adjust Board for VVMC-MG Controller
60	HC-TACH-SCR	Tach Adjust Board for VVMC-SCR Controller
61	SC-SB2K	Main A17.1 - 2000 Compliant Relay Board
62	SC-HDIO	High Density I/O board for A17.1 - 2000
63	SC-BASE-D	Lock Bypass, Access, Overspeed and Emergency Brake Board used with DF controlers
64	SC-BASE	Lock Bypass, Access, Overspeed and Emergency Brake Board used with non-DF controllers
65	SC-BASER-D	Rear version of SC-BASE used with DF controllers
66	SC-BASER	Rear version of SC-BASE used with non-DF controllers
67	SC-SB2K-H	Hydro version of SC-SB2K
68	SC-BAH	Hydro version of SC-BASE
69	SC-BAH-R	Hydro version of SC-BASE with rear doors

① Individual group cars use board numbers for car A only

SCHEMATIC SYMBOLS

SYMBOL	DESCRIPTION
X / X	BUS LOCATED ON PC BOARD
X / X	BUS LOCATED OFF PC BOARD
	MICROCOMPUTER OUTPUT OR CALL CIRCUIT
	MICROCOMPUTER INPUT
MP	MICROCOMPUTER OUTPUT OR CALL CIRCUIT FOR ASME 17.1–2000 SERIES CONTROLLER
MP	MICROCOMPUTER INPUT FOR ASME 17.1–2000 SERIES CONTROLLER
P	PATTERN GENERATOR OUTPUT
P	PATTERN GENERATOR INPUT
S	PATTERN GENERATOR SAFETY INPUT
	POWER TERMINAL
	PANEL MOUNT TERMINAL
X	EYELET ON PC BOARD
X	SCREW TERMINAL ON PC BOARD
X	IDC CONNECTOR ON PC BOARD
CX–X X CX–X X	RIBBON CABLE CONNECTOR
TPX	TEST POINT

SYMBOL	DESCRIPTION
OFF BOARD SIDE X BOARD NUMBER	BOARD DESIGNATOR
	SOLDER CONNECTION ON REAR OF PC BOARD
	WIRING INSIDE CONTROL CABINET
	TRACE ON PC BOARD
	CUSTOMER WIRING INTO CONTROL CABINET
	ALL UNMARKED DIODES ARE 2.5 AMP 1000 VOLT
	VOLTAGE SPIKE SUPPRESSOR
	DOT BY RESISTOR INDICATES TOP OR LEFT SIDE AS MOUNTED
	BOX INDICATES UNUSED ITEM
	RELAY COIL
	FORCE GUIDED RELAY COIL
POLE NUMBER X SWING SIDE	NORMALLY OPEN (N.O.) RELAY CONTACT
POLE NUMBER X SWING SIDE	NORMALLY CLOSED (N.C.) RELAY CONTACT
N/C	NO CONNECTION

WIRE SYMBOLS

SYMBOL	DESCRIPTION
X	#X AWG THHN WIRE 90° C
X	#X AWG PVC WIRE 105° C
X	#X AWG PTL WIRE 125° C
X	#X AWG TEFLON WIRE 200° C

UNLESS NOTED, ALL WIRES ARE #18 AWG PVC, WITH EXCEPTION TO THE PC BOARD WIRING, WHICH IS DETERMINED BY ENGINEERING.

WIRE GAUGES

SYMBOL	SIZE
03	3/0 AWG
02	2/0 AWG
0	0 AWG
1	1 AWG
2	2 AWG
4	4 AWG
6	6 AWG
8	8 AWG
10	10 AWG
12	12 AWG
14	14 AWG
16	16 AWG
18	18 AWG

MCE Motion Control Engineering, Inc.	NOMENCLATURE
F:\ENG\DOCS\NMCLR2.DWG	Effective Date: 3–14–03

APPENDIX G
FLEX-TALK OPTION

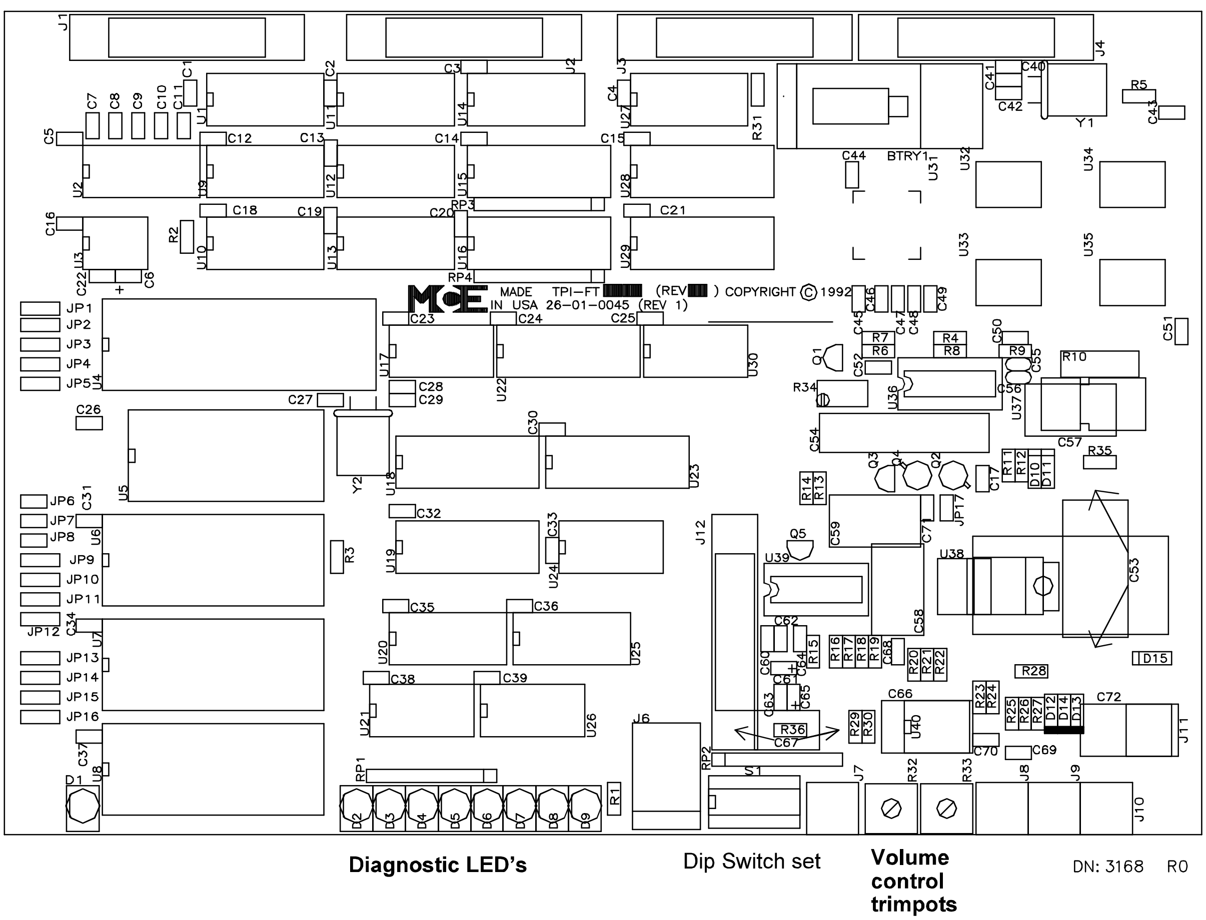
> The following is a listing of diagnostic tools available on a controller if the Flex-Talk option is provided.

Use this addendum in conjunction with the manual. The addendum provides information regarding the diagnostics and volume adjustments for the TPI-FT option on the Flex-Talk unit.

G.1 INTRODUCTION AND THEORY OF OPERATION

The Flex-Talk board is designed for use on any MCE controller to provide flexibility in audio announcement. The TPI-FT board is installed inside the controller and hooked up to the last board of the daisy chain. The receives such needed information as door status, nudging, PI, etc. from the MCE bus. A 5V power supply runs the digital circuitry, and a -/+15V supply operates the analog circuitry of the speaker. There are eight LED's used for diagnostic purposes in conjunction with the dip switches. The input and output connectors (J1 and J2) are used for the MCE bus; however, it is unlikely that the output will be used, as the Flex-Talk board is typically the last in the daisy chain, the exception being a duplex where there are two Flex-Talk boards.

FIGURE G.1 TPI-FR Flex-Talk Board



G.2 DIAGNOSTICS

The six switches on the dip switch package are used for diagnostics purposes. There are also eight LEDs (D2 through D9), for displaying diagnostic information. These LED's are used in conjunction with the dip switch package (see below). For self-test, turn ON switch S2 of the dip switch set. The unit will announce each of the floor messages, the direction, nudging and the fire service messages. The special messages are not included in the self test. This test does not require the connection of the MCE bus.

FIGURE G.2 Diagnostic Table

DIP SWITCHES					DIAGNOSTIC LEDS								MNEM.
S2	S3	S4	S5	S6	D2	D3	D4	D5	D6	D7	D8	D9	
1	0	0	0	0	SELF TEST								
0	0	0	0	0	UP	DOWN	NUDG	DOOR	MAIN FIRE	SAF	ALT FIRE	HOSP	MODSW
0	1	0	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								PIN
0	0	1	0	0	X	EM3A	EM2A	EM1A	DORA	GDA	GUA	PIA	MAW
0	1	1	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								IPR_3
0	0	0	1	0	SEC. FLR	HLW	EMP	X	X	X	X	X	SMAW1
0	1	0	1	0	STOP SW	OVS	LOBM	X	X	X	X	X	SMAW2
0	0	1	1	0	X	X	EMP	X	X	X	X	X	EMPWI N
0	1	1	1	0	UP	DOWN	NUDG	DLK	FRS	SAF	FRA	HOSP	ITR-1
0	0	0	0	1	PI0	PI1	PI2	PI3	PI4	CSE	HLW	EPR	ITR-2
0	1	0	0	1	PI5	X	DOPLFR	X	X	H OR (NOT) STC	ATALT	ATMN	ITR-3

Dip switches:
- switches S2, S3, S4, S5, and S6 are used to select which flags on the TPI are to be displayed.
- switch S2 is used for the self test.
- switch S1 is current not used.
- 0 = switch is "Off", 1 = switch is "On"

D2 thru D9: diagnostic LEDs located on the processor board. Lit LEDs indicate that one of the flags listed below D2 thru D9 on the above chart are read as active.

Example: if all switches are off, D4 & D6 are turned on, then nudging and main fire service flags are on.

G.3 VOLUME CONTROL

Trimpots R32 and R33 adjust the main and alternate volume. The main volume adjustment (R32) controls the floor announcements, such as “First Floor”. The alternate volume (R33) controls all other announcements, such as “going up”. Turning either trimpot fully counterclockwise gives maximum volume. The adjustments are easily made with diagnostic switch S2 ON. This will activate the messages and allow the time necessary to adjust the volume. These two trimpots do not affect any music volume that may be connected on J8. Music volume is set external to this unit.

G.4 TROUBLESHOOTING

If there are no audio messages, then:

- The speaker may not be connected on J9.
- The +/-15V supply on connector J7 may not be present.
- Relay U39 may be defective.
- U38 (audio power op-amp) may be defective.
- U5 (program EPROM), U7 or U8 (digitized voice EPROM) may be defective.
- A volume control trimpot may be defective or turned fully clockwise.

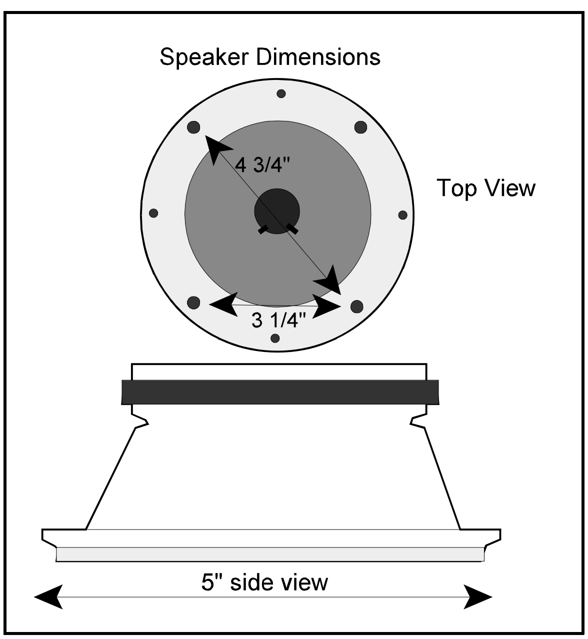
If the message, “Please allow the doors to close” is heard when nudging:

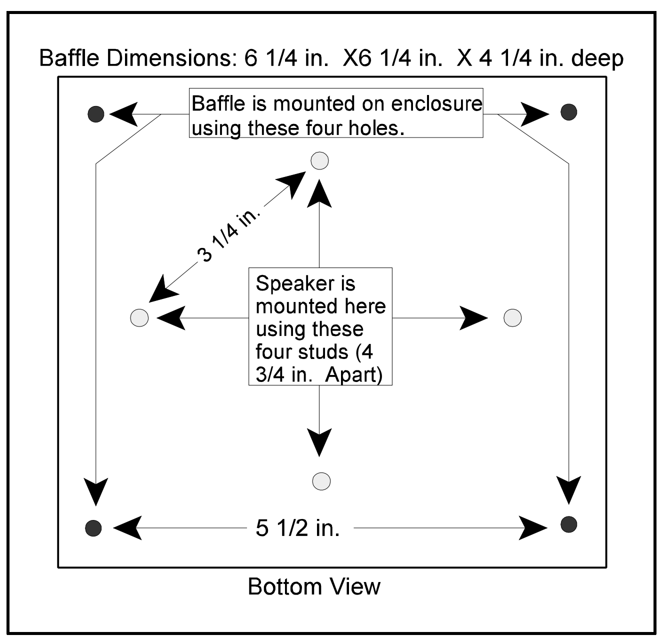
- The photo eye used to detect objects in the door path may be blocked.
- The photo eye may be dirty, or defective.

G.5 PERIPHERAL EQUIPMENT

Square recessed mount 6 1/4" by 6 1/4" by 4 1/4" deep (manufacturer Model # 198-4).
Square surface mount 7" by 7" by 4 1/4" deep (manufacturer Model # SE 198-4).
Circular recessed mount 6 1/8" by 4 1/4" deep without lip (manufacturer Model # 94-4).
7" round by 4 1/4" deep (including lip).
7 3/8" in diameter with circular grill.

FIGURE G.3 Speaker Dimensions





APPENDIX H
LS-QUTE-X-2K LANDING SYSTEM ASSEMBLY DRAWINGS

NOTE:	If a sensor or the HC-IPLS board is replaced, make sure that the **orientation of the HC-IPLS** board is correct. Use the chassis ground and the LEDs shown in the figure below for an orientation reference.

FIGURE H.1 LS QUTE-X-2K Enclosure Assembly

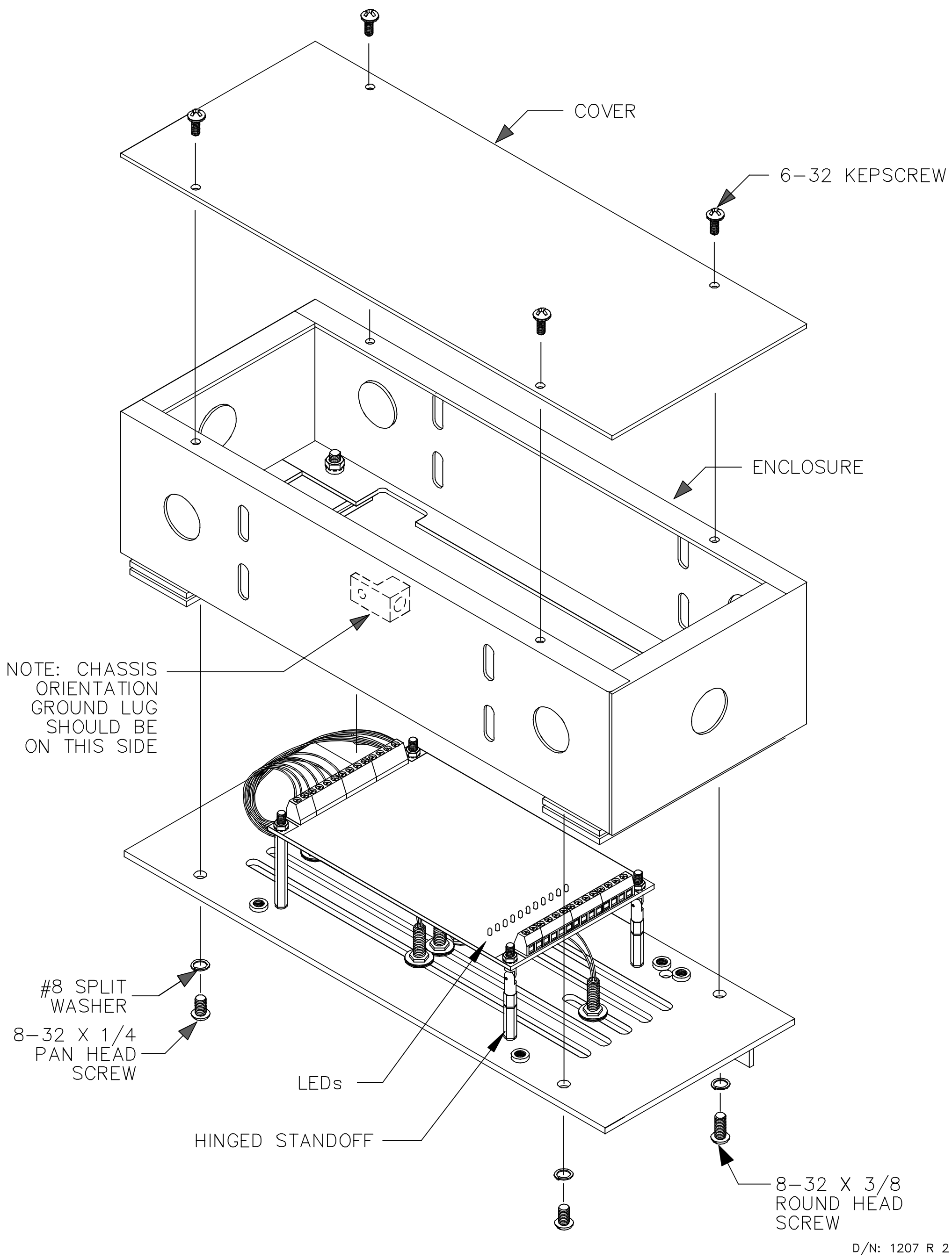
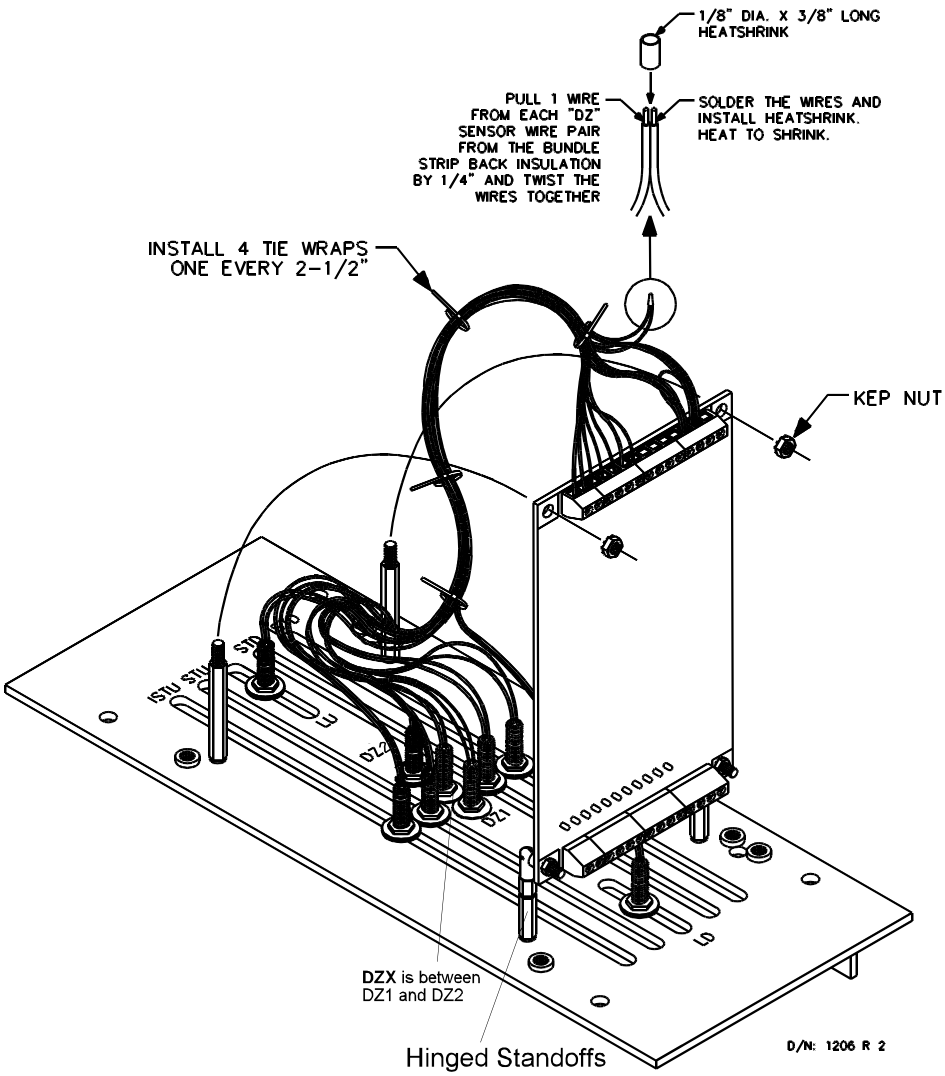


FIGURE H.2 LS-QUTE-X-2K Wiring Diagram



SENSOR	HC-IPLS BOARD TERMINALS	
DZ1	DZ2 SENSOR	S18
DZX	SDZX	S18
DZ2	DZ1 SENSOR	S27
DZF	SDZF	S18
DZR	SDZR	S18
LD	SLD	S18
LU	SLU	S18
STD	STD	S2
STU	STU	S2
ISTD	ISTD	S2
ISTU	ISTU	S2
One 2 inch jumper	S18	S2

APPENDIX I
OPTION SMARTLINK FOR CAR OPERATING PANEL

I.0 GENERAL INFORMATION

This Appendix applies to MCE Controllers with the following boards and software versions: MC-NC Software Version 2.00, and MC-NIO Software Version 2.00. SmartLink Serial Communication for Car Call Signals **is an option** for MCE controllers. It links the Car Operating Panel (COP) signals to the car controller in the machine room using serial communication techniques. This option reduces the wiring from the COP to the car controller; thus, reducing the installation time and labor cost. The serial link is based on state-of-the-art LonWorks® networking technology. A four-wire link carries the signals and power from the COP to the car controller. If the SmartLink for COP option is on this controller, reference this Appendix Figure I.1 for controller and board layout. Otherwise, use the controller manual information only.

TABLE I.1 Principal Characteristics

PRINCIPAL CHARACTERISTICS	
Number of Wires	4 (2 for data and 2 for power)
Power on serial link	24 VDC
Number of I/Os on one COP board	24 inputs, 24 outputs
Communication protocol	LonTalk® (based on OSI 7-layer networking protocol)
Controller characteristics	Available for M3 Group System car controllers

I.1 PRODUCT DESCRIPTION

SmartLink Serial Communication for Car Call Signals provides a serial communication link between the car controller and the Car Operating Panel (COP). Other than the input/output interface between the controller and the COP, there are no changes to the existing controller. The functionality of the controller is not affected.

I.1.1 CAR CONTROLLER NODE

The car controller node (MC-NC board) is the main node of the network. It provides the input/output interface between the car controller computer (MC-MP2-2K board) and the COP. It contains the Neuron® processor which implements the seven layers of the LonTalk® communication protocol for receiving and sending signals, as network data packets, to and from the COP. It also implements the application level routines to serially transfer these signal values to the car controller computer.

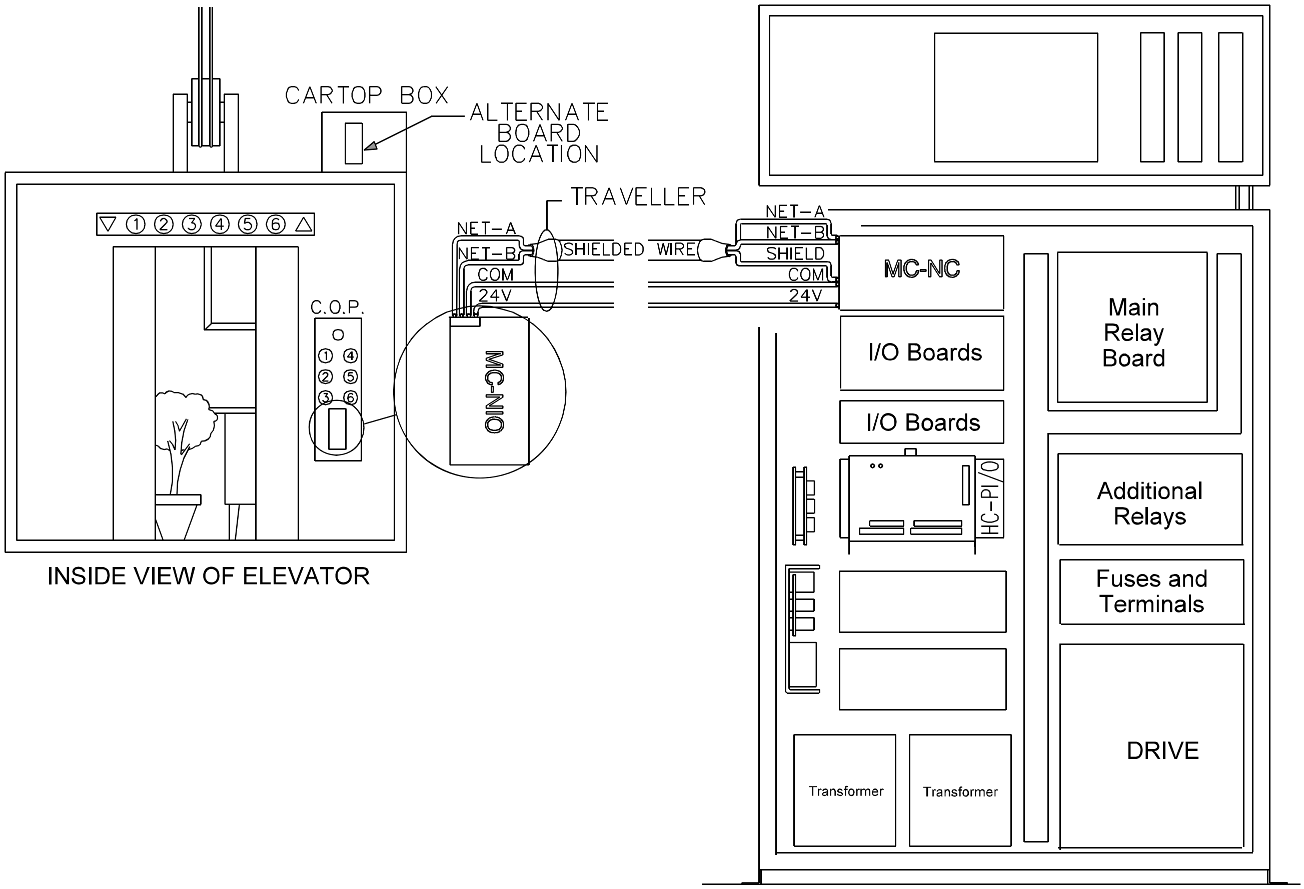
I.1.2 CAR OPERATING PANEL (COP) NODE

The function of the COP node (MC-NIO board) is to transfer COP signal values to and from the car controller node as network packets. The COP signals, such as call buttons, door close button, call lockouts, etc., are sent serially to the car controller node via the LonWorks® network. Similarly, signals such as call button lights, indicators, etc., are received from the car controller node.

I.2 PHYSICAL LAYOUT AND FUNCTIONAL DESCRIPTION

Figure I.1 shows the typical connection between the controller node and the COP node. The physical layout and hardware are described below.

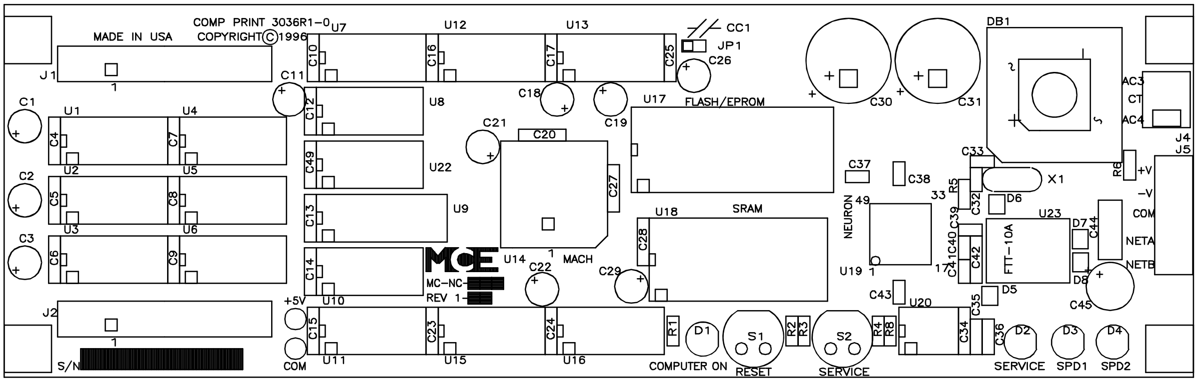
FIGURE I.1 SmartLink for Car Operating Panel - Typical System



I.2.1 CAR CONTROLLER NODE

The car controller node consists of the MC-NC Neuron Controller board (see Figure I.2) which, for most controllers, replaces the HC-CI/O Call Input/Output board and is physically located where the HC-CI/O board would otherwise be. The MC-NC board provides the interface between the car controller's Main Processor (MC-MP2-2K board) and the MC-NIO board in the COP. The car call push-button inputs and other input signals from the COP are received serially via the LonWorks® network and are processed by the MC-NC board and then sent serially to the car controller's Main Processor board via a 20-conductor ribbon cable. Information from the car controller's Main Processor board is received serially by the MC-NC board, formatted into data packets, and sent to the COP via the LonWorks® network.

FIGURE I.2 MC-NC Neuron Controller Board



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I.2.2 CAR OPERATING PANEL (COP) NODE

The COP node consists of the MC-NIO Neuron Input/Output board (see Figure I.3) and, if required, one or more MC-NIO-X Neuron Input/Output Extender board(s) (see Figure I.4). The COP board(s) are physically located either in the COP itself or on the car top. The MC-NIO board has two major functional blocks, the input/output interface and the LonWorks® network interface.

The MC-NIO board monitors the state of the car call push-buttons (ON/OFF) and activates call acknowledgment outputs. It also acquires other inputs from the COP switches and buttons and activates other COP outputs. The MC-NIO board can handle 24 inputs and 24 outputs. The MC-NIO-X board is used for additional inputs and outputs and is responsible for the input/output interface only. It does not contain the network interface electronics.

FIGURE I.3 MC-NIO Neuron Input/Output Board

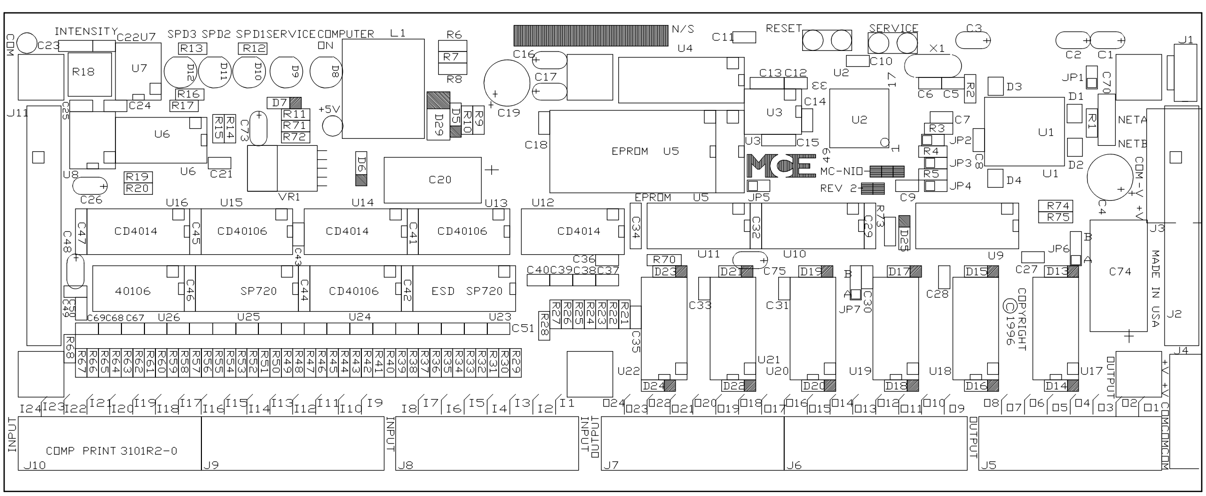

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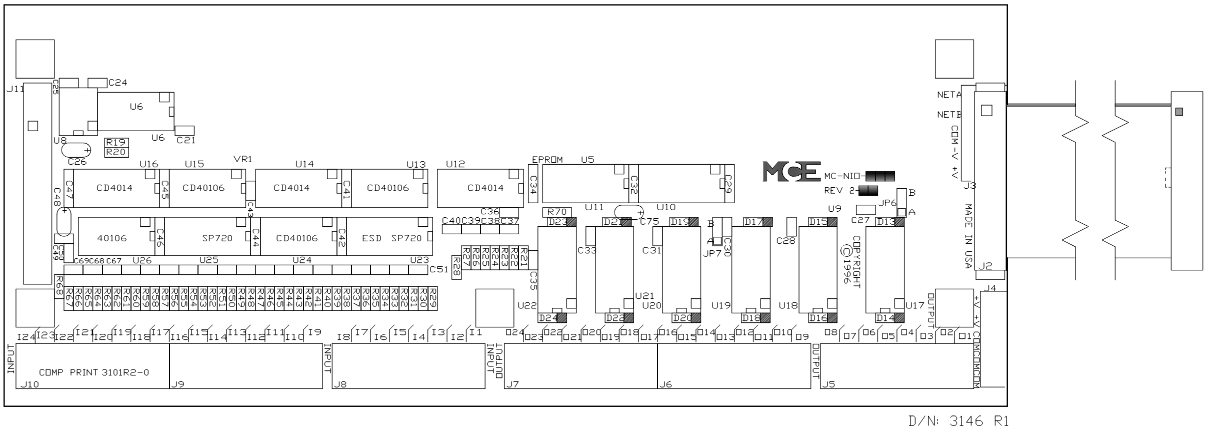
FIGURE I.4 MC-NIO-X Neuron Input/Output Extender Board



I.3 INSTALLATION OF THE MC-NIO & MC-NIO-X BOARDS

MCE's SmartLink Serial Communication for Car Call Signals option is simple and easy to install. A communication cable is required to connect the MC-NC board (located in the elevator controller) to the MC-NIO board, mounted in the Elevator's Car Operating Panel (COP). As an alternative, the COP board(s) may be located in a metal box on the car top and wired to the COP.

The **MC-NIO** board is the 'NEURON INPUT/OUTPUT' board. All car call buttons as well as all car call acknowledge lights are connected to this board. The **MC-NIO-X** board is the 'NEURON INPUT/OUTPUT EXPANDER' board. It is also located in the COP and used in conjunction with the MC-NIO board for providing additional I/O. The MC-NIO-X board is used when more inputs or outputs are required than the MC-NIO board can provide. The MC-NIO-X board is the same as the MC-NIO board except that fewer components are loaded. The MC-NIO-X board is connected to the MC-NIO board through a 26-conductor ribbon cable. The MC-NIO board connector J11 connects to the MC-NIO-X board at connector J2. Additional MC-NIO-X boards, if needed, can be connected in a cascade fashion to connector J11 of the MC-NIO-X board.

I.3.1 MOUNTING THE BOARDS IN THE COP

MOUNTING ONE BOARD - If the job requires only one board, the MC-NIO can be mounted anywhere in the COP such that the connectors are easily accessible and the board does not obstruct any fixture in the COP. The MC-NIO board is supplied with a mounting plate. The dimensions are shown in Figure I.5.

MOUNTING MORE THAN ONE BOARD - If the job requires the expander MC-NIO-X board(s), they can be mounted in the following three ways. The MC-NIO-X board is also supplied with a mounting plate.

Option 1 - The boards can be stacked one on top of another (see Figure I.6). Make sure that the total height of the boards stacked together does not exceed the available height for mounting the boards in the COP.

Option 2 - The boards can be placed end to end with connector J11 of one board facing connector J2 of the other board (see Figure I.7). In this case, the height requirement will be that of a single board and the I/O connectors on all the boards will be on the same side. Since the boards are mounted lengthwise in this option, make sure that the COP has enough free space lengthwise.

Option 3 - The boards can be placed side by side, with the I/O connectors facing the opposite sides and the non-I/O connector side of the two boards facing each other (see Figure I.8). This option can be used if the COP is wide enough to place two boards side by side.

Any combination of the above three options can be used to best suit the COP length, width, height and the wiring requirements.

NOTE: The MCE part number for the Mounting Plate is **40-02-0074**

FIGURE I.5 Mounting Plate Dimensions for Mounting the MC-NIO and MC-NIO-X boards

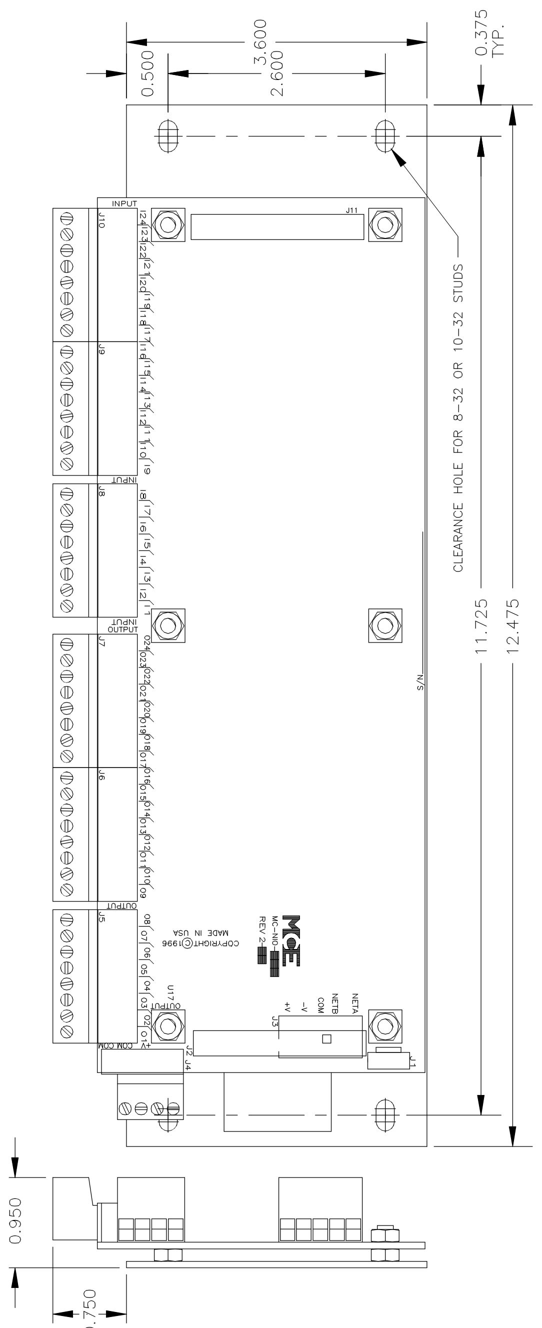


FIGURE I.6 Mounting Option 1: Boards Stacked

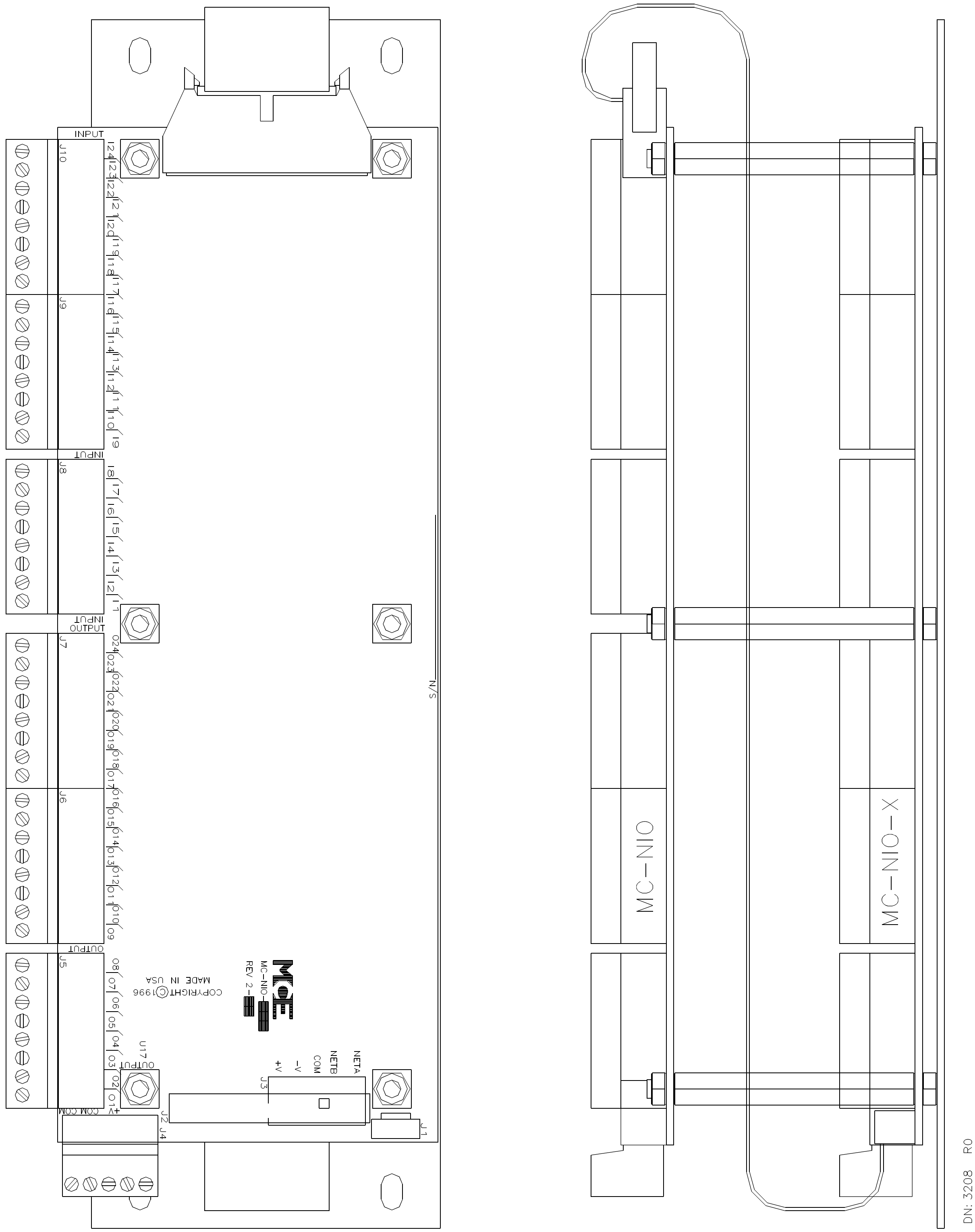


FIGURE I.7 Mounting Option 2: Boards Placed End to End

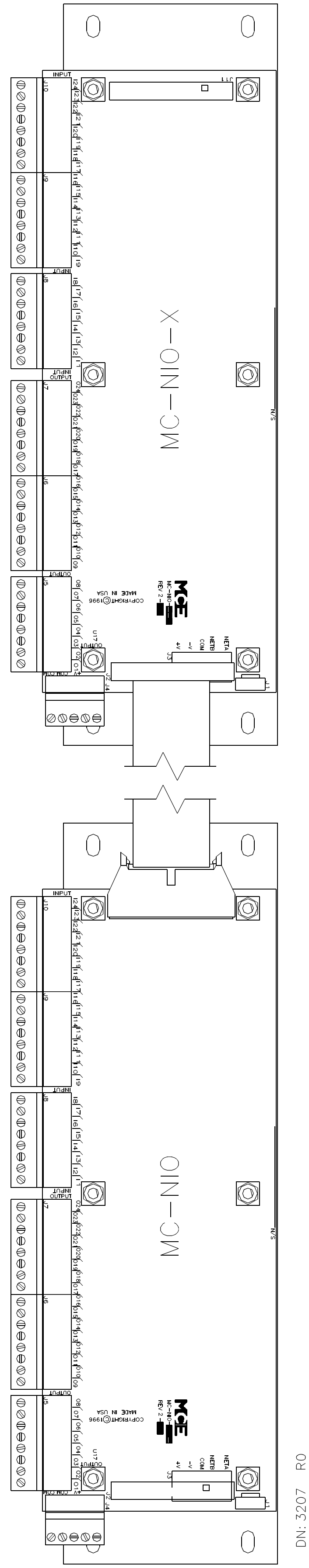
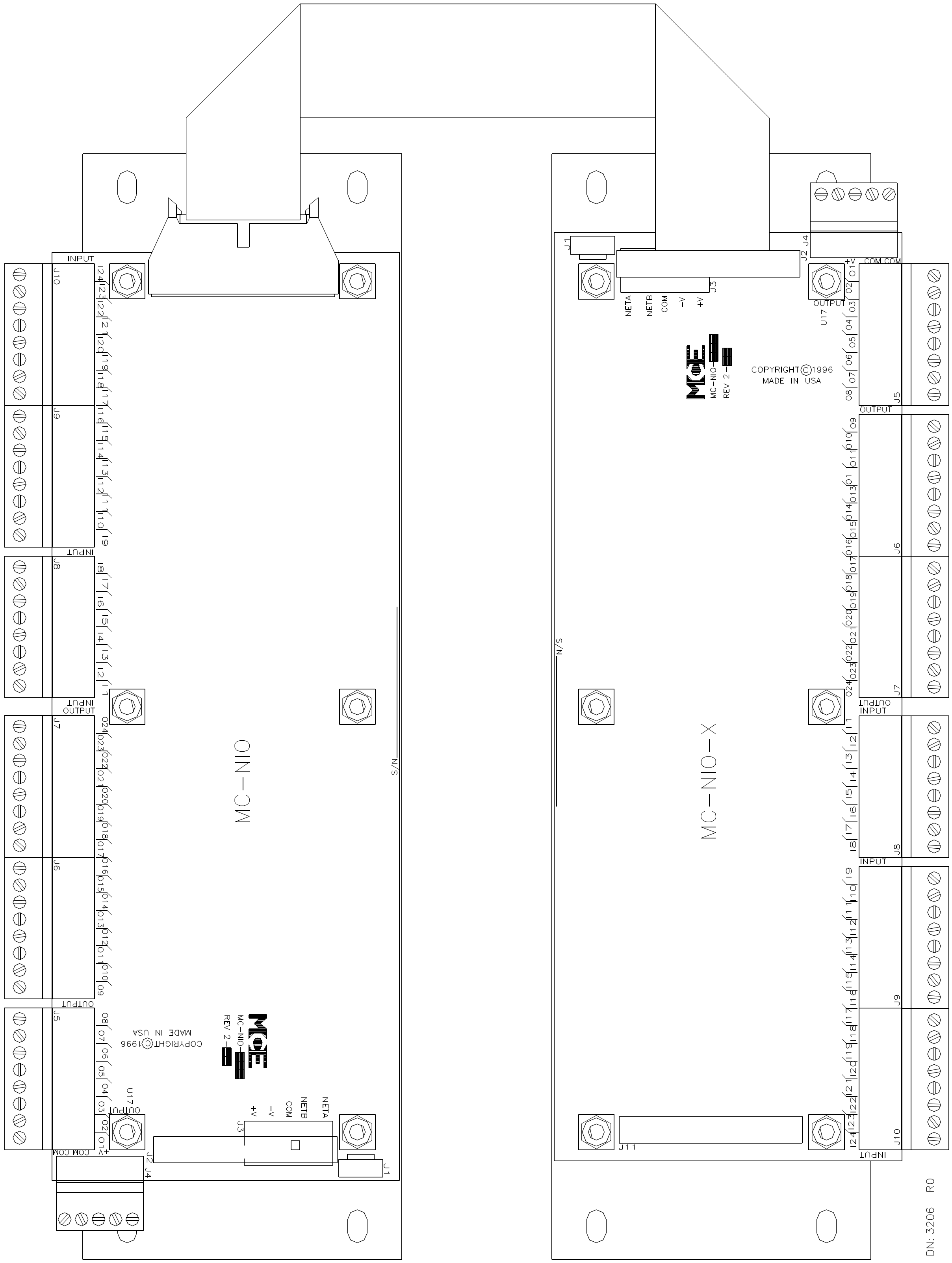


FIGURE I.8 Mounting Option 3: Boards Placed Side By Side



I.3.2 COP INPUT/OUTPUT WIRING

The outputs of the MC-NIO, MC-NIO-X boards are of the “open-collector” type. The bulbs are turned ON when the output terminal is grounded, therefore, the common side of bulbs is connected to the +V terminal (J4) on the MC-NIO and MC-NIO-X boards.

The inputs are internally pulled up to the +V voltage and become activated when grounded, therefore, the common of all the switches is connected to the COM terminal (J4) on the MC-NIO and MC-NIO-X board.

The MC-NIO board is provided with an additional ‘COM’ terminal (J4) which is to be connected to the car or cartop. This will provide a common to the Car. Refer to the job prints for details of the connections.

I.3.2.1 TESTING THE CONNECTIONS

To locally test the connections to the buttons and indicators, power must be supplied with the Network disconnected. To test inputs and outputs after the connections are made, put the MC-NIO board into test mode. To do this, disconnect NETA or NETB and then momentarily short the reset pins. This will cause the inputs of the MC-NIO and MC-NIO-X (if available) boards to turn on its corresponding outputs (i.e., I1 turns on O1 ..... I24 turns on O24). Inputs are activated by grounding them. Test all the outputs by grounding the corresponding inputs. Confirm the wire connections with this test.

I.3.2.2 ACCEPTABLE BULBS FOR USE WITH MC-NIO AND MC-NIO-X BOARDS

In the following tables, the shaded row indicates the preferred lamp for this application.

TABLE I.2 Indicator Specification

INDICATOR SPECIFICATION			
INDICATOR TYPE	**VOLTAGE**	**MAXIMUM CURRENT EACH OUTPUT**	**WATTAGE EACH OUTPUT**
Incandescent Lamp	28V	0.3 Amps	6 Watts
Solid State LED	28V (lamp must have built-in resistor)	0.3 Amps	6 Watts
Neon Lamp	Not applicable		
Electronic Buzzer/Chime	28V	0.3 Amps	6 Watts
Mechanical Buzzer/Chime	Not Applicable		

TABLE I.3 Miniature Bayonet Bulbs

MINIATURE BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
1495	28V	0.30A (MORE BRIGHT)
1873	28V	0.20A
1864, 313, 456, 356	28V	0.17A
1820	28V	0.10A
757, 265	28V	0.08A
1829	28V	0.07A
1819, 28MB	28V	0.04A
1843	28V	0.022A (LESS BRIGHT)

TABLE I.4 Single Contact Bayonet Bulbs

SINGLE CONTACT BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
303	28V	0.30A (MORE BRIGHT)
1251	28V	0.23A
456	28V	0.17A
757	28V	0.08A (LESS BRIGHT)

TABLE I.5 Double Contact Bayonet Bulbs

DOUBLE CONTACT BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
304	28V	0.3A (MORE BRIGHT)
6S6DC/30V	30V	0.23A
1252	28V	0.23A (LESS BRIGHT)

TABLE I.6 Screw Base Bulbs

CANDELABRA, SCREW BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
6S6/30V	30V	6 WATTS (MORE BRIGHT)
28RC	28V	1.1 WATTS (LESS BRIGHT)

TABLE I.7 PSB5 Bulbs

SLIDE BASE - TYPE 5 (PSB5)		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
28PSB	28V	0.04A

*** Note:** Bulb shapes vary within a given base style and some may not fit within your fixture.

I.3.3 TRAVELER CABLE

For proper operation the specification of this cable must be, at a minimum, the following:

TABLE I.8 Existing Traveler-Communication Cable Specification

EXISTING TRAVELER-COMMUNICATION CABLE SPECIFICATION	
For NETA and NETB connections	**For +V and Com**
Shielded Twisted Pair (16-22 AWG) (Shield grounded in controller)	See Job Prints - page 1

When the opportunity exists for a new traveler cable, the following specifications are recommended.

TABLE I.9 New Traveler-Communication Cable Specification

NEW TRAVELER-COMMUNICATION CABLE SPECIFICATION	
For NETA and NETB connections	**For +V and Com**
Single twisted pair (one of the following) Belden # 85102 (or equivalent) Belden # 8471 (or equivalent) Belden # 9841 (or equivalent)	See Job Prints - page 1

I.3.3 NODE IDENTIFICATION JUMPERS

A future option will allow multiple MC-NIO boards to be connected to the LonWorks® network where multiple COPs exist. Each MC-NIO board has several jumpers located on it. Three of the jumpers are for identifying the board when more than one is used. These identifying jumper positions are listed in Figure I.10 MC-NIO Board Quick Reference.

I.3.4 BULB INTENSITY

The COP node (MC-NIO board) has an intensity control for incandescent bulbs and solid state LEDs. The intensity adjustment trimpot is located at the edge of the board near the 26-pin ribbon cable connector. It is a single turn trimpot which, when turned fully counterclockwise, reduces the intensity by approximately 50%. When turned fully clockwise the intensity is 100% (full voltage applied at output terminals). In addition, two jumpers control which lamps are affected by the intensity trimpot. Jumper position and affected outputs are listed in Figure I.10 MC-NIO Board Quick Reference. Acceptable bulb types are listed in Tables 0.2 thru 0.7. If two COPs are connected in parallel, bulbs cannot exceed three watts each.

I.3.5 PERIPHERAL DEVICES

Output devices connected to the MC-NIO board must be “Positive Common Bus” type devices. The voltage rating must be 24VDC. Devices can include digital PI’s, electronic arrival chimes, lanterns, and electronic buzzers.

I.3.6 COMMUNICATION TERMINATION

The shield of the twisted pair SmartLink communication cable must be connected to the “COM” terminal (J5) only on the MC-NC board in the car controller (located in the machine room). Do NOT connect the shield on the MC-NIO board.

The serial link is a 78 Kbit per second data link which should be terminated at both ends of the communication cable, both in the machine room and in the COP or car top box. Termination at the car controller end, on the MC-NC board, is integrated into the design. Termination at the COP end, on the MC-NIO board, is accomplished by placing a shunt on jumper JP1 (factory installed).

I.4 NETWORK SELF-INSTALLATION AND CONFIGURATION

NOTE: Previous software versions required that the installer perform a “network installation process” before the serial communication link would function. MC-NC software version 2.00 includes an enhancement which eliminates the need for such a process.

After all electrical connections have been made, network communication should be established approximately 10 seconds after system power-up.

I.4.1 NETWORK COMMUNICATION

The diagnostic LED SPD2 on the MC-NC board indicates network activity/status.

If the SPD2 LED on the MC-NC board blinks at an approximate rate of twice per second, network communication has been established.

If the LED is solidly ON or OFF, the network communication is not established. Check the network wire connections to NETA and NETB.

Diagnostic address 3017H contains a communication error counter. Normally all diagnostic LEDs displayed at this address should be OFF on the computer swing panel. If the counters are increasing rapidly (once every 10 seconds), the communication is not stable, check for proper wiring and shielding.

I.5 TROUBLESHOOTING GENERAL

The Diagnostic Indicators on the MC-NC and MC-NIO boards and on the Computer Swing Panel assist in troubleshooting the SmartLink Serial Communication for Car Call Signals. The SmartLink for Car Calls option requires two additional boards, the MC-NC Neuron Controller board (in the car controller) and MC-NIO, Neuron Input/Output board (in the COP or on top of the car). Both of these boards have a processor on them and run independent software programs.

I.5.1 TROUBLESHOOTING THE MC-NC BOARD

Begin by examining the indicators and jumpers on the MC-NC board (see Figure I.9, MC-NC Quick Reference).

I.5.1.1 COMPUTER ON LED

Upon power-up the “Computer On” LED on the MC-NC board should be solidly ON. If this LED is OFF or blinking, verify that the EPROM is installed properly and that all the ribbon cable connections are secure. Verify that the voltage at the +5V test point (located near ribbon cable connector J2) is between 4.75V and 5.1V.

I.5.1.2 COMMUNICATION WITH THE MAIN COMPUTER

The diagnostic LED SPD1 on the MC-NC board indicates communication activity with the Main computer (MC-MP2-2K). If this LED is solidly ON, it means that the MC-NC and the Main Computer are not communicating. Verify that the ribbon cable is connected properly to J2. Proper communication is indicated by the SPD1 LED blinking at a rate of approximately 20 times/second.

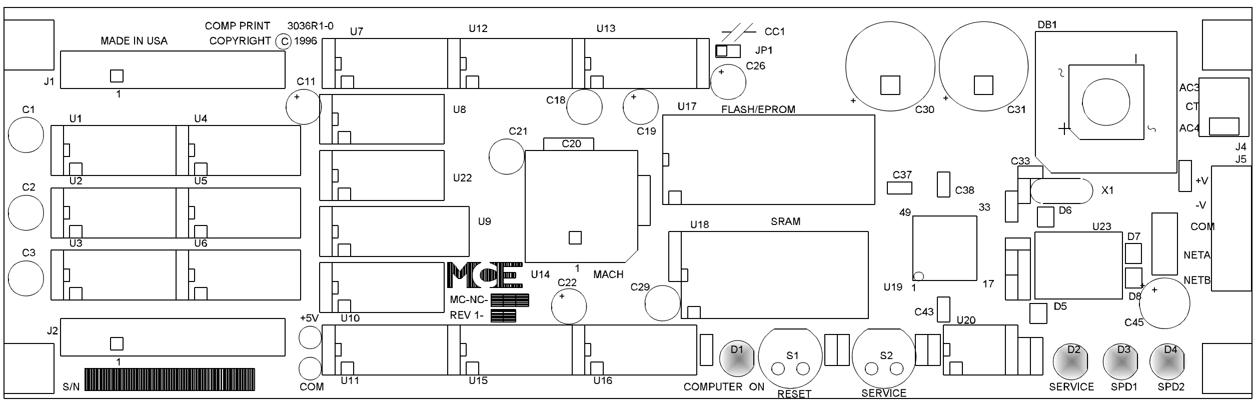
I.5.1.3 NETWORK COMMUNICATION

The network communication status is indicated by diagnostic LED SPD2 on the MC-NC board. If this LED is solidly ON, it means that the network communication is not established. Verify that the network wires are connected properly to NETA and NETB on the connector.

To confirm that the network communication is established properly, check the SPD2 LED on the MC-NC board. It should be blinking at a rate of twice a second. If the SPD2 LED on the MC-NC board is either ON or OFF, network communication is not established. Check the network communication counters in the diagnostic buffer (address 3017H). If these counters are increasing rapidly (once every 10 seconds), the communication is not stable. Verify proper wiring and shielding of the network cable as shown in the Job prints.

Figure I.9 MC-NC Board Quick Reference

MC-NC QUICK REFERENCE Software Ver. 2.00 or higher



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Note status of LEDs (Computer ON, Service, SPD1 & SPD2)

RESET AND SERVICE TEST PINS

"Reset" test pins reset the board and the board program when shorted together.
"Service" test pins send the node information on the network when shorted together.

MC-NC Diagnostic Indicators

LED	Computer On	Service	SPD1	SPD2
OFF	Board not functioning. Check +5V. If no +5V, check ribbon cable connection at J2.	**Normal.** The normal state of this LED is OFF.	Possible faulty ribbon cable at J2, connector J2, or MC-NC board.	If normal blinking does not occur (as described below), check NETA and NETB connections.
ON	**Normal.** Computer functioning properly.	Verify proper installation of EPROM. If installed properly, replace board.	MC-NC unsuccessful in communicating with MC-MP2-2K. Possible software configuration error (MP).	MC-NC unsuccessful in communicating with MC-NIO. Check NETA and NETB connections.
Blinking	If Computer On LED blinks continuously (approx. once per second), verify proper installation of EPROM.	Verify EPROM version. If V2.00 or higher, replace board.	**Normal.** When accompanied by SPD2 blinking, there is communication. SPD1 blinks very rapidly under normal conditions.	**Normal.** Indicates communication between the MC-NC and the MC-NIO (blinks approx. twice per second).

I.5.2 TROUBLESHOOTING THE MC-NIO BOARD

Begin by examining the indicators and jumpers on the MC-NIO board (see Figure I.10, MC-NIO Quick Reference).

I.5.2.1 COMPUTER ON LED

Upon power-up the "Computer ON" LED on the MC-NIO board should be solidly ON. If the LED is OFF or is flashing, verify that the EPROM is installed properly and the voltage on the +V pin of connector J3 is between 12V and 28V and that the voltage at the +5V test point is between 4.75 and 5.15V.

I.5.2.2 NETWORK COMMUNICATION

The network communication status is indicated by diagnostic LED SPD2 on both the MC-NC and the MC-NIO boards. If this LED is solidly ON, it means that the network communication is not established (see the diagnostic indicator table on the MC-NIO QR card).

I.5.2.3 BULB INTENSITY CONTROL

If the bulbs do not come on or if varying the intensity trimpot has no effect on the bulb intensity check jumpers JP6 and JP7 (see Figure I.10, MC-NIO Quick Reference). If the jumpers are installed correctly and the bulb intensity still does not work, replace the MC-NIO board.

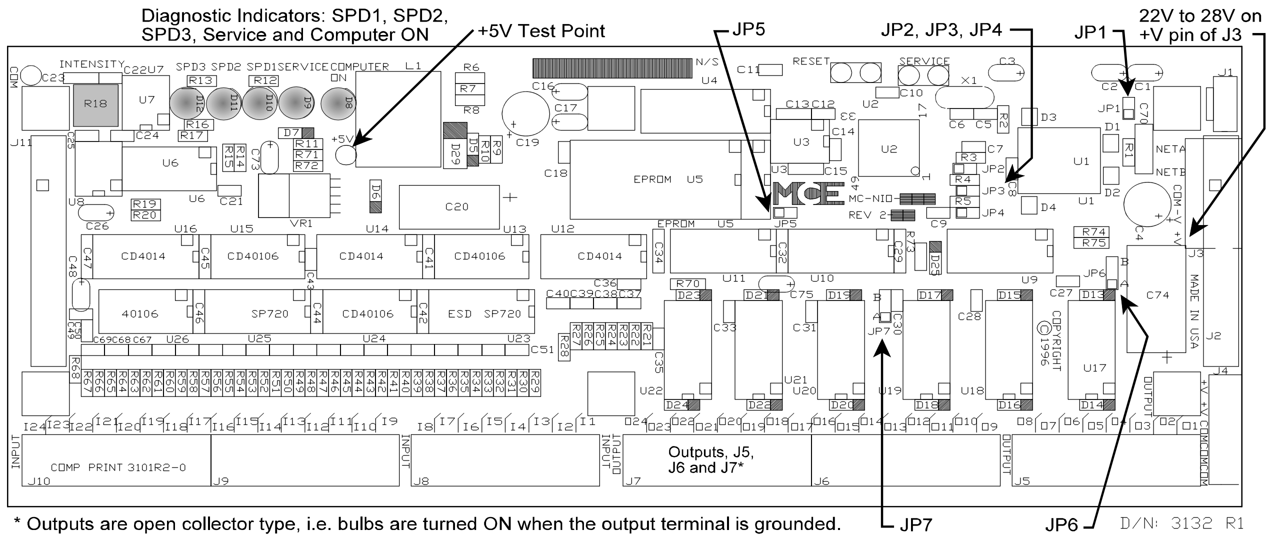
I.5.2.4 MC-NIO & MC-NIO-X OUTPUTS

Testing During Installation - To test inputs and outputs during installation, put the MC-NIO board into test mode. To do this, ensure that the board has power at the +V to COM terminals at connector J3, then disconnect the NETA wire and momentarily short the reset pins. This will cause the inputs of the MC-NIO and MC-NIO-X (if available) boards to turn ON its corresponding outputs (i.e., I1 turns on O1 ..... I24 turns on O24). Inputs are activated by grounding them. Test all the outputs.

Output Fails During Operation - If a previously working output fails, check the output device and wiring. If the device is functional, and the wiring correct, swap the corresponding driver chip with another driver chip (U17 to U22) to check for a failed driver. If problem remains, replace the board.

FIGURE I.10 MC-NIO Board Quick Reference

MC-NIO QUICK REFERENCE Software Ver. 2.00 or higher



* Outputs are open collector type, i.e. bulbs are turned ON when the output terminal is grounded.

Jumper Settings (* Denotes factory setting)

NODE IDENTIFICATION JUMPERS

	JP2	**JP3**	**JP4**
1st Board*	ON	ON	ON
2nd Board	OFF	ON	ON
3rd Board	ON	OFF	ON
4th Board	OFF	OFF	ON
5th Board	ON	ON	OFF
7th Board	OFF	ON	OFF
6th Board	ON	OFF	OFF
8th Board	OFF	OFF	OFF

OUTPUT INTENSITY CONTROL JUMPERS
R18 adjusts intensity when Enabled

JUMPER	POSITION	DESCRIPTION
JP6	A	Intensity Enabled Outputs 01 to 08
	B*	Intensity Disabled Outputs 01 to 08
JP7	A*	Intensity Enabled Outputs 09 to 024
	B	Intensity Disabled Outputs 09 to 024

TERMINATION JUMPER

JP1	ON*	ON = terminated, OFF = not terminated

EPROM SIZE JUMPER

JP5	ON*	ON = 27C256, 27C512, 27C010. OFF = 27C020

MC-NIO Diagnostic Indicators

LED	Computer On	Service	SPD1	SPD2	SPD3
OFF	Board not functioning. Check +5V and +24V	**Normal.** The normal state of this LED is OFF.	SPD1 lights whenever any input is activated. If SPD1 does not light when a button is pushed, check the button/switch “common.”	This LED should flash whenever a button/switch is activated or deactivated.	SPD3 lights whenever the input/output circuits are being read/written. This LED should blink very quickly (this is the normal state of SPD3). Check EPROM and +5V if SPD3 is off continuously.
ON	**Normal.** Computer functioning properly.	Verify proper installation of EPROM. If installed properly, replace board.			
Blinking	Computer not functioning. Verify proper installation of EPROM.	Verify EPROM version. If V2.00 or higher, replace board.			

I.5.3 SYSTEM TROUBLESHOOTING

GENERAL The serial link is a method of transferring input status (buttons and switches) and output status (indicators) between the car operating panel and the elevator controller. A non-operational serial link would generally result in the complete failure in the transfer of this information. When troubleshooting a problem that you believe might be attributed to a failure of the serial link, bear in mind that the serial link is simply an I/O system. For example, the inability to register a car call from the car operating panel may be due to reasons other than the serial link. Whenever possible, separate the issues (divide and conquer) through creative means (e.g., try to register car calls via the group or local CRT to determine if car calls can be registered at all).

A few examples are given below, with commentaries that serve to illustrate the concepts discussed above.

Problem: Car call buttons do not illuminate when pressed, and the calls do not latch.

Pushing a car call button should always result in the illumination of the indicator for that button. If the car call indicators do not light when the respective buttons are pushed, a failure of the serial link should be investigated. Special attention should be paid to the serial bus wiring (the wires that make up the serial link), especially when this behavior applies to all of the car call buttons (not just a select few). Follow the instructions in the “General Troubleshooting Steps” section below.

Problem: Car calls do latch, and a number of car calls can be registered, but after awhile all the calls cancel simultaneously. The car stops at the next landing and does not open its doors.

Because the car calls can, in fact, be registered through the car operating panel, and because the car call indicators do function properly, the problem described may not be related to the serial link. Cancellation of the car calls may be a result of something unrelated to the serial link (e.g., anti-nuisance logic), so it is important to keep an open mind (don’t assume that the serial link is the cause for canceling the car calls). Check the job prints for inputs that are being transferred through the serial link. There may be an input transferred through the serial link that may cause car cancellation should an intermittent problem with the input signal exist. For example, “flickering” of the independent service input will generally result in car call cancellation (it is typical to initially cancel all car calls whenever an off-to-on transition of independent service is detected).

Problem: When pressed, the call buttons illuminate, but then extinguish. The call does not latch.

Discussion: This may or may not be a problem with the serial link. During conditions in which car calls are not allowed to latch by the controller main processor, this behavior is expected. Follow the “General Troubleshooting Steps” outlined below.

GENERAL TROUBLESHOOTING STEPS

Step 1 Determine if car calls can, in fact, be registered. On many products this can be accomplished via a system CRT Terminal (connected to either the elevator controller or a Group Supervisor). If a CRT is not available, car calls can be latched via the elevator controller's swing panel. Section 5 of the controller's installation manual provides details regarding this process. If car calls cannot be registered, the problem may not be with the serial link at all.

Step 2 Determine if the serial link is communicating reliably. This is done by activating the independent service switch in the COP (if one exists; if one does not exist, go to Step 2A). Make sure that the independent service status is not being established through any other means (i.e., the Test switch, or some other independent service switch not wired through the serial link). Verify the car is on independent service. If a helper is available (with communications) verify that the independent service indicator on the swing panel's vertical LEDs toggles on and off corresponding to the activation and deactivation of the switch in the COP. Check to see that the indicator does not "flicker" when the independent service switch is left in the ON position.

Step 2A If an independent service switch does not exist in the COP, activate the door close button. If the doors appear to respond to the button, it is very likely that the serial link is performing properly. It may be worthwhile to verify that the communication link is solid by referencing the swing panel diagnostics (address 20H). As an example, an assistant can observe the DBC flag in the diagnostics while the door close button is being pressed continuously in the COP. The DBC flag should illuminate solidly while constant pressure is placed on the door close button. Refer to the Controller Manual for additional swing panel diagnostic information.

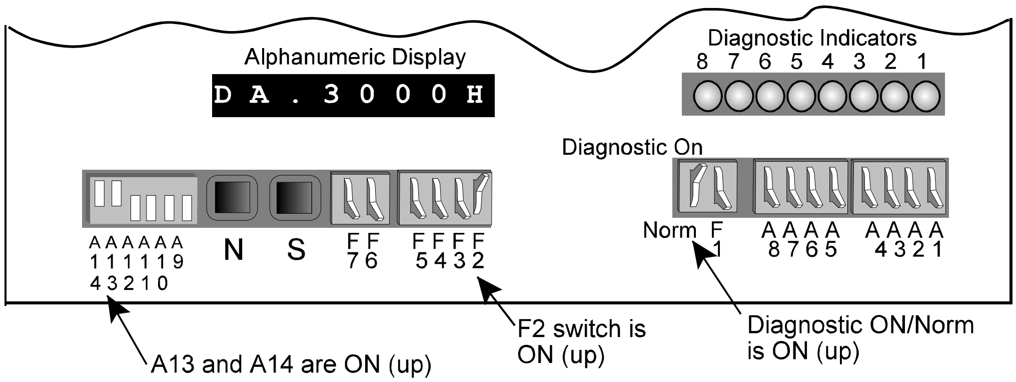
Step 3 If Step 2 indicates that the serial communication is not established, all network wiring should be double-checked. "Network wiring" refers to the wires that connect the MCNC board (in the controller) to the MC-NIO board (in the COP). These wires should be checked for continuity and for connection to the proper respective terminals on each board. [Note: A subsequent step in the troubleshooting process will call for the inspection of diagnostic indicators on the MC-NIO board. Accordingly, it is suggested that access to the MC-NIO board be maintained at this time.]

Step 4 Once all wiring has been verified (both in the controller and in the COP) observe the diagnostic LEDs on both the MC-NC board and the MC-NIO board. Figures 0.9 "MC-NC Quick Reference" and 0.10 "MC-NIO Quick Reference" provide information regarding the interpretation of these LEDs.

I.5.4 COMPUTER SWING PANEL DIAGNOSTICS

The contents of serial link related computer memory flags can be viewed on the Computer Swing Panel's Diagnostic Indicators. MCE Technical Support personnel may request that you access this information while troubleshooting. The memory flags for serial link data begin at address 3000 hex. Set the switches as shown in Figure I.11 to access address 3000 hex.

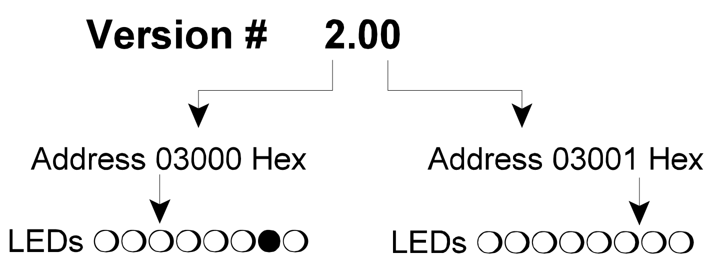
FIGURE I.11 Diagnostic Switch Settings for Address 3000 HEX



Switches A13 and A14 select the first two digits of the address (30) with A9 thru A12 OFF (down) and A13 and A14 ON (up). Switches A1 thru A8 select the last two digits of the address (00) with A1 thru A8 OFF (down). The Alphanumeric Display indicates that address 3000 hex is selected (DA.3000H). The Diagnostic Indicators show the status of the computer memory flags at this location (LED ON = 1, LED OFF = 0).

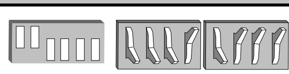
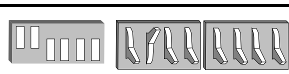
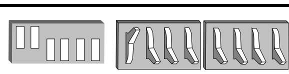
Software Version Verification for the MC-NC: Address 03000H displays the major version number on the diagnostic indicators. Address 03001H displays the minor version number. See example below.

Example:



Car call inputs from the MC-NC board to the MC-MP2-2K board, and car call latched outputs from the MC-MP2-2K board may be viewed in the following addresses and are useful troubleshooting tools.

TABLE I.10 Key Diagnostic Memory Addresses

Alpha-numeric Display	Switch Setting A14 - A9 A8 - A1	Diagnostic Indicators	LED Designation
3017H		Displays the count of failed attempts for MC-NC communication.	LEDs should be *OFF*.
3040H		Displays the car call inputs from the MC-NIO board.	LEDs correspond to the first eight floors. Subsequent floor calls are viewed at address 3041, 3042 etc.
3080H		Displays the car call registration outputs from the Main controller.	LEDs correspond to the first eight floors. Subsequent floor calls are viewed at address 3081, 3082 etc.

APPENDIX J
ELEVATOR SECURITY INFORMATION AND OPERATION

Building name: ___________________________________

Building location: ___________________________________

Security activation:	Key switch	Mon:	from ________	to ____
	or	Tue:	from ________	to ____
	Time clock	Wed:	from ________	to ____
		Thu:	from ________	to ____
		Fri:	from ________	to ____
		Sat:	from ________	to ____
		Sun:	from ________	to ____

Instructions: To gain access to secured floors, follow the steps below while in the elevator car. The steps may be taken while the car is moving or standing still. Requests for a car from a hallway or corridor are answered without restriction.

1. While in the car, press the button for the desired floor. If the destination floor is secured, the button for that floor will flash ON and OFF.

   If the button for that floor stays solidly lit, that floor is unsecured.

2. While the destination floor button is flashing, enter the security code for that floor within 10 seconds. Enter the security code by pressing the corresponding buttons on the panel.

   If the code was entered correctly and within the required time limit, the car will immediately go to that floor. If the code was not entered within the 10-second time limit or was entered incorrectly, the destination floor button light will turn off after 10 seconds and the entire sequence must be repeated.

   If a mistake is made while entering the security code, simply wait until the destination floor button light stops flashing and start the entire sequence again.

SECURITY CODES

Maintain a record of the security codes by noting the floor name as found in the elevator cab and each floor's code. Any floor with a security code is a secured floor.

1.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
2.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
3.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
4.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
5.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
6.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
7.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
8.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
9.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
10.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
11.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
12.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
13.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
14.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
15.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
16.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
17.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
18.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
19.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
20.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
21.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
22.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
23.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
24.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
25.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
26.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
27.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
28.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
29.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
30.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
31.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___
32.	**Floor**	______	**security code**	**=**	___ ___ ___ ___ ___ ___ ___ ___

APPENDIX K
POWERBACK R4 REGENERATIVE DRIVE

K.1 GENERAL

The following information pertains to the POWERBACK R4 Regenerative Drive used with IMC-AC-R and VFMC Series M controllers.

K.2 REGENERATIVE DRIVE INTERFACE

The following is an explanation of the POWERBACK R4 Regenerative Drive interface.

K.2.1 DRIVE INPUTS

- Drive Enable (Terminal 8): This input enables the R4 drive and puts the drive in standby mode. Drive parameter **ru. 0** reads **stby** during motoring condition and **Active** during deceleration/overhauling conditions. A voltage between drive terminals 7 & 8 of 18 VDC = ON, 0 VDC = OFF.

- Drive Reset (Terminal 11): This input resets an R4 drive fault. Pressing the drive reset button on the HC-ACI board activates the reset input and clears regenerative drive faults. A voltage between drive terminal 11 & 7 of 18 VDC = ON, 0 VDC = OFF.

K.2.2 DRIVE OUTPUT

- Drive ready contact: The contacts between terminals 1 and 3 on the R4 drive remain closed under normal condition and open during a fault, which drops the RDY relay on the HC-ACI board. Pressing the Drive Reset button on the HC-ACI board should clear the R4 drive fault and should turn ON the RDY relay.

K.2.3 POWER CONNECTIONS

a. It is recommended that the L1, L2, L3 connections on the Inverter and the R4 drive be in phase.

b. The input power connections (L1-2, L2-2, L3-2) and the phase monitoring connections (L1, L2, L3) on the R4 drive must be in phase. If these connections are not in phase the R4 drive will trip fault **E.Syn** and drop the RDY relay on the HC-ACI board. If the R4 drive trips on **E.nEt** at power up or trips the over voltage **E.oP** fault at the end of a run, one of the phase monitoring fuses may be open or there may be a loose connection on the phase monitor inputs.

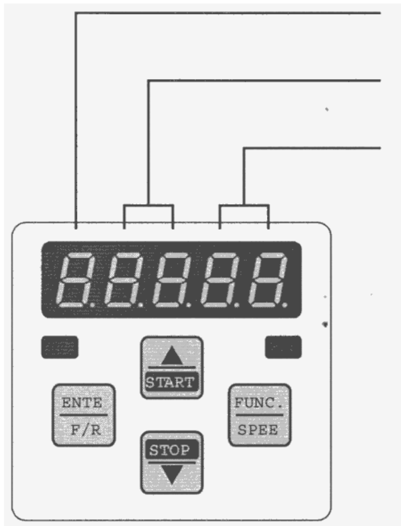
c. The DC bus connections must be correct and according to the drawings. ***It is critical that DC bus connections be correct. Incorrect connections will damage the drive units.***

d. The line inductor ground connection to the R4 Drive and F4 Drive must be completed according to the drawings.

K.2.4 HOW TO USE THE DRIVE KEYPAD

The R4 drive is delivered from the factory in the *Application* mode, which allows access to all parameters and functions available on the unit.

The display shows three types of information which define the parameter:



Parameter set

Parameter group

Parameter number

By pressing the FUNC button you can change between the displayed parameter and its value.

To select a different parameter use the ENTER button to toggle the flashing point to the right of the field to be changed. Then use the UP and DOWN buttons to scroll the desired value. Once the correct parameter information is displayed, the FUNC button can be pressed at any time to see the value of the parameter.

When displaying a parameter value, the value of the parameter can be changed by pressing the UP/DOWN buttons. Generally, these changes are immediately effective and permanently stored, meaning they remain stored after the unit is switched off. Confirming the input with ENTER is not necessary, with the exception of the parameters known as *Enter Parameters*.

Enter Parameter: For some parameters the value adjusted by UP/DOWN does not automatically become valid. These parameters are called Enter Parameters since they must be confirmed by ENTER. When pressing UP/DOWN only the display is changed but not the value stored in the R4. When the display value is different from the stored value in the R4, it is marked by a point in the display. By pressing ENTER the display value is stored in theR4 and the point is deleted. The displayed value of an Enter parameter always starts with the stored value.

K.2.5 ERROR MESSAGES

If a drive fault occurs during operation, the display is overwritten with an error message. Press ENTER to clear the error message.

NOTE: Pressing ENTER resets only the error message in the display. To reset the actual error and return the unit to normal operation, the cause of the error must be removed and a reset done on terminal 11, or power off reset.

Refer to the R4 drive manual for a listing of error messages.

K.2.6 PARAMETER SETTING / ADJUSTMENT

The R4 drive parameters listed below are set at MCE and no field adjustments are necessary. The parameter explanation is only for reference.

QUICK REFERENCE FOR POWERBACK R4 REGENERATIVE AC DRIVE PARAMETERS (SERIES M and IMC-AC-R)

WARNING: ***Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.***

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Cp - Parameters				
Cp. 0	Password (100 = read only, 200 = customer mode, 440 = application password)		0 - 9999	440	440
	Pn - Parameters				
Pn. 0	Auto reset E.UP	-	0 - 1	1	1
Pn. 1	Auto reset E.OP	-	0 - 1	1	0
Pn.16	Delay time E.doH	sec	0 - 120	60	60
Pn.59	Delay time E.nEt	sec	0 - 10	0	0
	Ud - Parameters				
ud. 0	Key Board Pass	-	0 - 9999	APPL	APPL
ud. 1	Buss Password	-	0 - 9999	N/A	N/A
ud. 2	Start parameter group	-	ru - table	ru	ru
ud. 3	Start parameter number	-	0 - 99	0	0
ud. 4	Save Changes	-	0 = Off 1= on	0	1
ud. 6	Inverter Address	-	0 - 239	1	1
ud. 7	Baud rate	-	1200 - 19200	9600	19200
	Fr - Parameters				
Fr. 0	Copy parameter set	-	-2 : init	-2	init
Fr. 1	Copy Bus parameter	-	-2	N/A	N/A
	An - Parameters	-			
An.14	Analog output function	-	0 - 2	0	0
An.15	Analog output gain	-	-20 to 20	1.0	1
An.16	Analog output offset X	%	-100 to 100	0.0	0.0
An.17	Analog output offset Y	%	-100 to 100	0	0
	di - Parameters				
di. 0	Noise Filter Digital	-	0 - 31	0	0
di. 1	NPN/PNP Selection	-	0 = PNP 1 = NPN	0	0
di. 2	Input logic	-	0 - 7	0	0
di. 3	Input function 11	-	0 - 1	0	0
di.14					0
di.15	Select Signal Source	-	0 - 7	0	0
di.16	Digital input setting	-	0 - 7	0	0

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	do - Parameters				
do. 0	out put logic	-	0 - 3	0	0
do. 1	output condition 1	-	0 - 10	2	2
do. 2	output condition 2	-	0 - 10	4	5
do. 3	out put condition 3	-	0 - 10	3	3
do. 9	select output 1 condition	-	0 - 7	1	1
do.10	select output 2 condition	-	0 - 7	2	2
do.11	select output 3 condition	-	0 - 10	4	4
do.17	out put 1 condition logic	-	0 - 7	0	0
do.18	out put 2 condition logic	-	0 - 7	0	0
do.19	Out put 3 condition logic	-	0 - 7	0	0
do.25	out condition logic	-	0 - 7	0	0
	Le - Parameters				
Le. 8	Load Level 1	%	0 - 200	50	50
Le. 9	Load Level 2	%	0 - 200	100	100
Le.10	Load Level 3	%	100 - 200	100	160
Le.12	Phase current level 1	A	0 - 370	370	0
Le.13	Phase current level 2	A	0 - 370	370	0
Le.14	Phase current level 3	A	0 - 370	370	0
Le.24	DC voltage level 1	V	0 - 1000	650	0
Le.25	DC voltage level 2	V	0 - 1000	650	✳________
	✳Set to 250 for 230 VAC Drives. Set to 500 for 480 VAC Drives.				
Le.26	DC voltage level 3	V	0 - 1000	650	0
Le.32	OL warning level	%	0 - 100	80	80
Le.38	Current Hysteresis	A	0 - 370	370	0.0
	CS - Parameters				
CS.27	Regen Voltage Level	%	100 - 200	110	106
CS.35	Line frequency window	%	2 - 30	10	5

Job #:
Drive Model #:
Drive Manufacturer:
Drive Software (In. 4):
Line #:
Tested By:
Approved:

APPENDIX L
QUICK REFERENCE FOR YASKAWA F7 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

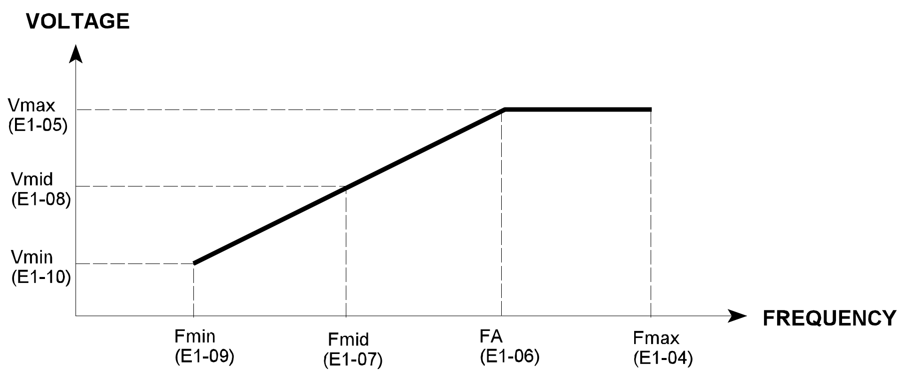
Field Adjustable Parameters are shown in shaded rows. All other parameters should be set to the values shown below in the "Field/MCE Set" column.

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Initialization				
A1-00	Select Language	Selects the language for the Digital Operator 0: English 3: Francais 6:Portugues 1: Japanese 4: Italiano 2: Deutsch 5: Espanol	-	0 - 6	0	0
A1-01	Access Level	Sets parameters accessible by Digital Operator 0: Operation Only 1: User Level (A2 parameters must be set) 2: Advanced Level	-	0 - 2	2	2
A1-02	Control Method	Selects the drive control method 0: V/F without PG 2: Open Loop Vector 1: V/F with PG 3: Flux Vector (closed loop)	-	0 - 3	0	✿
		✿ V/F Control (open loop) = 0 Flux Vector (closed loop) = 3				
A1-03	Init Parameters	Sets parameters to default values (see Note 1) 0: No Initialize 2220: 2-Wire Initial 1110: User Initialize 3330: 3-Wire Initial	-	0 - 3330	0**	0**
A1-04	Enter Password	If A1-04 does not match A1-05, parameters A1-01 thru A1-03 and A2-01 thru A2-32 cannot be changed.	-	0 - 9999	-	0
A1-05	Select Password		-	0 - 9999	-	0
		Sequence				
B1-01	Reference Source	Selects the frequency reference input source. 0: Operator 2: Serial Com 4: Pulse Input 1: Terminals 3: Option PCB	-	0 - 4	0	0
B1-02	Run Source	Selects the run command input source. 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
B1-03	Stopping Method	Selects the stopping method 0: Ramp to Stop 2: DC Injection to Stop 1: Coast to Stop 3: Coast with Timer	-	0 - 3	0	0
B1-04	Reverse Oper	Prohibition of reverse operation 0: Reverse Enabled 1: Reverse Disabled 2: Exchange Phase - change rotation direction	-	0 - 2	0	0
		DC Injection Braking				
B2-01	DCInj Start Freq	DC Injection Braking Start Frequency (speed)	Hz	0.0 - 10.0	1.5	1.5
B2-02	DCInj Current	DC Injection Braking Current *(N/A to Flux Vector)*	%	0 - 100	50	50
B2-03	DCInj Time@Start	DC Injection Braking Time at Start	sec	0.00 - 10.00	0.00	❀
		❀ V/F Control (open loop) = 0.20 Flux Vector (closed loop) = 0.0				
B2-04	DCInj Time@Stop	DC Injection Braking Time at Stop	sec	0.00 - 10.00	0.50	0.50
		Accel / Decel	**Field Adjustable Parameters are shaded**			
C1-01	Accel Rate 1	Acceleration Rate 1	f/s^2	0.01 - 8.00	3.00	✳
C1-02	Decel Rate 1	Deceleration Rate 1	f/s^2	0.01 - 8.00	3.00	✳
C1-03	Accel Rate 2	Acceleration Rate 2	f/s^2	0.01 - 8.00	3.00	3.00
C1-04	Decel Rate 2	Deceleration Rate 2	f/s^2	0.01 - 8.00	6.00	6.00

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
C1-05	Accel Rate 3	Acceleration Rate 3	f/s^2	0.01 - 8.00	6.00	6.00
C1-06	Decel Rate 3	Deceleration Rate 3	f/s^2	0.01 - 8.00	6.00	6.00
C1-07	Accel Rate 4	Acceleration Rate 4	f/s^2	0.01 - 8.00	3.00	✳
C1-08	Decel Rate 4	Deceleration Rate 4	f/s^2	0.01 - 8.00	3.00	✳
C1-09	Fast Stop Rate	Fast Stop Rate	f/s^2	0.01 - 8.00	3.00	3.00
C1-11	Acc/Dec SW fre	Accel/Decel switching level	Hz	0.00 - 400	0.0	0.0
		Motor-Slip Compensation				
C3-01	Slip Comp Gain	Slip Compensation Gain	-	0.0 - 2.5	1.0	1.0
C3-02	Slip Comp Time	Primary Time Delay *(N/A to Flux Vector)*	ms	0 - 10000	200	200
C3-04	Slip Comp Regen	Slip Compensation During Regen 0: Disabled 1: Enabled *(N/A to Flux Vector)*		0, 1	1	1
		Torque Compensation				
C4-01	Torque Comp Gain	Torque Compensation Gain *(N/A to Flux Vector)*	-	0.00 - 2.50	1.00	1.00
C4-02	Torque Comp Time	Torque Compensation Primary Delay Time *(N/A to Flux Vector)*	ms	0 - 10000	200	200
		ASR Tuning	**(Flux Vector only)**			
C5-01	ASR P Gain 1	ASR Proportional Gain 1 *(Flux Vector only)*	-	0.00 -300.00	20.00	20.00
C5-02	ASR I Time 1	ASR Integral Time 1 *(Flux Vector only)*	sec	0.0 - 10.000	0.200	0.200
C5-03	ASR P Gain 2	ASR Proportional Gain 2 *(Flux Vector only)*	-	0.00 - 300.00	20.00	20.00
C5-04	ASR I Time 2	ASR Integral Time 2 *(Flux Vector only)*	sec	0.0 - 10.000	0.500	0.500
		Carrier Frequency				
C6-01	Heavy/Normal Duty	Drive Duty Selection 0: Heavy 1: Normal 1 2: Normal 2	-	0 - 2	0	0
C6-02	Carrier Freq Sel	Carrier Frequency Selection 0: Low noise 1: 2.0 kHz 2: 5.0 kHz 3: 8.0 kHz 4: 10.0 kHz 5: 12.5 kHz 6: 15.0 kHz	-	0 - F	kVA dependent	3
C6-03	Carrier Freq Max	Carrier Frequency Upper Limit	kHz	2.0 - 15.0	kVA dependent	8.0
		Preset Reference	**Field Adjustable Parameters are shaded**			
❇ The upper limit is the max FPM value set by O1-03. Set this parameter before setting D1-01 thru D1-17.						
D1-01	Reference 1	Preset Reference 1 (Not used)	FPM	0.0 - ❇	0.0	0.0
D1-02	High	High Speed (must be > D1-07)	FPM	0.0 - ❇	50.0	✳
D1-03	High Level	High Level (must be > D1-05 and < D1-07)	FPM	0.0 - 30.0	13.0	✳
D1-04	Reference 4	Preset Reference 4 (Not used)	FPM	0.0 - ❇	0.0	0.0
D1-05	Level	Level Speed (must be < D1-03)	FPM	0.0 - 15.0	2.5	✳
D1-06	Reference 6	Preset Reference 6 (Not used)	FPM	0.0 - ❇	0.0	0.0
D1-07	Combination	Intermediate (must be > D1-03 and < D1-02)	FPM	0.0 - ❇	42.0	✳
D1-08	Reference 8	Preset Reference 8 (Not used)	FPM	0.0 - ❇	0.0	0.0
D1-17	Jog reference	Jog Reference - Inspection Speed	FPM	0.0 - ❇	42.0	✳
		Reference Limits				
D2-01	Ref Upper Limit	Frequency Reference Upper Limit	%	0.0 - 110.0	100.0	100.0
D2-02	Ref Lower Limit	Frequency Reference Lower Limit	%	0.0 - 110.0	0.0	0.0
		Jump Frequencies	**(not used) set at drive defaults**			
		V/F Pattern	**Field Adjustable Parameters are shaded**			
E1-01	Input Voltage	Input Voltage Setting	V	180 - 460	230/460	✳
E1-02	Motor Selection	Motor selection 0: Fan-Coded 1: Blower-Coded	-	0, 1	0	0
E1-03	V/F Selection	V/F Pattern Selection *(N/A to Flux Vector)* 0: 50Hz F: Custom V/F	-	0 - F	F	F
E1-04	Max Frequency	Maximum Output Frequency	Hz	40.0 - 80.0	60.0	✳
E1-05	Max Voltage	Maximum Output Voltage (Motor Voltage)	V	0.0 - 460.0	230/460	✳
E1-06	Base Frequency	Maximum voltage output frequency	Hz	0.0 - 72.0	60.0	✳
E1-07	Mid Frequency A	Mid Output Frequency A *(N/A to Flux Vector)*	Hz	0.0 - 72.0	3.0	3.0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
E1-08	Mid Voltage A	Mid Output Voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	16.1/32.2	✳
E1-09	Min Frequency	Minimum Output Frequency *(N/A to Flux Vector)*	Hz	0.0 - 72.0	0.5	0.5
E1-10	Min Voltage	Minimum Output Voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	10.0/20.0	✳



No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Motor Setup	**Field Adjustable Parameters are shaded**			
E2-01	Motor Rated FLA	Set to motor nameplate full load amps. This value is automatically set during Auto-Tuning.	A	0.00 - 1500.0	Motor rated FLA	✳
E2-02	Motor Rated Slip	Motor rated slip frequency - Note: Refer to the attached table to calculate the slip frequency.	Hz	0 - 15.0	kVA dependent	✳
E2-03	No-Load Current	Motor No Load Current	A	0 -150	30 - 50% Motor FLA	✳
E2-04	Number of Poles	Number of Motor Poles *(Flux Vector only)*	-	2 - 48	6	✳
		PG Option Setup (Flux Vector only)	**Field Adjustable Parameters are shaded**			
F1-01	PG Pulse/Rev.	Encoder pulses per revolution *(Flux Vector only)*	-	0 - 60000	1024	1024
F1-02	PG Fdbk Loss Sel *(Flux Vector only)*	Stoping method at PG line brake detection. 0: Ramp to stop 2: Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-03	PG Overspeed Sel *(Flux Vector only)*	Stoping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-04	PG Deviation Sel *(Flux Vector only)*	Stoping method at DEV fault detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-05	PG Rotation Sel	PG rotation 0: CCW 1: CW *(Flux Vector only)*	-	0/1	0	0 or 1
F1-06	PG Output Ratio	PG Division Rate *(Flux Vector only)*	-	1 - 132	1	1
F1-07 thru F1-13	*(Flux Vector only)*	Set to drive defaults.				
		Digital Inputs	**See H1-01 description in F7 Drive Manual**			
H1-01	Terminal S3 Sel	Multi-Function Input Terminal S3 Function Selection 9: External BaseBlock N.C.	-	0 - 82	9	9
H1-02	Terminal S4 Sel	Multi-Function Input Terminal S4 Function Selection 14: Fault Reset	-	0 - 82	14	14
H1-03	Terminal S5 Sel	Multi-Function Input Terminal S5 Function Selection 80: Multi-Step Ref 1F	-	0 - 82	80	80
H1-04	Terminal S6 Sel	Multi-Function Input Terminal S6 Function Selection 81: Multi-Step Ref 2F	-	0 - 82	81	81
H1-05	Terminal S7 Sel	Multi-Function Input Terminal S7 Function Selection 82: Multi-Step Ref 3F	-	0 - 82	82	82
H1-06	Terminal S8 Sel	Multi-Function Input Terminal S8 Function Selection 6: Jog Ref (Inspection speed)	-	0 - 82	6	6

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Digital Outputs	**See H2-01 description in F7 Drive Manual**			
H2-01	Term M1-M2 Sel	Terminal M1-M2 Function Selection 40: During Run 3	-	0 - 40	40	40
H2-02	Term M3-M4 Sel	Terminal M1-M2 Function Selection 4: Frequency Detection 1	-	0 - 40	4	4
H2-03	Term M5-M6 Sel	Terminal M1-M2 Function Selection F: Not Used	-	0 - 40	F	F
		Analog Inputs				
H3-01	Term A1 Lvl Set	Sets the signal level of terminal A1. 0: 0 to 10VDC 1: -10 to +10VDC	-	0, 1	0	0
H3-02	Terminal A1 Gain	Sets the output level when 10V is input, as a percentage of max. output frequency (E1-04)	%	0.0 - 1000.0	100.0	100.0
H3-03	Terminals A1 Bias	Sets the output level when 0V is input, as a percentage of max. output frequency (E1-04)	%	-100.0 - +100.0	0.0	0.0
H3-04	Term A3 Signal	Sets the signal level of terminal A3. 0: 0 to 10VDC 1: -10 to +10VDC	-	0, 1	0	0
H3-05	Terminal A3 Sel	Terminal A3 Function Selection 1F: Not Used	-	0 - 1F	1F	1F
H3-06	Terminal A3 Gain	Sets the output level when 10V is input.	%	0.0 - 1000.0	100.0	100.0
H3-07	Terminal A3 Bias	Sets the frequency reference when 0V is input.	-	-100.0 - 100.0	0.0	0.0
		Analog Outputs	**See H4-01 description in F7 Drive Manual**			
H4-01	Terminal FM Sel	Terminal FM Monitor Selection 1: Frequency Ref.	-	1 - 99	1	1
H4-02	Terminal FM Gain	Sets terminal FM output level when selected monitor is at 100%.	%	0.0 - 1000.0	100.0	100.0
H4-03	Terminal FM Bias	Sets terminal FM output level when selected monitor is at 0%.	%	-110.0 to 110.0	0.0	0.0
H4-04	Terminal AM Sel	Terminal AM Monitor Selection 2: Output Freq	-	1 - 99	2	2
H4-05	Terminal AM Gain	Sets terminal AM output voltage (in percent of 10Vdc) when selected monitor is at 100% out.	%	0.0 - 1000.0	100.0	100.0
H4-06	Terminal AM Bias	Sets terminal FM output voltage (in percent of 10Vdc) when selected monitor is at 0% output.	%	-110.0 to 110.0	0.0	0.0
H4-07	AO Level Select 1	Selects the signal level of terminal FM. 0: 0 to 10Vdc 1: -10 to +10V 2: 4 to 20mA	-	0 - 2	0	0
H4-08	AO Level Select 2	Selects the signal level of terminal AM. 0: 0 to 10Vdc 1: -10 to +10V 2: 4 to 20mA	-	0 - 2	0	0
		Motor Overload				
L1-01	MOL Fault Select	Motor Overload Protection Selection - OL1 0: Disabled 2: Blower Cooled 1: Fan Cooled 3: Vector Motor	-	0 - 3	2	2
L1-02	MOL Time Const	Motor Overload Protection Time	min	0.1 - 20.0	1.0	1.0
		Power Loss Ridethru				
L2-01	PwrL Selection	Momentary power loss ridethrough selection 0: Disabled 1: Ridethrough (for time set in L2-02) 2: Ridethrough while CPU has power	-	0 - 2	0	0
L2-02	PwrL RideThru t	Momentary Power Loss Ride-thru Time	sec	0.0 - 25.5	2.0	2.0
L2-03	PwrL Baseblock t	Momntary Pwr Loss Minimum Base Block Time	sec	0.1 - 5.0	0.7	0.7
		Stall Prevention				
L3-01	StallP Accel Sel (*N/A to Flux Vector)*	Stall Prevention Selection During Acceleration 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	1	1
L3-02	StallP Accel Lvl *(N/A to Flux Vector)*	Stall Prevention Level During Acceleration	%	0 - 200	180	180

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
L3-04	StallP Decel Sel	Stall Prevention Selection During Deceleration 0: Disabled 1: General-purpose 2: Intelligent 3: Stall Prevention with Braking Resistor	-	0 - 3	0	0
L3-05	StallP Run Sel *(N/A to Flux Vector)*	Stall Prevention Selection During Running 0: Disabled 1: Decel Time 1 2: Decel Time 2	-	0 - 2	0	0
L3-06	StallP Run Level *(N/A to Flux Vector)*	Stall Prevention Level During Running	%	30 - 200	160	160
		***Ref Detection* (Flux Vector only)**	**Set to Drive Default for V/F**			
L4-01	Spd Agree Level	Speed Agreement Detection Level (L4-01 = E1-04) *(Flux Vector only)*	Hz	0.0 - 400	0.0	60.0
L4-02	Spd Agree Width	Speed Agreement Detection Width *(FV only)*	Hz	0.0 - 20.0	2.0	5.0-8.0
		Fault Restart				
L5-01	Num of Restarts	Number of automatic restart attempts	-	0 - 10	0	0
L5-02	Restart Sel	Automatic restart operation selection 0: No Fault Relay 1: Fault Relay Active	-	0, 1	1	1
		Torque Detection				
L6-01	Torq Det 1 Sel	Torque Detection Selection 1 0: Disabled 1: OL3 at Speed Agree - Alarm 2: OL3 at Run - Alarm 3: OL3 at Speed Agree - Fault 4: OL3 at Run - Fault 5: UL3 at Speed Agree - Alarm 6: UL3 at Run - Alarm 7: UL3 at Speed Agree - Fault 8: Ul3 at Run - Fault	-	0 - 8	0	0
L6-02	Torq Det 1 Lvl	Torque Detection Level 1	%	0 - 300	150	150
L6-03	Torq Det 1 Time	Torque Detection Time 1	sec	0.0 - 10.0	0.1	0.1
		Torque Limits	**(Flux Vector only)**			
L7-01 thru L7-04	Torque Limits *(Flux Vector only)*	Set to Factory Defaults	%	0 - 300	200	200
		Hardware Protection				
L8-01	DB Resistor Prot	Protection Selection for Internal DB Resistor 0: Not Provided 1: Provided	-	0, 1	0	0
L8-05	Ph Loss In Sel	Input Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1
L8-07	Ph Loss Out Sel	Output Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1
		Monitor Select				
O1-01	User Monitor Sel	Monitor Selection 6 = Output voltage	-	4 - 45	6	6
O1-02	Power-On Monitor	Monitor Selection upon Power-up 1: Frequency reference 2: Output Frequency 3: Output Current 4: User monitor	1	1 - 4	1	1
O1-03	Display Scaling	Digital Operator Display Selection Sets the units of the Frequency References (D1-01 to D1-17), the Frequency Reference Monitors (U1-01, U1-02, U1-05), and the Modbus communication frequency reference. Units are fixed at FPM (ft/Min) with a range of 10.0 to 999.9 FPM at max frequency. 10100 to 19999: User units e.g. (10100 = 10.0 FPM) (19999 = 999.9 FPM)	-	10100 to 19999	11000 (= 100 FPM)	Set to contract speed ✳

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Key Selections				
O2-01	Local/Remote Key	Local/Remote Key 0: Disabled 1: Enabled	-	0, 1	0	0
O2-02	Oper Stop Key	Stop key during external terminal operation 0: Disabled 1: Enabled	-	0, 1	1	1
O2-03	User Defaults (see Note 1)	User (MCE) defined default value settings 0 = No change 1= Set defaults 2 = Clear all	-	0-2	0	1
See Section 4.11.3		**S Curve Control**	**Field Adjustable Parameters are shaded**			
P1-01	Jerk Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	4.0
P1-02	Jerk Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	10.5
P1-03	Jerk Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	48.0
P1-04	Accel Jerk In 1	S Curve #1 at the Start of Acceleration	f/s^3	0.01 - 30.00	2.5	✳
P1-05	Accel Jerk Out 1	S Curve #1 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-06	Decel Jerk In 1	S Curve #1 at the Start of Deceleration	f/s^3	0.01 - 30.00	5.00	✳
P1-07	Decel Jerk Out 1	S Curve #1 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✳
P1-08	Accel Jerk In 2	S Curve #2 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-09	Accel Jerk Out 2	S Curve #2 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-10	Decel Jerk In 2	S Curve #2 at the Start of Deceleration	f/s^3	0.01 - 30.00	2.00	✳
P1-11	Decel Jerk Out 2	S Curve #2 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✳
P1-12	Accel Jerk In 3	S Curve #3 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-13	Accel Jerk Out 3	S Curve #3 at the End of Acceleration	f/s^3	0.01 - 30.00	2.5	✳
P1-14	Decel Jerk In 3	S Curve #3 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.0	✳
P1-15	Decel Jerk Out 3	S Curve #3 at the End of Deceleration	f/s^3	0.01 - 30.00	3.5	3.5
P1-16	Accel Jerk In 4	S Curve #4 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-17	Accel Jerk Out 4	S Curve #4 at the End of Acceleration	f/s^3	0.01 - 30.00	2.5	✳
P1-18	Decel Jerk In 4	S Curve #4 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.0	✳
P1-19	Decel Jerk Out 4	S Curve #4 at the End of Deceleration	f/s^3	0.01 - 30.00	15.00	15.00
		Stop - Start				
P2-01	Run Cmd Delay	Run Command Delay Scans (5ms scans)	-	0 - 200	40	40
P2-03	Fwd Torque Comp	Forward Torque Compensation	%	-100 - 100	0	0
P2-04	Rev Torque Comp	Reverse Torque Compensation	%	-100 - 100	0	0
P2-05	Dgtl Input Fltr	Digital Input Filter Scans (5ms scans)	-	0 - 200	2	2
P2-06	Stop Dwell Time	Stop Dwell Time	sec	0.0 - 30.0	0.0	0.0
		Fault Auto - Reset				
P3-01	Num Auto-Resets	Number of Automatic Resets	-	0 - 10	3	3
P3-02	Auto-Reset Time	Time Delay Between Automatic Resets	sec	0.5 - 10.0	3.0	3.0

***** Set values for 200 volts. The value at 400V is twice that of 200V.

****** Do not initialize the drive in the field if it is not required. Setting A1-03 =1110 and pressing enter will initialize the Drive and will set all of the drive parameters to the MCE Drive default values. Parameter A1-03 will display 0 after Initialization.

Note 1: At the factory, MCE will set the drive parameters to the values shown in the *MCE Set* column, and will save those values as “defaults” by setting parameter O2-03 = 1. In the field, the drive parameters can be *reset* to the MCE Set values by setting parameter A1-03 = 1110. The Field Adjustable parameters can then be re-entered.

Note 2: The Yaskawa drive software has been modified for this application. Some of the parameters in this sheet are different and are not available in the drive manuals. If a drive has been replaced in the field then all the drive parameters should be entered manually and should be verified according to this parameter sheet.

FIGURE B.1 Velocity Curve and S Curve Parameters (Yaskawa F7)

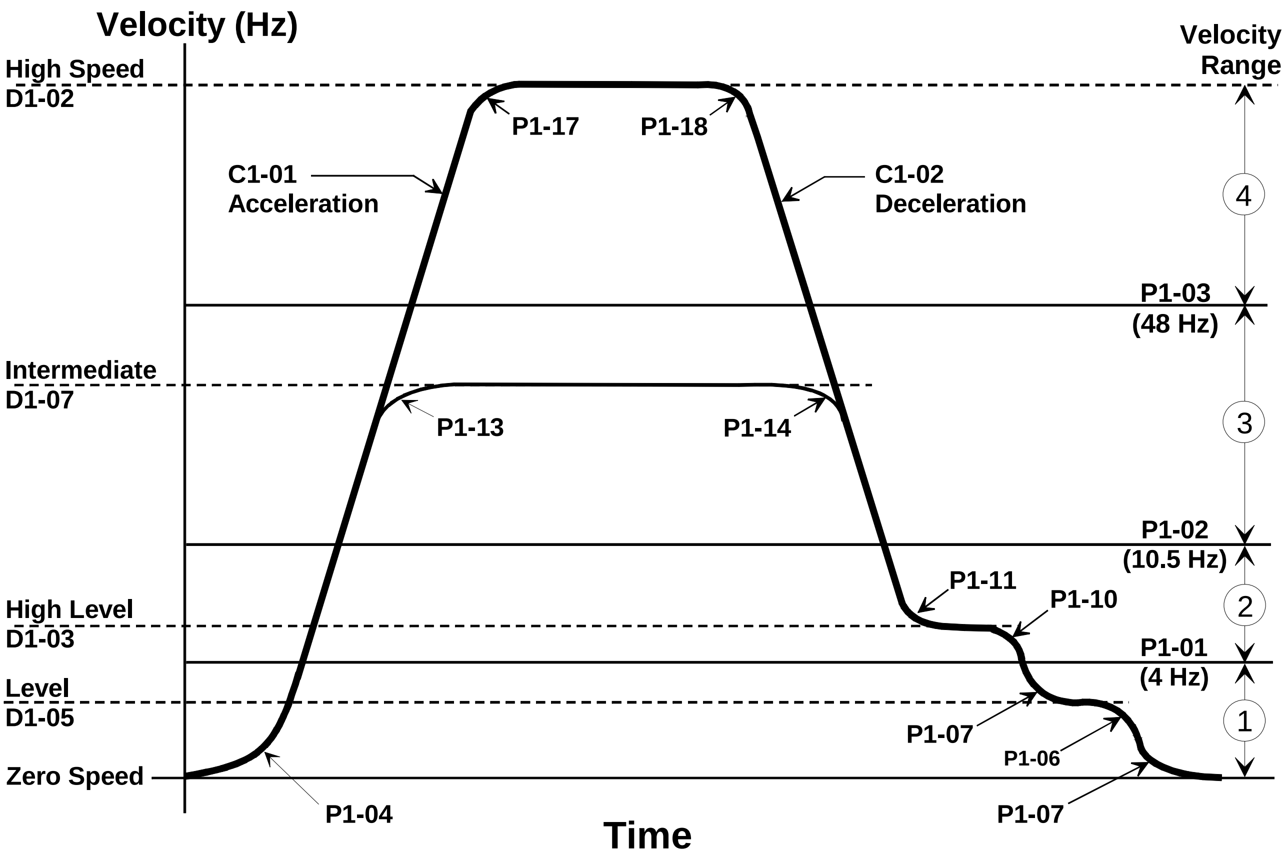


Table for Selection of S-Curves

(Increasing the value (time) of an S-curve parameter causes a longer (smoother) transition)

Range	Velocity (Hz)	Start Accel	End Accel	Start Decel	End Decel
①	Less than P1-01	✶ **P1-04**	P1-05	✶ **P1-06**	✶ **P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	✶ **P1-10**	✶ **P1-11**
③	Between P1-02 and P1-03	P1-12	✶ **P1-13**	✶ **P1-14**	✶ **P1-15**
④	Greater than P1-03	P1-16	✶ **P1-17**	✶ **P1-18**	P1-19

✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.

Motor Rated Slip Frequency = E2-02

E2-02 = f_s = f − (N x P/120)

where...

f_s: slip frequency (Hz)
f: motor rated frequency (Hz)
N: motor rated speed (F.L - rpm)
P: number of motor poles

P	Synchronous RPM	
	60Hz Motor	50Hz Motor
8	900	750
6	1200	1000
4	1800	1500

Job #:
Drive Model #:
Drive Manufacturer:
Drive Serial Number:
Drive Software (U1-14):
Line #:
Tested By:
Approved:

APPENDIX M
QUICK REFERENCE FOR POWERBACK R6 REGENERATIVE AC DRIVE PARAMETERS (SERIES M and IMC-AC-R)

K.1 GENERAL

The following information pertains to VVMC-1000-PTC Series M controllers with the addition of the POWERBACK R6 Regenerative Drive.

K.2 REGENERATIVE DRIVE INTERFACE

The following is an explanation of the POWERBACK R6 Regenerative Drive interface.

K.2.1 DRIVE INPUTS

- Drive Enable (Terminal 12): This input enables the R6 drive and puts the drive in standby mode. Drive parameter **ru. 0** reads **stby** during motoring condition and **Active** during deceleration/overhauling conditions. A voltage between drive terminals 12 & 17 of 18 VDC = ON, 0 VAC = OFF.

- Drive Reset (Terminal 13): This input resets an R6 drive fault. Pressing the drive reset button on the HC-ACI board activates the reset input and clears regenerative drive faults. A voltage between drive terminal 13 & 17 of 18 VDC = ON, 0 VAC = OFF.

K.2.2 DRIVE OUTPUT

- Drive ready contact: The contacts between terminals 24 and 26 on the R6 drive remain closed under normal condition and open during a fault, which drops the RDY relay on the HC-ACI board. Pressing the Drive Reset button on the HC-ACI board should clear the R6 drive fault and should turn ON the RDY relay.

K.2.3 POWER CONNECTIONS

- Make sure synchronization cable is connected between the commutation choke and the R6 drive.

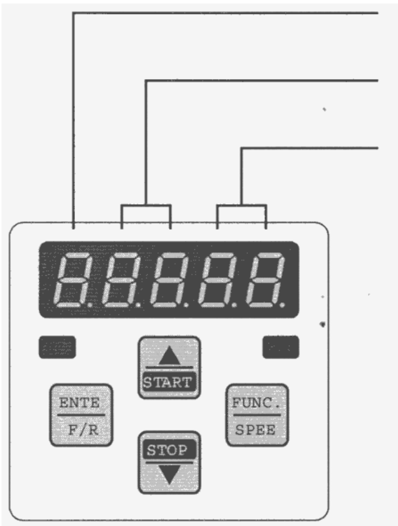
- The DC bus connections must be correct and according to the drawings. ***It is critical that DC bus connections be correct. Incorrect connections will damage the drive units.***

- The line inductor ground connection to the R6 Drive and F5 Drive must be completed according to the drawings.

K.2.4 HOW TO USE THE DRIVE KEYPAD

The R6 drive is delivered from the factory in the *Application* mode, which allows access to all parameters and functions available on the unit.

The display shows three types of information which define the parameter:



Parameter set

Parameter group

Parameter number

By pressing the FUNC button you can change between the displayed parameter and its value.

To select a different parameter use the ENTER button to toggle the flashing point to the right of the field to be changed. Then use the UP and DOWN buttons to scroll the desired value. Once the correct parameter information is displayed, the FUNC button can be pressed at any time to see the value of the parameter.

When displaying a parameter value, the value of the parameter can be changed by pressing the UP/DOWN buttons. Generally, these changes are immediately effective and permanently stored, meaning they remain stored after the unit is switched off. Confirming the input with ENTER is not necessary, with the exception of the parameters known as *Enter Parameters*.

Enter Parameter: For some parameters the value adjusted by UP/DOWN does not automatically become valid. These parameters are called Enter Parameters since they must be confirmed by ENTER. When pressing UP/DOWN only the display is changed but not the value stored in the R6. When the display value is different from the stored value in the R6, it is marked by a point in the display. By pressing ENTER the display value is stored in theR6 and the point is deleted. The displayed value of an Enter parameter always starts with the stored value.

K.2.5 ERROR MESSAGES

If a drive fault occurs during operation, the display is overwritten with an error message. Press ENTER to clear the error message.

NOTE:	Pressing ENTER resets only the error message in the display. To reset the actual error and return the unit to normal operation, the cause of the error must be removed and a reset done on terminal 11, or power off reset.

Refer to the R6 drive manual for a listing of error messages.

TURN ON PROCEDURE

The Powerback R6 is initialized after connection of the main line supply. The power circuit identification is checked first. If an invalid power circuit is recognized, error E.PuCi (power unit check) is triggered and displayed in the operator. This error cannot be reset, the power circuit must be checked.

If a valid power circuit is recognized, the Powerback R6 changes into status "Syn". The following procedures take place one after another during this synchronisation phase:

- Verification of correct synchronisation to the line, (error E.nEt is triggered if the synchronization signals are missing)
- Verification of the phasing of the synchronization signals to the main line phases. Error E.Syn is triggered if a phase signal is missing or in case the phasing is not correct.
- The actual line frequency is determined. If the frequency is outside the set window the unit will trigger an E.FnEt fault.
- The unit is now ready for operation. If the enable (terminal I1) is activated, the Powerback R6 is put into operation. Depending on the actual value of the DC bus voltage, the Powerback R6 is in status rEgEn or Stdby.

Status Stdby - Powerback R6 detects the idle voltage level in the DC bus circuit of the connected frequency inverter (motor operation) and keeps the modulation signals of the regen unit deactivated.

Status rEgEn - If the DC bus voltage rises above 103% of the idle voltage (CP.9), the modulation signals are activated and the unit changes into regen operation. Alternately, if another R6 unit connected in parallel switches into rEgEn mode, the slave unit will immediately switch into regen mode simultaneously.

CP.34 Control Angle Parameter

This parameter adjusts the conduction angle during regen mode. The default value is 30.0 degrees. By lowering this value, the audible sound from the commutation choke can be reduced. The typical adjustment range is 25.0 to 30.0 degrees. Values higher than 36 can result in random E.OC errors. Values lower than 25 can limit the available regen power.

Troubleshooting		
Problem	**Cause**	**Solution**
During parallel operation, load sharing between units is not equal.	Can be caused by tolerances between the voltage circuit in the choke, the choke itself and the voltage sensing circuit in the R6 unit. As a result more current flows through that unit.	If the unit has version 1.3 software, lower the value of CP.34, on the unit with the highest load, in steps of 1.0, until the load between the two balances out.
Audible noise from the choke is too loud.	The default adjustment of the R6 unit allows for fast response and high peak capacity. This can lead to more audible noise from the choke. By reducing the commutation angle, it is possible to lower this sound.	If the unit has version 1.3 software, lower the value of parameter CP.34 from 30.0 to 26.0. Run the car at full load to make sure there are no issues running full load down.

PARAMETER SETTING / ADJUSTMENT

The R6 drive parameters listed in the Parameters Quick Reference are set at MCE and should not require field adjustments.

QUICK REFERENCE FOR POWERBACK R6 REGENERATIVE AC DRIVE PARAMETERS

WARNING: ***Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.***

All parameters should be set to the values shown below in the "Field/MCE Set" column.

Operator Display	Parameter Description	Setting Range	Resolution	Field/MCE Set
CP. 0	Password	0 - 9999	1	---
CP. 1	Status display	---	---	---
CP. 2	Main Line Frequency	---	0.1 Hz	---
CP. 3	AC-Phase current L1	---	0.1 A	---
CP. 4	AC-Phase current L2	---	0.1 A	---
CP. 5	AC-Phase current L3	---	0.1 A	---
CP. 6	Actual Load	---	1%	---
CP. 7	Actual Load / peak value	---	1%	---
CP. 8	DC output current	---	0.1 A	---
CP. 9	Actual DC voltage	---	1 V	---
CP.10	DC voltage / peak value	---	1 V	---
CP.11	Heat sink temperature	---	1^{0}C	---
CP.12	Over load counter	---	1%	---
CP.13	Active power	---	0.1kW	---
CP.14	Total regen kWh counter	---	0.1kWh	---
CP.15	Total motor kWh counter	---	0.1kWh	---
CP.16	Total net kWh counter	---	0.1kWh	---
CP.17	Apparent power / Line input	---	0.1kVA	---
CP.18	Analog output 1/ amplification factor	-20.00...20.00	0.01	---
CP.19	DC bus switching level	+/- 30000.00	0.01	Set to 260 for 208 - 240Vac Set to 600 for 460 - 480Vac
CP.20	Auto error reset counter	0...10	1	3
CP.21	Last Error	---		---
CP.22	Last Error 1	---		---
CP.23	Last Error 2	---		---
CP.24	Last Error 3	---		---
CP.25	Last Error 4	---		---
CP.26	Last Error 5	---		---
CP.27	Last Error 6	---		---
CP.28	Last Error 7	---		---
CP.29	Software version	---		
CP.30	Software date code	DDMM.Y		
CP.31	Power part ID code	---		250 for 208-240Vac 253 for 460-480Vac
CP.32*	Pulse off Level	-100kW...0.0kW	0.1kW	-0.8kW
CP.33*	Operating Mode 0: Master with Commutation Choke 2: Slave with Commutation Choke	0...3	1	Set to 0 for Main Regen Drive Set to 2 for Second Drive
CP.34*	Control Angle	0.0...60.0	0.1	29

* NEW PARAMETERS in software version 1.3

Job #:	
Prod. Order #:	
Drive Model #:	
Drive Serial #:	
Test Technician:	
Date:	

APPENDIX N
QUICK REFERENCE FOR TORQMAX F5 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

WARNING: ***Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.***

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

CAUTION: For permanent magnet (PM Synchronous) motors, consult the following sections of the TORQMAX F5 Drive manual before roping the machine, 5.5 *PM Synchronous Motors*, 5.8 *Encoder Feedback* and 5.11 *Running the Motor.*

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
LF. 2	Signal operating mode: AbSPd - Absolute Analog Speed d SPd - Digital Speed Selection A tor - Analog Torque Control A Spd - Analog Speed Control SerSP - Serial Com. Speed Control bnSPd - Binary Speed Selection	-	AbSPd d Spd A tor A Spd SerSP bnSPd	bnSPd	bnSPd
LF. 3	Drive configuration: run - run mode conF - Configuration (5 minute time limit) EconF - Expired Configuration S Lrn - activate auto tune for PM Motor	-	run conF EconF S Lrn	conF	run
LF. 4	Motor-selection: Displays mode selected using US. 4 and US.10	-	see US.10	-	✳✳✳
LF. 5	Drive Fault auto reset	1	0 - 10	5	5
LF. 8	Electronic motor overload protection	-	on, off	off	on
LF. 9	IM - Electronic overload current PM - not visible, auto set same as LF.12	A	1.0 - 110% Drive rated	8.0	✳
LF.10	Rated motor power, PM - read only, auto calc.	HP	0.00 - 125.00	5.00	✳
LF.11	Rated motor speed	rpm	10.0 - 6000.0	1165 or 150	✳
LF.12	Rated motor current	A	1.0 - 110% Drive rated	8.0	✳
LF.13	Rated motor frequency	Hz	4.0 - 100.0	60.0	✳
LF.14	Rated Motor voltage IM - Name plate rated voltage PM - No-load, phase-to-phase back EMF rms voltage at LF.11	V	IM: 120 - 500V PM: 1 - 32000V/krpm	230/460	✳
LF.15	Power factor, PM - not applicable	1	0.50 - 1.00	0.90	0.90
LF.16	Field weakening speed, PM - not applicable	rpm	0.0 - 6000.0	set @ 80% of LF.11	✳
LF.17	Rated motor torque, IM - read only, auto calc. PM - enter motor name plate torque	lb ft	1 - 10000	IM - calc. PM - 18	IM - ✳✳✳ PM ✳____
LF.18	Motor stator resistance: IM - not applicable PM only - Motor resistance value	ohm	0.0 - 49.999	49.999	
LF.19	Motor leakage inductance: PM only - motor winding leakage inductance from Mfg. data sheet	mH	0.01 - 500.00	1.00	

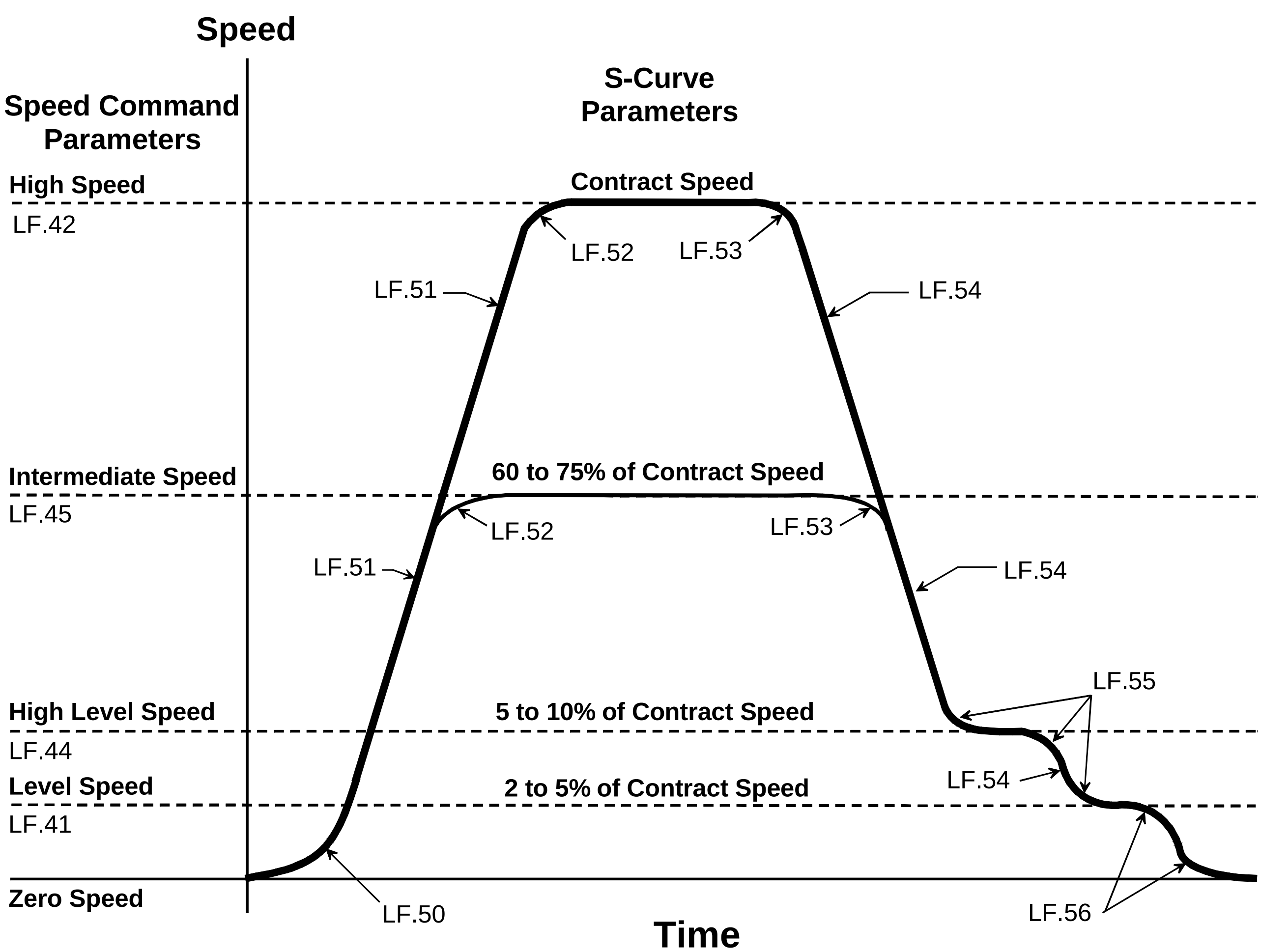
Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
LF.20	Contract speed	fpm	0 - 1600	0	✳
LF.21	Traction sheave diameter (measured value)	inch	7.00 - 80.00	24.00	✳
LF.22	Gear reduction ratio	1	1.00 - 99.99	30.00	✳
LF.23	Roping ratio	1	1 - 8	1	✳
LF.24	Load weight	lbs	0 - 30000	0	✳
LF.25	Estimated gear ratio: Read only, auto calc.	.01	1.00 - 99.99	-	✳✳✳
0.LF.26	Encoder feedback: displays feedback type	-	-	-	✳✳✳
LF.27	Encoder pulse number	ppr	256 - 16384	1024	✳
LF.28	Reverse encoder: 0 nothing reversed 1 encoder A<–>B swapped 2 motor rotation reversed 3 motor rotation reversed and A<–>B swapped	1	0 - 3	0	✳
LF.29	Encoder sample time (recommend gearless = 4, geared = 8)	mSec	0.5 - 32	4	✳ 4 or 8
LF.30	Control method 0, 1 Open loop induction motor operation 2 - Closed loop speed control (LF.2 = A Spd) 3 - Closed loop speed control with pre-torque 4 - Closed loop torque control 5 - Close loop with synthesized pre-torque	1	0 - 5	0	✳
A.LF.31	Kp speed accel: Proportional gain, accel & run	1	1 - 32767	3000	✳✳ 3000
d.LF.31	Kp speed decel: Proportional gain, decel	1	1 - 32767	3000	✳✳ 3000
A.LF.32	Ki speed accel: Integral gain, accel & run	1	1 - 32767	350	✳✳ 350
d.LF.32	Ki speed decel: Integral gain, decel	1	1 - 32767	250	✳✳ 250
A.LF.33	Ki speed offset accel: Gain at low speed, accel	1	0 - 8000	3000	✳✳ 3000
d.LF.33	Ki speed offset decel: Gain at low speed, decel	1	0 - 8000	1000	✳✳ 1000
LF.34	Kp current: Proportional gain (auto calculated)	1	1 - 32767	Calculated	✳✳✳
LF.35	Ki CUrrent: Integral gain (auto calculated)	1	1 - 32767	Calculated	✳✳✳
0.LF.36	Maximum torque **(<u>Auto calc by the drive</u>)**.	lb ft	0 - 23590	Calculated	✳✳✳
1.LF.36	Maximum torque emergency operation (= LF.17)	lb ft	0 - 23590	Calculated	✳✳✳
LF.37	Open loop torque boost: Open loop op. only	%	0 - 25.5	5.0	5.0
LF.38	Carrier frequency; 0 = 8 KHz , 1 = 16KHz (**Note: set LF.38 = 0 if <u>E.OL2</u> error on drive*)***	1	0, 1	0	0
LF.41	Leveling speed	fpm	0 - 25	0.0	✳✳ 4
LF.42	High speed	fpm	0.0 - LF.20	0.0	✳
LF.43	Inspection speed	fpm	0.0 - 150	0.0	✳
LF.44	High leveling speed	fpm	0-25% of LF.20	0.0	✳✳ 18
LF.45	Intermediate speed 1	fpm	0-91% of LF.20	0.0	0.0
LF.46	Intermediate speed 2	fpm	0.0 - LF.20	0.0	0.0
LF.47	Intermediate speed 3	fpm	0.0 - LF.20	0.0	200.0
0.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	3.00	✳✳ 3.00
0.LF.51	Acceleration	ft/s^2	0.30 - 12.00	3.30	✳✳ 3.50
0.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	4.00	✳✳ 4.00
0.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	4.50	✳✳ 4.50
0.LF.54	Deceleration	ft/s^2	0.30 - 12.00	3.50	✳✳ 3.50
0.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	2.50	✳✳ 2.50
1.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	3.50	✳✳ 3.50
1.LF.51	Acceleration	ft/s^2	0.30 - 12.00	3.50	✳✳ 3.50

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
1.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	4.50	✳✳ 4.50
1.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	5.50	✳✳ 5.50
1.LF.54	Deceleration	ft/s^2	0.30 - 12.00	3.50	✳✳ 3.50
1.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	3.50	✳✳ 3.50
2.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	1.50	✳✳ 1.50
2.LF.51	Acceleration	ft/s^2	0.30 - 12.00	1.50	✳✳ 1.50
2.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	1.50	✳✳ 1.50
2.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	1.50	✳✳ 1.50
2.LF.54	Deceleration	ft/s^2	0.30 - 12.00	1.50	✳✳ 1.50
2.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	1.50	✳✳ 1.50
LF.56	Stop jerk	ft/s^3	0.30 - 32.00	2.00	✳✳ 2.00
LF.57	Speed following error (0 = off, 1 = on,)	1	off, on	on	on
LF.58	Speed difference	%	0 - 30	10	10
LF.59	Trigger time speed difference: Following error timer	sec	0.0 - 1.0	1.0	1.0
LF.61	Emergency operation mode		Off, SPd1, SPd2, SPd3, di 1	off	off
LF.67	Pre-torque gain	-	0.25 - 2.00	1.00	1.00
LF.68	Pre-torque offset	%	-100.0 - 100.0	0.00	0.00
LF.69	Pre-torque direction (-1 = -V, 1 = +V)	1	-1, 1	1	1
LF.70	Speed pick delay (Delay to turn on DRO)	sec	0.0 - 3.0	0.30	0.30
LF.71	Brake pick delay	sec	0.0 - 3.0	0.05	0.20
LF.76	Encoder resolution multiplier	1	0 - 13	2	2
LF.77	Absolute encoder position (measured)	1	0 - 65535h	0	✳
LF.78	Brake drop delay. Time motor will hold full current and control after direction inputs drop.	sec	0.00 - 3.00	0.50	0.45
LF.79	Current hold time. Delay in turning off the drive (Delay to turn OFF the motor current after the direction is dropped and LF.78 has expired)	sec	0.00 - 3.00	0.30	0.20
Diagnostic Parameters (Read only)					
LF.25	Estimated gear ratio	1	see tables in F5 Drive Manual		
LF.80	Software version	-			
LF.81	Software date	-			
LF.82	X2A input state	-			
LF.83	X2A output state	-			
LF.86	Operation mode	-			
LF.87	Actual inverter load (100% = rated load)	%			
LF.88	Motor set speed	rpm			
LF.89	Actual motor speed	rpm			
LF.90	Actual elevator speed	ft/m			
LF.93	Phase current	A			
LF.94	Peak phase current	A			
LF.95	Actual DC voltage	V			
LF.96	Peak DC voltage	V			
LF.97	Actual output frequency	Hz			
O.LF.98	Last error	-			

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
US Parameters					
US. 1	Password: Used to accessed different parameter groups for advanced programming.	-	-	-	-
US. 3	Load defaults: Select LoAd and press ENTER to cause all LF parameters to be reset to the drive default values.	-	LoAd	-	
US. 4	Load configuration: Select LoAd and press ENTER to load the setting selected in US.10.	-	LoAd	-	
US.10	Select configuration: Selects the drive mode. ICLSd = Closed loop induction I9LSS = Closed loop induction gearless PCLSd = Closed loop permanent magnet (PM) P9LSS = Closed loop PM gearless	-	ICLSd I9LSS PCLSd P9LSS	-	✳ ______

✳ Parameters are motor / machine / job dependent.
✳✳ Recommended but field adjustable.
✳✳✳ The value is automatically calculated from the motor data or other parameter values.

Parameters for Drive Software Version (LF 80 Drive Software = 1.51) (LF.81 date code = 1005.7)



Job #:	Drive Serial #:
Production Order #:	Test technician:
Drive Model:	Date:

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