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CONTROLLER INSTALLATION MANUAL

VVMC-1000-PTC-SCR Series M
Programmable Traction Controller
with MagneTek DSD412 SCR Drive

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

PART # 42-02-4P22 REV. B.3 APRIL 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 to 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 and 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.

If you encounter any problems with A17.1 (redundancy) faults, refer to Section 5.6.5 for instructions on how to temporarily bypass the faults.

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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:

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

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

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.

NOTE

This controller may be shipped without the final running program. However, you may install the unit, hookup and run your elevator on Inspection operation. Call MCE about a 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 your chip.

WARNING

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 running of elevators.

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

The 3-phase AC power supply to this equipment must come 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 overload 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 shortest possible routing. See National Electrical Code Article 250-95, or the related local applicable code.

WARNING

Before applying power to the controller, physically check all 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.

CAUTION

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.

NOTE

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

WARNING

Do not change drive parameters while the elevator is running. Incorrect values of drive parameters can cause erratic elevator operation.

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 and 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^{o} 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 VVMC-1000-PTC SCR (Programmable Close Loop Traction Controller for DC Elevators) is designed to exhibit the characteristics listed below in a traction elevator installation. The PTC 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
Maximum Number of Cars	2
Car Speed Speed Regulation	350 fpm (Encoder feedback) less than ± 5%
Field Programmable	
Rotating equipment	DC machine with digital SCR Drive
Environment	32° to 104° F (0° to 40° C) ambient 12,000 ft altitude 95% humidity

EQUIPMENT CATEGORIES

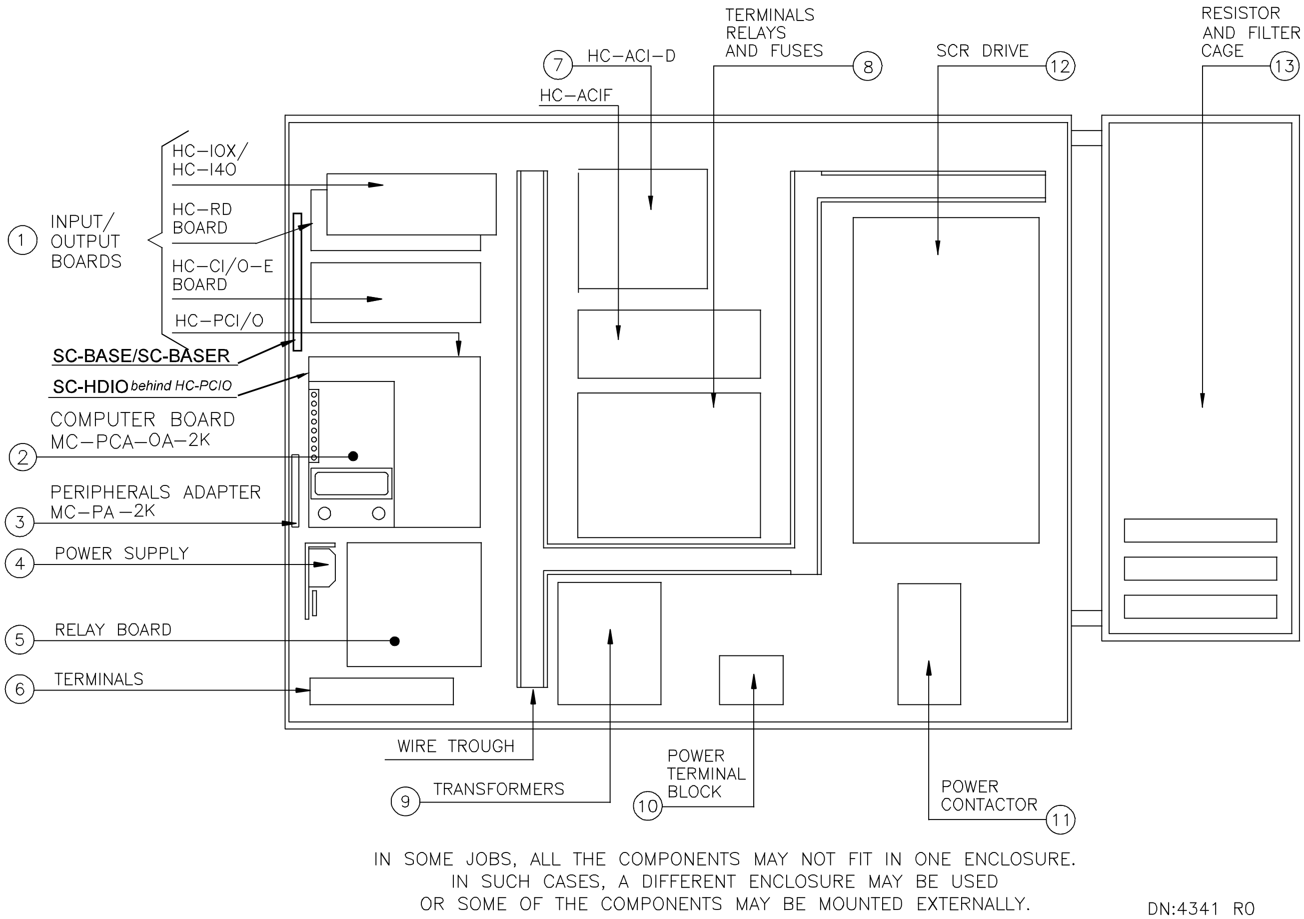
The VVMC-1000-PTC SCR closed loop traction controller consists of three major pieces of equipment:

- Controller Unit
- Cartop Selector (Landing system)
- Peripherals

1.1 CAR CONTROLLER PHYSICAL DESCRIPTION

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

FIGURE 1.1 Typical Physical Layout



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-PCI/O	Power and Call Input/Output board
•	HC-CI/O-E	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)
•	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 the HC-CI/O-E, HC-RD, HC-IOX and HC-I4O boards are optional and may be required depending on system requirements (i.e., number of landings served).

HC-PCI/O Power and Call Input/Output board - This board provides the following:

- 22 input signals
- 12 output signals
- 4 PI output terminals
- 2 gong output terminals
- 10 call input and output terminals
- 2 direction arrow output terminals
- 1 passing floor gong output terminal

For details of each input and output signal and the associated terminals, see Figure 1.2.

FIGURE 1.2 HC-PCI/O Input Output Details

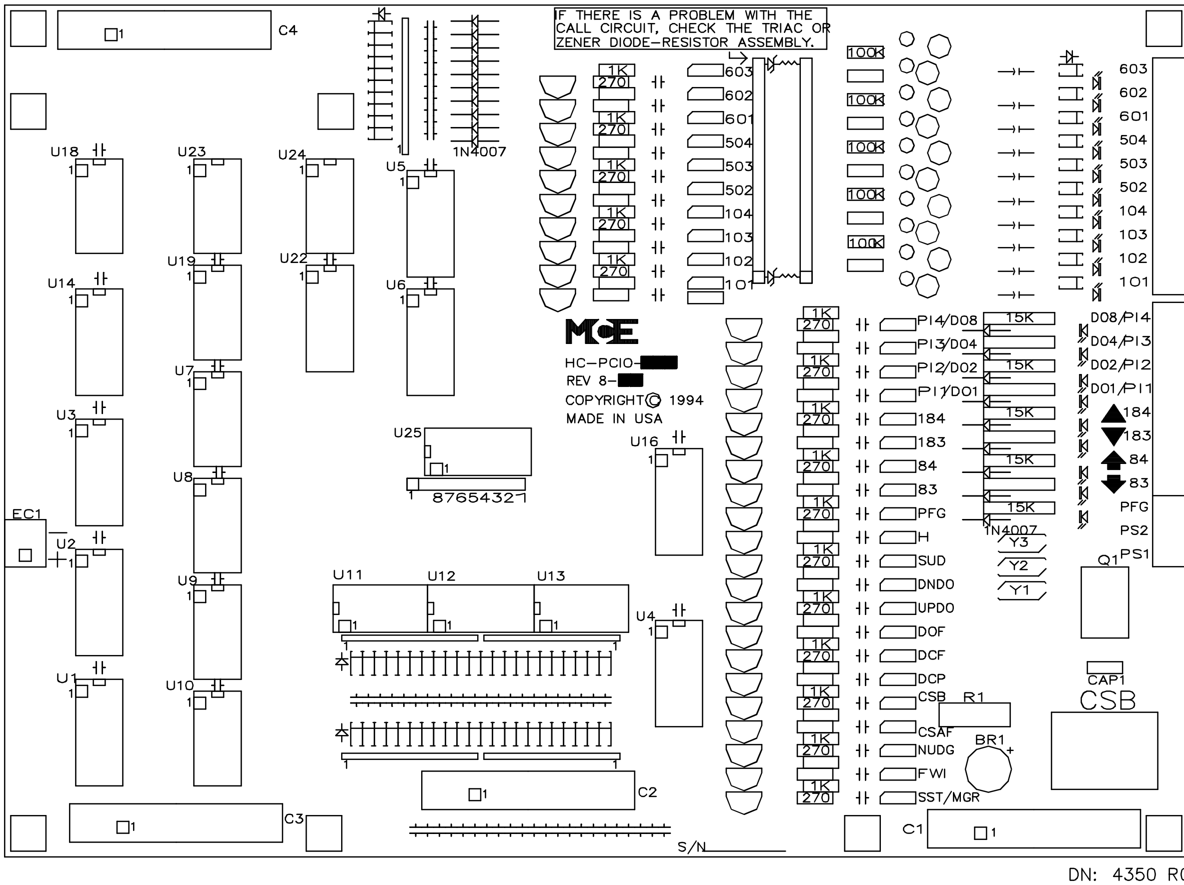
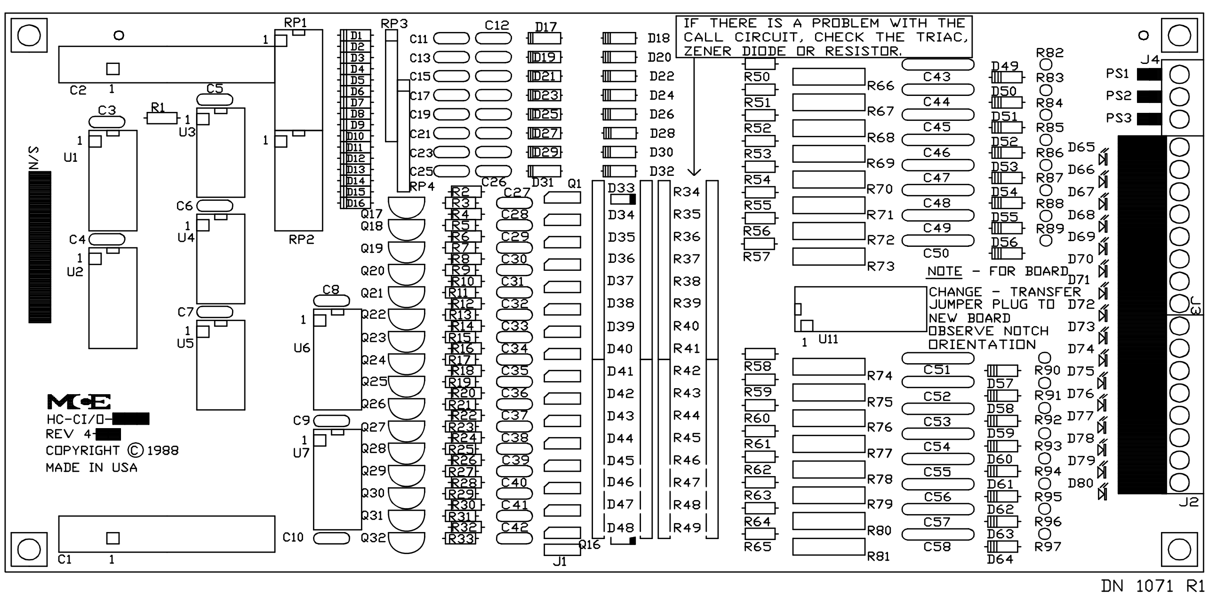


FIGURE 1.3 HC-CI/O-E Call Input/Output Board

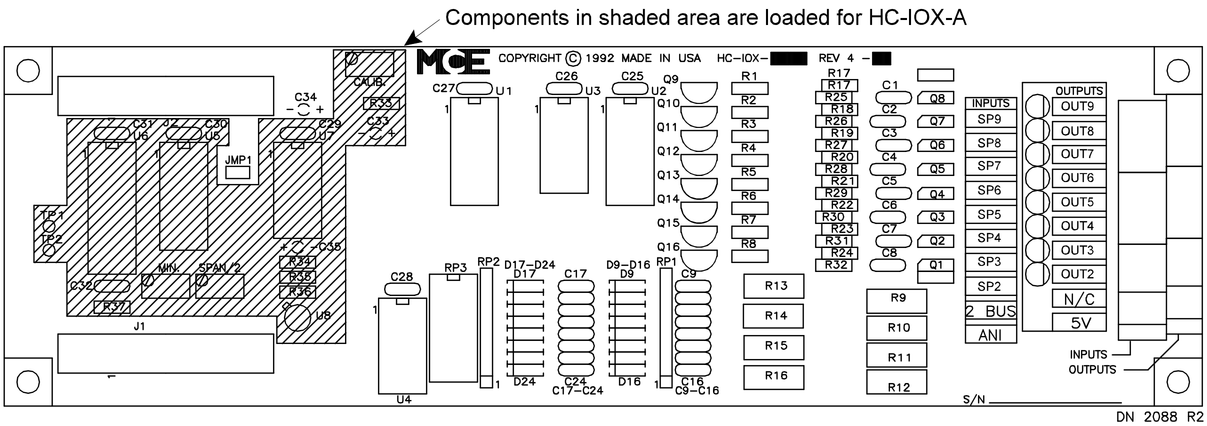


HC-CI/O-E Call Input/Output Board - See Figure 1.3. This board provides the following:

- 4 PI output terminals
- 12 call input and output terminals

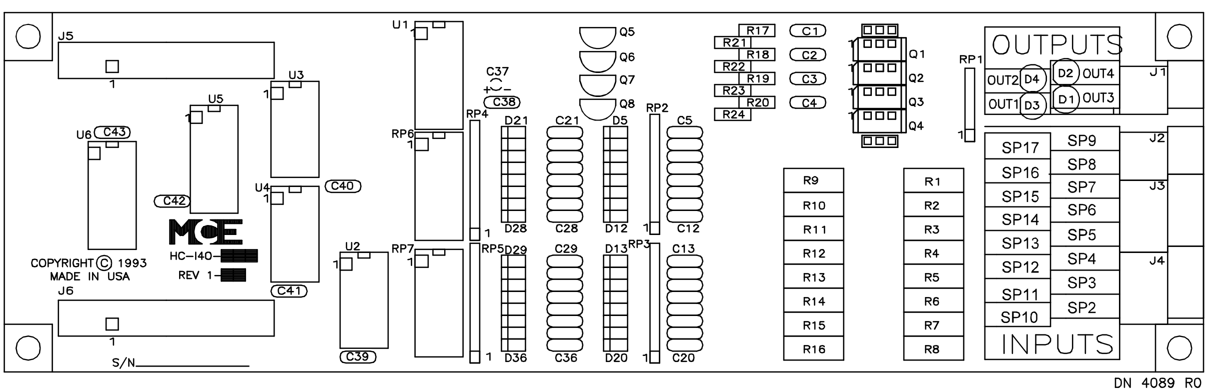
HC-RD Rear Door Logic Board - This board (not shown) provides the inputs and outputs required for independent rear doors.

FIGURE 1.4 HC-IOX Input/Output Expander Board



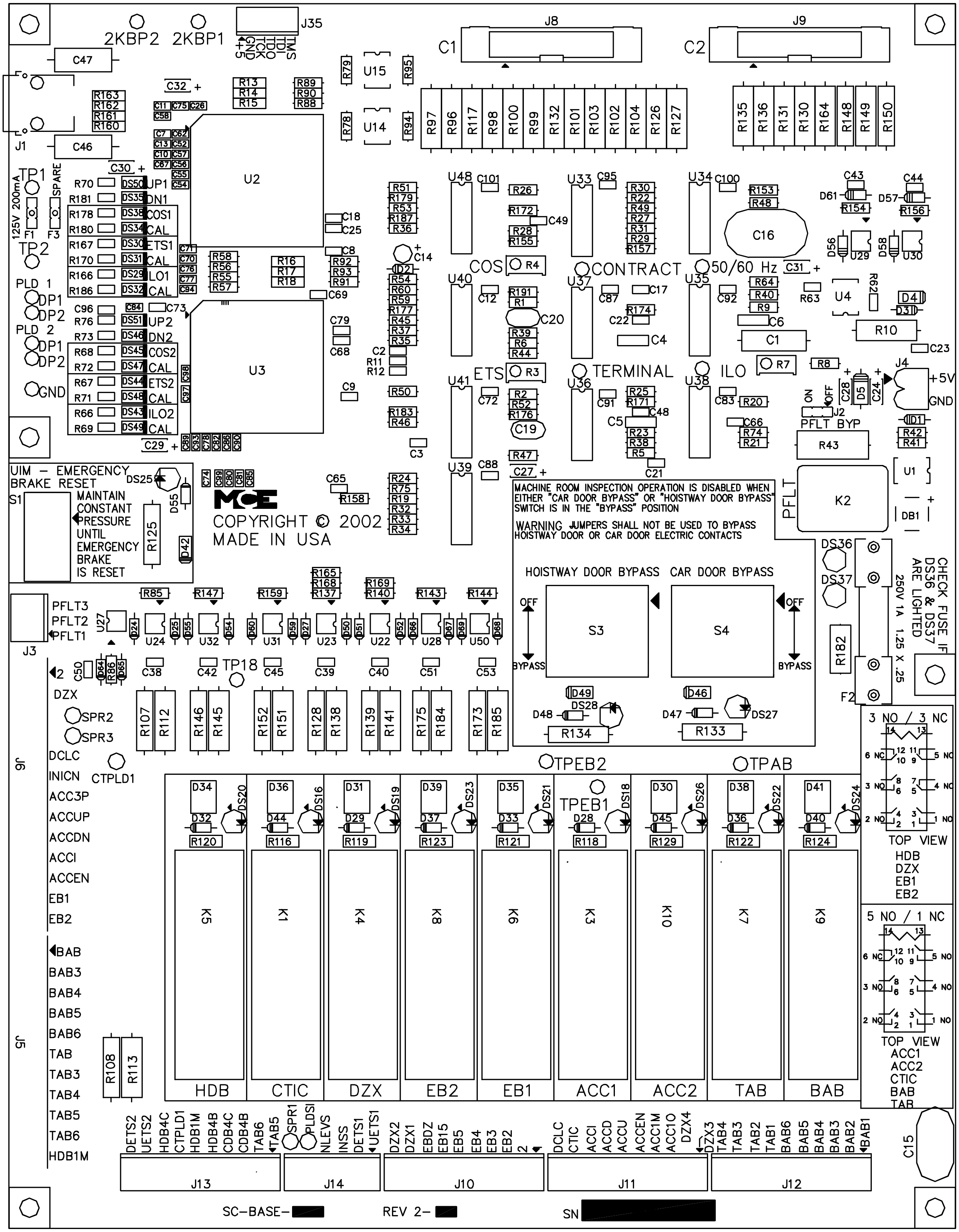
HC-IOX Input/Output Expander Board - This is a multi-purpose input/output board designed to accommodate additional inputs and outputs as required, such as floor encoding signals, etc.

FIGURE 1.5 HC-I4O Input/Output Expander Board



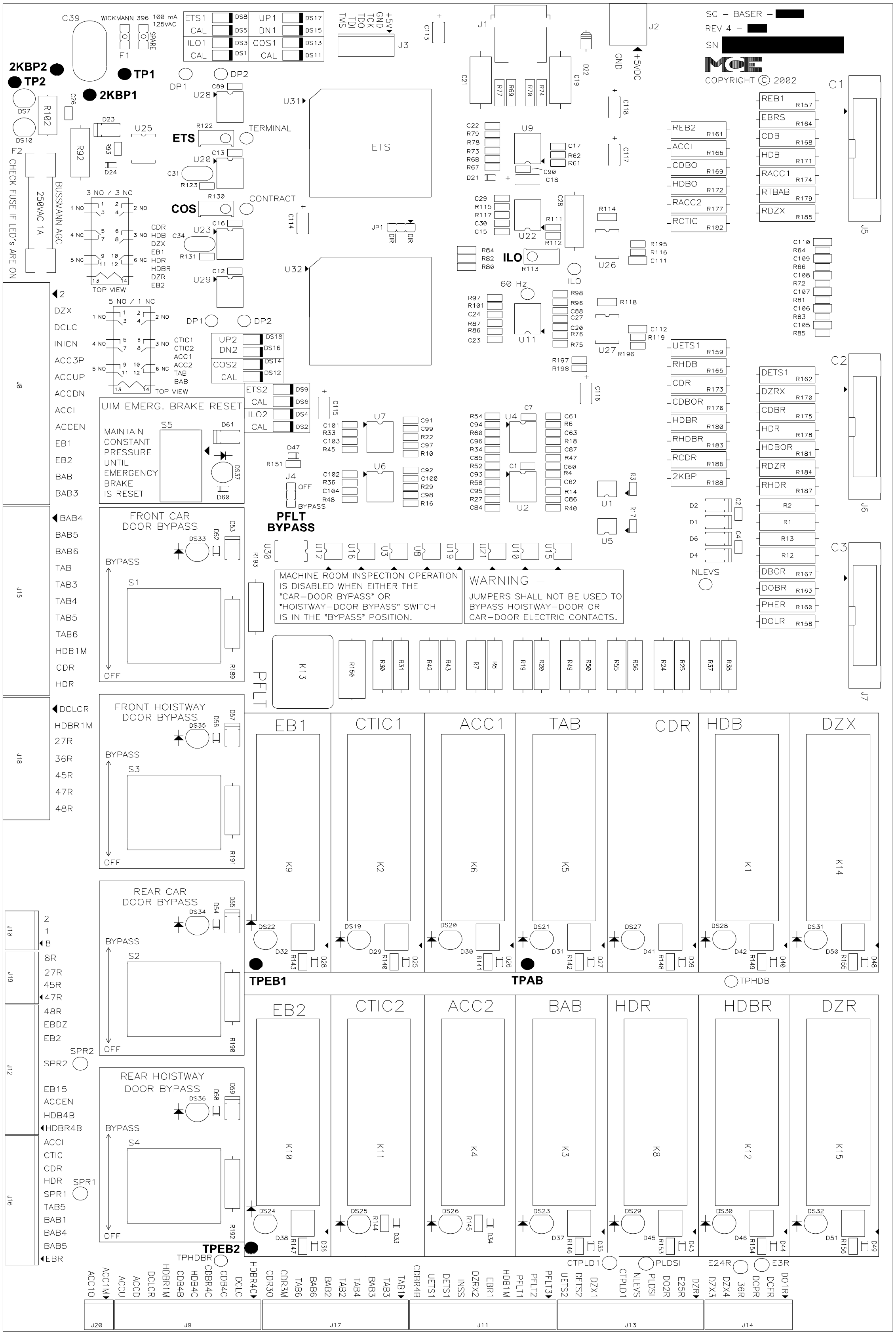
HC-I4O Input/Output Expander Board - This is a multi-purpose input/output board designed to accommodate additional inputs and outputs as required.

FIGURE 1.6 SC-BASE Board



SC-BASE Lock Bypass, Access, Overspeed, Emergency Brake Board - This board handles I/O for control of the emergency brake, and includes the car and hoistway door lock bypass switches. Inspection access circuitry and inspection leveling overspeed logic is also included.

FIGURE 1.7 SC-BASER Board



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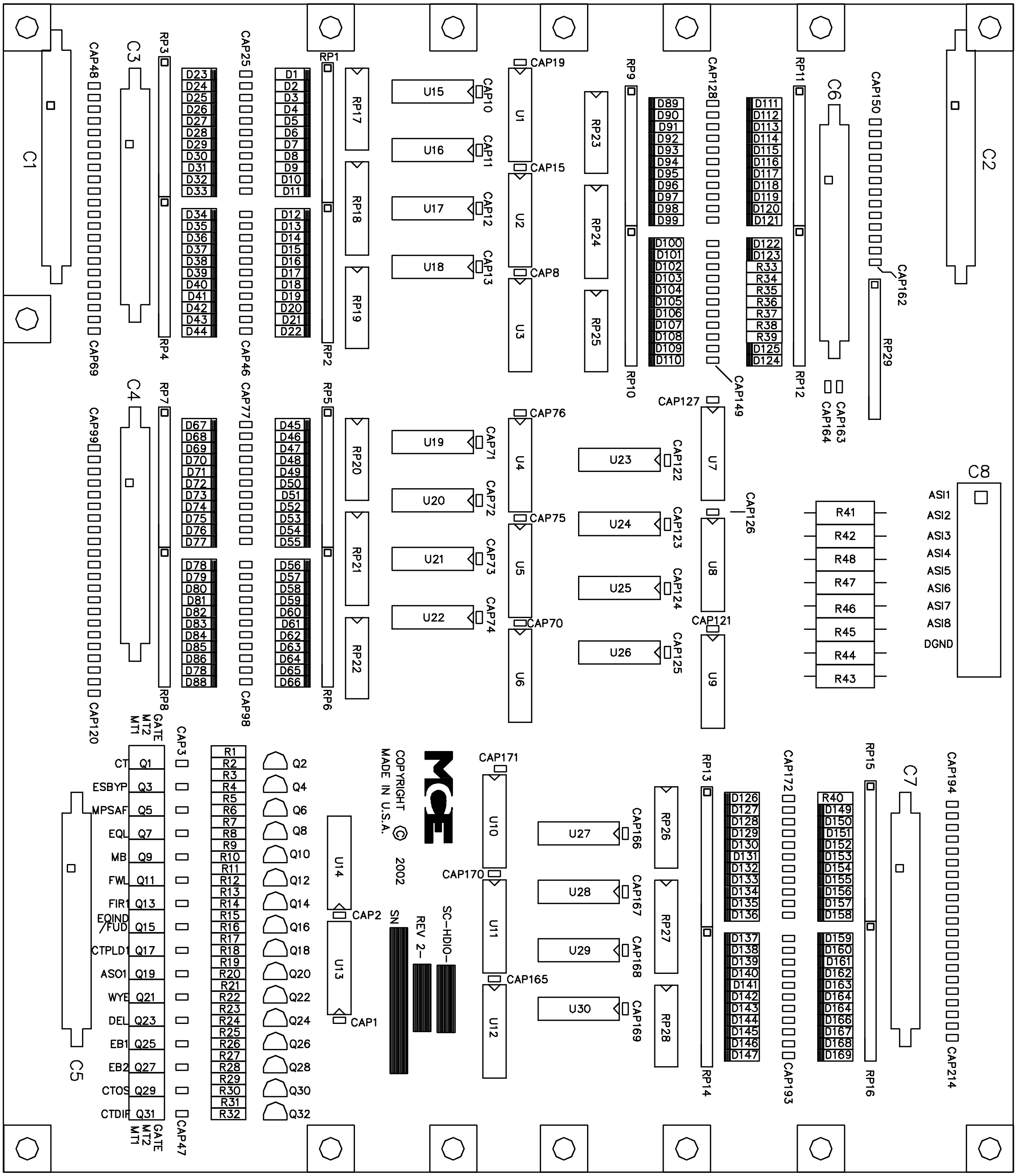
SC-BASER Lock Bypass, Access, Overspeed, Emergency Brake Board with Rear Doors - This board is used in place of the SC-BASE board when the job has rear doors.

FIGURE 1.8 SC-HDIO High Density Input/Output Board



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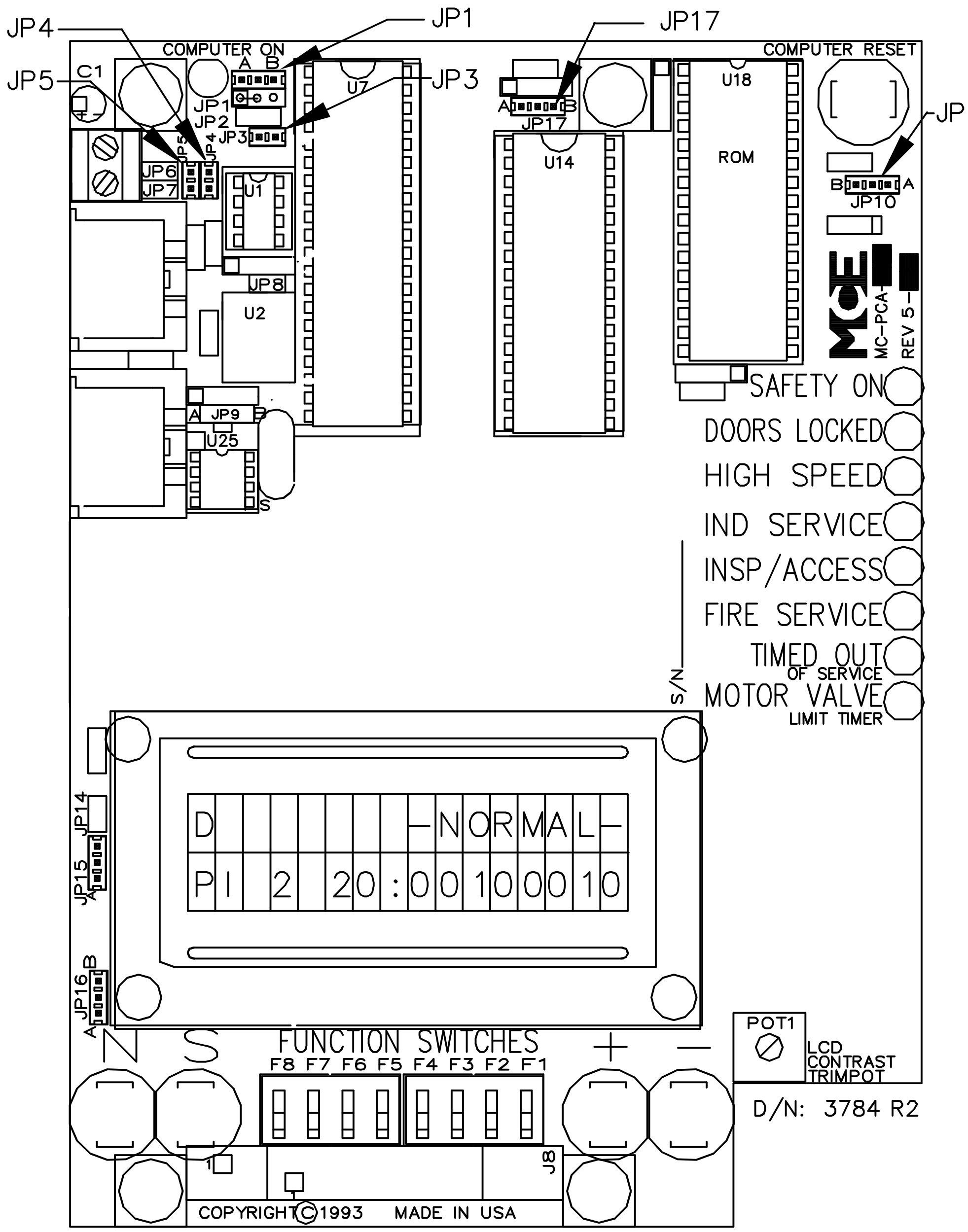
SC-HDIO High Density Input/Output Board - This board processes many of the code required redundancy inputs and outputs. There are no adjustments or customer connections to this board.

2. **MC-PCA-OA-2K Main Computer Board** - This board is mounted on the top of the HC-PCI/O board (see Figure 1.9). The main computer board is responsible for:

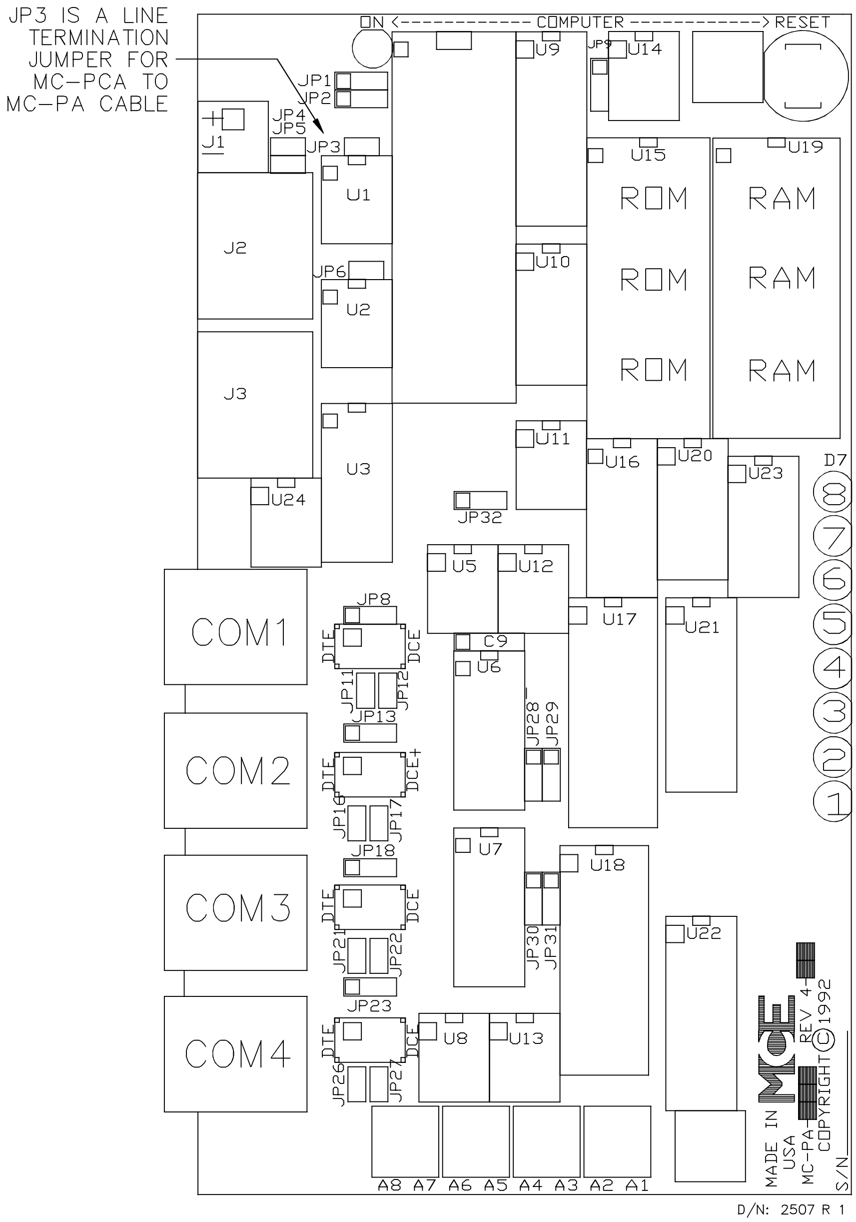
- Car Operation Control
- Car Communication Control
- Duplexing
- Programming and Diagnostic Tools

FIGURE 1.9 MC-PCA-OA-2K Computer Board



NOTE:	The main Processor used with A17.1 - 2000 code compliant products is different from the standard MC-PCA-OA. The part number on the 2000 compliant board should be MC-PCA-OA-2K. Any reference to the MC-PCA or MC-PCA-OA in this manual refers to the MC-PCA-OA-2K board.

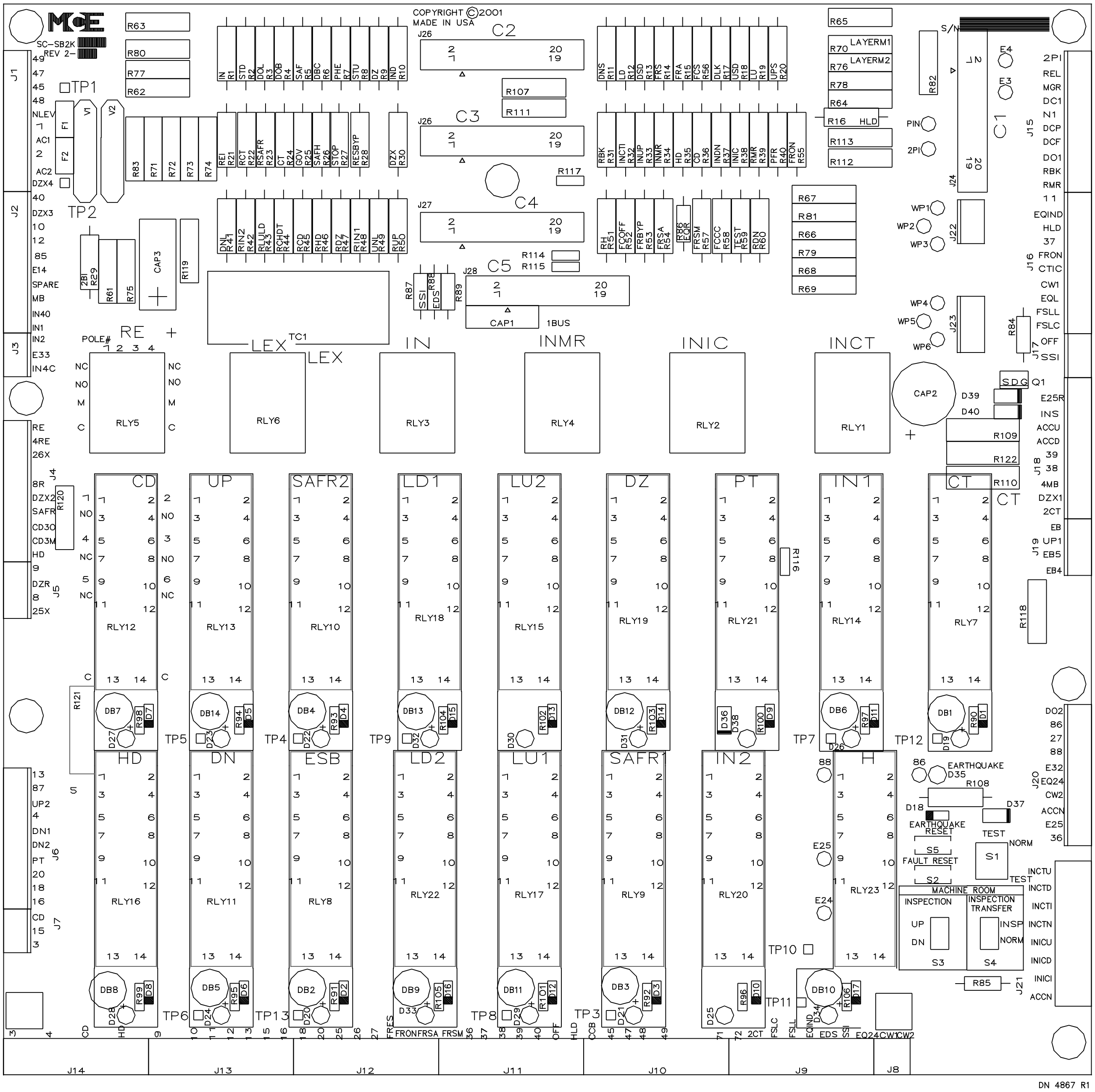
FIGURE 1.10   MC-PA-2K Peripherals Adapter Board (optional)



3. **MC-PA-2K Peripherals Adapter Board** - The optional MC-PA-2K board contains the COM ports used for serial communication with peripherals such as CRTs and PCs through direct connection or through line drivers or modems (see Figure 1.10). This board also stores the events displayed on the Special Events Calendar screen on a peripheral device.

4. **POWER SUPPLY** - The power supply is a single output linear power supply that provides +5 VDC power to the computer and its peripheral boards.

FIGURE 1.11 SC-SB2K Main Safety Relay Board



5. **SC-SB2K Main Safety Relay Board** - This board satisfies many of the ASME A17.1 - 2000 code requirements. It also provides the necessary circuitry for running the car on Machine Room Inspection operation. This board, in conjunction with the HC-PI/O and SC-HDIO boards, comprises the high voltage interface between the PCA-OA-2K and the individual car logic functions such as door operation, direction outputs, direction sensing, main safety circuits, leveling circuitry, redundancy checking, etc.

   Where required we have implemented logic using force-guided safety relays. Each safety relay has a test pad designed to aid in the inspection-testing required for commissioning. There are terminals at the bottom of the board for field wiring. This board, located in the lower left corner of the controller cabinet, includes the MACHINE ROOM INSPECTION TRANSFER INSP/NORM switch, the MACHINE ROOM INSPECTION UP/DN switch TEST/NORM and pushbuttons for Earthquake and Fault Reset

6. **TERMINALS** - For field connections.

FIGURE 1.12 Board Interconnects for A17.1 Boards

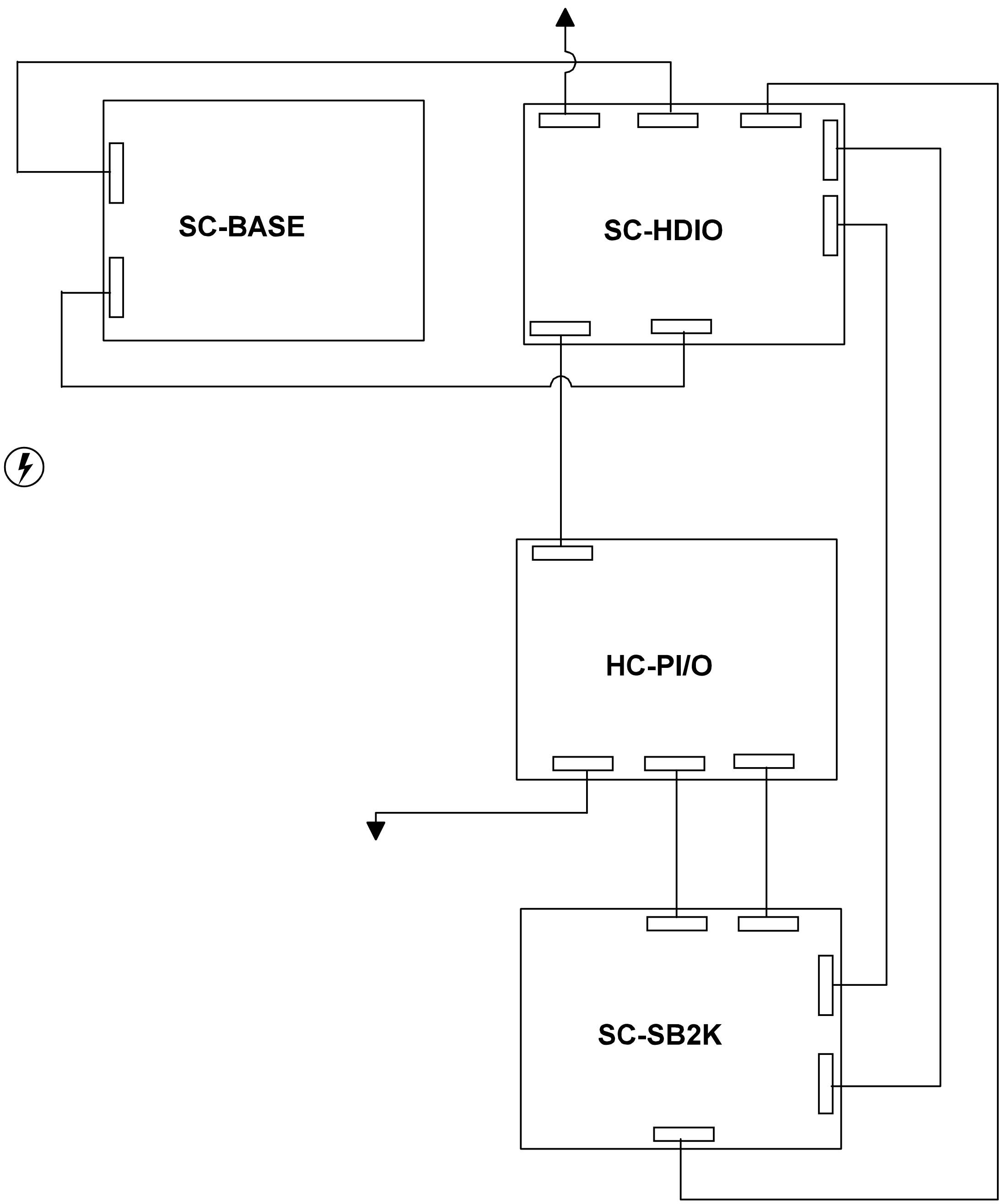
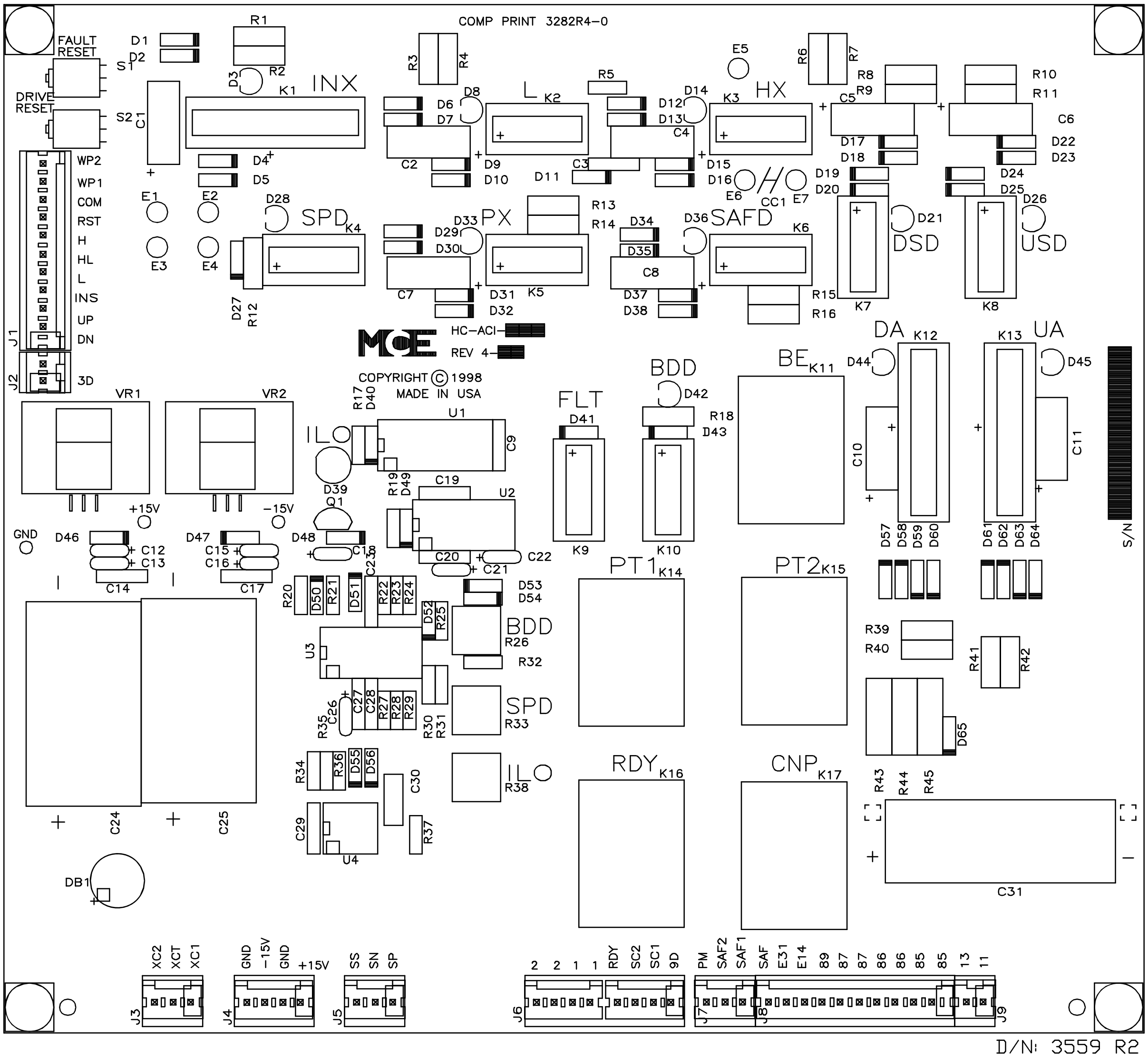


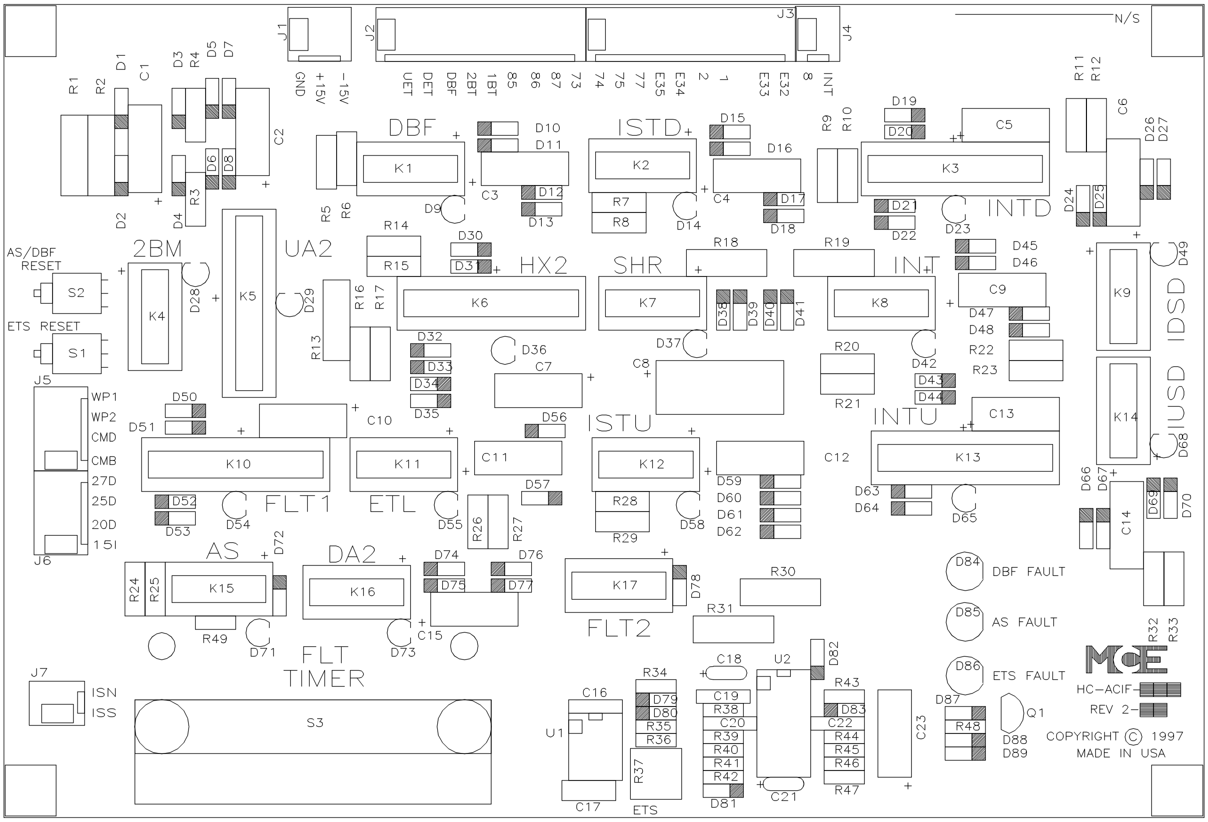
FIGURE 1.13 HC-ACI-D Drive Interface Board



7. **HC-ACI-D Drive Interface Board** -The HC-ACI-D board (Figure 1.13) is the interface between the Main Relay board and the SCR 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 contactor monitoring. Other functions include an independent motor speed monitoring circuit plus brake and speed signal coordination.

HC-ACIF Additional Drive Interface Board -This board contains the intermediate speed, ETS and Drive circuits (see Figure 1.14).

FIGURE 1.14 HC-ACIF AC Drive Interface Board



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8. **RELAYS, FUSES, TERMINAL BLOCKS, ETC** -This space contains any door operator circuitry, terminal blocks (for customer wiring), fuse holders, fuses and any other circuitry needed for a specific job.

9. **TRANSFORMERS** - Transformers are provided, as necessary, according to the power requirements of each individual car load and the available AC line voltage. Transformers are usually in the lower part of the cabinet.

10. **POWER TERMINAL** - For input power connections.

11. **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.

12. **SCR DRIVE UNIT** - The SCR Drive Unit receives the direction(run) and speed command from the HC-ACI-D board, and provides the proper DC armature voltage and motor field voltage to create the required RPM and torque in the motor.

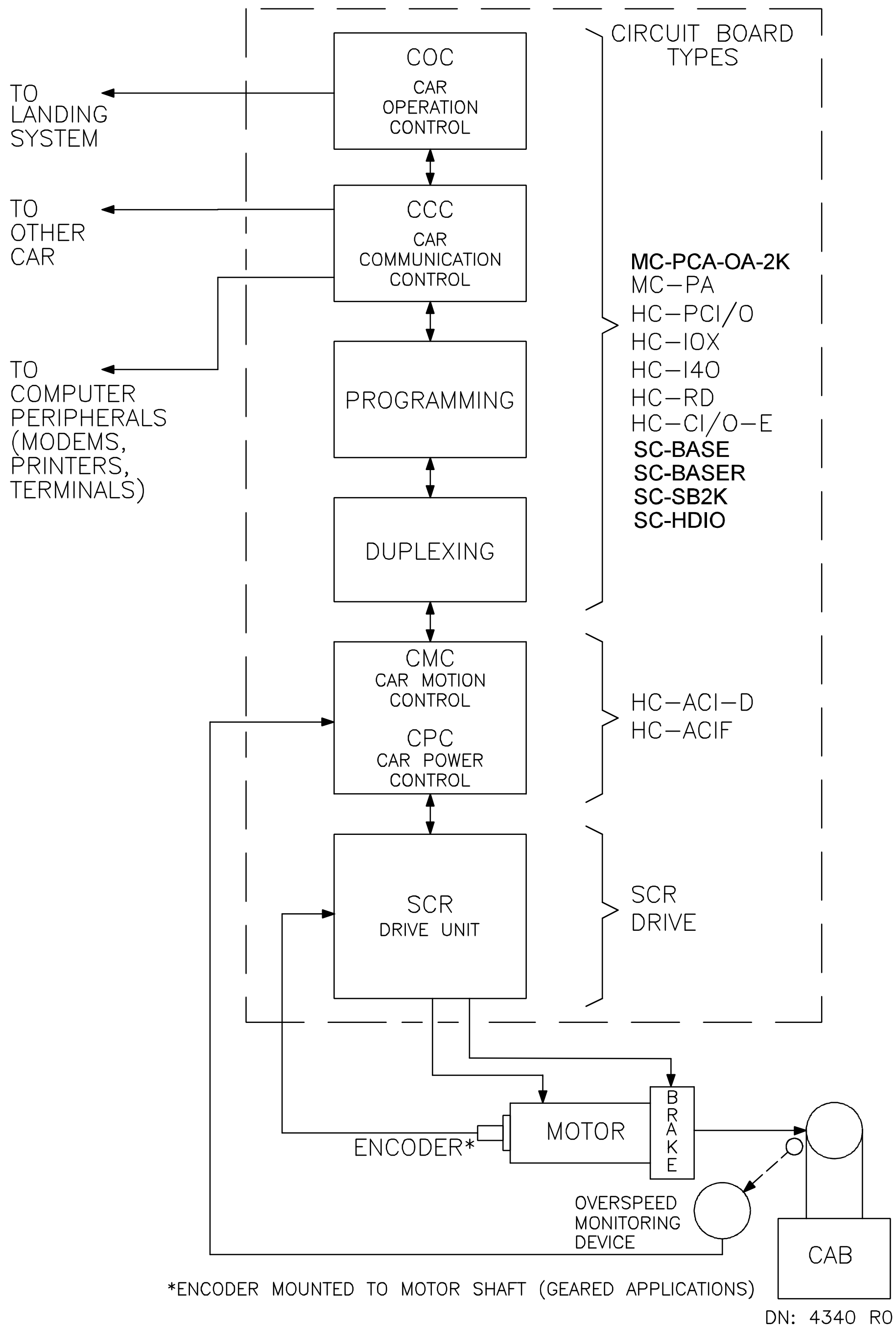
13. **POWER RESISTOR CAGE AND SCR FILTER** - Any power resistors that generate significant heat, such as door resistors or Drive system resistors, are located in the power resistor cage so their heat does not affect other electrical components. The SCR filter is included in the Power Resistor Cage.

1.2 CAR CONTROLLER FUNCTIONAL DESCRIPTION

Functionally, the Control Unit is divided into six sections. Figure 1.15 shows these functional blocks and the printed circuit board types associated with each functional block:

- Car Operation Control
- Car Communication Control
- Programming and Diagnostics Tools
- Duplexing
- Car Motion Control and Car Power Control
- SCR Drive

FIGURE 1.15 Car Controller Functional Layout



1.2.1 CAR OPERATION CONTROL (COC)

Normal Operation - Normal car operation consists of responding to hall and car call demands, and operating the doors, as required.

Special Operations - The following are special operations controlled by the COC:

- Inspection/Access
- Independent Service
- Fire Service
- Emergency Power

For details of each operation, see MCE Specifications for Elevator Products. The special features and options are discussed in Section 5 of this manual.

Discussion of Car Operation Control (COC) - The Car Operation Control (COC) performs the elevator logic operations for the individual car. These functions are performed by the following circuit boards:

- SC-SB2K Main Safety Relay board
- MC-PCA-OA-2K Main Processor board
- HC-PCI/O Power Input/Output board
- HC-CI/O-E Call Input/Output board (optional)
- HC-RD Rear Door board (optional)
- HC-IOX Input/Output Expander board (optional)
- HC-I4O Input/Output Expander board (optional)
- SC-BASE Lock Bypass, Access, Emergency Brake and Overspeed board
- SC-BASER Lock Bypass, Access, Emergency Brake and Overspeed board
- with rear doors
- SC-HDIO High Density I/O board

The heart of the COC is the SC-SB2K (Main Safety Relay) board, which makes it possible to move the car without computers and 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 if the door lock circuits are not closed. Except for calls, most of the individual elevator inputs and outputs are handled through the Main Relay board and are routed to the HC-PCI/O board, which is the main interface to the computer.

Provisions for 4 position indicator outputs are on the HC-PCI/O board. If additional position indicators are required, HC-CI/O-E 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-PCI/O board. Car calls and hall calls are interfaced to the computer through the HC-PCI/O board and HC-CI/O-E boards, which can handle up to 4 landings per board. Therefore, all the input/output boards (HC-PCI/O, HC-RD, HC-IOX, HC-I4O and HC-CI/O-E) act as the interface between the MC-PCA-OA-2K Main Computer board and the user. These input/output boards are linked to the HC-PCI/O board through a ribbon cable. A connector on the back of the MC-PCA-OA-2K board plugs into the HC-PCI/O board. The MC-PCA-OA-2K board contains the main elevator logic program.

1.2.2 CAR COMMUNICATION CONTROL (CCC)

The Car Communication Control (CCC) coordinates communication between the individual car controllers in a duplex configuration, as well as peripheral devices such as modems, printers, CRT terminals, etc. These functions are performed by the MC-PCA-OA-2K Main Computer board.

1.2.3 PROGRAMMING AND DIAGNOSTICS TOOLS

The PTC is a versatile traction controller and is compatible with most applications. This means it allows the user to customize the controller to the building requirements after the unit has been installed. The Programming Tool is part of the processing unit (MC-PCA-OA-2K computer board). The list of all of the programmable functions and variables are provided in Section 5 of this manual.

1.2.4 DUPLEXING

Each car is capable of seeing the hall calls and at any time performing the duplexing functions, but only one of the cars can process the hall calls and make hall call assignments. If the car that is performing the duplexing operation goes out of service, the other car will take over the hall call registration and assignment.

1.2.5 CAR MOTION CONTROL (CMC)

The 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-D SCR Drive Interface board
- HC-ACIF Additional Drive Interface board
- Additional relays along with the above described boards are used for the drive interface.

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

1.2.6 SCR DRIVE

The SCR Drive Unit receives the direction(run) and speed command from the HC-ACI-D board, and provides the proper DC armature voltage and motor field voltage to create the required RPM and torque in the motor.

1.2.7 TYPICAL SEQUENCE OF OPERATION

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

A car call is registered by grounding an input on the HC-PCI/O board. This 120VAC signal is converted to a + 5V logic signal and is then read by the MC-PCA-OA-2K Computer board. The MC-PCA-OA-2K board acknowledges this signal by sending a logic signal back to the HC-

PCI/O board which then turns on a triac to illuminate the call registered light in the car panel and an LED on the HC-PCI/O board.

The MC-PCA-OA-2K Computer board determines where the call is in relation to the car position and sends a direction arrow signal to the HC-PCI/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, the MC-PCA-OA-2K Computer board sends the correct direction output signal to the HC-PCI/O board, which operates the correct direction triac. This signal is sent to the SC-SB2K Main Safety 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 MC-PCA-OA-2K board through the HC-PCI/O and the Main Relay board. The CMC is ready to lift the brake and to provide SCR Drive Unit control in response to a speed command that will be provided by the CMC.

In summary, the call signal entered the COC and was processed into direction and high speed acceleration sequence commands. The SCR drive 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 SYSTEMS

There are two different types of landing systems that can be used with VFMC-1000-PTC controllers, depending on the customer's preference: LS-STAN-X-2K and LS-QUTE-X-2K. These landing systems are discussed separately throughout this manual.

1.3.1 LS-STAN-X-2K

This is a car top mounted vane-operated landing system, which uses the VS-1A infrared proximity switches. The vanes are to be mounted to the rails (see Figures 1.16 and 1.17).

FIGURE 1.16 LS-STAN5-2K Cartop Control Box

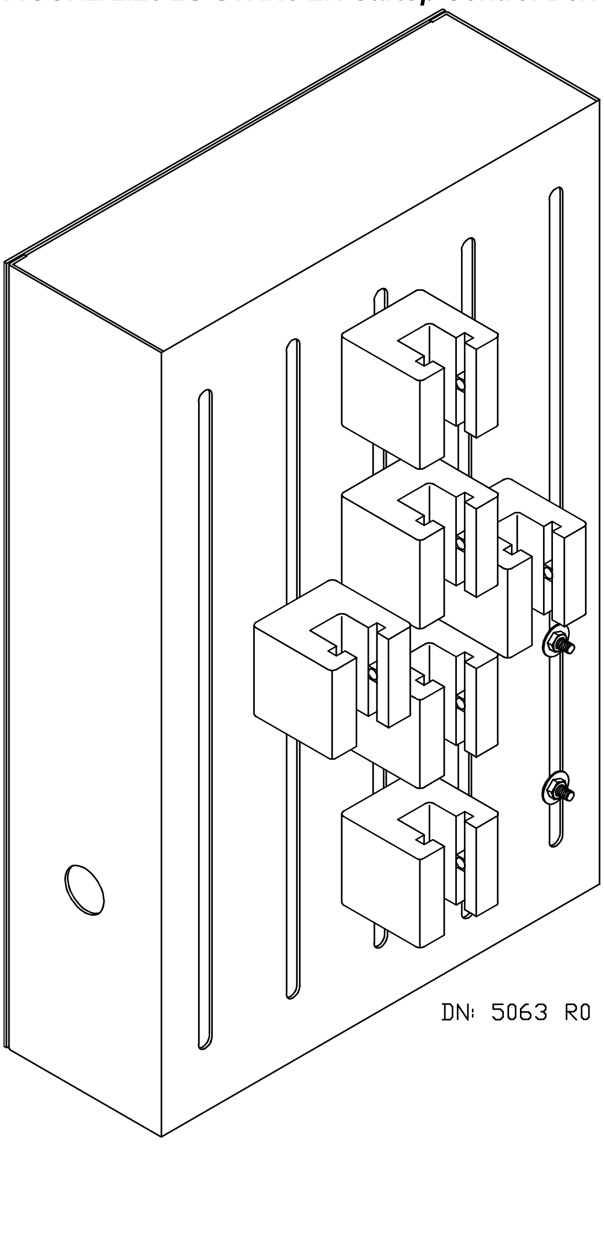
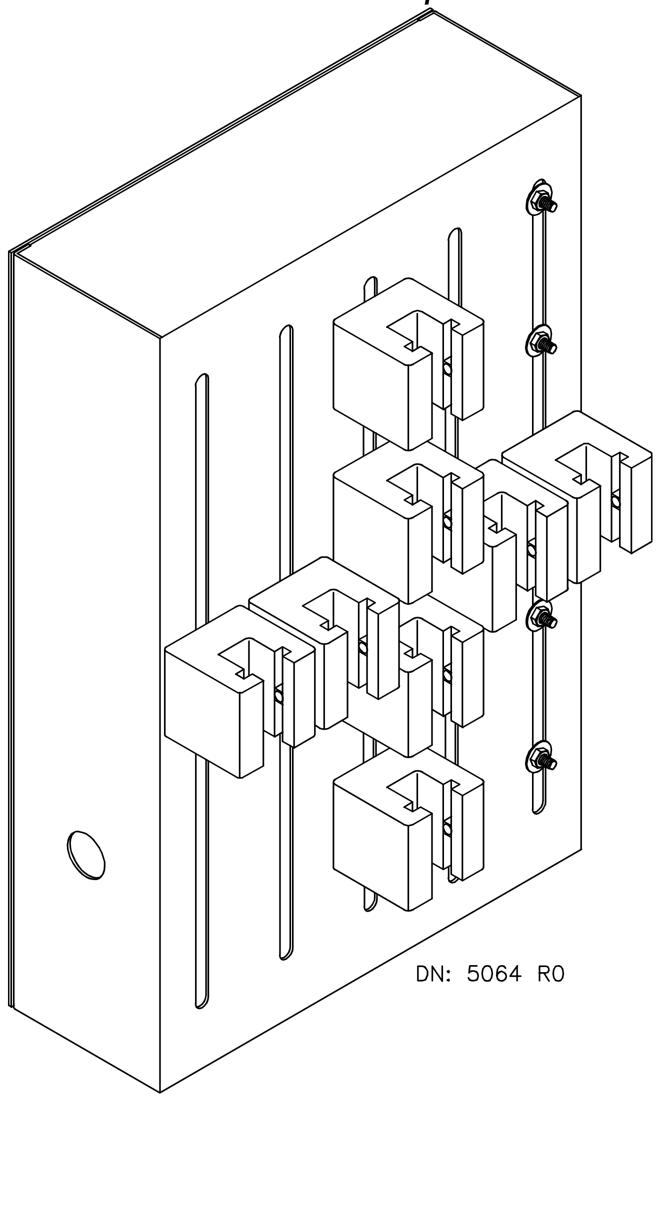


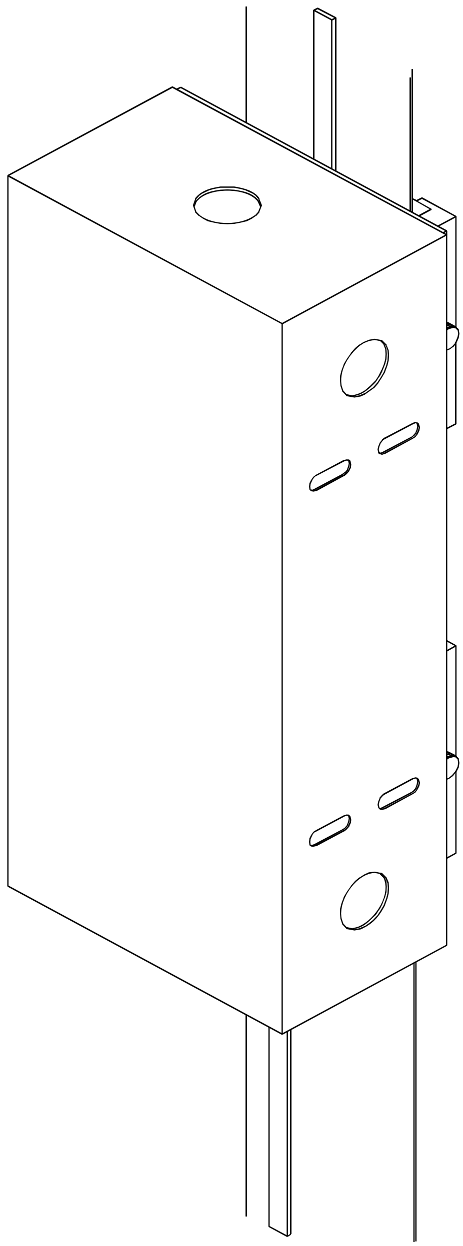
FIGURE 1.17 LS-STAN7-2K Cartop Control Box



1.3.2 LS-QUTE-X-2K

This is a tape-and-magnet-operated landing system, with a 3-inch steel tape mounted in the hoistway and an electronic box mounted on the car top (see Figure 1.17) More information is provided in Appendix F, LS-QUTE-X-2K Landing System Assembly Drawings.

FIGURE 1.18 LS-QUTE-X-2K Car Top Control Box



SECTION 2
INSTALLATION

2.0 GENERAL INFORMATION

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

2.0.1 SITE SELECTION

In choosing a proper location for the control equipment, the factors listed below 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.

- Do not install equipment in a hazardous location.

- Provide space for future expansion, if possible.

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

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

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

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

2.0.2 ENVIRONMENTAL CONSIDERATIONS

The following are some important environmental considerations that will help to provide for the longevity of the elevator equipment and reduce maintenance requirements.

- The ambient temperature should not exceed 32° to 104° Fahrenheit (0° - 40° Celsius). Higher ambient temperatures are possible, but not recommended because it will shorten the life of the equipment. Adequate ventilation and possibly air conditioning may be required.

- The air in the machine room should be free of excessive dust, corrosive atmosphere or excessive moisture to avoid condensation. A NEMA 4 or NEMA 12 enclosure would help meet these requirements. If open windows exist in the machine room, it is preferable to place cabinets away from these windows so that severe weather does not damage the equipment.

- High levels of radio frequency (RF) radiation from nearby sources may cause interference to the computers and other parts of the control system. Using a hand-held communication device in close proximity to the computers may also cause interference.
- 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:

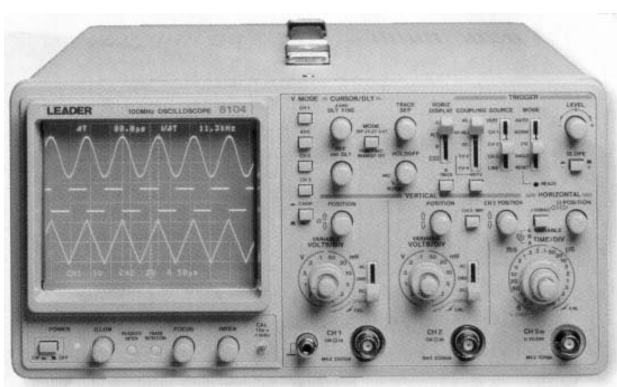
- A digital multimeter, Fluke series 75, 76, 77 or equivalent.
- An oscilloscope (preferably storage type) or a strip chart recorder.
- A hand-held tachometer.
- A clamp-on AC ammeter.
- A DC loop ammeter.
- Hand held radios.
- A telephone.
- Test weights.
- Assorted soldering tools, rosin flux solder,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

DIGITAL MULTIMETER

AMP-PROBE

MEGOHMETER

OSCILLOSCOPE

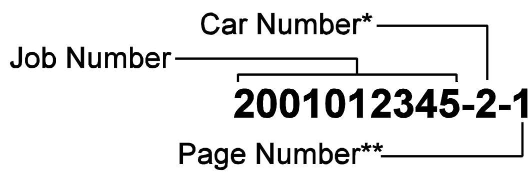


TELEPHONE

2.0.4 WIRING PRINTS

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

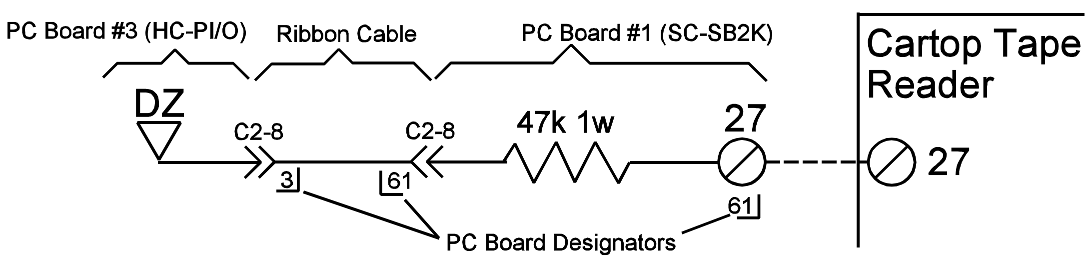
DRAWING NUMBER FORMAT - Each print has a drawing number indicated in the title block. The drawing number is comprised of the job number, car number and page number (see examples). In this manual the drawings will often be referred to by the last digit of the drawing number (page number). The following 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 use 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 C 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.
- Become familiar with page 2DI of the job prints for duplex interconnect wiring if this is a duplex application.
- The power connections are shown on drawing number -D.
- Review any additional wiring diagrams and details as may be required.
- The remainder are detailed drawings of the VVMC-1000-PTC SCR programmable traction control system.
- A specific part of the schematic may be referred to by the *area number,* which will be found 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 SCR 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.

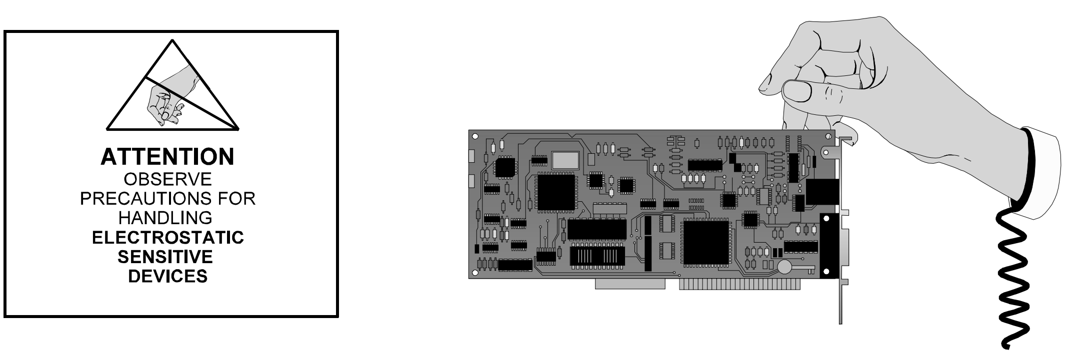
NOTE: Pay very close attention to the hierarchy of the inspection inputs. In order to maintain safe operation of the lift while on access, car top or in car inspection, the inspection circuits must be wired as shown in the prints.

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

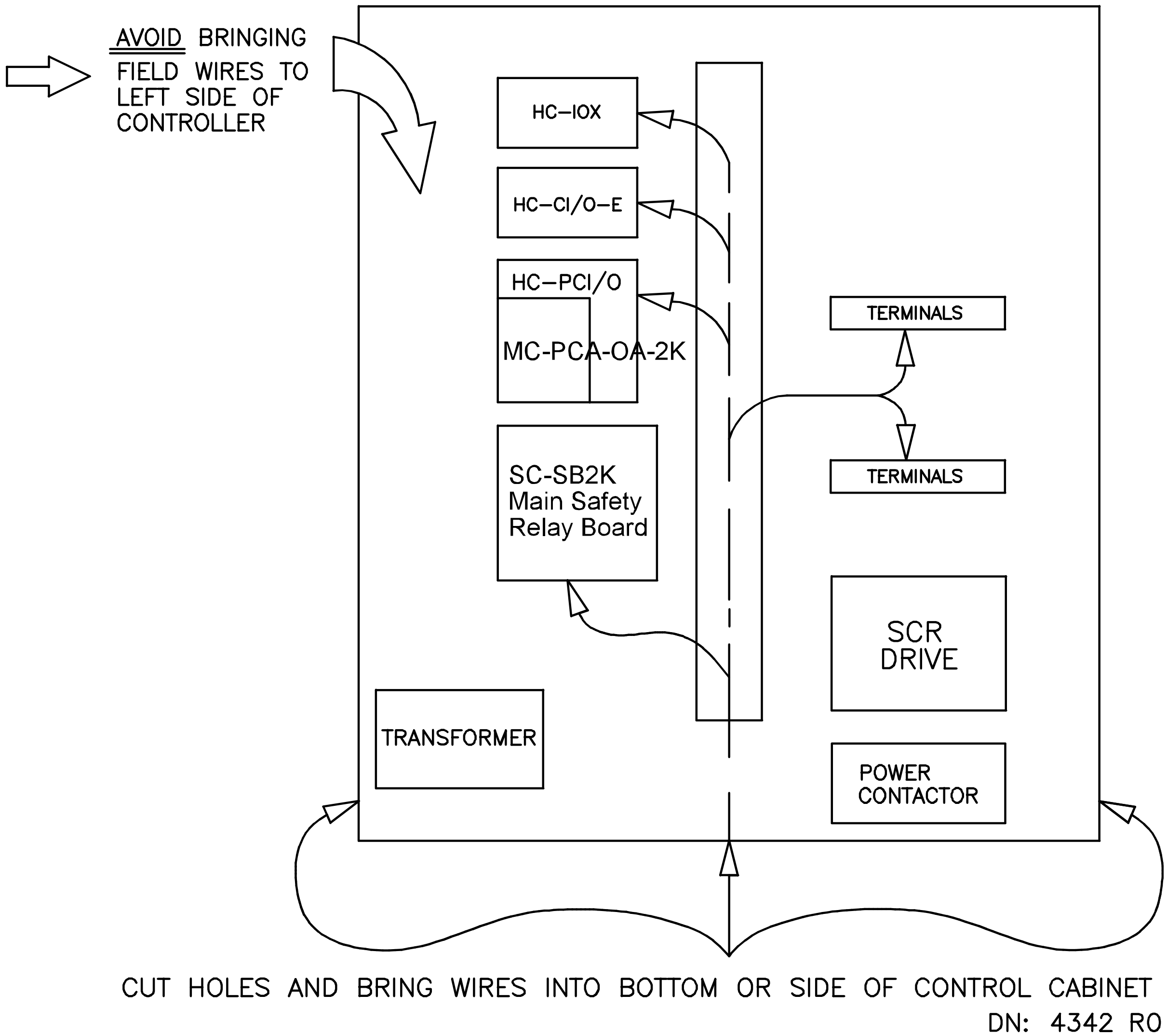
Do not touch PC Boards unless you are properly grounded.



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

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

FIGURE 2.2 Field Wiring of Controller



- Call terminals are located on the HC-PCI/O board and, if more than four stops, on the HC-CI/O-E board.
- All position indicators, arrows and gong enable terminals are located on HC-PCI/O board and, if more than four stops, on the HC-CI/O-E board or, if a gong board is provided, position indicators are also provided on the gong board (HC-GB).
- Terminals 4-72 and 85, 86, 87, 88, and 89 are located on the SC-SB2K Main Safety 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 different 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 wires according to the hoistway and car wiring prints.

e. If the car controller is part of a duplex system, a separate conduit or wiring trough must be provided for the high-speed serial link between the MC-PCA-OA-2K computers in each controller 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 duplex system, there are a number of details relating to the wiring of the interconnects between the individual cars. They are as follows:

1. The wiring details for the high-speed communication link are fully detailed in the drawing titled "Instructions for Connection of High Speed Communication Cables" in the job prints. Follow these instructions exactly. Again, note the requirement for routing the high-speed interconnect cables through a separate conduit or wiring trough.

2. If applicable, also wire according to the drawing titled "Duplex Interconnects to Individual Car Cabinets" in the job prints. Make sure to ground all of the cabinets according to Section 2.2.1.

2.2 GENERAL WIRING GUIDELINES

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

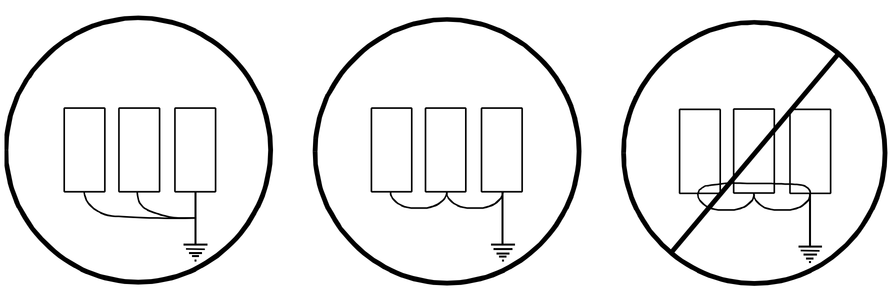
2.2.1 GROUND WIRING

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).

FIGURE 2.3 Ground Wiring to Controller Cabinets

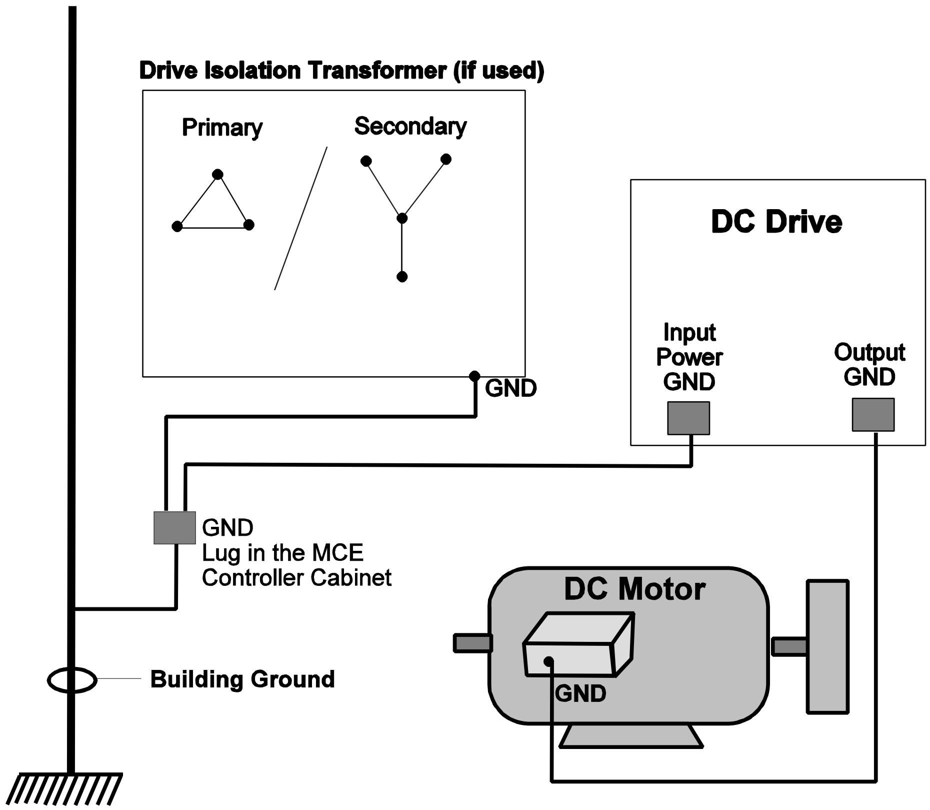


(a) Acceptable *(b) Acceptable* *(c) Not Acceptable*

- 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 2.4 Ground Wiring to Drive and Motor



2.2.2 DC HOIST MOTOR, MOTOR FIELD 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 DC hoist motor armature, motor field 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 the motor and the armature, motor field 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.

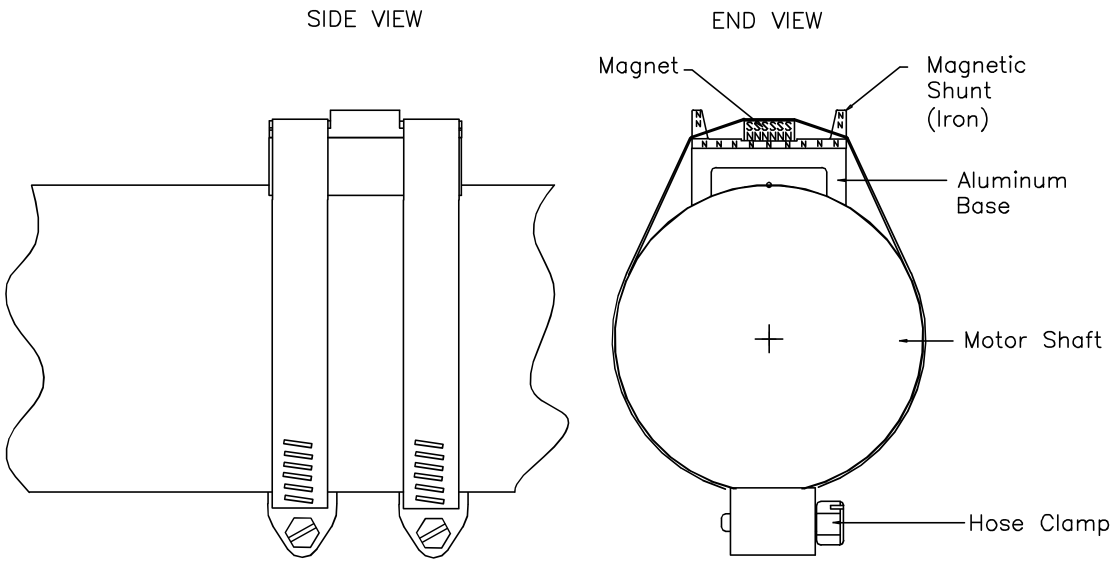
b The hoist motor shunt field and brake wiring must use #14 AWG wire (or larger) if current level requires it.

c. The motor wiring must be brought to terminal A1M and A2M in the control cabinet. For details of armature wiring, refer to drawing - D.

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).

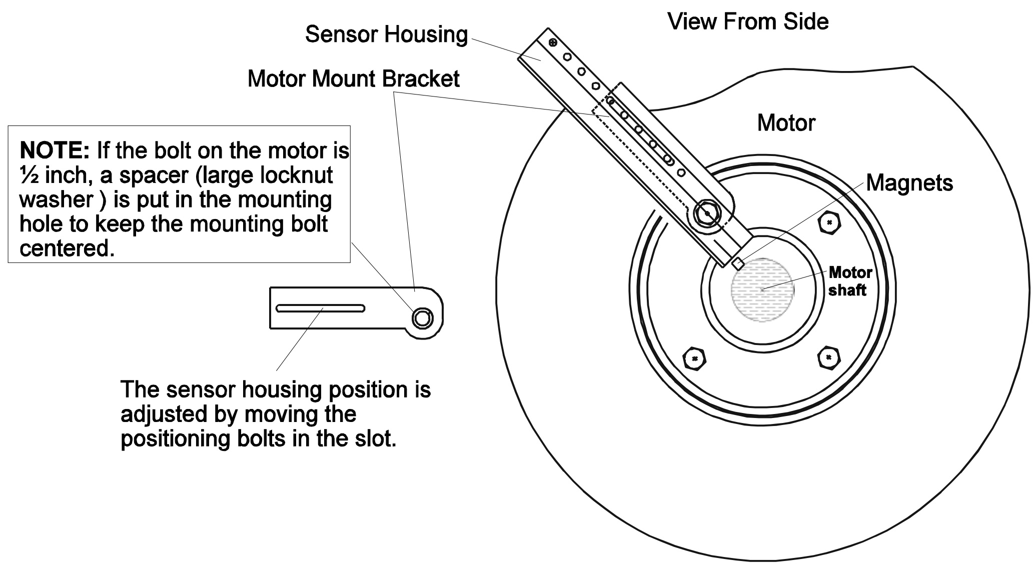
FIGURE 2.5 Speed Sensor Magnet Mounting on the Motor Shaft



> **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.

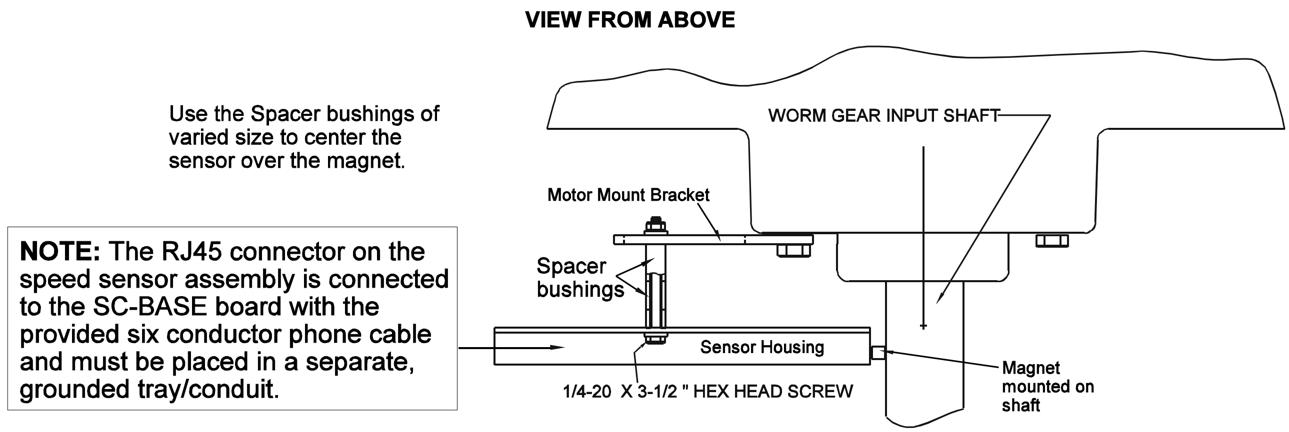
FIGURE 2.6 Speed Sensor Housing Positioning on the Motor



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



NOTE:	Use the provided shielded six conductor phone cable for wiring from the sensor to the SC-BASE board in the controller. This cable must be placed in a separate, grounded conduit.

2.2.4 INSTALLING THE BRAKE SWITCH

> **NOTE:** All controllers have been set up with a BPS input that is fed directly by a Brake Contact or a Micro-switch. The purpose of this input is to monitor the brake status and not for the purpose of energy saving. This is an additional feature. It may enhance the reliability of the system. It prevents the operation of the elevator in the event that the brake fails to release in the intended manner. When this happens the Brake Pick Failure message will flash on the LCD display.

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

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 speed and position of the motor shaft. It is *very* important that the encoder does not slip, wobble, bounce, or vibrate due to a 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. An insulated encoder mount has been furnished with the BEI encoder. However, this type of mount may not be practical for your application. It is impossible to predict which type of mounting that will work best for all installations, therefore, the best method for mounting the encoder and coupling it to the motor can only be solved on the job site.

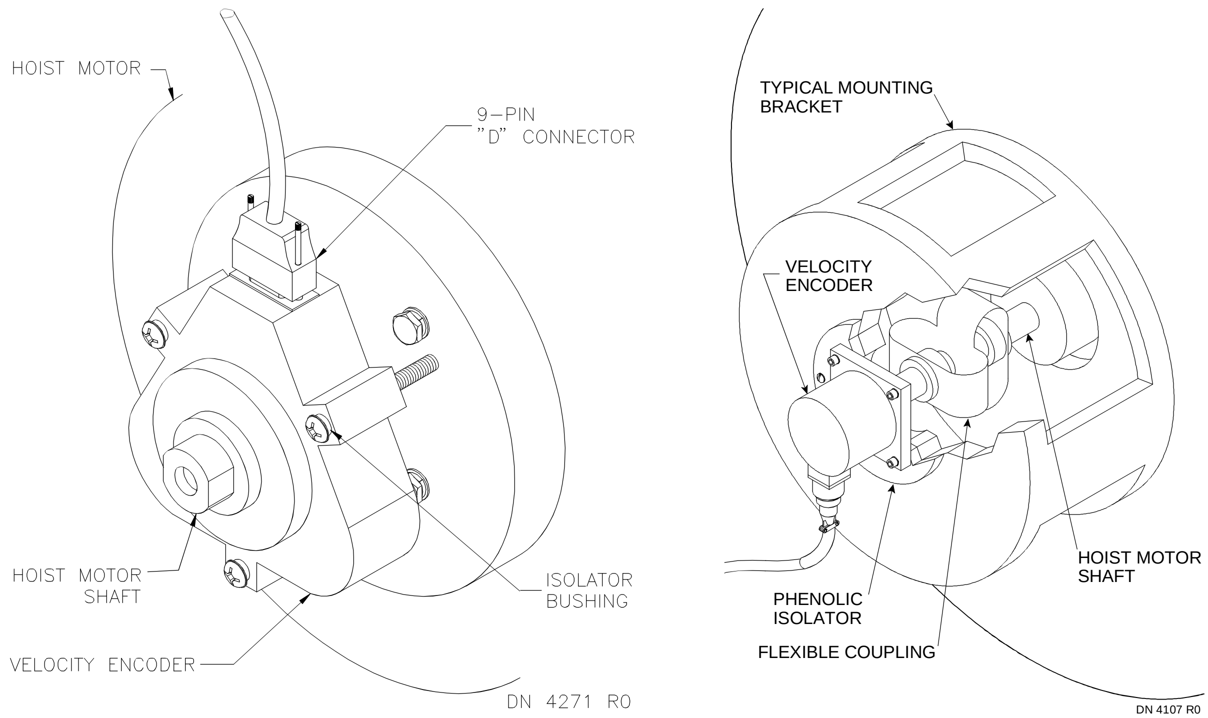
> **NOTE:** The Encoder wiring must use a separate grounded conduit. Make sure that the encoder housing is electrically isolated from the machine (ground). To check this, place one ohmmeter lead on the frame of the machine and one lead on the case of the encoder. The speed sensor wires can be routed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

b. Connect the Encoder to the SCR Drive 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 SCR Drive using the phoenix terminals provided. The cable shield will *not* be connected to any ground or case, but connected as shown on page -1-D of the job prints.

> **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 mount the encoder or route the encoder wires close to a magnetized area (the armature, motor field or brake coil) as it may induce noise in the encoder signal output. This can cause the Drive to miscount and cause erratic speed control at lower speeds.

FIGURE 2.8 Typical Encoder Installations



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-2K system a second vane switch is installed in the center door zone lane. On the LS-QUTE-X-2K 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 will cover the sequence of applying power to the controller and associated components, DC 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 Figures 2.3 and 2.4 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 the system is a duplex, consult the schematics and remove the fuse that powers terminal 2H and the fuse that powers terminal 2F, if present.

b. Check for shorts to ground on all terminals on the bottom of the SC-SB2K Main Relay board. The only terminals that should be grounded are terminals 1 and 89.

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

d. On the door operator, 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 terminals L1P, L2P, L3P, A1M, A2M, MF1, MF2, 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 DC hoist motor armature, motor field 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 the motor and the armature, motor field 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.

3.2 BEFORE APPLYING POWER

In the following instructions it is assumed that the sling is suspended from the hoist ropes, 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 and the governor installed and roped. Test the safety by hand to make sure that it will hold the car. Correct any malfunction before proceeding further.

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-PCI/O board at connector C1 by pushing open the two latches.

c. Unplug the screw terminal blocks from the HC-PCI/O and any HC-CI/O-E, 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 VVMC-1000-PTC SCR controller is designed to be able to operate on Inspection and Access without the computers hooked up during start-up.

At this point, it is strongly recommended to read the manual for the SCR Drive Unit. The MCE installation manual contains information from the SCR drive manual, but has been supplemented with additional information to clarify the installation and adjustment process. Therefore this manual should be used for installation and adjustments of the complete elevator control system. The original SCR Drive manual may be referenced, if necessary.

3.3 APPLYING POWER - PREPARING TO MOVE THE CAR ON INSPECTION

3.3.1 INITIAL ADJUSTMENTS AND SAFETY CONSIDERATIONS

WARNING: This equipment contains rotating parts on motors and machines and voltages that may be as high as 600V. High voltage and moving parts can cause serious or fatal injury. Only qualified personnel familiar with this manual and machinery should attempt to start-up or trouble-shoot this equipment. Observe these precautions:

a. USE EXTREME CAUTION: DO NOT TOUCH any circuit board, the SCR 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. Motor Armature and 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.

CAUTION: Do not open the hinge cover or the drive top cover when the power is ON. Turn OFF the main power before opening the drive covers. You may damage the top cover if it is not removed carefully . If top cover needs to be removed, first remove the small cover at the bottom front portion of the drive that covers logic terminals. Remove the two screws at the bottom front and gently pull (1/4th of an inch outward) and then push the cover in the UP Direction.

This control system uses an SCR drive to run the DC elevator motor. The SCR Drive supplies power to the motor armature and the motor field to run the DC elevator motor. Simplified instructions for getting the elevator moving are provided in this section. This assumes the SCR Drive has been set up at the factory to provide a satisfactory match to the motor characteristics.

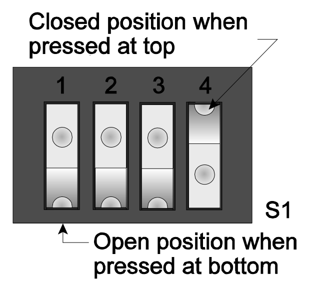
3.3.2 VERIFYING THE MOTOR FIELD CONNECTION AND DIP SWITCH SETTING

1. Refer to the controller drawings and note the Motor Field voltage and resistance values.
2. Measure the motor field resistance. It should match the value on the drawings, assuming that correct motor field information was provided to MCE during the job survey.
3. Calculate the Motor Field current as follows:
   - Motor field current = Motor field voltage / Motor field resistance.
4. The DSD412 SCR Drive has a built in 0.2A - 40.0A motor field. Terminals MF1 and MF2 in the controller are provided for the motor field connections. Based upon the required current value, refer to Table 3.1 and verify that terminal **MF1** is connected to the proper **F1** drive terminal (1.9A or 6.9A or 16A or 40A) on connector TB4. Terminal **MF2** is always connected to drive terminal **F2-** on connector TB4.
5. Refer to Table 3.1 and, based on the TB4 - F1 drive terminal connection, verify the **S1 Switch** settings in the DSD412 drive. The dip switches and a selection table are located on the motor field board which is close to the bottom of the DSD412 drive.

CAUTION:	Incorrect motor field connection and S1 switch settings may cause damage to the drive and/or equipment.

TABLE 3.1 DSD412 Wiring and Rocker Switch Settings

DSD412 Wiring and S1 Rocker Switch Settings ✳					
Rated Motor Field Current Range	**TB4 (MF1/F1) Connection**	**S1 Setting ✳✳**			
		1	**2**	**3**	**4**
16.1 - 40.0	40A	Closed	Open	Open	Open
7.0 - 16.0	16A	Open	Closed	Open	Open
2.0 - 6.9	6.9A	Open	Open	Closed	Open
0.2 - 1.9	1.9A	Open	Open	Open	Closed



✳ ***Failure to follow this table may cause damage to the drive and/or equipment.***
✳✳ ***Press the bottom of the switch to open. Press the top of the switch to close.***

3.3.3 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 L1P, L2P and L3P on the controller.

NOTE:

1. Check for the proper voltage on the primary of the Drive Isolation Transformer (H1, H2 and H3 terminals) and on the secondary feeding AC power to the SCR drive (L1S, L2S and L3S in the controller).

2. Make sure that the voltage on L1, L2 and L3 on the SCR drive is correct according to the job prints. The Drive Isolation Transformer may have a specific voltage to be used in this installation.

e. The SCR Drive Unit provided with this controller should not display any fault. If a fault is indicated, refer to the SCR Drive Manual. The Drive Faults section of the Drive Manual provides a list of faults and recommended corrective action.

f. Turn OFF the power and install fuse F4. If door fuses are provided, DO NOT install 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 cartop 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 Cartop 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. Turn ON the power and verify that relay IN is picked, thereby placing the car on Inspection operation. If the IN relay is not picked check the connections in the Safety String.

k. Install a temporary jumper from 2 bus to terminal 38 on the SC-SB2K board and from 2 bus to panel mount terminal EPI (if present).

l. You must also bypass the ASME A17.1 - 2000 fault logic, as this has yet to be adjusted. Follow the instructions in Section 5.6.5.2 to set the **LONG TERM, INSPECTION ONLY ASME A17.1-2000 REDUNDANCY BYPASS** option to **BYPASS ON**. The car can then be run on Inspection indefinitely without nuisance shutdown due to the as yet unadjusted fault monitors.

When it's time to go to Automatic operation, follow the instructions in Section 5.6.5.1 to set the **ASME A17.1-2000 REDUNDANCY BYPASS** option to **BYPASS ON**. The car can then be run for two hours without shutdown due to ASME A17.1 Redundancy faults. When the two hours expire, set the option to **BYPASS ON** again, for another two hours.

During initial installation, when the landing system/speed sensors are not installed and the system is running with the ASME A17.1-2000 faults bypassed, the PLDs can still generate faults and shut down the system by dropping the PFLT relay. There is a 3-position PFLT Bypass Jumper on the SC-BASE-x board. The normal setting of this jumper is OFF. During the installation phase, **set the PFLT bypass jumper to the ON position** to prevent shut down due to PFLT faults.

CAUTION:	**Exercise extreme caution when the fault monitors are bypassed.**

3.3.4 DRIVE INTERFACE BOARD DETAILS

The HC-ACI-D board is the interface between the SC-SB2K Main Relay board and the SCR Drive Unit. It performs a variety of functions including providing speed inputs and performing certain elevator code requirements such as Inspection/Leveling Overspeed detection as well as motor and brake contactor monitoring. Other functions include an independent motor speed monitoring circuit plus brake and speed signal coordination, see Figure 1.9, HC-ACI-D (SCR Drive Interface Board).

HC-ACI-D BOARD DETAILS

- **Trimpots:**

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

  BDD - Brake Drop Delay. Dropping the brake 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 the 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, provided for convenience, resets many SCR drive faults. Drive faults are displayed on the drive keypad and can also be reset by pressing the drive reset button on the drive keypad. Some faults, which cannot be reset in this manner, require the power to be cycled OFF and then ON again.

HC-ACIF BOARD DETAILS - This board is only used for jobs with intermediate speeds.

- **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 or SC-BASER 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 - Not applicable to the SCR drive.

- **Push Buttons:**

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

  AS/DBF RESET - This switch resets the At Speed Fault.

ADDITIONAL RELAYS AND DRIVE INTERFACE -External relays, HC-ACI-D & HC-ACIF are used for the drive interface. The following is an explanation of the key interface connections between the MCE controller and the DSD412 drive.

TB1-9 (Field Enable) - Activated to bring the motor field to forcing value.

TB1- 51 (Ramp rate select) - When active, selects the 2nd ACC/DCC rate.

TB1-8 (Run UP) - When active, selects the up direction.

TB1-50 (Run Down) - When active, selects the down direction.

TB1-7 (Loop contactor) - When active, confirms that the main contactor is ON.

TB1-49 (Reset) - When active, resets the drive faults.

TB1-11, 12, 53 (High speed) - All three inputs are activated to select the High speed.

TB1- 12, 53 (Intermediate speed) - These two inputs are activated to select the One Floor speed.

TB1-12 (Level speed) - This input is activated to select the Level speed.

TB1- 54 (Inspection / Correction speed) - This input is activated to select Inspection / Correction speed.

TB1- 41, 42 (Drive fault contacts) - Normally closed, opens if there is a fault.

TB1- 78 (Speed Deviation) - This output is normally ON. It turns OFF if the drive detects an error between the commanded speed and the speed feedback.

TABLE 3.2 Speed Selection Table

Bit S0 Terminal 11	Bit S1 Terminal 53	Bit S2 Terminal 12	Bit S3 Terminal 54	Drive Parameter	Speed
1	1	1	0	156 - Preset Speed #7	H Speed
0	1	1	0	155 - Preset Speed #6	Intermediate Speed
0	0	1	0	153 - Preset Speed #4	Level Speed
0	0	0	1	157 - Preset Speed #8	Inspection/ Correction
0	0	0	0	0	Zero Speed

3.3.5 DRIVE PARAMETER SETTINGS

Each controller is shipped with completed parameter sheets. Appendix B has a form which can be used to record changes and final parameter settings. 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 the drive parameter settings before start up.**

> **NOTE:** The drive has custom MCE software. 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 SCR drive unit which is provided along with this manual. Specifically, refer to the section on the Digital Operator (drive keypad) to learn how to display the output current and output voltage. Also, learn how to display and set the parameter constants. Pages D and DX of the job prints show the drive interface and which external functions are being used.

3.3.6 VERIFYING THE CRITICAL SCR DRIVE PARAMETERS

Table 3.3 lists the critical drive parameters which must be verified before start up. A complete listing of drive parameters can be found in Appendix B.

> **WARNING:** ***Do not change drive parameters when the elevator is running. The parameters in Table 3.3 are very critical DSD 412 SCR Drive parameters. Incorrect values for these parameters can cause erratic elevator operation.***

TABLE 3.3 Critical DSD 412 SCR Drive Parameters

CRITICAL SCR DRIVE PARAMETERS						
Parameter Number/ Drive Keypad Display	**Remote Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**Drive Default**	**Field/MCE settings**
3	Rated ARM I	Motor name plate current	A	0-1250	50	✳
7	Rated ARM V	Motor name plate voltage	V	150-550	240	✳
9	Nom AC Voltage	AC voltage applied to the drive	V	150-525	230	✳
10	Encoder Pulses/Rev	Encoder pulses per revolution per encoder name plate	P/R	600-19999	4096	✳✳✳ 4096
11	Motor RPM	Motor name plate RPM	RPM	0-2000	1150	✳
17	Rated FT/MIN	Rated car speed in FPM	FPM	5-2000	400	✳
40	Response	Speed regulator response	RAD	1-15	6.0	✳
41	System Inertia	System inertia	SEC	0.1- 9.99	2.0	✳
50	Rated Field Current	Rated motor field current per motor name plate	AMP	0.2-48	6.0	✳
52	Rated Field Voltage	Rated motor field voltage	V	50-525	240	✳
153	Preset speed #4	Leveling speed	FPM	0-(16%)**	0	4

TABLE 3.3 Critical DSD 412 SCR Drive Parameters

CRITICAL SCR DRIVE PARAMETERS						
Parameter Number/ Drive Keypad Display	**Remote Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**Drive Default**	**Field/MCE settings**
155	Preset speed #6	Intermediate speed	FPM	0-(91%)**	0	✳
156	Preset speed #7	High speed	FPM	0-(100)**	0	✳
157	Preset speed #8	Inspection/correction speed	FPM	0-(66%)**	0	30
170	ACC Rate #1 Not used	S curve #1 total time in acceleration	SEC	0.0-25.0	5.0	Must be set equal to 171
171	ACC Rate #2	S curve #2 total time in acceleration	SEC	0.0-25.0	5.0	2.0 - 3.0
172	DEC Rate #1	S curve #1 total time in deceleration	SEC	0.0-25.0	5.0	2.0 - 3.0
173	DEC Rate #2	S curve #2 total time in deceleration	SEC	0.0-25.0	5.0	2.0 - 3.0
174	ACC J% #1 Not used	S curve #1 acceleration jerk (% of ACC Rate #1)	%	0%-100%	25	Must be set equal to 175
175	ACC J% #2	S curve #2 acceleration jerk (% of ACC Rate #2)	%	0%-100%	25	0 - 25 ________
176	DEC J% #1	S curve #1 deceleration jerk (% of DEC Rate #2)	%	0%-100%	25	0 - 25 ________
177	DEC J% #2	S curve #2 deceleration jerk (% of DEC Rate #2)	%	0%-100%	25	0 - 25 ________

✳ **These parameters are specific to each controller. Verify the factory settings per the parameter sheet shipped with this controller.**

✳✳ **The actual speed value is entered in FPM. However, the speed range maximum value is described as a percentage of contract speed. Speeds in excess of the defined maximum will cause the drive to generate fault #450.**

✳✳✳ **Encoder RPM (P10) must be set correctly. Incorrect value of this parameter will cause under or over speed condition.**

NOTE: The drive parameters must be saved once they are updated, otherwise they will be lost when the drive power is cycled. Follow these steps to transfer (save) the ACTIVE parameters to NV RAM (non-volatile RAM) once the required parameters have been adjusted.

1. Turn the NV RAM switch, located on the top right side of the drive unit, to the UP position. The red LED on the drive key pad marked (NV RAM NOT PROTECTED) should turn ON. If the NV RAM switch is in the down position, “Prot” will be displayed on the drive key pad and drive will not save the parameters.

2. Access parameter #994 and press Data Function. Use Up arrow to display SAVE, then press Enter. The key pad will display 994. Turn the NV RAM switch to the DOWN position. The red LED (NV RAM NOT PROTECTED) should turn OFF.

The updated parameters are now saved in NV RAM in the drive.

3.4 MOVING THE CAR ON INSPECTION OPERATION

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

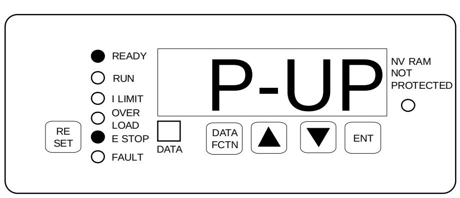
WARNING: The motor circuit may have high voltage present whenever AC power is applied to the controller, even when the motor is not rotating. After removing the AC power, wait for a few minutes before opening the drive cover. Use extreme caution. Do not touch any circuit board, power device or electrical connection without ensuring that high voltage is not present.

NOTE: This installation is configured with an emergency brake (EB). The EB will apply when the car is away from door zone and both the doors are open. For access operation, move the lift to the desired location and then close and lock the car gate. Relay CD should pick and this will keep the emergency brake from applying while the car is away from DZ. If the car gate is left open, the emergency brake will apply every time direction is dropped while on access operation. This will result in a slight delay, before the car is allowed to move, every time direction is picked.

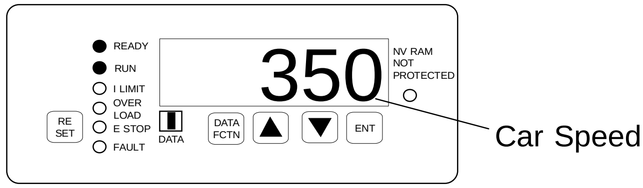
Once all the steps described in the Sections 3.3.1, 3.3.2, 3.3.4 and 3.3.5 are accomplished, then proceed with the following.

a. Verify that the MACHINE ROOM INSPECTION TRANSFER switch on the SC-SB2K board is in the INSP position. Turn ON the main disconnect. There should not be any fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the SCR drive manual. Upon power up, if the drive key pad displays ***Prot***, place the NV RAM PROTECTION switch to the UP position, press the drive reset button. After the reset is accomplished place the NV RAM PROTECTION switch in the DOWN position. The red LED on the drive key pad marked (NV RAM NOT PROTECTED) should turn OFF.

On power up the Drive Keypad should display :



Press the UP arrow to select P 600 or P 602 and press DATA FNC to display the Car speed or Speed reference respectively.



If a fault is present, refer to the troubleshooting section in the DSD412 SCR drive manual.

b. The IN relay should pick when the MACHINE ROOM INSPECTION TRANSFER switch is on INSP. After a few seconds the SAFR1 relay should turn ON (the LED on the relay will be lighted). If none of the relays are picked, inspect fuse F4 in the controller. 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 terminals 2 and 20 on the SC-SB2K board and confirm that the SAFR1 relay turns ON after four seconds. If the SAFR1 relay turns OFF after removing the jumper, there is a problem with the safety circuit.

Relays RDY and CNP on the HC-ACI-D must turn ON. Note that the RDY relay will turn ON if there is no fault on the SCR drive and there is +/-15DVC present on the HC-ACI-D board. The N.O. fault contact in the SCR drive (TB1- 41& TB1- 42) is used to pick the RDY relay. This contact opens if there is a fault in the SCR drive. The fault can be reset by pressing the drive reset button on the HC-ACI-D board or by pressing the drive reset button on the drive keypad.

c. Verify that the encoder has been installed as described in Section 2.2.5 and the connections have been completed according to the job prints. For geared applications the encoder must be mounted on the motor shaft. Use MCE drawings to complete the encoder connections.

d. With the SCR drive powered up, verify that there is standing Motor Field voltage present between terminals MF1 and MF2 in the controller. A fault 905 (Field Loss Fault), can occur if the average field current feed back drops below the feed back settings. If the SCR drive trips on a fault 905, verify the following:

- Input AC voltage to the motor field terminals AC1 & AC2 on connector TB1 located on the motor field board (bottom of the drive).
- Refer to section 3.3.2 to verify the motor field connections and dip switch settings.
- The field feed back current setting is programed by parameters and depends on the condition of the drive. Higher or incorrect values of the following parameters may cause the 905 fault.

  <u>Parameter 53 - Standing field current mode (may be the cause).</u>
  Parameter 50 - Full field current mode (Accel/Decel)
  Parameter 49 - Field weakening mode (High speed)

e. Verify that the speed commands, acceleration, deceleration and S curves parameters are set correctly. Appendix B contains a complete listing of the DSD412 SCR Drive Parameters. <u>A completed parameter sheet with specific controller settings as programmed by MCE is shipped with each controller.</u>

f. Connect a jumper wire between terminals 4 and 9 on the SC-SB2K board ***to override the gate switch and the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16. ***This bypasses the main safety circuit. Remove these jumpers as soon as possible, for safety reasons***.

g. Run the car by toggling the UP/DN toggle switch on the SC-SB2K board in the desired direction using constant pressure. When the UP/DN switch is in the UP position, relays UP (SC-SB2K) and UA (HC-ACI-D), UAX, UAXD should pick. When the UP/DN switch is in the DN position, relays DN (SC-SB2K) and DA (HC-ACI-D), DAX, DAXD should pick. The speed reference (Parameter 602) on the drive key pad should display the correct Inspection speed.

   The M, BK and SAFR2 contactors 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 correct direction and speed, go to step ‘i’, Self Tune Test 1.
   - If the car moves in the opposite direction, reverse the motor field connections.
   - If the car does not move and the drive trips on **Fault 98**(Tach Loss Fault), verify the encoder connections.
   - If the drive trips on **Fault 99**(Reverse Tach), the encoder connections are reversed. Switch A+ with B+ and A - with B -.
   - **If the car does not move on Inspection, refer to Section 6.5 for more details.**

h. The Inspection Speed *(Preset speed #8)* is set by Parameter *157*. Verify that Parameter 602 displays the correct commanded speed and Parameter 600 displays the correct car speed when the car moves on Inspection operation.

i. **SELF TUNE TEST 1** (Parameter 997) - In the self tune test, the drive measures the total motor armature resistance, inductance, field L/R time. These values are used in conjunction with parameter *#8 - Crossover Frequency* to calculate the current and proportional gain of the speed regulator. Be sure to save the parameters and update the parameter sheet after completing the self tune.

   1. Turn OFF the power. Remove fuses FB1 and FB2 and disconnect the brake coil wires connected to terminals B1 and B2 to prevent the brake from picking during this test.

   2. Place a jumper across contact #3 (N.O.) of relay LPRM. This contact is in series with TB1-7 (loop contactor) circuit.

   3. Place a jumper across contact #4 (N.O.) of relay MX.

   4. Connect a jumper between <u>terminal 2 and the right side of the MP1 coil **or** terminal 2 and PM on the HC-ACI-D Board</u>**.** This will allow the SCR drive to pick the M contactor during the self tune test. Disconnect and insulate the wire from the drive terminal TB1-9. This will prevent **Fault 403** during Auto Tuning.

   5. Verify that the car is on Inspection. Turn ON the power. If a Fault 405 (Safety Circuit Fault) is displayed on the drive keypad it can be ignored.

   6. Verify that the ASME A17.1 fault logic has been bypassed as described in Section 3.3.3 paragraph (l) and Section 5.6.5.2.

7. Refer to Section 3.8 in the SCR drive manual and carefully follow the instructions to perform the SELF TUNE test (Function #997) *or follow the steps described below:*

   (a) Select Parameter 997. Press the DATA/FCTN key.

   (b) If the drive keypad displays PROT, turn the Protection switch to the UP position. This switch is located on the top right side of the drive cover. Then press the DATA/FCTN key.

   (c) ENTER will be displayed. Press the ENTER key.

   (d) The Drive will pick the M contactor and conduct the test. After the test is completed, PASS will be displayed on the drive keypad.

8. After completing Self Tune Test 1, record the values of the following:

   - Parameter 613 - Measured Motor Field Resistance
   - Parameter 614 - Measured Motor Inductance
   - Parameter 615 - Measured Field L/R Time Constant

9. SELF Tune Test 2 (Parameter 998) - This test verifies the SCR drive internal operation and armature feedback circuits. Refer to Section 3.9 in the SCR drive manual to perform the Power Unit Diagnostic (Function #998) or follow the steps described below:

   (a) Select Parameter 998. Press the DATA/FCTN key.

   (b) If the drive keypad displays PROT, turn the Protection switch to the UP position. This switch is located on the top right side of the drive cover. Then press the DATA/FCTN key.

   (c) ENTER will be displayed. Press the ENTER key.

   (d) The Drive will pick the M contactor and conduct the test. After the test is completed, PASS will be displayed on the drive keypad.

10. After completing Self Tune tests, ***MCE strongly recommends setting Parameter 2 = OFF. Then enter and SAVE the measured values of the following parameters. This will force the drive to uses the measured values and avoid the possibility of selecting an incorrect value if parameter 2 = ON .***

    - ***Set parameter 4 = the measured value of parameter 613.***
    - ***Set parameter 6 = the measured value of parameter 614.***
    - ***Set parameter 51 = the measured value of parameter 615.***

11. **Save the drive parameters before turning OFF the power, otherwise the new values will be lost when power is cycled**. Refer to the note in Section 3.3.6 which explains how to save the parameters.

12. Turn OFF the power. Install fuses FB1 and FB2 and re-connect the brake coil wires to terminals B1 and B2. **Remove the jumper** between terminals **2** and **PM or the right side of the MP1 coil. Reconnect the wire to terminal TB1-9**. Remove the jumpers across **contact #3 of relay LPRM** and **contact #4 of relay MX.** Also remove the jumper between **pins 2KBP1 and 2KBP2 on the SC-BASE board**. Then turn ON the power and verify that ASME A17.1-2000 REDUNDANCY BYPASS is OFF (see Section 5.6.5.2).

j. **Inspection Speed Calibration** - Run the car on Inspection. Verify the Inspection speed using a hand held Tachometer. Compare the measured car speed with Parameter 602 (Reference speed) and then with Parameter 600 (car speed). These three values should match if the car is running at the correct Inspection speed. **Verify Parameter 10 (Encoder P/R)**. If the actual speed is slower than the requested speed, increase the Motor RPM Parameter 11 (Motor RPM/SPD). If the actual speed is higher than the requested speed, decrease the value of Motor RPM Parameter 11. Parameter 11 can be adjusted up to +/-5% of the motor rated F.L. RPM without having much effect on the performance.

Now the correct Inspection speed (in feet per minute) should be displayed on the drive keypad (Parameter 600) whenever the car moves on Inspection. Adjust the Inspection Speed Parameter 157 (Preset Speed #8) for a comfortable Inspection speed. Then adjust the SPD trimpot on the HC-ACI-D board to coordinate the application of the speed command to the drive with the picking of the brake, so that the car does not move under the brake or rollback at the start.

k. At this time the adjustment of the BDD trimpot on the HC-ACI-D board is also necessary. Otherwise you may be stopping the car 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.

NOTE: If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI-D board, the ILO indicator will turn ON and the FLT relay will pick, which will drop the RDY relay and shut down the controller. Reset the fault by pressing the Fault Reset button on the HC-ACI-D board and adjust the ILO trimpot fully CCW.

l. To make sure that the Cartop Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and ACCN, from step 3.3.2 (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 Cartop Inspection switch is in the NORMAL position. There should be no power on terminal ACCN when the Cartop Inspection switch is in the INSP position.

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

n. Run the car through the hoistway, 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.

o. 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
- 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)

p. Check the counterweight balance. Verify that the counterweighting is as specified. Make whatever corrections are necessary to make the counterweight correct. If a drum machine is being used then follow the manufacturer's recommendations for counter weighing, and test the limit switch on the drum machine.

NOTE: On modernizations it is easy to overlook the typical 40% counterweighting. 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. For a drum machine, follow the manufacturer's counterweighting recommendation and test the drum machine's limit switches.

q. Turn OFF the power. Reinstall the fuses that power terminals 2H and 2F. The elevator controller installation should now be completed.

r. Remove the temporary jumper between 2 bus and terminal 38 on the SC-SB2K board once the Fire Service input is brought into the controller.

s. Remove the temporary jumper between 2 bus and panel mount terminal EPI (if present) once the Emergency Power input is brought into the controller.

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 covers the final adjustment and testing procedures for controllers with the MagneTek DSD 412 drive.

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-PCI/O board (if previously removed).

> **NOTE:** Pin 1 on both the ribbon cable connector and the header on the HC-PCI/O board must match. These are 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, turn OFF the power, pull the door fuses and close the doors so 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 cartop is still accessible after closing all of the doors.

4.1.2 HC-ACI-D 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 is located on HC-ACI-D board. It may need to be adjusted as described in Section 3 on Inspection operation to coordinate the application of the speed command with the picking of the brake. This trimpot may require readjustment when the car is adjusted for High speed in Section 4.3.5(g).

- **BDD** trimpot (Brake Drop Delay) - This trimpot is located on the HC-ACI-D board and it may need readjustment as described in Section 4.3.5(h). 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 DIAGNOSTIC MESSAGES AND INPUT/OUTPUT SIGNALS

To speed up final adjustment and troubleshooting, become familiar with the Error Status Messages (Table 5.2) and Input/Output signals (Flags and Variables, Tables 5.3 and 5.4) .

NOTE: Read Section 5.1: *The MC-PCA-OA2K Computer Panel - Your Tool for Programming, Diagnostics and Data Communication* and Section 5.3, Diagnostic Mode.

ON-BOARD DIAGNOSTICS - When the Elevator Controller's Computer (MC-PCA-OA2K) is in the DIAGNOSTIC MODE, with switches F1 - F8 in the down position, the LCD display provides a description of normal and abnormal conditions. When the LCD displays NORMAL, in the car status field, the system is ready for normal operation. A complete listing of the status and error messages, their meaning, probable cause and needed response are found in Table 5.2, Error Status Messages and Response Chart.

The computer displays abnormal conditions in the same priority that the computer evaluates them. For example, if the safety circuit is open and the system is also on Fire Service, the computer will first show that the safety circuit is open and will expect this problem to be corrected first. When the safety circuit problem has been corrected and the computer has recognized the safety input, the diagnostics will then show the Fire Service indication. After successfully bringing in the Fire Service input, the computer will then show NORMAL on the LCD display, provided that the system is not on some other function such as Independent Service or Cartop Inspection operation. The display will show NORMAL only if everything is normal. If the LCD display is showing any other message, an abnormal condition exists.

4.1.4 A FEW WORDS ABOUT ABSOLUTE FLOOR ENCODING

Absolute floor encoding is an option which allows the controller to read encoding vanes or magnets at each landing and thereby identify the floor. If the absolute floor encoding option is provided, the behavior of the car, when power is turned ON, is different than without absolute floor encoding.

JOBS WITHOUT ABSOLUTE FLOOR ENCODING - If the car is in the middle of the hoistway when power is turned ON, the controller will not know where the car is and must send the car to the bottom landing to get in step with the floor Position Indicator. It does so by generating an internal BFD (Bottom Floor Demand) flag in the computer. When the BFD flag is present, no car calls will be accepted until the car reaches the bottom terminal. The BFD flag will be cleared when the DSD (Down Slow Down) switch has opened (dropping power to terminal 13) and if DZ (Door Zone) and DLK (Door Locked) are both active. 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 put on Relay Panel Inspection or Cartop Inspection operation and then is returned to Automatic operation, if the car is not at a terminal landing, the controller will create the BFD flag and will act as described above. If the BFD flag is present, and the TEST/NORMAL switch is on TEST, it will be necessary to place a jumper between terminals 2 and 45 (Door Close input) to move the car. It may be necessary to hold the jumper on the terminals for several seconds.

JOBS WITH ABSOLUTE FLOOR ENCODING - 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, LU2, LD1 and LD2 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-PCI/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 placed, or it may wait several seconds before moving.

CAUTION: The call terminals on the HC-PCI/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 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 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 into Test Mode, provided that the Car Top Inspection and Relay Panel Inspection switches are in the OFF or normal positions. In that case, the LCD should be showing TEST MODE and not NORMAL. 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 inactive at the same time when the doors are closed and locked and the safety circuit is closed.

4.2 EXPLANATION OF DSD 412 SCR DRIVE PARAMETERS AND S CURVES

Set **AUTO BYPASS ON** for two hours of run time with ASME A17.1-2000 functions bypassed while setting up drives. If necessary set **AUTO BYPASS** to **ON** again for another two hours. See section 5.6.5.2 for instructions on setting up AUTO BYPASS ON.

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 SCR 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 Section *3, Standard Control / Display Unit Operation* in the MagneTek DSD 412 SCR Elevator Drive Technical Manual.

4.2.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.3.6. Incorrect values for these parameters can cause erratic elevator operation.

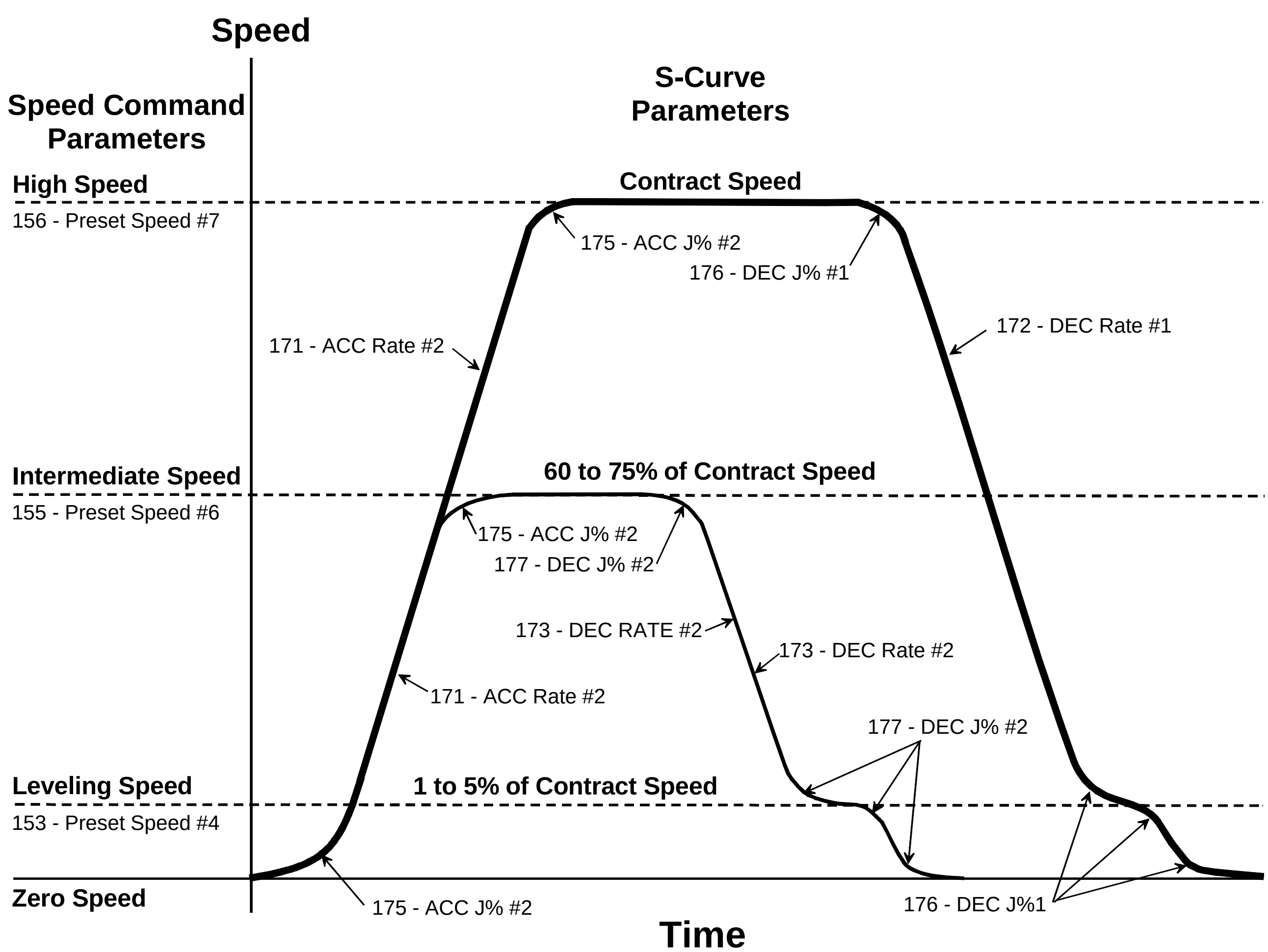
CAUTION: It is very important that drive parameters only be changed when the car is stopped and the elevator is on Inspection or Test operation.

The PTC Series M controller uses the *Preset Speed* Parameters described in Table 4.1. The controller selects the desired speed using the DSD 412 SCR Drive Logic inputs as described on page -DX in the Job Prints . The Speed Command Parameters should be set as shown in Table 4.1 in preparation for running the elevator at high speed.

TABLE 4.1 DSD 412 Speed Command Parameters

DSD 412 SPEED COMMAND PARAMETERS				
Speed	**Parameter Number**	**Keypad Display**	**Preferred setting in preparation for running the car at High speed.**	**Unit**
High	156	Preset Speed # 7	**50% of Contract Speed (Parameter 17- Rated FPM)**. This parameter will be changed to Contract Speed during final adjustment.	ft/m
Intermediate	155	Preset Speed # 6	**42% of Contract Speed (Parameter 17- Rated FPM).** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
Leveling	153	Preset Speed # 4	1% to 3 % of Contract Speed (Parameter 17- Rated FPM)	ft/m
Inspection/ correction	157	Preset Speed # 8	Normal setting is 10% of the contract speed (Parameter 17 - Rated FPM).	ft/m

FIGURE 4.1 Velocity and S Curve Parameters (DSD 412)



4.2.2 ACCELERATION AND DECELERATION RATE PARAMETERS

Acceleration for both one floor and multi-floor runs is controlled by parameter 171 (ACC Rate #2). The value is in seconds and it determines the total time in acceleration from zero to steady speed, either Intermediate or High speed. The lower the value the faster the acceleration.

Deceleration for one floor runs is controlled by parameter 173 (DEC Rate #2). The value is in seconds and it determines the total time in deceleration from Intermediate speed to zero speed. The lower the value the faster the deceleration.

Deceleration for multi floor runs is controlled by parameter 172 (DEC Rate #1). The value is in seconds and it determines the total time in deceleration from High speed to zero speed. The lower the value the faster the deceleration.

4.2.3 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 4.1). The jerk parameter values are a percentage of the acceleration and deceleration rate parameters. Increasing the value causes a smoother (longer) transition. Acceleration Jerk for both one floor and multi-floor runs is controlled by parameter 175 (ACC J% #2). Deceleration Jerk for multi-floor runs is controlled by parameter 176 (DEC J% #1). Deceleration jerk for one floor runs is controlled by parameter 177 (DEC J% #2).

TABLE 4.2 DSD 412 Velocity Curve Parameters

Parameter Number/ Drive Keypad Display	Remote Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/ MCE Set
	S-Curve Parameters					
170	ACC Rate #1 Not used	Acceleration rate #1 - Not used A higher value results in more time spent in acceleration (slower acceleration rate). Set Parameter 170 = Parameter 171	sec	0 - 25	5.00	Must be set equal to 171
171	ACC Rate #2	Acceleration rate #2 Total time in acceleration from 0 to contract speed. A higher value results in more time spent in acceleration (slower acceleration rate).	sec	0 - 25	5.00	2.0 - 3.00
172	DEC Rate #1	Deceleration rate #1 - Multi-floor runs Total time in deceleration from contract speed to stop. A higher value results in more time spent in deceleration (slower deceleration rate).	sec	0 - 25	5.00	2.0 - 3.00
173	DEC Rate #2	Deceleration rate #2 - One floor runs Total time in deceleration from one floor speed to stop. A higher value results in more time spent in deceleration (slower deceleration rate).	sec	0 - 25	5.00	2.0 - 3.00
174	ACC J% #1 Not used	Jerk rate 1: Not used Jerk rate at the start and end of acceleration (percentage of parameter 170). A higher value results in a smoother transition during acceleration. Set Parameter 174 = Parameter 175	%	0 - 100%	25	Must be set equal to 175

Parameter Number/ Drive Keypad Display	Remote Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/ MCE Set
175	ACC J% #2	Jerk rate at the start and end of acceleration on multi-floor and one floor runs (percentage of parameter 171).	%	0 - 100%	25	0 - 25
176	DEC J% #1	Jerk rate at the start and end of deceleration on multi-floor runs (percentage of parameter 172).	%	0 - 100%	25	0 - 25 20
177	DEC J% #2	Jerk rate at the start and end of deceleration on one floor runs (percentage of parameter 173). A higher value results in a smoother transition during deceleration.	%	0 - 100%	25	0 - 25 20
	Speed Reference Parameters					
153	Preset Speed #4	Leveling Speed	fpm	0 - (16%)*	0	2 - 5
155	Preset Speed #6	Intermediate Speed	fpm	0 - (91%)*	0	✳
156	Preset Speed #7	High Speed	fpm	0 - (100%)*	0	✳
157	Preset Speed #8	Inspection / Correction Speed	fpm	0 - (66%)*	0	20 - 40

✳ **The actual speed value is entered in FPM. However, the speed range maximum value is described as a percentage of contract speed. Speeds in excess of the defined maximum will cause the drive to generate fault #450 (Speed Setting Error).**

4.2.4 ADJUSTING THE S CURVE PARAMETERS

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals TB1-45 (Speed reference) and TB1-46 (Speed feedback) with respect to terminal TB1-80 (com) on the DSD 412 SCR drive. The output signal is ±10VDC.

Adjust the following parameters for correct approach to the floor (smooth transition from deceleration to Leveling speed and stop) on multi-floor runs:

- Level speed parameter153 (Preset Speed #4)
- Deceleration Rate parameter 172 (DEC Rate #1)
- Deceleration Jerk parameter 176 (DEC J% #1)
- Stability parameter 42 (adjust between 1 to 2)

Adjust the following parameters for correct approach to the floor (smooth transition from deceleration to Leveling speed and stop) on one floor runs:

- One floor speed parameter 155 (Preset Speed #6)
- Deceleration Rate parameter 173 (DEC Rate #2)
- Deceleration Jerk parameter 177 (DEC J% #2)
- Stability parameter 42 (adjust between 1 to 2)

The acceleration rate parameter 171 (ACC Rate #2), and the acceleration jerk parameter 175 (ACC J% #2) can be adjusted for smooth starting and transition to Intermediate and High speed. This will be further addressed in the final adjustment section.

NOTE: Parameter 170 must be set equal to Parameter 171 and Parameter 174 must be set equal to Parameter 175.

4.3 FINAL ADJUSTMENTS

4.3.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION

a. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, then see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase I, 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

Place the Relay Panel (SC-SB2K) MACHINE ROOM INSPECTION TRANSFER switch in the NORM 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 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 153 (Preset Speed #4) on the SCR 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 directional (normal) 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

a Put the car on Inspection at the bottom landing. Put 2/3 of a contract load in the car.

b. 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 contract load while running down on Inspection. KEEP THE CAR NEAR THE BOTTOM AS IT IS LIKELY TO SLIDE THROUGH THE BRAKE ONTO THE BUFFERS.

c. If the SCR Drive Unit trips off when the car is going down, but not while it is going up, refer to the manual for the SCR Drive Unit and look up the failure indicated on the Drive display. If a fault is indicated, refer to the fault section. If this problem cannot be solved, call MCE Technical Support.

d. Remove all test weights from the car.

4.3.4 SELF TUNING OF DSD 412 SCR DRIVE

If the self tuning described in Section 3.4.'i' has not been performed, perform the procedure now. In the self tune test, the drive measures the total Motor armature resistance, inductance and field L/R time constant. These values are used in conjunction with parameter #8 - Crossover Frequency, to calculate the current and proportional gain of the speed regulator. **Refer to section 3.4 'i'** to perform the self tuning procedure.

4.3.5 BRINGING THE CAR UP TO HIGH SPEED

a. Verify that all the steps described in Section 4.1 and Section 4.2 regarding the adjustments, 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 display for *parameter 600* (car speed) 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 156 (Preset Speed #7) to the Contract Speed value. Once parameter 156 is set at contract speed the car should run at contract speed. Verify contract speed using a hand held tachometer. The measured speed should be equal to the displayed value of Parameter 600 and Parameter 602 when the car runs at contract speed. If there is a problem reaching Contract Speed, see the following note and also refer to section 4.3.4. Adjust parameter #49 (Weak Field Amps) to obtain the rated armature voltage at contract speed (see Section 4.3.6).

> **NOTE:** **Drive gain adjustments** - The default values for parameter 40(Response), parameter 41(Inertia) and the motor field adjustment are sufficient to run the car on High Speed. However, for optimum performance, and to help in achieving Contract Speed, self tuning of the drive as described in Section 4.3.4 is strongly recommended.

c. At the slowdown distance from the next floor, the Position Indicator will step. After stepping occurs, High speed drops and the car should rapidly decelerate to Leveling speed.

The Leveling speed can be adjusted using parameter 153 (Preset Speed #4) so that the car levels into the floor and stops. Leveling speed should be 3 - 5 fpm, or use personal judgement in adjusting the leveling speed. If the car re-levels frequently, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone or lower the final leveling speed (Parameter 153).

d. Adjust the SPD (Speed Pick Delay) trimpot by first turning it far enough clockwise so that the car rolls back in the direction of the load before accelerating. Then adjust SPD so that the brake is fully picked just as the motor first moves. SPD is used to avoid moving the motor before the brake is fully lifted thus preventing rollback at the start of car motion.

e. Run the car again and verify that the car will start, accelerate, run at high speed, decelerate and run at Leveling speed 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. If the car is not running at contract speed, slowly increase High speed parameter 156 (Preset Speed #7) until Contract Speed is reached. It may be necessary to adjust the deceleration rate parameter 172 (DEC Rate #2) and deceleration jerk parameter 176 (DEC J% #2) to get the car to approach the floor correctly as the car speed increases. Adjust the acceleration rate parameter 171 (ACC Rate #2) and acceleration jerk parameter 175 (ACC J% #2) 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.

If the job does not have Intermediate speed, set P177 = P176 and P173 = P172. If the job has Intermediate speed, go to step 'f'.

NOTE: To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminal TB1-45 and TB1-46 with respect to TB1-80. 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 the potential of the lead to which the negative probe is connected. 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. **Intermediate Speed** - If the job has Intermediate speed, first make the adjustments for multi-floor runs. Then make one floor runs and adjust the Intermediate Speed parameter 155 (Preset Speed #6) to reach the correct Intermediate speed. There may also be a need to adjust parameter 173 (DEC Rate #2) for the correct approach to the floor (refer to Figure 4.1 *Velocity and S Curve Parameters* described in Section 4.2.4).

If, after these adjustments, the car still takes a longer time in the approach to the floor on an Intermediate speed run, there is a possibility that the Intermediate Stepping vanes/magnets (ISTU/ISTD) are installed too far away from the floor. To verify this, reduce the ISTU/ISTD) distance for a middle floor (away from the terminal landings). Then adjust parameters 155 and 173 for the correct approach. If this is successful, implement the change in the ISTU/ISTD distances for the other floors. Note: Parameter 177 should be set between zero and three (0 - 3).

g. **Speed Pick Delay** - To achieve a proper start, without rollback or snapping away from the floor, a variable delay before applying the speed signal has been provided (trimpot SPD, Speed Pick Delay). This was adjusted previously; however, check trimpot SPD again and make adjustments if necessary. *Do this with an empty car*. SPD must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. The correct setting will be obvious by watching the drive sheave. The response of the car can also be monitored using an oscilloscope by measuring the voltage on the drive terminals TB1- 45 (Speed reference) and TB1-46 (Speed feedback) with respect to terminal TB1-80 (com) on the DSD 412 SCR drive. The output signal is 0, +/-10VDC.

h. **Brake Drop Delay** - When the elevator slows to leveling speed and enters the dead zone, the speed command drops to zero and the SCR Drive Unit causes the machine to stop electrically. The dropping of the brake must be delayed long enough to allow the sheave to stop turning before setting the brake firmly on the brake drum. This is adjusted 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 the instant the motor has stopped.

If there is too much delay before dropping the brake, the SCR Drive will release 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 acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but should not substantially exceed the value of the deceleration rate parameter. Excessive acceleration may cause the SCR 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 rate parameter 172 (DEC Rate #1). Continue to increase the value of parameter 172 until the car overshoots the floor on multi-floor runs, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the parameter 172 value (DEC Rate #1) 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, increase the leveling speed.

4.3.6 MOTOR FIELD AND ARMATURE VOLTAGE ADJUSTMENTS

The armature voltage is a result of the motor field current times the rotational speed. The goal is to have the armature voltage be equal to the name plate voltage while running at the name plate RPM and full load current. The following information is required to adjust the motor field correctly:

- Motor name plate Armature Voltage.
- Motor Field Voltage.
- Motor Field resistance.

Motor Field current = Motor Field Voltage / Motor Field Resistance.

The DSD412 SCR drive motor field voltage is adjusted by adjusting the motor field current values using the following drive parameters:

- 50 - Full Field Current (sets the forcing field current)
- 49 - Running Field Current (sets the weakening/running field voltage)
- 52 - Rated Motor Field Voltage
- 53 - Standing Field Current (sets the standing field Voltage)

Motor terminal voltage = CEMF + I x R
CEMF = Counter EMF
I x R = Voltage drop in the motor armature;
I = Parameter 3 (Armature current)
R = Parameter 4 (Armature resistance)

Note: Self tuning of the DSD412 drive as described in Section 4.3.4 should be complete.

Step 1: Calculate the CEMF voltage.
CEMF voltage = Motor name plate voltage - [Armature current P#3 x Armature resistance P#4]

Step 2: Select parameter 609 and press the Data FNCT Key . This parameter displays the CEMF voltage.

Step 3: Run the car at contract speed in both directions and the read the CEMF voltage displayed by parameter 609. If the value of CEMF is equal to the above calculated value then the adjustments are complete. At this time motor armature voltage displayed in parameter 610 should be equal to the motor name plate voltage. The displayed value will be equal to the motor name plate in the overhauling direction and a higher value in the motoring direction.

Step 4: If the displayed value of CEMF in parameter 609 is lower than the calculated value in step 1, increase the running motor field current (parameter 49) in small increments until the value of CEMF equals the calculated value in both directions. If the displayed value of CEMF in parameter 609 is higher than the calculated value in step 1, decrease the running motor field current (parameter 49) in small increments until the value of CEMF equals the calculated value in both directions.

4.3.7 SPEED CALIBRATION

At this time the motor should be running with correct armature voltage. If required, adjust the running motor field as described in step 4.3.6. Verify contract speed using the hand held tachometer. The measured value of speed should be equal to the displayed value of parameter 600 and parameter 602 when the car runs at contract speed. If the measured value is lower than the displayed values, increase parameter 11 (Motor RPM/SPD). If the measured value is higher than the displayed value, decrease the value of parameter 11. Parameter 11 can be adjusted to +/- 5% of the motor rated RPM without having much effect on the performance**.**

4.3.8 LOAD TESTING

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the SCR Drive current (Parameter 611) on the display and check to see if there is a Fault 918 (IST Fault) as the car accelerates to full speed. If so, this indicates that the SCR 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. Reducing the acceleration rate by increasing parameter 171 (ACC Rate #2). Increasing this parameter will lower the rate of acceleration, and reduce the current demand.

2. A more gradual transition from acceleration to high speed may be made by increasing parameter 175 (ACC J% #2) between zero and three (0 - 3).

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

4. The elevator may be improperly counterweighted. This possibility should be thoroughly investigated by placing a balanced load in the car and verifying that the armature current is the same in both the up and down directions.

5. Make a copy of the table in Appendix B, *Quick Reference for MagneTek DSD412 SCR Drive Parameters* and use the digital operator on the drive unit to look up and write down every parameter value as programmed in the unit. Have this data in hand BEFORE calling MCE.

b. If there is a problem lifting the fully loaded car, adjust parameters 40 (Response) and 41 (System Inertia). If there is a problem slowing the car in the down direction, adjust the deceleration rate parameter 172 (DEC Rate #1).

4.4 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. First, verify that the overspeed functions for ETS and ILO have been calibrated as described in 4.5.

After completing the overspeed test, test both the ascending car overspeed and unintended car movement protection.

4.4.1 OVERSPEED CALIBRATION AND TESTING

Please refer to section 4.5 for calibration of the ILO and ETS overspeed detection logic.

On the SC-SB2K board, move the MACHINE ROOM INSPECTION TRANSFER switch to the INSP position and place the TEST/ NORMAL switch in the TEST position.

4.4.2 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 especially critical for the "Rope Brake" style of emergency brake, that the brake shoes are properly "arced-in" to conform with the curvature of the ropes.

a. On the SC-BASE board, place a jumper between 2KBP1 and 2KBP2.

b. On MC-PCA-OA2K board, place the F3 switch UP and set LONG TERM INSPECTION ONLY ASME A17.1-2000 REDUNDANCY BYPASS option to **BYPASS ON** (see Section 5.6.5.2).

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 the car's 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, press and hold the Emergency Brake Reset pushbutton on the SC-BASE board. Remove all jumpers, set the LONG TERM REDUNDANCY BYPASS option to **BYPASS OFF** and place F3 down (OFF). Turn MACHINE ROOM INSPECTION TRANSFER switch to NORM and place TEST/NORMAL on NORMAL.

4.4.3 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 board) until the emergency brake resets.

4.5 FINAL ELEVATOR INSPECTION PROCEDURE

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

4.5.1 INSPECTION LEVELING OVER SPEED TEST

Note: Before performing tests 4.5.1 and 4.5.3, 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. An accurate representation of actual car speed is required for this test. If the calibration in Section 3.4 'j' was performed, then parameter 600 - Car Speed may be used. Otherwise a hand-held tachometer is required.

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

c. Now, run the car on Inspection and adjust the IN speed (Parameter 157, Preset Speed #8) for the preferred maximum leveling speed (something below 140 fpm). Run the car and verify the speed using either parameter 600 or a hand-held tachometer.

d. 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-OA2K LCD display should read “ILO Fault”. The ILO fault will self reset in a moment.

e. Now set Inspection speed parameter 157 (Preset Speed #8) to a lower value. Run the car on Inspection and increase the inspection speed in increments of 2 fpm using Parameter 157. Verify that the low speed safety monitor circuit will trip the ILO Fault at no higher than 140 fpm (or no higher than the maximum available inspection speed if less than 140 fpm). Check this in *both* directions.

f. Set the Inspection speed Parameter 157 (Preset Speed #8) back to the original or desired value. Place the Relay Panel Inspection switch on the SC-SB2K board in the OFF position.

4.5.2 TERMINAL SLOWDOWN LIMIT SWITCHES

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 at terminals 71 (STU) and 72 (STD) on the SC-SB2K board.

c. Register calls for the terminal landings (top and bottom). 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.

4.5.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR

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 the High Speed parameter 156 (Preset Speed #7). Then, on a multi-floor run, adjust the speed of the car to 95% of contract speed by adjusting the High speed parameter 156 (Preset Speed #7).

d. Remove the wire from the Up Emergency and Terminal Limit Switch wires where they connect to the controller at terminal 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 onthe 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 wire 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 156 (Preset Speed #7) 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.

4.5.4 CONTRACT SPEED BUFFER TEST:

4.5.4.1. 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 enter system mode by placing function switch F3 UP (MC-PCA-OA2K board) and then selecting option **AUTO BYPASS ON** (See section 5.6.5.2).

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 counter weight 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 enter system mode by placing function switch F3 UP (MC-PCA-OA2K board) and then select option **AUTO BYPASS 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 by placing function switch F3 UP (MC-PCA-OA2K board) and then selecting option **AUTO BYPASS ON** (See section 5.6.5.2).

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 enter system mode by placing function switch F3 UP (MC-PCA-OA2K board) and then select option **AUTO BYPASS OFF.** ***Remove all of the jumpers installed in this section.***

4.5.5 GOVERNOR AND CAR SAFETY TESTS

4.5.5.1 GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Make sure that there are no jumpers between terminals 2 and 15. Trip open the electrical OVERSPEED 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.

4.5.5.2 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. 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-BASE board, install a jumper between pins 2KBP1 and 2KBP2. Also, enter System Mode and set ASME A17.1-2000 REDUNDANCE BYPASS to **BYPASS ON** (see Section 5.6.5) to **bypass ASME A17.1 - 2000 faults**.

h. Set the SCR drive parameter **81 (Overspeed Mult) = 1.40** or to the required tripping speed. If the trip point is greater than 150%, skip steps (h), (i), (j) and (k) and use other means to overspeed the car.

i. Enable the overspeed test by setting parameter **80 (Overspeed Test) = ON**. This setting changes back to OFF immediately after the test run. It is necessary to repeat this step if another test run is required.

j. Set the Over Speed %, parameter **12 = 150.**

NOTE: The following is required only if a drive fault is generated when the test is performed in step 'k'.

Note the values of parameters **49 (Weak Field Amps)**, **50 (Full Field Amps)** and **57 (Field Weaken Speed)**. Then set the parameters as follows:

- **49 = 50% of its present value**
- **50 = 50% of its present value**
- **57 = 60% of its present value**
- Verify that parameter **56 (Field Strength Speed) = 90%.**

k. Register a car call in the down direction, but not for the bottom landing. The car should exceed Contract Speed. The governor should trip and set the safety and stop the car.

l. Put the car on Inspection.

m. Reset the SCR drive parameters: **81 (Overspeed Mult) = 1.0**, **12 (Over Speed %) = 110** and verify that parameter **80 (Overspeed Test) = OFF**.

n. If any of the following parameters were changed, return them to their original values: **49 (Field Weakening Amps**, **50 (Full Field Amps)**, **57 (Field Weaken Speed)** and **56 (Field Strength Speed)**.

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

p. 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.

q. ***Remove the jumper between terminals EBS1 and EBS2 which bypasses the governor overspeed switch.***

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

s. Properly reinstall relays AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets. Remember AS and ETL are different!

t. **Remove the jumper between pins 2KBP1 and 2KBP2 on the SC-BASE board**. Also, enter System Mode and set ASME A17.1-2000 REDUNDANCE BYPASS to **BYPASS OFF** (see Section 5.6.5).

u. 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.**

v. 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.

4.5.6 MOTOR FIELD LOSS DETECTION TESTS

Put the car on Inspection. Turn OFF the controller power and disconnect the motor field wires at terminals MF1 and MF2. Turn ON the power. The SCR drive will detect the motor field failure fault. Place a call and observe that car does not run. Turn OFF the power and reconnect the wires at terminals MF1 and MF2.

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:

* 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 UET or DET.
* No jumper between 2KBP1 and 2KBP2 on SC-BASE
* No jumper between terminals 2 and 15 (SC-SB2K).
* No jumpers between terminals 2 and 36 (DOL) (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 AUTO BYPASS is set to OFF and the F3 switch on the MC-PCA-OA2K board is down (OFF).
* PFLT BYP jumper in the OFF position
* Parameter 156 (Preset Speed #7) must be set to original value.
* Parameter 81 (Overspeed Mult) = 1.0
* Parameter 80 (Overspeed test) = OFF
* COS trimpot on the SC-BASE / SC-BASER board fully CW.

SECTION 5
THE COMPUTER

5.0 ABOUT THE PTC SERIES

The computer on the PTC Series elevator controller has been designed for easy communication between the mechanic and the controller and between the controller and other computers or data terminals. The computer will be used (see Figure 5.1) for diagnostic troubleshooting and for programming the controller.

5.1 THE MC-PCA COMPUTER PANEL - YOUR TOOL FOR PROGRAMMING, DIAGNOSTICS AND DATA COMMUNICATION

Figure 5.1 shows the indicators, switches and terminals on the computer panel.

5.1.1 INDICATORS

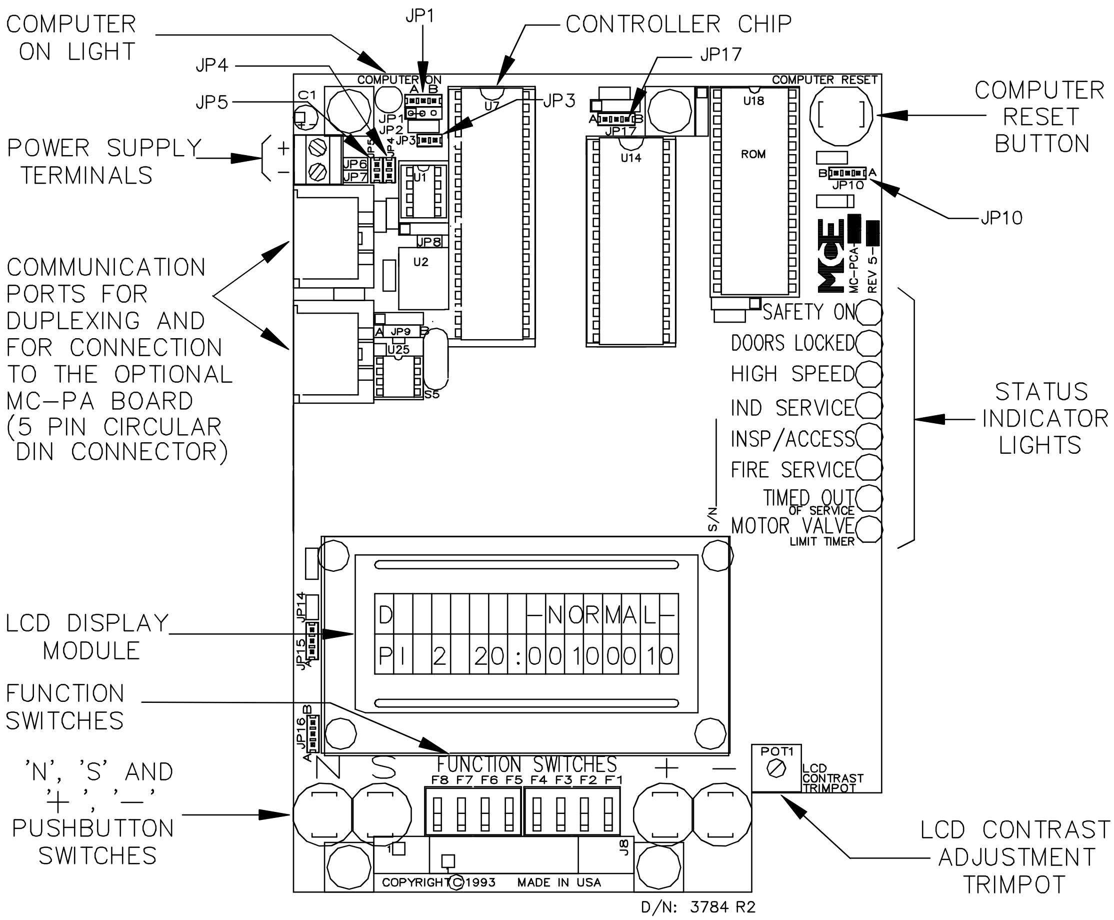
5.1.1.1 COMPUTER ON LIGHT - When steadily lit, this light shows that the computer is functioning normally and completing its program loop successfully. Pressing the COMPUTER RESET button will cause the COMPUTER ON light to flash *OFF* and ON while the RESET button is depressed. The computer is equipped with a shut down feature that will cause the system to shut down if the program loop cannot be completed. If the COMPUTER ON light is flashing continuously, it means that the computer board is malfunctioning. Inspect the controller chip (see Figure 5.1) and EPROM chip to see if they are properly seated and to see if the pins are properly inserted into the socket.

5.1.1.2 VERTICAL STATUS INDICATOR LIGHTS - These lights show the status of the elevator. Table 5.1 shows a list of these lights and their meanings.

TABLE 5.1 Status Indicators

LIGHT NAME	MEANING
SAFETY ON	Safety circuit is made.
DOORS LOCKED	Door lock contacts are made.
HIGH SPEED	Elevator is running at high speed.
IND SERVICE	Elevator is on Independent Service.
INSP/ACCESS	Elevator is on Car Top Inspection or Hoistway Access operation.
FIRE SERVICE	Elevator is on Fire Service operation.
TIMED OUT OF SERVICE	Elevator Is Timed Out of Service.
MOTOR/VALVE LIMIT TIMER	Motor Limit Timer has elapsed.

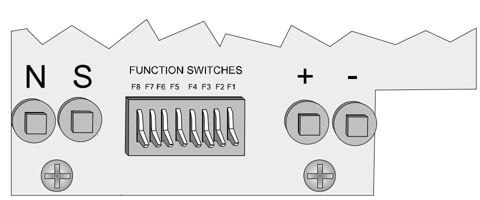
FIGURE 5.1   MC-PCA-OA-2K Computer Panel Board Layout



5.1.1.3 DIAGNOSTICS LCD DISPLAY - The 32-character LCD (Liquid Crystal Display) displays various information depending on the positions of the F1-F8 switches. Diagnostic mode is accessed when all of the switches are in the down position. The LCD display shows an elevator status message, the car position, the contents of the computer's internal memory and communication status.

5.1.2 SWITCHES, BUTTONS & ADJUSTMENTS

5.1.2.1 COMPUTER RESET PUSHBUTTON - Pressing the RESET button will cause the computer to reset. If the elevator is running, the controller will drop the safety relay and bring the elevator to an immediate stop. The elevator will then go to the terminal landing (or to the next landing if the controller has the absolute floor encoding feature) to correct its position before it can respond to any calls. Existing calls and P.I. information will be lost each time the computer is reset.



5.1.2.2 N, S, +, and – PUSHBUTTONS - These pushbuttons will allow the mechanic to view and change data in the computer memory. These pushbuttons have different functions depending on the current mode (Diagnostic mode [see Section 5.3], Program mode [see Section 5.4], External Memory mode [see Section 5.5], or System mode [see Section 5.6]).

5.1.2.3 MODE SELECTION F1-F8 FUNCTION SWITCHES - The computer panel operates in different modes. Diagnostic mode is useful for diagnosing and troubleshooting the elevator system. It is initiated by placing all of the *F1-F8* switches in the down position. Program mode is used to set up the controller to meet the elevator specifications. Program mode is initiated by moving the *F1* switch to the up position (with all other *F* switches in the down position). External Memory mode is initiated by placing the *F2* switch in the up position (with all other *F* switches in the down position) and is useful for diagnosing the elevator system by viewing the computer's external memory. System mode is initiated by placing the *F3* switch in the up position (with all other *F* switches in the down position). Programming System mode functions does not require the car to be on inspection. When only the *F8* switch is placed in the up position, the system status displays are available on the LCD display (see Section 5.1.4).

5.1.2.4 LCD CONTRAST ADJUSTMENT TRIMPOT - The contrast on the LCD can be adjusted to make it easier to read by turning this trimpot. See Figure 5.1.

5.1.3 TERMINALS

5.1.3.1 POWER SUPPLY TERMINAL - The two terminals marked (+) and (-) are for +5VDC and Ground, respectively, to the MC-PCA board. See Figure 5.1.

5.1.3.2 COMMUNICATION PORT FOR DUPLEXING - The DIN connectors shown in Figure 5.1 are used for the high-speed communication between two cars in a duplex configuration and connect to an optional MC-PA-2K Peripherals Adaptor board. The communication cable is a twisted pair shielded cable. Two wires are for signals and the third is for grounding the shield (see the Job Prints for hook-up details).

5.1.3.3 COM PORT 1 AND 2 - These terminals on the MC-PA-2K Peripherals Adaptor board are used to connect to a peripheral device. Refer to Section 5.4.9.11.

5.1.4 STATUS DISPLAYS

To access the Status Displays, place function switch ***F8*** in the up position (F1 thru F7 must be down). Press the ***N*** pushbutton to cycle through the available status displays.

The following system status displays are available for viewing on the LCD display:

- **PTHC Software Version** - Main processor software version number.
- **Eligibility Map** - Door access for each floor (F = front, R = rear, B = both). Read left to right - floors 1 thru 16 in the top row, floors 17 thru 32 in the bottom row. See Sections 5.4.2.5 and 5.4.2.6 for programming instructions.
- **Current Load** - The current load in the car as a percentage of full load (analog load weigher required).

5.2 COMPUTER SECURITY

A computer security system is available for the PTC controllers. The system requires the user to enter a passcode before they can access the Program Mode or System Mode through the Computer Panel and adjust the controller’s parameters.

The controllers are shipped without the computer security system. However, the computer security system can be purchased through MCE's Technical Support Department. Complete installation instructions are provided with the modification package. The next few paragraphs explain how the security system works after it is installed.

NOTE: This message is not related to Computer Security. If the message on the LCD screen is "**PASSCODE REQUEST**," it means that the Passcode Request Option has been activated and that a passcode is required in order to run the elevator on any mode of operation other than Inspection. See Section 5.6.2, Passcode Request Menu for more info.

```
PASSCODE REQUEST
PI 8 20:10001000
```

5.2.1 PASSWORD

There are two sections that are secured by an 8-digit, alpha-numeric code chosen by the customer, Program Mode and System Mode.

When either of these two sections is accessed, the LCD display will show:

```
ENTER PASSWORD:
   00000000
```

The mechanic must then enter the correct passcode to log into the system. Only then can the computer be used to program the controller.

The password is entered the same way and has the same code for both modes.

N	Pushbutton	Change the position of the cursor.
+	Pushbutton	Increment the current position by one.
–	Pushbutton	Decrement the current position by one.
S	Pushbutton	Check for a match

If an invalid code is entered, the operator will be prompted to re-enter the code. Once a valid code has been entered, access is granted to the programming options and the password will not have to be reentered until the Password Timer expires.

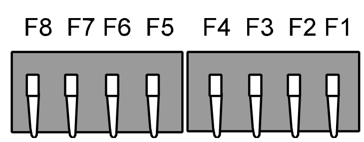
5.3 DIAGNOSTIC MODE

MCE's PTC Elevator Controller Computer with On-Board Diagnostics is self-sufficient; external devices are not required when using the computer. The computer is generally the most reliable component of the elevator control system and the On-Board Diagnostics were designed to aid in evaluating the status of the control system. The On-Board Diagnostics help to pinpoint the cause of elevator malfunctions.

5.3.1 GETTING INTO DIAGNOSTIC MODE

Diagnostic mode is initiated by placing the *F1-F8* switches in the down position. A description of the LCD display format and the function of the *N*, *S*, +, and – pushbuttons during Diagnostic mode follows.

FUNCTION SWITCHES



Diagnostic mode

5.3.2 FUNCTION OF N PUSHBUTTON

The ***N*** pushbutton (see Figure 5.1) allows for the advancement of the computer memory address, which is displayed on the second line of the LCD. For example, in this display, pressing the ***N*** pushbutton once will cause the 2 of the address 20 to begin blinking. By continuing to press the ***N*** pushbutton, the 0 of the address 20 will begin to

```
NORMAL OPERATION
PI 8 20:10110011
```

blink. The cycle continues while the ***N*** pushbutton is being pressed. Once the digit to be changed is blinking, the address can be modified using the **+** and **–** pushbuttons (refer to Sections 5.3.4 and 5.3.5).

The data (8 digits) that corresponds to the memory address is displayed to the right of the address (see Section 5.3.6.4). This display will change as the memory address changes.

5.3.3 FUNCTION OF S PUSHBUTTON

The ***S*** pushbutton (see Figure 5.1) ends the ability to change the address by stopping the digit from blinking. If the ***S*** pushbutton is not pressed, the selected digit will stop blinking automatically after a period of about 20 seconds.

5.3.4 FUNCTION OF + PUSHBUTTON

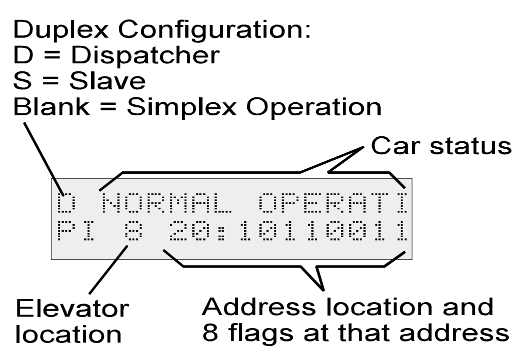
The **+** pushbutton (see Figure 5.1) modifies the digit of the computer memory address selected by the ***N*** pushbutton. If the **+** pushbutton is pressed, the selected digit is incremented by one. The data display will also change as the address changes. For example, if the 0 of the address 20 is blinking, pressing the **+** pushbutton once will change the address from 20 to 21. Pressing the **+** pushbutton several more times will change the address to 22, 23, 24, etc., up to 2F and then back to 20 again. If the 2 of the address 20 is blinking, pressing the **+** pushbutton once will change the address from 20 to 30. Pressing the **+** pushbutton several more times will change the address to 40, 50, 60, etc., up to F0. Once the address has reached F0, pressing the **+** pushbutton will cause the address to begin back at 00.

5.3.5 FUNCTION OF – PUSHBUTTON

The **–** pushbutton (see Figure 5.1) also modifies the digit of the computer memory address selected by the ***N*** pushbutton. If the **–** pushbutton is pressed, the selected digit is decremented by one. The data display will also change as the address changes. For example: If the 0 of address 20 is blinking, pressing the **–** pushbutton once will change the address from 20 to 2F. Pressing the **–** pushbutton several more times will change the address to 2E, 2D, 2C, etc., back to 20 again. If the 2 in the address 20 is blinking, pressing the **–** pushbutton once will change the address from 20 to 10. Pressing the **–** pushbutton several more times will change the address to 00, F0, E0, etc., back to 00. Once the address has reached 00, pressing the **–** pushbutton will cause the address to start over at F0.

5.3.6 FORMAT OF LCD DISPLAY

The multi-functional alphanumeric LCD display shows the car's status and can also be used for diagnostic purposes to display the contents of the computer's memory. The figure shows the various parts of the LCD in Diagnostic mode.



5.3.6.1 NORMAL DISPLAY - For simplex controllers, the letter **D** in the drawing will not appear on the LCD and instead that part of the display will always be blank. For a duplex controller, this part of the display provides information about the communication between the controllers and about the dispatching. One of the following codes should appear:

S Indicates that this computer is acting as the slave to the dispatching computer. Hall call assignments are received from the dispatching computer through the communication cable.

D Indicates that this computer is acting as the dispatcher. It is responsible for assigning hall calls to itself and to the other controller.

BLANK If this part of the display is blank, it denotes that communication has not been established between the two cars (see Section 6 for information on identifying and solving communication problems).

5.3.6.2 STATUS MESSAGE - The scrolling part of the LCD shows the prevailing status of the elevator. There is a status message for each special operation (e.g., Fire Service). There are also messages for many error conditions (e.g., open safety string). Refer to Table 5.2 Status and Error Messages and Table 5.3 *ASME A17.1-2000 Status and Error Messages* for a complete listing of these messages, including a description and troubleshooting suggestions.

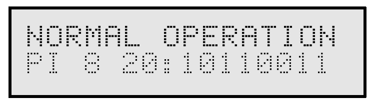


TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
2AB REDUNDANCY FAULT	
Description: Monitors the 2AB relay for proper operation. If the 2AB relay is ON , the R2AB input will be OFF. R2AB should always be the opposite of 2AB otherwise, the 2AB Redundancy Fault is logged and the elevator shuts down. **Troubleshooting:** Check the 2AB relay for proper operation. Also check the prints to see where the input R2AB comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or HC-IOX.	
Alarm - 4 times in 60 secs (not scrolled, Event Calendar only)	**Alarm - 4 times in 60 secs**
Description: The alarm has been activated four times in one minute and the car is not moving (see ABI, Alarm Bell Input option) .	
Alarm - Car not in DZ (not scrolled, Event Calendar only)	**Alarm - Car not in DZ**
Description: The alarm has been activated while the car is stopped outside of the landing (door) zone (see ABI, Alarm Bell Input option).	
ATTENDANT SERVICE OPERATION	
Description: The car is on attendant operation. The attendant service input (ATS) is activated. **Troubleshooting:** Go into Program Mode and check to see if any spare inputs are programmed as ATS. Then check to see if that particular input is activated.	
BAB REDUNDANCY FAULT	
Description: Monitors the BAB relay for proper operation. If the BAB relay is ON , the RBAB input will be OFF. RBAB should always be the opposite of BAB otherwise, the BAB Redundancy Fault is logged and the elevator shuts down. **Troubleshooting:** Check the BAB relay for proper operation. Also check the prints to see where the input RBAB comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or HC-IOX.	
BOTH USD AND DSD INPUTS ARE ACTIVE	**Both USD and DSD are Open**
Description: Usually indicates a problem with the up slow down or the down slow down switch. **Troubleshooting:** Inspect both switches and associated wiring. The down slow down switch should be closed, unless the car is at the bottom; then it should be open. The up slow down switch should be closed, unless the car is at the top; then it should be open.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
BOTTOM FLOOR OR TOP FLOOR DEMAND	**Bottom Floor Demand / Top Floor Demand**
Description: The controller is trying to establish the position of the car by sending it to either the top or the bottom. Usually associated with bottom floor demand. Bottom Floor Demand has four possible causes: 1. A change from Inspection to Automatic operation. 2. Pressing the COMPUTER RESET button. 3. Initial Power-up. 4. If the car is at the top floor, and the controller gets an up slow down signal (USD), the controller will create a Bottom Floor Demand. **Troubleshooting:** Bottom Floor Demand should be cleared when all of the following conditions are met: 1. The car is at the bottom and the down slow down (DSD) input to the controller is *OFF* (because the switch should be open). 2. The Door Zone (DZ) input to the controller is *ON*. 3. The Door Lock (DLK) input to the controller is *ON*. If the car is at the bottom, and the message still flashes, check the Down Slow Down switch & associated wiring. Also, inspect the door zone landing system vane or magnet at the bottom floor and the door lock circuit. Top Floor Demand should be cleared when all of the following conditions are met: 1. The car is at the top and the up slow down (USD) input to the controller is *OFF* (because the switch should be open). 2. The Door Zone (DZ) input to the controller is *ON*. 3. The Door Lock (DLK) input to the controller is *ON*. If the car is at the top, and the message still flashes, inspect the Up Slow Down Switch & associated wiring. Also, inspect the door zone landing system vane or magnet at the top floor and the door lock circuit. NOTE: If the controller has the absolute floor encoding feature, then the Bottom and Top Floor Demands should be cleared when the car stops in any door zone. The car does not have to travel to the top or bottom.	
BRAKE PICK FAILURE (*Traction only*)	
Description: The car is shut down due to the BPS input being seen as activated during three consecutive runs indicating the brake is not fully picked. (BPS is high) **Troubleshooting:** Go into Program Mode and check to see if any spare inputs are programmed as BPS. Then check to see if that particular input is activated.	
CAPTURE FOR TEST	
Description: CTST input has been activated. **Troubleshooting:** Go into Program Mode. Check the spare inputs to see if any are programmed as CTST. Ensure that this input is NOT activated.	
CAR CALL BUS IS DISCONNECTED	**Bus Fuse Blown (2C)**
Description: Usually indicates a problem in the wiring or fuses. There is no power to the Car Call circuits on the HC-CI/O-E and HC-PCI/O board(s). **Troubleshooting:** Check the Car Call Bus fuse. Check the wires that go to the Car Call Power inputs on the HC-PCI/O & HC-CI/O-E board(s) in the controller.	
CAR IN TEST MODE	
Description: The spare input TEST has been activated. **Troubleshooting:** Check the TEST/NORM switch on the Relay Board. Check voltage level at the TEST input.	
Car Out of Svc. w/ DLK (not scrolled, Event Calendar only)	**Car Out of Svc. w/ DLK**
Description: The car was delayed from leaving a landing for a significant period of time and the doors were locked. **Troubleshooting:** Check the door locks, PHE and DOB circuits.	
Car Out of Svc. w/o DLK (not scrolled, Event Calendar only)	**Car Out of Svc. w/o DLK**
Description: The car was delayed from leaving a landing for a significant period of time and the doors were not locked. **Troubleshooting:** Check for an obstruction that has kept the doors from closing. Also check the door locks, PHE and DOB circuits.	
CAR SAFETY DEVICE OPEN	**Car Safety Device Open**
Description: One of the car safety devices has activated, opening the safety circuit (e.g., emergency exit contact, safety clamp switch, car-top emergency stop switch). **Troubleshooting:** Check all car safety devices. Refer to controller wiring prints for applicable devices.	
CAR TO FLOOR FUNCTION	
Description: The CTF input has been activated. **Troubleshooting:** Go into Program Mode and see if any spare inputs are programmed as CTF. Then, check to see if that particular input is activated.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
CAR TO LOBBY OPERATION	
Description: The CTL input has been activated. **Troubleshooting:** Go into Program Mode and see if any spare inputs are programmed as CTL. Then, check to see if that particular input is activated.	
Communication Loss (not scrolled, Event Calendar only)	**Communication Loss**
Description: The MC-PCA board is not communicating with the MC-PA board. **Troubleshooting:** Check the cable between the MC-PCA and MC-PA boards and the associated connectors.	
CONFIGURATION ERROR-CHANGE SETTINGS BEFORE INSTALLATION	
Description: Incorrect Programmed value(s), e.g., a floor selected for the fire floor is not one at which the elevator stops. **Troubleshooting:** Go into Program Mode. Check all of the values associated with stops & special floors. Save the values. If the message still appears, contact MCE.	
CONTACTOR PROOFING REDUNDANCY FAILURE	
Description: The main power contactors that provide power to the controller have not dropped out in their intended manner. **Troubleshooting:** Inspect the main power contactors to ensure that they are working as intended. Ensure that there is power on the CNP input when the car is not in motion.	
DIRECTION RELAY REDUNDANCY FAILURE (*Non ASME-2000*)	
Description: A failure in the up and down direction relays has been detected. **Troubleshooting:** Check to see if the UDF input is active without the computer's generation of the UPDO or DNDO outputs. (This is not required.)	
DOOR CLOSE PROTECTION TIMER ELAPSED	**Door Close Protection**
Description: A failure to lock the doors is detected. This failure condition exists when the doors have closed (DCLC = 1 or DCL = 0/DPM=1) a demand exists for the car to move (DCP=1),but the doors are not locked (DLK = 0) within 60 seconds. **Troubleshooting:** If the Retiring Cam option is set, verify the Retiring Cam relay is activated (DCP=1, DCL=0/DPM=1 or DCLC=1) and the doors lock (DLK=1). If no Retiring Cam is used, verify the door lock circuitry contacts are closed to provide power to the door lock input (DLK=1). When a predetermined number of sequential failures is detected, default set to four, the car will shutdown. The failure will be reset once the doors are locked (DLK=1), if the car is placed on Inspection, or the Computer Reset Button is pressed.	
DOOR ZONE SENSOR FAILURE - OFF POSITION	
Description: Indicates that the car completed a run, but did not see door zone. **Troubleshooting:** Reset this fault by pressing the Fault Reset button or by toggling MACHINE ROOM INSPECTION INSP/NORM switch. Run the car to the same floor and verify that DZ=1 or DZR=1. Check placement of DZ magnets.	
DOOR ZONE SENSOR FAILURE - ON POSITION	**Stuck Door Zone Input**
Description: The controller computer detected that one of the DZ inputs (front or rear) did not transition to the low state during the last elevator run. Probable cause may be: 1. A faulty door zone sensor or associated circuitry (within the landing system assembly); 2. Faulty wiring from the landing system to the controller; 3. Faulty computer input circuit (main relay board or HC-PCI/O board). **Troubleshooting:** Check operation of the door zone sensors and associated wiring (place car on inspection, move car away from the floor, noting the transitions in the door zone signal(s) coming from the landing system). • Verity 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).	
DRIVE FAILED TO RESPOND (*Non ASME-2000 Traction only*)	**Drive Failed to Respond**
Description: 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. **Troubleshooting:** Check the circuitry associated with the DRON input for proper operation.	
DRIVE FAULT	
Description: The drive fault input (DFI) has been activated, indicating that a drive fault has occurred. **Troubleshooting:** Check the contact wired to the DFI input (this contact should originate from the drive system). Refer to the installation/user manual associated with the specific drive for troubleshooting suggestions.	
EARTHQUAKE OPERATION (*Traction only*)	**Earthquake**
Description: The car is shutdown on Earthquake Operation (EQI is high; used for ASME and California Earthquake Operation.) **Troubleshooting:** Go into Program Mode and check to see if any spare inputs are programmed as EQI. Then, check to see if that particular input is activated. The elevator may be returned to normal service by means of the momentary reset button on the HC-EQ2 board, provided that the CWI input is not active.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
EARTHQUAKE - REDUCED SPEED OPERATION (*Traction only*)	
Description: The car is allowed to run at reduced speed on Earthquake Normal Operation. (EQI is high, CWI is low; used for ASME earthquake operation only.) **Troubleshooting:** Go to Program Mode and check to see if any spare inputs are programmed as EQI. Then, check to see if that particular input is activated. The elevator may be returned to normal service by means of the momentary reset button on the HC-EQ2 board.	
ELEVATOR SHUTDOWN SWITCH ACTIVE	
Description: The ESS input has been activated. **Troubleshooting:** Go into Program Mode and see if any of the inputs are programmed as ESS. Then, check to see if that particular input is activated.	
EMERGENCY MEDICAL SERVICE	
Description: Either the EMSH or the EMSC input has been activated. **Troubleshooting:** Ensure that the MASSACHUSETTS EMS SERVICE option is set correctly. If not required, set this option to NO and ensure that the EMSH and EMSC inputs are not programmed as spare inputs. If it is required, set this option to the floor that the car should return to when the EMSH input is activated.	
EMERGENCY POWER OPERATION	**Emergency Power**
Description: The car is on Emergency Power operation (EPI is low). **Troubleshooting:** Ensure that the Emergency Power operation option is set correctly. If emergency power is not required, set this option to NO and ensure that the EPI input is not programmed. If it is required, set this option to the floor that the car should return to on Emergency Power and program the EPI input.	
ENTER SECURITY CODE	
Description: MCE Security has been initiated. **Troubleshooting:** Enter floor passcode in the C.O.P. within 10 seconds. See Section 5.6.1 for instructions on how to program or change security passcodes.	
EXMLT INPUT IS ACTIVATED (*Hydro only*)	
Description: MLT shutdown with External Motor Limit Timer (EXMLT) **Troubleshooting:** Check the External Motor Limit Timer and the associated circuitry. Check the voltage at the EXMLT input. Verify that the wiring is correct. Check the MLT / VLT Data Trap to verify that EXMLT is active.	
FIRE SERVICE PHASE 1 - ALTERNATE	**Fire Service Alternate**
Description: The car is returning to an alternate fire return landing. The FRS input is low, the FRA input is high or FRAON is active. **Troubleshooting:** Inspect the fire sensors (especially the main floor sensor) and the Fire Phase I switch wiring. For some fire codes including ASME, the Fire Phase I switch must be turned to the *BYPASS* position and then back to *OFF* to clear the fire service status once activated.	
FIRE SERVICE PHASE 1 - MAIN	**Fire Service Main**
Description: The car is returning to the main fire return landing. The FRS input is low or the FRON or FRON2 inputs are high. **Troubleshooting:** Inspect the fire sensors and the Fire Phase I switch wiring. For some fire codes including ASME, the Fire Phase I switch must be turned to the *BYPASS* position and then back to *OFF* to clear the fire service status once activated.	
FIRE SERVICE PHASE 2	**Fire Service Phase 2**
Description: The FCS controller input is *ON.* **Troubleshooting:** Inspect the phase 2 switch and wiring. In some cases, to exit Fire Service Phase 2, the car must be at the fire floor at which Fire Phase 2 was activated, the doors must be fully open, and the phase 2 switch must be off (the FCOFF input must be activated) to get out of phase 2.	
FRONT DOL AND DLK ARE BOTH ACTIVE	
Description: A critical failure has caused both the Door Open Limit and Door Lock inputs to both be active at the same time.(DOL=0 & DLK=1). A problem with DOL and/or DLK circuitry or wiring. **Troubleshooting:** Inspect the Door Open Limit and the Door Lock circuitry and wiring. When this error is generated, the car will shutdown with the doors open and will not answer any calls. The only way to reset this error condition is to put the car on Inspection operation.	
FRONT DOOR IS LOCKED BUT NOT FULLY CLOSED	
Description: Doors Open (DCL = 1) and Locked (DLK = 1). A problem with DCL and/or DLK circuitry or wiring. **Troubleshooting:** Inspect the Door Closed Limit and the Door Lock circuitry and wiring. When this error is generated, the car is not allowed to run.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
FRONT DOOR LOCK SWITCH FAILURE *(NYCHA)*	
Description: The front door lock contacts have failed closed. **Troubleshooting:** Ensure that with the front hoistway doors closed and locked, there is power on the DLS input and no power present on the DCL input.	
FRONT DOOR OPEN LIMIT FAILURE	
Description: The door open limit switch has failed open. **Troubleshooting:** Ensure that the car gate is open, there is no power on the DOL input and no power is present on the DLS or CD inputs.	
FRONT GATE SWITCH FAILURE*(NYCHA)*	
Description: The front car gate switch has failed closed. **Troubleshooting:** Ensure that with the front car gate closed, there is power on the GS input and no power present on the DCL input.	
GOVERNOR SWITCH OPEN (*Traction only*)	**Governor Switch Open**
Description: The overspeed governor has activated, opening the safety circuit. **Troubleshooting:** Check the overspeed governor.	
HALL AND CAR CALL BUSES DISCONNECTED	
Description: A problem in the wiring or fuses. There is no power to the call circuits on the HC-CI/O-E and HC-PCI/O board(s). **Troubleshooting:** Check the Call Bus fuses. Check the wires that go to the Call Power inputs on the HC-PCI/O & HC-CI/O-E board(s) in the controller.	
HALL CALL BUS IS DISCONNECTED	**Bus Fuse Blown (2H)**
Description: A problem in the wiring or fuses. There is no power to the Hall Call circuits on the HC-CI/O-E and HC-PCI/O board(s). **Troubleshooting:** Check the Hall Call Bus fuse. Check the wires that go to the Hall Call Power inputs on the HC-PCI/O & HC-CI/O-E board(s) in the controller.	
HEAVY LOAD WEIGHER CONDITION	
Description: The HLI input has been activated. **Troubleshooting:** Go into Program Mode and see if any spare inputs are programmed as an HLI input. Then, check to see if that particular input is activated.	
HOISTWAY SAFETY DEVICE OPEN	
Description: One of the hoistway safety devices has activated, opening the safety circuit (e.g., pit stop switch, car and cwt buffers switches, up/down final limit switches). **Troubleshooting:** Check all hoistway safety devices. Refer to controller wiring prints for applicable devices.	
HOSPITAL PHASE 1 OPERATION	**Hospital Service**
Description: A hospital emergency momentary call switch is activated at any floor. **Troubleshooting:** Ensure that the hospital emergency operation option is set correctly. If hospital emergency operation is not required, set this option to no. If it is required, set the floors eligible to answer a hospital call to yes.	
HOSPITAL PHASE 2 OPERATION	
Description: The car has answered a hospital emergency call or the in car hospital emergency key switch has been activated (HOSP is high). **Troubleshooting:** Ensure that the hospital emergency operation option is set correctly. Then check to see if any spare inputs are programmed as HOSP and if it is activated.	
IN CAR STOP SWITCH ACTIVATED	**Stop SW/Safety Relay Ckt**
Description: The in-car stop switch has been pulled, opening the safety circuit. **Troubleshooting:** Check the status of the in-car emergency stop switch.	
INAX REDUNDANCY FAULT	
Description: Monitors the INAX relay for proper operation. If the INAX relay is ON , the RINAX input will be OFF. RINAX should always be the opposite of INAX otherwise, the INAX Redundancy Fault is logged and the elevator shuts down. **Troubleshooting:** Check the INAX relay for proper operation. Also check the prints to see where the input RINAX comes in and check 47 K resistor, swap ribbon cable and finally try replacing the associated board (w/ relay) or HC-IOX.	
INDEPENDENT SERVICE OPERATION	**Independent Service**
Description: The Independent Service switch inside the car has been turned on. **Troubleshooting:** Check the Independent Service switch inside the car.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
INSPECTION OPERATION	**Inspection**
Description: The inspection computer input (IN) is deactivated. **Troubleshooting:** Check all of the inspection switches and associated wiring.	
LANDING SYSTEM REDUNDANCY FAILURE (*Non ASME-2000*)	
Description: Either DZ, LU or LD has failed closed. **Troubleshooting:** Ensure that on any run between floors, the LSR input goes low at least once. If the DZ sensor has failed closed, power will be present continuously on the LSR input. If either the LU or LD sensor has failed closed, power will be present constantly on their respective inputs and this can also cause this error. This condition can be cleared by pressing the Redundancy Reset button.	
LEVELING DOWN	
Description: The Level Down computer input is *ON*. Comes *ON* normally when the car is just above a floor. If the car is level with the floor and a message appears, it is usually the result of a switch or sensor problem. **Troubleshooting:** Inspect the LD switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.	
LEVELING SENSOR FAILED - OFF POSITION	**Leveling Input is absent**
Description: One of the leveling sensor inputs (LU or LD) appears to have failed (in the inactive state). The controller computer did not detect the appropriate leveling signal (LU or LD) during the last approach to the floor. Probable causes may be: 1. A faulty leveling sensor or associated circuitry (within the landing system assembly); 2. Faulty wiring from the landing system to the controller; 3. Faulty computer input circuit (main relay board or HC-PCI/O board). **Troubleshooting:** Check operation of the leveling sensors and associated wiring (place car on inspection, 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.	
LEVELING SENSOR FAILED - ON POSITION	**Stuck Leveling Input**
Description: One of the leveling sensor inputs (LU or LD) appears to have failed (in the active state). The controller computer detected that both the LU and LD inputs are active simultaneously. Probable causes may be: 1. A faulty leveling sensor or associated circuitry (within the landing system assembly); 2. Faulty wiring from the landing system to the controller; 3. Faulty computer input circuit (main relay board or HC-PCI/O board). **Troubleshooting:** Check operation of the leveling sensors and associated wiring (place car on inspection, 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. • 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.	
LEVELING SENSOR FAILURE	
Description: One or both of the LU and LD sensors have failed closed. **Troubleshooting:** Ensure that power is not present on both the LU and LD inputs.	
LEVELING UP	
Description: The Level Up computer input is *ON*. Comes *ON* normally when the car is just below a floor. If the car is level with the floor and a message appears, it is usually the result of a switch or sensor problem. **Troubleshooting:** Inspect the LU switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.	
LIGHT LOAD WEIGHER CONDITION	
Description: The Light Load Weighing input is activated. **Troubleshooting:** Ensure that Light Load Weighing is required. If not, set the Light Load Weighing option to NO and ensure that the LLI input is not programmed. If Light Load Weighing is required, ensure that the Light Load Car Call Limit is set to the correct number of stops.	
Lost DLK During Run (not scrolled, Event Calendar only)	**Lost DLK During Run**
Description: The Door Lock input was deactivated while the car was traveling through the hoistway. **Troubleshooting:** Check the clearance between the door unlocking rollers and clutch.	
LOW OIL SWITCH INPUT IS ACTIVATED *(Hydro only)*	
Description: MLT shutdown with LOS. The car was unable to move at the expected speed due to insufficient oil. **Troubleshooting:** Check the MLT/VLT Data Trap (Addr 495H bit 8). Ensure that there is sufficient oil in the reservoir. Check the Low Oil switch and LOS input.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
LSA Movement Failure (not scrolled, Event Calendar only)	**LSA Movement Failure**
Description: The car has failed to complete an LSA movement check after being idle for 10 minutes at a landing (see ABI, Alarm Bell Input option).	
MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED	**Motor Limit Timer**
Description: The Starter Overload or the Thermal Overload has tripped, or there is a mechanical problem that prevents or slows the motion of the car. **Troubleshooting:** To clear the condition, the car must be put on Inspection, then back into Normal operation, or the RESET button must be pressed. Immediately check the starter and thermal overloads and all circuitry associated with the motor.	
NORMAL OPERATION	
Description: The elevator and controller are operating normally.	
OVERLOAD CONDITION	
Description: The car appears to be overloaded, as indicated by the load weigher input OVL. **Troubleshooting:** Check the OVL input. If power is present on the OVL input, the load weigher contact associated with this input is closed. This contact being closed indicates to the elevator computer that the car is overloaded.	
PASSCODE REQUEST	
Description: The Passcode Request Option has been activated from the System Mode Menu. **Troubleshooting:** The system can be run on Inspection operation only. The passcode must be entered correctly in the System Mode Menu in order to deactivate this option and allow the controller to run normally (see Section 5.6.2).	
Photo Eye Failure (not scrolled, Event Calendar only)	**Photo Eye Failure**
Description: The Photo Eye input has been continuously active for a considerable period of time. **Troubleshooting:** Check for abnormal blockage of the optical device, frayed or defective photo eye relating cable or failure of the photo eye input circuit.	
POWER TRANSFER INPUT ACTIVE	
Description: The PTI input has been activated. **Troubleshooting:** Go into Program Mode and see if any of the inputs are programmed as PTI. Then, check to see if that particular input is activated.	
POWER UP SHUT DOWN DUE TO EARTHQUAKE (*Traction only*)	
Description: The CWI and/or EQI input was detected high at power up. (Used for ASME Earthquake Operation only.) **Troubleshooting:** Go into Program Mode and check to see if any spare inputs are programmed as EQI or CWI. Then check to see if those particular inputs are activated. The elevator may be returned to normal service by means of the momentary reset button on the HC-EQ2 board. If both the EQI and CWI input were activated at power up, the MC-PCA board would need to be reset as well.	
PRESSURE SWITCH ACTIVATED *(Hydro only)*	
Description: This message is displayed when the Pressure Switch Input (PSS) is programmed and activated (low). **Troubleshooting:** Check the associated hardware device and take appropriate action.	
REAR DOL & DLK ARE BOTH ACTIVE	
Description: The Door Open Limit Rear and the Door Lock inputs are both active, DOLR=0 and DLK=1. A problem with DOLR and/or DLK circuitry or wiring. **Troubleshooting:** Inspect the Door Open Limit Rear and the Door Lock circuitry and wiring. When this error is generated, the car will shutdown with the doors open and will not answer any calls. The only way to reset this error condition is to put the car on Inspection operation.	
REAR DOOR IS LOCKED BUT NOT FULLY CLOSED	
Description: Rear Doors Open (DCLR = 1) and Locked (DLK = 1). Indicates a problem with DCLR and/or DLK circuitry or wiring. **Troubleshooting:** Inspect the Door Closed Limit Rear and the Door Lock circuitry and wiring. When this error is generated, the car is not allowed to run.	
REAR DOOR LOCK SWITCH FAILURE *(NYCHA)*	
Description: The rear door lock contacts have failed closed. **Troubleshooting:** Ensure that with the rear hoistway doors closed and locked, there is power on the DLSR input an no power present on the DCLR input.	
REAR DOOR OPEN LIMIT FAILURE	
Description: The rear door open limit switch has failed open. **Troubleshooting:** Ensure that the rear car gate is open, there is no power on the DOLR input and no power is present on the DLSR or CDR inputs.	

TABLE 5.2 Status and Error Messages

Scrolling Message	Special Event Message
REAR GATE SWITCH FAILURE *(NYCHA)*	
Description: The rear car gate switch has failed closed. **Troubleshooting:** Ensure that with the rear car gate closed, there is power on the GSR input an no power present on the DCLR input.	
REDUNDANCY DOOR LOCK RELAY FAILURE	
Description: The one or both of the front or rear door lock relays has failed closed. **Troubleshooting:** Ensure that with the hoistway doors open, there is no power present on the RDLS or RDLSR inputs. If power is present, one or more of the door lock relays has failed in the closed or picked position.	
REDUNDANCY FRONT GATE SWITCH FAILURE (*Non ASME-2000*)	
Description: The car gate switch relay has failed closed. **Troubleshooting:** Ensure that with the car gate open, there is no power present on the RGS input. If power is present, the car gate switch relay has failed closed.	
REDUNDANCY REAR GATE SWITCH FAILURE	
Description: The rear car gate switch relay has failed closed. **Troubleshooting:** Ensure that with the rear car gate open, there is no power on the RGSR input. If power is present, the rear car gate switch relay has failed closed.	
SABBATH OPERATION ACTIVE	
Description: The spare input SAB has been activated. **Troubleshooting:** Check spare input bit address for SAB. Verify that the spare input address matches the SAB flag. Check voltage level at the SAB input.	
SAFETY CIRCUIT IS OPEN	**Safety Relay Circuit Open**
Description: The Car Operating Panel emergency stop switch has been pulled, or another contact switch in the safety circuit is in the open position. **Troubleshooting:** Check the C.O.P. stop switch. Check the other switches and contacts in the safety string. Check safety string wiring against the MCE wiring diagrams.	
Safety String Open (not scrolled, Event Calendar only)	**Safety String Open**
Description: The safety circuit is open. **Troubleshooting:** Check the on-car and off-car safety devices, e.g. governor overload, over-travel limit switches, car stop switches and the SAF input.	
SHUTDOWN OPERATION (*MG Traction only*)	
Description: The car is on MG Shutdown Operation (MGS is high). **Troubleshooting:** Ensure that the MG Shutdown Operation Option is set correctly. If MG Shutdown is not required, set this option to NO and ensure that the MGS Input is not programmed. If it is required, set this option to the floor that the car should return to on MG Shutdown and program the MGS Input.	
SYNCHRONIZATION OPERATION (*Hydro only*)	
Description: The SYNCI input has been activated **Troubleshooting:** Ensure that the synchronization function is required. This function is used on PHC controllers used on jobs with two jacks or telescopic jacks. • If the SYNCI Input option is programmed and has been activated, the SYNC function will be performed as soon as all demand is serviced. Ensure that the circuit connected to SYNCI input is not activating the input inappropriately.	
System Out of Service (not scrolled, Event Calendar only)	**System Out of Service**
Description: The supervisor has lost communication with the cars or the hall call common bus (2H) has failed.	
TIME OUT OF SERVICE	**Time Out of Service**
Description: The T.O.S. timer has expired. **Troubleshooting:** See Section 5.4.5.6.	
VALVE LIMIT TIMER (ANTI-STALL) ELAPSED (*Hydro only*)	**Valve Limit Timer**
Description: Indicates a problem with the valve or valve solenoids. **Troubleshooting:** Inspect the valves & valve solenoids and associated wiring.	
VISCOSITY CONTROL FUNCTION (*Hydro only*)	
Description: The Viscosity Control Input (VCI) is *ON*. The computer is periodically running the motor to warm the oil in the system. **Troubleshooting:** Check the device that is wired to the input (usually an oil temperature sensor).	

2-2-04

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. For example, if the RBK redundancy fault is displayed, measure the voltage at resistor RBK on the SC-SB2K board and expect 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 fault doesn't clear, swap out associated output TRIACs (for output circuits) 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 and the SC-BASE-X. 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.

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.

TABLE 5.3 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 and RSAFR 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 Flt**
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 Flt**
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. • 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 5.3   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 *(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), follow directions in Section 4 *A17.1-2000 Code Compliant Functions and Testing* 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 5.3 ASME A17.1 - 2000 Status and Error Messages

<table>
<tr><th>Scrolling Message</th><th>Special Event Message</th></tr>
<tr><td>COS2 FAULT (Traction only)</td><td>Overspeed Fault</td></tr>
<tr><td colspan="2">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), follow directions in Section 4 A17.1-2000 Code Compliant Functions and Testing 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.</td></tr>
<tr><td>CT CYCLE TEST FAULT</td><td>End of Run Cycle Test Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>CTDIF REDUNDANCY FAULT (Traction only)</td><td>CTDIF Redundancy Fault</td></tr>
<tr><td colspan="2">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 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.</td></tr>
<tr><td>CTOS REDUNDANCY FAULT (Traction only)</td><td>CTOS Redundancy Fault</td></tr>
<tr><td colspan="2">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 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.</td></tr>
<tr><td>CYCLE TEST</td><td></td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>DCL REDUNDANCY FAULT</td><td>Front Door Input Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>DCLR REDUNDANCY FAULT</td><td>Rear Door Input Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>DETS REDUNDANCY FAULT</td><td>Emer. Terminal Sw. Failure</td></tr>
<tr><td colspan="2">Description: This fault indicates 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 equals DETS2 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.</td></tr>
</table>

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
DFV REDUNDANCY FAULT *(Hydro only)*	**Down Fast Valve Fault**
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. Check 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 when we are leveling and in door zone [DZ is high or DZR is high and either LU or LD is high]. • DLK should also be high when all of the car and hoistway door lock inputs are made active [CD is high and HD is high and CDR is high and HDR is high]. 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. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. 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. Check that the DN LED on the SC-BASE(-D) is ON when car motion is down and OFF when car motion is up. 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. Check the scrolling message to see which fault is active: DZX, DZRX, RDZ, RDZX, or RDZR REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message 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)*	
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 5.3 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, REI should be low, otherwise this fault is generated. • If UPS is high or DNS is high, REI should be high, otherwise this fault is generated. • Verify REI = 0, 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	**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	**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. Check the scrolling message to see what fault is active, EBR STUCK or EBR FLICKERING FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message 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 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. 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 5.3 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. Check the scrolling message 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:** Check the scrolling message to identify the fault and then 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. Check the scrolling message to see which fault is active: EQR STUCK or EQR FLICKERING FAULT. ASME 2000 event. **Troubleshooting:** Check the scrolling message to identify the fault and then 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 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. 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 5.3 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 and SAFC = 1, STOP should be 1, 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.	
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 car shuts 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), follow directions in Section 4 *A17.1-2000 Code Compliant Functions and Testing* 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!	
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), follow directions in Section 4 *A17.1-2000 Code Compliant Functions and Testing* 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!	
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. Check the scrolling messages 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.	
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, SAFH should be 0, 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.	
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.	
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).	
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 5.3 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. • 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 Flt**
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, INMR = 0 and IN = 0, 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), follow directions in Section 4 *A17.1-2000 Code Compliant Functions and Testing* 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), follow directions in Section 4 *A17.1-2000 Code Compliant Functions and Testing* 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. • 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 and SAF = 1, INUP should be 1 and INDN should be 1, 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 5.3 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, INICI = 0, ACCI = 0, INMR = 0 and IN = 0, 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 and SAF is low, INDN should be low, otherwise this fault is generated. • If IN is high and SAF is high, INDN should be high, otherwise this fault is generated. • If RDN is low, INDN should be high, otherwise this fault is generated. • If RDN is high, INDN should be low, 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, ACCI = 0, INMR = 0 and IN = 0, 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 and SAF = 1, INUP should be 1 and INDN should be 1, 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. Check the scrolling message to see which fault is active: INCTI, INICI, INMR or IN REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Check the scrolling message to identify the fault and then 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 and SAF = 0, INUP should be 0, otherwise this fault is generated. • If IN = 1 and SAF = 1, INUP should be 1, otherwise this fault is generated. • If RUP = 0, INUP should be 1, otherwise this fault is generated. • If RUP = 1, INUP should be 0, 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.	
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 also verify SAFR1 relay is dropped und finally verify SAF input = 0. 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
Overspeed Fault (not scrolled, Event Calendar only)	**Overspeed Fault**
Description: Check the scrolling message to see which fault is active: IL01, IL02, ETS2, ETS1, COS1, or COS2 OVERSPEED FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	
PFLT FAULT *(Traction only)*	**PFLT Fault**
Description: Indicates that PLD1 has dropped the PFLT relay. ASME 2000 event. **Troubleshooting Tips:** • If STOP = 1 and PFLT = 0, 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 Fault**
Description: Indicates that PLD1 has dropped the PFLT relay. ASME 2000 event. **Troubleshooting Tips:** • If STOP = 1 and PFLT = 0, 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	**Red. 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, RACC1 should be 0, otherwise this fault is generated. • Or if ACCI = 0, RACC1 should be 1, 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	**Red. 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, RACC2 should be 0, otherwise this fault is generated. • If ACCI = 0, RACC2 should be 1, 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.	
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, RBK should be 1, otherwise this fault is generated. • If MB = 0, RBK should be 1, otherwise this fault is generated. • If REI = 1 and RPT = 0 and RMR = 0, RBK should be 0, 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RCD REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of a front door 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 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, RCT should be 0, 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	**Red. 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 and INICI = 0, RCTIC should be 1, otherwise this fault is generated. • Otherwise RCTIC should be 0 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)*	**Starter #1, #2, #3 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)*	**Down Fast Valve 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	
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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
RDSV REDUNDANCY FAULT *(Hydro only)*	**Down Slow Valve 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. Check the scrolling message to see which fault is active: DCLR, DPMR, CDR, RCDR, CDBR, HDR, RHDR, HDBR or RHDBR REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	
REB1 REDUNDANCY FAULT *(Traction only)*	**Red. Emergency Brake Fault**
Description: A failure of relay EB1 has been detected. REB1 Redundancy Fault is generated if EB1 = 0 and REB1 is not 1 OR if EB1 = 1 and REB1 is not 0. Also, if GOV = 0, REB1 should be 1 and REB2 should be 1, 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)*	**Red. Emergency Brake Fault**
Description: A failure of relay EB2 has been detected. REB2 Redundancy Fault is generated if EB2 = 0 and REB2 is not 1 OR if EB2 = 1 and REB2 is not 0. Also, if GOV = 0, REB1 should be 1 and REB2 should be 1, 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)	**Red. Access Input Fault**
A failure of a hoistway access related input, relay or associated circuitry has been detected. Check the scrolling message to see which fault is active: RACC1, RACC2 or RTBAB REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	
Redundancy Emergency Brake Fault (not scrolled, Event Calendar only)	**Red. Emergency Brake Fault**
Description: A failure of EB1 relay or EB2 relay has been detected. Check the scrolling message to see if REB1 or REB2 REDUNDANCY FAULT is active. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table..	
Redundancy Inspection Input Fault (not scrolled, Event Calendar only)	**Red. Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. Check the scrolling message to see which fault is active: RIN1, RIN2 OR RCTIC REDUNDANCY FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
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, REI should be low, otherwise this fault is generated. • If UPS is high or DNS is high, REI should be high, otherwise this fault is generated. • Verify REI = 0, 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.	
RESBYP REDUNDANCY FAULT	**RESBYP Redundancy Fault**
Description: A failure of the ESB relay has been detected. The fault will be generated if SAFC = 0 and RESBYP is not 1, OR if ESBYP = 1 and RESBYP is not 0, OR if ESBYP = 0 and RESBYP is not 1. 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.	
RFR Button Fault (not scrolled, Event Calendar only)	**RFR Button Fault**
Description: A failure of the Redundancy Fault Reset Pushbutton or RFR input has been detected. Check the scrolling message to see which fault is active: RFR STUCK or RFR FLICKERING FAULT. ASME 2000 event. **Troubleshooting:** Once the scrolling message is identified, look up that message in this table.	
RFR FLICKERING FAULT	**RFR Button Fault**
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 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 / PCA to clear the fault.	
RFR STUCK FAULT	**RFR Button Fault**
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. 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.	
RH REDUNDANCY FAULT	**Front Door Input Fault**
Description: A failure of the H relay or RH input has been detected.When output H is OFF, input RH should be 1. 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 and DLK = 0 (28 bit 7), RH should be 1, otherwise this fault is generated.If H = 1 and RLULD = 1 and RIN2 = 0 AND there is an intent to move up/down UP - if UNL = 1 and RUP = 0 and USD = 1 DOWN - if DNL = 1 and RDN = 0 and DSD = 1 RH should be 0, otherwise this fault is generated. If RH should be 1, 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.	
RHD REDUNDANCY FAULT *(Traction only)*	**Front Door Input Fault**
Description: A failure of a front door 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
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	**Red. Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. If SAF = 0, RIN1 should be 1, otherwise this fault is generated. Or if IN = 1, RIN1 should be 0, otherwise this fault is generated. Or if IN = 0, RIN1 should be 1, 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	**Red. Inspection Input Fault**
Description: A failure of a redundancy inspection related input, relay or associated circuitry has been detected. If SAF = 0, RIN2 should be 1, otherwise this fault is generated. Or if IN = 1, RIN2 should be 0, otherwise this fault is generated. Or if IN = 0, RIN2 should be 1, 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. RLULD is also verified "OFF" when running at high RH = 0, or intermediate speed (INT = 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.	
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, M3) 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 M1, M2 or M12 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, RMR should be 1, otherwise this fault is generated. If MB = 0, RMR should be 1, otherwise this fault is generated. ASME 2000 event. **Troubleshooting:** • Check the NC aux contacts of relays M12, M1 and M2. 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
ROFRT REDUNDANCY FAULT *(Hydro only)*	**ROFRT Redundancy Fault**
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 (with relay - sometimes relay OFRT is panel mounted) 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 relay 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)*	**Run Pump Motor 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 then verify RPT = 1. If RUP = 1 and RDN = 1 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)*	
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.	
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	**RSAFR Redundancy 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 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, 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

<table>
<tr><th>Scrolling Message</th><th>Special Event Message</th></tr>
<tr><td>RSTOP REDUNDANCY FAULT</td><td>RSTOP Redundancy Fault</td></tr>
<tr><td colspan="2">Description: A failure of the In Car Stop Switch has been detected. If RSTOP = 0 and SAFC = 1, STOP should be 1, otherwise this fault is generated. If RSTOP = 1 and ESBYP = 0, STOP 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.</td></tr>
<tr><td>RSYNC REDUNDANCY FAULT (Hydro only)</td><td>RSYNC Redundancy Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>RTBAB REDUNDANCY FAULT</td><td>Red. Access Input Fault</td></tr>
<tr><td colspan="2">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, RTBAB should be 1, otherwise this fault is generated. If INUP = 0 and INDN = 0, RTBAB should be 1, otherwise this fault is generated. Else RTBAB should be 0, 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.</td></tr>
<tr><td>RUDX1 REDUNDANCY FAULT (Traction only)</td><td>Direction Input Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>RUDX2 REDUNDANCY FAULT (Traction only)</td><td>Direction Input Fault</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>RUDX3 REDUNDANCY FAULT (Traction only)</td><td></td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>RUDX4 REDUNDANCY FAULT (Traction only)</td><td></td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>RUFV REDUNDANCY FAULT (Hydro only)</td><td>Up Fast Valve Fault</td></tr>
<tr><td colspan="2">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</td></tr>
</table>

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
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)*	**Starter #1, #2, #3 Fault**
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, STOP should be 0, 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.	
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, SAFC should be 0 , 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, meaning the switch is in the TEST position, IND should be 1, 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.	

TABLE 5.3 ASME A17.1 - 2000 Status and Error Messages

Scrolling Message	Special Event Message
UETS REDUNDANCY FAULT *(Traction only)*	**Emer. Terminal Sw. Failure**
Description: This fault indicates that 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 equals UETS2 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)*	**Up Fast Valve 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.	
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. ASME 2000 event. **Troubleshooting:** See the note, GENERAL TROUBLESHOOTING TIPS, just prior to this table. 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. Check that the UP LED on the SC-BASE-D) is ON when car motion is up and OFF when car motion is down. 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.	

3-31-05

5.3.6.3 ELEVATOR POSITION - The underlined section in this display shows the current elevator position relative to the bottom. The number 1 denotes the lowest landing in the elevator system.

```
D NORMAL OPERATI
PI 8 20:10110011
```

5.3.6.4 COMPUTER INTERNAL MEMORY - The underlined section in this display shows the computer's internal memory address (2 digits) and the data (8 digits) at that address. The colon character (:) separates the address from the data. The address can be changed by first pressing the ***N*** pushbutton, then by using the **+** and **–** pushbuttons.

```
D NORMAL OPERATI
PI 8 20:10110011
```

Each of the 8 data digits (flags) corresponds to a particular elevator signal or condition. There are 8 pieces of information about the elevator at each address. Each data digit is either 1 or 0. The 1 indicates the signal or condition is *ON*, and 0 indicates the signal or condition is *OFF*.

The Computer Internal Memory Chart (Table 5.4) indicates the meaning of these data digits at different addresses. For example, the internal memory display might look like this:

The address on the display is 29; the data at that address is 11110000. Table 5.5 is a list with a description of each flag and variable. Below is an example of how to interpret the display.

```
D NORMAL OPERATI
PI 8 29:11110000
```

Display Data:	1	1	1	1	0	0	0	0
Row 29:	DNDO	LD	DPD	DDP	UPDO	LU	UPD	UDP

Notice DNDO, LD, DPD and DDP signals are *ON* and the UPDO, LU, UPD and UDP signals are *OFF*.

TABLE 5.4 Computer Internal Memory Chart

FLAGS AND VARIABLES								
ADDRESS	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
10:	DOLMR	PHER	DZR	DOLR	DBCR	DOBR	GEUR	GEDR
11:	TFAR	DCR	UCR	CCR	NDSR	FDCR	DHOR	DOIR
12:	DCFR	DCPR	DOFR	LOTR	GHTR	HCTR	CCTR	SDTR
13:	DOCR	SER	DCLCR	CSBR	DCCR	NUDGR	NDGBPSR	DSHTR
20:	DOLM	PHE	DZ	DOL	DBC	DOB	GEU	GED
21:	TFA	DC	UC	CC	NDS	FDC	DHO	DOI
22:	DCF	DCP	DOF	LOT	GHT	HCT	CCT	SDT
23:	DOC	SE	DCLC	CSB	DCC	NUDG	NDGBPS	DSHT
24:	INT	FRA	FCS	FRS	DNS	UPS	STD/R0	STU/R1
25:	SCE	FCCC	FCHLD	HLI	LEF	HDLYE	FWI	PIC
26:	LFP	UFP	NYDS	CCH	DIN	DPR	GTDE	GTUE
27:	HD	FCOFF	DHLD	IND	IN	DLKS	DELSIM	YSIM
28:	LLW	DLK	DDF	REL	ISR	INCF	REAR	LLI
29:	DNDO	LD	DPD	DDP	UPDO	LU	UPD	UDP
2A:	DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
2B:	TOS	MLT		MGR	H	HSEL	DSH	RUN
2C:	DZP	STC	SAF	HCR	HCDX	CCD	ISV	ISRT
2D:	TEMPB	UFQ	DZORDZ	FCSM	FRM	FRSS	FRAS	FRC
2E:	SD	SDA	DSD	BFD	SU	SUA	USD	TFD
2F:	FRBYP	FRON	HYD1_TRC0	ECC	CD	ECRN	EPR	PFG
30:	R4	ISTD/R2	ISTU/R3	FREE	DEADZ	DHLDI	PH1	NDGF
31:	CTLDOT	CTLF	CTL	ALV	EPSTP	AUTO	EPRUN	EPI
33:	API	SAB	TEST	DHENDR	DHEND	CTST	HOSPH2	HOSP
38:	HML	SLV	CCC	CNFG	DLI	DLW	LWCE	HLW
42:	COMMUNICATION TIME-OUT ERROR COUNT							
43:	COMMUNICATION CHECKSUM ERROR COUNT							

5.3.7 TROUBLESHOOTING USING THE COMPUTER'S INTERNAL MEMORY

Examining the computer memory (as in the example above) is a useful step in troubleshooting elevator problems. It's possible to check if the controller is receiving input signals correctly and if it is sending out the proper output signals. It is also possible to look up each of the computer output and input signals shown in the Job Prints.

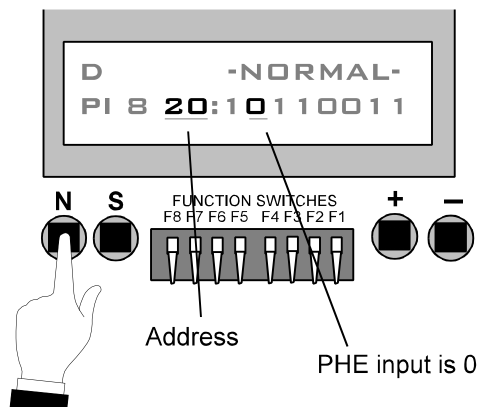
The following example illustrates how to use Tables 5.4 and 5.5 to check a signal in the computer internal memory.

Example problem: the photo eye will not cause the doors to reopen.

Step 1: Look at Table 5.5. Find the flag (mnemonic) for Photo Eye input. Table 5.5 shows that the mnemonic for Photo Eye input is PHE.

Step 2: Table 5.5 also gives an Address (ADDR) and Position for each signal. Note that the Address of PHE is 20 and the Position is 7.

Step 3: Notice on Table 5.4 that PHE is indeed in Position 7 on row 20.



Step 4: Now that the Address and Position have been determined, look up the PHE signal on the computer. First, change the address on the display to address 20. (With all function switches down, press and hold the ***N*** pushbutton until the address digit you wish to change is flashing. Change the digit with the **+** and **-** pushbuttons to the desired number. Set the address). Then, look at data bit number 7 (from the right), which is highlighted and underlined in the following display:

This digit represents the computer's interpretation of the PHE signal. If the digit is 1, the computer thinks that the PHE signal is *ON*. If the digit is 0 (as shown), the computer thinks that the PHE signal is *OFF*.

This information can be used to find the source of the problem. The diagnostic display will show that the PHE input is *ON* when an obstruction is present, interrupting the photo eye beam. If this is the case, checking the voltage present on the PHE terminal will show if the problem is inside or outside the controller.

TABLE 5.5 Alphabetized Flags/Variables and Their Locations

FLAG	Definition	Addr	Position	FLAG	Definition	Addr	Position
ALV	Other car alive output	31	5	GED	Gong enable down output	20	1
API	Alternate Parking Input	33	8	GEDR	Gong enable down output (rear)	10	1
AUTO	Emergency power auto output	31	3	GEU	Gong enable up output	20	2
BFD	Bottom floor demand flag	2E	5	GEUR	Gong enable up output (rear)	10	2
CC	Car call flag	21	5	GHT	Gong hold timer flag	22	4
CCA	Car call above flag	2A	1	GHTR	Gong hold timer flag (rear)	12	4
CCB	Car call below flag	2A	5	GTDE	Gong timer down enable	26	2
CCC	Car call cancel input	38	6	GTUE	Gong timer up enable	26	1
CCD	Car call disconnect flag	2C	3	H	High speed output	2B	4
CCH	Car call hold	26	5	HCDX	Hall call disconnect flag	2C	4
CCR	Car call flag (rear)	11	5	HCR	Hall call reject flag	2C	5
CCT	Car call time flag	22	2	HCT	Hall call door time flag	22	3
CCTR	Car call time flag (rear)	12	2	HCTR	Hall call door time flag (rear)	12	3
CD	Car done flag	2F	4	HD	High speed delay flag	27	8
CNFG	Configuration error flag	38	5	HDLYE	High speed delay elapsed flag	25	3
CSB	Car stop switch bypass	23	5	HLI	Heavy load input	25	5
CSBR	Car stop switch bypass (rear)	13	5	HLW	Heavy load weigher flag	38	1
CTL	Car to lobby input	31	6	HML	Home landing input	38	8
CTLDOT	Car to lobby door open timer	31	8	HOSP	In car hospital emergency input flag	33	1
CTLF	Car to lobby function	31	7	HOSPH2	Hospital emergency phase 2 flag	33	2
CTST	Capture for test input	33	3	HSEL	Hospital service select flag	2B	3
DBC	Door close button input	20	4	IN	Inspection or access input	27	4
DBCR	Door close button (rear)	10	4	INCF	Independent service car call cancel flag	28	3
DC	Down call flag	21	7	IND	Independent service input	27	5
DCA	Down call above flag	2A	3	INT	Intermediate speed input	24	8
DCB	Down call below flag	2A	7	ISR	In service and ready	28	4
DCC	Door close complete flag	23	4	ISRT	In service truly flag	2C	1
DCCR	Door close complete flag (rear)	13	4	ISTD/R2	Intermediate step down/absolute floor encoding #2	30	7
DCF	Door close function output	22	8	ISTU/R3	Intermediate step up/absolute floor encoding #3	30	6
DCFR	Door close function output (rear)	12	8	ISV	In service flag	2C	2
DCLC	Door close contact input	23	6	LD	Level down input	29	7
DCLCR	Door close contact input (rear)	13	6	LEF	Leveling encounter flag	25	4
DCP	Door close power output	22	7	LFP	Lower parking floor flag	26	8
DCPR	Door close power output (rear)	12	7	LLI	Light load input	28	1
DCR	Down call flag (rear)	11	7	LLW	Light load weighing function input flag	28	8
DDF	Double ding function flag	28	6	LOT	Lobby door time	22	5
DDP	Down direction preference flag	29	5	LOTR	Lobby door time (rear)	12	5
DEADZ	Dead zone flag	30	4	LU	Level up input	29	3
DELSIM	Delta simulation flag	27	2	LWCE	Load weighing change enable flag	38	2
DHEND	Door hold end	33	4	MGR	Motor generator run flag	2B	5
DHEND2	Door hold end rear	33	5	MLT	Motor limit timer flag	2B	7
DHLD	Door hold input flag	27	6	NDGBPS	Nudging bypass flag	23	2
DHLDI	Normal door hold input flag	30	3	NDGBPSR	Nudging bypass flag (rear)	13	2
DHO	Door hold open flag	21	2	NDGF	Nudging function flag	30	1
DHOR	Door hold open flag (rear)	11	2	NDS	Hall door timer non-shorten	21	4
DIN	Door open inactive	26	4	NDSR	Hall door timer non-shorten (rear)	11	4
DLI	Dispatch Load Input	38	4	NUDG	Nudging output	23	3
DLK	Door lock input	28	7	NUDGR	Nudging output (rear)	13	3
DLKS	Door lock store bit	27	3	NYDS	New York door shortening flag	26	6
DLW	Dispatch load weighing function	38	3	PFG	Passing floor gong output	2F	1
DMD	Demand down flag	2A	8	PH1	Phase 1 return complete flag	30	2

TABLE 5.5 Alphabetized Flags/Variables and Their Locations

FLAG	Definition	Addr	Position	FLAG	Definition	Addr	Position
DMU	Demand up flag	2A	4	PHE	Photo eye input	20	7
DNDO	Down direction output	29	8	PHER	Photo eye input (rear)	10	7
DNS	Down direction sense input	24	4	PIC	PI correction flag	25	1
DOB	Door open button input	20	3	R4	Absolute floor encoding #4	30	8
DOBR	Door open button input (rear)	10	3	REAR	Rear door flag	28	2
DOC	Door open command	23	8	REL	Releveling	28	5
DOCR	Door open command (rear)	13	8	RUN	Run flag	2B	1
DOF	Door open function output	22	6	SAB	Sabbath input	33	7
DOFR	Door open function output (rear)	12	6	SAF	Safety string input	2C	6
DOI	Door open intent flag	21	1	SCE	Stepping correction enable	25	8
DOIR	Door open intent flag (rear)	11	1	SD	Supervisory down flag	2E	8
DOL	Door open limit input	20	5	SDA	Down direction arrow	2E	7
DOLM	Door open limit memory flag	20	8	SDT	Short door time flag	22	1
DOLMR	Door open limit memory flag (rear)	10	8	SDTR	Short door time flag (rear)	12	1
DOLR	Door open limit (rear)	10	5	SE	Safety edge input	23	7
DPD	Down previous direction	29	6	SER	Safety edge input (rear)	13	7
DPR	Door protection timer flag	26	3	SLV	Stable slave flag	38	7
DSD	Down slow down input	2E	6	STC	Stepping complete flag	2C	7
DSH	Door shortening flag	2B	2	STD/R0	Step down input/absolute floor encoding #0	24	2
DSHT	Door shortening flag	23	1	STU/R1	Step up input/absolute floor encoding #1	24	1
DSHTR	Door shortening flag (rear)	13	1	SU	Supervisory up flag	2E	4
DZ	Door zone input	20	6	SUA	Up direction arrow	2E	3
DZORDZ	Front or rear door zone input	2D	6	TEMPB	Temporary bit	2D	8
DZP	Door zone previous	2C	8	TEST	Test switch input	33	6
DZR	Door zone input (rear)	10	6	TFA	Timing function active	21	8
ECC	Excess car calls flag	2F	5	TFAR	Timing function active (rear)	11	8
ECRN	Emergency car run flag	2F	3	TFD	Top floor demand flag	2E	1
EPI	Emergency power input flag	31	1	TOS	Timed out of service flag	2B	8
EPR	Emergency power return	2F	2	UC	Up call flag	21	6
EPRUN	Emergency power run input	31	2	UCA	Up call above flag	2A	2
EPSTP	Emergency power stop input	31	4	UCB	Up call below flag	2A	6
FCCC	Fire phase 2 car call cancel	25	7	UCR	Up call flag (rear)	11	6
FCHLD	Fire phase 2 hold	25	6	UDP	Up direction preference	29	1
FCOFF	Fire phase 2 off	27	7	UFP	Upper parking floor flag	26	7
FCS	Fire phase 2 input	24	6	UFQ	Up first qualifier flag	2D	7
FCSM	Fire service phase 2 input memory	2D	5	UPD	Up previous direction	29	2
FDC	Door fully closed phase 2	21	3	UPDO	Up direction output	29	4
FDCR	Door fully closed phase 2 (rear)	11	3	UPS	Up direction sense input	24	3
FRA	Alternate Fire service phase 1 input	24	7	USD	Up slow down input	2E	2
FRAS	Alternate fire flag	2D	2	YSIM	Wye simulation bit	27	1
FRBYP	Fire phase 1 bypass input flag	2F	8				
FRC	Fire phase 2 flag	2D	1				
FREE	No demand and in service	30	5				
FRM	Fire service phase 1 flag	2D	4				
FRON	Fire phase 1 on input flag	2F	7				
FRS	Fire phase 1 input	24	5				
FRSS	Fire phase 1 flag	2D	3				
FWI	Fire warning indicator output	25	2				

5.3.8 TROUBLESHOOTING SPECIFIC PROBLEMS

This section will describe how to solve some specific problems by using the computer panel.

5.3.8.1 PROBLEM: THE BFD/TFD ERROR MESSAGE IS FLASHING ON THE DISPLAY - As shown in Table 5.2, the message means that there is either a Bottom Floor Demand or a Top Floor Demand. The controller is trying to establish the position of the car by sending it to either the bottom or top floor.

> **NOTE:** If the controller has the Absolute Floor Encoding feature, then the controller can establish the position of the car as soon as the car reaches any door zone. The car does not have to travel to a terminal landing to establish the position of the car.

It is normal for the BFD/TFD message to appear on the display right after power up or after the car is taken off Inspection or after the COMPUTER RESET button is pressed. However, in all three cases, the BFD/TFD message should clear quickly and then should not appear again as the car runs on Normal service.

If the BFD/TFD message is flashing for no apparent reason, take the following steps:

The first step in troubleshooting is to decide which of the following scenarios applies:

Scenario A: The car is stuck at the bottom floor with the BFD/TFD error message flashing constantly.

-OR-

Scenario B: The car runs normally until it reaches the top floor, then the BFD/TFD error message flashes and the car goes to the bottom floor. When it reaches the bottom, the message is cleared and the car functions normally until it again reaches the top floor.

-OR-

Scenario C: The car runs normally until it reaches the bottom floor. Then the BFD/TFD error message flashes and the car goes to the top. After it gets there, the message is cleared and the car runs normally until it again reaches the bottom floor.

WHAT TO DO FOR SCENARIO A: A Bottom Floor Demand should clear when all of the following conditions are met:

1. The car is at the bottom and the Down Slow Down (DSD) input to the controller is *OFF*.
2. The Door Zone (DZ) input to the controller is *ON*.
3. The Door Lock (DLK) input to the controller is *ON*.

Look up the DSD, DZ and DLK signals in the computer memory (see Section 5.3.7 for an explanation). When the car is at the bottom floor with the doors locked, the correct values for these signals in the computer memory are as follows:

DSD	=	0 (*OFF*)
DZ	=	1 (*ON*)
DLK	=	1 (*ON*)

If there is a different value for any of the 3 signals, check the wiring associated with that particular signal. For example, if the DSD signal is equal to 1 (*ON*) in the computer memory, inspect the DSD input wiring, including the Down Slow Down limit switch. The Down Slow Down switch contacts should be open when the car is at the bottom.

WHAT TO DO FOR SCENARIO B: For scenario B, the USD input is usually the problem. Look at the USD signal in the computer memory (Address 2E, Position 2). USD should be *ON* except when the car is at the top; then it should be *OFF*. If the signal is not following this rule, then inspect the wiring associated with the USD input, including the Up Slow Down limit switch. The Up Slow Down switch contacts should be open when the car is at the top.

WHAT TO DO FOR SCENARIO C: For scenario C, the DSD input is usually the problem. Look at the DSD signal in the computer memory (Address 2E, Position 6). DSD should be *ON* except when the car is at the bottom; then it should be *OFF*. If the signal is not following this rule, then inspect the wiring associated with the DSD input, including the Down Slow Down limit switch. The Down Slow Down switch contacts should be open when the car is at the bottom.

5.3.8.2 PROBLEMS WITH CALLS - See Section 6.3, for Call Logic and Troubleshooting of call circuits.

5.3.8.3 PROBLEMS WITH DOORS - See Sections 6.2 and 5.3.7, which explain how to use computer memory to solve door problems.

5.3.9 SETTING PARAMETERS (OPTIONS) TO DEFAULT VALUES

There are occasions when it is necessary to set the parameters (options) to their default values. Setting the parameters to their default values is usually required when:

- The MC-PCA and/or MC-PA software is changed (EPROMS changed), e.g. MC-PCA software changed from version 5.02.xxxx to version 5.03.xxxx.
- RAM memory becomes corrupted. This sometimes happens due to lightening.
- Changes to Communication Port settings on the MC-PCA require that the MC-PA parameters be set to their default values.

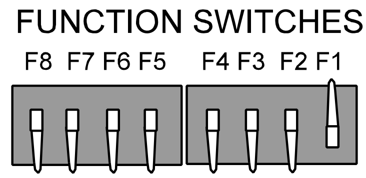
To set the MC-PCA parameters to their default values:

1. Place the car on Machine Room Inspection.
2. Place function switches **F1**, **F3**, **F5** and **F7** in the **On** (up) position.
3. Press all four pushbuttons (**N**, **S**, **+**, **-**) at the same time.
4. Using the settings shown in Appendix A, *Original Programmed Values and the Record of Changes*, reprogram the values that are different from the default values.

To set the MC-PA parameters to their default values:

1. Place function switches **A1**, **A3**, **A5** and **A7** in the **On** (up) position.
2. Press the **Reset** button on the **MC-PA board**.
3. Keep function switches **A1**, **A3**, **A5** and **A7** in the **On** (up) position for about 30 seconds or until the CRT terminal reinitializes.
4. If you have a CRT terminal, verify that parameters are correct (security and/or CMS parameters must be reprogrammed).

5.4 PROGRAM MODE



Program mode

This section will explain how to use Program mode. Enter Program mode by moving the ***F1*** switch on the computer board to the up position. Program mode can be used to program the controller to meet the requirements of the elevator such as, the selection of stops and fire floors, or changing timer values and selecting options such as nudging. The PTC controller has already been programmed at MCE. Usually, the controller does not have to be programmed during the initial installation. Program mode can be used later to modify the elevator operation.

Refer to the Programming Record in the Job Prints for a list of the options and values programmed into the controller at MCE. You may wish to copy these values into the space provided in Appendix A.

NOTE: If any changes are made using Program mode, record them in writing for future reference (use Appendix A).

5.4.1 GENERAL DESCRIPTION OF PROGRAM MODE

The car must be on Inspection before Program mode can be used. Messages will appear on the computer board display. Use the ***N*** and ***S*** pushbuttons below the display to find and select options and to change values. The next several subsections describe in detail how to use Program mode.

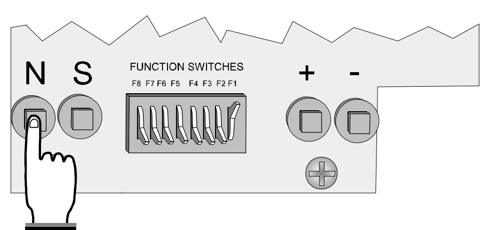
5.4.1.1 VIEWING MENUS ON THE LCD DISPLAY - All of the programmable options and features are divided into menus. The following is a list of all of the menus:

- Basic Features Menu
- Door Operation Menu
- Gongs/Lanterns Menu
- Spare Outputs Menu
- Fire Service Menu
- Timer Menu
- Spare Inputs Menu
- Extra Features Menu

For each menu, there is a Menu Message on the display. To look at these Menu Messages, enter Program mode by moving the ***F1*** switch to the up position. The Start Message will appear:

PROGRAM MODE
PRESS **N** TO BEGIN

Press the *N* pushbutton, and release it.



The first Menu Message will appear:

BASIC FEATURES
* MENU *

Press the ***N*** pushbutton again, the next Menu message will appear:

FIRE SERVICE

Hold down the ***N*** pushbutton, each Menu Message will appear, one at a time. Finally, the Start Message will appear again.

5.4.1.2 VIEWING OPTIONS WITHIN A MENU - The options can be viewed inside a particular menu by pressing the ***S*** pushbutton when the Menu Message appears on the display. For example, to look at the options in the Door Operation Menu, first press the ***N*** pushbutton until the Door Operation Menu Message appears:

DOOR OPERATION *MENU *

Press the ***S*** pushbutton. The following display will appear:

NUDGING? YES

To view the next option, press the ***N*** pushbutton. Hold down the ***N*** pushbutton to scroll through the options. Eventually the Menu Message will reappear, or to return directly to the Menu Message while the options are displayed, press the ***N*** and '**+**' pushbuttons at the same time. Press the ***S*** pushbutton to see the options for that same menu again, or press the ***N*** pushbutton to go on to the next menu.

5.4.1.3 CHANGING A VALUE - For each option that appears, the value can be changed by pressing the ***S*** pushbutton. While in the Timer, Spare Inputs and Spare Outputs menus, pressing and holding the ***S*** pushbutton for five seconds causes the display to scroll through the values at a faster rate. Also, in those same menus, pressing the ***S*** and '**-**' pushbuttons at the same time will cause the display to scroll backwards and pressing the ***S*** and '**+**' pushbuttons at the same will reset the option to NOT USED. To return directly to the Menu Message while the values or options are displayed, press the ***N*** and '**+**' pushbuttons at the same time.

Going back to the previous example in which the Nudging option was on the display:

NUDGING? YES

Pressing the ***S*** pushbutton to changes Nudging to NO:

NUDGING? NO

5.4.1.4 SAVING THE NEW VALUES - Whenever options or values are changed in Program mode, this information must be saved in the computer's memory. When the changes are complete, press the ***N*** pushbutton until the following message appears:

Press the ***S*** pushbutton to save the changes and the following display will appear:

SAVE COMPLETE: N = CONTINUE

Now press the ***N*** pushbutton, and the Start Message will appear again. When programming is complete, move the ***F1*** switch back to the down position.

> **NOTE:** If the values have not been saved, they will be lost when *F1* is switched back to *OFF* (down) position. *Make sure* to keep an account of saved changes on the record provided in Appendix A.

5.4.1.5 RESTORING ORIGINAL VALUES - When using Program mode, if some values have been changed, but then you decide to go back to the old values, exit Program mode without saving the changes. Move the ***F1*** switch back to the down position and the original values will be restored.

5.4.1.6 STEP-BY-STEP EXAMPLE - Table 5.6 is a step-by-step example of using Program mode. In this example, the Fire Phase 1 Alternate floor will be changed. Similar steps can be taken to change any option.

TABLE 5.6 Using the Program Mode

Example: Changing Fire Phase 1 Alternate floor from 1 to 3			
STEPS TO TAKE	**DISPLAY MENUS AND SUB-MENUS**		**SECTION OF MANUAL**
Put car on Inspection	D INSPECTION OP PI 8 20:1011000		
Flip ***F1*** switch *Up*	PROGRAM MODE PRESS N TO BEGIN		
Press ***N*** button for Next	*BASIC FEATURES* * MENU *		**5.4.2**
Press ***N*** button for Next	* FIRE SERVICE * * MENU *		**5.4.3**
Press ***S*** button for Select		FIRE SERVICE OPERATION? YES	**5.4.3.1**
Press ***N*** button for Next		FIRE PHASE 1 MAIN FLOOR = 1	**5.4.3.2**
Press ***N*** button for Next		FIRE PHASE 1 ALT. FLOOR = 2	**5.4.3.3**
Press ***S*** button to select next available value. If you press ***S*** too many times, continue to press it until the desired value appears again.		FIRE SVCE. CODE ALT. FLOOR = 3	**5.4.3.3**
Press ***N*** button for Next		FIRE SVCE. CODE XXXX	**5.4.3.4**
Press ***N*** button for Next		BYPASS STOP SW. ON PHASE 1? YES	**5.4.3.5**
Press ***N*** button to scroll through any remaining Fire Service sub-menus.			
Press ***N*** button for Next	* FIRE SERVICE * * MENU *		
Press ***N*** button for Next	*DOOR OPERATION* * MENU *		**5.4.4**
Press ***N*** button for Next	* TIMER * * MENU *		**5.4.5**
Press ***N*** button for Next	*GONGS/LANTERNS* * MENU *		**5.4.6**
Press ***N*** button for Next	* SPARE INPUTS * * MENU *		**5.4.7**
Press ***N*** button for Next	* SPARE OUTPUTS* * MENU *		**5.4.8**
Press ***N*** button for Next	*EXTRA FEATURES* * MENU *		**5.4.9**
Press ***N*** button for Next	* SAVE CHANGES?* * N=NO S=YES *		
Press ***S*** button to Save	SAVE COMPLETE: N = CONTINUE		
Press ***N*** button for Next	PROGRAM MODE PRESS N TO BEGIN		
Flip ***F1*** switch *Down* and take car off of Inspection	***The new options are stored and are now in effect.***		

5.4.2 BASIC FEATURE MENU OPTIONS

5.4.2.1 SIMPLEX OR DUPLEX? - The controller has been programmed at the factory for either simplex or duplex capability.

If the controller has simplex capability, it can only operate a single car as a simplex. The Simplex/Duplex option message will not appear on the display.

If the controller has duplex capability, then it can operate a single car as a simplex, or it can be connected to a second PTC controller and the 2 controllers can operate 2 cars as a duplex.

Both PTC controllers must have duplex capability for this arrangement to work. Also, the Simplex/Duplex option on each controller must be set to duplex.

5.4.2.2 OPERATION (DISPATCHING OPERATION) - For simplex operation, there are 3 dispatching operations to choose from: Selective Collective, Single Button Collective, or Single Automatic Pushbutton. Each operation is described below.

Selective Collective - Choose this operation if there is an UP and DOWN button at each landing station except for the top floor (DOWN button only) and bottom floor (UP button only) and any number of calls can be registered at one time.

Single Button Collective - Choose this operation if there is only 1 call button at each landing station and any number of calls can be registered at one time.

Single Automatic Pushbutton - Choose this operation if there is only 1 call button at each landing station and only 1 call can be registered and/or serviced at a time.

NOTE: If either Single Button Collective or Single Automatic Push-Button operation is selected, then one of the spare output terminals should be used for an INDFRC output. This output is used to cut out the hall calls during Fire Service and Independent Service (see Section 5.4.8 for more details). Refer to the Job Prints for information on using the INDFRC output to cut out hall calls.

For duplex operation, the dispatching scheme is always Selective Collective. Therefore, the Operation option message will not appear on the display if the Duplex option was selected.

5.4.2.3 TOP LANDING SERVED? (simplex) / TOP LANDING FOR THIS CAR? (duplex) - Set this option to the highest floor served by this car.

5.4.2.4 CAR DOORS ARE WALK-THRU? (simplex) / THIS CARS DOORS WALK-THRU? (duplex) - Set this option to *YES* if independent (walk-through) doors are served by this car.

5.4.2.5 CAR SERVES FRNT/FLR 1? (simplex) /THIS CAR SERVES FRNT/FLR 1? (duplex) - Setting this option to YES indicates that this car is eligible to serve a front opening at this floor. This option will continue to be asked until the top landing is reached. Press the '+' pushbutton to scroll through the available landings. Press the N pushbutton for the next option.

5.4.2.6 CAR SERVES REAR/FLR 1? (simplex) / THIS CAR SERVES REAR/FLR 1? (duplex) - Setting this option to YES indicates that this car is eligible to serve a rear opening at this floor. This option will not be displayed if option 5.4.2.4 is set to *NO*. This option inquiry will continue until the top landing is reached. Press the '+' pushbutton to scroll through the available landings. Press the N pushbutton for the next option.

For a duplex, option inquiries for 5.4.2.3 through 5.4.2.6 must be answered for both cars. Each message will ask what the *other* car's top landing is, if it serves rear floors, etc. Again, select *YES* if the other car of the duplex serves that floor and *NO* if the other car does not. *Both* controllers in a duplex need to be programmed with this information.

5.4.2.7 PARKING FLOOR - Any landing can be selected to be the parking floor. The car will go to the parking floor when it is free of call demand. In addition, there is a Parking Delay Timer that will cause a free car to wait for a short time before parking. The timer is adjustable, with a value between 0.0 minutes (no delay) and 6.0 minutes (see Section 5.4.5.10 for more details). If the parking feature is not needed, choose NONE when the Parking Floor option message is on the display. The car will stay at the last call answered.

5.4.2.8 ALT. PARKING FLOOR - This option is available only when the API input is programmed and a parking floor is set. Any landing can be selected to be the alternate parking floor. This car will go to the alternate parking floor when it is free of call demand and the API input is active.

5.4.2.9 SECONDARY PARKING FLOOR - This option is for duplex systems only. Any landing can be selected to be the secondary parking floor. The car will go to this floor when it becomes free of call demand and the other car is already parked at the first parking floor. It is acceptable to make the secondary parking floor the same as the first parking floor, if both cars are to park at the same floor. If a second parking floor is not needed, choose *NONE* when the Secondary Park Floor option message is on the display. Then, the first free car will go to the first parking floor, but the second car will stay at the last call answered.

5.4.2.10 LOBBY FLOOR - Any landing can be selected to be the Lobby Floor. When the car answers either a hall or car call at this floor, the doors will stay open until the Lobby Door Timer elapses (the Lobby Door Timer is adjustable, see Section 5.4.5.4). NOTE: The Lobby Floor is also used for CTL input.

5.4.2.11 CAR IDENTIFIER - This option is for duplex systems only. Its purpose is to specify which controller is assigned to car A and which controller is assigned to car B. This is primarily used for controllers that use a peripheral device such as a CRT.

5.4.2.12 NUMBER OF IOX BOARDS? - Program the number of HC-IOX boards installed in the controller (valid range is 0 to 4).

5.4.2.13 NUMBER OF I4O BOARDS? - Program the number of HC-I4O boards installed in the controller (valid range is 0 to 3).

5.4.2.14 NUMBER OF AIOX BOARDS? - Program the number of HC-AIOX boards installed in the controller (valid range is 0 or 1).

5.4.3 FIRE SERVICE MENU OPTIONS

5.4.3.1 FIRE SERVICE OPERATION? - If Fire Service operation is not required, then this option should be set to *NO*. Otherwise, if set to *YES*, the options below will appear on the LCD display.

5.4.3.2 FIRE PHASE 1 MAIN FLOOR - Any landing can be selected to be the Main Fire Return Floor for Fire Service.

5.4.3.3 FIRE PHASE 1 ALT. FLOOR - Any landing can be selected to be the Alternate Fire Return Floor for Fire Service.

5.4.3.4 FIRE SVCE. CODE - The Fire Service Operation will conform to the selected fire service code. There are fourteen different codes to choose from:

1. CHICAGO (OLD)
2. VET ADMIN (Veterans' Administration)
3. NYC RS-18
4. ANSI A17.1 -89>
5. CALIF. TITLE 8
6. HAWAII
7. CSA B44-M90
8. 34 PA CODE, CH. 7
9. CITY OF HOUSTON
10. AUSTRALIA
11. CITY OF DETROIT
12. MASSACHUSETTS
13. ANSI A17.1 85 - 88
14. CITY OF DENVER
15. CHICAGO 2001
16. A17.1 - 2000

5.4.3.5 FIRE PHASE I 2ND ALT. FLOOR - This option is only available when the FIR SVCE CODE option is set to City of Detroit. Any landing can be selected to be the 2nd alternate fire return floor.

5.4.3.6 BYPASS STOP SW. ON PHASE 1? - This option was added to keep the stop switch from being bypassed on Fire Phase I. With this option set to *NO*, the CSB output will not come on as the car is returning on Fire Phase I.

5.4.3.7 HONEYWELL FIRE OPERATION? (*YES/NO*) - This option is only available if the FIRE SVCE. CODE option is set to AUSTRALIA (see section 5.4.3.4). If this option is set to *YES* then the Australia fire code will conform to Honeywell's requirements. If this option is set to *NO* then the controller will conform to standard Australia code.

5.4.3.8 NEW YORK CITY FIRE PHASE 2 AND ANSI 89? (*YES/NO*) - This option is only available if the FIRE SVCE. CODE option is set to ANSI A17.1 89 (see section 5.4.3.4). If this option is set to *YES* then the ANSI A17.1 89 Fire Code will conform to New York City Fire Code requirements when on Fire Phase 2. If this option is set to *NO* then the controller will conform to standard ANSI A17.1 89 Fire Code.

5.4.3.9 WHITE PLAINS, NY FIRE CODE? (*YES/NO*) - This option is only available if the FIRE SVCE. CODE option is set to ANSI A17.1 89 (see section 5.4.3.4). The city of White Plains requires that if fire phase one is still in effect, the car can exit fire phase two regardless of the position of the doors. Setting this option to YES will comply with this requirement.

5.4.3.10 MASS 524 CMR FIRE CODE? *(YES/NO)* - This option is only available if the "FIRE SVCE. CODE" option is set to "A17.1 - 2000". If this option is set to YES, the ASME A17.1-2000 fire code will conform to the Massachusetts 524 CMR requirements. If this option is set to NO, the controller will conform to the standard ASME A17.1-2000 code.

5.4.4 DOOR OPERATION MENU OPTIONS

5.4.4.1 NUDGING? - This option causes Nudging Operation to occur when the doors are prevented from closing. During Nudging Operation, the controller will turn *ON* the NUDG output, to signal the door operator to close the doors at a reduced speed. The NUDG output will stay *ON* for the amount of time the Nudging Timer is set, and then cycle *OFF* for the same amount of time. This cycle will continue until the doors have become fully closed. The NUDG output can also be used to activate a buzzer. The PHE (Photo Eye) input will be ignored during nudging, if the Stuck Photo Eye Protection option has been selected (see Section 5.4.4.2). A Safety Edge or Door Open Button input will stop the doors from closing, but will not reopen the doors fully. Nudging Operation will begin when the Nudging Timer elapses. The Nudging Timer starts when the regular door timer elapses. The Nudging Timer is adjustable, with a value between 10 and 60 seconds (see Section 5.4.5.5).

5.4.4.2 STUCK PHOTO EYE PROTECTION? - This option causes the controller to ignore the PHE (Photo Eye) input and to close the doors. The PHE input will be ignored when the Nudging Timer elapses, if the Nudging option is selected or when the Time Out of Service Timer elapses, whichever comes first. If the Nudging option is not selected, then the PHE input will be ignored when the Time Out of Service Timer elapses (see Section 5.4.5.6 for details).

If the Stuck Photo Eye Protection option is not selected, a PHE input that is stuck *ON* will keep the doors open indefinitely.

5.4.4.3 SEQUENTIAL DOOR OPER. (F/R) - This option is available only if independent rear doors are present. If this option is set to *Yes* then the front and rear doors of the car do not open at the same time. Whenever the controller receives a front and rear call to the same landing, the car will, upon reaching that landing, first open the front doors and close them, then open the rear doors and close them. The default is to open the front doors first unless the rear doors have already started to open.

5.4.4.4 CAR CALL CANCELS DOOR TIME? - If this option is selected, pressing a car call button when the doors are fully open will cause the doors to start closing. There is one exception. If the car is stopped at a floor, pressing the car call button *for that same floor* will not cause the doors to close, but will cause the doors to reopen if they are in the process of closing.

5.4.4.5 NUDGING DURING FIRE PH. 1? - If this option is selected, the controller will turn *ON* the NUDG output while the doors are closing during Fire Phase 1. The NUDG output signals the door operator to close the doors at a reduced speed. This option is useful for elevators that do not have mechanical safety edges. During Fire Phase 1, all smoke sensitive reopening devices must be disabled. This includes photo eyes and other devices that use infrared beams. If there are no other reopening devices active, then the doors should be closed at a reduced speed.

5.4.4.6 RETIRING CAM OPTION? - This option should be selected for elevators with retiring cams. The option affects the car only when it's sitting at a floor. Without this option, the controller waits until the doors are closed and locked before turning *OFF* the door close signal. However, if the elevator has a retiring cam, the doors will not lock until the retiring cam is activated.

If this option is selected, the controller turns *OFF* the door close signal when the doors are *closed* instead of waiting for the doors to be locked. More precisely, the controller will turn *OFF* the door close output signal (DCF) when the DCLC (Doors Closed Contact) input is *ON* or when the DCL (Door Close Limit) input is *OFF*, (DPM is *ON*) instead of waiting for the DLK (Door Lock) input to turn *ON*.

5.4.4.7 PRE-OPENING? - If this option is selected, the controller will begin to open the doors just before the car completely stops at a floor. More precisely, the controller will turn *ON* the DOF (Door Open Function) output signal when the DZ (Door Zone) input turns *ON.* Typically, the DZ input first turns *ON* when the car is about 3 inches away from the final stopping point. This option is not recommended for elevators that may spend an extended period of time in leveling.

5.4.4.8 MECHANICAL SAFETY EDGE? - If this option is selected, the Nudging Operation will cycle until the doors are fully closed. Otherwise, the nudging function will operate continuously to comply with code requirements where a door reopening device is not used (see Section 5.4.4.1 for more details).

5.4.4.9 NUDGING OUTPUT/BUZZER ONLY? - If this option is selected with the Nudging option, the NUDG output will be activated when the Nudging Timer elapses. However, if either the Mechanical Safety Edge or the Door Open button is activated, the doors will stop and reopen fully. If this option is not selected, the doors will simply stop under these circumstances, but will not reopen fully. This option may be useful when only a nudging buzzer is required, but the actual Nudging Operation is not needed (see Section 5.4.4.1 for more details).

5.4.4.10 D.C.B. CANCELS DOOR TIME? - When the doors are fully open, this option cancels any pre-existing door time and causes the doors to start closing when the Door Closed button is pressed.

5.4.4.11 LEAVE DOORS OPEN ON MGS? - With this option set and the MG Shutdown Operation (MGS) input selected and active, the doors will remain open instead of cycling closed once the car has returned to the return floor.

5.4.4.12 LEAVE DOORS OPEN ON PTI/ESS? - With this option set and either the Power Transfer (PTI) input or the Elevator Shutdown Switch (ESS) input selected and active, once the car has stopped at a floor, the doors will remain open instead of cycling closed.

5.4.4.13 NUDGING DURING FIRE PHASE 2? - If this option is selected, the controller will turn *ON* the NUDG output while the doors are closing during Fire Phase 2. The NUDG output signals the door operator to close the doors at a reduced speed.

5.4.4.14 DIR. PREFERENCE UNTIL DLK? - This option causes the car to maintain its present direction preference until the doors are fully closed. Otherwise, the direction preference is maintained only until the door dwell time expires.

5.4.4.15 FULLY MANUAL DOORS? - When set to *YES*, this option will allow the MGR output to turn *OFF* when the MG timer elapses, even if the doors are left open. Usually, having DCF *ON* is one reason to leave the MG running.

5.4.4.16 CONT. D.C.B. TO CLOSE DOORS? - When this option is set to *YES*, the doors will remain open while the car is at a landing until the Door Close button is pressed. While the Door Close button is pressed, the doors will continue to close. If the Door Close button is released before the doors have closed fully, the door will reopen.

5.4.4.17 CONT. D.C.B. FOR FIRE PH 1? - When set to *YES*, the doors will remain open when the car goes on Fire Phase 1 until constant DCB forces them closed.

5.4.4.18 MOMENT. D.O.B. DOOR OPENING ? - This option is used to require the momentary pressure on the Door Open Button (DOB) to open the doors. If set to *NO*, momentary pressure on the DOB is not required to open the doors when the car reaches a landing. The doors open automatically in response to a call.

5.4.4.18.1 MOMENT D.O.B. FOR: *(FRONT CALLS/ REAR CALLS/ BOTH CALLS)* - Choose whether front calls, rear calls or both calls need momentary D.O.B.

- *FRONT CALLS* - this option necessitates that DOB be pressed when the car responds to *front* door calls. Rear door calls are not affected.
- *REAR CALLS* - this option necessitates that DOB be pressed when the car responds to *rear* door calls. Front door calls are not affected.
- *BOTH CALLS* - this option necessitates that DOB be pressed when the car responds to both *front* and *rear* door calls.

5.4.4.18.2 MOMENT D.O.B. FOR: *(HALL CALLS/ CAR CALLS/ ALL CALLS)* - Choose whether hall calls, car calls or all calls need momentary D.O.B.

- *HALL CALLS* - this option necessitates that DOB be pressed when the car responds to *hall calls*. Car calls are not affected.
- *CAR CALLS* - this option necessitates that DOB be pressed when the car responds to *car calls*. Hall calls are not affected.
- *ALL CALLS* - this option necessitates that DOB be pressed when the car responds to both *hall calls* and *car calls*.

5.4.4.19 DOORS TO OPEN IF PARKED: - (*NONE/FRONT/REAR/BOTH*) If set to *NONE*, the doors remain closed while the car is parked. When set to *FRONT*, *REAR*, or *BOTH*, the corresponding doors automatically open and remain open while the car is parked. This option is available only if a parking floor is programmed in the Basic Features menu. *BOTH* option is not available if the car is programmed for sequential door operation. See Section 5.4.4.3 for more details.

5.4.4.20 DOORS TO OPEN ON MAIN FIRE? - The choices for this option are FRONT, REAR and BOTH. This option determines which door(s) should open once the car has completed a Main Fire return (only if option 5.4.2.4 is set to *YES*).

5.4.4.21 DOORS TO OPEN ON ALT FIRE? - The choices for this option are FRONT, REAR and BOTH. This option determines which door(s) should open once the car has completed an Alternate Fire return (only if option 5.4.2.4 is set to *YES*).

5.4.4.22 LEAVE DOORS OPEN ON CTL? - When set to *YES*, and the CTL (car to lobby) input is active, once the car returns to the lobby, the doors will remain open instead of cycling closed.

5.4.4.23 LIMITED DOOR RE-OPEN OPTION - Once the doors begin to close after a door dwell time has expired, if a re-opening device input (PHE or SE) is seen, this option will allow the doors to re-open as long as the re-opening device is active. Once the re-opening device is inactive, the doors will immediately begin to close again. Without this option set, in this same case, the doors will re-open fully for a short door time and then close.

5.4.4.24 REDUCE HCT WITH PHOTO EYE - This option will cause a normal hall call time to be shortened to a short door time if a photo eye input is seen.

5.4.4.25 LEAVE DOORS OPEN ON EPI - When set to *YES*, and EPI (Emergency Power) input is active, once the car returns to the emergency power return floor, the doors are left open instead of cycling closed.

5.4.4.26 DOORS TO OPEN IF NO DEMAND - (NONE/FRONT/REAR/BOTH) - When set to NONE, the doors remain closed when the car is at a landing with no demand. When set to FRONT, REAR, or BOTH, the corresponding doors automatically open and remain open when the car is at a landing with no demand. BOTH option is not available if the car is programmed for sequential door operation. See Section 5.4.4.3 for more details

5.4.4.27 CONST. PRESS OP. BYPASS PHE? - This option is used to indicate if Constant Pressure Operations, such as Independent Service, Attendant Service, or if the Constant Pressure Door Close option is set to YES, should bypass the Photo Eye when the Photo Eye is active and there is a demand to close the doors and move the car. When set to YES, the car will bypass the Photo Eye and nudge the doors closed. When set to NO, the car will not bypass the Photo Eye; the doors will remain open until the Photo Eye is cleared.

5.4.4.28 DOOR TYPE IS HORIZONTAL / VERTICAL - This option is used to indicate if the doors open horizontally or vertically. When set to vertical, requires constant pressure on the door close button (DCB) to shut the doors when exiting Fire Phase 2 away from the recall floor with Fire Phase 1 active (ASME A17.1 requirement).

5.4.4.29 FRONT DOOR MECH. COUPLED? *YES/ NO* - Set to YES if the front car gate is mechanically coupled to the hallway doors. To satisfy A17.1-2000 code requirements, this option is used to qualify the HD Redundancy fault when the Retiring Cam Option (Section 5.4.4.6) is set to YES and this option is set to YES.

5.4.4.30 REAR DOOR MECH. COUPLED? *YES/ NO* - Set to YES if the rear car gate is mechanically coupled to the hallway doors. To satisfy A17.1-2000 code requirements, this option is used to qualify the HDR Redundancy fault when the Retiring Cam Option (Section 5.4.4.6) is set to YES and this option is set to YES.

5.4.4.31 PREVENT DCP TIL DOORS CLOSE? - When this option is set to YES, the DCP output will not be generated until the doors close and a demand is present. Set this option to YES when it is required that the doors be fully closed before asserting DCP, e.g., when DCP is used to power the retiring cam RC relay, DCP should be asserted only after the doors have fully closed as indicated by the DCL input.

5.4.4.32 MOMENT. D.C.B TO CLOSE DOORS? *YES/NO* - When this option is set to “YES” a momentary push on the door close button is required to allow the doors to close while on normal operation.

5.4.4.33 DOORS TO LATCH DOF? *FRONT/REAR/BOTH/NONE* - This option would maintain the Door Open Function on the selected doors continuously as long as a door closing command is absent.

5.4.4.34 DOORS TO LATCH DCF? *FRONT/REAR/BOTH/NONE* - This option would maintain the Door Close Function on the selected doors continuously as long as a door opening command is absent.

5.4.4.35 INV. DOOR CLOSE LIMIT? *NONE/ FRONT/ REAR/ BOTH* - Set this option for doors that require *inverted* door close limit input logic (DCL and/or DCLR). When this option is set, the DCL and/or DCLR inputs must be active when the doors are closed and inactive when the doors are open.

5.4.5 TIMER MENU OPTIONS

5.4.5.1 SHORT DOOR TIMER (Range: 0.5-120.0 Seconds) - This is the length of time the doors will stay open after being reopened by the Photo Eye, Safety Edge or Door Open button.

5.4.5.2 CAR CALL DOOR TIMER (Range: 0.5-120.0 Seconds) - This is the length of time the doors will stay open when the car stops to answer a car call.

5.4.5.3 HALL CALL DOOR TIMER (Range: 0.5-120.0 Seconds) - This is the length of time the doors will stay open when the car stops to answer a hall call.

5.4.5.4 LOBBY DOOR TIMER (Range: 0.5-120.0 Seconds) - This is the length of time the doors will stay open when the car stops to answer either a hall call or a car call at the Lobby Floor. The location of the Lobby Floor is programmable (see Section 5.4.2.9).

5.4.5.5 NUDGING TIMER (Range: 10-240 Seconds) - This timer is used only if the Nudging option is selected. Door Nudging Operation will begin when the Nudging Timer elapses. The Nudging Timer will start when the regular door timer elapses (see Section 5.4.4.1).

5.4.5.6 TIME OUT OF SVCE. TIMER (Range: 15-240 Seconds or NONE) - This timer is used to take a car out of service when the car is held at one floor excessively when there are calls registered at other floors. The timer will start when there is a call registered at another floor. If the timer expires before the car closes its doors and begins to move, then the car will become out of service. Typically, this occurs when the doors are held open by continuous activation of the photo eye, a call button, or another reopening device. When NONE is selected, no Time Out of Service timing is performed.

When the timer expires, the Timed Out of Service Indicator on the MC-PCA-OA-2K board will turn *ON*. The controller will ignore the PHE (Photo Eye) input, if the Stuck Photo Eye Protection option is selected. In duplexes, the car's assigned hall calls will be assigned to the other car. When the car closes its doors and begins to move again, it will go back into Normal service.

5.4.5.7 MOTOR LIMIT TIMER (Range: 1.0 - 6.0 Minutes) - This timer starts whenever the controller attempts to move the car and is reset when the car reaches its destination floor. If the timer expires before the car reaches its destination, the controller stops trying to move the car, to protect the motor. The Motor Limit Timer Indicator on the MC-PCA board turns *ON*.

5.4.5.8 MGR OUTPUT TIMER (Range: 0 - 27 Minutes) - This is the amount of time that the MGR output will stay *ON* after the car is at rest. For elevators with MG sets, the MGR output runs the MG set. Thus, this timer determines how long the MG set will run after the car is at rest. If the MGR output is not used, then this timer should be set to NONE.

5.4.5.9 DOOR HOLD INPUT TIMER (Range: 0-240 Seconds) - This timer will be used only if there is a DHLD (Door Hold) input on the controller (see Section 5.4.7). Usually, a Door Hold Open button will be connected to this input. This timer determines the amount of time that the doors will stay open when the door hold open button is pressed. The timer will be canceled and the doors will begin to close, if either the Door Close button or a Car Call button is pressed. If a Door Hold Key switch (instead of a button) is connected to the DHLD input, this timer value should be set to 0, so that the doors will close when the switch is turned to the *OFF* position.

5.4.5.10 PARKING DELAY TIMER (Range: 0.0-6.0 Minutes) - This timer is used only if a parking floor is selected (see Sections 5.4.2.7 and 5.4.2.8). The timer starts when the car is free of call demand. The car will not park until the timer elapses.

5.4.5.11 FAN/LIGHT OUTPUT TIMER (Range : 1.0-10.0 Minutes) - Used with the FLO output. This timer sets the amount of time that will pass before the FLO output will be activated. The time will start when the car becomes inactive. The FLO output should be connected to a relay that when activated, will turn *OFF* the fan and light within the car.

5.4.5.12 HOSPITAL EMERG. TIMER (Range : 0.0-10.0 Minutes) - This timer sets the amount of time that the car will remain at the hospital emergency floor with the doors open before automatically returning to normal service (refer to Section 5.4.9.19).

5.4.5.13 DOOR OPEN PROTECTION TIMER (Range 8 - 30 Seconds) - This timer determines how long the door operator will attempt to open the doors. If DOL does not go low within this time, the doors will then begin to close, and the car will answer the next demand.

5.4.5.14 CTL DOOR OPEN TIMER (Range: 2.0 - 60.0 seconds) - This timer is used to indicate how long the doors should remain open after lowering to the lobby floor when the CTL spare input is activated.

5.4.5.15 DOOR BUZZER TIMER (Range: 0.0 - 30.0 Seconds) - This timer determines the length of time, after the door dwell timer (CCT, HCT, etc.) expires, that the door buzzer sounds before the doors are automatically closed.

5.4.6 GONGS/LANTERNS MENU OPTIONS

5.4.6.1 MOUNTED IN HALL OR CAR? - This option determines when the gongs and lanterns will activate, as the car slows in to the floor for hall mounted fixtures or after the door lock breaks for car mounted fixtures. If both types of gongs are used, then the Hall option is recommended.

5.4.6.2 DOUBLE STRIKE ON DOWN? - This option causes a double strike of the gongs and lanterns, if the direction preference of the car is down.

5.4.6.3 PFG ENABLE BUTTON? (Passing Floor Gong Enable Button) - If this option is selected, the Passing Floor Gong will only be operative when initiated by a momentary pressure pushbutton. Once initiated, the Passing Floor Gong will operate for the current direction of travel but will be rendered inoperative when the car reverses direction. The PFGE spare input (see Section 5.4.7) should also be selected if this option is turned *ON.*

5.4.6.4 EGRESS FLOOR ARRIVAL GONG? / MAIN EGRESS FLOOR # - To program this option (Michigan Code), set one of the spare outputs to EFG. Then, set EGRESS FLOOR ARRIVAL GONG? to NO (no gong) or press ***S*** to select the floor number where the gong should activate (after the door locks break). If ***S*** is pressed, the display will read MAIN EGRESS FLOOR #1. Press ***S*** until the desired floor number is displayed.

5.4.7 SPARE INPUTS MENU OPTIONS

There is 1 additional or spare input terminal available on the Relay board, marked SP1. There are also 8 spare input terminals on the HC-IOX board(s) and 16 spare input terminals on the HC-I4O board(s). The maximum number of terminals possible is 49. Any of these spare inputs (SP1, SP2, ...) may be used for any of the input signals listed below.

SPARE INPUTS MENU OPTIONS	
2AB	2AB relay coil monitoring input.
ABI	Alarm Bell Input. This input monitors the car through the CRT or with CMS software. There are three conditions that will display a warning on the screen. First, if the Alarm Button is pressed when the car is stopped outside of the door zone. Next, if the Alarm Button is pressed four times in 60 seconds without the car moving. And lastly, if the car fails to complete an LSA movement check after being idle for 10 minutes at a landing. All of these failures will alert the monitoring station through the PA board.
ALV	Alive Input - This input is used in a duplex configuration and is received from the other car. If the input is on for this car, it states that the other car is powered. This input is used in emergency power applications.
API	Alternate Parking Input. This input is used to determine whether to park at the primary parking floor, or at the alternate parking floor. When API is low, the car will park at the primary floor. When API is high, the car will park at the alternate floor.
ATS	Attendant Service Input.
AUTO	Emergency Power Auto Selection Input. This input is for duplexes only.
AXR	Auxiliary Reset Input - Usually connected to a pushbutton on a controller to reset redundancy error conditions.
BAB	BAB relay coil monitoring input.

SPARE INPUTS MENU OPTIONS	
BPS	Brake Pick Sensor Input - This input is used to monitor the position of the brake. Three seconds after the initiation of a run, the BPS input is checked. If, at that time, the BPS input is seen as deactivated (showing that the brake *is* fully picked), it will not be monitored for the remainder of the run. In other words, if the brake drops during the run, this will not count as a fault. If, however, the BPS input was seen as *activated* (showing that the brake is *not* fully picked), this will be recorded as a fault. If this type of fault is detected in three consecutive runs, it is considered as a brake pick failure and the car is shut down after the *completion of the third run*. If the computer detects that the BPS input remained active *throughout an entire run* (the brake did not pick at all), an immediate brake pick failure will be generated upon completion of the run.
BSI	Building Security Input - This input is used to activate MCE Security when the Master Software Key (in the Extra Features Menu) is set to ENABLED.
CCC	Car Calls Cancel Input - Activation of this input will unconditionally cancel car calls. Because this input has no logical qualification in the software, it is highly suggested that necessary qualification be done in external circuitry (e.g., disable the signal feeding this input when on fire phase II).
CNP	Contactor Proof Input - This input is used for redundancy checking. It monitors the main power contactors. If any of these relays fail to open in the intended manner, the CFLT relay will pick, dropping the safety relays.
CTF	Car to floor Input - This input is used to return the car to a previously selected floor. The return floor is selected using the parameter CAR TO FLOOR RETURN FLOOR in the EXTRA FEATURES MENU. When activated, this input will cause the car to immediately become non-responsive to hall calls, and will prevent the registration of new car calls. The car will be allowed to answer all car calls registered prior to activation of the CTF input. Once all car calls have been answered, the car will travel to the return floor, perform a door operation, and will be removed from service.
CTL	Car-to-Lobby Input - When activated, this input will cause the car to immediately become non-responsive to hall calls, and will prevent the registration of new car calls. The car will be allowed to answer all car calls registered prior to activation of the CTL input. Once all car calls have been answered, the car will travel to the lobby landing, perform a door operation, and will be removed from service.
CTST	Capture for Test Input.
CWI	Earthquake Input (see Section 5.4.9.8 for more details, see also SSI).
DCL	Door Close Limit Input - Breaks when the car door is approximately 1 inch from being closed. DCL input will be low once the doors fully close. Moving the door approximately 1 inch will reapply power to the DCL input due to the switch making up. Needed for CSA code with door lock bypass (DCL = high when DPM = low).
DCLC	Doors Closed Contact Input.
DFI	Drive Fault Input.
DHLD	Door Hold Input for Normal Service (not for Fire Service.) A Door Hold button or key switch can be connected to this input (see Section 5.4.5.9 for more details).
DHLDR	DHLD for Rear Doors.
DLI	Dispatch Load Input - A load weigher device can be connected to this input. When the input is activated, the door dwell time will be eliminated when the elevator has an up direction at the Lobby Floor.
DLS	Door Lock Sensor Input - Monitors the state of the contacts in the landing door lock string. Power will be present on the DLS input when all landing doors are closed and locked.
DLSR	DLS for rear doors.
DNI	Down Input (Attendant Service).
DPM	Front Door Position Monitor Input - Makes when the car door is approximately 1 inch from being closed. DPM input will be active once the door fully closes. Moving the door approximately 1 inch will remove power from the DPM input due to the switch breaking.
DPMR	Rear Door Position Monitor Input - Makes when the car door is approximately 1 inch from being closed. DPMR input will be active once the door fully closes. Moving the door approximately 1 inch will remove power from the DPMR input due to the switch breaking.
DSTI	Door Stop Input.
DSTIR	DSTI for rear doors.
ECRN	Emergency Car Freeze Input - This input is used with EMP-OVL product and will cause the car to freeze, allowing others cars to return on emergency power.
EDS	Earthquake Direction Switch Input - This input is received from the Direction Switch and is activated when the car is beside the counterweight.
EDTLS	Earthquake Direction Terminal Limit Switch - When active, this input indicates that the car is above the counterweight. When not active, this input indicates that the car is below the counterweight.
EMSC	Emergency Medical Switch Car.

SPARE INPUTS MENU OPTIONS	
EMSH	Emergency Medical Switch Hall.
EPI	Emergency Power Input (see Section 5.4.9.5 for more details).
EPR	Emergency Power Return Input - This input is used with the EMP-OVL product and allows the car to return to the lobby landing on emergency power.
EPRUN	Emergency Power Run Input.
EPSTP	Emergency Power Stop Input.
ESS	Elevator Shutdown Input - When this input is activated, the car stops at the next landing in the direction of travel, cycles the doors and shuts down.
EXMLTC	Complimented EXMLT Input. This input provides reverse logic for the EXMLT function. EXMLT operation is initiated when this input goes low.
FCCC	Fire Phase 2 Call Cancel Button Input.
FCHLD	Fire Phase 2 Switch HOLD Position Input.
FCOFF	Fire Phase 2 Switch OFF Position Input.
FRAA	Fire Phase 1 Alternate (2nd alternate) Input.
FRAON	Fire Phase 1 Alternate Switch ON Position Input.
FRBYP	Fire Phase 1 Switch BYPASS Position Input.
FRON	Fire Phase 1 Switch ON Position Input.
FRON2	Fire Phase 1 Switch ON Position Input (additional input - same as FRON).
FRSA	Alternate Fire Service - This is a normally active input. When this input goes low, Alternate Fire Service operation is initiated and the FWL output (Fire Warning Light) will flash.
FRSM	Main Fire Service - This is a normally active input. When this input goes low, Main Fire Service operation is initiated and the FWL output (Fire Warning Light) will flash.
GOV	Governor input.
GS	Gate Switch Input - Makes up when the car door is approximately 1 inch from being fully closed. With the car door closed, there should be power on the GS input.
GSR	Gate Switch Rear Input.
HEATD	Heat Detector Input.
HLI	Heavy Load Input - A load weigher device can be connected to this input. When the input is activated, the controller will not answer hall calls.
HML	Home Landing Input - This input is used with the primary parking feature and will determine whether the car will park or not.
HOSP	Hospital Emergency Operation Input.
INA	INAX relay coil monitoring input.
INT	Intermediate Speed Input.
IRCOF	Front Infra Red Cutout. - This is a normally active input. When this input goes low, the infra red detector signal is ignored for the ***front*** door only and the door will always close at reduced torque and speed, i.e., nudge closed unless the door requires a constant door close button signal to close. In this case the door will close at full speed.
IRCOR	Rear Infra Red Cutout - This is a normally active input. When this input goes low, the infra red detector signal is ignored for the ***rear*** door only and the door will always close at reduced torque and speed, i.e., nudge closed unless the door requires a constant door close button signal to close. In this case the door will close at full speed.
LLI	Light Load Input - A load weigher device can be connected to this input (see Section 5.4.9.6 for details).
LSR	Landing System Redundancy Input - This input is used for redundancy checking. It monitors DZ (Door Zone), LU (Level Up), and LD (Level Down). The LSR input will go low at least once during a run. If, however, the DZ sensor has failed closed, power will be present on the LSR input and the car will not be able to restart. The LSR FAIL message will be displayed.
LWB	Load Weigher Bypass - This input is used to bypass the load weigher inputs (LLI, HLI, OVL and DLI).
MGS	Motor Generator Shutdown Input (see Section 5.4.9.10).
NSI	Non-Stop Input (Attendant Service)
OVL	Overload Input.
OVL2	Overload 2 Input. While on Fire Phase II, when the car is stopped at a landing with the doors open, activation of this input will hold the doors open until the overload condition is cleared by deactivating the input (only used for the ANSI A17.1-2000 fire service code).
PFGE	Passing Floor Gong Enable Input (see Section 5.4.6.3).

SPARE INPUTS MENU OPTIONS	
PSS	Pressure Switch Input. When activated (low), this input will cause the elevator to stop immediately.
PTI	Power Transfer Input - When this input is activated, it causes the car to stop at the next landing in the direction of travel, open the doors and shut down. This input is typically used with Emergency Power when transferring from normal power to emergency power (testing) or emergency power to normal power.
R2AB	Redundancy monitoring input for the 2AB relay contact.
R5, R4, R3, R2	Floor Encoding Inputs - These inputs are required for jobs with absolute floor encoding. See Section 5.4.9.2 for more details about floor encoding inputs.
RBAB	Redundancy monitoring input for the BAB relay contact.
RDLSR	Rear Hoistway Door Lock Contacts Relay Status - The RDLSR input monitors the status of the DLSR relays, for the purpose of redundancy checking.
REO	Re-Open Input.
RGS	Gate Switch Relay Redundancy - Makes up when the car door is approximately 1 inch from fully closed. With the car door closed, there will be power on the RGS input.
RGSR	Gate Switch Relay Redundancy Rear Input
RINAX	Redundancy monitoring input for the INAX relay contact
RSAFM	Redundancy SAFM Input. This input is used to monitor the SAFM relay contact.
SAB	Sabbath Operation Input. This input is used to select Sabbath Operation. This mode will move the car through the hoistway, stopping at landings that are programmed in the Extra Features Menu.
SAFC	Car Safety Input.
SAFH	Hoistway Safety Input.
SE	Safety Edge Input - Activating this input will open the doors. The doors will remain open as long as this input is active. (ASME A17.1-2000)
SIMP	Simplex Input - Activation of this input will cause the car to behave as a simplex. As a simplex, the car will respond to hall calls registered on its own call circuitry (it will not accept hall calls assigned to it by another controller connected to it) and will perform its own parking function (independent of the other controller).
STARTIN	Start Input - The STARTIN input is used for the START position of the three position fire phase two switch for Australian jobs. When activated, it will cause the front and rear doors to close. The car will not proceed to answer car calls during fire phase two until the STARTIN input has been activated.
STOP	In-car Stop Switch Safety Input.
TEST	TEST Switch Input. This input will monitor the TEST/NORM Switch located on the Relay Board to differentiate between Test and Independent Operation. This input is normally high and will go low when the switch is placed in the Test position.
UDF	Up and Down Direction Relay Fault Input.
UPI	Up Input (Attendant Service).
WLD	Emergency Dispatch Input.

5.4.8 SPARE OUTPUTS MENU OPTIONS

There are 8 spare output terminals on the HC-IOX board(s) and 4 spare output terminals on the HC-I4O board(s). The maximum number of spare outputs possible is 32. Any of these spare outputs may be used for any of the output signals listed below.

SPARE OUTPUTS MENU OPTIONS	
900	Car Call Cancellation Output - This output is generated at the time of registration of a car call. This output is used to comply with specific handicap codes (*barrier-free* codes) that require an audible acknowledgment of car call registration
ABZ	Attendant Service Buzzer Output.
CCDE	Car Call Disconnect Enable Output - This output comes *ON* when the car calls are canceled during PHE anti-nuisance operation
CCT	Car Call Time Flag Output - This flag is activated upon *normal* response and cancellation of a car call, and remains active until the car call door dwell time elapses or is canceled.
CD	Car Done on Emergency Power Output - This output is active when the car has finished returning on emergency power or when it has been determined that the car cannot lower.

SPARE OUTPUTS MENU OPTIONS	
CFLT	This output is currently used for Canadian Standards Association (CSA) code only. If this is the applicable code for the installation, please refer to the Compliance Report included with the job.
CGED	Car Gong Enable Down Output.
CGEDR	CGED for rear doors Output.
CGEU	Car Gong Enable Up Output.
CGEUR	CGEU for rear doors Output.
CGF	Car Generated Fault Output.
CHBPO	This output is active whenever a door is being bypassed (car gate or hoistway door for both the front and rear sides).
CSB	Car Stop Switch Bypass Output.
CSEO	Code Sequence Enable Output. Formerly called SCE (Security Code Enable). This output will be *ON* during the time a security code is being entered to register a car call while on MCE's Standard Security.
CSR	Car Selected to Run Output - This output is generated when the car is selected to run on emergency power phase 2 (via the AUTO or EPRUN input).
CTLDOT	Car-to-Lobby Door Open Timer Output - This output is generated upon completion of the car to lobby function (the car has returned to the lobby landing, the doors have opened, and the CTL door timer has expired).
DBZF	Front Door Buzzer - Prior to automatic closing of the front doors, this output will be active for the length of time determined by the Door Buzzer Timer.
DBZR	Rear Door Buzzer - Prior to automatic closing of the rear doors, this output will be active for the length of time determined by the Door Buzzer Timer.
DHEND	Door Hold End Output. This output will turn *ON* five seconds prior to when the Door Hold Timer expires.
DHENDR	Door Hold End Rear Output. This output will turn *ON* five seconds prior to when the Door Hold Rear Timer expires.
DHO	Door Hold Output - This output indicates that the doors are being held open by the *door hold input* function (the DHLD input is active, or the timer associated with the door hold function has not yet elapsed).
DLOB	Door Left Open Bell Output.
DNO	Down output (Attendant Service).
DO1,	**DO2, DO4, DO8, DO16, D032** Binary coded P.I. outputs for digital P.I. devices.
DSH	Door Time Shortening Output (intermediate) - This output is generated whenever a *destination car call* button is pressed (this action causes the shortening of the door dwell time if the doors are fully open).
DSHT	Door Time Shortening - This output is generated if either a *destination car call* button is pressed, or if the door close button for the front doors is pressed.
DSHTR	Door Time Shortening Rear - This output is generated if either a *destination car call* button is pressed, or if the door close button for the rear doors is pressed.
ECRN	Emergency Power Car Run Output - This output is associated with the emergency power logic. Activation of this output indicates that the car is being prevented from running by the emergency power operation logic.
EFG	Egress Floor Gong Output.
EMSB	Emergency Medical Service Buzzer Output
EMSIC	Emergency Medical Service Indicator Car Output.
EMSIH	Emergency Medical Service Indicator Hall Output.
EP1	Emergency Power Phase 1 Output - This output is generated when the system is in the first phase of emergency power (the sequential lowering phase).
EP2	Emergency Power Phase 2 Output- This output is generated when the system is in the second phase of emergency power (the *normal running* of a car on emergency power generators).
EQIND	Earthquake Indicator Output - This output is generated when the CWI input is activated and the car is out of a door zone on Independent Service (only during the 10 seconds the car waits before moving).
FIR1	Fire Service Phase I output - This output is activated during Fire Service Phase I operation.
FLASH	Flash output - This output turns ON and OFF at 0.5 second intervals.

SPARE OUTPUTS MENU OPTIONS	
FLO	Fan/Light Operation Output - This output is used to turn *OFF* the fan and the light within the car. The output is usually *OFF.* It is turned *ON* after the Fan/Light Timer elapses. The timing starts when the car becomes inactive.
FRC	Fire Service Phase 2 Output.
FRM	Fire Service Phase 1 Output.
FSA	Fire Service Alternate Output.
FSM	Fire Service Main Output.
FSO	Fire Service On Output.
FSVC	True Fire Service Output. This input is used to indicate when the car is on Fire Service Phase One or Two.
FWL	Fire Warning Light Output - This output is used to indicate when the car is on Fire Phase 1 or 2. It will flash if the Machine Room or Hoistway fire sensor is active.
HCP	Hall call pushed output - This output is active whenever a hall call button is pressed. It is only activated for the amount of time that the button is being pressed.
HCR	Hall Call Reject Output.
HDSC	Heat Detector Shutdown Complete Output.
HLW	Heavy Load Weigher Output - This output will be generated when the car is heavy loaded, shown by the HLI input (see Section 5.4.7).
INDFRC	Independent Service/Fire Service Phase 2 Output - This output is needed for all elevators with either Single Button Collective or Single Automatic Pushbutton Operation (see Section 5.4.2.2). This output will be used to cut out hall calls during Fire Service and Independent Service.
ISRT	In Service and Running Output. This output reflects the car's ability to respond to hall calls(the ISRT status). ISRT is active when the car's status is such that it can answer hall calls.
ISV	In Service Output.
IUL	In Use Light output - This output activates when the car is in use, e.g., the car is in motion or the doors are open.
LLW	Light Load Weigher Output - This output will be generated when the LLI input is activated and the required number of car calls have been registered (see Section 5.4.9.6 for more details).
MISV	Mechanically In Service Output.
MLT	Motor Limit Timer Elapsed Output
NCD	Car Not Done with Emergency Power Return Output - This output may only be used if the elevator has Emergency Power Operation (see Section 5.4.9.5).
OFR	One Floor Run Output - This output is generated when the car initiates a run and remains active until the car encounters the first door zone in its movement (the output is active while traversing the first floor height in its direction of travel).
OFRP	One Floor Run Programmable Output. This output will be active while making one-floor runs between adjacent floors designated in the Extra Features Menu.
OLW	Overloaded Car Threshold Output - This output is set when the threshold value considered to be unsafe to move the elevator is reached. When this threshold is exceeded, the car will remain at the floor with doors open.
PH1	Fire Service Phase 1 Return Complete Output - This output is most often used as a signal to activate the machine room sprinklers.
PRIFLG	Priority Service Output - This is to indicate to the emergency power overlay which car should be selected to run if it is on an emergency/priority service.
SEC	Security Code Incorrect Output - When the building's elevator security is on, this output will turn on for five seconds when an incorrect security code is entered.
SIMPO	Simplex Output - This output comes on when the SIMP input is activated or when Simplex Operation is chosen through KCE (if available).
TOS	Time Out of Service Output.
UPO	Up Output (Attendant Service).
WLDI	*Wildop* Indication Output - This output is generated if the car is in emergency dispatch mode of operation (i.e., if the hall call bus fuse is blown and *emergency dispatching* is activated).
XPI1 - XPI7	Auxiliary Position Indicators 1 thru 7. These outputs behave identically to the standard PI1 - PI7 outputs except that the XPI1 - XPI7 outputs are disabled on Inspection or during Fire Service Phase I and II.

SPARE OUTPUTS MENU OPTIONS	
XSDA	Auxiliary Supervisory Down Arrow - This output behaves identically to the standard SDA output except that the XSDA output is disabled on Inspection and during Fire Service Phase I and II.
XSUA	Auxiliary Supervisory Up Arrow - This output behaves identically to the standard SUA output except that the XSUA output is disabled on Inspection and during Fire Service Phase I and II.
ZADJ	Zero Adjust - This output is used to cause the analog load weigher to perform its zero adjust procedure. The output is generated once every 31 hours or whenever the car is idle at the bottom floor for 30 seconds.

5.4.9 EXTRA FEATURES MENU OPTIONS

5.4.9.1 PI OUTPUT TYPE - Choose either 1 WIRE PER FLOOR or BINARY-CODED PIs, depending on the inputs required by the P.I. device itself.

5.4.9.2 FLOOR ENCODING INPUTS? - If this option is selected whenever the car is in a door zone, the computer checks the floor code inputs and corrects the P.I. if necessary. The code inputs are provided by the landing system (refer to the Job Prints). Refer to R4, R3, R2 in Section 5.4.7.

5.4.9.3 ENCODE ALL FLOORS? - This option is only available when the Floor Encoding option is programmed to YES. This option indicates at what landing the Absolute Floor Encoding values begin. When set to YES, then every landing must have AFE code values, including the terminal landings. When set to NO, then only intermediate landings must have AFE code values.

5.4.9.4 INTERMEDIATE SPEED? - This option must be selected for all elevators that use Intermediate speed.

5.4.9.5 EMERGENCY POWER OPERATION? / EMERGENCY POWER RETURN FLOOR - If this option is selected, the controller will put the elevator into Emergency Power Operation when the controller receives the Emergency Power Input (EPI) signal. During Phase 1 of Emergency Power Operation, the car will be moved to the emergency power return floor. In a duplex controller, each car will be moved to the emergency power return floor, one at a time.

During Phase 2 of Emergency Power Operation, if the car's Emergency Power Run (EPRUN) input is activated, the car will run normally. Otherwise, the car will remain at the emergency power return floor and will not respond to any calls.

For a simplex controller, the car's EPRUN input is sometimes connected to a switch, so that the input can be turned *ON* and *OFF.* For a duplex controller, both cars' EPRUN inputs are usually connected to a Run Selection switch. The position of this switch determines which car will run during Phase 2 of Emergency Power Operation.

Often there is an AUTO position on the Run Selection switch connected to the AUTO input on both controllers in a duplex. If the AUTO input is activated, then one car will be automatically selected to run during Phase 2 of Emergency Power Operation. For example: If one car happens to be out of service when the operation begins, the other car will be automatically selected to run.

If the Emergency Power option is selected, then the appropriate spare inputs should be selected also (see Section 5.4.7).

5.4.9.6 LIGHT LOAD WEIGHING? / LIGHT LOAD CAR CALL LIMIT - This option is only used when the Light Load Weigher Input is activated (refer to Section 5.4.7, LLI spare input). To program this option, activate the LLI input. Then, set LIGHT LOAD WEIGHING? to *NO* or press ***S*** to select the maximum number of car calls registered before all the car calls are canceled. If ***S*** is pressed, the display will read LIGHT LOAD CAR CALL LIMIT. Press ***S*** until the desired number is displayed.

5.4.9.7 PHOTO EYE ANTI-NUISANCE? / CONSEC STOPS W/O PHE LIMIT - When this option is *ON*, the car calls will cancel if the Photo Eye input has not been activated after a programmed number of consecutive stops. The number of consecutive stops must be programmed before the car calls will cancel. To program this option, set PHOTO EYE ANTI-NUISANCE? to *NO* or press ***S*** to select the number of consecutive stops. If ***S*** is pressed, the display will read CONSEC STOPS W/O PHE LIMIT. Press ***S*** until the desired number is displayed.

5.4.9.8 EARTHQUAKE OPERATION - The controller should be equipped with the proper circuitry before selecting the inputs needed for Earthquake Operation. This option can be set to ANSI EARTHQUAKE OPERATION or CALIFORNIA EARTHQUAKE OPERATION. Descriptions of these options follow.

1. ANSI EARTHQUAKE OPERATION - When ANSI Earthquake Operation is selected upon activation of a Seismic switch (EQI input), the elevator in motion will continue to the nearest available floor at a speed of not more than 150 ft/min (0.76 m/s), open the doors and shut down. If the Counterweight Displacement switch is not activated (CWI), the elevator will be allowed to run at reduced speed on Automatic Operation.

   If the elevator is in motion when the Counterweight Displacement switch is activated (CWI input) an emergency stop is initiated and then the car will proceed away from the counterweight at reduced speed to the nearest available floor, open the doors and shut down. For this operation the Earthquake Direction Switch input (EDS) must be selected (see Section 5.4.7). An elevator may be returned to Normal service by means of the Momentary Reset button on the HC-EQ2 board, provided that the Displacement switch (CWI) is no longer activated.

2. CALIFORNIA EARTHQUAKE OPERATION - When CALIF Earthquake Operation is selected upon activation of a Seismic switch (EQI input), the elevator, if in motion, will proceed to the nearest available floor at a speed of not more than 150 ft/min (0.76 m/s) open the doors and shut down.

   When a Counterweight Displacement switch is required and the Counterweight Displacement switch (CWI input) has been activated, the elevator, if in motion, will initiate an emergency stop and proceed away from the counterweight at reduced speed to the nearest available floor, open the doors and shut down. For this operation, the Earthquake Direction Switch (EDS) input must be selected (see Section 5.4.7). An elevator may be returned to Normal service by means of the Momentary Reset button on the HC-EQ2 board, provided that the Displacement switch (CWI) is not activated. When Earthquake Operation is needed, the appropriate spare inputs should be selected (see Section 5.4.7).

5.4.9.9 COUNTERWEIGHTED DRUM MACHINE? - Only jobs that are termed “Counterweighted Drum Machines” should set this option to Yes. For normal California jobs, this option should be set to NO. When set to YES it indicates that there is only one Earthquake input, EQI. When activated, EQI will shut down the elevator and will not move it until EQI is reset. Once deactivated, the car will move to the next landing and cycle the doors before returning to normal operation.

5.4.9.10 MG SHUTDOWN OPERATION? / MGS RETURN FLOOR - This option will cause a car to return to the landing specified whenever the MGS input is activated. Once the car has reached the specified floor, the doors will cycle and the car will be shut down with the MGR output turned *OFF*. To program this option, set MG SHUTDOWN OPERATION? to NO or press ***S*** to select the return floor. If ***S*** is pressed, the display will read MGS RETURN FLOOR. Press ***S*** until the desired floor number is displayed.

5.4.9.11 PERIPHERAL DEVICE? - If this option is set to YES, it allows for various peripheral devices to be used. Currently the controller has 2 Communication Ports that can be programmed. Press ***N*** to select the media for COM Port 1. The display will read PA COM1 MEDIA. One of the following media may be selected:

- SERIAL CABLE
- LINE DRIVER
- MODEM
- NONE

Press ***N*** again to select the peripheral device that will be connected to COM Port 1. The display will read PA COM 1 DEVICE. One of the following peripherals may be selected:

- CRT - NO KEYBOARD (color or monochrome)
- CRT AND KEYBOARD (color or monochrome)
- PERSONAL COMP. (to be used with CMS or as a graphic display)

If one of the CRT options was selected, the next option will be COLOR CRT? Select YES if you have a color CRT or NO if you have a monochrome CRT. If PERSONAL COMPUTER was selected as the peripheral device, the next option will be FUNCTION. Select CMS or GRAPHIC DISPLAY.

A similar set of options will be displayed for COM Port 2. Each Communication Port (COM 1 and COM 2) must be programmed for a device and a media according to the particular job specifications to allow the particular peripheral device to operate properly.

5.4.9.12 AUTOMATIC FLOOR STOP OPTION? - When this option is set to a specific floor number, the car will automatically stop at that floor as the car is passing it.

5.4.9.13 CC CANCEL W/DIR REVERSAL? - This option will cause all of the previously registered car calls to be canceled whenever a direction reversal is detected.

5.4.9.14 CANCEL CAR CALLS BEHIND CAR? - If this option is set to *YES* and 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, no car calls can be registered from sixth floor and above.

5.4.9.15 CE ELECTRONICS INTERFACE? - This option allows information such as position and arrival gong outputs to be provided for a CE electronics device. This option is to be used with the CE2242 CE Electronics Interface board which provides a 3-wire serial interface to CE electronic fixtures.

5.4.9.16 MASSACHUSETTS EMS SERVICE? / EMS SERVICE FLOOR # - This option is provided in the state of Massachusetts only. This option is key-operated and provides immediate car service for Massachusetts Emergency Medical Service personnel.

5.4.9.17 MASTER SOFTWARE KEY - This option is a board-level control of the security system. MCE Security is initiated by the Master Software Key. There are three possible settings for the Master Software Key: ACTIVATED, ENABLED, and DEACTIVATED.

- If set to ACTIVATED, Security is initiated.
- If set to ENABLED, Security is initiated if the Building Security Input (BSI) is *ON*.
- If set to DEACTIVATED, Security is deactivated regardless of the status of the BSI input.

5.4.9.18 PI TURNED OFF IF NO DEMAND? - Setting this option to yes will allow the PI outputs to turn *OFF* if the car has been inactive for an adjustable time (from 1 to 10 minutes)

5.4.9.19 HOSPITAL EMERG. OPERATION? - This option calls any eligible in-service elevator to any floor on an emergency basis. If this installation has Hospital Emergency Service Operation, a hospital emergency call switch will be installed at each floor where this service is desired.

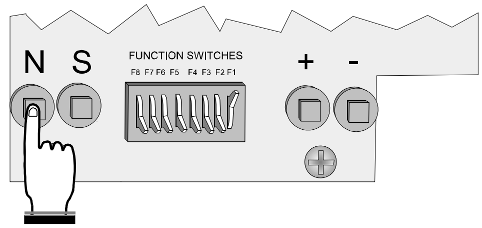
When the hospital emergency momentary call switch is activated at any floor, the hospital emergency call registered light will illuminate at that floor only, and the nearest available elevator will respond to the hospital emergency call. All car calls within the selected car will be canceled and any landing calls which had previously been assigned to that car will be transferred to the other car. If the selected car is traveling away from the hospital emergency call, it will slow down and stop at the nearest floor without opening the doors, reverse direction, and proceed nonstop to the hospital emergency floor. If the selected car is traveling toward the hospital emergency floor, it shall proceed nonstop to that floor. At the time of selection, if the car happens to slow down for a stop, it will stop without opening the doors and then start immediately toward the hospital emergency floor.
When the car reaches the hospital emergency floor, it will remain with doors open for a pre-determined time interval. After this interval has expired, if the car has not been placed on in-car Hospital Emergency Service Operation, the car will automatically return to normal service.

A hospital emergency key switch will be located in each car operating station for selecting in-car Hospital Emergency Service Operation. Upon activation of the key switch, the car will be ready to accept a call for any floor, and after the doors are closed, will proceed nonstop to that floor. Returning the key switch to the normal position will restore the car to normal service.

Either car selected to respond to a hospital emergency call will be removed from automatic service and will accept no additional calls, emergency or otherwise, until it completes the initial hospital emergency function. If both cars are out of service and unable to answer an emergency call, the hospital emergency call registered light will not illuminate.

Four outputs are available on the first HC-CI/O-E board used for the hospital emergency service calls. Hospital Emergency Operation (HEO) will flash once the car has been selected to respond to a hospital emergency call and will remain flashing until the in-car hospital switch is returned to normal or the time interval that the car must wait for the in-car switch to be turned *ON* expires. Hospital Emergency Warning Indicator (HWI) will remain steadily *ON* for a car on Independent Service when the hospital call is registered. Hospital Emergency Select (HSEL) will remain steadily *ON*, indicating that the car has been selected to answer a hospital call, until the in-car hospital switch is turned *ON* or the time interval expires. Hospital Emergency Phase 2 (HOSPH2) will remain *ON*, indicating that the car has arrived at the floor where the hospital call was registered, until the in-car hospital switch is returned to normal or the time interval that the car must wait for the in-car switch to be turned *ON* expires.

If you do not have Hospital Emergency Service Operation, set this option to *NO* by pressing the ***S*** pushbutton. Then, press the ***N*** pushbutton to exit this option.



If you have Hospital Emergency Service Operation, set this option to *YES* by pressing the ***S*** pushbutton. Press the ***N*** pushbutton to continue. The following display will appear:

HOSPITAL CALLS
FRNT/FLR1? YES

If you want Hospital Emergency Service to this landing, then set this option to *YES* by pressing the ***S*** pushbutton (press ***S*** again to set the option to *NO*). Press the '+' pushbutton to scroll through the available landings. Press the ***N*** pushbutton to continue. If this car has rear doors, then the following will be displayed:

HOSPITAL CALLS
REAR/FLR1? YES

Press the '+' pushbutton to scroll through the available landings. The computer will continue to present these options for each floor, up to the top floor. Press the ***N*** pushbutton to exit the Hospital Emergency Service option.

5.4.9.20 FIRE BYPASSES HOSPITAL? - Set this option to YES if Hospital Service is used for VIP, Priority or Commandeering Service. Set this option to NO if Hospital Service is *truly* used for Hospital Service.

5.4.9.21 HIGH SPEED DELAY AFTER RUN? - Setting this option will insert a fixed delay (3 seconds) between the completion of a run and the initiation of the next run. This option should be used in applications in which an immediate “stop/start” is undesirable. Under most “normal” circumstances, the initiation of a run is delayed by the time required for the door operation. In some cases, however, the car may stop and start immediately in the absence of a door operation (example: a direction reversal upon being assigned a hall call while the car is parking).

5.4.9.22 SINGLE SPEED A.C. OPTION? - Setting this option allows the direction output to clear once the car “steps” into the floor. Typically the direction output is not cleared until the car enters door zone. However, for applications only requiring one speed, the direction must be cleared prior to door zone to allow the car to arrive into the landing properly.

5.4.9.23 SABBATH OPERATION? - If you do not have Sabbath Operation, set this option to *NO* by pressing the ***S*** Pushbutton. Then, press the ***N*** pushbutton to exit this option.

If you have Sabbath Operation, set this option to *YES* by pressing the ***S*** pushbutton. Press the ***N*** pushbutton to continue. The following display will appear:

“FRONT UP STOP AT FLOOR 1?”

If you want to set the car to stop at this floor while traveling in the UP direction, change *NO* to *YES* by pressing the ***S*** pushbutton (press ***S*** again to set this option to *NO*). Press the **+** pushbutton to increment floor value to the next landing. Continue until all of the desired front UP stops are set to *YES*.

Press the ***N*** pushbutton to proceed to the next eligibility map. If "walk through doors" are not programmed on this controller, then rear eligibility maps will not display. In order, the next eligibility maps are as follows:

"REAR UP STOP AT FLOOR 1?"
"FRONT DOWN STOP AT FLOOR 2?"
"REAR DOWN STOP AT FLOOR 2?"

Remember that the **+** pushbutton increments the floor value to the next landing. And that the ***N*** pushbutton will proceed to the next eligibility map.

5.4.9.24 INTERMEDIATE SPEED BETWEEN FLOORS? - This option will only be available if the controller has the Intermediate Speed option set to *YES*. It allows each individual floor run to be selected to run at high speed or at intermediate speed.

If you want the car to move at intermediate speed between the shown floors, set the option to *YES*, otherwise set it to *NO*. Press the **+** pushbutton to increment the floor values to the next landings. Continue until all intermediate speed floors have been selected. Press the ***N*** pushbutton to continue to the next option.

5.4.9.25 LEVELING SENSOR ENABLED/DISABLED - If this option is set to disabled, the LFLT ON, LFLT OFF and DZ STUCK errors will not be generated.

5.4.9.26 KCE ENABLE / DISABLE - The KCE Enable is set to ON when ENABLE is selected or OFF when DISABLE is selected from the menu display.

5.4.9.27 ANALOG LOAD WEIGHER? NONE / MCE / K-TECH - This option enables the analog load weigher logic and selects the type of learn operation to be performed, depending on the type of load weigher installed.

5.4.9.29 IND. BYPASS SECURITY? YES / NO - This option determines if Elevator Security is bypassed when the car is on Independent Service (available only when Security is enabled).

5.4.9.30 ATS. BYPASS SECURITY? YES / NO - This option determines if Elevator Security should be bypassed when the car is on Attendant Service (available only when Security and Attendant Service are enabled).

5.4.9.31 CAR TO FLOOR RETURN FLOOR - This option determines the floor to which the car will be returned when the CAR TO FLOOR input is activated (see CTF in Spare Inputs Menu Options).

5.4.9.32 SCROLLING SPEED (SLOW / NORMAL / FAST) - Menu options which are too long to be fully displayed on the LCD display are scrolled. This option determines the scrolling speed.

5.4.9.33 OFRP BETWEEN FLRS - This option indicates the floors in between which the OFRP spare output would trigger.

5.4.10 ASME A17.1 2000 FEATURES MENU

5.4.10.1 ETS SWITCHES REQUIRED? (YES/NO) - Set this option to YES for elevators that require Emergency Terminal Switches.

5.4.10.2 HOISTWAY ACCESS? (YES/NO) - Set this option to YES on elevators with Hoistway Access operation.

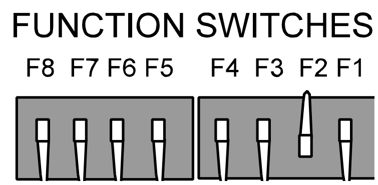
5.4.10.3 ANSI 2000 EARTHQUAKE? (YES/NO) - Set this option to YES for elevators with Earthquake operation.

5.5 EXTERNAL MEMORY MODE

External Memory mode can be used to view memory addresses in the external RAM on the MC-PCA-OA-2K board. The external memory address is denoted by the letters DA (Data Address). The ability to view the external memory can also be helpful for diagnosing and troubleshooting the elevator system. The Computer External Memory Chart (Table 5.7) shows the meaning of the data digits at different addresses.

5.5.1 GETTING INTO EXTERNAL MEMORY MODE

External Memory mode is initiated by placing the ***F2*** switch in the up position (see Figure 5.1). The following is a description of the LCD display format and the function of the *N*, *S*, +, and – pushbuttons during External Memory mode.



External Memory mode

5.5.2 FUNCTION OF N PUSHBUTTON

EXTERNAL MEMORY
DA.1234:10110011

The ***N*** pushbutton (see Figure 5.1) allows for the advancement of the computer memory address, which is displayed on the second line of the LCD display. For example, for this display, pressing the ***N*** pushbutton once (hold it for 1-2 seconds) will cause the 1 in the address 1234 to begin blinking. By continuing to press the ***N*** pushbutton, the 2 in the address 1234 will begin to blink. The cycle will continue while the ***N*** pushbutton is being pressed. Once the digit needed to be changed is blinking, the address can then be modified.

The data (8 digits) that correspond to the external memory address is displayed to the right of the address. This data display will change as the memory address changes.

5.5.3 FUNCTION OF S PUSHBUTTON

The ***S*** pushbutton (see Figure 5.1) ends the ability to change the address by stopping the digit from blinking. If the ***S*** pushbutton is not pressed, the selected digit will stop blinking automatically after 20 seconds.

5.5.4 FUNCTION OF + PUSHBUTTON

The **+** pushbutton (see Figure 5.1) modifies the digit of the computer memory address selected by the ***N*** pushbutton. If the **+** button is pressed, the selected digit is incremented by one. The data display will also change as the address changes. For example, if the 2 of the address 1234 is blinking, pressing the **+** pushbutton once will change the address from 1234 to 1334. Pressing the **+** pushbutton several more times will change the address to 1434, 1534, 1634, etc., up to 1F34 and then back to 1034.

5.5.5 FUNCTION OF – PUSHBUTTON

The **–** pushbutton (see Figure 5.1) modifies the digit of the computer memory address selected by the ***N*** pushbutton. If the **–** pushbutton is pressed, the selected digit is decreased by one. The data display will also change as the address changes. For example: If the 2 in the address 1234 is blinking, pressing the **–** pushbutton once will change the address from 1234 to 1134. Pressing the **–** pushbutton several more times will change the address to 1034, 1F34, 1E34, etc.

5.5.6 TROUBLESHOOTING USING EXTERNAL MEMORY MODE

By using the computer's External Memory mode, it is possible to find out if the controller is receiving call signals, as well as spare input and output signals, correctly.

5.5.6.1 The following example illustrates how to use Table 5.7 to check a signal in the computer's external memory.

Example: The DHLD (Door Hold Open Switch) input will not cause the doors to stay open. DHLD is programmed for the Spare 5 input.

Step 1: Find SP5 in Table 5.7. Notice that the Address of SP5 is 02AF and the Position is 4.

Step 2: Look up the signal on the computer. Change the address on the display to Address 02AF (see Section 5.6). Look at data bit number 4 (from the right), which is underlined in the following display:

EXTERNAL MEMORY
DA.02 AF:10110011

This digit represents the computer's interpretation of the Spare 5 input signal. If the digit is 1, the computer thinks that the SP5 signal is *ON*. If the digit is 0, the computer thinks that the SP5 signal is *OFF*. This information can be used to determine the source of the problem. If the Spare 5 input is programmed for the DHLD (Door Hold) input and the doors are not staying open, the diagnostic display will show that the SP5 input is *OFF*. If this is the case, checking the voltage on the SP5 terminal will show whether the problem is inside or outside the controller.

TABLE 5.7 Computer External Memory Chart

	HALL CALLS						CAR CALLS	
ADD	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
0140:	601R/UC1R	601/UC1					101R/CC1R	101/CC1
0141:	602R/UC2R	602/UC2	502R/DC2R	502/DC2			102R/CC2R	102/CC2
0142:	603R/UC3R	603/UC3	503R/DC3R	503/DC3			103R/CC3R	103/CC3
0143:	604R/UC4R	604/UC4	504R/DC4R	504/DC4			104R/CC4R	104/CC4
0144:	605R/UC5R	605/UC5	505R/DC5R	505/DC5			105R/CC5R	105/CC5
0145:	606R/UC6R	606/UC6	506R/DC6R	506/DC6			106R/CC6R	106/CC6
0146:	607R/UC7R	607/UC7	507R/DC7R	507/DC7			107R/CC7R	107/CC7
0147:	608R/UC8R	608/UC8	508R/DC8R	508/DC8			108R/CC8R	108/CC8
0148:	609R/UC9R	609/UC9	509R/DC9R	509/DC9			109R/CC9R	109/CC9
0149:	610R/UC10R	610/UC10	510R/DC10R	510/DC10			110R/CC10R	110/CC10
014A:	611R/UC11R	611/UC11	511R/DC11R	511/DC11			111R/CC11R	111/CC11
014B:	612R/UC12R	612/UC12	512R/DC12R	512/DC12			112R/CC12R	112/CC12
014C:	613R/UC13R	613/UC13	513R/DC13R	513/DC13			113R/CC13R	113/CC13
014D:	614R/UC14R	614/UC14	514R/DC14R	514/DC14			114R/CC14R	114/CC14
014E:	615R/UC15R	615/UC15	515R/DC15R	515/DC15			115R/CC15R	115/CC15
014F:	616R/UC16R	616/UC16	516R/DC16R	516/DC16			116R/CC16R	116/CC16
0150:	617R/UC17R	617/UC17	517R/DC17R	517/DC17			117R/CC17R	117/CC17
0151:	618R/UC18R	618/UC18	518R/DC18R	518/DC18			118R/CC18R	118/CC18
0152:	619R/UC19R	619/UC19	519R/DC19R	519/DC19			119R/CC19R	119/CC19
0153:	620R/UC20R	620/UC20	520R/DC20R	520/DC20			120R/CC20R	120//CC20
0154:	621R/UC21R	621/UC21	521R/DC21R	521/DC21			121R/CC21R	121/CC21
0155:	622R/UC22R	622/UC22	522R/DC22R	522/DC22			122R/CC22R	122/CC22
0156:	623R/UC23R	623/UC23	523R/DC23R	523/DC23			123R/CC23R	123/CC23
0157:	624R/UC24R	624/UC24	524R/DC24R	524/DC24			124R/CC24R	124/CC24
0158:	625R/UC25R	625/UC25	525R/DC25R	525/DC25			125R/CC25R	125/CC25
0159:	626R/UC26R	626/UC26	526R/DC26R	526/DC26			126R/CC26R	126/CC26
015A:	627R/UC27R	627/UC27	527R/DC27R	527/DC27			127R/CC27R	127/CC27
015B:	628R/UC28R	628/UC28	528R/DC28R	528DC28			128R/CC28R	128/CC28
015C:	629R/UC29R	629/UC29	529R/DC29R	529/DC29			129R/CC29R	129/CC29
015D:	630R/UC30R	630/UC30	530R/DC30R	530/DC30			130R/CC30R	130/CC30
015E:	631R/UC31R	631/UC31	531R/DC31R	531/DC31			131R/CC31R	131/CC31
015F:			532R/DC32R	532/DC32			132R/CC32R	132/CC32
SPARE INPUTS								
ADD	8	7	6	5	4	3	2	1
02AF:	SP9	SP8	SP7	SP6	SP5	SP4	SP3	SP2
02B0:	SP17	SP16	SP15	SP14	SP13	SP12	SP11	SP10
02B1	SP25	SP24	SP23	SP22	SP21	SP20	SP19	SP18
02B2	SP33	SP32	SP31	SP30	SP29	SP28	SP27	SP26
02B3	SP41	SP40	SP39	SP38	SP37	SP36	SP35	SP34
02B4	SP49	SP48	SP47	SP46	SP45	SP44	SP43	SP42
SPARE OUTPUTS ✴								
ADD	8	7	6	5	4	3	2	1
02EF:	OUT8	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1
02F0:	OUT16	OUT15	OUT14	OUT13	OUT12	OUT11	OUT10	OUT9
02F1:	OUT24	OUT23	OUT22	OUT21	OUT20	OUT19	OUT18	OUT17
02F2:	OUT32	OUT31	OUT30	OUT29	OUT28	OUT27	OUT26	OUT25
✴ This table shows the spare outputs for HC-IOX boards. If an HC-I40 board is used, the outputs follow those of an HC-IOX board and are in the following format. Increment the output numbers accordingly.								
HC-I4O board spare output format								
ADD	8	7	6	5	4	3	2	1
02xx:	OUT4	OUT3	OUT2	OUT1	not used	not used	not used	not used

TABLE 5.8 Computer's Hospital Call and Eligibility Memory Chart

	HOSPITAL CALL ELIGIBILITY				HOSPITAL CALLS				
	OTHER CAR		THIS CAR		ASSIGNED HOSPITAL CALLS		REGISTERED HOSPITAL CALLS		
	REAR	FRONT	REAR	FRONT	REAR	FRONT	REAR	FRONT	
ADD	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
0240:							ECR1	EC1	Floor # 1
0241:							ECR2	EC2	Floor # 2
0242:							ECR3	EC3	Floor # 3
0243:							ECR4	EC4	Floor # 4
0244:							ECR5	EC5	Floor # 5
0245:							ECR6	EC6	Floor # 6
0246:							ECR7	EC7	Floor # 7
0247:							ECR8	EC8	Floor # 8
0248:							ECR9	EC9	Floor # 9
0249:							ECR10	EC10	Floor # 10
024A:							ECR11	EC11	Floor # 11
024B:							ECR12	EC12	Floor # 12
024C:							ECR13	EC13	Floor # 13
024D:							ECR14	EC14	Floor # 14
024E:							ECR15	EC15	Floor # 15
024F:							ECR16	EC16	Floor # 16
0250:							ECR17	EC17	Floor # 17
0251:							ECR18	EC18	Floor # 18
0252:							ECR19	EC19	Floor # 19
0253:							ECR20	EC20	Floor # 20
0254:							ECR21	EC21	Floor # 21
0255:							ECR22	EC22	Floor # 22
0256:							ECR23	EC23	Floor # 23
0257:							ECR24	EC24	Floor # 24
0258:							ECR25	EC25	Floor # 25
0259:							ECR26	EC26	Floor # 26
025A:							ECR27	EC27	Floor # 27
025B:							ECR28	EC28	Floor # 28
025C:							ECR29	EC29	Floor # 29
025D:							ECR30	EC30	Floor # 30
025E:							ECR31	EC31	Floor # 31
025F:							ECR32	EC32	Floor # 32

Legend for Table 5.8:

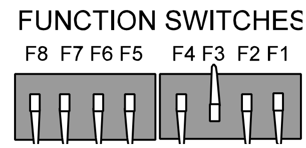
→ Registered hospital calls for the floor opening.
1 = call is registered 0 = call is not registered

→ Assigned hospital calls for the floor opening.
1 = Call is assigned 0 = Call is not assigned

→ The car is eligible for Hospital Emergency Service Operation for the floor opening.
1 = Hospital emergency call can be entered for the floor opening
0 = Hospital emergency call cannot be entered for the floor opening

5.6 SYSTEM MODE

System mode allows the user to change certain system-wide options that do not require the car to be on Inspection. To enter System mode, move the ***F3*** switch to the up position. Press the ***N*** pushbutton to select the desired System Mode item:



System mode

- Building Security Menu (see Section 5.6.1)
- Passcode Request Menu (see Section 5.6.2)
- Load Weigher Thresholds (see Section 5.6.3)
- Analog Load Weigher Learn Function (see Section 5.6.4)
- ASME A17.1 - 2000 Options (see Section 5.6.5)

5.6.1 BUILDING SECURITY MENU

Elevator Security is typically used to prevent access to specific floors via the elevators, or to limit access to passengers with a valid security code. MCE's elevator security options include Basic Security and Basic Security with CRT. Basic Security provides a means to prevent registration of unauthorized car calls. Basic Security with CRT provides a means to prevent registration of unauthorized car calls and/or hall calls and additional programming options are available via the CRT terminal. Refer to MCE's Elevator Security User's Guide, part # 42-02-S024 for additional information and instructions for using the CRT terminal. The Appendix *Elevator Security Information and Operation* in this manual provides instructions for passengers who will be using the elevator while Security is ON. For both Basic Security and Basic Security with CRT, the security codes for each floor are programmed as described below.

The Security code for each floor may consist of one to eight characters where each character is one of the floor buttons found in the elevator car. With Basic Security, any floor with a programmed security code is a secured floor when Security is ON. Refer to the Elevator Security User's Guide for information on turning Basic Security with CRT ON or OFF. Basic Security (without CRT) is turned ON or OFF by the Building Security Input (BSI) in combination with the Master Software Key parameter in the Extra Features Menu (Program mode). There are 3 possible settings for the Master Software Key: ACTIVATED, ENABLED, and DEACTIVATED:

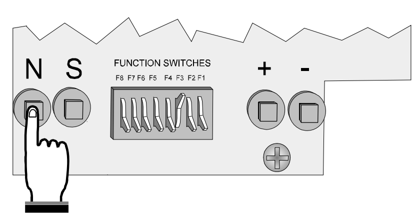
- If set to ACTIVATED, Security is ON.
- If set to ENABLED, Security is ON when the BSI input is turned *ON*.
- If set to DEACTIVATED, Security is OFF regardless of the status of BSI.

To find the BSI input, refer to the job prints. When Security is ON, all car calls are screened by the computer and become registered only if 1) the call is not to a secured floor, or 2) the call is to a secured floor and its security code is correctly entered within 10 seconds.

5.6.1.1 VIEWING THE BUILDING SECURITY MENU - Place the ***F3*** switch in the up position (with all other switches in the down position).

The following display appears:

```
SYSTEM MODE
PRESS N TO BEGIN
```

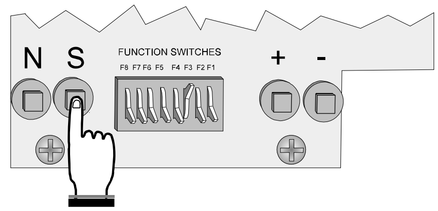


Press the ***N*** pushbutton.

The following display appears:

```
*   BUILDING   *
* SECURITY MENU *
```

5.6.1.2 PROGRAMMING AND VIEWING THE SECURITY CODES - Press the ***S*** pushbutton to start programming or changing the Security codes (or to view the codes).



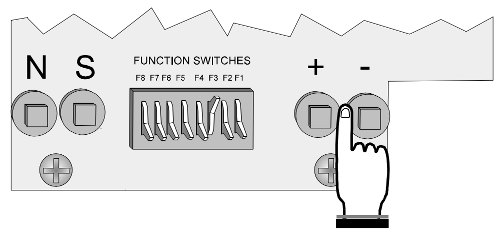
If no code has been programmed, then the computer displays NO CODE PROGRAMMED for that particular floor number. Press the ***S*** pushbutton again to start programming the Security code.

FLR 1F: NO
CODE PROGRAMMED

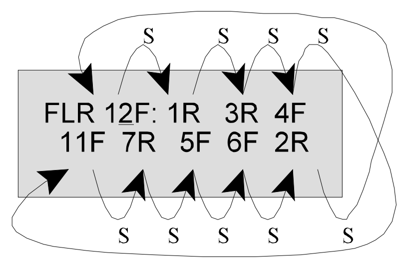
If a code has already been programmed, then the computer displays the security code. The cursor will blink below the floor number for the Security code being displayed.

FLR 1F: 8R 3F 4F
2R 21F 31R 19F 17R

Press the **+** and **–** pushbuttons to change the floor number. The **+** pushbutton increments the value that is being displayed to the next eligible value. The **–** pushbutton decrements the value.



Press the ***S*** pushbutton to move the cursor to the first character of the Security code. Press the **+** and **–** pushbuttons to change the value of the first character. Repeat these steps (pressing the ***S*** pushbutton followed by the **+** and **–** pushbuttons) until the desired number of characters are programmed (maximum of 8 characters). The ***S*** pushbutton moves the position of the blinking cursor according to the diagram at the right. If any character is left blank, or after all eight characters have been programmed, and the ***S*** pushbutton is pressed, the cursor returns to the floor number.



Repeat these steps (Section 5.6.1.2) to program the Security codes for all the floors. You may exit the Building Security Menu at any time during programming by pressing the ***N*** pushbutton. When the ***N*** pushbutton is pressed, the LCD will display the following:

EXIT THIS MENU?
N=NO S=YES

Press the ***S*** pushbutton to exit or the ***N*** pushbutton to return to the previous display. If ***S*** is pressed, the following will appear (only if changes have been made):

SAVE CHANGES?
N=NO S=SAVE

Press ***S*** to save the changes or ***N*** to exit without saving (any original codes will remain in effect if the changes are not saved).

5.6.2 PASSCODE REQUEST MENU

The Passcode Request Operation can be used to require a password to be entered in order to run the car on any mode of operation other than Inspection.

> **NOTE:** If a passcode has not been programmed for this controller, the Passcode Request Menu will not appear.

If a passcode has been programmed, the LCD screen will flash the "PASSCODE REQUEST" message when Passcode Request Operation is activated.

```
PASSCODE REQUEST
P I  8  20: 10001000
```

In order to clear or set the Passcode Request Operation, the controller must first be placed into the System Mode as described in Section 5.6. By pressing the ***N*** pushbutton when the display reads "BUILDING SECURITY MENU," the Passcode Request Menu will appear:

```
* PASSCODE *
REQUEST MENU
```

CLEARING THE PASSCODE - With Screen 1 displayed, press the ***S*** pushbutton. If Passcode Request Operation is activated, the following screen appears:

```
REQUESTED PASS-
CODE:  00000000
```

The first character of the passcode to be entered will blink. The "**+**" and "**-**" pushbuttons will scroll through the numbers 0-9 and letters A-Z for each character of the passcode. The ***N*** pushbutton will advance to the next character position of the passcode. Pressing the ***S*** pushbutton will cause the program to verify that the passcode entered was correct. If it was not correct, the following screen will appear:

```
* INVALID CODE *
S=CONT. N=EXIT
```

Pressing the ***S*** pushbutton will display Screen 2. Pressing the ***N*** pushbutton from this screen will return the display back to Screen 1.

If the correct passcode was entered, the following screen appears:

```
*  VALID CODE *
N=EXIT
```

Pressing the ***N*** pushbutton will return the display to Screen 1. The car may now be run on Normal operation mode.

ACTIVATING THE PASSCODE - With Screen 1 displayed, press the ***S*** pushbutton. If Passcode Request Operation is not activated, the following display appears:

```
ACTIVATE
PASSCODE?  NO
```

Pressing the ***S*** pushbutton will toggle the display from "NO" to "YES". Pressing the ***N*** pushbutton while "NO" is displayed will return the display back to the Screen 1. Pressing the ***N*** pushbutton while "YES" is displayed will activate the Passcode Request Operation and return the display back to Screen 1. With Passcode Request Operation *activated*, the passcode must be entered in order to run the car on any mode of operation other than Inspection.

5.6.3 LOAD WEIGHER THRESHOLDS

The load weigher (isolated platform or crosshead deflection) provides a signal that corresponds to the perceived load in the car. 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 dispatching operations. The load thresholds are user-programmable and determine when each of these logical operations should be performed.

- **LIGHT LOAD WEIGHER (LLW):** This value is used to define the load at which a limited number of car calls is to be registered (anti-nuisance). 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 the parameter LIGHT LOAD WEIGHING? / LIGHT LOAD CAR CALL LIMIT in the EXTRA FEATURES MENU OPTIONS. If the limit is set to a value of three, the computer will only allow three calls to be registered if the load is less than 20%. If a fourth call is registered, all car calls will be canceled.

- **DISPATCH LOAD WEIGHER (DLW):** This 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.

- **HEAVY LOAD WEIGHER (HLW):** This value is used to define the load value at which hall calls should be bypassed.

- **OVERLOAD WEIGHER (OLW):** This value is used to define the load 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.

- **OVERLOAD 2 WEIGHER (OLW2):** When on Fire Service, this value is used instead of the Overload Weigher value (see OVERLOAD WEIGHER above).

ADJUSTING THE LOAD THRESHOLDS

The typical values for the load thresholds are shown below. However, these thresholds are user-adjustable and may be changed at any time.

Load Threshold	Default Value	Range
• LIGHT LOAD WEIGHER (LLW)	20%	0 - 40%
• DISPATCH LOAD WEIGHER (DLW)	50%	20 - 80%
• HEAVY LOAD WEIGHER (HLW)	80%	50 - 100%
• OVERLOAD WEIGHER (OLW)	105%	80 - 125%
• OVERLOAD 2 WEIGHER (OLW2)	0% = disabled	100 - 140%

To adjust these thresholds:

a. Enter the SYSTEM mode of operation by placing the ***F3*** switch in the up position.

```
* LOAD WEIGHER *
*  THRESHOLDS  *
```

b. Press the ***N*** pushbutton until LOAD WEIGHER THRESHOLDS appears on the LCD display.

LIGHT LOAD WEIGHER = 20%

c. Press the **S** pushbutton to display the load threshold you wish to set.

d. The value shown is the current threshold value expressed as a percentage of the full load value (see the table above). Press the '**+**' or '**-**' pushbutton to adjust the value. If the value is set to 0%, the load weigher function is disabled.

e. Press the ***S*** pushbutton to select another load threshold to adjust or press the ***N*** pushbutton to exit this menu.

f. Place the ***F3*** switch in the down position to exit SYSTEM mode when finished.

If an analog load weigher is used, the Analog Load Weigher Learn Function must be performed before the load weigher system will perform properly (see Section 5.6.4).

5.6.4 ANALOG LOAD WEIGHER LEARN FUNCTION

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 at each floor due to the dynamics of the elevator system. 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.

The Analog Load Weigher Learn Function is performed as follows:

a. Move the ***empty*** car to a convenient floor where the test weights are located. It is best to have one person in the machine room and another person at the floor to load the weights.

b. Place the car on Independent Service operation. If an Independent Service switch is not available in the car, place a jumper between panel mount terminal 2 and terminal 49 on the Main Relay board (SC-SB2K).

c. Place the ***F3*** switch in the up position and press the ***N*** pushbutton to select the Analog Load Weigher Learn Function (scrolling message is displayed).

ANALOG LOAD WEIGH PRESS S TO START

d. Press the ***S*** pushbutton to start. The computer responds with one of two scrolling messages:

- CAR NOT READY TO LEARN, MUST BE ON INDEPENDENT SERVICE.

Verify that the car has been placed on Independent Service.

- READY TO LEARN EMPTY CAR VALUES? PRESS S TO START.

If the empty car values have already been learned and you want to be learn the full car values, press the ***N*** pushbutton (go to step 'e').

To begin learning the empty car values, press the ***S*** pushbutton. The computer displays the message:

- LEARNING EMPTY CAR VALUES. PRESS N TO ABORT.

If the Extra Features Menu Option "Analog Load Weigher?" is set to K-TECH, 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 Analog Load Weigher Learn Function was begun and the computer will display the scrolling message:

- EMPTY CAR LEARN PROCESS COMPLETED. PRESS S TO CONT.

If the Extra Features Menu Option "Analog Load Weigher?" is set to MCE, the car will learn the empty car value and then display the message:

- EMPTY CAR LEARN PROCESS COMPLETED. PRESS S TO CONT.

Press the ***S*** pushbutton.

e. The computer displays the scrolling message:

- READY TO LEARN FULL CAR VALUES? PRESS S TO START.

f. Place the full load test weights in the car and press the ***S*** pushbutton to begin learning the full car values. The computer displays the message:

- LEARNING FULL CAR VALUES. PRESS N TO ABORT.

If the Extra Features Menu Option "Analog Load Weigher?" is set to K-TECH, the car will move to the bottom floor, record the full car value and then move up, stopping at each floor to record the full car value. When the top floor has been reached, the car will move back to the floor at which the Analog Load Weigher Learn Function was begun and the computer will display the scrolling message:

- FULL CAR LEARN PROCESS COMPLETED. PRESS S TO CONT.

If the Extra Features Menu Option "Analog Load Weigher?" is set to MCE, the car will learn the full car value and then display the message:

- FULL CAR LEARN PROCESS COMPLETED. PRESS S TO CONT.

Press the ***S*** pushbutton, place the ***F3*** switch in the down position and take the car off of Independent service.

g. To verify that the Load Weigher Learn Function has been performed successfully, place the ***F8*** switch in the up position. With the test weights in the car, the following should be displayed:

```
CURRENT LOAD
= 100%
```

If the Load Weigher Learn Function has not been performed successfully, the following will be displayed:

```
CURRENT LOAD
= NOT LEARNED
```

h. The Load Weigher Learn Function (empty or full values) may be aborted at any time by pressing the ***N*** pushbutton. The computer will display the message:

- LEARN PROCESS ABORTED... PRESS S TO CONT.

When the ***S*** pushbutton is pressed the computer displays the scrolling message:

- ANALOG LOAD WEIGHER LEARN FUNCTION. PRESS S TO START

At this point you may exit System Mode by placing the ***F3*** switch in the down position, or you may re-start the learn function by moving the car back to the floor where the test weights are located and press ***S*** to start (go to step 'd').

If the empty car values have been learned but the full load learn function was aborted, you need not re-learn the empty car values. When the message READY TO LEARN EMPTY CAR VALUES is displayed, press the ***N*** pushbutton. The computer will display:

- READY TO LEARN FULL CAR VALUES? PRESS S TO START.

Press the ***S*** pushbutton to begin learning the full car values (go to step 'f').

5.6.5 ASME A17.1 - 2000 OPTIONS

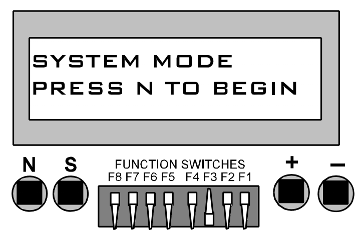
ASME A17.1-2000 Redundancy monitoring can be bypassed to allow the mechanic time to setup and adjust the car without nuisance shut downs. Perform the following steps in order to invoke the A17.1-2000 fault bypass mode. There are two bypass modes, one for Inspection operation with no time limit and one for automatic operation with a two hour time limit.

5.6.5.1 ASME A17.1-2000 REDUNDANCY BYPASS. JUMPER MUST BE INSTALLED TO ACTIVATE. (BYPASS ON / BYPASS OFF) - This option can be used for automatic or test modes to bypass all ASME A17.1-2000 redundancy checking for trouble shooting purposes. This option can only be set if the bypass jumper is installed. The maximum time limit for the bypass is two hours, after which this option will deactivate automatically.

To activate automatic / test mode ASME A17.1-2000 Redundancy bypass:

1. Place car on either automatic or test mode (use TEST/NORM switch on the SC-SB2K board).

2. Place a jumper between 2KBP1 and 2KBP2 on the SC-BASE board.



3. Enter System mode, F3 switch ON (up).

4. Press ***N*** until **ASME A17.1 SYSTEM MENU** is displayed, then press ***S***.

ASME A17.1
SYSTEM MENU

5. The scrolling message **ASME A17.1-2000 REDUNDANCY BYPASS. JUMPER MUST BE INSTALLED TO ACTIVATE** is displayed. Beneath scrolling message, BYPASS OFF is displayed. Press ***S*** to change the setting to **BYPASS ON**.

ASME A17.1-2000 R
BYPASS OFF

Once invoked, the A17.1 - 2000 fault logic will be bypassed for 2 hours. After the two hours have elapsed, the system will be shut down. To obtain another two hours of bypass mode operation, repeat steps 1 through 5 above.

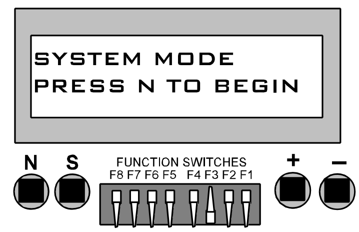
When adjustment is complete, set the option to **BYPASS OFF** and remove the jumper between 2KBP1 and 2KBP2 on the SC-BASE board to enable the ASME A17.1 -2000 fault monitoring.

5.6.5.2 LONG TERM, INSPECTION ONLY ASME A17.1-2000 REDUNDANCY BYPASS. JUMPER MUST BE INSTALLED TO ACTIVATE. (BYPASS ON / BYPASS OFF) - This option can only be used on Inspection operation to bypass all ASME A17.1-2000 redundancy checking for trouble shooting purposes. This option can only be set if the bypass jumper is installed. There is no time limit for this option.

To activate Long Term, Inspection Mode Only ASME A17.1-2000 Redundancy bypass:

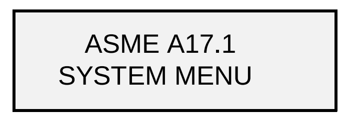
1. Place car on Inspection operation (use MACINE ROOM INSPECTION TRANSFER INSP/NORM switch on SC-SB2K board).

2. Place a jumper between 2KBP1 and 2KBP2 on the SC-BASE board.



3. Enter system mode, F3 = ON (up).

4. Press ***N*** until **ASME A17.1 SYSTEM MENU** is displayed, then press ***S***.



5. Press ***N*** until **LONG TERM, INSPECTION ONLY ASME A17.1-2000 REDUNDANCY BYPASS. JUMPER MUST BE INSTALLED TO ACTIVATE** is displayed. Beneath scrolling message, BYPASS OFF is displayed. Press ***S*** to change the option to **BYPASS ON**.

Once invoked, the A17.1 - 2000 fault logic will be bypassed indefinitely while on Inspection. When the inspection transfer switch is moved to the NORM position, the A17.1 fault monitoring will be re-enabled once the car is at floor level. Remember to remove the jumper between 2KBP1 and 2KBP2 on the SC-BASE board.

5.7 DUPLEXING

A great advantage of the PTC Series is how easily it can be duplexed. Because the duplexing logic is completely internal to the computers, it requires only a connecting cable and the selection of the Duplex option (see Section 5.4.2.1). The duplexing logic provides for proper assignment of hall calls to cars and increases efficiency and decreases waiting time.

5.7.1 DISPATCHING ALGORITHM

The dispatching algorithm for assigning hall calls will be real time-based on estimated time of arrival (ETA). In calculating the estimated time of arrival for each elevator, the dispatcher will consider, but not be limited to, the location of each elevator, the direction of travel, the existing hall call and car call demand, door time, MG start up time, flight time, lobby removal time penalty and coincidence call.

5.7.2 HARDWARE CONNECTIONS

There are two critical items in duplexing hardware: Proper grounding between the two controller subplates and proper installation of the duplexing cable. The hall calls will be connected to both cars simultaneously. Once in a duplex configuration, either of the two controllers can become the dispatcher of hall calls. The controller that assumes the dispatching duty on power up remains the dispatching processor until it is taken out of service. If, for any reason, the communication link between the two controllers does not function, each car will respond to the registered hall calls independently.

5.7.3 TROUBLESHOOTING

In a duplexing configuration, the controller that assumes dispatching duty is identified by the letter *D* in the upper left corner of the LCD display. The other car is identified by the letter *S* (slave), in the upper left corner of the LCD. If the upper left-hand corner of the LCD is blank (neither the *D* nor the *S* is displayed), the cars are not communicating, the following troubleshooting steps should be taken:

Step 1: Check for proper grounding between the two subplates.

Step 2: Check the communication cable hook-up.

Step 3: The JP3 jumper is installed on both MC-PCA-OA-2K boards (found next to the power supply terminals, see Figure 5.1) as the default configuration for duplex communication. JP3 is an EIA-485 Standard Communication Termination jumper. However, in an attempt to optimize the duplex communication, the JP3 jumper may be removed from either one or both of the MC-PCA-0A-2K boards.

Step 4: If all of the above are unsuccessful, contact MCE.

If the *D* and/or *S* indicators on the LCD are flickering, it is most likely caused by bad communication and the following troubleshooting steps should be taken:

Step 1: Check the Communication Time-Out Error Counter shown in Table 5.4 (Address 42). If the counter is actively counting errors, the slave computer is not responding to the dispatcher's request for information. If the cause is a communication problem, complete Steps 1-4 above.

Step 2: Check the Communication Checksum Error Counter shown in Table 5.4 (Address 43). If the counter is actively counting errors, the data being received is bad or does not have integrity and cannot be used by the computer. If the cause is a communication problem, complete Steps 1-4 above.

SECTION 6
TROUBLESHOOTING

6.0 GENERAL INFORMATION

MCE's PTC controllers are equipped with certain features that can help field personnel speed up troubleshooting. 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 following pages will describe how to use these features and speed up the troubleshooting process.

Overall, the computer (MC-PCA-OA-2K board) and the program are the most reliable parts of the system. The Diagnostic mode on the computer is the most helpful tool for troubleshooting. Therefore, it is best to start with the computer. Refer to Section 5.3 of this manual for instructions on using Diagnostic mode. When viewing the diagnostic LCD display, be observant of any contradictory information (i.e., the High Speed light should not be ON while the Doors Locked light is OFF).

The troubleshooting section is arranged as follows:

Troubleshooting Topic:	**Go to:**
Tracing Signals in the Controller	Section 6.1
Door Logic	Section 6.2
Call Logic	Section 6.3
Using the Optional CRT for Troubleshooting	Section 6.4
Troubleshooting the MagneTek DSD412 Drive	Section 6.5
Troubleshooting Using the DSD412 Control Display Unit	Section 6.6
Troubleshooting Flowcharts	Section 6.7
Using the MLT Data Trap	Section 6.8
ASME A17.1-2000 Fault Troubleshooting Tables	Section 6.9
PC Board Quick References	Section 6.10

6.1 TRACING SIGNALS IN THE CONTROLLER

Typically, a malfunction of the control system is due to a bad input or output signal. Inputs are signals generated outside the controller cabinet and are brought to the designated terminals inside the cabinet and then read by the computer. Outputs are signals generated inside the computer, and are usually available on terminal blocks inside the controller cabinet. Since a fault on any input or output can be the cause of a system malfunction, being able to trace these signals and find the source of the problem is essential. The following is an example that shows how an input signal can be traced from its origination point to its destination inside the computer. For example, look at the Door Zone (DZ) input. Using the Diagnostic mode instructions in Section 5.3 of this manual, use the N and S push-buttons to address and observe the Door Zone (DZ) flag, which shows the status of the Door Zone (DZ) input. Moving the car in the hoistway should cause this flag to turn ON (1) and OFF (0) whenever the car passes a floor. If the status of the (DZ) flag does not change, one of the following could be a cause of the problem:

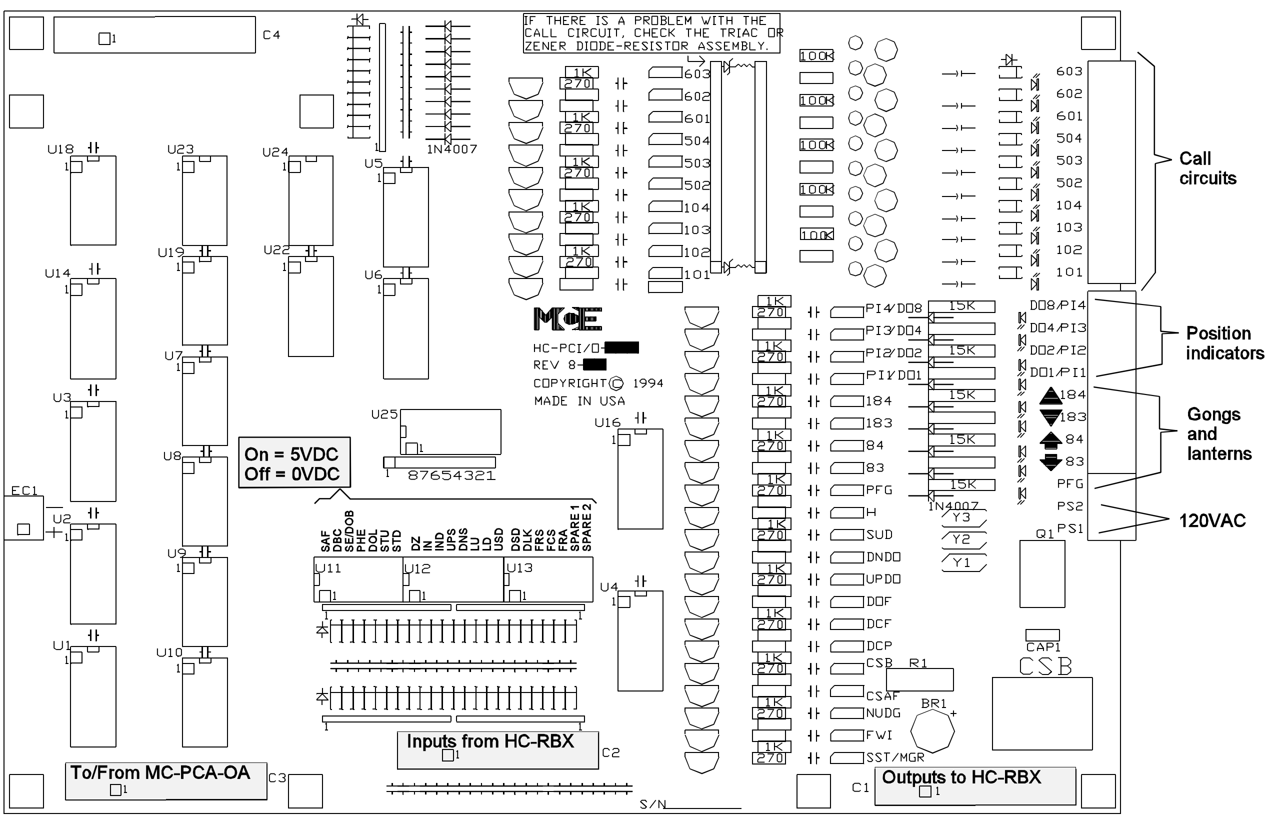
1. A defective Door Zone switch or sensor on the landing system car top unit.
2. Incorrect hoistway wiring.
3. Bad termination of hoistway wiring to the (DZ) terminal inside the controller.
4. A defect on the SC-SB2K Relay board or HC-PCI/O board.

The first step is to determine if the problem is inside or outside of the controller. To do so, use a voltmeter to probe the Door Zone terminal (27) on the Relay board. This terminal is in Area 3 of the Job Prints (areas of the Job Prints are marked on the left-hand side of the pages and certain signals may be in locations different from the print area mentioned in this guide). Moving the car in the hoistway should cause the voltmeter to read 120VAC when the car is at Door Zone. If the signal read by the voltmeter does not change when the car passes the Door Zone, then the problem must be external to the controller and items (1), (2), or (3) should be examined. If the signal read by the voltmeter *does* change as the car passes the Door Zone, the problem must be internal to the controller and item (4) must be examined. From the print, notice that this input goes to the right-hand side of the DZ relay and to a 47K 1W resistor. The 47K 1W resistor conducts the signal to pin 8 of the C2 connector on the top of the SC-SB2K Relay board. Next, a 20-pin ribbon cable conducts the signal to pin 8 of the C2 connector on the HC-PCI/O board.

FIGURE 6.1 HC-PCI/O Quick Reference

42-QR-HC-PCI/O Rev. 1

HC-PCI/O QUICK REFERENCE



HC–PCI/O INPUT/OUTPUT DETAIL

CONNECTOR C2

INPUT	PIN	INPUT	PIN
SAF	1	UPS	11
DBC	2	DNS	12
DOB	3	LU	13
PHE	4	LD	14
DOL	5	USD	15
STU	6	DSD	16
STD	7	DLK	17
DZ	8	FRS	18
IN	9	FCS	19
IND	10	FRA	20

CONNECTOR C1

OUTPUT	PIN	OUTPUT	PIN
SST/MGR	1	DCP	10
FWI	2,4	DCF	12
SE	3	STOP SW OUT	13,15
SPARE 1 INPUT	5	DOF	14
NUDG	6	UPDO	16
LAMP COMMON	7	DNDO	18
CSAF	8	STOP SW SOURCE	17,19
SUB/REL	9,11	H	20

D/N: 1111 R2

Figure 6.1 is a picture of the HC-PCI/O board, which shows where the DZ signal can be found on this board. Refer to the SC-SB2K Quick Reference illustration (Figure 6.24) for the location of the DZ signal on the Relay board. If power is present at terminal 27, there should be approximately 120VAC at the bottom of the 47K 1W resistor corresponding to DZ. Whereas the top of the same resistor should read approximately 5VAC if the C2 ribbon cable is connected. If the ribbon cable is disconnected, the reading should be 120VAC at the top of this same resistor. This is because the other half of the voltage divider is on the HC-PCI/O board.

The SC-SB2K board has test pins near many of the relays. These pins are for use during the inspection and testing of section 4. Use the controller wiring diagrams to locate the test pins. Pins on the left of relay coils (as depicted in the schematics) would need to be connected to TP1 (fused 1-bus) to energize the associated relay. Pins located on the right hand side of the coil would be connected to TP2 (fused 2-bus , 120 VAC) to allow the relays to pick. Some relays require both test points (TP1 and TP2) to allow the coil to energize. Relays that do not have associated test pins can be readily energized via the terminals connected to the coils (like PT, use screw terminal 9).

It is therefore not necessary to remove the relay or access the back of the SC-SB2K board to trace the signals on the board. The signals can also be traced on the HC-PCI/O board. See Figure 6.1 for details. If the signal gets to the HC-PCI/O board but does not get to the computer, it would be safe to assume that the problem is on the HC-PCI/O board.

6.2 DOOR LOGIC

As complex as it is, the Door Logic portion of the software answers one simple question: Should the doors be open? The computer looks at certain inputs and then calls upon specific logic to determine the answer to this basic question. All of these inputs and all of the flags generated by the specific logic are available for viewing through Diagnostic mode on the computer. When troubleshooting a door problem, inspecting the action and sequence of these flags and inputs is very important. When the meaning of the flags becomes more familiar, the state of these flags will generally serve to point to the root of the problem. Once the computer has determined the answer to the door status question, the appropriate outputs are turned ON and/or OFF to attempt to cause the doors to be 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
DOB - Door Open Button Input
DOL - Door Open Limit Input
DZ - Door Zone Input
PHE - Photo Eye Input
SE - Safety Edge Input

The computer generates the following outputs:

DCF - Door Close Function Output
DCP - Door Close Power Output
DOF - Door Open Function Output

Associated 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 Call Time Flag
SDT	-	Short Door Time Flag

The computer uses the flags and inputs listed above to make a decision concerning the desired state of the doors. This decision has only two possible goals: *doors open* or *doors closed*. The computer's answer to this question is reflected in the state of the Door Open Intent (DOI) flag. If the computer recognizes a valid reason either to open the doors or keep the doors open, it will set (turn ON) this internal flag. This flag can be seen by using Diagnostic mode on the computer. When inspecting this flag using Diagnostic mode, notice that the DOI flag turns ON (1) when the computer decides that the doors should be open. If the computer decides that the doors should be closed, the DOI flag will be turned OFF (0).

The DOI flag is a useful flag to inspect when troubleshooting door problems. This flag shows the *intention* of the computer concerning the state of the doors.

Remember that if the DOI flag is ON (1), it will turn on the DOF output which should pick the DO relay. The door will remain open until the DOL (Door Open Limit) input goes away. This will shut OFF the DOF output while the doors are open and DOI is ON. Turning OFF the DOI flag will turn ON the DCF output, which will pick the DC relay and close the doors. While there is no demand to go anywhere, the signal that shuts OFF the DCF output is DLK (Doors Locked), or possibly DCLC if the car has a retiring cam. However, there is a 2-second delay before the DCF output turns OFF after the doors are locked. If there is any demand (as is evidenced by the DMU or DMD flags being ON) and if the DOI flag is *not* ON (0), then the DCP output will be turned ON regardless of the position of the door. The DCP output is used to provide door closing power for those door operators requiring power while the car is running, such as those made by G.A.L. Corporation.

The various values of door standing open time result from the type of call canceled or responded to. A hall call cancellation will give an HCT flag and a car call cancellation will give a CCT flag. A door reopen from a hall or car call button at the lobby, or a lobby hall or car call cancellation will give a LOT flag. A door reopen from the Photo Eye, Safety Edge or Door Open button will give a SDT flag. Each flag (HCT, CCT, LOT, or SDT) has a separate door standing open time.

The door logic provides protection timers for the door equipment both in the open and the close direction. If the doors get stuck because of the door interlock keeper failing to lift high enough to clear the door interlock during the opening cycle, then the doors cannot complete their opening cycle. This could result in damage to the door motor. The door open protection timer will eventually stop trying to open the doors so the car can go on to the next call. Similarly, if the doors do not close all the way (i.e., the doors do not lock), the computer will recycle the doors at a programmed interval in an attempt to clear the problem.

To provide a clearer understanding of the computer logic, note that the logic 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 OFF DOI). 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 says to the logic 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 set (turned ON): CCT, HCT, or LOT. When one of the reopening devices is active (SE, PHE, or DOB), the SDT flag should be set. When an Emergency or Independent Service condition exists, the presence of a particular condition will cause the DOI flag to be set. Some of these conditions include the following: Fire Service, Emergency Power operation, Independent Service, Attendant Service, etc.

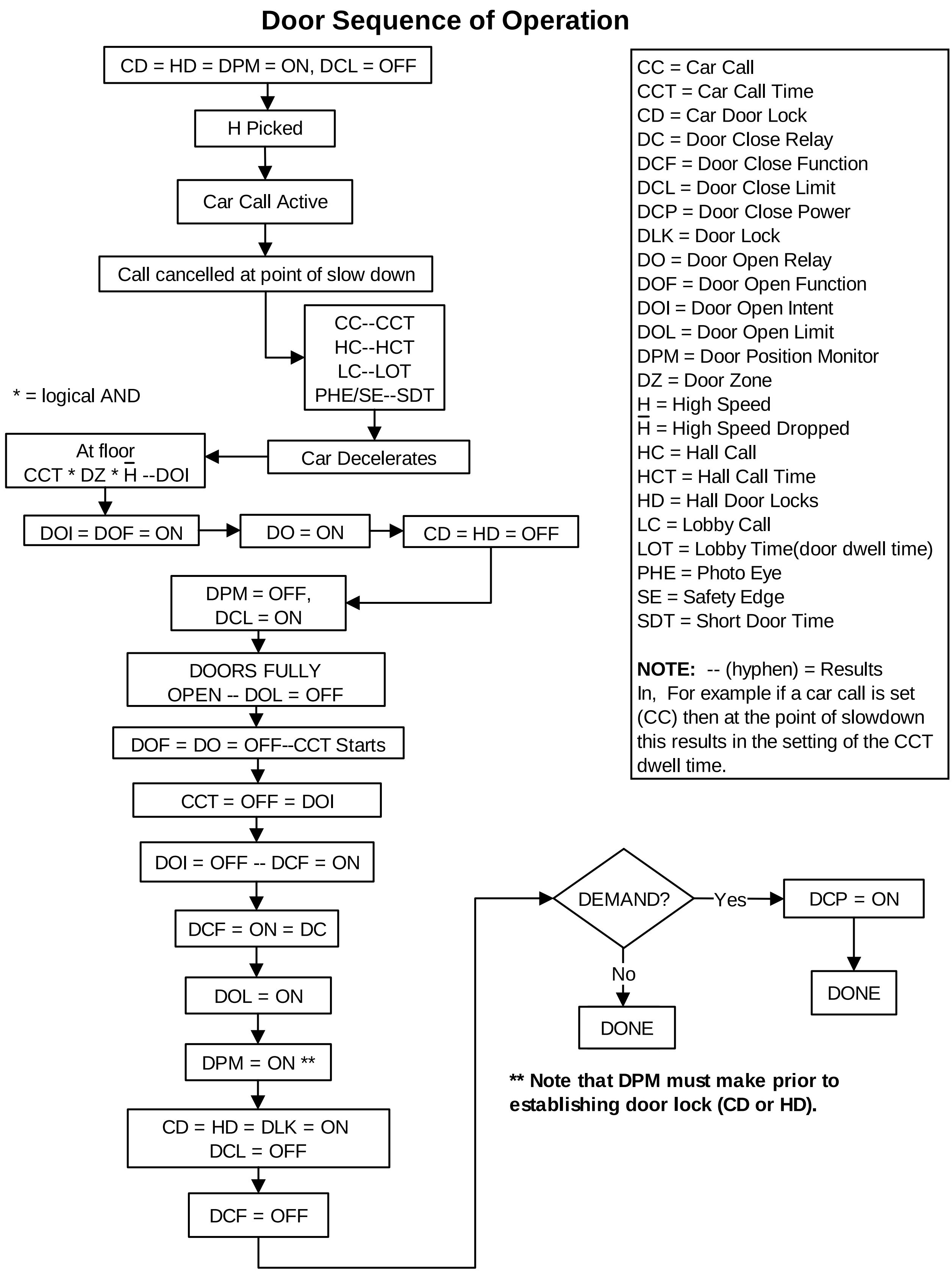
Once the intention of the computer has been determined, inspect the high voltage hardware to see if the appropriate functions are being carried out. For example, if the doors are closed and DOI is set, the doors should be opening (the DO relay picked). If the doors are open and DOI is cleared (turned OFF), the doors should be closing (the DC relay picked).

The trouble arises when the door control system is not doing what the mechanic thinks it should be doing. However, when troubleshooting, it is vital to determine if the control system is doing what *it* thinks it should be doing. If the control system (high voltage section) is doing what the logic intends it to do, then determining how the logic is coming to its conclusions is important. If the control system is *not* doing what the logic intends it to do, then determining what is preventing the desired function from being carried out is important (bad relay, bad triac, etc.). Diagnostic mode on the MC-PCA-OA-2K Computer board will help to determine which situation is present. The output flags will show which outputs the computer is attempting to turn ON or OFF. These flags can be compared with what is actually happening in the high voltage hardware.

Consider, as an example, this problem: the doors are closed and locked on the car, but the DC relay is *always* picked, preventing the doors from opening when they should. The cause of the problem must first be isolated. If both the DCF and DCP flags are cleared (turned OFF) in the computer, the DC relay should *not* be picked. If the DC relay *is* picked, then a problem obviously exists in the output string to the DC relay. However, if either the DCF or DCP flag is *always* set in the computer, then the problem is not with the output circuit, but possibly a problem with the door lock circuitry. If the doors are truly physically locked, inspecting the DLK flag in the computer would be wise. If the flag is not set in the computer, then there is obviously a fault in the input circuit from the door lock input. A simple inspection of the computer's Diagnostic mode will substantially narrow down the cause of the problem.

Refer to Figure 6.2 *Door Sequence of Operation*, Figure 6.3 *Door Closing Sequence, Timing and Fault Generation* and Figure 6.4 *Door Operation Timing Diagram*.

FIGURE 6.2 Door Sequence of Operation



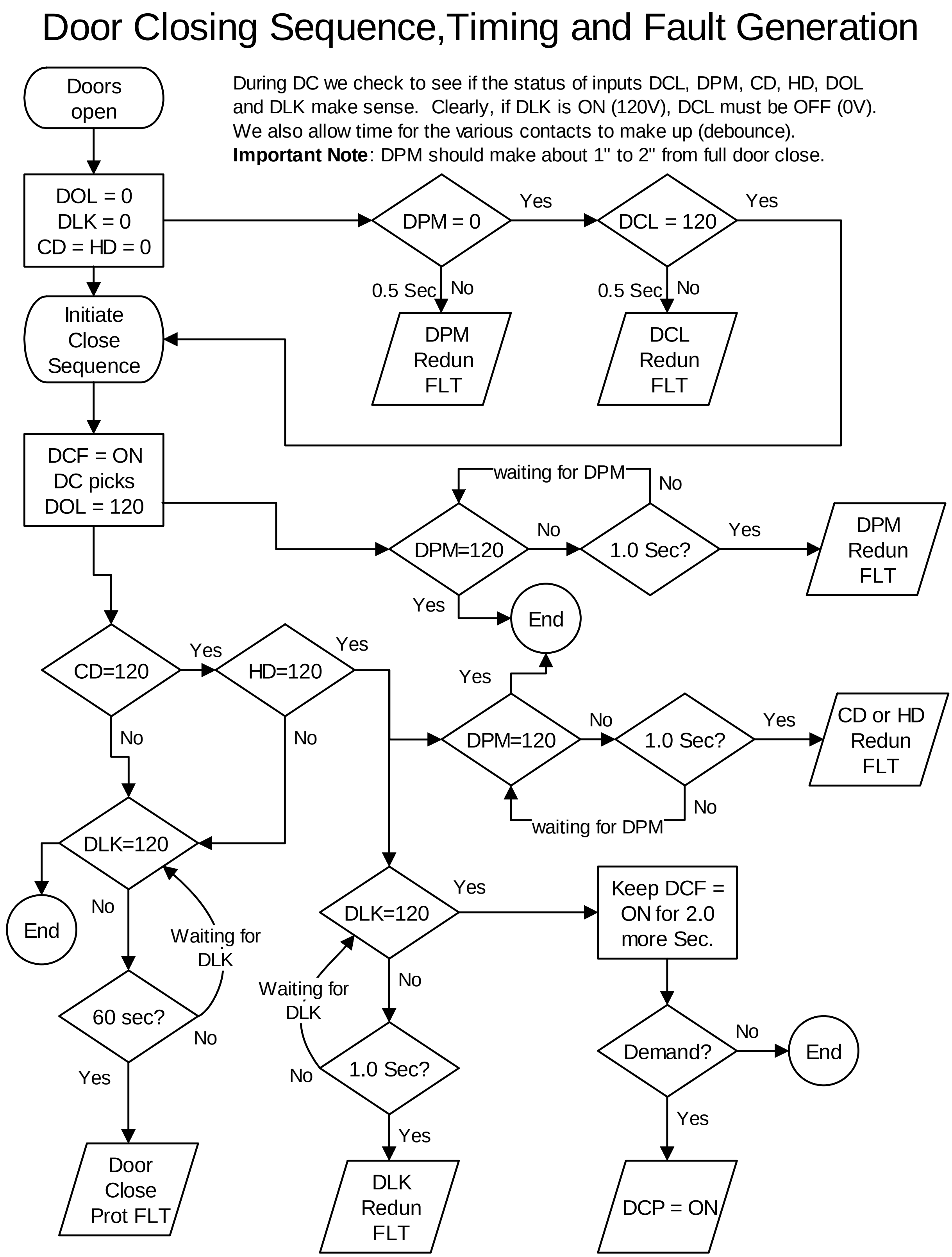
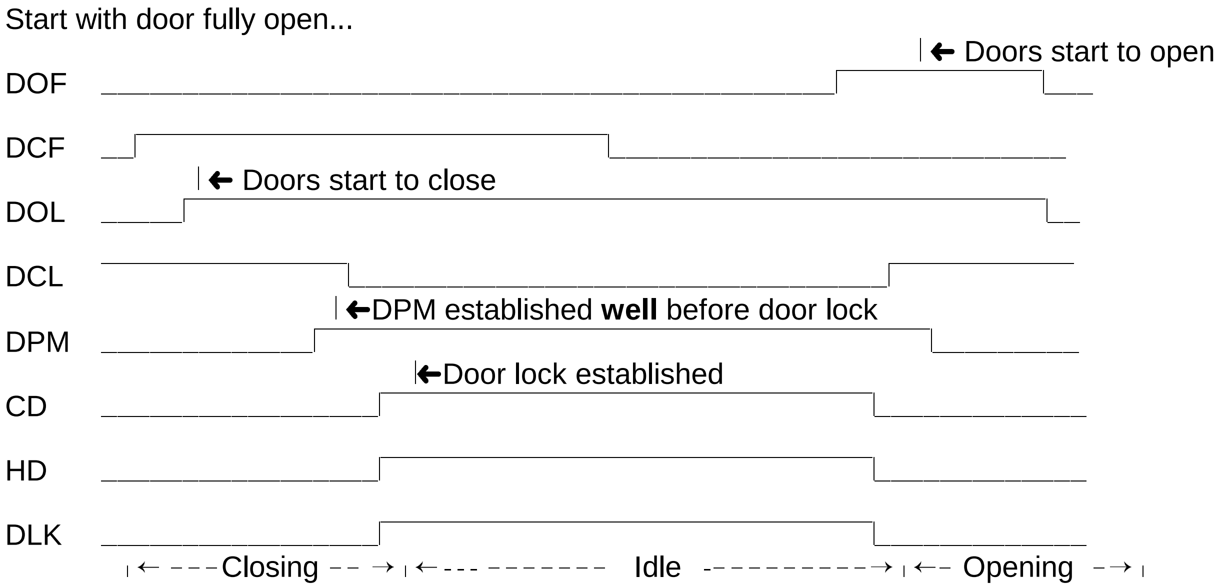

Door Closing Sequence,Timing and Fault Generation
During DC we check to see if the status of inputs DCL, DPM, CD, HD, DOL and DLK make sense. Clearly, if DLK is ON (120V), DCL must be OFF (0V). We also allow time for the various contacts to make up (debounce).
Important Note: DPM should make about 1" 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
DPM Redun FLT
0.5 Sec
No
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
Yes
DPM=120
No
1.0 Sec?
Yes
CD or HD Redun FLT
No
waiting for DPM
No
No
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

FIGURE 6.4 Door Operation Timing Diagram

Door Operation Timing Diagram



6.3 CALL LOGIC

6.3.1 NORMAL OPERATION

In the MCE call input structure, calls are input to the system by grounding the appropriate call input, as labeled on the HC-PCI/O board (with more than four floors, both the HC-PCI/O board and one or more HC-CI/O-E Call boards). The act of physically grounding the call input terminal will illuminate the corresponding call indicator LED on the Call board. Latching of the call by the computer (recognition and acceptance) will cause the indicator to remain lit on the board. Cancellation of the call will cause the indicator to turn OFF. With the MCE call input/output structure, the single input/output terminal on the HC-PCI/O (or HC-CI/O-E) board will accept a call input from the call fixture and serves as the output terminal which illuminates the call fixture to show registration of the call. This means that the field wiring is identical to that which would be used for a standard relay controller.

Calls may be prevented from latching by the computer in certain circumstances. If none of the car calls are allowed to be registered, the computer may be purposely preventing these calls from being registered for some reason. When the computer prevents car call registration, it sets (turns ON) the Car Call Disconnect (CCD) flag for that car. Inspection of this flag using Diagnostic mode will show if it is the computer itself that is preventing the registration of these calls. If the CCD flag is set (ON), the reason for this CCD condition must be discovered. There are many reasons for a CCD condition: Fire Service, Motor Limit Timer elapsed condition, bottom or top floor demand, etc.

A corresponding flag exists for hall call registration prevention. The computer may detect conditions for preventing hall calls from being registered, and will set the Hall Call Disconnect (HCDX) flag. This is a system flag (as opposed to a per car flag), but is available for viewing in Diagnostic mode along with the car operating flags. There are also 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.

It should also be mentioned that if a call circuit becomes damaged or stuck ON due to a stuck push-button, the elevator will release itself from the stuck call automatically. It will probably return there later, but will again release itself automatically, thereby allowing continued service in the building.

6.3.2 PREPARATION FOR TROUBLESHOOTING CALL CIRCUITS

Review Section 5.5 (External Memory mode) of this manual. Then, look at Table 5.6. It shows where to look up the calls in the computer memory (addresses 0140 through 015F). By looking at this memory, it is possible to see if a particular call is being recognized by the computer.

Prepare a jumper with one side connected to terminal #1 which is the same as ground (subplate is grounded), then use the other end to enter the call by grounding the call terminal in question.

6.3.3 TROUBLESHOOTING THE CALL CIRCUITS

1. Once the wires have been disconnected from the call input terminal, the system should be turned ON and in a normal running configuration. Use Diagnostic mode on the computer as described previously to check the status of the HCDX flag and CCD flag. If they are ON, they will shut OFF hall calls and car calls respectively.

NOTE: If it appears that there is a problem with a call, disconnect the field wire (or wires) from that call terminal in order to find out if the problem is on the board or out in the field. The calls can be disconnected by unplugging the terminals or by removing individual wires. If the individual field wire is disconnected, lightly tighten the screw on the terminal. If the screw is loose while trying to ground the terminal using a jumper, contact may not be made.

2. If HCDX and CCD are normal (or OFF), take a meter with a high input impedance (such as a good digital meter) and check the voltage on the call terminal in question. Depending on the voltage that the call circuits were set up for, the reading should be approximately the voltage on the call terminal called for (or up to 15% less). If the voltage is lower than what is specified, and the call terminal is on an HC-CI/O-E board, turn OFF the power and remove the resistor-fuse associated with the call terminal (i.e., if the call terminal is the fifth one from the bottom, remove the fifth resistor-fuse from the bottom). Turn the power back ON. The reading should be the voltage as discussed above. Note: the HC-PCI/O board does not have these resistor-fuses.

NOTE: The resistor-fuse is an assembly made up of a 10 Volt zener diode and a 22 ohm ¼ Watt resistor.

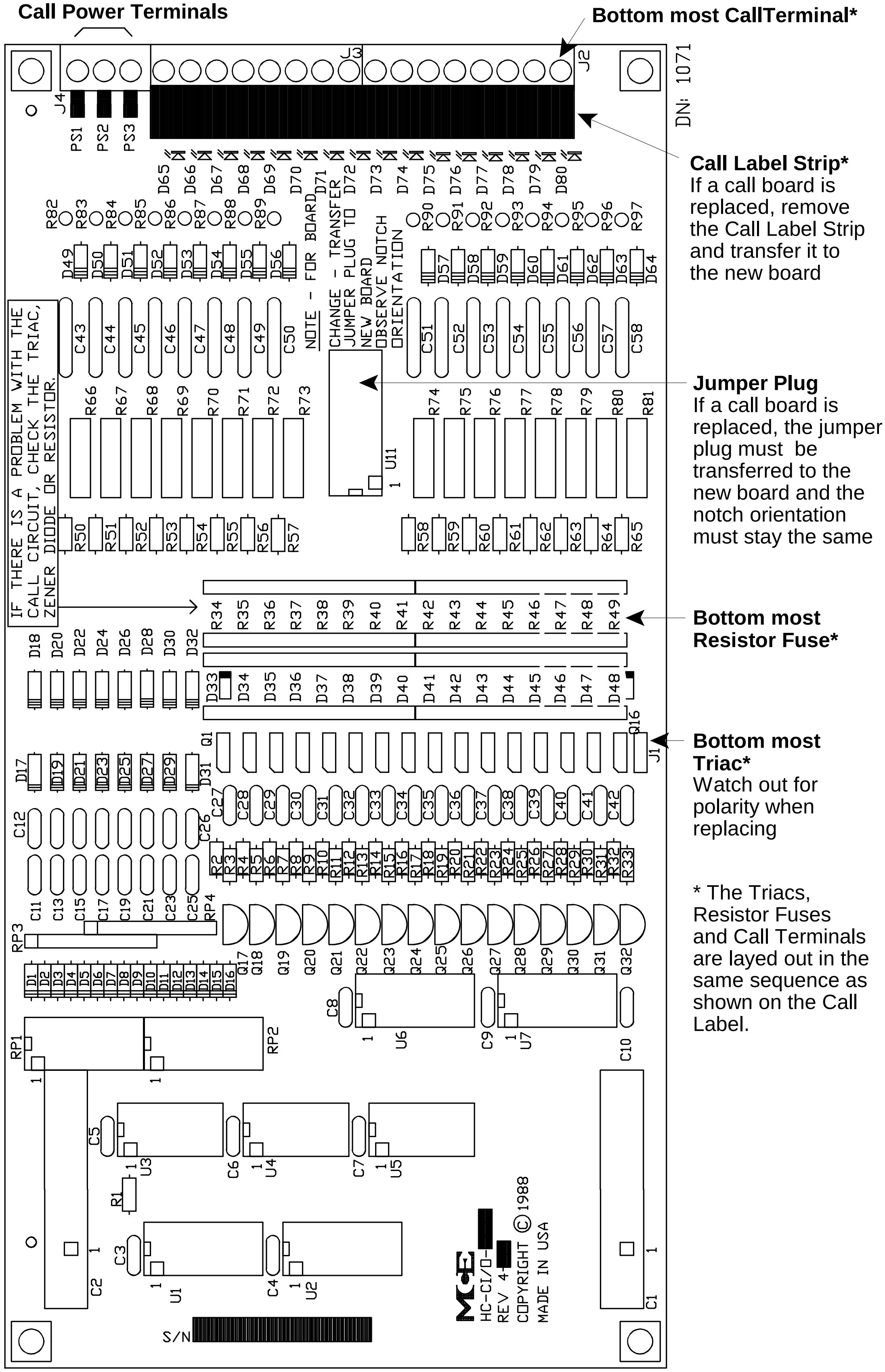
3. If the job has more than four floors, the controller will include at least one HC-CI/O-E Call Input/Output board. If the problem terminal is on this board and the necessary voltage does not read on the terminal, make sure the jumper plug (or header) is in position on the Call board. The jumper plug socket is on the right-hand side of the Call board near the call indicators. If a Call board is replaced, this jumper plug must *always* be transferred to the new board and stay in the same position. If this plug is *not* installed, any calls on the new board may become registered if the field wiring is not connected, so make sure the jumper plug is in place (see Figure 6.5).

FIGURE 6.5 HC-CI/O Call Input/Output Board Quick Reference

42-QR-HC-CI/O Rev. 2

HC-CI/O QUICK REFERENCE CARD

(BOARD 2)



* The Triacs, Resistor Fuses and Call Terminals are layed out in the same sequence as shown on the Call Label.

TROUBLESHOOTING THE CALL CIRCUITS

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.

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.

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 (other car in a duplex system) 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). For PTC or PHC controllers, verify that the HCDX flag is OFF (address 2C, LED4). 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 4.3.4, *Viewing and Entering Calls* (the call registered light on the call board may not work correctly). For PTC or PHC controllers see Table 5.6. 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 call cancels, replace the bad resistor fuse.

TROUBLESHOOTING THE CALL INDICATORS

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 board), the board indicators are not affected by the fixture bulbs.

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.

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.

4. For both the HC-PCI/O board and the HC-CI/O-E board(s), make sure that the correct voltage is coming into the terminals on the board marked PS1, PS2, and PS3. Note that there may be power on all three of these terminals, only two, or at *least one*, depending on the type of calls on the board.

5. Once the proper voltage is on the call terminal in question, use External Memory mode and Table 5.6 to examine the call in the computer memory. The call should *not* be ON. If it is, reset the computer for that car. Let the car find itself or run it to a terminal landing to make sure the CCD flag is turned OFF. If the resistor-fuse has been removed (if necessary), the field wires disconnected, HCDX and CCD both OFF, and the proper voltage exists on the call terminal, the call should *not* be registered. Shorting the call terminal to terminal 1 (or ground) should register the call in the computer according to External Memory mode. This does not mean the call registered light on the Call board will work correctly. If the call does not register and cancel under the conditions mentioned in this step, then a condition exists on the board that cannot be corrected in the field and the board should be replaced.

6. If the call works correctly in the previous step, and it does not register, and the board is not arranged for neon indicator lamps in the fixtures, the indicator for that call on the board will glow dimly. If the board *is* arranged for neon indicators, the call indicator on the board will not glow. In this case, a dim glow indicates that the incandescent bulb in the fixture is burned out (when the call has the resistor-fuse plugged in and the field wire connected normally).

7. With a known good resistor-fuse plugged into the proper call position, check to see that the indicator on the Call board works correctly (glows brightly when the call is registered and glows dimly, or not at all, when the call is not registered). If the call indicator burns brightly when the resistor-fuse is plugged in and shows no change in brightness whether the call is registered or not, then there is a bad triac or triac driver transistor. The triacs are plug-in types and can be easily replaced. Usually, if a triac has failed, it will measure as a short circuit between the metal base and terminal 1 with the power disconnected and the field wire removed. If the Call board is not in the system, check for a short circuit between the metal base of the triac to any pad area around a mounting screw hole. On the HC-CI/O-E board, the bottom most triac corresponds to the bottom most terminal, and terminals and triacs are corresponding from there on up (see Figure 6.5). On the HC-PCI/O board, the triacs are labeled the same as the call terminals (see Figure 6.1).

8. If the call has passed all of the previous tests, then it should be working properly while the field wires are not attached. Before reconnecting the field wires, jumper the wire (or wires) to terminal 1 and go out to that hall or car call push-button and press it. If a fuse blows, then a field wiring problem exists. If everything seems okay, then connect the call wires and test it. If connecting the call wires causes a problem, the board may have again been damaged. In any event, once the board checks out okay, any other problems will probably be field wiring problems and should be investigated.

6.4 USING THE OPTIONAL CRT FOR TROUBLESHOOTING

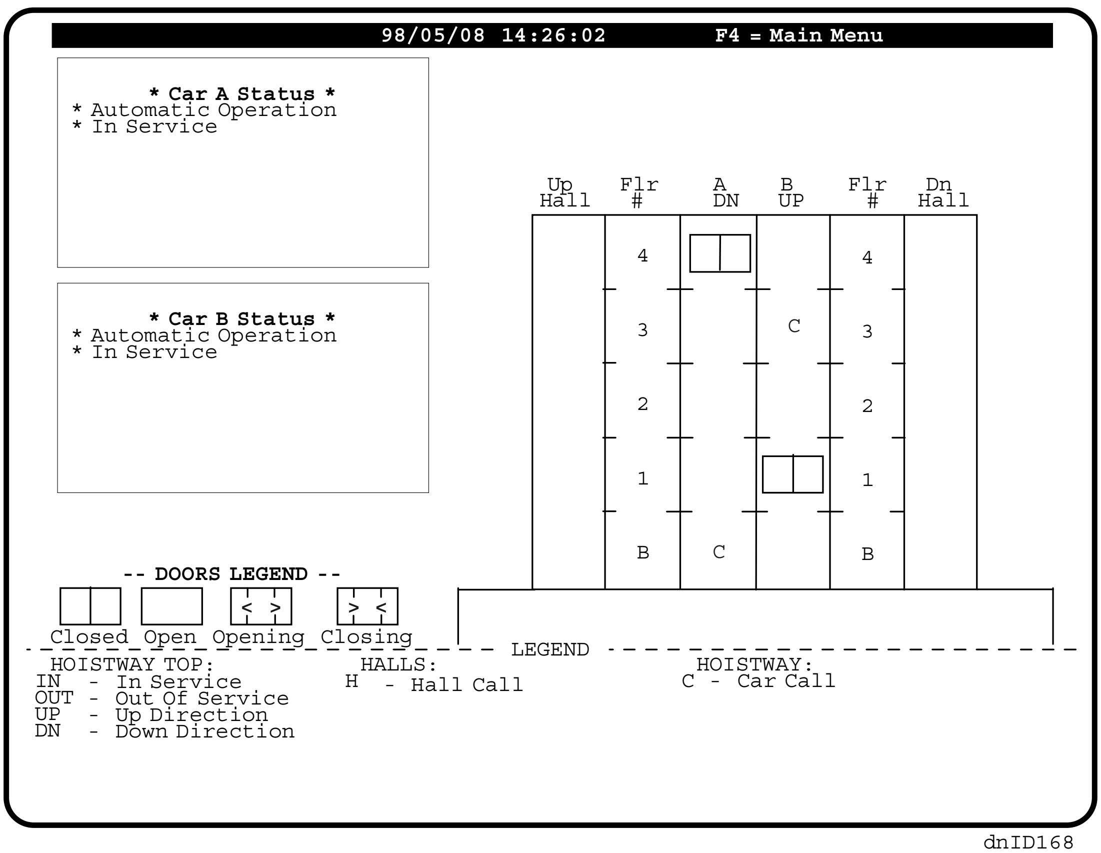
6.4.1 GRAPHIC DISPLAY OF ELEVATOR (F3) SCREEN

The F3 screen shows the hoistway graphic display (see Figure 6.6).

a. HOISTWAY GRAPHIC DISPLAY - shows the car position, direction arrows, car calls and assigned hall calls and the position of the doors.

b. CAR STATUS DISPLAY - This portion of this display describes the current status of the car.

FIGURE 6.6 Graphic Display of Elevator (F3) Screen (Color CRT)



6.4.2 MCE SPECIAL EVENTS CALENDAR ENTRIES (F7 - 1) SCREEN

Events that could affect car functions are recorded inside the MC-PA computer memory. This data is available to the mechanic for troubleshooting and analysis of the events (see Figure 6.7). The Special Events Calendar logs the following information:

- DATE (month/day)
- TIME (hour/minute)
- EVENT (the cause for logging the data, such as; doorlock clipped, stop switch pulled, etc.)
- STATUS (Activated, Deactivated)
- CAR
- FLOOR
- MISCEL.

Tables 5.2 and 5.3 provide a list of Special Events Calendar messages and their definitions.

FIGURE 6.7 Special Event Calendar - Display Special Event Entries (F7 - 1) Screen

98/05/08 14:28:17 Esc = Previous Menu

MCE Special Event Calendar Entries

Date	Time	Event	Status	Car	Flr	Miscel.
10-23	02:15	Time Out of Service	Activated	A	2	
10-23	02:20	Door Close Protection	Activated	B	4	
10-23	02:21	Time Out of Service	Deactivated	A	2	
10-23	02:25	Door Close Protection	Deactivated	B	4	
10-23	13:59	Motor Limit Timer	Activated	A	5	
10-24	14:05	Motor Limit Timer	Deactivated	A	5	
10-24	15:43	Excessive Commun. Error				
10-24	08:27	Hospital Service	Activated	A	L	
10-24	08:28	Hospital Service	Deactivated	A	2	
10-25	08:30	Independent Service	Activated	B	2	
10-25	08:31	Independent Service	Deactivated	B	L	

Up/ Dn Arrows: Scroll Page Up/Dn: Previous/Next Page Home/End: 1st/Last page

6.5 TROUBLESHOOTING THE DSD 412 SCR DRIVE

6.5.1 IF THE 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-PCA-OA-2K 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 the M contactor, relays BK, SAFR1 & SAFR2 and the brake pick when the direction relays, U and D, are picked. If M, BK, SAFR1and SAFR2 do not pick, check the related circuit as shown in the controller drawings. Relays CNP and RDY on the HC-ACI-D board should also be ON (picked) when the direction is picked. These relays will turn OFF if there is a drive fault.

   Verify that relays PT1 and PT2 on the HC-ACI-D board and MP1, MP2, LPR & LPRM, (UAX, UAXD or DAX, DAXD) in the controller pick when the direction is 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.

3. Verify that relays CNP and RDY are picked. If relay RDY is not picked then check the drive keypad to see if there is a drive fault. If there is no fault in the drive unit, check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI-D 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-D 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-D board.

4. Verify that the drive receives the Field Enable (TB1-9), direction (TB1- 8 or 50), inspection speed command (TB1-54) and Loop contactor confirm (TB1-7) inputs. To check these signals, measure the DC voltage on the above terminals with respect to TB1- 44 (24 VDC = ON, 0 VDC = OFF).

   The Ready and Run Green LED on the drive key pad should turn ON, ***Parameter 602 value*** should display the commanded inspection speed when direction is picked.

   If all the functions described in the above steps are working properly and the car still does not move, 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 Number/Drive keypad Display	Description	Setting value
1	Rated ARM Current	Motor rated current.
2	Rated ARM Voltage	Motor rated voltage.
9	Nominal AC voltage	AC voltage applied @ Drive terminals L1,L2, L3.
10	Encoder P/R	4096 (MCE supplied encoder)
11	Motor RPM	Motor rated RPM
17	Rated FT/M	Rated car speed in FPM
40	Response	6 .0 - 8.0
41	Inertia	1.5 - 2.0
50	Rated Field Current	Motor rated field current. (Voltage / Resistance)
52	Rated Field Voltage	Motor rated Field Voltage.
157	Preset speed #8 (Inspection/correction speed)	10% of the contact speed (10% of Parameter 17).

5. If the car moves in the reverse direction or trips a Fault 98: **Refer to section 3.4 (g)**

If the parameters are set to the correct values and the Motor Armature, Motor Field and Brake connections are correct, and if the car still does not move on inspection, call MCE Technical Support.

6.5.2 IF THE CAR DOES NOT REACH CONTRACT SPEED

1. Verify the following parameters:

   - P 10 (Encoder Pulses/Rev.)
   - P 11 (Motor RPM)
   - P 17 (Rated FPM)
   - P 156 (Rated FPM)

2. Verify that drive receives the H speed command:

   Select drive Parameter 602 (Reference speed) and register a multi-floor run. Parameter 602 should display the contact speed value on the drive display. If the displayed value is zero, this indicates that the drive is not getting the High speed command from the controller (go to step 3).

3. To determine why the drive is not getting the H speed command from controller:

   Verify that relays H on the HC-RB4-SCR board and HX3 in the controller turn ON.

   When relays H and HX3 are ON, verify the following:

   - There is 24 VDC between (TB1-11, TB1-12, TB1-53) and TB1- 44.
   - There is zero volts between TB1-54 and TB1-44.

   If the correct voltage is not present, refer to MCE's drive interface drawing (Page 1-DX).

4. If the car moves slower or faster then the required contract speed, refer to section 4.3 of the manual. Sections 4.3.2 thru 4.3.5 describe the steps required to reach the correct contract speed

6.5.3 IF THE CAR DOES NOT REACH INTERMEDIATE SPEED

1. Parameter P155 = Intermediate speed value.
2. Parameter P602 displays the correct value of intermediate speed.
3. Relays H and HX3 drop after the car begins to move on one floor runs.
4. Relays SHR and INT on the HC-ACIF board are picked on one floor runs.
5. There is 24 VDC between (TB1-12, TB1-53) and TB1-44.

6.5.4 IF THE DRIVE TRIPS ON FAULT 923 (MOTOR CURRENT FAULT)

1. Verify the value of parameter 3 (Rated ARM Amp).
2. Verify the value of parameter 1 (Current Limit).
3. Reduce the acceleration rate by increasing parameter 171 (ACC RATE #2).

6.5.5 IF THE CAR OVERSHOOTS ON DECELERATION

1. Verify that the drive gains are adjusted correctly (parameters 40 and 41).
2. If the car overshoots on multi-floor runs, decrease the value of parameter 172 (DEC Rate #1).
3. If the car overshoots on single floor runs, decrease the value of parameter 173 (DEC Rate #2).

6.5.6 IF OSCILLATIONS OCCUR IN THE CAR AT CONTRACT SPEED

1. Verify that the parameters 40 (Response) and 41 (System Inertia) are set to the correct values. A high value of parameter 40 can cause oscillations in the car.
2. There might be a need tor reduce the gain at high speed. Gain reduction can be achieved by decreasing the values of parameter 105 (Gain Switch Speed) and parameter 108 (Gain Reduce) in small increments as descried in the parameter sheet or the drive manual.

6.5.7 DRIVE ALARMS AND FAULTS

Table 6.1 provides a list of faults which are not listed in the MagneTek DSD 412 Drive manual. For other faults, refer to the fault section in MagneTek DSD 412 Drive manual.

Table 6.1 DSD 412 Drive Faults (not listed in the drive manual)

DSD 412 Drive Faults (not listed in the drive manual)	
Fault #	**Description**
406	**10% Line Dip Detected** - Line voltage input was detected as being less than 90% of nominal (Parameter #9). A non-critical fault.
407	**DCU CEMF Fault** - Measured CEMF was greater than 1.09 x measured line volts.
408	**PCU CEMF Fault** - Measured CEMF was greater than 118% of Rated Line Volts (Parameter #9).
411	**Maximum Auto-Resets Attempted** - An accumulation of 5 critical faults has occurred. No further Auto-Resets can be performed. Requires power OFF-ON cycle to clear.
450	**Speed Setting Error** - Parameter #156 is greater than Rated Speed (Parameter #17); **OR** Parameter #155 is set greater than 91% of Rated Speed; **OR** Parameter #157 is set greater than 66% of Rated Speed; **OR** Parameter #153 is set greater than 16% of Rated Speed.
906	**Drive Control Unit Failure Fault** (DSD power down is required.) - The update of the Dual Port RAM from the Drive Control Unit is unreliable. This requires the replacement of the Main CPU Control PCB or components on it. ***This Fault will shutdown the Drive.***
916	**Forcing Fault** (not applicable to MCE controllers)

6.5.8 OPERATIONAL FLOW CHARTS

Figure 6.8 describes the controller's operational flow with regard to the M Contactor. Figure 6.9 describes the operational flow of the brake.

6.5.9 TROUBLESHOOTING SPEED DEVIATION FAULTS AND AS OR ASPR RELAYS DROPPING

Parameters 120 (Time Speed Deviation) and 121 (Speed Deviation Level) set the time and level that the speed feedback (encoder) and speed dictation can vary from one another. These parameters are typically set at 0.50 seconds and 5.0%, respectively. This means that if the speed dictation and speed feedback vary from one another by 5.0% for a period of one half second the ASPR relay will be dropped out, stopping the car. The fault automatically resets in 5 seconds.

If the AS or ASPR relays are dropping first increase the Response parameter (parameter #40). Factory default is 8.2, but you can go as high as 12. If increasing Response does not rid the system of nuisance AS/ASPR faults, then the next step to try is to increase parameters 120 and 121. First increase parameters 121 from 5% to 10% and then try increasing parameter 120 from 0.5 to 1.00 seconds.

Series M DC - M Contactor Operation Sequence

Provided there are no faults in the drive and the main contactors have released properly (after the last run) the CNP and RDY relays will be up on the HC-ACI-D. CNP =Contactor Proofing

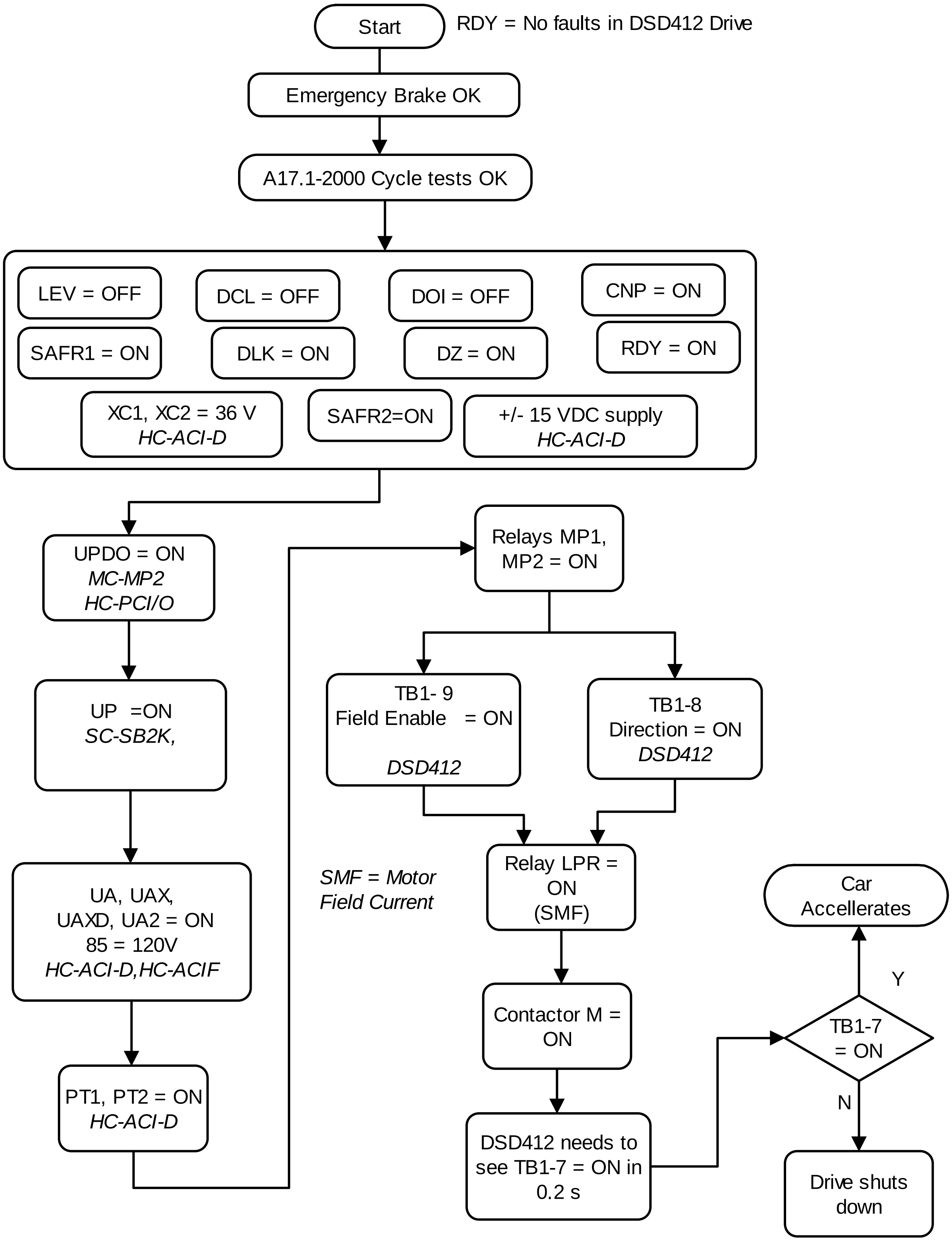
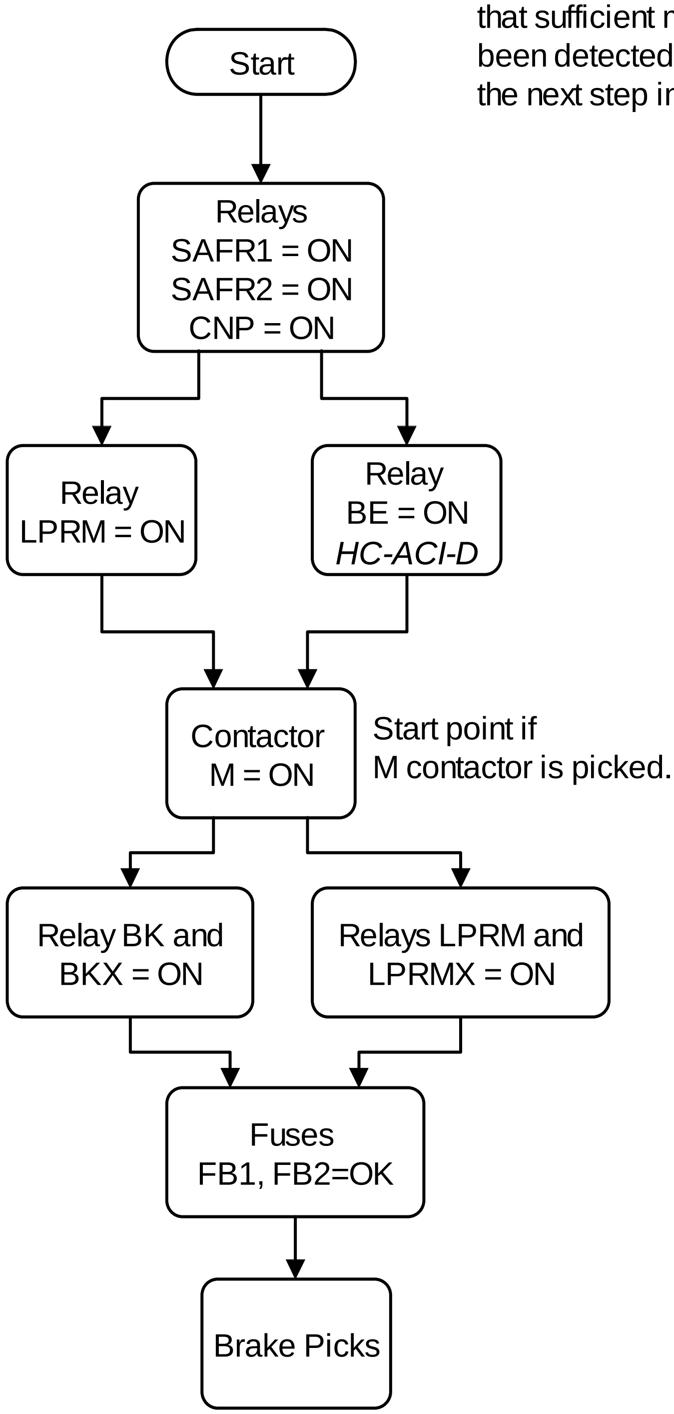


FIGURE 6.9 Brake Operation Sequence

Brake Operation Sequence

Provided that the M contactor has picked and that sufficient motor field current has been detected, the picking of the brake will be the next step in the sequence.



Series M DC

6.5.10 CAR DOES NOT MOVE ON INSPECTION OR AUTOMATIC

If the car does not move, check the following:

1. Relays SAFR1 and SAFR2 will drop and, if the code mandated “cycle tests” function as required, pick back up at the end of every run. 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 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-OA-2K display to determine which section of the hardware has failed.

NOTE: Many of the safety relays that populate the main PC boards (SC-SB2K and SC-BASE) are soldered to the board, hence it will be necessary to replace the entire board when any relay fails to operate as intended (manufacturers have yet to provide sockets for the new code mandated force-guided relays).

2. Verify that pilot relay MP, contactors M (Main if present), Y and DEL (if star-delta) pick when the direction relays, UP and DN, are picked). If MP and Y do not pick, check the related circuit (M TRIAC) as shown in the controller drawings. Check for any fault that is displayed on the MC-PCA-OA-2K display before and after picking the direction on Inspection. Also relaysYP and DELP on the SC-SB2K board should be picked. If these relays are not picked, check for 120VAC on terminals 9, 10,12 and 20 on the SC-SB2K Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays SAFR1and SAFR2 should also be picked.

3. Verify that contactors M (if present), Y and DEL are dropped when the direction is not picked. These relays feed redundancy checking inputs RM, RWYE and RDEL. If these main contactors fail to release as intended the system will be shut down and further operation of the lift will be prevented. Many other relays are monitored (see prints) for proper operation. UP, DN and H are some of the monitored relays. If any of these relays fail a message will be displayed on the LCD display that indicates which relay.

4. If all the functions described in the above steps are working properly and the car still does not move, then verify that the valves are getting voltage applied to the solenoids. This happens at terminals 85, 86, 87 and 88. Check associated wiring to terminals 10, 11, 12, 13, etc. All mentioned terminals are located on the SC-SB2K board.

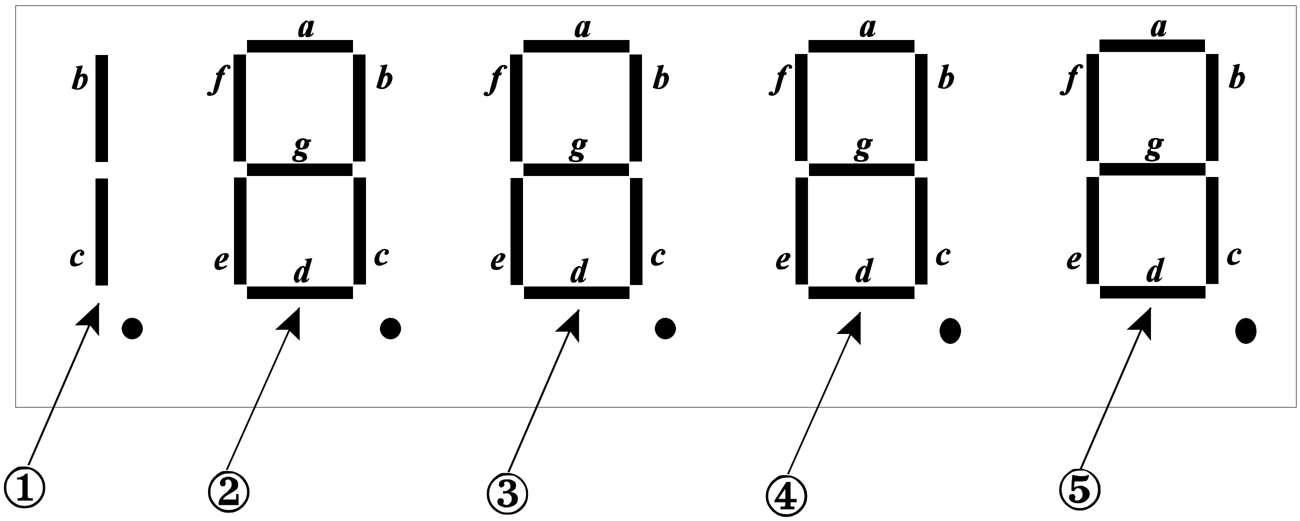
6.6 TROUBLESHOOTING USING THE DSD 412 CONTROL DISPLAY UNIT

By using **F#981**, the Control Display unit (CDU) LED segments can be used to verify/troubleshoot the DAD 412. Here's how to use this troubleshooting tool:

1. Press the Up or Down keys and go the **F#981**.

2. Press the **DATA FUNCT** key.

3. The **Control Display Unit** will show ***lit segments*** indicating which logic inputs/outputs are active. Use the Interconnection Diagram 23Y00274-0001 to correlate the lit segments with the inputs and outputs.



① ***b.*** TB1-7, Loop Contactor Aux
c. TB1-53, S1 (S curve)

② ***a.*** TB1-40, 41, 42 Critical Fault Relay
b. TB1-8, Hw Run
c. TB1-54, S3 (S curve)
d. Not used
e. TB1-12, S2 (S curve)
f. TB1-49, Flt Reset
g. TB1-79, Speed Reg released

③ ***a.*** TB1-38, 39, Non-Critical Fault Relay
b. TB1-9, Field Enable
c. Mtr Thrmst Open, TB3-2, 8
d. Not used
e. ESTOP (Safety chain)
f. TB1-50, Fwd/Rev
g. TB1-83, Car Up

④ ***a.*** TB1-36, 37, Excess Fld Flt
b. TB1-10, Pretorque
c. Not used
d. Not used
e. Not used
f. TB1-51, Ramp Rate Select, S4 (S curve)
g. TB1-84, Car Down

⑤ ***a.*** TB1-78, CEMF Flt or 10% Line Droop
b. TB1-11, S0 (S curve)
c. Not used
d. Not used
e. Not used
f. TB1-52, Mtr Fld Shutdown
g. Loop Pick Up

6.7 TROUBLESHOOTING FLOWCHARTS

FIGURE 6.10 Drive Key Pad

Drive Key Pad

Series M DC DSD412 Drive
ASME A17.1-2000

How to change drive parameters.

Start

↓

There are Five push buttons on the drive key pad
.

1. ENT: This is used to enter the selected parameter value.

2. UP : Increases the selected parameter value. In addition it is also used to find the parameter number.

3. DN : Decrease the selected parameter value. In addition it is also used to find the parameter number.

4. FUNC: Displays (reads) the value of selected parameter.

5. Reset: This pushbutton resets the drive computer.

↓

1. To select a parameter (Press the **Enter** key)

2. Use **UP** or **DN** arrow to select the desired 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 enter and temporarly save a parameter.

(Note: If this parameter is not saved, then upon power loss, the drive will default to its original parameter setting.) To save parameter, refer to the next flow chart.

↓

There are eight LEDs

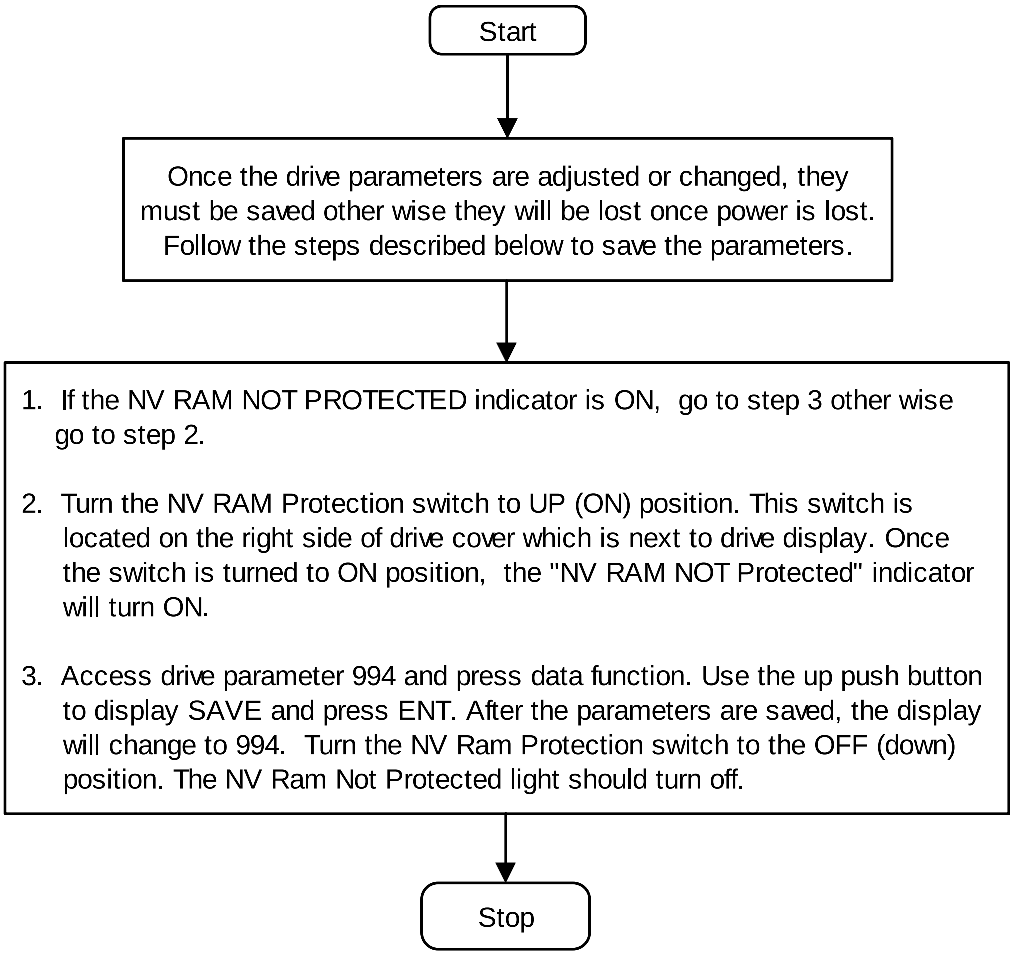
1. Ready: Drive is ready to operate.
2. Run: Drive is running (Main contactor is closed and Drive is in controll of motor speed) .
3. I limit: Drive has reached the Current limit.
4. E-STOP: Drive is in not running.
5. Overload: Motor armature current is in the O/L region and drive fault has occured.
5. Fault: Drive fault.
6. DATA: Green - Parameter is selected. RED - Parameter is not selected.
7. NV RAM not protected: ON - Drive parameters can be saved.

↓

Stop

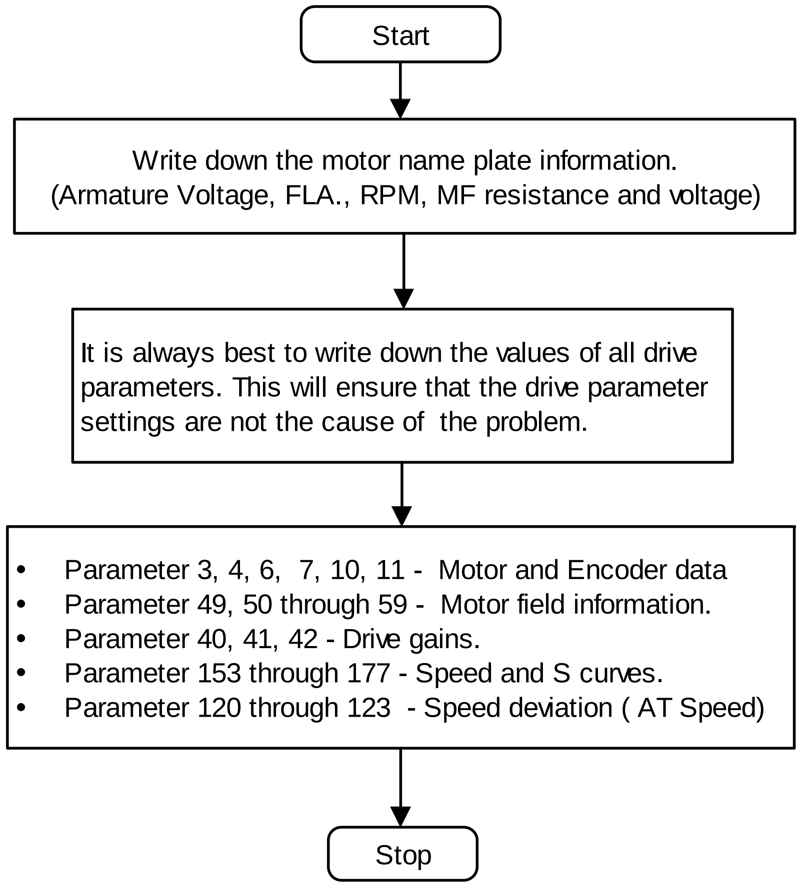
How to Save Drive Parameters

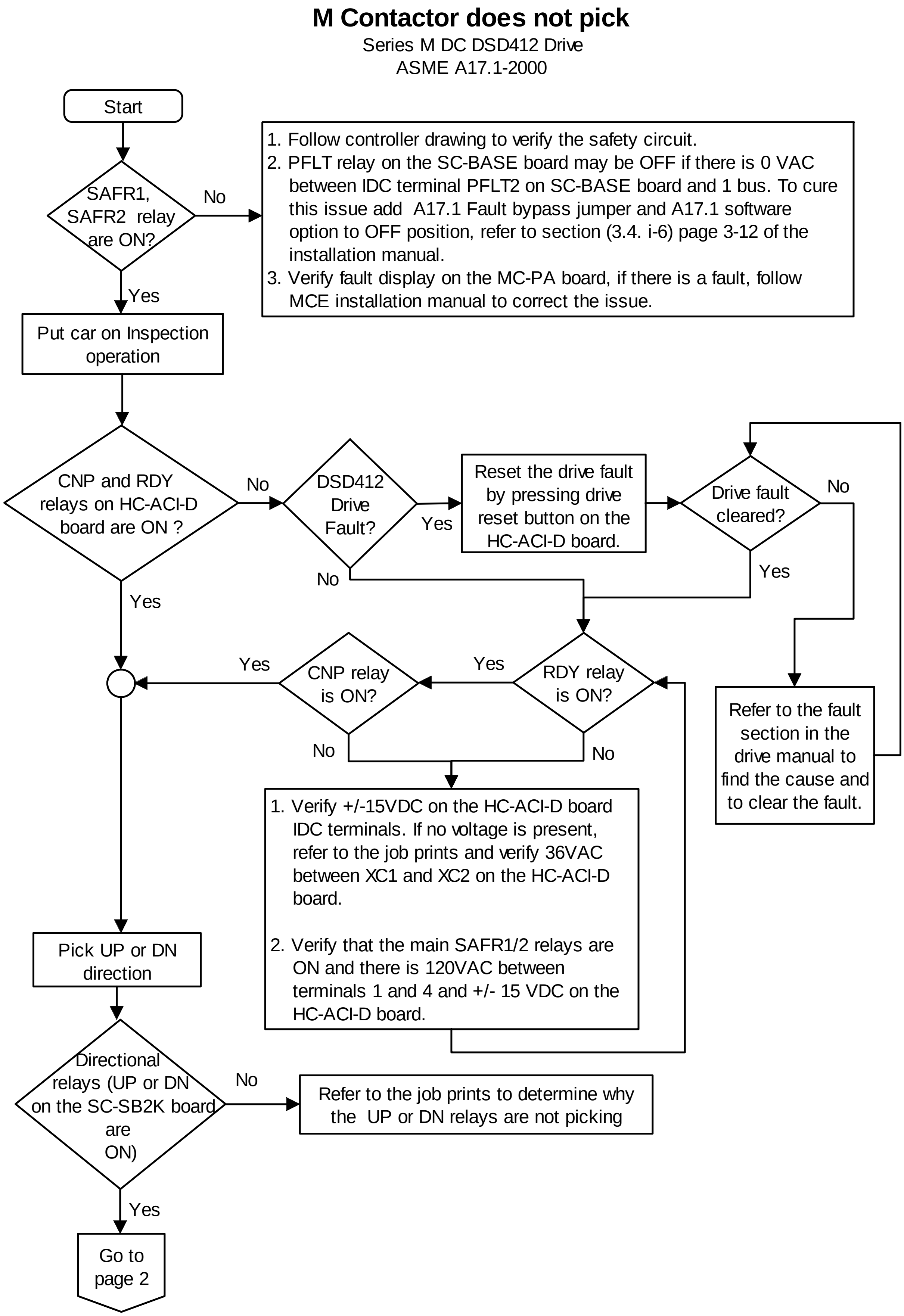
Series M DC DSD412 Drive
ASME A17.1-2000



Critical Drive Parameters

Series M DC DSD412 Drive
ASME A17.1-2000



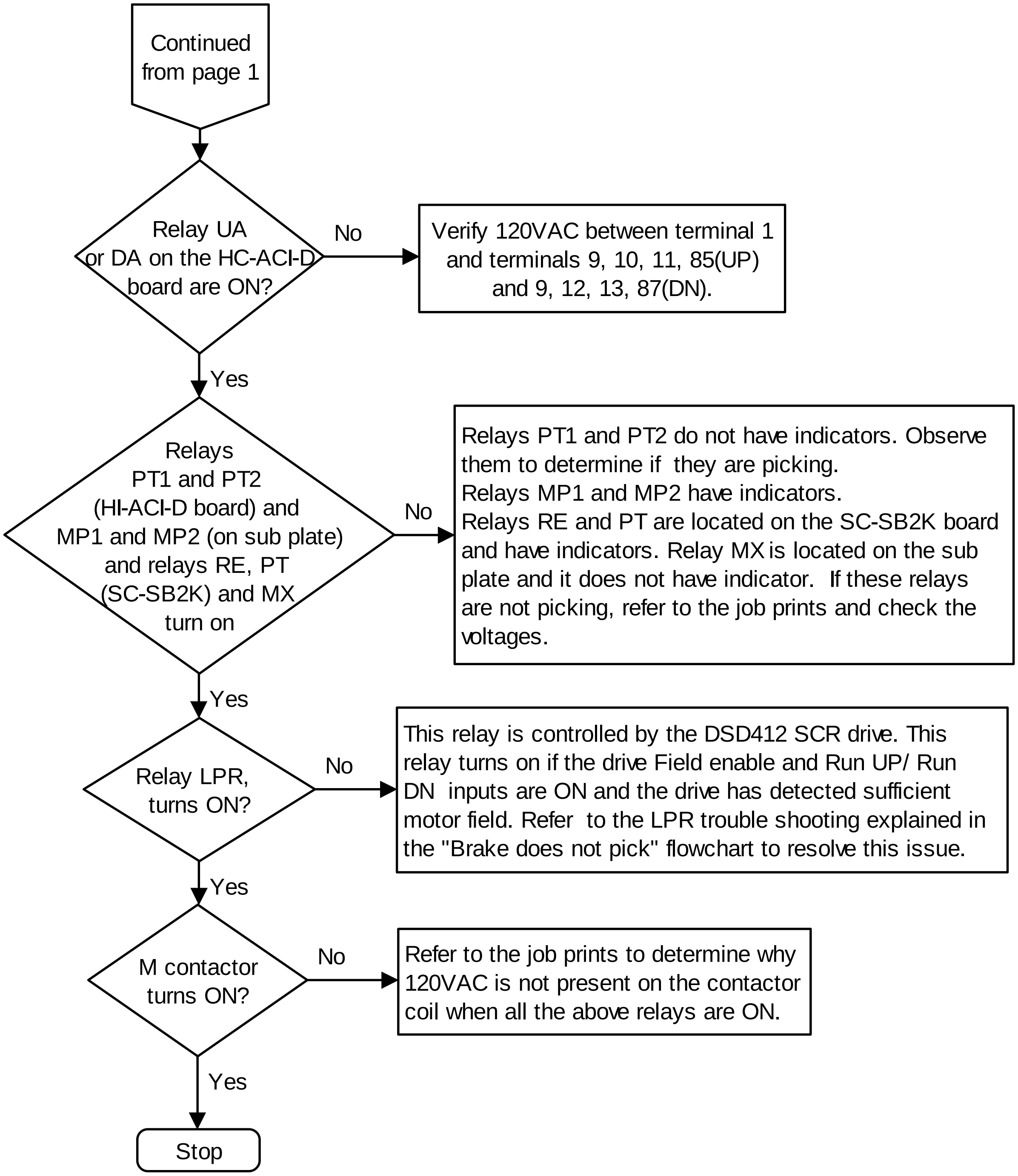

M Contactor does not pick
Series M DC DSD412 Drive
ASME A17.1-2000
Start
SAFR1, SAFR2 relay are ON?
No
1. Follow controller drawing to verify the safety circuit.
2. PFLT relay on the SC-BASE board may be OFF if there is 0 VAC between IDC terminal PFLT2 on SC-BASE board and 1 bus. To cure this issue add A17.1 Fault bypass jumper and A17.1 software option to OFF position, refer to section (3.4. i-6) page 3-12 of the installation manual.
3. Verify fault display on the MC-PA board, if there is a fault, follow MCE installation manual to correct the issue.
Yes
Put car on Inspection operation
CNP and RDY relays on HC-ACI-D board are ON ?
No
DSD412 Drive Fault?
Yes
Reset the drive fault by pressing drive reset button on the HC-ACI-D board.
Drive fault cleared?
No
Yes
No
Yes
Refer to the fault section in the drive manual to find the cause and to clear the fault.
Yes
CNP relay is ON?
Yes
RDY relay is ON?
No
No
1. Verify +/-15VDC on the HC-ACI-D board IDC terminals. If no voltage is present, refer to the job prints and verify 36VAC between XC1 and XC2 on the HC-ACI-D board.
2. Verify that the main SAFR1/2 relays are ON and there is 120VAC between terminals 1 and 4 and +/- 15 VDC on the HC-ACI-D board.
Pick UP or DN direction
Directional relays (UP or DN on the SC-SB2K board are ON)
No
Refer to the job prints to determine why the UP or DN relays are not picking
Yes
Go to page 2

M Contactor does not pick

Series M DC DSD412 Drive

A 17.1 controller

Page 2



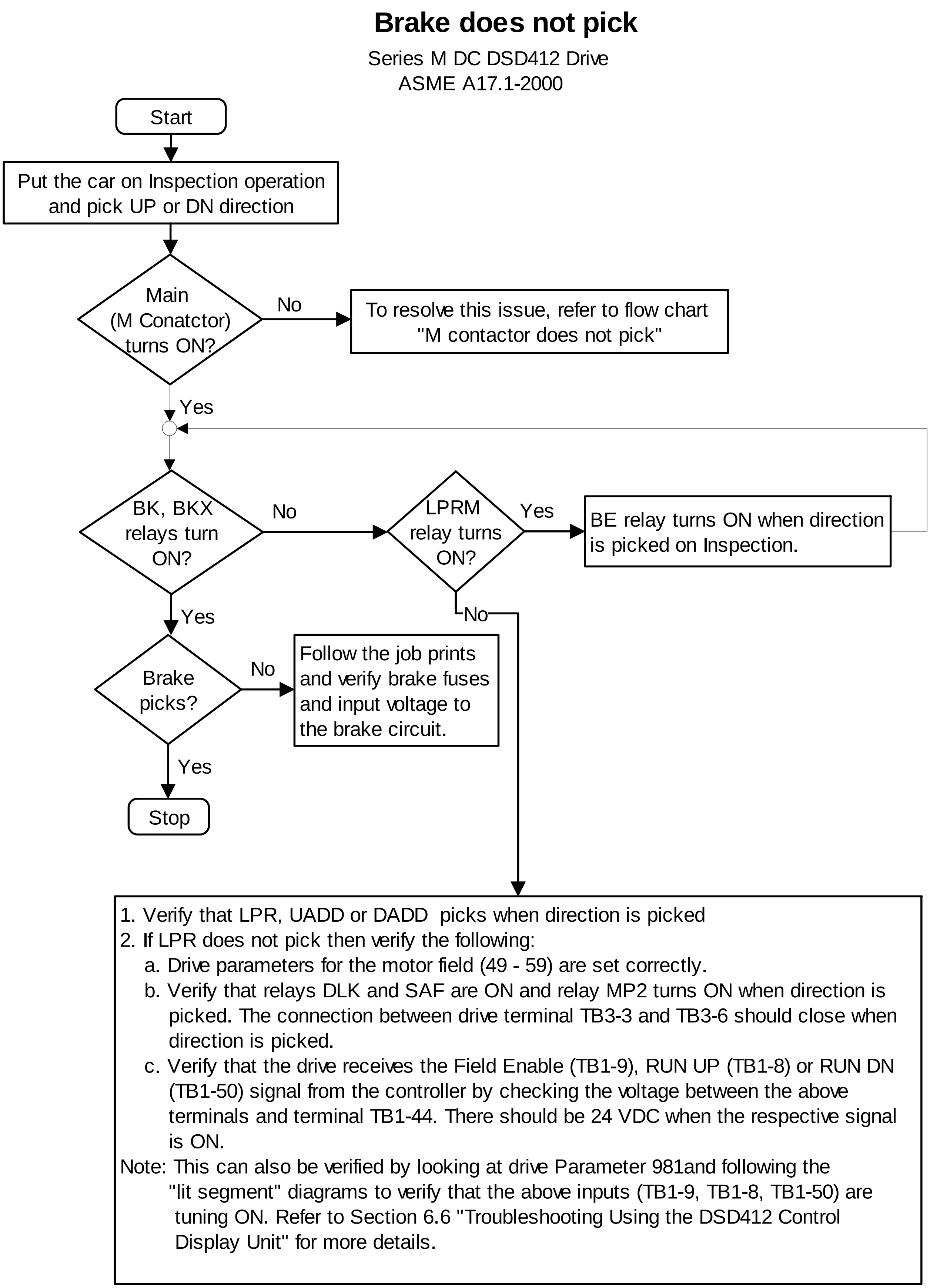

Brake does not pick
Series M DC DSD412 Drive
ASME A17.1-2000
Start
Put the car on Inspection operation and pick UP or DN direction
Main (M Conatctor) turns ON?
No
To resolve this issue, refer to flow chart "M contactor does not pick"
Yes
BK, BKX relays turn ON?
No
LPRM relay turns ON?
Yes
BE relay turns ON when direction is picked on Inspection.
No
Yes
Brake picks?
No
Follow the job prints and verify brake fuses and input voltage to the brake circuit.
Yes
Stop
1. Verify that LPR, UADD or DADD picks when direction is picked
2. If LPR does not pick then verify the following:
a. Drive parameters for the motor field (49 - 59) are set correctly.
b. Verify that relays DLK and SAF are ON and relay MP2 turns ON when direction is picked. The connection between drive terminal TB3-3 and TB3-6 should close when direction is picked.
c. Verify that the drive receives the Field Enable (TB1-9), RUN UP (TB1-8) or RUN DN (TB1-50) signal from the controller by checking the voltage between the above terminals and terminal TB1-44. There should be 24 VDC when the respective signal is ON.
Note: This can also be verified by looking at drive Parameter 981and following the "lit segment" diagrams to verify that the above inputs (TB1-9, TB1-8, TB1-50) are tuning ON. Refer to Section 6.6 "Troubleshooting Using the DSD412 Control Display Unit" for more details.

FIGURE 6.15 Car does not move

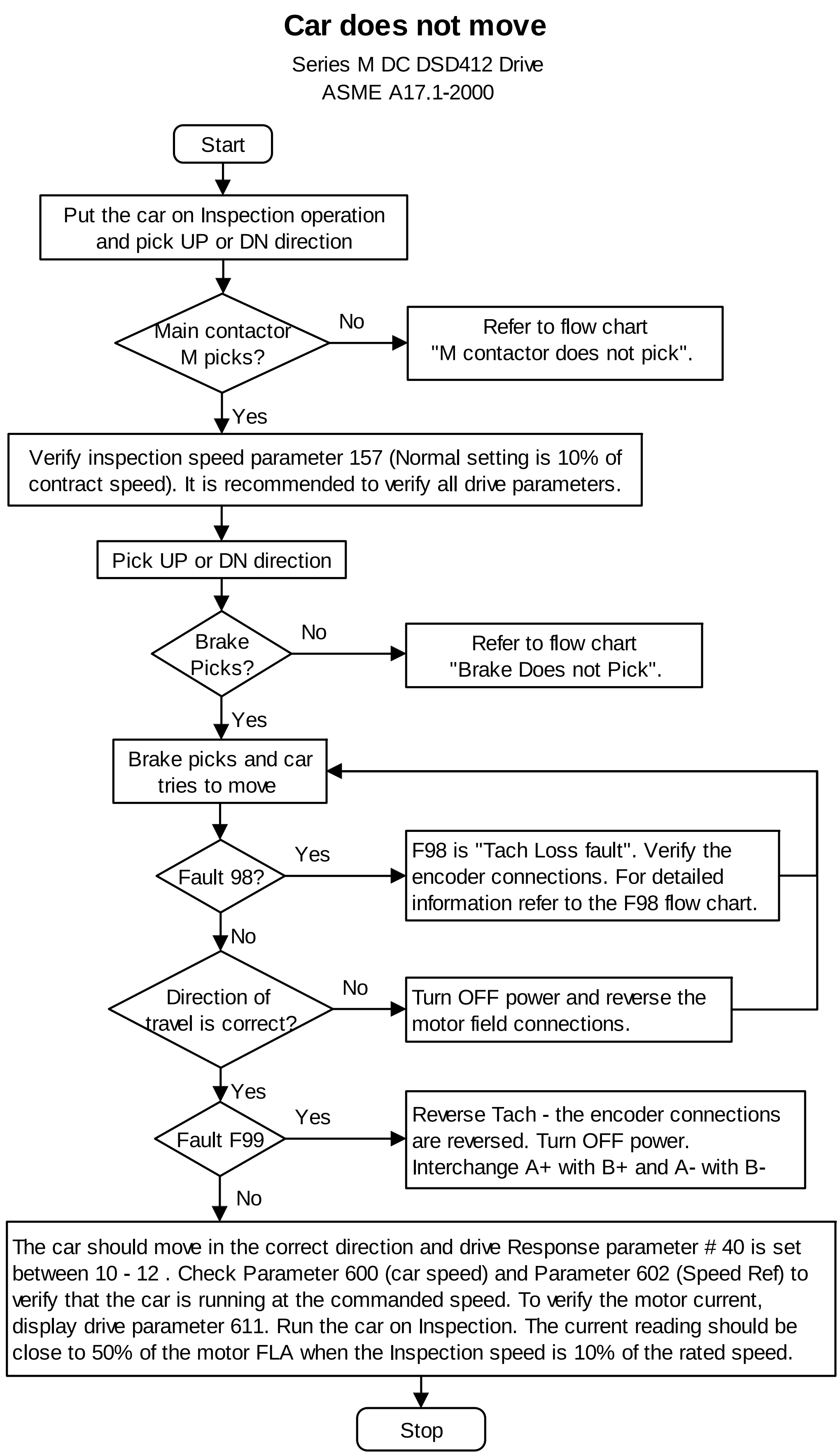


FIGURE 6.16 Self Tuning

Self Tuning

Series M DC DSD412 Drive
ASME A17.1-2000

This test measures the armature resistance, motor inductance, motor field time constant and armature feedback verification.

Start

1. Turn OFF the power at the main disconnect.
2. Remove the brake fuse or disconnect the brake coil.
3. Jumper N.O. contact number 3 of relay LPRM.
4. Connect a jumper between the 2 bus and the right side of the relay MP1 coil.
5. Disconnect and insulate the wire from drive terminal TB1-9.
6. For ASME 2000 controller ONLY: Jumper the MX relay N.O. contact # 4 which picks the SAFD relay".
7. Place the NV Ram protection switch in the ON (Up position).
8. Bypass A17.1 Faults, Refer to section 3.4-i.6, Page 3-12 in MCE installtion manual.

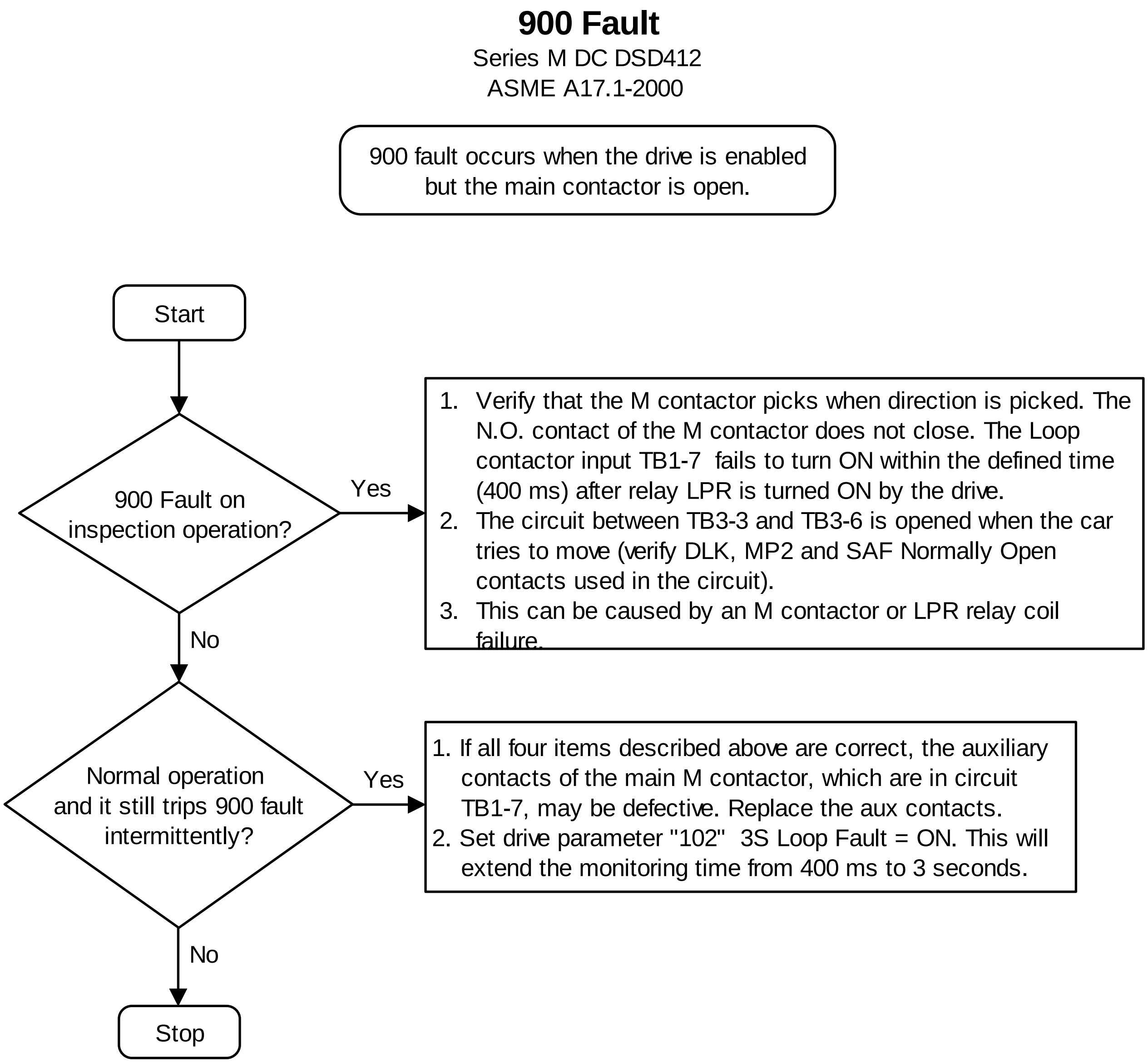
Self Tune Test #1: This test calculates the motor armature resistance, motor inductance and Field L/R time constant.
1. Select parameter 997 and Press Data Func KEY. ENTER will display on the screen. Press Enter.
2. The Drive will pick the main contactor a couple of times. Then it will display PASS or FAIL. If the test failed message appears, refer to the fault number to resolve the problem.
3. For test Passed: Record the value of Parametesr 613, 614, 615.

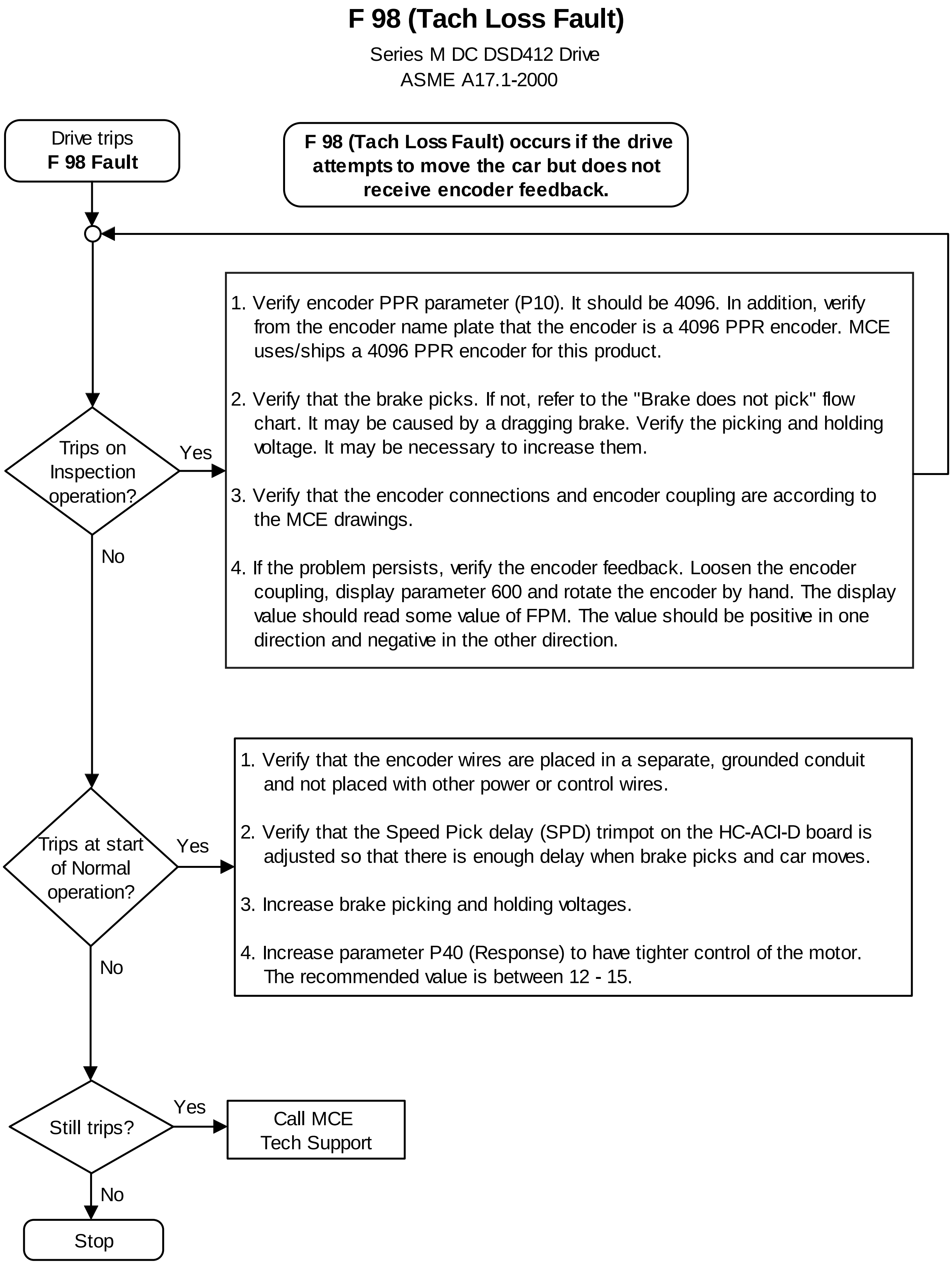
Self Tune Test #2: This test verifies the drive internal function and armature feedback circuits.
1. Select parameter 998. Press the Data Fun Key.
2. Enter is displayed on the key pad. Press Enter.
3. The Drive will pick the main contactor and conduct the test. PASS or FAIL will appear on the display.

1. Enter the recorded values for 613, 614and 615 in parameters 4, 6 & 51 respectively. Save new parameters.
2. Turn OFF the power. Install the brake fuse. Connect the brake coil. Remove the jumper across the LPRM relay contact number 3. Remove the jumper between the 2 bus and the right side of the MP1 relay coil and jumper across the relay MX N.O. contact #4.
3. Run the car on Inspection to verify the car operation.

Stop

FIGURE 6.17 900 Fault




F 98 (Tach Loss Fault)
Series M DC DSD412 Drive
ASME A17.1-2000
Drive trips
F 98 Fault
F 98 (Tach Loss Fault) occurs if the drive attempts to move the car but does not receive encoder feedback.
Trips on Inspection operation?
Yes
No
1. Verify encoder PPR parameter (P10). It should be 4096. In addition, verify from the encoder name plate that the encoder is a 4096 PPR encoder. MCE uses/ships a 4096 PPR encoder for this product.
2. Verify that the brake picks. If not, refer to the "Brake does not pick" flow chart. It may be caused by a dragging brake. Verify the picking and holding voltage. It may be necessary to increase them.
3. Verify that the encoder connections and encoder coupling are according to the MCE drawings.
4. If the problem persists, verify the encoder feedback. Loosen the encoder coupling, display parameter 600 and rotate the encoder by hand. The display value should read some value of FPM. The value should be positive in one direction and negative in the other direction.
Trips at start of Normal operation?
Yes
No
1. Verify that the encoder wires are placed in a separate, grounded conduit and not placed with other power or control wires.
2. Verify that the Speed Pick delay (SPD) trimpot on the HC-ACI-D board is adjusted so that there is enough delay when brake picks and car moves.
3. Increase brake picking and holding voltages.
4. Increase parameter P40 (Response) to have tighter control of the motor. The recommended value is between 12 - 15.
Still trips?
Yes
Call MCE Tech Support
No
Stop

Motor Field Adjustment

Series M DC DSD412 Drive
ASME A17.1-2000

To resolve motor field faults:

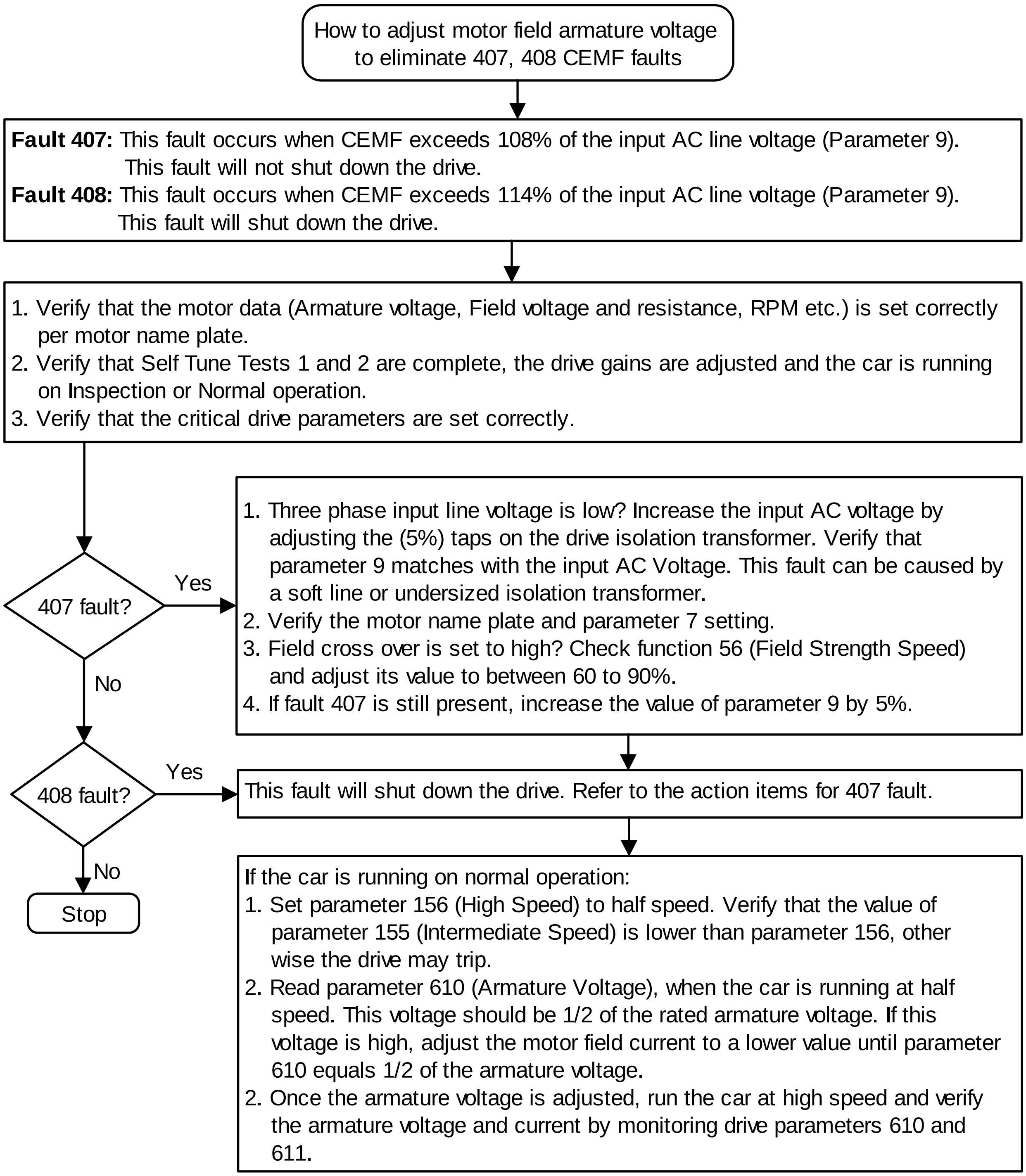
1. Measure the motor field resistance and verify that it is according to the prints.
2. From the motor name plate, write down the Full, running and standing field voltage values. Calculate the motor field current values by dividing the motor field voltage / motor field resistance.
3. Enter calculated values of the motor field current in drive parameter 49 (Weak Field), 50 (Full Field current), 53 (Standing Field).
4. Verify that Drive parameters 52 (Rated field voltage)and 55 (AC input for Motor Field) are set correctly.

1. Motor field module in the drive can supply 0.2 to 40.0 A. Verify that the motor field connections on the drive terminals are according to the measured values of current.
2. Verify that Motor Field Dip switches are set correctly (Refer to section 3.3.2 in the MCE installation manual) .
3. Verify that the motor field power AC1, AC2 are in phase with the L1, L2.

STOP

407 , 408 CEMF Faults. Motor field and Armature Voltage Adjustments

Series M DC DSD412 Drive
ASME A17.1-2000



6.8 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 the adjustable time set via parameter MOTOR LIMIT TIMER (1 - 6 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 software version 5.19.0001 or earlier. To return the car to service and not harm the data, simply toggle the relay panel MACHINE ROOM INSPECTION TRANSFER switch from INSP/NORM and back to NORM.

   Note: On software version 5.19.0002* or later, the data is not cleared on power up or reset. The data is overwritten each time a new MLT occurs. However, the data may be cleared and the MLT counter reset by placing the F1, F2, F7 and F8 switches in the up position.

2. On the MC-PCA-OA2K board place the F2 switch up (ON) to select External Memory. All other switches should be down (OFF). The LCD display shows the default address, DA.0100 (address 0100H) followed by the eight memory bits at that location.

   ```
   EXTERNAL MEMORY
   DA.0100:1011001
   ```

3. Use the DATA TRAP MEMORY CHART to determine the addresses where the saved data is stored. The section in the Controller Installation Manual titled EXTERNAL MEMORY MODE provides a complete description of how to use the External Memory Mode. Briefly, use the **N** pushbutton to select the digit to be changed (digit blinks on and off). Press **+** or **-** to change the digit.

4. Record the data displayed on the LCD for all rows shown on the chart. It helps if you have a few photocopies of the chart. Simply mark the positions in the chart that are shown as a “1" on the LCD display. Addresses 0480H thru 0493H contain car status flags. Address 0494H contains the car's position indicator value at the instant the MLT or VLT condition occurred and address 0495H contains the MLT counter (ver 5.19.0002 or later). Only the labeled positions are important to mark.

5. Once all of the addresses have been marked you may reset the computer to clear the recorded memory area (software versions 5.19.0001* or earlier).

6. Use the recorded values and the timer logic flowchart to help determine the cause of the problem. Then call MCE for assistance if any is needed.

   * Note: To determine the software version, place switch F8 up (ON) with all other function switches down (OFF).

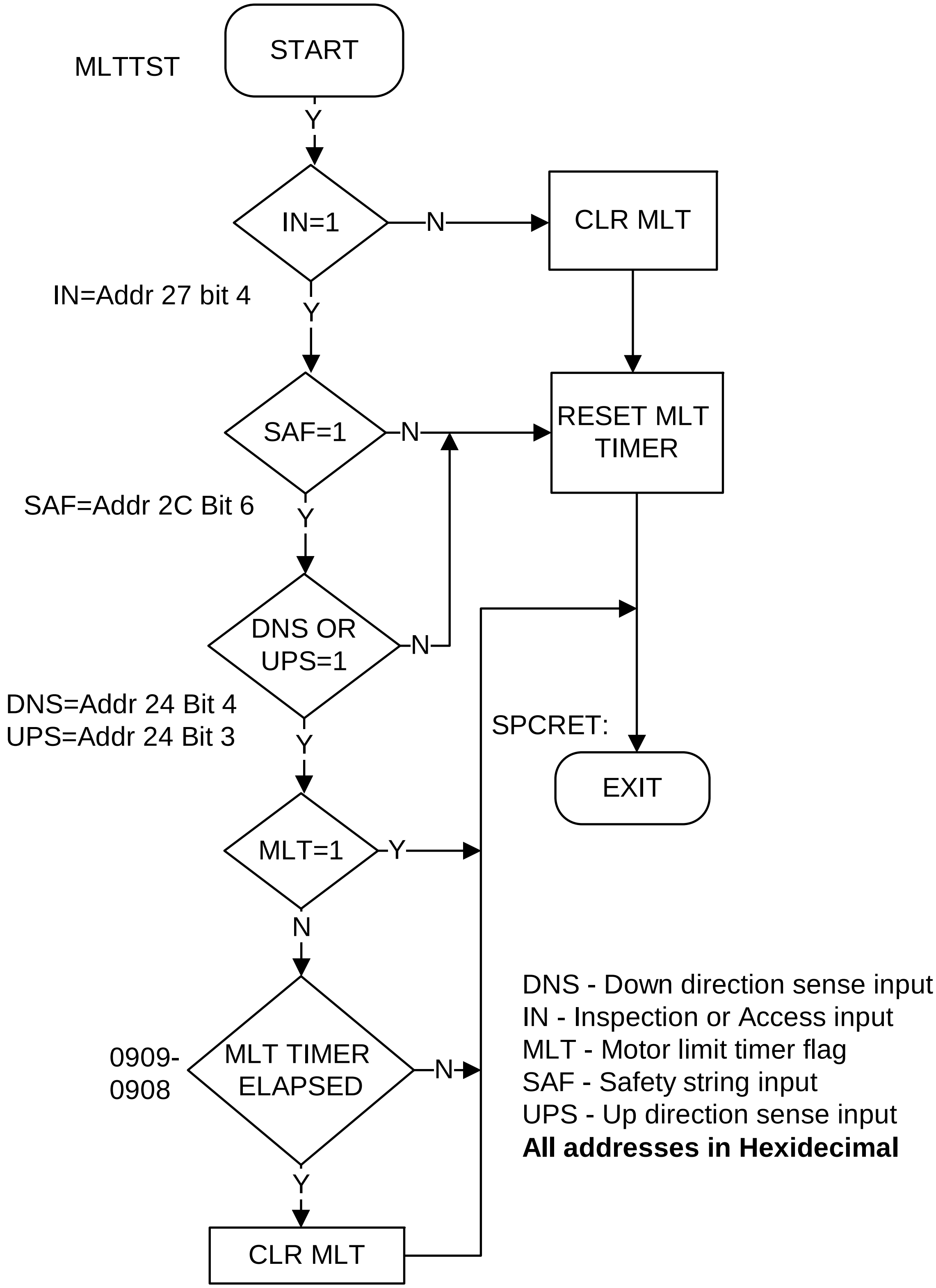
   ```
   PTHC D
   Ver# T06.02.0001
   ```

PTC TRACTION DATA TRAP MEMORY CHART

	DIAGNOSTIC INDICATORS							
	8	7	6	5	4	3	2	1
0480H	DOLM	PHE	DZ	DOL	DBC	DOB	GEU	GED
0481H	TFA	DC	UC	CC	NDS	FDC	DHO	DOI
0482H	DCFN	DCP	DOF	LOT	GHT	HCT	CCT	SDT
0483H	DOC	SE	DCLC	CSB	DCC	NUDG	NUGBPS	DSHT
0484H	INT	FRA	FCS	FRS	DNS	UPS	STD	STU
0485H	SCE	FCCC	FCHLD	HLI	LEF	HDLYE	FWI	PIC
0486H	LFP	UFP	NYDS	CCH	DIN	DPR	GTDE	GTUE
0487H	HD	FCOFF	DHLD	IND	IN	DLKS	DELSIM	YSIM
0488H	LLW	DLK	DDF	REL	ISR	INCF	REAR	LLI
0489H	DNDO	LD	DPD	DDP	UPDO	LU	UPD	UDP
048AH	DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
048BH	TOS	MLT		MGR	H	HSEL	DSH	RUN
048CH	DZP	STC	SAF	HCR	HCDX	CCD	ISV	ISRT
048DH	TEMPB	UFQ	DZORDZ	FCSM	FRM	FRSS	FRAS	FRC
048EH	SD	SDA	DSD	BFD	SU	SUA	USD	TFD
048FH	FRBYP	FRON	HYD1_TRC0	ECC	CD	ECRN	EPR	PFG
0490H	CODE4	CODE2	CODE3	FREE	DEADZ	DHLD1	PH1	NDGF
0491H	CTLDOT	CTLF	CTL	ALV	EPSTP	AUTO	EPRUN	EPI
0492H	FRMM	OFR	WLDI	WLD	CCMEM	OLW	OVLM	OVL
0493H	API	SAB	TEST	DHENDR	DHEND	CTST	HOSPH2	HOSP
0494H	PI	PI	PI	PI	PI	PI	PI	PI
0495H					MLT Counter	MLT Counter	MLT Counter	MLT Counter

Note: In software version 5.19.0001 and earlier, TRAPLOCK is located at address 0495H bit 1 and is cleared only when the controller is reset.

FIGURE 6.21 Traction Motor Limit Timer Logic



6.9 ASME A17.1 - 2000 FAULT TROUBLESHOOTING TABLES

The ASME A17.1 - 2000 Fault Troubleshooting data is stored in External Memory at the Hex addresses shown in the following tables. Refer to Section 5.5 *External Memory Mode* for additional information. External Memory Mode is initiated by placing the F2 switch in the up position with all other switches in the down position.

The ***N*** pushbutton advances of the computer memory address, which is displayed on the second line of the LCD. For example, for this display, pressing the ***N*** pushbutton once (hold it for 1-2 seconds) will cause the 1 in the address 1234 to begin blinking. By continuing to press the ***N*** pushbutton, the 2 in the address 1234 will begin to blink. The cycle will continue while the ***N*** pushbutton is being pressed. Once the digit needed to be changed is blinking, the address can then be modified using the **+** or **-** pushbuttons.

```
EXTERNAL MEMORY
DA.1234:10110011
```

The S pushbutton ends the ability to change the address by stopping the digit from blinking. If the S pushbutton is not pressed, the selected digit will stop blinking automatically after a period of about 20 seconds.

The data (8 digits) that corresponds to the memory address is displayed to the right of the address. This display will change as the memory address changes.

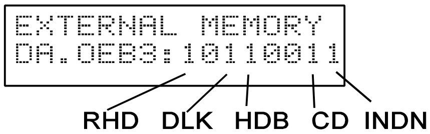
6.9.1 ASME A17.1 - 2000 REDUNDANCY FAULT ESTABLISHED MAP

TABLE 6.2 ASME A17.1 - 2000 Redundancy Fault Established Map

HEX ADDRESS	FAULT							
0E90	PFLT	RESBYP	RSAFR	RSTOP	GOV	SAFH	SAFC	RCT
0E91	RFR_FLKR	RFR_STK	EBR_FLKR	EBR_STK	REB2	REB1	REI	2BI
0E92	INUP	IN	INMR	ACCI	INICI	INCTI	RMR	RBK
0E93	RHD	RCD	DLK	HDB	CDB	HD	CD	INDN
0E94	RACC1	RIN2	RIN1	RLULD	DZX	RDZX	RDZ	RPT
0E95	ETS2	COS2	ILO1	ETS1	COS1	RCTIC	RTBAB	RACC2
0E96	RUP	DNS	DNL	UNL	UPS	DNDIR	UPDIR	ILO2
0E97	MGR	MPSAF	ESBYP	TEST	DCL	DPM	RH	RDN
0E98	DPDIF	EQR_FLKR	EQR_STK	RHDB	H	CTDIF	CTOS	REL
0E99	--	--	--	RSAFM	RUDX2	RUDX1	DETS1	UETS1
0E9A	DZRX	RDZR	RHDR	RCDR	HDBR	CDBR	HDR	CDR
0E9B	--	--	--	RUDX4	RUDX3	RHDBR	DCLR	DPMR
0E9F	PLD	CT	ESBYP	EB	4BUS	RSAFR	--	--

6.9.2 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.



Refer to Section 5.5 for additional information on the External Memory mode. To access the following data the F2 Switch is up. Example: Alphanumeric display at left indicates that at hex address 0EB3 the following faults are *ON* (indicated by a 1 in that position): RHD, DLK, HDB, CD and INDN.

TABLE 6.3 Redundancy Fault Established Data Trap

HEX ADDRESS	FAULT DATA (1 = ON, 0 = OFF)							
0EB0	PFLT	RESBYP	RSAFR	RSTOP	GOV	SAFH	SAFC	RCT
0EB1	RFR_FLKR	RFR_STK	EBR_FLKR	EBR_STK	REB2	REB1	REI	2BI
0EB2	INUP	IN	INMR	ACCI	INICI	INCTI	RMR	RBK
0EB3	RHD	RCD	DLK	HDB	CDB	HD	CD	INDN
0EB4	RACC1	RIN2	RIN1	RLULD	DZX	RDZX	RDZ	RPT
0EB5	ETS2	COS2	ILO1	ETS1	COS1	RCTIC	RTBAB	RACC2
0EB6	RUP	DNS	DNL	UNL	UPS	DNDIR	UPDIR	ILO2
0EB7	MGR	MPSAF	ESBYP	TEST	DCL	DPM	RH	RDN
0EB8	DPDIF	EQR_FLKR	EQR_STK	RHDB	H	CTDIF	CTOS	REL
0EB9	--	--	--	RSAFM	RUDX2	RUDX1	DETS1	UETS1
0EBA	DZRX	RDZR	RHDR	RCDR	HDBR	CDBR	HDR	CDR
0EBB	--	--	--	RUDX4	RUDX3	RHDBR	DCLR	DPMR
0EBF	PLD	CT	ESBYP	EB	4BUS	RSAFR	--	--

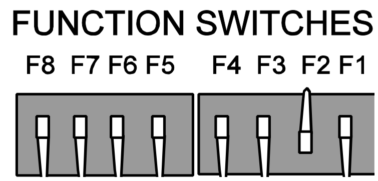
6.9.3 ASME A17.1 - 2000 SC-HDIO BOARD DATA TRAP

TABLE 6.4 ASME A17.1 - 2000 SC-HDIO Board Input Data Trap

HEX ADDRESS	INPUT DATA (1 = ON, 0 = OFF)							
0EC0	2BI	RCT	RESBYP	RSAFR	STOP	SAFC	SAFH	GOV
0EC1	INUP	INICI	INCTI	RMR	RBK	RFR	DZX	REI
0EC2	--	--	RHD	RCD	CD	INDN	INMR	HD
0EC3	RUP	DNL	UNL	RIN2	RIN1	RLULD	RDZ	RPT
0EC4	FRSA	FRSM	FRBYP	FCCC	FCOFF	TEST	RH	RDN
0EC5	--	--	--	--	SSI	CWI	EQR	EDS
0EC6	HDBO	HDB	CDBO	CDB	ACCI	EBR	REB2	REB1
0EC7	ILO1	ETS1	COS1	RDZX	RCTIC	RTBAB	RACC2	RACC1
0EC8	--	--	UETS2	PFLT	ILO2	COS2	ETS2	UPDIR
0EC9	CDBOR	CDBR	CDR	DZRX	RHDB	DETS1	UETS1	DNDIR
0ECA	A2KBP	RHDR	RCDR	RDZR	RHDBR	HDBOR	HDBR	HDR
0ECB	--	--	DETS2	RSTOP	RUDX2	RUDX4	RUDX3	RUDX1

6.9.4 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 External Memory mode (refer to Section 5.5)



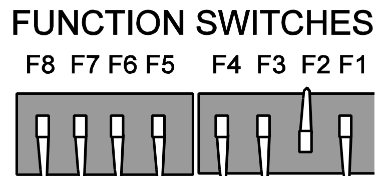
External Memory mode

TABLE 6.5 RAW ASME A17.1 2000 SC-HDIO Board Input Map

HEX ADDRESS	INPUTS							
0C60	2BI	RCT	RESBYP	RSAFR	STOP	SAFC	SAFH	GOV
0C61	INUP	INICI	INCTI	RMR	RBK	RFR	DZX	REI
0C62	--	--	RHD	RCD	CD	INDN	INMR	HD
0C63	RUP	DNL	UNL	RIN2	RIN1	RLULD	RDZ	RPT
0C64	FRSA	FRSM	FRBYP	FCCC	FCOFF	TEST	RH	RDN
0C65	--	--	--	--	SSI	CWI	EQR	EDS
0C66	HDBO	HDB	CDBO	CDB	ACCI	EBR	REB2	REB1
0C67	ILO1	ETS1	COS1	RDZX	RCTIC	RTBAB	RACC2	RACC1
0C68	--	--	UETS2	PFLT	ILO2	COS2	ETS2	UPDIR
0C69	CDBOR	CDBR	CDR	DZRX	RHDB	DETS	UETS	DNDIR
0C6A	2KBP	RHDR	RCDR	RDZR	RHDBR	HDBOR	HDBR	HDR
0C6B	--	--	DETS2	RSTOP	RUDX2	RUDX4	RUDX3	RUDX1

6.9.5 FORMATTED ASME A17.1 - 2000 SC-HDIO BOARD INPUT / OUTPUT MAP

The Formatted ASME A17.1-2000 SC-HDIO Board Input / Output Map is stored in External Memory at the Hex addresses shown in Table 6.11. Refer to Section 5.5 *External Memory Mode* for detailed information. External Memory Mode is initiated by placing the F2 switch in the up position with all other switches in the down position.



External Memory mode

TABLE 6.6 Formatted ASME A17.1 - 2000 SC-HDIO Board Input / Output Map

HEX ADDRESS	INPUTS / OUTPUTS						
0C4F	2_BI_M	MPSAF	STOP	SAFC	SAFH	GOV	RSAFR	2_BI
0C50	TEST	INDN	INUP	RIN2	RIN1	INMR	INICI	INCTI
0C51	--	--	--	RTBAB	RACC2	RACC1	ACCI	RCTIC
0C52	--	--	EQLED	EQIND	SSI	CWI	EQR	EDS
0C53	HDBO	HDB	CDBO	CDB	RHD	RCD	HD	CD
0C54	--	FIR1	FWL	FRSA	FRSM	FRBYP	FCCC	FCOFF
0C55	CTDIF	CTOS	ILO2	ETS2	COS2	ILO1	ETS1	COS1
0C56	RESBYP	ESBYP	–	RMR	RBK	RPT	REI	MB
0C57	TWO_2_ONE	ONE_2_TWO	EB2	EB1	EBRM	EBR	REB2	REB1
0C58	DNDIR	UPDIR	CTPLD1	RUP_M	RDN	RUP	DNL	UNL
0C59	RFR	RFRM	TWOKBP	CT	RCT	RH	RLULD	RDZ
0C5A	HDBOR	HDBR	CDBOR	CDBR	RHDR	RCDR	HDR	CDR
0C5B	DETS1	UETS1	RHDBR	RHDB	RDZR	DZRX	RDZX	DZX
0C5C	RUDX4	RUDX3	RUDX2	RUDX1	RSTOP	DETS2	UETS2	PFLT

TABLE 6.7 Mnemonic Definitions for ASME A17.1 Tables

ACCI	Inspection Access	PFLT	PLD Fault Input
CD	Car Door	RACC1	Redundancy Access Inspection Relay #1
CDB	Car Door Bypass Switch - Bypass Position	RACC2	Redundancy Access Inspection Relay #2
CDBO	Car Door Bypass Switch - Off Position	RBK	Redundancy Brake Relay
CDBOR	Car Door Rear Bypass Switch - Off Position	RCD	Redundancy Car Door Relay
CDBR	Car Door Rear Bypass Switch - Bypass Position	RCDR	Redundancy Car Door Rear Relay
CDR	Car Door Rear	RCT	Redundancy Cycle Test Relay
COS1	Overspeed - Contract, PLD #1	RCTIC	Redundancy Car Top / In Car Inspection Relay
COS2	Overspeed - Contract, PLD #2	RDN	Redundancy Down Relay
CT	Cycle Test Output	RDZ	Redundancy Door Zone Relay
CTDIF	Cycle Test - DP Differential	RDZR	Redundancy Door Zone Rear Auxiliary Relay
CTOS	Cycle Test - Overspeed	RDZX	Redundancy Door Zone Auxiliary Relay
CWI	Counterweight Input	REB1	Emergency Brake Relay #1
DETS1	Down Emergency Terminal Switch #1	REB2	Emergency Brake Relay #2
DETS2	Down Emergency Terminal Switch #2	REI	Run Enable Input
DNDIR	Down Direction Detected	RESBYP	Redundancy Emergency Stop Switch Bypass Relay

DNL	Down Normal Limit	RFR	Redundancy Fault Reset
DZRX	Door Zone Rear Auxiliary	RFRM	Redundancy Fault Reset Memory
DZX	Door Zone Auxiliary	RH	Redundancy High Speed Relay
EB1	Emergency Brake Relay #1 Output	RHD	Redundancy Hoistway Door Relay
EB2	Emergency Brake Relay #2 Output	RHDB	Redundancy Hoistway Door Bypass Relay
EBR	Emergency Brake Reset	RHDBR	Redundancy Hoistway Door Bypass Rear Relay
EBRM	Emergency Brake Reset Memory	RHDR	Redundancy Hoistway Door Rear Relay
EDS	Earthquake Direction Switch	RIN1	Redundancy Inspection Relay #1
EQIND	Earthquake Indicator	RIN2	Redundancy Inspection Relay #2
EQLED	Earthquake Light	RLULD	Redundancy Level Up / Level Down Relays
EQR	Earthquake Reset Switch	RMR	Redundancy Motor Relay
ESBYP	Emergency Stop Switch Bypass	RPT	Redundancy Car / Hoistway Door Timed Relay
ETS1	Overspeed - Emergency Terminal Switch, PLD #1	RSAFM	Redundancy Motor Contactor Safety Relay Input
ETS2	Overspeed - Emergency Terminal Switch, PLD #2	RSAFR	Redundancy Safety Relay Input
FCCC	Fire Phase 2 - Car Call Cancel	RSTOP	Redundancy Stop 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	RUDX3	Redundancy Up/Down Auxiliary #3
FRSM	Fire Phase 1 - MR / HTW Sensor - Main Recall	RUDX4	Redundancy Up/Down Auxiliary #4
FWL	Fire Warning Light	RUP	Redundancy Up Relay
GOV	Governor Switch Input	RUP_M	Redundancy Up Relay Memory
HD	Hoistway Door	SAFC	Safety Circuit - Car
HDB	Hoistway Door Bypass Switch - Bypass Position	SAFH	Safety Circuit - Hoistway
HDBO	Hoistway Door Bypass Switch - Off Position	SSI	Seismic Switch Input
HDBOR	Hoistway Door Rear Bypass Switch - Off Position	STOP	Stop Switch Input
HDBR	Hoistway Door Rear Bypass Switch - Bypass Position	TEST	Test Input
HDR	Hoistway Door Rear	TWO_2_ONE	Indicates Switching from EB2 to EB1
ILO1	Overspeed - Inspection / Leveling, PLD #1	TWO_BI	2 Bus Input
ILO2	Overspeed - Inspection / Leveling, PLD #2	TWO_BI_M	2 Bus Input Memory
INCTI	Inspection - Car Top Inspection	TWOKBP	ANSI 2000 Bypass Input
INDN	Inspection - Down Input	UETS1	Up Emergency Terminal Switch #1
INICI	Inspection - In Car Inspection	UETS2	Up Emergency Terminal Switch #2
INMR	Inspection - Machine Room	UNL	Up Normal Limit
INUP	Inspection - Up Input	UPDIR	Up Direction Detected
MB	Motor / Brake Output		
MPSAF	Main Processor - Safety Output		
ONE_2_TWO	Indicates Switching from EB1 to EB2		

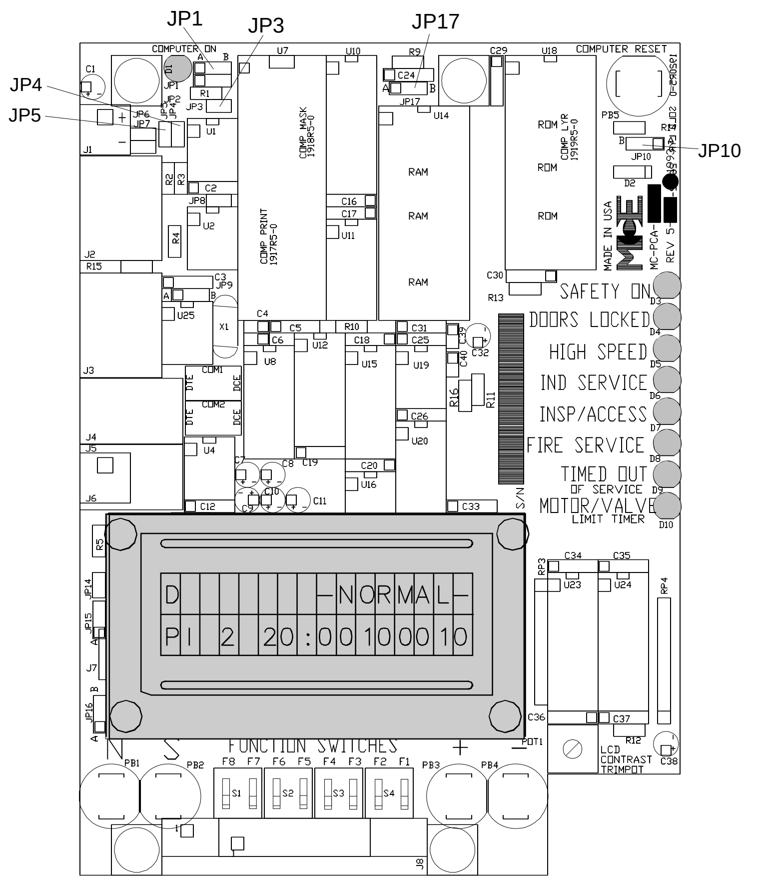
6.10 PC BOARD QUICK REFERENCES

FIGURE 6.22 MC-PCA-OA2K Board Quick Reference

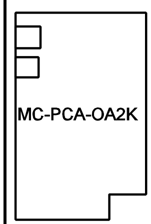
MC-PCA-OA2K Quick Reference 42-QR-MC-PCA-OA-2K

PTC and PHC Connections

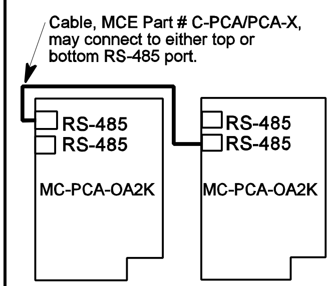
MC-PCA-OA2K Board



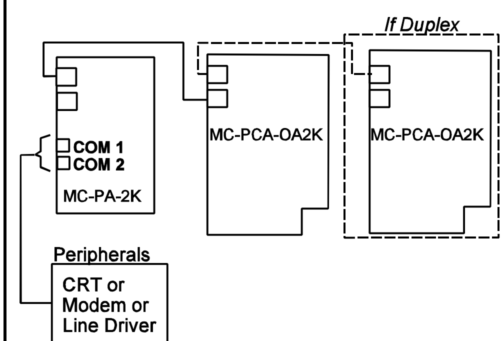
Simplex



Duplex Configuration



Configuration with MC-PA-2K
(Peripherals Adapter Board)



JUMPER TABLE	
	MC-PCA-OA2K (PHC & PTC) Controllers)
JP1	B *
JP3	ON * *
JP4	ON * * *
JP5	ON * * *
JP8	N/A
JP9	N/A
JP10	A
JP15	Set at factory
JP16	Set at factory
JP17	A

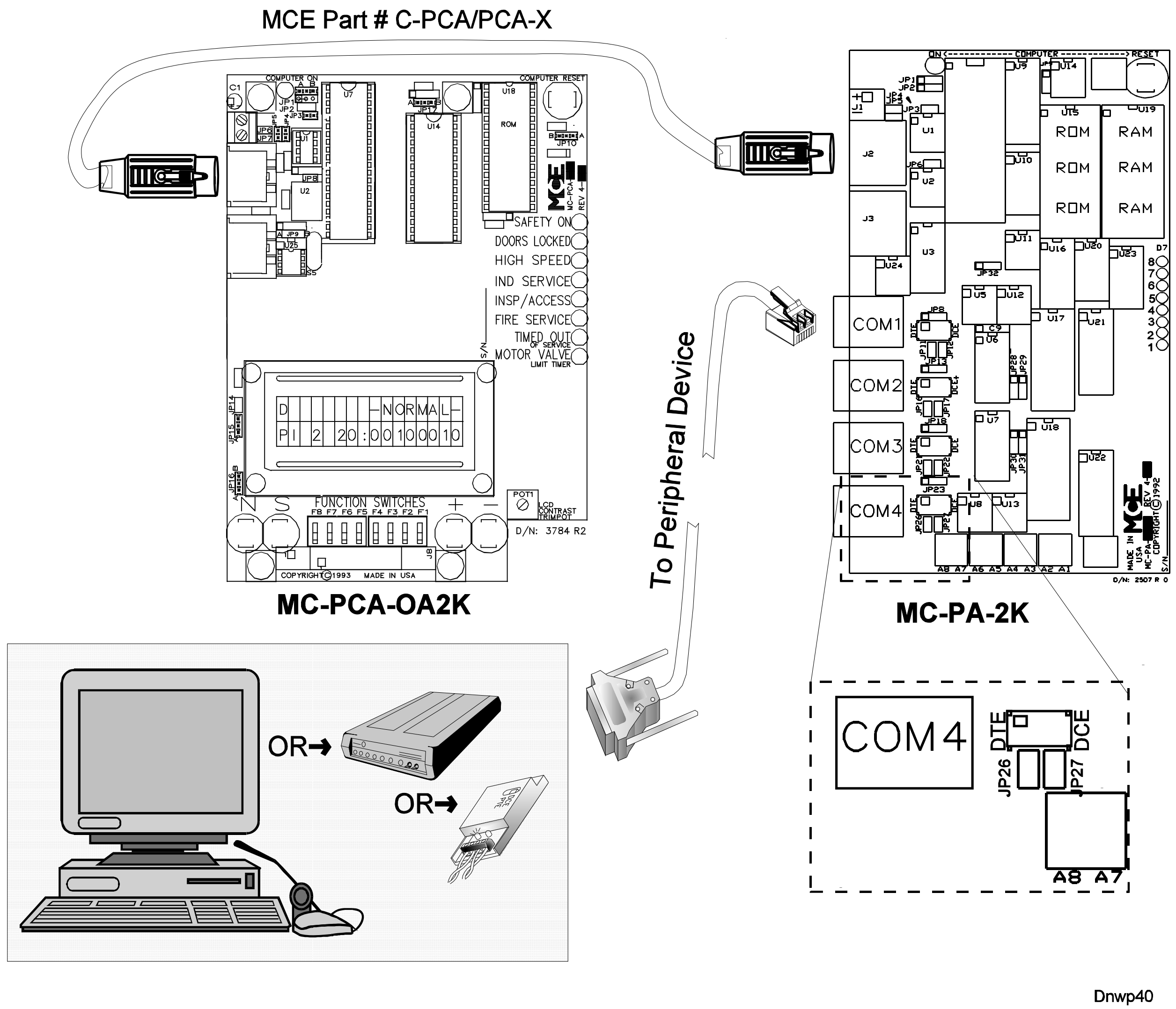
* If U7 on the MC-PCA-OA2K board contains a 21-LB-217A microcontroller, set JP1 to position B, otherwise set to position A.

* * The JP3 jumper should be in the ***OFF*** position if the MC-PCA-OA2K board is not at the end of a daisy chain in a duplex configuration, i.e. between MC-PCA-2K or MC-PA-2K boards.

* * * Try JP4 and JP5 in either the ON or OFF position until car to car or car to PA communication is established.

FIGURE 6.23 MC-PA-2K Board Quick Reference

42-QR-MC-PA-2K **MC-PA-2K QUICK REFERENCE CARD**



Port Switch Setting	Cable and Peripheral
DCE	**SERIAL CABLE to CRT Terminal, PC or Printer**
DTE	**LINE DRIVER / MODEM to CRT Terminal or PC**

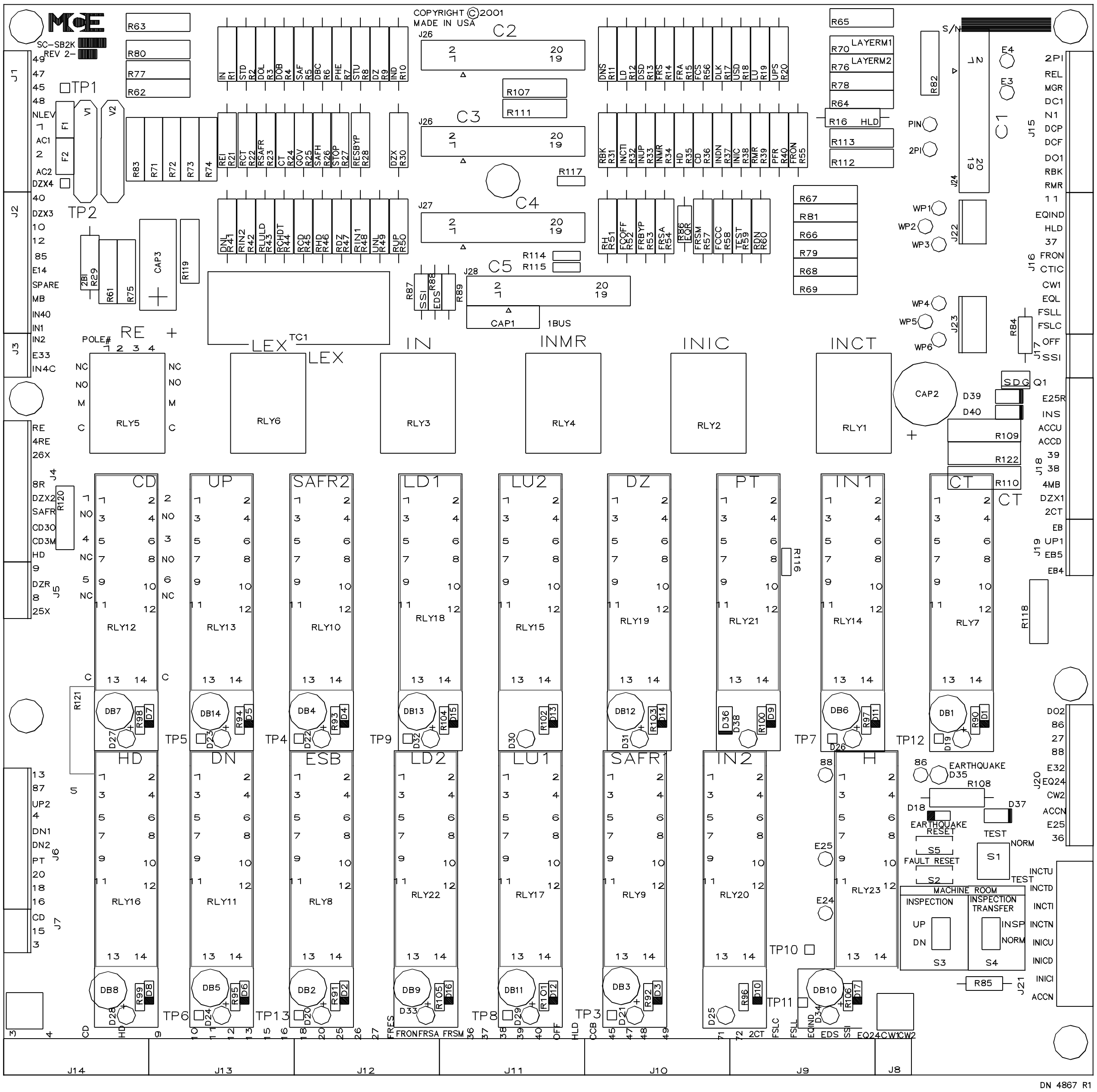
Jumper Settings

Jumper	Setting	Description
JP1	B	A = Internal, B = External
JP3	ON	120Ω Data Termination
JP9	B	A = 512Kb EPROM, B = 1 to 4 Mb EPROM
JP32	A	Reserved for future use

FIGURE 6.24 SC-SB2K Main Safety Relay Board Quick Reference

42-QR-SC-SB2K Rev. 1

SC-SB2K QUICK REFERENCE



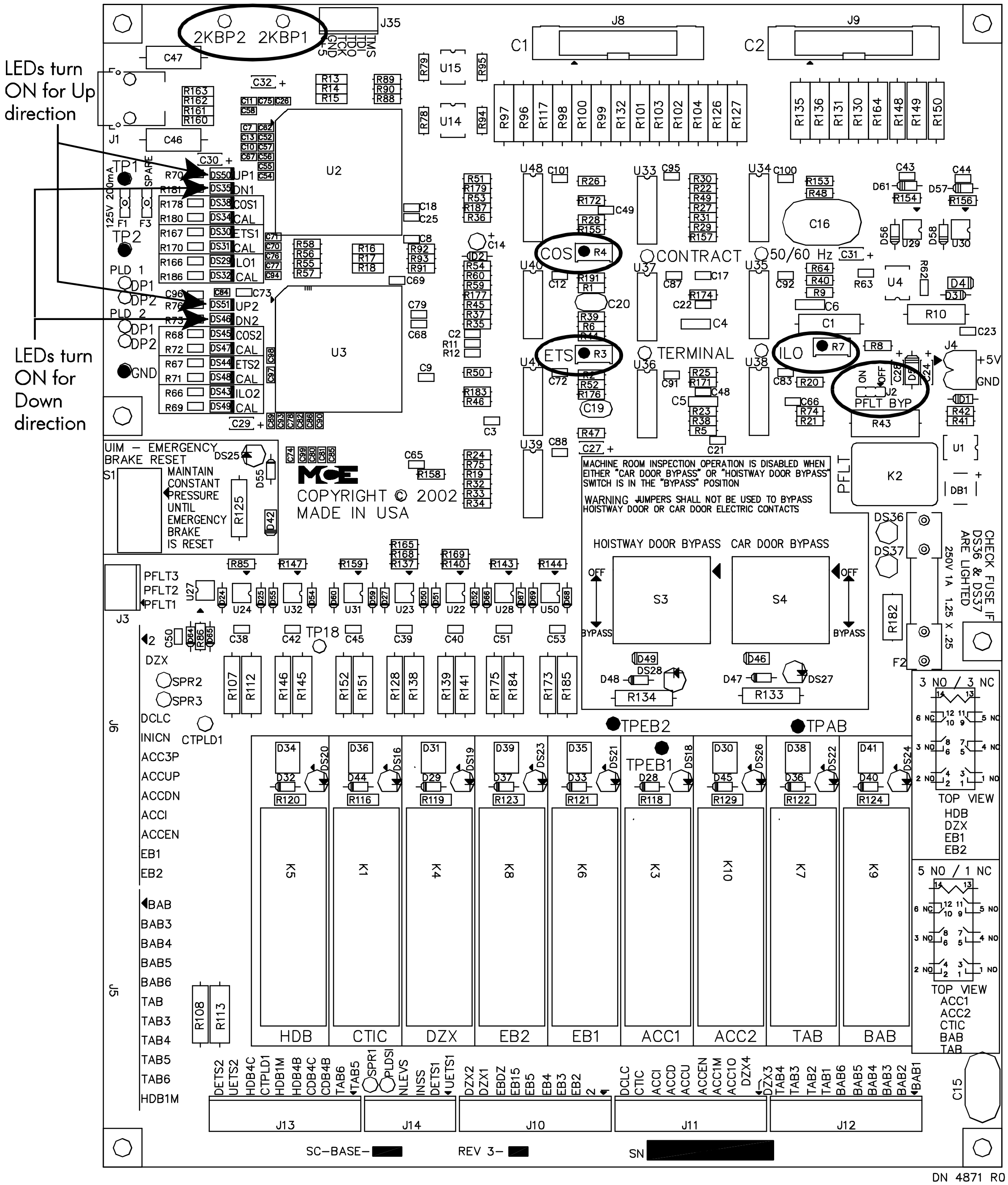
INDICATORS	Redundancy checking TEST POINTS (See Section 4.11.4 in this manual)		
Earthquake:	GOV: TP1 (fused 1-bus) and TP12	IN1, IN2: TP7 and TP2 (fused 2-bus, 120VAC)	H: TP1 (fused 1-bus) and TP11 and TP10 and screw terminal 11
SWITCHES	ESB: TP1 (fused 1-bus) and TP13	LU1, LU2: TP8 and TP2 (fused 2-bus, 120VAC)	EB1: TP1 (fused 1-bus) and TPEB1
Earthquake Reset Pushbutton:	SAFR1: TP1 (fused 1-bus) and TP3	LD1, LD2: TP9 and TP2 (fused 2-bus, 120VAC)	EB2: TP1 (fused 1-bus) and TPEB2
Fault Reset Pushbutton:	SAFR2: TP1 (fused 1-bus) and TP4	CD: TP1 (fused 1 bus) and TP12, with CD and TP2 (fused 2-bus, 120VAC)	CTIC: terminal INCTI and TP2 (fused 2-bus, 120VAC)
Machine Room Inspection Transfer INSP/NORM:	UP: TP1 (fused 1-bus) and TP5	HD: TP1 (fused 1 bus) and TP12, with HD and TP2 (fused 2-bus, 120VAC)	TAB: TP1 (fused 1-bus) and TPAB, with TAB and TP2 (fused 2-bus, 120VAC)
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 6.25 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)

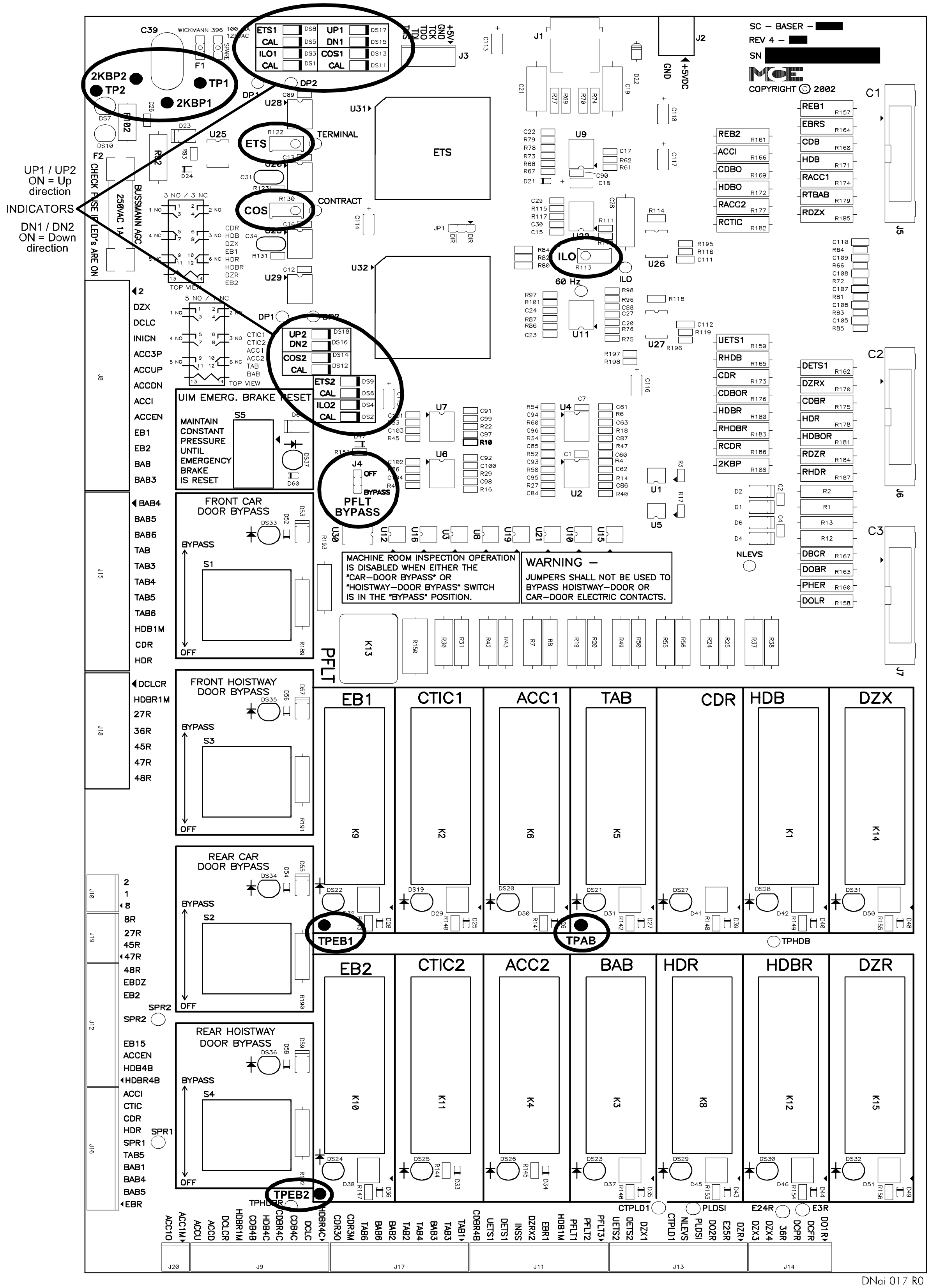
INDICATORS			
UP1 - UP2	ON = Up direction	ETS1 - ETS2	ON = Emergency Terminal Overspeed
DN1 - DN2	ON = Down direction	ILO1 - ILO2	ON = Inspection Leveling Overspeed
COS1 - COS2	ON = Contract overspeed		

FIGURE 6.26 SC-BASER Board Quick Reference

42-QR-SC-BASER Rev. 2

SC-BASER QUICK REFERENCE

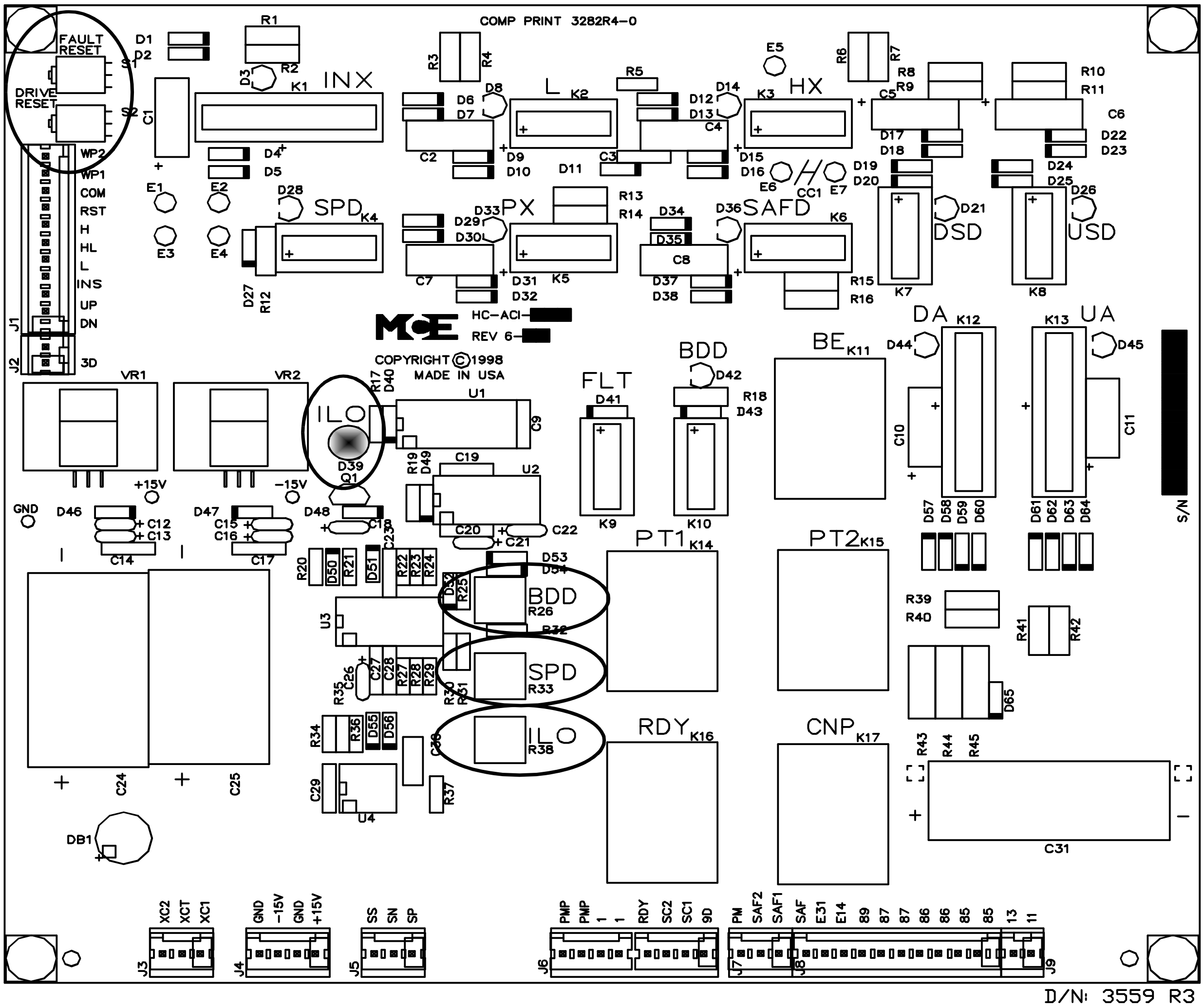
Board 66



Jumpers, switches and trimpots: see Figure 6.25 SC-BASE Board Quick Reference

FIGURE 6.27 HC-ACI-D 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**

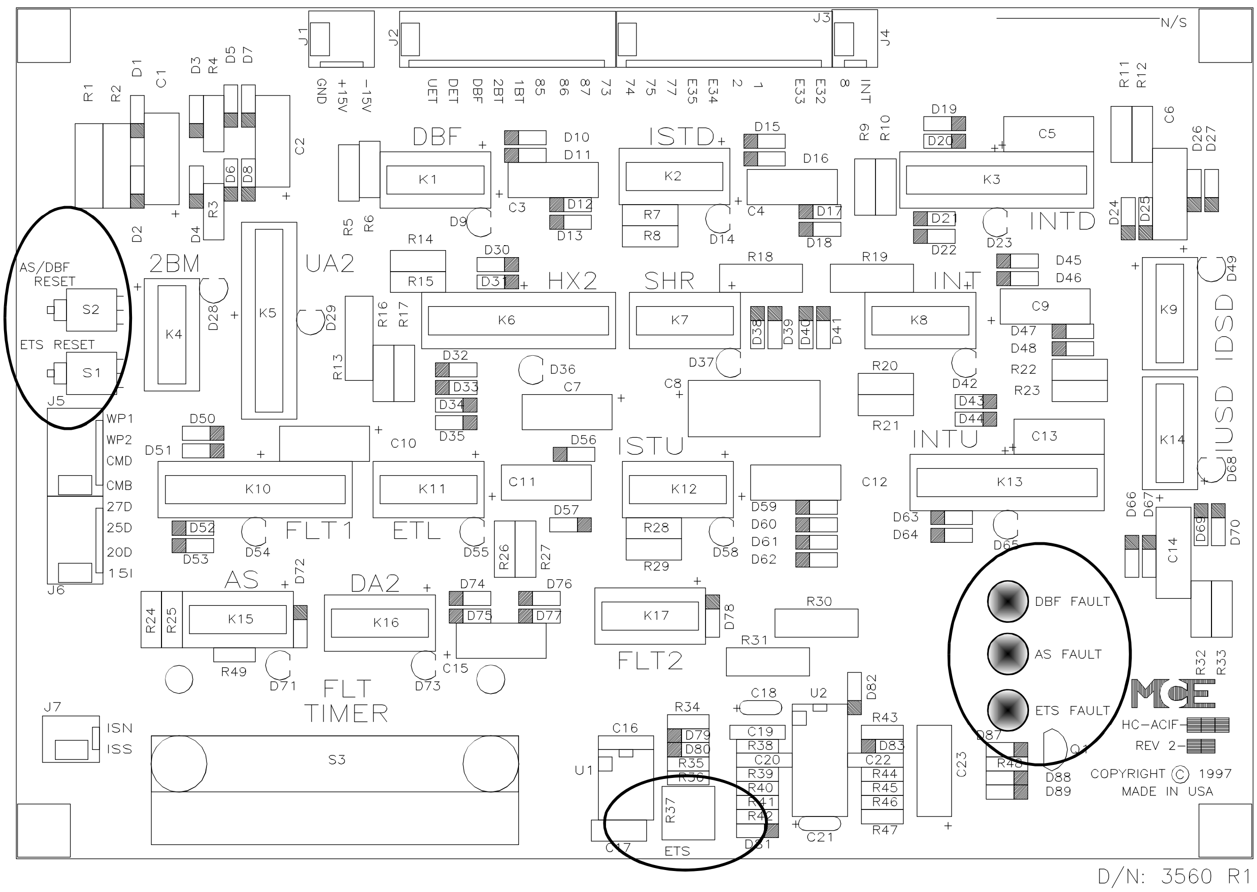
TRIMPOTS	
BDD	Brake Drop Delay - CW increases delay (fully CCW = 0.1 sec., fully CW = 0.7 sec.)
SPD	Speed Pick Delay - CW increases delay (fully CCW - .002 sec., fully CW = 0.450 sec.)
ILO	Inspection Leveling Overspeed - CCW sets the speed threshold higher. **Not used on ASMEA17.1-2000 compliant controllers** - 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 6.28 HC-ACIF Additional 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:

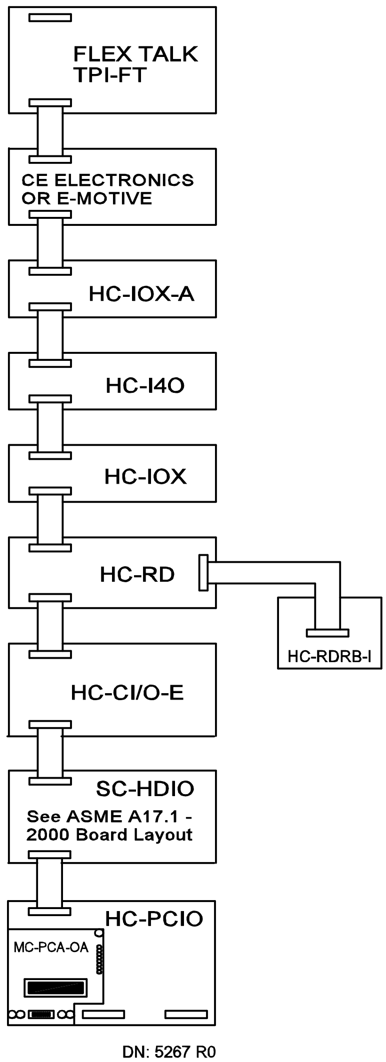
G5 / GPD515 Drive - verify / adjust L4-01 and L4-02

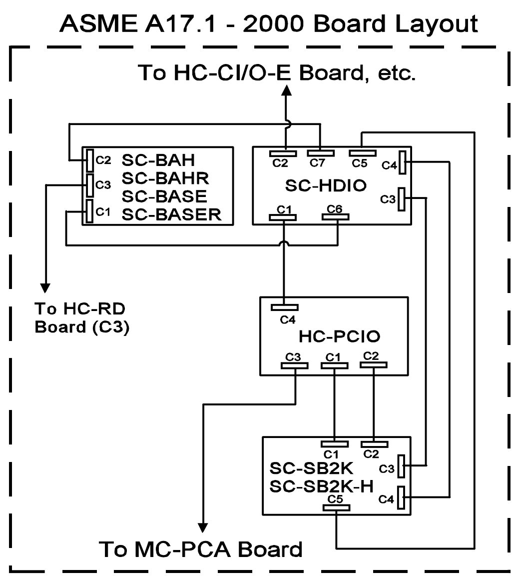
HPV 900 Drive - verify / adjust A1 Drive parameters “Spd Dev Lo Level” and Spd Dev Time”

TORQMAX - verify / adjust LF.58 and LF.59

DBF Fault Dynamic Braking Fault - Turns on if the dynamic braking temperature exceeds its threshold.

FIGURE 6.29 Standard PC Board Layout





APPENDIX

APPENDIX A
ORIGINAL PROGRAMMED VALUES AND THE RECORD OF CHANGES

BASIC FEATURES		
OPTIONS	**MCE VALUES**	**NEW VALUES**
Simplex or Duplex?	___ Simplex ___ Duplex	___ Simplex ___ Duplex
Operation:	___ Sel. Coll. ___ Single Button ___ Single Auto PB	___ Sel. Coll. ___ Single Button ___ Single Auto PB
Top Landing Served (Car A)?		
Car Doors are Walk-Thru (Car A)?	_____ Yes ______ No	_____ Yes ______ No
Car Serves Frnt/Flr (Car A)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Car Serves Rear/Flr (Car A)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Top Landing Served (Car B)?		
Car Doors are Walk-Thru (Car B)?	_____ Yes ______ No	_____ Yes ______ No
Car Serves Frnt/Flr (Car B)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Car Serves Rear/Flr (Car B)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Parking Floor		
Alt. Parking Floor		
Secondary Park Floor		
Lobby Floor		
Car Identifier	Set first car to A, next car to B	Set first car to A, next car to B
Number of IOX Boards:	_________ Valid range is 0-4.	_________ Valid range is 0-4.
Number of I4O Boards:	_________ Valid range is 0-3.	_________ Valid range is 0-3.
Number of AIOX Boards:	_________ Valid range is 0-1.	_________ Valid range is 0-1.

FIRE SERVICE		
OPTIONS	**MCE VALUES**	**NEW VALUES**
Fire Service Operation?	_____ Yes ______ No	_____ Yes ______ No
Fire Phase 1 Main Floor		
Fire Phase 1 Alt. Floor		
Fire Service Code		
Fire Phase 1, 2nd Alt Landing		
Bypass Stop Sw. on Phase 1?	_____ Yes ______ No	_____ Yes ______ No
Honeywell Fire Operation?	_____ Yes ______ No	_____ Yes ______ No
NYC Fire Phase 2 w/ ANSI 89?	_____ Yes ______ No	_____ Yes ______ No
White Plains, NY Fire Code?	_____ Yes ______ No	_____ Yes ______ No
Mass 524 CMR Fire Code?	_____ Yes ______ No	_____ Yes ______ No

DOOR OPERATION		
OPTIONS	**MCE VALUES**	**NEW VALUES**
Nudging?	_____ Yes ______ No	_____ Yes ______ No
Stuck Photo Eye Protection?	_____ Yes ______ No	_____ Yes ______ No
Sequential Door Oper.(F/R)?	_____ Yes ______ No	_____ Yes ______ No
Car Call Cancels Door Time?	_____ Yes ______ No	_____ Yes ______ No
Nudging During Fire Phase 1?	_____ Yes ______ No	_____ Yes ______ No
Retiring Cam Option?	_____ Yes ______ No	_____ Yes ______ No
Pre-Opening?	_____ Yes ______ No	_____ Yes ______ No
Mechanical Safety Edge?	_____ Yes ______ No	_____ Yes ______ No
Nudging Output/Buzzer Only?	_____ Yes ______ No	_____ Yes ______ No

DOOR OPERATION		
OPTIONS	**MCE VALUES**	**NEW VALUES**
D.C.B. Cancels Door Time?	_____ Yes ______ No	_____ Yes ______ No
Leave Doors Open on MGS?	_____ Yes ______ No	_____ Yes ______ No
Leave Door Open on PTI/ESS?	_____ Yes ______ No	_____ Yes ______ No
Nudging During Fire Phase 2?	_____ Yes ______ No	_____ Yes ______ No
Dir. Preference Until DLK?	_____ Yes ______ No	_____ Yes ______ No
Fully Manual Doors?	_____ Yes ______ No	_____ Yes ______ No
Cont. D.C.B. to Close Doors?	_____ Yes ______ No	_____ Yes ______ No
Cont. D.C.B. for Fire Phase 1?	_____ Yes ______ No	_____ Yes ______ No
Moment. D.O.B. door opening? Moment D.O.B. for: Moment D.O.B. for:	______ No ____Front ____Rear ____Both Calls ____Hall Calls ____Car Calls ____All Calls	______ No ____Front ____Rear ____Both Calls ____Hall Calls ____Car Calls ____All Calls
Doors to open if parked?	___None ___ Front ___ Rear ___ Both	___None ___ Front ___ Rear ___ Both
Doors to Open on Main Fire?	___ Front ___ Rear ___ Both	___ Front ___ Rear ___ Both
Doors to Open on Alt. Fire?	___ Front ___ Rear ___ Both	___ Front ___ Rear ___ Both
Leave Doors Open on CTL	_____ Yes ______ No	_____ Yes ______ No
Limited Door Re-Open Option	_____ Yes ______ No	_____ Yes ______ No
Reduce HCT with Photo Eye	_____ Yes ______ No	_____ Yes ______ No
Leave Doors Open on EPI	_____ Yes ______ No	_____ Yes ______ No
Doors to open if No demand?	___None ___ Front ___ Rear ___ Both	___None ___ Front ___ Rear ___ Both
Const. Press Op. Bypass PHE?	_____ Yes ______ No	_____ Yes ______ No
Door Type is	_____ Horizontal ______ Vertical	_____ Horizontal ______ Vertical
Front Door Mech. Coupled?	_____ Yes ______ No	_____ Yes ______ No
Rear Door Mech. Coupled?	_____ Yes ______ No	_____ Yes ______ No
Prevent DCP Til Doors Close:	_____ Yes ______ No	_____ Yes ______ No
Moment D.C.B to Close Doors?	_____ Yes ______ No	_____ Yes ______ No
Doors to Latch DOF?	___None ___ Front ___ Rear ___ Both	___None ___ Front ___ Rear ___ Both
Doors to Latch DCF?	___None ___ Front ___ Rear ___ Both	___None ___ Front ___ Rear ___ Both
Inv. Door Closed Limit?	___None ___ Front ___ Rear ___ Both	___None ___ Front ___ Rear ___ Both

TIMER		
OPTIONS	**MCE VALUES**	**NEW VALUES**
Short Door Timer	_____ seconds	_____ seconds
Car Call Door Timer	_____ seconds	_____ seconds
Hall Call Door Timer	_____ seconds	_____ seconds
Lobby Call Door Timer	_____ seconds	_____ seconds
Nudging Timer	_____ seconds	_____ seconds
Time out of Service Timer	___None_____ seconds	___None_____ seconds
Motor Limit Timer	_____ minutes	_____ minutes
MGR Output Timer	_____ minutes	_____ minutes
Door Hold Input Timer	_____ seconds	_____ seconds
Parking Delay Timer	_____ minutes	_____ minutes
Fan/Light Output Timer	_____ minutes	_____ minutes
Hospital Emerg. Timer	_____ minutes	_____ minutes
Door Open Protection Timer	_____ seconds	_____ seconds
CTL Door Open Timer	_____ seconds	_____ seconds
Door Buzzer Timer	_____ seconds	_____ seconds

GONGS/LANTERNS		
OPTIONS	**MCE VALUES**	**NEW VALUES**
Mounted in hall or car?	_____ hall _____ car	_____ hall _____ car
Double strike on Down?	_____ Yes _____ No	_____ Yes _____ No
PFG Enable Button?	_____ Yes _____ No	_____ Yes _____ No
Egress Floor Arrival Gong?	_____ No Main Egress Floor = _____	_____ No Main Egress Floor = _____

SPARE INPUTS		
OPTIONS	**MCE VALUES**	**NEW VALUES**
SP1 used for:		
SP2 used for:		
SP3 used for:		
SP4 used for:		
SP5 used for:		
SP6 used for:		
SP7 used for:		
SP8 used for:		
SP9 used for:		
SP10 used for:		
SP11 used for:		
SP12 used for:		
SP13 used for:		
SP14 used for:		
SP15 used for:		
SP16 used for:		
SP17 used for:		
SP18 used for:		
SP19 used for:		
SP20 used for:		
SP21 used for:		
SP22 used for:		
SP23 used for:		
SP24 used for:		
SP25 used for:		
SP26 used for:		
SP27 used for:		
SP28 used for:		
SP29 used for:		
SP30 used for:		
SP31 used for:		
SP32 used for:		
SP33 used for:		
SP34used for:		
SP35 used for:		
SP36 used for:		
SP37 used for:		
SP38 used for:		
SP39 used for:		
SP40 used for:		
SP41 used for:		
SP42 used for:		
SP43 used for:		
SP44 used for:		
SP45 used for:		
SP46 used for:		
SP47 used for:		
SP48 used for:		
SP49 used for:		

SPARE OUTPUTS		
OPTIONS	**MCE VALUES**	**NEW VALUES**
OUT1 used for:		
OUT2 used for:		
OUT3 used for:		
OUT4 used for:		
OUT5 used for:		
OUT6 used for:		
OUT7 used for:		

SPARE OUTPUTS		
OPTIONS	**MCE VALUES**	**NEW VALUES**
OUT8 used for:		
OUT9 used for:		
OUT10 used for:		
OUT11 used for:		
OUT12 used for:		
OUT13 used for:		
OUT14 used for:		
OUT15 used for:		
OUT16 used for:		
OUT17 used for:		
OUT18 used for:		
OUT19 used for:		
OUT20 used for:		
OUT21 used for:		
OUT22 used for:		
OUT23 used for:		
OUT24 used for:		
OUT25 used for:		
OUT26 used for:		
OUT27 used for:		
OUT28 used for:		
OUT29 used for:		
OUT30 used for:		
OUT31 used for:		
OUT32 used for:		

EXTRA FEATURES		
OPTIONS	**MCE VALUES**	**NEW VALUES**
PI Output Type:	_____ 1 wire _____ Binary	_____ 1 wire _____ Binary
Floor Encoding Inputs?	_____ Yes _____ No	_____ Yes _____ No
Encode All Floors?	_____ Yes _____ No	_____ Yes _____ No
Intermediate Speed?	_____ Yes _____ No	_____ Yes _____ No
Emergency Power Operation?	___ No Emergency Power Return Floor = ___	___ No Emergency Power Return Floor = ___
Light Load Weighing?	___ No Light Load Car Call Limit = ____	___ No Light Load Car Call Limit = ____
Photo Eye Anti-Nuisance?	___ No Consec Stops w/o PHE Limit =____	___ No Consec Stops w/o PHE Limit =____
Earthquake Operations	_____ ANSI Earthquake Operation _____ California Earthquake Operation	_____ ANSI Earthquake Operation _____ California Earthquake Operation
Counterweighted Drum Machine?	_____ Yes _____ No	_____ Yes _____ No
MG Shutdown Operation	_____ No MGS Return Floor = _____	_____ No MGS Return Floor = _____
Peripheral Device?	_____ Yes _____ No	_____ Yes _____ No
PA COM 1 Media:	_____ None _____ Serial Cable _____ Line Driver _____ Modem	_____ None _____ Serial Cable _____ Line Driver _____ Modem
PA COM 1 Device:	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No
PA COM 2 Media:	_____ None _____ Serial Cable _____ Line Driver _____ Modem	_____ None _____ Serial Cable _____ Line Driver _____ Modem
PA COM 2 Device:	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No
PA COM 3 Media:	_____ None _____ Serial Cable _____ Line Driver _____ Modem	_____ None _____ Serial Cable _____ Line Driver _____ Modem
PA COM 3 Device:	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No

EXTRA FEATURES		
OPTIONS	**MCE VALUES**	**NEW VALUES**
PA COM 4 Media:	_____ None _____ Serial Cable _____ Line Driver _____ Modem	_____ None _____ Serial Cable _____ Line Driver _____ Modem
PA COM 4 Device:	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No	Personal Computer: ____ CMS ____ Graphic Display CRT - No Keyboard: Color CRT: __ Yes __ No CRT and Keyboard: Color CRT: __ Yes __ No
Automatic Floor Stop Option?	_____ No Floor # for Car to Stop at:_____	_____ No Floor # for Car to Stop at:_____
CC Cancel w/Dir. Reversal?	_____ Yes _____ No	_____ Yes _____ No
Cancel Car Calls Behind Car?	_____ Yes _____ No	_____ Yes _____ No
CE Electronics Interface?	_____ Yes _____ No	_____ Yes _____ No
Massachusetts EMS Service?	_____No EMS Service Floor #:_____	_____No EMS Service Floor #:_____
Master Software Key	___ Activated ___ Deactivated ___ Enabled	___ Activated ___ Deactivated ___ Enabled
PI Turned off if No Demand?	_____ Yes _____ No	_____ Yes _____ No
Hospital Emergency Operation (Car A)	_____ Yes _____ No	_____ Yes _____ No
Set Hospital Calls (Car A)?	_____ Yes _____ No	_____ Yes _____ No
Hospital Calls Frnt/Flr (Car A)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Hospital Calls Rear/Flr (Car A)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Hospital Emergency Operation (Car B)	_____ Yes _____ No	_____ Yes _____ No
Set Hospital Calls (Car B)?	_____ Yes _____ No	_____ Yes _____ No
Hospital Calls Frnt/Flr (Car B)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Hospital Calls Rear/Flr (Car B)?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Fire Bypasses Hospital?	_____ Yes _____ No	_____ Yes _____ No
High Seed Delay After Run?	_____ Yes _____ No	_____ Yes _____ No
Single Speed A.C. Option?	_____ Yes _____ No	_____ Yes _____ No
Sabbath Operation?	_____ Yes _____ No	_____ Yes _____ No
UP Front Call?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
UP Rear Call?	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
DOWN Front Call?	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
DOWN Rear Call?	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Intermediate Speed between Flrs: Place an X in between the floors that require independent speed.	1--2--3--4--5--6--7--8--9--10--11--12--13--14 14--15--16--17--18--19--20--21--22--23--24 24--25--26--27--28--29--30--31--32	1--2--3--4--5--6--7--8--9--10--11--12--13--14 14--15--16--17--18--19--20--21--22--23--24 24--25--26--27--28--29--30--31--32
Leveling Sensors	___Enabled ____ Disabled	___ Enabled ____Disabled
KCE	___Enabled ____ Disabled	___ Enabled ____Disabled
Analog Load Weigher?	___None ____ MCE____K-Tech	___None ____ MCE____K-Tech
Ind. Bypass Security?	_____ Yes _____ No	_____ Yes _____ No
Ats. Bypass Security?	_____ Yes _____ No	_____ Yes _____ No
Car to Floor Return	_____ Floor	_____ Floor
Scrolling Speed	___Slow ____ Normal____Fast	___Slow ____ Normal____Fast
OFRP Between Flrs	_____ Floor _____ Floor	_____ Floor _____ Floor
ASME A17.1 - 2000 FEATURES		
OPTIONS	**MCE VALUES**	**NEW VALUES**
ETS Switches Required?	_____ Yes _____ No	_____ Yes _____ No
ANSI 2000 Earthquake?	_____ Yes _____ No	_____ Yes _____ No
Hoistway Access	_____ Yes _____ No	_____ Yes _____ No
PTC Version 6.03.xxxx		

APPENDIX B
QUICK REFERENCE FOR DSD 412 SCR DRIVE PARAMETERS (SERIES M DC PRODUCT ONLY)

Note: Some parameters listed in this table are not listed in the drive manual.

Field adjustable parameters are shown in shaded rows. All other parameters should be set to the values shown in the “Field/MCE” 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.

P# Drive display	**Description**	**Explanation**	**Unit**	**Range**	**Default**	**Field/ MCE**
1	Current Limit	Sets the drive current limit as a percentage of the rated armature amps (parameter 3).	%	0 - 300	250	250
2	User Self-Tune **(Note 1)**	Selects the measured values of the self tune variables.	-	ON, OFF	OFF	OFF
3	Rated Arm Amp	Motor rated current.	Amp	10 - 1250	50	✳ _____
4	Armature Ohms **(Note 1)**	Total armature circuit resistance, not including the brush drop. Self tune test 997 measures armature resistance and parameter 613 displays the measured value. Enter and save the measured value in Parameter 4. The drive uses this parameter to calculate the regulator integral and feed forward gains and calculate the CEMF for the field weakening.	Ohm	0.001 - 5.0	0.1	✳ 0.235 _____
6	Armature Inductance **(Note 1)**	This is the value of the motor armature circuit inductance. The drive self tune test 997 measures the inductance and parameter 614 displays the measured value. Enter and save the measured value in Parameter 6. This value includes the motor inductance and the inductance of the ripple filter in the armature circuit. This value of inductance is used in the calculation of the current regulator’s integral and the proportional gains.	MHNY	0.001 - 1.0	0.01	✳ .0052 _____
7	Rated Arm V	Rated motor name plate armature voltage.	Volts	150 - 550	240	✳ _____
8	I Reg Crossover	This value sets the band width of the current regulator. The drive response will increase as this number is increased. With a large value the motor current will fluctuate and with a lower value motor will become sluggish.	RAD	100 - 1000	500	500
9	Nominal AC Voltage	This is the nominal AC input voltage applied to the SCR drive, measured at drive terminals L1, L2 & L3.	V	150 - 525	230	✳ _____
10	Encoder Pulses/Rev.	Encoder pulses per revolution from the encoder nameplate.	PPR	600 - 19,999	2500	✳✳✳ 4096
11	Motor RPM	Motor name plate RPM. In general this is the motor name plate value but it might require a higher or lower value to run the car at the correct speed. For a direct coupled encoder on a geared application this entry also sets the encoder shaft RPM.	RPM	50 - 2000	1150	✳ _____

P# Drive display	Description	Explanation	Unit	Range	Default	Field/ MCE
12	Overspeed %	This value sets the UP/DN overspeed trip point. The drive will trip on a fault if the motor speed exceeds this value. This is a percentage of the Motor Speed (RPM) entered in parameter 11.	%	0 - 150	110	110
14	V Sense %	This parameter sets the minimum armature voltage above which the tach loss and the reverse tach loss become operative. This is a percentage of the rated armature voltage (parameter 7)	%	0 - 100	25	25
15	Tach Sense %	This parameter sets the percentage of the per unit tach feedback below which a tach loss will be declared.	%	0 -100	5	5
16	Gearless Ratio	This is the ratio of the encoder wheel to the motor sheave for gearless applications. For geared applications this parameter must be set to 1 because the encoder is mounted on the motor shaft.	-	1 - 19	1	1
17	Rated Ft/Min	Rated car speed in feet per minute.	FPM	5 - 2000	400	✳ ______
22	Error List Reset	On = resets the previous drive faults	-	ON, OFF	OFF	OFF
32	Field Sense	Sets the percentage of full motor field required to permit the SCR drive to release the speed regulator and pick the LPR relay which picks the loop contactor.	%	30 - 90	60	50
40	Response	Sets the tracking delay between the drive commanded speed and the actual motor speed. This parameter sets the bandwidth of the seed regulator. Tracking delay (sec) = 1/Response. Higher values result in less delay and tighter control.	RAD	1 - 15	6.0	✳ 8.2 ______
41	System Inertia	This entry sets the system inertia in terms of the time it takes at rated torque to accelerate to the contract motor speed. In general this parameter acts as a gain multiplier internal to the drive software.	SEC	0.1 - 9.9	2.0	✳ 1.15 ______
42	Stability	Stability determines the amount of damping in the regulator for smoother transitions. This is used to modify the response of the speed regulator to correct for mismatch of the system inertia. This parameter should only be adjusted after the INERTIA and RESPONSE are set correctly. If the quality of the ride is reduced by increasing the STABILTY from its default value, the system inertia should be checked again.	-	0.1 - 9.9	1	1 - 2 <u>1</u>
49	Weak Field AMP **(Note 2)**	Sets the motor filed current value in the weaken condition (sets the motor weaken field).	AMP	0.2 - 40	5.0	✳ ______
50	Full Field AMP **(Note 2)**	Hoist motor name plate field current (sets the motor full field).	AMP	0.2 - 40	6	✳ ______
51	Field L/R **(Note 1)**	Motor field time constant. <u>The drive self tune test 997 measures this value and parameter 615 displays the measured value of the inductance. Enter and save the measured value in parameter 51</u>.	SEC	0.1 - 10	0.80	✳ 0.375 ______
52	Rated Field VDC	Rated motor field voltage.	V	50 - 525	240	✳ ______
53	Standing Field AMP	Sets the standing motor field current (motor field current when the car is not running).	I	0.2 - 40	2	✳ ______
54	Field Response	Sets the motor field regulator response.	RAD	1 - 10	5	5

P# Drive display	**Description**	**Explanation**	**Unit**	**Range**	**Default**	**Field/ MCE**
55	Motor Field VAC	Motor field input AC voltage at terminals AC1 and AC2 (TB4). This parameter must be set to a measured value if external boosted voltage is applied to terminals AC1 and AC2. If this parameter is set to 0 the drive will select the value of parameter 9 (which is the input voltage at L1, L2, L3).	V	50 - 525	0	✳ 0 _____
56	Field Strength Speed **(Note 2)**	Sets the speed (as a percentage of parameter 11 - Motor Speed) at which the speed regulator begins to strengthen the motor field during deceleration.	%	10 - 200	130	90
57	Field Weaken Speed **(Note 2)**	Sets the speed (as a percentage of parameter 11 - Motor Speed) at which the speed regulator begins to weaken the motor field during acceleration.	%	10 - 200	130	90
58	Field Strengthen Rate **(Note 2)**	Sets the rate at which the motor field reaches the rated field.	SEC	.01 - 10	2	2
59	Field Weaken Rate **(Note 2)**	Sets the rate at which the motor field reaches the weaken value.	SEC	.01 - 10	2	2
63	UP/DN Bit Pick	Sets the threshold at which the drive will turn on a bit for detection of the motor rotation.	%	.01 - 10	.01	.01
80	Overspeed Test	This is used to activate an overspeed multiplier (parameter 81).	-	ON - OFF	OFF	OFF
81	Overspeed Multiplier	The speed reference is multiplied by this value when parameter 80 (Overspeed Test) is activated.	-	1 - 1.5	1.0	1.0
83	Motor O.L. Time Out	This value shapes the motor overload time out curve.	Sec	0 - 500	90	90
84	Motor Overload Level	This sets the motor over load trip level.	-	0 - 2	1	1
85	Current Decay Ramp	This sets the decay time of the armature current at a predictable rate upon clamping the regulator.	Sec	.001 - 2.5	0.2	0.2
86	LPR Decay time	This parameter allows relay LPR to remain picked until the armature current decays.	Sec	.001 - 2.5	0.3	0.3
95	Analog output 0 (TB1-45)	Set to 0 to assign the Speed Reference to Analog output 0 (0 to +/- 10V between TB1-45 and TB1-80).	V	0 = Spd Ref 1 = Trace Bf	0	0
96	Analog output 1 (TB1-46)	Set to 0 to assign the Speed Feedback to Analog output 1 (0 to +/- 10V between TB1-46 and TB1-80).	v	0 = Spd Fbk 1 = Trace Bf	0	0
97	Test Point 0 Mult	Sets the multiplier for Analog output 0 (TB1-45).	V	0 - 10	1	1
98	Test point 1 Mult	Sets the multiplier for Analog output 1 (TB1-46).	V	0 - 10	1	1
101	Auto Fault ON	Set to ON to automatically reset the drive faults.	-	ON, OFF	OFF	ON
102	3S Loop Fault	3S Loop Fault	-	ON, OFF	OFF	OFF
105	Gain Switch Speed (**Note 3)**	This parameter determine the point on the speed reference curve at which the gain is switched to value adjusted by parameter 108. 0 = Zero speed, 1.0 = 100% of contract speed.	-	0.1 - 1.0	1.0	1.0
107	Tach Rate Gain	This parameter fixes the rope response problem in a gearless elevator. This parameter should not be adjusted from its default (0.0) but, if required, should be adjusted in the increments of 0.1. Higher values will cause jittery ride quality.	%	0 - 30.0	0.0	0.0
108	Gain Reduce (**Note 3)**	This parameter is a multiplier applied to parameter 40 - Response when in a “low gain” mode.	-	0.1 - 1.0	.1	1.0
120	Spd Dev Low Time	Time to detect the speed difference.	Sec	0 - 9.99	0.5	2.0
121	Spd Dev Low Level	The % of the contract speed at which the speed deviation fault is detected.	%	0 - 10	5.0	6

P# Drive display	Description	Explanation	Unit	Range	Default	Field/ MCE
122	Spd Error Time Out	Time for which the speed error remains ON if it is detected	sec	0 - 5.0	5.0	3
123	Speed Error Limit	Error between the Ref & speed output	%	0 - 100	100	30
153	Preset speed #4	Preset Speed #4 (Leveling speed)	FPM	0 - (16%)**	0	✳ 2 - 5 ______
155	Preset Speed # 6	Preset speed #6 (Intermediate speed)	FPM	0 - (91%)**	0	✳ ______
156	Preset Speed #7	Preset Speed #7(High speed)	FPM	0 - (100%)**	0	✳ ______
157	Preset Speed #8	Preset Speed #8 (Correction / Inspection speed)	FPM	0 - (66%)**	0	✳ 20 - 40 ______
170	ACC Rate #1	Acceleration rate #1. (Not used - Must be set equal to parameter 171)	SEC	0.0 - 25.0	5.0	Must be equal to parameter 171
171	ACC Rate #2	Acceleration rate #2. The total time in acceleration on multi-floor run and single floor runs.	SEC	0.0 - 25.0	5.0	✳ 2.12 ______
172	DEC Rate #1	Deceleration rate #1. The total time in deceleration on multi-floor runs.	SEC	0.0 - 25.0	5.0	✳ 2.25 ______
173	DEC Rate #2	Deceleration rate #2. The total time in deceleration on single floor runs.	SEC	0.0 - 25.0	5.0	✳ 2.25 ______
174	ACC J% #1	Jerk at the start and end of acceleration. (Not used - Must be set equal to parameter 175)	%	0 - 100	25	Must be equal to parameter 175
175	ACC J% #2	Jerk at the start and end of acceleration on both multi-floor and one floor runs (percentage of parameter 171 - ACC Rate #2). Higher values result in smoother transitions.	%	0 - 100	25	✳ 0 - 25 20 ______
176	DEC J% #1	Jerk at the start and end of deceleration on multi-floor runs (percentage of parameter 172 - DEC Rate #1).	%	0 - 100	25	✳ 0 - 25 20 ______
177	DEC J% #2	Jerk at the start and end of deceleration on one floor runs (percentage of parameter 173 - DEC Rate #2).	%	0 - 100	25	✳ 0 - 25 20 ______

P# Drive display	**Description**	**Explanation**	**Unit**	**Range**	**Default**	**Field/ MCE**
		Display Parameters (Read only)				
600	Car Speed	The relative velocity of the elevator.	FPM			
601	Motor RPM	The speed of the elevator motor.	RPM			
602	Speed Ref	The reference which dictates how fast the elevator will travel.	FPM			
609	CEFM VDC	The calculated CEMF of the motor.	VDC			
610	Motor ARM V	The actual voltage applied to the motor armature.	VDC			
611	Motor ARM I	The actual armature current delivered to the motor.	ADC			
612	Motor Field I	The actual field current delivered to the motor.	ADC			
613	Measured R	The calculated motor armature resistance which was measured during self tune.	OHM			
614	Measured L	The calculated motor circuit inductance which was measured during self tune.	HNY			
615	Measured Field L/R	The calculated motor field time constant which was measured during self tune.	SEC			
616	Speed Error	The difference between the speed feedback and the speed reference.	FPM			
617	Line Freq	The actual frequency of the 3 phase AC line.	HZ			
619	AC Line Volts	The actual 3 phase AC line voltage, ± 5%.	VAC			
800	Error List		-			
997	Self Tune	Used to access the Self Tune (PCU) parameter measurement.	-			

✳ **Verify and adjust parameters as they are motor / machine / job dependent.**

✳✳ **The actual speed value is entered in FPM. However, the speed range maximum value is described as a percentage of contract speed. Speeds in excess of the defined maximum will cause the drive to generate fault #450.**

✳✳✳ **Encoder PPR (P10) must be set correctly. Incorrect value of this parameter will cause under or over speed condition.**

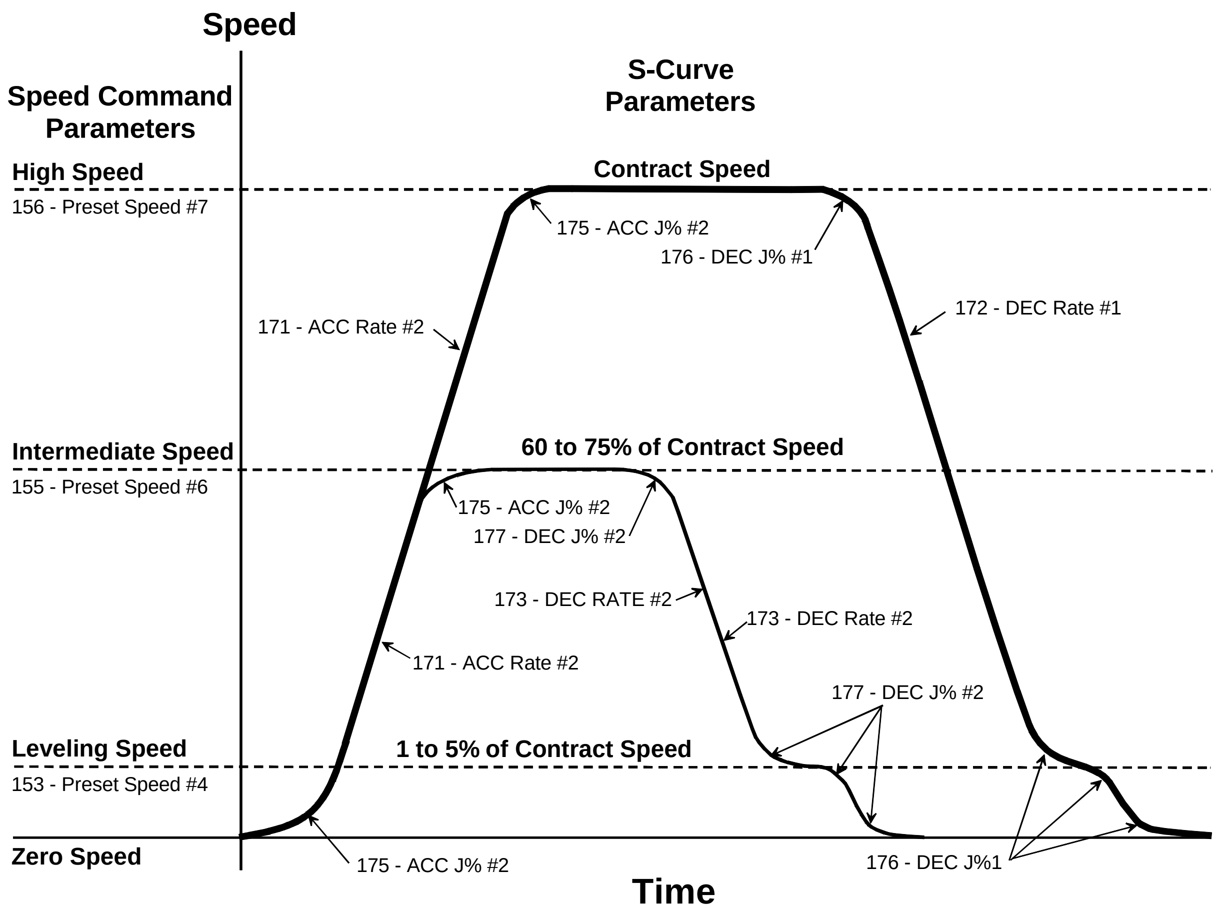
Note 1: Verify and then save this parameter after self tune is completed. (How to save the parameters - refer to Section 3.3.6**)**

Note 2: If contract speed is achieved **without** increasing Motor speed (parameter 11), then set the motor field weaken current (parameter 49) equal to the motor full field current (parameter 50).

If the Motor speed (parameter 11) **must be increased** in order to achieve contract speed, then adjust the motor field weaken current (parameter 49) lower than the motor full field current (parameter 50) to achieve the rated armature voltage at contract speed. The Field Weaken Speed (parameter 57) should be set to the motor rated RPM and the Field Strength SPD (parameter 56) should be set to 80%-90% of the contract speed.

Note 3: If required, adjust this parameter to reduce the gains at high speed for a smoother ride quality.

FIGURE B.2 *Velocity and S Curve Parameters (DSD 412)*



Software Version				
Drive Param. 692 (Day)	Drive Param. 693 (Month)	Drive Param. 695 (Year)	Drive Param. 698 (Software Rev.)	Drive Param. 699 (Controller No.)

Job #:
Prod. Order #:
Drive Manufacturer:
Drive Model #:
Drive Serial #
Tested By:
Approved:

DSD 412 DRIVE PARAMETER SETTINGS

P# Drive display	Description	Unit	Range	Default	Field/ MCE	Setting 1	Setting 2	Final Setting
1	Current Limit	%	0 - 300	250	250			
2	User Self-Tune	-	ON, OFF	OFF	OFF			
3	Rated Arm Amp	Amp	10 - 1250	50	✳			
4	Armature Ohms	Ohm	0.001 - 5.0	0.1	✳ 0.235			
6	Armature Inductance	MHNY	0.001 - 1.0	0.01	✳ .0052			
7	Rated Arm V	Volts	150 - 550	240	✳			
8	I Reg Crossover	RAD	100 - 1000	500	500			
9	Nominal AC Voltage	V	150 - 525	230	✳			
10	Encoder Pulses/Rev.	PPR	600 - 19,999	4096	4096			
11	Motor RPM	RPM	50 - 2000	1150	✳			
12	Overspeed %	%	0 - 150	110	110			
14	V Sense %	%	0 - 100	25	25			
15	Tach Sense %	%	0 -100	5	5			
16	Gearless Ratio	-	1 - 19	1	1			
17	Rated Ft/Min	FPM	5 - 2000	400	✳			
22	Error List Reset	-	ON, OFF	OFF	OFF			
32	Field Sense	%	30 - 90	45	50			
40	Response	RAD	1 - 15	5.0	✳ 8.2			
41	System Inertia	SEC	0.1 - 9.9	2.0	✳ 1.15			
42	Stability	-	0.1 - 9.9	1	1			
49	Weak Field AMP	AMP	0.2 - 40	2	✳			
50	Full Field AMP	AMP	0.2 - 40	6	✳			
51	Field L/R	SEC	0.1 - 10	0.5	✳ 0.375			
52	Rated Field VDC	V	50 - 525	240	✳			
53	Standing Field AMP	I	0.2 - 40	2	✳			
54	Field Response	RAD	1 - 10	5	5			
55	Motor Field VAC	V	50 - 525	0	0			
56	Field Strength Speed	%	10 - 200	130	90			
57	Field Weaken Speed	%	10 - 200	130	90			
58	Field Strengthen Rate	SEC	.01 - 10	2	2			
59	Field Weaken Rate	SEC	.01 - 10	2	2			
63	UP/DN Bit Pick	%	.01 - 10	.01	.01			
80	Overspeed Test	-	ON - OFF	OFF	OFF			
81	Overspeed Multiplier	-	1 - 1.5	1.5	1.0			
83	Motor O.L. Time Out	SEC	0 - 500	90	90			
84	Motor Overload Level	-	0 - 2	1	1			
85	Current Decay Ramp	SEC	.001 - 2.5	0.2	0.2			
86	LPR Decay time	SEC	.001 - 2.5	0.3	0.3			
95	Analog output 0 (TB1-45)	V	0 = Spd Ref 1 = Trace Bf	0	0			
96	Analog output 1 (TB1-46)	v	0 = Spd Fbk 1 = Trace Bf	0	0			

P# Drive display	Description	Unit	Range	Default	Field/ MCE	Setting 1	Setting 2	Final Setting
97	Test Point 0 Mult	V	0 - 10	1	1			
98	Test point 1 Mult	V	0 - 10	1	1			
101	Auto Fault ON	-	ON, OFF	OFF	ON			
102	3S Loop Fault	-	ON, OFF	OFF	OFF			
105	Gain Switch Speed	-	0.1 - 1.0	1.0	1.0			
107	Tach Rate Gain	%	0 - 30.0	0.0	0.0			
108	Gain Reduce	-	0.1 - 1.0	.1	1.0			
120	Spd Dev Low Time	Sec	0 - xx	0.5	2.0			
121	Spd Dev Low Level	%	0 - xx	50	6			
122	Spd Error Time	sec	x	50	3			
123	Speed Error Limit	%	0 - 100	100	33			
153	Preset speed #4	FPM	0 - 16%	0	✴ 3 - 5			
155	Preset Speed #6	FPM	0 - 91%	0	✴			
156	Preset Speed #7	FPM	0 - 100%	0	✴			
157	Preset Speed #8	FPM	0 - 66%	0	✴			
170	ACC Rate #1	SEC	0.0 - 25.0	5.0	Must be equal to parameter 171			
171	ACC Rate #2	SEC	0.0 - 25.0	5.0	2.0 - 3.0			
172	DEC Rate #1	SEC	0.0 - 25.0	5.0	2.0 - 3.0			
173	DED Rate #2	SEC	0.0 - 25.0	5.0	2.0 - 3.0			
174	ACC J% #1	%	0 - 100	25	Must be equal to parameter 175			
175	ACC J% #2	%	0 - 100	25	0 - 25			
176	DEC J% #1	%	0 - 100	25	0 - 25			
177	DEC J% #2	%	0 - 100	25	0 - 25			
Display Parameters (Read only)								
600	Car Speed	FPM						
601	Motor RPM	FPM						
602	Speed Ref	RPM						
609	CEFM VDC	VDC						
610	Motor ARM V	VDC						
611	Motor ARM I	ADC						
612	Motor Field I	ADC						
613	Measured R	OHM						
614	Measured L	HNY						
615	Measured Field L/R	SEC						
616	Speed Error	FPM						
617	Line Freq	HZ						
619	AC Line Volts	VAC						
800	Error List	-						

APPENDIX C
NOMENCLATURE

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
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

Motion Control Engineering, Inc.	NOMENCLATURE
	Effective Date: 03/06/02 3 Pages

#	PC BOARD	DESCRIPTION
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
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 D
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/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 E
FLEX-TALK OPTION

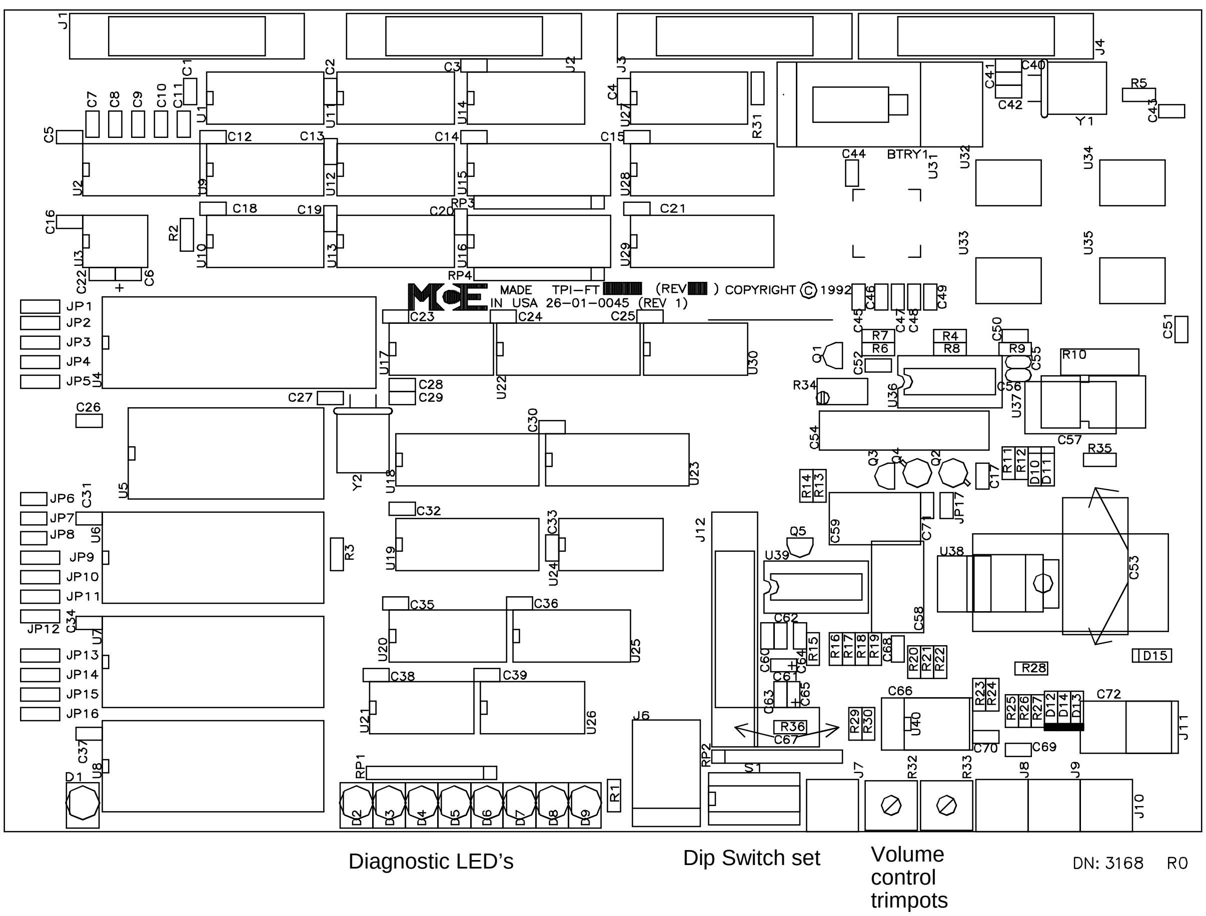
> **NOTE:** The following is a listing of diagnostic tools available on a controller if the Flex-Talk option is provided.

Use this appendix in conjunction with the manual. The appendix provides information regarding the diagnostics and volume adjustments for the TPI-FT option on the Flex-Talk unit.

E.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 TPI-FT 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 E.1 TPI-FT Flex-Talk Board



E.2 DIAGNOSTICS

The six switches on the dip switch package are used for diagnostics purposes. There are eight LED's (D2 through D9) also, for displaying diagnostics 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 E.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.

E.3 VOLUME CONTROL

The 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 diagnostics switch S2-ON. This will activate the messages and allow the time necessary to adjust volume. These two trimpots do not affect any music volume that may be connected on J8. Music volume is set external of this unit.

E.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.

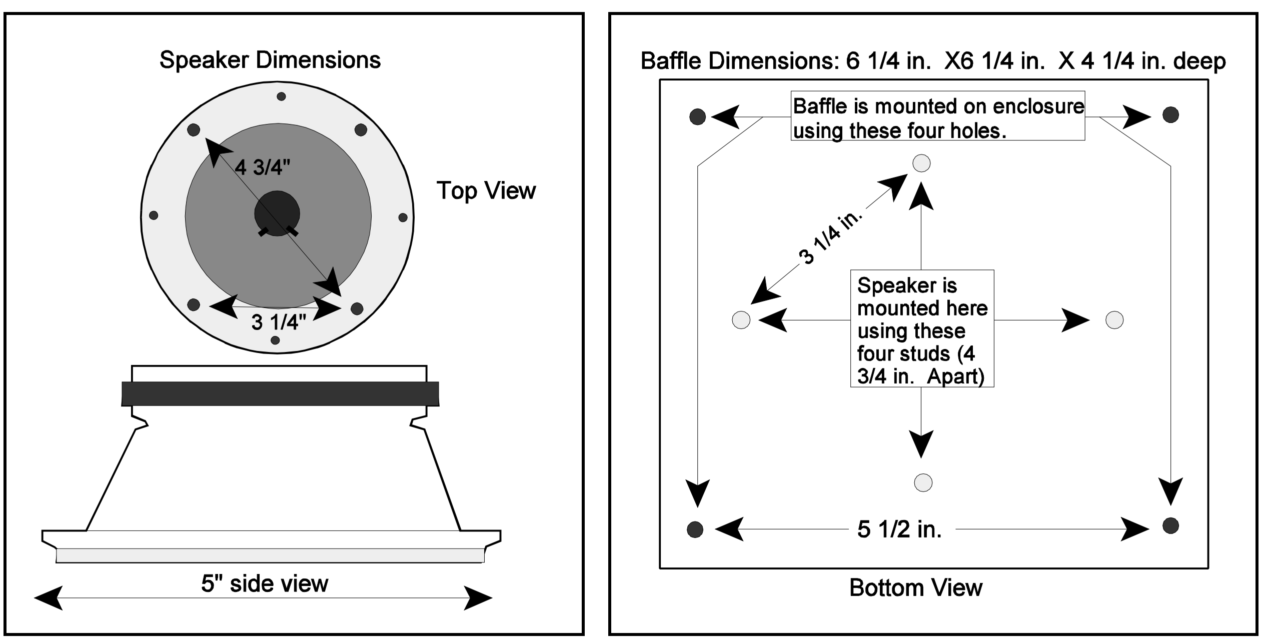
If the message, “Please allow the doors to close” is heard when nudging:

- The photo eye used to detect objects in the door path may be blocked.
- The photo eye may be dirty, or defective.

E.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 E.3 Speaker Dimensions



APPENDIX F
LS-QUTE-X-2K LANDING SYSTEM ASSEMBLY DRAWINGS

NOTE:	If a sensor or the HC-IPLS board is replaced make sure 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 F.1 LS-QUTE-X-2K Enclosure Assembly

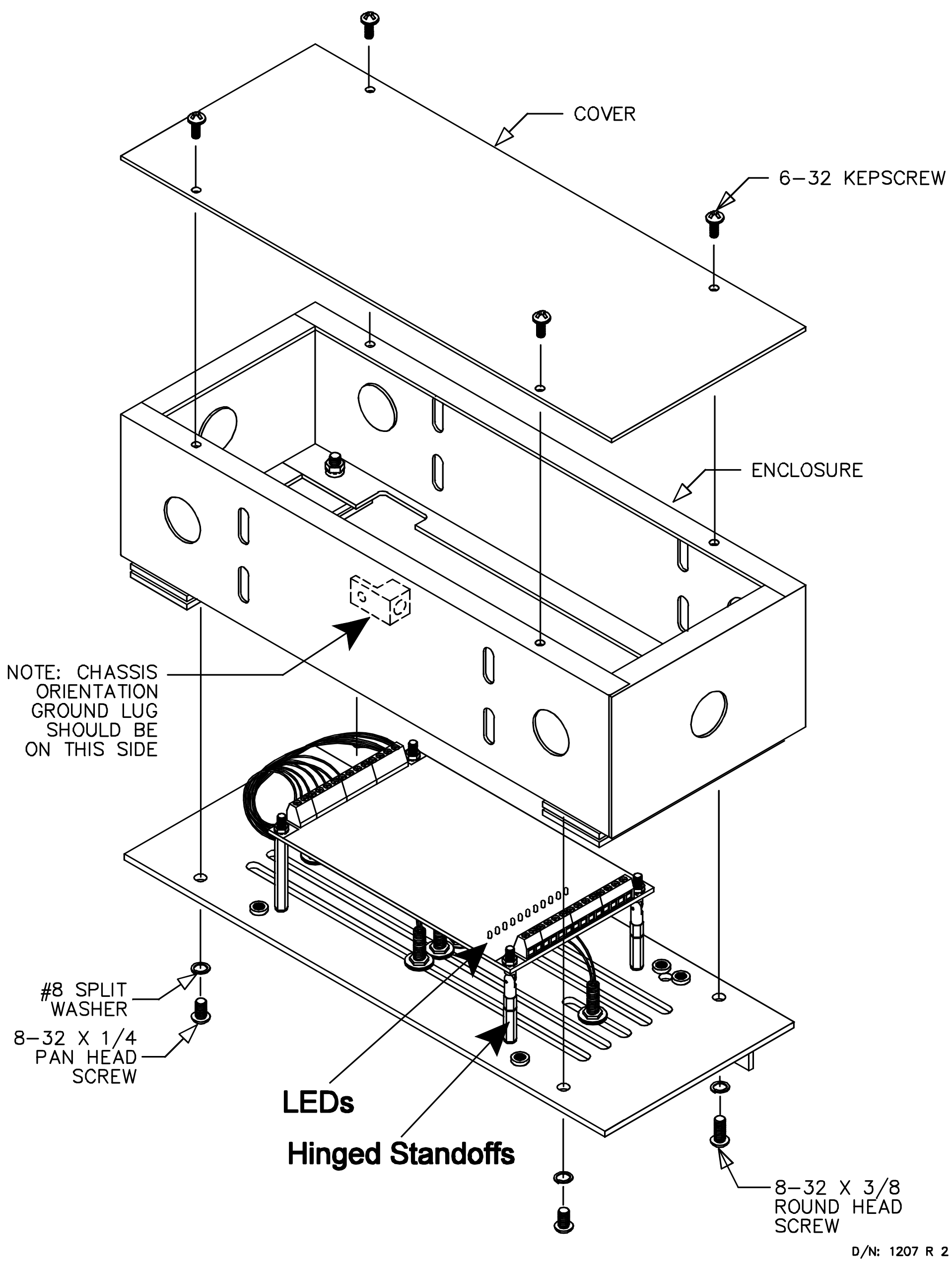
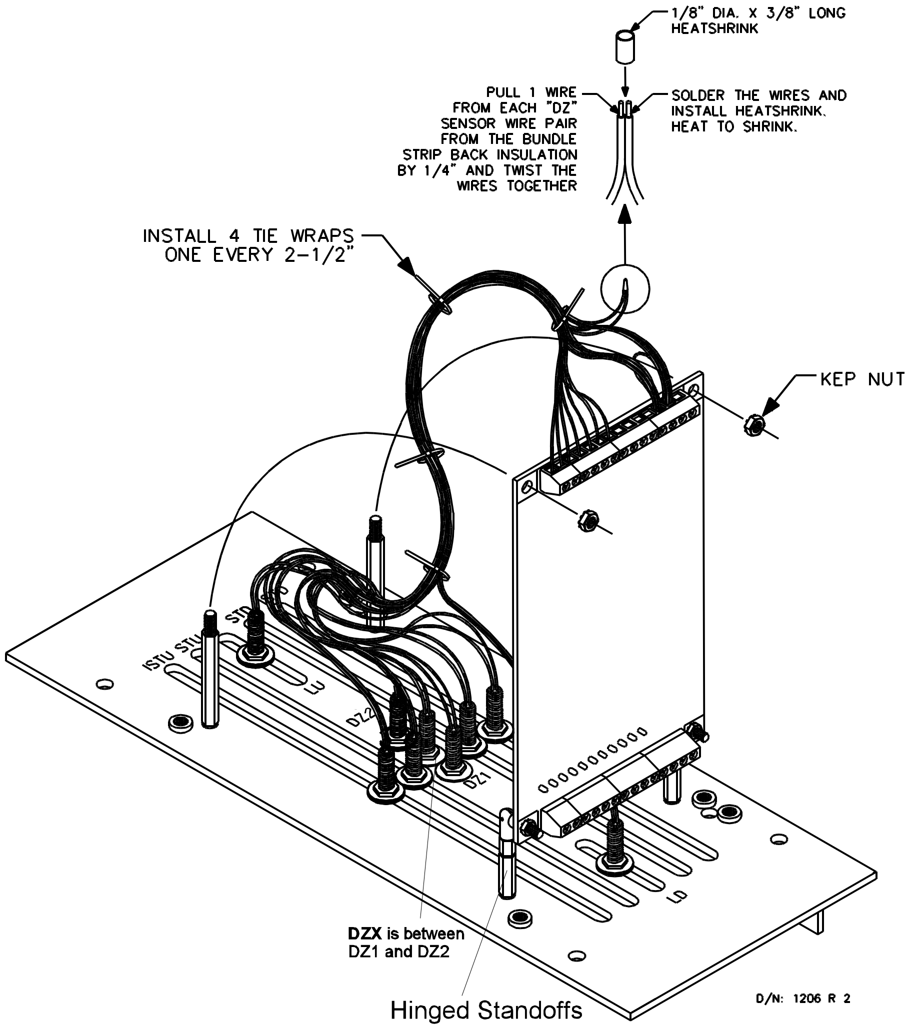


FIGURE F.2   LS QUTE-X-2K Wiring Diagram



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

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