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CONTROLLER INSTALLATION MANUAL

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

Applicable to EMS, IDM , Yaskawa, MagneTek (GPD515+ / G5+), MagneTek (HPV 900), Yaskawa (F7) and TORQMAX AC Drives

PART # 42-02-2P21 REVISION D.7 SEPTEMBER 2007

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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 that 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 A17.1 and National Electrical Code CAN/CSA-B44.1/ASME-A17.5 and must be installed by a qualified contractor. It is the responsibility of the contractor to make sure that the final installation complies with any local codes and is installed safely.

The 3-phase AC power supply to this equipment must come from a fused disconnect switch or a circuit breaker that is sized in conformance with all applicable national, state and local electrical codes, to provide the necessary overload protection for the drive unit and motor. Incorrect motor branch circuit protection will void the 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.

For proper operation of the VVVF AC Drive Unit in your controller, you must make sure that a direct solid ground is provided in the machine room to properly ground the controller and motor. Indirect grounds such as the building structure or a water pipe may not provide proper grounding and could act as an antenna to radiate RFI noise, thus disturbing sensitive equipment in the building. Improper grounding may also render any RFI filter ineffective.

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.

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

CAUTION

For proper operation of the VVVF AC Drive Unit in your controller, you must make sure that the incoming power to the controller and outgoing power wires to the motor are in their respective grounded conduits separate from all other control wires.

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-PCI/O 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 terminals 2, 3 and 4 before plugging these terminals back into the PC boards.

The controller should be installed nearest to the hoist motor, so that length of the connecting wires should not exceed more than 100 feet. If the wire from the controller to the hoist motor is more than 100 feet, contact MCE.

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° F (see Operator's Manual).
- Ensure the air conditioner unit's drain hose remains open.

LIMITED WARRANTY

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

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

SECTION 1
PRODUCT DESCRIPTION

1.0 GENERAL INFORMATION

MCE's VFMC-1000-PTC (Programmable Traction Controller for AC 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 Car Speed Speed Regulation	open loop - up to 150 fpm (no Encoder) ± 5% flux vector - up to 350 fpm (requires Encoder feedback) less than ± 5%
Field Programmable	
Rotating equipment	AC machine with VVVF Drive
Environment	32° to 104° F (0° to 40° C) ambient 12,000 ft altitude 95% humidity

EQUIPMENT CATEGORIES

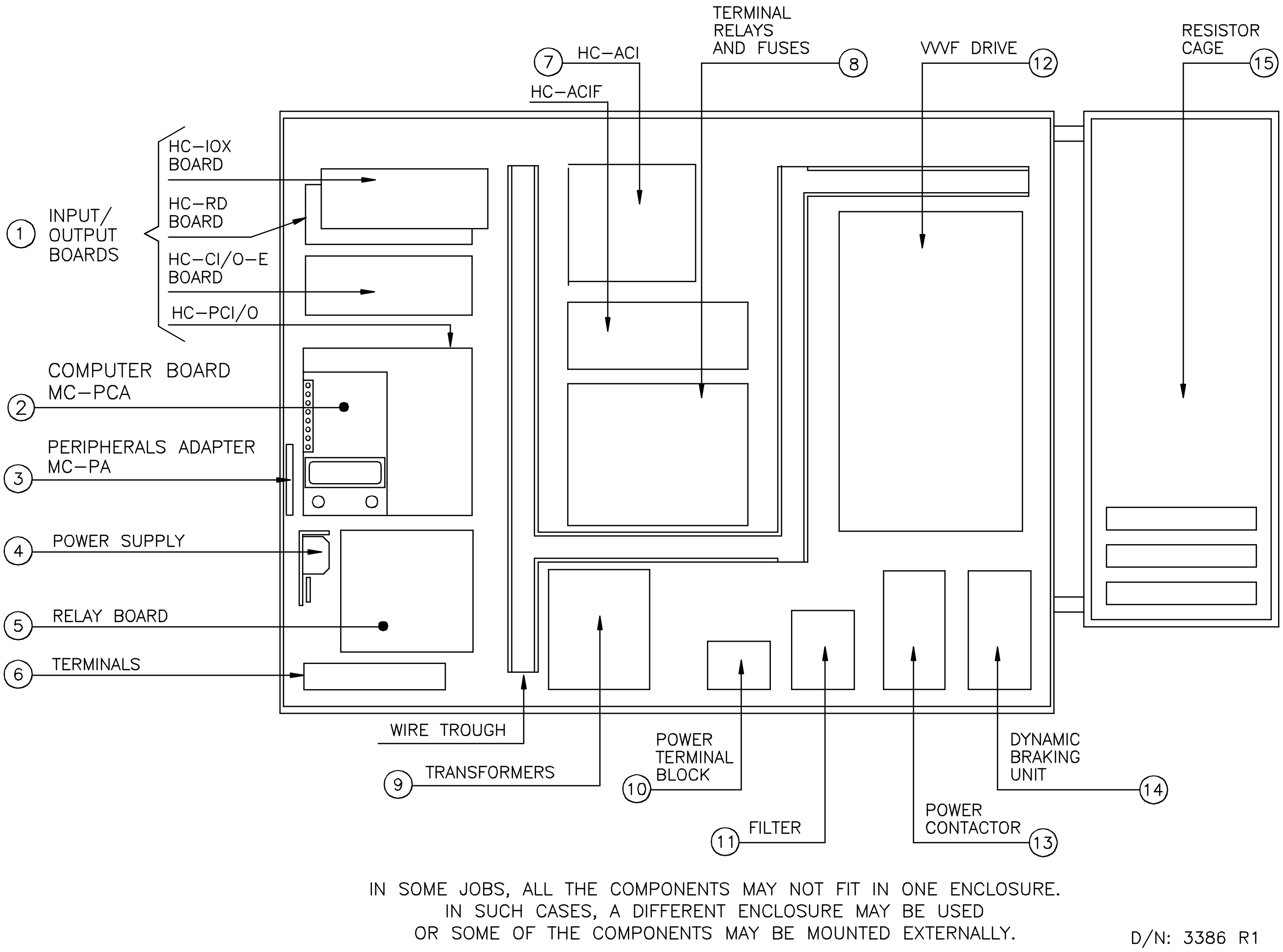
The VFMC-1000-PTC traction controller consists of three major pieces of equipment:

- Controller Unit
- Car Top 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)

   Note that the HC-CI/O-E , HC-IOX and HC-I4O) boards are optional and may be required depending on system requirements (e.g., 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

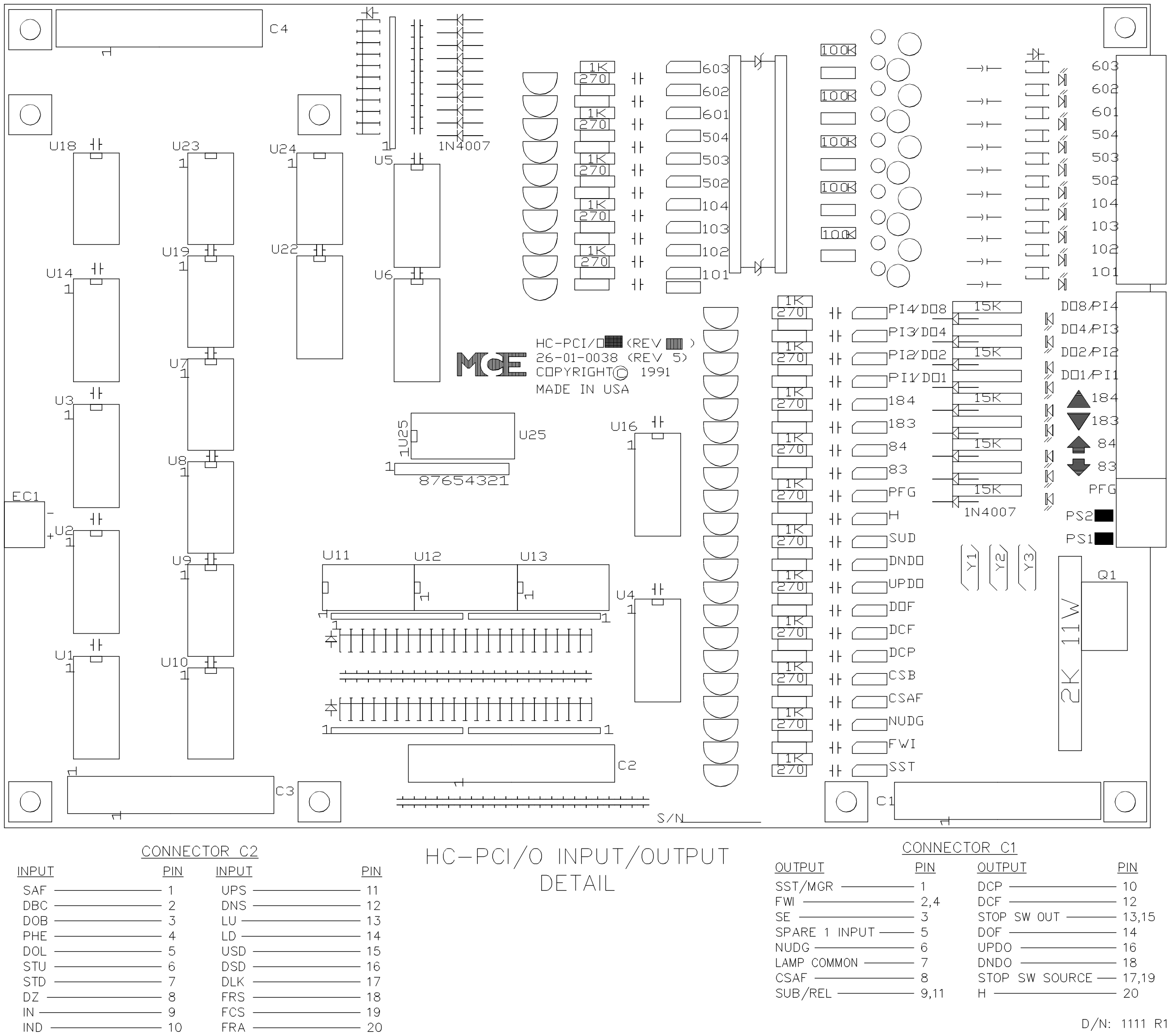
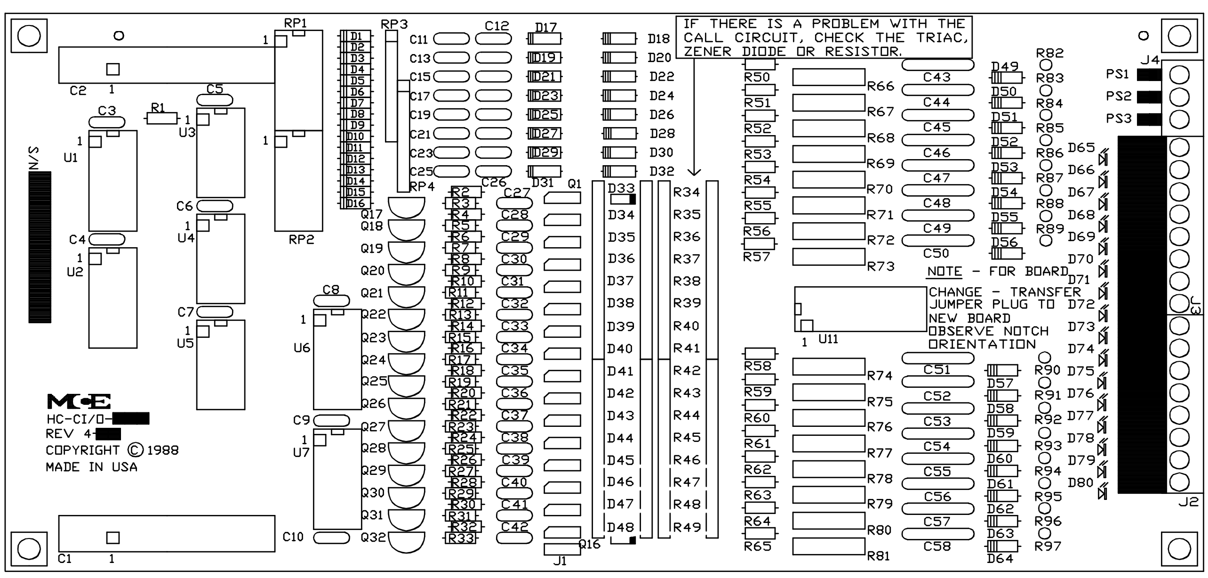


FIGURE 1.3 HC-CI/O-E Call Input/Output Board

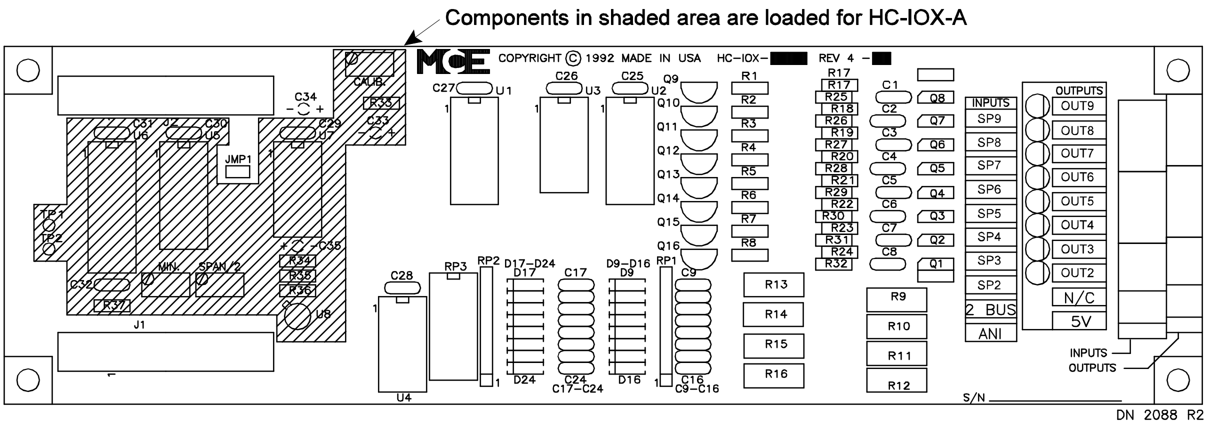


HC-CI/O-E Call Input/Output Board - See Figure 1.3. This board provides the following:

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

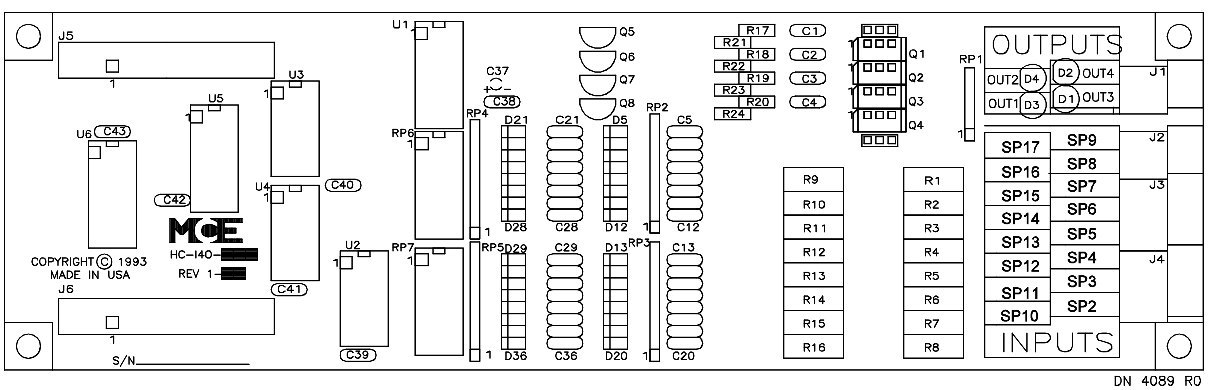
HC-RD Rear Door Logic Board - This board (not shown) provides the inputs and outputs required for independent rear doors.

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.

2. **MC-PCA Main Computer Board** - This board is mounted on the top of the HC-PCI/O board (see Figure 1.6). The main computer board is responsible for:

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

FIGURE 1.6 MC-PCA Computer Board

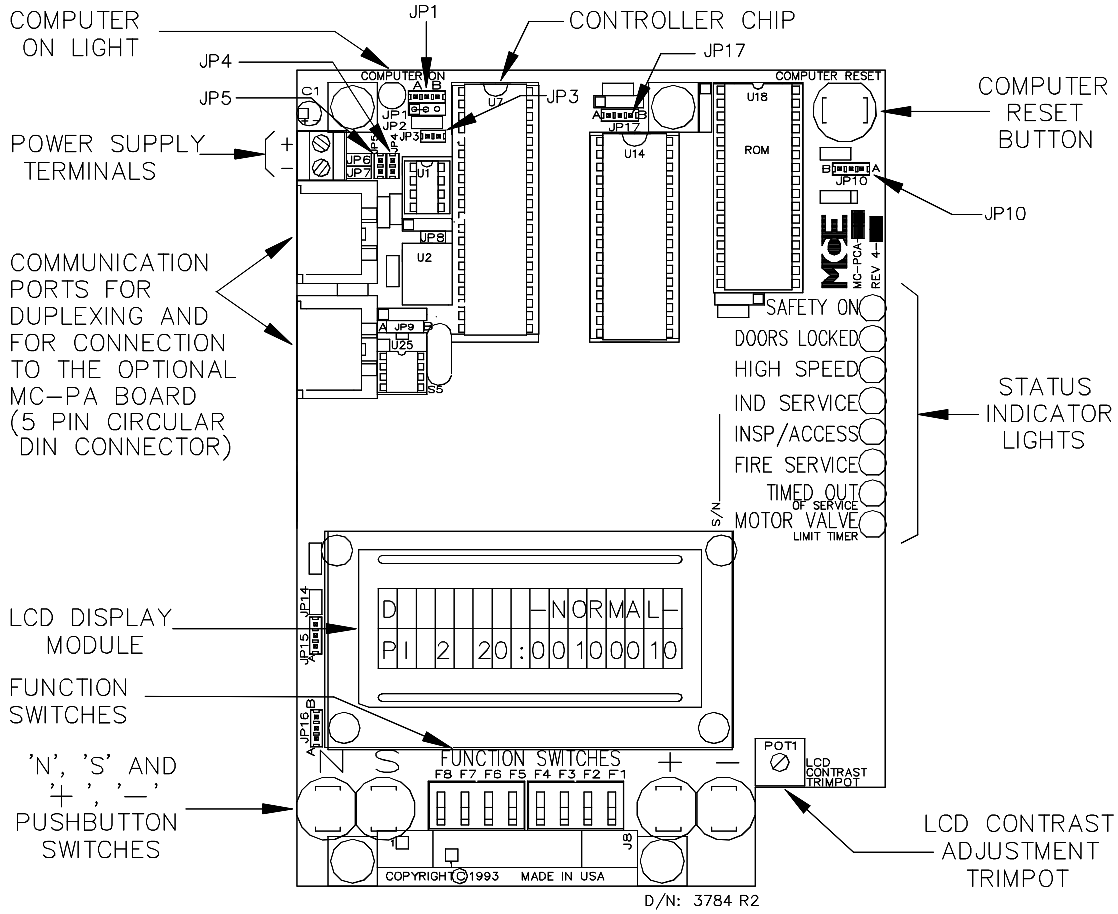
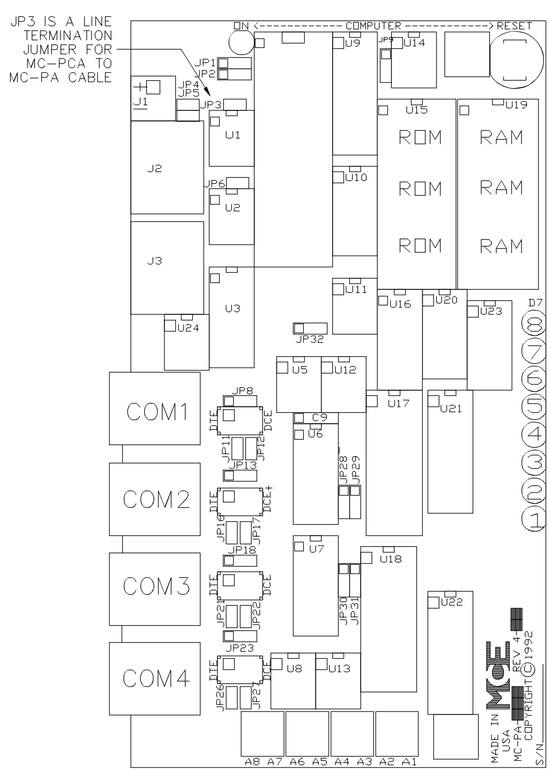


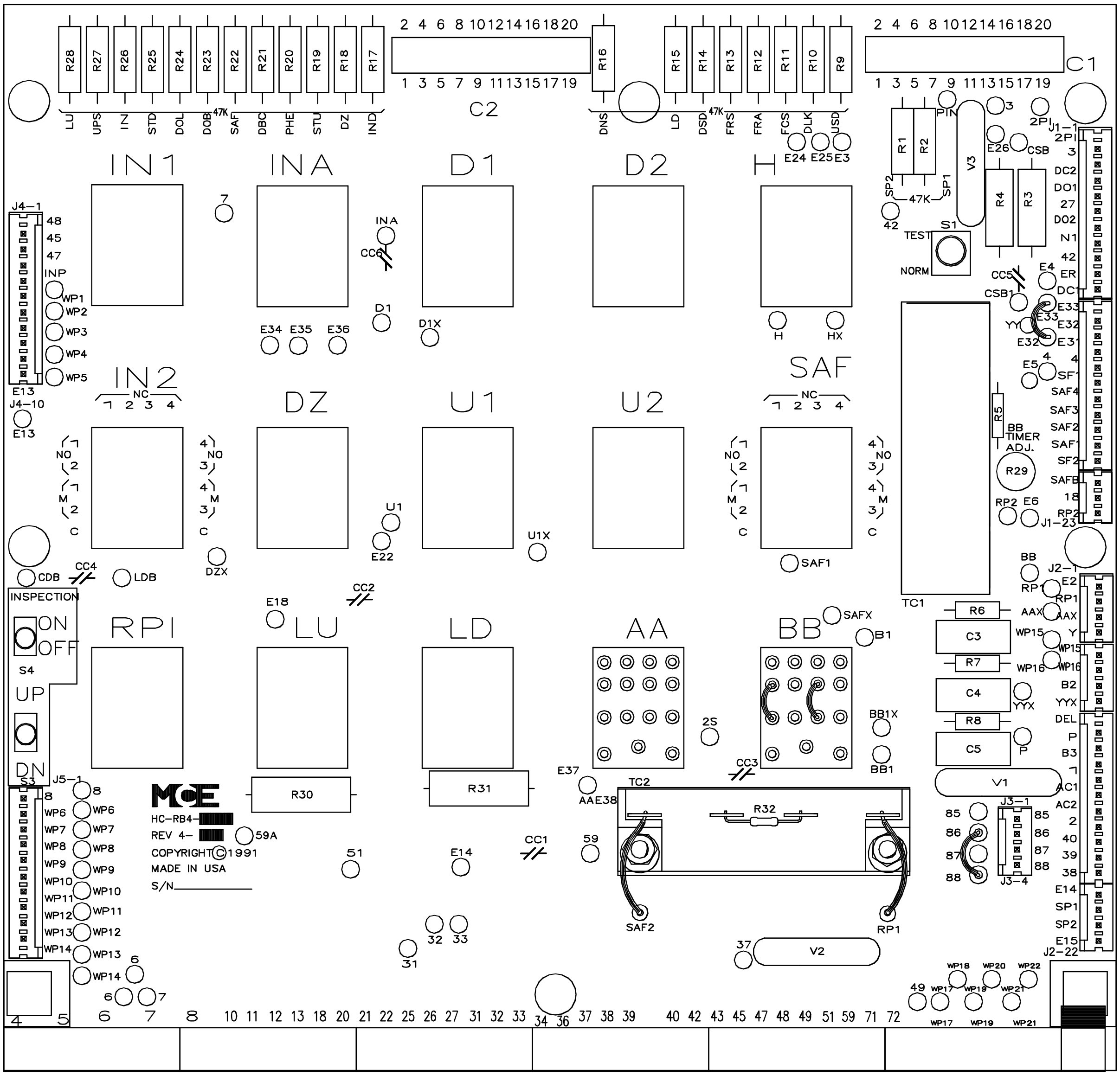
FIGURE 1.7 MC-PA Peripherals Adapter Board (optional)



3. **MC-PA Peripherals Adapter Board** - The optional MC-PA 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 1.7). 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 1.8 Main Relay Board (HC-RB4-VFAC)



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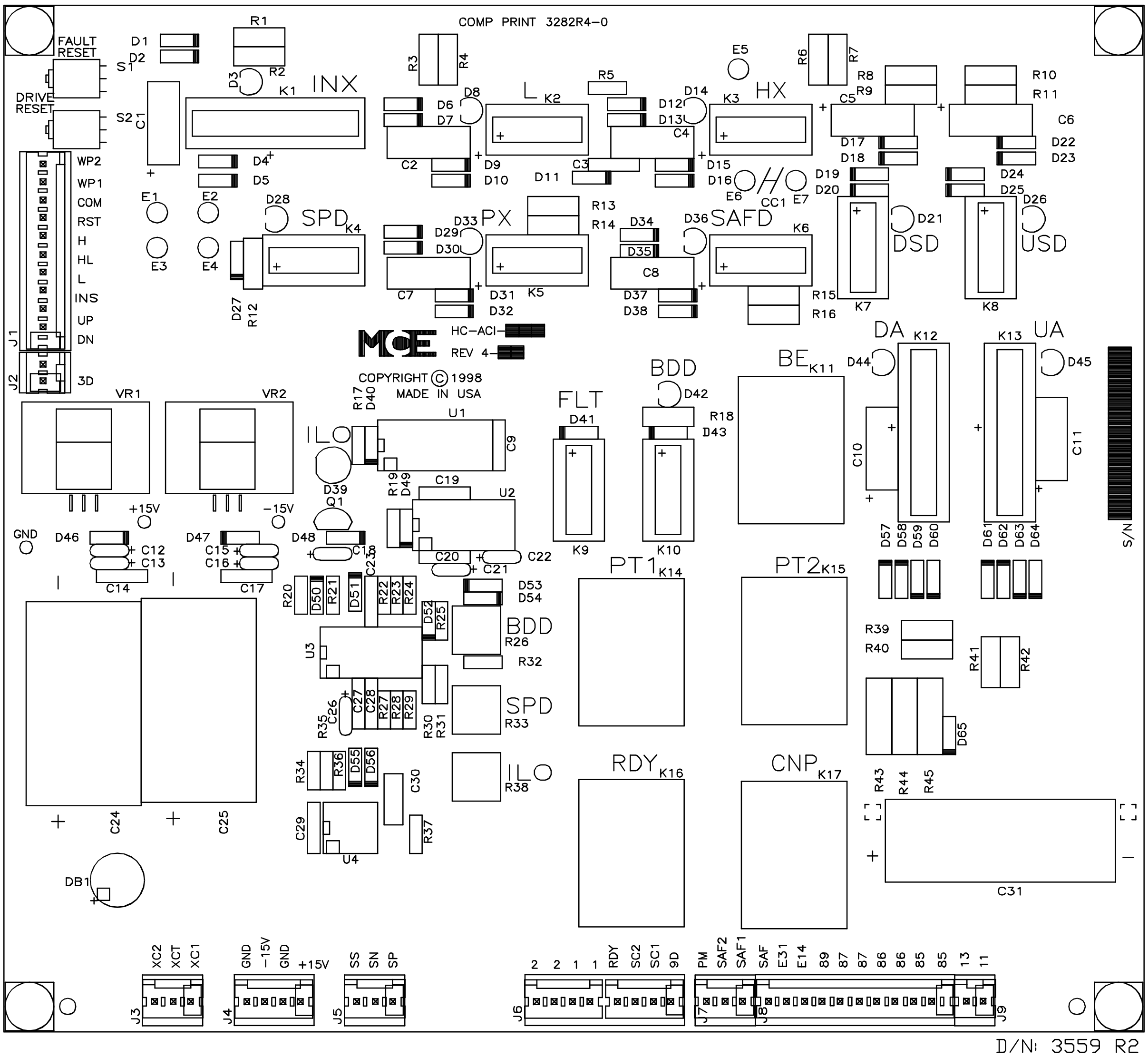
5. **HC-RB4-VFAC Main Relay Board** - This board satisfies many of the code requirements for relay contact redundancy and the requirements for normal terminal stopping devices. It also provides the necessary circuitry for running the car on Inspection or Access without the benefit of computers. Along with the HC-PCI/O board, this board comprises the high voltage interface between the MC-PCA computer and the individual car logic functions such as door operation, direction outputs, direction sensing, main safety circuits, leveling circuitry, etc. This board typically contains 13 four-pole relays as well as some terminals for field wiring. Test pads surround each relay for

ease of troubleshooting. A TEST/NORMAL switch, Inspection UP/DN switch and Relay Panel Inspection switch are provided on this board .

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

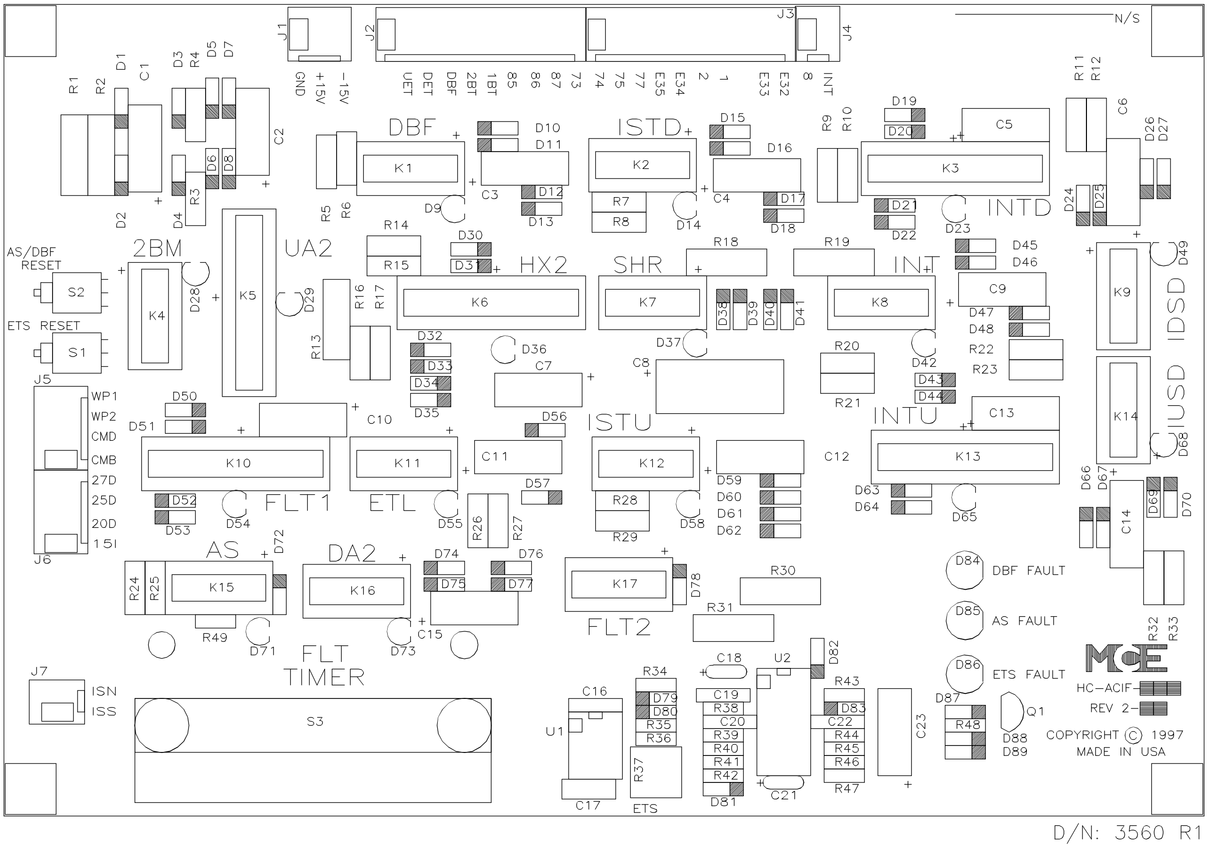
FIGURE 1.9 HC-ACI AC Drive Interface Board



7. **HC-ACI AC Drive Interface Board** -The HC-ACI board (Figure 1.9) is the interface between the Main Relay board and the VVVF Drive Unit. It performs a variety of functions including providing speed inputs and performing certain elevator code requirements such as Inspection/Leveling overspeed detection and motor and brake contractor monitoring. Other functions include an independent motor speed monitoring circuit plus brake and speed signal coordination.

HC-ACIF Additional Flux Vector Drive Interface Board -This board contains the intermediate speed, ETS and Flux Vector Drive circuits (see Figure 1.10).

FIGURE 1.10 HC-ACIF AC Drive Interface Board



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

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

13. **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.

14. **DYNAMIC BRAKING UNIT** - (optional) Whenever required, a dynamic braking module will be provided to dissipate the power generated by the car in case of overhauling load.

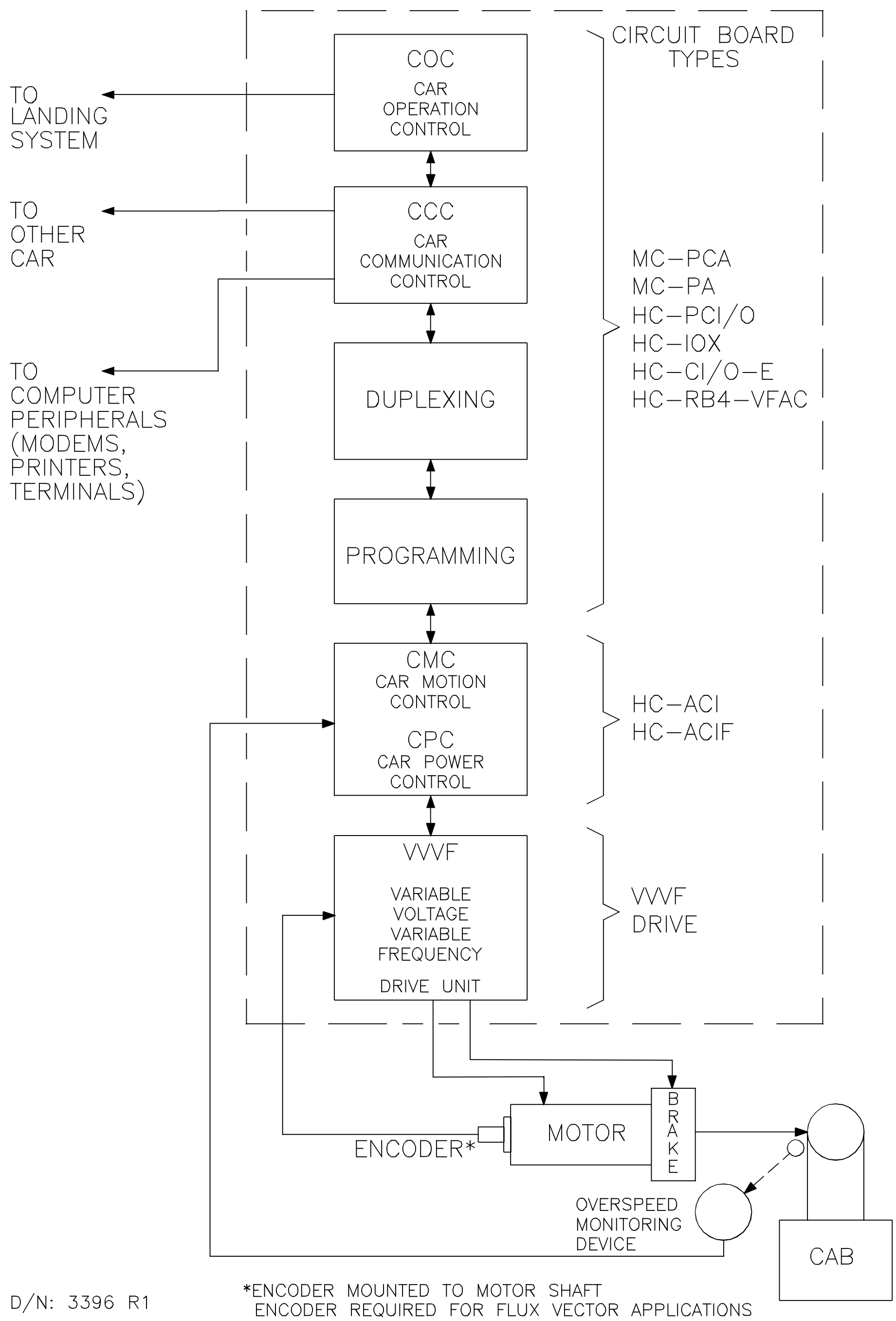
15. **POWER RESISTOR CAGE** - Any power resistors that generate significant heat, such as door resistors or Drive system resistors, are located in the power resistor cage so their heat does not affect other electrical components. Drive System resistors dissipate the power fed back into the VVVF Drive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

1.2 CAR CONTROLLER FUNCTIONAL DESCRIPTION

Functionally, the Control Unit is divided into six sections. Figure 1.11 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
- VVVF Drive

FIGURE 1.11 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:

- HC-RB4-VFAC Main Relay board
- MC-PCA 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)

The heart of the COC is the HC-RB4-VFAC (Main 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 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 board plugs into the HC-PCI/O board. The MC-PCA 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 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 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 AC Drive Interface board
- HC-ACIF Additional Flux Vector Drive Interface board

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

1.2.6 VVVF DRIVE

The VVVF Drive Unit receives the direction(run) and speed command from the HC-ACI board, and provides the proper 3-phase voltage and frequency to create the required RPM and torque in the motor. It also provides dynamic braking when necessary.

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 Computer board. The MC-PCA 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 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 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 HC-RB4-VFAC Main Relay board which energizes the direction pilot relays. This direction signal then goes to the HC-ACI board and to one or more auxiliary running relays. The direction and high speed commands originate from the MC-PCA board through the HC-PCI/O and the Main Relay board. The CMC is ready to lift the brake and to provide VFAC 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 VFAC speed command and brake signals are then created by the CMC and the CPC moves the elevator according to the commanded speed.

1.3 LANDING 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 and LS-QUTE. These landing systems are discussed separately throughout this manual.

FIGURE 1.12 LS-STAN Car Top Control Box

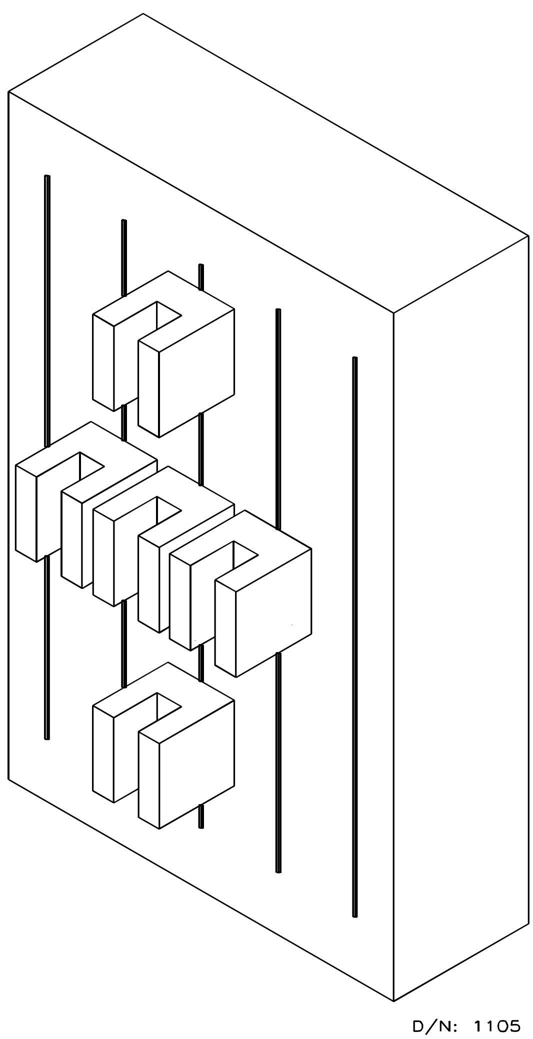
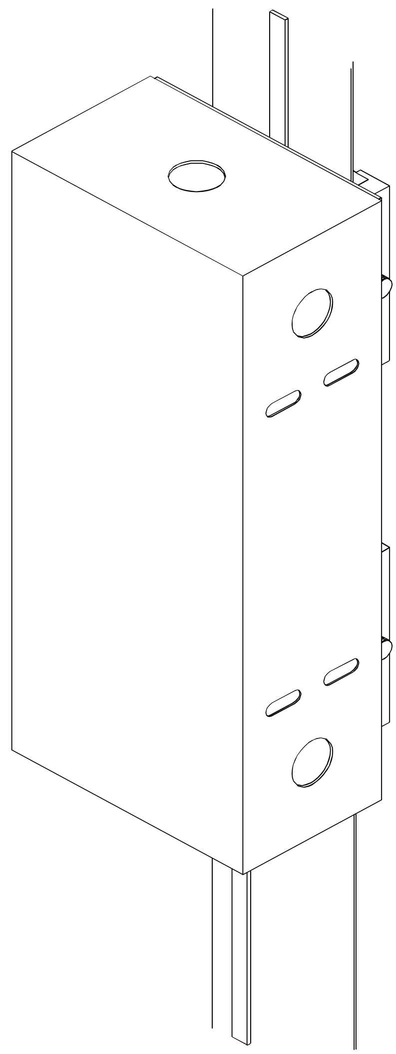


FIGURE 1.13 LS-QUTE Car Top Control Box



1.3.1 LS-STAN

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 Figure 1.12).

1.3.2 LS-QUTE

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 1.13) More information is provided in Appendix G, LS-QUTE Landing System Assembly Drawings.

SECTION 2
INSTALLATION

2.0 GENERAL INFORMATION

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

2.0.1 SITE SELECTION

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 hand-held communication devices 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:

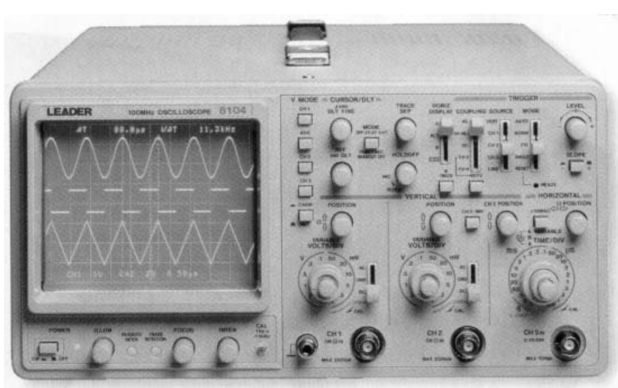
- A digital multimeter, Fluke series 75, 76, 77 or equivalent.
- An oscilloscope (preferably storage type) or a strip chart recorder.
- A hand-held tachometer.
- A clamp-on AC ammeter.
- A DC loop ammeter.
- Hand held radios.
- A telephone.
- Test weights.
- Assorted soldering tools, rosin flux solder,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

DIGITAL MULTIMETER

AMP-PROBE

MEGOHMETER

OSCILLOSCOPE

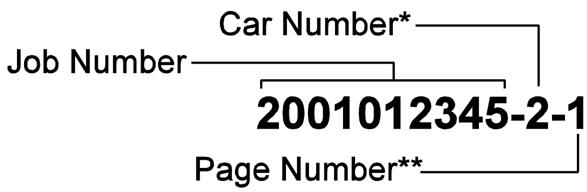


TELEPHONE

2.0.4 WIRING PRINTS

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

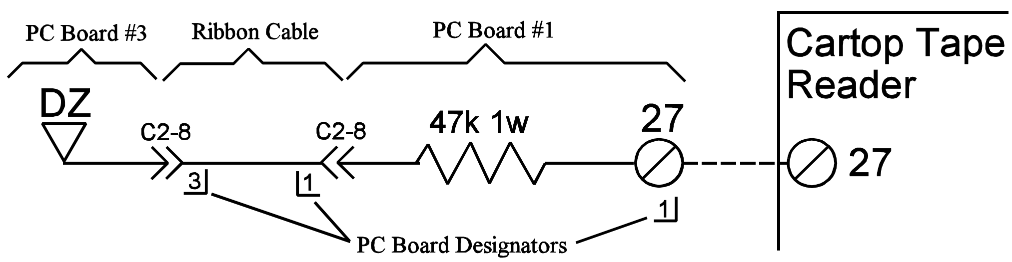
DRAWING NUMBER FORMAT - Each print has a drawing number indicated in the title block. The drawing number is comprised of the job number, car number and page number (see examples). In this manual the drawings will often be referred to by the last digit of the drawing number (page number). The following 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 -7 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 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 AC Drive while wiring to prevent damage to the components.

2.1.1 CONTROLLER WIRING GUIDELINES

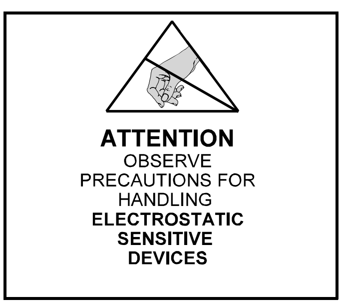
> **CAUTION:** Power conductors from the fused disconnect, isolation transformer or other high voltage, high current conductors must be separated from the control wires. It is essential that the Encoder and Speed Sensor wires be placed in a separate conduit, away from high current conductors.

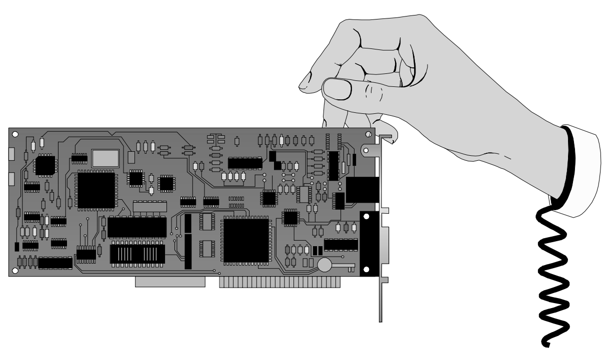
Figure 2.2 shows the recommended routing for the field wiring. Observe the following:

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.

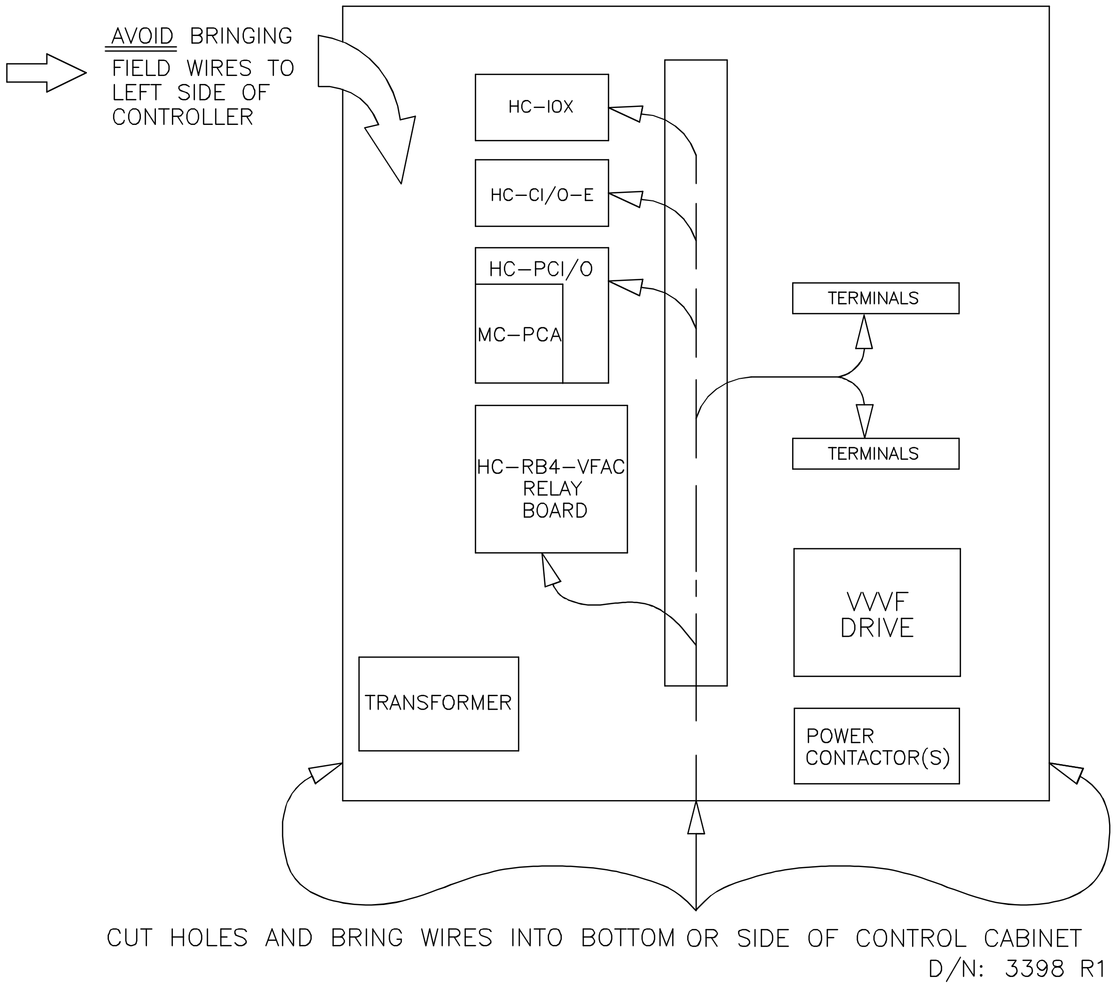




b. Bring the wires in from a location that would allow use of the wiring duct inside the control cabinet. The terminals are located conveniently near wiring ducts.

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 1-72 and 85, 86, 87, 88, and 89 are located on the HC-RB4-VFAC Main Relay Board.
- Terminals for the door operator are on respective door boards or on separate terminal blocks.
- Several 1 and 2 bus terminals are provided in 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 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.

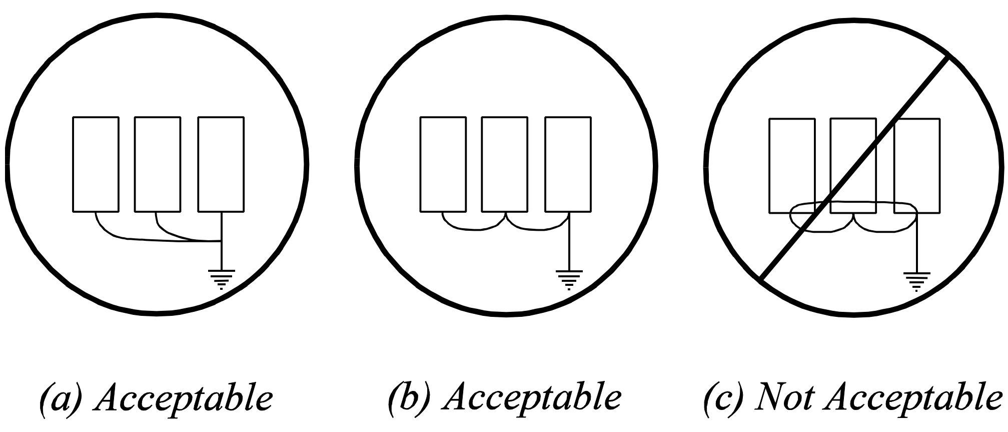
2.2.1 GROUND WIRING

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).

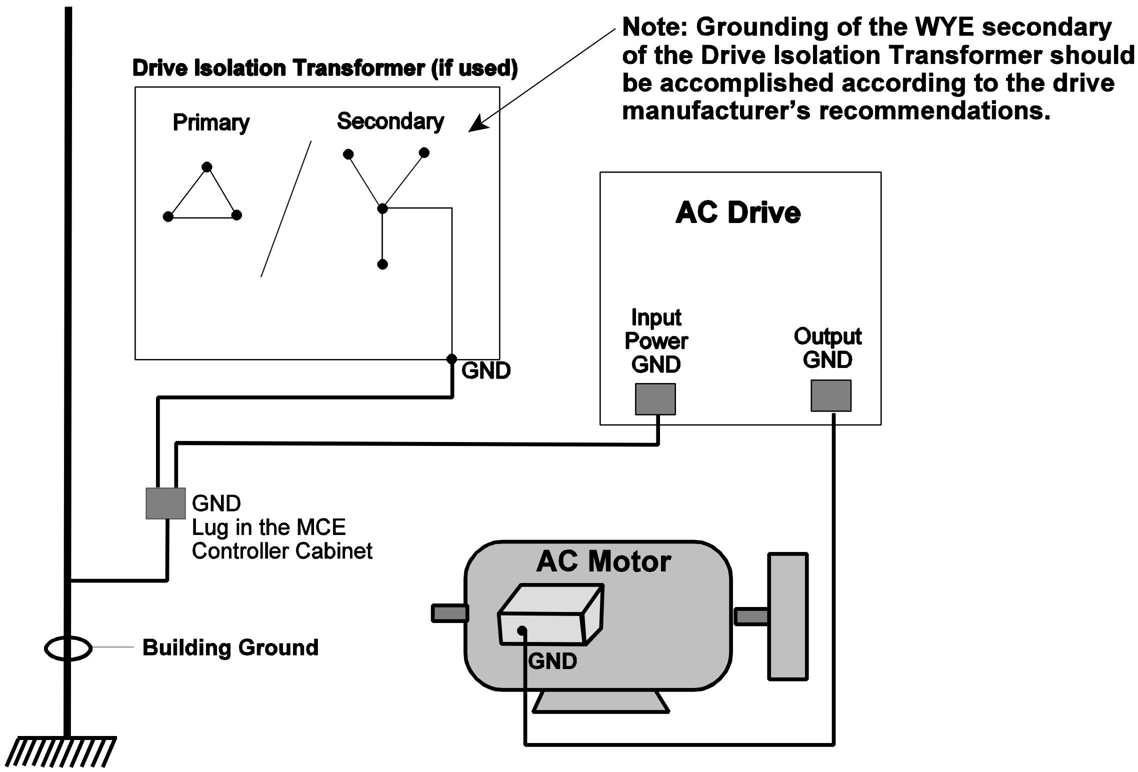
FIGURE 2.3 Ground Wiring to Controller Cabinets



- 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



2.2.2 AC MOTOR AND BRAKE WIRING

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

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

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

2.2.3 INSTALLING AND WIRING THE SPEED SENSOR

a. The speed sensor must be mounted and wired. The instructions for this are in Step (b). The speed sensor device is about 5/8" to 3/4" in diameter, about 1½" long, and is threaded over its entire length. This sensor detects two magnets that pass within 1/16" (or 1.6 mm) of the face of the sensor.

There are many ways to mount the magnets that actuate the sensor depending on the amount of space available to attach the magnets. Generally, the magnets are installed in two locations so that there are two pulses per each revolution of the motor. They must also be spaced equally. One way to install the magnets is to glue them to an accessible part of the motor shaft and then secure them with nylon wire ties (see Figure 2.5).

NOTE: The magnets must be 1/4" thick strips with the South pole facing **out**. The South pole is the side without adhesive and peal-off tape. If 1/8" thick magnet strips are being used, a double thickness must be used (one on top of the other).

FIGURE 2.5 Installing Magnets on Motor Shaft

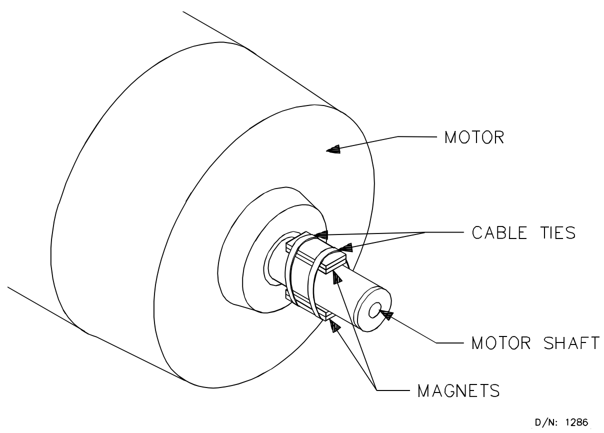
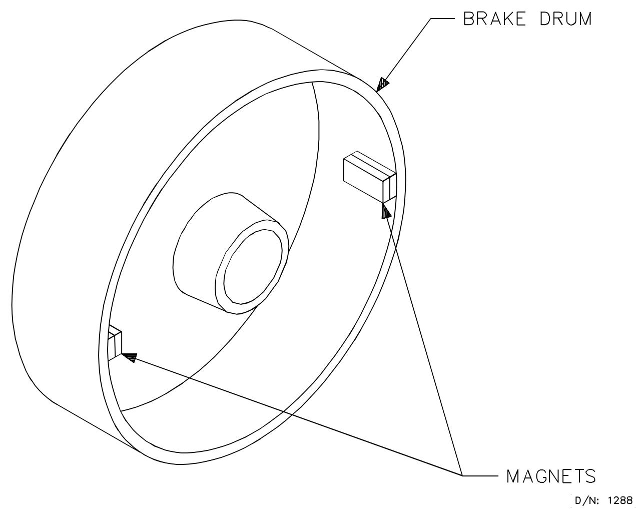


FIGURE 2.6 Installing Magnets on Brake Drum



CAUTION: ***Do not drill any holes in the motor shaft*** to mount the magnets. This will weaken the shaft. See Figure 2.5 for a sample installation of magnets on the motor shaft.

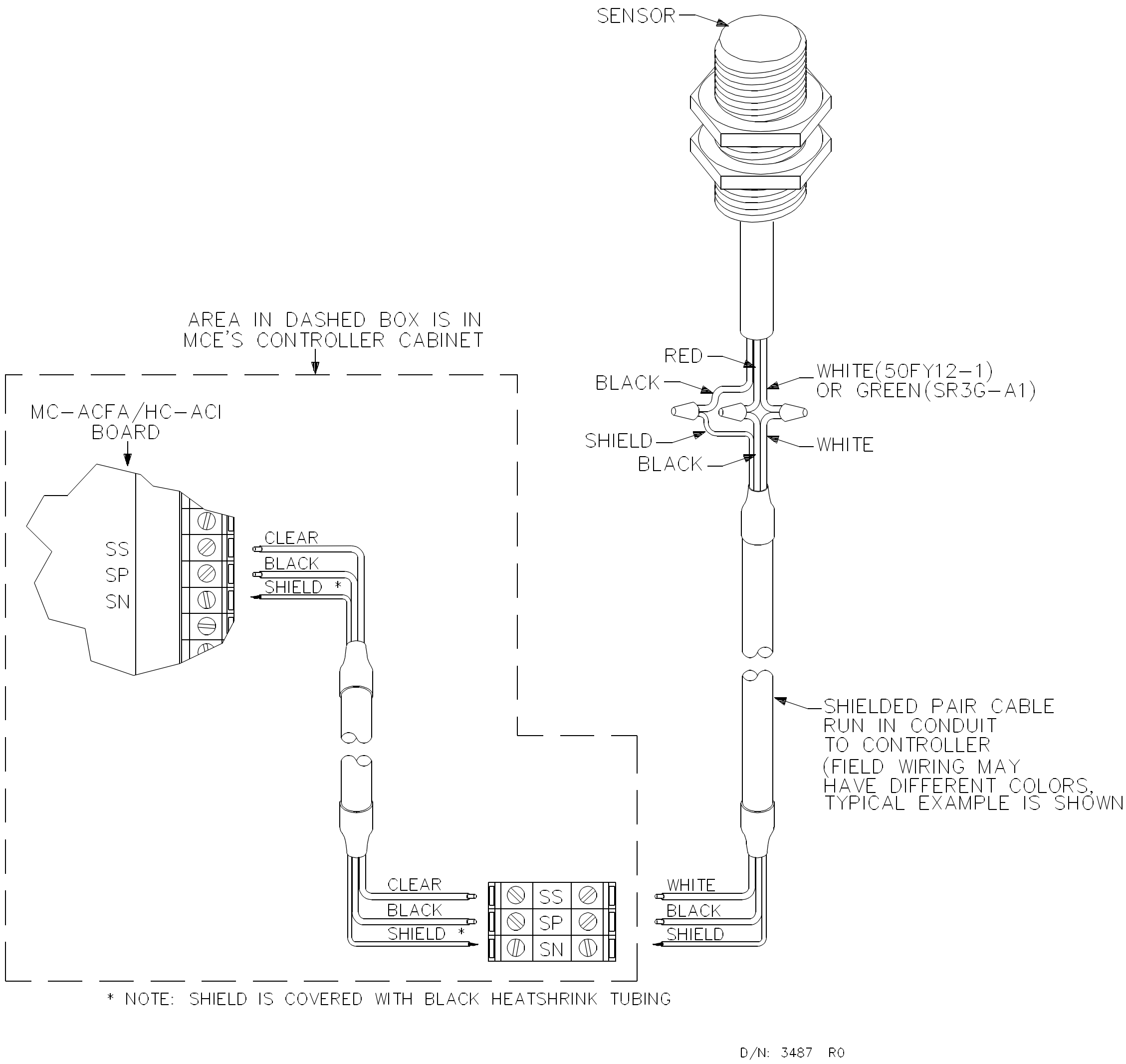
One alternative to mounting the magnets on the shaft is to mount them inside the brake drum using a high quality contact adhesive. See Figure 2.6.

CAUTION: Make sure that any adhesive used is kept *away* from the brake mechanism. ***Do not drill holes in the brake drum***.

b. The speed sensor must be mounted on a bracket with at least 1/4 of an inch of the sensor extending beyond the edge of the bracket. Take care not to over-tighten the nuts on the sensor. Position the face of the sensor so there is 1/32" to 1/16" (.79 to 1.6 mm) clearance from the magnets. To wire the sensor, note there may be one of two sensors supplied: a MICROSWITCH #SR3G-A1 or #50FY12-1. The wiring is similar except for the lead wire color code. See Figure 2.7 for the wiring detail for both sensors.

NOTE: A shielded 2 - conductor cable must be used for the wiring from the sensor to the controller. This cable must be placed in a separate, grounded conduit.

FIGURE 2.7 Speed Sensor Wiring Detail



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.

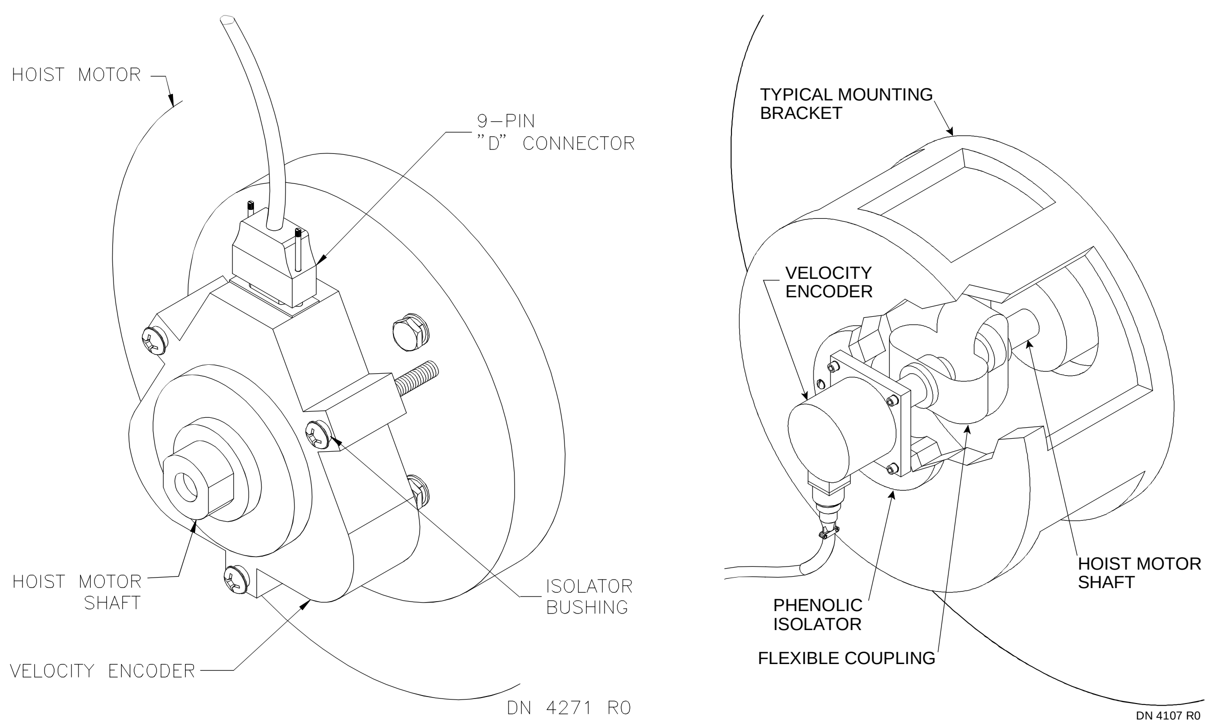
A switch contact must be attached to the brake assembly if one does not already exist. This is needed for the brake monitor circuit that shuts down the car in the event of a brake failure. There are many types of switches that can be used and there is no way to anticipate all the methods of mounting 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 - The encoder is only required for Flux Vector applications.

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

> **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.

FIGURE 2.8 Typical Encoder Installations



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

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

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

2.3 HOISTWAY CONTROL EQUIPMENT INSTALLATION

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

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

2.3.2 INSTALLING THE HOISTWAY LIMIT SWITCHES

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

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

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

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

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

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

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

2.3.3 INSTALLING THE LANDING SYSTEM CONTROL BOX (LS-QUTE) - 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 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 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 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 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.

2.3.6 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.

2.3.7 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, the AC hoist motor and brake, and completing the initial adjustment of the system to get basic car movement on Inspection operation.

3.1 GROUND CHECK

Conduct a ground test before powering up the system. Refer to Figure 1.2 and Figure 2.3 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 HC-RB4-VFAC 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. Check for shorts to ground on terminals F1, F2, A1, A2, and D5. If a G.A.L. MOD door operator is provided, remove door fuses F7 and F8. For other door operators, consult the prints as to which fuses to remove, then check the appropriate terminals for shorts to ground.

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

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

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

3.2 BEFORE APPLYING POWER

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

Before applying power to the controller, perform the following:

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

b. Remove one side of the ribbon cable connecting the HC-RB4-VFAC 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 VFMC-1000-PTC controller is designed to be able to operate on Inspection and Access without the computers hooked up during start-up.

3.3 APPLYING POWER - PREPARING TO MOVE THE CAR ON INSPECTION

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

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

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

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

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

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

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

3.3.1 INITIAL POWER UP

a. On the HC-RB4-VFAC board, place the INSPECTION switch in the ON position and the TEST/NORMAL switch in the TEST position.

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

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

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

e. The VFAC Drive Unit provided with this controller should not display any fault on the drive keypad. If a fault is indicated, refer to the Drive Manual or Section 6.5 (for G5 / GPD515 Drive), Section 6.6 (for HPV 900 Drive), Section 6.7 (for TORQMAX Drive) or Section 6.8 (Yaskawa F7 Drive) in this manual. The Drive Faults section of the Drive Manual provides a list of faults and recommended corrective action.

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

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

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

i. If a field wire is connected to terminal 59 on the HC-RB4-VFAC board, temporarily remove the wire, label and insulate it. This will disable the Car Top Inspection switch. Close the car door. Leave the hall doors closed, and lock the doors that are accessible to the public.

j. Install a temporary jumper between terminals 18 and 59 on the HC-RB4-VFAC board. Turn ON the power and verify that relay RPI is picked, thereby placing the car on Inspection operation. If the RPI relay is not picked check the connections in the Safety String.

k. Install a temporary jumper wire between terminals 4 and 8 on the HC-RB4-VFAC board ***to bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

3.3.2 DRIVE INTERFACE BOARD DETAILS

The HC-ACI board is the interface between the HC-RB4-VFAC main relay board and the VVVF Drive Unit. It performs a variety of functions including providing speed inputs and performing certain elevator code requirements such as Inspection/Leveling overspeed detection 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 1.10, HC-ACI (AC Drive Interface Board).

HC-ACI BOARD DETAILS

- **Trimpots:**

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

  > **NOTE:** Speed Pick Delay is not used on controllers with the TORQMAX drive. Turn the SPD trimpot fully CCW and then set it 1/4 turn in the CW direction (see Section 4.9.4 'd' and 'f').

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

  ILO - Inspection Leveling Overspeed. The ILO trimpot establishes the speed setting that will shut down the elevator in case of an overspeed condition during inspection or leveling operation. If ILO should trip, the ILO indicator will light and the FLT relay will pick, thereby shutting down the elevator. To restore operation, press the *Fault Reset* button on the HC-ACI board. Turning the trimpot CCW will result in a higher trip speed threshold and turning it CW will cause a lower speed threshold. For this trimpot to function, a sensor must be wired to the terminals SP, SS, and SN. The speed sensor installation and wiring is explained in Section 2.2.3, *Installing and Wiring the Speed Sensor*.

- **Indicator:**

  ILO - Inspection Leveling Overspeed indicator. This indicator comes ON when the car speed exceeds the threshold set by the ILO trimpot during Access, Leveling or Inspection operation. If the ILO indicator is ON then the FLT relay will be picked and the elevator will not move. To restore operation, press the Fault Reset button on the HC-ACI board and investigate any problems before returning the car to service.

- **Push Buttons:**

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

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

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

- **Trimpots:**

  ETS - Emergency Terminal limit Speed adjust. This trimpot sets the emergency terminal limit speed threshold which will shut down the elevator in case the elevator's speed at terminal limits is greater than the threshold speed. Turning the trimpot CCW sets the threshold speed lower. Turning CW sets the threshold speed higher. This trimpot functions based on feedback from the speed sensor, which is also used for the ILO fault.

- **Indicators:**

  ETS FAULT - Emergency Terminal limit overspeed fault. When the elevator operates (opens) either ETS switch, and detects car speed in excess of the threshold speed set by the ETS trimpot, an ETS fault is generated. This causes the ETS fault indicator to turn ON and picks the FLT2 relay, which shuts down the elevator. To restore operation, press the ETS Fault reset push button on the HC-ACIF board and investigate any problems before returning the car to the service.

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

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

- **Push Buttons:**

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

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

3.4 INSPECTION OPERATION - G5 / GPD515 DRIVE

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

3.4.1 DRIVE PARAMETER SETTINGS

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

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

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

3.4.2 VERIFYING THE CRITICAL G5 / GPD515 DRIVE PARAMETERS

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

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

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

TABLE 3.1 Critical G5 / GPD515 Drive Parameters

CRITICAL G5 / GPD515 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
A1-01	Access Level	Parameter access level 0: Operation Only 1: User Program 2: Quick Start Level 3: Basic Level 4: Advanced Level	-	0 - 4	3	3
A1-02	Control Method	Control Method - motor 1 0: V/f Control 1: V/f w/PG Fdbk 2: Open Loop Vector 3: Flux Vector	-	0 - 3	0	0 = V/f Control - Open loop 3 = Flux Vector
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
C1-01	Accel time 1	Acceleration time 1	s	0 - 6000	1.96	1-3 sec
C1-02	Decel time 1	Deceleration time 1	s	0 - 6000	1.96	1-3 sec
C1-03	Accel time 2	Acceleration time 2	sec	0-6000	1.96	1.6
C1-04	Decel time 2	Deceleration time 2	sec	0-6000	0.01	0.1
C1-07	Accel time 4	Acceleration time 4	s	0-6000	1.96	1-3 sec
C1-08	Decel time 4	Deceleration time 4	s	0-6000	1.96	1-3 sec

TABLE 3.1 Critical G5 / GPD515 Drive Parameters

CRITICAL G5 / GPD515 DRIVE PARAMETERS						
Parameter Number	Digital Operator Display	Parameter Description	Units	Setting Range	MCE drive default	Field/MCE settings
D1-02	Ref. -2	Preset reference 2 (High speed)	Hz	0 - 80	**30 ✶**	**30 ✶**
	✶ This parameter will be changed to 60Hz later during final adjustment to run the car at H speed.					
D1-03	Ref. - 3	Preset speed 3 (HL speed)	Hz	0 - 15	8.0	6-10
D1-05	Ref. - 4	Preset speed 5 (Level)	Hz	0 - 10	1.3	1-3
D1-07	Ref. - 7	Preset speed 7(Intermediate) If applicable to the job	Hz	0 -55	**25 ✶**	**25 ✶**
	✶ This parameter will be adjusted later during final adjustment, but must be less than D1-02 for proper operation.					
D1-09	Jog ref.	Jog reference (Inspection speed)	Hz	0-40	10	10
E1-01	Input volt	Drive input voltage	V ✶✶			Drive input voltage.
E1-03	V/F Selection	Pattern selection (N/A to flux vector)	F	0-F	F	F
E1-04	Max Freq..	Maximum frequency	Hz	0-80	60	60
E1-05	Max volt	Motor voltage	v			Motor name plate voltage
E1-06	Base Freq..	Maximum volt output freq.	Hz	40/50/60 (Motor rated)	60	60
E1-07	Mid Freq..	Mid out put frequency (N/A to flux vector)	Hz	0- 80	3	3
E1-08	Mid volt	Mid out put voltage (N/A to flux vector)	V	17.2 ✶✶	16.1 ✶✶	16.0-25.0 ✶✶
E1-09	Min freq.	Minimum out put frequency (N/A to flux vector)	Hz	0-80	0.5	0.5
E1-10	Min volt	Minimum out put volt (N/A to flux vector)	V	0-255	10 ✶✶	8.0-12.0 ✶✶
E2-01	Motor FLA	Motor Full load amp	A	0-1500	Motor dependent	Motor FLA
E2-02	Motor slip	Motor Rated slip	Hz	0-15	Motor dependent	
E2-03	No load current	Motor no load current	A	0-150	30% -40% of Motor FLA	
H1-01	Terminal 3 Sel	Multi-function input (terminal 3) *7* = Mult-Accell/Decel 1	-	0-82	7	7
H1-02	Terminal 4 Sel	Multi-function input (terminal 4) *14 = Fault Reset*	-	0 - 82	14	14
H1-03	Terminal 5 Sel	Multi-function input (terminal 5) *80 = Mult-step spd 1F*	-	0 - 82	80	80
H1-04	Terminal 6 Sel	Multi-function input (terminal 6) *81 = Mult-step spd 2F*	-	0 - 82	81	81
H1-05	Terminal 7 Sel	Multi-function input (terminal 7) *82 = mult-step spd 3F*	-	0 - 82	82	82

TABLE 3.1 Critical G5 / GPD515 Drive Parameters

CRITICAL G5 / GPD515 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
H1-06	Terminal 8 Sel	Multi-function input (terminal 8) *6 = Jog Ref (In speed)*	-	0 - 82	6	6
H2	**Digital Outputs**					
H2-01	Terminal 9 sel	Multi-F output 1 (Ter. 9 -10) 37= During Run 2	-	0-3F	37	37
H2-02	Terminal 25 sel	Multi-F output 2 (Ter. 25 -27) 4 = Freq Det. 1	-	0-3F	4	4
✶✶ These values should be doubled for the 460 volt application.						

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

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

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

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

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

a. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Turn ON the main power disconnect. The RPI relay will pick and after few seconds the SAF relay should pick (the LED on the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller’s back plate. Verify that there is 120 VAC between terminals 1 and 2 on the HC-RB4-VFAC Main Relay board.

   If no problems are found, then briefly place a jumper between terminals 2 and 20 on the HC-RB4-VFAC board and confirm that the SAF relay turns ON after four seconds. If the SAF relay turns OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

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

c. If required, install a temporary jumper between terminals 4 and 8 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

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

e. The **inspection speed** is set by drive parameter **D1-09 in Hz. For flux vector applications, set D1-09 = 4Hz as the initial setting to slowly move the car & to prevent arcing on the contactors during initial start up.** Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Verify that the drive is in OPERATION mode. Run the car in the desired direction by toggling the UP/DN toggle switch on the HC-RB4-VFAC board. The PM contactor and the BR contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

If the car moves in the opposite direction:

- for **open loop** applications, interchange two of the motor leads.
- for **flux vector** applications, display the OUTPUT CURRENT on the drive keypad by pressing the UP arrow (twice). Pick direction on Inspection and check the following:
  1. If the car moves in the **opposite direction** and draws a **normal value** of current(less than the Motor FLA or approximately 30% to 40% of motor FLA), then perform the following steps:
     (a) Turn the controller power OFF. Interchange two of the motor connections.
     (b) Turn the controller power ON. Set parameter F1-05 = CCW if its original setting is CW. If the original setting was CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.
  2. If the car moves in the **opposite direction** and draws **higher current** than normal:
     (a) Turn the controller power OFF. Interchange two of the motor leads.
     (b) Turn the controller power ON and check the direction and current. If the car moves in correct direction but still draws higher than normal current, go to step 3.
  3. If the car moves in the **correct direction** and draws **higher current** than the Motor FLA and the value of current keeps increasing, stop the car and set parameter F1-05 = CCW if its original setting is CW. If the original setting is CCW then set F1-05 to CW. The car should now move in the correct direction and draw the normal value of current.

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

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

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

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

> **NOTE:** If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI 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 board and adjust the ILO trimpot for the proper Inspection Leveling Overspeed trip threshold.

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and 59, from step 3.3.1 (j), and reinstall the wire into terminal 59. Turn ON the main disconnect. Make sure that there is 115VAC on terminal 59 with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal 59 when the car top inspection switch is in the INSP position.

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

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 4 and 8, and from terminals 18 and 59 (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC 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 HC-RB4-x board
> - jumper from 2 bus to terminal 36 on the HC-RB4-x board
> - jumper from 2 bus to terminal 38 on the HC-RB4-x board
> - jumper from 2 bus to panel mount terminal EPI (if present)

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

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

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

3.5 INSPECTION OPERATION - MAGNETEK HPV 900 DRIVE

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

3.5.1 DRIVE PARAMETER SETTINGS

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

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

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

3.5.2 VERIFYING THE CRITICAL MAGNETEK HPV 900 DRIVE PARAMETERS

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

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

- **A1- Contract Car Spd** (Elevator contract speed).
- **A1- Contract Mtr Spd** (Motor Speed at elevator contract speed/ Motor Full load RPM)
- **A1- Response = 20** (Sensitivity of the speed regulator)
- **A1- Inertia = 2** (System inertia. This parameter will be adjusted during the adaptive tuning of the drive in Section 4.8.3, Adaptive Tuning)
- **A2- Accel Rate 0 = 3.0**
- **A2- Decel Rate 0 = 3.0**
- **A3- Multistep Ref (Inspection, Level, High Level , Intermediate and High speed)** must be set to the valid speed settings described in Section 4.6.1 (Table 4.4).
- **A5 - (Motor parameters)** Must be verified with the motor name plate and the parameter sheet filled out for the specific controller and shipped with the controller.
- **C2- Log In 1 TB1-1 = Drive Enable**
- **C2- Log In 2 TB1-2 = Run UP**
- **C2- Log In 3 TB1-3 = Run DOWN**
- **C2- Log In 4 TB1-4 = Fault reset**
- **C2- Log In 5 TB1-5 = Step Ref B0** (Inspection speed input)
- **C2- Log In 6 TB1-6 = Step Ref B1** (Level speed input)
- **C2- Log In 7 TB1-7 = Step Ref B2** (High Level speed input)
- **C2- Log In 8 TB1-8 = Step Ref B3** (High speed input)
- **C2- Log In 9 TB1-9 = S Curve Sel 0**
- **C3- Relay Coil 1 = Fault**
- **C3- Relay Coil 2 = Speed Reg Rls.** This parameter is very critical for the operation of the brake (terminal 54 and 55 contact)

3.5.3 MOVING THE CAR ON INSPECTION OPERATION (HPV 900)

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

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

a. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Turn the main power disconnect ON. There should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

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

The RPI relay will pick and, after few seconds, the SAF relay should pick (the LED on the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between terminals 1 and 2 on the HC-RB4-VFAC Main Relay board.

If no problems are found, then briefly place a jumper between terminals 2 and 20 on the HC-RB4-VFAC board and confirm that the SAF relay turns ON after four seconds. If the SAF relay turns OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

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

c. If required, install a temporary jumper between terminals 4 and 8 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

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

e. The **Inspection Speed** is set by the **A3 - Inspection / Speed Command 1, parameter** in **ft/min**. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Run the car by toggling the UP/DN toggle switch on the HC-RB4-VFAC board in the desired direction using constant pressure. The PM contactor and the BR contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

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

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

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

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

NOTE: If the elevator does not run on Inspection, refer to Section 6.6, Troubleshooting the MagneTek HPV 900 AC Drive.

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

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

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

NOTE: If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI 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 board and adjust the ILO trimpot for the proper Inspection Leveling Overspeed trip threshold.

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

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and 59, from step 3.3.1 (j), and reinstall the wire into terminal 59. Turn ON. the main disconnect. Make sure that there is 115VAC on terminal 59 with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal 59 when the car top inspection switch is in the INSP position.

j. Stop the car so that the car top is accessible from the top hall door. **Remove jumpers from the safety circuit. Run the car from the car top Inspection station. Verify that**

the SAF relay drops out and the car stops when the Car Top Emergency Stop Switch is released. Also, by opening the Emergency Stop Switch while the car is moving up or down, verify that the brake stops and holds the car.

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 4 and 8, and from terminals 18 and 59 (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the 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 HC-RB4-VFAC 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 HC-RB4-x board
> - jumper from 2 bus to terminal 36 on the HC-RB4-x board
> - jumper from 2 bus to terminal 38 on the HC-RB4-x board
> - jumper from 2 bus to panel mount terminal EPI (if present)

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

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

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

3.6 INSPECTION OPERATION - TORQMAX F4 DRIVE

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

3.6.1 DRIVE PARAMETER SETTINGS

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

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

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

3.6.2 VERIFYING THE CRITICAL TORQMAX F4 DRIVE PARAMETERS

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

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

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

3.6.3 MOVING THE CAR ON INSPECTION OPERATION (TORQMAX F4)

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

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

a. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Turn ON the main power disconnect. Under normal conditions there should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

The RPI relay will pick and, after a few seconds, the SAF relay should pick (the LED on the relay will be lit). On the HC-ACI board, relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between terminals 1 and 2 on the HC-RB4-VFAC main relay board.

If no problems are found, then briefly place a jumper between terminals 2 and 20 on the HC-RB4-VFAC board and confirm that the SAF relay turns ON after four seconds. If the SAF relay turns OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is normal and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

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

c. If required, install a temporary jumper between terminals 4 and 8 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

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

e. The **Inspection Speed** is set by drive parameter **LF.43.** Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Run the car by toggling the UP/DN toggle switch on the HC-RB4-VFAC board in the desired direction using constant pressure. The PM and BR contactors should pick and the car should move.

If the car doesn't move, select drive parameter LF.86. The value of LF.86 changes from zero (0) to four (4) when direction is picked on Inspection. If the value remains zero (0), the drive is not receiving the Inspection speed command from the controller. Refer to Section 6.7 for troubleshooting information.

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

- **Open loop applications** - If the car moves in the opposite direction, interchange two of the motor leads.
- **Flux vector applications** - Display the MOTOR CURRENT on the drive keypad by selecting parameter ru.9. Run the car on Inspection and check for one of the following conditions:

  1. If the car moves in the correct direction and the drive draws normal current (30% to 40% of motor FLA) proceed to step g.
  2. If the car oscillates at zero speed, moves at slow speed, or trips the **E.ENC fault** on the drive then set **LF.18 = ON or OFF** (change from previous value). This parameter will swap the encoder channels internally in the drive.

It is not recommended to change the external encoder connections as the drive has the capability of changing them through software.

3. If the motor draws normal current but the car moves in the opposite direction, turn OFF the power and wait until there is no voltage present on the DC bus. Then interchange two of the motor leads.

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

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

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

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

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

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

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

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

> **NOTE:** If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI 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 board and adjust the ILO trimpot for the proper Inspection Leveling Overspeed trip threshold.

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

j. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and 59, from step 3.3.1 (j), and reinstall the wire into terminal 59. Turn ON the main disconnect. Make sure that there is 115VAC on terminal 59 with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal 59 when the car top inspection switch is in the INSP position.

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

l. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 4 and 8, and from terminals 18 and 59 (if present).** Correct any problem with the door locks and the door closed contacts.

m. Temporarily take the car off of Inspection operation. If the 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 HC-RB4-VFAC 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 HC-RB4-x board
> - jumper from 2 bus to terminal 36 on the HC-RB4-x board
> - jumper from 2 bus to terminal 38 on the HC-RB4-x board
> - jumper from 2 bus to panel mount terminal EPI (if present)

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

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

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

3.7 INSPECTION OPERATION - YASKAWA F7 DRIVE

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

3.7.1 DRIVE PARAMETER SETTINGS

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

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

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

3.7.2 VERIFYING THE CRITICAL YASKAWA F7 DRIVE PARAMETERS

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

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

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

TABLE 3.3 Critical Yaskawa F7 Drive Parameters

CRITICAL YASKAWA F7 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
A1-01	Access Level	Parameter access level 0: Operation Only 1: User Level 2: Advanced Level	-	0 - 2	2	2
A1-02	Control Method	Control Method - motor 1 0: V/F Control without PG 1: V/F Control with PG 2: Open Loop Vector 3: Flux Vector (closed loop)	-	0 - 3	0	0 = V/F Control - Open loop 3 = Flux Vector
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
C1-01	Accel Rate 1	Acceleration Rate 1	f/s^2	0.01 - 8.00	3.00	3.00
C1-02	Decel Rate 1	Deceleration Rate 1	f/s^2	0.01 - 8.00	3.00	3.00
C1-03	Accel Rate 2	Acceleration Rate 2	f/s^2	0.01 - 8.00	3.00	3.00
C1-04	Decel Rate 2	Deceleration Rate 2	f/s^2	0.01 - 8.00	6.00	6.00
C1-07	Accel Rate 4	Acceleration Rate 4	f/s^2	0.01 - 8.00	3.00	3.00
C1-08	Decel Rate 4	Deceleration Rate 4	f/s^2	0.01 - 8.00	3.00	3.00
✿ The maximum FPM is determined by O1-03. Set this parameter before setting D1-02 thru D1-17.						
D1-02	High	High Speed (must be > D1-07)	FPM	0.0 - ✿	50	✶
D1-03	High Level	High Level (must be > D1-05 and < D1-07)	FPM	0.0 - 30.0	13.0	✶
D1-05	Level	Level Speed (must be < D1-03)	FPM	0.0 - 15.0	2.5	✶
D1-07	Combination	Intermediate (must be > D1-03 and < D1-02)	FPM	0.0 - ✿	42	✶
D1-17	Jog Reference	Inspection speed)	FPM	0.0 - ✿	42	✶
✶ See Table 4.8 for suggested initial settings for these parameters.						
E1-01	Input volt	Drive Input Voltage	V ✶✶	180 - 460		Drive input voltage.
E1-03	V/F Selection	Pattern Selection (N/A to flux vector)	-	0 - F	F	F
E1-04	Max Frequency	Maximum Output Frequency	Hz	40.0 - 80.0	60.0	60.0
E1-05	Max Voltage	Motor Output Voltage	V	0.0 - 460.0		Motor name plate voltage
E1-06	Base Frequency	Maximum Voltage Output Freq.	Hz	40/50/60 (Motor rated)	60.0	60.0
E1-07	Mid Frequency A	Mid Output Frequency A (N/A to flux vector)	Hz	0.0 - 72.0	3.0	3.0
E1-08	Mid Voltage A	Mid Output Voltage A (N/A to flux vector)	V	0.0 - 255.0	16.1 ✶✶	16.0-25.0 ✶✶
E1-09	Min Frequency	Minimum Output Frequency (N/A to flux vector)	Hz	0.0 - 72.0	0.5	0.5
E1-10	Min Voltage	Minimum Output Voltage (N/A to flux vector)	V	0.0 - 255.0	10 ✶✶	8.0-12.0 ✶✶
✶✶ These values should be doubled for the 460 volt application.						

TABLE 3.3 Critical Yaskawa F7 Drive Parameters

CRITICAL YASKAWA F7 DRIVE PARAMETERS						
Parameter Number	**Digital Operator Display**	**Parameter Description**	**Units**	**Setting Range**	**MCE drive default**	**Field/MCE settings**
E2-01	Motor Rated FLA	Motor Full Load Amps	A	0.00 - 1500.0	Motor dependent	Motor FLA
E2-02	Motor Rated Slip	Motor Rated Slip Frequency	Hz	0.0 - 15.0	Motor dependent	
E2-03	No-load Current	Motor No Load Current	A	0 - 150	30% -40% of Motor FLA	
H1-01	Terminal S3 Sel	Multi-Function Input Terminal S3 Function Selection *9 = External BaseBlock N.C.*	-	0-82	9	9
H1-02	Terminal S4 Sel	Multi-Function Input Terminal S4 Function Selection *14 = Fault Reset*	-	0 - 82	14	14
H1-03	Terminal S5 Sel	Multi-Function Input Terminal S5 Function Selection *80 = Mult-step Ref 1F*	-	0 - 82	80	80
H1-04	Terminal S6 Sel	Multi-Function Input Terminal S6 Function Selection *81 = Mult-step Ref 2F*	-	0 - 82	81	81
H1-05	Terminal S7 Sel	Multi-Function Input Terminal S7 Function Selection *82 = Mult-step Ref 3F*	-	0 - 82	82	82
H1-06	Terminal S8 Sel	Multi-Function Input Terminal S8 Function Selection *6 = Jog Ref (Inspection speed)*	-	0 - 82	6	6
H2-01	Terminal M1-M2 Sel	Terminal M1-M2 Function Selection *40 = During Run 3*	-	0 - 40	40	40
H2-02	Terminal M3-M4 Sel	Terminal M1-M2 Function Selection *4 = Frequency Detection 1*	-	0 - 40	4	4
O1-03	Display Scaling	Digital Operator Display Selection Sets the units of the Frequency References (D1-01 to D1-17), the Frequency Reference Monitors (U1-01, U1-02, U1-05), and the Modbus communication frequency reference. Units are fixed at FPM (ft/Min) with a range of 10.0 to 999.9 FPM at max frequency. 10100 to 19999: User units e.g. (10100 = 10.0 FPM) (19999 = 999.9 FPM)	-	10110 - 19999	11000 (= 100 FPM)	Set to contract speed

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

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

3.7.3 MOVING THE CAR ON INSPECTION OPERATION (YASKAWA F7)

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

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

a. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Turn ON the main power disconnect. The RPI relay will pick and after few seconds the SAF relay should pick (the LED on the relay will be lit). On the HC-ACI board relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between terminals 1 and 2 on the HC-RB4-VFAC Main Relay board.

   If no problems are found, then briefly place a jumper between terminals 2 and 20 on the HC-RB4-VFAC board and confirm that the SAF relay turns ON after four seconds. If the SAF relay turns OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is in normal condition and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

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

c. If required, install a temporary jumper between terminals 4 and 8 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

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

e. The **inspection speed** is set by drive parameter **D1-17 in FPM. For flux vector applications, set D1-17 initial setting to slowly move the car & to prevent arcing on the contactors during initial start up.** Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Verify that the drive is in OPERATION mode. Run the car in the desired direction by toggling the UP/DN toggle switch on the HC-RB4-VFAC board. The PM contactor and the BR contactor should pick and the car should move. Make sure that the car moves in the appropriate direction and the brake works properly.

If the car moves in the opposite direction:

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

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

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

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

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

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

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

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

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

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

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

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

> **NOTE:** If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI 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 board and adjust the ILO trimpot for the proper Inspection Leveling Overspeed trip threshold.

i. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and 59, from step 3.3.1 (j), and reinstall the wire into terminal 59. Turn ON the main disconnect. Make sure that there is 115VAC on terminal 59 with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal 59 when the car top inspection switch is in the INSP position.

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

k. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 4 and 8, and from terminals 18 and 59 (if present).** Correct any problem with the door locks and the door closed contacts.

l. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC 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 HC-RB4-x board
> - jumper from 2 bus to terminal 36 on the HC-RB4-x board
> - jumper from 2 bus to terminal 38 on the HC-RB4-x board
> - jumper from 2 bus to panel mount terminal EPI (if present)

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

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

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

3.8 INSPECTION OPERATION - TORQMAX F5 DRIVE

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

3.8.1 DRIVE PARAMETER SETTINGS

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

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

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

3.8.2 VERIFYING THE CRITICAL TORQMAX F5 DRIVE PARAMETERS

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

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

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

3.8.3 MOVING THE CAR ON INSPECTION OPERATION (TORQMAX F5)

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

Once all the steps described in Sections 3.3.1, 3.8.1 and 3.8.2 are accomplished then proceed with the following.

a. Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Turn ON the main power disconnect. Under normal conditions there should be no fault message on the drive key pad display. If there is a drive fault message, refer to the fault section in the AC drive manual. The drive key pad should be adjusted to display the speed.

   The RPI relay will pick and, after a few seconds, the SAF relay should pick (the LED on the relay will be lit). On the HC-ACI board, relays RDY and CNP must also be picked. If none of the relays have been picked, inspect fuse F4 on the controller's back plate. Verify that there is 120 VAC between terminals 1 and 2 on the HC-RB4-VFAC main relay board.

   If no problems are found, then briefly place a jumper between terminals 2 and 20 on the HC-RB4-VFAC board and confirm that the SAF relay turns ON after four seconds. If the SAF relay turns OFF after removing the jumper, there is a problem with the safety string. Note that the RDY relay will turn ON as long as the VFAC drive is normal and there is +/-15DVC present on the HC-ACI board. The N.C. contact of the fault tripping output on the drive is used to pick the RDY relay. This contact opens if there is a fault in the VFAC drive unit. The fault can be reset by pressing the drive reset button on the HC-ACI board or by pressing the drive reset button on the drive keypad.

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

c. If required, install a temporary jumper between terminals 4 and 8 to ***bypass the door locks***. If the car is on a final limit switch, place a jumper between terminals 2 and 16 ***to bypass the main safety string. Remember to remove these jumpers as soon as possible***.

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

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

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

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

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

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

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

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

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

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

Verify proper car movement and brake operation:

a. The **Inspection Speed** is set by drive parameter **LF.43.** Verify that the INSPECTION switch on the HC-RB4-VFAC board is in the ON position. Run the car by toggling the UP/DN toggle switch on the HC-RB4-VFAC board in the desired direction using constant pressure. The PM and BR contactors should pick and the car should move.

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

   - **Open loop applications** - If the car moves in the opposite direction, interchange two of the motor leads.

   - **Flux vector applications** - Display the MOTOR CURRENT on the drive keypad by selecting parameter LF.93. Run the car on Inspection and check for one of the following conditions:

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

     2. If the car oscillates at zero speed, moves at slow speed, or trips the **E.ENC fault** on the drive, change parameter **LF.28** setting (see parameters quick reference in Appendix L). This parameter will swap the encoder channels internally in the drive. It is not recommended to change the external encoder connections as the drive has the capability of changing them through software.

3. If the motor draws normal current but the car moves in the opposite direction, turn OFF the power and wait until there is no voltage present on the DC bus. Then interchange two of the motor leads.

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

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

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

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

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

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

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

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

> **NOTE:** If an ILO (Inspection Leveling Overspeed) problem is detected by the HC-ACI 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 board and adjust the ILO trimpot for the proper Inspection Leveling Overspeed trip threshold.

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

f. To make sure that the Car Top Inspection switch is working properly, turn OFF the main disconnect, remove the jumper between terminals 18 and 59, from step 3.3.1 (j), and reinstall the wire into terminal 59. Turn ON the main disconnect. Make sure that there is 115VAC on terminal 59 with respect to terminal 1 when the car top inspection switch is in the NORMAL position. There should be no power on terminal 59 when the car top inspection switch is in the INSP position.

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

h. Run the car through the hoist way, checking clearance and the door locks. When all of the doors are closed, **remove the jumpers from terminals 4 and 8, and from terminals 18 and 59 (if present).** Correct any problem with the door locks and the door closed contacts.

i. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC 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 HC-RB4-x board
- jumper from 2 bus to terminal 36 on the HC-RB4-x board
- jumper from 2 bus to terminal 38 on the HC-RB4-x board
- jumper from 2 bus to panel mount terminal EPI (if present)

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

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

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

SECTION 4
FINAL ADJUSTMENT

4.0 GENERAL INFORMATION

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

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

4.1 PREPARING TO RUN ON HIGH SPEED AND AUTOMATIC OPERATION

Move the car to the bottom landing on Inspection operation and turn OFF the main disconnect. 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, 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 car top is still accessible after closing all of the doors. Turn ON the AC power to the elevator.

4.1.2 HC-ACI AND HC-ACIF BOARD ADJUSTMENTS - In the process of preparing for running the elevator on high speed and automatic operation the following trimpots may require adjustment.

- **SPD** trimpot (Speed Pick Delay) - This trimpot was adjusted in Section 3 on Inspection operation to coordinate 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.

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

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

- **ILO** trimpot (Inspection Leveling Overspeed) - This trimpot sets the Inspection Leveling Overspeed trip threshold. Instructions for adjustment are provided later in this section.

- **ETS** trimpot (Emergency Terminal Limit)- This trimpot is located on the HC-ACIF board which is only used for vector applications with speeds above 200 fpm. Instructions for adjusting this trimpot are provided later in this section.

4.1.3 DIAGNOSTIC MESSAGES AND INPUT/OUTPUT SIGNALS

To speed up the 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 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) 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 string is open and the system is also on Fire Service, the computer will first show that the safety string 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 Car Top 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) cam-operated switch has opened (dropping power to terminal 13) 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 Car Top Inspection operation and then is returned to Automatic operation, and 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 LU and LD 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 LU and LD 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, you will be asked to register car calls periodically. 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 put in, 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 Call board. Later versions of these boards may have plug-in zener diodes. These parts are designed to be field replaceable and spares are provided in unused positions on the Call board, or are available from MCE. DO NOT JUMPER THESE PLUG-IN COMPONENTS AS IT MAY DESTROY THE BOARD OR OTHER CONTROLLER COMPONENTS. If any of these components should blow, FIND OUT WHY instead of constantly replacing them, as the constant faults can eventually damage the board.

4.1.6 TEST MODE OPERATION

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

The car is put into TEST mode by placing the TEST/NORMAL switch on the HC-RB4-VFAC (Main 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 dead at the same time when the doors are closed and locked and the safety circuit is good.

4.2 EXPLANATION OF G5 / GPD515 DRIVE PARAMETERS AND S CURVES

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

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

4.2.1 SETTING THE SPEED LEVELS

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

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

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

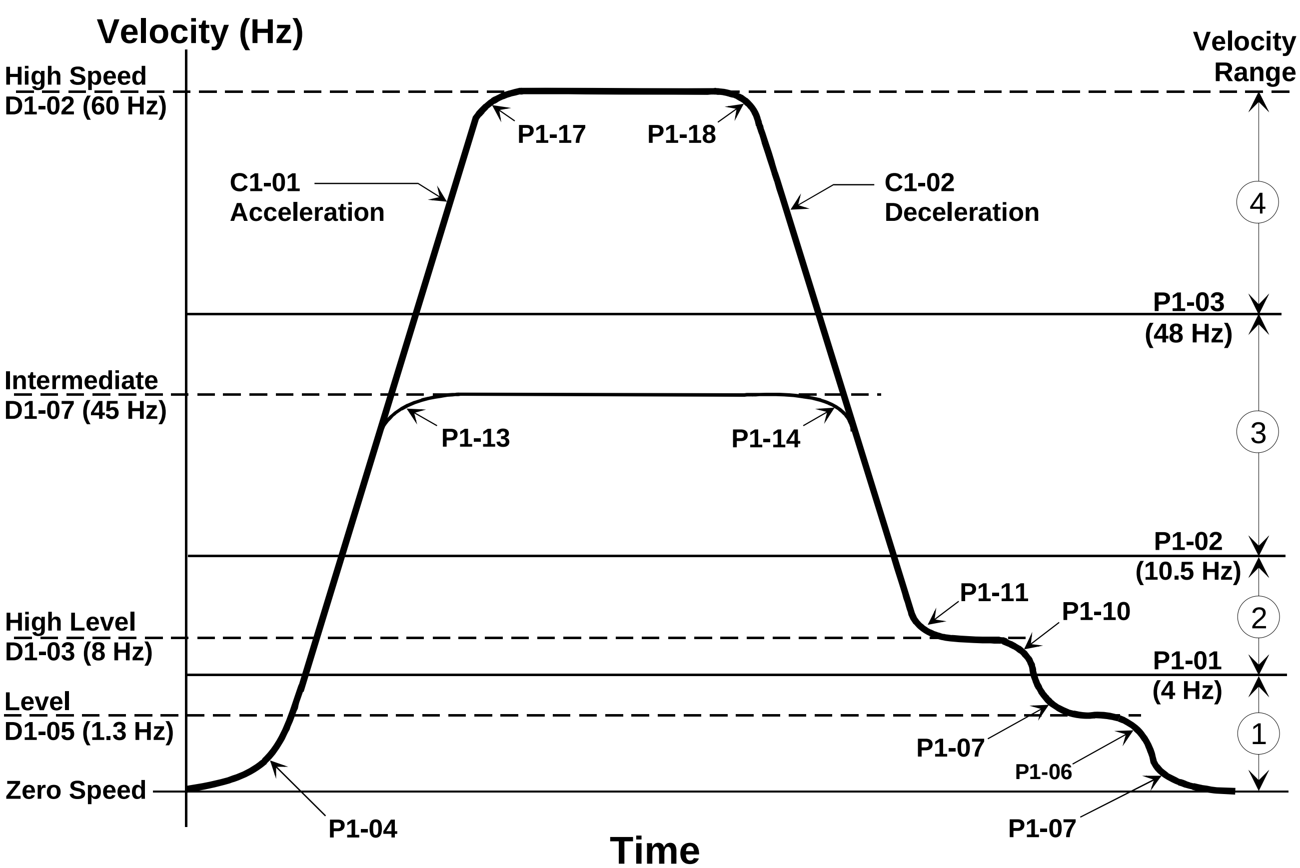
CAUTION: The drive will trip on **OPE40** or **OPE41 fault** if the following conditions are not met while setting the D1-D9 parameters:

D1-02 > D1-07 > D1-03 > D1-05 > 0.0 but less than the maximum specified value.

TABLE 4.1 G5 / GPD515 Drive Speed Levels

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

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

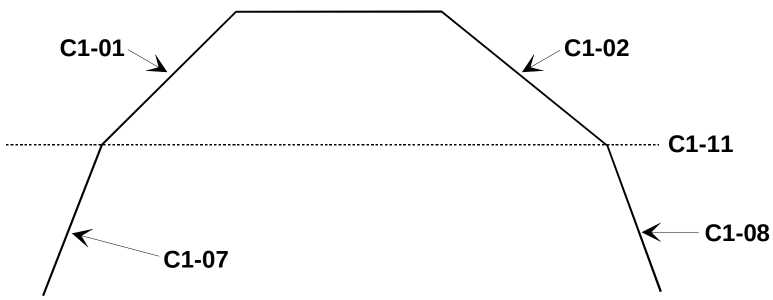


4.2.2 ADJUSTING ACCELERATION AND DECELERATION RATE

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

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

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

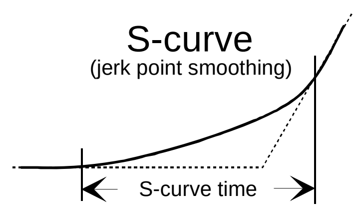


Acceleration : C1-01 = 1 to 3 seconds. Set initially to1.7 seconds.
C1-07 = C1–01

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

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

4.2.3 ADJUSTING THE S-CURVES (G5 / GPD515)



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

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

TABLE 4.2 G5 / GPD515 S-Curve Selection Table

Table for Selection of S-Curves					
Range	**Velocity (Hz)**	**Start Accel**	**End Accel**	**Start Decel**	**End Decel**
①	Less than P1-01	✶ **P1-04**	P1-05	P1-06	✶ **P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	✶ **P1-10**	✶ **P1-11**
③	Between P1-02 and P1-03	P1-12	✶ **P1-13**	✶ **P1-14**	✶ **P1-15**
④	Greater than P1-03	P1-16	✶ **P1-17**	✶ **P1-18**	P1-19
✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.					

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

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

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

TABLE 4.3 G5 / GPD515 S-Curve Parameters

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

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
P1-15	S Crv Dec End 3	S Curve #3 at the End of Deceleration	Sec	0.01 - 2.5	0.9	B	0.9
P1-16	S Crv Acc Start 4	S Curve #4 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-17	S Crv Acc End 4	S Curve #4 at the End of Acceleration	Sec	0.01 - 2.5	1.2	B	
P1-18	S Crv Dec Start 4	S Curve #4 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	
P1-19	S Crv Dec End 4	S Curve #4 at the End of Deceleration	Sec	0.01 -2.5	0.2	B	0.2

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

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

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

4.3 FINAL ADJUSTMENTS (G5 / GPD515)

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

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

a. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

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

4.3.2 SWITCHING TO AUTOMATIC OPERATION (G5 / GPD515)

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

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (D1-05) on the G5 / GPD515 AC Drive to get the car to move.
- If relays L and LD are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.

- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.3.5 LOAD TESTING (G5 / GPD515)

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

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

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

   3. **For Open loop applications** - Adjust parameter C4-01(Torque Compensation Gain) between 1.0 - 2.0. The maximum setting for this parameter is 2.5. Display the output current on the drive key pad in the Operation mode by pressing the up arrow twice. The drive keypad will display OUTPUT CURRENT U1-03= 0.0A. The G5 drive can provide 150% of its full load rated current for 1 minute. Run the car and monitor the current on the drive keypad. **If the motor is stalling but does not trip on OC faults, and if the value of the output current is more than or close to the motor rated current but less than the maximum drive output current, check the motor winding configuration.** Most elevator motors are connected in Y configuration. But sometimes the DELTA

configuration is used in order to pick the full load. The motor manufacturer's recommendations must be taken into consideration. If the field survey data was inaccurate, the Drive Unit may be undersized in relation to the motor. Call MCE Technical Support so that the job data can be reviewed.

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

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

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

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

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

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

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

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

4.4 FINAL ELEVATOR INSPECTION PROCEDURE (G5 / GPD515)

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

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

4.4.1 INSPECTION LEVELING OVER SPEED TEST (G5 / GPD515)

The HC-ACI board is equipped with an independent low speed monitoring system which can trip and open a fault contact if the car runs faster than a preset speed (150 fpm max.) on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (L) relay is picked or when the Access/Inspection relay (INX) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the HC-ACI board. The circuit looks at pulses coming from the hall effect sensor, sensing the magnets on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the Relay Panel Inspection switch on the HC-RB4-VFAC Main Relay board in the ON position.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and adjust the IN speed (Parameter D1-09) as high as possible to trip the ILO (the maximum value for D1-09 is 40 Hz). The ILO tripping speed should not exceed 140 fpm. If the red ILO light on the HC-ACI board is lit, push the FAULT RESET button and the light should go out.

c. Turn the ILO trimpot fully CCW. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot clockwise until the ILO indicator just turns ON. After stopping, push the FAULT RESET button on the HC-ACI board and then set D1-09 to a lower value. Run the car on Inspection and increase the inspection speed by increasing parameter D1-09 to show that this low speed safety monitor circuit will trip at no higher than 140 fpm (or no higher than the maximum available inspection speed if it is less than 140 fpm). The circuit should trip when D1-09 = 14Hz or above. Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the IN speed back to the value recorded in Step (b).

4.4.2 TERMINAL SLOWDOWN LIMIT SWITCHES (G5 / GPD515)

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

a. Place the TEST/NORMAL switch on the HC-RB4-VFAC board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the HC-RB4-VFAC board.

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

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the HC-RB4-VFAC board and return theTEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.4.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (G5 / GPD515)

All jobs under the requirements of ANSI A17.1 SECTION 209.4.B (ASME A 17.1b -1992 ADDENDA) must have a means to insure that the car speed is below 95% of the contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

Normally the jobs which come under the above requirements will have the HC-ACIF or HC-ETS board installed in the controller. Both boards have the ETS monitor circuit. This circuit receives the signal from the hall effect sensor and the magnets 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 all the wiring from the speed sensor to the HC-ACIF board is complete.

b. Turn the ETS trimpot on the HC-ACIF/ HC-ETS board fully CW.

c. On a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the H speed (Drive parameter D1-02).

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminal UET. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and trips the FLT2/FLT relay on the HC-ACIF/ HC-ETS board and the car stops.

e. Press the ETS reset push button on the HC-ACIF/ HC-ETS board to drop the FLT2/FLT relay. The ETS indicator should turn OFF and the car should be able to run.

f. Repeat (d) and (e) in the down direction with the wire from the DET terminal removed. The car should stop when it reaches 95% of contract speed. Reconnect the wires removed from controller terminals UET and DET when the test is complete.

4.4.4 CONTRACT SPEED BUFFER TEST (G5 / GPD515):

4.4.4.1. 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 HC-RB4-VFAC 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 HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than

150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Up Limit***, if provided, by placing a jumper between terminals 2 and UET on the HC-ACIF board.

d. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 8 and 10 and terminals 10 and 11 on the HC-RB4-VFAC board.

e. Register a car call for the top terminal landing from the controller . ***The counter weight will strike the buffer.***

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

g. Remove the jumpers between terminals 8 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the HC-RB4-VFAC board. Reseat the FLT relay.

4.4.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Down Limit***, if provided, by placing a jumper between terminals 2 and DET on the HC-ACIF board.

d. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 8 and 12 and terminals 12 and 13 on the HC-RB4-VFAC board.

e. 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.***

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

g. Remove the jumpers between terminals 8 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the HC-RB4-VFAC board. ***Remove all of the jumpers installed in this section.*** Reseat the FLT relay.

4.4.5 GOVERNOR AND CAR SAFETY TESTS (G5 / GPD515)

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

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

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

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

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

c. Turn the power OFF and pull the coil of the FLT relay from its socket as described in Section 4.4.4.1 (a). ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

d. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets.

e. ***Bypass the Governor OVER SPEED switch*** by placing a jumper between terminals 2 and 15 on the HC-RB4-VFAC board.

f. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 and 17 on the HC-RB4-VFAC board to ***bypass the safety plank (SOS) switch***.

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

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

i. Put the car on Inspection.

j. Change parameters E1-04 = 60Hz and D1-02 = 60 Hz for motors designed for 60Hz (the original values of the parameters).

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

l. 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.

m. ***Remove the jumper from terminals 2 and 15 which bypasses the governor overspeed switch.***

n. ***Remove the jumper from terminals 16 and 17 which bypasses the safety plank (SOS) switch).***

n. Properly reinstall the relays FLT on the HC-ACI and AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets.

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

4.4.6 PHASE LOSS DETECTION TESTS (G5 / GPD515)

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

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

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

The adjustments and tests are complete. Now is the time to fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

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

* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* Wire connected to panel mount terminal DCL
* Wire connected to terminal 47 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 36 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 38 on the HC-RB4-VFAC board
* No jumper from 2 bus to panel mount terminal EPI (if present)
* No jumpers between terminals 2 and UET or DET.
* No jumper between terminals 2 and 15 (HC-RB4-VFAC).
* No jumper between terminals 4 and 8 (HC-RB4-VFAC).
* No jumper between terminals 8 and 10 or 12 (HC-RB4-VFAC).
* No jumper between terminals 10 and 11 (HC-RB4-VFAC).
* No jumper between terminals 12 and 13 (HC-RB4-VFAC).
* No jumper between terminals 16 and 17 (HC-RB4-VFAC).
* Drive parameter D1-02 and E1-04 must be set to original value for High speed.

4.5 EXPLANATION OF HPV 900 DRIVE PARAMETERS AND S CURVES

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

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

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

4.5.1 SETTING THE SPEED LEVELS

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

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

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

TABLE 4.4 HPV900 Speed Levels

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

4.5.2 ADJUSTING ACCELERATION AND DECELERATION RATES

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

4.5.3 ADJUSTING THE JERK PARAMETERS

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

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

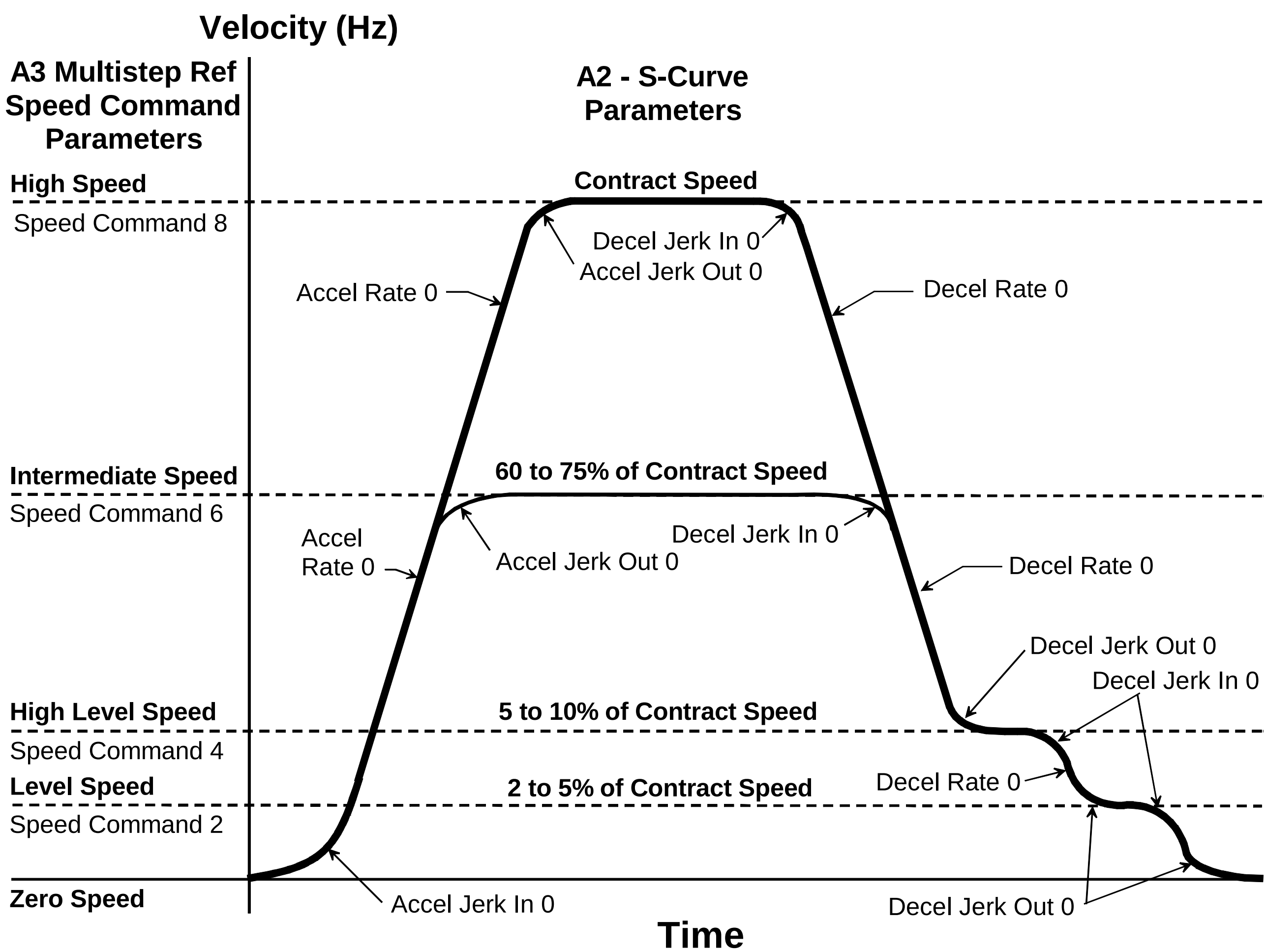


TABLE 4.5 HPV 900 Velocity Curve Parameters

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

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

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

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

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

4.6 FINAL ADJUSTMENTS (HPV 900)

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

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

a. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-

VFAC board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

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

4.6.2 SWITCHING TO AUTOMATIC OPERATION (HPV 900)

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

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

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

4.6.3 BRAKE ADJUSTMENT FOR 125% LOAD (HPV 900)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.6.5 ADAPTIVE TUNING (HPV 900)

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

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

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

4.6.6 LOAD TESTING (HPV 900)

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

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

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

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

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

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

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

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

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

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

4.7 FINAL ELEVATOR INSPECTION PROCEDURE (HPV 900)

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

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

4.7.1 INSPECTION LEVELING OVER SPEED TEST (HPV 900)

The HC-ACI board is equipped with an independent low speed monitoring system which can trip and open a fault contact if the car runs faster than a preset speed (150 fpm max.) on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (L) relay is picked or when the Access/Inspection relay (INX) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the HC-ACI board. The circuit looks at pulses coming from the hall effect sensor, sensing the magnets on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the Relay Panel Inspection switch on the HC-RB4-VFAC Main Relay board in the ON position.

b. Run the car on Inspection (up or down) and record the actual car speed measured with a hand-held tachometer ______________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and increase the Inspection speed (A3 - Speed Command 1) parameter in increments of 2 feet per minute to trip the ILO. The ILO tripping speed should not exceed 140 fpm. If the red ILO light on the HC-ACI board is lit, push the FAULT RESET button and the light should go out.

c. Turn the ILO trimpot fully CCW. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot clockwise until the ILO indicator just turns ON. After stopping, push the FAULT RESET button on the HC-ACI board and then set the A3 - Speed Command 1 parameter to a lower value. Run the car on Inspection and increase the inspection speed by increasing the A3 - Speed Command 1 parameter to show that this low speed safety monitor circuit will trip at no higher than 140 fpm (or no higher than the maximum available inspection speed if it is less than 140 fpm). The circuit should trip when the A3 - Speed Command 1 parameter equals 23% of Contract Speed or above. Check this in *both* directions. The over speed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the Inspection speed (A3 - Speed Command 1) parameter back to the value recorded in 4.7.1 (b).

4.7.2 TERMINAL SLOWDOWN LIMIT SWITCHES (HPV 900)

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

a. Place the TEST/NORMAL switch on the HC-RB4-VFAC board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the HC-RB4-VFAC board.

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

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the HC-RB4-VFAC board and return theTEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.7.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (HPV 900)

All jobs under the requirements of ANSI A17.1 SECTION 209.4.B (ASME A 17.1b -1992 ADDENDA) must have a means to insure that the car speed is below 95% of the contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

Normally the jobs which come under the above requirements will have the HC-ACIF or HC-ETS board installed in the controller. Both boards have the ETS monitor circuit. This circuit receives the signal from the hall effect sensor and the magnets installed on the motor shaft or brake drum as described in Section 2.3.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that all the wiring from the speed sensor to the HC-ACIF board is complete.

b. Turn the ETS trimpot on the HC-ACIF/ HC-ETS board fully CW.

c. On a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the High speed (A3 - Speed Command 8) parameter.

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminal UET. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and trips the FLT2/FLT relay on the HC-ACIF/ HC-ETS board and the car stops.

e. Press the ETS reset push button on the HC-ACIF/ HC-ETS board to drop the FLT2/FLT relay. The ETS indicator should turn OFF and the car should be able to run.

f. Repeat (d) and (e) in the down direction with the wire from the DET terminal removed. The car should stop when it reaches 95% of contract speed. Reconnect the wires removed from controller terminals UET and DET when the test is complete.

4.7.4 CONTRACT SPEED BUFFER TEST (HPV 900):

4.7.4.1. 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 HC-RB4-VFAC 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 HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Up Limit***, if provided, by placing a jumper between terminals 2 and UET on the HC-ACIF board.

d. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 8 and 10 and terminals 10 and 11 on the HC-RB4-VFAC board.

e. Register a car call for the top terminal landing from the controller. ***The counter weight will strike the buffer.***

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

g. Remove the jumpers between terminals 8 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the HC-RB4-VFAC board. Reseat the FLT relay.

4.7.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Down Limit***, if provided, by placing a jumper between terminals 2 and DET on the HC-ACIF board.

d. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 8 and 12 and terminals 12 and 13 on the HC-RB4-VFAC board.

e. 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.***

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

g. Remove the jumpers between terminals 8 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the HC-RB4-VFAC board. ***Remove all of the jumpers installed in this section.*** Reseat the FLT relay.

4.7.5 GOVERNOR AND CAR SAFETY TESTS (HPV 900)

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

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

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

b. Pull the coil of the FLT relay from its socket as described in Section 4.7.4.1 (a). ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets.

d. ***Bypass the Governor OVER SPEED switch*** by placing a jumper between terminals 2 and 15 on the HC-RB4-VFAC board.

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 and 17 on the HC-RB4-VFAC board to ***bypass the safety plank (SOS) switch***.

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

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

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

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

j. Put the car on Inspection.

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

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

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

n. ***Remove the jumper from terminals 2 and 15 which bypasses the governor overspeed switch.***

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

p. Properly reinstall relay FLT on the HC-ACI and relays AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets.

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

4.7.6 PHASE LOSS DETECTION TESTS (HPV 900)

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

The adjustments and tests are complete. Now is the time to fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

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

* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* Wire connected to panel mount terminal DCL
* Wire connected to terminal 47 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 36 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 38 on the HC-RB4-VFAC board
* No jumper from 2 bus to panel mount terminal EPI (if present)
* No jumpers between terminals 2 and UET or DET.
* No jumper between terminals 2 and 15 (HC-RB4-VFAC).
* No jumper between terminals 4 and 8 (HC-RB4-VFAC).
* No jumper between terminals 8 and 10 or 12 (HC-RB4-VFAC).
* No jumper between terminals 10 and 11 (HC-RB4-VFAC).
* No jumper between terminals 12 and 13 (HC-RB4-VFAC).
* No jumper between terminals 16 and 17 (HC-RB4-VFAC).

4.8 EXPLANATION OF TORQMAX F4 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

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

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

4.8.1 SETTING THE SPEED LEVELS

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

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

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

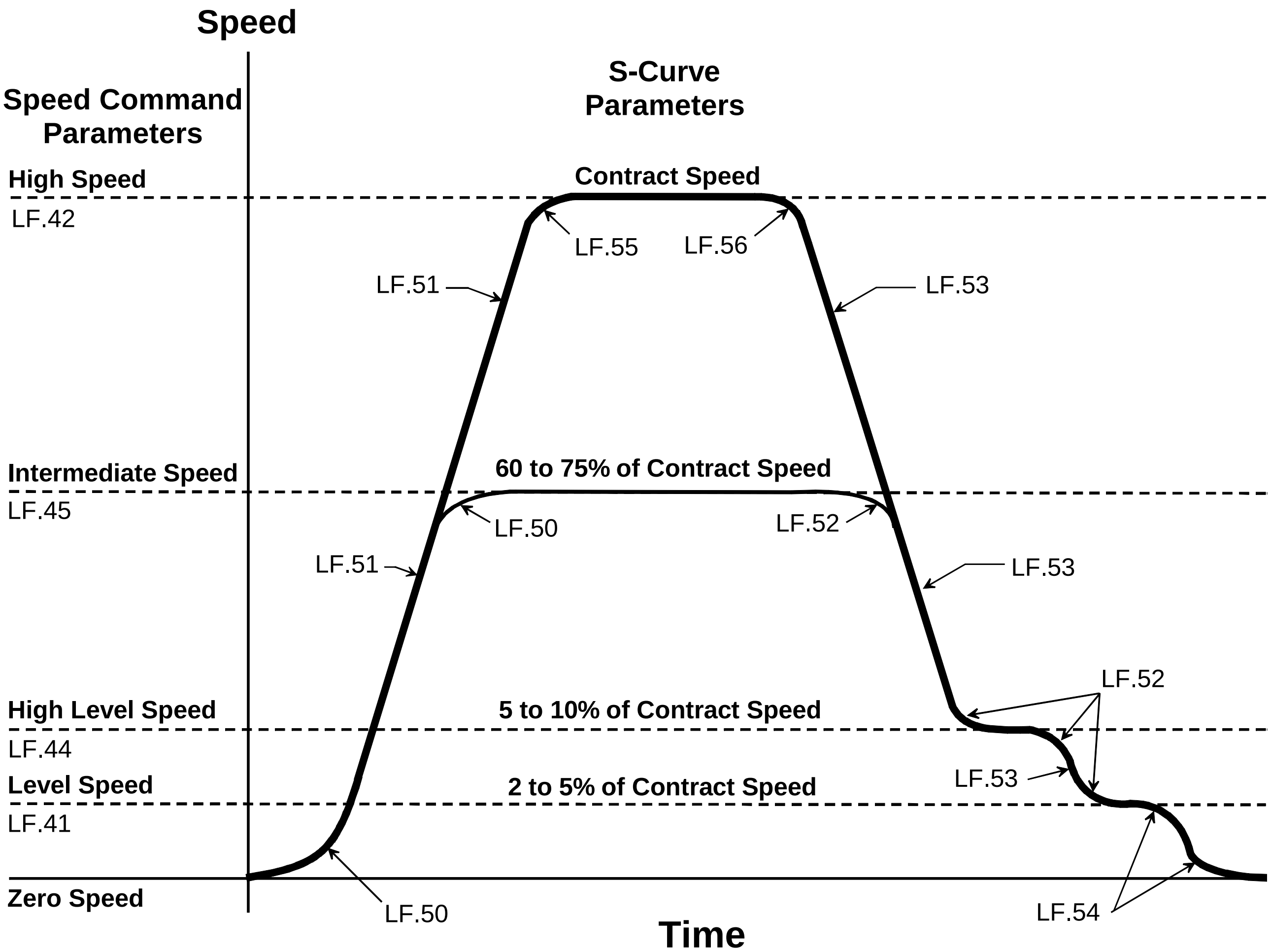
TABLE 4.6 TORQMAX F4 Drive Speed Levels

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

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

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

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



4.8.2 ADJUSTING ACCELERATION AND DECELERATION RATES

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

4.8.3 ADJUSTING THE JERK PARAMETERS

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

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

TABLE 4.7 TORQMAX F4 S Curve Parameters

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

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

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

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

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

4.9 FINAL ADJUSTMENTS (TORQMAX F4)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

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

a. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

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

4.9.2 SWITCHING TO AUTOMATIC OPERATION (TORQMAX F4)

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

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (LF.41) on the TORQMAX F4 Drive to get the car to move.

- If relays L and LD are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.

- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

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

4.9.3 BRAKE ADJUSTMENT FOR 125% LOAD (TORQMAX F4)

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

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

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

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

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

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

> **NOTE:** **Drive gain adjustments** - The default values for the gain parameters (LF.31 Speed Prop Gain and LF.32 Speed Integral Gain) may not be sufficient to run the car on High speed. It may be necessary to increase the value of these parameters.

c. At the slowdown distance from the next floor the Position Indicator will step. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed (LF.44) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car should decelerate to Level speed. The Level speed can be adjusted using parameter LF.41 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

d. Turn the Speed Pick Delay (SPD) trimpot fully CCW (fully OFF) and then set it 1/4 turn in the CW direction. The speed pick delay is achieved using the TORQMAX F4 drive parameter LF.70. Adjust LF.70 so that the brake is fully picked just as the motor first moves. The goal is to delay long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

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

This slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate (LF.53) and deceleration jerk rate (LF.52) to stop the car at the floor. Adjust the Acceleration rate parameter (LF.51) until the desired acceleration rate is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

> **NOTE:** To observe the commanded speed and the drive output with an oscilloscope or a chart recorder, monitor drive terminal X2.18 and X2.19 with respect to X2.13. Take all necessary precautions while measuring the voltage signals.

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

f. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal is provided using drive parameter LF.70. Parameter LF.70 must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check parameter LF.70 again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals X2.18 and X2.19 with respect to X2.13. These signals are ±10V and 0-10 V respectively. Terminal X2.18 is assigned to the drive input speed reference and terminal X2.19 is assigned to the drive output frequency.

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

NOTE: During High speed, if the speed change-over can be felt in the car, increase parameter LF.33 in steps of 100. This will help in achieving a smoother transition.

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

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

h. The adjustment is almost complete. The acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but it should not be so high that it substantially exceeds the value of the deceleration rate parameter. Excessive acceleration may cause the AC Drive circuits to saturate and thereby lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the deceleration parameter **LF. 53** and run the car. Continue to decrease the value of **LF.53** until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the **LF.53** parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls then you might have to increase the leveling speed.

4.9.5 LOAD TESTING (TORQMAX F4)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the AC Drive Unit current on its display **ru.9** and check to see if there is an **E.OL or E.OL2** (Overload) error indication as the car accelerates to full speed. If so, it is an indication that the AC drive unit is being pushed close to its limits and may require one or more of the following actions:

1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by decreasing the **LF.51** parameter. The lower the rate of acceleration, the lower the current demand.

2. A more gradual transition from acceleration to high speed may be made by decreasing the **LF.55** (Acceleration Jerk) parameter.

3. Verify that LF.38 = 0 (PWM = 8KHz). The drive gains (parameters **LF.31** and **LF.32**) may need to be increased.

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

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

6. Make a copy of the table in Appendix D, *Quick Reference for TORQMAX F4 Drive Parameters*. Use the digital operator on the Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

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

1. Through the drive keypad display: When the drive is in Operation mode, access parameter **ru.11** (DC bus) voltage or parameter **ru.12** (Peak DC bus) voltage. You can then run the elevator and watch the voltage reading,

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

The 230V drive will trip on E.OP (Over voltage in the DC bus circuit) if the **ru.12** reading is close to 400VDC. The 460V drive will trip on E.OP if the **ru.12** reading is close to 800VDC. If the DC bus voltage reading **(ru.11)** is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.9.6 ELECTRICAL NOISE (TORQMAX F4)

If the motor emits excessive electrical noise at Inspection or Contract speeds, or if the motor draws higher than normal current, perform the following:

a. Verify the actual traction sheave diameter. Enter the measured value in parameter LF.21.

b. Verify the gear reduction ratio, parameter LF.22.

c. Verify the Rated Motor speed, parameter LF.11. This value is the full load motor RPM.

> **NOTE:** The Imperial motors name plate has full load RPM information which should be entered in parameter LF.11.
>
> Full load RPM information may not be available for Reuland motors. The motor name plate lists the Synchronous RPM, i.e. 900, 1200, 1500 or 1800. In flux vector applications Reuland motors have slip between 1.8% and 2.0%. Set LF.11 = Motor Synchronous RPM - (0.018 x Motor Synchronous RPM).
>
> This calculation gives a very reasonable value for LF.11. Its effect can be verified by observing the motor current, parameter ru.09. If ru.09 is normal, compared to the motor FLA, when the car is running at contract speed, the motor slip is correct. If required, LF.11 can be adjusted in small increments (5-10 RPM). However, higher values close to the Synchronous RPM will trip the E.ENC drive fault.

d. Lower the Speed Prop. Gain, LF.31 (do not set below 1200). Refer to section 3.6.3.g of this manual for more detailed information.

4.10 FINAL ELEVATOR INSPECTION PROCEDURE (TORQMAX F4)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

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

4.10.1 INSPECTION LEVELING OVER SPEED TEST (TORQMAX F4)

The HC-ACI board is equipped with an independent low speed monitoring system which can trip and open a fault contact if the car runs faster than a preset speed (150 fpm max.) on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (L) relay is picked or when the Access/Inspection relay (INX) is dropped. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the HC-ACI board. The circuit looks at pulses coming from the hall effect sensor, sensing the magnets on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the Relay Panel Inspection switch on the HC-RB4-VFAC Main Relay board in the ON position.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and increase the Inspection speed parameter **LF.43** in increments of 2 feet per minute to trip the ILO. The ILO tripping speed should not exceed 140 fpm. If the red ILO light on the HC-ACI board is lit, push the FAULT RESET button and the light should go out.

c. Turn the ILO trimpot fully CCW. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot clockwise until the ILO indicator just turns ON. After stopping, push the FAULT RESET button on the HC-ACI board and then set **LF.43** parameter to a lower value. Run the car on Inspection and increase the inspection speed by increasing the parameter **LF.43** to verify that this low speed safety monitor circuit will trip at no higher than 140 fpm (or no higher than the maximum available inspection speed if it is less than 140 fpm). The circuit should trip when parameter **LF.43** equals 23% of Contract Speed or above. Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the Inspection speed parameter **LF.43** back to the value recorded in 4.10.1 (b).

4.10.2 TERMINAL SLOWDOWN LIMIT SWITCHES (TORQMAX F4)

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

a. Place the TEST/NORMAL switch on the HC-RB4-VFAC board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the HC-RB4-VFAC board.

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

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the HC-RB4-VFAC board and return the TEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.10.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (TORQMAX F4)

All jobs under the requirements of ANSI A17.1 SECTION 209.4.B (ASME A 17.1b -1992 ADDENDA) must have a means to insure that the car speed is below 95% of the contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

Normally the jobs which come under the above requirements will have the HC-ACIF or HC-ETS board installed in the controller. Both boards have the ETS monitor circuit. This circuit receives the signal from the hall effect sensor and the magnets installed on the motor shaft or brake drum as described in Section 2.3.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that all the wiring from the speed sensor to the HC-ACIF board is complete.

b. Turn the ETS trimpot on the HC-ACIF/ HC-ETS board fully CW.

c. On a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the High speed parameter **LF. 42**.

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminal UET. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and trips the FLT2/FLT relay on the HC-ACIF/ HC-ETS board and the car stops.

e. Press the ETS reset push button on the HC-ACIF/ HC-ETS board to drop the FLT2/FLT relay. The ETS indicator should turn OFF and the car should be able to run.

f. Repeat (d) and (e) in the down direction with the wire from the DET terminal removed. The car should stop when it reaches 95% of contract speed. Reconnect the wires removed from controller terminals UET and DET when the test is complete.

4.10.4 CONTRACT SPEED BUFFER TEST (TORQMAX F4):

4.10.4.1. 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 HC-RB4-VFAC 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 HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Up Limit***, if provided, by placing a jumper between terminals 2 and UET on the HC-ACIF board.

d. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 8 and 10 and terminals 10 and 11 on the HC-RB4-VFAC board.

e. Register a car call for the top terminal landing from the controller. ***The counter weight will strike the buffer.***

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

g. Remove the jumpers between terminals 8 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the HC-RB4-VFAC board. Reseat the FLT relay.

4.10.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Down Limit***, if provided, by placing a jumper between terminals 2 and DET on the HC-ACIF board.

d. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 8 and 12 and terminals 12 and 13 on the HC-RB4-VFAC board.

e. 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.***

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

g. Remove the jumpers between terminals 8 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the HC-RB4-VFAC board. ***Remove all of the jumpers installed in this section.*** Reseat the FLT relay.

4.10.5 GOVERNOR AND CAR SAFETY TESTS (TORQMAX F4)

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

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

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

b. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets.

d. ***Bypass the Governor OVER SPEED switch*** by placing a jumper between terminals 2 and 15 on the HC-RB4-VFAC board.

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 and 17 on the HC-RB4-VFAC board to ***bypass the safety plank (SOS) switch***.

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

g. Note (write down) the value of drive parameters LF.20 and LF.42 . To run the car at 125 % of its original speed set parameters LF.20 and LF.42 to 125% of the original setting. If the trip point is greater than 150%, skip steps (g), (h) and (i) and use other means to over speed the car.

h. Register a car call in the down direction, but not for the bottom landing. The car should travel at 125% of Contract Speed. The governor should trip and set the safety and stop the car.

i. Put the car on Inspection.

k. Reset the AC drive parameters **LF.20** and **LF.42** to their original value (contract speed value).

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

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

n. ***Remove the jumper from terminals 2 and 15 which bypasses the governor overspeed switch.***

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

p. Properly reinstall the relays FLT on the HC-ACI and AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets.

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

4.10.6 PHASE LOSS DETECTION TESTS (TORQMAX F4)

The VFAC Drive Unit is programmed to detect a motor phase loss. To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display **E.LC** (no current flows to the motor). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

The adjustments and tests are complete. Now is the time to fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

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

* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* Wire connected to panel mount terminal DCL.
* Wire connected to terminal 47 on the HC-RB4-VFAC board.
* No jumper between 2 bus and terminal 36 on the HC-RB4-VFAC board.
* No jumper between 2 bus and terminal 38 on the HC-RB4-VFAC board.
* No jumper between 2 bus and panel mount terminal EPI (if present).
* No jumpers between terminals 2 and UET or DET.
* No jumper between terminals 2 and 15 (HC-RB4-VFAC).
* No jumper between terminals 4 and 8 (HC-RB4-VFAC).
* No jumper between terminals 8 and 10 or 12 (HC-RB4-VFAC).
* No jumper between terminals 10 and 11 (HC-RB4-VFAC).
* No jumper between terminals 12 and 13 (HC-RB4-VFAC).
* No jumper between terminals 16 and 17 (HC-RB4-VFAC).
* Speed Command 8 and Overspeed Level parameters must be set to original value for high speed.
* Parameters LF.20 and LF.42 set to 100% of contract speed.

4.11 EXPLANATION OF YASKAWA F7 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

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

4.11.1 SETTING THE SPEED LEVELS

CAUTION: Verify the critical drive parameter settings as described in Section 3.7.2. Incorrect values for these parameters can cause erratic elevator operation.

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

There are five speed levels (D1 parameters) that can be set in the drive software (see Table 4.8 and Figure 4.5). The drive software will not accept data entry to any D1 parameters other than those listed in Table 4.8. If you change a drive parameter and there is an OPE40 fault, the only way to correct this fault is to access the PROGRAM mode again and access the particular D1-D9 parameter. You must enter a correct value and then reset the drive by pushing the drive fault reset button on the HC-ACI board or by pressing the drive reset button on the drive key pad.

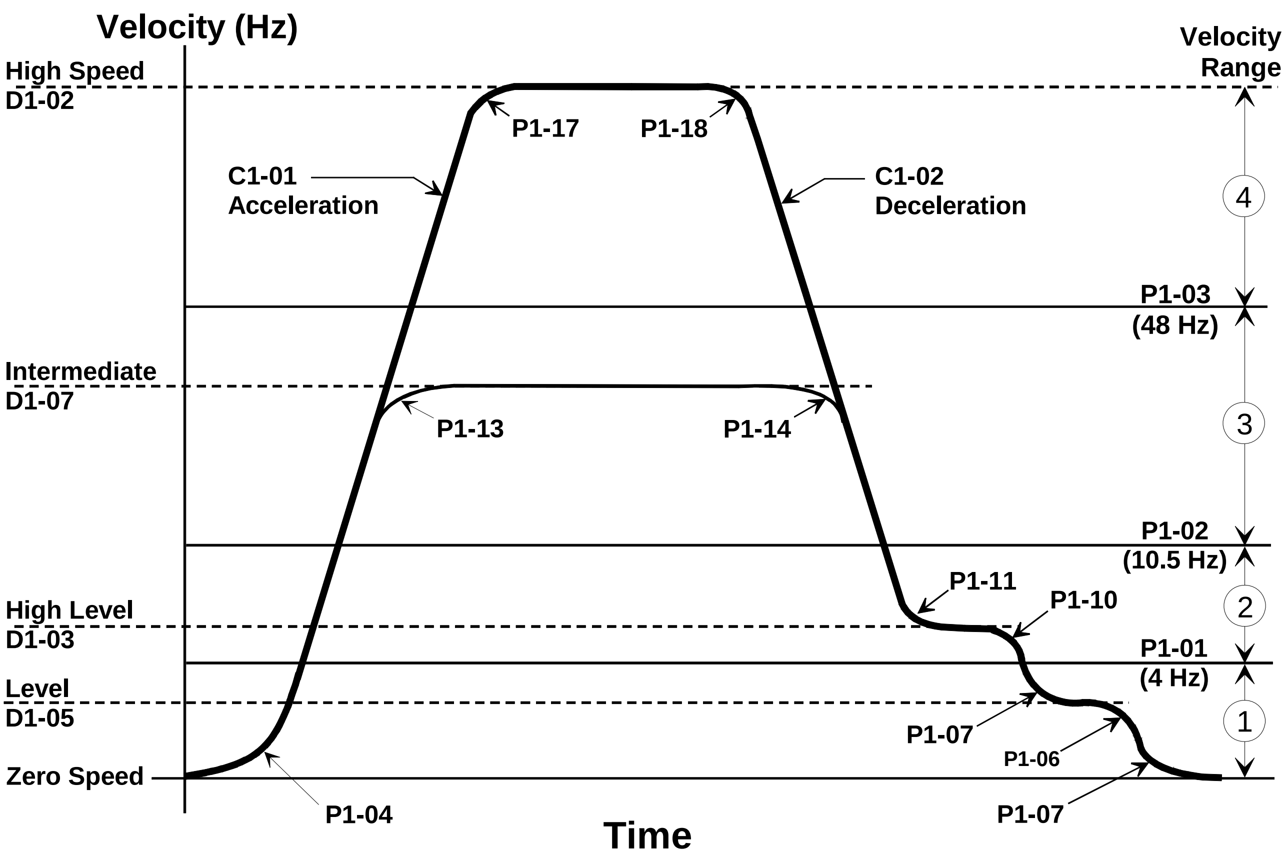
CAUTION: The drive will trip on **OPE40** or **OPE41 fault** if the following conditions are not met while setting the D1-D9 parameters:

D1-02 > D1-07 > D1-03 > D1-05 > 0.0 but less than the maximum specified value.

TABLE 4.8 Yaskawa F7 Drive Speed Levels

YASKAWA F7 SPEED LEVELS				
Speed	**Number**	**Display**	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	D1-17	Jog Reference	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	D1-05	Level	2 to 5% of Contract Speed	ft/m
High Level	D1-03	High Level	5 to 10% of Contract Speed	ft/m
Intermediate	D1-07	Combination	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	D1-02	High	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

FIGURE 4.5 Velocity Curve and S Curve Parameters (Yaskawa F7)

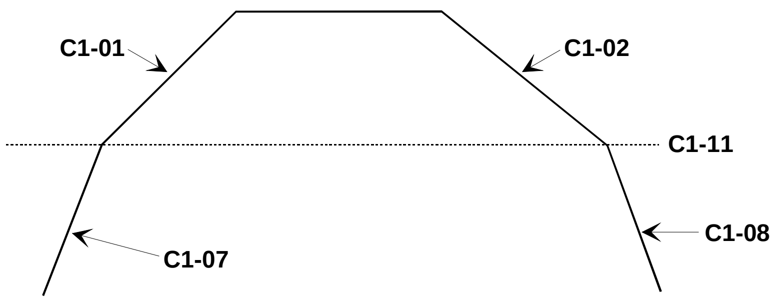


4.11.2 ADJUSTING ACCELERATION AND DECELERATION RATE

The acceleration (and deceleration) rate is programmed in f/s^2. This value is the amount of time to accelerate from Zero Speed to High Speed, or decelerate from High Speed to Zero Speed.

The drive has the capability to use a two sectioned acceleration / deceleration curve as shown in Figure 4.6. However, in this application, parameter C1-11 (Acceleration/Deceleration Switching Level) is set to 0.0. Therefore, parameter C1-01 defines the acceleration rate from Zero Speed to High Speed, and parameter C1-02 defines the deceleration rate from High Speed to Zero Speed. With parameter C1-11 set to 0.0 Hz, parameters C1-07 and C1-08 have no affect on acceleration or deceleration.

FIGURE 4.6 Acceleration and Deceleration Rate Parameters (Yaskawa F7)



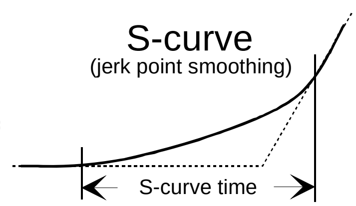
Acceleration : C1-01 = 3.00 f/s^2 (default) [range = 0.01 to 8.00]
C1-07 = C1–01

Deceleration : C1-02 = 3.00 f/s^2 (default) [range = 0.01 to 8.00]
C1-08 = C1-02

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

4.11.3 ADJUSTING THE S-CURVES (YASKAWA F7)

The S-curve parameters P1-04 thru P1-19 adjust the transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.5). **The S-curve parameter values are in ft/s^3. Decreasing the value decreases the rate of change and causes a smoother (longer) transition.** Note: Setting deceleration S-curves too low will cause the car to overshoot.



Smooth operation of the elevator requires that different S-curves be used at different points on the velocity curve. The factor determining which S-curve is used is the velocity range. There are four velocity ranges defined by parameters P1-01, P1-02 and P1-03 (see Figure 4.5). It is important that the correct S-curve be selected for adjustment (see Table 4.9 and Figure 4.5).

TABLE 4.9 Yaskawa F7-Curve Selection Table

Table for Selection of S-Curves					
Range	**Velocity (Hz)**	**Start Accel**	**End Accel**	**Start Decel**	**End Decel**
①	Less than P1-01	**✶ P1-04**	P1-05	**✶ P1-06**	**✶ P1-07**
②	Between P1-01 and P1-02	P1-08	P1-09	**✶ P1-10**	**✶ P1-11**
③	Between P1-02 and P1-03	P1-12	**✶ P1-13**	**✶ P1-14**	**✶ P1-15**
④	Greater than P1-03	P1-16	**✶ P1-17**	**✶ P1-18**	P1-19
✶ These are the *only* S-curve parameters that require field adjustment for smoothing the elevator ride. All the other parameter values are set to the MCE Drive defaults.					

The S-curve parameters listed below (also listed in the shaded area in Table 4.9) are the *only* S-curve parameters which require field adjustment for smoothing the elevator ride. Parameters P1-05, P1-08, P1-09, P1-12, P1-16 and P1-19 should be set to the MCE default values.

P1-04 = 2.50 - adjusts Speed Pick Delay at the start of motion
P1-13 = 2.50 - adjusts the transition from Acceleration to Intermediate speed
P1-17 = 2.50 - adjusts the transition from Acceleration to High Speed
P1-18 = 6.00 - adjusts the transition from High Speed to Deceleration
P1-14 = 6.00 - adjusts the transition from Intermediate Speed to Deceleration
P1-11 = 3.00 - adjusts the transition from Deceleration to High Level Speed
P1-10 = 2.00 - adjusts the transition from High Level Speed to Level Speed
P1-06 = 5.00 - adjusts the smoothness at the start of Level Speed
P1-07 = 3.00 - adjusts the smoothness at the end of Level Speed
P1-15 = **3.50 -** Preferred setting, lower value might cause spotting before the stop.

TABLE 4.10 Yaskawa F7 S-Curve Parameters

YASKAWA F7 S-Curve Parameters						
The Field Adjustable Parameters are shown in the shaded rows.						
No.	**Digital Operator Display**	**Parameter Description**	**Unit**	**Setting Range**	**MCE Defaults**	**Field/MCE Set**
P1-01	Jerk Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	4.0
P1-02	Jerk Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	10.5
P1-03	Jerk Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	48.0
P1-04	Accel Jerk In 1	S Curve #1 at the Start of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-05	Accel Jerk Out 1	S Curve #1 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-06	Decel Jerk In 1	S Curve #1 at the Start of Deceleration	f/s^3	0.01 - 30.00	5.00	✶
P1-07	Decel Jerk Out 1	S Curve #1 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✶
P1-08	Accel Jerk In 2	S Curve #2 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-09	Accel Jerk Out 2	S Curve #2 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-10	Decel Jerk In 2	S Curve #2 at the Start of Deceleration	f/s^3	0.01 - 30.00	2.00	✶
P1-11	Decel Jerk Out 2	S Curve #2 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✶
P1-12	Accel Jerk In 3	S Curve #3 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-13	Accel Jerk Out 3	S Curve #3 at the End of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-14	Decel Jerk In 3	S Curve #3 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.00	✶
P1-15	Decel Jerk Out 3	S Curve #3 at the End of Deceleration	f/s^3	0.01 - 30.00	3.50	3.5
P1-16	Accel Jerk In 4	S Curve #4 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-17	Accel Jerk Out 4	S Curve #4 at the End of Acceleration	f/s^3	0.01 - 30.00	2.50	✶
P1-18	Decel Jerk In 4	S Curve #4 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.00	✶
P1-19	Decel Jerk Out 4	S Curve #4 at the End of Deceleration	f/s^3	0.01 - 30.00	15.00	15.00

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

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

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

4.12 FINAL ADJUSTMENTS (YASKAWA F7)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

4.12.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (YASKAWA F7)

a. Temporarily take the car off of Inspection operation. If the LCD display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

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

4.12.2 SWITCHING TO AUTOMATIC OPERATION (YASKAWA F7)

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

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Level Speed parameter (D1-05) on the Yaskawa F7 AC Drive to get the car to move.

- If relays L and LD are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.

- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

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

4.12.3 BRAKE ADJUSTMENT FOR 125% LOAD (YASKAWA F7)

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

4.12.4 BRINGING THE CAR UP TO HIGH SPEED (YASKAWA F7)

a. Verify that all the steps described in Sections 4.1 and 4.11 regarding the adjustments and specifically the drive parameters are complete.

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

b. Register a car call one floor above the car. The High speed relay (H) should pick and the drive keypad should read 50% of contract speed as the car attempts to start. If the car runs normally, commence multi-floor runs and slowly increase the High speed parameter (D1-02) until contract speed is achieved.

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

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

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

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

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

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

f. Arrange the VFAC Drive Unit to display the output speed (parameter U1-02) to verify that contract speed is being reached.

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

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

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

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

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

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

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

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

NOTE: If the job has **Intermediate Speed** , first adjust the multi-floor runs. Then make one floor runs and adjust parameter D1-07 to reach the correct intermediate speed. Do not change any other parameter except P1-13 or P1-14, if required, as described in Figure 4.6

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

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

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

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

4.12.5 LOAD TESTING (YASKAWA F7)

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

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

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

3. **For Open loop applications** - Adjust parameter C4-01(Torque Compensation Gain) between 1.0 - 2.0. The maximum setting for this parameter is 2.5. Display the output current on the drive key pad in the Operation mode by pressing the up arrow twice. The drive keypad will display OUTPUT CURRENT U1-03= 0.0A. The F7 drive can provide 150% of its full load rated current for 1 minute. Run the car and monitor the current on the drive keypad. **If the motor is stalling but does not trip on OC faults, and if the value of the output current is more than or close to the motor rated current but less than the maximum drive output current, check the motor winding configuration.** Most elevator motors are connected in Y configuration. But sometimes the DELTA configuration is used in order to pick the full load. The motor manufacturer's recommendations must be taken into consideration. If the field survey data was inaccurate, the Drive Unit may be undersized in relation to the motor. Call MCE Technical Support so that the job data can be reviewed.

   For Flux Vector Applications -The Torque Compensation Gain parameter is not available for flux vector applications. ASR Tuning (C5 parameters), as described in Section 4.12.4 (g), can be adjusted to pick the full load.

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

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

6. Make a copy of the Table in Appendix J, Quick Reference for Yaskawa F7 Drive Parameters and use the digital operator on the VFAC Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

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

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

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

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

4.13 FINAL ELEVATOR INSPECTION PROCEDURE (YASKAWA F7)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the MagneTek HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the TORQMAX F5 AC Drive, see Sections 4.14 thru 4.16

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

4.13.1 INSPECTION LEVELING OVER SPEED TEST (YASKAWA F7)

The HC-ACI board is equipped with an independent low speed monitoring system which can trip and open a fault contact if the car runs faster than a preset speed (150 fpm max.) on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (L) relay is picked or when the Access/Inspection relay (INX) is dropped out. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the HC-ACI board. The circuit looks at pulses coming from the hall effect sensor, sensing the magnets on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the Relay Panel Inspection switch on the HC-RB4-VFAC Main Relay board in the ON position.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and adjust the IN speed (Parameter D1-17) as high as possible to trip the ILO (the maximum value for D1-17 is contract speed). The ILO tripping speed should not exceed 140 fpm. If the red ILO light on the HC-ACI board is lit, push the FAULT RESET button and the light should go out.

c. Turn the ILO trimpot fully CCW. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot clockwise until the ILO indicator just turns ON. After stopping, push the FAULT RESET button on the HC-ACI board and then set D1-17 to a lower value. Run the car on Inspection and increase the inspection speed by increasing parameter D1-17 to show that this low speed safety monitor circuit will trip at no higher than 140 fpm (or no higher than the maximum available inspection speed if it is less than 140 fpm). The circuit should trip when D1-17 = 140 fpm or above. Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the IN speed back to the value recorded in Step (b).

4.13.2 TERMINAL SLOWDOWN LIMIT SWITCHES (YASKAWA F7)

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

a. Place the TEST/NORMAL switch on the HC-RB4-VFAC board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the HC-RB4-VFAC board.

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

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the HC-RB4-VFAC board and return theTEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.13.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (YASKAWA F7)

All jobs under the requirements of ANSI A17.1 SECTION 209.4.B (ASME A 17.1b -1992 ADDENDA) must have a means to ensure that the car speed is below 95% of the contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

Normally the jobs which come under the above requirements will have the HC-ACIF or HC-ETS board installed in the controller. Both boards have the ETS monitor circuit. This circuit receives the signal from the hall effect sensor and the magnets 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 all the wiring from the speed sensor to the HC-ACIF board is complete.

b. Turn the ETS trimpot on the HC-ACIF/ HC-ETS board fully CW.

c. On a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the H speed (Drive parameter D1-02).

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminal UET. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and trips the FLT2/FLT relay on the HC-ACIF/ HC-ETS board and the car stops.

e. Press the ETS reset push button on the HC-ACIF/ HC-ETS board to drop the FLT2/FLT relay. The ETS indicator should turn OFF and the car should be able to run.

f. Repeat (d) and (e) in the down direction with the wire from the DET terminal removed. The car should stop when it reaches 95% of contract speed. Reconnect the wires removed from controller terminals UET and DET when the test is complete.

4.13.4 CONTRACT SPEED BUFFER TEST (YASKAWA F7):

4.13.4.1. COUNTER WEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

NOTE: The car should be at the bottom landing with the TEST/ NORM switch on the HC-RB4-VFAC 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 HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Up Limit***, if provided, by placing a jumper between terminals 2 and UET on the HC-ACIF board.

d. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 8 and 10 and terminals 10 and 11 on the HC-RB4-VFAC board.

e. Register a car call for the top terminal landing from the controller . ***The counter weight will strike the buffer.***

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

g. Remove the jumpers between terminals 8 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the HC-RB4-VFAC board. Reseat the FLT relay.

4.13.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Down Limit***, if provided, by placing a jumper between terminals 2 and DET on the HC-ACIF board.

d. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 8 and 12 and terminals 12 and 13 on the HC-RB4-VFAC board.

e. 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.***

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

g. Remove the jumpers between terminals 8 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the HC-RB4-VFAC board. ***Remove all of the jumpers installed in this section.*** Reseat the FLT relay.

4.13.5 GOVERNOR AND CAR SAFETY TESTS (YASKAWA F7)

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

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

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

a. Move the fully loaded car to the top terminal landing. Note and record the value of parameters D1-02 (High Speed), E1-04 (Maximum Output Frequency) and O1-03 (Display Scaling) which are set to run the car on High speed . These parameters will be reset to their original value later in the adjustments.

b. Set parameter E1-04 = 80Hz, parameter D1-02 = governor tripping speed (fpm) and parameter O1-03 = 1XXX00, where XXX = governor trip speed. This should run the car at mechanical governor tripping speed, if the motor is designed for 60Hz.

c. Turn the power OFF and pull the coil of the FLT relay from its socket as described in Section 4.13.4.1 (a). ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

d. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets. Also place a jumper between F7 Drive terminals SN and S3.

e. ***Bypass the Governor OVER SPEED switch*** by placing a jumper between terminals 2 and 15 on the HC-RB4-VFAC board.

f. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 and 17 on the HC-RB4-VFAC board to ***bypass the safety plank (SOS) switch***.

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

h. Register a car call in the down direction, but not for the bottom landing. The car should travel at governor tripping speed. The governor should trip and set the safety and stop the car.

i. Put the car on Inspection.

j. Change parameters E1-04 = 60Hz, D1-02 = contract speed (fpm) and O1-03 = original recorded value, for motors designed for 60Hz.

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

l. 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.

m. ***Remove the jumper from terminals 2 and 15 which bypasses the governor overspeed switch.*** Also remove the jumper between F7 Drive terminals SN and S3.

n. ***Remove the jumper from terminals 16 and 17 which bypasses the safety plank (SOS) switch).***

o. Properly reinstall the relays FLT on the HC-ACI and AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets.

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

4.13.6 PHASE LOSS DETECTION TESTS (YASKAWA F7)

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

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

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

The adjustments and tests are complete. Now is the time to fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

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

* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* Wire connected to panel mount terminal DCL
* Wire connected to terminal 47 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 36 on the HC-RB4-VFAC board
* No jumper from 2 bus to terminal 38 on the HC-RB4-VFAC board
* No jumper from 2 bus to panel mount terminal EPI (if present)
* No jumpers between terminals 2 and UET or DET.
* No jumper between terminals 2 and 15 (HC-RB4-VFAC).
* No jumper between terminals 4 and 8 (HC-RB4-VFAC).
* No jumper between terminals 8 and 10 or 12 (HC-RB4-VFAC).
* No jumper between terminals 10 and 11 (HC-RB4-VFAC).
* No jumper between terminals 12 and 13 (HC-RB4-VFAC).
* No jumper between terminals 16 and 17 (HC-RB4-VFAC).
* Drive parameter D1-02, E1-04 and O1-03 must be set to original value for High speed.
* No jumper between F7 Drive terminals SN and S3.

4.14 EXPLANATION OF TORQMAX F5 DRIVE PARAMETERS AND S CURVES

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13

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

NOTE: In order to access the parameter values, review the use of the Digital Operator in Section 3, *Parameter Adjustments* in the TORQMAX F5 Drive Technical Manual.

4.14.1 SETTING THE SPEED LEVELS

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

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

The PTC Series M controller uses drive parameters for setting the five speed levels described in Table 4.11 and Figure 4.7. The controller selects the desired speed using the TORQMAX F5 drive logic inputs. The Speed Command parameters should be set as shown in Table 4.11 in preparation for running the elevator at High speed.

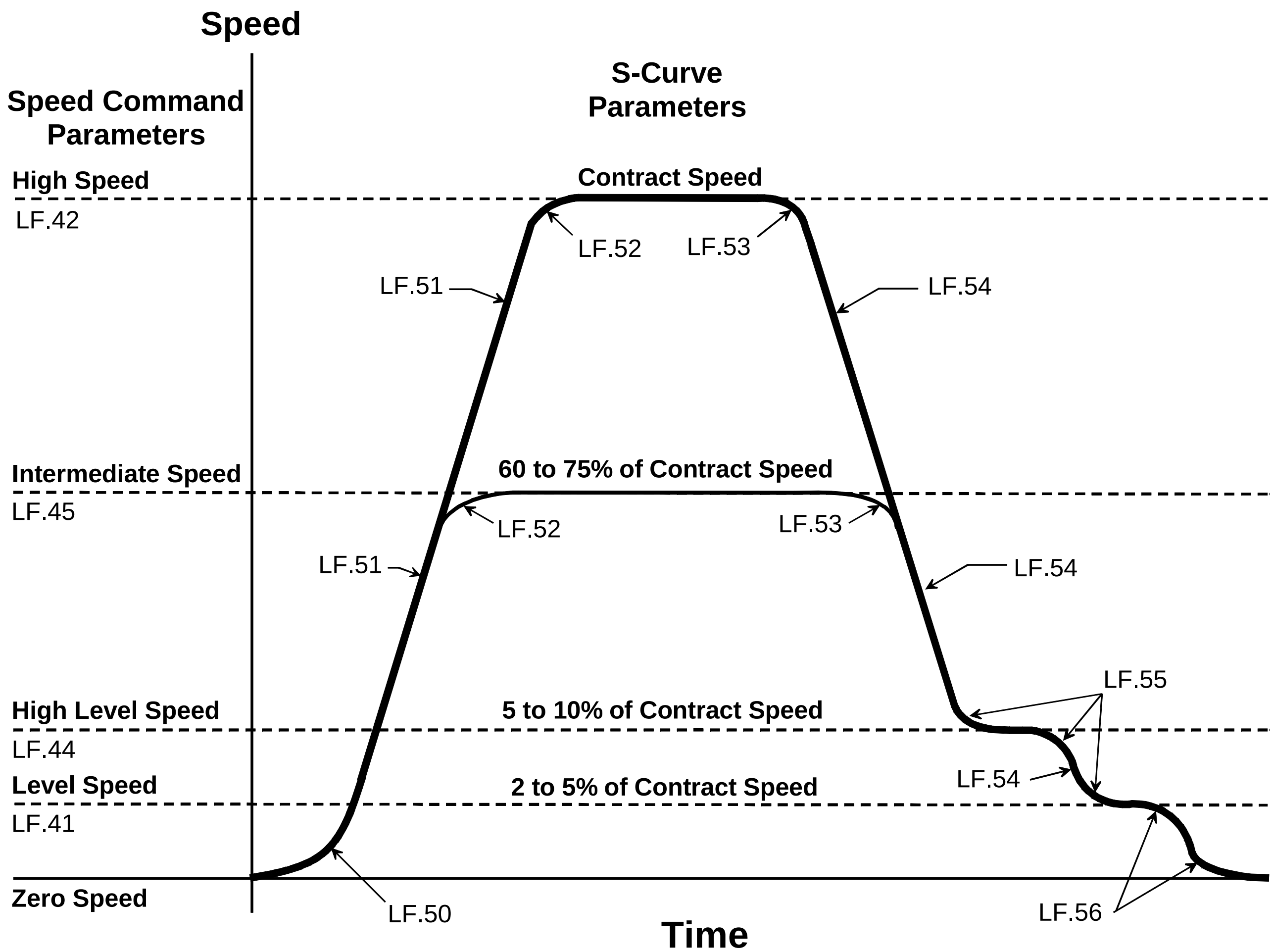
TABLE 4.11 TORQMAX F5 Drive Speed Levels

TORQMAX F5 Drive Speed Levels			
Speed	Speed/Drive parameter	**Preferred setting in preparation for running the car at High speed.**	**Unit**
Inspection	Inspection Speed (LF.43)	This speed can be increased to 66% of Contract Speed if required.	ft/m
Level	Level (LF.41)	2 to 5% of Contract Speed	ft/m
High Level	High Level (LF.44)	5 to 10% of Contract Speed	ft/m
Intermediate	Intermediate (LF.45)	**42% of Contract Speed.** This speed can be increased to 91% if required, but must be less than Contract Speed.	ft/m
High	High speed (LF.42)	**50% of Contract Speed**. This parameter will be changed to Contract Speed during final adjustment.	ft/m

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

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

FIGURE 4.7 S Curve Parameters and Recommended Speed Settings (TORQMAX F5)



4.14.2 ADJUSTING ACCELERATION AND DECELERATION RATES

The acceleration and deceleration rates are programmed in feet per second per second (ft/s^2) using the S-Curve parameters (see Figure 4.7 and Table 4.12). The acceleration rate is set using the ***LF.51*** parameter. The deceleration rate is set using the ***LF.54*** parameter. Increasing the value increases the acceleration (deceleration) rate (steeper curve). The default value is 3.00 ft/s^2.

4.14.3 ADJUSTING THE JERK PARAMETERS

The jerk parameters adjust the rate of change transition (smoothness) at the start and end of acceleration and deceleration, known as jerk points (see Figure 4.7). The jerk parameter values are in feet per second per second per second (ft/s^3). Decreasing the value decreases the rate of change and causes a smoother (longer) transition.

The parameters used for the jerk points at the start and during acceleration are **LF.50** and **LF.52**. The parameters used for the jerk points during deceleration and stop are **LF.53, LF.55** and **LF.56.** Parameter **LF.52** is used for the transition from acceleration to contract speed and parameter **LF.53** is used for the transition from contract speed to deceleration.

TABLE 4.12 TORQMAX F5 S Curve Parameters

Drive parameter	Parameter Description	Unit	Setting Range	Default Settings	Factory Settings
***S-Curves* (Profile 0)**					
0.LF.50	Start Jerk - used for the transition at the start of acceleration	ft/s^3	0.30 - 32.00	3.00	3.00
0.LF.51	Acceleration rate	ft/s^2	0.30 - 12.00	3..50	3.50
0.LF.52	Acceleration Jerk - used for the transition from acceleration to contract speed	ft/s^3	0.30 - 32.00	4.00	4.00
0.LF.53	Deceleration Jerk - used for the transition from contract speed to deceleration	ft/s^2	0.30 - 32.00	4.50	4.50
0.LF.54	Deceleration rate	ft/s^2	0.30 - 12.00	3.50	3.50
0.LF.55	Approach Jerk - used for the transitions at the end of deceleration	ft/s^3	0.30 - 32.00	2.50	2.50
LF.56	Stop Jerk - used for the final transitions from leveling speed to zero speed	ft/s^3	off, 0.30 -32.00	1.00	1.50
Speed parameters					
LF.42	High speed	ft/m	0 -100% *	0	
LF.45	Intermediate speed	ft/m	0 -91% *	0	
LF.44	High Leveling speed	ft/m	0 -25% *	0	
LF.41	Leveling speed	ft/m	0 -16% *	0	
LF.43	Inspection speed	ft/m	0 - 66% *	0	

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

The output response of the drive can be seen on an oscilloscope, when the car is running, by looking at the voltage between terminals X2A.6 (Motor torque) and X2A.8 (Com) on the TORQMAX F5 drive. The input can be seen at terminal X2A.5 (Actual speed) and X2A.8 (Com). The output signals are ±10V for X2A.6 and 0 - 10V for X2A.5.

The High Level speed **LF.44**, Level speed **LF.41**, Deceleration rate **LF.54** and Jerk rate parameters **LF.53** and **LF.55** should be adjusted for correct approach to the floor.

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

4.15 FINAL ADJUSTMENTS (TORQMAX F5)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13

4.15.1 FINAL PREPARATION FOR RUNNING ON AUTOMATIC OPERATION (TORQMAX F5)

a. Temporarily take the car off of Inspection operation. If the LED display does not show TEST MODE, see what message is being displayed and correct the problem. For example, if the indicators show that the car is on Fire Service Phase 1, a jumper must be connected between terminal 2 on the back plate and terminal 38 on the HC-RB4-VFAC board in order to run the car on Normal Operation. Remove the jumper once the Fire Service input is brought into the controller. Place the car back on Inspection.

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

4.15.2 SWITCHING TO AUTOMATIC OPERATION (TORQMAX F5)

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

- If the brake picks and the car is trying to level but is not able to, it may be necessary to adjust the Leveling Speed parameter (LF.41) on the TORQMAX F5 Drive to get the car to move.
- If relays L and LD are picked, but the brake and other relays are not, the down direction limit switch may be preventing the leveling down operation.
- If the car is trying to level, it will not leave the landing for a call until the leveling is complete. Move the limit switch if necessary.

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

4.15.3 BRAKE ADJUSTMENT FOR 125% LOAD (TORQMAX F5)

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

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

4.15.4 BRINGING THE CAR UP TO HIGH SPEED (TORQMAX F5)

a. Remove all test weights from the car. Verify that all the steps described in Sections 4.1 and 4.11 regarding the adjustments and specifically the drive parameters are complete.

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

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

> **NOTE:** **Drive gain adjustments** - The default values for the gain parameters (A.LF.31 Kp Speed Accel: Proportional Gain and A.LF.32 Speed Accel: Integral Gain) may not be sufficient to run the car on High speed. It may be necessary to increase the value of these parameters.

c. At the slowdown distance from the next floor the Position Indicator will step. After stepping occurs, High speed is dropped and the car should rapidly decelerate to High Level speed. Reduce the High Level speed (LF.44) so that the car runs at about 10 - 20 fpm or at a reasonable speed (use your personal judgment). Six inches before the floor at which the car is to stop, High Level speed is dropped and the car should decelerate to Level speed. The Level speed can be adjusted using parameter LF.41 so that the car levels into the floor and stops. Level speed should be 7 - 12 fpm, or a reasonable leveling speed (use personal judgement). If the car re-levels frequently once Level speed is adjusted satisfactorily, spread apart the LU and LD sensors or switches in the landing system to provide enough Dead Zone.

d. Turn the Speed Pick Delay (SPD) trimpot fully CCW (fully OFF) and then set it 1/4 turn in the CW direction. The speed pick delay is achieved using the TORQMAX F5 drive parameter LF.70. Adjust LF.70 so that the brake is fully picked just as the motor first moves. The goal is to delay long enough to avoid moving the motor before the brake is fully lifted, but not so long as to allow the car to roll back.

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

This slowdown distance was chosen to give a reasonable deceleration rate. Continue to make two-floor runs and slowly increase High speed until Contract Speed is reached. It may be necessary to adjust the Deceleration rate (LF.54) and deceleration jerk rate (LF.52) to stop the car at the floor. Adjust the Acceleration rate parameter (LF.51) until the desired acceleration rate is achieved. Several runs may be required to obtain optimum acceleration. The acceleration rate should be about the same as the deceleration rate.

> **NOTE:** To observe the Actual speed and the motor torque with an oscilloscope or a chart recorder, monitor drive terminal X2A.5 and X2A.6 with respect to X2A.8. Take all necessary precautions while measuring the voltage signals.

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

f. To achieve a proper start, without rollback (or snapping away from the floor), a variable delay in the application of the speed signal is provided using drive parameter LF.70 Speed Pick Delay. Parameter LF.70 must be adjusted to let the brake just clear the brake drum before attempting to accelerate the car. *Do this with an empty car*. The correct setting will be obvious by watching the Drive sheave. This was adjusted previously; however, check parameter LF.70 again and make adjustments if necessary. The response of the car can be monitored using an oscilloscope by measuring the voltage on the drive terminals X2A.5 and X2A.6 with respect to X2A.8. These signals are ±10V and 0-10 V respectively. Terminal X2A.5 is assigned to the drive Actual speed reference and terminal X2A.6 is assigned to the drive motor torque.

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

NOTE: During High speed, if the speed change-over can be felt in the car, increase parameter A.LF.33 Ki Speed Offset Accel and d.LF.33 Ki Speed Offset Decel in steps of 100. This will help in achieving a smoother transition.

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

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

h. The adjustment is almost complete. The acceleration rate parameter setting should be at least as great as the deceleration rate parameter, but it should not be so high that it substantially exceeds the value of the deceleration rate parameter. Excessive acceleration may cause the AC Drive circuits to saturate and thereby lose control of the car. Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration. Note the present value of the deceleration parameter **LF. 54** and run the car. Continue to decrease the value of **LF.54** until the car overshoots the floor, requiring a relevel operation. Observe the response of the car to verify a stable releveling operation. Return the value of the **LF.54** parameter to its original value so that the approach to the floor is the same as before. After the car stops, check the empty car releveling operation by placing a jumper between terminals 18 and 26 to cause an up level after which the car will stop due to picking the LD (Down Level) switch. Remove the jumper from terminals 18 and 26 and the car will level down against the counterweight. Make sure that it does not stall. If the car stalls then you might have to increase the leveling speed.

4.15.5 LOAD TESTING (TORQMAX F5)

a. Begin adding test weights to the car in 100 or 200 pound increments all the way up to the rated load. Observe the AC Drive Unit current on its display **LF.93** and check to see if there is an **E.OL or E.OL2** (Overload) error indication as the car accelerates to full speed. If so, it is an indication that the AC drive unit is being pushed close to its limits and may require one or more of the following actions:

1. The requested acceleration rate may be excessive. Try reducing the acceleration rate by decreasing the **LF.51** parameter. The lower the rate of acceleration, the lower the current demand.

2. A more gradual transition from acceleration to high speed may be made by decreasing the **LF.52** (Acceleration Jerk) parameter.

3. Verify that LF.38 = 0 (PWM = 8KHz). The drive gains (parameters **LF.31** and **LF.32**) may need to be increased.

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

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

6. Make a copy of the table in Appendix D, *Quick Reference for TORQMAX F5 Drive Parameters*. Use the digital operator on the Drive Unit to look up and write down every parameter value as programmed in the unit. Use this as a reference when calling MCE to review the data.

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

1. Through the drive keypad display: When the drive is in Operation mode, access parameter **LF.95** (DC bus) voltage or parameter **LF.96** (Peak DC bus) voltage. You can then run the elevator and watch the voltage reading,

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

The 230V drive will trip on E.OP (Over voltage in the DC bus circuit) if the **LF.96** reading is close to 400VDC. The 460V drive will trip on E.OP if the **LF.96** reading is close to 800VDC. If the DC bus voltage reading **(LF.95)** is 325 VDC (for a 230 VAC motor) or 650 VDC (for 460 VAC motor), and if there is no voltage measured across the braking resistors while the car is slowing with a full load going down or empty car up, there may be a wiring problem, or a defective braking unit (if provided). Be sure to investigate this thoroughly. These resistors perform the task of regulating car speed during a full load down or empty car up run (regeneration).

4.15.6 ELECTRICAL NOISE (TORQMAX F5)

If the motor emits excessive electrical noise at Inspection or Contract speeds, or if the motor draws higher than normal current, perform the following:

a. Verify the actual traction sheave diameter. Enter the measured value in parameter LF.21.

b. Verify the gear reduction ratio, parameter LF.22.

c. Verify the Rated Motor speed, parameter LF.11. This value is the full load motor RPM.

> **NOTE:** The Imperial motors name plate has full load RPM information which should be entered in parameter LF.11.
>
> Full load RPM information may not be available for Reuland motors. The motor name plate lists the Synchronous RPM, i.e. 900, 1200, 1500 or 1800. In flux vector applications Reuland motors have slip between 1.8% and 2.0%. Set LF.11 = Motor Synchronous RPM - (0.018 x Motor Synchronous RPM).
>
> This calculation gives a very reasonable value for LF.11. Its effect can be verified by observing the motor current, parameter ru.09. If ru.09 is normal, compared to the motor FLA, when the car is running at contract speed, the motor slip is correct. If required, LF.11 can be adjusted in small increments (5-10 RPM). However, higher values close to the Synchronous RPM will trip the E.ENC drive fault.

d. Lower the Kp Speed Accel/Decel Proportional Gain, A.LF.31 / d.LF.31 (do not set below 1200). Refer to section 3.6.3.g of this manual for more detailed information.

4.16 FINAL ELEVATOR INSPECTION PROCEDURE (TORQMAX F5)

For controllers with the G5 / GPD515 AC Drive, see Sections 4.2 thru 4.4
For controllers with the HPV 900 AC Drive, see Sections 4.5 thru 4.7
For controllers with the TORQMAX F4 AC Drive, see Sections 4.8 thru 4.10
For controllers with the Yaskawa F7 AC Drive, see Sections 4.11 thru 4.13

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

4.16.1 INSPECTION LEVELING OVER SPEED TEST (TORQMAX F5)

The HC-ACI board is equipped with an independent low speed monitoring system which can trip and open a fault contact if the car runs faster than a preset speed (150 fpm max.) on Car Top Inspection, Hoistway Access or Leveling operation. The monitoring system is active when the Leveling (L) relay is picked or when the Access/Inspection relay (INX) is dropped. The trimpot is labeled ILO (Inspection Leveling Overspeed) and is located on the HC-ACI board. The circuit looks at pulses coming from the hall effect sensor, sensing the magnets on the motor shaft or brake drum, etc. Calibrate this circuit as follows:

a. Put the car on Inspection operation by placing the Relay Panel Inspection switch on the HC-RB4-VFAC Main Relay board in the ON position.

b. Run the car on Inspection (up or down) and record the actual measured car speed with a hand-held tachometer _____________. It must be returned to the original value when this test is complete. Now, run the car on Inspection and increase the Inspection speed parameter **LF.43** in increments of 2 feet per minute to trip the ILO. The ILO tripping speed should not exceed 140 fpm. If the red ILO light on the HC-ACI board is lit, push the FAULT RESET button and the light should go out.

c. Turn the ILO trimpot fully CCW. Run the car in the UP direction on Inspection while very slowly turning the ILO trimpot clockwise until the ILO indicator just turns ON. After stopping, push the FAULT RESET button on the HC-ACI board and then set **LF.43** parameter to a lower value. Run the car on Inspection and increase the inspection speed by increasing the parameter **LF.43** to verify that this low speed safety monitor circuit will trip at no higher than 140 fpm (or no higher than the maximum available inspection speed if it is less than 140 fpm). The circuit should trip when parameter **LF.43** equals 23% of Contract Speed or above. Check this in *both* directions. The overspeed monitor is now calibrated for less than 150 fpm for Access, Inspection and Leveling. Turn the Inspection speed parameter **LF.43** back to the value recorded in 4.16.1 (b).

4.16.2 TERMINAL SLOWDOWN LIMIT SWITCHES (TORQMAX F5)

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

a. Place the TEST/NORMAL switch on the HC-RB4-VFAC board in the TEST position.

b. Disconnect and label the wires from terminals 71 (STU) and 72 (STD) on the HC-RB4-VFAC board.

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

d. Reconnect the wires to terminals 71(STU) and 72 (STD) on the HC-RB4-VFAC board and return the TEST/NORMAL switch to the NORMAL position. The final adjustments are now complete.

4.16.3 EMERGENCY TERMINAL LIMIT SWITCH MONITOR (TORQMAX F5)

All jobs under the requirements of ANSI A17.1 SECTION 209.4.B (ASME A 17.1b -1992 ADDENDA) must have a means to insure that the car speed is below 95% of the contract speed after opening the associated ETS limit switches. The emergency terminal limit switch monitor performs this function.

Normally the jobs which come under the above requirements will have the HC-ACIF or HC-ETS board installed in the controller. Both boards have the ETS monitor circuit. This circuit receives the signal from the hall effect sensor and the magnets installed on the motor shaft or brake drum as described in Section 2.3.3, *Installing and Wiring the Speed Sensor*.

a. Make sure that all the wiring from the speed sensor to the HC-ACIF board is complete.

b. Turn the ETS trimpot on the HC-ACIF/ HC-ETS board fully CW.

c. On a multi-floor run, adjust the speed of the car to 95% of the contract speed by adjusting the High speed parameter **LF. 42**.

d. Remove the wire from the Up Emergency / Terminal Limit Switch where it connects to the controller at terminal UET. Start the car at the bottom of the hoist way and while running the car in the up direction, slowly turn the ETS trimpot CCW until the ETS indicator turns ON and trips the FLT2/FLT relay on the HC-ACIF/ HC-ETS board and the car stops.

e. Press the ETS reset push button on the HC-ACIF/ HC-ETS board to drop the FLT2/FLT relay. The ETS indicator should turn OFF and the car should be able to run.

f. Repeat (d) and (e) in the down direction with the wire from the DET terminal removed. The car should stop when it reaches 95% of contract speed. Reconnect the wires removed from controller terminals UET and DET when the test is complete.

4.16.4 CONTRACT SPEED BUFFER TEST (TORQMAX F5):

4.16.4.1. COUNTER WEIGHT BUFFER TEST WITH EMPTY CAR GOING UP

> **NOTE:** The car should be at the bottom landing with the TEST/ NORM switch on the HC-RB4-VFAC 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 HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Up (STU) input by removing the wire from terminal 72 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Up Limit***, if provided, by placing a jumper between terminals 2 and UET on the HC-ACIF board.

d. ***Bypass the Up terminal slowdown and Up Normal Limit*** by placing jumpers between terminals 8 and 10 and terminals 10 and 11 on the HC-RB4-VFAC board.

e. Register a car call for the top terminal landing from the controller. ***The counter weight will strike the buffer.***

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

g. Remove the jumpers between terminals 8 and 10, and terminals 10 and 11 and reconnect the wire to terminal 72 on the HC-RB4-VFAC board. Reseat the FLT relay.

4.16.4.2 CAR BUFFER TEST WITH A FULL LOAD GOING DOWN

a. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

b. Disconnect the Step Down (STD) input by removing the wire from terminal 71 on the HC-RB4-VFAC relay board. Tape the wire to prevent shorting.

c. ***Bypass the Emergency Terminal Down Limit***, if provided, by placing a jumper between terminals 2 and DET on the HC-ACIF board.

d. ***Bypass the Down terminal slowdown and Down Normal Limit*** by placing jumpers between terminals 8 and 12 and terminals 12 and 13 on the HC-RB4-VFAC board.

e. 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.***

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

g. Remove the jumpers between terminals 8 and 12 and terminals 12 and 13 and reconnect the wire to terminal 71 on the HC-RB4-VFAC board. ***Remove all of the jumpers installed in this section.*** Reseat the FLT relay.

4.16.5 GOVERNOR AND CAR SAFETY TESTS (TORQMAX F5)

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

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

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

b. On the HC-ACI board, pull the FLT relay partially out of its socket at the coil end (left or diode side) so it will not shut down the elevator when the car is going faster than 150 fpm on Inspection. ***The safety on the HC-ACI board will trip but will not activate the FLT relay and stop the car.***

c. If the HC-ACIF board is used in this controller, remove relays AS and ETL from their sockets.

d. ***Bypass the Governor OVER SPEED switch*** by placing a jumper between terminals 2 and 15 on the HC-RB4-VFAC board.

e. In order to observe the loss of traction (when the safety mechanism sets) connect a jumper between terminals 16 and 17 on the HC-RB4-VFAC board to ***bypass the safety plank (SOS) switch***.

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

g. Note (write down) the value of drive parameters LF.20 and LF.42 . To run the car at 125 % of its original speed set parameters LF.20 and LF.42 to 125% of the original setting. If the trip point is greater than 150%, skip steps (g), (h) and (i) and use other means to over speed the car.

h. Register a car call in the down direction, but not for the bottom landing. The car should travel at 125% of Contract Speed. The governor should trip and set the safety and stop the car.

i. Put the car on Inspection.

k. Reset the AC drive parameters **LF.20** and **LF.42** to their original value (contract speed value).

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

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

n. ***Remove the jumper from terminals 2 and 15 which bypasses the governor overspeed switch.***

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

p. Properly reinstall the relays FLT on the HC-ACI and AS and ETL on HC-ACIF board. These relays were removed or partially removed from their respective sockets.

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

4.16.6 PHASE LOSS DETECTION TESTS (TORQMAX F5)

The VFAC Drive Unit is programmed to detect a motor phase loss. To test for proper tripping of the drive output phase loss (connection between the drive and motor), attempt to run the elevator on Inspection with one motor lead disconnected. The Drive should trip off, dropping the RDY relay and the brake. The drive should display **E.LC** (no current flows to the motor). A manual reset of the Drive on the HC-ACI board will be needed to return to Normal operation. Reconnect the motor lead and return the controls to Normal operation.

The adjustments and tests are complete. Now is the time to fine tune any areas that may require touching up. **Make sure that all of the appropriate data has been properly documented and that all of the jumpers have been removed before the car is returned to service.**

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

* Relays FLT on HC-ACI board and AS and ETL on the HC-ACIF board (if provided) must be installed properly in their sockets.
* Wire connected to panel mount terminal DCL.
* Wire connected to terminal 47 on the HC-RB4-VFAC board.
* No jumper between 2 bus and terminal 36 on the HC-RB4-VFAC board.
* No jumper between 2 bus and terminal 38 on the HC-RB4-VFAC board.
* No jumper between 2 bus and panel mount terminal EPI (if present).
* No jumpers between terminals 2 and UET or DET.
* No jumper between terminals 2 and 15 (HC-RB4-VFAC).
* No jumper between terminals 4 and 8 (HC-RB4-VFAC).
* No jumper between terminals 8 and 10 or 12 (HC-RB4-VFAC).
* No jumper between terminals 10 and 11 (HC-RB4-VFAC).
* No jumper between terminals 12 and 13 (HC-RB4-VFAC).
* No jumper between terminals 16 and 17 (HC-RB4-VFAC).
* Speed Command 8 and Overspeed Level parameters must be set to original value for high speed.
* Parameters LF.20 and LF.42 set to 100% of contract speed.

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

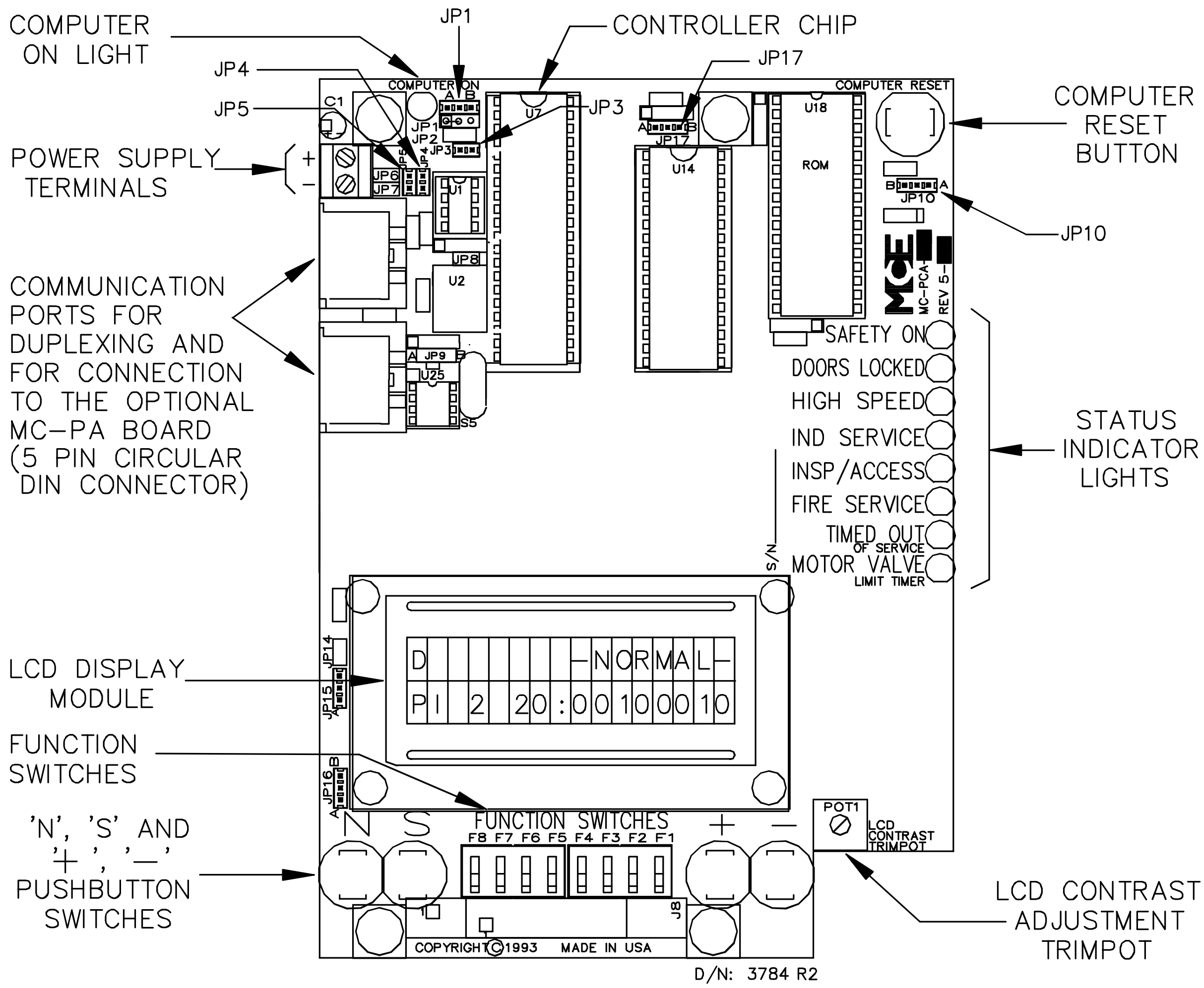
5.1.1.1 COMPUTER ON LIGHT - When steadily lit, this light shows that the computer is functioning normally and completing its program loop successfully. Pressing the COMPUTER RESET button will cause the COMPUTER ON light to turn *OFF* and the light will stay *OFF* while the RESET button is depressed. The computer is equipped with an auto reset feature that will cause the computer to reset if, for any reason, the program loop cannot be completed. For example: A very strong electromagnetic field or line noise may interrupt computer functioning. The computer will automatically reset itself and go back to Normal operation. The auto reset feature prevents unnecessary service calls. The auto reset process will also cause the COMPUTER ON light to turn *OFF* briefly. 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 it is 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 Computer Panel Board Layout

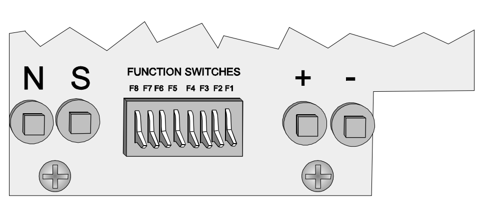


5.1.1.3 DIAGNOSTICS LCD DISPLAY - The 32-character LCD (Liquid Crystal Display) displays various information depending on the positions of the F1-F8 switches. Diagnostic mode is accessed when all of the switches are in the down position. The LCD display shows an elevator status message, the car position, 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 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 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 this message is seen on the LCD screen, 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 information.

```
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

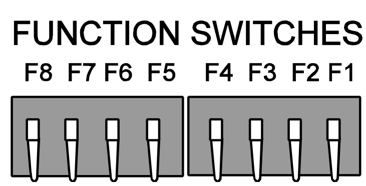
If an invalid code is entered, the operator will be prompted to re-enter the code. Once a valid code has been entered, access is granted to the programming options and the password will not have to be reentered until the Password Timer expires.

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.



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

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

N pushbutton, the 0 of the address 20 will begin to 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

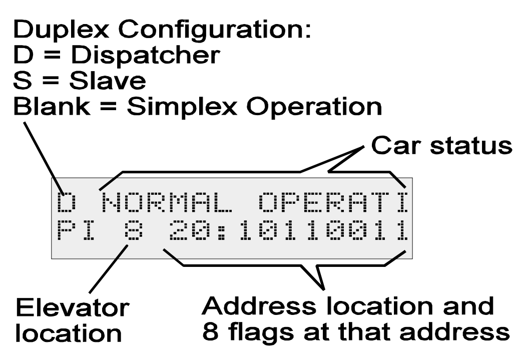
The **+** pushbutton (see Figure 5.1) modifies the digit of the computer memory address selected by the ***N*** pushbutton. If the **+** pushbutton is pressed, the selected digit is incremented by one. The data display will also change as the address changes. For example, if the 0 of the address 20 is 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 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

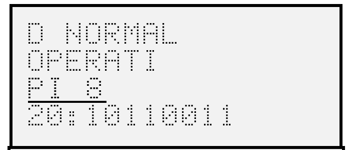
Scrolling Message	Special Event Message
LSA Movement Failure (not scrolled, Event Calendar only)	**LSA Movement Failure**
Description: The car has failed to complete an LSA movement check after being idle for 10 minutes at a landing (see ABI, Alarm Bell Input option).	
MOTOR LIMIT TIMER (ANTI-STALL) 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. **Troubleshooting:** None	
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	
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. To reset this error condition, 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

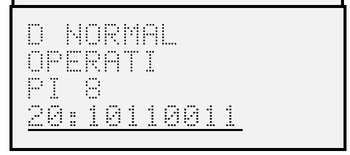
Scrolling Message	Special Event Message
REAR GATE SWITCH FAILURE *(NYCHA)*	
Description: The rear car gate switch has failed closed. **Troubleshooting:** Ensure that with the rear car gate closed, there is power on the GSR input an no power present on the DCLR input.	
REDUNDANCY DOOR LOCK RELAY FAILURE	
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).	

3-1-05

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.



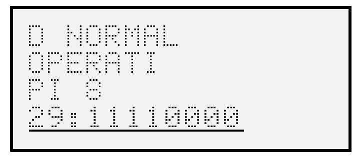
5.3.6.4 COMPUTER INTERNAL MEMORY - The underlined section in this display shows the computer's internal memory address (2 digits) and the data (8 digits) at that address. The colon character (:) separates the address from the data. The address can be changed by first pressing the ***N*** pushbutton,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



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 an alphabetized list with a description of each flag and variable. Below is an example of how to interpret the display.



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 5.3 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

FLAGS AND VARIABLES	
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 5.3 and 5.4 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 5.4. Find the abbreviation or mnemonic for Photo Eye input. Table 5.4 shows that the mnemonic for Photo Eye input is PHE.

Step 2: Look for PHE on Table 5.4. Table 5.4 gives an Address (ADDR) and Position for each signal. This will show where to look for the signal on Table 5.3 and on the computer display.

Table 5.4 shows that the Address of PHE is 20 and the Position is 7.

Step 3: Notice on Table 5.3 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 (see Sections 5.3.2 and 5.3.3 for an explanation). 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*.

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

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 5.4 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

FLAG	Definition	Addr	Position	FLAG	Definition	Addr	Position
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
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

FLAG	Definition	Addr	Position	FLAG	Definition	Addr	Position
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 Section 6.2, which explains 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:

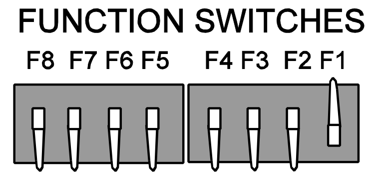
1. Place the car on Machine Room Inspection.
2. Place function switches **F1**, **F3**, **F5** and **F7** in the **On** (up) position.
3. Press all four pushbuttons (**N**, **S**, **+**, **-**) at the same time.
4. Using the settings shown in Appendix A, *Original Programmed Values and the Record of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

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

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

5.4 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.



Program mode

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.

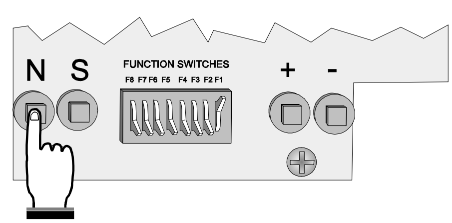
5.4.1.1 VIEWING MENUS ON THE LCD DISPLAY - All of the programmable options and features are divided into menus. The following is a list of all of the menus:

- 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:

```
* SAVE CHANGES? *
* N=NO   S=YES  *
```

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 5.5 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 5.5 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 -INSPECT- 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. ANSI 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 more 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*, 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 for more details).

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 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 will stop trying to move the car, to protect the motor. The Motor Limit Timer Indicator on the MC-PCA board will turn *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	Monitoring input for the 2AB relay coil.
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	Monitoring input for the BAB relay coil.

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 Counterweight Displacement Input.
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.
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 Monitoring 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.

SPARE INPUTS MENU OPTIONS	
DPMR	Rear Door Position Monitoring 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.
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.
EQI	Earthquake Input (see Section 5.4.9.8 for more details).
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.
FRHTW	Fire Sensor Hoistway - This input is used to indicate when a fire sensor placed in the hoistway has been activated. This input is normally high and is considered active low. When activated, Fire Phase 1 is initiated and the FWL output will flash.
FRMR	Fire Sensor Machine Room - This input is used to indicate when a fire sensor placed in the machine room has been activated. This input is normally high and is considered active low. When activated, Fire Phase 1 is initiated and the FWL output will flash.
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 - 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.

SPARE INPUTS MENU OPTIONS	
HOSP	Hospital Emergency Operation Input.
INA	Monitoring input for the INAX relay coil.
INSDN	Inspection Down Input. This input is used to indicate to the Microprocessor that there is an intent to move in the down direction while on inspection operation.
INSUP	Inspection Up Input. This input is used to indicate to the Microprocessor that there is an intent to move in the up direction while on inspection operation.
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 more 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 code).
PFGE	Passing Floor Gong Enable Input (see Section 5.4.6.3).
PSS	Pressure Switch Input. When activated (low), this input causes 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.
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.
R2AB	Redundancy monitoring input for the 2AB relay contact.
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
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.
SAFH	Hoistway Safety Input.
SAFC	Car Safety Input.

SPARE INPUTS MENU OPTIONS	
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	
ABZ	Attendant Service Buzzer Output.
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.
CCDE	Car Call Disconnect Enable Output - This output comes *ON* when the car calls are canceled during PHE anti-nuisance operation
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.
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.
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.

SPARE OUTPUTS MENU OPTIONS	
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.
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).

SPARE OUTPUTS MENU OPTIONS	
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. 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 - 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 behaves 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.
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.
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

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)

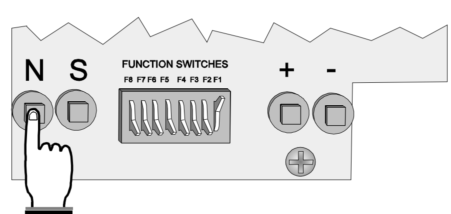
5.4.9.19 HOSPITAL EMERG. OPERATION? - This option calls any eligible in-service elevator to any floor on an emergency basis. If this installation has Hospital Emergency Service Operation, a hospital emergency call switch will be installed at each floor where this service is desired.

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:

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).

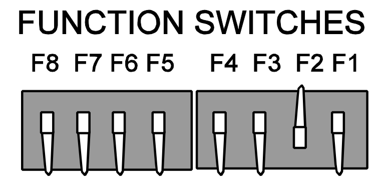
5.4.9.32 SCROLLING SPEED (SLOW / NORMAL / FAST) - Menu options which are too long to be fully displayed on the LCD display are scrolled. This option determines the scrolling speed.

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

5.5 EXTERNAL MEMORY MODE

External Memory mode can be used to view memory addresses in the external RAM on the MC-PCA 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 5.6) shows the meaning of the data digits at different addresses.

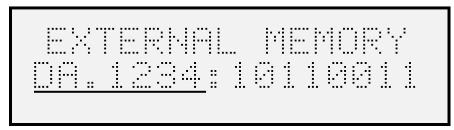
5.5.1 GETTING INTO EXTERNAL MEMORY MODE



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.

5.5.2 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 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 5.6 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 5.6. 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 5.5). Look at data bit number 4 (from the right), which is underlined in the following display:

```
EXTERNAL MEMORY
DA.02AF: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 5.6 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 5.7 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

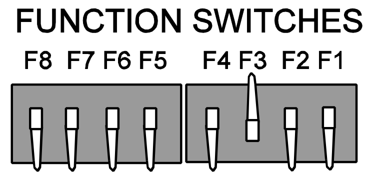
Legend for Table 5.7:

→ 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

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:

- 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)

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:

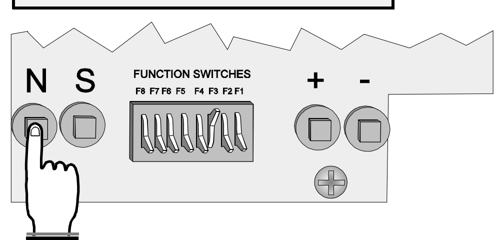
- If set to ACTIVATED, Security is ON.
- If set to ENABLED, Security is ON when the BSI input is turned *ON*.
- If set to DEACTIVATED, Security is OFF regardless of the status of BSI.

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:

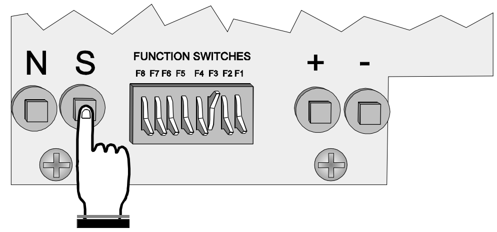
Press the ***N*** pushbutton.



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).



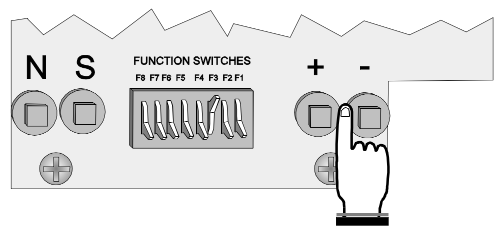
If no code has been programmed, then the computer displays NO CODE PROGRAMMED for that particular floor number. Press the ***S*** pushbutton again to start programming the Security code.

```
Flr 1f: NO
 CODE PROGRAMMED
```

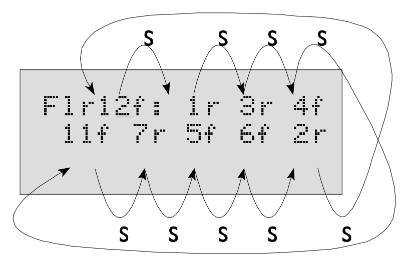
If a code has already been programmed, then the computer displays the security code. The cursor will blink below the floor number for the Security code being displayed.

```
Flr 1f: 8r 3f 4f
  2r21f31r19f17r
```

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):

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).

```
Save Changes?
  N=No S=Save
```

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
PI 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
```

Screen 1

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
```

Screen 2

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
```

Screen 3

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
```

Screen 4

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
```

Screen 5

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. This operation is overridden by Fire Service operation.
- **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.

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

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

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.

```
LIGHT LOAD
WEIGHER = 20%
```

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 (HC-RB4-x).

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').

5.7 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 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 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 5.3 (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 5.3 (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 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 G5 / GPD515 AC Drive	Section 6.5
Troubleshooting the MagneTek HPV 900 AC Drive	Section 6.6
Troubleshooting the TORQMAX F4 AC Drive	Section 6.7
Troubleshooting the Yaskawa F7 AC Drive	Section 6.8
Troubleshooting the TORQMAX F5 AC Drive	Section 6.9
Using the MLT Data Trap	Section 6.10
PC Board Quick References	Section 6.11

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:

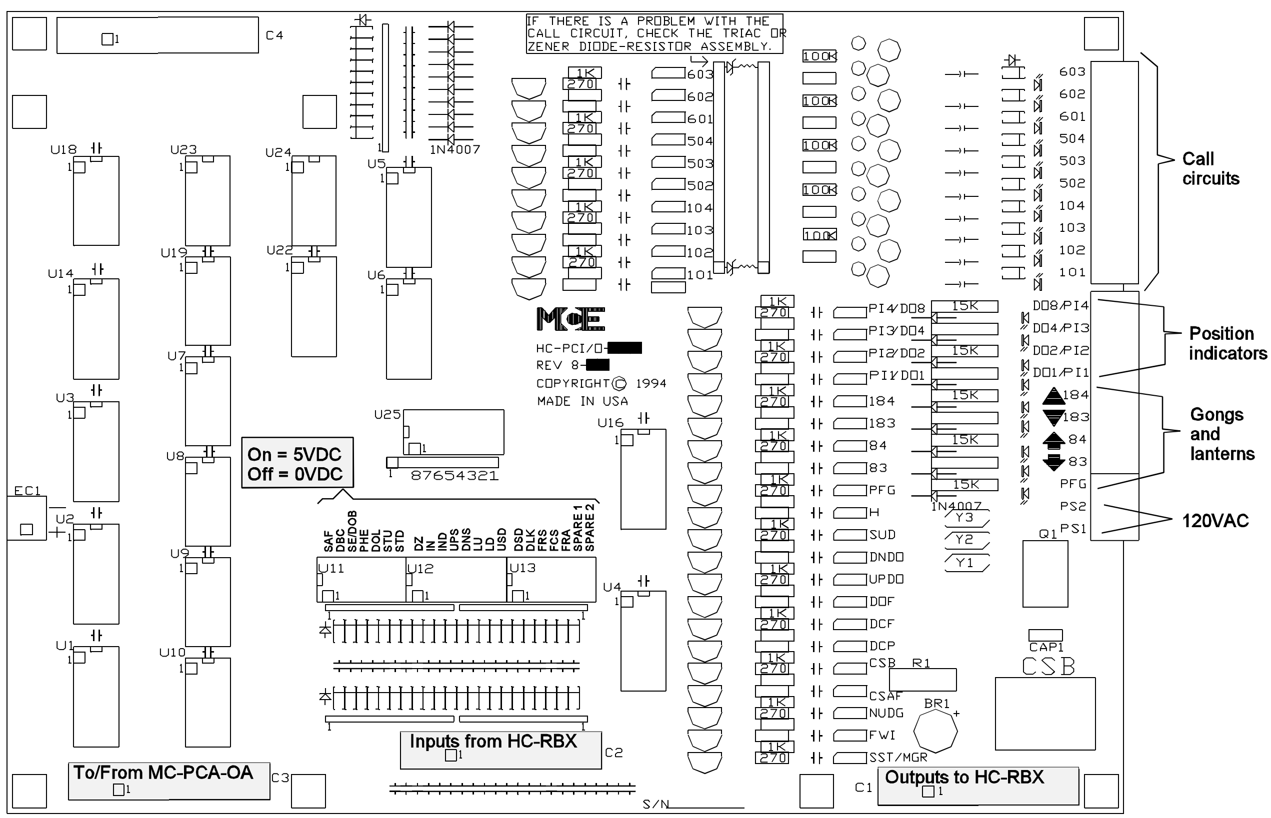
1. A defective Door Zone switch or sensor on the landing system car top unit.
2. Incorrect hoistway wiring.
3. Bad termination of hoistway wiring to the (DZ) terminal inside the controller.
4. A defect on the HC-RB4-VFAC Relay board or HC-PCI/O board.

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 HC-RB4-VFAC 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 Input Output Board 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 HC-RB4-VFAC board illustration (Figure 1.5) in Section 1 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 HC-RB4-VFAC board has test pads on the front of the board for every relay and connector. The relay on the lower left-hand side (RPI) has the legend describing which pad corresponds to which contact of the relay or its coil. To see if the input from terminal 27 is making its way to the relay coil, use the test pad on the lower right-hand side of the DZ relay (the right-hand side of the relay coil symbol on the job print corresponds to the right-hand side on the board). If 120VAC is present across the relay coil and the relay is not picked, then the relay may be defective**.**

It is therefore not necessary to remove the relay or access the back of the HC-RB4-VFAC 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

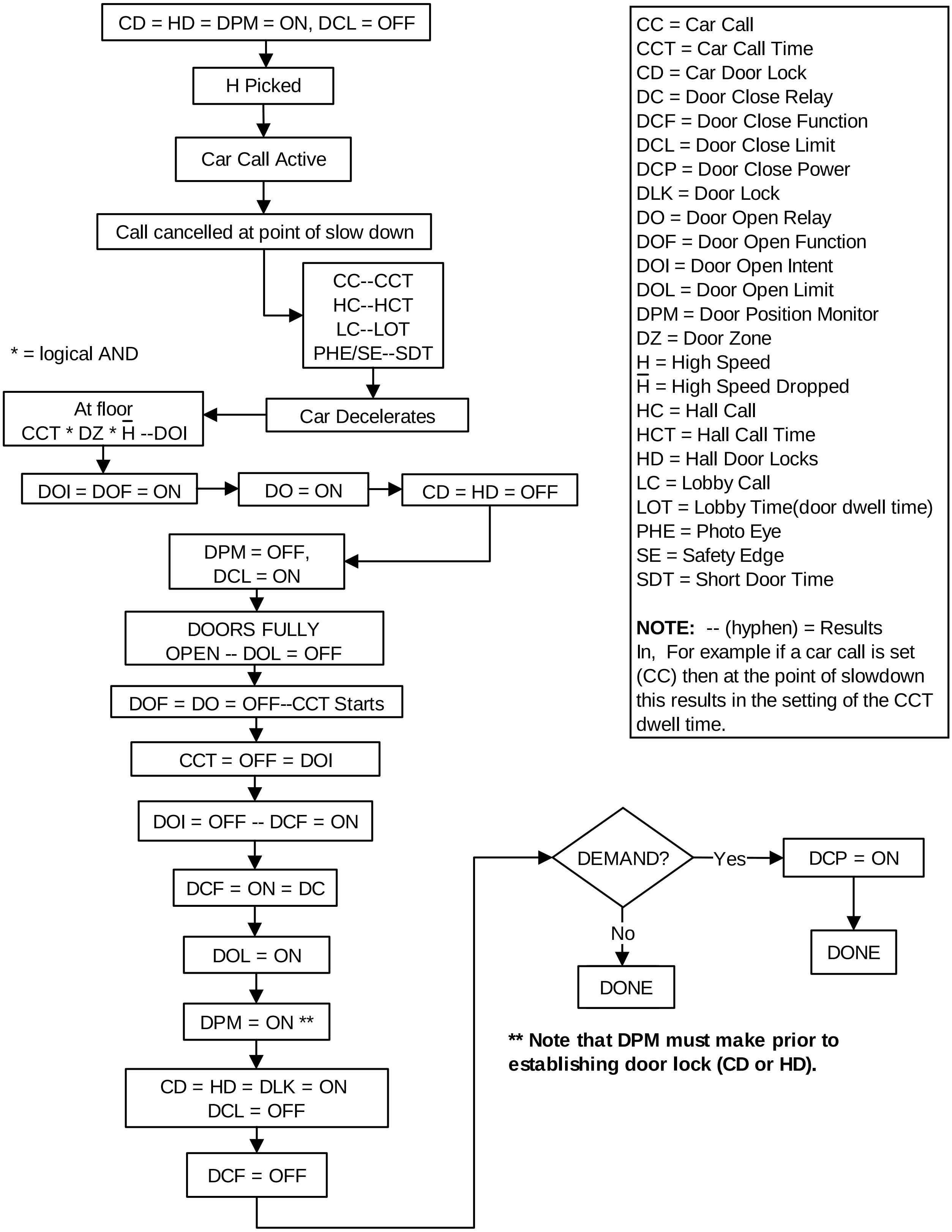
When a call is canceled, one of the following door time flags should be set (turned ON): CCT, HCT, or LOT. When one of the reopening devices is active (SE, PHE, or DOB), the SDT flag should be set. When an Emergency or Independent Service condition exists, the presence of a particular condition will 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 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.

Door Sequence of Operation



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

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.

> **NOTE:** Number 3 below relates to only those jobs that have more than 4 floors and therefore have a HC-CI/O board included.

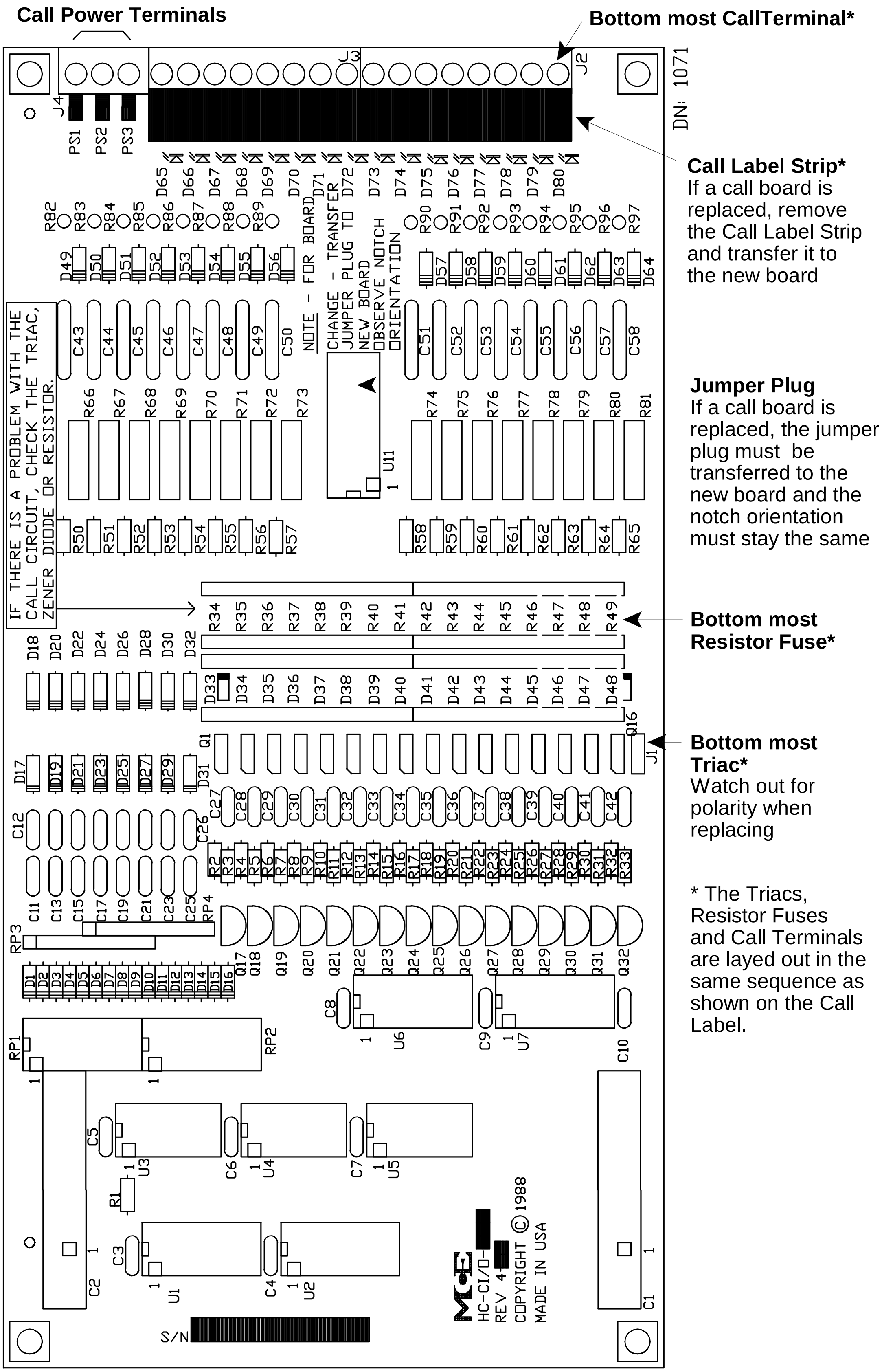
3. If the job has more than four floors, the controller will include at least one HC-CI/O-E Call Input/Output board. If the problem terminal is on this board and the necessary voltage does not read on the terminal, make sure the jumper plug (or header) is in position on the Call board. The jumper plug 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 6.3).

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.

FIGURE 6.3 HC-CI/O Call Input/Output Board Quick Reference

42-QR-HC-CI/O Rev. 2 **HC-CI/O QUICK REFERENCE CARD** **(BOARD 2)**



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, LED 4). 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. 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 not at all when a call is not registered.

Problem	Recommended steps to resolve the problem
No call is registered, yet the Call Indicator on the HC-CI/O board is dimly lit.	Incandescent bulb in the fixture for the call is burned out or missing. Replace the bulb.
Call indicator glows bright whether or not there is a call registered	Bad triac or triac driver transistor. Check triac with power OFF and field wire removed. Failed triac usually measures a short circuit from the metal back (collector) to terminal 1. If board is not in system, measure short between metal back and pad area around mounting hole. Be careful, the metal back of the triac is connected to AC when power is ON. NOTE: bottom triac corresponds to bottom terminal.

6. 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 6.3). 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

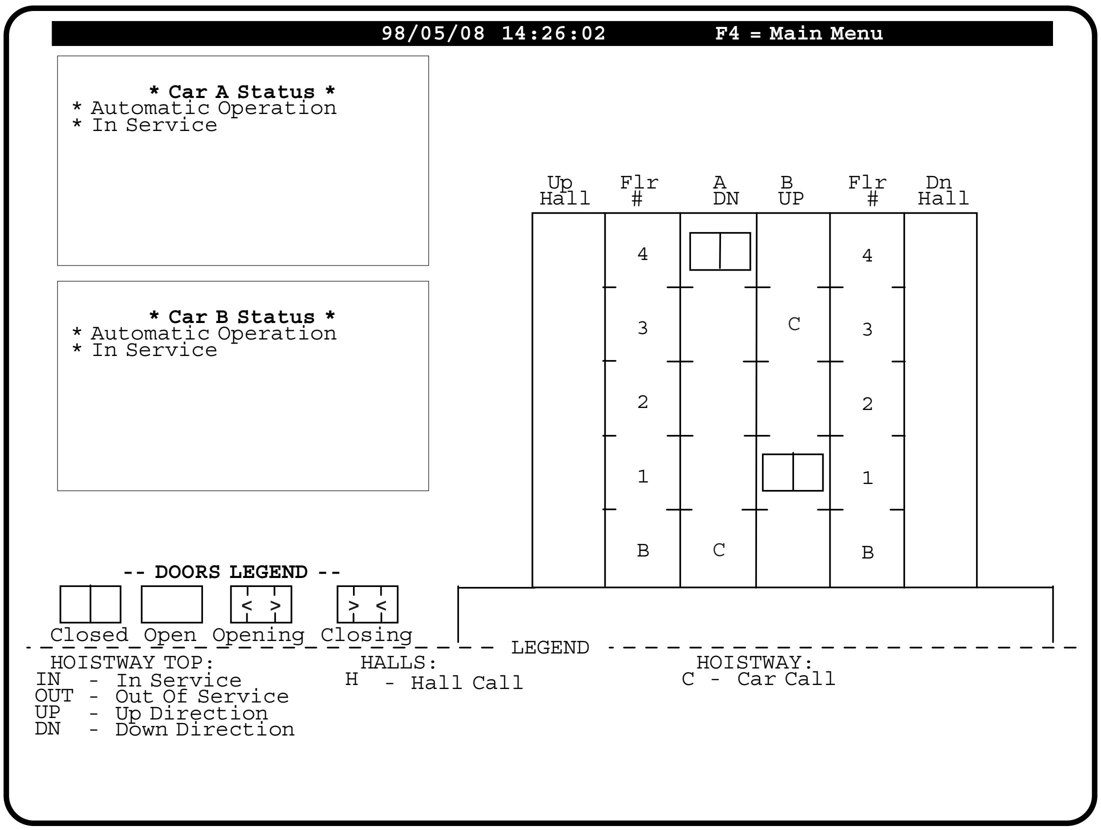
6.4.1 GRAPHIC DISPLAY OF ELEVATOR (F3) SCREEN

The F3 screen shows the hoistway graphic display (see Figure 6.4).

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 6.4 Graphic Display of Elevator (F3) Screen (Color CRT)



dnID168

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 6.5). 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.)
- PI (the car PI at the time the data was logged)

Table 6.1 provides a list of Special Events Calendar messages and their definitions.

FIGURE 6.5 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
```

TABLE 6.1 Special Events Calendar Messages

Bottom Floor Demand	Generated when car comes off of Inspection or when car PI indicates top terminal landing but car is not there. Check top terminal landing slowdown switches and USD input.
Both USD and DSD are Open	Both USD and DSD are simultaneously active (low). Check wiring on terminal switches.
Bus Fuse Blown (2H)	No power exists on the Hall Call Common Bus. Check fuse F4 on group.
Bus Fuse Blown (2)	No power exists on the Car Call Common Bus. Check fuse F4 on car.
Car Out of Svc w/ DLK	Car was delayed from leaving a landing for a significant period of time. Doors were locked. Suspect a malfunction of the running circuits.
Car Out of Svc w/o DLK	Car was delayed from leaving a landing for a significant period of time. Doors were not locked. Suspect an obstruction that has kept the doors from closing, thus preventing the car from leaving the landing.
Communication Loss	Car not communicating with PA. See troubleshooting guide in manual.
DOL Open and DLK Active	Car is shutdown due to unsafe conditions of the DOL and/or DLK sensors. Door Open Limit input (DOL) activated (low) and Door Lock input (DLK), activated (high). Check DOL and DLK inputs.
Door Close Protection	Doors unable to close and lock in specified time. Check door lock string contacts and individual doors for physical obstruction.
Earthquake	Earthquake input (CWI or EQI) activated (high).
Emergency Power	System placed on emergency power. Power removed from EPI input.
Fire Service Main	Main Fire Service input (FRS) activated (low).
Fire Service Alternate	Main Fire Service input (FRS) activated (low) and Alternate Fire Service input (FRA) activated (high).
Fire Service Phase 2	Phase 2 Fire Service input (FCS) activated (high).
Hospital Service	Car assigned to a HOSPITAL EMERGENCY CALL.

TABLE 6.1 Special Events Calendar Messages

Independent Service	Car placed on Independent Service.
Inspection	Hoistway access or car top inspection.
Lost DLK During Run	The DOOR LOCK input was deactivated while the car was traveling through the hoistway.
Motor Limit Timer	Motor stalled due to excessive time to complete run. Put car on inspection then take it off or reset processor. Check Up and Down Sense inputs (UPS and DNS), and generator and motor brushes.
Photo Eye Failure	The PHOTO EYE input has been continuously active for a considerable period of time. Suspect an abnormal blockage of the optical device or failure of the PHOTO EYE input circuit.
Safety String Open	Check on-car and off-car safety devices (e.g. governor overload, over- travel limit switches and car stop switches) and SAF input.
Stop Sw/Safety Relay Ckt	In-Car Stop switch activated or the Safety Relay Circuit opened.
System Out of Service	Car(s) out of service due to Hall Call common bus (2H) failure.
Top Floor Demand	Car PI indicates bottom terminal landing but car is not there. Check bottom terminal landing slowdown switches and DSD input.
Time Out of Service	Elevator abnormally delayed in reaching destination in response to a call demand. Doors cannot close and lock or motor stalled.

6.5 TROUBLESHOOTING THE G5 / GPD515 AC DRIVE

The VFAC drive's digital operator display must read as follows during power up: Frequency reference U1-01=0. If any fault or problem is detected, then turn off the power and refer to the *Alarms and Fault Displays* section of the EMS/Yaskawa AC Drive Manual.

6.5.1 CAR DOES NOT MOVE ON INSPECTION

NOTE: The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that contactors PM (Main) and BR (Brake) pick when the direction relays, U1 and U2 or D1 and D2, are picked). If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 8, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays CNP and RDY should also be picked.

2. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded Hz (Parameter D1-09 value), and the DRIVE and FWD or REV indicator should turn ON when direction is picked on Inspection. If this is not true then check the following:

   a. Verify that the CNP, RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

   b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 15VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

   If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

Parameter	**Description**	**Setting value**
A1-02	Control method selection	0 = V/F control 3 = Flux Vector
B1-01	Reference selection	0 = Operator
B1-02	Run source	1 = Terminals
B1-03	Stopping method	0 = Ramp to stop.
C1-01	Acceleration time	1.0 - 3.0 Setting described in Section 4.2.2
C1-02	Deceleration time	1.0 - 3.0 Setting is described in Section 4.2.2
D1-09	Inspection (Jog reference) Hz	4 -10 Hz or as described in Section 4.2.1
E1-01	Input voltage	Drive input voltage.
E1-03	V/F pattern selection	F - User defined pattern
E1-04 to E1-10	V/F pattern voltage at different points.	Should be according to MCE setting, but verify them.
E2-01	Motor rated FLA	Motor name plate value
E2-02	Motor rated slip frequency	Should be according to MCE setting, but verify. Ref. to the drive parameter sheet or the drive manual which explain how to calculate parameter E2-02.
E2-03	Motor rated No load current	Normally (30 - 40) % of Motor Full load current.
H1-06	Inspection (Jog reference)	6

If the parameters are set at the correct values and the car still does not move, call MCE Technical Support.

6.5.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
D1-02	High speed reference	60 Hz or as described in Section 4.3.4
H1-03	Terminal 5 select	80 (Mult -step spd 1F) for high speed input.

The D1-02 and H1-03 parameters are for High speed selection. When the H relay on the HC-RB4-VFAC board is picked, the HX relay on the HC-ACI should also pick. If parameter D1-02 is set at 60Hz then the drive keypad should display 60Hz and the DRIVE, FWD or REV indicator should be illuminated. If not, verify that the voltage between the COM and H terminals on the HC-ACI board are zero when the H relay is picked. Also check the wiring between the HC-RB4-VFAC board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.5.3 CAR OVERSHOOTS OR THE DRIVE TRIPS “OVER VOLTAGE” ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Adjust the ACC (Drive parameter C1-01, C1-07) and increase acceleration time.

2. Verify that parameter E2-02 and D1-02 are set correctly. Adjust parameter P1-14 if required as described in section 4.2.3 and Figure 4.1. For Flux Vector applications adjust the gain parameters as described in Section 4.3.4 (g).

3. Turn the power OFF and wait for at least 5 minutes so that the DC BUS voltage is not present in the dynamic braking circuit. Verify this by using a multi-meter to check the fuse, the value of the resistance, and to check for any open or loose connections in the dynamic braking circuit. Verify the voltage jumper setting inside the braking unit. If MCE's ACBU-L50 or ACBU-L75 braking unit is provided, then the jumper must be set at a value 10 volts less than the incoming AC line voltage to the drive unit. If Yaskawa's braking unit is provided, then the voltage selector jumper should be set to the same value as that of incoming AC line voltage to the drive unit.

NOTE: Refer to Section 4.3.5 b. for more details regarding over-voltage trip.

6.5.4 DRIVE TRIPS “OVER VOLTAGE” OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.5.3 items 2, 3 and the counter weight are set properly.

2. Verify that parameters D1-03 (High Level speed), D1-05(Level speed) and D1-07 (Intermediate speed if required) are set as described in section 4.2.4.1. Verify that parameters H1-04, H1-05 are set according to the drive parameter sheet.

3. Adjust the deceleration time (Parameter C1-02, C1-08) and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed. A very low leveling speed (less than 7 fpm) might cause this overshoot problem. These speed settings are very sensitive and should be adjusted in small increments (0.01) and carefully.

4. A value that is too high in a deceleration S-curve parameter (P1-18, P1-11, P1-10, P1-07 or P1-06) can cause the car to overshoot and relevel.

5. The coordination of the dropping of the brake and DC injection is very critical. The dropping of the brake is adjusted by trimpot BDD on the HC-ACI board and the DC injection is adjusted by the drive parameters B2-01, B2-02, and B2-04. Refer to drive parameter sheet for the correct settings. Increasing B2-02 will increase the DC injection current and you might start hearing a humming noise from motor before the car stops and brake drops.

NOTE: Refer to Section 4.3.5 b. for more details regarding over-voltage trip.

6. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these two floors at high speed and stop the car properly.

6.5.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED - CLOSED LOOP SYSTEM ONLY (FLUX VECTOR APPLICATIONS)

For a closed loop system, if there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters C5-01 and C5-02 are set very high? The default settings are C5-01= 20 and C5-02 = 0.2.

2. Is the Motor Slip parameter E2-02 set correctly?

3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.5.6 OSCILLATIONS IN THE CAR - OPEN LOOP SYSTEM

For open loop systems, if there are oscillations in the car, check the commanded speed input to the drive unit. Verify the motor slip parameter (E2-02) and the Slip Compensation Gain parameter (C3-01).

6.5.7 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameter L5-01=1 and parameter L5-02 = 0.

6.5.8 ALARMS AND FAULTS

The *Alarms & Fault Displays* section in the EMS/Yaskawa AC Drive manual explains the fault conditions, and suggests corrective actions to be taken if the AC Drive malfunctions. There are some faults which are not listed in the drive manual, such OPE40 AND OPE41, which are described in Table 6.2.

AC Drive Alarms & Faults - When the AC Drive detects a fault, the fault is displayed on the digital operator and activates a fault contact output, after which the motor coasts to a stop. Check the causes listed in the *Alarms & Fault Displays* section in the EMS/Yaskawa AC Drive manual and take the corresponding corrective actions. To restart the inverter, remove any run command and turn ON the reset input signal, or press the RESET key on the digital operator, or cycle power to reset the stop status. If taking the recommended corrective actions described does not solve the problem, contact MCE immediately.

Unlike faults, alarms do not activate fault contact outputs. After the cause of the alarm is corrected, the inverter returns to its former operation status automatically.

In the *Fault Diagnosis and Corrective Actions* table in the EMS/Yaskawa AC Drive manual, faults and alarms are classified in the as follows:

FAULT AND ALARM CLASSIFICATIONS		
Class	**Description**	**Result**
A	Major Fault	Motor coasts to a stop, operation indicator lights, and fault contact output (terminals 18 & 19) is activated.
B	Fault	Operation continues, operation indicator lights, and multi-function fault signal is output (when multi-function output is selected). Fault contact output is *not* activated.
C	Alarm (warning)	Operation cannot be performed, and operation indicator lights, but *no* fault signal is output.

TABLE 6.2 Fault Diagnosis and Corrective Actions (supplement to table in Drive manual)

Fault Display	Name	Description	Corrective Action	Class
OPE40 D1-XX > LIMIT	Invalid Parameter D1-01 - D1- 09	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 and within the Maximum specified values. Enter the correct value of the parameter while accessing the program mode and then reset the drive. The fault should clear.	C
OPE41 Case Fault 2	Invalid Parameter D1-01 - D1-09	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 condition is not met.	C

Motor Faults - If a motor fault occurs, consult the *Motor Faults and Corrective Actions* table in the EMS/Yaskawa AC Drive manual and take the corresponding corrective actions. The following motor faults are addressed in this table:

- Motor does not rotate
- Motor rotation reverses
- Motor rotates, but variable speed not available
- Motor RPM too high or too low
- Motor RPM not stable during operation

If taking the corrective actions described does not solve the problem, contact your EMS/Yaskawa representative immediately.

6.6 TROUBLESHOOTING THE MAGNETEK HPV900 AC DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault refer to the fault Section 3.7 of the MatneTek HPV 900 AC Drive Technical Manual.

6.6.1 CAR DOES NOT MOVE ON INSPECTION

NOTE: The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that contactors PM (Main) and BR (Brake) pick when the direction relays, U1 and U2 or D1 and D2, are picked. If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 8, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays CNP and RDY should also be picked.

2. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded speed and the drive RUN, DRO indicators should turn ON when direction is picked on Inspection. If this is not true then check the following:

   a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

   b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

   If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

CAUTION: The following are very critical HPV900 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

- **A1- Contract Car Spd** (Elevator contract speed).
- **A1- Contract Mtr Spd** (Motor Speed at elevator contract speed/ Motor Full load RPM)
- **A1- Response = 20** (Sensitivity of the speed regulator)
- **A1-Inertia = 2** (System inertia. This parameter will be adjusted during the adaptive tuning of the drive in Section 4.6.5, Adaptive Tuning)
- **A2- Accel Rate 0 = 3.0**
- **A2- Decel Rate 0 = 3.0**
- **A3- Multistep Ref (Inspection, Level, High Level , Intermediate and High speed)** must be set to the valid speed settings described in Section 4.5.1 (Table 4.4).
- **A5 - (Motor parameters)** Must be verified with the motor name plate and the parameter sheet filled out for the specific controller and shipped with the controller.
- **C2-Log In 1 TB1-1 = Drive Enable**
- **C2-Log In 2 TB1-2 = Run Up**
- **C2-Log In 3 TB1-3 = Run Down**
- **C2-Log In 4 TB1-4 = Fault reset**
- **C2-Log In 5 TB1-5 = Step Ref B0** (Inspection speed input)
- **C2-Log In 6 TB1-6 = Step Ref B1** (Level speed input)
- **C2-Log In 7 TB1-7 = Step Ref B2** (High Level speed input)
- **C2-Log In 8 TB1-8 = Step Ref B3** (High speed input)
- **C2-Log In 9 TB1-9 = S Curve Sel 0**
- **C3- Relay Coil 1 = Fault**
- **C3- Relay Coil 2 = Speed Reg Rls.** This parameter is very critical for the operation of the brake (terminal 54 and 55 contact)

If the parameters are set at the correct values and the car still does not move, then call MCE Technical Support.

6.6.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
C2- Log In TB1-8	Terminal 8 selection	Step Ref B3 (High speed input)
A1- Contract Car Spd	Elevator contract speed	Contract speed in ft/min
A1 - Contract speed RPM	Motor Spd at contract speed	Motor Full load RPM
A3- High speed	Speed command #8	Contract speed ft/min

The above described parameters are for High speed selection. When the H relay on the HC-RB4-VFAC board is picked, the HX relay on the HC-ACI should also pick and the drive keypad should display the contract speed. If not, verify that the voltage between the COM and H terminals on the HC-ACI board should be zero when the HX relay is picked. Also check the wiring between the HC-RB4-VFAC board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.6.3 CAR OVERSHOOTS OR THE DRIVE TRIPS “OVER VOLTAGE” ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE: It is mandatory to have 40% counterweight.

1. Decrease drive parameter A2- ACC Rate 0 to decrease the acceleration.

2. Verify the parameters described in section 6.6.1, A1-Response, A1-Inertia, A1- Inner Loop Xover are set correctly.

3. Turn off the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using an voltmeter verify that not voltage is present, then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.6.4 DRIVE TRIPS “OVER VOLTAGE” OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.6.3 items 2 and 3 and the counter weight are set properly.

2. Verify that High Level speed, Level speed (Intermediate speed if required) are set as described in Section 4.5.1.

3. Increase the deceleration parameter A2- Decel Rate 0 and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.

4. If the value of parameter A2- Lev Jerk Rate 0 is too high it can cause the car to overshoot and relevel.

5. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these floors at high speed and stop the car properly.

6.6.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The HPV 900 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters are set two high (A1-Response, A1-Inner Loop Xover)?

2. Are the Motor parameters (A5 - Motor) set correctly?

3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.6.6 DRIVE TRIPS "OVER VOLTAGE" BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameters A1- Flt Reset Delay = 5 , A1 - Flt Reset / Hour = 3 .

6.6.7 ALARMS AND FAULTS

Refer to the fault section 3.7 in the MagneTek HPV 900 AC Drive Technical Manual.

6.7 TROUBLESHOOTING THE TORQMAX F4 AC DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault displayed, refer to Section 6.8.7 in this manual or the fault section in TORQMAX F4 Drive Technical Manual.

6.7.1 CAR THE DOES NOT MOVE ON INSPECTION

NOTE:	The TORQMAX F4 drive software has been modified for use in MCE controllers. Some of the parameters in the drive are different from those listed in the standard drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that relay CNP and RDY on the HC- ACI board are ON (if not refer to step 2.a below). Contactors PM (Main) and BR (Brake) should pick when the direction relays U1 and U2 or D1 and D2, are picked. If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check to see if any fault is displayed on the drive keypad before and after picking direction on Inspection. When direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should pick. If these relays are not picking, check for 120VAC on terminals 8, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem.

2. To verify that the drive receives the direction, enable and inspection speed command signals from the (HC-ACI) board, do the following:

   - To verify the drive enable signal, select parameter LF.98 and pick direction on Inspection. The drive display should change from STOP to RUN. If it does not display RUN, follow the controller drawings and verify the connection to terminal X2.1 (Enable terminal).

   - To verify the commanded speed signal, select either parameter LF.88 or LF.86 and pick direction on Inspection. If LF 88 is selected, the drive key pad should display the inspection speed (Motor RPM) value. If LF.86 is selected the drive keypad should display a four (4).

- To verify the direction input signal, display parameter LF.99 and pick UP direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **Facc** (forward acceleration) and then to **Fcon** (forward constant running).

  Pick DOWN direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **rAcc** (reverse acceleration) and then to **rCon** (reverse constant running).

When direction is picked on Inspection, the DRO relay should pick. If this is not true, check the following:

a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If these relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

b. To verify the UP, DN , Enable and speed inputs to the drive, measure the DC voltage between terminals X2.10 and the respective drive terminals. In the down direction the voltage between X2.10 and X2.4 should be zero. In the up direction the voltage between X2.10 and X.2.4 should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked.

   If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

CAUTION: The following are very critical TORQMAX F4 Drive parameters. Incorrect values for these parameters can cause erratic elevator operation:

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

If all the parameters are correct, relay DRO turns ON (when direction is picked), and car still does not move, then call MCE technical support.

6.7.2 CAR DOES NOT RUN / REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
LF.11	Motor RPM	
LF.20	Contract speed in FPM	
LF.21	Traction Sheave diameter inches	
LF.22	Gear reduction ratio	
LF.23	Roping ratio	
LF.31	Speed Prop gain	
LF.32	Speed Int gain	
LF.42	High speed FPM	

Verify that the drive is getting the High speed command signal - To verify that the drive is getting the High speed command signal from the controller, select parameter LF.86 and make a multi-floor run. The display should change from zero (0) to three (3) when high speed is picked. If the value remains zero (0), the drive is not getting the high speed command signal. Check the following:

- Verify that relay H on the HC-RB4-VFAC board and relay HX on the HC-ACI board are both picked.
- Verify that the voltage between terminal H and COM on the HC-ACI board is zero when relay HX is picked. If not, check the wiring between the HC-ACI board and the drive.
- Verify the operation of relay USD / DSD on the HC-ACI board. The normally open contacts of these relays are in series with the High speed command to the drive.

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

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

If the car does not reach Contract speed - If the drive is getting the High speed command signal but the car does not reach Contract speed, perform one of the following checks:

New motor - If the hoist motor is new, verify the following:

- LF.20 and LF.42 are set to the correct value in FPM.
- Rated motor speed (LF.11) is set to motor full load RPM.
- LF.22 (Gear reduction ratio) is set correctly.

Old motor - If the hoist motor is old, and the car does not reach contract speed (empty car down), display LF.90 and do the following:

1. Decrease the field weakening speed LF.16 to approximately 2/3 of the motor synchronous speed.
2. Set the power factor parameter LF.15 = 0.9.
3. Decrease the rated motor speed parameter LF.11 in steps of 20 until the rated speed is reached (empty car down).
4. If the current drawn by the motor is too high (parameter ru.90) then increase parameter LF.11 in steps of 10.

6.7.3 CAR OVERSHOOTS OR THE DRIVE TRIPS on 'E. OL' or 'E. OP' ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE:	It is mandatory to have 40% counterweight.

1. Decrease drive parameters LF.51 Acceleration Rate and LF.50 Acceleration Jerk .
2. Increase the drive gains by increase parameters LF. 31 and LF.32.
3. Turn OFF the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using a voltmeter, verify that no voltage is present. Then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.7.4 DRIVE TRIPS 'E.OP' OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on 'E.OP' during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.8.3 and the counter weight are set properly.
2. Verify that the High Level speed, Level speed and Intermediate speed (if required) are set as described in Sections 4.8.1 and 4.9.4 'c'..
3. Increase the deceleration parameter <u>LF.53</u> and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.
4. If the value of parameter <u>LF.52</u> is too high it can cause the car to overshoot and relevel.
5. If all the items above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these floors at high speed and stop the car properly.

6.7.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The HPV 900 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters set two high (LF.31 and LF.32)?.
2. Are the Motor parameters set correctly?

3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.7.6 DRIVE TRIPS "OVER VOLTAGE" BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit.

6.7.7 ALARMS AND FAULTS

Following are some of the faults and drive errors. For more details and corrective actions, refer to the drive manual.

TABLE 6.8 TORQMAX F4 Drive Fault Messages

Display	Value	Description
E.buS	18	Error, bus, failure in serial communication
E.dOH	9	Error, drive-overheat, motor overheats and prewarning time has run out
E.dSP	51	Error, digital signal processor, error in signal processor
E.PrF	46	Error, prohibited rotation forward, error in the software limit switch (when the set direction of rotation is forward, the software limit switch for forward is inactive)
E.Prr	47	Error, prohibited rotation reverse, error in the software limit switch (when the set direction of rotation is reverse, the software limit switch for reverse is inactive)
E.hyb	52	Error, hybrid, error in the encoder input card
E.EnC	32	Error, encoder, error in the encoder signal-bad connection (reset only possible with Power-On-Reset)
E.LSF	15	Error, charging circuit of the inverter
E.OC	4	Error, overcurrent, short-circuit or ground fault on the output of the inverter
E.OH	8	Error, overheated, overheating of the inverter
E.OH2	30	Error, overheat 2, electronic motor overload protection
E.nOH	36	Error, no overheat, overheating no longer present, can be reset (valid for malfunction E.OH or E.OH2
E.OL	16	Error, overload, continuous overload, for cooling down the inverter has to stay supplied with power, the cooling time depends on the previous overload time
E.OL2	53	Error overload, overloading of the inverter at output frequency < 3 Hz
E.nOL	17	Error, no overload, cooling time has run out, error can be reset
E.OP	1	Error, over-potential, overvoltage in the DC voltage circuit
E.OS	105	Error, overspeed, overspeed (can only be reset with Power-On-Reset)
E.PuC	49	Error, power unit code, invalid power circuit recognition
E.SEt	39	Error, set, set selection error, check LF.02
E.UP	2	Error, under-potential, undervoltage in DC voltage circuit
E.hSd	-	Error, this error occurs when there is a difference between the commanded speed and the actual motor speed for a certain period of time. Verify parameter LF.58 and LF.59. Lower Speed Prop (LF.31) and Integral Gain (LF.32) parameters. Verify LF.17 (Encoder pulse count). Verify LF.11 (Motor speed/RPM). Reaching Torq limit - caused by higher acceleration. Load is too high - lower the value of LF.36.
E.LC	-	no current flows to the motor, check the wiring between motor and inverter

TABLE 6.9 TORQMAX F4 Drive Error State

Display	Significance
StOP	no speed selection
S.Co	speed selection without contactor control
S.IO	speed selection without drive enable
S.nC	no current flows to the motor, check the wiring between motor and inverter
S.bd	both direction inputs are selected simultaneously
run	starting procedure is completed

TABLE 6.10 TORQMAX F4 Drive Inverter State

Display	Value	Significance
bbl	76	base-block-time runs out, power modules are blocked for 3s (always when control release is cleared)
Facc	64	forward acceleration
Fcon	66	forward constant running
FdEc	65	forward deceleration
nOP	0	no operation, terminal X2.1 is not set.
LS	70	low speed, control release is switched but no direction of rotation is adjusted, modulation disabled
rAcc	67	reverse acceleration
rCon	69	reverse constant running
rdEc	68	reverse deceleration

6.7.8 TROUBLESHOOTING FLOWCHARTS - TORQMAX F4 DRIVE

FIGURE 6.25 TORQMAX F4 Troubleshooting Flowchart - Drive Key Pad

Drive Key Pad

Series M TORQMAX

How to change and save drive parameters.

Start

There are four push buttons on the drive key pad

.

1. Enter / (F/R): Saves the selected parameter. In addition it is also used for selecting parameter groups.
2. UP/Star : Increases the selected parameter value. In addition it is also used to find the parameter group.
3. DN/STOP: Decreases the selected parameter value. In addition it is also used to find the parameter group.
4. FUNC/SPEED: Displays (reads) the parameter value.

1. Select the parameter group (Press the **Enter** key. The blinking dot next to the parameter number should flash).
2. Use **UP** or **DN** arrow to select the desired LF.xx parameter.
3. Press the **FUNC** key to see the parameter value.
4. Use the **UP** or **DN** arrow to change the parameter value.
5. Press **Enter** to save the parameter value (Important, without this step parameter will not be saved).

Stop

FIGURE 6.26 TORQMAX F4 Troubleshooting Flowchart - Critical Drive Parameters

Critical Drive Parameters

Series M TORQMAX

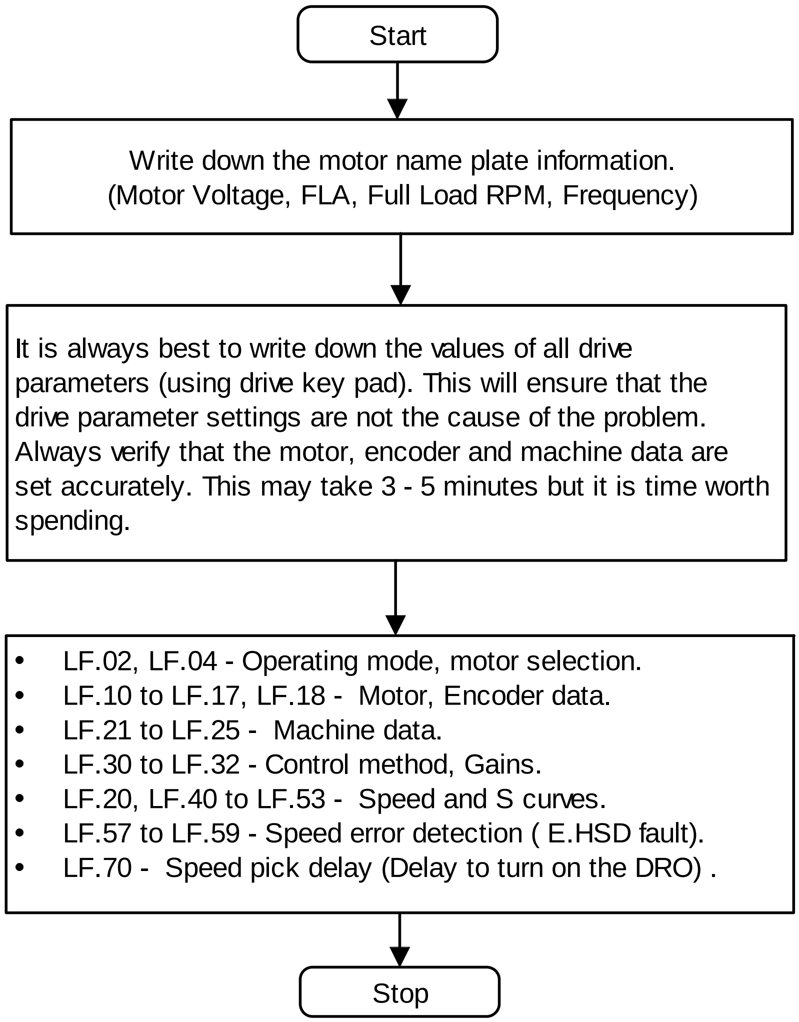
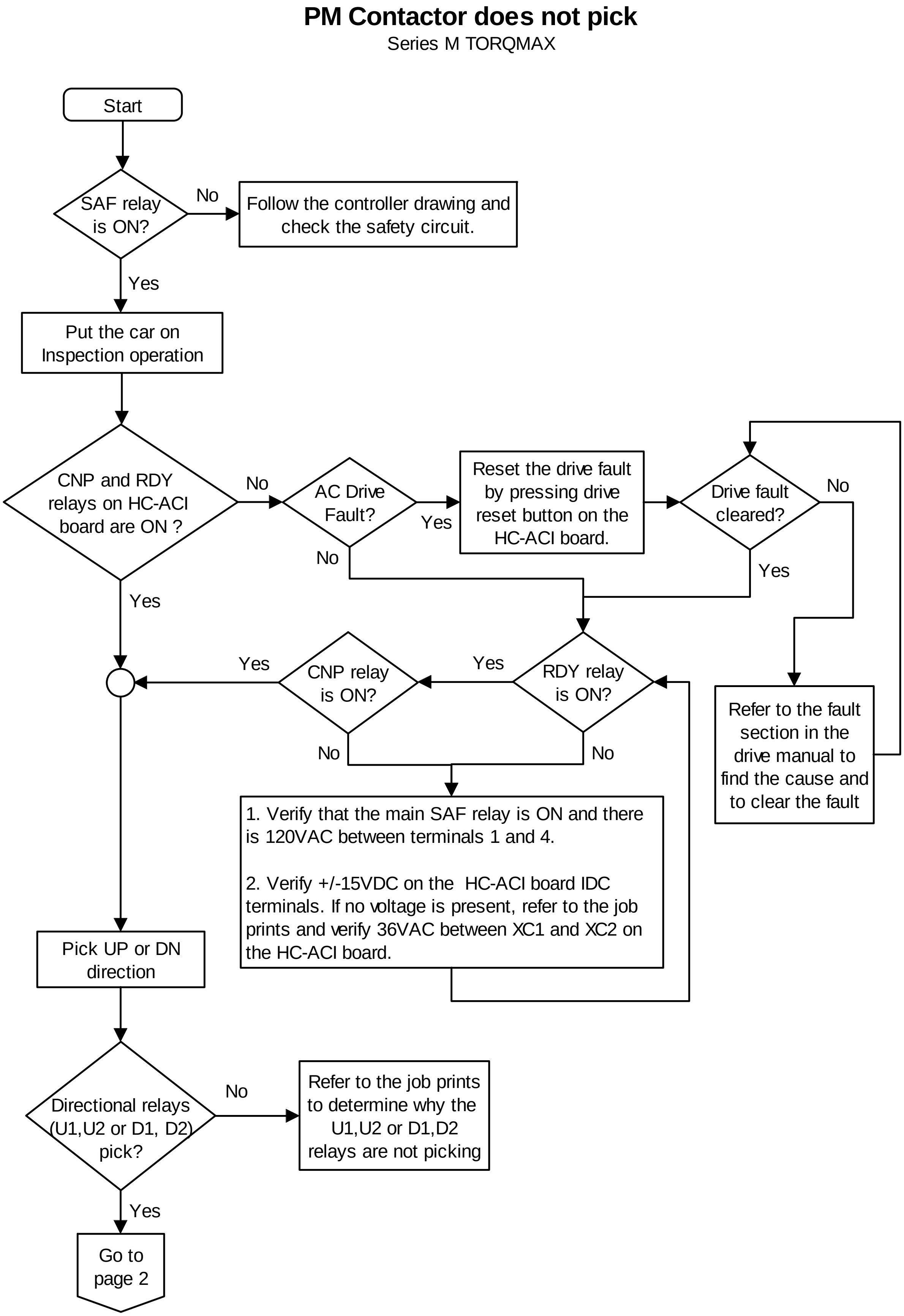


FIGURE 6.27 TORQMAX F4 Troubleshooting Flowchart - PM Contactor does not pick



PM Contactor does not pick

Series M TORQMAX

Page 2

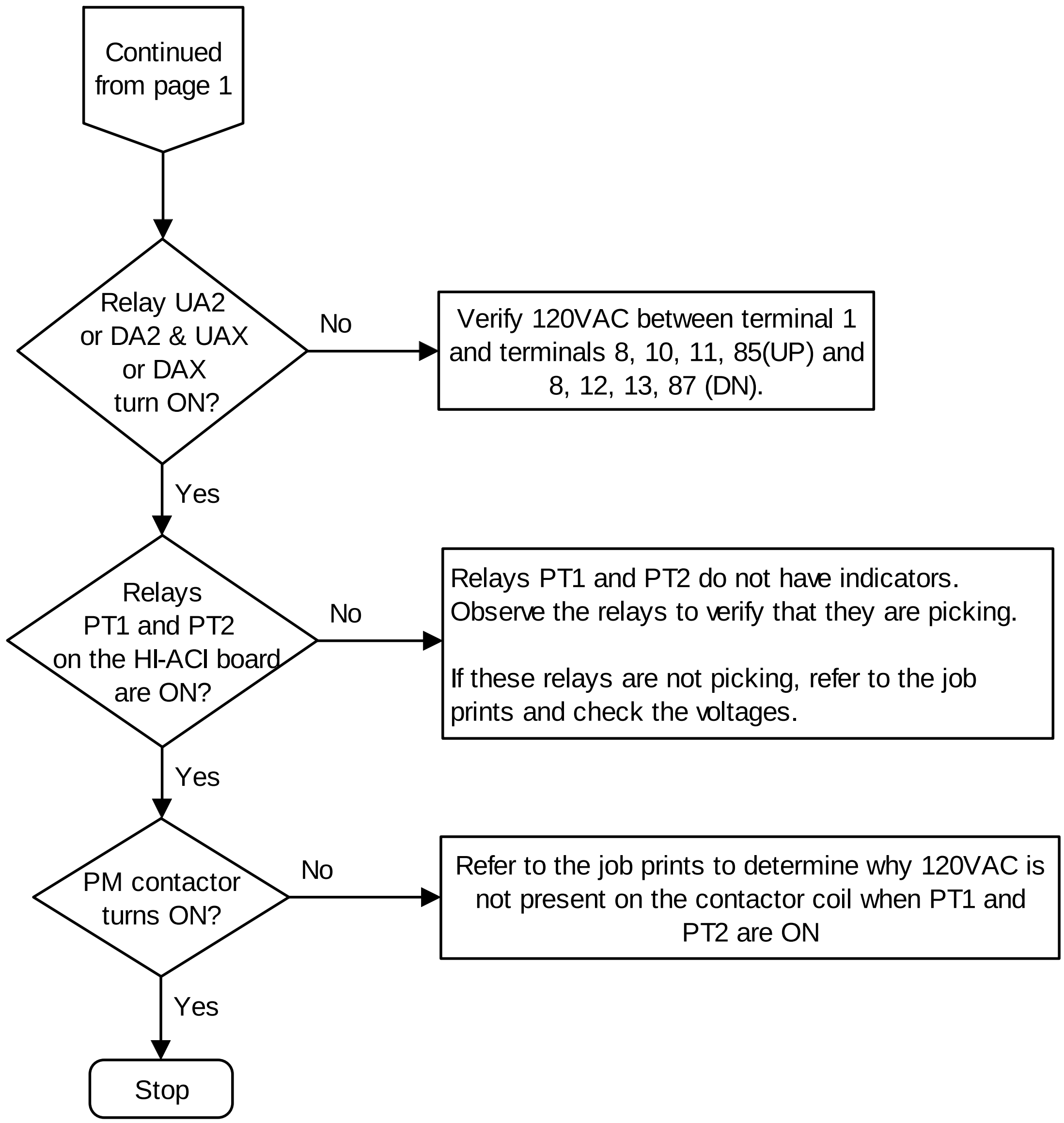
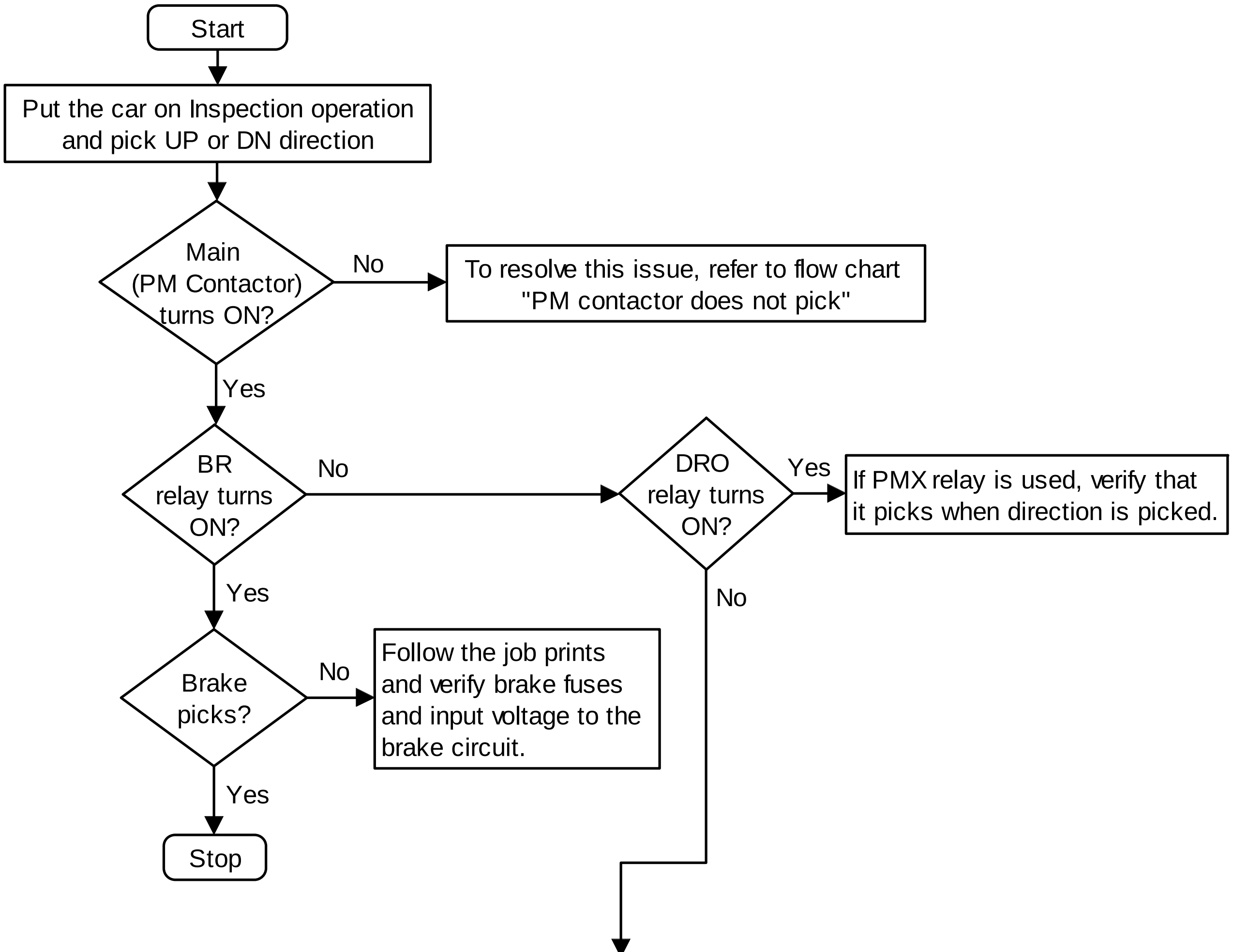


FIGURE 6.28   TORQMAX F4 Troubleshooting Flowchart - Brake does not pick

Brake does not pick

Series M TORQMAX



1. Verify that the drive parameters are set correctly.

2. Select LF.82. The value should change from 0 to 5 or 9 when a direction is picked on Inspection (0 = No signal, 5 = Enable and Forward(UP) inputs are ON, 9 = Enable and Reverse(DN) inputs are ON).
   If this is not true, the drive is not getting the enable and direction input signals.

3. Select LF.84. The value should change from 0 to 16 when direction is picked on Inspection. (0 = No speed, 16 = Inspection speed). If this is not true, the drive is not receiving the speed input.

4. To verify the drive input signals, refer to the job prints and measure the DC voltage between drive common "X2.11" and the respective input (X2.3 - Forward, X2.4 - Reverse , X3.5 - Inspection speed). The voltage should read 18VDC when the respective input is ON.

5. Select LF.85, The value should change to 5309 when direction on inspection is picked (Drive is running below High or INT speed).

6. If all the above are true, follow the drawings and verify the voltage at various points in the DRO coil circuit.

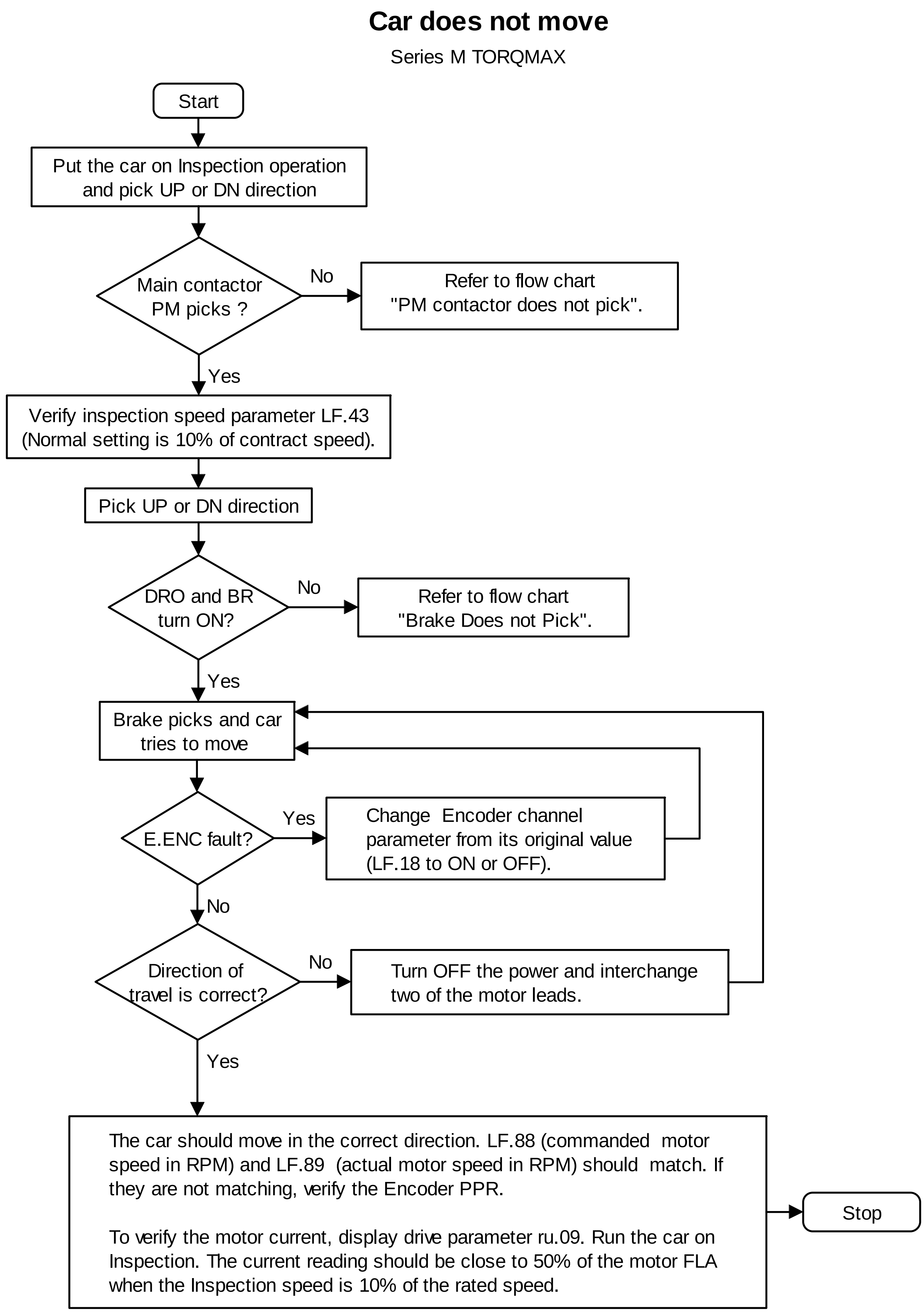

Car does not move
Series M TORQMAX
Start
Put the car on Inspection operation and pick UP or DN direction
Main contactor PM picks ?
No
Refer to flow chart "PM contactor does not pick".
Yes
Verify inspection speed parameter LF.43 (Normal setting is 10% of contract speed).
Pick UP or DN direction
DRO and BR turn ON?
No
Refer to flow chart "Brake Does not Pick".
Yes
Brake picks and car tries to move
E.ENC fault?
Yes
Change Encoder channel parameter from its original value (LF.18 to ON or OFF).
No
Direction of travel is correct?
No
Turn OFF the power and interchange two of the motor leads.
Yes
The car should move in the correct direction. LF.88 (commanded motor speed in RPM) and LF.89 (actual motor speed in RPM) should match. If they are not matching, verify the Encoder PPR.
To verify the motor current, display drive parameter ru.09. Run the car on Inspection. The current reading should be close to 50% of the motor FLA when the Inspection speed is 10% of the rated speed.
Stop

FIGURE 6.30 TORQMAX F4 Troubleshooting Flowchart - Encoder Fault

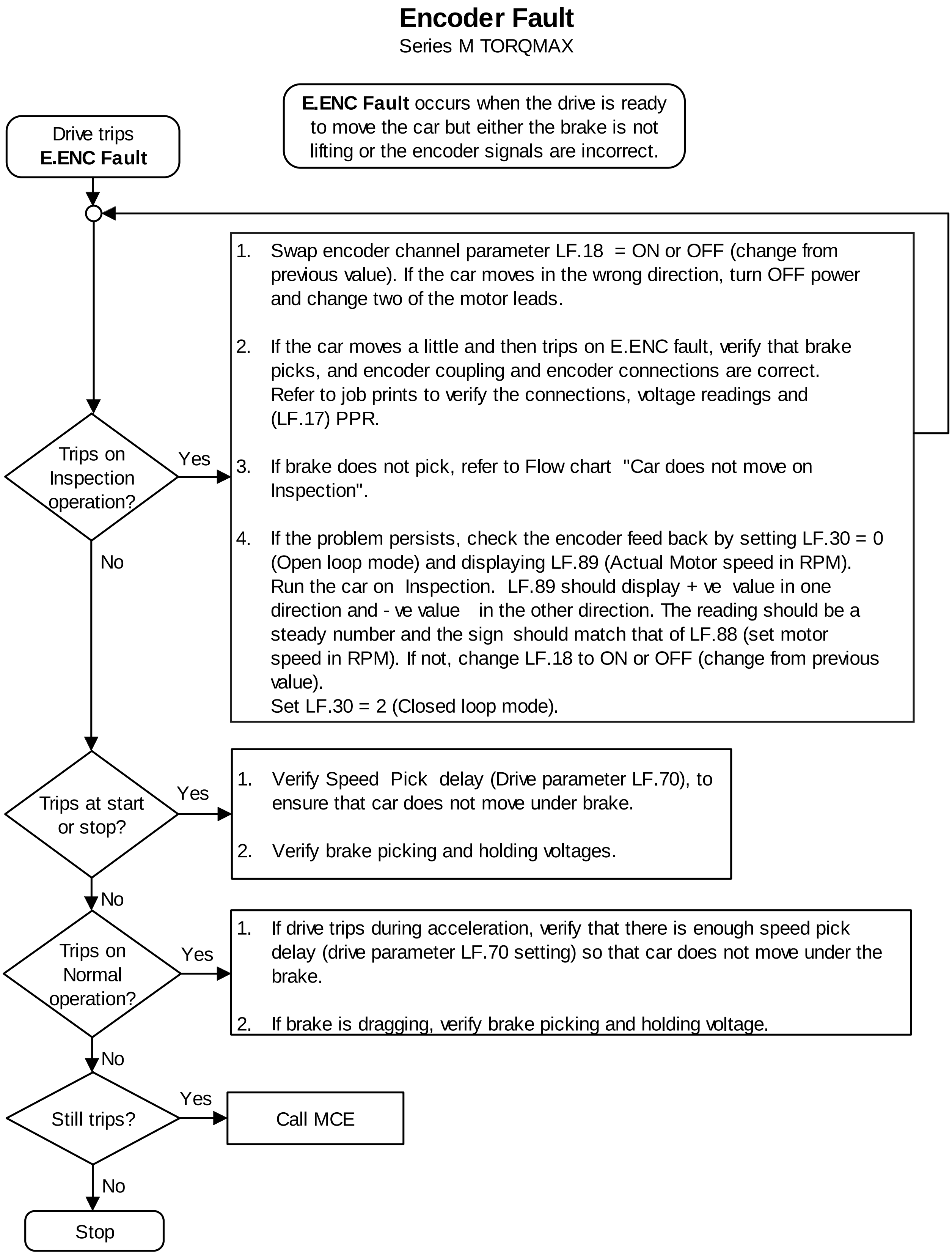


FIGURE 6.31 TORQMAX F4 Troubleshooting Flowchart - E.LC Fault

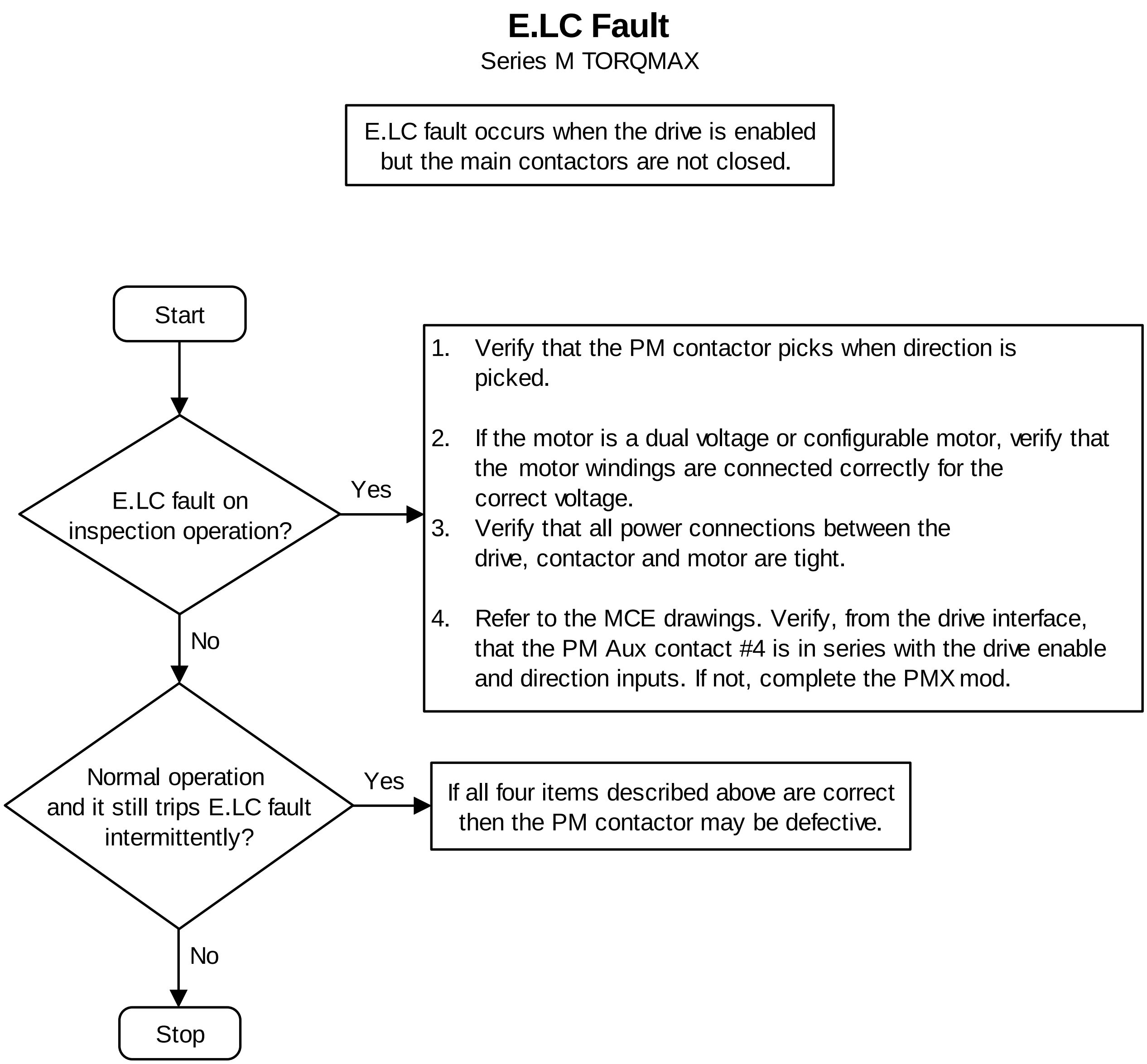
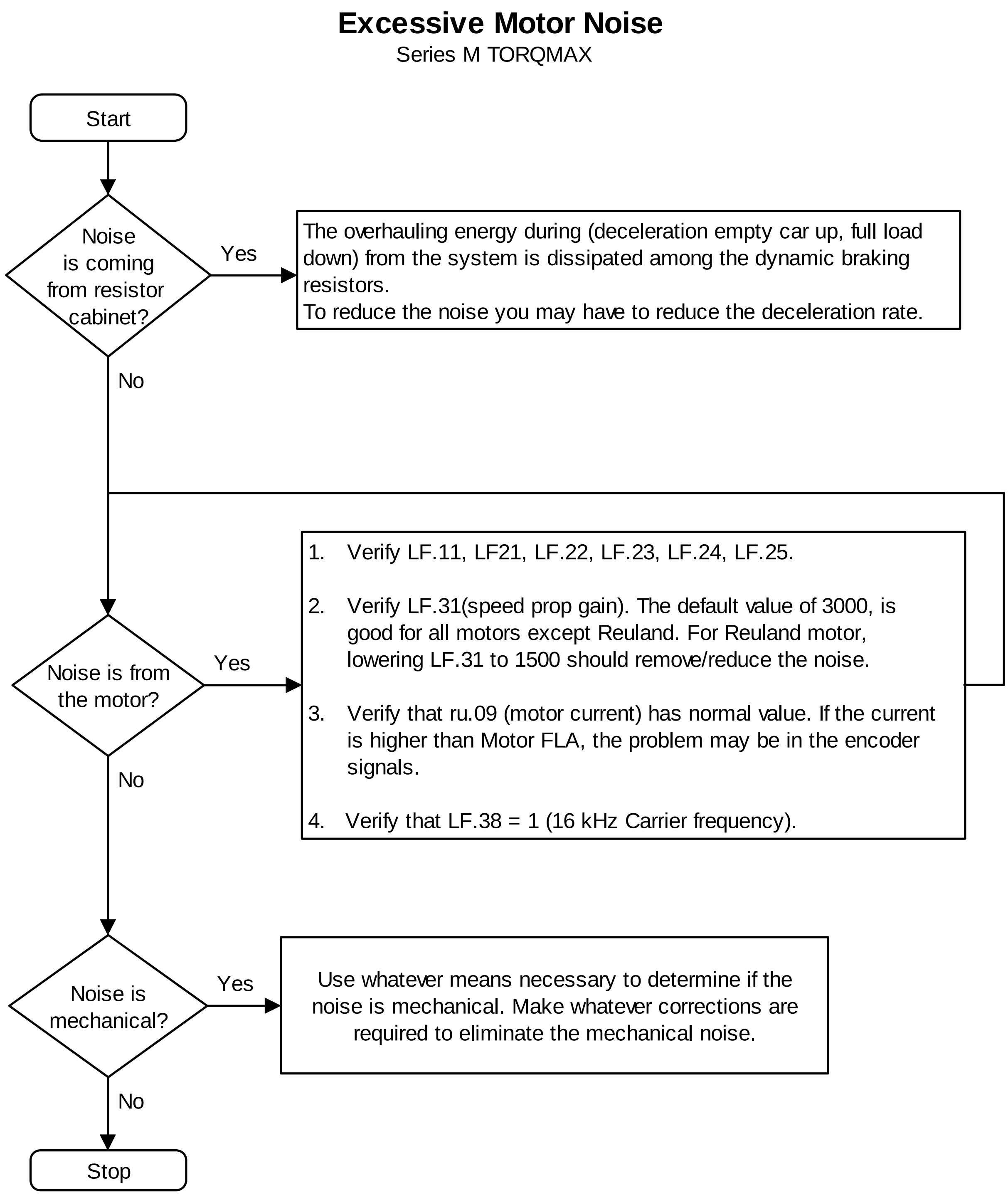


FIGURE 6.32 TORQMAX F4 Troubleshooting Flowchart - Excessive motor noise



6.8 TROUBLESHOOTING THE YASKAWA F7 AC DRIVE

The VFAC drive's digital operator display must read as follows during power up: Frequency reference U1-01=0. If any fault or problem is detected, then turn off the power and refer to the *Alarms and Fault Displays* section of the Yaskawa F7 AC Drive Manual.

6.8.1 CAR DOES NOT MOVE ON INSPECTION

NOTE: The drive software has been modified for this application. Some of the parameters in the parameter sheet are different and are not available in the drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that contactors PM (Main) and BR (Brake) pick when the direction relays, U1 and U2 or D1 and D2, are picked). If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check for any fault that is displayed on the drive keypad before and after picking the direction on Inspection. When the direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should be picked. If these relays are not picked, check for 120VAC on terminals 8, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem. Note that relays CNP and RDY should also be picked.

2. Verify that the drive receives the direction enable and inspection speed command signals from the (HC-ACI) board. The drive key pad should display the commanded fpm (parameter D1-17 value), and the DRIVE and FWD or REV indicator should turn ON when direction is picked on Inspection. If this is not true then check the following:

   a. Verify that the CNP, RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If the relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

   b. Check for the correct direction enable signal by measuring the DC voltage between terminals COM and UP or DN on the HC-ACI board. In the down direction the voltage between COM and DN should be zero. In the up direction the voltage between COM and UP should be zero. The floating voltage between these points is approximately 15VDC when the direction relays *are not* picked. The voltage between the COM and INS terminals should be zero when direction relays *are* picked on Inspection.

If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

Parameter	Description	Setting value
A1-02	Control method selection	0 = V/F control 3 = Flux Vector
B1-01	Reference selection	0 = Operator
B1-02	Run source	1 = Terminals
B1-03	Stopping method	0 = Ramp to stop.
C1-01	Acceleration rate	3.00 Setting described in Section 4.11.2
C1-02	Deceleration rate	3.00 Setting is described in Section 4.11.2
D1-17	Inspection (Jog reference) fpm	Inspection speed or as described in Section 4.11.1
E1-01	Input voltage	Drive input voltage.
E1-03	V/F pattern selection	F - User defined pattern
E1-04 to E1-10	V/F pattern voltage at different points.	Should be according to MCE setting, but verify them.
E2-01	Motor rated FLA	Motor name plate value
E2-02	Motor rated slip frequency	Should be according to MCE setting, but verify. Ref. to the drive parameter sheet or the drive manual which explain how to calculate parameter E2-02.
E2-03	Motor rated No load current	Normally (30 - 40) % of Motor Full load current.
H1-06	Inspection (Jog reference)	6

If the parameters are set at the correct values and the car still does not move, call MCE Technical Support.

6.8.2 CAR DOES NOT REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
D1-02	High speed reference	Contract speed or as described in Section 4.12.4
H1-03	Terminal 5 select	80 (Mult -step spd 1F) for high speed input.

The D1-02 and H1-03 parameters are for High speed selection. When the H relay on the HC-RB4-VFAC board is picked, the HX relay on the HC-ACI should also pick. If parameter D1-02 is set to contract speed then the drive keypad (U1-02 parameter) should display contract speed in fpm and the DRIVE, FWD or REV indicator should be illuminated. If not, verify that the voltage between the COM and H terminals on the HC-ACI board are zero when the H relay is picked. Also check the wiring between the HC-RB4-VFAC board and the HC-ACI board and the wiring between the HC-ACI board and the drive unit.

6.8.3 CAR OVERSHOOTS OR THE DRIVE TRIPS “OVER VOLTAGE” ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

> **NOTE:** It is mandatory to have 40% counterweight.

1. Adjust the ACC (Drive parameter C1-01, C1-07) and increase acceleration time.

2. Verify that parameter E2-02 and D1-02 are set correctly. Adjust parameter P1-14 if required as described in section 4.11.3 and Figure 4.9. For Flux Vector applications adjust the gain parameters as described in Section 4.12.4 (g).

3. Turn the power OFF and wait for at least 5 minutes so that the DC BUS voltage is not present in the dynamic braking circuit. Verify this by using a multi-meter to check the fuse, the value of the resistance, and to check for any open or loose connections in the dynamic braking circuit. Verify the voltage jumper setting inside the braking unit. If MCE's ACBU-L50 or ACBU-L75 braking unit is provided, then the jumper must be set at a value 10 volts less than the incoming AC line voltage to the drive unit. If Yaskawa's braking unit is provided, then the voltage selector jumper should be set to the same value as that of incoming AC line voltage to the drive unit.

> **NOTE:** Refer to Section 4.12.5 b. for more details regarding over-voltage trip.

6.8.4 DRIVE TRIPS “OVER VOLTAGE” OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on over voltage during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.8.3 items 2, 3 and the counter weight are set properly.

2. Verify that parameters D1-03 (High Level speed), D1-05(Level speed) and D1-07 (Intermediate speed if required) are set as described in section 4.11.1. Verify that parameters H1-04, H1-05 are set according to the drive parameter sheet.

3. Adjust the deceleration rate (Parameter C1-02, C1-08) and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed. A very low leveling speed (less than 7 fpm) might cause this overshoot problem. These speed settings are very sensitive and should be adjusted in small increments (0.01) and carefully.

4. A value that is too high in a deceleration S-curve parameter (P1-18, P1-11, P1-10, P1-07 or P1-06) can cause the car to overshoot and relevel.

5. The coordination of the dropping of the brake and DC injection is very critical. The dropping of the brake is adjusted by trimpot BDD on the HC-ACI board and the DC injection is adjusted by the drive parameters B2-01, B2-02, and B2-04. Refer to drive parameter sheet for the correct settings. Increasing B2-02 will increase the DC injection current and you might start hearing a humming noise from motor before the car stops and brake drops.

NOTE: Refer to Section 4.12.5 b. for more details regarding over-voltage trip.

6. If all the items described above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these two floors at high speed and stop the car properly.

6.8.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED - CLOSED LOOP SYSTEM ONLY (FLUX VECTOR APPLICATIONS)

For a closed loop system, if there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters C5-01 and C5-02 are set very high? The default settings are C5-01= 20 and C5-02 = 0.2.

2. Is the Motor Slip parameter E2-02 set correctly?

3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.8.6 OSCILLATIONS IN THE CAR - OPEN LOOP SYSTEM

For open loop systems, if there are oscillations in the car, check the commanded speed input to the drive unit. Verify the motor slip parameter (E2-02) and the Slip Compensation Gain parameter (C3-01).

6.8.7 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit and verify that drive parameter L5-01=1 and parameter L5-02 = 0.

6.8.8 ALARMS AND FAULTS

The *Alarms & Fault Displays* section in the Yaskawa F7 AC Drive manual explains the fault conditions, and suggests corrective actions to be taken if the AC Drive malfunctions. There are some faults which are not listed in the drive manual, such OPE40 AND OPE41, which are described in Table 6.6.

AC Drive Alarms & Faults - When the AC Drive detects a fault, the fault is displayed on the digital operator and activates a fault contact output, after which the motor coasts to a stop. Check the causes listed in the *Alarms & Fault Displays* section in the Yaskawa F7 AC Drive manual and take the corresponding corrective actions. To restart the inverter, remove any run command and turn ON the reset input signal, or press the RESET key on the digital operator, or cycle power to reset the stop status. If taking the recommended corrective actions described does not solve the problem, contact MCE immediately.

Unlike faults, alarms do not activate fault contact outputs. After the cause of the alarm is corrected, the inverter returns to its former operation status automatically.

In the *Fault Diagnosis and Corrective Actions* table in the Yaskawa F7 AC Drive manual, faults and alarms are classified as follows:

FAULT AND ALARM CLASSIFICATIONS		
Class	**Description**	**Result**
A	Major Fault	Motor coasts to a stop, operation indicator lights, and fault contact output (terminals MA & MB) is activated.
B	Fault	Operation continues, operation indicator lights, and multi-function fault signal is output (when multi-function output is selected). Fault contact output is *not* activated.
C	Alarm (warning)	Operation cannot be performed, and operation indicator lights, but *no* fault signal is output.

TABLE 6.6 Fault Diagnosis and Corrective Actions (supplement to table in Drive manual)

Fault Display	Name	Description	Corrective Action	Class
OPE40 D1-XX > LIMIT	Invalid Parameter D1-01 - D1- 17	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 and within the Maximum specified values. Enter the correct value of the parameter while accessing the program mode and then reset the drive. The fault should clear.	C
OPE41 Case Fault 2	Invalid Parameter D1-01 - D1-17	Preset speed reference parameters.	D1-02>D1-07>D1-03>D1-05>0.0 condition is not met.	C

Motor Faults - If a motor fault occurs, consult the *Motor Faults and Corrective Actions* table in the Yaskawa F7 AC Drive manual and take the corresponding corrective actions. The following motor faults are addressed in this table:

- Motor does not rotate
- Motor rotation reverses
- Motor rotates, but variable speed not available
- Motor RPM too high or too low
- Motor RPM not stable during operation

If taking the corrective actions described does not solve the problem, contact your Yaskawa representative immediately.

6.9 TROUBLESHOOTING THE TORQMAX F5 DRIVE

The drive's digital operator display should have the normal display. If there is any drive fault displayed, refer to the fault section in TORQMAX F5 Drive Technical Manual.

6.9.1 CAR THE DOES NOT MOVE ON INSPECTION

NOTE: The TORQMAX F5 drive software has been modified for use in MCE controllers. Some of the parameters in the drive are different from those listed in the standard drive manual. If a drive has been replaced in the field, all of the drive parameters should be entered manually and should be verified according to the parameter sheet shipped with the controller.

- Pick or Picked = relay energized
- Drop or dropped = relay de-energized

If the car does not move on INSPECTION, check the following:

1. Verify that relay CNP and RDY on the HC- ACI board are ON (if not refer to step 2.a below). Contactors PM (Main) and BR (Brake) should pick when the direction relays U1 and U2 or D1 and D2, are picked. If PM and BR do not pick, check the related circuit as shown in the controller drawings. Check to see if any fault is displayed on the drive keypad before and after picking direction on Inspection. When direction is picked on Inspection, relays PT1 and PT2 on the HC-ACI board should pick. If these relays are not picking, check for 120VAC on terminals 8, 10 and 12 on the HC-RB4-VFAC Main Relay Board. If there is no voltage on these terminals, refer to the controller drawings to find the problem.

2. To verify that the drive receives the direction, enable and inspection speed command signals from the (HC-ACI) board, do the following:

   - To verify the drive enable signal, select parameter LF.99 and pick direction on Inspection. The drive display should change from **noP** to **Facc** or **rAcc**. If it does not display **Facc** or **rAcc**, follow the controller drawings and verify the connection to terminal X2A.16 (Enable terminal).

   - To verify the commanded speed signal, select either parameter LF.88 or LF.86 and pick direction on Inspection. If LF 88 is selected, the drive key pad should display the inspection speed (Motor RPM) value.

   - To verify the direction input signal, display parameter LF.99 and pick UP direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **Facc** (forward acceleration) and then to **Fcon** (forward constant running).

     Pick DOWN direction on Inspection. The drive keypad display should change from **nOP** (no operation) to **rAcc** (reverse acceleration) and then to **rCon** (reverse constant running).

When direction is picked on Inspection, the DRO relay should pick. If this is not true, check the following:

a. Verify that the CNP and RDY relays are picked when the direction is not picked. If the RDY relay is not picked then check for a fault displayed on the drive keypad. If there is no fault in the AC drive unit then check the wiring for the RDY circuit. Relays PT1, PT2, UA or DA on the HC-ACI board should pick when the direction relays are picked. If these relays are not picking, check for 36VAC between terminals XC1, XC2 and +15 and -15 on the HC-ACI board. If there is no voltage, check the fuse on the primary side of the 30 VA transformer shown in drawing -3 of the job prints. Also check the wiring from the secondary of the same transformer to terminal XC1, XC2 on the HC-ACI board.

b. To verify the UP, DN , Enable and speed inputs to the drive, measure the DC voltage between terminals X2.10 and the respective drive terminals. In the down direction the voltage between X2.10 and X2.4 should be zero. In the up direction the voltage between X2.10 and X.2.4 should be zero. The floating voltage between these points is approximately 24 VDC when the direction relays *are not* picked.

If all the functions described in the above steps are working properly and the car still does not move, then verify the drive parameters and compare them with the drive parameter sheet which was shipped with the controller. The motor name plate values should match the entered motor parameters. Some of the following parameters, if not set properly, can prevent the car from moving on Inspection.

CAUTION: Do not change drive parameters while the elevator is running. The following are very critical TORQMAX F5 parameters. Incorrect values for these parameters can cause erratic elevator operation:

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

If all the parameters are correct, relay DRO turns ON (when direction is picked), and car still does not move, then call MCE technical support.

6.9.2 CAR DOES NOT RUN / REACH CONTRACT SPEED

If the car was operational on Inspection operation but does not reach CONTRACT SPEED, verify that the following drive parameters are set correctly:

Parameter	Description	Setting Value
LF.11	Motor RPM	
LF.20	Contract speed in FPM	
LF.21	Traction Sheave diameter inches	
LF.22	Gear reduction ratio	
LF.23	Roping ratio	
A.LF.31	Kp Speed Accel Proportional gain	
d.LF.31	Kp Speed Decel Proportional gain	
A. LF.32	Ki Speed Accel Integral gain	
d:LF.32	Ki Speed Decel Integral gain	
LF.42	High speed FPM	

Verify that the drive is getting the High speed command signal - To verify that the drive is getting the High speed command signal from the controller, select parameter LF.86 and make a multi-floor run. The display should change from zero (0) to three (3) when high speed is picked. If the value remains zero (0), the drive is not getting the high speed command signal. Check the following:

- Verify that relay H on the HC-RB4-VFAC board and relay HX on the HC-ACI board are both picked.
- Verify that the voltage between terminal H and COM on the HC-ACI board is zero when relay HX is picked. If not, check the wiring between the HC-ACI board and the drive.
- Verify the operation of relay USD / DSD on the HC-ACI board. The normally open contacts of these relays are in series with the High speed command to the drive.

If the car does not reach Contract speed - If the drive is getting the High speed command signal but the car does not reach Contract speed, perform one of the following checks:

New motor - If the hoist motor is new, verify the following:

- LF.20 and LF.42 are set to the correct value in FPM.
- Rated motor speed (LF.11) is set to motor full load RPM.
- LF.22 (Gear reduction ratio) is set correctly.

Old motor - If the hoist motor is old, and the car does not reach contract speed (empty car down), display LF.90 and do the following:

1. Decrease the field weakening speed LF.16 to approximately 2/3 of the motor synchronous speed.
2. Set the power factor parameter LF.15 = 0.9.
3. Decrease the rated motor speed parameter LF.11 in steps of 20 until the rated speed is reached (empty car down).
4. If the current drawn by the motor is too high (parameter ru.90) then increase parameter LF.11 in steps of 10.

6.9.3 CAR OVERSHOOTS OR THE DRIVE TRIPS on 'E. OL' or 'E. OP' ON ACCELERATION

If, during acceleration, the car OVERSHOOTS or trips on OVER VOLTAGE, then check the following:

NOTE:	It is mandatory to have 40% counterweight.

1. Decrease drive parameters LF.51 Acceleration Rate and LF.52 Acceleration Jerk .
2. Increase the drive gains by increase parameters LF. 31 and LF.32.
3. Turn OFF the power and wait for 5 minutes so the DC bus voltage is not present in the dynamic braking circuit. Using a voltmeter, verify that no voltage is present. Then verify the value of the dynamic braking resistor with the job prints and check for any loose connection.

6.9.4 DRIVE TRIPS 'E.OP' OR THE CAR OVERSHOOTS ON DECELERATION

If the drive trips on 'E.OP' during deceleration or overshoots the floors, then check the following:

1. Verify that all the items described in Section 6.9.3 and the counter weight are set properly.
2. Verify that the High Level speed, Level speed and Intermediate speed (if required) are set as described in Sections 4.8.1 and 4.9.4 'c'..
3. Increase the deceleration parameter <u>LF.54</u> and verify that the High Level and Level speeds are adjusted to provide a smooth transition from high speed to leveling speed.
4. If the value of parameter <u>LF.55</u> is too high it can cause the car to overshoot and relevel.
5. If all the items above are set properly and the car still overshoots, consult the Drive manual. If the problem still exists then increase the slow down distance on a couple of floors so that you can run the car between these floors at high speed and stop the car properly.

6.9.5 OSCILLATIONS IN THE CAR AT CONTRACT SPEED

The TORQMAX F5 series drive is used for Flux Vector applications. If there are OSCILLATIONS in the car at contract speed, then verify the following:

1. Are the gain parameters set two high (A.LF.31, d.LF.31, A.LF.32 and d.LF.32)?.
2. Are the Motor parameters set correctly?
3. Is the encoder properly mounted? If it is properly mounted it should not oscillate.

6.9.6 DRIVE TRIPS “OVER VOLTAGE” BY CLIPPING THE DOOR LOCKS

If the drive trips on over voltage by clipping the door locks, check the dynamic braking circuit.

6.9.7 ERROR MESSAGES AND THEIR CAUSES

Refer to the table titled ***Error Messages and Their Causes*** in the TORQMAX F5 Drive manual for a listing of messages and suggested cause and solution.

TABLE 6.8 TORQMAX F5 Drive Inverter State

Display	Value	Significance
bbl	76	base-block-time runs out, power modules are blocked for 3s (always when control release is cleared)
Facc	64	forward acceleration
Fcon	66	forward constant running
FdEc	65	forward deceleration
noP	0	no operation, terminal X2.1 is not set
LS	70	low speed, control release is switched but no direction of rotation is adjusted, modulation disabled
rAcc	67	reverse acceleration
rCon	69	reverse constant running
rdEc	68	reverse deceleration

6.9.8 TROUBLESHOOTING FLOWCHARTS - TORQMAX F5 DRIVE

FIGURE 6.33 TORQMAX F5 Troubleshooting Flowchart - Drive Key Pad

Drive Key Pad

Series M TORQMAX

How to change and save drive parameters.

Start

There are four push buttons on the drive key pad

.

1. Enter / (F/R): Saves the selected parameter. In addition it is also used for selecting parameter groups.

2. UP/Star : Increases the selected parameter value. In addition it is also used to find the parameter group.

3. DN/STOP: Decreases the selected parameter value. In addition it is also used to find the parameter group.

4. FUNC/SPEED: Displays (reads) the parameter value.

1. Select the parameter group (Press the **Enter** key. The blinking dot next to the parameter number should flash).

2. Use **UP** or **DN** arrow to select the desired LF.xx parameter.

3. Press the **FUNC** key to see the parameter value.

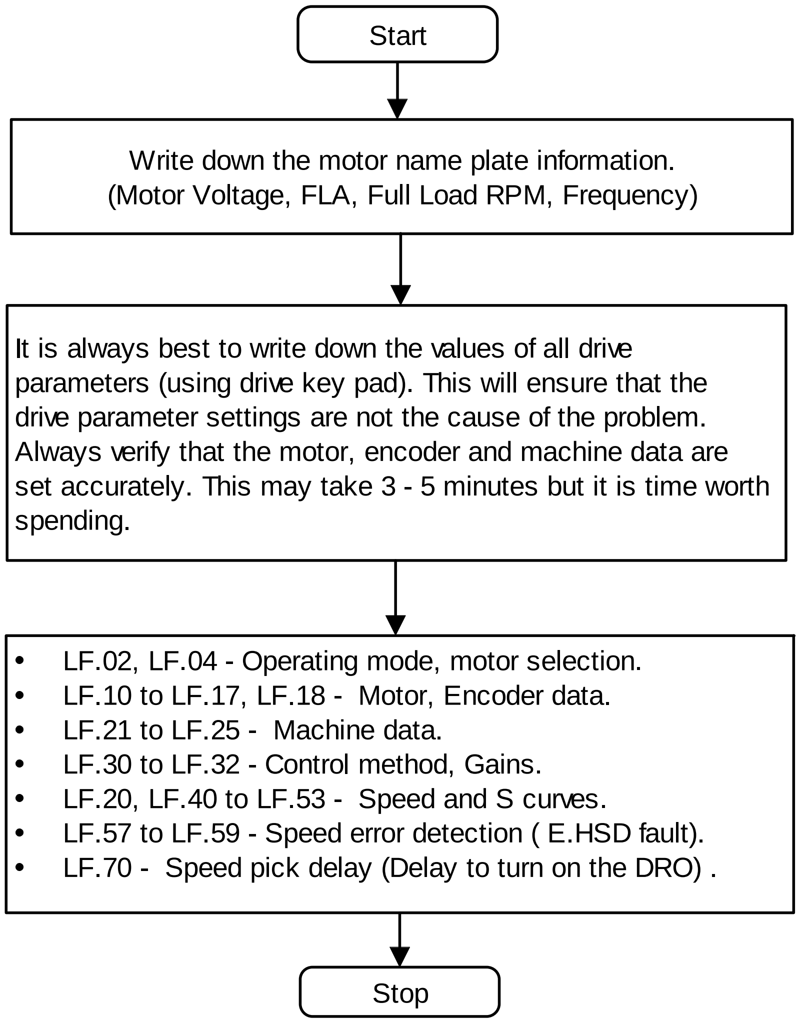
4. Use the **UP** or **DN** arrow to change the parameter value.

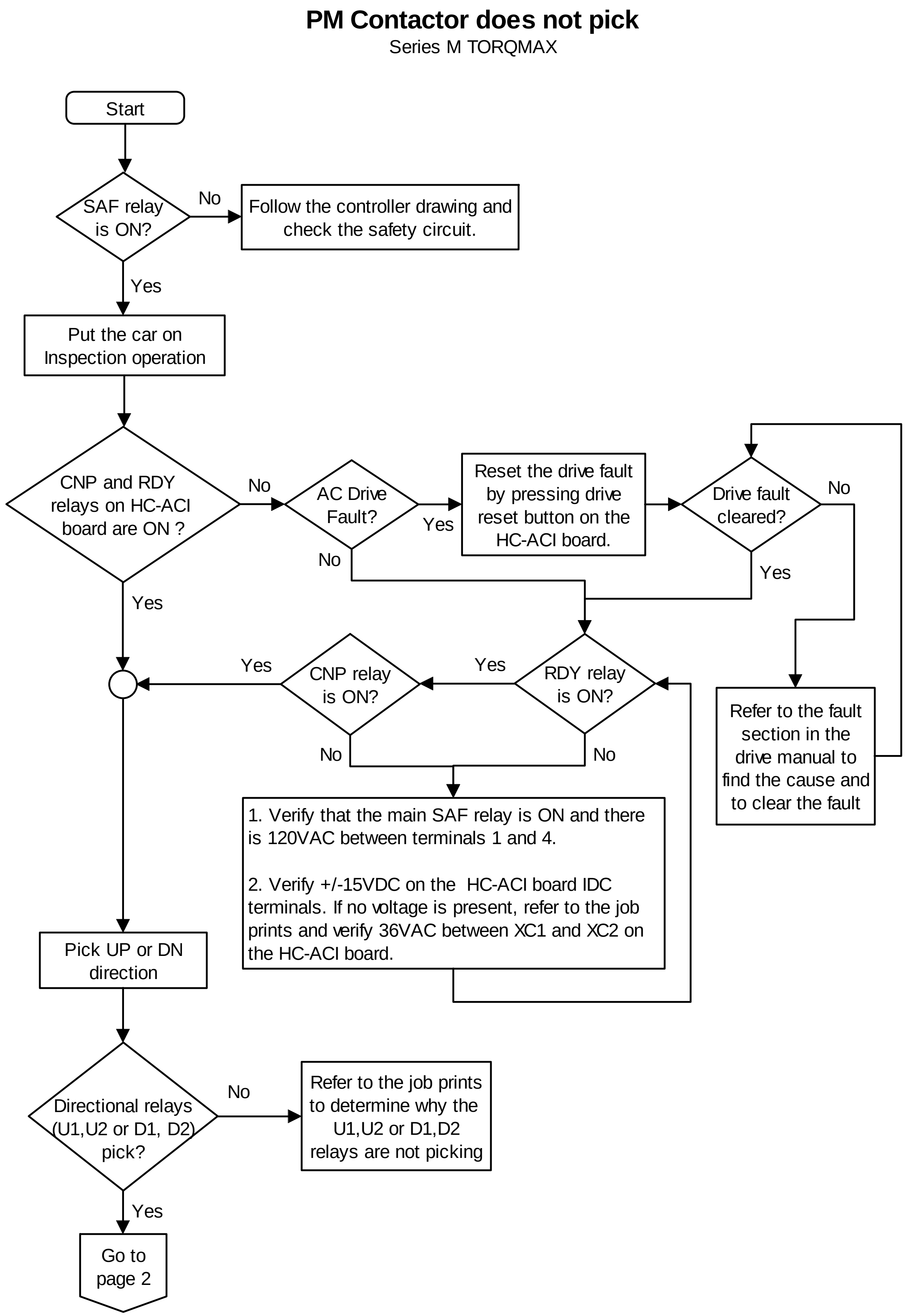
5. Press **Enter** to save the parameter value (Important, without this step parameter will not be saved).

Stop

Critical Drive Parameters

Series M TORQMAX

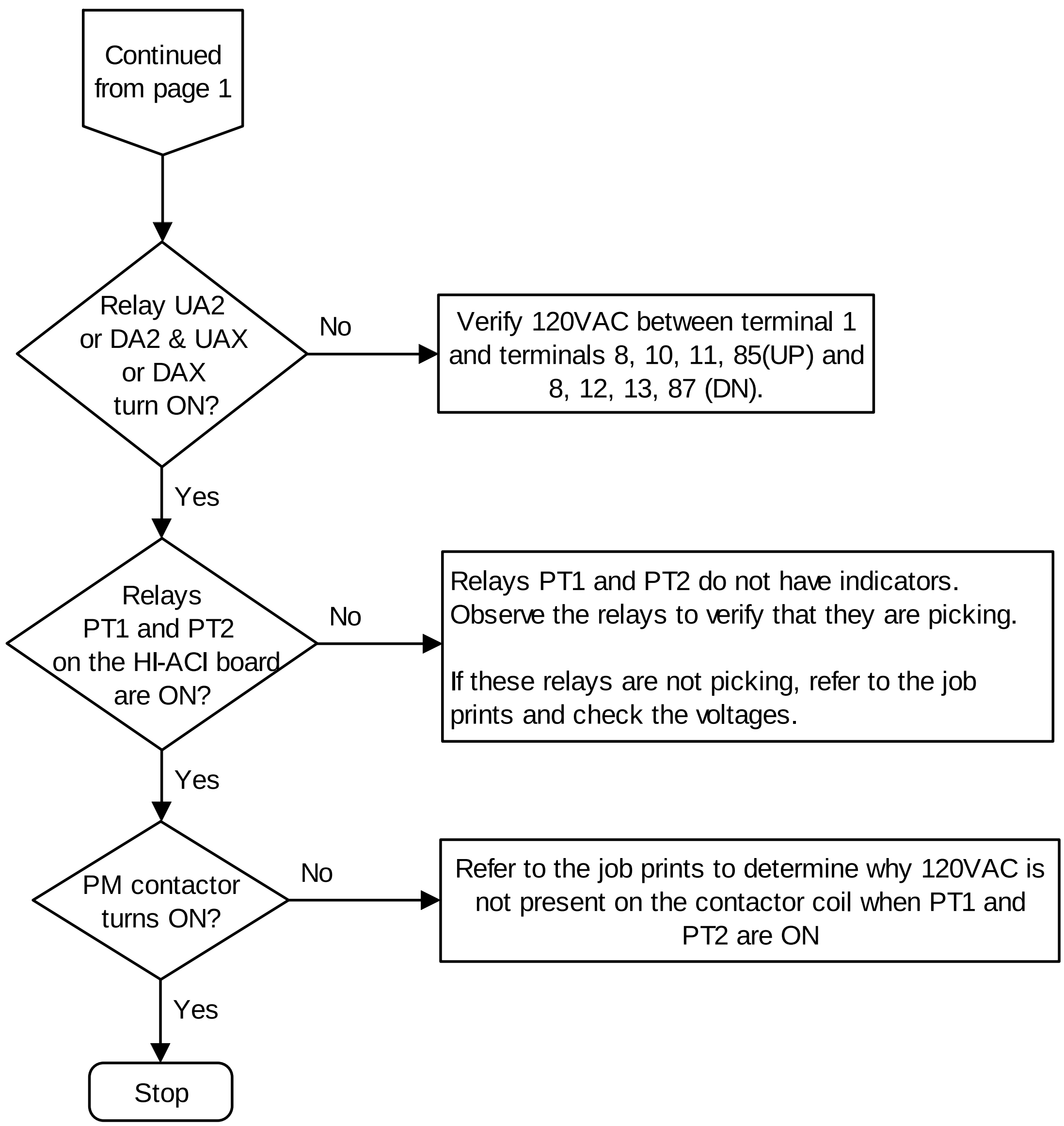



PM Contactor does not pick
Series M TORQMAX
Start
SAF relay is ON?
No
Follow the controller drawing and check the safety circuit.
Yes
Put the car on Inspection operation
CNP and RDY relays on HC-ACI board are ON ?
No
AC Drive Fault?
Yes
Reset the drive fault by pressing drive reset button on the HC-ACI board.
Drive fault cleared?
No
Yes
No
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 that the main SAF relay is ON and there is 120VAC between terminals 1 and 4.
2. Verify +/-15VDC on the HC-ACI board IDC terminals. If no voltage is present, refer to the job prints and verify 36VAC between XC1 and XC2 on the HC-ACI board.
Pick UP or DN direction
Directional relays (U1,U2 or D1, D2) pick?
No
Refer to the job prints to determine why the U1,U2 or D1,D2 relays are not picking
Yes
Go to page 2

PM Contactor does not pick

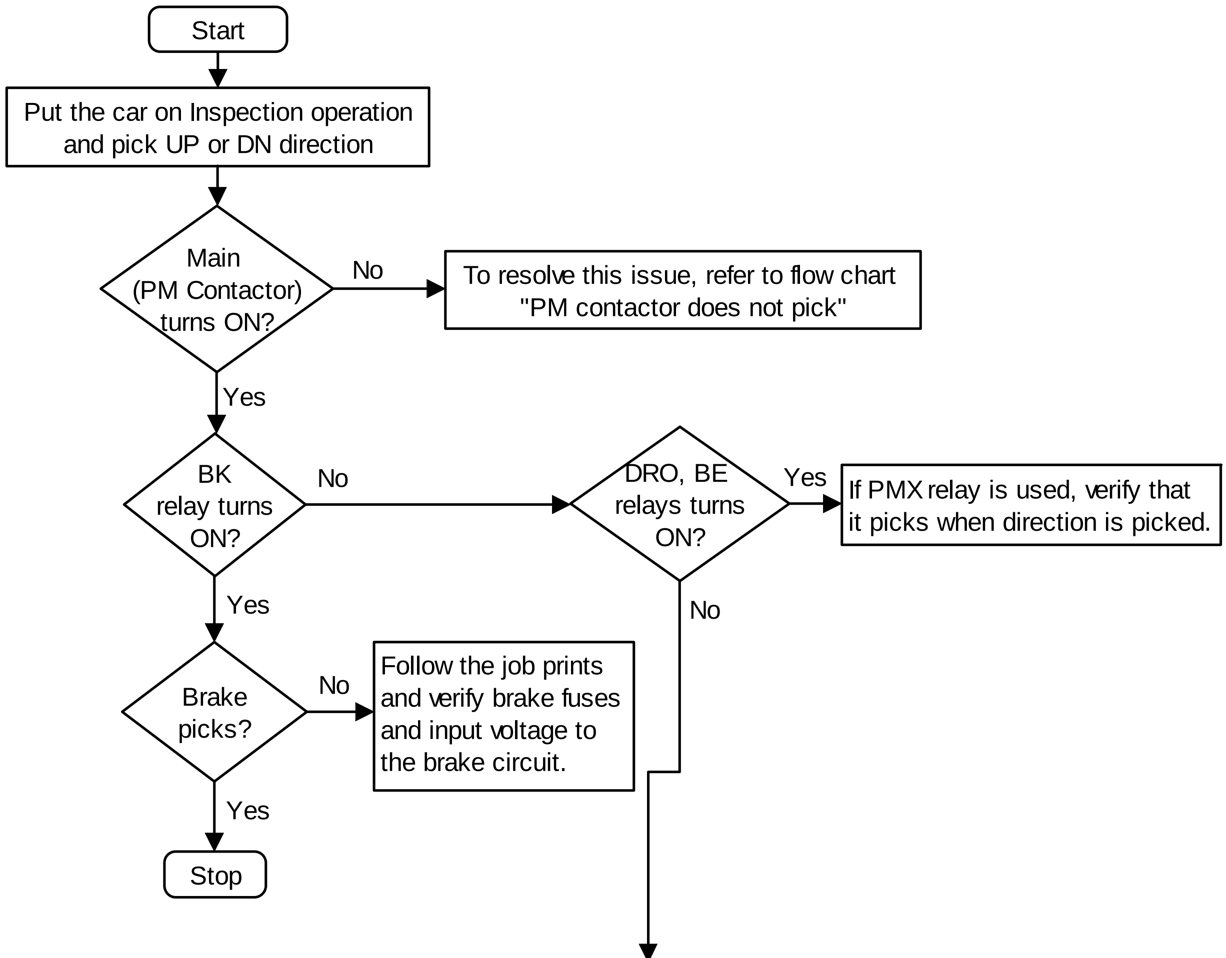
Series M TORQMAX

Page 2



Brake does not pick

Series M TORQMAX



1. Verify that all drive parameters are set correctly.
2. Relay BE on the HC-ACI board turns ON when a direction is picked on inspection.
3. Select LF.82. The value should change from 0 to 37 or 41 when a direction is picked on Inspection (0 = No signal, 37 = Enable, Inspection and Forward(UP) inputs are ON, 41 = Enable, Inspection and Reverse(DN) inputs are ON). If this is not true, the drive is not getting the enable and direction input signals.
4. To verify the drive input signals, refer to the job prints and measure the DC voltage between drive common "X2A.22" and the respective input (X2A.14 - Forward, X2A.15 - Reverse, X3A.11.5 - Inspection speed). The voltage should read 18VDC when the respective input is ON.
5. If all the above are true, follow the drawings and verify the voltage at various points in the DRO coil circuit.

FIGURE 6.37 TORQMAX F5 Troubleshooting Flowchart - Car does not move

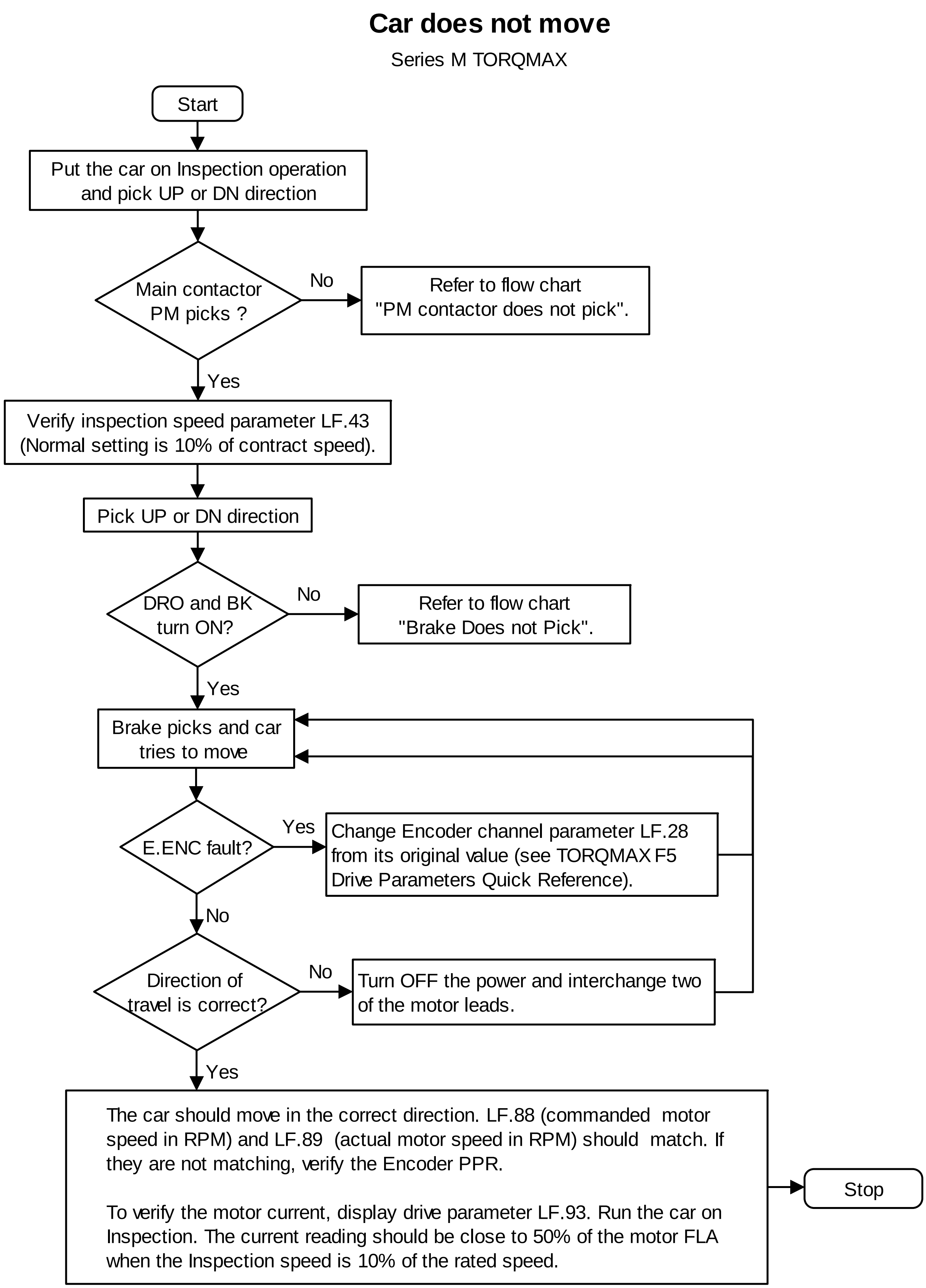


FIGURE 6.38 TORQMAX F5 Troubleshooting Flowchart - Encoder Fault

Encoder Fault

Series M TORQMAX

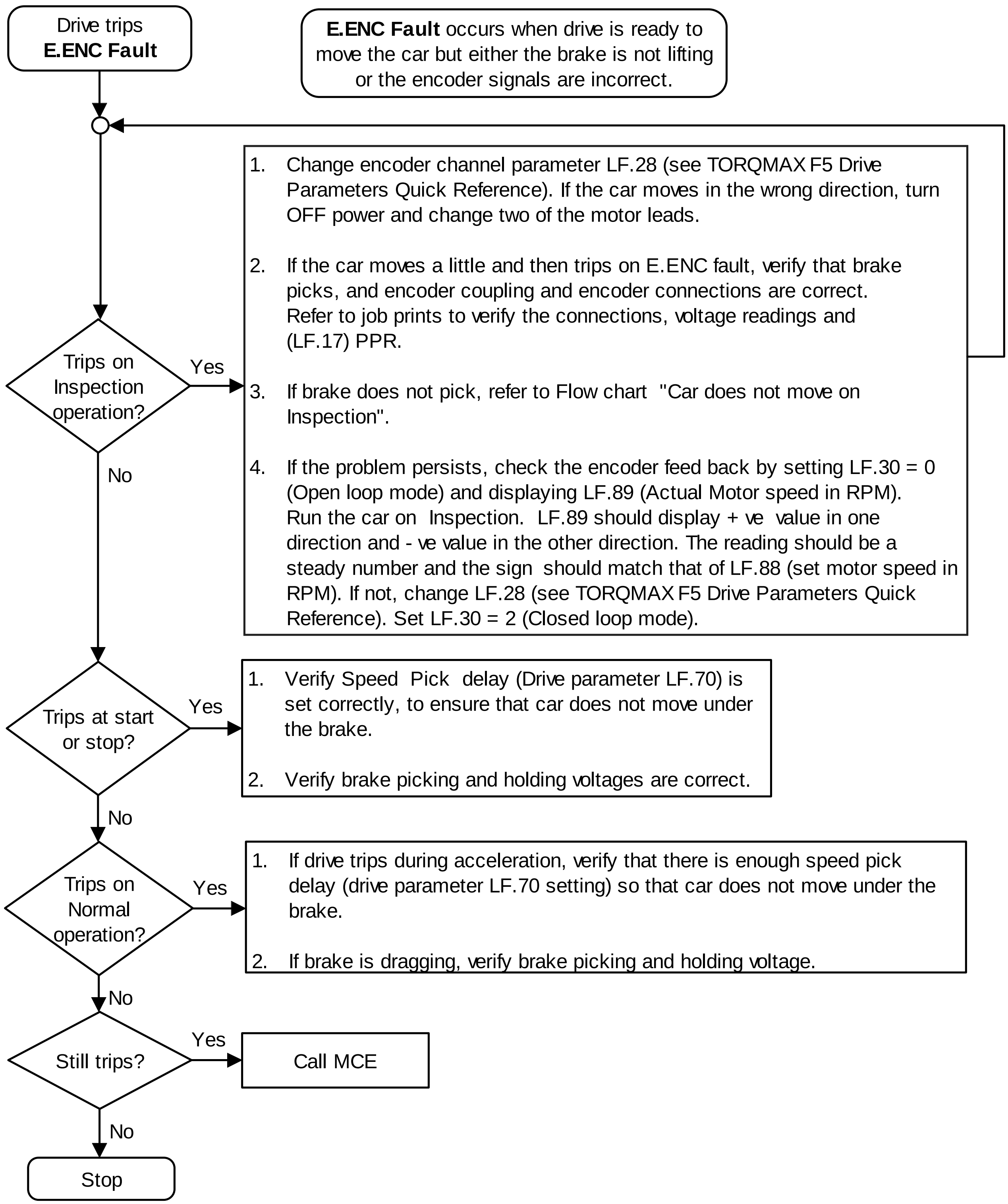


FIGURE 6.39 TORQMAX F5 Troubleshooting Flowchart - E.br Fault

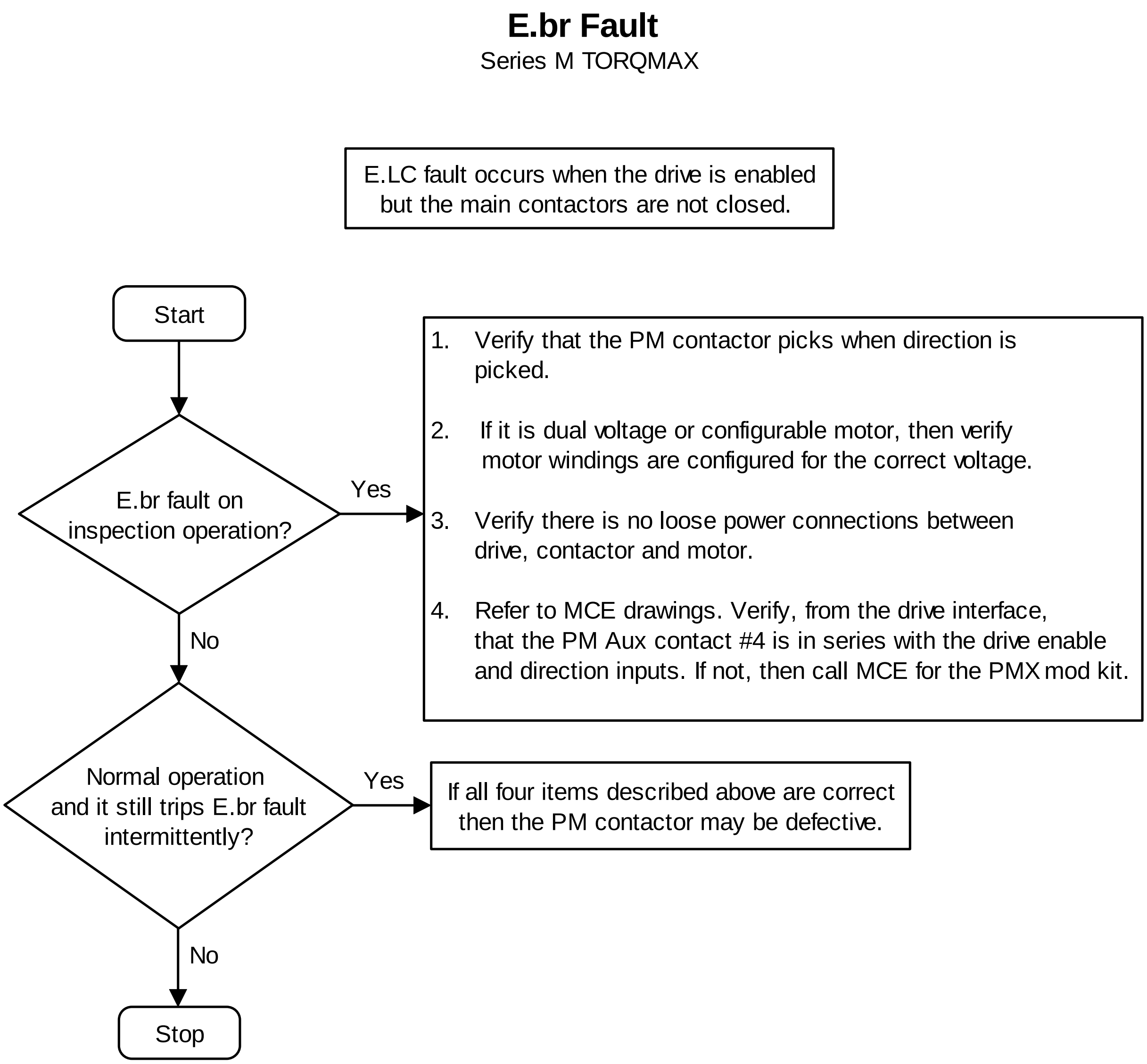
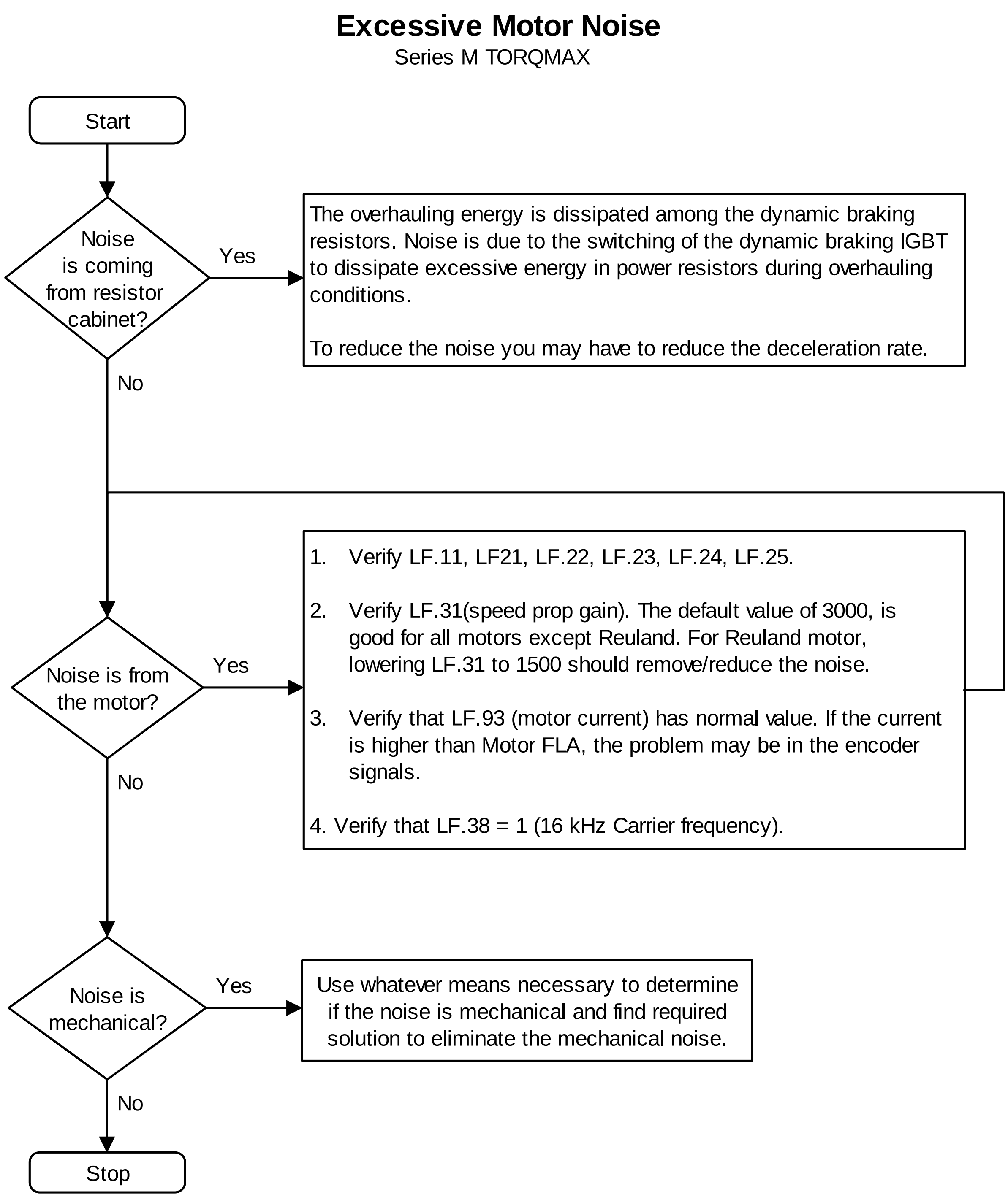


FIGURE 6.40 TORQMAX F5 Troubleshooting Flowchart - Excessive motor noise



6.10 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 inspection switch from OFF to ON and back to OFF.

   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 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.0100:10110011
   ```

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).

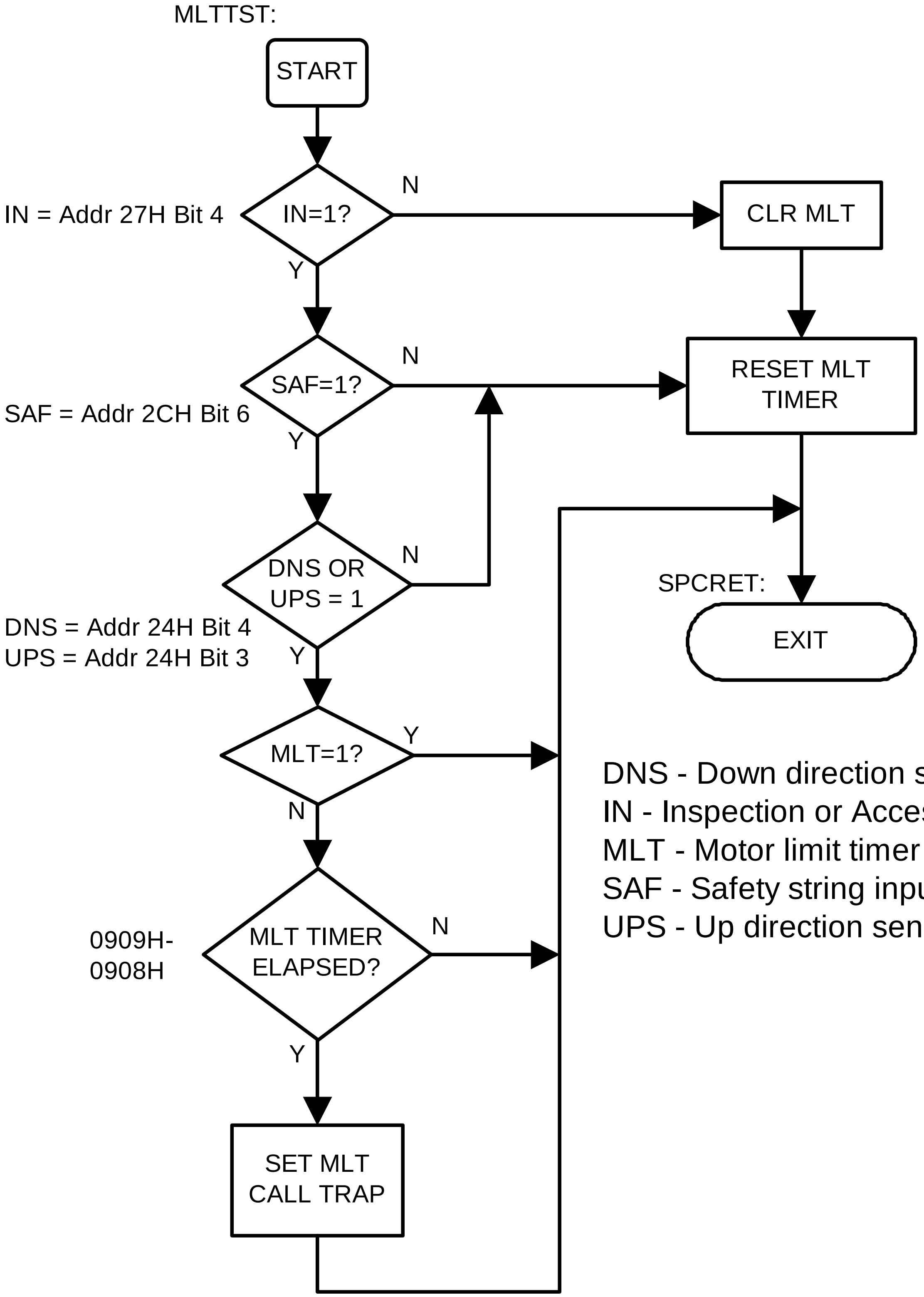
   ```
   PTHC D
   Ver# T05.23.0001
   ```

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.

TRACTION MOTOR LIMIT TIMER LOGIC



DNS - Down direction sense input
IN - Inspection or Access input
MLT - Motor limit timer flag
SAF - Safety string input
UPS - Up direction sense input

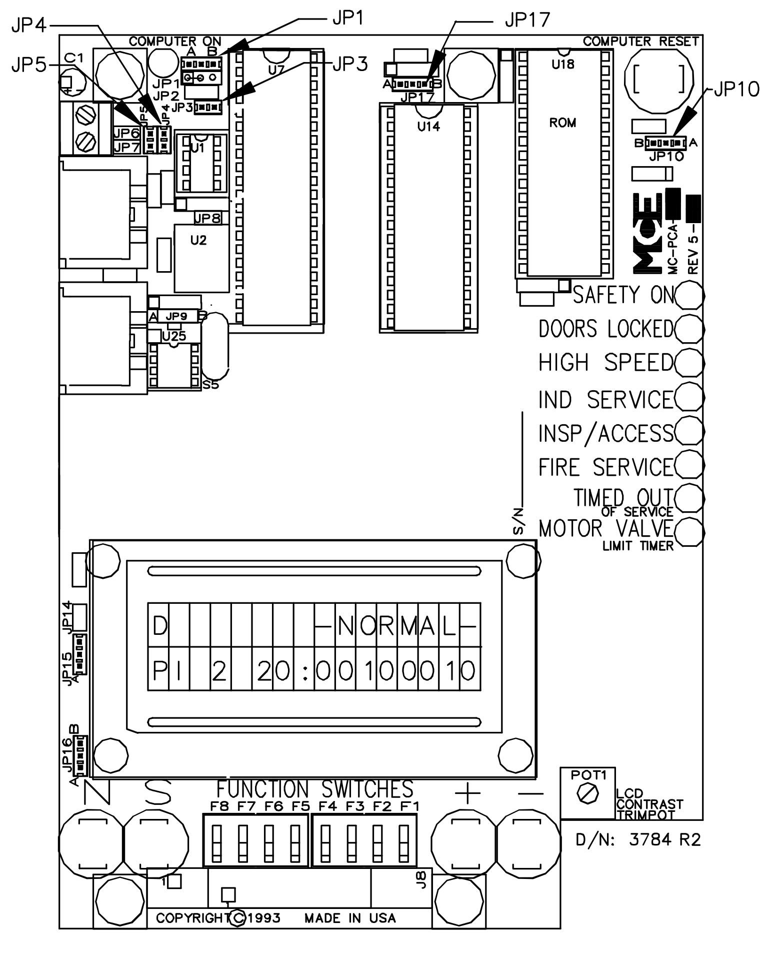
6.11 PC BOARD QUICK REFERENCES

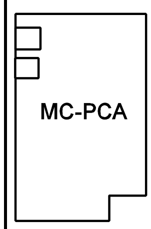
FIGURE 6.41 MC-PCA Quick Reference

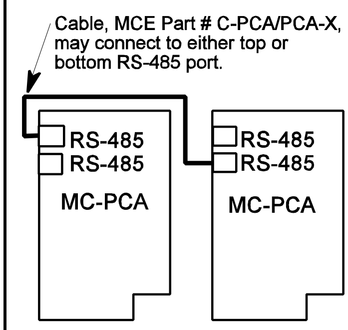
MC-PCA Quick Reference **Part # 42-QR-MC-PCA (Rev 2)**

PTC and PHC Connections

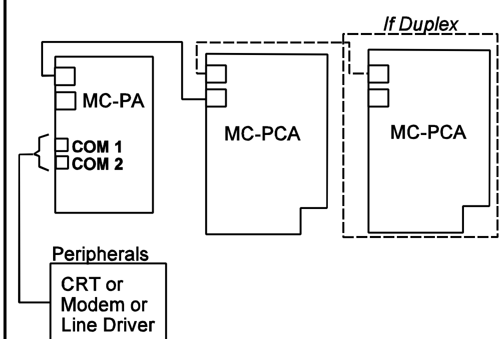
MC-PCA-OA Board	**Simplex**	**Duplex Configuration**







Configuration with MC- PA
(Peripherals Adapter Board)



JUMPER TABLE	
MC-PCA-OA (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-OA board contains a 21-LB-217A microcontroller, set JP1 to position B, otherwise set to position A.

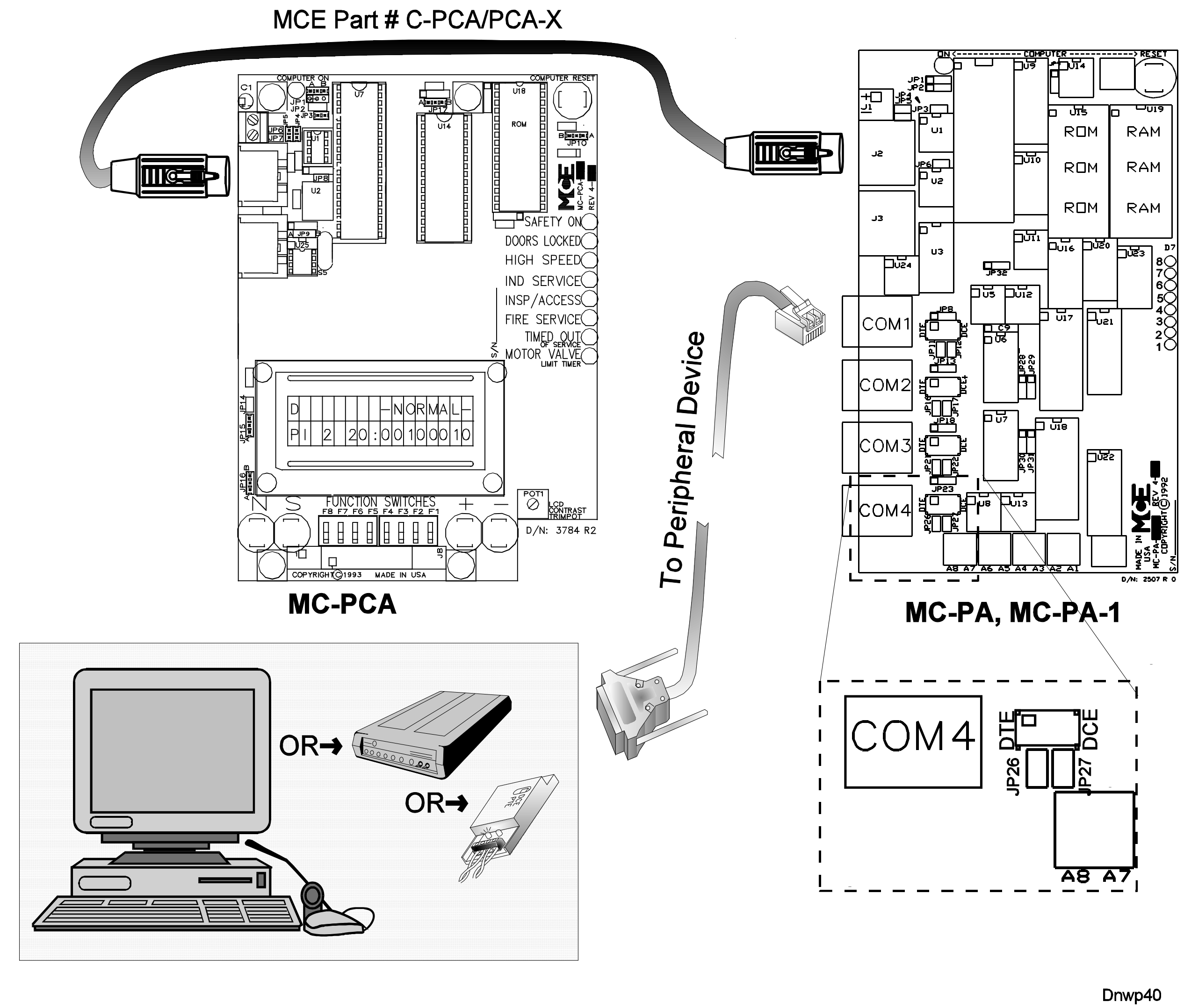
* * The JP3 jumper should be in the ***OFF*** position if the MC-PCA-OA board is not at the end of a daisy chain in a duplex configuration, i.e. between MC-PCA or MC-PA boards.

* * * Try JP4 and JP5 in either the ON or OFF position until car to car or car to PA communication is established.

FIGURE 6.42 MC-PA Quick Reference

42-QR-MC-PA Rev 2

MC-PA 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**

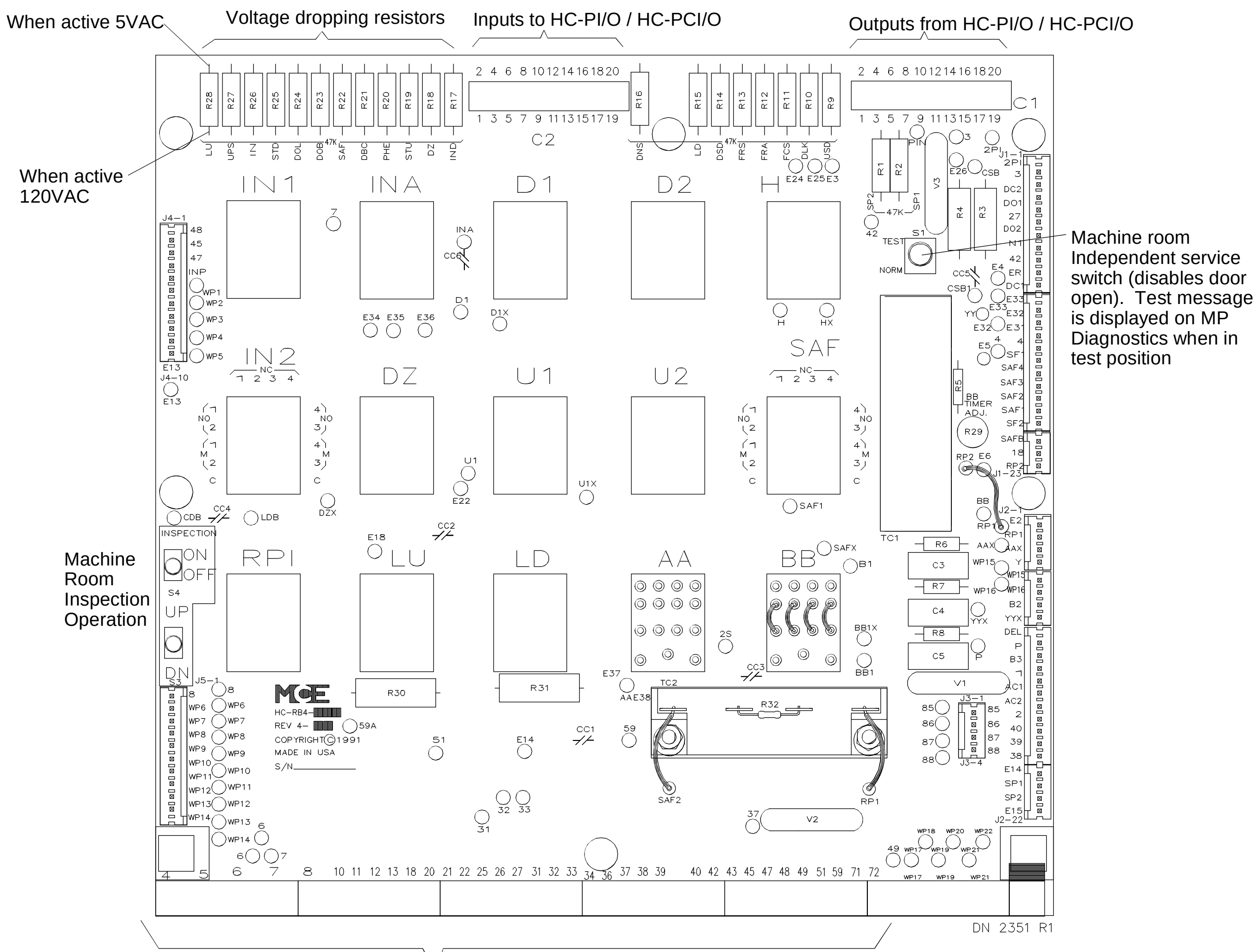
Jumper Settings

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 6.43 HC-RB4 Quick Reference

42-02-HC-RB4 Rev. 1

HC-RB4 QUICK REFERENCE CARD



120VAC signals from hoistway
ON = activated = 120VAC
OFF = not activated = 0 to 20VAC

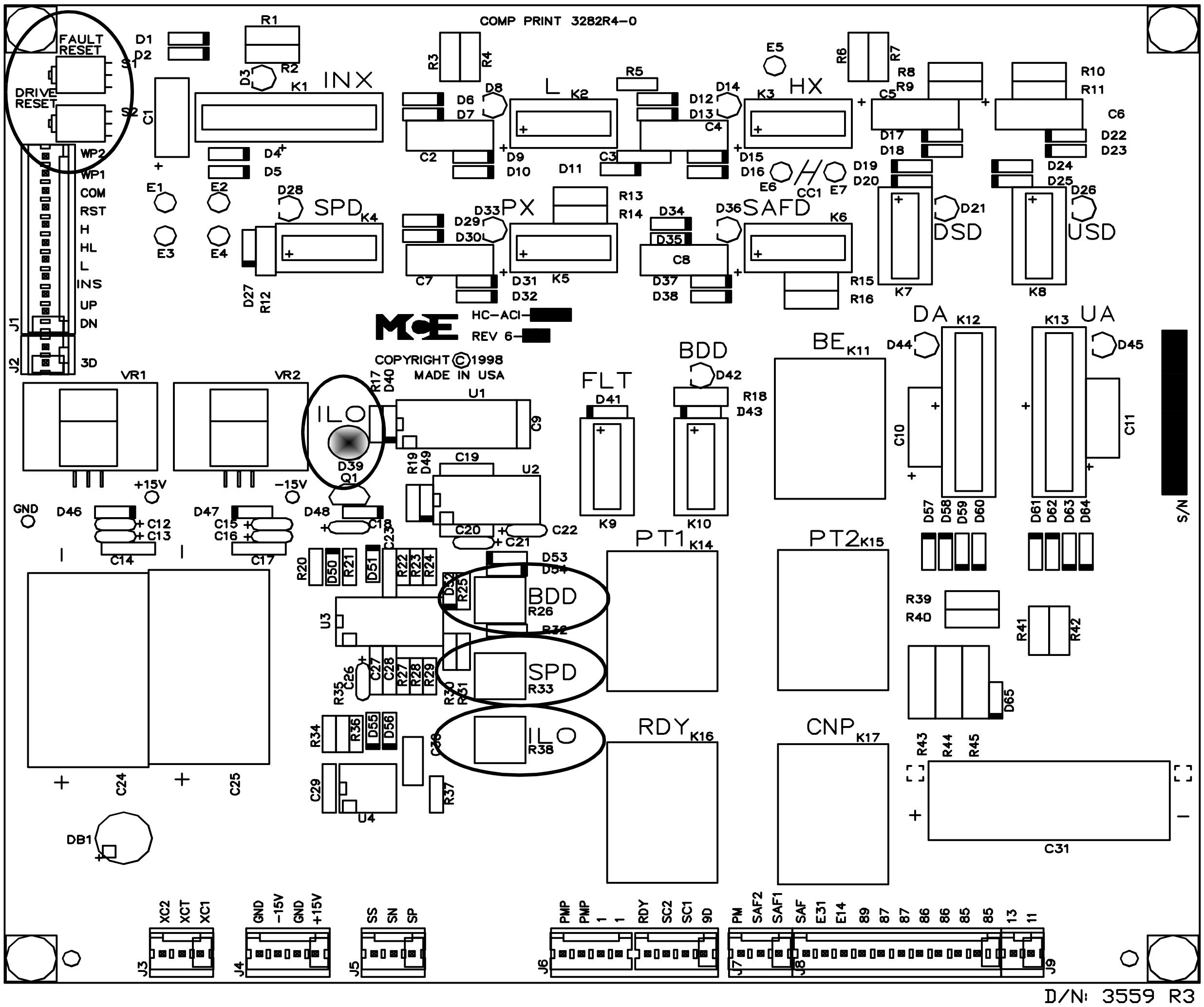
*Check all terminals for Ground with Power OFF and fuse F4 removed

FIGURE 6.44 HC-ACI AC Drive Interface Board Quick Reference

42-QR-HC-ACI

HC-ACI QUICK REFERENCE

BOARD 51



SWITCHES

Falt Reset	If the ILO indicator is ON, this push button turns the indicator OFF and drops out the FLT relay.
Drive Reset	This pushbutton resets VFAC drive faults.

INDICATOR

ILO	Inspection Leveling Overspeed - Turns ON when the car speed exceeds the threshold set by the ILO trimpot. **Not used on ASME A17.1-2000 compliant controllers**

TRIMPOTS

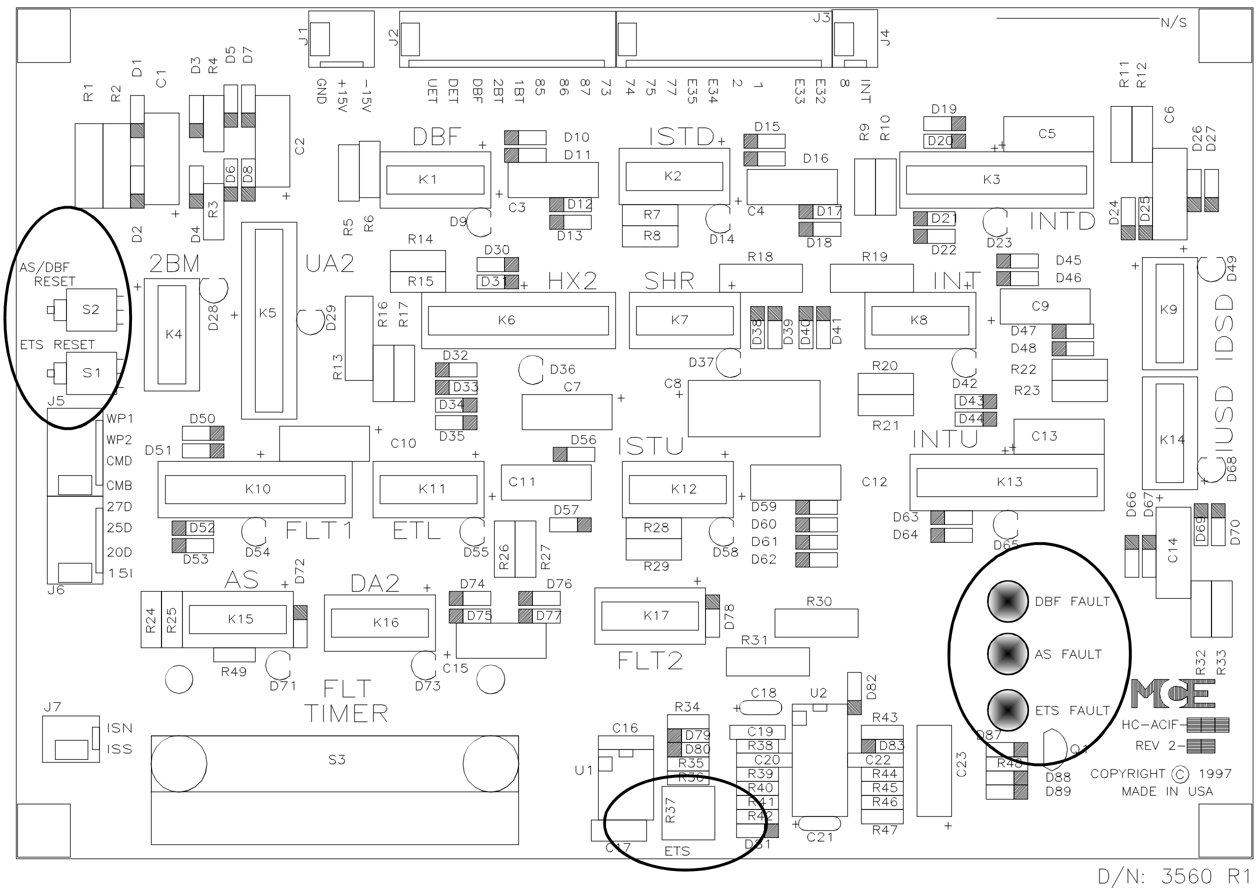
BDD	Brake Drop Delay - CW increases delay (fully CCW = 0.1 sec., fully CW = 0.7 sec.)
SPD	Speed Pick Delay - CW increases delay (fully CCW - .002 sec., fully CW = 0.450 sec.)
ILO	Inspection Leveling Overspeed - CCW sets the speed threshold higher. **Not used on ASMEA17.1-2000 compliant controllers** - Set the ILO trimpot on the HC-ACI board fully CCW. Use the ILO trimpot on the SC-BASE or SC-BASER board to adjust the ILO speed threshold.

FIGURE 6.45 HC-ACIF Additional Flux Vector Drive Interface Board Quick Reference

42-QR-HC-ACIF

HC-ACIF QUICK REFERENCE

BOARD 52



SWITCHES

AS/DBF Reset Resets the At Speed Fault (AS) and/or the Dynamic Braking Fault (DBF).

ETS Reset Resets the Emergency Terminal Switch Fault (ETS).

TRIMPOT

ETS Emergency Terminal Switch speed threshold adjust - (CW sets the speed threshold higher)

Not used on ASME A17.1-2000 compliant controllers. - Set the ETS trimpot on the HC-ACIF board fully CW. Use the ETS trimpot on the SC-BASE or SC-BASER board to adjust the ETS speed threshold.

INDICATORS

ETS Fault Emergency Terminal Switch overspeed Fault - Turns on when the car speed exceeds the threshold speed set by the ETS trimpot.

Not used on ASME A17.1-2000 compliant controllers.

AS Fault At Speed Fault - Turns on if the car speed exceeds the maximum or minimum limits set for contract speed. Increase the speed error threshold to desensitize this fault, provided that the Speed Proportional Gain is set correctly:

G5 / GPD515 Drive - verify / adjust L4-01 and L4-02

HPV 900 Drive - verify / adjust A1 Drive parameters “Spd Dev Lo Level” and Spd Dev Time”

TORQMAX - verify / adjust LF.58 and LF.59

DBF Fault Dynamic Braking Fault - Turns on if the dynamic braking temperature exceeds its threshold.

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
PTHC Version 6.03.xxxx		

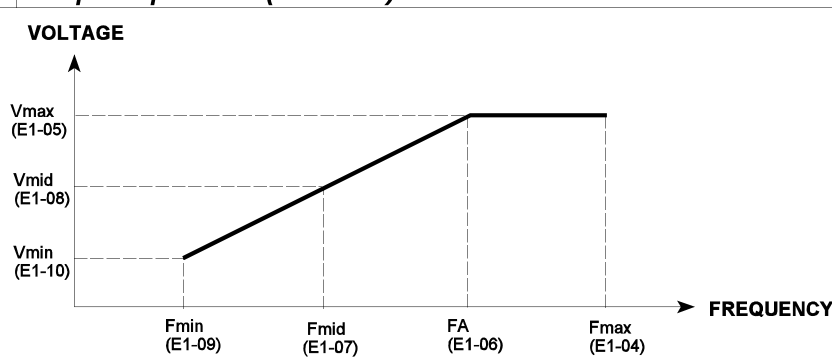
APPENDIX B
QUICK REFERENCE FOR G5+ / GPD515+ DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

Field Adjustable Parameters are shown in shaded rows. All other parameters should be set to the values shown below in the “Field/MCE Set” column.

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
Initialize							
A1-00	Select Language	Language Selection 0: English 1: Japanese	-	0 - 1	0	B	0
A1-01	Access Level	Parameter access level 0: Operation Only 3: Basic Level 1: User Program 4: Advanced Level 2: Quick Start Level	-	0 - 4	3	B	3
A1-02 or U1-04 ******	Control Method (for MagneTek drive, use U1-4 to verify the control method)	Control Method selection - motor 1 0: V/f Control 2: Open Loop Vector 1: V/f w/PG Fdbk 3: Flux Vector	-	0 - 3	0	B	✿
		✿ V/F Control - Open Loop = 0 Flux Vector = 3					
A1-03 *******	Inlt Parameters	Operator status 0: No Initialize 2220: 2-Wire Initial 1110: User Initialize 3330: 3-Wire Initial	-	0 - 9999	0**	B	0**
A1-04	Enter Password	Password (for entry)	-	0000 - 9999	-	B	0
A2	User Contents	Not used					
Programming							
B	**Application**						
B1	***Sequence***						
B1-01	Reference Source	Reference selection 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	0	B	0
B1-02	Run Source	Operation selection method 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	B	1
B1-03	Stopping Method	Stopping Method 0: Ramp to Stop 2: DC Injection to Stop 1: Coast to Stop 3: Coast w/Timer	-	0 - 3	0	B	0
B1-04	Reverse Oper	Prohibition of reverse operation 0: Reverse Enabled 1: Reverse Disabled	-	0/1	0	B	0
B2	***DC braking***						
B2-01	DCInj Start Freq	DC braking frequency (speed level)	Hz	0.0 - 10.0	1.5	B	1.5
B2-02	DCInj Current	DC braking current *(N/A to Flux Vector)*	%	0 - 100	50	B	50
B2-03	DCInj Time@Start	DC braking time at start	s	0.00 - 10.00	0.0	B	✿
		✿ V/F Control - Open Loop = 0.20 Flux Vector = 0.0					
B2-04	DCInj Time@Stop	DC Braking time at stop	s	0.00 - 10.00	1.0	B	0.5
C	**Tuning**	**Field Adjustable Parameters are shown in the shaded rows.**					
C1	***Accel/Decel***						
C1-01	Accel Time 1	Acceleration time 1	s	0.00 - 6000.0	1.96	B	✳
C1-02	Decel Time 1	Deceleration time 1	s	0.00 - 6000.0	1.96	B	✳
C1-03	Accel Time 2	Acceleration time 2	s	0.00 - 6000.0	1.96	B	1.60

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
C1-04	Decel Time 2	Deceleration time 2	s	0.00 - 6000.0	0.01	B	0.1
C1-05	Accel Time 3	Acceleration time 3	s	0.00-6000	1.0	A	1.0
C1-06	Decel Time 3	Deceleration time 3	s	0.00-6000	1.0	A	1.0
C1-07	Accel Time 4	Acceleration time 4	s	0.00-6000	1.96	B	✳
C1-08	Decel Time 4	Deceleration time 4	s	0.00-6000	1.96	B	✳
C1-09	Fast Stop Time	Fast Stop Time	s	0.00-6000	1.0	A	1.0
C1-10	Acc/Dec units	Accel/Decel time 0:0.01, 1:0.1	S	0/1	0	A	0
C1-11	Acc/Dec SW fre	Accel/Decel switching level	Hz	0.00-400	0.0	B	0.0
C3	***Motor-Slip Comp***						
C3-01	Slip Comp Gain	Slip compensation gain	-	0.0 - 2.5	1.0	B	1.0
C3-02	Slip Compensation	Primary Time Delay *(N/A to Flux Vector)*	-	0 - 2000	200	B	200
C3-04	Slip comp regen	Slip compensation during regen (*N/A to Flux Vector)*		0, 1	1	B	1
C4	***Torque Comp***						
C4-01	Torque Comp Gain	Torque compensation gain *(N/A to Flux Vector)*	-	0.00 - 2.50	1.00	B	1.0
C4-02	Torque Comp Time	Torque Compensation Time Constant *(N/A to Flux Vector)*	ms	0 - 1000	200	B	200
C5	***ASR Tuning (Flux Vector only)***						
C5-01	ASR P Gain1	ASR proportional gain 1 *(Flux Vector only)*	-	0.0-300	20	B	20.0
C5-02	ASR I Time 1	ASR integral time 1 *(Flux Vector only)*	s	0.00- 10.0	.200	B	0.20
C5-03	ASR P Gain 2	ASR proportional gain 2 *(Flux Vector only)*	-	0.00-300.0	20.0	B	20.0
C5-04	ASR I Time 2	ASR integral time 2 *(Flux Vector only)*	s	0.0- 10.0	0.50	B	0.50
C6	***Carrier Freq***						
C6-01	Carrier Freq Max	Carrier frequency upper limit	kHz	0.4 - 15.0	KVA dependent	B	10
D	**Reference**	**Field Adjustable Parameters are shown in the shaded rows.**					
D1	***Preset Reference***						
D1-01	Reference 1	Preset reference 1 (Not used)****	Hz	0.0	0.0	B	0.0
D1-02	Reference 2	Preset reference 2 (H Speed)****	Hz	0.0-80	30	B	✳
D1-03	Reference 3	Preset reference 3 (H Level)****	Hz	0.0-15	8.0	B	✳
D1-04	Reference 4	Preset reference 4 (Not used)****	Hz	0.0	0.0	B	0.0
D1-05	Reference 5	Preset reference 5 (Level)****	Hz	0-10	1.3	B	✳
D1-06	Reference 6	Preset reference 6 (Not used)****	Hz	0.0	0.0	B	0.0
D1-07	Reference 7	Preset reference 7 (Intermediate Speed)****	Hz	0-55	25	B	✳
D1-08	Reference 8	Preset reference 8 (Not used)****	Hz	0.0	0.0	B	0.0
D1-09	Reference 9	Preset reference 9 (Inspection Speed)**** (Jog Reference)	Hz	0-40	10	B	✳
D2	***Reference Limits***						
D2-01	Ref Upper Limit	Reference upper limit	%	0.0 - 100.0	100.0	B	100
D2-02	Ref Lower Limit	Reference lower limit	%	0.0 - 100.0	0.0	B	0
D3	***Jump Frequencies (not used) set at drive defaults***						



No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
E	**Motor**	**Field Adjustable Parameters are shown in the shaded rows.**					
E1	***V/f Pattern***						
E1-01	Input Voltage	Input voltage	V	180 - 460	230/460	B	✳
E1-02	Motor Selection	Motor selection 0: Fan-Coded 1: Blower-Coded	-	0/1	0	B	0
E1-03	V/f Selection *(N/A to Flux Vector)*	V/f pattern selection 0: 50Hz 1: 60Hz Saturation 2: 50Hz Saturation 3: 72Hz 4: 50Hz Variable Torque 1 5: 50Hz Variable Torque 2 6: 60Hz Variable Torque 1 7: 60Hz Variable Torque 2 8: 50Hz High Starting Torque 1 9: 50Hz High Starting Torque 2 A: 60Hz High Starting Torque 1 B: 60Hz High Starting Torque 2 C: 90Hz (N/A)*** D: 120Hz (N/A)*** E: 180Hz (N/A)*** F: User-defined V/f pattern	-	0 - F	F	B	F
E1-04	Max Frequency	Maximum frequency	Hz	0.0-80.0	60.0	B	✳
E1-05	Max Voltage	Maximum voltage (Motor Voltage)	V	0.0 - 460.0	230/460	B	✳
E1-06	Base Frequency	Maximum voltage output frequency	Hz	0.0-72.0	60.0	B	✳
E1-07	Mid Frequency A	Mid. output frequency *(N/A to Flux Vector)*	Hz	0.0-72.0	3.0	B	3.0
E1-08	Mid Voltage A	Mid. output voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	16.1/32.2	B	✳
E1-09	Min Frequency	Minimum output frequency *(N/A to Flux Vector)*	Hz	0.0-72.0	0.5	B	0.5
E1-10	Min Voltage	Minimum output voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	10.0/20.0	B	✳
E2	***Motor Setup***						
E2-01	Motor Rated FLA	Motor rated current	A	0.00 - 1500.0	Motor rated FLA	B	✳
E2-02	Motor Rated Slip***	Motor rated slip frequency - Note: Refer to the attached table to calculate the slip frequency.	Hz	0 - 15.0	kVA dependen t	B	✳
E2-03	No load current	Motor No Load Current	A	0-150	30 - 50% Motor FLA	B	✳
E2-04	Number of Poles	Number of Motor Poles *(Flux Vector only)*	-	2 - 48	6	B	✳
F	**Option**	**Field Adjustable Parameters are shown in the shaded rows.**					
F1	***PG Option Setup (Flux Vector only)***						
F1-01	PG pulse/Rev.	PG constant *(Flux Vector only)*	-	0-60000	1024	B	1024
F1-02	PG Feedback Loss selection *(Flux Vector only)*	Stoping method at PG line brake detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-03	PG overspeed selection *(Flux Vector only)*	Stoping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-04	PG Deviation selection *(Flux Vector only)*	Stoping method at DEV detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0-3	1	B	1
F1-05	PG Rotation sel.	PG rotation 0: CCW 1: CW *(Flux Vector only)*	-	0/1	0	B	0 or 1
F1-06	PG output ratio	PG division rate *(Flux Vector only)*	-	1-132	1	B	1
F1-07 thru F1-13	*(Flux Vector only)*	Set to drive defaults.				B	

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
H	**Terminal**						
H1	***Digital Inputs***						
H1-01	Terminal 3 Sel	Terminal 3 selection (Ref to H1-01 in drive manual) *7 = Multi Accel/Decel 1*	-	0 - 7F	7	B	7
H1-02	Terminal 4 Sel	Multi-function input (terminal 4) *14 = Fault Reset*	-	0 - 7F	14	B	14
H1-03	Terminal 5 Sel	Multi-function input (terminal 5) *80 = Mult-step spd 1F*	-	0 - 7F	80	B	80
H1-04	Terminal 6 Sel	Multi-function input (terminal 6) *81 = Mult-step spd 2F*	-	0 - 7F	81	B	81
H1-05	Terminal 7 Sel	Multi-function input (terminal 7) *82 = mult-step spd 3F*	-	0 - 7F	82	B	82
H1-06	Terminal 8 Sel	Multi-function input (terminal 8) *6 = Jog Ref (Inspection speed)*	-	0 - 7F	6	B	6
H2	***Digital Outputs***						
H2-01	Terminal 9 Sel	Multi-function input (terminal 9, terminal 10) *(same as F5-01) 37 = During Run 2*	-	0 - 3F	37	B	37
H2-02	Terminal 25 Sel	Multi-function input (terminal 25, terminal 27) *(same as F5-01) 4 = Freq. Detection 1*	-	0 - 3F	4	B	4
H2-03	Terminal 26 Sel	Multi-function input (terminal 26, terminal 27) *(same as F5-01) F = not used*	-	0 - 3F	F	B	F
H3	***Analog Inputs***						
H3-01	Term 13 Signal	Signal selection (terminal 13) 0: 0 to 10VDC 1: -10 to +10VDC	-	0/1	0	B	0
H3-02	Terminal 13 Gain	Reference % gain (terminal 13)	%	0.0 - 1000.0	100.0	B	100
H3-03	Terminals 13 Bias	Reference ±% bias (terminal 13)	%	-100.0 - 100.0	0.0	B	0
H3-04	Term 16 Signal	Signal selection (terminal 16) 0: 0 to 10VDC 1: -10 to +10VDC	-	0/1	0	B	0
H3-05	Terminal 16 Sel	Multi-function analog input selection (terminal 16) 1F = Not Used	-	0 - 1F	1F	B	1F
H3-06	Terminal 16 Gain	Reference % gain (terminal 16)	%	0.0 - 1000.0	100.0	B	100
H3-07	Terminal 16 Bias	Reference ±% bias (terminal 16)	-	-100.0 - 100.0	0.0	B	0
H4	***Analog Outputs***						
H4-01	Terminal 21 Sel	Analog output selection (terminal 21) *(same as F4-01)* 1 = Frequency Ref.	-	1 - 31	1	B	1
H4-02	Terminal 21 Gain	Analog output gain (terminal 21)	-	0.00 - 2.50	1.00	B	1.0
H4-03	Terminal 21 Bias	Analog output bias (terminal 21)	%	-10.0 - 10.0	0.0	B	0.0
H4-04	Terminal 23 Sel	Analog output selection (terminal 23) 2 = Output Freq.	-	1 - 31	2	B	2
H4-05	Terminal 23 Gain	Analog output gain (terminal 23)	-	0.00 - 2.50	1.00	B	1.0
H4-06	Terminal 23 Bias	Analog output bias (terminal 23)	%	-10.0 - 10.0	0.0	B	0.0
H4-07	AO Level Select	Analog output level selection 0: 0 to 10V 1: -10 to +10V	-	0/1	0	B	0
PROTECTION							
L1	***Motor Overload***						
L1-01	MOL Fault Select	Motor protection fault selection - OL1 0: Disabled 1: Coast to Stop	-	0/1	0	B	1
L1-02	MOL Time Const	Motor protection time constant	min	1.0 - 20.0	1.0	B	1.0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
L2	***PwrLoss Ridethru***						
L2-01	PwrL Selection	Momentary power loss ridethrough selection 0: Disabled 1: Ridethrough (for time set in L2-02) 2: Ridethrough while CPU has power	-	0 - 2	0	B	0
L2-02	PwrL RideThru t	Momentary power loss time	s	0.0 - 2.0	2.0	B	2.0
L2-03	PwrL Baseblock t	Minimum baseblock time	s	0.0 - 5.0	0.7	B	0.7
L3	***Stall Prevention***						
L3-01	StallP Accel Sel (N/A to Flux vector drive)	Stall prevention selection during accel 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	1	B	1
L3-02	StallP Accel Lvl *(N/A to Flux Vector)*	Stall Prevention level during accel	%	0 - 200	180	B	180
L3-04	StallP Decel Sel	Stall prevention selection during decel 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	0	B	0
L3-05	StallP Run Sel *(N/A to Flux Vector)*	Stall prevention selection during running 0: Disabled 1: Decel 1 2: Decel 2	-	0 - 2	0	B	0
L3-06	StallP Run Level *(N/A to Flux Vector)*	Stall prevention level during running	%	30 - 200	160	B	160
L4	***Ref Detection (Flux Vector only)***	***set to drive default for V/f***					
L4-01	Spd Agree Level	Speed agree det level *(Flux Vector only)* (L4-01 = E1-04)	Hz	0-400	0	B	60
L4-02	Spd Agree width	Speed agree det width *(Flux Vector only)*	Hz	0-20	2	B	5.0-8.0
L5	***Fault Restart***						
L5-01	Num of Restarts	Number of automatic restart attempts	-	0 - 10	0	B	0
L5-02	Restart Sel	Automatic restart operation selection 0: No Fault Relay 1: Fault Relay Active	-	0/1	1	B	1
L6	***Torque Detection***						
L6-01	Torq Det 1 Sel	Torque detection 1 selection 0: Disabled 1: Alarm at Speed Agree 2: Alarm at Run 3: Fault at Speed Agree 4: Fault at Run	-	0 - 4	0	B	0
L6-02	Torq Det 1 Lvl	Torque detection 1 level	%	0 - 300	150	B	150
L6-03	Torq Det 1 Time	Torque detection 1 time	s	0.0 - 10.0	0.1	B	0.1
L7	***Torque Limits (Flux Vector only)***						
L7-01 thru L7-04	Torque Limits *(Flux Vector only)*	Set to Factory Defaults	-	0 - 300	200	B	200
L8	***Hdwe Protection***						
L8-01	DB Resistor Prot	Protection selection for internal DB resistor	-	0/1	0	B	0
L8-05	Ph Loss In Sel ***	Input phase loss protection 0: Disabled 1: Enabled	-	0/1	1	B	1
L8-07	Ph Loss Out Sel ***	Output phase loss protection 0: Disabled 1: Enabled	-	0/1	1	B	1
Operator							
O1	***Monitor Select***						
O1-01	User Monitor Sel	Monitor selection 6 = Output voltage	-	4 - 28	6	B	6
O1-02	Power-On Monitor	Monitor selection after power-up 1: Frequency reference 2: Output Frequency 3: Output Current 4: User monitor	1	1 - 4	1	B	1
O1-03	Display Scaling	Scale units for setting and monitoring frequency	-	0 - 39999	0	B	0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	V/f	Field/ MCE Set
O2	***Key Selections***						
O2-01	Local/Remote Key	Local/Remote Key 0: Disabled 1: Enabled	-	0/1	0	B	0
O2-02	Oper Stop Key	Stop key during external terminal operation 0: Disabled 1: Enabled	-	0/1	1	B	1
O2-03	User Default *****	User(MCE) defined default value settings 0 = No change 1= Set defaults 2 = Clear all	-	0-2	0	B	1 *****
P	**Elevator**	**Field Adjustable Parameters are shown in the shaded rows.**					
P1	***S Curve Control***	REFER SECTION 4.2.3, S CURVE ADJUSTMENTS FOR MORE DETAILS					
P1-01	Scrv Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	B	4.0
P1-02	Scrv Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	B	10.5
P1-03	Scrv Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	B	48.0
P1-04	Scrv Acc Start 1	S Curve #1 at the Start of Acceleration	Sec	0.01 - 2.5	1.2		✳
P1-05	Scrv Acc End 1	S Curve #1 at the End of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-06	S CrvDec Start 1	S Curve #1 at the Start of Deceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-07	S Crv Dec End 1	S Curve #1 at the End of Deceleration	Sec	0.01 - 2.5	1.10	B	✳
P1-08	S Crv Acc Start 2	S Curve #2 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-09	S Crv Acc End 2	S Curve #2 at the End of Acceleration	Sec	0.01 -2.5	0.2	B	0.2
P1-10	S Crv Dec Start 2	S Curve #2 at the Start of Deceleration	Sec	0.01 - 2.5	1.5	B	✳
P1-11	S Crv Dec End 2	S Curve #2 at the End of Deceleration	Sec	0.01 - 2.5	1.05	B	✳
P1-12	S Crv Acc Start 3	S Curve #3 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-13	S Crv Acc end 3	S Curve #3 at the End of Acceleration	Sec	0.01 -2.5	1.2	B	✳
P1-14	S Crv Dec Start 3	S Curve #3 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	✳
P1-15	S Crv Dec End 3	S Curve #3 at the End of Deceleration	Sec	0.01 - 2.5	0.9	B	0.9
P1-16	S Crv Acc Start 4	S Curve #4 at the Start of Acceleration	Sec	0.01 - 2.5	0.2	B	0.2
P1-17	S Crv Acc End 4	S Curve #4 at the End of Acceleration	Sec	0.01 - 2.5	1.2	B	
P1-18	S Crv Dec Start 4	S Curve #4 at the Start of Deceleration	Sec	0.01 - 2.5	0.5	B	
P1-19	S Crv Dec End 4	S Curve #4 at the End of Deceleration	Sec	0.01 -2.5	0.2	B	0.2
P2	***Stop /Start***	Do not change these parameters. They are not used for elevator applications.					
P3	***Fault Auto-Reset***						
P3-01	Num Auto-Resets	Number of Automatic Resets	-	0 - 10	3	A	3
P3-02	Auto-Reset Time	Time Delay Between Automatic resets	sec	0.5 - 10.0	3.0	A	3.0

NOTE: The MagneTek and IDM drive software has been modified for this application, some of the parameters in this sheet are different and are not available in the drive manuals. If a drive has been replaced in the field then all the drive parameters should be entered manually and should be verified according to this parameter sheet. A = Advance, B = Basic

***** Must be set correctly for your specific motor/machine/job. Refer to the adjustment manual.

****** Do not initialize the drive in the field if it is not required. Setting A1-03 =1110 and pressing enter will initialize the Drive and will set all of the drive parameters to the MCE Drive default values. Parameter A1-03 will display 0 after Initialization.

******* All the required advanced parameters are accessible in the Basic mode because of modified drive software.

******** OPE40 error will occur, if D1-01 through D1-09 selected above MCE default values (IDM drive will display Min ans Max values) . Refer to final adjustments or drive fault section in the MCE manual.

********* At the factory, MCE will set the drive parameters to the values shown in the *MCE Set* column above, and will save those values as “User Default” by setting parameter O2-03 = 1. In the field, the drive parameters can be *reset* to the MCE Set values by setting parameter A1-03 = 1110. The Field Adjustable parameters can then be re-entered.

****** To verify Open loop or Flux Vector Mode: IDM drive use A1-02, MagneTek drive use U1-04.

******* Two wire initialization on an IDM drive will select Flux Vector mode (A1-02 = 3). For open loop controller, after the two wire initialization, verify/set A1-02 = 0.

Once all the above described steps are complete then all the modified parameters can be viewed and changed by accessing the modified constant.

FIGURE B.1 Velocity Curve and S Curve Parameters (G5 / GPD515)

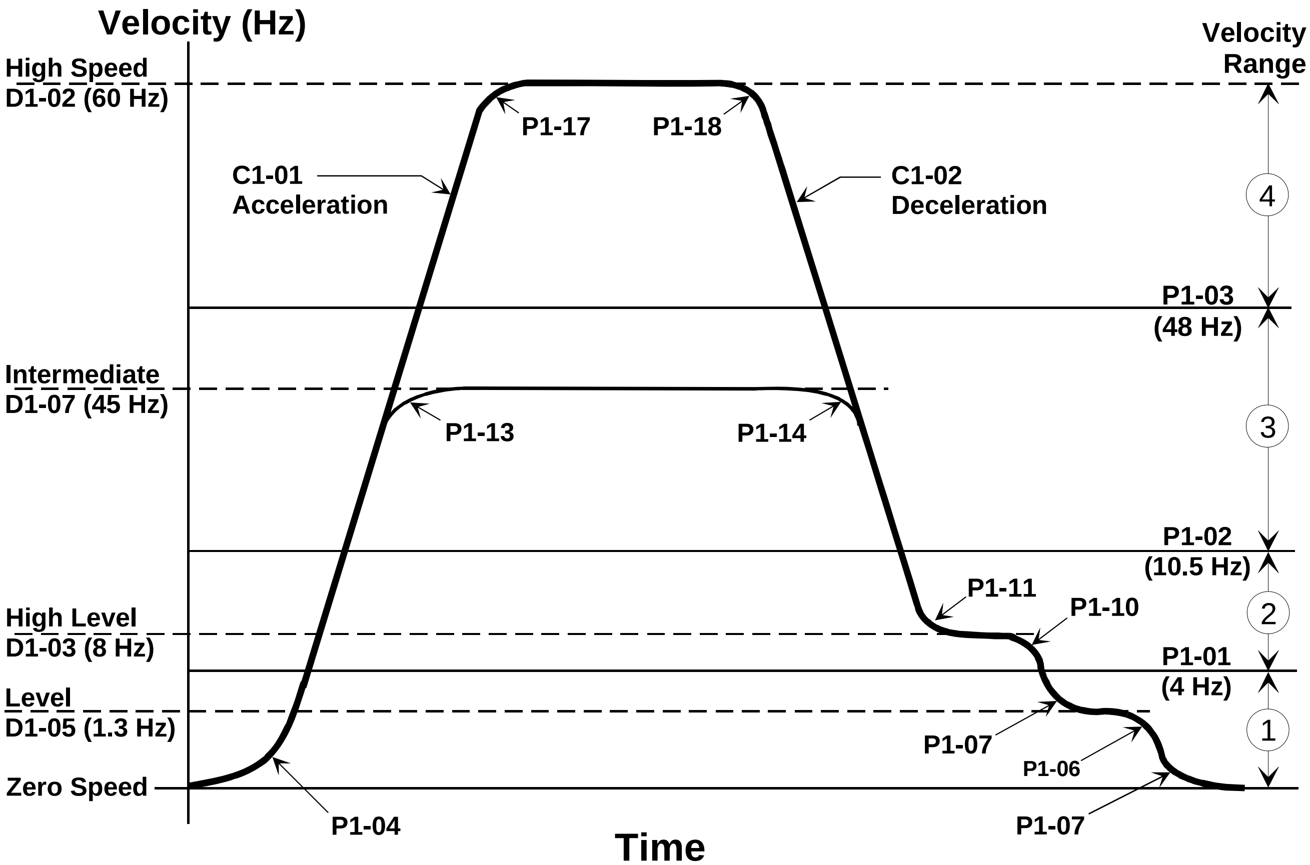


Table for Selection of S-Curves

(Increasing the value (time) of an S-curve parameter causes a longer (smoother) transition)

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

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

Motor Rated Slip Frequency = E2-02

E2-02 = f_s = f - (N x P/120)

where...

f_s: slip frequency (Hz)
f: motor rated frequency (Hz)
N: motor rated speed (F.L - rpm)
P: number of motor poles

P	Synchronous RPM	
	60Hz Motor	50Hz Motor
8	900	750
6	1200	1000
4	1800	1500

Job #:
Drive Model #:
Drive Manufacturer:
Drive Serial Number:
Drive Software (U1-14):
Line #:
Tested By:
Approved:

PARAMETER TREE

MENU	Sub-menu	Group	Function	Parameter No.		
				Quick-start	Basic	Advanced
Operation	U Monitor	U1	Monitor	01-14	15-19	
		U2	Fault trace	01-14		
		U3	Fault history	01-08		
A Initialize		A1	Initialize	00-04		
		A2	User constants			01-32
Programming	B Application	B1	Sequence	01-03	04	05-07
		B2	DC braking		01-04	
		B3	Speed search			01-03
		B4	Delay timers			01,02
		B5	PID control			01-08
		B6	Reference hold			01-04
		B7	Droop control			01,02
		B8	Energy saving			01,02
		B9	Zero servo			01,02
	C Tuning	C1	Accel/Decel	01, 02	03, 04, 09	05-06,10,11
		C2	S-curve accel/decel			01-04
		C3	Motor slip compensation		01	02-04
		C4	Torque compensation		01	02
		C5	ASR tuning		01-04	05-07
		C6	Carrier frequency		01	02,03
		C7	Hunting prevention			01
	D Reference	D1	Preset reference	01-04, 09	05-08	
		D2	Reference limit		01, 02	
		D3	Jump frequency		01-04	
		D4	Sequence			01,02
		D5	Torque control			01-04
	E Motor	E1	V/f pattern 1	01-10		11-13
		E2	Motor set-up 1	01-04		05-09
	F Option	F1	PG option set-up	01	02-07	08-13
		F2	AI-14 set-up		01	
		F3	DI-08, 16 set-up		01	
		F4	AO-08, 12 set-up		01-04	
		F5	DO-02 set-up		01, 02	
		F6	DO-08 set up		01	
		F7	PO-36F set up		01	
	H Terminal	H1	Digital inputs		01-06	
		H2	Digital outputs		01-03	
		H3	Analog inputs		01-07	08-12
		H4	Analog outputs		01-06	
		H5	Serial communication set-up			01-04
	L Protection	L1	Motor overload		01-02	
		L2	Power loss ride through		01-03	04,05
		L3	Stall prevention		01,02,04-06	03
		L4	Reference detection		01,02	03-05
		L5	Fault restart		01,02	
		L6	Torque detection		01-03	04,05
		L7	Torque limit	01-04		
		L8	Hardware protection		01	02,03,05,07
	O Operator	O1	Monitor select		01-04	05
		O2	Key select		01-04	05-08
	P Elevator	P1	S Curve Control		P1-01 - P1-19	
Modified Constants						
Auto-tuning						

APPENDIX C
QUICK REFERENCE FOR HPV 900 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

Field adjustable parameters are shown in shaded rows. All other parameters should be set to the values shown below in the “Field/MCE Set” column.

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

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
Adjust A0						
A1	***Drive***					
	Contract Car Spd	Elevator Contract Speed	fpm	0 - 3000	0.1	✳
	Contract Mtr Spd	Motor Speed at elevator contract speed	rpm	50 - 3000	1130	✳
	Respone	Sensitivity of the speed regulator	rad/ sec	1.0 - 20.0	10	20
	Inertia	System inertia	sec	0.25 - 50.00	2.0	✳
	Inner Loop Xover	Inner speed loop crossover frequency (only with Ereg speed regulator)	rad/ sec	0.1 - 20.0	2.0	2.0
	Gain Reduce Mult	Percent of response of the speed regulator using when in the low gain Mode	%	10 - 100	100	80
	Gain Chng Level	Speed level to change to low gain mode (only with internal gain switch)	%	0 - 100.0	100	10
	Tach Rate Gain	Helps with the effects of rope resonance	%	0 - 30.0	0	0
	Spd Phase Margin	Sets phase margin of speed regulator (only with PI speed regulator)	º	45 - 90	80	80
	Ramped Stop Time	Time to ramp torque from rated torque to zero (only with torque ramp down stop function)	sec	0 - 2.50	0.20	0.20
	Contact Flt Time	Time before a contactor fault is declared	sec	0.10 - 5.00	0.50	0.50
	Brake Pick Time	Time before a brake pick fault is declared	sec	0 - 5.00	0.00	0.00
	Brake Hold Time	Time before a brake hold fault is declared	sec	0 - 5.00	0.00	0.00
	Overspeed Level	Threshold for detection of overspeed fault	%	100.0 - 150.0	125.0	125.0
	Overspeed Time	Time before an overspeed fault is declared	sec	0 - 9.99	1.00	1.00
	Overspeed Mult	Multiplier for overspeed test	%	100 - 150	100	100
	Encoder Pulses	Encoder counts per revolution	ppr	600 - 10000	1024	1024
	Spd Dev Lo Level	Range around the speed reference for speed deviation low logic output	%	00.1 - 10.0	10	10
	Spd Dev Time	Time before speed deviation low logic output is true	sec	0 - 9.99	1.00	1.00
	Spd DevHi Level	Level for declaring speed deviation alarm	%	0 - 99.9	20.0	20.0
	Spd Command Bias	Subtracts an effective voltage to actual speed command voltage	volts	0 - 6.00	0.00	0.00
	Spd Command Mult	Scales analog speed command	-	0.90 - 3.00	1.00	1.00
	Pre Torque Bias	Subtracts an effective voltage to actual pre torque command voltage	volts	0 - 6.00	0.00	0.00
	Pre Torque Mult	Scales pre-torque command	-	-10.00-10.00	1.00	1.0
	Zero Speed Level	Threshold for zero speed logic output	%	0 - 99.99	0.00	0.00

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
	Zero Speed Time	Time before zero speed logic output is declared true	sec	0 - 9.99	0.10	0.10
	Up/Dwn Threshold	Threshold for detection of up or down direction	%	0 - 9.99	1.00	1.00
	Mtr Torque Limit	Motoring torque limit	%	0 - 250.0	250.0	250.0
	Regen Torq Limit	Regenerating torque limit	%	0 - 250.0	250.0	250.0
	Flux Wkn Factor	Defines the torque limit at higher speeds	%	60.0 - 100.0	75.0	75.0
	Ana Out 1 Offset	Subtracts an effective voltage to actual analog output 1	%	-99.9 - 99.9	0.00	0.00
	Ana Out 2 Offset	Subtracts an effective voltage to actual analog output 2	%	-99.9 - 99.9	0.00	0.00
	Ana Out 1 Gain	Scaling factor for analog output 1	-	0 - 10.0	1.0	1.0
	Ana Out 2 Gain	Scaling factor for analog output 2	-	0 - 10.0	1.0	1.0
	Flt Reset Delay	Time Before a fault is automatically reset	sec	0 - 120	5	5
	Flt Reset / Hour	Number of faults that is allowed to be automatically reset per hour	faults	0 - 10	3	3
	Up to SPD. Level	The logic output function is true when the motor speed is above the user specified speed defined by this parameter	%	0 - 110.00	080.00	080.00
	Mains DIP Speed	When enabled by the Main DIP Speed (A1) parameter, speed is reduced by this percent when a UV alarm (low voltage) is declared	%	5 - 99.9	25.00	25.00
	Run Delay Timer	Delays the Drive's recognition of the RUN signal.	sec	0.00 - 0.99	0.00	0.10
	AB Zero Spd Lev	Auto Brake Function - N/A to MCE products	%	0.00 - 2.00	0.00	0.00
	AB Off Delay	N/A to MCE products	sec	0.00 - 9.99	0.00	0.00
	Contactor DO Delay	N/A to MCE products	sec	0.00 - 5.00	0.00	0.00
	TRQ Lim Msg Dly	Determines the amount of time the drive is in torque limit before the Hit Torque Limit message is displayed.	sec	0.50 - 10.00	0.50	2.00
	SER2 Insp Spd	Defines the serial mode 2 inspection (only serial mode 2)	ft/min	0 - 100	000.0	000.0
	SER2 RS Crp Spd	Defines the creep speed that will be used in the "rescue mode."	ft/min	0 - 100	000.0	000.0
	SER2 RS Cpr Time	Defines the maximum time the drive will continue to run at rescue creep speed (only serial mode 2)	ft/min	0 - 100	180	180
	SER2 FLT Tol	Defines the maximum time that may elapse between valid run time messages before a serial fault is declared (only serial mode 2)	sec	0.0 - 2.0	0.04	0.4
	Rollback Gain	Anti-rollback gain	-	1 - 99	1	1
	Notch Filter Frq	Notch filter center frequency	Hz	5 - 60	20	20
	Notch Filt Depth	Notch filter maximum attenuation	%	0 - 100	0	0
	MSPD Delay 1 - 4	Determines the recognition time delay for a defined multistep speed command	sec	0.00 - 10.0	0.00	0.00
A2	***S-Curves***					
	Acc Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 0	Rate of increase of acceleration, up to Accel Rate, when increasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 0	Rate of decrease of acceleration to zero when approaching elevator contract speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 0	Rate of increase of deceleration, to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 29.9	8.0	2.0
	Acc Rate 1	Acceleration rate #1	ft/s^2	0 - 7.99	3.00	3.00

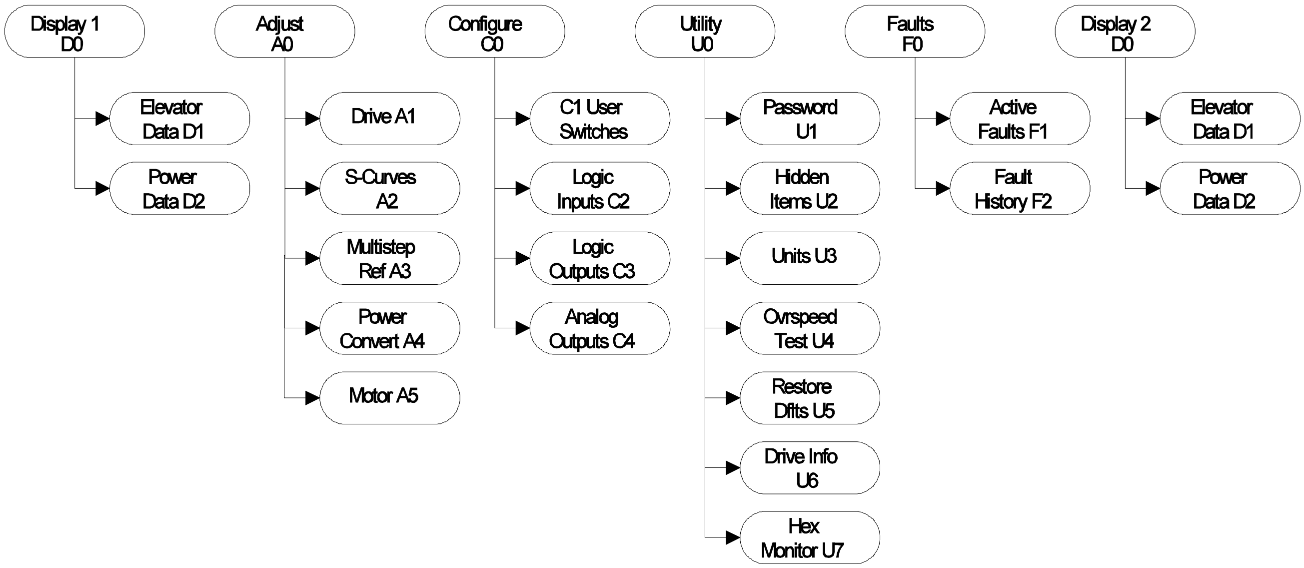
No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
	Decel Rate 1	Deceleration rate #1	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 1	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	00.0	2.0
	Accel Jerk Out 1	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	00.0	2.0
	Decel Jerk In 1	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	00.0	2.0
	Decel Jerk Out 1	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Acc Rate 2	Acceleration rate #2	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 2	Deceleration rate #2	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 2	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 2	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 2	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 2	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Acc Rate 3	Acceleration rate #3	ft/s^2	0 - 7.99	3.00	3.00
	Decel Rate 3	Deceleration rate #3	ft/s^2	0 - 7.99	2.60	3.00
	Accel Jerk In 3	(see Accel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Accel Jerk Out 3	(see Accel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk In 3	(see Decel Jerk In 0)	ft/s^3	0 - 29.9	8.0	4.0
	Decel Jerk Out 3	(see Decel Jerk Out 0)	ft/s^3	0 - 29.9	8.0	4.0
A3	***Multistep Ref***					
	Inspection	Speed command #1 (Inspection)	ft/m	0 - 66% *	0	✳
	Level	Speed command #2 (Level)	ft/m	0 - 16% *	0	✳
	Speed Command 3	Speed command #3	ft/m	0 % *	0	0
	High Level	Speed command #4 (High Level)	ft/m	0 - 25% *	0	✳
	Speed Command 5	Speed command #5	ft/m	0 % *	0	0
	Intermediate	Speed command #6 (Intermediate)	ft/m	0 - 91% *	0	✳
	Speed Command 7	Speed command #7	ft/m	0 % *	0	0
	High Speed	Speed command #8 (High Speed)	ft/m	0 -100% *	0	✳
	Speed Command 9	Speed command #9	ft/m	0 % *	0	0
	Speed Command 10	Speed command #10	ft/m	0 % *	0	0
	Speed Command 11	Speed command #11	ft/m	0 % *	0	0
	Speed Command 12	Speed command #12	ft/m	0 % *	0	0
	Speed Command 13	Speed command #13	ft/m	0 % *	0	0
	Speed Command 14	Speed command #14	ft/m	0 % *	0	0
	Speed Command 15	Speed command #15	ft/m	0 % *	0	0
	***The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. Any speed, other than the defined values will trip the drive SET UP FAULT 6. To clear this fault, enter the correct value of the parameter, and then reset the drive by pressing reset button on HC-ACI board.**					
A4	***Power Convert***					
	Id Reg Diff gain	Flux Current regulator differential gain	-	0.80 - 1.20	1.00	1.00
	Id Reg Prop Gain	Flux current regulator proportional gain	-	0.20 - 0.40	0.30	0.30
	Iq Reg Diff Gain	Torque current regulator differential gain	-	0.80 - 1.20	1.00	1.00
	Iq Reg Prop Gain	Torque current regulator proportional gain	-	0.20 - 0.40	0.30	0.30
	PWM Frequency	Carrier frequency	kHz	2.5 - 16.0	10.0	10.0
	UV Alarm Level	Voltage level for undervoltage alarm	%	80 - 99	80	80
	UV Fault Level	Voltage level for undervoltage fault	%	50 - 88	80	80
	Extern Reactance	External choke reactance	%	0 - 10	0	0
	Input L-L Volts	Nominal line-line AC input Voltage, RMS	volts	110 - 480	Drive dep.	
A5	***Motor***					
	Motor ID	Motor Identification	-	4 PoleDFLT, 6 Pole DFLT, MCE Test	MCE Test	✳
	Rated Mtr Power	Rated motor output power	HP	1.0 - 500	5.0	✳

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
	Rated Mtr Volts	Rated motor terminal RMS voltage	volts	190.0 - 575.0	460	✳
	Rated Excit Freq	Rated excitation frequency	Hz	5.0 - 400.0	60	✳
	Rated Motor Curr	Rated motor current	amps	1.00 - 800.00	6.8	✳
	Motor Poles	Motor poles	-	2 - 32	6	✳
	Rated Mtr Speed	Rated motor speed at full load	RPM	50.0 - 3000.0	1130	✳
	% No Load Curr	Percent no load current	%	10.0 - 60.0	35.0	✳
	Stator Leakage X	Stator leakage reactance	%	0 - 20.0	9.0	9.0
	Rotor Leakage X	Rotor leakage reactance	%	0 - 20.0	9.0	9.0
	Stator Resist	Stator resistance	%	0 - 20.0	1.5	1.5
	Motor Iron Loss	Iron loss at rated frequency	%	0 - 15.0	0.5	0.5
	Motor Mech Loss	Mechanical loss at rated frequency	%	0 - 15.0	1.0	1.0
	Ovld Start Level	Maximum continuous motor current	%	100 - 150	110	110
	Ovld Time Out	Time that defines motor overload curve	sec	5.0 - 120.0	60.0	60.0
	Flux Sat Break	Flux saturation curve slope change point	%	0 - 100	75	75
	Flux Sat Slope 1	Flux saturation curve slope for low fluxes	%	0 - 200.0	0	0
	Flux Sat Slope 2	Flux saturation curve slope for high fluxes	%	0 - 200.0	50	50
Configure C0						
C1	***User Switches***					
	Spd Command Src	Speed Command Source	-	Analog input Multi-step Serial	Multi-step	Multi-step
	Run Command Src	Run Command Source	-	External TB Serial Serial+extern	External TB	External TB
	Hi/Lo Gain Src	High / low gain change switch source	-	External TB Serial Internal	Internal	Internal
	Speed Reg Type	Chooses speed regulator	-	Elev spd reg Pi speed reg	Elev spd reg	Elev spd reg
	Motor Rotation	Allows user to reverse direction of motor rotation	-	Forward Reverse	Forward	Forward or Reverse
	Spd Ref Release	Determines when speed reference release is asserted	-	Reg release Brake picked	Reg release	Reg release
	Cont Confirm Src	Determines if an external logic input is used for contactor confirmation.	-	None External TB	None	None
	Pre Torque Source	Determines if a pre torque command is used and if used, it determines the source of the pre torque command	-	None Analog input Serial	None	None
	Pre Torque Latch	Chooses if analog pre-torque command is latched	-	Not latched Latched	Not latched	Not latched
	PTtorq Latch Clck	Determines source of pre torque latch control (if used)	-	External TB Serial	External TB	External TB
	Fault Reset Src	Fault reset source	-	External TB Serial Automatic	External TB	Automatic
	Overspd Test Src	Determines external logic source to trigger overspeed test	-	External TB Serial	External TB	External TB
	Brake Pick Src	If drive controls the mechanical brake, this determines the source of the brake pick command	-	Internal Serial	Internal	Internal
	Brake Pick Cnfrm	Determines if a logic input is used for brake pick confirm	-	None External TB	None	None

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
	Brake Hold Src	If drive controls the mechanical brake, this determines the source of the brake hold command	-	Internal Serial	Internal	Internal
	Ramped Stop Sel	Chooses between normal stop and torque ramp down stop	-	None Ramp on stop	None	None
	Ramp Down En Src	Determines the source that signals the torque ramp down stop (if used)	-	External TB Run logic Serial	External TB	External TB
	Brk Pick Flt Ena	Brake pick fault enable	-	Enable Disable	Disable	Disable
	Brk Hold Flt Ena	Brake hold fault enable	-	Enable Disable	Disable	Disable
	Ext Torq Cmd Src	When Speed Reg Type = External Reg, this sets the source of the torque command	-	None Serial	None	None
	Dir Confirm Ena	Confirms proper analog signal polarity when set to Enable and a logic input is programmed to Run Up and Run Down	-	Enabled Disabled	Disabled	Disabled
	S-Curve Abort	Addresses how the S-Curve Speed Reference Generator handles a *reduction* in the speed command before the S-Curve Generator has reached its target speed.	-	Enabled Disabled	Disabled	Disabled
	Fast Flux	Reduces starting takeoff time by reducing motor fluxing time	-	Enabled Disabled	Disabled	Enabled
	Main DIP Ena	Enables the Mains DIP Speed (A1) parameter which reduces speed when a UV alarm (low voltage) is declared	-	Enable Disable	Disable	Disable
	DB Protection	Dynamic braking protection fault or alarm selection	-	Fault Alarm	Fault	Fault
	Encoder Fault	Temporarily disables the Encoder Fault	-	Enable Disable	Enable	Enable
	Stopping Mode	Determines the stopping mode when Spd Command Src = multi-step	-	Immediate Ramp to stop	Immediate	Immediate
	Motor Ovrld Sel	Motor overload selection	-	Alarm Flt Immediate Fault at stop	Alarm	Flt Immediate
	Auto Stop	Auto stop function enable	-	Disable Enable	Disable	Disable
	Serial Mode	Serial protocol selection	-	None, Mode1 Mode 2 Mode 2 test	Mode 1	None
	Ser2 Flt Mode	Defines the reaction to a serial communication fault while in Serial Mode 2 (only serial mode 2)	-	Immediate Run remove Rescue	Immediate	Immediate
	DRV Fast Disable	Addresses how fast the drive responds to removal of drive enable logic input	-	Disable Enable	Disable	Disable
	MLT-Spd to DLY 1	Assigns multi-step speed command to recognition delay timer 1	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 2	Assigns multi-step speed command to recognition delay timer 2	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 3	Assigns multi-step speed command to recognition delay timer 3	-	None mspd1- mspd15	None	None
	MLT-Spd to DLY 4	Assigns multi-step speed command to recognition delay timer 4	-	None mspd1- mspd15	None	None

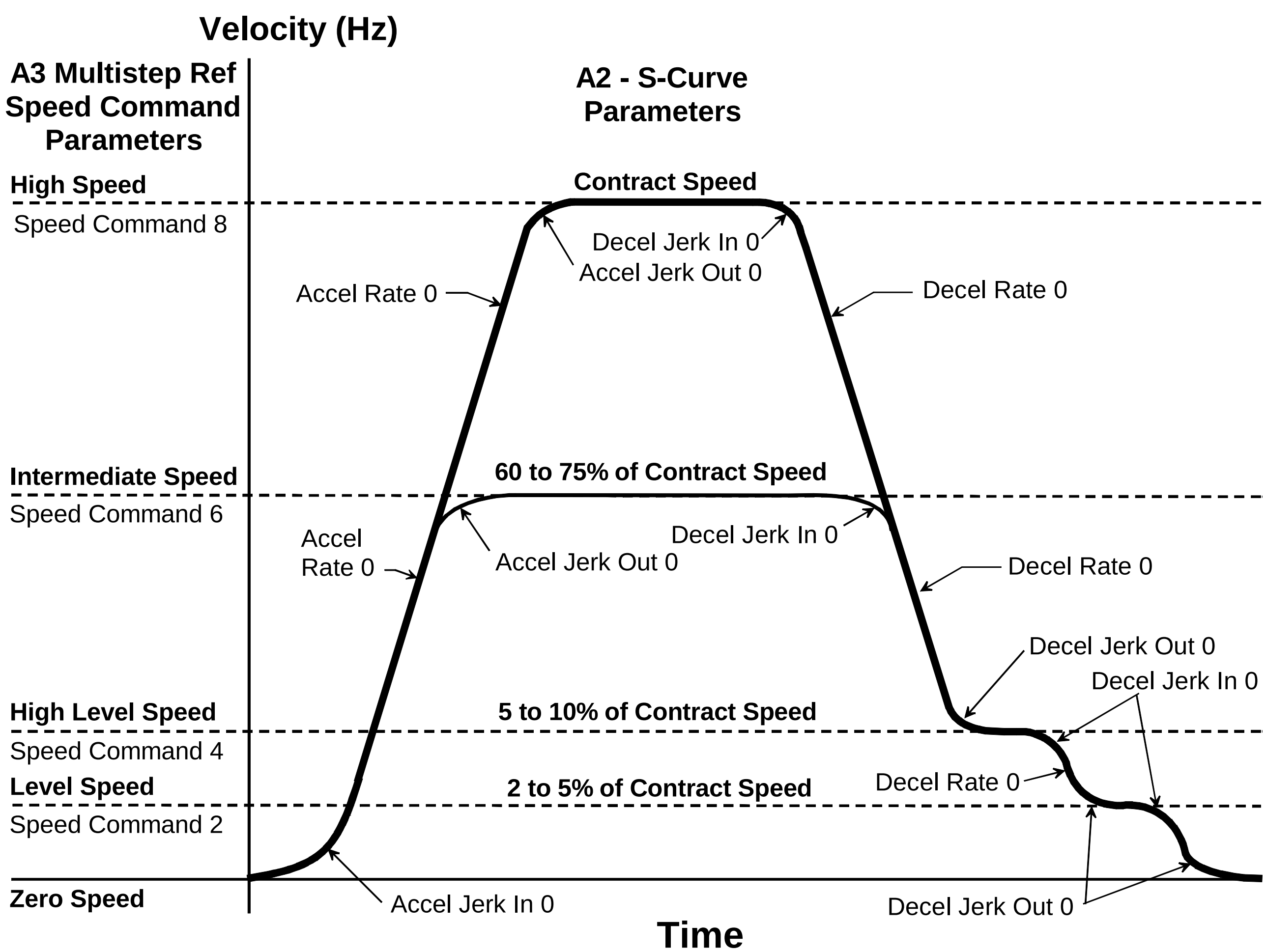
No.	Digital Operator Display	Parameter Description	Unit	Setting Range	Drive Defaults	Field/MCE Setting
dC2	***Logic Inputs***					
	Log In 1 TB1-1	Terminal 1 Selection	-	-	DRIVE ENABLE	DRIVE ENABLE
	Log In 2 TB1-2	Terminal 2 Selection	-	-	RUN UP	RUN UP
	Log In 3 TB1-3	Terminal 3 Selection	-	-	RUN DOWN	RUN DOWN
	Log In 4 TB1-4	Terminal 4 Selection	-	-	FAULT RESET	FAULT RESET
	Log In 5 TB1-5	Terminal 5 Selection	-	-	STEP REF B0	STEP REF B0
	Log In 6 TB1-6	Terminal 6 Selection	-	-	STEP REF B1	STEP REF B1
	Log In 7 TB1-7	Terminal 7 Selection	-	-	STEP REF B2	STEP REF B2
	Log In 8 TB1-8	Terminal 8 Selection	-	-	STEP REF B3	STEP REF B3
	Log In 9 TB1-9	Terminal 9 Selection	-	-	S-CURVE SEL 0	S-CURVE SEL 0
C3	***Logic Outputs***					
	Log Out 1 TB1-14	Terminal 14 Selection	-	-	SPEED DEV LOW	SPEED DEV LOW
	Log Out 2 TB1-15	Terminal 15 Selection	-	-	RUN COMMANDED	RUN COMMANDED
	Log Out 3 TB1-16	Terminal 16 Selection	-	-	MTR OVERLOAD	MTR OVERLOAD
	Log Out 4 TB1-17	Terminal 17 Selection	-	-	ENCODER FAULT	ENCODER FAULT
	Relay Coil 1	Relay 1 Function Selection	-	-	FAULT	FAULT
	Relay Coil 2	Relay 2 Function Selection	-	-	SPEED REG RLS	SPEED REG RLS
C4	***Analog Outputs***					
	Ana Out 1 TB1-33	Terminal 33 Selection	-	-	SPEED CMD	SPEED CMD
	Ana Out 2 TB1-35	Terminal 35 Selection	-	-	SPEED FEEDBK	SPEED FEEDBK
Utility U0						
U1	***Password***	Password	-	-	000000	000000
U2	***Hidden Items***	Enable or disable hidden parameters	-	ENABLED, DISABLED	ENABLED	ENABLED
U3	***Unit***	Unit for parameters	-	ENGLISH, METRIC	ENGLISH	ENGLISH
U4	***Overspeed Test***	Allows overspeed test during inspection	-	YES, NO	NO	NO
U5	***Restore Dflts***					
	Restore Motor Defaults?	Reset all parameters to default values except parameters in MOTOR A5				
	Restore Device Defaults?	Resets the parameters in MOTOR A5 to the defaults defined by the MOTOR ID				
U6	***Drive Info***	Drive information (Drive Version, Boot Version , Cube ID, Drive Type)				
U7	***HEX Monitor***	Hex Monitor				
U8	***Language Sel***	Selects the language for display				
Drive Version: A2950-C10304						

FIGURE C.1 HPV 900 Parameter Menu Trees



For more information refer to Section 3, *Parameter Adjustments* in the MagneTek HPV 900 AC Vector Elevator Drive Technical Manual.

FIGURE C.2 Velocity Curve and S Curve Parameters (HPV 900 software version A2950-C10304)



APPENDIX D
QUICK REFERENCE FOR TORQMAX F4 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

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

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.00	Password; (-5 = read & write, -4 = read only)	-	0 - 9999	-5	-5
LF.01	User defined Password	-	0 - 9999	440	440
LF.02	Operating Mode: 2 =Input coded terminals	-	1-4	2	2
LF.03	Incremental Encoder output (Not used)	-	1-128	1	1
LF.04	Motor selection: 1=Synchronous, 0= Induction	-	0 - 1	0	0
LF.05	Drive Fault Auto Reset	-	0 - 10	3	10
LF.07	Unit system	-	SI, US	US	US
LF.08	Electronic Motor Protection:	-	off, 1 - 4	off	3
LF.09	Electronic Motor Protection Current	A	1.0 - 110%Rtd	8.0	
LF.10	IM- Rated Motor Power	HP	0.00 - 100.00	5.00	✳
LF.11	IM-Rated Motor speed	rpm	75-6000	1165	✳
LF.12	IM- Rated Motor current	A	1.0 - 110% Drive rated	8	✳
LF.13	IM-Rated Motor Frequency	Hz	5 - 100	60	✳
LF.14	IM-Rated Motor voltage	V	1 - 650	230/460	✳
LF.15	IM-Rated power factor	-	0.01 - 1.00	0.83	0.83 - 0.90
LF.16	IM Field Weakening Speed	rpm	0.0 - 6000.0	set @ 80% of LF.11	✳
LF.17	Encoder Pulse Number	ppr	256 - 10000	1024	1024
LF.18	Swap Encoder channel: 0=OFF, 1 =ON	-	off - on	off	off
LF.19	DC voltage compensation (used for open loop)	V	150 - 500	230/460	-
LF.20	Contract Speed	fpm	0.0 - 2000.0	0	✳
LF.21	Traction Sheave Diameter	inch	7.0 -80.0	24	✳ 24
LF.22	Gear Reduction Ratio	-	1-99.9	30	✳ 30
LF.23	Roping ratio	-	1-8	1	✳ 1
LF.24	Load	lbs	0-65535	0	✳
LF.25	Estimated Gear Reduction	-	-	-	-
LF.30	Control method: 0= open loop, 2 = closed loop	-	0-3	0	✳
LF.31	IM-KP Speed (proportional gain)	-	1 - 65535	3000	✳✳ 3000
LF.32	IM-KI Speed (integral gain)	-	1 - 65535	1000	✳✳ 1000
LF.33	IM-KI Speed offset	-	0 - 65535	1000	✳✳ 3000
LF.34	IM-KP Current (proportional gain)	-	1 - 65535	1500	1500
LF.35	IM-KI Current (integral gain)	-	1 - 65535	500	500

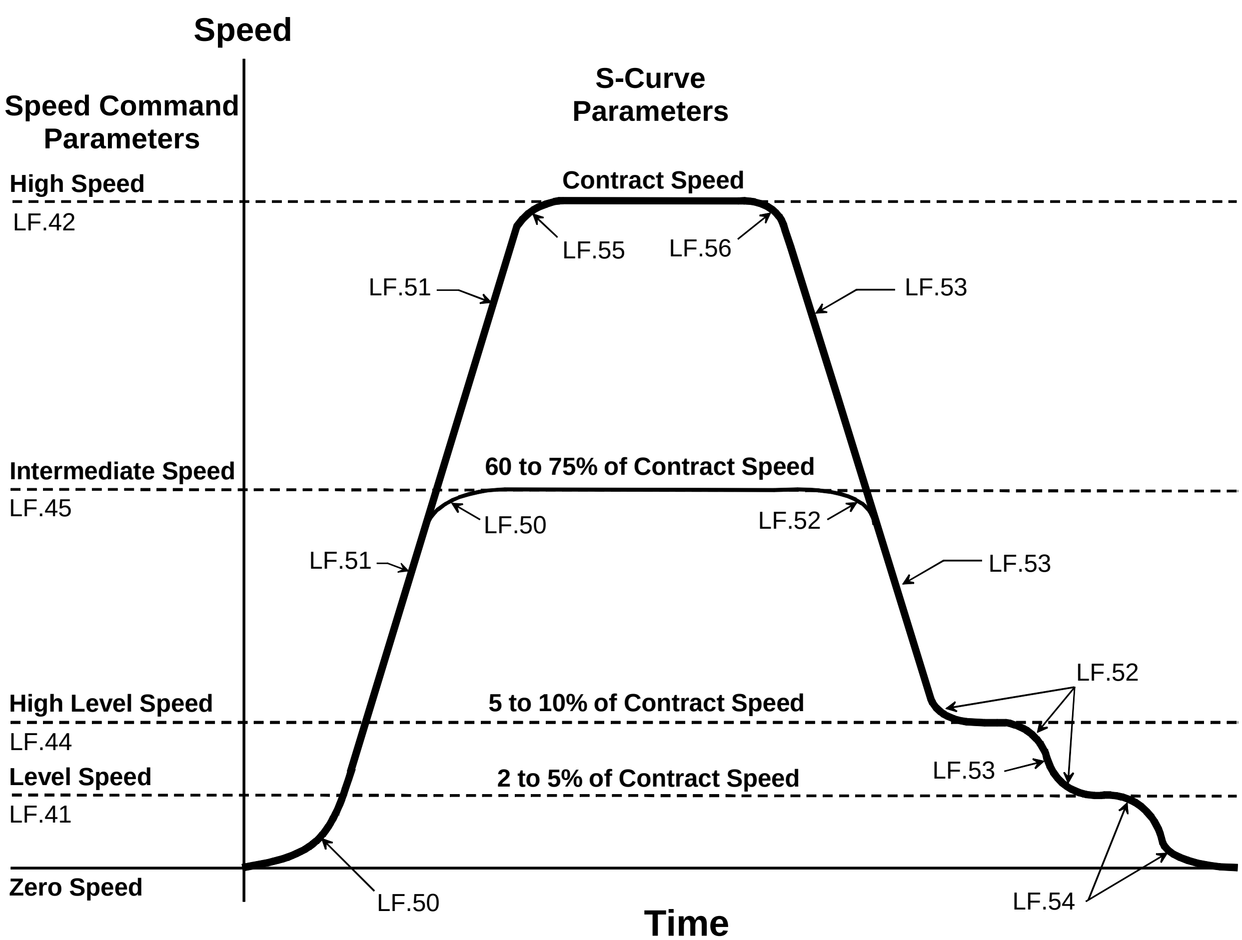
Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.36	Maximum torque **<u>Automatically calculated by the drive</u>). This value should be <u>3 times LF</u>**	lbft	0-500	200	300% of LF.91 ✳________
LF.37	Low speed torque boost	%	0 - 25.5	10.0	10.0
LF.38	Switching frequency; 0= 8 KHz , 1= 16KHz (**Note: set LF.38 = 0 if <u>E.OL2</u> error on drive*)***	-	0, 1	1	1
LF.40	Re-leveling Speed (Not used, but must be set to 0)	fpm	0.0 - 16% of LF.20	0.0	0.0
LF.41	Leveling speed	fpm	0 -16% of LF.20	0	✳✳ 3 - 5 ________
LF.42	High Speed	fpm	0 -LF.20	0	✳
LF.43	Inspection speed	fpm	0-66% of LF.20	0	✳
LF.44	High level Speed	fpm	0-25% of LF.20	0	✳✳ 10 -18 ________
LF.45	Intermediate speed	fpm	0-91% of LF.20	0	
LF.50	Start Jerk - used for the transitions at the start and end of acceleration (except, see LF.55)	ft/s^3	0.31 - 32.00	2.00	✳✳ 2.0 - 5.0 ________
LF.51	Acceleration rate	ft/s^2	0.30 - 8.00	3.00	✳✳ 2.0 - 5.0 ________
LF.52	Flare Jerk - used for the transitions at the start and end of deceleration (except, see LF.56)	ft/s^3	0.31 - 32.00	3.28	✳✳ 2.0 - 5.0 ________
LF.53	Deceleration rate	ft/s^2	0.30 - 8.00	3.00	✳✳ 2.0 - 5.0 ________
LF.54	Stop Jerk - used for the final transitions from leveling to zero speed (off = LF.52 is used instead)	ft/s^3	off, 0.02 - 32.00	off	✳✳ 1.00 ________
LF.55	Acceleration Jerk - used for the transition from acceleration to contract speed	ft/s^3	0.31 - 32.00	3.28	✳✳ 4.00 ________
LF.56	Deceleration Jerk - used for the transition from contract speed to deceleration	ft/s^2	0.30 - 8.00	3.00	✳✳ 4.00 ________
LF.57	Speed following error (0=off, 1 = on, 2=alarm)	-	0 - 2	1	1
LF.58	Speed Difference	%	0 - 30	10	10
LF.59	Following error timer	sec	0.000-10.000	3.000	3.000
LF-60 to LF-66	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
LF.67	Pretorque Gain	-	0.50 - 1.50	1.00	1.00
LF.68	Pretorque Offset	%	-25.0 - 25.0	0	0
LF.69	Pretorque Direction (0 = off, 1 = on)	-	0, 1	0 (off)	0 (off)
LF-70	Brake Release Time (Delay to turn on DRO).	sec	.001 - 3.0	0.200	0.200
LF.71 to LF-78	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
LF.A0 to LF.C5	NOT USED BY MCE, Must be left at factory defaults.	-	-	-	-
Monitor Parameters (Read only parameters)					
LF.25	Estimated gear ratio				
LF.80	Software version				
LF.81	Software date				
LF.82	Terminal X2 - Input states (refer to table x.x)				
LF.83	Terminal X2- output states (refer to table x.x)				
LF.84	Terminal X3 - input states (refer to table x.x)				
LF.85	Terminal X2- output states (refer to table x.x)				
LF.86	Selected speed				
LF.87	Actual inverter load	%			
LF.88	Actual set speed (commanded motor RPM)	rpm			
LF.89	Actual speed (actual motor RPM)	rpm			
LF.90	Elevator speed	fpm			
LF.91	Rated motor torque	lbft			

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
LF.92	Positioning drive	inch			
LF.98	Starting sequence state				
LF.99	Inverter state				
ru.09	Phase Current (actual motor current)	A			
ru.11	Actual DC Voltage (DC bus voltage)	V			
ru.12	Peak DC Voltage (max. DC bus voltage measured)	V			
Fr.0	Parameter reset		0 - init	0	✳✳✳ 0

The speed setting range is described in percentage of the contract speed, but the actual entered value of the speed is in FPM. The drive will not accept any speed, higher than the defined values.
✳ Parameters are motor / machine / job dependent.
✳✳ Recommended but field adjustable.

Parameters for Drive Software Version C31A (LF.81 date code = 0209.4)

FIGURE D.1 Velocity Curve and S Curve Parameters (TORQMAX)



Job #:	
Drive Model #:	
Drive Manufacturer:	
Drive Serial Number:	
Drive Software (LF.80):	
Line #:	
Tested By:	
Approved:	

APPENDIX E
NOMENCLATURE

Motion Control Engineering, Inc.	NOMENCLATURE		
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#	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
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

#	PC BOARD	DESCRIPTION
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 Asjust Board for VVMC-SCR Controller

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
XJ	EYELET ON PC BOARD
XJ	SCREW TERMINAL ON PC BOARD
XJ	IDC CONNECTOR ON PC BOARD
CX–X CX–X XJ JX	RIBBON CABLE CONNECTOR
TPX	TEST POINT

SYMBOL	DESCRIPTION
OFF BOARD SIDE JX 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

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

UNLESS NOTED, ALL WIRES ARE #18 AWG PVC, WITH EXCEPTION TO THE PC BOARD WIRING, WHICH IS DETERMINED BY ENGINEERING.

MCE Motion Control Engineering, Inc.

NOMENCLATURE

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Effective Date: 3–14–03

APPENDIX F
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 G
FLEX-TALK OPTION

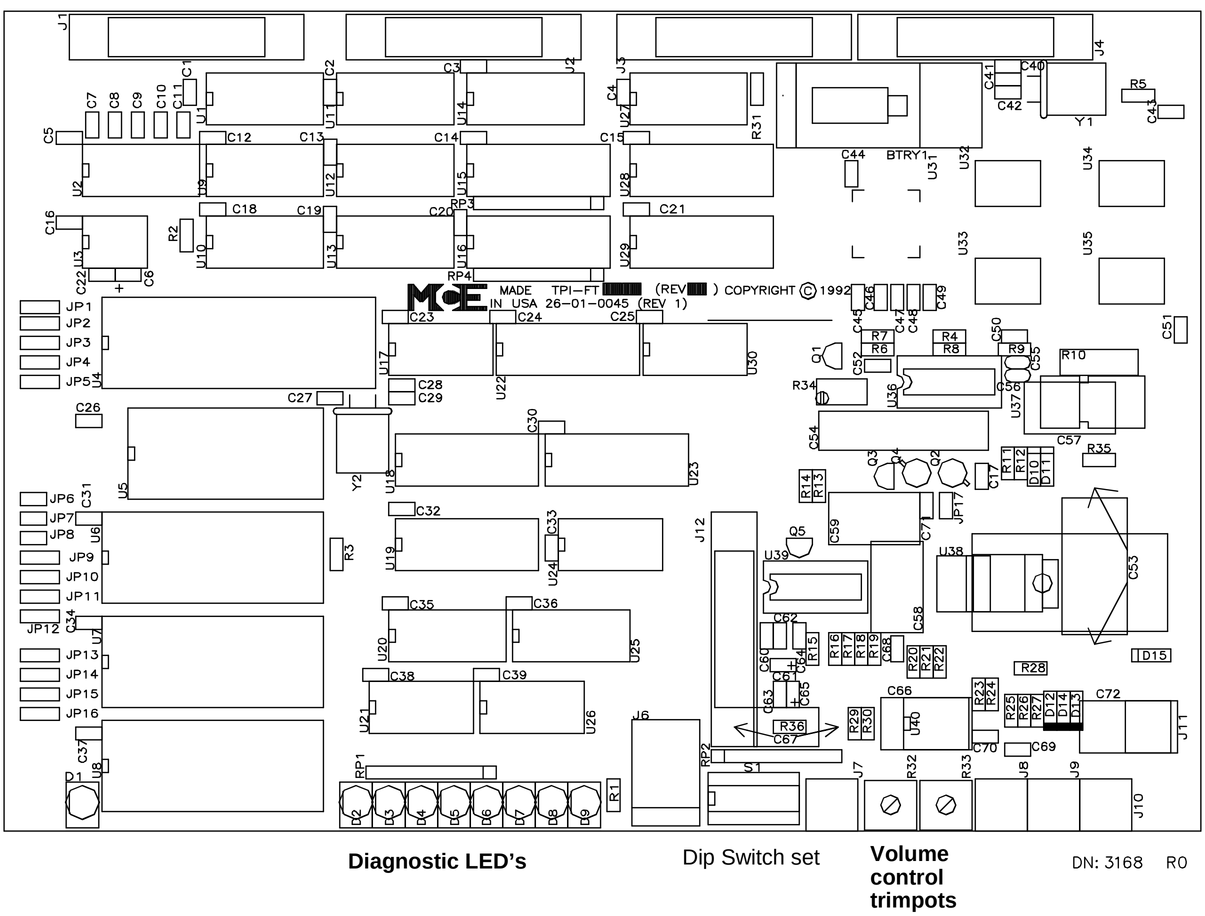
> The following is a listing of diagnostic tools available on a controller if the Flex-Talk option is provided.

Use this addendum in conjunction with the manual. The addendum provides information regarding the diagnostics and volume adjustments for the TPI-FT option on the Flex-Talk unit.

G.1 INTRODUCTION AND THEORY OF OPERATION

The Flex-Talk board is designed for use on any MCE controller to provide flexibility in audio announcement. The TPI-FT board is installed inside the controller and hooked up to the last board of the daisy chain. The 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 G.1 Flex-Talk Board



G.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 G.2 Diagnostic Table

DIP SWITCHES					DIAGNOSTIC LEDS								MNEM.
S2	S3	S4	S5	S6	D2	D3	D4	D5	D6	D7	D8	D9	
1	0	0	0	0	SELF TEST								
0	0	0	0	0	UP	DOWN	NUDG	DOOR	MAIN FIRE	SAF	ALT FIRE	HOSP	MODSW
0	1	0	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								PIN
0	0	1	0	0	X	EM3A	EM2A	EM1A	DORA	GDA	GUA	PIA	MAW
0	1	1	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								IPR_3
0	0	0	1	0	SEC. FLR	HLW	EMP	X	X	X	X	X	SMAW1
0	1	0	1	0	STOP SW	OVS	LOBM	X	X	X	X	X	SMAW2
0	0	1	1	0	X	X	EMP	X	X	X	X	X	EMPWI N
0	1	1	1	0	UP	DOWN	NUDG	DLK	FRS	SAF	FRA	HOSP	ITR-1
0	0	0	0	1	PI0	PI1	PI2	PI3	PI4	CSE	HLW	EPR	ITR-2
0	1	0	0	1	PI5	X	DOPLFR	X	X	H OR (NOT) STC	ATALT	ATMN	ITR-3

Dip switches : - switches S2, S3, S4, S5, and S6 are used to select which flags on the TPI are to be displayed.

- switch S2 is used for self test.
- switch S1 is current not used.
- 0 = switch is "Off" and 1 = switch is "On"

D2 thru D9: diagnostic leds located on the processor board. Lit LEDs indicate that one of of the flags listed below D2 thru D9 on the above chart are read as active.

Example: if all switches are off, D4 & D6 are turned on, then nudging and main fire service flags are on.

G.3 VOLUME CONTROL

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 counter-clockwise 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 effect any music volume that may be connected on J8. Music volume is set external of this unit.

G.4 TROUBLESHOOTING

If there are no audio messages, then:

The speaker may not be connected on J9.
The +/-15V supply on connector J7 may not be present.
U39 relay may be defective.
U38 (audio power op-amp) may be defective.

U5 (program Eprom), U7 or U8 (digitized voice Eprom) may be defective.
A volume control trimpot may be defective or turned fully clockwise.

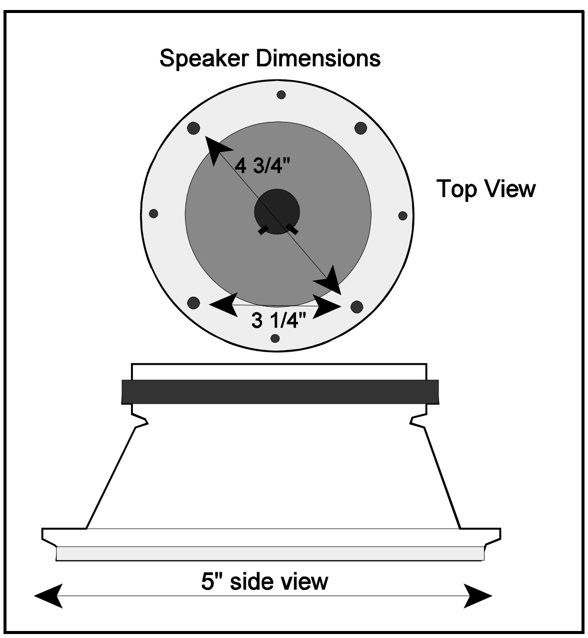
If the message "Please allow the doors to close" is heard when nudging:

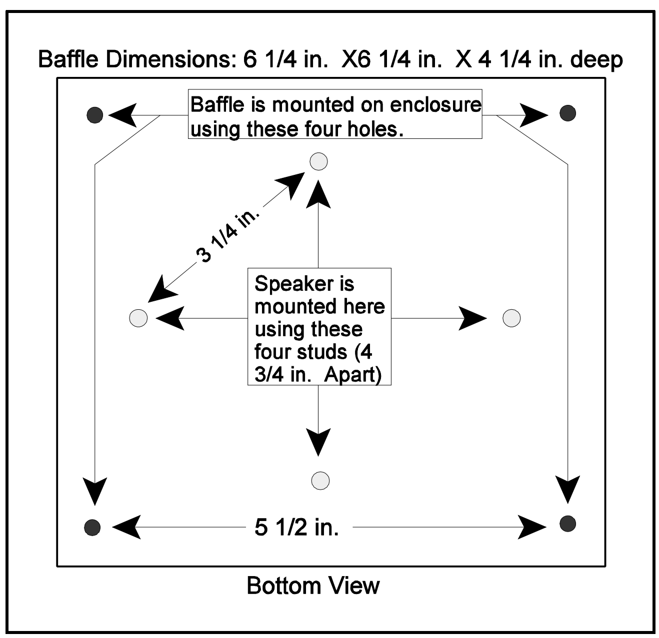
The photo eye used to detect objects in the door path may be blocked.
The photo eye may be dirty, or defective.

G.5 PERIPHERAL EQUIPMENT

Square recessed mount 6 1/4" by 6 1/4" by 4 1/4" deep (manufacturer Model # 198-4).
Square surface mount 7" by 7" by 4 1/4" deep (manufacturer Model # SE 198-4).
Circular recessed mount 6 1/8" by 4 1/4" deep without lip (manufacturer Model # 94-4).
7" round by 4 1/4" deep (including lip).
7 3/8" in diameter with circular grill.

FIGURE G.3 Speaker Dimensions





APPENDIX H
LS-QUTE 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 H.1 LS QUTE Enclosure Assembly

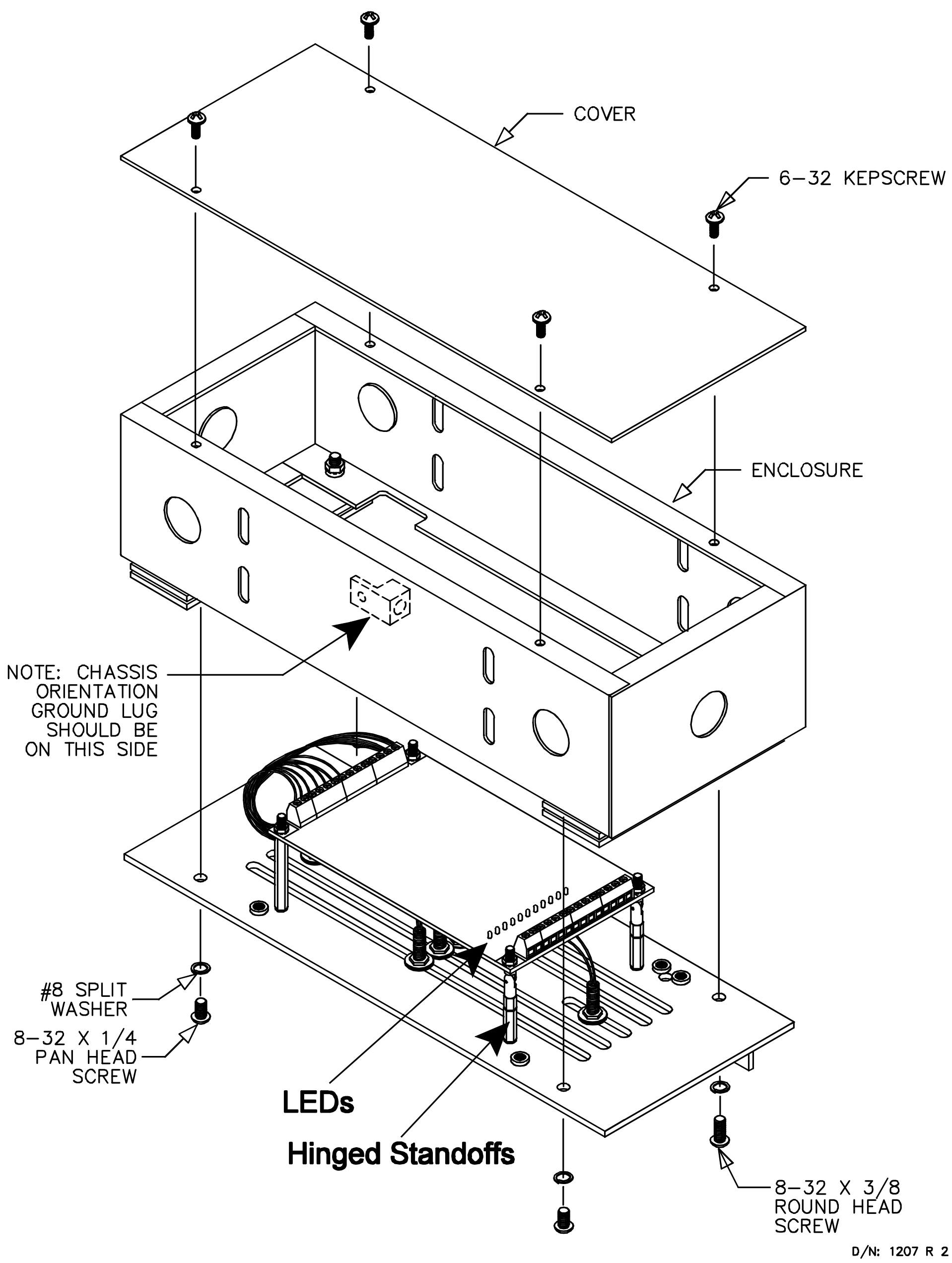
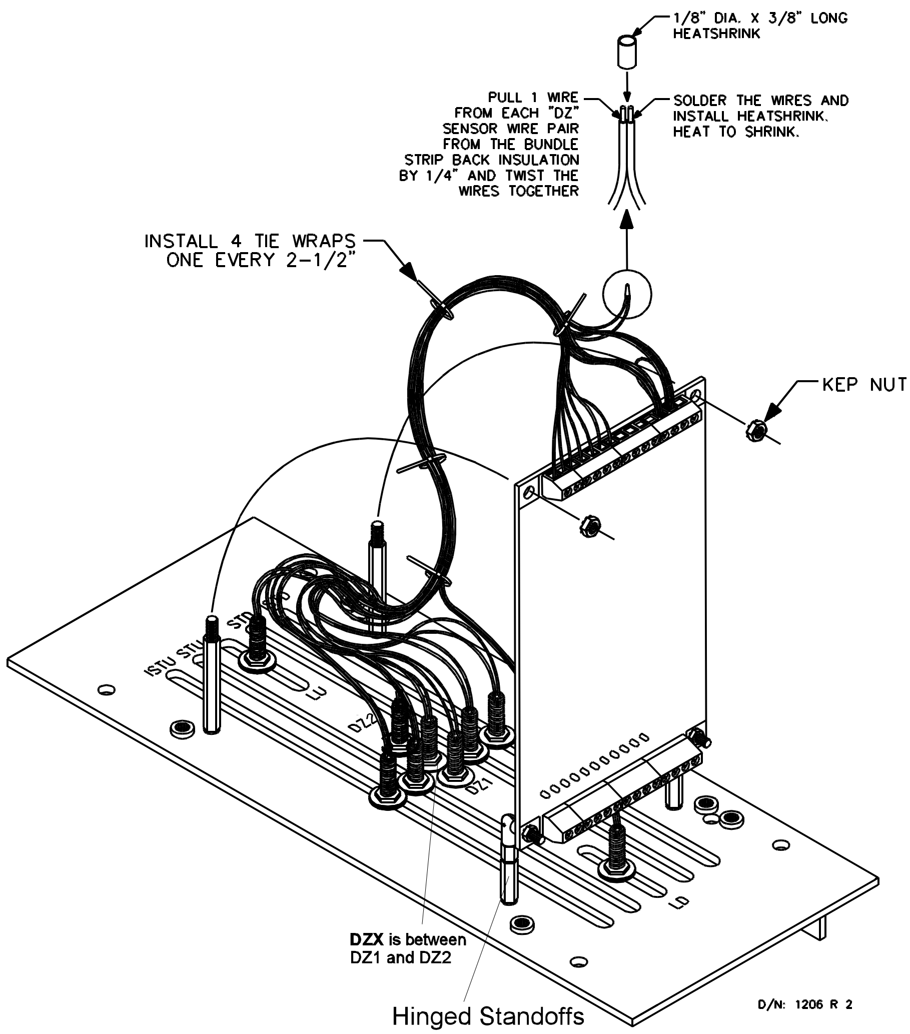


FIGURE H.2 LS QUTE Wiring Diagram



SENSOR	HC-IPLS BOARD TERMINALS	
DZ1	DZ2 SENSOR	S18
DZX	SDZX	S18
DZ2	DZ1 SENSOR	S27
DZF	SDZF	S18
DZR	SDZR	S18
LD	SLD	S18
LU	SLU	S18
STD	STD	S2
STU	STU	S2
ISTD	ISTD	S2
ISTU	ISTU	S2
One 2 inch jumper	S18	S2

APPENDIX I
POWERBACK R4 REGENERATIVE DRIVE

I.1 GENERAL

The following information pertains to the POWERBACK R4 Regenerative Drive used with IMC-AC-R and VFMC Series M controllers.

I.2 REGENERATIVE DRIVE INTERFACE

The following is an explanation of the POWERBACK R4 Regenerative Drive interface.

I.2.1 DRIVE INPUTS

- Drive Enable (Terminal 8): This input enables the R4 drive and puts the drive in standby mode. Drive parameter **ru. 0** reads **stby** during motoring condition and **Active** during deceleration/overhauling conditions. A voltage between drive terminals 7 & 8 of 18 VDC = ON, 0 VDC = OFF.

- Drive Reset (Terminal 11): This input resets an R4 drive fault. Pressing the drive reset button on the HC-ACI board activates the reset input and clears regenerative drive faults. A voltage between drive terminal 11 & 7 of 18 VDC = ON, 0 VDC = OFF.

I.2.2 DRIVE OUTPUT

- Drive ready contact: The contacts between terminals 1 and 3 on the R4 drive remain closed under normal condition and open during a fault, which drops the RDY relay on the HC-ACI board. Pressing the Drive Reset button on the HC-ACI board should clear the R4 drive fault and should turn ON the RDY relay.

I.2.3 POWER CONNECTIONS

a. It is recommended that the L1, L2, L3 connections on the Inverter and the R4 drive be in phase.

b. The input power connections (L1-2, L2-2, L3-2) and the phase monitoring connections (L1, L2, L3) on the R4 drive must be in phase. If these connections are not in phase the R4 drive will trip fault **E.Syn** and drop the RDY relay on the HC-ACI board. If the R4 drive trips on **E.nEt** at power up or trips the over voltage **E.oP** fault at the end of a run, one of the phase monitoring fuses may be open or there may be a loose connection on the phase monitor inputs.

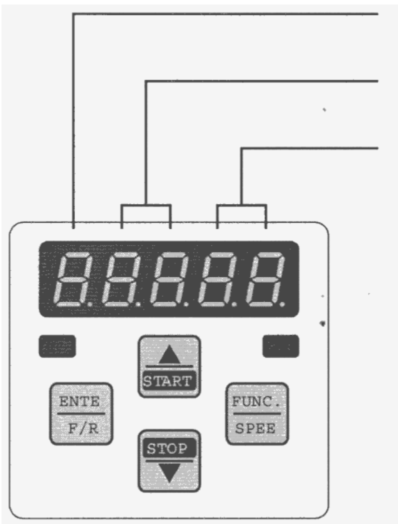
c. The DC bus connections must be correct and according to the drawings. ***It is critical that DC bus connections be correct. Incorrect connections will damage the drive units.***

d. The line inductor ground connection to the R4 Drive and F4 Drive must be completed according to the drawings.

I.2.4 HOW TO USE THE DRIVE KEYPAD

The R4 drive is delivered from the factory in the *Application* mode, which allows access to all parameters and functions available on the unit.

The display shows three types of information which define the parameter:



By pressing the FUNC button you can change between the displayed parameter and its value.

To select a different parameter use the ENTER button to toggle the flashing point to the right of the field to be changed. Then use the UP and DOWN buttons to scroll the desired value. Once the correct parameter information is displayed, the FUNC button can be pressed at any time to see the value of the parameter.

When displaying a parameter value, the value of the parameter can be changed by pressing the UP/DOWN buttons. Generally, these changes are immediately effective and permanently stored, meaning they remain stored after the unit is switched off. Confirming the input with ENTER is not necessary, with the exception of the parameters known as *Enter Parameters*.

Enter Parameter: For some parameters the value adjusted by UP/DOWN does not automatically become valid. These parameters are called Enter Parameters since they must be confirmed by ENTER. When pressing UP/DOWN only the display is changed but not the value stored in the R4. When the display value is different from the stored value in the R4, it is marked by a point in the display. By pressing ENTER the display value is stored in theR4 and the point is deleted. The displayed value of an Enter parameter always starts with the stored value.

I.2.5 ERROR MESSAGES

If a drive fault occurs during operation, the display is overwritten with an error message. Press ENTER to clear the error message.

NOTE: Pressing ENTER resets only the error <u>message</u> in the display. To reset the actual error and return the unit to normal operation, the cause of the error must be removed and a reset done on terminal 11, or power off reset.

Refer to the R4 drive manual for a listing of error messages.

I.2.6 PARAMETER SETTING / ADJUSTMENT

The R4 drive parameters listed below are set at MCE and no field adjustments are necessary. The parameter explanation is only for reference.

QUICK REFERENCE FOR POWERBACK R4 REGENERATIVE AC DRIVE PARAMETERS

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

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	Cp - Parameters				
Cp. 0	Password (100 = read only, 200 = customer mode, 440 = application password)		0 - 9999	440	440
	Pn - Parameters				
Pn. 0	Auto reset E.UP	-	0 - 1	1	1
Pn. 1	Auto reset E.OP	-	0 - 1	1	0
Pn.16	Delay time E.doH	sec	0 - 120	60	60
Pn.59	Delay time E.nEt	sec	0 - 10	0	0
	Ud - Parameters				
ud. 0	Key Board Pass	-	0 - 9999	APPL	APPL
ud. 1	Buss Password	-	0 - 9999	N/A	N/A
ud. 2	Start parameter group	-	ru - table	ru	ru
ud. 3	Start parameter number	-	0 - 99	0	0
ud. 4	Save Changes	-	0 = Off 1= on	0	1
ud. 6	Inverter Address	-	0 - 239	1	1
ud. 7	Baud rate	-	1200 - 19200	9600	19200
	Fr - Parameters				
Fr. 0	Copy parameter set	-	-2 : init	-2	init
Fr. 1	Copy Bus parameter	-	-2	N/A	N/A
	An - Parameters	-			
An.14	Analog output function	-	0 - 2	0	0
An.15	Analog output gain	-	-20 to 20	1.0	1
An.16	Analog output offset X	%	-100 to 100	0.0	0.0
An.17	Analog output offset Y	%	-100 to 100	0	0
	di - Parameters				
di. 0	Noise Filter Digital	-	0 - 31	0	0
di. 1	NPN/PNP Selection	-	0 = PNP 1 = NPN	0	0
di. 2	Input logic	-	0 - 7	0	0
di. 3	Input function 11	-	0 - 1	0	0
di.14					0
di.15	Select Signal Source	-	0 - 7	0	0
di.16	Digital input setting	-	0 - 7	0	0

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	do - Parameters				
do. 0	out put logic	-	0 - 3	0	0
do. 1	output condition 1	-	0 - 10	2	2
do. 2	output condition 2	-	0 - 10	4	5
do. 3	out put condition 3	-	0 - 10	3	3
do. 9	select output 1 condition	-	0 - 7	1	1
do.10	select output 2 condition	-	0 - 7	2	2
do.11	select output 3 condition	-	0 - 10	4	4
do.17	out put 1 condition logic	-	0 - 7	0	0
do.18	out put 2 condition logic	-	0 - 7	0	0
do.19	Out put 3 condition logic	-	0 - 7	0	0
do.25	out condition logic	-	0 - 7	0	0
	Le - Parameters				
Le. 8	Load Level 1	%	0 - 200	50	50
Le. 9	Load Level 2	%	0 - 200	100	100
Le.10	Load Level 3	%	100 - 200	100	160
Le.12	Phase current level 1	A	0 - 370	370	0
Le.13	Phase current level 2	A	0 - 370	370	0
Le.14	Phase current level 3	A	0 - 370	370	0
Le.24	DC voltage level 1	V	0 - 1000	650	0
Le.25	DC voltage level 2	V	0 - 1000	650	✳_______
✳Set to 250 for 230 VAC Drives. Set to 500 for 480 VAC Drives.					
Le.26	DC voltage level 3	V	0 - 1000	650	0
Le.32	OL warning level	%	0 - 100	80	80
Le.38	Current Hysteresis	A	0 - 370	370	0.0
	CS - Parameters				
CS.27	Regen Voltage Level	%	100 - 200	110	106
CS.35	Line frequency window	%	2 - 30	10	5

Job #:
Drive Model #:
Drive Manufacturer:
Drive Serial Number
Drive Software (In. 4):
Line #:
Tested By:
Approved:

APPENDIX J
QUICK REFERENCE FOR YASKAWA F7 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

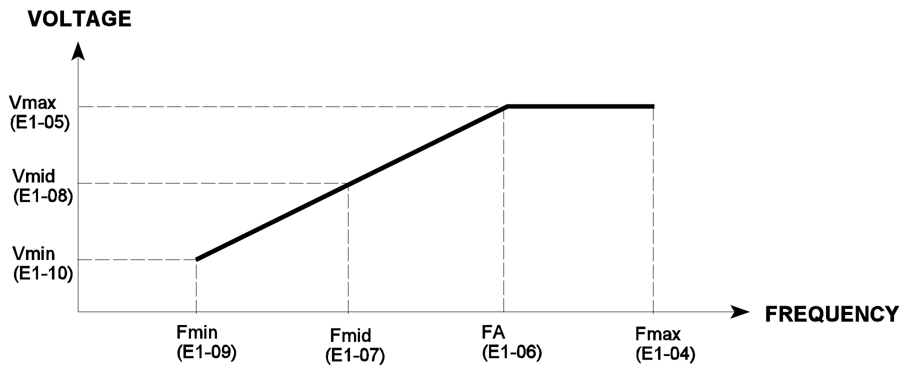
Field Adjustable Parameters are shown in shaded rows. All other parameters should be set to the values shown below in the “Field/MCE Set” column.

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Initialization				
A1-00	Select Language	Selects the language for the Digital Operator 0: English 3: Francais 6:Portugues 1: Japanese 4: Italiano 2: Deutsch 5: Espanol	-	0 - 6	0	0
A1-01	Access Level	Sets parameters accessible by Digital Operator 0: Operation Only 1: User Level (A2 parameters must be set) 2: Advanced Level	-	0 - 2	2	2
A1-02	Control Method	Selects the drive control method 0: V/F without PG 2: Open Loop Vector 1: V/F with PG 3: Flux Vector (closed loop)	-	0 - 3	0	✿
		✿ V/F Control (open loop) = 0 Flux Vector (closed loop) = 3				
A1-03	Init Parameters	Sets parameters to default values (see Note 1) 0: No Initialize 2220: 2-Wire Initial 1110: User Initialize 3330: 3-Wire Initial	-	0 - 3330	0**	0**
A1-04	Enter Password	If A1-04 does not match A1-05, parameters A1-01 thru A1-03 and A2-01 thru A2-32 cannot be changed.	-	0 - 9999	-	0
A1-05	Select Password		-	0 - 9999	-	0
		Sequence				
B1-01	Reference Source	Selects the frequency reference input source. 0: Operator 2: Serial Com 4: Pulse Input 1: Terminals 3: Option PCB	-	0 - 4	0	0
B1-02	Run Source	Selects the run command input source. 0: Operator 2: Serial Com 1: Terminals 3: Option PCB	-	0 - 3	1	1
B1-03	Stopping Method	Selects the stopping method 0: Ramp to Stop 2: DC Injection to Stop 1: Coast to Stop 3: Coast with Timer	-	0 - 3	0	0
B1-04	Reverse Oper	Prohibition of reverse operation 0: Reverse Enabled 1: Reverse Disabled 2: Exchange Phase - change rotation direction	-	0 - 2	0	0
		DC Injection Braking				
B2-01	DCInj Start Freq	DC Injection Braking Start Frequency (speed)	Hz	0.0 - 10.0	1.5	1.5
B2-02	DCInj Current	DC Injection Braking Current *(N/A to Flux Vector)*	%	0 - 100	50	50
B2-03	DCInj Time@Start	DC Injection Braking Time at Start	sec	0.00 - 10.00	0.00	❀
		❀ V/F Control (open loop) = 0.20 Flux Vector (closed loop) = 0.0				
B2-04	DCInj Time@Stop	DC Injection Braking Time at Stop	sec	0.00 - 10.00	0.50	0.50
		Accel / Decel	**Field Adjustable Parameters are shaded**			
C1-01	Accel Rate 1	Acceleration Rate 1	f/s^2	0.01 - 8.00	3.00	✳
C1-02	Decel Rate 1	Deceleration Rate 1	f/s^2	0.01 - 8.00	3.00	✳
C1-03	Accel Rate 2	Acceleration Rate 2	f/s^2	0.01 - 8.00	3.00	3.00
C1-04	Decel Rate 2	Deceleration Rate 2	f/s^2	0.01 - 8.00	6.00	6.00

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
C1-05	Accel Rate 3	Acceleration Rate 3	f/s^2	0.01 - 8.00	6.00	6.00
C1-06	Decel Rate 3	Deceleration Rate 3	f/s^2	0.01 - 8.00	6.00	6.00
C1-07	Accel Rate 4	Acceleration Rate 4	f/s^2	0.01 - 8.00	3.00	✴
C1-08	Decel Rate 4	Deceleration Rate 4	f/s^2	0.01 - 8.00	3.00	✴
C1-09	Fast Stop Rate	Fast Stop Rate	f/s^2	0.01 - 8.00	3.00	3.00
C1-11	Acc/Dec SW fre	Accel/Decel switching level	Hz	0.00 - 400	0.0	0.0
		Motor-Slip Compensation				
C3-01	Slip Comp Gain	Slip Compensation Gain	-	0.0 - 2.5	1.0	1.0
C3-02	Slip Comp Time	Primary Time Delay *(N/A to Flux Vector)*	ms	0 - 10000	200	200
C3-04	Slip Comp Regen	Slip Compensation During Regen 0: Disabled 1: Enabled *(N/A to Flux Vector)*		0, 1	1	1
		Torque Compensation				
C4-01	Torque Comp Gain	Torque Compensation Gain *(N/A to Flux Vector)*	-	0.00 - 2.50	1.00	1.00
C4-02	Torque Comp Time	Torque Compensation Primary Delay Time *(N/A to Flux Vector)*	ms	0 - 10000	200	200
		ASR Tuning	**(Flux Vector only)**			
C5-01	ASR P Gain 1	ASR Proportional Gain 1 *(Flux Vector only)*	-	0.00 -300.00	20.00	20.00
C5-02	ASR I Time 1	ASR Integral Time 1 *(Flux Vector only)*	sec	0.0 - 10.000	0.200	0.200
C5-03	ASR P Gain 2	ASR Proportional Gain 2 *(Flux Vector only)*	-	0.00 - 300.00	20.00	20.00
C5-04	ASR I Time 2	ASR Integral Time 2 *(Flux Vector only)*	sec	0.0 - 10.000	0.500	0.500
		Carrier Frequency				
C6-01	Heavy/Normal Duty	Drive Duty Selection 0: Heavy 1: Normal 1 2: Normal 2	-	0 - 2	0	0
C6-02	Carrier Freq Sel	Carrier Frequency Selection 0: Low noise 1: 2.0 kHz 2: 5.0 kHz 3: 8.0 kHz 4: 10.0 kHz 5: 12.5 kHz 6: 15.0 kHz	-	0 - F	kVA dependent	3
C6-03	Carrier Freq Max	Carrier Frequency Upper Limit	kHz	2.0 - 15.0	kVA dependent	8.0
		Preset Reference	**Field Adjustable Parameters are shaded**			
❊ The upper limit is the max FPM value set by O1-03. Set this parameter before setting D1-01 thru D1-17.						
D1-01	Reference 1	Preset Reference 1 (Not used)	FPM	0.0 - ❊	0.0	0.0
D1-02	High	High Speed (must be > D1-07)	FPM	0.0 - ❊	50.0	✴
D1-03	High Level	High Level (must be > D1-05 and < D1-07)	FPM	0.0 - 30.0	13.0	✴
D1-04	Reference 4	Preset Reference 4 (Not used)	FPM	0.0 - ❊	0.0	0.0
D1-05	Level	Level Speed (must be < D1-03)	FPM	0.0 - 15.0	2.5	✴
D1-06	Reference 6	Preset Reference 6 (Not used)	FPM	0.0 - ❊	0.0	0.0
D1-07	Combination	Intermediate (must be > D1-03 and < D1-02)	FPM	0.0 - ❊	42.0	✴
D1-08	Reference 8	Preset Reference 8 (Not used)	FPM	0.0 - ❊	0.0	0.0
D1-17	Jog reference	Jog Reference - Inspection Speed	FPM	0.0 - ❊	42.0	✴
		Reference Limits				
D2-01	Ref Upper Limit	Frequency Reference Upper Limit	%	0.0 - 110.0	100.0	100.0
D2-02	Ref Lower Limit	Frequency Reference Lower Limit	%	0.0 - 110.0	0.0	0.0
		Jump Frequencies	**(not used) set at drive defaults**			
		V/F Pattern	**Field Adjustable Parameters are shaded**			
E1-01	Input Voltage	Input Voltage Setting	V	180 - 460	230/460	✴
E1-02	Motor Selection	Motor selection 0: Fan-Coded 1: Blower-Coded	-	0, 1	0	0
E1-03	V/F Selection	V/F Pattern Selection *(N/A to Flux Vector)* F: Custom V/F	-	0 - FF	F	F
E1-04	Max Frequency	Maximum Output Frequency	Hz	40.0 - 80.0	60.0	✴
E1-05	Max Voltage	Maximum Output Voltage (Motor Voltage)	V	0.0 - 460.0	230/460	✴
E1-06	Base Frequency	Maximum voltage output frequency	Hz	0.0 - 72.0	60.0	✴
E1-07	Mid Frequency A	Mid Output Frequency A *(N/A to Flux Vector)*	Hz	0.0 - 72.0	3.0	3.0

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
E1-08	Mid Voltage A	Mid Output Voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	16.1/32.2	✳
E1-09	Min Frequency	Minimum Output Frequency *(N/A to Flux Vector)*	Hz	0.0 - 72.0	0.5	0.5
E1-10	Min Voltage	Minimum Output Voltage *(N/A to Flux Vector)*	V	0.0 - 255.0	10.0/20.0	✳



No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Motor Setup	**Field Adjustable Parameters are shaded**			
E2-01	Motor Rated FLA	Set to motor nameplate full load amps. This value is automatically set during Auto-Tuning.	A	0.00 - 1500.0	Motor rated FLA	✳
E2-02	Motor Rated Slip	Motor rated slip frequency - Note: Refer to the attached table to calculate the slip frequency.	Hz	0 - 15.0	kVA dependent	✳
E2-03	No-Load Current	Motor No Load Current	A	0 -150	30 - 50% Motor FLA	✳
E2-04	Number of Poles	Number of Motor Poles *(Flux Vector only)*	-	2 - 48	6	✳
		PG Option Setup (Flux Vector only)	**Field Adjustable Parameters are shaded**			
F1-01	PG Pulse/Rev.	Encoder pulses per revolution *(Flux Vector only)*	-	0 - 60000	1024	1024
F1-02	PG Fdbk Loss Sel *(Flux Vector only)*	Stoping method at PG line brake detection. 0: Ramp to stop 2: Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-03	PG Overspeed Sel *(Flux Vector only)*	Stoping method at OS detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-04	PG Deviation Sel *(Flux Vector only)*	Stoping method at DEV fault detection. 0: Ramp to stop 2:Fast Stop 1: Cost to stop 3: Alarm only	-	0 - 3	1	1
F1-05	PG Rotation Sel	PG rotation 0: CCW 1: CW *(Flux Vector only)*	-	0/1	0	0 or 1
F1-06	PG Output Ratio	PG Division Rate *(Flux Vector only)*	-	1 - 132	1	1
F1-07 thru F1-13	*(Flux Vector only)*	Set to drive defaults.				
		Digital Inputs	**See H1-01 description in F7 Drive Manual**			
H1-01	Terminal S3 Sel	Multi-Function Input Terminal S3 Function Selection 9: External BaseBlock N.C.	-	0 - 82	9	9
H1-02	Terminal S4 Sel	Multi-Function Input Terminal S4 Function Selection 14: Fault Reset	-	0 - 82	14	14
H1-03	Terminal S5 Sel	Multi-Function Input Terminal S5 Function Selection 80: Multi-Step Ref 1F	-	0 - 82	80	80
H1-04	Terminal S6 Sel	Multi-Function Input Terminal S6 Function Selection 81: Multi-Step Ref 2F	-	0 - 82	81	81
H1-05	Terminal S7 Sel	Multi-Function Input Terminal S7 Function Selection 82: Multi-Step Ref 3F	-	0 - 82	82	82
H1-06	Terminal S8 Sel	Multi-Function Input Terminal S8 Function Selection 6: Jog Ref (Inspection speed)	-	0 - 82	6	6

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Digital Outputs	**See H2-01 description in F7 Drive Manual**			
H2-01	Term M1-M2 Sel	Terminal M1-M2 Function Selection 40: During Run 3	-	0 - 40	40	40
H2-02	Term M3-M4 Sel	Terminal M1-M2 Function Selection 4: Frequency Detection 1	-	0 - 40	4	4
H2-03	Term M5-M6 Sel	Terminal M1-M2 Function Selection F: Not Used	-	0 - 40	F	F
		Analog Inputs				
H3-01	Term A1 Lvl Set	Sets the signal level of terminal A1. 0: 0 to 10VDC 1: -10 to +10VDC	-	0, 1	0	0
H3-02	Terminal A1 Gain	Sets the output level when 10V is input, as a percentage of max. output frequency (E1-04)	%	0.0 - 1000.0	100.0	100.0
H3-03	Terminals A1 Bias	Sets the output level when 0V is input, as a percentage of max. output frequency (E1-04)	%	-100.0 - +100.0	0.0	0.0
H3-04	Term A3 Signal	Sets the signal level of terminal A3. 0: 0 to 10VDC 1: -10 to +10VDC	-	0, 1	0	0
H3-05	Terminal A3 Sel	Terminal A3 Function Selection 1F: Not Used	-	0 - 1F	1F	1F
H3-06	Terminal A3 Gain	Sets the output level when 10V is input.	%	0.0 - 1000.0	100.0	100.0
H3-07	Terminal A3 Bias	Sets the frequency reference when 0V is input.	-	-100.0 - 100.0	0.0	0.0
		Analog Outputs	**See H4-01 description in F7 Drive Manual**			
H4-01	Terminal FM Sel	Terminal FM Monitor Selection 1: Frequency Ref.	-	1 - 99	1	1
H4-02	Terminal FM Gain	Sets terminal FM output level when selected monitor is at 100%.	%	0.0 - 1000.0	100.0	100.0
H4-03	Terminal FM Bias	Sets terminal FM output level when selected monitor is at 0%.	%	-110.0 to 110.0	0.0	0.0
H4-04	Terminal AM Sel	Terminal AM Monitor Selection 2: Output Freq	-	1 - 99	2	2
H4-05	Terminal AM Gain	Sets terminal AM output voltage (in percent of 10Vdc) when selected monitor is at 100% out.	%	0.0 - 1000.0	100.0	100.0
H4-06	Terminal AM Bias	Sets terminal FM output voltage (in percent of 10Vdc) when selected monitor is at 0% output.	%	-110.0 to 110.0	0.0	0.0
H4-07	AO Level Select 1	Selects the signal level of terminal FM. 0: 0 to 10Vdc 1: -10 to +10V 2: 4 to 20mA	-	0 - 2	0	0
H4-08	AO Level Select 2	Selects the signal level of terminal AM. 0: 0 to 10Vdc 1: -10 to +10V 2: 4 to 20mA	-	0 - 2	0	0
		Motor Overload				
L1-01	MOL Fault Select	Motor Overload Protection Selection - OL1 0: Disabled 2: Blower Cooled 1: Fan Cooled 3: Vector Motor	-	0 - 3	2	2
L1-02	MOL Time Const	Motor Overload Protection Time	min	0.1 - 20.0	1.0	1.0
		Power Loss Ridethru				
L2-01	PwrL Selection	Momentary power loss ridethrough selection 0: Disabled 1: Ridethrough (for time set in L2-02) 2: Ridethrough while CPU has power	-	0 - 2	0	0
L2-02	PwrL RideThru t	Momentary Power Loss Ride-thru Time	sec	0.0 - 25.5	2.0	2.0
L2-03	PwrL Baseblock t	Momntary Pwr Loss Minimum Base Block Time	sec	0.1 - 5.0	0.7	0.7

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Stall Prevention				
L3-01	StallP Accel Sel (*N/A to Flux Vector)*	Stall Prevention Selection During Acceleration 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	1	1
L3-02	StallP Accel Lvl *(N/A to Flux Vector)*	Stall Prevention Level During Acceleration	%	0 - 200	180	180
L3-04	StallP Decel Sel	Stall Prevention Selection During Deceleration 0: Disabled 1: General-purpose 2: Intelligent 3: Stall Prevention with Braking Resistor	-	0 - 3	0	0
L3-05	StallP Run Sel *(N/A to Flux Vector)*	Stall Prevention Selection During Running 0: Disabled 1: Decel Time 1 2: Decel Time 2	-	0 - 2	0	0
L3-06	StallP Run Level *(N/A to Flux Vector)*	Stall Prevention Level During Running	%	30 - 200	160	160
		***Ref Detection* (Flux Vector only)**	**Set to Drive Default for V/F**			
L4-01	Spd Agree Level	Speed Agreement Detection Level (L4-01 = E1-04) *(Flux Vector only)*	Hz	0.0 - 400	0.0	60.0
L4-02	Spd Agree Width	Speed Agreement Detection Width *(FV only)*	Hz	0.0 - 20.0	2.0	5.0-8.0
		Fault Restart				
L5-01	Num of Restarts	Number of automatic restart attempts	-	0 - 10	0	0
L5-02	Restart Sel	Automatic restart operation selection 0: No Fault Relay 1: Fault Relay Active	-	0, 1	1	1
		Torque Detection				
L6-01	Torq Det 1 Sel	Torque Detection Selection 1 0: Disabled	-	0 - 8	0	0
L6-02	Torq Det 1 Lvl	Torque Detection Level 1	%	0 - 300	150	150
L6-03	Torq Det 1 Time	Torque Detection Time 1	sec	0.0 - 10.0	0.1	0.1
		Torque Limits	**(Flux Vector only)**			
L7-01 thru L7-04	Torque Limits *(Flux Vector only)*	Set to Factory Defaults	%	0 - 300	200	200
		Hardware Protection				
L8-01	DB Resistor Prot	Protection Selection for Internal DB Resistor 0: Not Provided 1: Provided	-	0, 1	0	0
L8-05	Ph Loss In Sel	Input Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1
L8-07	Ph Loss Out Sel	Output Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1
		Monitor Select				
O1-01	User Monitor Sel	Monitor Selection 6 = Output voltage	-	4 - 45	6	6
O1-02	Power-On Monitor	Monitor Selection upon Power-up 1: Frequency reference 2: Output Frequency 3: Output Current 4: User monitor	1	1 - 4	1	1
O1-03	Display Scaling	Digital Operator Display Selection Sets the units of the Frequency References (D1-01 to D1-17), the Frequency Reference Monitors (U1-01, U1-02, U1-05), and the Modbus communication frequency reference. Units are fixed at FPM (ft/Min) with a range of 10.0 to 999.9 FPM at max frequency. 10100 to 19999: User units e.g. (10100 = 10.0 FPM) (19999 = 999.9 FPM)	-	10100 to 19999	11000 (= 100 FPM)	Set to contract speed ✳

No.	Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Defaults	Field/MCE Set
		Key Selections				
O2-01	Local/Remote Key	Local/Remote Key 0: Disabled 1: Enabled	-	0, 1	0	0
O2-02	Oper Stop Key	Stop key during external terminal operation 0: Disabled 1: Enabled	-	0, 1	1	1
O2-03	User Defaults (see Note 1)	User (MCE) defined default value settings 0 = No change 1= Set defaults 2 = Clear all	-	0-2	0	1
See Section 4.11.3		**S Curve Control**	**Field Adjustable Parameters are shaded**			
P1-01	Jerk Change P1	Frequency reference for S curve #1 selection	Hz	0 - 400	4.0	4.0
P1-02	Jerk Change P2	Frequency reference for S curve #2 selection	Hz	0 -400	10.5	10.5
P1-03	Jerk Change P3	Frequency reference for S curve #3 selecting	Hz	0 - 400	48.0	48.0
P1-04	Accel Jerk In 1	S Curve #1 at the Start of Acceleration	f/s^3	0.01 - 30.00	2.5	✴
P1-05	Accel Jerk Out 1	S Curve #1 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-06	Decel Jerk In 1	S Curve #1 at the Start of Deceleration	f/s^3	0.01 - 30.00	5.00	✴
P1-07	Decel Jerk Out 1	S Curve #1 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✴
P1-08	Accel Jerk In 2	S Curve #2 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-09	Accel Jerk Out 2	S Curve #2 at the End of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-10	Decel Jerk In 2	S Curve #2 at the Start of Deceleration	f/s^3	0.01 - 30.00	2.00	✴
P1-11	Decel Jerk Out 2	S Curve #2 at the End of Deceleration	f/s^3	0.01 - 30.00	3.00	✴
P1-12	Accel Jerk In 3	S Curve #3 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-13	Accel Jerk Out 3	S Curve #3 at the End of Acceleration	f/s^3	0.01 - 30.00	2.5	✴
P1-14	Decel Jerk In 3	S Curve #3 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.0	✴
P1-15	Decel Jerk Out 3	S Curve #3 at the End of Deceleration	f/s^3	0.01 - 30.00	3.5	3.5
P1-16	Accel Jerk In 4	S Curve #4 at the Start of Acceleration	f/s^3	0.01 - 30.00	15.00	15.00
P1-17	Accel Jerk Out 4	S Curve #4 at the End of Acceleration	f/s^3	0.01 - 30.00	2.5	✴
P1-18	Decel Jerk In 4	S Curve #4 at the Start of Deceleration	f/s^3	0.01 - 30.00	6.0	✴
P1-19	Decel Jerk Out 4	S Curve #4 at the End of Deceleration	f/s^3	0.01 - 30.00	15.00	15.00
		Stop - Start				
P2-01	Run Cmd Delay	Run Command Delay Scans (5ms scans)	-	0 - 200	40	40
P2-03	Fwd Torque Comp	Forward Torque Compensation	%	-100 - 100	0	0
P2-04	Rev Torque Comp	Reverse Torque Compensation	%	-100 - 100	0	0
P2-05	Dgtl Input Fltr	Digital Input Filter Scans (5ms scans)	-	0 - 200	2	2
P2-06	Stop Dwell Time	Stop Dwell Time	sec	0.0 - 30.0	0.0	0.0
		Fault Auto - Reset				
P3-01	Num Auto-Resets	Number of Automatic Resets	-	0 - 10	3	3
P3-02	Auto-Reset Time	Time Delay Between Automatic Resets	sec	0.5 - 10.0	3.0	3.0

***** Set values for 200 volts. The value at 400V is twice that of 200V.

****** Do not initialize the drive in the field if it is not required. Setting A1-03 =1110 and pressing enter will initialize the Drive and will set all of the drive parameters to the MCE Drive default values. Parameter A1-03 will display 0 after Initialization.

Note 1: At the factory, MCE will set the drive parameters to the values shown in the *MCE Set* column, and will save those values as “defaults” by setting parameter O2-03 = 1. In the field, the drive parameters can be *reset* to the MCE Set values by setting parameter A1-03 = 1110. The Field Adjustable parameters can then be re-entered.

Note 2: The Yaskawa drive software has been modified for this application. Some of the parameters in this sheet are different and are not available in the drive manuals. If a drive has been replaced in the field then all the drive parameters should be entered manually and should be verified according to this parameter sheet.

FIGURE B.1 Velocity Curve and S Curve Parameters (Yaskawa F7)

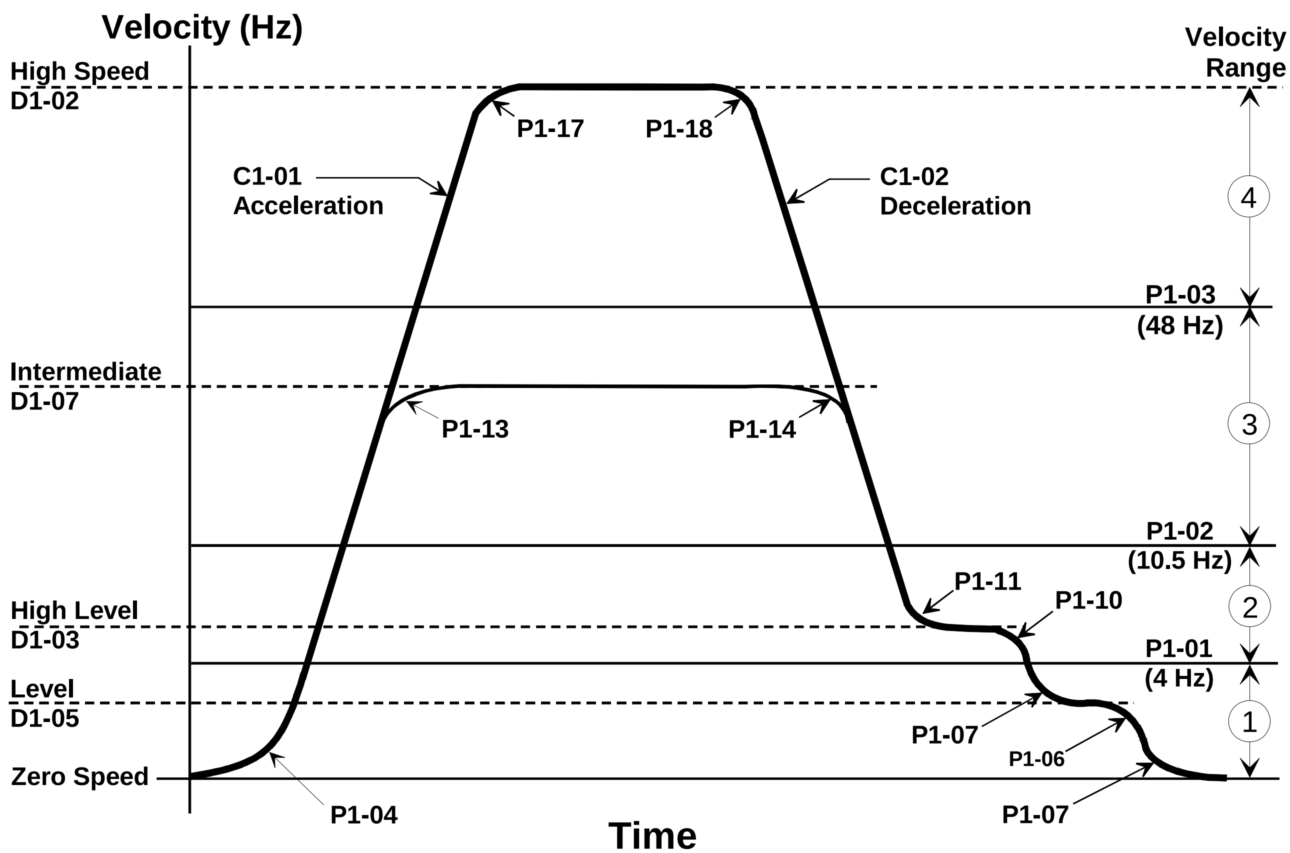


Table for Selection of S-Curves

(Increasing the value (time) of an S-curve parameter causes a longer (smoother) transition)

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

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

Motor Rated Slip Frequency = E2-02

E2-02 = f_s = f − (N x P/120)

where...

f_s: slip frequency (Hz)
f: motor rated frequency (Hz)
N: motor rated speed (F.L - rpm)
P: number of motor poles

P	Synchronous RPM	
	60Hz Motor	50Hz Motor
8	900	750
6	1200	1000
4	1800	1500

Job #:
Drive Model #:
Drive Manufacturer:
Drive Serial Number:
Drive Software (U1-14):
Line #:
Tested By:
Approved:

APPENDIX K
QUICK REFERENCE FOR POWERBACK R6 REGENERATIVE AC DRIVE PARAMETERS (SERIES M and IMC-AC-R)

K.1 GENERAL

The following information pertains to VVMC-1000-PTC Series M controllers with the addition of the POWERBACK R6 Regenerative Drive.

K.2 REGENERATIVE DRIVE INTERFACE

The following is an explanation of the POWERBACK R6 Regenerative Drive interface.

K.2.1 DRIVE INPUTS

- Drive Enable (Terminal 12): This input enables the R6 drive and puts the drive in standby mode. Drive parameter **ru. 0** reads **stby** during motoring condition and **Active** during deceleration/overhauling conditions. A voltage between drive terminals 12 & 17 of 18 VDC = ON, 0 VAC = OFF.

- Drive Reset (Terminal 13): This input resets an R6 drive fault. Pressing the drive reset button on the HC-ACI board activates the reset input and clears regenerative drive faults. A voltage between drive terminal 13 & 17 of 18 VDC = ON, 0 VAC = OFF.

K.2.2 DRIVE OUTPUT

- Drive ready contact: The contacts between terminals 24 and 26 on the R6 drive remain closed under normal condition and open during a fault, which drops the RDY relay on the HC-ACI board. Pressing the Drive Reset button on the HC-ACI board should clear the R6 drive fault and should turn ON the RDY relay.

K.2.3 POWER CONNECTIONS

- Make sure synchronization cable is connected between the commutation choke and the R6 drive.

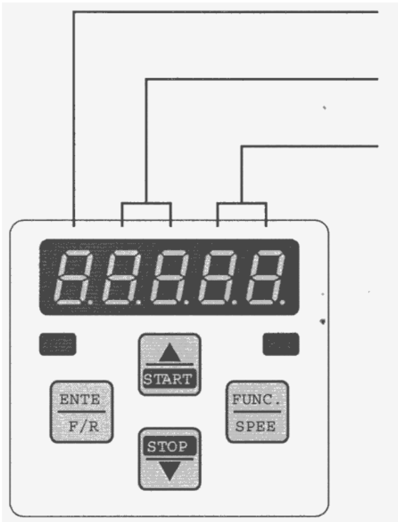
- The DC bus connections must be correct and according to the drawings. ***It is critical that DC bus connections be correct. Incorrect connections will damage the drive units.***

- The line inductor ground connection to the R6 Drive and F5 Drive must be completed according to the drawings.

K.2.4 HOW TO USE THE DRIVE KEYPAD

The R6 drive is delivered from the factory in the *Application* mode, which allows access to all parameters and functions available on the unit.

The display shows three types of information which define the parameter:



Parameter set

Parameter group

Parameter number

By pressing the FUNC button you can change between the displayed parameter and its value.

To select a different parameter use the ENTER button to toggle the flashing point to the right of the field to be changed. Then use the UP and DOWN buttons to scroll the desired value. Once the correct parameter information is displayed, the FUNC button can be pressed at any time to see the value of the parameter.

When displaying a parameter value, the value of the parameter can be changed by pressing the UP/DOWN buttons. Generally, these changes are immediately effective and permanently stored, meaning they remain stored after the unit is switched off. Confirming the input with ENTER is not necessary, with the exception of the parameters known as *Enter Parameters*.

Enter Parameter: For some parameters the value adjusted by UP/DOWN does not automatically become valid. These parameters are called Enter Parameters since they must be confirmed by ENTER. When pressing UP/DOWN only the display is changed but not the value stored in the R6. When the display value is different from the stored value in the R6, it is marked by a point in the display. By pressing ENTER the display value is stored in theR6 and the point is deleted. The displayed value of an Enter parameter always starts with the stored value.

K.2.5 ERROR MESSAGES

If a drive fault occurs during operation, the display is overwritten with an error message. Press ENTER to clear the error message.

> **NOTE:** Pressing ENTER resets only the error <u>message</u> in the display. To reset the actual error and return the unit to normal operation, the cause of the error must be removed and a reset done on terminal 11, or power off reset.

Refer to the R6 drive manual for a listing of error messages.

K.2.6 PARAMETER SETTING / ADJUSTMENT

The R6 drive parameters listed below are set at MCE and no field adjustments are necessary. The parameter explanation is only for reference.

QUICK REFERENCE FOR POWERBACK R6 REGENERATIVE AC DRIVE PARAMETERS

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

Digital Operator Display	Parameter Description	Unit	Setting Range	MCE Drive Defaults	Field/MCE Set
	CP - Parameters				
CP. 0	Password (100 = read only, 200 = customer mode, 440 = application password)		0 - 9999	440	440
CP. 1	Status disp;ay				
CP. 2	Main Line Frequency	Hz			
CP. 3	AC-Phase current L1	A			
CP. 4	AC-Phase current L2	A			
CP. 5	AC-Phase current L3	A			
CP. 6	Actual Load	%			
CP. 7	Actual Load / peak value	%			
CP. 8	DC output current	A			
CP. 9	Actual DC voltage	V			
CP.10	DC voltage / peak value	V			
CP.11	Heat sink temperature	°C			
CP.12	Over load counter	%			
CP.13	Active power	kW			
CP.14	Total regen kWh counter	kWh			
CP.15	Total motor kWh counter	kWh			
CP.16	Total net kWh counter	kWh			
CP.17	Apparent power / Line input	kVA			
CP.18	Analog output 1/ amplification factor	.01			
CP.19	DC bus switching level	.01			
CP.20	Auto error reset counter	1			
CP.21	Last Error				
CP.22	Last Error 1				
CP.23	Last Error 2				
CP.24	Last Error 3				
CP.25	Last Error 4				
CP.26	Last Error 5				
CP.27	Last Error 6				
CP.28	Last Error 7				
CP.29	Software version				
CP.30	Software date code		DDMM.Y		
CP.31	Power part ID code				

Job #:
Production Order #:
Drive Model #:
Drive Serial Number
Test technician:
Date:

APPENDIX L
QUICK REFERENCE FOR TORQMAX F5 DRIVE PARAMETERS (SERIES M PRODUCT ONLY)

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

WARNING: Parameters with an asterisk (✳) must be set correctly for your specific motor / machine / job. Refer to the adjustment manual for detailed information.

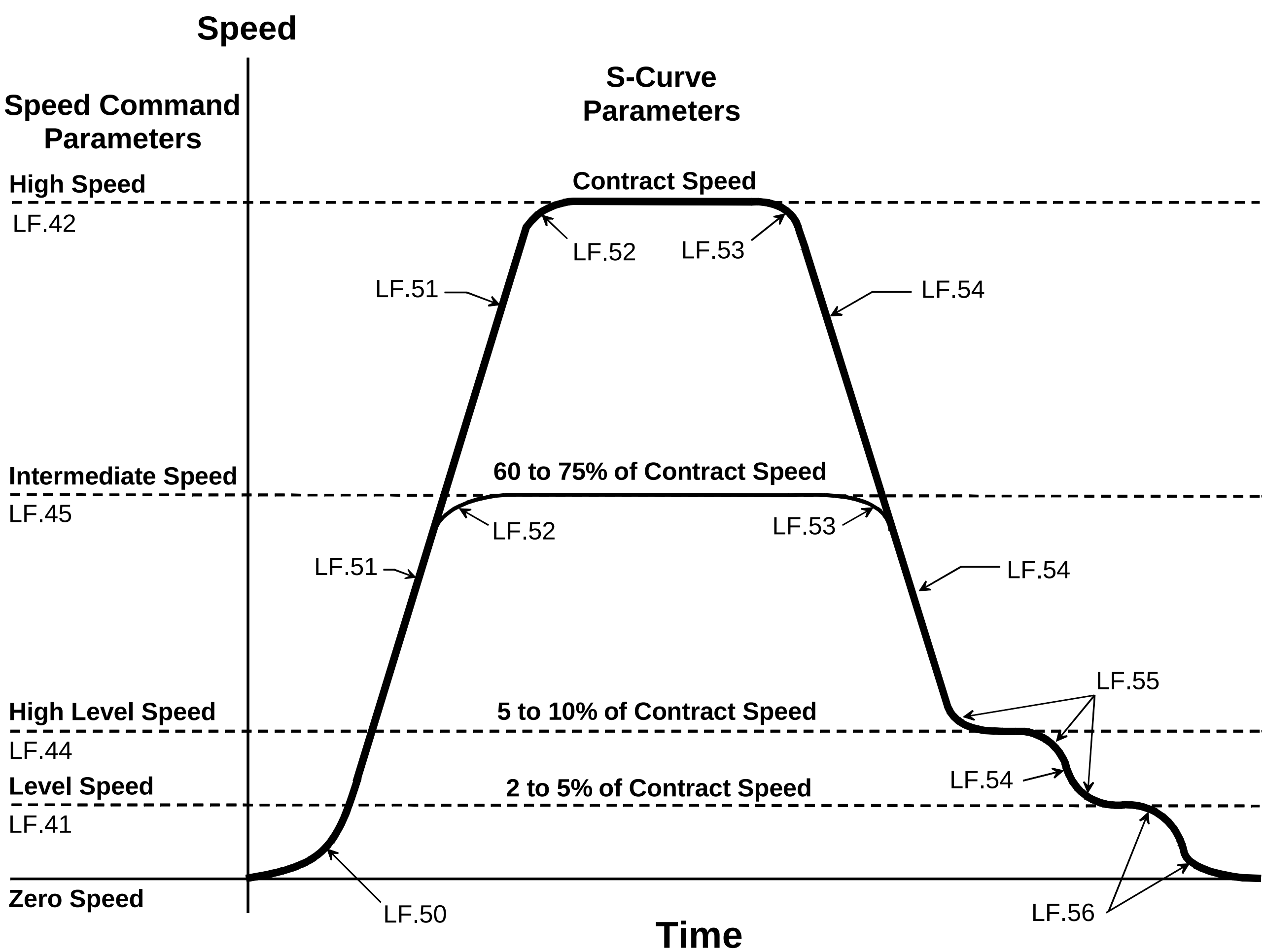
CAUTION: For permanent magnet (PM Synchronous) motors, consult the following sections of the TORQMAX F5 Drive manual before roping the machine, 5.5 *PM Synchronous Motors*, 5.8 *Encoder Feedback* and 5.11 *Running the Motor*.

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
LF. 2	Signal operating mode: AbSPd - Absolute Analog Speed d SPd - Digital Speed Selection A tor - Analog Torque Control A Spd - Analog Speed Control SerSP - Serial Com. Speed Control bnSPd - Binary Speed Selection	-	AbSPd d Spd A tor A Spd SerSP bnSPd	bnSPd	bnSPd
LF. 3	Drive configuration: run - run mode conF - Configuration (5 minute time limit) EconF - Expired Configuration S Lrn - activate auto tune for PM Motor	-	run conF EconF S Lrn	conF	run
LF. 4	Motor-selection: Displays mode selected using US. 4 and US.10	-	see US.10	-	✳✳✳
LF. 5	Drive Fault auto reset	1	0 - 10	5	5
LF. 8	Electronic motor overload protection	-	on, off	off	on
LF. 9	IM - Electronic overload current PM - not visible, auto set same as LF.12	A	1.0 - 110% Drive rated	8.0	✳
LF.10	Rated motor power, PM - read only, auto calc.	HP	0.00 - 125.00	5.00	✳
LF.11	Rated motor speed	rpm	10.0 - 6000.0	1165 or 150	✳
LF.12	Rated motor current	A	1.0 - 110% Drive rated	8.0	✳
LF.13	Rated motor frequency	Hz	4.0 - 100.0	60.0	✳
LF.14	Rated Motor voltage IM - Name plate rated voltage PM - No-load, phase-to-phase back EMF rms voltage at LF.11	V	IM: 120 - 500V PM: 1 - 32000V/krpm	230/460	✳
LF.15	Power factor, PM - not applicable	1	0.50 - 1.00	0.90	0.90
LF.16	Field weakening speed, PM - not applicable	rpm	0.0 - 6000.0	set @ 80% of LF.11	✳
LF.17	Rated motor torque, IM - read only, auto calc. PM - enter motor name plate torque	lb ft	1 - 10000	IM - calc. PM - 18	IM - ✳✳✳ PM ✳____
LF.18	Motor stator resistance: IM - not applicable PM only - Motor resistance value	ohm	0.0 - 49.999	49.999	

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
LF.19	Motor leakage inductance: PM only - motor winding leakage inductance from Mfg. data sheet	mH	0.01 - 500.00	1.00	
LF.20	Contract speed	fpm	0 - 1600	0	✳
LF.21	Traction sheave diameter (measured value)	inch	7.00 - 80.00	24.00	✳
LF.22	Gear reduction ratio	1	1.00 - 99.99	30.00	✳
LF.23	Roping ratio	1	1 - 8	1	✳
LF.24	Load weight	lbs	0 - 30000	0	✳
LF.25	Estimated gear ratio: Read only, auto calc.	.01	1.00 - 99.99	-	✳✳✳
0.LF.26	Encoder feedback: displays feedback type	-	-	-	✳✳✳
LF.27	Encoder pulse number	ppr	256 - 16384	1024	✳
LF.28	Reverse encoder: 0 nothing reversed 1 encoder A<–>B swapped 2 motor rotation reversed 3 motor rotation reversed and A<–>B swapped	1	0 - 3	0	✳
LF.29	Encoder sample time (recommend gearless = 4, geared = 8)	mSec	0.5 - 32	4	✳ 4 or 8
LF.30	Control method 0, 1 Open loop induction motor operation 2 - Closed loop speed control (LF.2 = A Spd) 3 - Closed loop speed control with pre-torque 4 - Closed loop torque control 5 - Close loop with synthesized pre-torque	1	0 - 5	0	✳
A.LF.31	Kp speed accel: Proportional gain, accel & run	1	1 - 32767	3000	✳✳ 3000
d.LF.31	Kp speed decel: Proportional gain, decel	1	1 - 32767	3000	✳✳ 3000
A.LF.32	Ki speed accel: Integral gain, accel & run	1	1 - 32767	350	✳✳ 350
d.LF.32	Ki speed decel: Integral gain, decel	1	1 - 32767	250	✳✳ 250
A.LF.33	Ki speed offset accel: Gain at low speed, accel	1	0 - 8000	3000	✳✳ 3000
d.LF.33	Ki speed offset decel: Gain at low speed, decel	1	0 - 8000	1000	✳✳ 1000
LF.34	Kp current: Proportional gain (auto calculated)	1	1 - 32767	Calculated	✳✳✳
LF.35	Ki CUrrent: Integral gain (auto calculated)	1	1 - 32767	Calculated	✳✳✳
0.LF.36	Maximum torque **(Auto calc by the drive)**.	lb ft	0 - 23590	Calculated	✳✳✳
1.LF.36	Maximum torque emergency operation (= LF.17)	lb ft	0 - 23590	Calculated	✳✳✳
LF.37	Open loop torque boost: Open loop op. only	%	0 - 25.5	5.0	5.0
LF.38	Carrier frequency; 0 = 8 KHz , 1 = 16KHz (**Note: set LF.38 = 0 if E.OL2 error on drive)**	1	0, 1	0	0
LF.41	Leveling speed	fpm	0 - 25	0.0	✳✳ 4
LF.42	High speed	fpm	0.0 - LF.20	0.0	✳
LF.43	Inspection speed	fpm	0.0 - 150	0.0	✳
LF.44	High leveling speed	fpm	0-25% of LF.20	0.0	✳✳ 18
LF.45	Intermediate speed 1	fpm	0-91% of LF.20	0.0	0.0
LF.46	Intermediate speed 2	fpm	0.0 - LF.20	0.0	0.0
LF.47	Intermediate speed 3	fpm	0.0 - LF.20	0.0	200.0
0.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	3.00	✳✳ 3.00
0.LF.51	Acceleration	ft/s^2	0.30 - 12.00	3.30	✳✳ 3.50
0.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	4.00	✳✳ 4.00
0.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	4.50	✳✳ 4.50
0.LF.54	Deceleration	ft/s^2	0.30 - 12.00	3.50	✳✳ 3.50
0.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	2.50	✳✳ 2.50

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
1.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	3.50	✱✱ 3.50
1.LF.51	Acceleration	ft/s^2	0.30 - 12.00	3.50	✱✱ 3.50
1.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	4.50	✱✱ 4.50
1.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	5.50	✱✱ 5.50
1.LF.54	Deceleration	ft/s^2	0.30 - 12.00	3.50	✱✱ 3.50
1.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	3.50	✱✱ 3.50
2.LF.50	Starting jerk	ft/s^3	0.30 - 32.00	1.50	✱✱ 1.50
2.LF.51	Acceleration	ft/s^2	0.30 - 12.00	1.50	✱✱ 1.50
2.LF.52	Acceleration jerk	ft/s^3	0.30 - 32.00	1.50	✱✱ 1.50
2.LF.53	Deceleration jerk	ft/s^3	0.30 - 32.00	1.50	✱✱ 1.50
2.LF.54	Deceleration	ft/s^2	0.30 - 12.00	1.50	✱✱ 1.50
2.LF.55	Approach jerk	ft/s^3	0.30 - 32.00	1.50	✱✱ 1.50
LF.56	Stop jerk	ft/s^3	0.30 - 32.00	2.00	✱✱ 2.00
LF.57	Speed following error (0 = off, 1 = on,)	1	off, on	on	on
LF.58	Speed difference	%	0 - 30	10	10
LF.59	Trigger time speed difference: Following error timer	sec	0.0 - 1.0	1.0	1.0
LF.61	Emergency operation mode		Off, SPd1, SPd2, SPd3, di 1	off	off
LF.67	Pre-torque gain	-	0.25 - 2.00	1.00	1.00
LF.68	Pre-torque offset	%	-100.0 - 100.0	0.00	0.00
LF.69	Pre-torque direction (-1 = -V, 1 = +V)	1	-1, 1	1	1
LF.70	Speed pick delay (Delay to turn on DRO)	sec	0.0 - 3.0	0.30	0.30
LF.71	Brake pick delay	sec	0.0 - 3.0	0.05	0.20
LF.76	Encoder resolution multiplier	1	0 - 13	2	2
LF.77	Absolute encoder position (measured)	1	0 - 65535h	0	✱
LF.78	Brake drop delay. Time motor will hold full current and control after direction inputs drop.	sec	0.00 - 3.00	0.50	0.45
LF.79	Current hold time. Delay in turning off the drive (Delay to turn OFF the motor current after the direction is dropped and LF.78 has expired)	sec	0.00 - 3.00	0.30	0.20
Diagnostic Parameters (Read only)					
LF.25	Estimated gear ratio	1			
LF.80	Software version	-			
LF.81	Software date	-			
LF.82	X2A input state	-	see tables in F5 Drive Manual		
LF.83	X2A output state	-			
LF.86	Operation mode	-			
LF.87	Actual inverter load (100% = rated load)	%			
LF.88	Motor set speed	rpm			
LF.89	Actual motor speed	rpm			
LF.90	Actual elevator speed	ft/m			
LF.93	Phase current	A			
LF.94	Peak phase current	A			
LF.95	Actual DC voltage	V			
LF.96	Peak DC voltage	V			
LF.97	Actual output frequency	Hz			
O.LF.98	Last error	-			

Digital Operator Display	Parameter Description	Unit	Setting Range	Default Setting	Factory Setting
US Parameters					
US. 1	Password: Used to accessed different parameter groups for advanced programming.	-	-	-	-
US. 3	Load defaults: Select LoAd and press ENTER to cause all LF parameters to be reset to the drive default values.	-	LoAd	-	
US. 4	Load configuration: Select LoAd and press ENTER to load the setting selected in US.10.	-	LoAd	-	
US.10	Select configuration: Selects the drive mode. ICLSd = Closed loop induction I9LSS = Closed loop induction gearless PCLSd = Closed loop permanent magnet (PM) P9LSS = Closed loop PM gearless	-	ICLSd I9LSS PCLSd P9LSS	-	✳ ________
✳ Parameters are motor / machine / job dependent. ✳✳ Recommended but field adjustable. ✳✳✳ The value is automatically calculated from the motor data or other parameter values.					
Parameters for Drive Software Version (LF 80 Drive Software = 1.51) (LF.81 date code = 1005.7)					



Job #:	Drive Serial #:
Production Order #:	Test technician:
Drive Model:	Date:

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