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Tricon Controller, Installation & Adjustment:
Magnetek HPV 600 Drive
Magnetek HPV 900 Drive
Yaskawa F7 Drive
Mitsubishi A500 Drive
Magnetek DSD 412 DC Drive

V6.2x Software

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Important Precautions and Useful Information

This preface contains information that will help you understand and safely maintain MCE equipment. We strongly recommend you review this preface and read this manual before installing, adjusting, or maintaining Motion Control Engineering equipment. This preface discusses:

- Safety and Other Symbol Meanings
- Safety Precautions
- Environmental Considerations
- In This Guide

Safety and Other Symbol Meanings

Danger

This manual symbol is used to alert you to procedures, instructions, or situations which, if not done properly, might result in personal injury or substantial equipment damage.

Caution

This manual symbol is used to alert you to procedures, instructions, or situations which, if not done properly, might result in equipment damage.

Note

This manual symbol is used to alert you to instructions or other immediately helpful information.

Safety Precautions

Danger

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

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

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

Before applying power to the controller, physically check all the power resistors and other components located in the resistor cabinet and inside the controller. Components loosened during shipment may cause damage.

For proper operation of the AC Drive Unit in your controller, you must make sure that: 1) 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. 2) The incoming power to the controller and the outgoing power wires to the motor are in their respective, separate, grounded conduits.

This equipment may contain voltages as high as 1000 volts. Use extreme caution. Do not touch any components, resistors, circuit boards, power devices, or electrical connections without ensuring that high voltage is not present.

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 and 104 degrees F (0 to 40 degrees C).
- Prevent condensation on the equipment.
- Do not install the controller in a hazardous location or where excessive amounts of vapors or chemical fumes may be present.
- Make certain that power line fluctuations are within plus or minus 10% of proper value.

Air Conditioned Equipment Cabinets

If your control or group enclosure is equipped with an air conditioning unit, it is very important to observe the following precautions. (Failure to do so can result in moisture damage to electrical components.)

- Maintain the integrity of the cabinet by using sealed knockouts and sealing any holes made during installation.
- Do not run the air conditioning while the cabinet doors are open.
- If you turn the air conditioner off while it is running, wait at least five minutes before restarting it. Otherwise, the compressor may be damaged.
- Observe the recommended thermostat setting (75 degrees) and follow recommended maintenance schedules.
- Make certain that the air conditioning drain tube remains clear to avoid water accumulation in the unit.

In This Manual:

This manual is the installation, adjustment, and troubleshooting guide for the Tricon car control. When viewed online as a pdf file, hyperlinks (buttons or blue text) link to related topics and informational websites. The manual includes:

- Contents: Table of Contents. When viewed online as a pdf file, hyperlinks in the Contents link to the associated topic in the body of the manual.
- Section 1. Tricon General Information: System description; operating modes.
- Section 2. Installation.
- Section 3. Startup & Drive Adjustment.
- Section 4. Release to Normal Operation: Limit board adjustment and Final test descriptions.
- Section 5. Tricon Configuration: How to use the Hand Held Unit to program and troubleshoot the controller. Complete with parameter definitions where appropriate.
- Index: Alphabetical index to help you find information in the manual. When viewed online as a pdf file, index entry page references are hyperlinks to the associated information in the body of the manual.

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Section 1. Tricon General Information

Section 2. Installation

Section 3. Startup & Drive Adjustment

Section 4. Release to Normal Operation

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Quick Topics

- Tricon
- Car Controller
- Cartop Station
- Car Station
- Dispatcher
- Hand Held Unit
- Operating Modes

Tricon General Information 1

Tricon

The job prints are the primary document necessary to install the controller. The job prints and manual together provide information to install, adjust, and troubleshoot the controller. Study the job prints and read the manual before starting work. Call MCE with any questions you may have.

Depending on the job, the Tricon system may include:

- Controller: Configured according to customer job survey.
- Car top station: Interface/interconnect/control box between car-mounted equipment and the car controller.
- Car top junction box: Some jurisdictions require that components normally mounted inside the Car top station be in the controller cabinet instead. In these instances, a smaller car top junction box is used in place of the car top station.
- Car station: Optional, car operating panel to cartop interface.
- Group Dispatcher: Dispatching components may be installed in a separate cabinet or in one of the car controller cabinets.
- Hand Held Unit: The HHU is a hand-held programming and diagnostic tool that plugs into the Tricon serial communications stream using a simple, telephone-style plug.

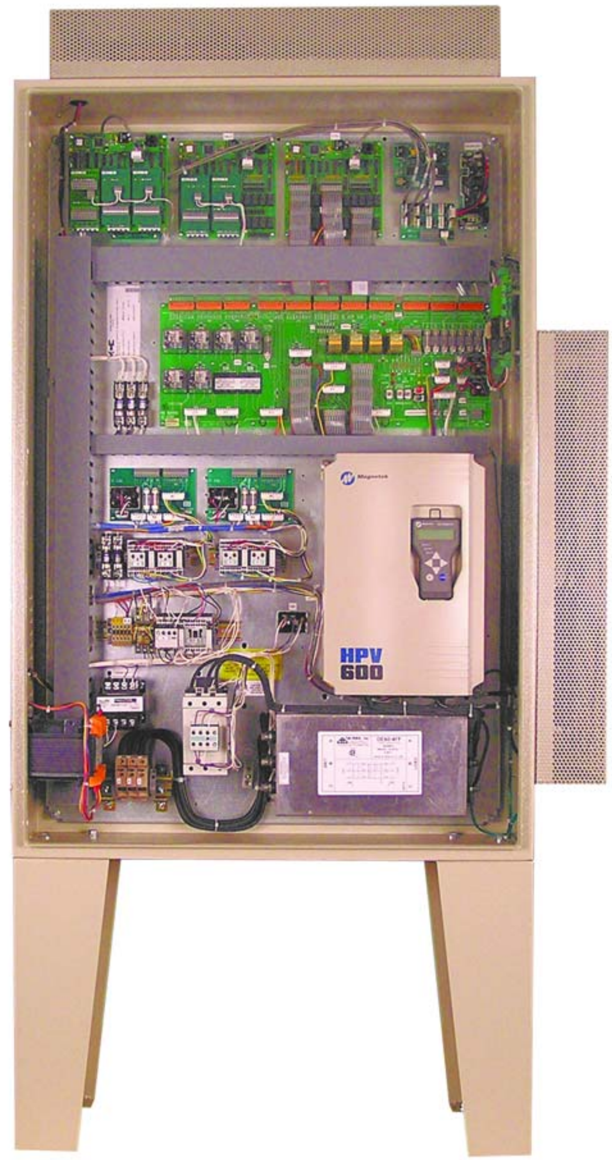
Specifications:

- Performance up to 300 feet per minute
- Up to 32 single or double-openings
- Up to 6 cars in a control group
- Extensive field programmability

Car Controller

Tricon controllers may be ordered in ASME A17.1-2000 or other compliance versions. Tricon is compatible with drives including:

- Magnetek HPV 600 AC vector drive
- Magnetek HPV 900 AC vector drive
- Yaskawa F7 AC vector drive
- Mitsubishi A500 AC drive
- Magnetek DSD412 DC drive



Tricon may use open or closed loop control. A typical Tricon controller with an AC drive is shown to the right.

Jobs may use different cabinet sizes depending upon the number and type of boards required, drive size, the presence or absence of group dispatcher components, and environmental requirements.

Figure 1.1 System Block Diagram

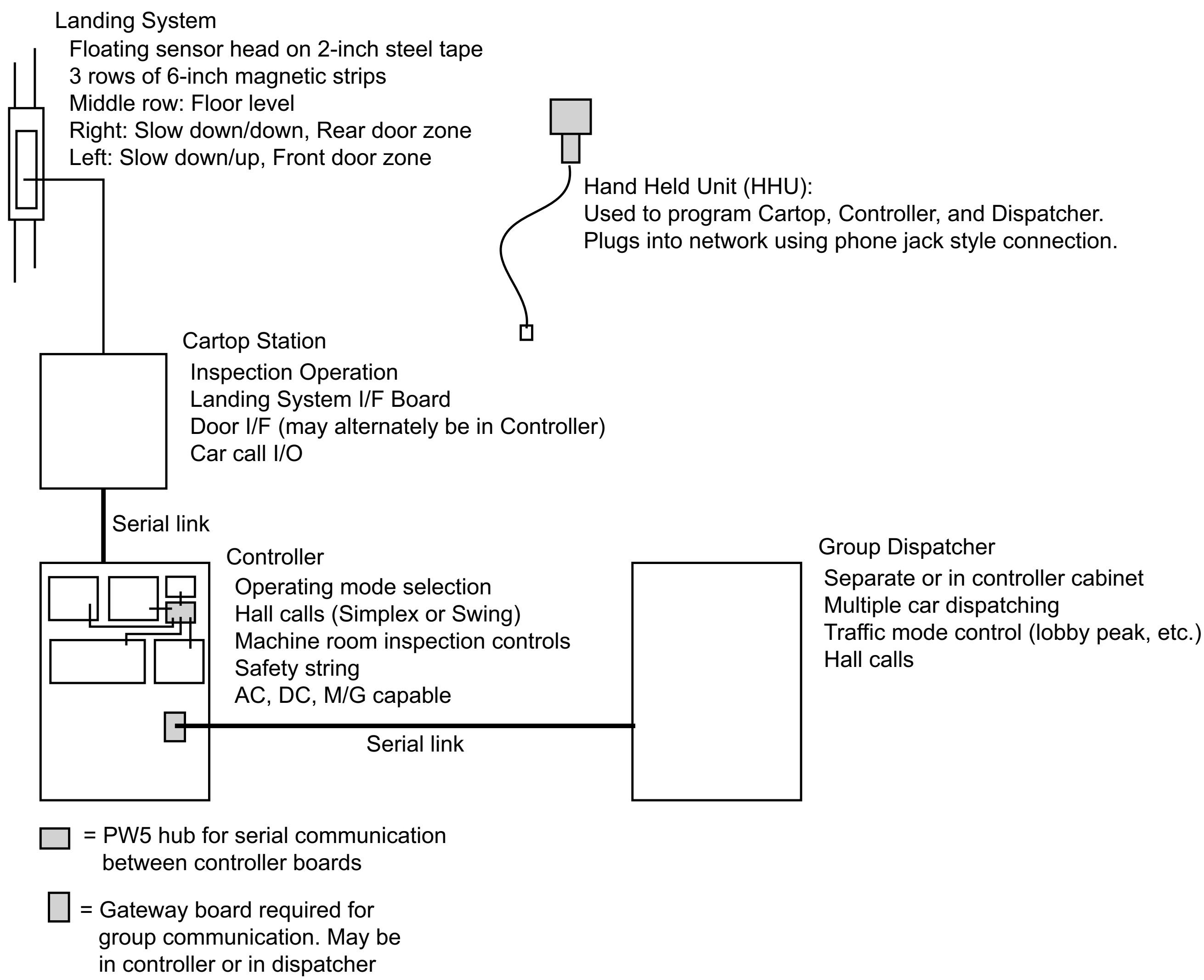
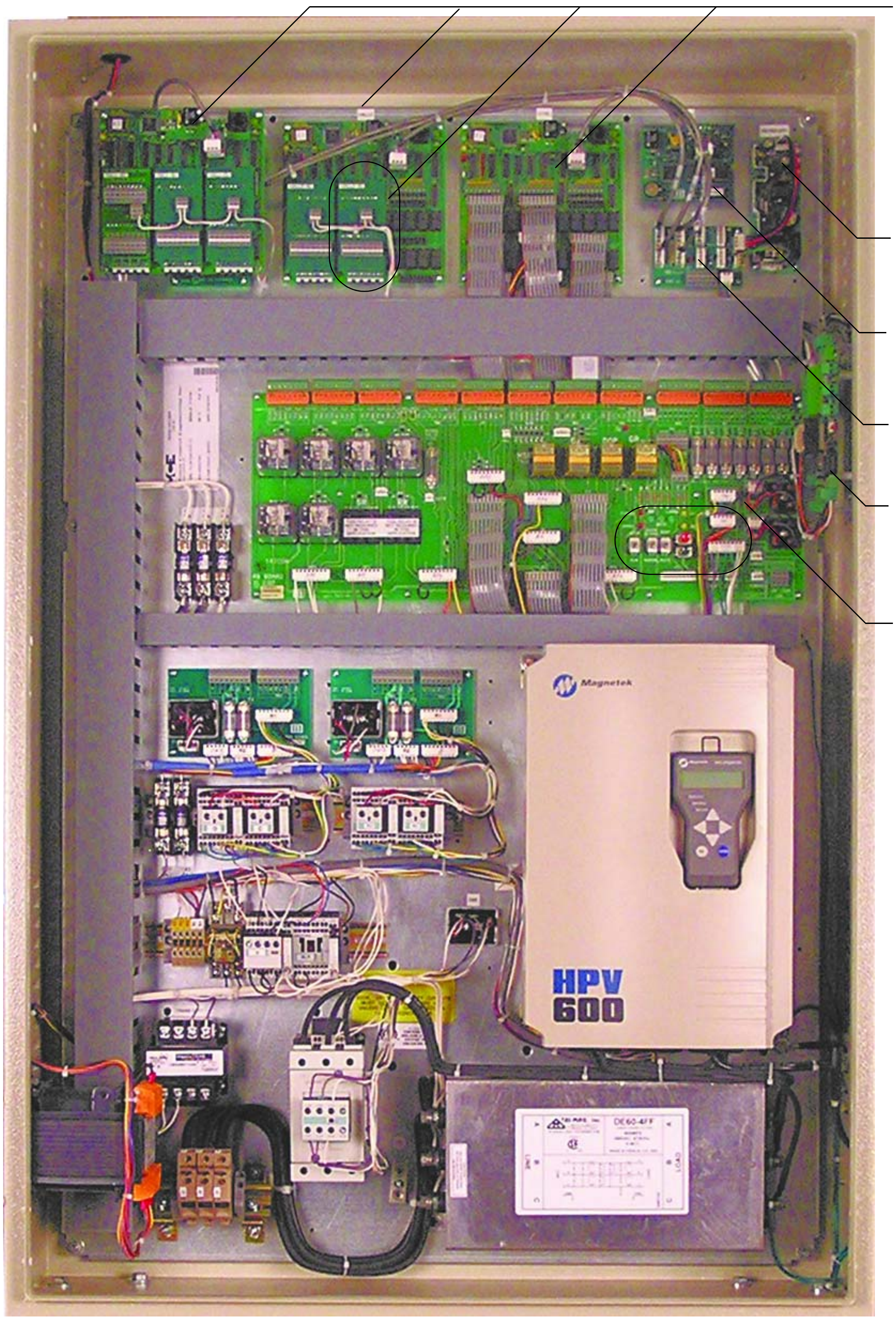


Figure 1.2 Typical Controller Layout



Controller Circuit Boards

The following board types may be used depending on the specific job:

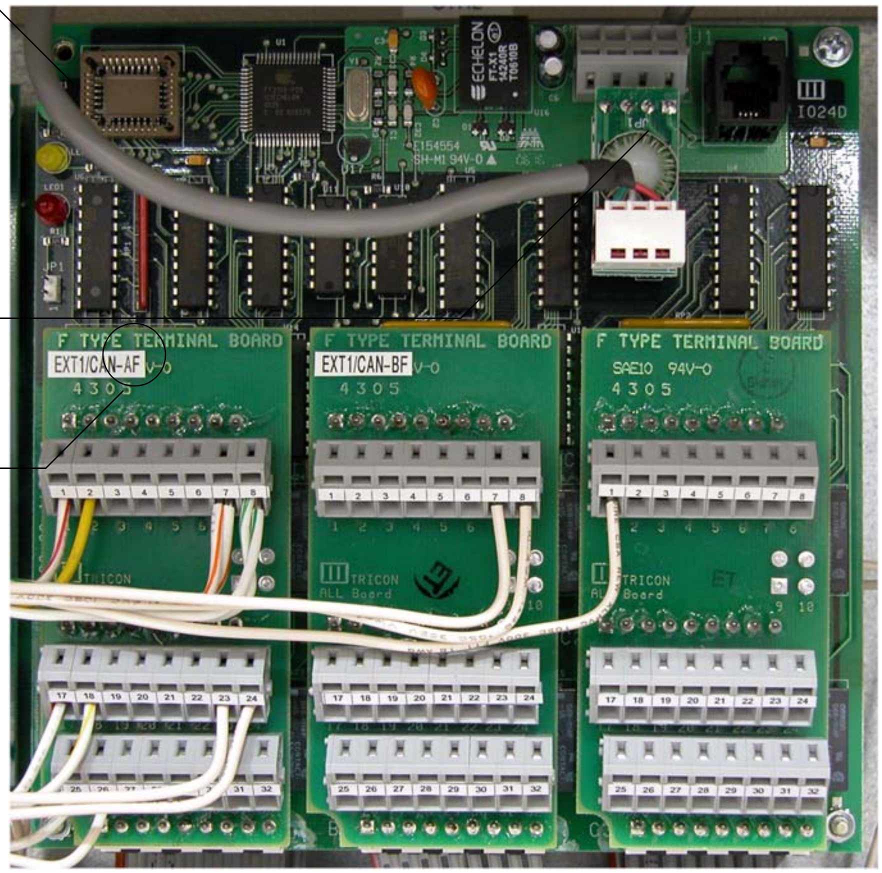
- 5V, 6A Power Supply: Provides 5-volt DC power distributed through the PW5 board.
- CPU: The Central Processing Unit performs control processing. (The same board, fitted with different software, is used in group dispatcher applications.)
- PW5: Major system components communicate through a high-speed serial link. The PW5 board provides a point-of-connection for eight communicating components. One of the connection points is always used by the system CPU, the other seven are available for other connections. These connections also distribute +5V power.
- I/O 24 Board: Depending upon the software installed, I/O 24 boards may be used as Car Controller boards, Hall I/O boards, Position Indicator, Expansion, Car Call Lockout, or Dispatch boards. In all cases, functionality can be expanded by "plugging in" from one to three expansion boards. (Left-to-right, viewed from the front, the three expansion board locations are A, B, and C). When used as a Car Controller, the I/O 24 board may have an Access board plugged into its C position or all expansion positions may be empty. Please refer to "I/O 24 Board with Terminal Boards at A, B, and C Positions" on page 1-6. Expansion boards include:
  - L Terminal board: Used for car or hall calls, provides 8 paired input/output combinations. The input services the call button and the output enables the button lamp.
  - O Terminal board: Used for general purpose I/O, provides 8 independent inputs and 8 independent outputs. The common bus (power or ground) for the outputs is determined by a connection to the Relay board.
  - F Terminal board: Used for general purpose I/O, provides 8 independent inputs and 8 independent outputs. Each output provides two connection points. The common bus (power or ground) for the outputs is determined by a connection to the Relay board.
  - Access board: Used when top and or bottom hoistway access is provided. Mounts on the I/O 24 (Controller-only position) board in the C location.
- CE Driver board: Interfaces to third-party audible or visual devices. The type (heavy duty or standard) and number of driver boards provided depends on the particular job.
- Limit board or 2K Limit/Gripper board: Limit board provides car Feet-Per-Minute setting, limits overspeed conditions, monitors speed feedback, controls hoistway learn operations. 2K Limit/Gripper performs the same functions and additionally limits unintended motion and controls an external rope gripper. Refer to Section 4 for more information.
- PI board: I/O 24 board with position indicator software and up to three O-type Terminal boards. Provides expandable position indicator control.
- Gateway board: When a car is part of a group, a Gateway board is provided in the controller cabinet to communicate with the group dispatcher.
- CCL board: I/O 24 board, with terminal boards as required to accommodate hard wired car call lockout switch inputs. Please refer to "Car Lockout Setup" on page 5-68.

Figure 1.3 I/O 24 Board with Terminal Boards at A, B, and C Positions

You can identify the board by the label on the programmed chip in this location.

Plug in for the Hand Held Unit (HHU)

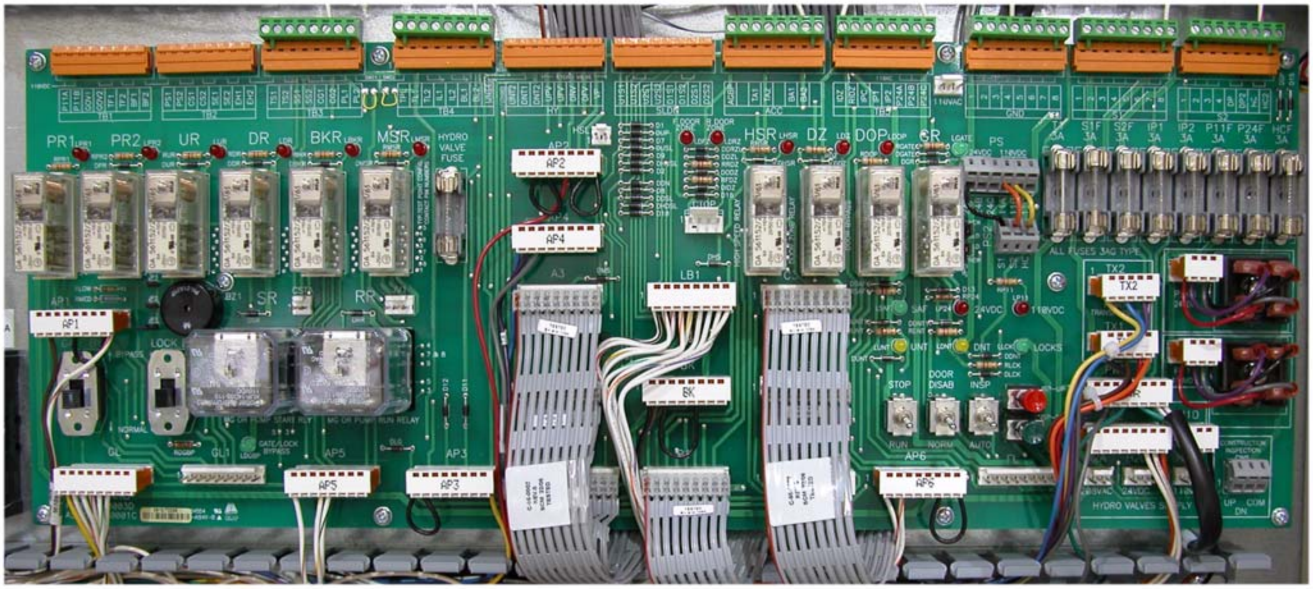
Indicates location (A) and terminal board type (F).



Terminal board locations are A, B, and C from left to right.

A B C

- RB board: Provides power bus fuses and heavy duty relays for drive, brake, and motor control. Also provides mode (Inspection/Normal) and motion control switches for operating the elevator from the controller cabinet. One of three different RB boards is used depending upon job requirements. The 2K Relay board is described here. The others will have “subsets” of 2K controls and indicators.



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Relay Board switches:

- Stop/Run: Enables or disables motor movement by opening/closing the safety string.
- Inspection/Auto: Mode select for inspection or automatic (normal) running.
- Door Disable/Normal: Disable/Enable door operation.
- Gate Bypass: Select Bypass to “jumper out” the gate contacts from the safety string (A17.1/2000 compliant boards only). Buzzer will sound when in Bypass position.
- Door Bypass: Select Bypass to “jumper out” the door contacts from the safety string (A17.1/2000 compliant boards only). Buzzer will sound when in Bypass position.
  - Buzzer volume: The volume of the buzzer for the Gate and Door Bypass switches is set using one of three SEL BUZ jumpers. JP1 = high volume. JP2 = medium volume. JP3 = low volume.
  - The bypass switches may be enabled or disabled by setting car Parameter 125.
- Insp/Up: With the Inspection/Auto switch in the Inspection position, runs the car up the hoistway when held down. Car will automatically stop when it reaches the Normal Limit switch.
- Insp/Down: With the Inspection/Auto switch in the Inspection position, runs the car down the hoistway when held down. Car will automatically when it reaches the Normal Limit switch.

Relay Board LEDs:

- LUNT: Up Normal Terminal - lights yellow when this switch is open.
- LDNT: Down Normal Terminal - lights yellow when this switch is open.
- LLCK: Lights green when door lock contacts are all closed.
- LSAF: Lights green when the safety string is made up.
- LGATE: Lights green when gate contacts are all closed.
- LDGP: Gate/Lock Bypass - lights green when either bypass switch is enabled.
- 110VDC: Lights red when 110VDC power is present.
- 24VDC: Lights red when 24VDC power is present.
- LDFZ: Lights red when the car is in a front door zone.
- LDRZ: Lights red when the car is in a rear door zone.
- Relay Sequence: The car is not allowed to start if the Relay Sequence input to the Controller board is OFF. The seven LEDs below are associated with the relays in the sequence. The relays monitor various inputs. If the monitored input is active, the relay will change state, the associated LED will light red.
  - LPR1, LPR2: LEDs for Potential relays 1 and 2 respectively.
  - LUR: LED for Up Run relay.
  - LDR: LED for Down Run relay.
  - LMSR: LED for Medium Speed relay.
  - LHSR: LED for High Speed relay.
  - LBKR: LED for Brake relay.

Additional circuit boards may be used, including:

- EXT 1 board: Used for additional input/output capability.
- BMS board: Used to interface to a modem for central monitoring.
- Door board(s): Used if required for specific door operators.
- HHSW board: Modem interface for monitoring applications.
- SLH board: Fuse board for specific applications.
- CE Fixture boards with LON interface: Used when extensive external fixtures are required.

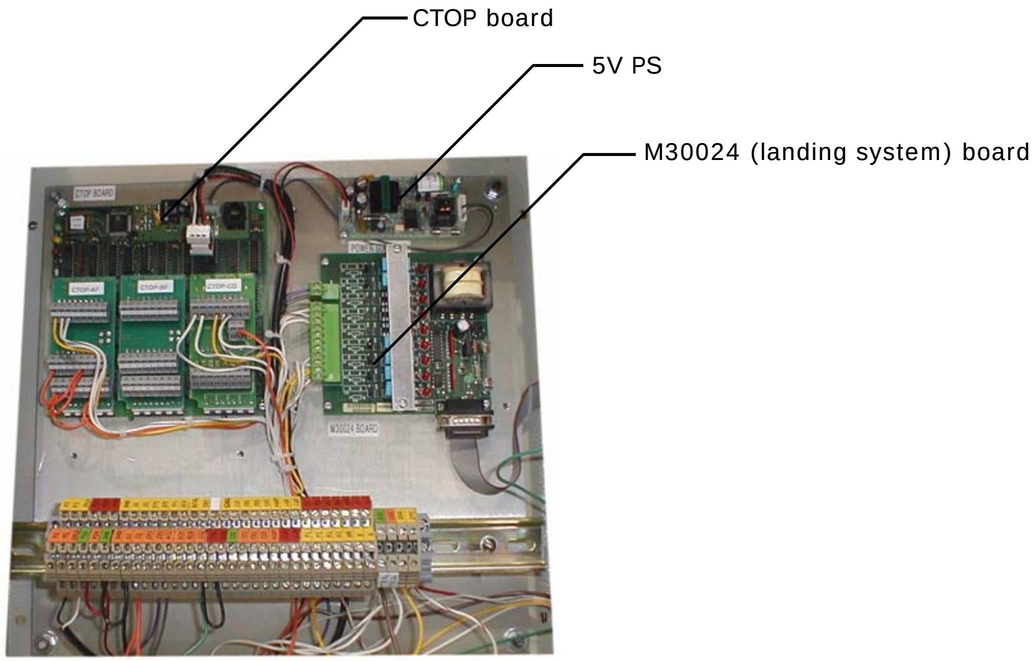
Cartop Station

The standard cartop station provides both an interface between the controller and car equipment like leveling systems and door operators and a cartop control station for running the car on Inspection mode from the cartop.

The illustration to the right shows an exterior view of a typical cartop station. The emergency stop, inspection/normal, safety, and directional control buttons are visible across the top.

The illustration below shows the layout of a typical cartop station interior.

Figure 1.4 Typical Cartop Station Layout



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Cartop Circuit Boards

Like the controller, the circuit boards in the cartop station might vary slightly from job to job, depending upon customer needs.

- CTOP board: The I/O 24 board, configured with appropriate Terminal boards to handle the car operating panel interface.
- 5V PS: A five-volt power supply to handle low voltage component needs.
- M30024: Interface board for the SET 9000 cartop landing system.

Cartop Junction Box

Some installations require that components typically mounted in the cartop station be located in the controller cabinet instead. In these cases, a smaller cartop interconnect box is used, supporting only the landing system interface board. A typical cartop junction box is shown to the right.

Car Station

The car station is a semi-custom addition to a user-provided car operating panel. The car station converts the discrete inputs of the car operating panel into a high speed serial stream, communicating with the car controller through a simple, twisted-strand cable.

The car station allows the bulk of the traveler cable to be reduced since it is no longer necessary to use individual wires between the car and the controller for each car operating panel button or lamp.

Please contact MCE Sales support if you are interested in a car station for your Tricon installation.

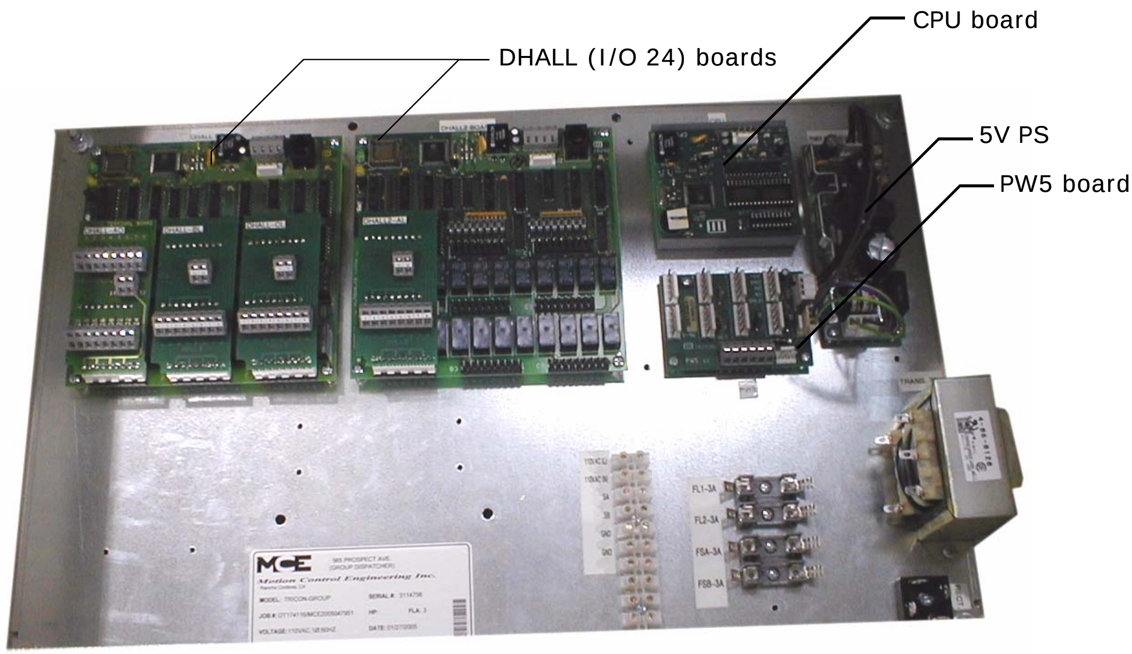
Dispatcher

The Tricon dispatcher provides centralized control of up to six cars to efficiently handle building traffic. The dispatcher also controls car parking assignment, special operating modes (i.e., lobby peak), and group response during atypical operation (i.e., operation during fire conditions, emergency power conditions, etc.).

Dispatcher Circuit Boards

The circuit board complement of the dispatcher varies according to customer requirements. The illustration below shows a typical dispatcher layout.

Figure 1.5 Typical Dispatcher Layout



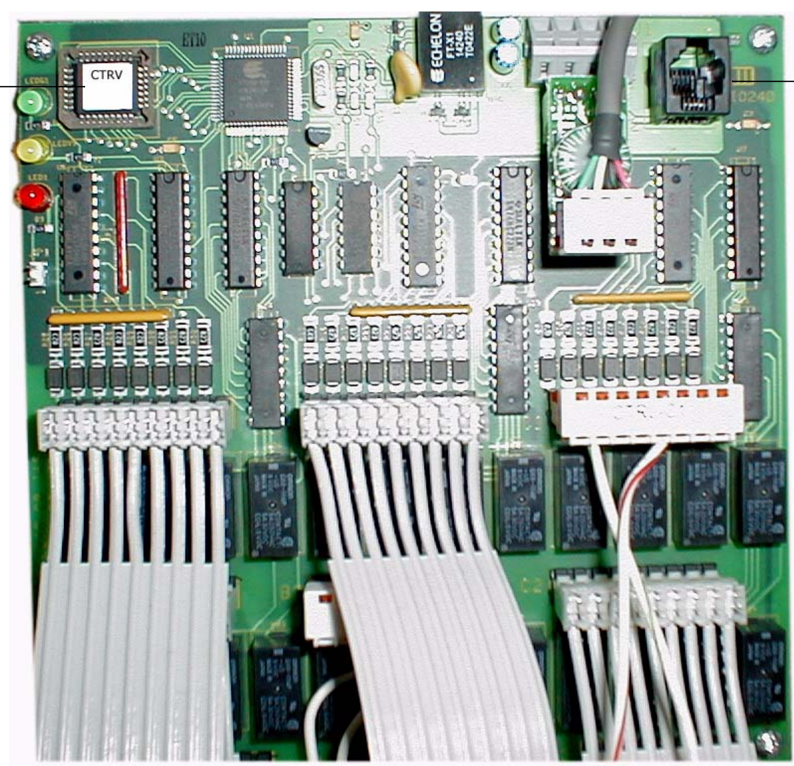
Hand Held Unit (HHU)

The Hand Held Unit is used to set up and troubleshoot the Tricon controller, cartop, car station, and dispatcher components. The Hand Held Unit allows you to set system parameters and view status and error information.

You plug the Hand Held Unit into a common “telephone jack” style connector on one of the circuit boards associated with the microprocessor you want to view or edit:

- Car Network: To view or edit the car network CPU, plug the Hand Held Unit into any car network (controller or cartop station) board with a phone jack (I/O 24, CE, or PI boards). Car network I/O 24 boards can be identified by the sticker on the square IC in the upper left corner of the board, which will be labeled “Hall” or “CTRV”.
- Dispatcher: To view or edit the dispatching (group control) network, plug the Hand Held Unit into any dispatcher I/O 24 board. Typically, the dispatcher is housed in a separate cabinet from the controller cabinets of the cars it controls. (If you have a dispatcher housed in the same cabinet with a car controller, you can identify the dispatcher I/O 24 board by the “dHall” sticker on the square IC in the upper left corner of the board.)

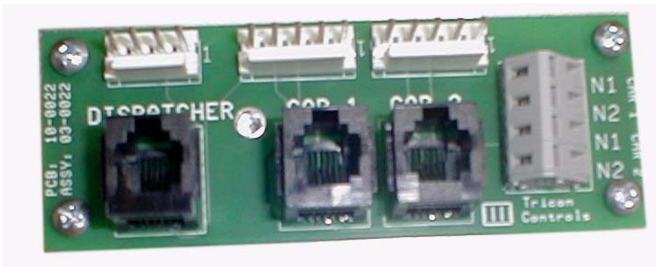
Figure 1.6 I/O 24, Controller Board for Car Network



HHU / Dispatcher Board Connection (Optional)

Some installations require that the networks of all cars in a group be accessible from the group dispatcher cabinet. In these installations, an optional Dispatcher board is mounted in the group dispatcher cabinet. A two-car group example of this board is shown below.

Figure 1.7 Optional Dispatcher Board



Note

Please refer to “Seismic Equipment” on page 2-38 for an example of how a Dispatcher board is connected inside the dispatcher cabinet.

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Control Parameters

A good way to familiarize yourself with the capabilities of Tricon car and group controls is to read through the control parameters tables. If you have not installed Tricon controls before, this is a very valuable process.

- Please refer to “Car Setup, Parameters Screen” on page 5-38
- Please refer to “Dispatcher, Parameter Screen Parameters” on page 5-74

Operating Modes

This section describes controller operating modes, including:

- Inspection Operation
- Car Switch (Attendant) Operation
- Emergency Power Operation
- Code Blue Operation
- Seismic Operation

Inspection Operation

Inspection priority order is:

- Top of car
- Access
- Controller

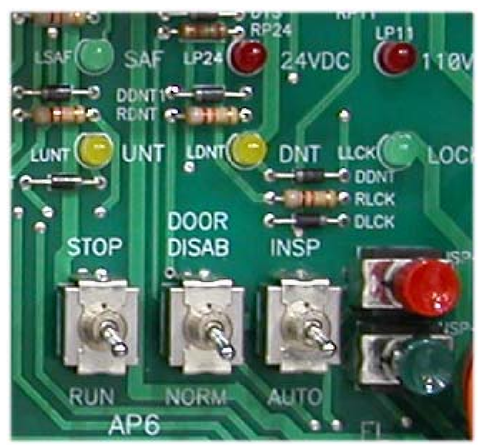
In inspection, a car operates at slow speed using up and down buttons. The car will stop as soon as the buttons are released.

Danger

Changing parameters 76 and 85 may allow the drive to remain on after the buttons are released. Make sure 76 and 85 are set to 0 (zero) when the car is released to normal service.

Controller Inspection

Operate the car using the controller UP or DOWN inspection buttons. A car running in either direction will automatically stop when it reaches the normal terminal switch in that direction. Pressing and holding both UP and DOWN buttons at the same time will open the doors if the car is stopped at a door zone.



Car Top Inspection

In this mode, the car is operated by pushing the cartop UP or DOWN and SAFETY buttons. Doors will open if both UP and DOWN buttons are pressed for more than two seconds while the car is in a door zone.

Access Inspection

To initiate access, the car must be on in car inspection. In access mode, the car moves when a top/bottom access switch is moved to the up/down direction. The car moves only until the hoistway mounted access switch for top/bottom access is opened.

- Pressing the bottom floor car call will close the doors and move the car down. The next car call will move the car up.
- If car open and close buttons are operational, a door will only open if the car is in a door zone.

Car Switch Operation

Tricon supports attendant mode, self-leveling operation when using standard or manual door operation software. Standard drive software, CTRL No.1, for cars 200 fpm or less, or CTRL No.2, for cars above 200 fpm, can be used. All I/O boards required for standard automatic operation are required for car switch operation. Manual door software can be used with a standard car station or car switch.

Running the Car From the Hand Held

The car may be run from the hand held unit for tune up purposes:

- The door disable switch on the controller should be on.
- Entering a floor in the simplex parking floor, parameter 141, moves the car to the entered floor.
- Parking delay time, parameter 142, should be set to 0.
- **Before the car is run from the car switch, the parking floor must be set to 0 and the door disable switch must be off.** If the door disable switch is on, the car switch will latch the top and bottom floor car calls.

Setting Up Car Switch Operation

To use car switch operation:

- Put the car on attendant operation by setting the B2 input on the CSTA board (car station) ON.
- The field terminal board used on the CSTA I/O board (for car calls) must be the “O” type. This type of field terminal board does not connect the input to the output for the call acknowledge light.
- Parameters and floor tables are set as on a standard job except:
  - 133: Yes (Inspection flag. Prevents car calls from latching.)
  - 139: 0 (Prevents car going out of service if delayed.)
  - 141: 0 (Parking floor.)
  - 142: 0 (Parking delay time.)

Operation

When the car switch is moved to the up direction, the top floor car call input will be activated. This will start the car in motion. Moving the handle to the center position (top floor car call input off), will allow the car to slow down and level to the next available floor.

When the car switch is moved to the down direction, the bottom floor car call input will be activated. This will start the car in motion. Moving the handle to the center position (bottom floor car call input off), will allow the car to slow down and level to the next available floor.

A one floor run requires the call-input to be off within two seconds of the start of the car.

When running the car on door disconnect from the hand held, the car switch handle will latch the calls. Remove the car from door disconnect operation before running the car with the switch.

Car Door Operation

If a door operator is used, the software must be standard VVD software. Set up is as described above. To close the door, the door close input to the CTOP board must be turned on. As is the case for car switch operation, car direction and starting are controlled through the top and bottom floor car calls. The car door will not close without a call above or below the car.

Hall Call Operation

Hall calls may be used and will cause the attendant buzzer to sound when a hall call is registered and the car door is not in motion. If you are providing an annunciation light panel in the car, wire the hall call wires to the lights. The buzzer will sound for 5 seconds, then switch off for 10 seconds. This will continue until you start the car.

The car will automatically slow down for hall calls if it is traveling in the proper direction. To stop for a hall call in the opposite direction, release the car switch to stop at the floor. When you stop at a floor, up and down calls at the floor are cancelled. To bypass hall calls, you can wire a bypass button to the bypass input on the CSTA board. When this input is on, the car will not slow down for calls as you pass them.

Emergency Power Operation

Tricon provides the following types of emergency power operations. The desired operation requires setting car and dispatcher parameters and operation of the car select inputs to the dispatcher. In the description that follows, emergency power operation is described as Phase I and Phase 2 operation. Phase I recalls the cars to the recall floor. Phase 2 is operating the car from the car station while on emergency power.

Operation Modes:

- 1-Automatic sequential phase 1 recall with automatic phase 2 car selection.
- 2-Automatic sequential phase 1 recall with manual phase 2 car selection.
- 3-Manual phase I recall with manual phase 2 car selection.

All the operations above allow the car selection switches to override automatic operation and select the car manually for phase 1 recall or phase 2 operation.

The dispatcher provides pre-transfer operation when changing to and from normal power. When the pre-transfer input is activated, all running cars will stop at the next available floor and wait for transfer of emergency power to normal power. This input should be active at least fifteen seconds before the emergency power is transferred to normal power. All power transfers should allow a complete power down of the equipment before the new power source is switched on. All cars and the dispatcher should have power provided at the same time.

Software Required

The controller provides emergency power when used with dispatcher version 6 and above software. The car requires version 6 software for MPU, CTRL (1 or 2), and CTOP boards. The dispatcher requires version 6 software for the MPU. Other car and dispatcher system boards may be version 5 software.

Input Mapping

When emergency power is enabled, the dispatcher will require six inputs for the lobby selection switches and two inputs for emergency power and emergency power off. Emergency power operation is enabled by setting dispatcher parameter 20, Emergency Power Recall Timeout time, to a value other than zero. Assuming you want emergency power operation, you should set a minimum of 45 seconds for this parameter. This will cause the dispatcher to provide the inputs for emergency power as described above. The inputs used for emergency power will be located on the DHALL board “B” location. This is the second group of 8 inputs on this board. They were previously used for the first 8 hall calls. All hall call wires will have to be shifted to the right by 8 locations.

The bottom floor up call will not start on the DHALL ‘CL1' location. This will continue on to the DHALL 2 board. You may need an additional I/O board or I/O board field terminal board to relocate all of the hall calls. Following is a list of new inputs that will be created when the emergency power option is provided. All inputs will select the function when turned on.

Table 1.1 Emergency Power Option Inputs

Input	Function
B1-1	Car 1 selected
B1-2	Car 2 selected
B1-3	Car 3 selected
B1-4	Car 4 selected
B1-5	Car 5 selected
B1-6	Car 6 selected
B1-7	Pre-transfer. This will stop all running cars at the next floor and wait for the removal of this input.
B1-8	Emergency power operation.

Car Parameters Description and Operation

The car uses two parameters for emergency power — parameters 108 and 155. Parameter 108, the fire recall floor, is used as the recall floor for fire service and emergency power. Parameter 155, emergency power enabled, must be set to **yes** when dispatcher parameter 20, emergency power recall time, is not set to 0. This will enable emergency power operation on the car and the dispatcher. Once parameter 155 is set to 'yes', the car will not operate if it cannot communicate with the dispatcher.

Dispatcher Parameters Description and Operation

The dispatcher uses three parameters for emergency power:

- Parameter 20, emergency power recall time out.
- Parameter 21, emergency power manual operation phase 1 and phase 2.
- Parameter 22, emergency power manual phase 2 select.

Parameter 20 sets the time the dispatcher will wait before aborting a phase 1 recall if a car is being held or cannot run. If a car is passed over, the dispatcher will try again after returning all of the other cars. A car that has not returned can be manually selected at any time with the manual selection switch. If the manual switches have not been provided, you can force the dispatcher to try another phase 1 return sequence by putting the phase 2 car in inspection operation. A second function of parameter 20 is to turn off emergency power operation. If the time is set to 0, emergency power operation will be disabled and the inputs will be remapped as described above.

Parameters 21 and 22 Limit Phase 1 and Phase 2 Operation.

- Operation Mode 1: [Auto recall / Auto phase 2 / Manual override]. Parameters 21 and 22 are set to "No". The emergency power will operate as follows:
  - All cars will sequentially return to the lobby, phase 1 operation.
  - After the cars have returned or have been bypassed, the first car will return to service.
  - The car select switches will allow you to select another car. Selecting another car will start a phase 1 recall operation of the car in service.
- Operation Mode 2: [Auto recall / Manual phase 2 / Manual override]
  - Parameter 21 set to "Yes" will allow you to recall all cars starting with cars that have their manual select switch on and then all remaining cars afterwards. The manually selected car will then be returned to service for phase 2 operation.
- Operation Mode 3: [Manual recall / Manual override]
  - Parameters 22 set to "No" will allow only cars with their manual select switch on to be selected. With the select switch on, the car will be selected to recall. When finished with the recall operation, the car will be immediately selected for phase 2 operation. If the first car is deselected and a different car selected, the first will be recalled. When the first car finishes, the second will recall and go back into service. This process must be repeated for every car if all cars are to be recalled. In this mode of operation, a car that has its selection switch OFF will never be selected for either recall and/or normal operation.

Code Blue Operation

The Code Blue feature provides a method of entering a high priority call at a floor. This feature allows one of a specified group of cars to be called to a floor for priority service. Determining which cars are eligible to respond is programmed at the job site using a hand held unit and may range from one car to all cars. This operation is also known as Hospital Emergency Phase I and/or Cardiac Arrest.

Recall Procedure

Upon activation of a Code Blue call input, the dispatcher will send the closest car available for recall to the floor where the call was made. The dispatcher will select cars in the following order:

- Cars on normal group operation
- Cars on Simplex operation
- Cars on Independent/Attendant (if enabled)
- Cars on Fire Recall Phase I (if enabled)

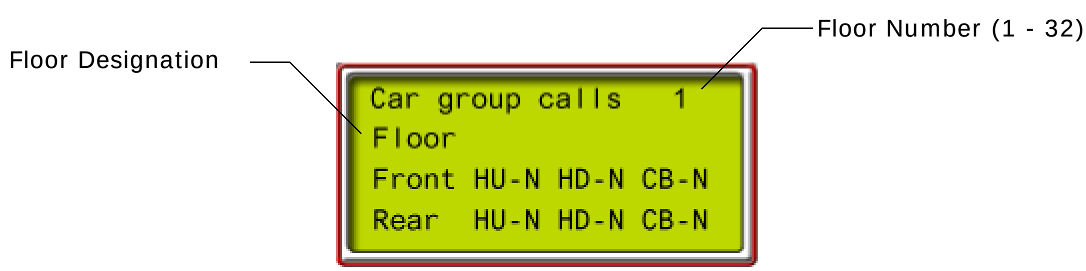
Once selected, a car will flash the Code Blue Indicator, cancel all car and hall calls and proceed non-stop to the Code Blue recall floor. Once at the floor, the corresponding door will open and remain open for as long as the Code Blue button is activated plus the Code Blue wait time set. (See **Dispatcher Parameters Description** below.)

Dispatcher I/O All Code Blue call inputs and outputs are located on the dispatcher. They start at the next 8 call group after the last hall call and are located in order of bottom floor to top floor, front door first, then rear door.

Car I/O An indicator light must be connected to the Code Blue Indicator output. This light will turn ON when the car is in Code Blue Recall operation or in Hospital Emergency operation.

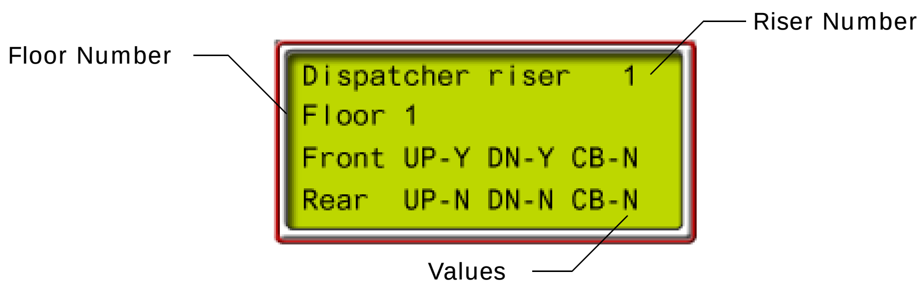
Car Parameters Description

The car group assignments table must be filled with a “Y” for every floor and door where the car will answer Code Blue calls.



Dispatcher Parameters Description

The dispatcher floor table contains entries designated ‘CB’ for front and rear doors at every floor. For every entry marked ‘Y’, a Code Blue call will be allocated. The first Code Blue call defined will always be located at the first input of a hall call panel group. Hall calls and code blue calls will never share the same hall card group panel.



- Parameter ‘Code Blue: Override Fire Recall’ will enable the dispatcher to select a car for Code Blue recall when it is on Fire Recall mode.
- Parameter ‘Code Blue: Wait Time’ will determine how long a car will sit at the Code Blue recall floor waiting for the operator to activate the Hospital Emergency key switch. The time is in seconds.
- Parameter ‘Code Blue: Override Independent and Attendant’ will enable the dispatcher to select cars for Code Blue recall even when they are on Independent or Attendant service.

Seismic Operation

A “ring on a string” circuit is used to detect displacement of the counterweight caused by seismic activity (input CWS). The car position in the hoistway in relationship to the counterweight is reported by a switch mounted on the car and positioned such that it is always closed when the car is above the counterweight (input POS). The seismic switch is a manually activated switch or an external seismic detection device (input SAS).

Car Setup Parameter 168 enables and disables seismic operation and also defines how the car will operate on seismic or “earthquake” mode. If set to zero (0), seismic operation is disabled. Other operating states are enabled by entering the sum of the desired Flag numbers into the parameter. For example, to enable Flags 1, 2, and 4, you would enter a seven (7).

Table 1.2 Seismic Parameter 168 Settings

Flag	Enables
1	Seismic inputs and outputs on the EXT board are enabled according to ANSI A17.1-2000 code. Active CWS input will cause an emergency stop after which the car will be in earthquake operation and will move to and level at the first available floor in the direction away from the counterweight and open its doors. If CWS is off when the car is returned to a floor, it will return to Automatic service at reduced speed. If CWS is continuously ON, the car will not return to service. An active SAS input (alone) will cause the car to slow down and stop at the next available floor. The car will then be returned to service at reduced speed. A momentarily active SRE input will reset seismic operation provided both CWS and SAS inputs are inactive.
2	When set, CWS or SAS inputs will return the car to a floor in a direction away from the counterweight, open the doors for passenger exit, and remove the car from service. If the CWS input is not continuously on, the following operations are allowed at reduced speed: Lobby Phase 1 fire recall. Code Blue recall. Code Blue car switch operation. If the CWS input is ON, the car may only be run from the cartop inspection station.
4	If set, and the CWS input is continuously ON, the car will run at reduced speed in response to a Lobby Phase 1 fire recall.
8	If set, and the CWS input is continuously ON, the car will run at reduced speed in response to a Lobby Phase 1 fire recall only if the recall floor is above the counterweight position.

1

Seismic Input and Output Definitions

Please refer to “Seismic Equipment” on page 2-38 for additional explanation.

- CWS: Counterweight Displacement Switch input. Connected to a relay operated by the counterweight displacement switch or to the switch directly. When triggered, the car will make an emergency stop, then move to and level at the nearest floor in the direction away from the counterweight. Once leveled, the car will open its doors and allow passengers to exit. If the car is on Fire Phase 2, the doors will operate as defined for that mode.
  - When in earthquake operation, the SAL (Seismic Activity Light) output will be enabled.
  - If on independent or attendant service, the BUZ (buzzer) output will be enabled until the car is returned to a landing.
- SAS: Seismic Activity Switch input. Connected to a switch or seismic device. When triggered, a car in motion will drop all car and hall calls and proceed to the nearest landing. Once leveled, the car will open its doors and allow passengers to exit. If the car is on Fire Phase 2, the doors will operate as defined for that mode.
  - When in earthquake operation, the SAL (Seismic Activity Light) output will be enabled.
  - If on independent or attendant service, the BUZ (buzzer) output will be enabled until the car is returned to a landing.
- SRE: Seismic Reset input. Connected to momentary reset button. Resets earthquake operation provided SAS and CWS inputs are both OFF.
- POS: Counterweight Position Switch input. Connected to a switch mounted on the cartop or hoistway positioned such that its contacts will be closed when the car is above the counterweight and open when the car is below the counterweight. This switch will retain its state regardless of power status.
- SAL: Seismic Activity Light output. Connected to a warning light. Active when the car is on earthquake operation.
- BUZ: Buzzer output. Connected to an audible signal. Active during earthquake operation if the car is on independent or attendant operation until the car has been leveled to a floor for five seconds.

Installation 2

Installation

This section contains:

Note

If you have installed Tricon controls before, you might want to use the Tricon Quick Start Up guide that came with the job prints.

Install Sequence

This is the installation sequence for installing and setting up Tricon controls:

- Install and ground major system components (this section)
- Connect AC power (this section)
- Connect motor, brake, tach or encoder, velocity encoder, if used (this section)
- Set up for Construction operation if needed (this section)
- Complete installation of peripheral equipment, hoistway equipment, etc. (this section)
- Complete field wiring (this section)
- Controller parameter adjustments (Section 5)
- Inspection start up (this section and drive information in Section 3)
- Initial drive adjustments (Section 3)
- Inspection speed learn operation (Section 4)
- Inspection operation
- Final tuning and drive adjustments (Section 3)
- Normal speed learn operation (Section 4)
- Final Testing (Section 4)
- Release to operation

Supporting Information

The drawing package accompanying your controller provides information to make all connections and install all controller related components and is **the primary guide to system installation**.

Section 5 of this manual contains parameter descriptions for all user-programmable system elements. The manual is intended to provide general knowledge of system components, system operation, and supporting information for the controller drive (Section 3).

Please contact MCE support with any questions you have while installing and adjusting the Tricon system. If you discover errors, omissions, or incomplete information in this manual or in the drawings package, please report them to MCE so that we can correct them.

Safety

Keep safety in mind at all times to avoid injury or equipment damage.

Personal Safety

- Tricon controls should only be installed or maintained by qualified, licensed, elevator personnel familiar with the operation of microprocessor-based elevator controls.
- Verify that all safety devices (limits, governors, hoistway locks, car gate, etc.) are fully functional before attempting to run the elevator. Never operate Tricon controls with any safety device inoperative.
- The user is responsible for complying with current National Electrical Code with respect to overall installation and for proper sizing of electrical conductors.
- The user is responsible for understanding and applying all current local, state, provincial, and federal codes that govern controller placement, applicability, wiring protection, disconnections, over current protection, and grounding.
- Controller equipment is at line voltage when AC power is connected. Never operate Tricon controls with covers removed from drive or brake controls.
- After AC power has been removed, internal capacitors can remain charged for up to 5 minutes. Wait at least 5 minutes after power down before touching any internal components.
- To lessen the risk of shock, all equipment must be securely grounded to earth ground with a minimum of #8 AWG wire as outlined in the National Electrical Code. Failure to obtain an actual earth ground may result in electrical shock to personnel.
- When using test equipment (oscilloscopes, etc.) with a power cord that electrically ties probe common to earth ground, an isolation transformer should be used to isolate the instrument common from earth ground.
- Stay clear of all rotating equipment while working on the controls.

Equipment Safety

- All equipment must be securely grounded to earth ground with a minimum of #8 AWG wire as outlined in the National Electrical Code. Failure to obtain a true earth ground may result in electrical shock and is the most common cause of electrical component failure and noise-induced problems.
- Replace components only with main line power off. Damage to equipment or unexpected operation of the elevator may occur if this precaution is not observed.
- Substitution of parts or unauthorized modifications should not be attempted before first contacting Motion Control Engineering to ensure all safety features are maintained. MCE will not be held responsible for circuit modifications made in the field unless they are approved in writing by MCE.
- Circuit boards believed to be defective must be sent to MCE for repair and testing. Field repair may leave the board with undetected problems.
- Care should be taken when using test leads and jumpers to avoid shorting high voltage or ground to low voltage microprocessor circuits.

Installation Considerations

1. Dust, carbon, or metallic particles must not be allowed to accumulate on any part of the control.
2. Avoid vibration and shock.
3. Avoid rapid temperature change, high humidity, high ambient temperatures.
4. Avoid caustic fumes.
5. Prevent electromagnetic interference. This may be caused by radio transmitters, high voltage inductive spikes from unsuppressed relay coils, improper grounding, and improper wiring practices. Note the following:
   - The outer door will protect against interference only if closed. When the door is open, do not run high wattage radios near the microprocessor.
   - Noise from door operator reactors can cause a problem if mounted on the controller.
   - If the CRT shows lines, spikes, or other signs of interference, check for electromagnetic interference (noise) by checking the following:
     - Proper grounding
     - High voltage wiring running near the MPU board or monitor
     - If seen when the door motor is operating (CX or OX are lit on the screen), add suppression around door operator circuitry.
     - If seen when a relay is picking or dropping, add arc suppression around the coil.

Note

Standard arc suppressors (resistor/capacitor networks) are used on AC relays. Diode/resistor combinations work well for DC relays. Consult MCE for proper component sizing.

Machine Room Preparation

When preparing the machine room for controller installation, consider:

- Equipment location
- Machine room environment

When choosing equipment location, consider:

- Adequate working space and a workbench or table.
- Logical arrangement, considering other equipment in the machine room and electrical power.
- Do not install equipment in a hazardous location.
- A telephone in the machine room facilitates remote diagnostic and adjustment assistance.
- If any areas in the machine room are subject to vibration, they should be avoided or reinforced to prevent equipment damage.
- Provide adequate lighting.
- Reduce wiring by locating the isolation transformer near the controller.

Environmental conditions are important:

- Ambient temperature should remain within 32° to 104° Fahrenheit (0° to 40° Celsius). Temperatures outside these guidelines may be tolerated, but will shorten equipment life. Adequate ventilation is required. Air conditioning may be necessary.
- The air in the machine room should be free of excessive dust, corrosive elements, and excessive moisture. A NEMA 4 or NEMA 12 enclosure can help meet these requirements if machine room conditions are inadequate. If the machine room has open or unglazed windows or other direct outside openings, place equipment cabinets far enough from them so that severe weather does not damage the equipment.
- Very high levels of radio frequency (RF) radiation from nearby sources should be avoided. RFI may interfere with controller components, degrading elevator performance. Using hand-held communication devices close to the controller may also cause interference. Interference from permanently installed radio transmitting antennas is not common.
- Power line fluctuation should not be greater than ±10%.

Piping and Wiring

Proper routing of signal and power wires is essential to microprocessor based equipment. Low and high voltage wiring cannot be run in the same conduit, duct, or tray.

How Electrical Noise Occurs

Electrical noise may be induced when a high power conductor and a low signal level conductor run alongside one another. As current flows through the high power wire, magnetic lines of flux (voltage) expand outward and voltage is induced in the low level conductor.

The low level conductor, in the case of Tricon, may be a 24-volt input that really only needs to see 12 volts to turn on. If the voltage induced from the high power conductor is large enough to induce a 12-volt spike, the input can falsely turn on.

How to Avoid Electrical Noise Problems

Route high and low level signal wiring properly. Keep low level wiring in separate conduit from high power wiring. If high and low power wiring must be run in the same duct, separate them by a minimum of three to four inches. If one must cross the other, it should be at a ninety degree angle.

Run low level wiring in shielded cable. The shield collects any induced voltage from surrounding high power wiring. The shield or “drain” must be connected to ground at one end only—never at both ends.

Possible EMI/RFI Interference

Semiconductor devices that switch at high frequencies (such as variable frequency drives) produce EMI/RFI. To avoid EMI problems:

1. Run all motor leads in a separate conduit. Motor lead runs should be as short as possible. Control cabinet entry should be as close to the final termination point as possible.
2. Run main line supply leads in a separate conduit.
3. Run primary isolation transformer wiring in separate conduit from main line conductors to the transformer.
4. Run all secondary isolation transformer wiring in a separate conduit from the transformer to the drive cabinet.
5. A single-point ground should be established inside the control cabinet and a #8 AWG ground wire run directly from each of the following devices to this single point:
   - Earth Ground from running water supply, hydro-electric supplied ground, or a ground supplied via an earthing rod to the single ground stud.
   - Continuous wire from the main line disconnect to the single ground stud.
   - Continuous wire from the motor frame to the single ground stud.
   - Continuous wire from the isolation transformer frame to the single ground stud.
   - Continuous wire from the line filter frame to the single-point ground stud.
   - Jumper the “N” stud on the line filter to the line filter frame.
   - Continuous wire from the load reactor frame to the single-point ground stud.
   - Continuous wire from the drive frame ground stud to the single-point ground stud.

Equipment Grounding

A proper ground is essential to trouble free operation. Ground is defined as a direct connection to EARTH GROUND. This type of ground is not always available from the electrical supply panel.

The electrical conduit is not a sufficient ground for the system. Electrical ground should be obtained and certified from the electrical contractor. If this is not available, keep the following in mind when seeking an adequate connection to EARTH GROUND:

1. Building steel is not always earth ground. In most cases, building beams rest on concrete beam pockets, and the earth connection is inadequate.
2. Sprinkler system water pipe is **not** adequate because the sprinkler system is, in most cases, isolated from a free flowing earth water source.

If either of the two methods above are chosen for ground, and a true electrical ground is later introduced to the system, a difference in potential can occur between the assumed ground and the actual earth ground. This may lead to unsafe operating conditions and the possibility of electrical shock to passengers or personnel.

3. A water pipe is an adequate ground only if the water in the pipe is connected to a continuous city water source.

Wiring Connections for Properly Grounded Systems

1. An uninterrupted ground wire of at least #8 AWG should be run from each car controller cabinet chassis or backplate to earth ground. The connection at the car controller must be free of paint so the ground connection is made to the bare metal of the enclosure. The car controller should read less than 1-ohm to ground with the power off.
2. Ground straps, or short loops of ground wire, should be run from the controller ground connection to the primary duct connections.
3. An uninterrupted #8 AWG ground wire should be run from the hoist motor frame to the controller ground. The ground connection to the hoist motor must be free of paint.
4. A continuous looped ground wire should be run from each hall lantern and position fixture box to controller ground. The ground connection at each fixture should make an electrical connection to the bare metal of the fixture box and its cover. This connection should be free of paint.
5. An uninterrupted ground wire of minimum #14 AWG should be run from a termination point on the cab to the controller ground.
6. An uninterrupted ground wire should be run from the cab enclosure to the ground terminal on the cab to protect passengers and personnel from electrical shock.
7. An uninterrupted ground wire should be run from each car operating panel to the ground terminal on the cab to protect passengers and personnel from electrical shock.
8. An uninterrupted ground wire should be run from the dispatch cabinet chassis or backplate to earth ground. The connection at the dispatch cabinet must be free of paint so the ground connection is made to the bare metal of the enclosure.
9. A continuous looped ground wire should be run from each hall push button station to the dispatch or controller ground.

AC Power Connections

Note

All conductors entering or leaving the controller must be through conduit. High voltage, high current conductors must be separated from control wires. Velocity encoder or tachometer wires must be routed in a separate conduit from high voltage, high current wires. Incoming power to the controller and outgoing power to the motor must be through separate, grounded conduits.

Brake Module If your job uses a brake control module, your job drawings may show auxiliary power connections specific to the brake from an isolation transformer. Follow the drawings carefully.

1. Check the AC input specifications on your job prints. Verify that the AC supply is as specified.

Note

Proper motor branch circuit protection in the form of a fused disconnect switch or circuit breaker must be provided for each elevator according to applicable electrical code. Each disconnect or breaker must be clearly labeled with the elevator number. The electrical contractor must determine the wire size for the main AC power supply and for the wiring from the disconnect or breaker to the controller or isolation transformer.

2. Connect AC supply wiring as shown in the job prints.

Initial Power Up

After connecting power, it is a good practice to temporarily power up the control to check functionality before connecting any field wiring.

1. Verify that the Inspection switch on the Relay Board is in the Inspection position.
2. Verify that the Run/Stop switch is in the Stop position.
3. Visually check for loose connections or components.
4. Power up the controller.
5. Check that the 24VDC and 110VDC LEDs on the Relay Board are on.
   - If not, verify all transformer and power supply voltage levels are correct per the job prints.
   - Verify all fuses are intact.
   - Check phase-to-phase input voltage. If necessary, shut off main power and swap two of the incoming feeds at the controller main terminal.
6. Check the status of the three LEDs on the top left of the I/O 24 boards. The green LED on each board should be blinking. See below if otherwise:
   - Solid red: Board has not started up properly. May indicate a bad board.
   - Solid amber: Board has not completed initializing.
   - Solid green: Board has started properly and is sending data to MPU. LED should starting blinking after about 15 seconds.
   - Solid green with solid amber: Board has incorrect system configuration. (All other boards will probably be indicating normal operation.)
   - No LEDs: Check that the four-pin power cable from the PW5 board is properly connected. Check that 5-volt DC power is at all red and black power connections on PW5 board. Check that 110-volt power is present at IP1 and IP2 fuses on Relay Board.
7. After verifying that the green LED on each I/O 24 board is blinking or correcting the problem if they are not, shut down the controller before continuing with field connections.

Motor, Brake, and Encoder Connection

Danger
Verify that power to the controller has been shut off at the main disconnect before proceeding with connections.

Motor Connection

If you are reusing an existing hoist motor, you must check it for insulation breakdown before proceeding.

Insulation Breakdown Test

1. Disconnect all motor and brake wiring.
2. Perform an insulation test between motor and brake connection points and the body of the motor. Use a Megohm meter to subject the insulation to the same high voltage that would be present during elevator operation.
3. A minimum insulation resistance of 100k Ohms is required.
4. Correct any insulation problems before proceeding with installation. Insulation problems may indicate a serious problem in the equipment.

Motor Wiring

Incoming power to the controller and outgoing power wires to the motor must be through separate grounded conduits.

1. Refer to the Power section drawing in your job prints.
2. Make connections as shown. Be sure to follow any notes regarding wire sizes.

Brake Connection

1. Refer to the brake circuit drawing in your job prints to verify the configuration of the braking circuit. (Brake control and brake adjustment resistors vary from job to job.)
2. Connect the wires from the controller to the brake as shown in the job prints. Remember that brake wires must not be routed in the same conduit with motor power or velocity encoder wires.

Brake Mechanics

Check basic brake characteristics at this time:

- Ensure that the brake mechanism is clean and in good condition.
- Check that the brake lining makes good contact with the machine braking surface (at least 95% of the pad must be in contact with the braking surface).
- Check that the adjustment of the brake solenoid is not preventing the brake from fully applying when it is not energized.
- If you have the manufacturer recommended brake torque settings, check to see that the spring adjustments are equal and are torqued to at least that setting.

Velocity Encoder Installation and Wiring

The velocity encoder reports hoist motor speed to the controller. The encoder must be mounted and wired according to the drawings. When installed, the encoder must be electrically isolated from the motor or any other ground. (Resistance between the encoder casing and the motor or other ground should be “infinite.”)

Do not place the encoder or its wiring close to a magnetic field (the motor or brake coils). Magnetic fields can induce AC into the encoder signal. This can cause the drive to miscount, producing erratic control at lower speeds.

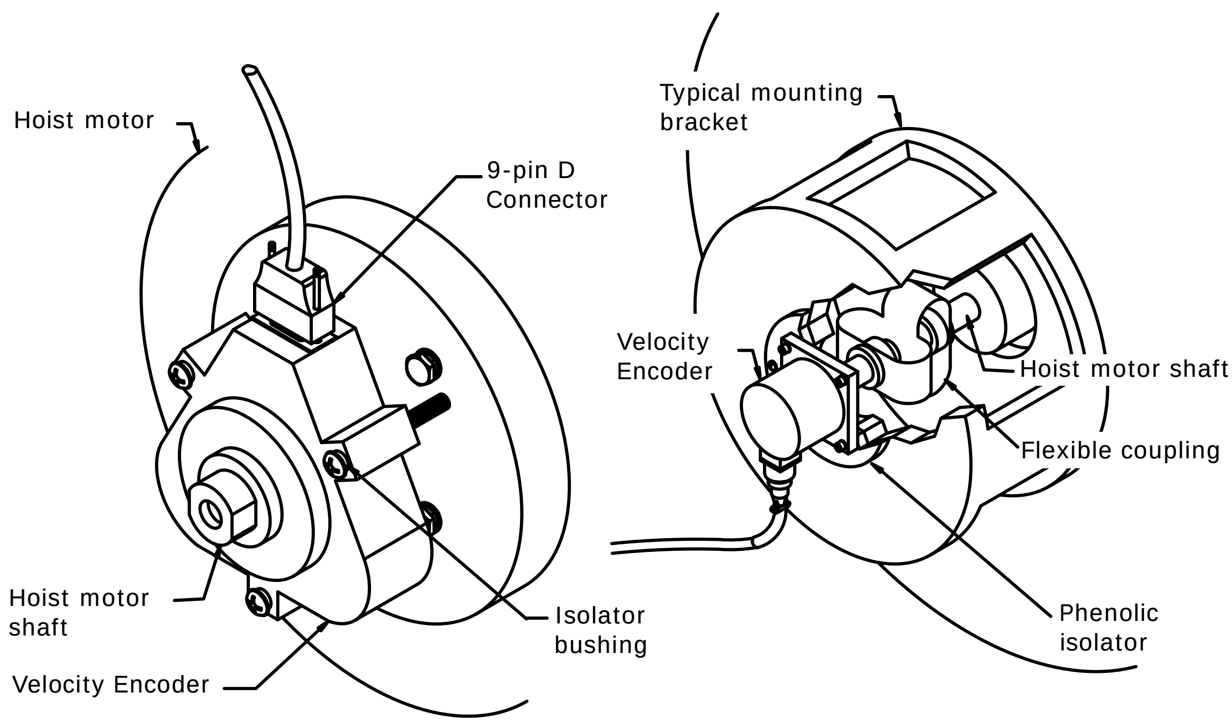
Note

The encoder wiring must use a separate grounded conduit. Inside the controller cabinet, if control wires must cross power wires, they must cross at right angles to reduce the possibility of interference.

Encoder Mounting

The following illustration shows two typical encoder installations.

Figure 2.1 Typical Encoder Installations



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. However, this type of mounting may not be practical for all applications, therefore, the best method for mounting the encoder and coupling it to the motor must be determined at the job site.

Encoder Isolation

The encoder housing must be electrically isolated from the machine (ground). To check this:

1. Measure the resistance between the encoder case and the frame of the motor.

The measured value must be “infinite” for complete isolation.

Encoder Wiring

A shielded cable with an appropriate connector at the encoder end is provided. The controller end of the cable exposes trimmed and tinned individual conductors. The encoder cable must be routed into the controller cabinet in a separate conduit. Connect the cable to the encoder using the cable/connector provided.

1. Route the cable through a separate conduit to the controller cabinet.
2. Connect the controller end of the cable as shown on the Drive Interface sheet of the job prints.
3. Verify that the encoder shield is soldered to the drain wire (wire without insulation). Keep the cable shield connection as short as possible.

Caution

Do not coil excess Encoder cable near high voltage components — noise may be induced. If the cable must be shortened, trim it at the controller end. Do not cut and re-splice in the middle of the cable or shorten at the Encoder end.

T-Limit-2K Motor Speed / Position Sensor

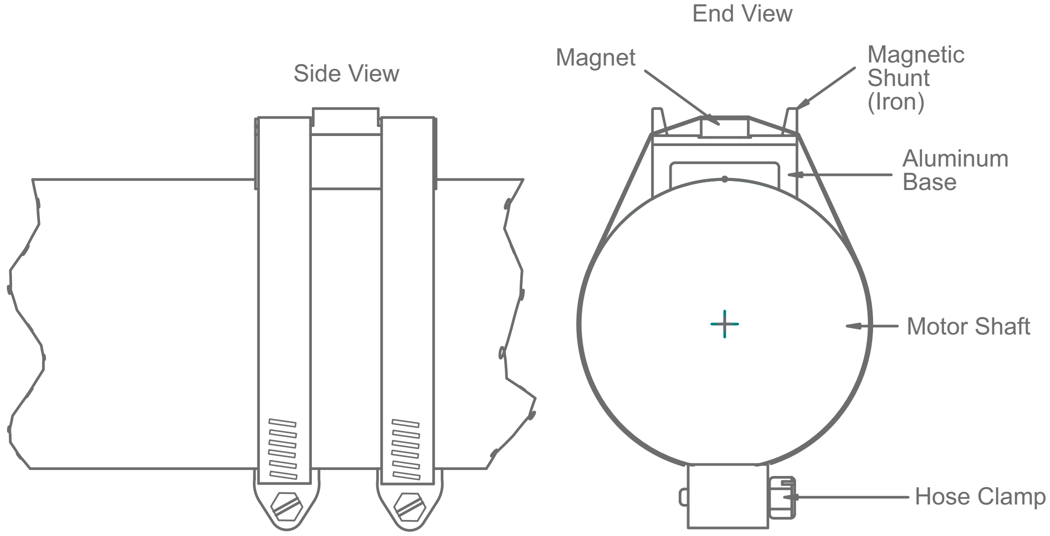
For A17.1-2000, CSA B44.00 compliant controllers, a speed/position sensor mounted on the elevator machine/motor provides independent feedback to the T-Limit-2K Limit/Gripper board through a special cable assembly. This connection is detailed on the Limit/Rope Gripper Board drawing in the drawings package accompanying the controller.

The speed sensor detects a magnet assembly, attached to the shaft of the motor, as the magnet assembly passes during each motor revolution.

Mounting the Magnet Assembly

DO NOT drill any holes in the motor shaft to mount the assembly. Use hose clamps as shown in the following illustration.

Figure 2.2 Mounting the Speed Sensor Magnet Assembly



Mounting the Speed Sensor

When mounting the speed sensor, do not over-tighten the mounting nuts. Position the face of the sensor so there is 1/16” to 1/8” (1.6 - 3.18mm) clearance between the face of the sensor and the magnet assembly. The speed sensor must be electrically isolated from the motor body. The sensor is provided with the proper mounting hardware.

Figure 2.3 Speed Sensor Mounting (side view)

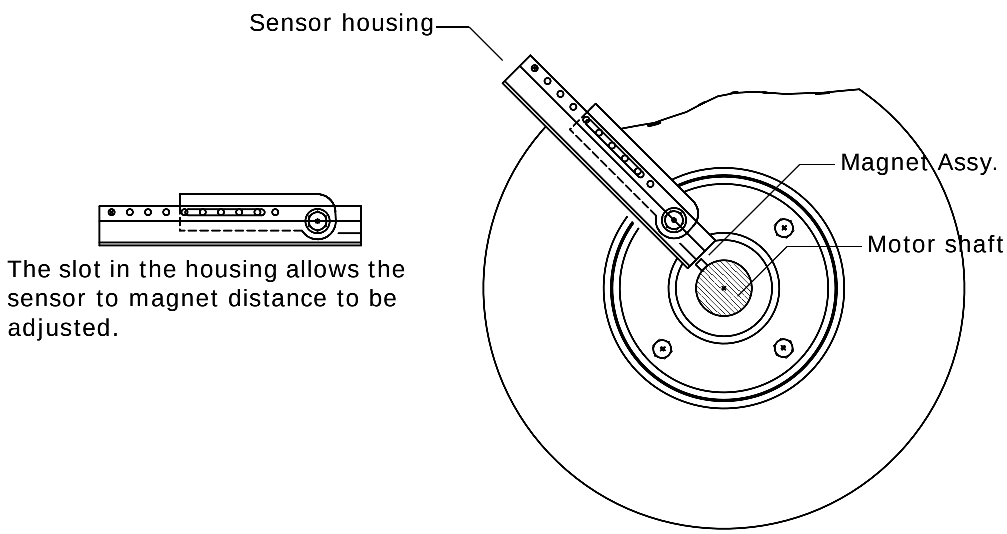
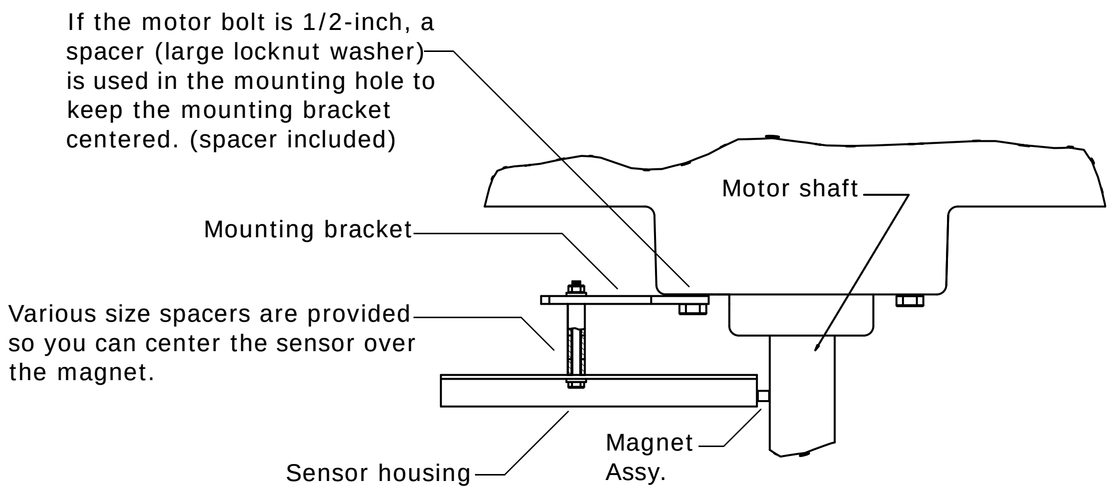


Figure 2.4 Speed Sensor Mounting (top view)



Construction Operation

If required, it is possible to run the car during construction without all hoistway limits, door, and gate switches in place. In this mode, the car runs at inspection speed (45 fpm). If they are in place cartop controls may be used or the car may be run from the controller. If desired a temporary run box may be installed.

Minimal Requirements

Minimal equipment requirements are:

- The governor must be wired into the Safety string.
- If needed, a temporary controller box may be connected. Please refer to “Temporary Run Box Hookup” on page 2-17.
- Motor, brake, and drive connected and set up
- Velocity encoder or tach if used
- Normal and Final Limit Switches installed and connected

Jumper Requirements

Temporary jumpers, as necessary, may be placed across the following connections in order to run the car on construction inspection. PMT designates a panel mounted terminal connector like those typically used for brake connections.

Table 2.1 Construction Mode Jumper Requirements

Bypassed Functions	Jumper Connections
Governor 110%Overspeed	GOV1 (RB, TB1-3 to GOV1A (TB1 on PMT) N/A on non 2k models
Hoistway safety string	GOV1 (RB, TB1-3 to CG1 (RB, TB3-5)
Car Gate	CG1 (RB, TB3-5) to CG2 (RB, TB3-6)
Door Lock	TL1 (RB, TB4-2) to BL2 (RB, TB4-7)
Up Normal Terminal	UNT1 (RB, TB4-8) to UNT2 (HY-1)
Down Normal Terminal	DNT1 (HY-2) to DNT2 (HY-3)
Door Pre-Lock	PL1 (RB, TB3-7) to PL2 (TB3-8) (Factory jumpered if no door pre-locks)

Required Controller and Drive Parameter Settings

In order to operate safely in construction mode, particular controller and drive parameters must be verified or set.

Caution

Before powering the controller to make these settings, verify that the Run/Stop switch is in the Stop position.

Controller Parameters

The Hand Held Unit (HHU) is used to program controller parameters. Refer to Section 6 of this guide if you are unfamiliar with the operating the HHU. For the settings described here, you may plug the HHU into the jack on any of the I/O 24 boards in the controller.

- Car Setup/Parameters Menu
  - Parameter 76: Time to hold the drive running after the brake output is dropped during Inspection operation. Slow brake compensation. Start with 2.0 seconds; adjust as needed.
  - Parameter 84: Time to delay brake lift during Inspection operation. Set to compensate for potential roll back. Machine dependent.
  - Parameter 85: Time brake remains lifted after the car stops during Inspection operation. Set to 0.0 seconds.
  - Parameter 106: Pattern start delay during Inspection operation. Set to 0.0 seconds.
  - Parameter 125: Enable gate and lock bypass switches on RB board. Set to Yes.
  - Parameter 128: Allow construction inspection with bypass switches. Set to Yes.
  - Parameter 132: Inspection High Speed. Set to Yes to run at 45 FPM.
  - Parameter 162: Enable Redundant Inspection Check. Set to No.

Drive Parameters

Drive parameters are set on the drive. Locate the start up instructions for your drive and feedback loop in this manual (Section 4) and set parameters accordingly. Consult the drive manufacturer's manual to familiarize yourself with the drive.

Danger

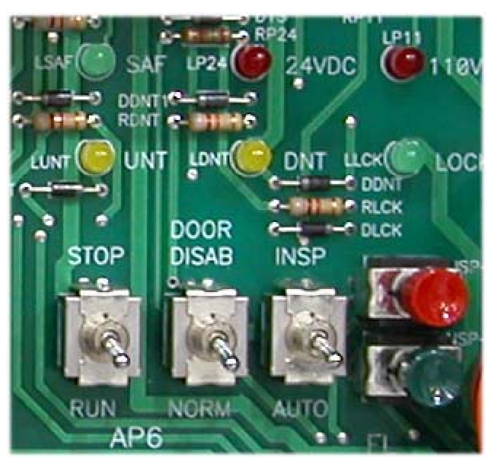
Set the Inspection Speed parameter of the drive to 45 FPM.

Using Inspection Stations to Run

In inspection, a car operates at slow speed using up and down buttons. The car will stop as soon as the buttons are released.

Controller

Operate the car using the controller UP or DOWN inspection buttons. A car running in either direction will automatically stop when it reaches the normal terminal switch in that direction. Pressing and holding both UP and DOWN buttons at the same time will open the doors if the car is stopped at a door zone.



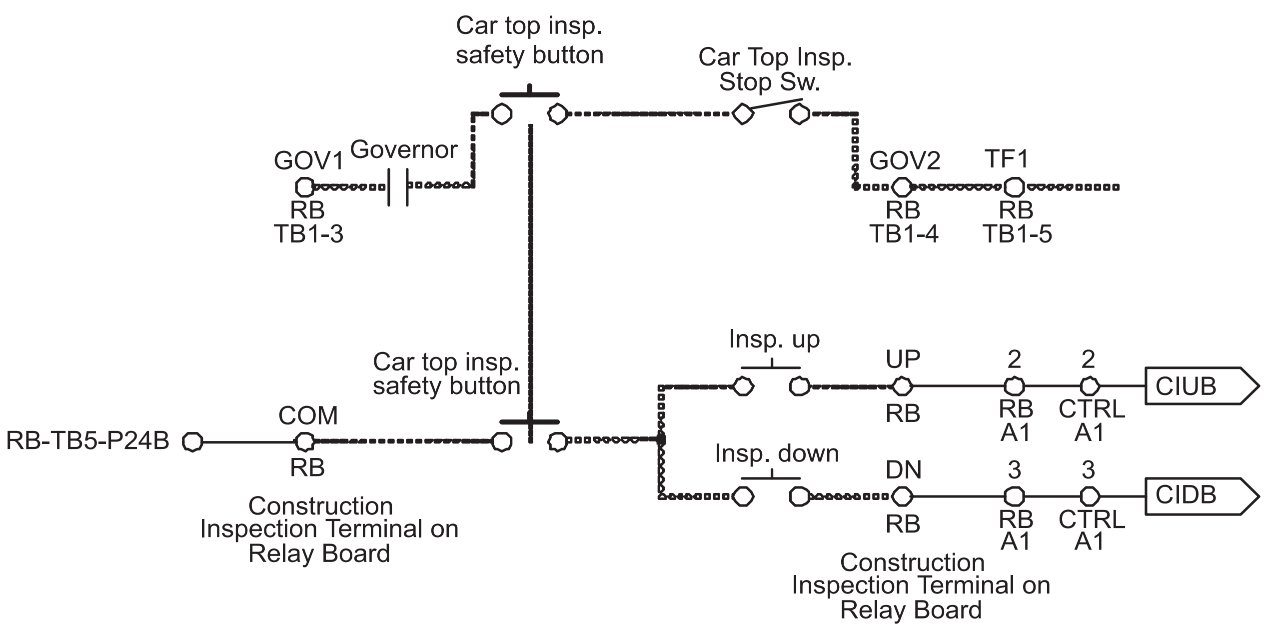
Car Top Inspection

In this mode, the car is operated by pushing the cartop UP or DOWN and SAFETY buttons. Doors will open if both UP and DOWN buttons are pressed for more than two seconds while the car is in a door zone.

Temporary Run Box Hookup

The following illustration shows a temporary run box hookup. Disconnect controller power before attempting to wire the run box. The temporary run box must have a safety button, an up button, a down button, and a stop switch. The safety button is two-pole. The safety circuit must open every time the safety button is released. The run box uses the same inspection direction inputs on the CTRL board as the controller inspection circuit does.

Figure 2.5 Temporary Construction Operation Run Circuit



Running the Car

1. On the controller Relay Board:
   - Set the Inspection switch UP.
   - Set the Stop switch DOWN.
2. Power up the controller.
3. Attempt to run the car up using the inspection up/down buttons. Hold the up button until the car starts to move. If the motor moves in the down direction, stop the car. Change the motor rotation setting on the drive or temporarily disconnect power and swap two of the input phases to the motor.
4. Again run the motor. Confirm that the motor turns in the correct direction to move the car up or down.
5. Check the speed reference on the drive. Run the car in the down direction. The speed reference displayed on the drive should be negative. Using the inspection up button, run the car in the up direction. The speed reference should be positive.
6. While using the inspection up/down buttons to run the car, use a hand tach to check car speed. It should be moving at approximately the same speed as that displayed by the drive. This should be very close to 45 FPM. Adjust drive inspection speed setting if required.

Brake Basics

1. Ensure that the brake is picking cleanly.
2. Ensure that, when set, the brake is capable of holding 125% of rated car capacity.
3. Check that brake and motor coordination are such that the brake is dropping just when motor rotation stops.
4. Check that the brake pick delay allows the motor to build sufficient flux to prevent roll back when the car is starting.

Completing Installation

If the car has been operated in Construction mode, temporary jumpers may have been used to bypass some safety string or other connections. As you are completing field wiring for the car, be certain to remove any temporary jumpers.

The drawings package for your specific job contains all the information to complete remaining hoistway, car, and field wiring. Hoistway limit switches and floor leveling and slowdown magnet placement specific to your job are also in the drawings package.

The remainder of this topic contains:

- A description of the I/O 24 boards and terminal boards used for low voltage field inputs and outputs.
- Basic brake checks.
- Inspection Learn for Limit Board.
- A description of the landing system and hoistway tape/magnets used by Tricon systems.
- A description of the limit and slowdown switches used by Tricon systems.
- A description of Seismic detection equipment

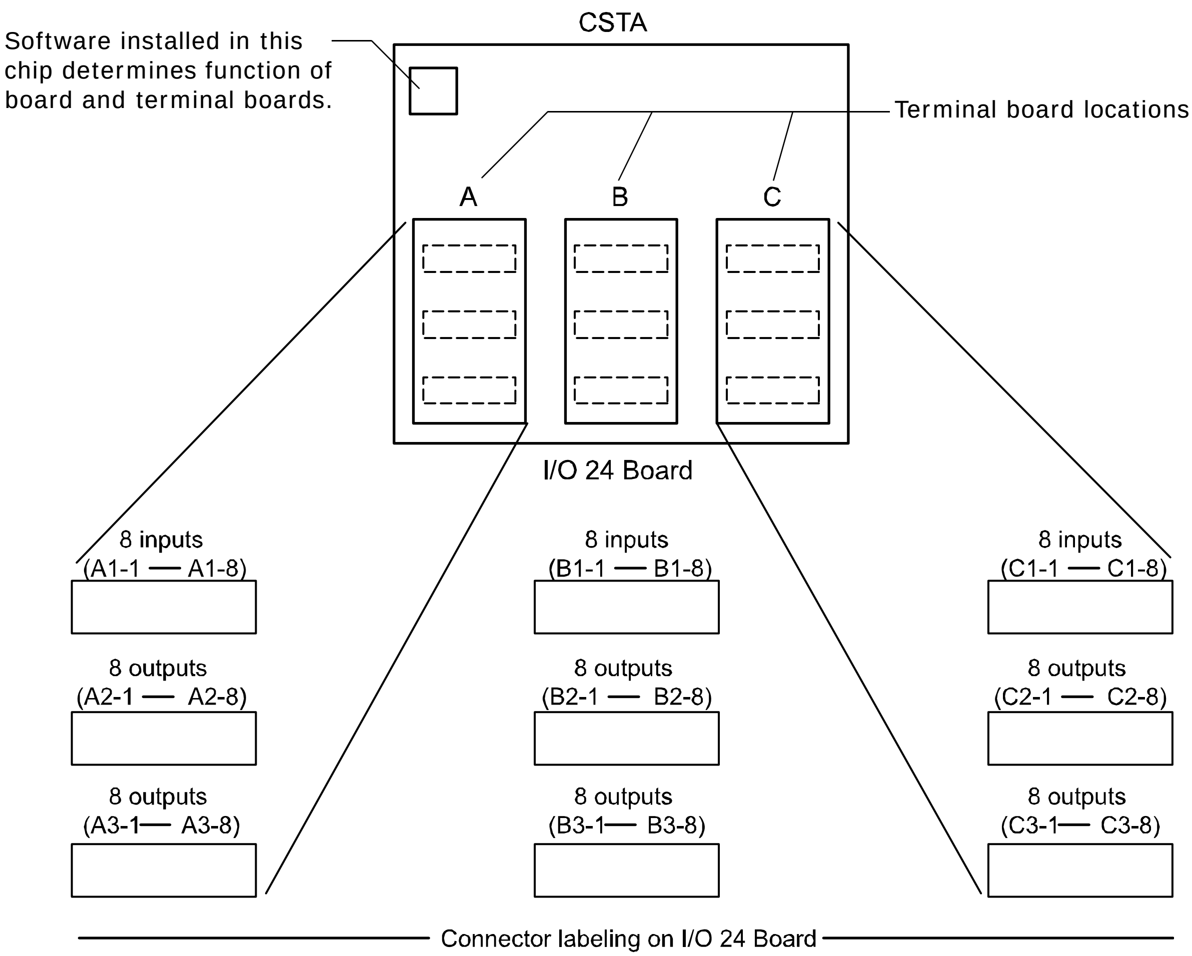
Read these to familiarize yourself with the equipment but follow the specific instructions contained in your drawings package for installation purposes.

Low Voltage Signal Wiring

Low voltage signal wiring includes all the 24-volt inputs. These include car calls, door limits, electric eyes, etc. The inputs on the I/O boards only need to see 12 volts or more to turn on. If the signal wires are run along side the 240 VDC door operator wiring, a 12-volt spike is very likely to occur. Keep low level signal wiring at least 4 inches from high power wiring to avoid false signal firing. If this is not possible, and the low level wiring must cross the high power wiring, the two should cross at a ninety-degree angle.

Terminal boards, mounted on I/O 24 boards, are used for low voltage connections. The function of the particular I/O 24 board/Terminal board set is determined by the software installed on that I/O 24 board. Each I/O 24 board is labeled according to its function or location. For example, the I/O 24 board used in the car station is labeled "CSTA" while the I/O 24 used for hall call connections in the controller cabinet is labeled "HALL."

Figure 2.6 I/O 24 Board Layout



In the wiring prints, inputs and output labeling will tell you where the terminal board to be used is located using the I/O24 board label (i.e., CSTA), the Terminal board position (i.e., A), the Terminal board type (i.e., F) and the connector pin number. For example: CSTA-AF 28 means pin #28 on the F Type terminal board in the A position on the CSTA (I/O24) board.

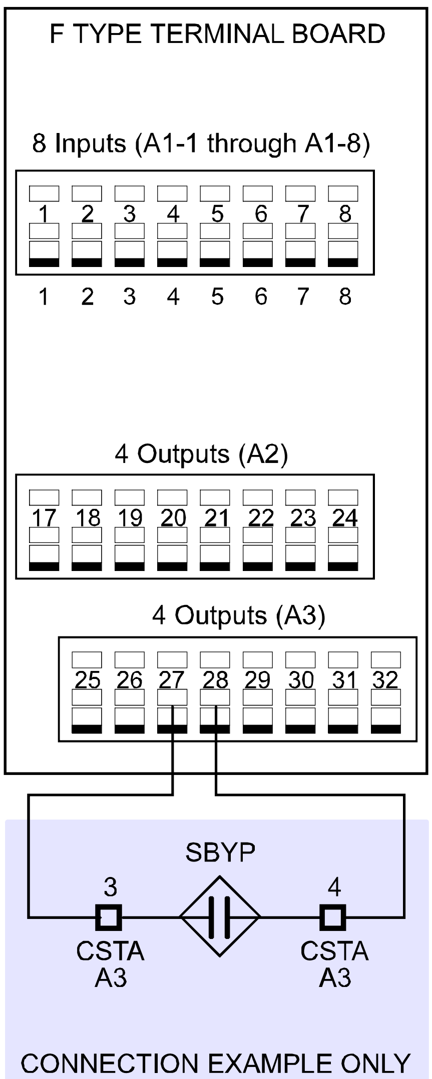
Three Terminal boards are most commonly used for low voltage signal wiring:

- F Type Terminal Board
- O Type Terminal Board
- L Type Terminal Board

F Type Terminal Board

The F Type Terminal board provides 8 single-wire inputs and 8 two-wire (+V/GND) outputs. The wiring prints for the job will detail how each input and output must be connected.

Figure 2.7 F Type Terminal Board Connections

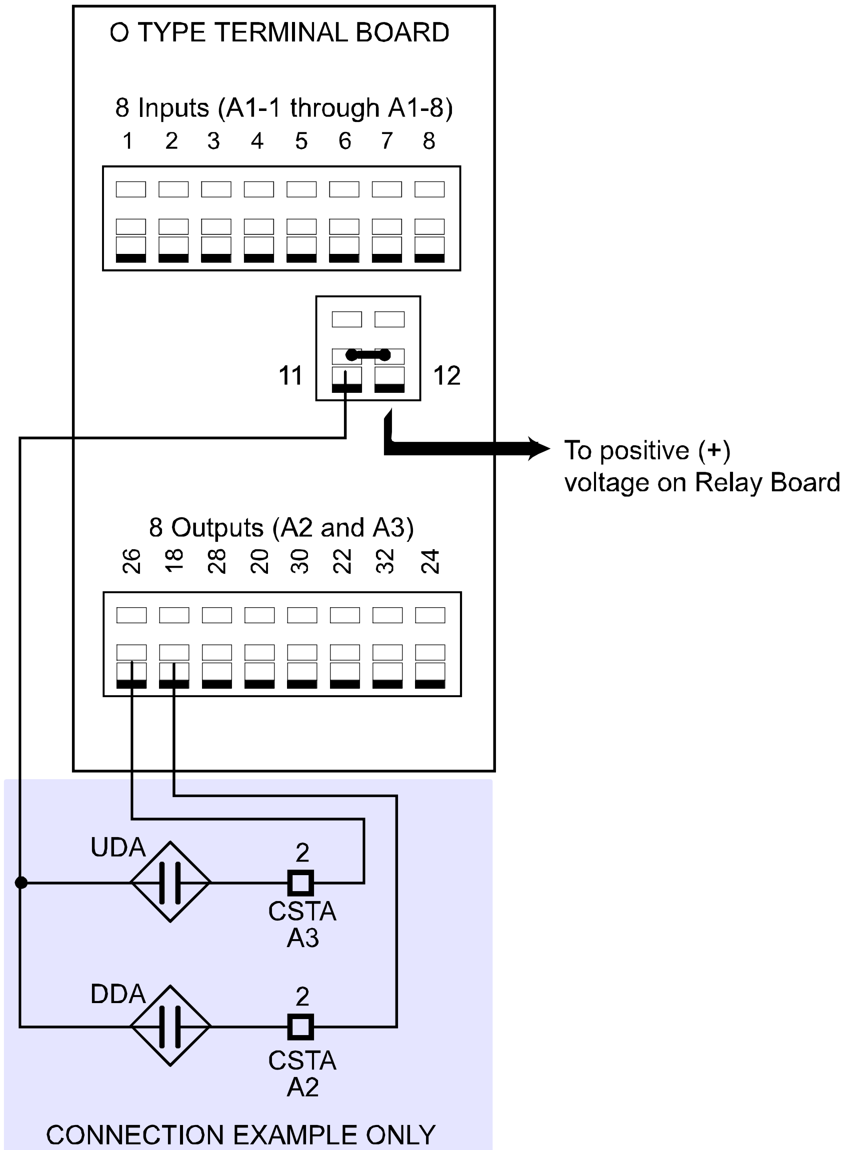


2

O Type Terminal Board

The O Type Terminal board provides 8 single-wire inputs and 8 “single-wire” outputs that share a common voltage connection. The common voltage is determined by a connection to a voltage source on the Relay Board.

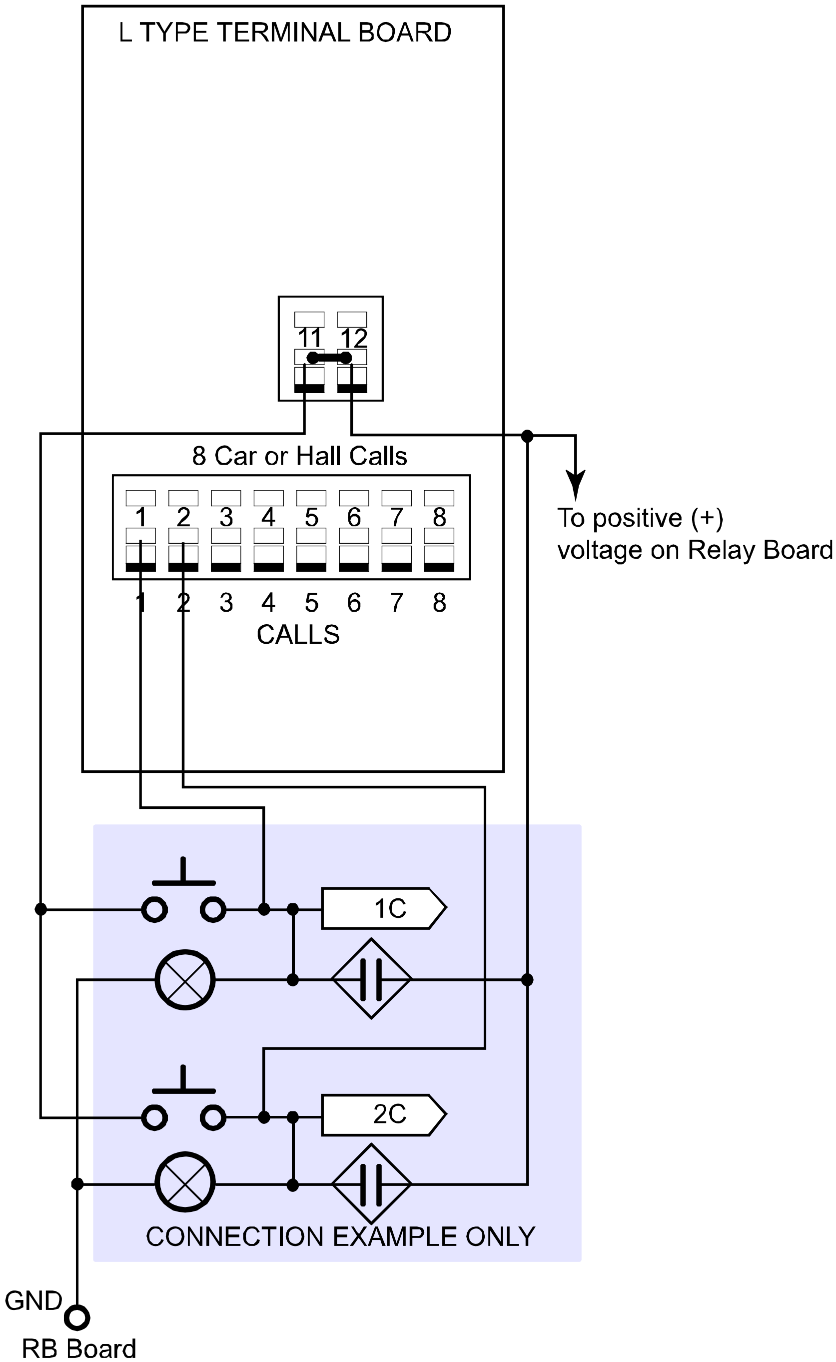
Figure 2.8 O Type Terminal Board Connections



L Type Terminal Board

The L Type Terminal board provides 8-inputs and 8-outputs working together. For example, after an input is detected, the same connection becomes an output to drive the indicator bulb for that input. L Type Terminal boards are used for Car and Hall Call connections.

Figure 2.9 L Type Terminal Board Connections



SET-9000 Landing System

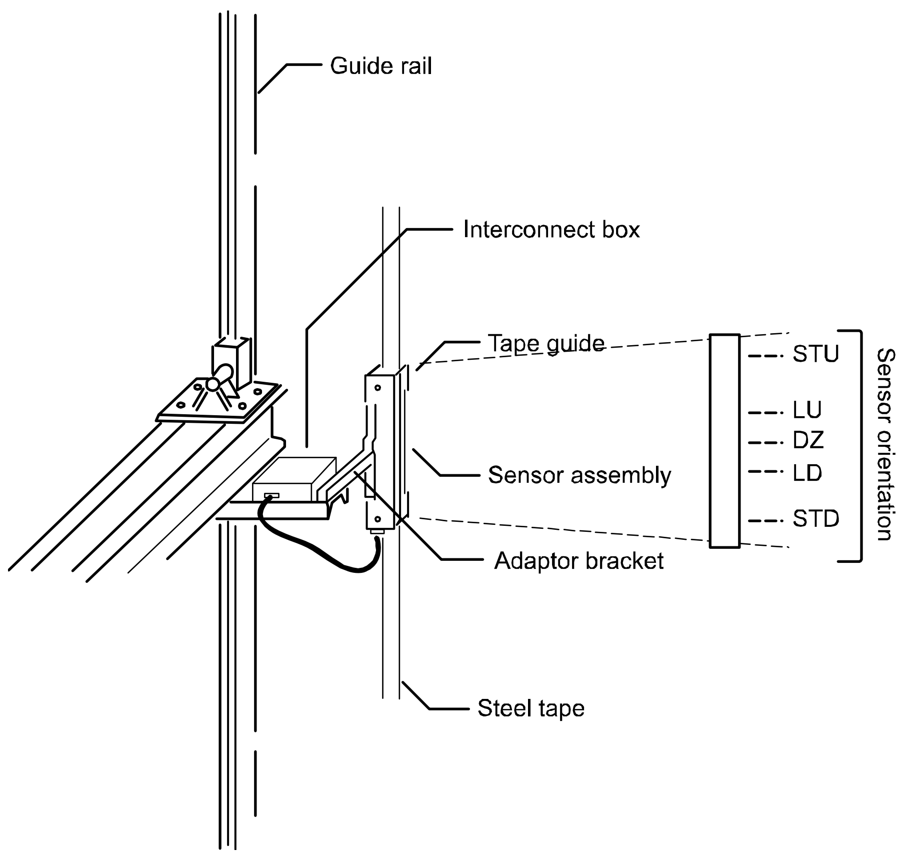
The SET-9000 landing system uses solid state sensors to detect the presence of magnetic strips placed on a length of 2-inch steel tape that runs the length of the elevator hoistway. Magnetic strips are placed along the tape in three, distinct rows. The center row is used for “leveling” magnets. The left hand row is used for up direction “slowdown” magnets. The right hand row is used for down direction “slowdown” magnets.

The sensor head containing the solid state sensors is mounted on the elevator car so that it “rides” the steel tape as the car moves, detecting and using the magnets to control floor approach and leveling.

Installing the SET-9000 system includes:

- Hoistway tape installation
- Interconnect box installation
- Sensor head installation
- Magnetic strip placement
- Landing system cabling

Figure 2.10 SET-9000 Landing System Components



Hoistway Tape Installation

The SET-9000 system uses 2-inch wide steel tape. The tape is hung from a bracket at the top of the hoistway in a single, vertical run to a second bracket at the bottom of the hoistway. The bottom bracket has a tensioning spring that is adjusted to maintain tension on the tape, preventing undue movement and possible noise from tape vibration. Tape installation includes:

- Top bracket and hanger installation
- Bottom bracket and tensioner installation

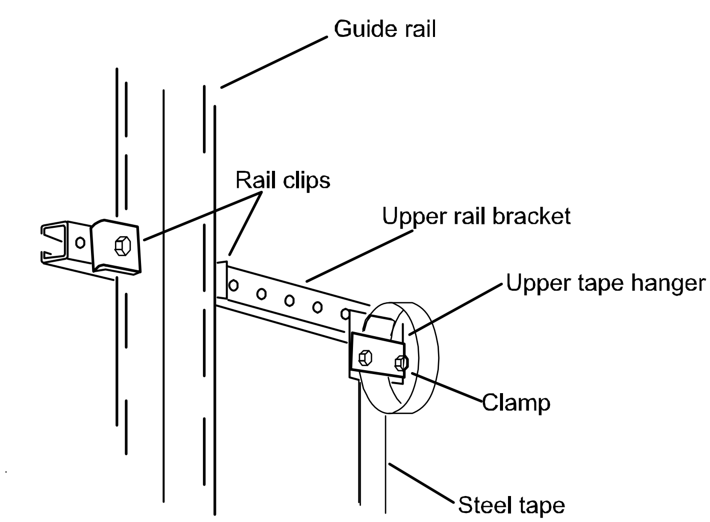
Before installing stationary tape, ensure the location you choose will have adequate clearance from shaft-way beams, walls, counterweights, cab, and terminal limit cams. Make sure the SET-9000 is not placed too close to the governor lift arm so that, when the car safeties are activated, the sensor assembly might be damaged or the car safeties prevented from working properly.

Top Bracket and Hanger Installation

1. Run the car up the hoistway on Inspection mode until the counterweight is resting on a fully compressed buffer.
2. Using the clips provided, attach the top bracket to the back of the elevator guide rail as shown below. The bracket should be installed to position the steel tape as close to the car sling as the guide shoe and hoistway equipment clearance will allow.

2

Figure 2.11 Top Tape Bracket Installation

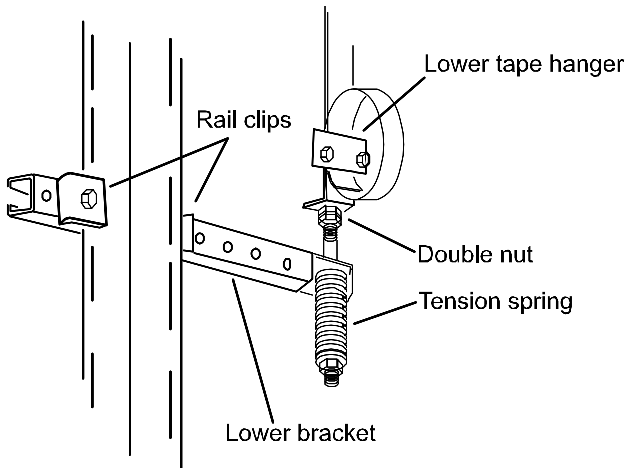


3. Bolt the upper tape hanger assembly to the bracket at the chosen location.
4. Referring to the figure above, push the end of the steel tape through the bottom of the tape hanger clamp.
5. Loop the tape as shown and again insert the end through the tape hanger clamp, allowing about 1-inch to protrude above the clamp.
6. Tighten the clamp bolts.
7. Run the car down the hoistway on Inspection. Slowly play out the steel tape as you go.

Bottom Bracket and Tensioner Installation The tape should be attached in the pit low enough so that, when the car is on the fully compressed buffer, the stick and any car devices do not come in contact with the tape hold down assembly.

1. Using the clips provided, attach the bottom bracket to the back of the guide rail as shown below. The bracket should be about 6-inches below the lowest floor level and must be square to the guide rail.

Figure 2.12 Bottom Tape Bracket Installation



2. Loosen the nuts on the spring tension bolt until only two threads are showing.
3. Remove the tape hanger clamp.
4. Slowly run the car down until the buffer is fully compressed. Check that there is sufficient clearance between the car and the lower rail bracket.
5. Position the steel tape against the lower tape hanger and reinstall the clamp to hold the tape in position. Tighten the clamp bolts ONLY LIGHTLY.
6. Cut the steel tape one foot below the clamp bottom.
7. Loop the steel tape and insert the end through the clamp so that about 1-inch protrudes from the clamp bottom. Tighten the clamp bolts securely.
8. Adjust the spring tensioning nut to provide adequate tensioning of the tape in the hoistway. Use the second (double) nut to insure the first nut is unable to loosen.
9. During installation, the edges of the tape may be gouged. After tape installation is complete, go over the tape edges with a fine file to remove any burrs or gouges. This will ensure quiet operation of the SET 9000 system as the car travels at contract speed.
10. After smoothing the tape edges, wipe off all excess oil and dirt from the face of the tape so that the magnets will stick properly when they are installed later. Do not use rags that leave lint on the tape during cleaning.

Interconnect Box Installation

The interconnect box contains the electronics that interpret the landing sensor inputs for the car controller. Depending on your installation requirements, you may have one of two interconnect boxes.

- Cartop Station: Most installations use a cartop station containing not only the board that connects to the landing sensor but boards performing other functions as well.
- Control Box: In some installations, there is a requirement that the microprocessor and door controller electronics that are normally in the cartop station, be located in the Tricon elevator control cabinet instead. In these cases, a smaller interconnect box, the control box, is used in place of the cartop station. Figure 2.1 earlier in this section shows an installation using the control box (actual unit shown to the right).

Regardless of the interconnect box type used, mount it in a secure location on the elevator crosshead close enough to the landing sensor head to connect the two with the cable provided.

Sensor Head Installation

Please refer to “SET-9000 Landing System Components” on page 2-24. Sensor head installation consists of installing the crosshead bracket, the adaptor bracket, and the sensor head assembly. The sensor head assembly mounts to the adaptor bracket via a “floating” subassembly that allows the sensor head to move with tape or hoistway irregularities. Tape guides at each end of the sensor assembly “grip” the hoistway tape and keep the sensors at the correct distance from the strip magnets.

Figure 2.13 Sensor Head Assembly

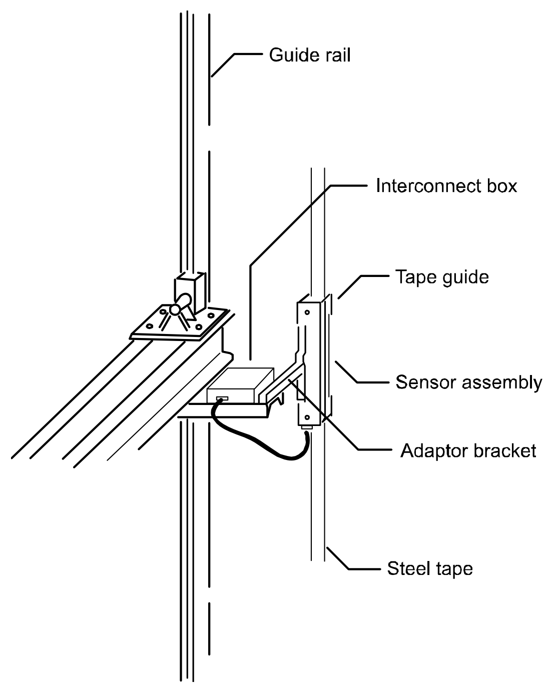
1. Clip the crosshead bracket to the crosshead. Check that the bracket is square with the crosshead.
2. Bolt the adaptor bracket to the crosshead bracket. Check that the adaptor bracket is square with the crosshead bracket.
3. Slide the sensor head mounting subassembly onto the adaptor bracket.
4. Remove the screws that hold the tape guide outer end caps in place and remove the caps.

Figure 2.14 Tape Guides

Tape Guide (closed)

Tape Guide (open)

5. Position the sensor head assembly on the steel tape.
6. Replace the tape guide caps. Reinsert the screws.
7. Bolt the sensor head assembly to the subassembly. Adjust the mounting bracket and secure.
8. Connect the sensor head assembly to the interconnect box using the supplied cable.
9. If needed, adjust the sensor assembly so it does not ride hard on one side of the unistrut bracket during any part of the travel through the hoistway.

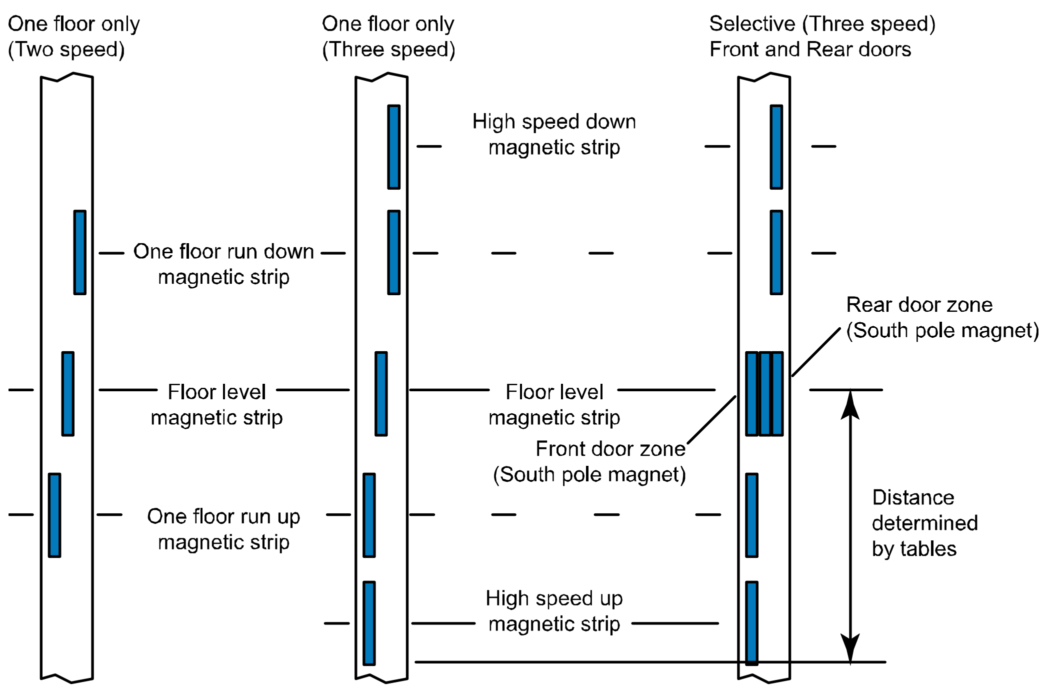


Magnet Installation

- The floor leveling and slowdown magnetic strips are 6-inches long.
- Install all floor leveling magnets before installing one-floor-run up, high-speed up, one-floor-run down, and high-speed down magnets.
- Two speed operation requires leveling, one-floor-run up, and one-floor run down magnets only.
- Three speed operation requires leveling, one-floor-run up, one-floor-run down, high-speed up, and high-speed down magnets.
- Selective installations (front and rear car doors) require, in addition to the appropriate two-speed or three-speed operation magnets, front and rear door zone magnets. Door zone magnets are placed to the left (front door zone) and right (rear door zone) of the leveling magnet.

Consistent measurement is the key to good installation. Cut a stick to the slowdown distance required for the job, and use it to install all one-floor-run magnets. (For three-speed jobs, cut a second stick for the high-speed magnets.) This will ensure consistent slowdown targets. Even if the targets are installed at an incorrect distance (by up to 2 inches), the speed board (in most cases) may be adjusted to accommodate.

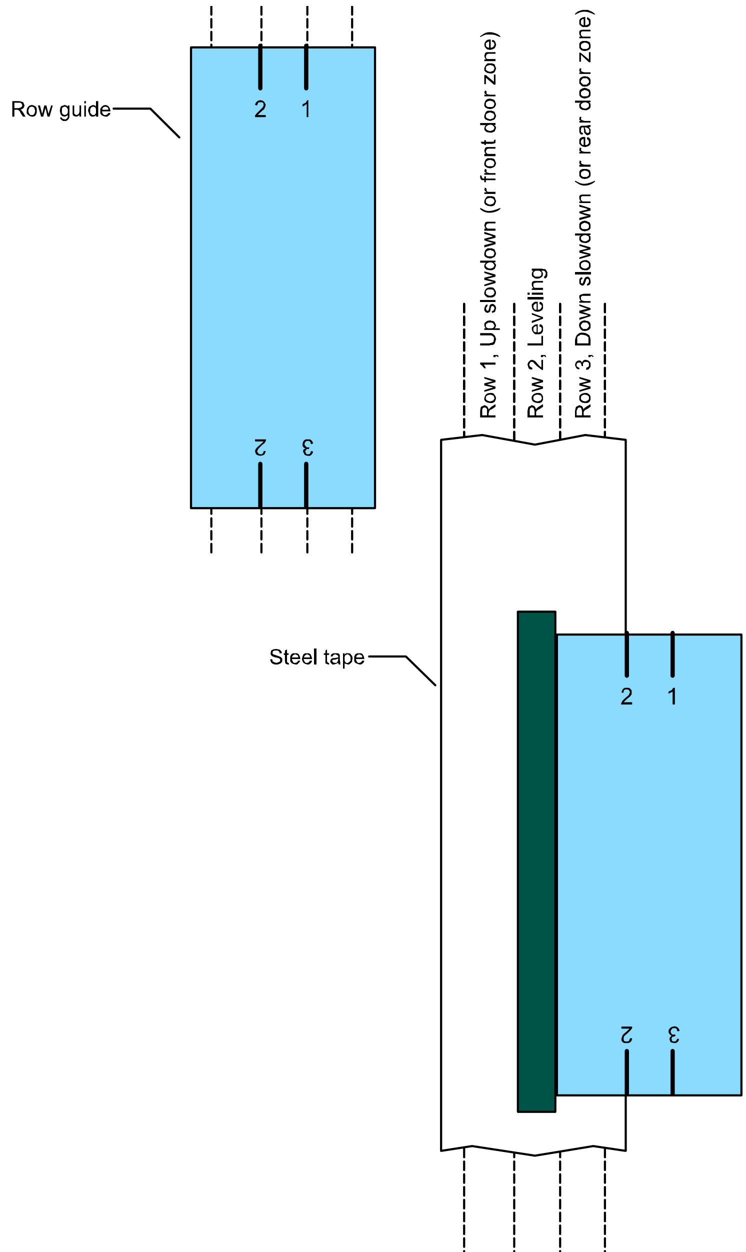
- Floor leveling magnets are placed in the center of the tape.
- Up slowdown magnets are placed on the left side of the tape.
- Down slowdown magnets are placed on the right side of the tape.



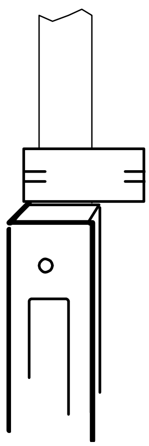
Leveling Magnet Installation

A row guide and a level guide are provided to help with magnet installation.

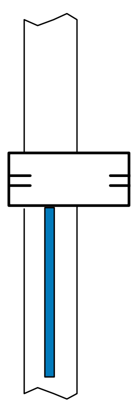
- The row guide is a five-inch long by 2-inch wide magnetic "block" with markings indicating magnet row location on the 2-inch tape.
- The level guide is a nine-inch long magnetic strip used to position the floor level magnets vertically.



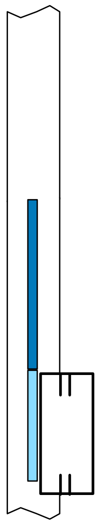
1. Bring the car to floor level. Place the row guide across the top of the sensor head.



2. Move the elevator down. Place the (9-inch) level guide strip vertically under the center of the row guide.



3. Use the row guide to locate the leveling row (typically row 2/center row, but check your job prints to be certain). Remove the backing from a leveling magnet strip and place it carefully in the correct row just under the level guide magnet.



4. Repeat these steps for each floor in the building.

Slowdown Magnets

One-floor-run up and down magnets are required on all jobs. The distance from floor level (center of the leveling magnet) to the top of a down slowdown magnet or to the bottom of an up slowdown magnet is called the “slowdown distance.” Magnet placement instructions for your particular job are in the job print package provided. The following descriptions are general guidelines only.

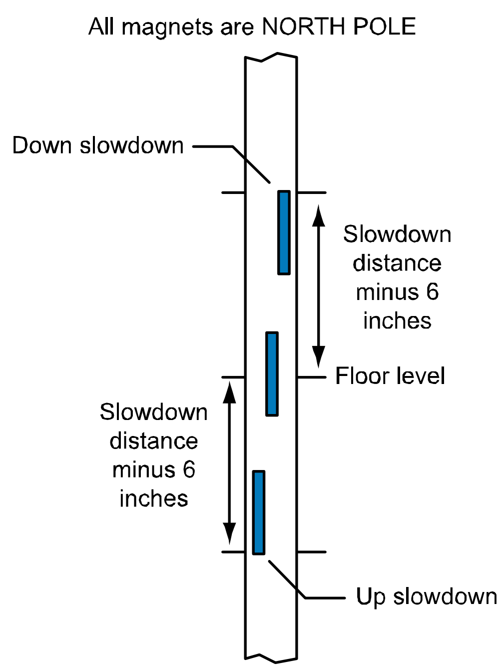
No High Speed Operation, Front Doors ONLY For jobs not requiring high speed operation, slowdown distance is typically one foot of slowdown for every 50 FPM of contract speed **OR** the shortest floor height divided by 2.5 — whichever is smaller. The table below provides slowdown distances for non-high speed operation. This distance may need to be adjusted depending on the rotating equipment used.

- One-floor run speeds are typically under 200 FPM with 8' 6" floors

Speed	Slowdown Distance	Min Floor Height
50 FPM	1' 0"	2' 6"
100 FPM	2' 0"	4' 6"
125 FPM	2' 6"	5' 6"
150 FPM	3' 0"	6' 6"
175 FPM	3' 6"	7' 6"
200 FPM	4' 0"	8' 6"

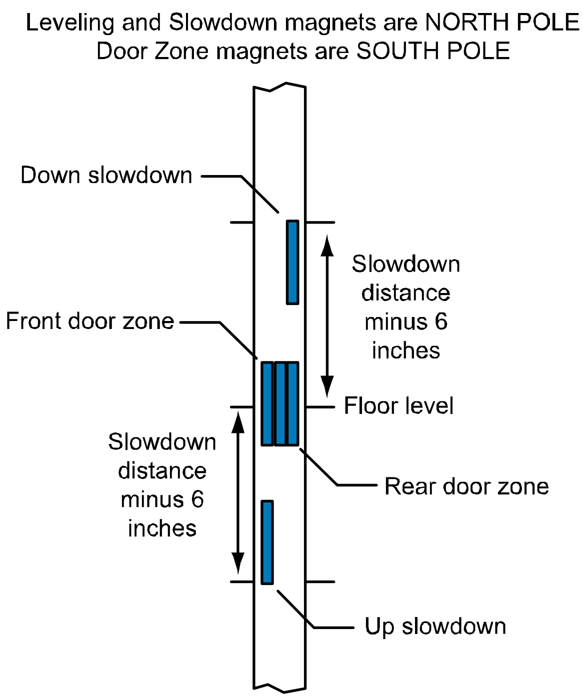
Magnet placement:

- For Up Slowdowns - Measurement is from the center of the leveling magnet to the bottom edge of the slowdown magnet.
- For Down Slowdowns - Measurement is from the center of the leveling magnet to the top edge of the slowdown magnet.



No High Speed Operation, Front & Rear Doors When a car has both front and rear doors, two additional magnets are required per floor:

- Front door zone magnet: For each floor, a front door zone magnet is placed in tape row 1, immediately to the left of the floor level magnet.
- Rear door zone magnet: For each floor, a rear door zone magnet is placed in tape row 3, immediately to the right of the floor level magnet.



1. Install a door zone magnet for each door opening in its corresponding location. If there are two openings at a floor, install both door zone magnets.

Note

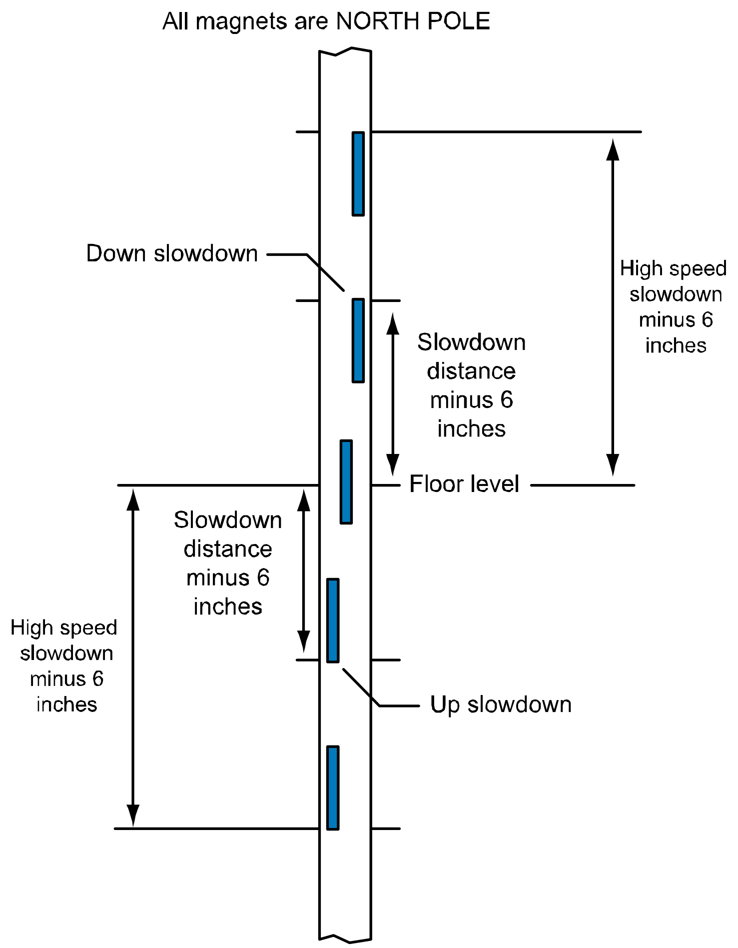
Door zone magnets are SOUTH POLE. These are only used for jobs with Front AND Rear door openings.

High Speed Operation, Front Door ONLY High speed operation requires four slowdown magnets per floor, one-floor up and down magnets, plus high speed up and down magnets. One-floor magnet slowdown distance is calculated to be the shortest floor height in the building divided by 2.5. High speed magnet slowdown distance is equal to the top speed of the car divided by 50.

Speed	High Speed Magnet Slowdown	Minimum Floor Height
250 FPM	5'0"	6'6"
275 FPM	5'6"	7'
300 FPM	6'0"	7'6"
325 FPM	6'6"	8'
350 FPM	7'0"	8'6"
375 FPM	7'6"	9'
400 FPM	8'0"	9'6"

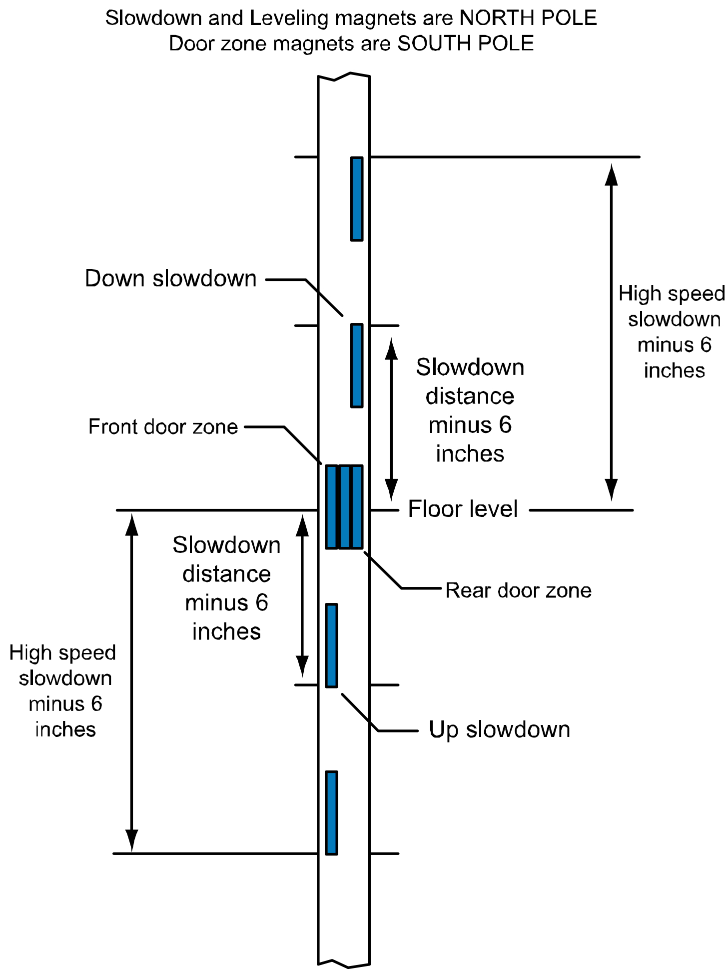
The slowdown distances are based on the magnets being placed as follows:

- For Up Slowdowns - Measurement is from the center of the leveling magnet to the bottom edge of the slowdown magnet.
- For Down Slowdowns - Measurement is from the center of the leveling magnet to the top edge of the slowdown magnet.



High Speed Operation, Front & Rear Doors When a car has both front and rear doors, two additional magnets are required per floor:

- Front door zone magnet: For each floor, a front door zone magnet is placed in tape row 1, immediately to the left of the floor level magnet.
- Rear door zone magnet: For each floor, a rear door zone magnet is placed in tape row 3, immediately to the right of the floor level magnet.



1. Install a door zone magnet for each door opening in its corresponding location. If there are two openings at a floor, install both door zone magnets.

- Door zone magnets are SOUTH POLE. Used ONLY on jobs with Front AND Rear openings.

Landing System Cabling

Wire the cartop interconnect box as described in your job prints.

- Relay outputs are dry contact, 1 amp, N.O.

Limit and Slowdown Switches

The limit and slowdown switch arrangement for your particular job is described in the job prints.

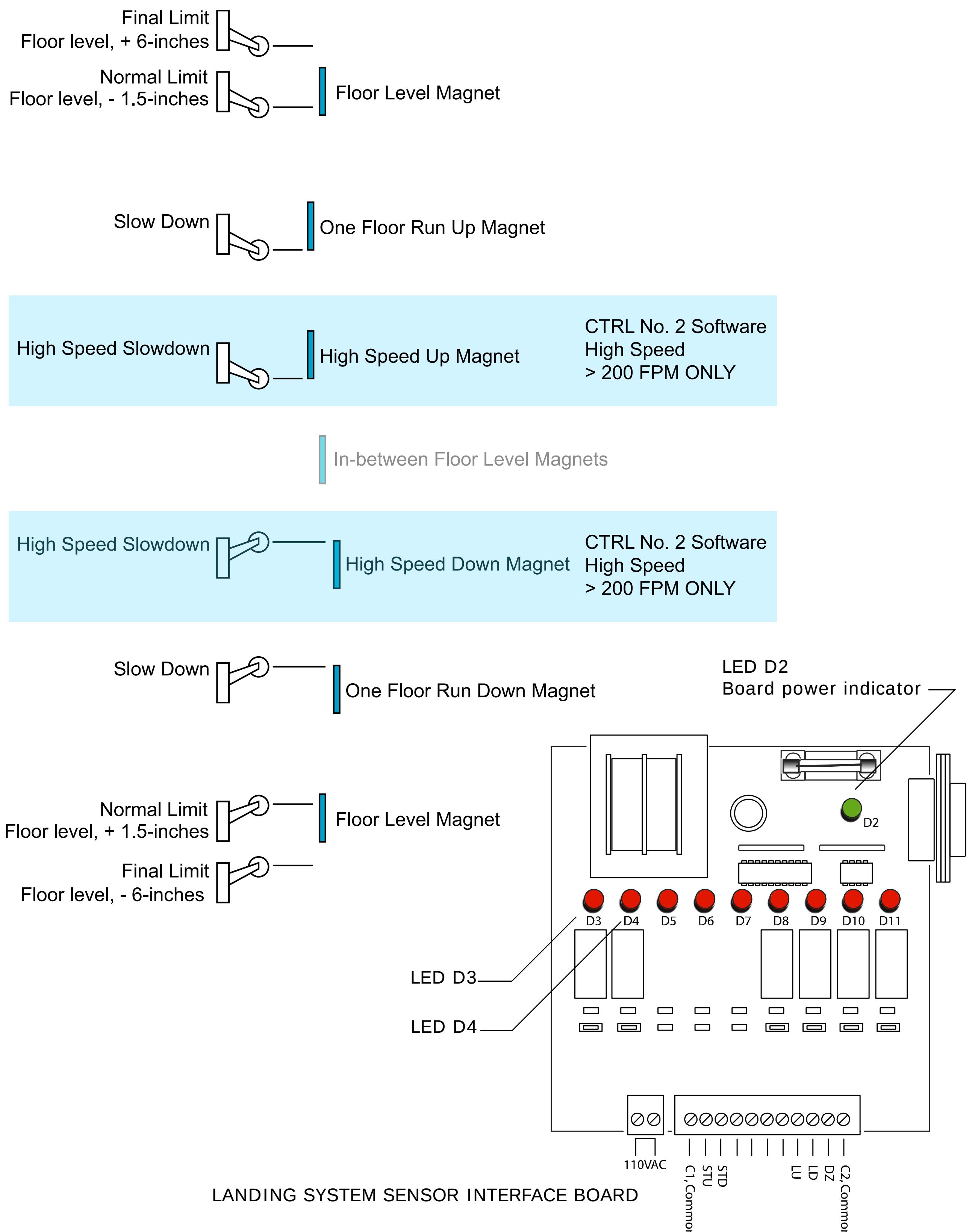
Generally, for car speeds under 200 feet per minute (CTRL No.1 software):

- Normal Limit: The normal directional limits should be set open when the car is 1.5" before floor level at the terminal floors.
- Final Limit: The final limits should be set to open no sooner than 6" beyond the floor.
- Top Terminal Slowdown: The slowdown switch should be set to open immediately AFTER the US sensor comes on the top floor slowdown magnet. (This can be seen by monitoring the US relay on the SET9000 sensor interface board. LED D3 lights.) This slowdown switch opens U1S1 to U1S2.
- Bottom: The slowdown switch should be set to open immediately AFTER the DS sensor comes on the bottom floor slowdown magnet. (This can be seen by monitoring the DS relay on the SET9000 sensor interface board. LED D4 lights.) This slowdown switch opens D1S1 to D1S2.

Generally, for car speeds over 200 feet per minute (CTRL No.2 software):

- Top Switch 1: The terminal slowdown switch that is furthest from the floor should be set to open immediately AFTER the US sensor comes on the top floor high speed slowdown magnet. (This can be seen by monitoring the HU relay on the SET9000 sensor interface board. LED D3 lights.) This slowdown switch opens U2S1 to U2S2.
- Top Switch 2: The terminal slowdown switch that is closest to the floor should be set to open immediately AFTER the US sensor comes on the top floor one floor run slowdown magnet. (This can be seen by monitoring the HU relay on the SET9000 sensor interface board. LED D3 lights.) This slowdown switch opens U1S1 to U1S2.
- Bottom Switch 1: The terminal slowdown switch that is furthest from the floor should be set to open immediately AFTER the DS sensor comes on the bottom floor high speed slow-down magnet. (This can be seen by monitoring the DS relay on the SET9000 sensor inter-face board. LED D4 lights.) This slowdown switch opens D2S1 to D2S2.
- Bottom Switch 2: The terminal slowdown switch that is closest to the floor should be set to open immediately AFTER the DS sensor comes on the bottom floor one floor run slow-down magnet. (This can be seen by monitoring the DS relay on the SET9000 sensor inter-face board. LED D4 lights.) This slowdown switch opens D1S1 to D1S2.

Figure 2.15 Hoistway Switch Opening Electrically Correlated to Magnet Positions

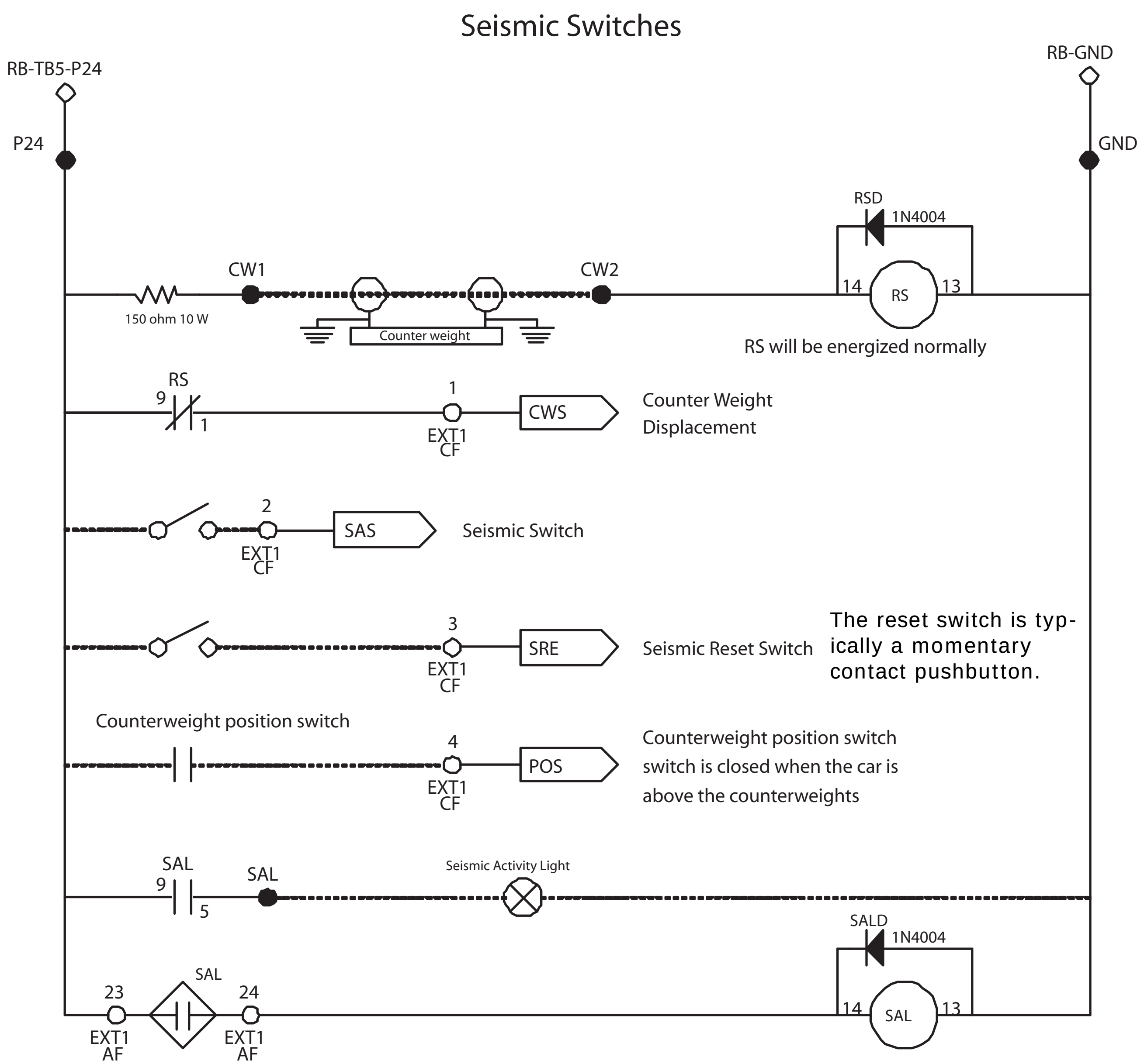


Seismic Equipment

A “ring on a string” circuit detects excessive counterweight motion caused by a seismic disturbance. When motion is detected, the car will make an emergency stop. After stopping, the car will move to and level at the next available floor in the direction away from the counterweight. After leveling, the car will open its doors and allow passengers to exit.

Modes of operation other than Automatic, for example Fire Phase II or attendant mode, allow different operating options. Please refer to Seismic Operation on page 1-21. The following illustration is an example of wiring connections for seismic equipment. Your system may be different so always follow the print in the wiring diagrams specific to your job.

Figure 2.16 Seismic Device Connections



Car to Group Wiring

Car controllers communicate with the group dispatcher through high-speed, twisted-pair, network connections. Communication cables (white shielded wire) between the cars and the dispatcher should be run in a separate pipe from all other signal wiring.

When a car is part of a group, an additional circuit board (the Gateway board) is used. In most applications, a Gateway board is mounted in each car cabinet. In some jurisdictions (NYCHA for example), all Gateway boards for all cars in a group are mounted in the group dispatcher cabinet. In both instances, drawings in the job drawing package detail the appropriate connections. The following drawings provide examples of both types of interconnection.

Figure 2.17 Car / Group Communication, Standard Implementation

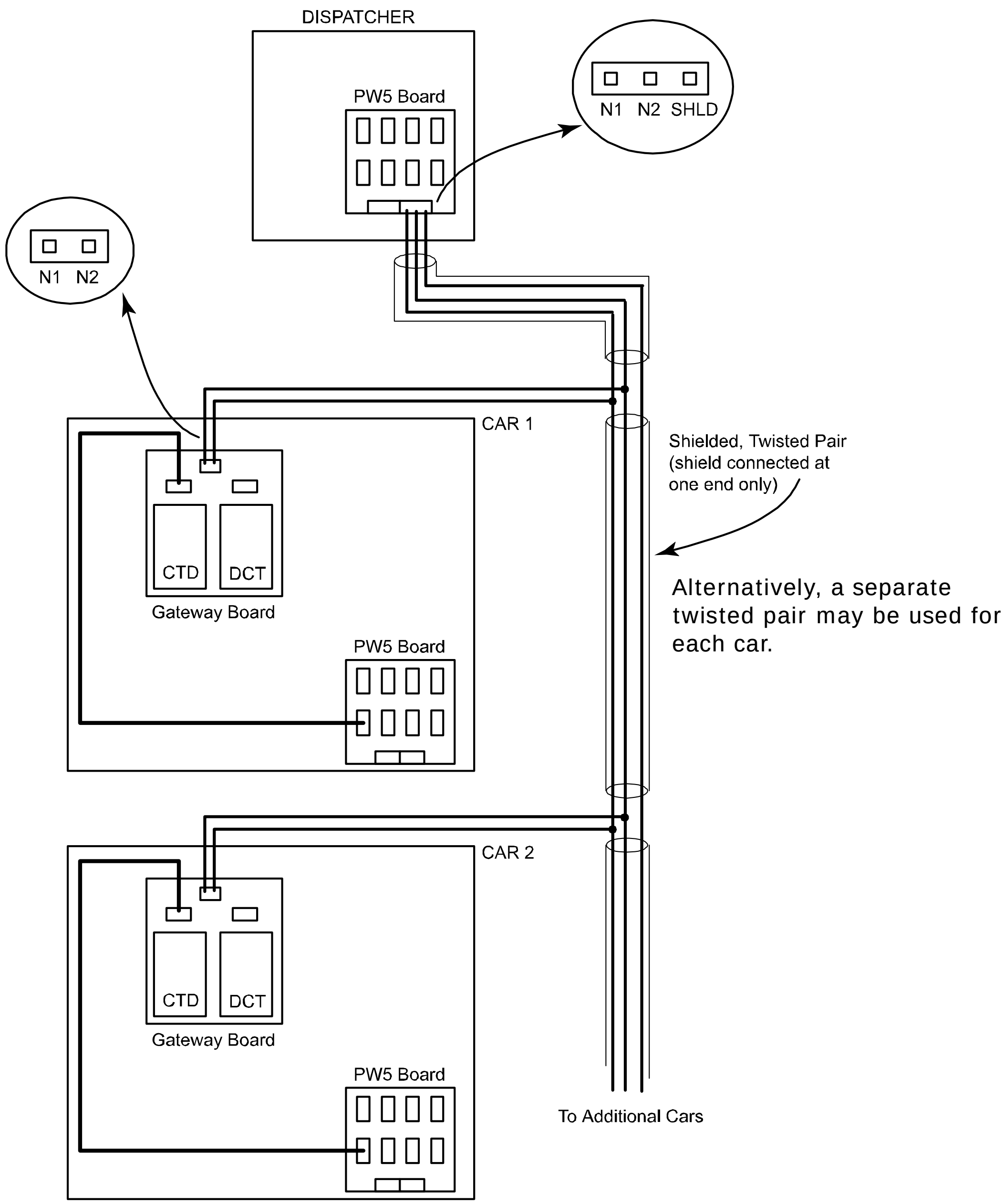
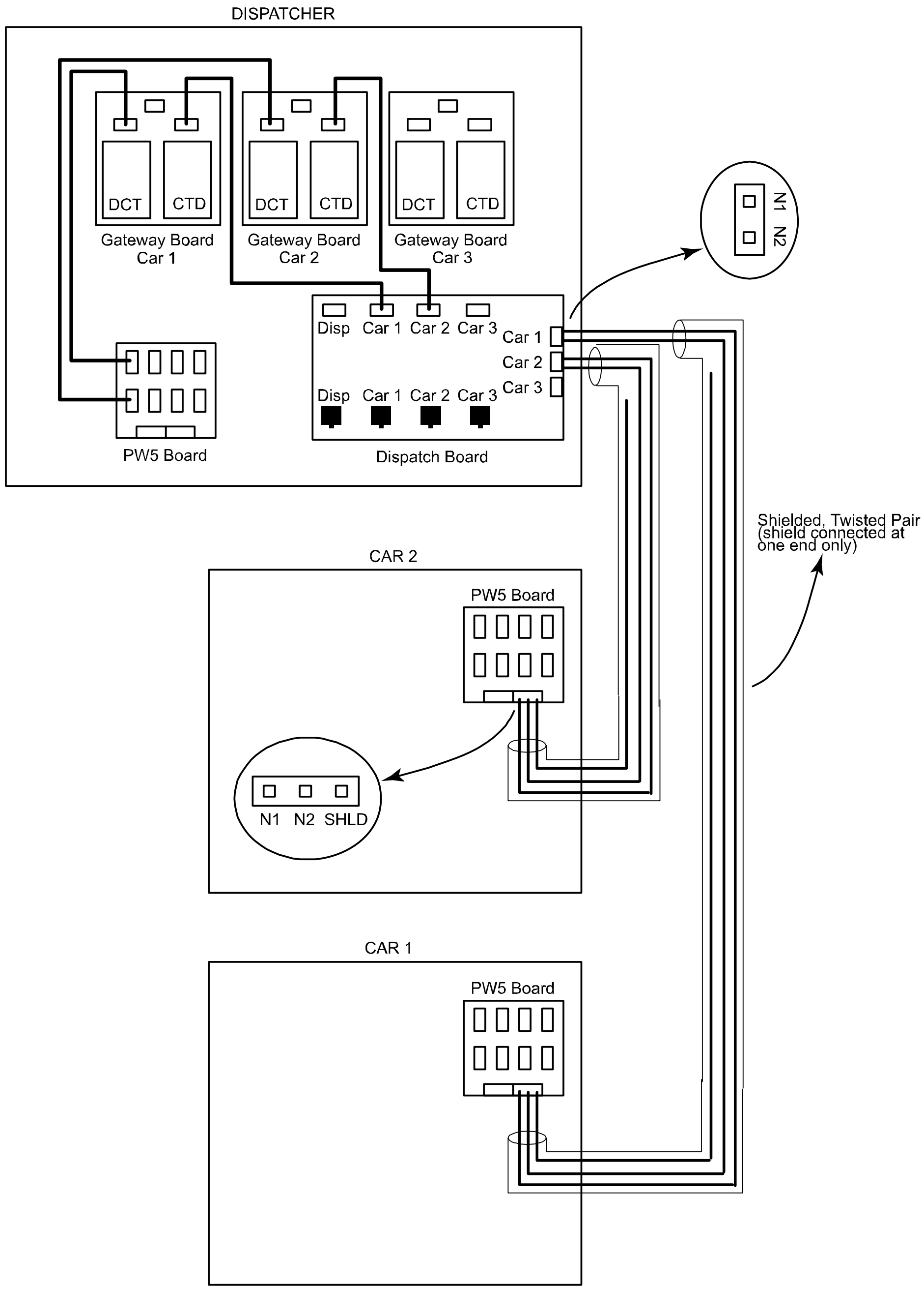


Figure 2.18 Car / Group Communication, Alternate Configuration (NYCHA)



Running on Inspection Mode

Danger

Controller inspection warnings:

- Read Sections 1 and 2 completely before starting this procedure.
- Have someone stand by the main line disconnect during the following phases of the start up procedure for added safety:
  - First time power is applied to the controller
  - First time an attempt is made to move the car
- Insure all safety circuits are functional.
- Insure all hoistway door interlocks are functional.
- Insure car gate circuitry is functional.

Prior to Applying Power:

- Verify all circuits are wired to the controller properly.
- Check the following items:
  - INSP switch up
  - STOP switch down
  - Door Disconnect up
- Verify, with an ohmmeter, that the governor overspeed switch and any other devices that are wired in at this time will open the safety circuit.
- Physically verify that all hoistway doors are closed and locked.

Controller Power Up

After powering up the controller, check the following:

- Power LEDs on Relay Board ON. If not, verify all transformer and power supply voltage levels are correct per the prints.
- SAF LED on relay board ON. If not, refer to the job prints and check that all safety string connections are correct.

- Locks LED ON. If not, find the open door lock.
- Gate LED ON. If not, adjust the gate so it is closed when the doors are fully closed.
- Limit board relay should be energized. Temporarily jump the SF1 and SF2 contacts on the limit board until the board can be set up properly.
- UNT, DNT LED ON. (Up normal limit, Down normal limit) If not, troubleshoot the normal directional limits.

- I/O24 "CAR" Boards are Communicating with the MPU Board. To verify, check the status of the three (3) LEDs on the top left-hand of the I/O24 (labeled CTRL - x) boards. To proceed, the green LED on the boards must be blinking. If the LED indication is—
  - Solid Red**:** The I/O24 (CTRL) board has not started up properly. This may indicate that the I/O24 board is bad.
  - Solid Amber: The I/O24 (CTRL) board has not finished initializing.
  - Solid Green: The I/O24 (CTRL) board has started up properly and is sending data to the MPU board. This should take 15 seconds. If the light does not start blinking after 15 seconds, check the following:
    - 4-pin power cables plugged into all I/O24 (CTRL) boards
    - 5-volt DC power is at all red and black power connections on PW5 board
    - 110-volt power at IP1 and IP2 fuses on relay board
  - Solid Green / Solid Amber: Board has bad system configuration. Assuming all other boards in system OK.
  - Blinking Green: The MPU is functioning and communicating with the I/O24 (CTRL) boards. (The LED must be blinking to continue with power up.)

Plug the Hand Held into the Hand Held Connector on the Car Network I/O24 board. Use the Hand Held to check the following:

- All Error Conditions (except NETWORK LOSS) are resolved in the "STATES" section of the Hand Held Unit (CAR DIAGNOSTICS/STATES). Error conditions are in capital letters. See Section 5 - Hand Held Unit for details on operation of the Hand Held and a description of how to correct errors. All errors must be resolved to continue.
- Inspection Controls is displayed in the state machine - Inspection of the Hand Held Unit (CAR DIAGNOSTICS/STATES/INSPECTION). This will allow you to operate the car via the car controller inspection buttons on the car control board when necessary. Please refer to "HHU Basics" on page 5-2.

Drive Setup

Refer to the drive setup instructions in Section 3 of this manual for the drive used on your job. Read and follow the instructions carefully before running the car.

Inspection Learn

Before the car can be moved on inspection, a learn operation must be performed using Limit Board controls. The Inspection Speed Learn operation allows the Limit board to learn the elevator inspection speed. Once learned, the Limit board can prevent the car from exceeding 150% of the learned inspection speed when the car is operating in Inspection mode. Inspection Learn may be completed before the slowdown limits are wired.

Non-2K Compliant Cars

Please refer to "Operation, Inspection Setup Before High Speed" on page 4-7.

2K Compliant Cars

2. Please refer to "Inspection Learn" on page 4-14.

Brake Adjustment

Two different brake circuits may be used with the Tricon system. One uses the Garvac brake regulator; the other does not.

Note

Brake outputs are set at the factory using survey data. Before adjusting brake control, clean the brake assembly and all pins and make certain that brake spring tensions are set to hold 125% of car capacity. Check brake shoes to ensure at least 95% contact with the braking surface. If spring tension is changed after adjustment, the adjustment procedure will have to be repeated.

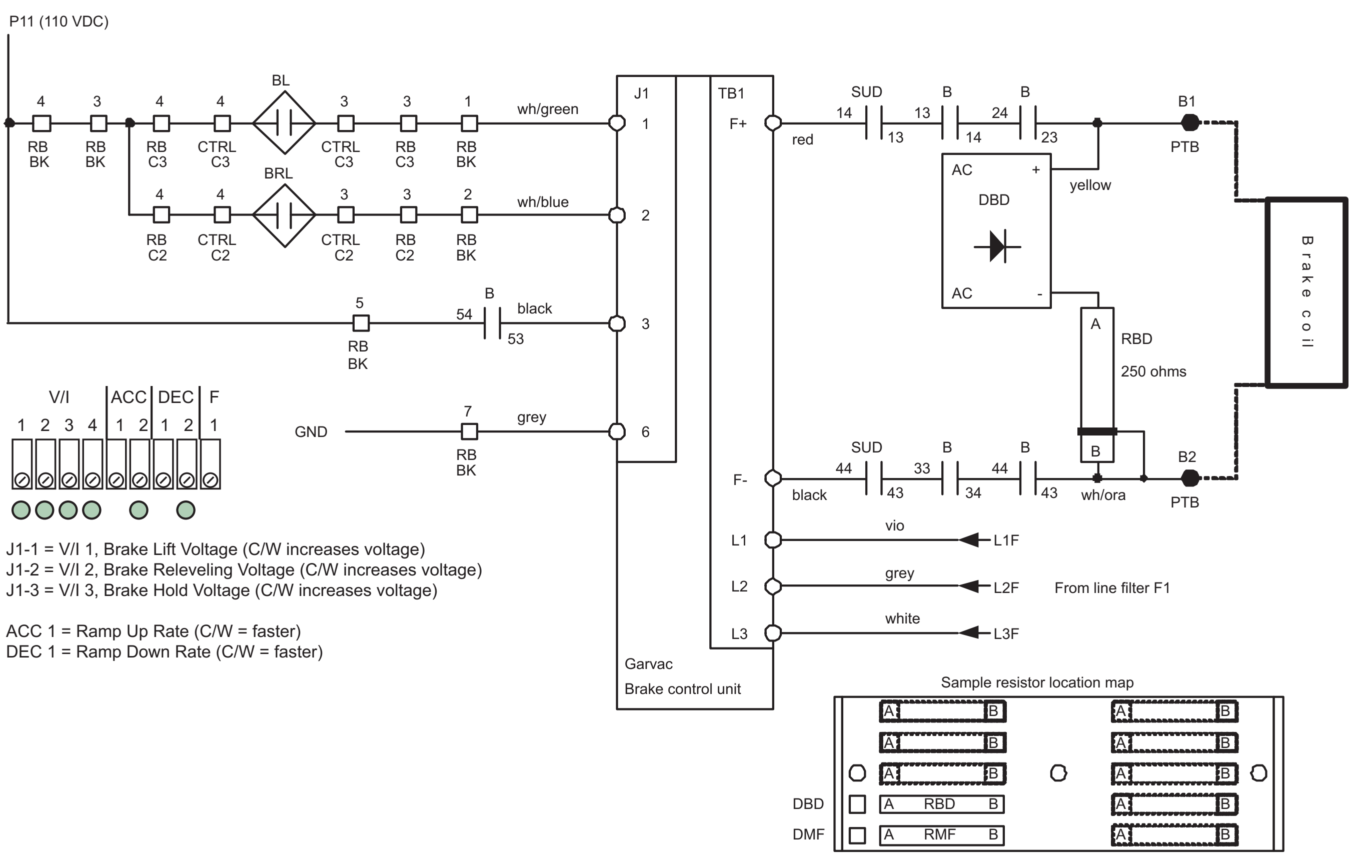
Brake Regulator Circuit

For brake circuits using the Garvac brake regulator, follow these instructions.

- V/I 1 adjusts Lift voltage
- V/I 2 adjusts Releveling voltage
- V/I 3 adjusts Hold or Running voltage
- ACC 1 adjusts ramp up rate (C/W = faster)
- DEC 1 adjusts ramp down rate (C/W = faster)
- DEC 2, and ACC 2 are not used.

2

Figure 2.19 Brake Regulator Circuit



If the sample brake resistor locations do not match your system, consult your job prints for the correct location.

1. Check that the brake coil has been properly connected to the controller.
2. Connect a meter across the F- and F+ terminals of the brake regulator. Set the meter range high enough to measure the brake lifting voltage level for the job.
3. With no inputs on at the J1 terminal of the regulator, the V/I-4 pot will be selected (LED on). Adjust the V/I-4 pot fully counterclockwise. The meter should read approximately 30 volts.
4. **Turn the main line power OFF**. TEMPORARILY jump from P11 (110VDC) on the Relay Board to J1-1 on the driver.
5. **Turn the main line power ON.** Run the car on inspection and adjust V/I-1 pot until the brake pick voltage required for the job is obtained.
6. **Turn the main line power OFF.** Remove the jumper between P11 and regulator J1-1.
7. **Turn the main line power ON.** Run the car on inspection and wait until the LED over the V/I-3 pot lights.
8. Adjust V/I-3 until approximately 60% brake lifting voltage is obtained or the brake holding voltage previously measured in Step 2. If the brake drops at this level, stop the car, turn the pot clockwise 1 full turn, and attempt to run the car again.
9. Jump J1-3 to J1-2 (releveling input).
10. Adjust V1/2 to approximately 80% of brake hold voltage. This is the releveling brake voltage and may be adjusted higher or lower for a drag brake.
11. The brake shoes should not lift completely off the drum. If they do, stop the car. Turn the V/I-2 pot counterclockwise a couple of turns and repeat step 11. If the brake shoes lift completely on relevel, there may be insufficient torque in the hoist motor to assure adequate leveling control.
12. Remove the jumper between J1-3 and J1-2.
13. Turn the ACC1 pot fully clockwise. This will allow a rapid response of the brake regulator from a lower voltage level to a higher voltage level.
14. Turn the DEC1 pot fully clockwise. This will allow rapid response of the brake regulator from a higher voltage level to a lower voltage level. This will also help prevent excessive arcing on the contacts of the B relay.

Note

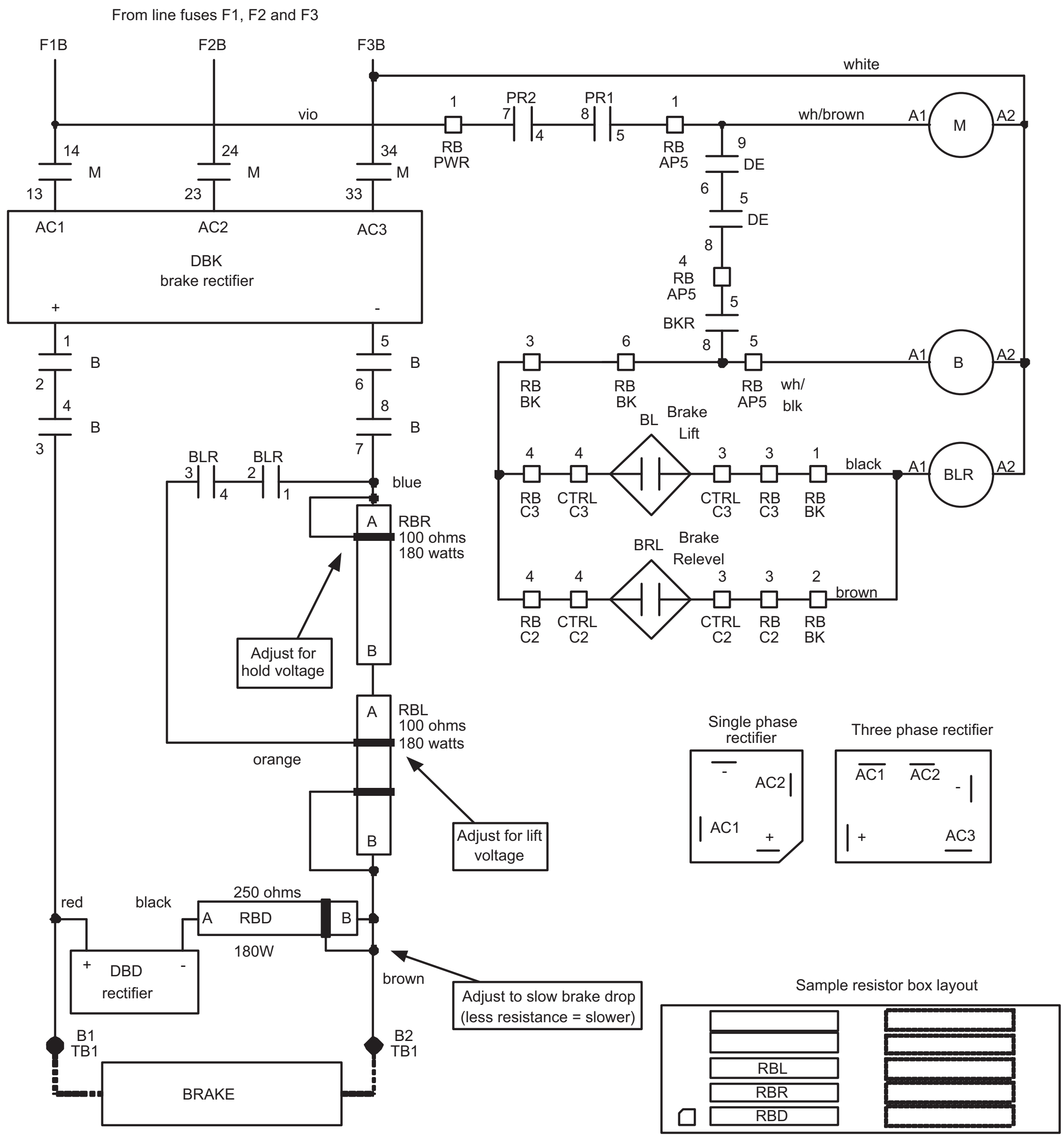
After all drive adjustments have been made, a ramped release of the brake may be required to control roll back. This can be seen with a voltmeter on the output of the regulator. Moving the car on inspection with all loads and direction starts, observe the brake release as well as the start of the car. Slowing the ACC 1 rate will release the brake when loop current is sufficient to hold the car without roll back. Settings of the following controller parameters can be used to delay the brake lift if required: Parameter 81 for normal operation starts; Parameter 84 for Inspection starts; Parameter 86 for releveling starts.

Brake Circuit

For brake circuits that do not use a regulator, follow these instructions.

- RBL adjusts Lift/Pick voltage
- RBD adjusts brake drop (less resistance = slower drop)
- RBR adjusts Hold or Running voltage

Figure 2.20 Brake Circuit

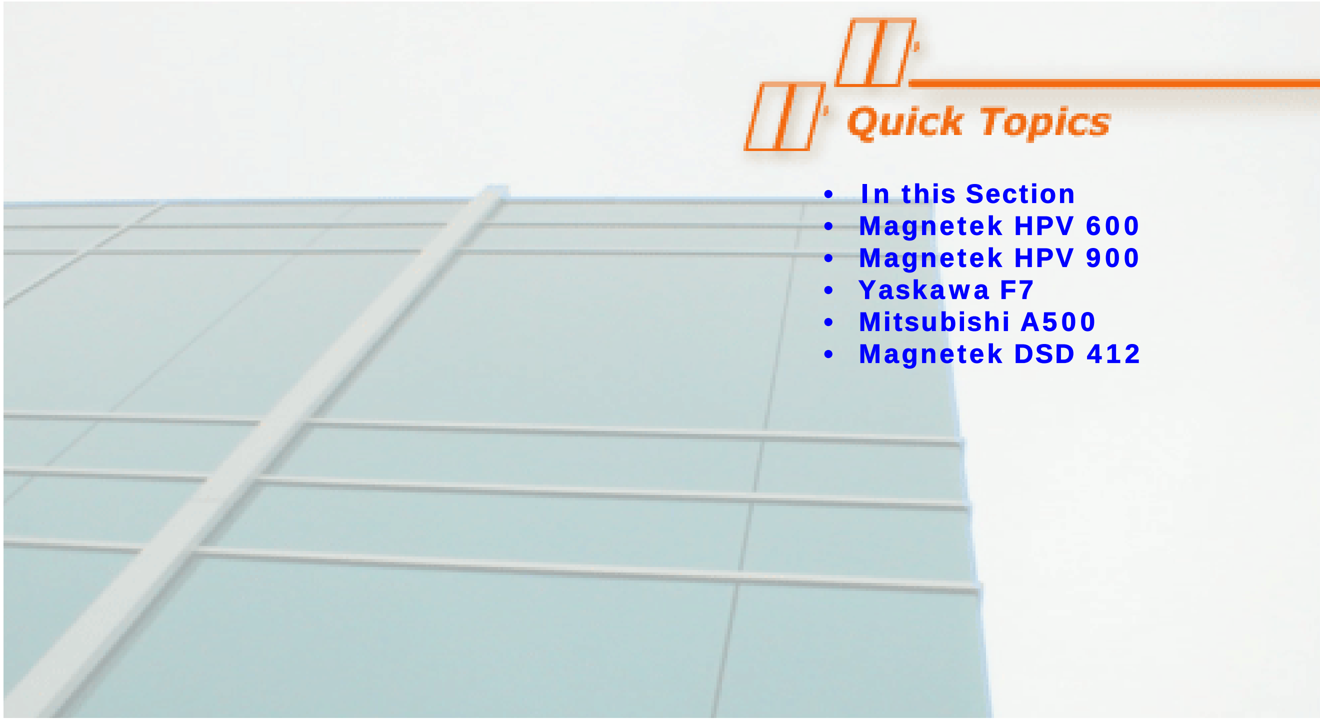


If the sample brake resistor locations do not match your system, consult your job prints for the correct location.

1. Check that the brake coil has been properly connected to the controller.
2. Run the car on inspection and adjust resistor RBL until the brake pick voltage required for the job is obtained.
3. Adjust RBR until approximately 60% brake lifting voltage is obtained or the brake holding voltage from the manufacturer. Check that the brake settles from full pick but does not touch the machine braking surface.
4. Stop the car and check that the brake drops just as motor rotation is stopping (brake does not drop on a rotating machine).
5. Adjust resistor RBD to coordinate brake drop with motor rotation as needed. (Less resistance will cause the brake to drop more slowly.)

Note

Settings of the following controller parameters can be used to delay brake lift if required: Parameter 81 for normal operation starts; Parameter 84 for Inspection starts; Parameter 86 for releveling starts.



Startup & Drive Adjustment

3

In this Section

This section provides startup, tuning, high-speed adjustment, and running instructions for the Tricon controller as used with various drives:

- Magnetek HPV 600
- Magnetek HPV 900
- Yaskawa F7
- Mitsubishi A500
- Magnetek DSD 412

Note

Complete instructions in Sections 1 and 2 before beginning procedures described in this section.

Magnetek HPV 600

This section describes:

HPV 600 AC Drive Start Up, Open Loop

To obtain optimal ride quality and performance, the drive must be tuned to the motor. Tuning requires you to be familiar with the drive and AC motors. If you are unfamiliar with drives of this type, please contact MCE Engineering for assistance.

Refer to the Magnetek HPV 600 Elevator Drive Technical Manual for detailed explanation of drive features. The HPV 600 drive is fully digital with configurable inputs, outputs, and modes of operation. This section describes configuring the HPV 600 for the Tricon controller. Due to the complexity of drive systems, it is not possible to cover all potential problems or possibilities. If you encounter difficulties, please contact MCE Technical Support.

Note

Use the Magnetek manual as a reference. Follow the start up and adjusting procedures from this manual, not the procedures from the Magnetek manual.

Before the controller and drive were shipped, the entire system was tested at the factory. All drive parameters were preset based on the information provided in the controller order form. The drive should run on inspection operation with very little effort. If not, verify that the motor information given to MCE was correct. If not, contact Engineering for assistance.

System Overview

The control system uses the HPV 600 internal speed curve algorithm. Adjustments to the accel rate, jerk rates, and decel rate are done through drive parameters.

Drive Programming

The drive has been modified to meet MCE specifications. If replacement of the drive is ever required, please contact MCE Technical Support. MCE will not accept any drive for warranty repair without a Return Material Authorization (RMA) number issued by Technical Support. Removing boards from the drive without authorization may void the manufacturer warranty.

Once the controller has been powered up, the drive must be programmed to operate correctly with the equipment at the job site. The drive was pre-programmed based on the information provided in the electrical survey, but it is important to confirm **ALL** parameters before attempting to run the car.

- The drive may fault on initial power up due to incorrectly set parameters. This is normal and may be ignored at this time.
- Verify that the voltage on the motor nameplate matches the voltage input to the drive. If not, contact MCE Technical Support before proceeding.
- Confirm that the three leads from the controller to the motor are connected. If there are more than three motor leads, make sure the motor is wired in a ‘wye’ configuration with correct field rotation or follow the motor manufacturer recommendations.
- Locate the test sheets shipped with the controller. These sheets list the drive parameters calculated for your installation.

HPV 600 Drive Parameters – Open Loop

The following procedures describe adjusting the HPV 600 drive with optional open loop software. This software allows the drive to operate without an encoder. If the drive you are working on has an encoder, please refer to the closed-loop instructions for this drive. Please refer to “HPV 600 AC Drive Start Up, Closed Loop” on page 3-22.

Before attempting to run the drive, confirm that parameters are correctly set. Verify that the parameters in the drive match those on the Test sheets. For detailed information on using the drive programming unit, please refer to the Magnetek HPV 600 manual.

Using the HPV600 Drive Programmer The HPV 600 programmer is used to program the drive and to display drive data. The programmer has three menu levels:

- Menu level
- Sub-menu level
- Entry level.

There are five keys on the front of the programmer. These keys perform different functions, depending on which menu level is active.

At the Main Menu level, the left and right arrows move the programmer between Main Menu selections. The up and down keys move the programmer into the various Sub-Menus at each Main Menu selection. Pressing the Enter key will move the programmer into the Sub-Menu currently displayed.

At the Sub-Menu level, the up and down arrows display various parameters in the Sub-Menu. Pressing the Escape key will move the programmer back to the Main Menu level. Pressing the Enter key while at the Sub-Menu level moves the programmer into the Entry level to modify the displayed parameter.

At the Entry level, the left and right arrows move a cursor to highlight data. When a digit is highlighted, pressing the up arrow will increase the value and pressing the down arrow will decrease it. Pressing the Enter key will save the value displayed on the programmer. Pressing the Escape key will move the programmer back to the Sub-Menu level.

Parameter Settings

Check the following to confirm correct settings for your application. Note that many parameters are not listed because their default values will not need to be modified or they are not used in this application.

Adjust A0 Menu

1. Go to the sub menu **Drive A1**.
2. **CONTRACT CAR SPD**. This is the rated contract speed of the car. Set to the speed, in feet per minute, for which the car is rated.
3. **CONTRACT MTR SPD**. Set to the motor RPM that will make the car run at contract speed. This is not the data from the motor nameplate. It programs the speed at which the drive will run the motor when the car is at contract speed.
4. Go to the **S-Curves A2** sub-menu.
5. **ACCEL RATE 0**. Desired acceleration rate. Set to 2.5 ft/s^2.
6. **DECEL RATE 0**. Desired deceleration rate. Set to 4.0 ft/s^2.
7. **ACCEL JERK IN 0**. Desired initial jerk rate. Set to 3.0 ft/s^3.
8. **ACCEL JERK OUT 0**. Desired jerk rate when transitioning from acceleration to contract speed. Set to 3.0 ft/s^3.
9. **DECEL JERK IN 0**. Desired jerk rate when transitioning from contract speed to deceleration. Set to 4.0 ft/s^3.
10. **DECEL JERK OUT 0**. Desired jerk rate when transitioning from deceleration to leveling speed. Set to 4.0 ft/s^3.

Remaining **S-Curves A2** menu parameters are not used.

11. Access the **Multistep Ref A3** sub-menu.
12. **SPEED COMMAND 1**. Leveling speed of the car. Set to 3.5 ft./min.
13. **SPEED COMMAND 2**. Approach speed of the car. Set to 12 ft./min.
14. **SPEED COMMAND 3**. Inspection speed of the car. Set to 45 ft./min.
15. **SPEED COMMAND 4**. Contract speed of the car. Set to the cars rated speed.

Remaining **Multistep Ref A3** sub-menu parameters are not used.

16. Access the **Power Convert A4** sub-menu.
17. **INPUT L-L VOLTS** parameter. Tells the drive what the input line voltage is. This value is used by the drive to declare a low line voltage fault. Set to the nominal AC voltage at the input to the drive.
18. Go to the **Adjust A0** sub-menu **Motor A5**.

MOTOR ID. To obtain this value, determine the motor speed at the rated excitation frequency without any slip using the formula: <u>120 * Rated Frequency</u>/No Slip Motor RPM.

If you cannot determine the motor speed with zero slip, take the motor nameplate RPM and use it in the formula. Round the number up to the nearest even whole number to determine motor poles. If the motor that the drive is connected to has a synchronous (no slip) speed of 900 or 1200 RPM set this parameter to **6 POLE DFLT**. If the motor has a synchronous speed of 1800 RPM set this parameter to **4 POLE DFLT**.

19. **RATED MTR PWR**. Rated motor horsepower or kilowatts. Set to the value on the motor nameplate.
20. **RATED MTR VOLTS**. Rated motor voltage. Set to the value on the motor nameplate.
21. **RATED EXCIT FREQ**. Frequency at which the motor is excited to obtain motor nameplate rated RPM. Typically this is 60 Hz. Set to the motor nameplate or manufacturer data sheet value.
22. **MOTOR MID VOLTS**. If the motor is rated for 208 – 230 volts, set this parameter to **14** volts. If the motor is rated for 400 – 480 volts, set it to **28** volts.
23. **MOTOR MID FREQ**. Set to **3** hz.
24. **MOTOR MIN VOLTS**. If the motor is rated for 208 – 230 volts, set to **4** volts. If the motor is rated for 400 volts, set to **9** volts. If the motor is rated for 480 volts, set to **8** volts.
25. **MOTOR MIN FREQ**. Set to 1hz.
26. **RATED MOTOR CURR**. Current required by the motor to obtain rated power at rated speed. Set this parameter to the motor nameplate value.
27. **MOTOR POLES** parameter. If the synchronous speed of the motor is 900 RPM, set this parameter to **8** poles. If the synchronous speed of the motor is 1200 RPM, set this parameter to **6** poles. If the synchronous speed of the motor is 1800 RPM, set this parameter to **4** poles.

Note

This value must be an even number or a Setup Fault will occur.

28. **RATED MTR SPEED**. Speed the motor should be turning when it is excited at its rated frequency and producing rated power. Set to the value from the motor nameplate or manufacturer data sheet. The final setting can be calculated by performing an adaptive tune.

Note

This value must be less than 900 RPM on 8-pole motors, 1200 RPM on 6-pole motors, and 1800 RPM on 4-pole motors or a drive set up fault will occur. Reuland motors have the synchronous speed on the motor nameplate. Setting this parameter to synchronous speed will result in a set up fault. The correct value is approximately synchronous speed times 0.9833.

29. **% NO LOAD CURR**. Current required to turn the motor at rated speed with no load. This can be determined from the motor manufacturer data sheets on new motors. If it is not available, **temporarily** set it to **50**%. The final setting can be calculated during adaptive tuning.

Remaining **Motor A5** sub-menu parameters remain at their default values.

Configure C0 Menu

1. Access the **User Switches C1** sub-menu.
2. **SPEED COMMAND SRC**. Set to **MULTISTEP**.
3. **RUN COMMAND SRC**. Set to **EXTERNAL TB1**.
4. Skip down to **SPD REF RELEASE**. Set to **REG RELEASE**.
5. **CONT CONFIRM SRC**. Set to **EXTERNAL TB1**.

Remaining **User Switches C1** sub-menu parameters remain at their default values.

6. Access the **Logic Inputs C2** sub-menu.
7. **LOG IN 1 TB1-16**. Set to **DRIVE ENABLE**.
8. **LOG IN 2 TB1-17**. Set to **CONTACT CFIRM**.
9. **LOG IN 3 TB1-18**. Set to **FAULT RESET**.
10. **LOG IN 4 TB1-19**. Set to **STEP REF B0**.
11. **LOG IN 5 TB1-20**. Set to **STEP REF B1**.
12. **LOG IN 6 TB1-21**. Set to **STEP REF B2**.
13. **LOG IN 7 TB1-22**. Set to **STEP REF B3**.
14. **LOG IN 8 TB1-23**. Set to **RUN DOWN**.
15. **LOG IN 9 TB1-24**. Set to **RUN UP**.
16. Access the **Logic Outputs C3** sub-menu.
17. **LOG OUT 1 TB1-5**. Set to **CLOSE CONTACT**.
18. **LOG OUT 2 TB1-7**. Set to **READY TO RUN**.
19. **LOG OUT 3 TB1-9**. Set to **SPEED REG RLS**.
20. **LOG OUT 4 TB1-11**. Set to **SPEED REG RLS**.
21. **RELAY COIL 1**. Set to **READY TO RUN**.

The HPV600 drive is now configured for **open loop operation**.

Running the Car

1. Attempt to run the car up using the inspection up/down buttons. Hold the up button until the car starts to move. If the motor moves in the down direction, stop the car. Using the programmer, access the **Configure C0** menu. Go to **User Switches C1** and change parameter **Motor Rotation** from Forward to Reverse.
2. Again run the motor. Confirm that the motor turns in the correct direction to move the car up or down.
3. Using the programmer, access the **Display D1** menu. Monitor **Speed Reference**. Run the car in the down direction. The speed reference displayed on the drive should be negative. Using the inspection up button, run the car in the up direction. The speed reference should be positive.
4. While using the inspection up/down buttons to run the car, use a hand tach to check car speed. It should be moving at approximately the same speed as that displayed by the drive. If not, access the **Adjust A0** menu, **User Switches A1**. Adjust **Contract Motor Spd** until the car is running at the same speed displayed by **Speed Reference**.

Drive Parameter Reference, Open Loop

Following is a list of drive parameters with an explanation and setting for each. Refer to the previous section for initial programming. Please refer to “HPV 600 AC Drive Start Up, Open Loop” on page 3-2.

Table 3.1 HPV 600 Drive Parameters, Open Loop

WARNING: Parameters with an asterisk (*) must be set correctly for your specific job.

Parameter	Description	Unit	Range	Default	Field / MCE Set
Adjust A0, A1 Drive					
Contract Car Spd	Elevator Contract Speed	fpm	0 - 3000	400	*
Contract Mtr Spd	Motor Speed at contract speed	rpm	50 - 3000	1130	*
Response	Sensitivity of speed regulator	rad/ sec	1.0 - 20.0	10	10
Inertia	System inertia	sec	0.25 - 50.00	2.0	2.0
Inner Loop Xover	Inner speed loop crossover frequency (with Ereg speed regulator)	rad/ sec	0.1 - 20.0	2.0	2.0
Gain Reduce Mult	Percent of speed regulator response in low gain Mode	%	10 - 100	100	100
Gain Chng Level	Speed level to change to low gain mode (with internal gain switch)	%	0 - 100.0	100	0
Tach Rate Gain	Helps with 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	2.0
Brake Pick Time	Time before a brake pick fault is declared	sec	0 - 5.00	1.00	0.5
Brake Hold Time	Time before a brake hold fault is declared	sec	0 - 5.00	0.20	0.00
Overspeed Level	Threshold for detection of overspeed fault	%	100.0 - 150.0	115.0	115
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	125	125
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	20
Spd Dev Time	Time before speed deviation low logic output is true	sec	0 - 9.99	0.5	0.5
Spd Dev/Hi Level	Level for declaring speed deviation alarm	%	0 - 99.9	10.0	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

Table 3.1 HPV 600 Drive Parameters, Open Loop

Zero Speed Level	Threshold for zero speed logic output	%	0 - 99.99	25.00	1.00
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	200.0	200.0
Regen Torq Limit	Regenerating torque limit	%	0 - 250.0	200.0	200.0
Flux Wkn Factor	Defines torque limit at higher speeds	%	60.0 - 100.0	100.0	100
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 allowed to be automatically reset per hour	faults	0 - 10	3	3
Up to SPD. Level	Logic output function is true when motor speed is above user specified speed defined by this parameter	%	0 - 110.00	80.00	080.00
Mains DIP Speed	When enabled by 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 drive recognition of RUN signal.	sec	0.00 - 0.99	0.00	0.00
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 Dly	N/A to MCE products	sec	0.00 - 5.00	0.00	0.00
TRQ Lim Msg Dly	Amount of time drive is in torque limit before Hit Torque Limit message is displayed.	sec	0.50 - 10.00	0.50	0.5
SER2 INSP SPD	Defines serial mode 2 Inspection (only serial mode 2)	ft/min	0 - 100	30	30
SER2 RS CRP SPD	Defines creep speed used in “rescue mode”	ft/min	0 - 100	10	10
SER2 RS CPR Time	Defines maximum time drive will continue to run at rescue creep speed (only serial mode 2)	ft/min	0 - 100	180	180
SER2 FLT TOL	Defines 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	0.04
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 recognition time delay for a defined multistep speed command	sec	0.00 - 10.0	0.00	0.00

Table 3.1 HPV 600 Drive Parameters, Open Loop

A2 S-Curves					
Accel Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.50
Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	3.00	4.00
Accel Jerk in 0	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0
Accel Jerk out 0	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	5.0
Decel Jerk in 0	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0
Decel Jerk out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	5.0
Accel Rate 1	Acceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 1	Deceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 1	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 1	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk in 1	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 1	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Rate 2	Acceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 2	Deceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 2	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 2	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk in 2	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 2	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Rate 3	Acceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 3	Deceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 3	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 3	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0

Table 3.1 HPV 600 Drive Parameters, Open Loop

Decel Jerk in 3	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 3	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
A3 Multistep Ref					
Speed command 1	Multi-Step Speed command #1	ft/m	-3000 to 3000	0	* 4
Speed command 2	Multi-Step Speed command #2	ft/m	-3000 to 3000	0	* 12
Speed Command 3	Multi-Step Speed command #3	ft/m	-3000 to 3000	0	45
Speed command 4	Multi-Step Speed command #4	ft/m	-3000 to 3000	0	*
Speed Command 5	Multi-Step Speed command #5	ft/m	-3000 to 3000	0	0
Speed command 6	Multi-Step Speed command #6	ft/m	-3000 to 3000	0	0
Speed Command 7	Multi-Step Speed command #7	ft/m	-3000 to 3000	0	0
Speed command 8	Multi-Step Speed command #8	ft/m	-3000 to 3000	0	*
Speed Command 9	Multi-Step Speed command #9	ft/m	-3000 to 3000	0	0
Speed Command 10	Multi-Step Speed command #10	ft/m	-3000 to 3000	0	0
Speed Command 11	Multi-Step Speed command #11	ft/m	-3000 to 3000	0	0
Speed Command 12	Multi-Step Speed command #12	ft/m	-3000 to 3000	0	0
Speed Command 13	Multi-Step Speed command #13	ft/m	-3000 to 3000	0	0
Speed Command 14	Multi-Step Speed command #14	ft/m	-3000 to 3000	0	0
Speed Command 15	Multi-Step Speed command #15	ft/m	-3000 to 3000	0	0
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	90	90
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	*
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	50	*
Stator Leakage X	Stator leakage reactance	%	0 - 20.0	9.0	9.0

Table 3.1 HPV 600 Drive Parameters, Open Loop

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 1 Serial Serial+extern	External TB1	External TB
Hi/Lo Gain Src	High / low gain change switch source	-	External TB 1 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 1	None	External TB
Pre Torque Source	Determines if a pre torque command is used and if used, 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
Ptorq Latch Clck	Determines source of pre torque latch control (if used)	-	External TB 1 Serial	External tb1	External TB
Fault Reset Src	Fault reset source	-	External TB 1 Serial Automatic	External tb1	External TB
Overspd Test Src	Determines external logic source to trigger overspeed test	-	External TB 1 Serial	External tb1	External TB
Brake Pick Src	If drive controls mechanical brake, determines source of brake pick command	-	Internal Serial	Internal	Internal
Brake Pick CNFM	Determines if a logic input is used for brake pick confirm	-	None External TB 1	None	None
Brake Hold Src	If drive controls mechanical brake, determines source of brake hold command	-	Internal Serial	Internal	Internal

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Table 3.1 HPV 600 Drive Parameters, Open Loop

Ramped Stop Sel	Chooses between normal stop and torque ramp down stop	-	None Ramp on stop	None	None
Ramp Down En Src	Determines source that signals torque ramp down stop (if used)	-	External TB 1 Run logic Serial	External tb1	External TB
Brk Pick Flt	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, sets source of torque command	-	None Serial	None	None
Dir Confirm	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 S-Curve Speed Reference Generator handles a reduction in speed command before S-Curve Generator has reached target speed.	-	Enabled Disabled	Disabled	Disabled
Fast Flux	Reduces starting takeoff time by reducing motor fluxing time	-	Enabled Disabled	Enabled	Enabled
Main DIP Ena	Enables Mains DIP Speed (A1) parameter which reduces speed when a UV alarm (low voltage) is declared	-	Enabled Disabled	Disabled	Disabled
DB Protection	Dynamic braking Protection fault or alarm selection		Fault Alarm	Fault	Fault
Encoder Fault	Temporarily disables Encoder Fault	-	Enabled Disabled	Enabled	Enabled
Stopping Mode	Determines 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 Mode 1 Mode 2 Mode 2 test	Mode 1	None
SER2 FLT Mode	Defines reaction to serial communication fault while in Serial Mode 2 (Only serial mode 2)	-	immediate	Immediate Run remove rescue	immediate
DRV Fast Disable	Addresses how fast drive responds to removal of Drive Enable logic input.	-	Disable	Disable Enable	Disable
MLT-SPD to DLY1	Assigns multi-step speed command to recognition delay timer 1	-	None	None mspd1- mspd15	None
MLT-SPD to DLY2	Assigns multi-step speed command to recognition delay timer 2	-	None	None mspd1- mspd15	None

Table 3.1 HPV 600 Drive Parameters, Open Loop

MLT-SPD to DLY3	Assigns multi-step speed command to recognition delay timer 3	-	None	None mspd1-mspd15	None
MLT-SPD to DLY4	Assigns multi-step speed command to recognition delay timer 4	-	None	None mspd1-mspd15	None
C2 Logic Inputs					
Log In 1 TB1-16	Logic input 1	-	-	DRIVE ENABLE	DRIVE ENABLE
Log In 2 TB1-17	Logic input 2	-	-	RUN	CONTACT CONFIRM
Log In 3 TB1-18	Logic input 3	-	-	FAULT RESET	FAULT RESET
Log In 4 TB1-19	Logic input 4	-	-	UP/DN	STEP REF B0
Log In 5 TB1-20	Logic input 5	-	-	S-Curve Sel 0	STEP REF B1
Log In 6 TB1-21	Logic input 6	-	-	STEP REF B0	STEP REF B2
Log In 7 TB1-22	Logic input 7	-	-	STEP REF B1	STEP REF B3
Log In 8 TB1-23	Logic input 8	-	-	STEP REF B2	RUN DoWN
Log In 9 TB1-24	Logic input 9	-	-	External Fault 1	RUN UP
C3 Logic Outputs					
Log Out 1 tb1-9	Logic Output 1	-	-	Ready To Run	SPEED REG RLS
Log Out 2 tb1-10	Logic Output 2	-	-	Run Command	NO FUNCTION
Log Out 3 tb1-11	Logic Output 3	-	-	MTR OVER-LOAD	NO FUNCTION
Log Out 4 tb1-12	Logic Output 4	-	-	READY TO RUN	NO FUNCTION
Relay Coil 1	Relay 1 Function Selection	-	-	FAULT	READY TO RUN
Relay Coil 2	Relay 2 Function Selection	-	-	SPEED REG RLS	SPEED REG RLS
C4 Analog Outputs					
Analog Out 1	Analog Output 1	-	-	TORQUE REF	TORQUE REF
Analog Out 2	Analog Output 2	-	-	SPEED FEEDBK	SPEED FEEDBK
Utility U0					
U1 Password					
	Password	-	-	000000	000000
U2 Hidden Items					
	Enable or disable hidden parameters Enable Disable	-	-	ENABLE	ENABLE

Table 3.1 HPV 600 Drive Parameters, Open Loop

U3 Unit					
	Unit for parameters English Metric	-	-	ENGLISH	ENGLISH
U4 Overspeed Test					
	Allows overspeed test during inspection Yes No	-	-	No	No
U5 Restore Defaults					
	Reset all parameters to default values	-			
U6 Drive Info					
	Drive information (Drive Version, Boot Version and Cube ID)	-	BootVersion: Drive: CubeID:		
U7 HEX Monitor					
	Hex Monitor	-			
U8 Language Sel					
	Selects Language for operator text	-	English deutsch	English	English
U9 BASICS Operation					
	Selects Open-Loop or Closed-Loop drive Operation	-	Open Loop Closed Loop	Open Loop	

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

HPV 600 Drive Faults, Open Loop

If a drive fault occurs, the Fault LED on the front panel will light. To access drive faults using the hand held programmer, go to the **FAULTS F0** menu. This menu has two sub-menus, **ACTIVE FAULTS F1** and **FAULT HISTORY F2**. Use the arrow keys to access the desired menu. If the drive is faulted, **ACTIVE FAULTS** will display the present fault. **FAULT HISTORY** will display faults that occurred previously.

Following is a list of detected drive faults. Listed after each fault is a description of what the fault is and suggested corrective action.

Table 3.2 HPV 600 Drive Faults, Open Loop

Fault	Description	Corrective Action
AtoD Fault	Control board ADC converter not responding.	Cycle power to controller and see if fault clears. If not, replace Control board.
Brake Alarm	Dynamic brake resistor overcurrent.	Confirm motor data correctly entered into drive, braking resistance connected and sized correctly, car balanced correctly. **NOTE:** After drive stops, this becomes a Brake IGBT Fault.
Brk Hold Fault	Brake hold state does not match commanded state.	Disabled.
Brk IGBT Fault	Brake IGBT overcurrent.	Overcurrent of braking IGBT has occurred. Fault latches, but does not shut car down until it stops to allow passengers to exit. Confirm motor data correctly entered, braking resistance connected and sized correctly, car balanced correctly.
Brk Pick Fault	Brake pick state does not match commanded state.	Disabled.
Bridge Fault	Power module detecting overcurrent or over-temperature condition.	**Overcurrent:** Check proper sizing and connection of dynamic braking resistor. Check for short in motor wiring or windings. **Over-temperature:** Check drive cooling fan and heatsink. Replace drive if fault cannot be corrected with above measures.
Charge Fault	DC Bus has not charged.	DC Bus did not reach desired stabilized voltage level within 2 seconds. Check incoming AC power. If OK, replace drive.
Comm Fault Invalid Checksum	The programmer received four consecutive invalid messages.	Possible noise or bad programmer connector. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Comm Fault No Drive Handshake	The programmer lost communications with the drive Control board.	Possible noise or bad programmer connector. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Contactor Fault	Contactor state does not match commanded state.	Drive has turned on command to close main contactor and Contactor Confirm signal is not present for amount of time specified by “**Contact Flt Time**” parameter.
Cube Data Fault	The drive parameters are invalid.	Check drive parameters. Cycle drive power. If fault recurs, go to **Utility** menu, select **Restore Defaults**. If fault persists, replace Control board. **Note: Restore Defaults** selection will require all drive parameter be set to their correct values.
Cube ID Fault	Drive identification is invalid.	Check all drive parameters. Cycle power to drive. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** The **Restore Defaults** selection will require all drive parameters to be set to their correct values.

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Table 3.2 HPV 600 Drive Faults, Open Loop

Curr Reg Fault	Actual current does not match commanded current.	Check for proper incoming power. Check motor parameters and verify proper settings. Check motor connections and motor windings for open circuit. Check main contactor for bad contact. If OK, bad current sensor or bad drive.
DCU Data Fault	The DCU parameters are not set correctly.	Check all drive parameters. Cycle power to drive. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** The **Restore Defaults** selection will require all drive parameter to be set to their correct values.
Dir Conflict	Commanded direction from analog input does not match polarity of **Up/Dwn** input.	Not used.
Drv Overload	Drive exceeded overload curve.	Check motor connections, main contactor contacts, and motor windings. Make sure brake is lifting. Verify encoder is properly connected and that feedback matches motor speed.
Extrn Fault 1	External Fault 1 input is activated.	Not used.
Extrn Fault 2	External Fault 2 input is activated.	Not used.
Extrn Fault 3	External Fault 3 input is activated.	Not used.
Extrn Fault 4	External Fault 4 input is activated.	Not used.
Fan Alarm	Heatsink cooling fan not operating.	Check fan and connections. Clean heatsink.
Fuse Fault	The DC Bus fuse on the drive is open.	Check fuse. If OK, check motor connections. Check motor for continuity from windings to ground. If OK, replace drive.
Ground Fault	Sum of all phase currents exceeded 50% of rated drive amperage.	Disconnect motor from drive. Cycle power to drive. If problem clears, possible bad motor or wiring. If problem does not clear, possible bad system ground or bad drive.
Hit Torque Limit	The measured current is equal or greater than the torque limit setting.	Verify car balance correct. Verify motor and drive sizing. Can be delayed by increasing value of **TRQ LIM MSG DLY (A1)** parameter.
Mtr id Fault Mtr Data Fault	Invalid motor parameters.	Check all drive parameters. Cycle power to drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:**The **Restore Defaults** selection will require all drive parameter to be set to their correct values.
Mtr Overload	Motor has exceeded the motor overload curve.	Verify correct car balance. Check for dragging brake or mechanical bind in machine or hoistway. Verify setting of **OVLD START LEVEL (A1)** and **OVLD TIME OUT (A1)** parameters. Check for bad motor.
Overcurr Fault	Phase current exceeded 250% of rated current.	Verify car balanced correctly. Verify proper motor and drive sizing. Check for bad motor or motor connection. Check for bad main contactor contacts. Check for mechanical bind in car or machine.
Overspeed Fault	Motor speed exceeded user entered parameters.	Check parameters **OVERSPEED LEVEL (A1)** and **OVERSPEED TIME (A1)**. If OK, check tracking of motor to desired speed and tune regulator for better performance.
Overtemp Fault	Heatsink temperature is too high.	Drive heatsink temperature exceeded 105ºC (221ºF). Check fans on drive; make sure airflow is adequate.

Table 3.2 HPV 600 Drive Faults, Open Loop

Overvolt Fault	DC Bus voltage is too high.	DC bus voltage exceeded 850 volts on a 460-volt drive or 425 volts on a 230-volt drive. Check braking resistance connected and sized properly. Check for high AC line. Confirm input voltage to drive. If these check OK, possible bad braking IGBT. Drive unit needs to be replaced.
PCU Data Fault	PCU parameters not correct.	Check all drive parameters. Cycle power to drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** The **Restore Defaults** selection will require all drive parameter to be set to their correct values.
Phase Fault	Open motor phase.	Check motor, motor connections, motor windings, and main contactor contacts.
Setup Fault 1	Rated motor speed, poles and frequency not set correctly.	**RATED EXCIT FREQ (A5)**, **RATED MTR SPEED (A5)** and **MOTOR POLES (A4)** do not satisfy the formula: **9.6 < {120 (Excit Freq)} - {(Motor Poles)(Motor Speed)} < 1222.3**
Setup Fault 3	Motor Poles parameter not set correctly.	**MOTOR POLES (A4)** must be set to an even number.
Setup Fault 5	Rated Motor Power and Rated Motor Voltage not set correctly.	Check **RATED MOTOR PWR (A4)**, **RATED MTR VOLTS (A4)**. They must satisfy the formula: **(.07184) {(Motor Pwr) / (Motor Voltage)} Drive Current Rating**
Setup Fault 6	Multi-Step speed reference exceeds contract speed.	Check **SPEED COMMAND 1** through **SPEED COMMAND 16** and **CONTRACT CAR SPD** parameters.
Setup Fault 7	Run logic inputs not correctly defined.	Check **LOG IN 1 TB1-16** through **LOG IN 9 TB1-24** for correct setting.
Setup Fault 8	**DIR CONFIRM (C1)** enabled. **RUN UP**, **RUN DOWN**, not assigned as logic inputs. **SPD COMMAND SRC (C1)** not set to **ANALOG INPUT**.	Not used.
Setup Fault 9	Incorrect setting of motor parameters.	Motor parameters must satisfy the following formulas: **MOTOR MIN VOLTS < MOTOR MID VOLTS < RATED MTR VOLTS MOTOR MIN FREQ < MOTOR MID FREQ < RATED EXCIT FREQ.** Confirm settings of motor parameters.
Stall Test Fault	Motor current exceeds value of **STAL TEST LVL** for more than time period specified by **STALL FAULT TIME**.	Confirm setting of **STALL TEST LVL (A1)**. Confirm setting of **STALL FAULT TIME (A1)**. Check motor, machine, and brake for mechanical bind. Check motor parameter settings. Check for excessive motor current.
Undervolt Fault	DC Bus voltage low.	Voltage on DC Bus dropped below user-entered values of parameters **INPUT L-L Volts (A4)** and **UV FAULT LEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbances on AC line.
Undervolt Alarm	DC Bus voltage low during run.	DC bus voltage dropped below user-entered values of **INPUT L-L Volts (A4)** and **UV ALARM LEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbance on AC line.

HPV 600 High Speed Adjustment — Open Loop

The drive should now be running on inspection speed. When commanded to run in the up direction, the car should run up and, when commanded to run down, the car should run down. Use a hand tach to confirm that the speed displayed on the drive programmer at the parameter **DISPLAY D0**, **ELEVATOR DATA D1**, **SPEED REFERENCE** exactly matches the speed at which the car is running.

While observing the hand tach, run the car up and down in the middle section of the hoistway. Modify the **CONTRACT MTR SPEED** parameter under the **ADJUST A0**, **MOTOR A5** menu to exactly achieve the speed displayed at **SPEED REFERENCE**.

Car Balancing

In order for the drive to perform properly, the car must be properly balanced. Geared cars are typically balanced with 40 – 50% of the cars rated capacity. To confirm this:

1. From the car top, run the car on inspection to the center of the hoistway. Stop the car so the crosshead on the counterweight is exactly adjacent to the crosshead on the car.
2. Place a chalk mark on the cables in the machine room and mark the hoist motor so that when the car is run from the machine room you will be able to tell when the car passes through the center of the hoistway.
3. Move the car to a convenient floor. Place 40% of the cars rated capacity in the car.
4. On inspection, run the car so it is about 10 feet above the center of the hoistway.
5. Place an Amprobe on one of the leads to the hoist motor.
6. While observing the display on the Amprobe, run the car down on inspection operation through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
7. Place the car about 10 feet below the center of the hoistway.
8. While observing the display on the Amprobe, run the car up through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
9. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running up was greater than the value running down, the car is too heavy. Remove 100 pounds of weight from the car and repeat previous steps until the recorded values are equal but of opposite polarity.
10. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running down was greater than the value running up, the car is too light. Add 100 pounds of weight to the car and repeat preceding steps until the recorded values are equal but of opposite polarity.
11. When the values are equal but of opposite polarity, the car is balanced. Check how much weight is in the car. It should be between 40 and 50% of the cars rated capacity. If not, the counterweighting needs to be adjusted. If the car is too heavy, weight needs to be added to the counterweight to get the car balanced between 40 and 50% of rated capacity. If the car is too light, weight needs to be removed from the counterweight to get it balanced between 40 and 50% of rated capacity. **Do not proceed with the adjustment process until the car is properly balanced.**

Motor Parameter Adjustments

In order to perform correctly, the drive needs to be programmed for the correct motor values. Volts/hertz ratio must be correctly set or the motor may stall with a load or at slow speed.

1. Place a full load into the car.
2. Change inspection speed parameter (**SPEED COMMAND 3, A3**) so it is 5% of contract speed.
3. Using the programmer, display motor frequency. This can be found under **Display D0**, **Power Data D2**, **MOTOR FREQUENCY**.
4. Monitor the output frequency of the drive while running the car up on inspection. If the frequency is not exactly 3 hertz, stop the car. If the frequency was less than 3 hertz, increase the inspection speed. If the frequency was greater than 3 hertz, decrease the inspection speed. Repeat until the output of the drive is exactly 3 hertz.
5. Using a hand tach, monitor the speed of the car. If the car is moving at less than the inspection speed programmed, increase the **MOTOR MID VOLTS** parameter in the **Motor A5** menu. If the car is moving faster, decrease the parameter.
6. Repeat until the car is running at the speed programmed. This is the final setting for the **MOTOR MID VOLTS** parameter.
7. Change inspection speed parameter (**SPEED COMMAND 3, A3**) so it is 1.7% of contract speed.
8. Using the programmer, display motor frequency. This can be found under **Display D0**, **Power Data D2**, **MOTOR FREQUENCY**.
9. Monitor the output frequency of the drive while running the car up on inspection. If the frequency is not exactly 1 hertz, stop the car. If the frequency was less than 1 hertz, increase inspection speed. If the frequency was greater than 1 hertz, decrease inspection speed.

Note

The motor may stall at this low frequency. Ignore this for now.

10. Repeat until the output of the drive is exactly 1 hertz.
11. Using a hand tach, monitor car speed. If the car is moving at less than the inspection speed programmed, increase the **MOTOR MIN VOLTS (Motor A5** menu). If the car is moving faster, decrease the parameter.
12. Repeat until the car is running at the speed programmed. This is the final setting for **MOTOR MIN VOLTS**.
13. Reset the **SPEED COMMAND 3, A3** parameter to 45 feet per minute or the desired inspection speed.

Speed Curve Setting and Adjustment

The Magnetek HPV 600 drive has an internal speed curve algorithm that controls acceleration, deceleration, and jerk rates. There are four independently selectable speed curves. This system uses only the first.

Preliminary setting of speed curve parameters was done in the drive programming section. The values entered at that time are designed to be somewhat aggressive to ensure that the car does not overshoot the floors, but rather comes in slow. This will prevent the car from running into the pit or the overhead until the final values for the speed curve are entered.

1. Place a balanced load in the car.
2. Disable the doors and place a car call two floors away from the present position of the car (one floor away if the car speed is 200 feet per minute or less).

Note

Keep the elevator away from the terminal floors at this time.

3. While the car is running, monitor car speed with a hand tach. It should be running at contract speed (+ 5%). If not, adjust **CONTRACT MTR SPEED A1** to obtain the correct speed.
4. Observe deceleration as the car approaches the floor. The car should decelerate rapidly and there should be two noticeable steps of speed prior to stopping at the floor. If there are not, confirm that the tape reader is properly installed and the slowdown magnets are placed the correct distance from the floor.
5. Change **DECEL RATE 0 A2** to 3.5 ft/s^2. This will yield a slower rate of deceleration and less approach distance to the floor.
6. Again run the car and observe the approach into the floor. If the car still has too much slow down distance, decrease **DECEL RATE 0 A2** to 0.1 ft/s^2 less than the present rate.
7. Repeat until the car is coming into the floor with about 3 to 6 inches of approach.
8. Modify **DECEL JERK IN 0** and **DECEL JERK OUT 0** to get a smooth approach into the floor with 1 to 2 inches of sustained leveling. If there is not enough sustained leveling, the car may overshoot intermittently and cause releveling.
9. Modify the **ACCEL JERK OUT 0** rate to the same value entered into the **DECEL JERK IN 0** parameter.
10. If the rated speed of the car is greater than 200 feet per minute, make a one floor run. Observe the approach into the floor on single floor runs. If the approach is longer than the multi-floor runs, increase the **SPEED COMMAND 4 A3** parameter until the approach on a one floor run is the same as the multi-floor run. If the approach is quicker, decrease the **SPEED COMMAND 4 A3** parameter until the approach on a one floor run is the same as the multi-floor run.
11. The speed curve parameters have been set. Ride the car and observe acceleration, deceleration, and jerk rates. If any rate seems too sharp, make that value smaller. Note that changing values in the deceleration profile will result in a different approach into the floor. You may need to modify other deceleration parameters to get the desired ride.

12. Observe floor stops. Make multi-floor runs and one floor runs into a floor at the center of the hoistway. If the car is stopping short of the floor (too high in the down and too low in the up), increase the **SPEED COMMAND 1 A3** parameter. This will result in faster leveling speed and cause the car to travel farther before stopping.
13. If the car is stopping past the floor (too high in the up and too low in the down), decrease the **SPEED COMMAND 1 A3** parameter. This will result in slower leveling speed and cause the car to travel a shorter distance before stopping.

Note

If you are unable to achieve consistent floor stops by modifying leveling speed, the brake may not be adjusted properly. Confirm that all brake voltages are set correctly and that the resistance around the brake coil is connected properly. The resistance can be changed to control brake set rate. Less resistance causes a slower drop and more resistance causes a quicker drop.

The car should now be running at contract speed with accurate floor stops and a smooth ride. Remove all weights from the car and, staying away from the terminal floors, make one floor runs and multi-floor runs up and down.

Add weight to the car, approximately 100 pounds at a time. Staying away from the terminal floors, observe the one floor and multi floor runs to be sure that the car rides well under all load conditions. Keep adding weight until the car has full load, less the weight of anyone riding the car.

The drive is now successfully set up.

Hoistway Learn for Normal Operation

You must now perform a normal operating speed learn operation using controls on the Limit Board. Please refer to the instructions for your Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

HPV 600 AC Drive Start Up, Closed Loop

The Magnetek HPV 600 drive can be configured as a closed loop AC vector drive with the optional Incremental Encoder card. In order to obtain optimal ride quality and performance, the drive must be tuned to the motor. The tuning process requires that you be familiar with the drive and AC motors. If you have never worked on this drive, or any other AC Vector drive, please contact MCE for assistance.

Refer to the Magnetek HPV 600 Elevator Drive Technical Manual for detailed explanation. The HPV 600 drive is fully digital with configurable inputs, outputs, and modes of operation. This procedure describes configuring the HPV 600 to operate with the Tricon control. Due to the complexity of drive systems, it is not possible to cover all potential problems or possibilities. If you encounter any difficulties, please contact MCE Technical Support.

Note

Use the Magnetek manual as a reference, but follow the start up and adjusting procedures here.

Before the controller and drive were shipped, the entire system was tested at the factory. All drive parameters were preset based on the information provided in the controller order form. The drive should run on inspection operation with very little effort. If not, verify that the motor information given to MCE was correct. If not, contact Engineering for assistance.

System Overview

The control system uses the HPV 600 internal speed curve algorithm. Adjustments to the accel rate, jerk rates, and decel rate are made through the drive.

HPV 600 Drive Programming, Closed Loop

The drive has been modified to meet MCE specifications. If replacement of the drive is ever required, please contact MCE Technical Support. MCE will not accept any drive warranty repair without a Return Material Authorization (RMA) number issued by Technical Support. Removing boards from the drive without authorization may void the manufacturer warranty.

Once the controller has been powered up, the drive must be programmed to operate correctly with the equipment on the job site. MCE has pre-programmed the drive based on the information provided in the electrical survey, but it is important to confirm **ALL** parameters before attempting to run the car.

- The drive may fault on initial power up due to incorrectly set parameters. This is normal, and may be ignored at this time.
- Verify that the voltage on the motor nameplate matches the voltage input to the drive. If not, contact MCE Technical Support before proceeding.
- Confirm that the three leads from the controller to the motor are connected. If there are more than three motor leads make sure that the motor is wired in a 'wye' configuration with correct field rotation or follow motor manufacturer recommendations.
- Locate the test sheets shipped with the controller. These sheets list the drive parameters calculated for your installation.

Drive Parameters – Closed Loop

The following procedures are used to adjust the HPV 600 drive with optional closed loop software. This software allows the drive to operate with encoder feedback. If the drive you are working on will not be using encoder feedback, please refer to the earlier open-loop discussion. Please refer to “HPV 600 AC Drive Start Up, Open Loop” on page 3-2.

Before attempting to run the drive, confirm that the parameters are set correctly. Verify that parameters in the drive match those in the Test sheets. For detailed information about the programming unit please refer to the Magnetek HPV 600 manual.

Using the HPV600 Drive Programmer The HPV 600 programmer is used to program the drive and to display drive data. The programmer has three menu levels:

- Menu level
- Sub-menu level
- Entry level.

There are five keys on the front of the programmer. These keys perform different functions, depending on which menu level is active.

At the Main Menu level, the left and right arrows move the programmer between Main Menu selections. The up and down keys move the programmer into the various Sub-Menus at each Main Menu selection. Pressing the Enter key will move the programmer into the Sub-Menu currently displayed.

At the Sub-Menu level, the up and down arrows display various parameters in the Sub-Menu. Pressing the Escape key will move the programmer back to the Main Menu level. Pressing the Enter key while at the Sub-Menu level moves the programmer into the Entry level to modify the displayed parameter.

At the Entry level, the left and right arrows move a cursor to highlight data. When a digit is highlighted, pressing the up arrow will increase the value and pressing the down arrow will decrease it. Pressing the Enter key will save the value displayed on the programmer. Pressing the Escape key will move the programmer back to the Sub-Menu level.

Parameter Settings

Check the following parameters to confirm they are set correctly for your application. Note that many parameters are not listed because their default values will not need to be modified or they are not used in this application.

Adjust A0 menu.

1. Go to sub menu **Drive A1**.
2. **CONTRACT CAR SPD**. Rated contract speed of the car. Set to the speed in feet per minute for which the car is rated.
3. **CONTRACT MTR SPD**. Set to the motor RPM that will make the car run at contract speed. This is not the data from the motor nameplate. This parameter sets the speed at which the drive will run the motor when the car is commanded to run at contract speed.
4. Skip down to the **ENCODER PULSES** parameter. Set to the number of pulses per revolution (PPR) from the encoder nameplate.

5. Go to the **S-Curves A2** sub-menu.
6. **ACCEL RATE 0**. Acceleration rate of speed curve function. Set to 2.5 ft/s^2.
7. **DECEL RATE 0**. Deceleration rate of speed curve function. Set to 4.0 ft/s^2.
8. **ACCEL JERK IN 0**. Initial jerk rate of speed curve function. Set to 3.0 ft/s^3.
9. **ACCEL JERK OUT 0**. Jerk rate when transitioning from acceleration to contract speed. Set to 3.0 ft/s^3.
10. **DECEL JERK IN 0**. Jerk rate when transitioning from contract speed to deceleration. Set to 4.0 ft/s^3.
11. **DECEL JERK OUT 0**. Jerk rate when transitioning from deceleration to leveling speed. Set to 4.0 ft/s^3.

Remaining **S-Curves A2** parameters are not used.

1. Access the **Multistep Ref A3** sub-menu.
2. **SPEED COMMAND 1**. Leveling speed of the car. Set to 3.5 ft./min.
3. **SPEED COMMAND 2**. Approach speed of the car. Set to 12.0 ft./min.
4. **SPEED COMMAND 3**. Inspection speed of the car. Set to 45.0 ft./min.
5. **SPEED COMMAND 4**. Contract speed of the car. If less than 200 ft./min., set to cars rated speed. If the car is rated for a speed greater than 200 ft./min., set to 200 ft./min.
6. If the cars rated speed is greater than 200 ft./min., go to the **SPEED COMMAND 8** parameter.
7. Set **SPEED COMMAND 8** to contract speed.

Remaining **Multistep Ref A3** sub-menu parameters are not used.

1. Access the **Power Convert A4** sub-menu.
2. **INPUT L-L VOLTS** parameter. Input line voltage. This value is used by the drive to declare a low line voltage fault. Set to the nominal AC voltage at the input to the drive.
3. Go to sub-menu **Motor A5**.
4. **MOTOR ID**. To obtain this value, determine the motor speed at the rated excitation frequency without any slip. The formula is: 120 * Rated Frequency/No Slip Motor RPM.

If you cannot determine motor speed with zero slip, take the motor nameplate RPM and use it in the formula. Round the number up to the nearest even whole number to determine motor poles. If the motor has a synchronous (no slip) speed of 900 or 1200 RPM, set this parameter to **6 POLE DFLT**. If the motor has a synchronous speed of 1800 RPM, set this parameter to **4 POLE DFLT.**

5. **RATED MTR PWR**. Rated motor horsepower or kilowatts. Set to the value on the motor nameplate.
6. **RATED MTR VOLTS**. Rated motor voltage. Set to the value from the motor name-plate.
7. **RATED EXCIT FREQ**. Frequency at which the motor is excited to obtain motor nameplate rated RPM. Typically this is 60 Hz. Set to the value from the motor name-plate or the manufacturer data sheet.

8. **MOTOR POLES** parameter. Tells the drive how many poles the motor has. If the synchronous speed of the motor is 900 RPM, set to **8** poles. If the synchronous speed of the motor is 1200 RPM, set to **6** poles. If the synchronous speed of the motor is 1800 RPM, set to **4** poles.

Note

This value must be an even number or a Setup Fault will occur.

9. **RATED MTR SPEED**. Speed the motor should be turning when it is excited at its rated frequency and producing rated power. Set to the value from the motor nameplate or the manufacturers data. If this value is not available, **temporarily** set it for the value calculated by: **(No Slip Motor RPM) 0.98** The final setting can be calculated by the drive during adaptive tuning.

Note

This value must be less than 900 RPM on 8 pole motors, 1200 RPM on 6 pole motors, and 1800 RPM on 4 pole motors or a drive set up fault will occur. Reuland motors have the synchronous speed on the motor nameplate. Setting this parameter to synchronous speed will result in a set up fault. The correct value is approximately synchronous speed times 0.9833.

10. **% NO LOAD CURR**. Current required to turn the motor at rated speed with no load. This can be determined from the motor manufacturer data sheet. If it is not available, **temporarily** set it to **50**%. The final setting can be calculated by the drive during adaptive tuning.

Remaining **Motor A5** sub-menu parameters remain at their default values.

Configure C0 Menu

1. Access the **User Switches C1** sub-menu.
2. **SPEED COMMAND SRC**. Set to **MULTISTEP**.
3. **RUN COMMAND SRC**. Set to **EXTERNAL TB1**.
4. Skip down to **SPD REF RELEASE**. Set to **REG RELEASE**.
5. **CONT CONFIRM SRC**. Set to **EXTERNAL TB1**.

Remaining **User Switches C1** sub-menu parameters remain at their default values.

1. Access the **Logic Inputs C2** sub-menu.
2. **LOG IN 1 TB1-16**. Set to **DRIVE ENABLE**.
3. **LOG IN 2 TB1-17**. Set to **CONTACT CFIRM**.
4. **LOG IN 3 TB1-18**. Set to **FAULT RESET**.
5. **LOG IN 5 TB1-20**. Set to **STEP REF B1**.
6. **LOG IN 6 TB1-21**. Set to **STEP REF B2**.
7. **LOG IN 7 TB1-22**. Set to **STEP REF B3**.
8. **LOG IN 8 TB1-23**. Set to **RUN DOWN**.
9. **LOG IN 9 TB1-24**. Set to **RUN UP**.

10. Access the **Logic Outputs C3** sub-menu.
11. **LOG OUT 1 TB1-5**. Set to **CLOSE CONTACT**.
12. **LOG OUT 2 TB1-7**. Set to **READY TO RUN**.
13. **LOG OUT 3 TB1-9**. Set to **SPEED REG RLS**.
14. **LOG OUT 4 TB1-11**. Set to **SPEED REG RLS**.
15. **RELAY COIL 1**. Set to **READY TO RUN**.

The HPV600 drive is now correctly configured for closed loop operation.

Running the Car

1. Attempt to run the car up using the inspection up/down buttons. Hold the up button until the car starts to move. If the motor moves in the down direction, stop the car. Using the programmer, access the **Configure C0** menu. Go to **User Switches C1** and change parameter **Motor Rotation** from Forward to Reverse.
2. Again run the motor. Confirm that the motor turns in the correct direction to move the car up or down.
3. Using the programmer, access **Display D1**. Monitor **Speed Reference**. Run the car in the down direction. The speed reference displayed on the drive should be negative. Using the inspection up button on the Relay board, run the car in the up direction. The speed reference should be positive.
4. In the **Display D1** menu, monitor **Speed Feedback**. Run the car in the down direction. The speed feedback should be negative. If not, reverse the A and A- signals from the encoder to the drive.
5. While using the inspection up/down buttons to run the car, use a hand tach to check car speed. It should be moving at approximately the same speed as that displayed on the drive. If not, access **Adjust A0**, **User Switches A1**. Adjust **Contract Motor Spd** until the car is running at exactly the same speed as displayed by **Speed Feedback**.

HPV 600 Drive Parameter Reference, Closed Loop

Following is a list of drive parameters with explanations and setting recommendations. Refer to the previous section for initial programming. Please refer to “HPV 600 AC Drive Start Up, Closed Loop” on page 3-22.

Table 3.3 HPV 600 Drive Parameters, Closed Loop

Parameter	Description	Unit	Range	Defaults	Field / MCE Set
Adjust A0, A1 Drive					
Contract Car Spd	Elevator Contract Speed	fpm	0 - 3000	400	*
Contract Mtr Spd	Motor Speed at elevator contract speed	rpm	50 - 3000	1130	*
Response	Sensitivity of speed regulator	rad/sec	1.0 - 20.0	10	10
Inertia	System inertia	sec	0.25 - 50.00	2.0	2.0
Inner Loop Xover	Inner speed loop crossover frequency (with Ereg speed regulator)	rad/sec	0.1 - 20.0	2.0	2.0
Gain Reduce Mult	Percent of response of speed regulator used in low gain Mode	%	10 - 100	100	100
Gain Chng Level	Speed level to change to low gain mode (with internal gain switch)	%	0 - 100.0	100	0
Tach Rate Gain	Helps with effects of rope resonance	%	0 - 30.0	0	0
Spd Phase Margin	Sets phase margin of speed regulator (with PI speed regulator)	o	45 - 90	80	80
Ramped Stop Time	Time to ramp from rated torque to zero (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	2.0
Brake Pick Time	Time before a brake pick fault is declared	sec	0 - 5.00	1.00	0.5
Brake Hold Time	Time before a brake hold fault is declared	sec	0 - 5.00	0.20	0.00
Overspeed Level	Threshold for detection of overspeed fault	%	100.0 - 150.0	115.0	115
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	125	125
Encoder Pulses	Encoder counts per revolution	ppr	600 - 10000	1024	1024
Spd Dev Lo Level	Range around speed reference for speed deviation low logic output	%	00.1 - 10.0	10	20
Spd Dev Time	Time before speed deviation low logic output is true	sec	0 - 9.99	0.5	0.5
Spd Dev/Hi Level	Level to declare speed deviation alarm	%	0 - 99.9	10.0	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	25.00	1.00
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	200.0	200.0
Regen Torq Limit	Regenerating torque limit	%	0 - 250.0	200.0	200.0

Table 3.3 HPV 600 Drive Parameters, Closed Loop

Flux Wkn Factor	Defines the torque limit at higher speeds	%	60.0 - 100.0	100.0	100
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	80.00	080.00
Mains DIP Speed	When enabled by Main DIP Speed (A1) parameter, speed reduced by this percent when UV alarm (low voltage) declared	%	5 - 99.9	25.00	25.00
Run Delay Timer	Delays drive recognition of RUN signal.	sec	0.00 - 0.99	0.00	0.00
AB Zero Spd Lev	Auto Brake Function - N/A to Tricon	%	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 Dly	N/A to MCE products	sec	0.00 - 5.00	0.00	0.00
TRQ Lim Msg Dly	Determines amount of time drive is in torque limit before Hit Torque Limit message displayed.	sec	0.50 - 10.00	0.50	0.5
SER2 INSP SPD	Defines serial mode 2 Inspection (only serial mode 2)	ft/min	0 - 100	30	30
SER2 RS CRP SPD	Defines creep speed that will be used in rescue mode	ft/min	0 - 100	10	10
SER2 RS CPR Time	Defines maximum time drive will continue to run at rescue creep speed (only serial mode 2)	ft/min	0 - 100	180	180
SER2 FLT TOL	Defines 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	0.04
Rollback Gain	Ant-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	Determine recognition time delay for a defined multistep speed command	sec	0.00 - 10.0	0.00	0.00
A2 S-Curves					
Accel Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.50
Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	3.00	4.00
Accel Jerk in 0	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0
Accel Jerk out 0	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	5.0
Decel Jerk in 0	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0

Table 3.3 HPV 600 Drive Parameters, Closed Loop

Decel Jerk out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	5.0
Accel Rate 1	Acceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 1	Deceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 1	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 1	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk in 1	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 1	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Rate 2	Acceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 2	Deceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 2	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 2	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk in 2	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 2	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Rate 3	Acceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
Decel Rate 3	Deceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
Accel Jerk in 3	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Accel Jerk out 3	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk in 3	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
Decel Jerk out 3	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
A3, Multistep Ref					
Speed command 1	Multi-Step Speed command #1	ft/m	-3000 to 3000	0	* 4
Speed command 2	Multi-Step Speed command #2	ft/m	-3000 to 3000	0	* 12
Speed Command 3	Multi-Step Speed command #3	ft/m	-3000 to 3000	0	45
Speed command 4	Multi-Step Speed command #4	ft/m	-3000 to 3000	0	*
Speed Command 5	Multi-Step Speed command #5	ft/m	-3000 to 3000	0	0
Speed command 6	Multi-Step Speed command #6	ft/m	-3000 to 3000	0	0
Speed Command 7	Multi-Step Speed command #7	ft/m	-3000 to 3000	0	0

Table 3.3 HPV 600 Drive Parameters, Closed Loop

Speed command 8	Multi-Step Speed command #8	ft/m	-3000 to 3000	0	*
Speed Command 9	Multi-Step Speed command #9	ft/m	-3000 to 3000	0	0
Speed Command 10	Multi-Step Speed command #10	ft/m	-3000 to 3000	0	0
Speed Command 11	Multi-Step Speed command #11	ft/m	-3000 to 3000	0	0
Speed Command 12	Multi-Step Speed command #12	ft/m	-3000 to 3000	0	0
Speed Command 13	Multi-Step Speed command #13	ft/m	-3000 to 3000	0	0
Speed Command 14	Multi-Step Speed command #14	ft/m	-3000 to 3000	0	0
Speed Command 15	Multi-Step Speed command #15	ft/m	-3000 to 3000	0	0
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	90	90
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	*
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	50	*
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

Table 3.3 HPV 600 Drive Parameters, Closed Loop

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 1 Serial Serial+extern	External TB1	External TB
Hi/Lo Gain Src	High / low gain change switch source	-	External TB 1 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 1	None	External TB
Pre Torque Source	Determines if a pre torque command is used and if used, 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
Ptorq Latch Clck	Determines source of pre torque latch control (if used)	-	External TB 1 Serial	External TB1	External TB
Fault Reset Src	Fault reset source	-	External TB 1 Serial Automatic	External TB1	External TB
Overspd Test Src	Determines external logic source to trigger overspeed test	-	External TB 1 Serial	External TB1	External TB
Brake Pick Src	If drive controls mechanical brake, determines source of brake pick command	-	Internal Serial	Internal	Internal
Brake Pick CNFM	Determines if a logic input is used for brake pick confirm	-	None External TB 1	None	None
Brake Hold Src	If drive controls mechanical brake, determines source of 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 source that signals torque ramp down stop (if used)	-	External TB 1 Run logic Serial	External tb1	External TB
Brk Pick Flt	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, sets source of torque command	-	None Serial	None	None
Dir Confirm	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

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Table 3.3 HPV 600 Drive Parameters, Closed Loop

S-Curve Abort	Addresses how S-Curve Speed Reference Generator handles a reduction in speed command before S-Curve Generator has reached target speed.	-	Enabled Disabled	Disabled	Disabled
Fast Flux	Reduces starting takeoff time by reducing motor fluxing time	-	Enabled Disabled	Enabled	Enabled
Main DIP Ena	Enables Mains DIP Speed (A1) parameter which reduces speed when a UV alarm (low voltage) is declared	-	Enabled Disabled	Disabled	Disabled
DB Protection	Dynamic braking Protection fault or alarm selection		Fault Alarm	Fault	Fault
Encoder Fault	Temporarily disables the Encoder Fault	-	Enabled Disabled	Enabled	Enabled
Stopping Mode	Determines 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 Imme-diate
Auto Stop	Auto Stop Function enable	-	Disable Enable	Disable	Disable
Serial Mode	Serial Protocol selection	-	None Mode 1 Mode 2 Mode 2 test	Mode 1	None
SER2 FLT Mode	Defines reaction to a serial communication fault while in Serial Mode 2 (Only serial mode 2)	-	immediate	Immediate Run remove rescue	immediate
DRV Fast Disable	Addresses how fast drive responds to removal of Drive Enable logic input.	-	Disable	Disable Enable	Disable
MLT-SPD to DLY1	Assigns multi-step speed command to recognition delay timer 1	-	None	None mspd1- mspd15	None
MLT-SPD to DLY2	Assigns multi-step speed command to recognition delay timer 2	-	None	None mspd1- mspd15	None
MLT-SPD to DLY3	Assigns multi-step speed command to recognition delay timer 3	-	None	None mspd1- mspd15	None
MLT-SPD to DLY4	Assigns multi-step speed command to recognition delay timer 4	-	None	None mspd1- mspd15	None
C2, Logic Inputs					
Log In 1 TB1-16	Logic input 1	-	-	DRIVE ENABLE	DRIVE ENABLE
Log In 2 TB1-17	Logic input 2	-	-	RUN	CONTACT CONFIRM
Log In 3 TB1-18	Logic input 3	-	-	FAULT RESET	FAULT RESET
Log In 4 TB1-19	Logic input 4	-	-	UP/DN	STEP REF B0
Log In 5 TB1-20	Logic input 5	-	-	S-Curve Sel 0	STEP REF B1

Table 3.3 HPV 600 Drive Parameters, Closed Loop

Log In 6 TB1-21	Logic input 6	-	-	STEP REF B0	STEP REF B2
Log In 7 TB1-22	Logic input 7	-	-	STEP REF B1	STEP REF B3
Log In 8 TB1-23	Logic input 8	-	-	STEP REF B2	RUN DoWN
Log In 9 TB1-24	Logic input 9	-	-	External Fault 1	RUN UP
C3, Logic Outputs					
Log Out 1 tb1-9	Logic Output 1	-	-	Ready To Run	SPEED REG RLS
Log Out 2 tb1-10	Logic Output 2	-	-	Run Com-mand	NO FUNC-TION
Log Out 3 tb1-11	Logic Output 3	-	-	MTR OVER-LOAD	NO FUNC-TION
Log Out 4 tb1-12	Logic Output 4	-	-	READY TO RUN	NO FUNC-TION
Relay Coil 1	Relay 1 Function Selection	-	-	FAULT	READY TO RUN
Relay Coil 2	Relay 2 Function Selection	-	-	SPEED REG RLS	SPEED REG RLS
C4, Analog Outputs					
Analog Out 1	Analog Output 1	-	-	TORQUE REF	TORQUE REF
Analog Out 2	Analog Output 2	-	-	SPEED FEEDBK	SPEED FEEDBK
Utility U0					
U1, Password	Password	-	-	000000	000000
U2, Hidden Items	Enable or disable hidden parameters	-	Enable Disable	ENABLE	ENABLE
U3, Unit	Unit for parameters	-	English Metric	ENGLISH	ENGLISH
U4, Overspeed Test	Allows overspeed test during inspection	-	Yes No	No	No
U5, Restore Dflts	Reset all parameters to default values	-			
U6, Drive Info	Drive information (Drive Version, Boot Version and Cube ID)	-	Boot Version: Drive: Cube ID:		
U7, HEX Monitor	Hex Monitor	-			
U8, Language Sel	Selects Language for operator text	-	English deutsch	English	English
U9, BASICS Operation	Selects Open-Loop or Closed-Loop drive Operation	-	Open Loop Closed Loop	Open Loop	

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HPV 600 Drive Faults, Closed Loop

If a fault occurs in the drive, the Fault LED on the front panel lights. To access drive faults using the hand held programmer, go to the **FAULTS F0** menu. This menu has two sub-menus, **ACTIVE FAULTS F1** and **FAULT HISTORY F2**. Use the arrow keys to access the desired menu. If the drive is faulted, **ACTIVE FAULTS** will display the present fault. **FAULT HISTORY** will display faults that have occurred previously.

Following is a list of detected drive faults. Listed after each fault is a description of what the fault is and suggested corrective action.

Table 3.4 HPV 600 Drive Faults, Closed Loop

Fault	Description	Corrective Action
AtoD Fault	Analog to digital converter on control board not responding.	Cycle power to controller and see if fault clears. If not, replace Control board.
Brake Alarm	Dynamic brake resistor overcurrent.	Confirm motor data is correctly entered, braking resistance is connected and sized correctly, and car is balanced correctly. **NOTE:** *After drive stops, alarm becomes a Brake IGBT Fault.*
Brk Hold Fault	Brake hold state does not match the commanded state.	Disabled.
Brk IGBT Fault	Brake IGBT overcurrent.	Overcurrent of braking IGBT. Fault latches, but does not shut car down until it stops to allow passengers to safely exit. Confirm motor data correctly entered into drive, braking resistance connected and sized correctly, car balanced correctly.
Brk Pick Fault	Brake pick state does not match the commanded state.	Disabled.
Bridge Fault	The power module is detecting an overcurrent or over-temperature condition.	**Overcurrent:** Check sizing and connection of dynamic braking resistor. Check for short in motor wiring or windings. **Over-temperature:** Check drive cooling fan and heatsink. Replace drive if fault cannot be corrected with above measures.
Charge Fault	DC Bus has not charged.	DC Bus has not reached desired stabilized voltage level within 2 seconds. Check incoming AC power. If OK, replace drive.
Comm Fault Invalid Checksum	The programmer received four consecutive invalid messages.	Possible noise or bad programmer connector. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Comm Fault No Drive Handshake	The programmer lost communications with the drive Control board.	Possible noise or bad connector for programmer. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Contactor Fault	Contactor state does not match the commanded state.	The drive has turned on the command to close the main contactor and the Contactor Confirm signal is not present for the amount of time specified by the **Contact Flt Time** parameter.
Cube Data Fault	The drive parameters are invalid.	Check all drive parameters. Cycle power to the drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** *The **Restore Defaults** selection will require all drive parameters to be set to their correct values.*
Cube ID Fault	The drive identification is invalid.	Check all drive parameters. Cycle power to the drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:***The **Restore Defaults** selection will require all drive parameters to be set to their correct values.*

Table 3.4 HPV 600 Drive Faults, Closed Loop

Curr Reg Fault	Actual current does not match the commanded current.	Check incoming power. Check motor parameters and verify proper setting. Check motor connections and motor windings for open circuit. Check main contactor for bad contact. If OK, bad current sensor or bad drive.
DCU Data Fault	The DCU parameters are not set correctly.	Check all drive parameters. Cycle power to the drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** The **Restore Defaults** selection will require all drive parameters to be set to their correct values.
Dir Conflict	The commanded direction from the analog input does not match the polarity of the **Up/Dwn** input.	Not used.
Drv Overload	The drive has exceeded the overload curve.	Check motor connections, main contactor contacts, and motor windings. Make sure the brake is lifting. Verify encoder is properly connected and feedback matches motor speed.
Extrn Fault 1	External Fault 1 input is activated.	Not used.
Extrn Fault 2	External Fault 2 input is activated.	Not used.
Extrn Fault 3	External Fault 3 input is activated.	Not used.
Extrn Fault 4	External Fault 4 input is activated.	Not used.
Fan Alarm	The heatsink cooling fan is not operating.	Check fan and connections. Clean heatsink.
Fuse Fault	The DC Bus fuse on the drive is open.	Check fuse. If OK, check motor connections. Check motor for continuity from windings to ground. If OK, replace drive.
Ground Fault	The sum of all phase currents has exceeded 50% of the rated amperage of the drive.	Disconnect motor from drive. Cycle power to drive. If problem clears, possible bad motor or wiring. If problem does not clear, possible bad system ground or bad drive.
Hit Torque Limit	The measured current is equal or greater than the torque limit setting.	Verify car is balanced correctly. Verify motor and drive sizing. Can be delayed by increasing the value of the **TRQ LIM MSG DLY (A1)** parameter.
Mtr id Fault Mtr Data Fault	Invalid motor parameters.	Check all drive parameters. Cycle power to the drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:**The **Restore Defaults** selection will require all drive parameters to be set to their correct values.
Mtr Overload	Motor has exceeded the motor overload curve.	Verify correct balancing of car. Check for dragging brake or mechanical bind in machine or hoistway. Verify correct setting of **OVLD START LEVEL (A1)** and **OVLD TIME OUT (A1)** parameters. Check for bad motor.
Overcurr Fault	Phase current exceeded 250% of rated current.	Verify car is balanced correctly. Verify proper motor and drive sizing. Check for possible bad motor or motor connection. Check for bad main contactor contacts. Check for mechanical bind in car or machine.
Overspeed Fault	Motor speed exceeded user entered parameters.	Check parameters **OVERSPEED LEVEL (A1)** and **OVERSPEED TIME (A1)**. If OK, check tracking of motor to desired speed and tune regulator for better performance.
Overtemp Fault	The heatsink temperature is too high.	Drive heatsink temperature has exceeded 105ºC (221ºF). Check fans on drive; make sure airflow is adequate.

Table 3.4 HPV 600 Drive Faults, Closed Loop

Overvolt Fault	The DC Bus voltage is too high.	Voltage on the DC Bus exceeded 850 volts on a 460-volt drive or 425 volts on a 230-volt drive. Check braking resistance connected and sized properly. Check for possible high AC line. Confirm input voltage to drive. If everything checks OK, possible bad braking IGBT. Drive unit needs to be replaced.
PCU Data Fault	PCU parameters not correct.	Check all drive parameters. Cycle power to drive. If fault recurs, go to the **Utility** menu and select **Restore Defaults**. If fault persists, replace Control board. **Note:** The **Restore Defaults** selection will require all drive parameters to be set to their correct values.
Phase Fault	Open motor phase.	Check motor, motor connections, motor windings, and main contactor contacts.
Setup Fault 1	Rated motor speed, poles and frequency not set correctly.	Parameters **RATED EXCIT FREQ (A5)**, **RATED MTR SPEED (A5)** and **MOTOR POLES (A4)** do not satisfy the formula: **9.6 < {120 (Excit Freq)} - {(Motor Poles)(Motor Speed)} < 1222.3**
Setup Fault 3	Motor Poles parameter not set correctly.	**MOTOR POLES (A4)** must be set to an even number.
Setup Fault 5	The Rated Motor Power and Rated Motor Voltage parameters are not set correctly.	Check **RATED MOTOR PWR (A4)** and **RATED MTR VOLTS (A4)**. They must satisfy the formula: **(.07184) {(Motor Pwr) / (Motor Voltage)} Drive Current Rating**
Setup Fault 6	Multi-Step speed reference exceeds contract speed.	Check **SPEED COMMAND 1** through **SPEED COMMAND 16** and **CONTRACT CAR SPD** parameters.
Setup Fault 7	Run logic inputs are not correctly defined.	Check **LOG IN 1 TB1-16** through **LOG IN 9 TB1-24** for correct setting.
Setup Fault 8	DIR CONFIRM (C1) enabled. RUN UP, RUN DOWN, not assigned as logic inputs. SPD COMMAND SRC (C1) not set to ANALOG INPUT.	Not used.
Setup Fault 9	Incorrect setting of motor parameters.	Motor parameters must satisfy the following formulas: **MOTOR MIN VOLTS < MOTOR MID VOLTS < RATED MTR VOLTS MOTOR MIN FREQ < MOTOR MID FREQ < RATED EXCIT FREQ.** Confirm settings.
Stall Test Fault	Motor current exceeds value of **STALL TEST LVL** parameter for more than the time specified by **STALL FAULT TIME**.	Confirm correct setting of **STALL TEST LVL (A1)** and **STALL FAULT TIME (A1)**. Check motor, machine, and brake for possible mechanical bind. Check correct setting of motor parameters. Check for excessive motor current.
Undervolt Fault	DC Bus voltage low.	Voltage on the DC Bus has dropped below user-entered values for **INPUT L-L Volts (A4)** and **UV FAULT LEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbances on the AC line.
Undervolt Alarm	DC Bus voltage low during run.	DC bus voltage has dropped below user-entered values for **INPUT L-L Volts (A4)** and **UV ALARM LEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbances on the AC line.

HPV 600 High Speed Adjustment — Closed Loop

The drive should be running on inspection speed at this point. When commanded to run in the up direction, the car should run up, when commanded to run down, the car should run down. Use a hand tach to confirm that the speed displayed on the drive programmer at **DISPLAY D0**, **ELEVATOR DATA D1**, **SPEED REFERENCE** exactly matches the speed of the car.

While observing the hand tach, run the car up and down in the middle section of the hoistway. Modify **CONTRACT MTR SPEED** under the **ADJUST A0**, **MOTOR A5** menu to exactly achieve the speed displayed at **SPEED REFERENCE**.

Car Balancing

In order for the drive to perform properly, the car must be properly balanced. Geared cars are typically balanced with 40 – 50% of the cars rated capacity. To confirm this:

1. Access the car top. Run the car on inspection to the center of the hoistway. Stop the car so the crosshead on the counterweight is exactly adjacent to the crosshead on the car.
2. Place a chalk mark on the cables in the machine room and mark the hoist motor so that while the car is run from the machine room you will be able to tell when the car passes through the center of the hoistway.
3. Move the car to a convenient floor. Place 40% of the cars rated capacity in the car.
4. On inspection, run the car so it is about 10 feet above the center of the hoistway.
5. Place an Amprobe on one of the leads to the hoist motor.
6. While observing the display on the Amprobe, run the car down on inspection operation through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
7. Place the car about 10 feet below the center of the hoistway.
8. While observing the display on the Amprobe, run the car up through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
9. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running up was greater than the value running down, the car is too heavy. Remove 100 pounds of weight from the car and repeat previous steps until the recorded values are equal but of opposite polarity.
10. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running down was greater than the value running up, the car is too light. Add 100 pounds of weight to the car and repeat preceding steps until the recorded values are equal but of opposite polarity.
11. When the values are equal but of opposite polarity, the car is balanced. Check how much weight is in the car. It should be between 40 and 50% of the cars rated capacity. If not, the counterweighting needs to be adjusted. If the car is too heavy, weight needs to be added to the counterweight to get the car balanced between 40 and 50% of rated capacity. If the car is too light, weight needs to be removed from the counterweight to get it balanced between 40 and 50% of rated capacity. **Do not proceed with the adjustment <u>process until the car is properly balanced.</u>**

Motor Parameter Adjustments

In order to perform correctly, the drive needs to be programmed for correct motor values and volts/hertz ratio so the motor will not stall with a load or at slow speed. The following procedure establishes volts/hertz ratio.

1. Place full load into the car.
2. Run the car up and down on inspection speed.
3. Using a hand tach, monitor the speed of the car. If the car is moving at less than the inspection speed programmed at **SPEED COMMAND 3 (A3)**, increase **CONTRACT MTR SPD (A1)**. If the car is moving faster than the inspection speed programmed at **SPEED COMMAND 3 (A3)**, decrease **CONTRACT MTR SPD (A1)**.
4. Repeat until the car is moving at exactly the speed programmed at **SPEED COMMAND 3 (A3)**.

Speed Curve Setting and Adjustment

The Magnetek HPV 600 drive has an internal speed curve algorithm that controls acceleration, deceleration, and jerk rates. There are four independently selectable speed curves. This system uses only the first.

Preliminary setting of speed curve parameters was done in the drive programming section. The values entered at that time are designed to be somewhat aggressive to ensure that the car does not overshoot the floors, but rather comes in slow. This will prevent the car from running into the pit or the overhead until the final values for the speed curve are entered.

1. Place a balanced load in the car.
2. Disable the doors and place a car call two floors away from the present position of the car (one floor away if the car speed is 200 feet per minute or less).

Note

Keep the elevator away from the terminal floors at this time.

3. While the car is running, monitor speed with a hand tach. The car should be running at contract speed (+ 5%). If not, adjust **CONTRACT MTR SPEED (A1)** to obtain the correct speed.
4. Observe deceleration as the car approaches the floor. The car should decelerate rapidly and there should be two noticeable steps of speed prior to stopping at the floor. If there are not, confirm that the tape reader is properly installed and the slowdown magnets are placed the correct distance from the floor.
5. Change **DECEL RATE 0 (A2)** to 3.5 ft/s^2. This will yield a slower rate of deceleration and less approach distance to the floor.
6. Again run the car and observe approach into the floor. If the car still has too much slow down distance, decrease **DECEL RATE 0 (A2)** to 0.1 ft/s^2 less than the present rate.
7. Repeat until the car is coming into the floor with about 3 to 6 inches of approach.
8. Modify the **DECEL JERK IN 0 (A2)** and **DECEL JERK OUT 0 (A2)** parameters for a smooth approach to the floor with 1 to 2 inches of sustained leveling. If there is not enough sustained leveling, the car may overshoot intermittently and relevel.

9. Modify the **ACCEL JERK OUT 0 (A2)** rate to the same value that was entered into the **DECEL JERK IN 0 (A2)** parameter.
10. If the rated speed of the car is greater than 200 feet per minute, make a one floor run. Observe the approach into the floor. If the approach is longer than the multi-floor runs, increase the **SPEED COMMAND 4 (A3)** parameter until the approach on a one floor run is the same as the multi-floor run. If the approach is quicker, decrease the **SPEED COMMAND 4 (A3)** parameter until the approach on a one floor run is the same as the multi-floor run.
11. The speed curve parameters have been set up. Ride the car and observe acceleration, deceleration, and jerk rates. If any rate seems too sharp, make that value smaller. Note that changing values in the deceleration profile will result in a different approach into the floor. You may need to modify other deceleration parameters to get the desired ride.
12. Observe floor stops. Make multi-floor runs and one floor runs into a floor at the center of the hoistway. If the car is stopping short of the floor (too high in the down and too low in the up), increase the **SPEED COMMAND 1 (A3)** parameter. This will result in faster leveling speed and cause the car to travel farther on before stopping.
13. If the car is stopping past the floor (too high in the up and too low in the down), decrease the **SPEED COMMAND 1 (A3)** parameter. This will result in slower leveling speed and cause the car to travel a shorter distance before stopping.

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Note

If you are unable to achieve consistent floor stops by modifying leveling speed, the brake may not be adjusted properly. Confirm that all brake voltages are set correctly and that the resistance around the brake coil is connected properly. The resistance can be changed to control brake set. Less resistance causes a slower drop. More resistance causes a quicker drop.

The car should now be running at contract speed with accurate floor stops and a smooth ride. Remove all weights from the car and, staying away from the terminal floors, make one floor runs and multi-floor runs up and down.

Add weight to the car, approximately 100 pounds at a time. Staying away from the terminal floors, observe one floor and multi floor runs to be sure that the car rides well under all load conditions. Keep adding weight until the car has full load, less the weight of anyone riding the car.

HPV 600 Adaptive Tune

If the motor is old and no data is available for it, an adaptive tune must be performed. The adaptive tune requires that the car is run at contract speed and is capable of lifting full load.

1. Select the “Default Motor” option for the Motor ID parameter. This will load default values into the motor data parameters to prepare the drive for the adaptive tune.
2. Place a balanced load in the car. Reduce the car speed to 70% of contract speed by changing the value of **SPEED COMMAND 8 (A3)**.
3. Run the car from top to bottom and back. While the car is running, monitor the motor torque under **Display Power Data (D2)**. The torque should be between + 15%. If not, verify that the car is balanced correctly.

Note

If the car does not have compensation, motor torque will vary depending on car position in the hoistway. Verify that the motor torque is between + 15% as the car passes through the center of the hoistway.

4. With the car running from top to bottom and back, observe **EST NO LOAD CURR** found under **Display Power Data (D2)**. Enter this estimated value into the parameter**% NO LOAD CURR (A5)**.
5. Repeat until the value of the **EST NO LOAD CURR** and the**% NO LOAD CURR (A5)** are equal.
6. Verify that motor torque is still + 15% and flux reference is still 100%. If not, adjust the **% NO LOAD CURR (A5)** as needed.
7. Increase car speed to 100% of contract speed. With a balanced load in the car, run from top to bottom and back.
8. While the car is running, observe **EST NO LOAD CURR** found under **Display Power Data (D2)**. Compare this value to the value found under **% NO LOAD CURR** found under **Adjust Motor (A5)**.
9. If the **EST NO LOAD CURR** value is 2% larger than the **% NO LOAD CURR** then increase **FLUX SAT SLOPE 2** by 10%. If the **EST NO LOAD CURR** and **% NO LOAD CURR** values are within 2%, continue.
10. Repeat until **EST NO LOAD CURR** and **% NO LOAD CURR** are within 2%.
11. Place a full load in the car. Run the car at contract speed from top to bottom and back.
12. Observe **EST RATED RPM** found under **Display Power Data (D2)**.
13. Enter this value into **RATED MTR SPEED** found under **Adjust Motor (A5)**.
14. Remove the full load from the car and place balanced load in it. Run the car from bottom to top and back.
15. Observe **EST INERTIA** found under **Display Elevator Data (D1)**. Write down the value for up and down.
16. Average the up and down values of **EST INERTIA**. Enter this value into **INERTIA** found under **Adjust Drive (A1)**.
17. Remove weights from the car. Ride the car up and down, adding 100 pounds of weight at a time. Observe one floor, two floor, and multi floor runs to be sure that the car rides well under all load conditions.

Normal Speed Learn Operation

You must now perform a normal speed learn operation using the controls on the Limit Board. Please refer to the learn operation information for your particular Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

Magnetek HPV 900 AC Vector Drive

This section describes:

HPV 900 Startup

The Magnetek HPV 900 is an AC Vector drive. In order to obtain optimal ride quality and performance, the drive must be tuned to the motor. The tuning process requires that you be familiar with the drive and AC motors. If you have never worked on this drive, or another AC Vector drive, please contact Motion Control Engineering for assistance.

Refer to the Magnetek HPV 900 Vector Elevator Drive Technical Manual for detailed explanation of drive features. The HPV 900 is fully digital with configurable inputs, outputs, and modes of operation. This procedure describes configuring the HPV 900 for the Tricon controller. Due to the complexity of drive systems, it is not possible to cover all potential problems or possibilities. If you encounter any difficulties, please contact Engineering.

Note

Use the Magnetek manual as a reference, but follow the start up and adjusting procedures described here.

Before the controller and drive were shipped, the entire system was tested at the factory. All drive parameters were preset based on information provided in the controller order form. The drive should run on inspection operation with very little effort. If not, verify that the information given to MCE was correct. If not, contact Engineering for assistance.

System Overview

The control system uses the internal speed algorithm of the Magnetek HPV 900 drive. Adjustments to the accel rate, jerk rates, and decel rates are made through the drive.

Drive Programming

The drive has been modified to meet MCE specifications. If replacement of the drive is ever required please contact MCE Technical Support. MCE will not accept any drive for repair under warranty without a Return Material Authorization (RMA) number issued by Technical Support. Removing boards from the drive without authorization may void the manufacturer warranty.

Once the controller has been powered up, the drive must be programmed to operate correctly with the equipment on the job site. MCE has pre-programmed the drive based on the information provided in the electrical survey, but it is important to confirm **ALL** parameters before attempting to run the car.

The drive may fault on initial power up due to incorrectly set parameters. This is normal, and may be ignored at this time.

Verify that the voltage on the motor nameplate matches the voltage input to the drive. If not, contact MCE Technical Support before proceeding.

Confirm that the three leads from the controller to the motor are connected. If there are more than three motor leads, make sure that the motor is wired in a 'wye' configuration with correct field rotation, or follow the motor manufacturer recommendations.

Locate the test sheets shipped with the controller. These sheets list the drive parameters calculated for your installation.

Drive Parameters

Before attempting to run the drive, confirm that the parameters are set correctly. Verify that the parameters in the drive match those on the Test sheets. For information on using the programming unit, please refer to the Magnetek HPV 900 manual.

The following parameters are the HPV900 key parameters and parameters which have been changed from the drive default settings. Refer to the HPV 900 manual for a full parameter description.

Using the HPV900 Drive Programmer The drive programmer is used to program the drive and display drive data. There are three menu levels in the drive. They are the Menu level, the Sub-menu level, and the Entry level. There are five keys on the front of the programmer. These keys perform different functions, depending upon the active menu level.

When the programmer is at the Main Menu level, the left and right arrows move the programmer between the Main Menu selections. The up and down keys move the programmer into the various Sub-Menus at each Main Menu selection. Pressing the Enter key will move the programmer into the Sub-Menu currently displayed on the programmer.

When the programmer is at the Sub-Menu level the up and down arrows display various parameters in the Sub-Menu. Pressing the Escape key will move the programmer back to the Main Menu level. Pressing the Enter key while at the Sub-Menu level moves the programmer into the Entry level to modify the displayed parameter.

At the Entry level, the left and right arrows move a cursor to highlight data. When a digit is highlighted, pressing the up arrow will increase the value and pressing the down arrow will decrease it. Pressing the Enter key will save the value displayed on the programmer. Pressing the Escape key will move the programmer back to the Sub-Menu level.

Parameter Settings

The following parameters must be checked to confirm that they are set correctly for your application. Note that many parameters are not listed because their default values will not need to be modified or they are not used in this application.

Adjust A0 Menu

1. Go to the sub menu, **Drive A1**.
2. **CONTRACT CAR SPD**. Rated contract speed of the car. Set to the speed in feet per minute for which the car is rated.
3. **CONTRACT SPD**. Set to the motor RPM that will make the car run at contract speed. This is not the data from the motor nameplate. This parameter sets the speed at which the drive will run the motor when the car is commanded to run at contract speed.
4. Skip down to **ENCODER PULSES**. Set to the number of pulses per revolution from the encoder nameplate.
5. Go to the **S-Curves A2** sub-menu. The first parameter is **ACCEL RATE 0**. Desired acceleration rate of speed curve function. Set to 2.5 ft./s^2.
6. **DECEL RATE 0**. Desired deceleration rate of speed curve function. Set to 4.0 ft./s^2.
7. **ACCEL JERK IN 0**. Desired initial jerk rate of speed curve function. Set to 3.0 ft./s^2.
8. **ACCEL JERK OUT 0**. Desired jerk rate when transitioning from acceleration to contract speed. Set to 3.0 ft./s^2.
9. **DECEL JERK IN 0**. Desired jerk rate when transitioning from contract speed to deceleration. Set to 4.0 ft./s^2.
10. **DECEL JERK OUT 0**. Desired jerk rate when transitioning from deceleration to leveling speed. Set to 4.0 ft./s^2.

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The remaining parameters in the **S-Curves A2** sub-menu are not used.

1. Access the **Multistep Ref A3** sub-menu. The first parameter is **SPEED COMMAND 1**. Sets the leveling speed of the car. Set to 3.5 ft./min.
2. **SPEED COMMAND 2**. Sets approach speed of the car. Set to 12.0 ft./min.
3. **SPEED COMMAND 3**. Sets inspection speed of the car. Set to 45.0 ft./min.
4. **SPEED COMMAND 4**. Sets contract speed of the car if the car speed is 200 ft./min. or less. Set to the cars rated speed. If the car is rated for a speed greater than 200 ft./min., set to 200 ft./min.
5. If the cars rated speed is greater than 200 ft./min. go to the **SPEED COMMAND 8** parameter, otherwise go to step 7.
6. Set **SPEED COMMAND 8** to the contract speed of the car.

The remaining parameters in the **Multistep Ref A3** sub-menu are not used.

1. Access the **Power Convert A4** sub-menu.
2. Go to the **INPUT L-L VOLTS** parameter. This parameter tells the drive what the input line to line voltage is. This value is used by the drive to declare a low line voltage fault. Set to the nominal AC voltage at the input to the drive.

3. Go to the **Adjust A0** sub-menu **Motor A5**. The first parameter is **MOTOR ID**. To obtain this value, determine the motor speed at the rated excitation frequency without any slip. The formula is:

$$\frac{\textbf{120 * Rated Frequency}}{\textbf{No Slip Motor RPM}}$$

If you cannot determine the motor speed with zero slip, take the motor nameplate RPM and use it in the formula. Round the number up to the nearest even whole number to determine motor poles. If the motor that the drive is connected to has a synchronous (no slip) speed of 900 or 1200 RPM, set this parameter to **6 POLE DFLT**. If the motor has a synchronous speed of 1800 RPM, set this parameter to **4 POLE DFLT**.

4. **RATED MTR PWR**. Tells the drive rated motor horsepower or kilowatts. Set to the value on the motor nameplate.
5. **RATED MTR VOLTS**. Tells the drive rated motor volts. Set to the value from the nameplate on the motor.
6. **RATED EXCIT FREQ**. Tells the drive the frequency at which the motor is excited to obtain motor nameplate rated RPM. Typically this is 60 Hz. Set to the value from the motor nameplate or the manufacturer data sheet.
7. **MOTOR POLES** parameter. Tells the drive how many poles the motor has. To obtain this value, refer to step 20 above. If the synchronous speed of the motor is 900 RPM, set this parameter to **8** poles. If the synchronous speed of the motor is 1200 RPM, set this parameter to **6** poles. If the synchronous speed of the motor is 1800 RPM, set this parameter to **4** poles.

Note

This value must be an even number or a Setup Fault will occur.

8. **RATED MTR SPEED**. Tells the drive what speed the motor should be turning when it is excited at its rated frequency and producing rated power. Set to the value from the motor nameplate or the manufacturer data. If this value is not available, temporarily set it for the value calculated by the following formula:

(No Slip Motor RPM) X.98

The final setting can be calculated by the drive by performing an adaptive tune.

Note

This value must be less than 900 RPM on 8 pole motors, 1200 RPM on 6 pole motors, and 1800 RPM on 4 pole motors or a drive set up fault will occur. Reuland motors have the synchronous speed on the motor nameplate. Setting this parameter to synchronous speed will result in a set up fault. The correct value is approximately synchronous speed times 0.9833.

9. **% NO LOAD CURR**. Tells the drive what current is required to turn the motor at rated speed with no load. This can be determined from the motor manufacturer data sheets on new motors. If it is not available, **temporarily** set it to **50**%. The final setting can be calculated by the drive during adaptive tuning.

The remaining parameters in the **Motor A5** sub-menu do not need to be modified from their default values.

Configure C0 Menu

1. Access the **User Switches C1** sub-menu.
2. **SPEED COMMAND SRC**. Set to **MULTI-STEP**.
3. **RUN COMMAND SRC**. Set to **EXTERNAL TB1**.
4. **SPD REF RELEASE**. Set to **REG RELEASE**.
5. **CONT CONFIRM SRC**. Set to **EXTERNAL TB1**.

The remaining parameters in the **User Switches C1** sub-menu do not need to be modified from their default values.

1. Access the **Logic Inputs C2** sub-menu. The first parameter is **LOG IN 1 TB1-16**. Set to **DRIVE ENABLE**.
2. **LOG IN 2 TB1-17**. Set to **RUN**.
3. **LOG IN 3 TB1-18**. Set to **FAULT RESET**.
4. **LOG IN 4 TB1-19**. Set to **STEP REF B0**.
5. **LOG IN 5 TB1-20**. Set to **STEP REF B1**.
6. **LOG IN 6 TB1-21**. Set to **STEP REF B2**.
7. **LOG IN 7 TB1-22**. Set to **STEP REF B3**.
8. **LOG IN 8 TB1-23**. Set to **UP/DWN**.
9. **LOG IN 9 TB1-24**. Set to **CONTACT CFIRM**.
10. Access the **Logic Outputs C3** sub-menu. The first parameter is **LOG OUT 1 TB1-5**. Set to **CLOSE CONTACT**.
11. **LOG OUT 2 TB1-7**. Set to **READY TO RUN**.
12. **LOG OUT 3 TB1-9**. Set to **SPEED REG RLS**.
13. **LOG OUT 4 TB1-11**. Set to **SPEED REG RLS**.
14. **RELAY COIL 1**. Set to **READY TO RUN**.

The HPV900 drive is now correctly configured.

Running the Car

1. Attempt to run the car up using the inspection up/down buttons. Hold the up button until the car starts to move. If the motor moves in the down direction, stop the car. Using the programmer, access the **Configure C0** menu. Go to User **Switches C1** and change parameter **Motor Rotation** from Forward to Reverse.
2. Again run the motor. Confirm that the motor turns in the correct direction to move the car up or down.
3. Using the programmer, access the **Display D1** menu. Monitor parameter **Speed Reference**. Run the car in the down direction. The speed reference displayed on the drive should be negative. Using the inspection up button, run the car in the up direction. The speed reference should be positive.
4. In the **Display D1** menu, monitor the **Speed Feedback** parameter. Run the car in the down direction. The speed feedback should be negative. If not, reverse the A and A- signals from the encoder to the drive.
5. While using the inspection up/down buttons to run the car, use a hand tach to check car speed. It should be moving at approximately the same speed as that displayed on the drive. If not, using the drive programmer, access the **Adjust A0** menu. Access User **Switches A1**. Adjust the **Contract Motor Spd** parameter until the car is running at exactly the same speed as displayed by **Speed Feedback**.

Drive Parameter Reference

The following table describes drive parameters and provides a recommended setting for each. Refer to the previous section for initial programming. Please refer to “HPV 900 Startup” on page 3-41.

Table 3.5 HPV 900 Drive Parameters

No.	Parameter	Description	Unit	Range	MCE Defaults	Field / MCE Set
		Adjust A0				
A1	**Drive**					
	Contract Car Spd	Elevator Contract Speed	fpm	0 - 3000	0.1	*
	Contract Mtr Spd	Motor Speed at contract speed	rpm	50 - 3000	1130	*
	Response	Speed regulator sensitivity	rad/sec	1.0 - 20.0	10	10
	Inertia	System inertia	sec	0.25 - 50.00	2.0	2.0
	Inner Loop Xover	Inner speed loop crossover frequency (with Ereg speed regulator)	rad/sec	0.1 - 20.0	2.0	2.0
	Gain Reduce Mult	Speed regulator response in low gain mode	%	10 - 100	100	100
	Gain Chng Level	Speed level to change to low gain mode (with internal gain switch)	%	0 - 100.0	100	0
	Tach Rate Gain	Helps with rope resonance issues	%	0 - 30.0	0	0
	Spd Phase Margin	Sets phase margin of speed regulator (with PI speed regulator)	o	45 - 90	80	80
	Ramped Stop Time	Time to ramp from rated torque to zero (with torque ramp down stop function)	sec	0 - 2.50	0.20	0.20
	Contact Flt Time	Time before contactor fault is declared	sec	0.10 - 5.00	0.50	0.80
	Brake Pick Time	Time before brake pick fault declared	sec	0 - 5.00	0.00	1.0

Table 3.5 HPV 900 Drive Parameters

	Brake Hold Time	Time before brake hold fault declared	sec	0 - 5.00	0.00	0.20
	Overspeed Level	Overspeed fault detection threshold	%	100.0 - 150.0	125.0	115
	Overspeed Time	Time before overspeed fault declared	sec	0 - 9.99	1.00	1.00
	Overspeed Mult	Multiplier for overspeed test	%	100 - 150	100	125
	Encoder Pulses	Encoder counts per revolution	ppr	600 - 10000	1024	1024
	Spd Dev Lo Level	Range around speed reference for speed deviation low logic output	%	00.1 - 10.0	10	20
	Spd Dev Time	Time before speed deviation low logic output is true	sec	0 - 9.99	1.00	0.5
	Spd DevHi Level	Level for declaring speed deviation alarm	%	0 - 99.9	20.0	20.0
	Spd Command Bias	Subtracts an effective voltage to actual speed command voltage	volts	0 - 6.00	0.00	0.00
	Spd Command Mult	Scales analog speed command	-	0.90 - 3.00	1.00	1.00
	Pre Torque Bias	Subtracts an effective voltage to actual pre torque command voltage	volts	0 - 6.00	0.00	0.00
	Pre Torque Mult	Scales pre-torque command	-	-10.00-10.00	1.00	1.0
	Zero Speed Level	Threshold for zero speed logic output	%	0 - 99.99	1.00	1.00
	Zero Speed Time	Time before zero speed logic output is declared true	sec	0 - 9.99	0.10	0.10
	Up/Dwn Thresh-old	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	200.0
	Regen Torq Limit	Regenerating torque limit	%	0 - 250.0	250.0	200.0
	Flux Wkn Factor	Defines torque limit at higher speeds	%	60.0 - 100.0	75.0	100
	Ana 1 Out Offset	Subtracts an effective voltage to actual analog output 1	%	-99.9 - 99.9	0.00	0.00
	Ana 2 Out Offset	Subtracts an effective voltage to actual analog output 2	%	-99.9 - 99.9	0.00	0.00
	Ana 1 Out Gain	Scaling factor for analog output 1	-	0 - 10.0	1.0	1.0
	Ana 2 Out 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 allowed to be auto-matically reset per hour	faults	0 - 10	3	3
	Up to SPD. Level	The logic output function is true when motor speed is above user specified speed defined by this parameter	%	0 - 110.00	080.00	080.00
	Mains DIP Speed	When enabled by 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 drive recognition of RUN sig-nal.	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 Dly	N/A to MCE products	sec	0.00 - 5.00	0.00	0.00

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Table 3.5 HPV 900 Drive Parameters

	TRQ Lim Msg Dly	Determines amount of time drive is in torque limit before Hit Torque Limit message is displayed	sec	0.50 - 10.00	0.50	2.00
	SER2 INSP SPD	Defines serial mode 2 Inspection (only serial mode 2)	ft/ min	0 - 100	30	30
	SER2 RS CRP SPD	Defines creep speed used in rescue mode	ft/ min	0 - 100	10	10
	SER2 RS CPR Time	Defines maximum time drive will continue to run at rescue creep speed (serial mode 2)	ft/ min	0 - 100	180	180
	SER2 FLT TOL	Defines 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	Ant-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	Recognition time delay for defined multistep speed command	sec	0.00 - 10.0	0.00	0.00
A2	**S-Curves**					
	Accel Rate 0	Acceleration rate #0	ft/s^2	0 - 7.99	3.00	3.50
	Decel Rate 0	Deceleration rate #0	ft/s^2	0 - 7.99	3.00	4.00
	Accel Jerk in 0	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0
	Accel Jerk out 0	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	5.0
	Decel Jerk in 0	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	5.0
	Decel Jerk out 0	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	5.0
	Accel Rate 1	Acceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
	Decel Rate 1	Deceleration rate #1	ft/s^2	0 - 7.99	3.00	7.99
	Accel Jerk in 1	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Accel Jerk out 1	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk in 1	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk out 1	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
	Accel Rate 2	Acceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99
	Decel Rate 2	Deceleration rate #2	ft/s^2	0 - 7.99	3.00	7.99

Table 3.5 HPV 900 Drive Parameters

	Accel Jerk in 2	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Accel Jerk out 2	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk in 2	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk out 2	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
	Accel Rate 3	Acceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
	Decel Rate 3	Deceleration rate #3	ft/s^2	0 - 7.99	3.00	7.99
	Accel Jerk in 3	Rate of increase of acceleration, up to ACCEL Rate, when increasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Accel Jerk out 3	Rate of decrease of acceleration to zero when approaching contract elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk in 3	Rate of increase of deceleration, up to Decel Rate, when decreasing elevator speed	ft/s^3	0 - 8.0	8.0	0.0
	Decel Jerk out 3	Rate of decrease of deceleration to zero when slowing the elevator to leveling speed	ft/s^3	0 - 8.0	8.0	0.0
A3	**Multistep Ref**					
	Speed command 1	Multi-Step Speed command #1	ft/m		0	* 4
	Speed command 2	Multi-Step Speed command #2	ft/m		0	* 12
	Speed Command 3	Multi-Step Speed command #3	ft/m		0	45
	Speed command 4	Multi-Step Speed command #4	ft/m		0	*
	Speed Command 5	Multi-Step Speed command #5	ft/m		0	0
	Speed command 6	Multi-Step Speed command #6	ft/m		0	0
	Speed Command 7	Multi-Step Speed command #7	ft/m		0	0
	Speed command 8	Multi-Step Speed command #8	ft/m		0	*
	Speed Command 9	Multi-Step Speed command #9	ft/m		0	0
	Speed Command 10	Multi-Step Speed command #10	ft/m		0	0
	Speed Command 11	Multi-Step Speed command #11	ft/m		0	0
	Speed Command 12	Multi-Step Speed command #12	ft/m		0	0
	Speed Command 13	Multi-Step Speed command #13	ft/m		0	0
	Speed Command 14	Multi-Step Speed command #14	ft/m		0	0
	Speed Command 15	Multi-Step Speed command #15	ft/m		0	0
A4	**Power Convert**					
	Id Reg Diff gain	Flux Current regulator differential gain	-	0.80 - 1.20	1.00	1.00

Table 3.5 HPV 900 Drive Parameters

	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	90
	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	*
	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	*	*
	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 TB1	External TB
	Hi/Lo Gain Src	High / low gain change switch source	-	External TB 1 Serial Internal	Internal	Internal
	Speed Reg Type	Chooses speed regulator	-	Elev spd reg Pi speed reg	Elev spd reg	Elev spd reg

Table 3.5 HPV 900 Drive Parameters

	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	External TB
	Pre Torque Source	Determines if a pre torque command is used and if used, determines source of 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
	Pretorque Latch Clock	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	External TB
	Overspd Test Src	Determines external logic source to trigger overspeed test	-	External TB Serial	External TB	External TB
	Brake Pick Src	If drive controls mechanical brake, determines source of 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
	Brake Hold Src	If drive controls mechanical brake, determines source of 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 source that signals 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, sets source of torque command	-	None Serial	None	None
	Dir Confirm	Confirms proper analog signal polarity when set to Enable and a logic input is programmed to Run Up and Run Down	-	Enabled Disabled	Disabled	Disable
	S-Curve Abort	Addresses how S-Curve Speed Reference Generator handles a reduction in speed command before S-Curve Generator has reached target speed.	-	Enabled Disabled	Disabled	Disable
	Fast Flux	Reduces starting takeoff time by reducing motor fluxing time	-	Enabled Disabled	Enabled	Enable
	Main DIP Ena	Enables Mains DIP Speed (A1) parameter which reduces speed when a UV alarm (low voltage) is declared	-	Enabled Disabled	Disabled	Disable
	DB Protection	Dynamic braking protection fault or alarm selection		Fault Alarm	Fault	Fault
	Encoder Fault	Temporarily disables Encoder Fault	-	Enabled Disabled	Enabled	Enable

Table 3.5 HPV 900 Drive Parameters

	Stopping Mode	Determines stopping mode when Spd Command Src = multi-step	-	Immediate Ramp to stop	Immedi- ate	Immediate
	Motor Ovrld Sel	Motor Overload Selection	-	Alarm Flt Immediate Fault at Stop	Alarm	FLT Imme- diate
	Auto Stop	Auto Stop Function enable	-	Disable Enable	Disable	Disable
	Serial Mode	Serial Protocol selection	-	None Mode 1 Mode 2 Mode 2 test	Mode 1	None
	SER2 FLT Mode	Defines reaction to a serial communi-cation fault while in Serial Mode 2 (serial mode 2)	-	Immediate	Immediate Run remove rescue	Immediate
	DRV Fast Disable	Addresses how fast drive responds to removal of Drive Enable logic input.	-	Disable	Disable Enable	Disable
	MLT-SPD to DLY1	Assigns multi-step speed command to recognition delay timer 1	-	None	None mspd1- mspd15	None
	MLT-SPD to DLY2	Assigns multi-step speed command to recognition delay timer 2	-	None	None mspd1- mspd15	None
	MLT-SPD to DLY3	Assigns multi-step speed command to recognition delay timer 3	-	None	None mspd1- mspd15	None
	MLT-SPD to DLY4	Assigns multi-step speed command to recognition delay timer 4	-	None	None mspd1- mspd15	None
C2	**Logic Inputs**					
	Log In 1 TB1-1	Terminal 1 Selection	-	-	DRIVE ENABLE	DRIVE ENABLE
	Log In 2 TB1-2	Terminal 2 Selection	-	-	RUN UP	RUN
	Log In 3 TB1-3	Terminal 3 Selection	-	-	RUN DOWN	FAULT RESET
	Log In 4 TB1-4	Terminal 4 Selection	-	-	FAULT RESET	STEP REF B0
	Log In 5 TB1-5	Terminal 5 Selection	-	-	STEP REF B0	STEP REF B1
	Log In 6 TB1-6	Terminal 6 Selection	-	-	STEP REF B1	STEP REF B2
	Log In 7 TB1-7	Terminal 7 Selection	-	-	STEP REF B2	STEP REF B3
	Log In 8 TB1-8	Terminal 8 Selection	-	-	STEP REF B3	UP/DN
	Log In 9 TB1-9	Terminal 9 Selection	-	-	S-CURVE SEL 0	CONTACT CFIRM

Table 3.5 HPV 900 Drive Parameters

C3	**Logic Outputs**					
	Log Out 1 tb1-14	Terminal 14 Selection	-	-	SPEED DEV LOW	RUN COM-MANDED
	Log Out 2 tb1-15	Terminal 15 Selection	-	-	RUN COM-MAND	SPEED REG RLS
	Log Out 3 tb1-16	Terminal 16 Selection	-	-	MTR OVER-LOAD	NO FUNC-TION
	Log Out 4 tb1-17	Terminal 17 Selection	-	-	ENCODER FAULT	NO FUNC-TION
	Relay Coil 1	Relay 1 Function Selection	-	-	FAULT	READY TO RUN
	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	TORQUE REF
	Ana Out 2 tb1-35	Terminal 35 Selection	-	-	SPEED FEEDBK	SPEED FEEDBK
Utility U0						
U1	Password	Password	-	-	000000	000000
U2	Hidden Items	Enable or disable hidden parameters Enable Disable	-	-	ENABLE	ENABLE
U3	Unit	Unit for parameters English Metric	-	-	ENGLISH	ENGLISH
U4	Overspeed Test	Allow overspeed test during inspection Yes No	-	-	No	No
U5	Restore Dflts	Reset all parameters to defaults				
U6	Drive Info	Drive information Drive Version: Boot Version: Cube ID: Drive Type:				
U7	HEX Monitor	Hex Monitor				

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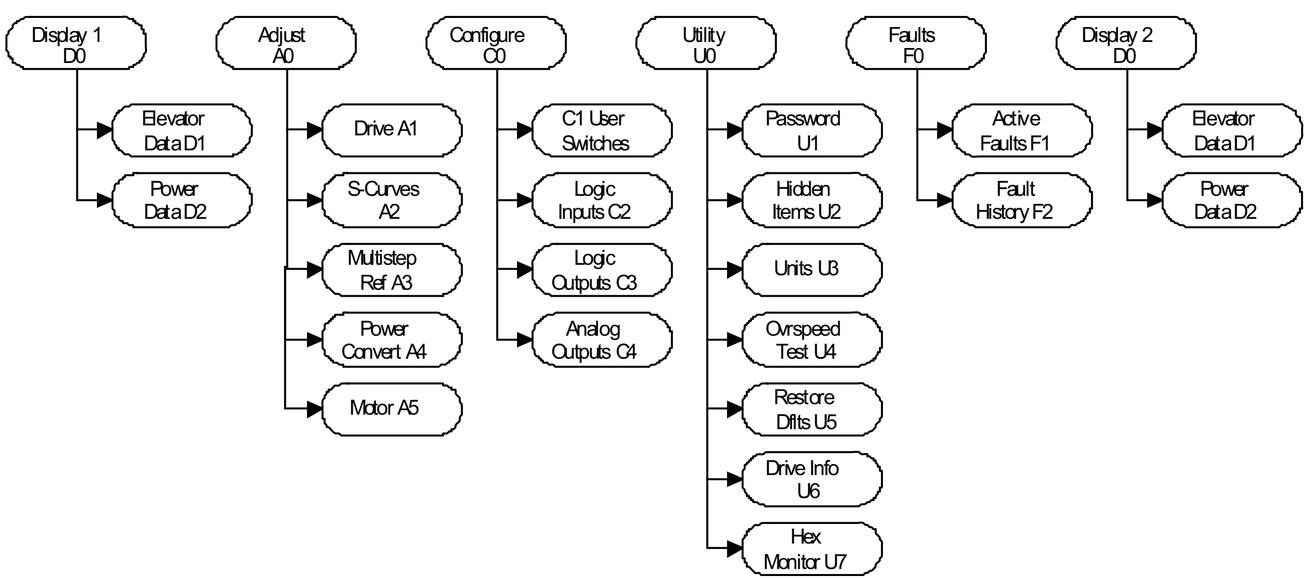
Figure 3.1 HPV 900 Parameter Menu Trees



Drive Faults

If a fault occurs in the drive, the Fault LED on the front panel will light. To access drive faults using the hand held programmer, go to the **FAULTS F0** menu. This menu has two sub-menus, **ACTIVE FAULTS F1** and **FAULT HISTORY F2**. Use the arrow keys to access the desired menu. If the drive is faulted, **ACTIVE FAULTS** will display the present fault. **FAULT HISTORY** will display faults that occurred previously.

The following is a list of detected drive faults. Listed after each fault is a description of what the fault is, and a suggested corrective action.

Table 3.6 HPV 900 Drive Faults

Fault	Description	Corrective Action
AtoD Fault	Control board analog to digital converter not responding.	Cycle power to controller and see if fault clears. If not, replace Control board.
Brake Alarm	Dynamic brake resistor overcurrent.	Confirm motor data correctly entered into drive, braking resistance connected and sized correctly, and car is balanced correctly. **NOTE:** *After drive stops this becomes Brake IGBT Fault.*
Brk Hold Fault	Brake hold state does not match commanded state.	Disabled.
Brk IGBT Fault	Brake IGBT overcurrent.	Overcurrent of braking IGBT has occurred. Fault latches, but does not shut car down until it stops to allow passengers to safely exit. Confirm motor data correctly entered, braking resistance connected and sized correctly, car balanced correctly.
Brk Pick Fault	Brake pick state does not match commanded state.	Disabled.
Bridge Fault	Power module is detecting overcurrent or overtemperature condition.	**Overcurrent:** Check proper sizing, connection of dynamic braking resistor. Check for short in motor wiring or windings. **Overtemperature:** Check drive cooling fan and heatsink. Replace drive if fault cannot be corrected with above measures.
Charge Fault	DC Bus has not charged.	DC Bus has not reached desired stabilized voltage level within 2 seconds. Check incoming AC power. If OK, replace drive.
Comm Fault Invalid Checksum	The programmer received four consecutive invalid messages.	Possible noise or bad connector for programmer. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Comm Fault No Drive Handshake	The programmer lost communications with the drive Control board.	Possible noise or bad connector for programmer. Check connector on Control board and programmer. Replace Control board or programmer if fault cannot be corrected.
Contactor Fault	Contactor state does not match the commanded state.	The drive has turned on the command to close the main contactor and the Contactor Confirm signal is not present for the amount of time specified by the **Contact Flt Time** parameter.
Cube Data Fault	The drive parameters are invalid.	Check all drive parameters. Cycle power to drive. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists replace Control board. **Note:** ***Restore Defaults*** *will require all drive parameters be set to their correct values.*
Cube ID Fault	The drive identification is invalid.	Check all drive parameters. Cycle drive power. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists replace Control board. **Note:** ***Restore Defaults*** *will require all drive parameters be set to their correct values.*
Curr Reg Fault	Actual current does not match the commanded current.	Check incoming power. Check motor parameters. Check motor connections, windings for open circuit. Check main contactor for bad contact. If OK, bad current sensor or bad drive.

Table 3.6 HPV 900 Drive Faults

DCU Data Fault	The DCU parameters are not set correctly.	Check all drive parameters. Cycle power to drive. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists replace Control board. **Note:** ***Restore Defaults*** *will require all drive parameters be set to their correct values.*
Dir Conflict	Commanded direction from analog input does not match polarity of **Up/Dwn** input.	Not used.
Drv Overload	The drive has exceeded the overload curve.	Check motor connections, main contactor contacts, and motor windings. Make sure brake is lifting. Verify encoder is properly connected and feedback matches motor speed.
Encoder Fault	The drive is in a run condition and encoder is not operating.	Check encoder connections. If drive has been running, replace encoder. If fault occurs on initial start up of drive, swap A and A- connections to drive. May also be caused by high starting current. Check for binds in machine or brake and proper balancing of car.
Extrn Fault 1	External Fault 1 input is activated.	Not used.
Extrn Fault 2	External Fault 2 input is activated.	Not used.
Extrn Fault 3	External Fault 3 input is activated.	Not used.
Extrn Fault 4	External Fault 4 input is activated.	Not used.
Fan Alarm	The heatsink cooling fan is not operating.	Check fan and connections, clean heatsink.
Fuse Fault	Drive DC Bus fuse open.	Check fuse. If OK, check motor connections. Check motor for continuity from windings to ground. If OK, replace drive.
Ground Fault	Sum of all phase currents exceeded 50% of rated drive amperage.	Disconnect motor from drive. Cycle drive power. If problem clears, possible bad motor or wiring. If problem does not clear, possible bad grounding of system or bad drive.
Hit Torque Limit	Measured current equal to or greater than torque limit setting.	Verify car is balanced correctly. Verify motor and drive sizing. Can be delayed by increasing value of **TRQ LIM MSG DLY (A1)**.
Mtr id Fault Mtr Data Fault	Invalid motor parameters.	Check all drive parameters. Cycle drive power. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists replace Control board. **Note:** ***Restore Defaults*** *will require all drive parameters be set to their correct values.*
Mtr Overload	Motor has exceeded the motor overload curve.	Verify correct balancing of car. Check for dragging brake or mechanical bind in machine or hoistway. Verify **OVLD START LEVEL (A1)** and **OVLD TIME OUT (A1)**. Check for bad motor.
Overcurr Fault	Phase current exceeded 250% of rated current.	Verify car balanced correctly. Verify motor and drive sizing. Check for bad motor/connection. Check for bad main contactor contacts. Check for mechanical bind in car or machine.
Overspeed Fault	Motor speed exceeded user entered parameters.	Check parameters **OVERSPEED LEVEL (A1)** and **OVERSPEED TIME (A1)**. If OK, check tracking of motor to desired speed and tune regulator for better performance.
Overtemp Fault	The heatsink temperature is too high.	Drive heatsink temperature exceeded 105ºC (221ºF). Check fans on drive; make sure adequate airflow is present.
Overvolt Fault	The DC Bus voltage is too high.	DC bus voltage exceeded 850 volts on a 460-volt drive or 425 volts on a 230-volt drive. Check braking resistance connected and sized properly. Check for high AC line. Confirm input voltage to drive. If above OK, possible bad braking IGBT. Drive unit needs to be replaced.

Table 3.6 HPV 900 Drive Faults

PCU Data Fault	PCU parameters not correct.	Check all drive parameters. Cycle power to drive. If fault recurs, go to **Utility** menu and select **Restore Defaults**. If fault persists replace Control board. **Note: *Restore Defaults*** *will require all drive parameters be set to their correct values.*
Phase Fault	Open motor phase.	Check motor, motor connections, motor windings and main contactor contacts.
Setup Fault 1	Rated motor speed, poles and frequency not set correctly.	**RATED EXCIT FREQ (A5)**, **RATED MTR SPEED (A5)** and **MOTOR POLES (A4)** do not satisfy formula: **9.6 < {120 (Excit Freq)} - {(Motor Poles)(Motor Speed)} < 1222.3**
Setup Fault 2	Encoder PPR and motor poles not set correctly.	Check ENCODER PULSES, MOTOR POLES parameters. Must satisfy formula: **{(Encoder Pulses) / (Motor Poles)} > 64**
Setup Fault 3	Motor Poles parameter not set correctly.	**MOTOR POLES (A4)** must be set to an even number.
Setup Fault 4	Encoder PPR and Motor Speed parameters not set correctly.	Check **ENCODER PULSES (A1)** and **RATED MTR SPEED (A1)**. Must satisfy formula: **300,000 < (Rated Motor Speed) (Encoder Pulses) < 18,000,000**
Setup Fault 5	Rated Motor Power and Rated Motor Voltage not set correctly.	Check **RATED MOTOR PWR (A4)** and **RATED MTR VOLTS (A4)**. Must satisfy formula: **(.07184) {(Motor Pwr) / (Motor Voltage)} Drive Current Rating**
Setup Fault 6	Multi-Step speed reference exceeds contract speed.	Check **SPEED COMMAND 1** through **SPEED COMMAND 16** and **CONTRACT CAR SPD** parameters.
Setup Fault 7	Run logic inputs are not correctly defined.	Check **LOG IN 1 TB1-16** through **LOG IN 9 TB1-24** for correct setting.
Setup Fault 8	**DIR CONFIRM (C1)** enabled. **RUN UP**, **RUN DOWN** not assigned as logic inputs. **SPD COMMAND SRC (C1)** not set to **ANALOG INPUT**.	Not used.
Speed Dev	Desired speed differs from actual speed	Actual motor speed differs from demanded speed by more than specified by **SPD DEV HI LEVEL (A1)** or **SPD DEV LO LEVEL (A1)** longer than time specified by **SPD DEV TIME (A1)**.
Stall Test Fault	Motor current exceeds value of **STAL TEST LVL** for more than time period specified by **STALL FAULT TIME**.	Confirm correct settings of **STALL TEST LVL (A1)** and **STALL FAULT TIME (A1)**. Check motor, machine and brake for possible mechanical binds. Check for correct setting of motor parameters. Check for excessive motor current.
Tq Lim 2Hi 4cube	Torque limits (based on programmed motor data) exceed drive capacity.	Verify that the drive is sized correctly. Verify that the motor parameters are set correctly. Verify that the **MTR TORQ LIMIT (A1)** and **REGEN TORQ LIMIT (A1)** are set correctly.
Undervolt Fault	DC Bus voltage low.	DC bus voltage dropped below user-entered values of **INPUT L-L Volts (A4)** and **UV FAULT LEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbance on AC line.
Undervolt Alarm	DC Bus voltage low during run.	DC bus voltage dropped below user-entered values of **INPUT L-L Volts (A4)** and **UV ALARMLEVEL (A4)**. Check braking resistance and connections. Verify proper AC input voltage to drive. Possible disturbance on AC line.

HPV 900 High Speed Adjustment

The drive should be running on inspection speed at this point. When commanded to run in the up direction, the car should run up, when commanded to run down, the car should run down. Use a hand tach to confirm that the speed displayed on the drive programmer at the parameter **DISPLAY D0**, **ELEVATOR DATA D1**, **SPEED REFERENCE** exactly matches the speed at which the car is running.

While observing the hand tach, run the car up and down in the middle section of the hoistway. Modify the **CONTRACT MTR SPEED** parameter under the ADJUST **A0**, **MOTOR A5** menu to exactly achieve the speed displayed at **SPEED REFERENCE**.

Car Balancing

In order for the drive to perform properly, the car must be properly balanced. Geared cars are typically balanced with 40 – 50% of the cars rated capacity. To confirm this:

1. Access the car top. Run the car on inspection to the center of the hoistway. Stop the car so the crosshead on the counterweight is exactly adjacent to the crosshead on the car.
2. Place a chalk mark on the cables in the machine room and mark the hoist motor so that while the car is run from the machine room you will be able to tell when the car passes through the center of the hoistway.
3. Move the car to a convenient floor. Place 40% of the cars rated capacity in the car.
4. On inspection, run the car so it about 10 feet above the center of the hoistway.
5. Place an Amprobe on one of the leads to the hoist motor.
6. While observing the display on the Amprobe, run the car down on inspection operation through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
7. Place the car about 10 feet below the center of the hoistway.
8. While observing the display on the Amprobe, run the car up through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
9. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running up was greater than the value running down, the car is too heavy. Remove 100 pounds of weight from the car and repeat steps 8 through 10 until the recorded values are equal, but of opposite polarity.
10. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running down was greater than the value running up, the car is too light. Add 100 pounds of weight to the car and repeat steps 7 and 8 until the recorded values are equal, but of opposite polarity.

When the values are equal, but of opposite polarity, the car is balanced. Check how much weight is in the car. It should be between 40 and 50% of the rated capacity. If not, the counterweighting needs to be adjusted. If the car is too heavy, weight needs to be added to the counterweight to get the car balanced between 40 and 50% of the rated capacity. If the car is too light, weight needs to be removed from the counterweight to get it balanced between 40 and 50% of the rated capacity. **Do not proceed with the adjustment process until the car is <u>properly balanced.</u>**

Motor Parameter Adjustments

In order to perform correctly, the drive needs to be programmed for the correct motor values and the correct volts/hertz ratio so the motor will not stall with a load or at slow speed. The following procedure establishes the volts/hertz ratio.

1. Place a full load into the car.
2. Run the car up and down on inspection speed.
3. Using a hand tach, monitor the speed of the car. If the car is moving at less than the inspection speed programmed at **SPEED COMMAND 3 (A3)**, increase the value of **CONTRACT MTR SPD (A1)**. If the car is moving faster than the inspection speed programmed at **SPEED COMMAND 3 (A3)**, decrease the value of **CONTRACT MTR SPD (A1)**.
4. Repeat steps 2 and 3 until the car is moving at exactly the speed programmed at **SPEED COMMAND 3 (A3)**.

Speed Curve Setting and Adjustment

The Magnetek HPV 900 drive has an internal speed curve algorithm that controls the acceleration, deceleration, and various jerk rates of the drive. There are four independently selectable speed curves. This system uses only the first speed curve.

The preliminary setting of the speed curve parameters was done in the drive programming section. The values that were entered are designed to be somewhat aggressive to ensure that the car does not overshoot the floors, but rather comes in slow. This will prevent the car from running into the pit or the overhead until the final values for the speed curve are entered.

1. Place a balanced load in the car.
2. Disable the doors and place a car call two floors away from the present position of the car (one floor away if the car speed is 200 feet per minute or less).

Note

Keep the elevator away from the terminal floors at this time.

3. While the car is running, monitor the car speed with a hand tach. It should be running at contract speed (+ 5%). If not, adjust the **CONTRACT MTR SPEED (A1)** parameter to obtain the correct speed.
4. Observe the deceleration of the car as it approaches the floor. The car should decelerate rapidly and there should be two noticeable steps of speed prior to stopping at the floor. If there are not, confirm that the tape reader is properly installed and the slowdown magnets are placed the correct distance from the floor.
5. Change the **DECEL RATE 0 (A2)** parameter to 3.5 ft/s^2. This will yield a slower rate of deceleration and less approach distance to the floor.
6. Again run the car and observe the approach into the floor. If the car still has too much slow down distance decrease the **DECEL RATE 0 (A2)** parameter to 0.1 ft/s^2 less than the present rate.
7. Repeat until the car is coming into the floor with about 3 to 6 inches of approach.

8. Modify the **DECEL JERK IN 0 (A2)** and **DECEL JERK OUT 0 (A2)** parameters to get a smooth approach into the floor with 1 to 2 inches of sustained leveling. If there is not enough sustained leveling, the car may overshoot intermittently and cause releveling.
9. Modify the **ACCEL JERK OUT 0 (A2)** rate to the same value that was entered into the **DECEL JERK IN 0** parameter.
10. If the rated speed of the car is greater than 200 feet per minute, make a one floor run. Observe the approach into the floor on single floor runs. If the approach is longer than the multi-floor runs, increase the **SPEED COMMAND 4 (A3)** parameter until the approach on a one floor run is the same as the multi-floor run. If the approach is quicker, decrease the **SPEED COMMAND 4 (A3)** parameter until the approach on a one floor run is the same as the multi-floor run.
11. The speed curve parameters have been set up. Ride the car and observe the acceleration, deceleration, and jerk rates. If any rate seems too sharp, make that value smaller. Note that changing values in the deceleration profile will result in a different approach into the floor. You may need to modify other deceleration parameters to get the desired ride.
12. Observe the floor stops. Make multi-floor runs and one floor runs into a floor at the center of the hoistway. If the car is stopping short of the floor (too high in the down and too low in the up) increase the **SPEED COMMAND 1 (A3)** parameter. This will result in a faster leveling speed and cause the car to travel farther before stopping.
13. If the car is stopping past the floor (too high in the up and too low in the down) decrease the **SPEED COMMAND 1 (A3)** parameter. This will result in a slower leveling speed and cause the car to travel a shorter distance before stopping.

3

Note

If you are unable to achieve consistent floor stops by modifying leveling speed, the brake may not be adjusted properly. Confirm that all brake voltages are set correctly and that the resistance around the brake coil is connected properly. The resistance can be changed to control brake set. Less resistance causes a slower drop. More resistance causes a quicker drop.

The car should now be running at contract speed with accurate floor stops and a smooth ride. Remove all weights from the car and, staying away from the terminal floors, make one floor runs and multi-floor runs up and down.

Add weight to the car, approximately 100 pounds at a time. Staying away from the terminal floors, observe the one floor and multi floor runs to be sure that the car rides well under all load conditions. Keep adding weight until the car has full load, less the weight of anyone riding the car.

HPV 900 Adaptive Tuning

If the motor is an old motor and no data is available for it, an adaptive tune must be performed. The adaptive tune requires that the car is run at contract speed and is capable of lifting full load.

1. Select the “Default Motor” option for the Motor ID parameter. This will load default values into the motor data parameters to prepare the drive for the adaptive tune.
2. Enter the following motor data into the drive:
   - Motor HP or kW from nameplate into “RATED MTR POWER.”
   - Motor AC voltage from nameplate into “RATED MTR VOLTS.”
   - Motor AC frequency (usually 60 cycles) into “RATED EXCIT FREQ.”
   - Motor nameplate full load amps into “RATED MTR CURR.”
   - The number of motor poles into “MOTOR POLES.
   - Motor RPM with full load at the correct frequency into “RATED MTR SPEED.”
3. Place a balanced load into the car. Reduce the car speed to 70% of contract speed by changing the value of **SPEED COMMAND 8 (A3)**.
4. Run the car from top to bottom and back. While the car is running, monitor the motor torque found under **Display Power Data (D2)**. The torque should be between + 15%. If not, verify that the car is balanced correctly.

Note

If the car does not have compensation, the motor torque will vary depending on car hoistway position. Verify that the motor torque is between + 15% as the car passes through the center of the hoistway.

5. Verify that the flux reference found under **Display Power Data (D2)** is 100%. If not, reduce the car speed until it is.
6. With the car running from top to bottom and back, observe **EST NO LOAD CURR** found under **Display Power Data (D2)**. Enter this estimated value into the parameter **% NO LOAD CURR**.
7. Repeat steps 5 and 6 until the value of the **EST NO LOAD CURR** and the **% NO LOAD CURR** are equal.
8. Verify that the motor torque is still + 15% and flux reference is still 100%. If not, adjust the **% NO LOAD CURR** as needed.
9. Increase the car speed to 100% of contract speed. With balanced load still in the car, run the car from top to bottom and back.
10. While the car is running, observe **EST NO LOAD CURR** found under **Display Power Data (D2)**. Compare this value to the value found under **% NO LOAD CURR** found under **Adjust Motor (A5)**.
11. If the **EST NO LOAD CURR** value is 2% larger than the **% NO LOAD CURR** then increase **FLUX SAT SLOPE 2** by 10%. If the **EST NO LOAD CURR** and**% NO LOAD CURR** values are within 2%, continue to step 12.
12. Repeat steps 9 and 10 until **EST NO LOAD CURR** and **% NO LOAD CURR** are within 2%.
13. Place full load in the car. Run the car at contract speed from top to bottom and back.

14. Observe **EST RATED RPM** found under **Display Power Data (D2)**.
15. Enter this value into **RATED MTR SPEED** found under **Adjust Motor (A5)**.
16. Remove full load from the car and place balanced load in it. Run the car from bottom to top and back.
17. Observe **EST INERTIA** found under **Display Elevator Data (D1)**. Write down the value for up and down.
18. Average the up and down values of **EST INERTIA**. Enter this value into **INERTIA** found under **Adjust Drive (A1)**.
19. Remove weights from the car. Ride the car up and down, adding 100 pounds of weight at a time. Observe one floor, two floor and multi floor runs to be sure that the car rides well under all load conditions.

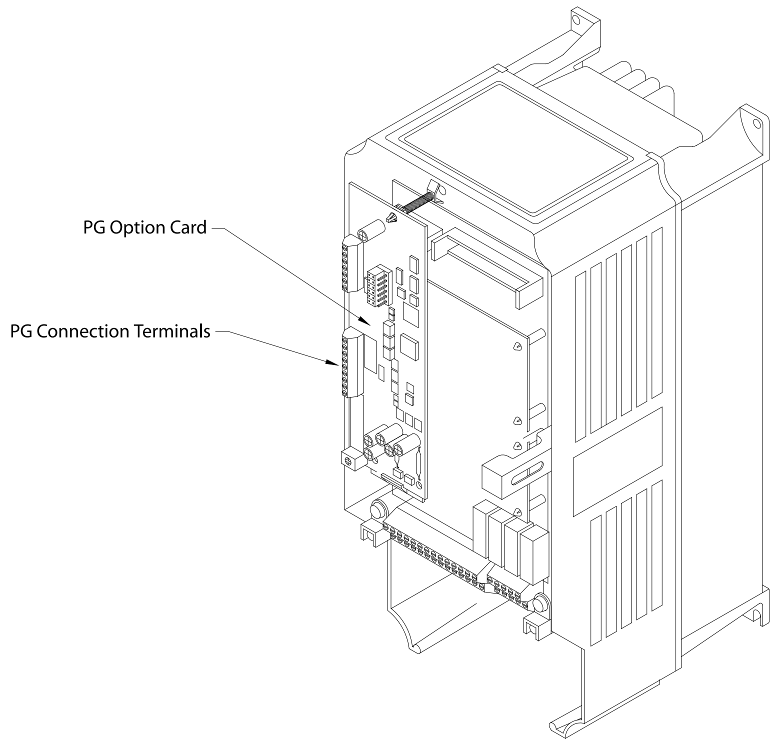
Normal Speed Learn Operation

You must now perform a normal operating speed learn operation using controls on the Limit Board. Please refer to the learn operation information for your particular Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

Yaskawa F7 Drive

The Yaskawa F7 drive is capable of open and closed loop operation. For closed loop (Flux Vector mode) operation, the optional encoder (PG) card must be installed. If purchased, the PG card was installed and tested at the factory. Contact MCE Engineering if you require closed loop operation and do not have a PG option card installed.



For MCE control application, custom software provides added control over the sequence of operations. Additionally, the software provides ride-tuning features and speed display in feet/minute display and entry.

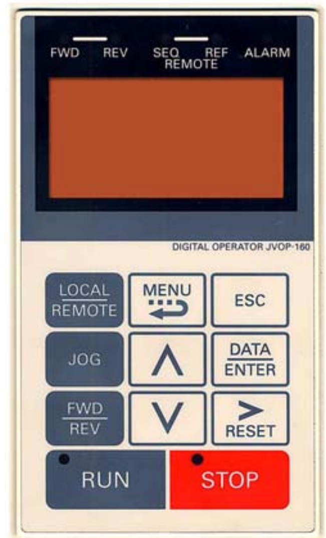
To understand and access these features make sure you have a copy of the supplemental instructions for software # **VSF11012**. This supplement describes features in addition to, or alterations of, standard drive software. Check monitor U1-14 to verify that the correct software is loaded on to the drive. If the software is not VSF11012, contact MCE Technical Support. Refer to section 3 of the F7 Users Manual for keypad instructions.

Caution

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.

Yaskawa Programmer

Caution
Read and observe all warnings listed in the F7 User Manual.



Program the F7 using the drive keypad. For a complete description of keypad use, refer to Section 3 of the F7 Users Manual.

The following parameter description is for information and reference only. All necessary parameter settings were made at the factory using the information supplied in the field survey. No changes should be made until the system is powered up and verified later in this procedure.

Digital Inputs

Yaskawa F7 Drive output is controlled via programmable digital inputs, preset and checked at the factory for your application. If you believe any of these to be in error, call MCE technical assistance.

Table 3.7 Yaskawa F7 Drive Inputs

Terminal	Function	Parameter	Setting
S3	Base Block, used for emergency stops	H1-01	9
S4	Fault Reset	H1-02	14
S5	Digital Speed Input-1	H1-03	80
S6	Digital Speed Input-2	H1-04	81
S7	Digital Speed Input-3	H1-05	82
S8	Jog Reference	H1-05	6

Directional control of the elevator is controlled via input to terminals S1 and S2, forward and reverse respectively. These are set during the “2-wire” initialization process in parameter A1-03 (programmed at the factory prior to shipment).

Digital Outputs

In addition to digital inputs, the Yaskawa F7 Drive has 3 isolated, programmable digital outputs and one form C fault contact. These have been wired and programmed at the factory.

Table 3.8 Yaskawa F7 Drive Digital Outputs

Terminals	Function	Parameter	Setting
MA-MC	Fault Contact N.O.	N/A	N/A
MB-MC	Fault Contact N.C.	N/A	N/A
M1-M2	During Run 3 (ready to run output)	H2-01	40
M3-M4	Not used by Controller (Default = Zero Speed)	H2-02	1
M5-M6	Not used by Controller (Default=Fref Out Agree)	H2-03	2

Analog Outputs

The Yaskawa F7 Drive has 2 analog outputs that can be programmed to monitor a variety of drive functions. These are not used by the Tricon controller and may be used for other monitoring purposes. See F7 Users Manual Index A-29 for a list of other output selections.

Table 3.9 Yaskawa F7 Drive Analog Outputs

Terminals	Default Function	Parameter	Setting
FM-AC	Output Speed in FPM (0-10VDC or 【10VDC)	H4-01	2
AM-AC	Output Current (0-10VDC or 【10VDC)	H4-02	3

Scaling Car Speed to Motor

This procedure has been completed at the factory.

In order to program car speed settings and drive readouts, car speed is scaled to motor speed using parameters O1-03 and E1-04 (adjusts range setting for all preset speeds). This scaling was completed at the factory using survey information. Verify that this information matches the specifications of the elevator.

Parameter: O1-03 (Display Scaling)

Note

Display scaling has been fixed at Feet Per Minute and may not be changed to use other units.

The following is an explanation of the scaling process, DO NOT make changes at this time.

- The first digit defines the number of decimal places.
- The next four define the speed in feet/minute at maximum motor speed (speed of motor (elevator) at 60Hz)

- Default Setup (Unless your elevator is 100FPM this value will be different in your controller)

100FPM

Table 3.10 Yaskawa F7, Speed Scaling, 100 FPM

11000	1	1000	100.0FPM
Parameter Display	First Digit	Next Four	Display Result at a motor speed of 60Hz
	Number of Decimal Places	Speed of Car at Maximum Motor Speed	

150FPM

Table 3.11 Yaskawa F7, Speed Scaling, 150 FPM

11500	1	1500	150.0FPM
Parameter Display	First Digit	Next Four	Display Result at a motor speed of 60Hz
	Number of Decimal Places	Speed of Car at Maximum Motor Speed	

200FPM

Table 3.12 Yaskawa F7, Speed Scaling, 200 FPM

12000	1	2000	200.0FPM
Parameter Display	First Digit	Next Four	Display Result at a motor speed of 60Hz
	Number of Decimal Places	Speed of Car at Maximum Motor Speed	

Maximum motor speed E1-04 (Default 60Hz) Setting

Induction motors may be wound in a variety of configurations (4, 6, or 8 poles). Each will produce different RPM for the same applied frequency. Additionally, the amount of slip in the motor design will affect the actual maximum speed at 60Hz. The maximum speed of the motor is set in hertz (Hz). Unless you are performing an over speed test or the motor is rated at some other frequency, it is advisable to leave the maximum motor speed at the default value of 60 hertz and adjust car speed using parameter O1-03.

Sample setup of O1-03

Sample information: Rated RPM = 1100 and Contract Speed = 150FPM

Find the synchronous speed of the motor in the following table using the next higher RPM from the rated RPM for your motors synchronous speed.

Synchronous (no slip) RPM	Number of Poles
900	8
1200	6
1800	4

Since scaling is based on maximum motor speed, it is necessary to determine the speed of the car at that speed. This can be mathematically calculated using the following formula. Using the table above, we find that the next higher RPM from our example of 1100RPM is 1200RPM, which would indicate that the motor is a 6 pole design.

Using 1200 as our synchronous speed, we find the setting of O1-03 with the following formula:

1	Synchronous RPM x Contract Speed Rated RPM	= Car Speed at Synchronous RPM
2	1200RPM x 150FPM 1100RPM	= Car Speed at Synchronous RPM
3	163.6 FPM	= Car Speed at Synchronous RPM
4	11636	= **O1-03** Setting

Speed Set Up

Now that scaling is set, you can set the preset speeds of the elevator.

Note

If you attempt to adjust the preset speeds before adjusting the scaling you will be limited to the maximum default speed of 100FPM.

There are four speeds that can be set.

Table 3.13 Yaskawa F7 Speed Set Up

Parameter	Name	Rule	Range	Default Setting
D1-02	High	Must be >D1-07	0.0* ~ Max. Scale	100.0 FPM
D1-03	High Level	Must be >D1-05 & <D1-07	0.0* ~ 30.0	13.0 FPM
D1-05	Level	Must be <D1-03	0.0* ~ 15.0	2.5 FPM
D1-07	Combination (Inspection)	Must be >D1-03 & <D1-02	0.0* ~ Max. Scale	42.0 FPM
D1-17	Jog (Intermediate)	Overrides all speeds	0.0* ~ Max. Scale	42.0 FPM

* The actual minimum speed available in volts per hertz (V/f) mode (open loop) will be 1.5Hz of motor speed. The minimum speed (in FPM) will change with changes to scaling. The actual minimum setting will automatically change with changes in scaling.

- **Example:** at the default scaling of 100 FPM, the minimum speed in V/f mode is 2.5 FPM.
- **Example:** at 300 FPM, the minimum speed in V/f mode is 7.5 FPM

This only affects minimum speeds in V/f mode. Zero is the minimum in Flux Vector mode (closed loop).

Inspection Startup (V/f mode/Open Loop/Closed Loop)

- Before applying power to the controller, confirm that the incoming three-phase AC voltage at the main line matches the value on the power section of the wiring diagrams.
- Confirm that the three leads from the controller to the motor are connected. If there are more than three leads coming out of the motor, make sure that the motor is wired in a delta configuration with correct field rotation, or follow the motor manufacturer recommendation.
- Confirm that the encoder is connected correctly. Refer to the Yaskawa F7 Users Manual for wiring diagrams.
- Refer to the parameters table shipped with the controller or to the parameters table in this manual section. The parameters table shipped with the controller has the specific drive parameters programmed for your installation.
- Make sure the controller is on inspection operation. Verify that the hoistway is clear and that the car is ready to be moved.
- Apply power to the controller.

For inspection purposes, even if your controller operates in Flux Vector mode (closed loop), initially set the drive to run in V/f mode (open loop) to check elevator mechanical characteristics. Set drive parameter A1-02 = 0.

- **Before** attempting to **run**, confirm that the modified parameters of the drive match the list sent with the controller by viewing the modified parameter section on the drive keypad in comparison to settings on the list sent with the controller.

Note

If your system was programmed to Flux Vector mode at the factory, changing to V/f may alter some preset speeds that are set to minimum speeds. These will have to be manually reprogrammed when the drive is switched back to Flux Vector mode later in this procedure.

- Verify that the line voltage in parameter **E1-01** is set correctly to actual line voltage.
- Set the motors name plate full load amps in parameter **E2-01.**
- Using the Up/Down toggle on the Relay Board, attempt to run the car.
  - If the motor moves in the opposite direction, stop the car and Reverse any two of the hoist motor wires.
  - Verify that elevator operates in the proper direction. Run elevator up and down to check the hoistway.

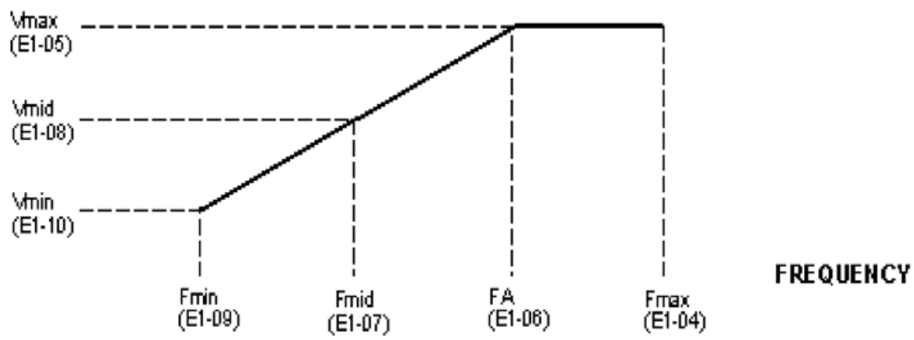
Please refer to “Scaling Car Speed to Motor” on page 3-64 for V/f (Open Loop) controls.

Table 3.14 Yaskawa F7 Drive Parameters

Field Adjustable Parameter cells are shaded. All other parameters should be set to the values shown in the Field / MCE Set column.						
WARNING: Parameters with an asterisk (*) must be set correctly for your motor / machine / job.						
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:Portuguese 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 Com4: 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
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				
C6-03	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	High Inspection Speed (must be > D1-03 and < D1-02)	FPM	0.0 - *	42.0	45.0
D1-08	Reference 8	Preset Reference 8 (Not used)	FPM	0.0 - *	0.0	0.0
D1-17	Jog reference	Jog Reference - Medium Speed	FPM	0.0 - *	42.0	*
		Reference Limits				
D2-01	Ref Upper Limit	Frequency Reference Upper Limit	%	0.0 - 110.0	100.0	100.0
D2-02	Ref Lower Limit	Frequency Reference Lower Limit	%	0.0 - 110.0	0.0	0.0

		Jump Frequencies	(not used) set at drive defaults



		V/F Pattern	Field Adjustable Parameters are shaded			
E1-01	Input Voltage	Input Voltage Setting	V	180 - 460	230/460	*
E1-02	Motor Selection	Motor selection 0: Fan-Coded 1: Blower-Coded	-	0, 1	0	0
E1-03	V/F Selection	V/F Pattern Selection*(N/A to Flux Vector)* 0: 50Hz 1: 60Hz Saturation 2: 50Hz Saturation 3: 72Hz (60 Hz Base) 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 (60 Hz Base) D: 120Hz (60 Hz Base) E: 180Hz (60 Hz Base) F: Custom V/F FF: Custom w/o limit	-	0 - F	F	F
E1-04	Max Frequency	Maximum Output Frequency	Hz	40.0 - 80.0	60.0	*
E1-05	Max Voltage	Maximum Output Voltage (Motor Voltage)	V	0.0 - 460.0	230/460	*
E1-06	Base Frequency	Maximum voltage output frequency	Hz	0.0 - 72.0	60.0	*
E1-07	Mid Frequency A	Mid Output Frequency A*(N/A to Flux Vector)*	Hz	0.0 - 72.0	3.0	3.0
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	*

		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)	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 (Flux Vector only)	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 (Flux Vector only)	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*(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.				

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		Digital Inputs	See H1-01 description in F7 Drive Manual			
H1-01	Terminal S3 Sel	Multi-Function Input Terminal S3 Function Selection 9: External Base Block N.C.	-	0 - 82	9	9
H1-02	Terminal S4 Sel	Multi-Function Input Terminal S4 Function Selection14: Fault Reset	-	0 - 82	14	14
H1-03	Terminal S5 Sel	Multi-Function Input Terminal S5 Function Selection80: Multi-Step Ref 1F	-	0 - 82	80	80
H1-04	Terminal S6 Sel	Multi-Function Input Terminal S6 Function Selection81: Multi-Step Ref 2F	-	0 - 82	81	81
H1-05	Terminal S7 Sel	Multi-Function Input Terminal S7 Function Selection82: Multi-Step Ref 3F	-	0 - 82	82	82
H1-06	Terminal S8 Sel	Multi-Function Input Terminal S8 Function Selection6: Jog Ref (Inspection speed)	-	0 - 82	6	6
		Digital Outputs	**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 Ridethrough				
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 RideThrough t	Momentary Power Loss RideThrough Time	sec	0.0 - 25.5	2.0	2.0
L2-03	PwrL Baseblock t	Momentary Pwr Loss Minimum Base Block Time	sec	0.1 - 5.0	0.7	0.7

		Stall Prevention				
L3-01	StallP Accel Sel (N/A to Flux Vector)	Stall Prevention Selection During Acceleration 0: Disabled 1: General-purpose 2: Intelligent	-	0 - 2	1	1
L3-02	StallP Accel Lvl (N/A to Flux Vector)	Stall Prevention Level During Acceleration	%	0 - 200	180	180
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	1	1
L5-02	Restart Sel	Automatic restart operation selection 0: No Fault Relay 1: Fault Relay Active	-	0, 1	1	1
		Torque Detection				
L6-01	Torq Det 1 Sel	Torque Detection Selection 1 0: Disabled 1: OL3 at Speed Agree - Alarm 2: OL3 at Run - Alarm 3: OL3 at Speed Agree - Fault 4: OL3 at Run - Fault 5: UL3 at Speed Agree - Alarm 6: UL3 at Run - Alarm 7: UL3 at Speed Agree - Fault 8: Ul3 at Run - Fault	-	0 - 8	0	0
L6-02	Torq Det 1 Lvl	Torque Detection Level 1	%	0 - 300	150	150
L6-03	Torq Det 1 Time	Torque Detection Time 1	sec	0.0 - 10.0	0.1	0.1
		Torque Limits		**(Flux Vector only)**		
L7-01 thru L7-04	Torque Limits (Flux Vector only)	Set to Factory Defaults	%	0 - 300	200	200
		Hardware Protection				
L8-01	DB Resistor Prot	Protection Selection for Internal DB Resistor 0: Not Provided 1: Provided	-	0, 1	0	0
L8-05	Ph Loss In Sel	Input Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1
L8-07	Ph Loss Out Sel	Output Phase Loss Protection 0: Disabled 1: Enabled	-	0, 1	1	1

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		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 Frequency References (D1-01 to D1-17), Frequency Reference Monitors (U1-01, U1-02, U1-05), and 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 *
		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
		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

*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 sets parameters to the values in the *MCE Set* column and saves those values as defaults by setting parameter O2-03 = 1. In the field, drive parameters can be *reset* to MCE Set values by setting parameter A1-03 = 1110. Field Adjustable parameters can then be re-entered.

Note 2: 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, all parameters should be entered manually and verified according to this parameter sheet.

Figure 3.2 Velocity Curve and S Curve Parameters

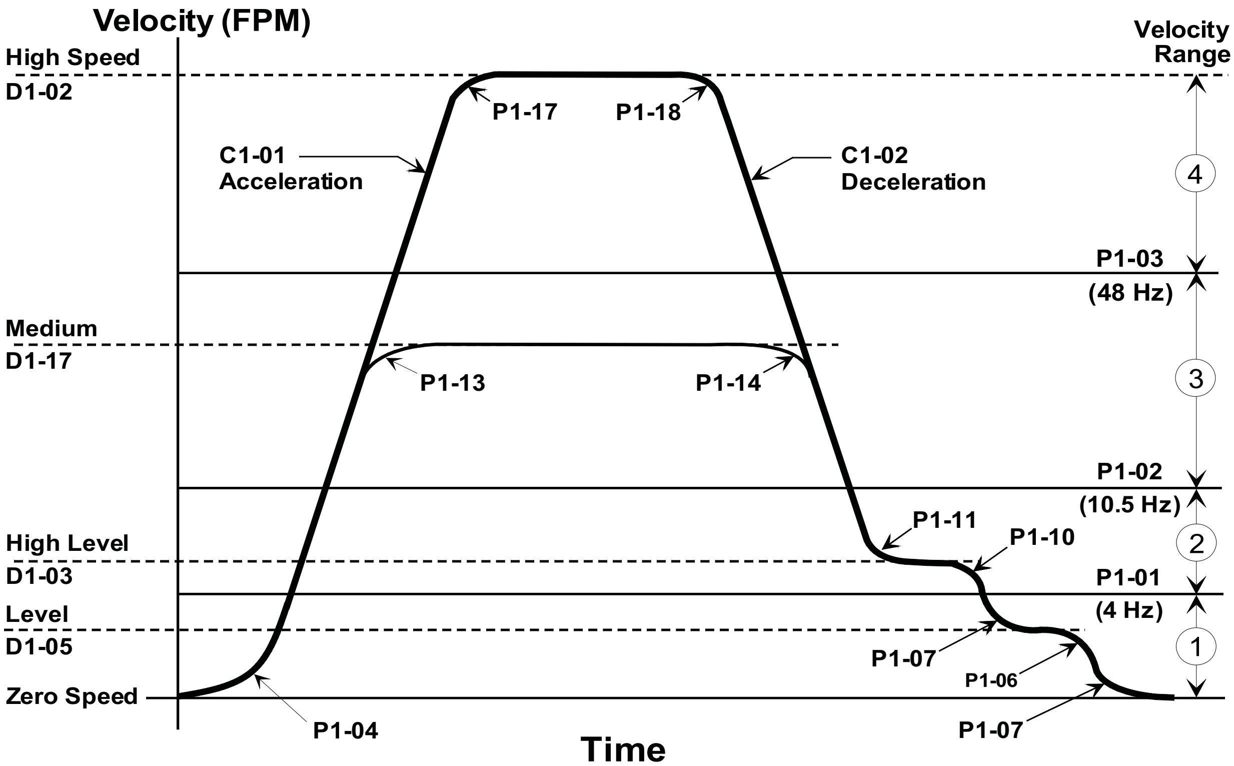

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Table for Selection of S-Curves (Increasing the value (time) of an S-curve parameter causes a longer (smoother) transition)					
Range	**Velocity (FPM)**	**Start Accel**	**End Accel**	**Start Decel**	**End Decel**
1	Less than P1-01	✶ **P1-04**	P1-05	✶ **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 to smooth the elevator ride. All the other parameter values are set to the MCE Drive defaults.					

*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

At the factory, MCE sets drive parameters to the values in the *MCE Set* column, and saves those values as defaults by setting parameter O2-03 = 1. In the field, the drive parameters can be *reset* to MCE Set values by setting parameter A1-03 = 1110. The Field Adjustable parameters can then be re-entered.

Note

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.

Startup for Flux Vector Mode (Closed Loop)

- Enable the drive for Flux Vector Mode by setting parameter **A1-02** = 3
- Remember to reset preset speed minimums back to the design settings sent with the controller.
- Attempt to run the elevator on inspection while in Flux Vector mode.
  - If encoder feedback is reversed, the car will run at very low speed with high current. Output current can be observed on Monitor U1-03. Running the car in the down direction, monitor the “Output Freq” (U1-02) and the “Encoder Speed” feedback (U1-90). The two signals should be negative if the encoder polarity is correct. To reverse encoder direction, reverse A and A- signals from the encoder to the drive.

If this does not resolve the problems, check these possible causes:

1. PPR setting in drive is incorrect. Check Parameter F1-01.
2. Encoder has been damaged.
3. Improper encoder wire routing, shielding, or connection.
4. Motor Data in drive is incorrect. See Motor Tuning Section.

- Run the car again and confirm that the car runs correctly in both directions.
- Using the keypad, access the “U1-90” Monitor parameter “Encoder Speed.” Run the car in the down direction. The speed reference should be negative. Monitor parameter “Speed Feedback.” Run the car in the down direction. The speed feedback should be negative. If not, reverse the A and A- signals from the encoder to the drive.

Scaling Adjustments

Using the keypad, access the “U1-02” Output Freq on open loop or U1-05 Motor Speed on closed loop. Hold a hand tach against the governor rope and run the car in either direction while monitoring the displayed speed and the tach. If the displayed speed is slower than the observed speed on the hand tach, access parameter O1-03 and Raise the FPM scaling. If the displayed speed is faster than the observed speed on the hand tach, access O1-03 and decrease the scaling. The car can now be run on inspection operation.

Drive Faults

When a drive fault occurs, the fault message will be displayed on the keypad and the drives fault contact will cycle. The Tricon controller will attempt to reset the fault automatically. If the fault condition remains, the reset will stop and the drive will remain in a faulted condition.

You can view the status of the drive at the time of the current fault by looking at the Fault Trace monitors (U2-01 to 14). You can also view the last ten fault messages in the Fault History contained in monitors (U3-01 to 20). High-speed stops will frequently cause a drive fault.

Motor Tuning (Flux Vector / Closed Loop Only)

In order for the drive to properly control the motor, it is necessary to program motor characteristics into the drive. This can be done in a couple of ways, however, for elevator applications the simplest method is to use the drives Static Auto-Tune feature.

Note

In order for auto-tune to complete, it is necessary to force close the output contactor.

- Press the Menu key until the Auto-Tune menu appears.
- Press Data/Enter.

Enter the following data:

Parameter	Data	Description
T1-01	1	Auto-tune no rotate
T1-02	Motor rated power in Kw	If motor data is in horse power multiply HP * 0.746
T1-03	Rated Voltage	Enter 90% of line voltage (Line Voltage x 0.90) i.e. 230VAC x 0.90 = **207VAC** or 208 VAC x 0.90 = **187VAC**
T1-04	Motor Rated Current	Full load amperage rating of the motor.
T1-05	Motor Rated Frequency	Generally 60Hz
T1-06	Number of Poles	Check the list of motor speeds in the section on scaling. Find the number of poles for your motor speed.
T1-07	Rated Motor Speed	Speed of the motor in RPM at Rated Frequency. This will be the synchronous speed minus the slip percentage.
T1-08	Encoder PPR	Encoder pulses per revolution

Once the above data is entered, a keypad message should appear, “press the run key to start auto-tune.” The drive will send current to the motor; the process will take up to 1 minute. The keypad display will advise if the tune was successful. The drive will automatically load data to the proper parameters.

Normal Speed Learn Operation

You must now perform an normal speed learn operation using controls on the Limit Board. Please refer to the learn operation information for your particular Limit Board in Section 4.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

Mitsubishi A500 Variable Frequency Drive

This section describes:

- A500 Startup and Adjustment
  - Open Loop Volts/Hertz
  - MFVC Mode (Open Loop with Slip Compensation)
  - Closed Loop Speed Control
- Brake Adjustment

A500 Startup and Adjustment

This section describes adjusting the Mitsubishi A500 drive. The instructions are not intended to replace the Mitsubishi drive manual and assume you understand how to use the drive parameter unit to access monitor modes as well as parameters.

The drive can be operated in three modes:

- Open loop volts / hertz
- MFVC mode (open loop volts / hertz with slip compensation)
- Closed loop speed control

The drive is shipped with parameters set for open loop volts / hertz mode. Each mode in turn, in the order shown above, improves the performance of the drive. The highest performance mode, closed loop speed control, requires an encoder feedback board in the controller cabinet and a motor-mounted encoder.

Even if you intend to run the car in closed loop mode with encoder feedback, you must start adjusting from the open loop volts / hertz mode and move up one mode at a time. **This is required** because the motor self-tune must be done without the encoder board plugged into the drive.

The A500 drive is shipped with a FR-DU04 parameter unit. An optional full size parameter unit FRPU04 with the extension cable FR-CB203 is available.

Open Loop Volts/Hertz

These instructions are for open loop volts/hertz adjustment.

A500 Inspection Startup, Open Loop Volts/Hertz After verifying all controller, motor, and brake connections, try moving the car on controller inspection.

- If the direction of the motor is reversed, reverse any two of the hoist motor wires.
- The torque boost parameter may require some adjustment for low speed torque. If set too high, the final leveling speed current (on automatic as well as low inspection speed) will be very high. This should be adjusted as low as possible while still able to move full load at the final leveling speed.
- The inspection speed may be low inspection speed parameter 5 or high inspection speed parameter 24. To run at high inspection speed, set car parameter 132 to yes.

High Speed Adjustment, Open Loop Volts/Hertz This mode of operation uses torque boost at low speed to increase motor torque to keep the full load up and full load down leveling speeds approximately equal. Final leveling speed (parameter 6) can be reduced only if the motor has enough torque to level under all load conditions. If final leveling speed is too slow, the car may stall at leveling speed or leveling current may be too high.

There is no speed regulation or load compensation in open loop volts/hertz mode. All adjustments may cause high acceleration, deceleration, and holding currents. You must check these current levels after each adjustment to insure they are kept as low as possible.

1. Adjust acceleration time parameter 7 for comfortable acceleration while keeping the peak current as low as possible.
2. Adjust deceleration time parameter 8 for approximately three inches of final leveling with full load in the down direction.
3. The drive is shipped with the S curve in the linear mode, parameter 29=0. This is normally adequate for open loop mode, but you can try setting parameter 29 to a 1 (S curve operation) and decide which you prefer.
4. To reduce the accel and decel currents, increase acceleration time and deceleration distance. The deceleration distance should be approximately 1 foot for every 50FPM of rated contract speed. (This can be made longer if the motor will not slow down the load properly.)

Final Stop Adjustment, Open Loop Volts/Hertz Final stop is adjusted using DC injection voltage parameter 12. Injection voltage is applied to the motor when the car is level (LU and LD on). The DC voltage should not be any larger than required to stop the motor.

To check the holding current being applied to the motor:

1. Temporarily increase the DC injection time to 3 seconds and controller drive hold time parameter 77 to 5 seconds.
2. Monitor the drive hold current at the stop of the car.

While adjusting final stop:

3. Set holding current as low as possible. There is a point at which, no matter how much current is applied to the motor, it will not stop the load.
4. Adjust the brake to drop as quickly as possible, because it may not be possible to stop the motor rotation with DC injection.

Note

Brake drop time can be decreased by lowering the brake holding voltage and increasing the resistance in parallel with the brake coil. This resistor can be found on the job prints. It has a diode in series with it and is in parallel with the brake coil.

Problems Adjusting Open Loop Volts/Hertz This mode provides adequate performance if the motor is sized correctly for the load. If you see a large speed difference when lifting the load as compared to lowering the load at high speed and leveling speed (as well as the motor not slowing the load equally in each direction) the motor is too small for the job. If this is the case, avoid the following mistakes:

- **Do not** lower the final leveling speed too low, as this will push the motor closer to a stall condition. Increasing final leveling speed will reduce the up/down speed difference.
- If the car exhibits poor final leveling, the dead zone should be opened so that you can adjust the stop without overshooting the floor. To open the dead zone, move the LU and LD in the leveling stick closer together. Always adjust the car for a proper stop, then adjust the leveling switches for a level floor stop.
- Adding torque boost will help low leveling speed regulation, but you may raise the current to a point that will cause the drive to trip on overcurrent or even be damaged. Always monitor drive current at low speed to ensure torque boost is no higher than needed.

Mitsubishi Open Loop Volts/Hertz Parameters The drive is shipped with the following parameters. The parameters listed are those which have been adjusted differently than Mitsubishi factory drive defaults.

Table 3.15 Mitsubishi Open Loop Drive Parameters

Par. number	Parameter name	Parameter function	Default value
0	Torque boost	Greater torque at low speed	6% or less
1	Maximum frequency	Maximum frequency limit	60 Hz
2	Minimum frequency	Minimum frequency limit	2.5 Hz
3	Base frequency	Motor nominal operating frequency	60 Hz
4	High speed	High speed setting	60 Hz
5	Int. speed	Approach and low inspection speed setting	12 Hz
6	Int. speed	Leveling speed setting	8 Hz
7	Acceleration time		1.7 Sec.
8	Deceleration time		2 Sec.
9	Thermal overload relay	Adjust to the motor nameplate	Motor nominal current
10	DC Injection brake operating frequency	Adjusts the point the drive will begin to DC inject for stopping the motor	0.7 Hz
11	DC Injection brake duration	Adjusts the amount of time the DC will be applied	0.5 sec.
12	DC Injection brake voltage	Adjusts the % of motor voltage applied at the stop	5%
19	Base frequency voltage	Motor name plate voltage, must be =< main-line VAC	Motor nominal voltage
22	Current limit	Maximum current allowed (in percentage of drive nominal current)	160%
24	Int. speed	High inspection speed	30 Hz
29	Accel/Decel S curve	0 = linear 1 = S curve	0 = (linear rate profile)
72	PWM Frequency	Preset is 2 KHZ which will cause a lot of audible motor noise	10 KHz
80	Motor Capacity	Activates MVFC mode automatically when set to any value	9999
81	Number of motor poles	Activates MVFC mode automatically when set to any value	9999

Mitsubishi A500, Magnetic Flux Vector Control

The MFVC mode allows the drive to track speed, improving control and almost eliminating stall conditions. In this mode, the A500 can approach the ride quality of a closed loop vector drive.

The MFVC mode of operation is automatically activated when parameters 80 and 81 are set to any value other than “9999”. When MFVC mode is activated, the value entered for torque boost parameter 0 is ignored. The drive will internally calculate the necessary torque boost values required after the motor has been auto tuned. To deactivate the MFVC mode set “9999” in parameters 80 and 81.

At this point, you should already have adjusted the car in open loop volts / hertz mode. Depending on the motor it may not be possible to auto tune or run the drive in this mode, see the section below explaining adjusting problems.

If an encoder board and encoder have been provided, the encoder board **must be** unplugged from the drive before auto tuning is performed. Auto tuning with the card installed can cause the auto tuning parameters to be stored incorrectly. Always remove power from the drive before unplugging or plugging in the board.

Adjusting the Drive in MFVC Vector Mode

Initial conditions:

- Car may be run in inspection from the controller
- Car load must be balanced
- The encoder board, if provided, must be unplugged from the drive before auto tuning
- Always remove power from the drive before unplugging or plugging in a board

1. Move car to the lowest floor.
2. Set the drive to ‘PU’ by pressing the PU key.
3. Set the following parameters:

Table 3.16 A500 Parameters, MFVC

Parameter	Value
0	0%
1	60 Hz
2	0 Hz
3	60 Hz
4	60 Hz
5	6 Hz
6	2 Hz
7	2 Sec
8	2 Sec
9	Motor nameplate current
10	0.7 Hz
11	0.8 Sec
13	0 Hz
22	200%
29	1 = S curve
71	13

Table 3.16 A500 Parameters, MFVC

77	0 (801will let you view the motor values stored and write enable)
80	Motor horsepower multiplied by 0.746 Some of the typical values for this parameter 7.5 HP = 5.5 10 HP = 7.5 12.5 HP = 9.3 15 HP = 11 Motor Poles = (120 * frequency) / RPM 900 RPM = 8 but use 4 to auto tune
81	1200 RPM = 6 1800 RPM = 4
83	Motor Voltage (V) =Nameplate voltage Must be less than or equal to the input AC line voltage.
84	60 Hz
96	Auto Tuning Enable Use “1” to tune without motion. Use “101” to tune with motion.

Starting the Auto-tune

To start the auto-tune procedure:

1. Set parameter 96 to 101 and push the write key.
2. Push the EXT button. The display will show: 101 ---STOP EXT
3. Push the controller up inspection button.

The motor will hum intermittently and then the car will accelerate to full speed in the up direction before decelerating. Do not stop the car unless it gets too close to the top landing or moves too fast.

4. Hold the up direction button until the display shows the 103 / completed.

This may take 10 seconds after the car has stopped moving in the up direction. When completed, the display will show: **TUNE 103 COMP STF STOP PU.**

Please refer to “Problems Auto Tuning In MFVC Mode ” on page 3-84 if the auto tune fails. After a successful auto tune, more fine-tuning can be achieved by adjusting the drive gain as explained in the following paragraph.

Car Balancing

For the drive to perform properly, the car needs to be properly balanced. Geared cars are typically balanced with 40 – 50% of the cars rated capacity. To confirm this, the following procedure must be followed.

1. Access the car top. Run the car on inspection to the center of the hoistway. Stop the car so the crosshead on the counterweight is exactly adjacent the crosshead on the car.
2. Place a chalk mark on the cables in the machine room and mark the hoist motor so that while the car is run from the machine room you will be able to tell when the car passes through the center of the hoistway.
3. Move the car to a convenient floor. Place 40% of the car’s rated capacity in the car.
4. On inspection, run the car so it about 10 feet above the center of the hoistway.
5. Place an Amprobe on one of the leads to the hoist motor.
6. While observing the display on the Amprobe, run the car down on inspection operation through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
7. Place the car about 10 feet below the center of the hoistway.

8. While observing the display on the Amprobe, run the car up through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
9. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running up was greater than the value running down, the car is too heavy. Remove 100 pounds of weight from the car and repeat steps 8 through 10 until the recorded values are equal, but have opposite polarity.
10. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running down was greater than the value running up, the car is too light. Add 100 pounds of weight from the car and repeat steps 7 and 8 until the recorded values are equal, but have opposite polarity.

When the values are equal, but have opposite polarity, the car is balanced. Check how much weight is in the car. It should be between 40 and 50% of rated capacity. If not, the counter-weighting needs to be adjusted. If the car is too heavy, weight needs to be added to the counter-weight to get the car balanced between 40 and 50% of rated capacity. If the car is too light, weight needs to be removed from the counterweight to get it balanced between 40 and 50% of rated capacity. Do not proceed with the adjustment process until the car is properly balanced.

High Speed Adjustment and Gain Adjustment The drive has slip compensation to allow it to compensate for motor slip at high speed as well as leveling speed. The drive will regulate high speed if you set high-speed parameter 4 to less than 60 HZ. Setting parameter 4 to 55HZ will give the drive some headroom to regulate the speed of the car at high speed. Running the car with full load, the drive should regulate the high speed and final-leveling speed quite closely after you have adjusted the gain as described below. If you need more than 60HZ at high speed, raise parameters 1 and 3 (they are the limits for the drive).

1. The drive normally requires S curve parameter 29 to be set to a 1, as the control may be bumpy with sharp changes to the pattern profile.
2. Parameter 89 defines the gain of the vector control, which acts like any typical closed loop gain control. To change parameter 89, disable write protect by setting parameter 77 to 801.
   Parameter 89 is factory-set to 100%. Increasing the gain will increase the speed control precision and decreasing it will make the car more stable.

To find the optimal gain for the installation do the following:

3. Put full load in the car.
4. Observe car speeds and slowdown times in the up and down directions. If they are significantly different, additional gain will reduce the difference. If the car oscillates or overshoots significantly, the gain is set too high.
5. If no gain setting seems to improve the car up and down symmetry, verify counterweight balance. Also verify the slowdown distances. Remember that the TRICON controller initiates slowdown when it ENTERS the slowdown magnet.

6. Adjust the PWM frequency (parameter 72) to a value as low as possible without generating too much audible noise. The value will change from job to job. Values as low as 4500 Hz are attainable. Reducing the PWM frequency also reduces the heat generated in the drive and radio frequency interference.
7. Run the car with no load and verify that it still runs smoothly and evenly in up and down directions.

Problems Auto Tuning In MFVC Mode If the auto tune fails, verify all parameters and retry.

- If the dynamic auto tune fails, you can try the auto tune in the static mode. The static mode uses a “1” in parameter 96. Follow the procedure for auto tuning.
- If any error occurred, the car will stop and the display will show the error. An example of this is: **TUNE 9 ERROR STF STOP PU** Error 9, Inverter trip.
- Check value of parameter 80, it should be set to the kilowatts capacity of the motor. Example: 7 horsepower motor = 7 x 0.746 = 5.22 KW

If the drive does not auto tune correctly and parameters 80 and 81 are not set back to 9999, the drive will still be in advanced MFVC mode using Mitsubishi motor constants. This is OK as long as peak current does not exceed twice the motor nameplate rated current. If the peak currents are greater than twice the motor nameplate, take the drive out of the MFVC mode (Parameter 80 and 81 set to 9999) and manually adjust the torque boost.

Monitoring Peak Current Check the peak output current of the drive with full load. Run the car in both directions and monitor peak current using the FR-PU04 parameter unit.

1. Press the “help” key twice from the main menu until “monitor” appears, then press “read”.
2. Scroll down using the arrow button to “PEAK I” and press “read”. The peak current will be displayed from the last run the car made.

As long as the peak current does not exceed twice the motor nameplate current when the car is run up and down, drive setup is good. If it exceeds twice the motor nameplate current, try auto tuning again. If this fails, take the drive out of MFVC mode (Parameter 80 and 81 set to 9999) and manually adjust the torque boost.

Normal Speed Learn Operation

You must now perform a normal speed learn operation using controls on the Limit Board. Please refer to the learn operation information for your particular Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

Mitsubishi A500, Closed Loop Speed Control

Closed loop speed control requires an encoder feedback board and a encoder mounted on the motor. The encoder is typically 5-volt, 1024 count per revolution. Closed loop operation has three performance modes, selected through the value set in parameter 370. You must start with mode 0, verifying the operation before moving to mode 1, or 2.

To access any of the “300” parameters, the encoder board must be installed. **Always remove power** from the drive before unplugging or plugging in the encoder board.

Closed Loop Speed Control, 370 Set to a 0 Overview Set all of the parameters shown in the table for closed loop operation. (Please refer to “A500 Parameters Closed Loop Speed Control” on page 3-86.) The following parameters are recognized when the encoder board is installed. These parameters must be set properly for the drive to work in this mode: 144, 359, 369, 367, 368.

Parameter 370 set to a 0 requires the encoder direction, (parameter 359) be set properly for speed regulation from the encoder. To determine if this parameter is set properly, or the encoder is working, do the following.

1. Run the car at slow inspection speed with an empty car.
2. View the drive display, monitoring the frequency.
3. If the encoder is working, the frequency will be higher in the down direction, as well fluctuating to regulate the car speed.
4. If the encoder is rotating backwards, you will move at the same frequency in the up and the down direction.
5. If the encoder is not working or is misconnected, you will have the same condition as rotating backwards.
6. To reverse the encoder direction, change parameter 359 from a 0 to a 1 or from a 1 to a 0. You can monitor the motor RPM at the drive to insure the encoder is working.

Closed loop speed control, 370 set to a 1 or 2 Only if you have made the drive perform in all of the previous modes are you ready to run in the higher performance modes, 1 or 2. If you observe unusual drive operation in this mode, refer to the section below. If a “1 or a 2 is selected for parameter 370, the A500 drive will be in closed loop vector mode and **must** be properly tuned with a constant torque motor selected for the motor type (parameter = 71) and **must** be auto tuned with motion (parameter 96 = 101). If auto tuning is not performed properly, the drive will not operate in the vector mode. Remember that the encoder board **must not** be installed when you perform an auto tune.

If a “1 or a 2" is selected for parameter 370, parameter 22 now becomes the torque limit of the motor, not the drive. This torque limit has a range of 0-300% and should be set to 250%.

If a “1 or a 2" is selected for parameter 370, the drive will ignore parameter 367 and try to follow the encoder feedback as closely as possible. This may be a problem during acceleration and deceleration where the inertia of the car can cause the drive to over and under shoot the desired speed. In a effort to correct itself, excessive output can lead to a bumpy ride. Setting parameter 370 to a 2 allows access to gain parameters 372 and 373. They can be used to smooth the ride. See the explanation of the parameters below.

Gain Parameters Adjustment When parameter 370 is in mode 2, gain parameters are used to smooth the ride of the car. Parameter 372 is the proportional speed loop gain. Its starting point is 150%. You need to have this high enough to handle the loads, but not so high that the car is unstable. Parameter 373 is the integral gain of the speed loop. A lower number will increase the time the drive will take to respond to a speed variation. Its starting point is 5%.

S Curve Adjustments When the encoder board is installed, S curve rounding can be adjusted by doing the following:

1. The accel and decel ramp time set in parameter 7 and 8 function normally.
2. Rounding can be adjusted when you have set parameter 29 to a 4.
3. The accel rounding is parameter 380. The decel rounding is parameter 381.
4. Each rounding parameter is normally set to 50%.

Unusual Operation in Mode 1 or 2 When the drive is run in mode 1 or 2, and you encounter unusual performance, high current with no motor speed, unusual motor noise not present in mode 0, see the section below on clearing all of the parameters to factory setting.

Clearing the Drive Parameters to Factory Default If the drive performs unusually in mode 1 or 2 of closed loop operation, you will have to clear the drive to the factory default values. You should clear all of the parameters with the encoder board installed.

1. From the PU mode, push help 2 times.
2. Move the cursor with the arrow keys to #4 (Pr Clear), then push read.
3. Move to #2 (clear all), then push read.
4. Push write. The display should say clear all parameters.

You will have to change all factory default parameters values to the ones shown in the table for open loop operation. It is best to start by running the car in the open loop mode as you have done to ensure you have entered all of the parameters properly. The auto tune without the encoder board installed will have to be redone, as well as the “300” parameters to run with the encoder and the higher performance modes.

Table 3.17 A500 Parameters Closed Loop Speed Control

Par. number	Parameter name	Parameter function
29	Accel/ Decel Profile	0 = Linear Accel/decel ramp 1 = S shaped Accel/decel ramp A 2 = S shaped Accel/decel ramp B 4 = S shaped Accel/decel Ratio
144	Motor Poles	Motor Poles = (120 * frequency) / RPM 900 RPM = 8 but use 4 to auto tune 1200 RPM = 6 1800 RPM = 4
359	Encoder rotation	Looking at the motor shaft if forward rotation, (UP direction) is clockwise set to 0, otherwise set to 1
367	Speed feedback range	This parameter is used in mode 0, and not in mode 1 or 2. (Sync Speed-Full load speed) * (# of poles) 120 Example (1800 RPM -1750) X (4 poles) =1.67HZ 120
368	Feed back Gain	Suggested setting = 1
369	Encoder Pulses/ rev	Typically 1024 (check your encoder)

Table 3.17 A500 Parameters Closed Loop Speed Control

370	Control Mode	0 = MFVC mode with encoder 1 = vector mode with zero speed 2 = vector mode with servo lock
372	Speed Control P gain	Used to set the proportional gain of the speed loop. A higher setting will make the speed response faster. Suggested setting = 150%
373	Speed Control I gain	Used to set the integral gain of the speed loop. A lower setting will increase restoration time at the occurrence of a speed variation. Suggested setting = 5%
380	S shaped Accel%	Only valid when Parameter 29 = 4 Suggested setting = 50%
381	S shaped Decel%	Only valid when Parameter 29 = 4 Suggested setting = 50%

Alarms

- **E.OC1** Over Current During Acceleration Alarm Drive overheating: Check cooling fan. Increase Acceleration time (Pr. 7). Decrease Torque boost.
- **Pr. 0C** Output Transistor Module Damaged. Disconnect the motor from the M relay and try the drive. If the drive trips as soon as it is enabled to run, the drive is damaged.
- **E.OC2** Over Current During Constant Speed Alarm Drive overheating. Check cooling fan. Consider using Magnetic Flux Vector Control Mode if using V/F mode. Auto tune motor to the drive.
- **E.OC3** Over Current During Decel or Stop Alarm A) Drive overheating. Check cooling fan. B) Increase Decel time (Pr 8) C) Check brake unit FR-BU(H) transistor or brake resistor if applicable. D) Output transistor module damaged. Disconnect the motor from the M relay and try the drive. If the drive trips as soon as it is enabled to run, the drive is damaged.

Normal Speed Learn Operation

You must now perform a normal speed learn operation using controls on the Limit Board. Please refer to the learn operation information for your particular Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9

Magnetek DSD 412 DC Drive

Magnetek Drive installation instructions can be found in the separate manufacturers manual - Magnetek Technical Manual CS 0274 - enclosed with the project shipment.

The drive has been modified to meet MCE specifications. The Magnetek Technical Manual shipped with the elevator control may be used with the exceptions listed below. The exceptions listed below supersede those in the standard manual.

Hardware Modifications

Typically, the only hardware modification may be the occasional use of a motor field transformer. You received a motor field transformer if it was dictated by the project specification data.

Drive Programming

Once the controller is powered up, the drive must be programmed to interface correctly with the equipment on the job site. MCE has pre-programmed the drive based on the information provided in the survey but it is important to confirm settings before attempting to run the car.

The drive may fault on initial power up due to incorrect parameters. This is normal, and should be ignored at this time.

1. To use the keypad, press the up arrow. The display should change to a “0.” Press the up arrow again, and it should change to a “1.” Press the DATA/FCTN key and the value programmed into parameter one will be displayed.
2. Parameter #1, Current Limit, should be set to 275. If it is not, press the up or down arrow until 275 is reached. Press enter to save this value.

Note

Saved values are only held in the drive volatile RAM at this time. Powering down the drive or pressing the reset button will cause this data to be lost. For the data to become permanent, it must be saved to the drive non-volatile RAM. If you wish to save any value at this time, follow the procedure in Step 20 below or refer to the Quick Start Up and Reference Guide which was shipped with the controller.

3. Access parameter #3. Enter the motor nameplate rated armature current in amps. Press enter to save.
4. Access parameter #7. Enter the motor nameplate rated armature voltage in volts. Press enter to save.
5. Access parameter #9. Enter the nominal AC input voltage to the drive found on terminals L1, L2, and L3. Press enter to save.
6. Access parameter #10. Enter the pulses per revolution (PPR) of the motor encoder. This data can usually be found on the sticker attached to the encoder. Press enter to save.
7. Access parameter #11. Enter the motor nameplate RPM. Press enter to save.
8. Access parameter #16. This parameter is the gearless ratio of the encoder. If the encoder is mounted to the motor shaft, set this value to 1.000.

9. Access parameter #17. Enter the contract speed of the car in feet per minute (FPM). Press enter to save.
10. Access parameter #49. Enter the running field current in amps. If field weakening is not used, enter the full field current in amps. Press enter to save.
11. Access parameter #50. Enter the full field current in amps. This may or may not be the value on the motor nameplate (the fields may have been re-wired). If you are unsure, check the survey data to see what the field current was with the old controller. Press enter to save.
12. Access parameter #52. Enter the full field voltage in volts. Press enter to save.
13. Access parameter #53. Enter the standing field current in amps. This value is typically half of the full field value from parameter 50. Press enter to save.
14. Access parameter #56. If the motor uses field weakening, enter a value of 90. If field weakening is not used, enter a value of 130. Press enter to save.
15. Access parameter #57. If the motor uses field weakening, enter a value of 70. If field weakening is not used, enter a value of 130. Press enter to save.
16. Access parameter #82. Enter a value of 1.0. Press enter to save.
17. Access parameter #87. Enter a value of 1.0. Press enter to save.
18. Access parameter #97. Enter a value of 1.0. Press enter to save.
19. Access parameter #98. Enter a value of 1.0. Press enter to save.
20. The programmed values must now be saved to the drive non-volatile RAM. Access parameter 994. Press the DATA/FCTN key. The display will read “rESt.” Press the up arrow. The display will change to “SAVE.”
21. On the upper, right hand side of the drive you will find a small slide switch. This switch is the NVRAM Protect switch, S3. Flip this switch to the up position. The red LED “NV RAM NOT PROTECTED” will illuminate.
22. Press the “ENTER” key on the drive. The display should now read “994.”
23. Flip the NVRAM Protect switch back to the down position. The values are now saved.

Self Tune

The Magnetek DSD 412 digital DC drive has a self tuning feature that dynamically calculates the armature resistance and inductance. This includes the choke and filter used in series with the armature. It also measures the motor field resistance and inductance.

The self tune procedure will learn the motor and store the values in parameters 613, 614, and 615. The following assumes you have read the drive manual and understand how to use the parameter unit.

Note

Motor fields must be at full field current during self tune. Display parameter #612 must be the same as parameter #50. Check by running on inspection. Motor field fault will result if parameter #612 is less than parameter #50 during self tune.

1. Go to parameter #997.
2. Put the write enable switch up (the red LED will be on).
3. Press the Function / Data Key.
4. Connect the temporary jumper from L1B (the Bottom of the 1st controller fuse) to DE33 contact. This will lift the M relay.
5. Press the enter key to begin the self tune test.
6. The M relay will pick and drop until the display says Pass or Fault.
7. Put the write enable switch down (LED off).
8. Press the Function / Display key (977).
9. Use the down arrow key to access the 613 parameter, use the function data key to view the value stored. The value stored in 613 (armature resistance) should be recorded and then loaded in parameter 4. The value stored in 614 (armature inductance) should be recorded and then loaded in parameter 6. The value stored in 615 (Field LR) should be recorded and then loaded in parameter 51.
10. On the upper right-hand side of the drive you will find a small slide switch. This switch is the NVRAM Protect switch, S3. Flip this switch to the up position. The red LED "NV RAM NOT PROTECTED" will illuminate.
11. Press the "ENTER" key on the drive. The display should now read "994." Flip the NVRAM Protect switch back to the down position. The values are saved.

After the self tune is successful, the calculated values are stored in the following parameters:

- #613 Measured Motor Resistance
- #614 Measured Motor Inductance
- #615 Measured Field L/R time constant

These values should then be transferred and stored to the proper locations.

- #613 value transferred to Function #4 Arm Ohms
- #614 value transferred to Function #5 Arm L
- #615 value transferred to Function #51 Field L/R

Inspection Start Up

1. If the car does not run up at a controlled speed when pressing the Up button, take the actions listed in this chart.

IF THIS HAPPENS	DO THIS
Car runs up very fast until drive trips.	Swap wires TB1-4 (B) and TB1-5 (B-)
Car runs down very fast until drive trips.	Turn off main line power and wait 60 seconds. Swap motor field connections, F1 & F2.
Car runs down at a controlled speed.	Turn off main line power and wait 60 seconds. Swap motor field connections, F1 & F2. Swap wires TB1-4 (B) and TB1-5 (B-)

2. While running the car on inspection, vary the inspection pot and observe the car to make sure car speed varies.
3. Connect the red meter lead to the TB1-68 drive terminal. Connect the black meter lead to the TB1-63 drive terminal. As the car runs, adjust the inspection pot until 0.7 volts appears on the meter. If the car is running down, the polarity will be negative. If the car is running up, the polarity will be positive.
4. Hand tach the car. It should be running at 10% of contract speed. If not, modify drive parameter 11 (Motor RPM) to achieve the correct speed.

Drive Faults

Drive faults will be indicated on the display as an “F” followed by a 2- or 3-digit number. For example: F 910 indicates a blown fuse.

There are two (2) error logs within the drive.

- Parameter #800 contains a list of the last 16 faults that occurred. This list is constantly updated, with the newest error overwriting the oldest. The list is stored on NVRAM and is never cleared. Errors on this list could be from the first time the drive was powered up. It is a continuous list, constantly updated.
- Parameter #0 also contains a list of the last 16 faults that occurred. This list is also constantly updated, with the newest error overwriting the oldest However, this list can be cleared.

To view or clear this error list, do the following;

- Use the arrow keys to scroll to Parameter #0.
- Press DATA/FCTN key.
- The first entry is “ALL.”
- Press ENT to clear all the errors in the list.
- Use arrow keys to scroll past the “ALL” entry to view the error list.
- The first error after “ALL,” is the latest error.
- Press the ENT key to clear that particular error.
- The end of the list will be indicated by “END.”

For a more complete description of Parameters #800 & #0, refer to the Magnetek Technical Manual.

High Speed Adjust Magnetek DSD 412

Car Balancing

In order for the drive to perform properly and be set up correctly, the car needs to be properly balanced. Geared cars are typically balanced with 40 – 50% of the cars rated capacity. To confirm this, the following procedure must be followed.

1. Access the car top. Run the car on inspection to the center of the hoistway. Stop the car so the crosshead on the counterweight is exactly adjacent the crosshead on the car.
2. Place a chalk mark on the cables in the machine room and mark the hoist motor so that while the car is run from the machine room you will be able to tell when the car passes through the center of the hoistway
3. Move the car to a convenient floor. Place 40% of the car rated capacity in the car.
4. On inspection, run the car so it about 10 feet above the center of the hoistway.
5. Place an Amprobe on one of the leads to the hoist motor armature.
6. While observing the display on the Amprobe, run the car down on inspection operation through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
7. Place the car about 10 feet below the center of the hoistway.
8. While observing the display on the Amprobe, run the car up through the center of the hoistway. Write down the amperage displayed while the car passes by the chalk mark on the cables. The value may vary slightly, so average the value if necessary.
9. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running up was greater than the value running down, the car is too heavy. Remove 100 pounds of weight from the car and repeat steps 8 through 10 until the recorded values are equal, but have opposite polarity.
10. Ignoring whether the recorded values were positive or negative, if the value recorded while the car was running down was greater than the value running up, the car is too light. Add 100 pounds of weight from the car and repeat steps 7 and 8 until the recorded values are equal, but have opposite polarity.

When the values are equal, but have opposite polarity, the car is balanced. Check how much weight is in the car. It should be between 40 and 50% of the rated capacity. If not, the counterweight needs to be adjusted. If the car is too heavy, weight needs to be added to the counterweight to get the car balanced between 40 and 50% of the rated capacity. If the car is too light, weight needs to be removed from the counterweight to get it balanced between 40 and 50% of the rated capacity. **Do not proceed with the adjustment process until the car is properly balanced.**

Drive Parameters

There are four (4) primary parameters used in high speed adjustment of the DSD 412 drive.

- **40 (Response):** This parameter adjusts how closely the drive tracks the speed pattern. Typical values are from 5 to 8. The higher the number, the closer the tracking. Too high a number will cause vibration in the car, mostly noticed at slowdown, because the drive is trying to regulate speed too closely. Too small a number may cause to car to overshoot the floor due to poor tracking.
- **41 (System Inertia):** This parameter is the inertia of the elevator system. It is the time (in seconds) it takes to accelerate the motor to base speed. Typical values are from 0.5 to 2.5. Too large a number may cause vibration and too small a number will cause the speed regulator to become sluggish.
- **42 (Stability)** : This parameter adjusts the amount of speed regulator damping. This value is usually left at the default of 1.0.
- **8 (Current Regulator Crossover)** : Adjusts the bandwidth of the current regulator. This value is typically left at the default of 500. Too small a number will cause vibration in the car, usually at full speed or going into or out of full speed. Too large a number will cause the motor to become sluggish.

S-Curve Pattern Adjustments

The Tricon control generates an “S” shape speed pattern. The output provides a step-less 0-10VDC bipolar speed reference to the speed reference input of the DSD 412 drive. The drive is configured to use this voltage and polarity to run 0 to contract speed in a forward or reverse direction. The S curve and speed pots have been set at the factory. Only minor adjustment will be required. The accel rate has been set to a slow rate (full counterclockwise). The decel rate has been set to a fast rate (full clockwise). These settings will help with your first high speed runs.

The speed board output can be measured at terminals TB1-3 (common) and TB2-9 (Ref). When the car is run in the up direction, the Ref terminal will be positive with respect to common.

Speed Pots

The speed board has five adjustable speed output voltages. These pots have a limited output. See the table below. Clockwise rotation will increase voltage. The pot setting can be measured with the car stopped by measuring each of the speed input terminals (TB1-1 – TB1-HI) to the board common (TB1-3). Adjust the corresponding pot for the desired voltage (speed). The voltage required for a given speed can be precisely calculated using the following formula.

$$\text{Reference Voltage} = \frac{\text{Desired Speed x 10}}{\text{Contract Speed FPM}}$$

Speed Pot	Adjustable% of full speed	Voltage output
SP1	0-15%	0-1.5VDC
SP2	0-25%	0-2.5VDC
SP3-SP5	0-100%	0-10.0VDC
HI	Fixed	10.0VDC

The system control uses the following speeds:

Speed	Function	Normal Setting
SP1	Leveling	4-8FPM (.25VDC)
SP2	Approach / Inspection	20-30FPM (1.0VDC)
SP4	One floor run or contract speed 200FPM or less (5.0 or 10VDC)	
HI	Multi floor run / contract speed >200FPM (10VDC)	

Acceleration / Deceleration Pots

The speed board has two acceleration rates and three deceleration rates available. Tricon uses accel 1 and decel1. The range for the accel1 and decel1 is 10 seconds with the potentiometer fully counterclockwise (slow accel and slow decel) to one second with the potentiometer fully clockwise (fast accel and fast decel).

S Curve Knee Pots

The S shape of the output is controlled by Knee pots P1-P4. When the pots are turned full counter-clockwise, the curve will be very smooth. When the pots are turned full clockwise, the curve will be very sharp. These adjustments will have more effect when acceleration or deceleration rates are slow and will have less effect when the rates are fast.

Pot	Function
P1	Accel start
P2	Accel end
P3	Decel start
P4	Decel end

Dead Zone Pattern Ramp

The R54 potentiometer allows the speed reference output to be ramped to 0 when the car enters the dead zone (level). When the car becomes level, the up down signal will be dropped. The speed reference will be ramped to zero at a rate determined by the R54 setting. With R54 full clockwise, the reference will ramp for 10 milliseconds. With R54 full counterclockwise, the reference will ramp for 0.5 seconds. Normally the pot should be set full clockwise (fastest ramp).

Final S-Curve Adjustments

S curve and speed pots have been set at the factory to the speeds shown above. Only minor adjustment is required. The accel rate has been set to a slow rate (full counterclockwise). The decel rate has been set to a fast rate (full clockwise). These setting will help with your first high-speed runs, preventing overshooting floors. Adjust the accel, decel, and knee pots for a comfortable rate. After the multi floor run has been adjusted, you can adjust one floor runs. Raise or lower one floor run speed to achieve the same finial leveling distance as multi floor runs.

A dual trace storage oscilloscope should be used to shape the S Curve output. Insure the scope has a floating ground (ground pin on the scope power cord must not be connected to earth ground). The output common (TB1-3) is not connected to ground. You can monitor the speed reference and car speed at the drive analog outputs.

Table 3.18 DSD 412 Drive Parameters

P#	Parameter	Description	Unit	Range	Default	Field / MCE
1	Current Limit	Sets drive current limit as a percentage of rated armature amps (parameter 3).	%	0 - 300	250	275
2	User Self-Tune	Selects self tune variables measured values.	-	ON, OFF	OFF	OFF
3	Rated Arm Amp	Motor rated current.	Amp	10 - 1250	50	* ______
4	Armature Ohms	Total armature circuit resistance, not including brush drop.	Ohm	0.001 - 5.0	0.1	0.450
6	Armature Inductance	Value of motor armature circuit inductance.	MHNY	0.001-1.0	0.01	.0043
7	Rated Arm V (Note 1)	Rated motor name plate armature voltage.	Volts	150 - 550	240	* _____
8	I Reg Crossover	Current regulator bandwidth. Response will increase as this number increases. At higher values, motor current will fluctuate. At lower value, motor will become sluggish.	RAD	100 - 1000	500	500
9	Nominal AC Voltage (Note 1)	Nominal AC voltage applied to SCR drive measured at drive terminals L1, L2 & L3.	V	150 - 525	230	* _____
10	Encoder Pulses/ Rev.(Note 4)	Encoder pulses per revolution from encoder nameplate.	PPR	600 - 19,999	4096	* _____
11	Motor RPM	Motor nameplate RPM. Usually motor nameplate value but may require higher or lower value to run at correct speed. For direct coupled encoder on geared application, also sets encoder shaft RPM.	RPM	50 - 2000	1150	* ______
12	Overspeed %	UP/DN overspeed trip point. Drive will trip on fault if motor speed exceeds this value. This is a percentage of Motor Speed (RPM) entered in parameter 11.	%	0 - 150	110	110
14	V Sense %	Minimum armature voltage above which tach loss and reverse tach loss are operative. Percentage of rated armature voltage (param 7)	%	0 - 100	25	25
15	Tach Sense %	Sets percentage of per unit tach feedback below which a tach loss will be declared.	%	0 -100	5	5
16	Gearless Ratio (Note 4)	Encoder wheel to motor sheave ratio for gearless jobs. Geared applications, set to 1 because encoder is mounted on motor shaft.	-	1 - 19	1	1 _____
17	Rated Ft/Min	Rated car speed in feet per minute.	FPM	5 - 2000	400	* _____
21	Accel Rate	Maximum acceleration rate in ft/sec2	Ft/sec2	2-10	4.2	4.2
32	Field Sense	Percentage of full motor field required to permit SCR drive to release speed regulator and pick LPR relay which picks loop contactor.	%	30 - 90	45	45
40	Response	Tracking delay between drive commanded speed and actual motor speed. Sets bandwidth of speed regulator. Tracking delay (sec) = 1/Response. Higher values result in less delay, tighter control.	RAD	1 - 15	6.0	6.0

Table 3.18 DSD 412 Drive Parameters

41	System Inertia	Sets system inertia in terms of time to accelerate to contract motor speed at rated torque. Acts as a gain multiplier internal to drive software.	SEC	0.1 - 9.9	2.0	2
42	Stability	Regulator damping for smoother transitions. Modifies speed regulator response to correct system inertia mismatch. Adjust only after INERTIA and RESPONSE are set. If ride quality is reduced by increasing STABILTY value, check system inertia.	-	0.2 - 9.9	1	2
49	Weak Field AMP	Sets motor field current value in weaken condition (sets motor weaken field).	AMP	0.2 - 48	5.0	* _____
50	Full Field AMP	Hoist motor nameplate field current (sets motor full field).	AMP	0.2 - 48	6	* _____
51	Field L/R	Motor field time constant.	SEC	0.1 - 10	0.80	0.270
52	Rated Field VDC (Note 3)	Rated motor field voltage.	V	50 - 525	240	* _____
53	Standing Field AMP	Sets standing motor field current (motor field current when car is not running).	I	0.2 - 48	2.5	* _____
54	Field Response	Sets motor field regulator response.	RAD	1 - 10	5	5
55	Motor Field VAC	Motor field input AC voltage at AC1 and AC2 (TB4). Must be set to a measured value if external boosted voltage is applied to terminals AC1 and AC2. If set to 0, drive selects value of parameter 9 (voltage at L1, L2, L3).	V	50 - 525	0	* 0 _____
56	Field Strength Speed	Speed (as percentage of parameter 11 - Motor Speed) at which speed regulator begins to strengthen motor field during deceleration.	%	10 - 200	130	90
57	Field Weaken Speed	Speed (as percentage of parameter 11 - Motor Speed) at which speed regulator begins to weaken motor field during acceleration.	%	10 - 200	130	70
58	Field Strengthen Rate	Rate at which motor field reaches rated field.	SEC	.01 - 10	2	2
59	Field Weaken Rate	Sets rate at which motor field reaches weaken value.	SEC	.01 - 10	2	2
63	UP/DN Bit Pick	Sets threshold at which drive will turn on a bit for detection of motor rotation.	%	.01 - 1	.01	.01
80	Overspeed Test	Used to activate an overspeed multiplier (parameter 81).	-	ON - OFF	OFF	OFF
81	Overspeed Multiplier	Speed reference multiplied by this value when parameter 80 (Overspeed Test) activated.	-	1 - 1.5	1.0	1.0
82	Reference Mult	Multiplies speed command	-	0.9-2.0	1.0	1.0
83	Motor O.L. Time Out	Shapes motor overload time-out curve.	Sec	0 - 500	90	90
84	Motor Overload Level	Sets motor overload trip level.	-	0 - 2	1	1
85	Current Decay Ramp	Sets decay time of armature current at a predictable rate upon clamping regulator.	Sec	.001 - 2.5	0.2	0.2
86	LPR Decay time	Allows relay LPR to remain picked until armature current decays.	Sec	.001 - 2.5	0.3	0.3
87	Pretorque Mult	Multiplies pretorque command.	-	0.9-2.0	1.0	1.0

Table 3.18 DSD 412 Drive Parameters

95	Analog output 0 (TB1-45)	Set to 0 to assign Speed Reference to Analog output 0 (0 to +/- 10V between TB1-44).	V	0 = Spd Ref 1 = Trace Bf	0	0
96	Analog output 1 (TB1-46)	Set to 0 to assign Speed Feedback to Analog output 1 (0 to +/- 10V between TB1-46 and TB1-80).	v	0 = Spd Fbk 1 = Trace Bf	0	0
97	Test Point 0 Mult	Sets multiplier for Analog output 0 (TB1-45).	V	0 - 10	.7	1.0
98	Test point 1 Mult	Sets multiplier for Analog output 1 (TB1-46).	V	0 - 10	.7	1.0
99	Spd_Err_Hyst	Sets amount of time speed command will be allowed to vary from speed feedback before drive trips on a speed error fault	sec	0.2-5.0	.8	.8
100	Spd_Err_Lim	Sets amount speed command will be allowed to vary from speed feedback before drive trips on a speed error fault	%	10 -100	30.0	30.0
104	1 Serial Gain Sw	Determines source of gain Reduce function at parameter 108. If set to 0, it is determined by parameter 105, Gain Switch speed	-	ON, OFF	OFF	OFF
105	Gain Switch Speed	Point on speed reference curve at which gain switches to value set by parameter 108. 0 = Zero speed, 1.0 = 100% of contract speed.	-	0.1 - 1.0	1.0	1.0
107	Tach Rate Gain	Helps rope response in gearless elevators. Should not be adjusted from its default (0.0) unless required, then in increments of 0.1. Higher values cause jittery ride.	%	0 - 30.0	0.0	0.0
108	Gain Reduce	Multiplier applied to parameter 40 - Response when in “low gain” mode.	-	0.1 - 1.0	.1	1.0
110	Multistep Enable	Allows enabling drive internal S-curve functions	-	0 =Off, 1=ON	OFF	OFF
150-164	Preset Speed S Curve	Used with internal S-Curve functions	FPM	0-1000	0.0	0.0
170-173	Accel/Decel S Curve	Used for Acc/Dec when internal S-Curve is used	Sec	0-25.0	5.0	5.0
174-177	Jerk S Curve	Percent Jerk of S-Curve	%	0-100	30.0	30.0

*Motor / machine / job dependent.

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

***Encoder PPR (P10) must be set correctly. Incorrect value will cause under- or over-speed condition.

Note 1: Parameter 9 is equal to isolation transformer secondary voltage.

Note 2: Only * entries in “Field/MCE” column are changed after drive

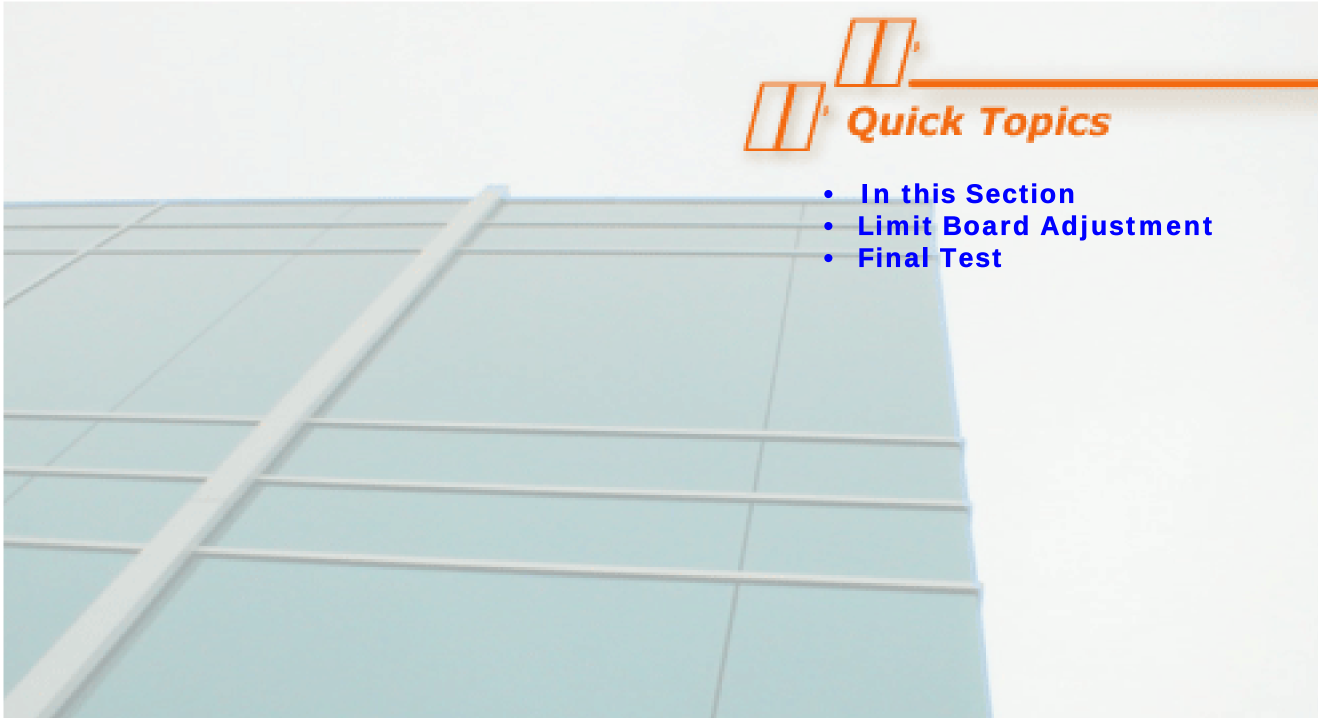
Note 3: When Filling P(52) job entry verify that 1.25<P(9)/P(52)<3. Otherwise a separate transformer for motor field supply is needed.

Note 4: Installer: Verify parameter 10 and 16 for correct values. They vary according to the installed encoder and mounting procedure (see MagneTek manual CS0601 for an explanation of these parameters.

Normal Speed Learn Operation

You must now perform a normal operating speed learn operation using controls on the Limit Board. Please refer to learn operation information specific to your Limit Board in Section 4 of this guide.

- Please refer to “Limit Board (Standard)” on page 4-3
- Please refer to “2K Limit/Gripper Board” on page 4-9



Quick Topics

Release to Normal Operation 4

In this Section

Before the car can be released to inspection or normal operation, speed and position related parameters need to be adjusted on the controller Limit board, hoistway learn operations must be completed, and code-mandated testing must be completed and approved. This section describes:

- Limit Board Adjustment
- Final Test

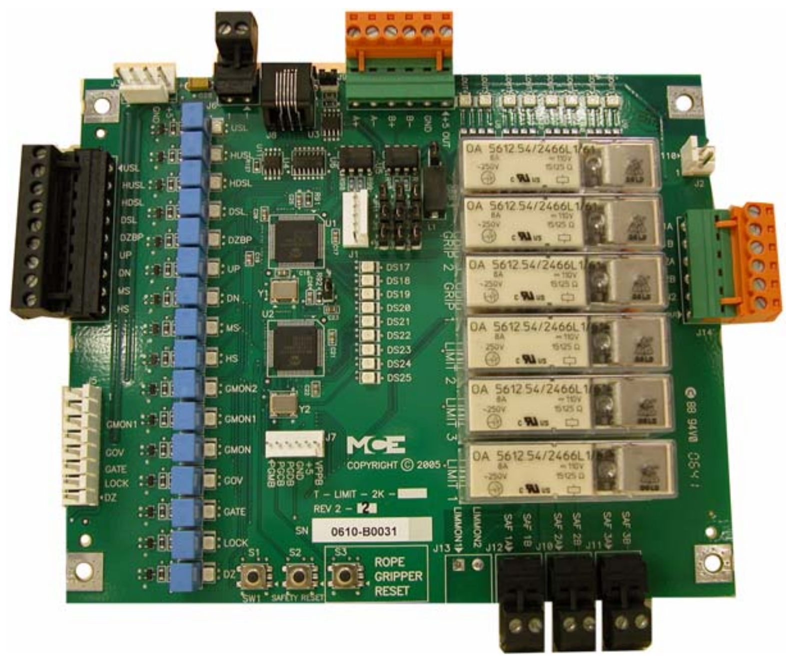
Limit Board Adjustment

Depending upon whether or not the controller must meet A17.1-2000/CSA B44.00 requirements, one of two limit boards may be used. Please refer to “Limit Board (Standard)” on page 4-3 for systems not required to meet A17.1-2000/CSA B44.00 requirements. Please refer to “2K Limit/Gripper Board” on page 4-9 for systems required to meet A17.1-2000/CSA B44.00 requirements.

Figure 4.1 Limit and 2K Limit/Gripper Boards

Limit Board, Standard

2K Limit/Gripper Board



Limit Board (Standard)

The limit board monitors the signal from a DC tachometer or an encoder to control car speed under various operating conditions. The board monitors direction, speed, and status by interpreting hoistway switch input states. Please refer to “Limit Board Diagram” on page 4-4 for a more detailed view of the wiring, switches, and LEDs described here.

There are two, parallel rows of LEDs on the Limit board. Input states are displayed by the left row of LEDs, D1-D9. The right row, D10-D17, displays board fault codes or status.

Adjusting the Limit board requires the car be run to the terminal landings while in a learn mode. (Please refer to “Operation, Inspection Setup Before High Speed” on page 4-7. Please refer to “Operation, Normal Setup High Speed” on page 4-7.)

Note

If any car speed or slowdown adjustments are made after the limits are learned, the Limit board learn process must be repeated.

- The limit board must learn the speed of the car on Inspection to provide inspection speed protection.
- The car should be fully adjusted in high speed without going to the terminal landings.
- The hoistway limits must be set to open at the same distance from the terminal landing as the selector (magnet) slowdowns.

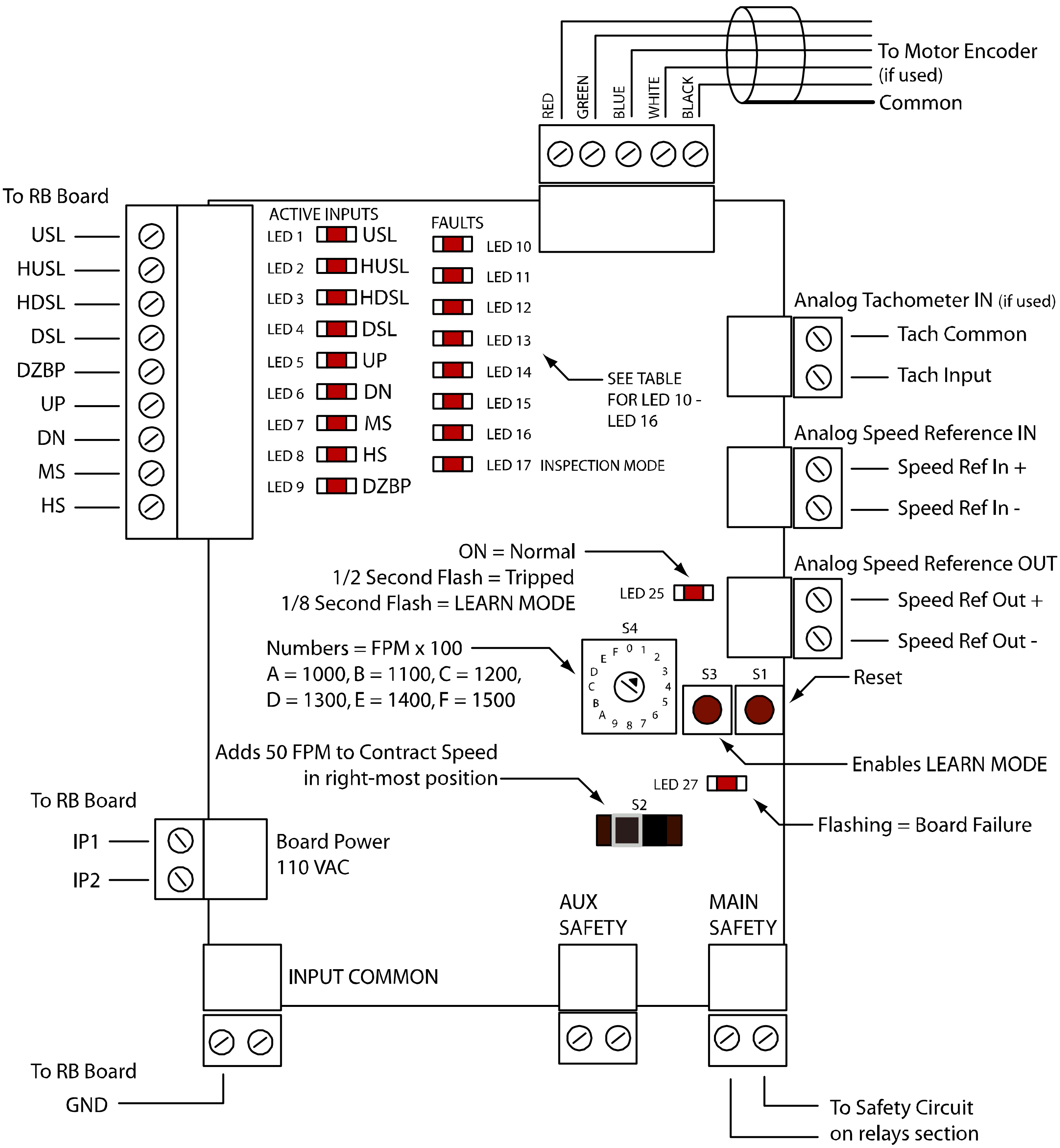
The board will open the safety circuit output, stopping the car, if any of the following conditions are detected:

- The car runs at 150% of the learned inspection speed after the inspection speed has been learned. This is used for inspection operation before the limit board speed feedback has been scaled at high speed. Please refer to “Operation, Inspection Setup Before High Speed” on page 4-7.
- The car runs at 10% above contract speed or one-floor-run speed. This allows detection of an overspeed of the one-floor-run, learned speed as well as high speed multi-floor-run overspeeds.
- The car exceeds 30% of contract speed in the opposite direction from the intended direction.
- Direction slowdown inputs operate without any tach feedback. This allows a tach loss to be detected.
- The car is moved on inspection or with doors open at a speed greater than 125 FPM.

Input Definitions

Limit board connections and features are shown below and described on the following pages.

Figure 4.2 Limit Board Diagram



- USL: (Up slow down) This input is the last up slowdown to open prior to reaching the top landing. The hoistway switch must be adjusted to open at the same time the normal selector slowdown magnet comes on.
- HUSL: Up High Speed Slow Down). This input is the first up slowdown to open prior to reaching the top landing. This slowdown is used only on cars with contract speeds greater than 200FPM.
- DSL: (Down slow down) This input is the last down slowdown prior to reaching the bottom landing. This input should be on when the car is above it and the DN (down) input is on.
- HDSL: (Down High Speed Slow Down). This slowdown is present on higher speed cars and is further away from the bottom landing than DSL. This input should be on when the car is above it and the DN input is on.
- UP: This input indicates that the car is to move in the up direction.
- DN: This input indicates that the car is to move in the down direction.
- MS: This input indicates that the car is to move at medium speed, one floor run speed if HS is used, or contract speed if contract speed is equal to or less than 200FPM
- HS: This input indicates that the car is to move at high speed, multi floor run speed.
- DZBP: (Door Zone Bypass) This input indicates that the door locks are being bypassed.When this input is on, car speed should not exceed 100 FPM.

Diagnostic and Mode LEDs

LEDs D10 through D16 have two functions. When the Limit board is in learn mode, these LEDs provide feedback as learn progress is made. In normal mode, each LED has a numeric value and the sum of lighted LED values is the numeric indicator of a particular fault.

Table 4.1 Limit Board Learn Mode LED Meanings

LED	Meaning
LED 10	Learn up limits
LED 11	Learn down limits
LED 12	Learn tach reverse
LED 13	Learn slowdown setup fault
LED 14	Learn slowdown missing fault
LED 15	Learn pulse tach
LED 16	Learn speed clamp

In normal mode, the sum of the value of lighted LEDs indicates a fault. For example, if LEDs 10 (1) and 12 (4) were lighted in the illustration below, their sum would be 5. 5 indicates an Overspeed at HDSL fault.

Figure 4.3 Limit Board Fault LED Meanings

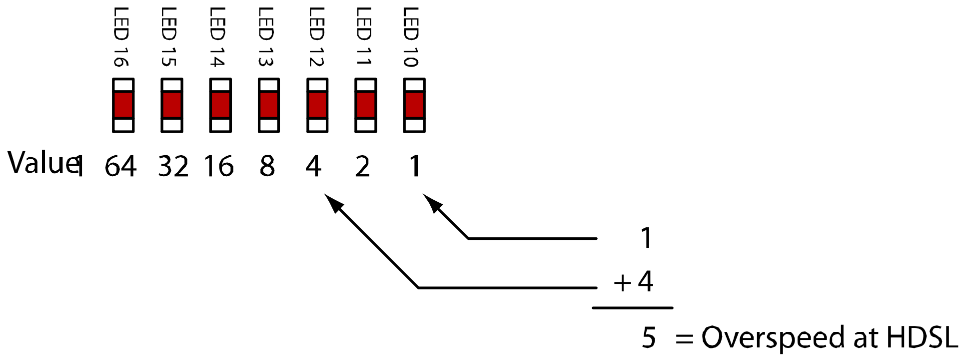


Table 4.2 Limit Board Fault Indications

LED Sum	Fault
0	No LEDs lighted. No fault.
1	Overspeed up fault.
2	Overspeed down fault.
3	Overspeed at HUSL (high speed up slowdown switch).
4	Overspeed at USL (up slowdown switch).
5	Overspeed at HDSL (high speed down slowdown switch).
6	Overspeed at DSL (down slowdown switch).
7	Direction Failure.
8	Inspection Failure Up.
9	Inspection Failure Down.
10	Stall Failure Up.
11	Stall Failure Down.
12	No demand failure up.
13	No demand failure down.
14	Bypass locks failure.

- Momentarily pressing switch S3 displays a counter showing the number of times the fault has occurred.
- Holding switch S3 for seven seconds clears the fault counter.
- Momentarily pressing switch S1 resets the Limit board.

Operation, Inspection Setup Before High Speed

Before the car can be moved on inspection, a Learn operation must be performed using the Limit board. The Inspection Speed Learn operation allows the Limit board to learn the elevator inspection speed. Once learned, the Limit board can prevent the car from exceeding 150% of the learned inspection speed when the car is operating in Inspection mode. The inspection learn can be completed before the slowdown limits are wired.

To learn inspection speed,

1. Press and hold the S3 and S1 switches. Release switch S1 before releasing switch S3. LED D25 will blink rapidly (four times per second). Diagnostic LEDs D10 and D11 will be on.
2. Move the car on inspection in the up direction for five seconds. When the car is stopped the D10 LED will go off.
3. Move the car on inspection in the down direction for five seconds. When the car is stopped, the D11 LED will go off. D25 will now be on continuously, indicating the learn was successful.

Operation, Normal Setup High Speed

Note

The Limit board must have all of the proper inputs for direction, speed, and slowdowns. The hoistway limits must be set to open at the same distance from the terminal landing as the selector (magnet) slowdowns.

The board will sense a normal learn mode when the board is in the learn mode and the UP input goes on. Either the USL or HUSL input will be on. If after UP input is on, and HS or MS are not on, then the board enters inspection set up mode as outlined in the inspection setup. When the car enters set up mode, LEDs D10 and D11 are illuminated.

1. To place the limit board on the learn mode, press and hold the S3 and S1 switches. Release switch S1 before releasing switch S3. LED D25 will blink rapidly (four times per second). Diagnostic LEDs D10 and D11 will be on.
2. After normal learn mode is entered, it is necessary to run the car from the bottom landing to the top landing. If two slowdown limits are present (USL and HUSL, then, after the top landing is reached, it is necessary to move the car one floor down from the top and then run the car up to the top again. After this is completed, LED D10 should turn off.
3. Next, the car should be run to the bottom. If two slowdown limits are present (DSL and HDSL), the car should be moved up one floor and run to the bottom again. After this operation is complete, LED D11 should go out and the board will enter normal operation.
4. When the normal learn trip is performed. It also determines if the slowdowns are placed in the proper position. The slowdown should open within 200 milliseconds of the HS or MS relay going off. If it does not, a learn fault will be displayed on the diagnostic LEDs, D10 - D17. Please refer to “Limit Board Learn Mode LED Meanings” on page 4-5. The fault will be displayed if the slowdown is not positioned properly.

Operation, Normal

After the normal set up has been completed, the limit board goes into normal operation.

- D25 will be on continuously.
- In normal operation, speed is checked as it reaches the limits. If the speed at a limit is excessive, the safety will open to prevent the car from going beyond the floor.
- The Limit board checks if the car is going too fast beyond contract speed.
- The Limit board checks if the car is moving in the proper direction. If the car is told to go in one direction and its speed exceeds 20% of contract speed in the opposite direction for greater than 1/2 second, it will also cause a trip. After the board trips it will automatically reset after the car has halted for more than 2 seconds.
- Tachometer disconnected faults will be detected if a run has begun, detected speed remains 0, and a slowdown is broken.
- A trip will occur when the UP and DN inputs are both off, indicating that the car is not in motion, but the Limit board detects an active speed signal. The safety will open.
- A trip will occur if the speed of the car on inspection is greater than 125 FPM.
- A trip will occur if DZBP is on and the car exceeds 125 FPM.

2K Limit / Gripper Board

The 2K Limit/Gripper board is used if the controller is A17.1-2000/CSA B44.00 compliant. Through an input from a quadrature speed/position sensor on the elevator motor and 16 discrete inputs from hoistway switches and monitoring relays, the board monitors car speed, direction, position, and status. Refer to the drawings package for connection information.

The board incorporates both speed limiting and rope gripper control functions. The board opens three safety contacts (SAF 1A/1B, SAF 2A/2B, SAF 3A/3B) if a limit or a rope gripper fault is detected. If the detected fault is a rope gripper fault, rope gripper contacts GOUT 1A/1B and GOUT 2A/2B are also opened.

Board monitoring inputs are:

- Motor Shaft Speed and Position: A speed/position monitoring sensor is installed on the elevator motor. Please refer to “T-Limit-2K Motor Speed/Position Sensor” on page 2-13. The cable connecting the sensor to the limit board incorporates single-ended to differential signal conversion circuitry for improved immunity to electrical noise.
- USL: Up Slow Down. Input from the last up slowdown to open before the car reaches the top landing.
- HUSL: Up High Speed Slow Down. Input from the first up slowdown to open before the car reaches the top landing.
- HDSL: Down High Speed Slow Down. Input from the first down slowdown to open before the car reaches the bottom landing.
- DSL: Down Slow Down. Input from the last down slowdown to open before the car reaches the bottom landing.

Note

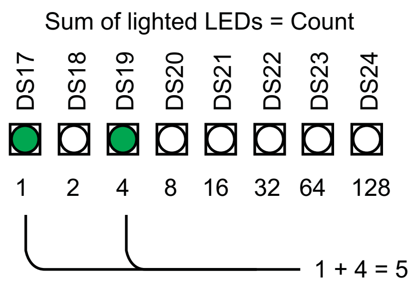
The terminal hoistway slowdown switches must be set to open at the same time the normal selector slowdown magnet comes on. The high-speed slowdowns, HUSL and HDSL, are used for contract speeds greater than 200 FPM.

- DZBP: Door Zone Bypass. Input indicates that the door locks are being bypassed. When this input is on, car speed should not exceed 125 FPM (after the high speed learn trip has been performed).
- UP: Indicates that the car is to move in the up direction.
- DN: Indicates that the car is to move in the down direction.
- MS: Indicates that the car is to move at medium speed, one floor run speed if HS is used, or contract speed if the car contract speed is equal to or less than 200 FPM.
- HS: Indicates that the car is to move at high speed, multi-floor run speed.
- GMON2: Not currently used.
- GMON1: Monitors the rope gripper relay. If the input drops off while the rope gripper output is on, or if the input turns on when the board is not detecting a fault condition, the rope gripper will trip and a gripper relay contact failure fault will be annunciated.
- GMON: There is no external connection to this input. It is used internally to monitor the gripper relays during the gripper relay sequence test.

- GOV: Monitors the 110% overspeed governor switch in the safety circuit/string. May be selected as the source of the rope gripper overspeed fault. This input automatically resets when the detected condition clears.
- GATE: Monitors the gate switch to determine if the car door is open. One of the inputs used to determine unintended movement conditions for the rope gripper.
- LOCK: Monitors the door locks to determine if the hall door is open. One of the inputs used to determine unintended movement conditions for the rope gripper.
- DZ: Monitors the cars remaining in the door zone. One of the inputs used to determine unintended movement conditions for the rope gripper.

Switches S1, S2, and S3:

- S1: Used with S2 to set parameters or, during normal operation, displays or resets trip counter-
  - Press momentarily to display the limit and rope gripper trip count on LEDs DS17 through DS242 (Fault, Parameter, Learn LEDs in the board illustration following).



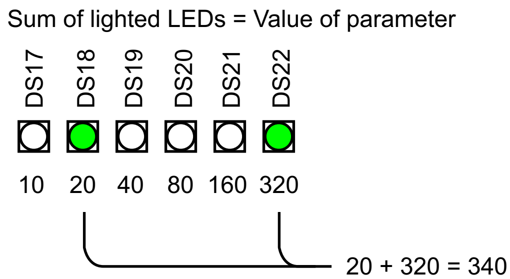
  - Press and hold S1 for 5 seconds to clear the trip counter. (If a fault code had been displayed, it will also be cleared.)

- S2: Resets the safety for a limit fault; enters parameter setting mode. Used with S1 to change parameter values. (Use S3 to exit parameter setting mode.)

Parameter Indication			**Parameter**
DS25	DS24	DS23	
Blinking	Off	Off	1: Car speed in FPM
Blinking	Off	On	2: Limit section overspeed in FPM
Blinking	On	Off	3: Rope gripper overspeed in FPM
Blinking	On	On	4: Flags DS17 On: rope gripper enabled. DS18 On: rope gripper overspeed trip from overspeed parameter enabled DS19 On: rope gripper overspeed from governor input enabled

- Press S2 momentarily and release to reset the safety for a limit fault. If five consecutive limit trips have occurred during a short interval, limit trips will stop automatically resetting. In this event, pressing S2 momentarily also resets the limit trip counter and re-enables limit section automatic resets.

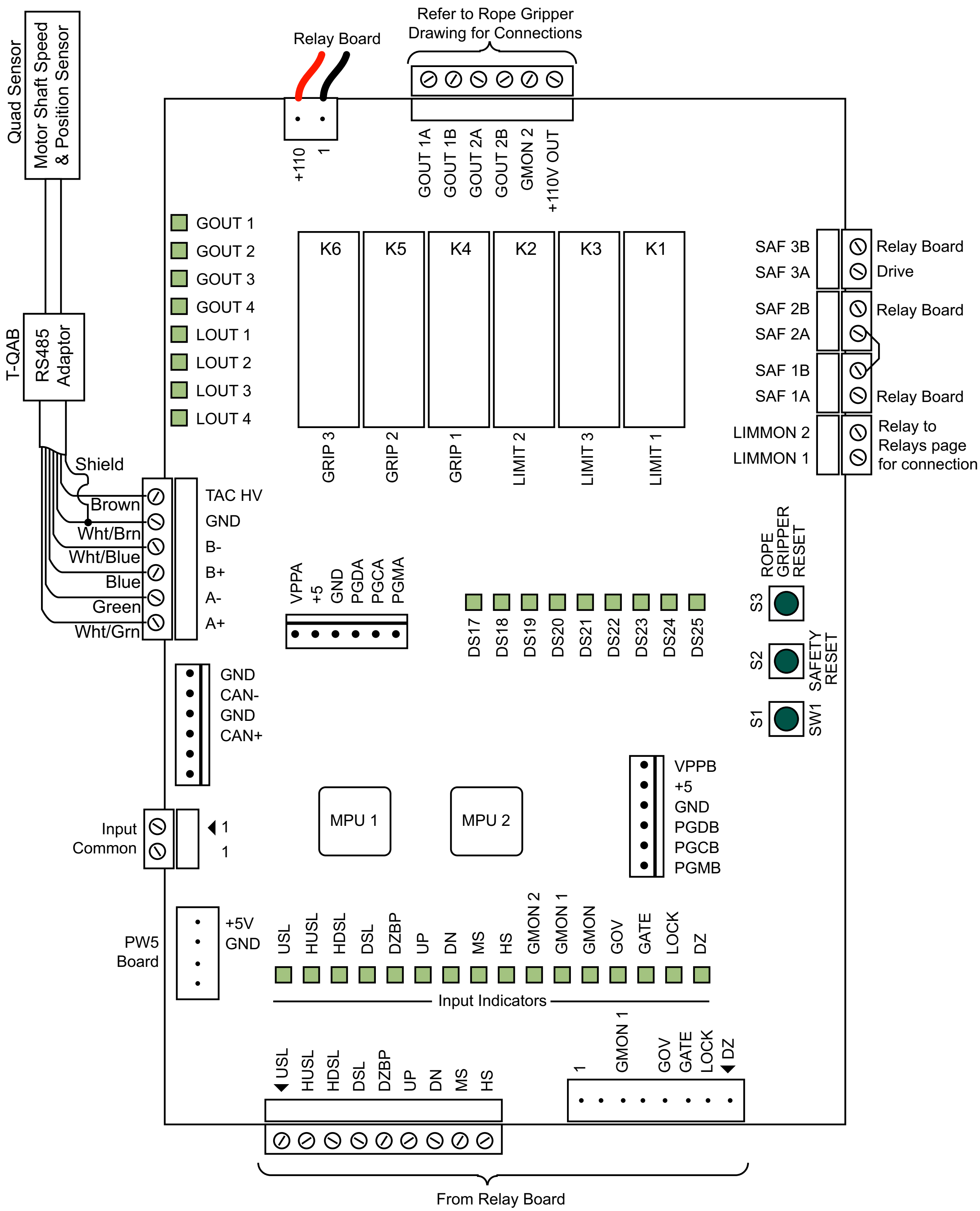
- Press and hold S2 for 5 seconds to enter parameter mode. DS25 will blink rapidly, 16 times per second. Parameter 1 (car speed FPM) value will be displayed on LEDs DS17 through DS22.



- Press S1 to change the displayed parameter.
- Press S2 to move to the next parameter.
- Press S3 to exit parameter mode.

- S3: Resets rope gripper. Enters/Exits Learn mode. (If board is in Parameter mode, exits Parameter mode.) In Learn mode, DS25 will blink (8 times per second) and DS17, 18, and 22 will be on steadily. Please refer to “Inspection Learn” on page 4-14.

Figure 4.4 2K Limit/Gripper Board



Parameter Entry

In parameter entry mode, you can change settings for:

- Parameter 1: Car speed in FPM - Determines the speed which the board will use as high speed during the Normal Learn operation. Please refer to “Normal Learn” on page 4-15.
- Parameter 2: Limit section overspeed in FPM - Sets the speed at which the board will open the safety circuit, bringing the car to an emergency stop.
- Parameter 3: Rope Gripper overspeed in FPM - Sets the speed at which the board will set the rope gripper. Please refer to “Limit Functionality” on page 4-16.
- Parameter 4: Flags - Displays and allows you to change three settings:
  - Rope gripper enabled. If LED DS17 is on, the rope gripper is enabled.
  - Rope gripper overspeed from overspeed parameter: If LED DS18 is on, the Parameter 2: Limit section overspeed in FPM value will be used to trip the rope gripper.
  - Rope gripper overspeed from governor input: If LED DS19 is on, the governor input will be used to trip the rope gripper.

Note

The limit overspeed, DS18 on, and the governor input, DS19 on, can both be enabled. Either condition would then trigger the rope gripper.

- Parameter entry mode and active parameter displayed are indicated by:

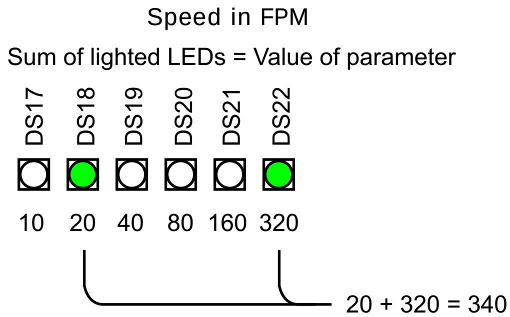
Parameter Indication			Parameter
DS25	DS24	DS23	
Blinking	Off	Off	1: Car speed in FPM
Blinking	Off	On	2: Limit section overspeed in FPM
Blinking	On	Off	3: Rope gripper overspeed in FPM
Blinking	On	On	4: Flags DS17 On: rope gripper enabled. DS18 On: rope gripper overspeed from overspeed parameter enabled DS19 On: rope gripper overspeed from governor input enabled

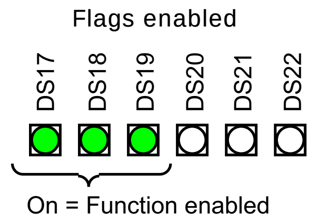
Entering Parameters

1. Press and hold S2 for 5 seconds to enter parameter mode.

DS25 will blink rapidly, 16 times per second. Parameter 1 (car speed FPM) value will be displayed on LEDs DS17 through DS22.

2. Press S2 (repeatedly) to move to the desired parameter. (See indications table above.)
3. Press S1 (repeatedly) to change the displayed value (DS17 - DS22, see examples).





4. Press S3 to exit parameter mode.

When the limit board is in parameter mode, the limit section is disabled and the safety circuit is opened. Parameter mode times out after 5 minutes if no buttons are pressed. After time out, return to normal operation is indicated by LED DS25 which will stop blinking and light steadily.

Inspection Learn

Before the car can be moved on Inspection, you must perform an inspection learn operation so the limit board can learn and limit inspection speed to 150% of the learn inspection speed value. (The Inspection Learn may be completed before the slowdown limits are wired.)

1. Press and hold switch S3 for 5 seconds.

The board will enter learn mode. LED DS25 will blink rapidly (8 times per second). Diagnostic LEDs DS17, 18, and 22 will light steadily.

2. Move the car on Inspection in the up direction for 5 seconds.

When the car is stopped, LED DS17 will go off and the Insp Mode LED DS24 will light.

3. Move the car on inspection in the down direction for 5 seconds.

When the car is stopped, the DS18, 22, and 24 LEDs will go off and DS25 will light steadily. The inspection learn process is complete.

Normal Learn

The normal learn procedure varies slightly depending upon the revision of software installed on MPU 2 of the Limit/Gripper board. Please refer to “2K Limit/Gripper Board” on page 4-12 for processor location. Check the revision level of the software on MPU 2. It will be either V2.xx or V3.xx. Perform the learn procedure accordingly.

Note

Before a normal learn can be performed, all proper inputs for direction, speed, and slowdowns must be connected to the limit/gripper board. Hoistway limits must be set to open at the same distance from the terminal landing as the selector (magnet) slowdowns come on.

The board will sense a normal learn mode when the limit/gripper board is in learn mode, the UP input goes on, and either the HS or MS input is on. If the UP input is on but HS or MS are not on, the board will default to Inspection learn mode.

1. Press and hold switch S3 for 5 seconds to enter learn mode.

The board will enter learn mode. LED DS25 will blink rapidly (8 times per second). Diagnostic LEDs DS17, 18, and 22 will light steadily.

2. Start the learn process at the bottom floor. Run the car at high speed to the top floor.

If the car has V3.xx MPU 2 software, or is low speed (Parameter 107 set to No) and has only one up slowdown, USL, the DS17 LED will turn off as the car approaches the top floor. If this is the case, skip to step 4.

3. If the car is high speed (Parameter 107 set to Yes) and has V2.xx MPU 2 software and two up slowdowns, USL and HUSL, then, after the top landing is reached, you must move the car one floor down from the top and then run to the top again. At this point, the DS17 LED will go off.
4. Run the car to the bottom floor. If the car has V3.xx MPU 2 software, or is low speed (Parameter 107 set to No) and has only one down slowdown, DSL, the DS18 LED will turn off as the car approaches the bottom floor. If this is true, the learn trip is complete and the DS25 LED will light steadily. If this is a high speed car with V2.xx MPU 2 software, proceed to the next step.
5. If two down slowdown limits are present, DSL and HDSL, move the car up one floor and run to the bottom again. After this, LED DS25 will light steadily, the learn trip is complete, and the board will revert to normal operation.

Note

When a normal learn is performed, it also determines if the slowdowns are properly placed. The slowdown should open within 200 milliseconds of the HS or MS relay going off. If it does not, a learn fault will be displayed on diagnostic LEDs DS17 - DS23. Please refer to “Fault Operation” on page 4-18.

Caution

If any car speed or slowdown adjustments are made after the limits are learned, the learn trip must be repeated.

Operating Examples

Operating examples include:

- Limit Functionality
- Rope Gripper Functionality
- Normal Operation
- Fault Operation

Limit Functionality The limit/rope gripper board will open the safety circuit output, stopping the car if any of the following conditions are detected:

- The car runs at 150% of the learned inspection speed (inspection learn must have been completed). Used for inspection operation before the limit board speed feedback has been scaled at high speed. Please refer to “Inspection Learn” on page 4-14.
- The car runs at a speed above the limit overspeed parameter value.
- The car exceeds 75% of the learned inspection speed or 62 FPM in the opposite of the intended direction of travel. (Normal learn must have been completed.)
- Direction slowdown inputs operate without any tachometer/encoder feedback. (Tachometer loss will be detected.)
- Car is moved on inspection or with the doors open at a speed greater than 125 FPM.
- A limit/rope gripper board relay malfunction is detected.

Rope Gripper Functionality The rope gripper provides overspeed and unintended movement protection. Rope gripper parameters are adjusted as described in this section. Please refer to “Parameter Entry” on page 4-13. The rope gripper will open the safety circuit and rope gripper contacts if any of the following conditions are detected:

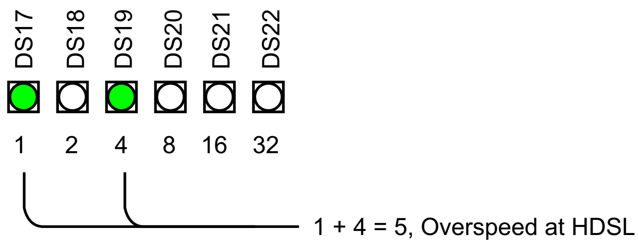
- Car runs at a speed above the rope gripper overspeed parameter value. (This speed is detected from the limit board encoder input.) The following flags need to be enabled:
  - DS17 On- Rope gripper enabled
  - DS18 On- Rope gripper overspeed from overspeed parameter
  - Alternately, or along with DS18, Flag DS19- Rope gripper overspeed from governor input may also be enabled.
- Car moves away from a floor, out of the door zone, with doors and gate open.
- Relay sequencing test fails: Each time the car comes to a halt, the board sequentially (one-at-a-time) tests three relays for the gripper and monitors the result. (Relays are tested individually to prevent the gripper from applying and opening the safety circuit.)
- The gripper output and gripper relay states do not correspond.

Normal Operation After normal learn is complete, the limit/gripper board enters normal operation. DS25 is on continuously. In normal operation, the board checks and responds to the following:

- Car speed at limit switches. If excessive, the safety will open to prevent the car from going beyond the floor.
- Car speed above contract speed.
- Car direction. If the car is commanded to move in one direction and its speed exceeds 62 FPM in the other direction for greater than 1 second, the safety circuit will open. In this event, the board will automatically reset after the car has halted for longer than 2 seconds.
- If a run has begun and speed remains at zero but a slowdown is broken, the safety circuit will open and a tach failure fault will be detected.
- UP and DN inputs are both off, indicating that the car is not in motion, and the limit board senses speed. Safety will be opened.
- Car speed on inspection exceeds 125 FPM.
- DZBP (Door Zone Bypass) is on and car speed exceeds 125 FPM.
- Relay sequencing test fails: Each time the car comes to a halt, the board sequentially (one-at-a-time) tests three relays for the gripper and monitors the result. (Relays are tested individually to prevent the gripper from applying and opening the safety circuit.)

Fault Operation The last-detected fault is displayed on LEDs DS17 through DS21 as a binary value. The values of each lighted LED are summed to determine the active fault.

Sum of lighted LEDs = Fault ID #



- When a fault occurs, LED DS25 will blink slowly (once per second).

Table 4.3 2K Limit/Gripper Fault Identification Table

ID	Fault
0	(No lights) No fault
1	Overspeed up
2	Overspeed down
3	Overspeed at HUSL (MPU 2 V2.xx)/Overspeed at terminal up (MPU 2 V3.xx)
4	Overspeed at USL (MPU 2 V2.xx)/Overspeed in DZ up* (MPU 2 V3.xx)
5	Overspeed at HDSL (MPU 2 V2.xx)/Overspeed at terminal down (MPU 2 V3.xx)
6	Overspeed at DSL (MPU 2 V2.xx)/Overspeed in DZ down* (MPU 2 V3.xx)
7	Direction Failure
8	Inspection Failure Up
9	Inspection Failure Down
10	Stall Failure Up
11	Stall Failure Down
12	No Demand Failure Up
13	No Demand Failure Down
14	Bypass Locks Failure
15	Limit Relay Contact Failure
16	Gripper Unintended Movement
17	Gripper Governor Overspeed
18	Gripper Limit Overspeed
19	Gripper Relay Contact Failure

* DZ up is the door zone of the top landing. DZ down is the door zone of the bottom landing.

- Press S1 momentarily to display a count of the total number of faults that have occurred since the last time faults were cleared.
- Press S1 for 7 seconds to reset the fault counter.

Reset Limit Section Safety

- Press S2 momentarily

Rope Gripper Reset

- Press S3 momentarily

Final Test

Final testing must be successfully completed before the car may be released for passenger operation.

Buffer Tests

Buffer tests allow the car and the counterweight to overtravel the terminals and strike the buffers at contract speed.

Preparation

Danger

Only qualified elevator personal, skilled in final adjustments and safety testing should perform the following test. The buffer tests require critical circuits to be bypassed. Ensure people do not ride on cars while performing tests. The car can be stopped at any time.

Before performing the test, complete all adjustments on the elevator.

- Check the operation of the hoistway terminal slowdown switches. Ensure the switches open at the same distance from the terminal floor as the position system (magnets) slow down.
- Check the door locks and all other hoistway and car switches for proper operation.

Buffer tests require the car to over travel the terminal landing. Check the following items while operating the car at inspection speed, prior to high speed testing.

- Check the over travel distance before striking the buffers.
- Check that, when the car and counterweight buffers are fully compressed, the following items have clearance, and will not be damaged.
  - Positioning system will not bottom on the tape support hitch or hit structural members.
  - Check the hoist rope and compensation ropes or chains to insure they are of a proper length to overtravel without causing damage.
  - Check all rope guards (car and counterweight) to ensure they are tight and will prevent the cables from jumping off the sheave.
  - Ensure that the car and the counterweight have proper overhead clearance when the buffers are fully compressed.

Contract Speed Buffer Test - Car

Before performing test, ensure you read and complete Limit adjustments carefully, and have checked hoistway over travel clearances.

Danger

If the car has a counterweight safety, ensure that the safety will not apply by tying down the safety actuating arm prior to performing this test. Failure to prevent the safety from applying may result in the safety applying while the buffer is compressed.

Begin the test with:

- Fully loaded car at the top floor (with one floor added to the floor table).
- The car should be level at the top floor.
- The car should be on door disable.
- The hand held must be displaying a position one floor above the actual top floor.

1. Connect a jumper on the down direction high speed (D2S1 to D2S2) and low speed (D1S1 to D1S2) slowdown.
2. Jump the Limit board safety contacts J5-1 to J5-2 and J6-1 to J6-2.
3. Using the simplex parking parameter, send the car to floor 1. The car will not slow down at the bottom floor and will impact the car buffer at contract speed.
4. Remove the slowdown and Limit board jumpers.
5. Remove any tiedown that may have been put on the safety.

Danger

Before moving the car, ensure that the car and compensation ropes are in proper sheave grooves. Move the car on inspection up off the buffer. Check for buffer return, the car or counterweight being racked, and damage to the equipment.

Contract Speed Buffer Test - Counterweight

Before performing test, ensure you read and complete Limit adjustments carefully, and have checked hoistway over travel clearances.

Danger

Before performing this test, ensure that the safety will not apply by tying down the safety actuating arm. Failure to prevent the safety from applying may result in the safety applying while the buffer is compressed.

Begin the test with:

- Empty car at the bottom floor (with one floor added to the floor table).

1. Connect a jumper on the down direction high speed (U2S1 to U2S2) and low speed (U1S1 to U1S2) slowdown.
2. Jump the Limit board safety contacts J5-1 to J5-2 and J6-1 to J6-2.
3. Using the simplex parking floor parameter, send the car to the top floor. The counterweight will not slow down at the bottom floor and will impact the buffer at contract speed.
4. Remove the slowdown and Limit board jumpers.
5. Remove any tiedown that may have been placed on the safety.

Danger

Before moving the car, ensure that the car and compensation ropes are in proper sheave grooves. Move the car on inspection to lift the counterweight up off the buffer. Check for buffer return, the car or counterweight being racked, and damage to the equipment.

Governor Safety Test

Preparation

Danger

Only qualified elevator personal, skilled in final adjustment and safety testing should perform the following test. Safety tests have the potential to damage equipment.

- Over speed tests must be done as far as possible from the terminal landings.
- Over speeding will prevent the car from slowing down at the floor the car is run to.
- The car may not set the governor at the overspeed setting, and you **must be prepared** to stop the car before the car gets to the terminal landing at a speed greater than contract speed.
- Insure that the car is readjusted to run at normal speed after completing an overspeed test.

Danger

If the car has a counterweight safety, ensure that the safety will not apply by tying down the safety actuating arm prior to performing this test. Failure to prevent the safety from applying may result in the safety applying while the buffer is compressed.

Governor Safety Test - Overspeed - 1025 Regulator

Before performing this test, ensure you read and complete Limit adjustments carefully.

Before the test:

- Measure and record the raw tach voltage at regulator terminal 1 + 2.
- Measure and record car speed on inspection and high speed. (This is done to allow you to re-scale the car speed on inspection after overspeeding the car.)
- Place a full load in the car.
- The car should be level at the top floor.
- The car should be on door disable.
- Be prepared to stop the car if the safety fails to apply.

1. Move the regulator trip disable header jumper to the disable position (center pin jumped to “D” pin left side).
2. Send the car down, two floors from the bottom, monitoring the car speed and position.
3. As the car is running, turn the contract speed pot clockwise until the car is at the desired tripping speed.
4. The car may not set the governor at the overspeed setting. If not, **you must stop** the car before the car gets to the terminal landing at a speed greater than contract speed.
5. Re-scale the car speed on inspection before moving the car.
6. Remove any tiedown that may have been placed on the safety.

Problems Overspeeding - 1025 Regulator The following are some of the problems that may prevent you from getting up to the governor tripping speed.

- The contract speed pot will only increase the car speed until the raw tach voltage is 150VDC. If the over speed is not achieved before this tach voltage, you will not be able to increase the speed. If this is the case, you can insert a 100 K OHM resistor in series with one wire off the raw tach. After doing this, scale the car speed on inspection before moving the car at high speed.
- The regulator has a limited voltage output. The output voltage GF1 + GF2 is 1.4 times the AC from the transformer secondary. You may have to increase the transformer tap to a higher voltage.

Normal Terminal Stopping (NTS) Test

This procedure will test operation of the Normal Terminal Stopping (NTS) system.

1. Remove the car from service.
2. Turn the Door Disconnect switch OFF at the controller. (This allows the car to answer car calls without responding to hall calls. All newly registered car calls will be answered with normal operation.)
3. Add one floor to the Floor Table. Please refer to “Floor Table” on page 5-50.

Top Floor Test Procedure

1. Access the Parking Floor parameter (#141) in the Setup/Parameters menu.
2. Set to the newly entered value for the top floor.

Step 2 commands the car to run to a floor beyond its limit of travel. When the car passes the slowdown switch in the hoistway it will immediately start to slow down and will level and stop at the terminal floor.

Bottom Floor Test Procedure

With the car at the top floor and an additional floor in the floor table, the controller will believe the car is one floor higher than it actually is.

1. Access the Parking Floor parameter (#141) in the Setup/Parameters menu.
2. Set to 01.

Step 2 commands the car to run to a floor beyond its limit of travel. When the car passes the slowdown switch in the hoistway, it will immediately start to slow down and will level and stop at the terminal floor.

Reset Floor Table

After testing both the top and bottom floors, change the Floor Table back to the correct number of floors. Please refer to “Floor Table” on page 5-50.

Emergency Terminal

This procedure will test the operation of the Emergency Terminal Stopping (ETS) system. This system is present only on cars that have rated speeds of 150 feet per minute or greater. It is designed to remove power from the hoist motor and brake before the car strikes the buffer if it has failed to slow down at a terminal floor as intended.

Magnetek HPV 600 Drive

1. Refer to the job prints (wiring diagrams). Locate the sheet that shows the speed reference signal to the drive.
2. For drives using one-floor-run logic (typically 200 feet per minute or greater), place a jumper from terminal TB1-14 to terminal TB1-22 on the drive.
3. For drives not using one-floor-run logic (typically under 200 feet per minute), place a jumper from terminal TB1-14 to terminal TB1-21 on the drive.

The drive jumper will create a failure of the speed control system that will cause the drive not to initiate a slowdown at any floor.

Magnetek HPV 900 Drive

1. Refer to the job prints (wiring diagrams). Locate the sheet that shows the speed reference signal to the drive.
2. For drives using one-floor-run logic (typically 200 feet per minute or greater), place a jumper from terminal TB1-55 to terminal TB1-7 on the drive.
3. For drives not using one-floor-run logic (typically under 200 feet per minute), place a jumper from terminal TB1-55 to terminal TB1-6 on the drive.

The drive jumper will create a failure of the speed control system that will cause the drive not to initiate a slowdown at any floor.

Mitsubishi A500 Drive

1. Refer to the job prints (wiring diagrams). Locate the sheet that shows the drive interface.
2. Place a jumper from terminal SD to terminal RH on the drive.

The drive jumper will create a failure of the speed control system that will cause the drive not to initiate a slowdown at any floor.

Top Floor Test Procedure

Danger

If the car has a counterweight safety, ensure that the safety will not apply by tying down the safety actuating arm prior to performing this test. Failure to prevent the safety from applying may result in the safety applying while the buffer is compressed.

1. Access the Parking Floor parameter (#141) in the Setup/Parameters menu.
2. Change this parameter to the top floor.

Step 2 commands the car to run to the top floor. When the car reaches the top terminal floor, it will not slow down. The ETS system will trip, stopping the car.

3. After completing the test, remove the drive jumper and any tiedown that may have been placed on a safety.

Bottom Floor Test Procedure

Danger

If the car has a counterweight safety, ensure that the safety will not apply by tying down the safety actuating arm prior to performing this test. Failure to prevent the safety from applying may result in the safety applying while the buffer is compressed.

1. Access the Parking Floor parameter (#141) in the Setup/Parameters menu.
2. Change this parameter to the bottom floor.

Step 2 commands the car to run to the bottom floor. When the car reaches the bottom terminal floor, it will not slow down. The ETS system will trip, stopping the car.

3. After completing the test, remove the drive jumper and any tiedown that may have been placed on a safety.

5 Tricon Configuration

In this Section

To configure or diagnose the Tricon control or the dispatcher, you use the Hand Held Unit (HHU). This section explains how to connect and use the HHU to view system status or errors, to examine the state of Tricon inputs and outputs, and to configure the Tricon control and dispatcher to suit your building:

- HHU Basics
- Car Diagnostics
- Car Setup
- Dispatcher Setup
- Network
- Fireman Operation

HHU Basics

The Hand Held Unit is used to set up and trouble-shoot the controller. It provides user access to system parameters, status, and error information.

Connection

The Hand Held Unit plugs into any I/O 24 board in the elevator controller using a simple “telephone jack” connector. If the installation includes a cartop or car station, the Hand Held Unit may also be connected to boards in these enclosures.

If the installation includes a dispatcher controlling multiple cars, the Hand Held Unit provides dispatcher access when plugged into an I/O 24 in the dispatcher enclosure.

Operation

Functions are arranged under a series of menus, submenus, and function screens. The top line of the display indicates the **currently active** menu.

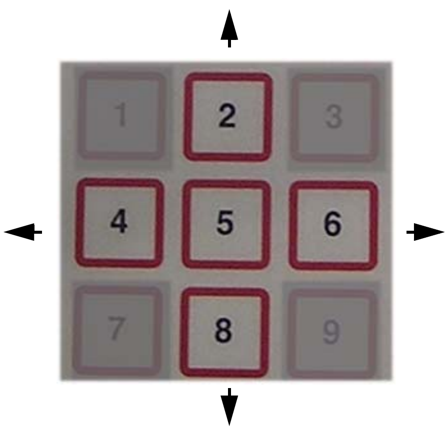
Moving within the Current Menu

To move within the current menu (down through submenus or back up to the current menu), use:

- The 2 and 8 keys or the Up/Down arrow keys —

Moving Between Submenus

- The **submenu** is displayed on the **second line** of the display. To move between submenus, use the 4 and 6 keys or the Left and Right arrow keys.



OR

Activating a Submenu

To select the submenu to be the currently active menu (or to select a displayed function screen from an active submenu), press the # key or the 8 key while the desired submenu is displayed. (Think of the # key as an <ENTER> key.)

OR with submenu selected

After you select a submenu (Dispatcher setup for example), it will move to the top line of the display and its function screens will be listed (one-at-a-time) on the second line.

Making an Entry in a Function Screen

With the desired function displayed, press the # key.

Return to Last Menu

Press the (star) key *. (Think of this as the <ESCAPE> key.)

Jumping

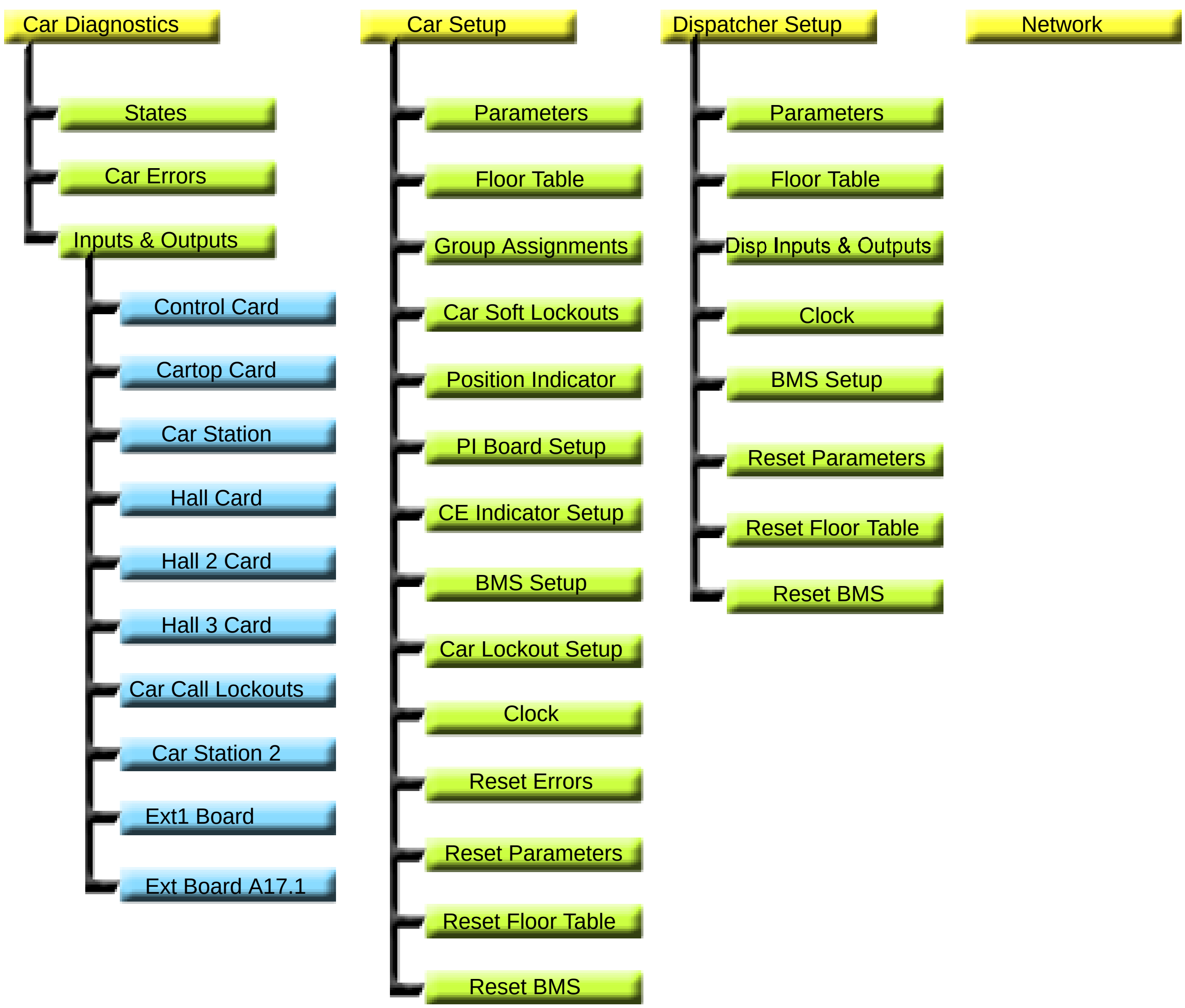
To jump through a long list quickly, you can “jump” four topics at-a-time:

- Press the 3 to jump up.
- Press the 9 to jump down.

Navigating Suggestion

Take a minute or two to experiment with moving around through the menus, submenus, and function screens. You will pick it up quickly. Menu organization is shown below. If you are viewing this on-line (pdf) file, click on a menu to jump to its description.

Figure 5.1 Hand Held Unit Menus and Submenus Guide



Main Menus

Main menu titles tell you what functions they address:

- Car Diagnostics: View controller status, errors, and input/output activity.
- Car Setup: Configure parameters and assign inputs and outputs.
- Dispatcher Setup: Configure dispatcher parameters and assign inputs and outputs.
- Network: View serial communications status. Useful when working with MCE support to diagnose communications issues.

Car Diagnostics

Under the Car Diagnostics menu are:

- States: Allows you to access and display the current status of several controller functions.
- Car Errors: The Car Errors screen displays the last fifty errors that have occurred on the controller. Error 1 is the most recent; Error 50 is the oldest.
- Inputs & Outputs: Allows you to select particular I/O 24 boards and view the activity on their inputs and outputs.

States Submenu Screen

The current operating mode of the controller can be deduced by observing the current status of the state machines. The following table lists each state, potential status display (State Name/HHU Label), and an explanation (Help) where appropriate.

Note

If a status is in CAPITAL LETTERS on the HHU, it indicates an error condition.

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

ID Name	State	State Name	HHU Label	Help
1 Master	0	Init	Initialize	System initialization
	1	Normal		
	2	State 2	State 2	
	3	Loss of Communications	NETWORK LOSS	Loss of communication with any node (card) in control network
	4	Invalid Parameters	INVALID PAR	Invalid Parameter(s)
	5	State 5	State 5	
	6	State 6	State 6	
2 Inspection	0	Init		
	1	Top of car	TOC Insp on	Top of car inspection
	2	In car	In car insp	In car inspection
	3	Access	Access	Access inspection
	4	Controller	Insp control	Inspection set from the controller switch
	5	TOC input failure	TOC FAILURE	TOC inspection inputs do not agree.
	6	In car input failure	IN CAR FAIL	In car inspection inputs do not agree.
	7	Access failure	ACCESS FAIL	Access inspection inputs do not agree.
	8	Control failure	CONTROL FAIL	Controller inspection inputs do not agree.
3 Services 1	0	Init		
	1	Normal	Automatic	
	2	Fire	Fire	System is in fire service
	3	Inspection	Inspection	System is in inspection
	4	Doors disabled	Door disable	Car doors are prevented from opening from the controller switch
	5	State 5	State 5	
	6	Code Blue	Code Blue	Code Blue (cardiac arrest) hospital service from priority hall riser
	7	Hospital emergency	Hosp Emerg	Operation of car by staff under hospital emergency rules
	8	Control board comm. loss	CTRL BRD COMM LOSS	Cannot communicate with CTRL board
	9	Car top board comm. loss	CAR TOP COMM	Cannot communicate with CAR TOP board
	10	Car station board comm. loss	CSTA COMM LOSS	Lost contact with the car station board.

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	11	Car MG switch	Car MG sw.	The car MG switch has been operated. The car will not restart and the doors will open if in the door zone.
	12	Lobby MG switch	Lobby MG sw.	The MG switch at the lobby has been operated. The car will not restart and will close the doors.
	13	Canada board comm loss	CAN COMM LOSS	Lost contact with EXT 1 board
	14	Hall board comm. Error	HALL COMM LOSS	Lost contact with HALL board
	15	Gate bypass switch	Gate Bypass Sw	Gate bypass switch activated
	16	Locks bypass switch	Locks Bypass Sw	Locks bypass switch activated
	17	Gate/locks bypass	G/Locks Bypass	Gate/locks bypassed
	18	Weight overload	Weight Overload	Weight Overload
	19	Weight bypass	Weight Bypass	Weight Bypass
	20	Stop switch monitor	STOP SW MON	Car stopped due to stop switch monitor error.
4 Fire 1	0	Init		
	1	No fire operation		
	2	Lobby recall	Lobby Recall	Phase 1 lobby recall
	3	Smoke detectors	Smoke recall	Lobby recall due to smoke detector activation on non lobby floor
	4	Lobby smk. det.	SmokeAlt Rec	Phase 1 alternate recall due to smoke detector activation on lobby floor
	5	Lobby rec MR det	Lob Rec & MR	Phase 1 lobby recall and machine room/low hoistway smoke detector activated.
	6	Machine Room	Mach. Room	Machine room smoke detector activated
	7	Smoke & MR det	Smoke rec & MR	Lobby recall due to smoke detector activation on non-lobby floor & machine room/low hoistway smoke detector activated.
	8	Lower hoistway	Low hoistway	Hoistway smoke det. below recall floor
	9	Lob smk MR det	SmokeAlt&MR	Phase 1 alternate recall due to smoke detector activation on lobby floor & machine room/low hoistway smoke detector activated.
5 Services 2	0	Init		
	1	Normal	Group oper.	
	2	Simplex	Simplex	Simplex operation
	3	Independent	Independent	Car is in independent service
	4	State 4	State 4	
	5	Dispatcher loss	No dispatcher	Car has lost communications with the group dispatcher
	6	State 6	State 6	
	7	State 7	State 7	

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

6 Services 3	0	Init		
	1	Normal		
	2	State 2	State 2	
	3	State 3	State 3	
	4	Lobby Recall	Lobby Recall	Lobby Recall
	5	State 5	State 5	
	6	Attendant	Attendant	Car is in attendant service.
	7	State 7	State 7	State 7
	8	State 8	State 8	State 8
7 Motion Control	0	Init		
	1	Normal		
	2	Position lost	Lost Posit'n	Loss of car position. Car will search for terminal landing
	3	Between floors wait	Between fl W	Car is between floors and in a waiting state
	4	Between floors	Between Flrs	
	5	Drive failure	DRIVE FAIL	Drive failure
	6	Car out of service	OUT OF SERV	The car cannot respond to calls
	7	Low oil	LOW OIL	The car tried to run up and it could not (Applies only to hydraulic elevators).
	8	State 8	STATE 8	
	9	Overload/ rescuvator	OVERL/RESC	The overload popped, or, in hydros, the rescuvator is feeding the car power.
	10	LU sensor failure	LU FAILURE	The LU sensor is stuck on
	11	LD sensor failure	LD FAILURE	The LD sensor is stuck on
	12	DZ sensor failure	DZ FAILURE	The DZ sensor is stuck on
8 Direction	0	Init		
	1	No direction	No direction	Car has no direction preference
	2	No direction CC preference	CC Pref.	Car has closed doors and no direction preference
	3	Up direction	Up	Car has an up direction preference
	4	Up Direction go	Up go	Car is committed to start in up direction
	5	Up start	Up start	Car is starting up
	6	Up run	Running up	Car is running up
	7	Up slowdown up	Up sldn up	Car is moving up in slowdown for an up call
	8	Up slowdown none	Up sldn none	Car is moving up in slowdown with no direction preference
	9	Up slowdown down	Up sldn dn	Car is moving up in slowdown with a down direction preference
	10	Down direction	Down	Car has a down direction preference
	11	Down direction go	Down go	Car is committed to travel down
	12	Down start	Down start	Car is starting in down direction
	13	Down run	Running down	Car is moving down
	14	Down slowdown down	Dn sldn down	Car is moving down in slowdown with a down direction preference

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	15	Down slowdown none	Dn sldn none	Car is moving down in slowdown with no direction preference
	16	Down slowdown up	Dn sldn up	Car is moving down in slowdown with an up direction preference
	17	Stopping	Stopping	Car is stopping with no direction preference
	18	Up stopping	Up stopping	Car is stopping with an up direction preference
	19	Down stopping	Dn stopping	Car is stopping with a down direction preference
	20	Up Run 1	Up Run 1	
	21	Down Run 1	Down Run 1	
	22	State 22	State 22	
	23	State 23	State 23	
9 Doors	0	Init		
	1	Allow doors to open	Allow open	Doors can open if desired
	2	Close doors	Close	Doors should close, the car is ready to leave the floor.
	3	Lock doors	Locked	Doors are locked
	4	Slowdown	Slowdown	The car is in slowdown, update lanterns.
	5	Locked error	LOCKED ERROR	Doors are unlocked when they should be locked
	6	State 6	STATE 6	
	7	State 7	STATE 7	
	8	State 8	State 8	
	9	State 9	State 9	
10 Door	0	Init		
	1	No door	No door	Car has no door (on this side)
	2	Stopped	Stopped	Door is neither opening nor closing
	3	Stopped by safety edge	Stopped, SE	Closing stopped by SE activation
	4	DOB opening	Opening DOB	Door is opening due to door open button activation
	5	SE opening	Opening SE	Door is opening due to safe edge activation
	6	EE opening	Opening EE	Door is opening due to electric eye activation
	7	Car call opening	Opening CC	Door is opening due to answering a car call at floor
	8	Hall call opening	Opening HC	Door is opening due to answering a hall call at floor
	9	Car and hall calls opening	Opening C&H	Door is opening due to answering both a car and hall call at floor
	10	Opening	Opening	Door is opening
	11	Opening by hall door	Opening HDoor	Opening doors due to the hall door being open (swing doors)
	12	Reclosing	Reclosing	Door is closing following a re-open door sequence

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	13	Opened by door open button	Opened, DOB	Door is opened due to door open button activation
	14	Opened by Safety edge	Opened, SE	Door is opened due to safe edge activation
	15	Opened by electric eye	Opened, EE	Door is opened due to electric eye activation
	16	Opened by a car call	Opened, CC	Door is opened due to a car call at present floor
	17	Opened by a hall call	Opened, HC	Door is opened due to a hall call at present floor
	18	Opened by both a car and hall call	Opened, CC & HC	Door is opened due to both a car and hall at present floor
	19	Opened	Opened	Door is opened (Door open limit is off)
	20	Opened by a hall door	Opened HDoor	Door is opened due to the manual hall door being opened (swing door only)
	21	Opened error	OPENED ERROR	Doors failed to open fully (timeout)
	22	Closing	Closing	Door is closing
	23	Reopening	Reopening	Door is reopening after being in closing state
	24	Closed	Closed	Door is closed (door closed limit is made)
	25	Locking	Locking	Doors are locking
	26	Locked	Locked	Door lock is made
	27	Closing error	CANNOT CLOSE	Door failed to close (timeout)
	28	Locking error	CANNOT LOCK	Door failed to lock (timeout)
	29	Locked error	UNLOCKED	Lost gate or lock while car was moving
	30	Opening error	OPENING ERR	Door failed to open (timeout)
	31	State 31	State 31	
	32	State 32	State 32	
	33	State 33	State 33	
	34	State 34	State 34	
11 Door Operator	0	Init		
	1	No door	No door	No door programmed on this riser
	2	Stopped open	Stopped open	Door is fully open and power removed
	3	Stop closed	Stopped closed	Door is fully closed and power removed
	4	Stopped ajar	Stopped ajar	Door is stopped neither fully opened nor closed and power is removed
	5	Opening	Opening	Door is opening
	6	Opened	Opened	Door is fully opened
	7	Closing	Closing	Door is closing
	8	Closed	Closed	Door is fully closed (door close limit is “on”)
	9	Locking	Locking	Door is locking (closing waiting for gates and locks)
	10	Drop cam	Drop cam	Drop retiring cam
	11	Locked	Locked	Door is locked (locks and gates are made)
	12	Closing error	CLOSE ERROR	Doors did not fully close [Door close limit did not open in (Par 17)]
	13	Opening error	OPEN ERROR	Door did not fully open

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Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	14	Locking GL error	GL INPUT OFF	GL input did not make (“off”) during door closing
	15	Locking lock error	LOCK ERROR	Lock did not make during door closing
	16	Locking gate error	GATE ERROR	Gate did not make during door closing
	17	Lost gate error	LOST GL ERR	Gate opened while car was moving
	18	Lost locks error	LOST LockERR	Looks opened while car was moving
	19	Lost CL error	LOST CL ERR	Lost CL input (”off”) while car was moving
	20	Lost GL input while doors were closed	LOST GL ERR	Lost GL input (“off”) while car was moving
	21	Cam drop error	CAM DROP ERR	The cam did not drop in the time allotted.
	22	Gate jumped	GATE JUMPED	The gate contact is made although the doors are opened, doors cannot close because it is presumed that the gate contact is jumpered out.
	23	Locks jumped	LOCKS JUMPED	The lock contacts are made although the doors are opened, doors cannot close because it is presumed that the lock contacts are jumpered out.
	24	Gate and locks jumped	G & L JUMPED	The gate and lock contacts are made although the doors are opened, doors cannot close because it is presumed that the gate and lock contacts are jumpered out.
	25	State 25	STATE 25	
12 Drive Control	0	Init		
	1	Disabled	Disabled	Drive is disabled
	2	Stopped	Stopped	Drive is stopped
	3	Stopped, not yet leveled	Stop relevel	Drive is stopped but not level at floor
	4	Up relevel start	Up relevel	Drive start for relevel up (not used)
	5	Releveling up	RelevelingUp	Drive is releveling up
	6	Dn relevel start	Dn relevel start	Drive start for relevel down (not used)
	7	Releveling down	RevelingDn	Drive is releveling down
	8	Up run start	Up run start	Up run start
	9	Up run first	Up run 1	Just started, waiting to leave door zone
	10	Running up	Run up	Drive is running up
	11	Down run start	DownRunStart	Down run start
	12	Down run first	Down Run 1	Just started, waiting to leave door zone
	13	Running down	Run down	Drive is running down
	14	Up slowdown start	Up sldn start	Drive is beginning slowdown in up direction (not used)
	15	Slowdown up	Slowing up	Drive is in slowdown in up direction
	16	Dn slowdown start	Dn sldn start	Drive is beginning slowdown in down direction (not used)
	17	Slowdown down	Slowing down	Drive is in slowdown in down direction
	18	Up leveling in outer door zone	Up ODZ level	Drive is in up leveling within outer door zone (not used)

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	19	Up leveling in inner door zone	UpIDZlevel	Drive is in up leveling within inner door zone
	20	Down leveling in outer door zone	DownODZ level	Drive is in down leveling within outer door zone (not used)
	21	Down leveling in inner door zone	DownIDZlevel	Drive is in down leveling within inner door zone
	22	Up slowdown caused by speed limit	UpLimit sldn	Slowdown in up direction due to limit slow-down while car position is correct
	23	Up good limit slowdown	UpGoodLimSld	Drive slowed down in up direction due to simultaneous position and limit slowdown inputs
	24	Down slowdown caused by speed limit	DnLimit Sldn	Slow down in down direction due to limit slowdown while car position is correct
	25	Down good limit slowdown	DnGoodLimSld	Drive slowed down in down direction due to simultaneous position and limit slowdown inputs
	26	Stopping	Stopping	Drive is stopping
	27	Up limit slow-down error	UP LIMIT ERR	Up limit slowdown while car position is incorrect
	28	Down limit slow-down error	DN LIMIT ERR	Slowdown in down direction due to limit slowdown while car position is incorrect
13 Drive	0	Init		
	1	Disabled	Disabled	Drive is disabled
	2	Sleep	Sleep	Drive is stopped and waiting
	3	MG start	MG start	Start the MG
	4	State 4	State 4	
	5	Stopped	Stopped	Drive is stopped
	6	Field build	Field build	Build up (increase) motor field prior to run-ning drive
	7	Ready	Ready to Run	Fields are built up and drive is ready to run
	8	Stopping up	Stopping up	Drive is stopping in up direction
	9	Stopping down	Stopping Dn	Drive is stopping in down direction
	10	Start up relevel	StartUpRelev	Start up for relevel (hydro only)
	11	Releveling up	Relevel up	Releveling
	12	Start down relevel	StartDnRelev	Start down for relevel (not used)
	13	Releveling down	Relevel down	Releveling down
	14	Start up pump	Start up P	
	15	Start up	Start up	Start for up run
	16	Start down	Down start	Start for down run
	17	Run up	Running up	Running up
	18	Run down	Running down	Running down
	19	Start up slow pump	Strt Up s p	
	20	Start up slow	Start UpSldn	Start up slowdown
	21	Start down slow	Start DnSldn	Start down slowdown

5

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	22	Up slowdown	Up slowdown	Drive in up slowdown
	23	Down slowdown	Down slowdown	Drive in down slowdown
	24	Up run fast	Run up fast	Car is running up at high speed.
	25	Up run fast 2	Run up f2	Running up at fast speed, waiting for the adjustable time delay to start the slowdown
	26	Dn run fast	Run down fast	Car is running down at high speed.
	27	Dn run fast 2	Run dn f2	Running down at fast speed, waiting for the adjustable time delay to start the slowdown
	28	Up run 2	Run up2	Running up, waiting for slowdown delay to start the slowdown
	29	Down run 2	Run dn2	Running down, waiting for slowdown delay to start the slowdown
	30	Up run start	Fast up start	
	31	Dn run start	Fast dn start	
14 Pump / MG Contr	0	Init		
	1	Stopped	Stopped	Stopped
	2	Start	Start	Start for wye delta sequence
	3	Running	Running	Run state for wye delta sequence
	4	State 4	State 4	
	5	Run hold	Hold	Prevents rapid start and stop of wye delta sequence
	6	State 6	State 6	
	7	State 7	State 7	
15 Positioning	0	Init		Initialization
	1	Leveled	Leveled	The car is leveled at the floor
	2	Above level	Above level	The car is in the leveling zone, above the leveled position.
	3	Above	Above	The car is above the position, not yet at slowdown distance from the floor above.
	4	Above, slow-down vane	Abve, sld1a	The car is moving up, above the current position, in the slowdown vane for the next floor up.
	5	Above, slowdown	Above, sldn	The car is moving up, above the current position, in the slowdown zone for the floor above, out of the slowdown vane.
	6	Above, slow-down 2	Above, sld2	The car is moving up, above the current position, in the low speed slowdown zone for the floor above.
	7	Below level	Below level	The car is in the leveling zone, below the leveled position.
	8	Below	Below	The car is below the position, not yet at slowdown distance from the floor below.
	9	Below, slowdown vane	Below, sld1a	The car is moving down, below the current position, in the slowdown vane for the next floor down.
	10	Below, slowdown	Below, sldn	The car is moving down, below the current position, in the slowdown zone for the floor below, out of the slowdown vane.

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	11	Below, slowdown 2	Below, sld2	The car is moving down, below the current position, in the low speed slowdown zone for the floor below.
	12	Leveled error	LEVEL ERR	The car suddenly lost both LU and LD at the same time.
	13	No leveling inputs	NO LEV. INP	No leveling inputs have been detected.
16 Nudging	0	Init		
	1	Off		Nudging is off
	2	Timing	Timing	Nudging time is running
	3	Ready	Ready	Nudging timer has expired but there is no demand for the car
	4	On	On	Nudging is active
	5	State 5	State 5	
17 Fire 2	0	Init		
	1	Off		
	2	Indep. recall	Indep recall	Phase 1 recall while car is on Independent service
	3	Attendant recall	Att recall	Phase 1 recall while car is on Attendant service
	4	Recall	Recall	Car is in Phase 1 recall
	5	Recalled	Recalled	Car has completed Phase 1 recall
	6	Phase II	Phase II	Car is in Phase II fire operation
	7	Car to hold glitch filter	Hold wait	Waiting for either fire door hold input (“on”) or timer expiration after in car fire input goes “off”
	8	Hold	Hold	Phase II fire door hold service
	9	Soft hold	Soft hold	Car is away from recall floor, doors are open, in car fire input is “off” and timer for fire door hold has expired.
	10	Start recall	Start recall	Transition stage from Phase II to Phase I fire recall
	11	State 11	State 11	
	12	State 12	State 12	
	13	State 13	State 13	
18 Emerg Power	0	Init		
	1	Off	Line pwr	
	2	Normal	Em pwr	Car is operating in normal state (selected car)
	3	Stopping	Stopping	Car is stopping at first available floor
	4	State 4	State 4	
	5	Stopped	Stopped	Car is stopped
	6	Recalling	Recalling	Car is recalling to designated floor on emergency power
	7	Recalled	Recalled	Car is recalled to designated floor

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

19 Seismic	0	Off	Off	
	1	Stop at next floor	Stop next flr	Seismic switch on & displacement switch off
	2	Halt	Halt	
	3	Bring at next floor	Bring next flr	
	4	Done	Done	
	5	Seismic	Seismic	Run at reduced speed on seismic operation
20 Relays	0	Init		
	1	Stopped	Stopped	Relays are de-energized
	2	Up	Up	Relays are energized for up run
	3	Down	Down	Relays are energized for down run
	4	Stopping up	Stopping up	Relays are energized for up slowdown
	5	Stopping down	Stopping dn	Relays are energized for down slowdown
	6	Wait	Wait	Delay prior to energizing relays
	7	Pick error	PICK ERROR	The relays did not pick, the relays proving circuit did not open when the drive went into 'run'.
	8	Drop error	DROP ERROR	The relays did not drop. The relays proving circuit did not close when all relays where dropped.
	9	State 9	State 9	
21 Brake	0	Init		
	1	Off	Off	Brake relay is dropped
	2	Lift wait	Wait for Lift	Delay on brake energization
	3	Lifting	Lifting	Brake lifting
	4	Lifted	Lifted	Brake is considered lifted after time out of lifting state
	5	Drop delay	Drop delay	Delay after stop on dropping brake
	6	Relevel lift delay	RelevLiftDel	Delay on picking brake (after start) during relevels
	7	Relevel lifted	Lifted Relev	Brake is considered lifted after time out of lifting state
	8	Relevel drop delay	RelevDropDel	Delay in dropping brake during releveling
	9	Dropping	Dropping	Dropping of brake sequence
	10	Lift error	LIFT ERROR	
	11	Drop error	DROP ERROR	
	12	State 12	State 12	
22 Field	0	Init		
	1	Economy	Economy	Economy field
	2	Forcing	Forcing	Transition from economy to full field
	3	Full Field	Full field	Full field
	4	Acceleration	Acceleration	Field from start of run until transition to run field
	5	Run	Run field	Running field
	6	Wait	Wait	Time after a stop that the fields remain at full field setting

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	7	State 7	STATE 7	
	8	State 8	State 8	
23 Pattern	0	init		
	1	Off	Off	Pattern is off (zero speed)
	2	Start delay	Start delay	Delay after run start for pattern start
	3	Leveling	Leveling	Pattern set for leveling speed
	4	Approach	Approach	Pattern set for approach speed
	5	Medium speed	Medium speed	Pattern set for medium speed
	6	High speed	High speed	Pattern set for high speed
	7	Inspection speed	Insp speed	Pattern set for inspection speed
	8	Restart speed	Restart	The car restarted from between floors.
	9	State 9	State 9	
24 Drive Error	0	No error		
	1	Up slowdown timeout	UP SLDN T.O.	
	2	Down slowdown timeout	DN SLDN T.O.	
	3	Relays pick error	PICK ERROR	
	4	Relays drop error	DROP ERROR	
	5	Brake pick error	BRK PICK ERR	
	6	Brake drop error	BRK DROP ERR	
	7	Overload error	OVERLOAD	
	8	Low oil error	LOW OIL	
	9	Low oil sensor activated	LOW OIL SW.	
	10	State 10	STATE 10	
	11	Drive fault tripped	DRIVE FAULT	
	12	Drive fault detected	FLT DETECTD	
	13	Fault resetting	FLT RESETNG	
	14	Fault resetting off	FLT RES WAIT	
	15	Too many drive faults	TOO MANY FLTS	
	16	Up relevel time-out	UP RELEV T.O.	
	17	Down relevel tim-eout	DN REVEL. TO	
	18	Up run timeout	UP RUN T.O.	
	19	Down run time-out	DN RUN T.O.	
	20	Up slowdown timeout	UP SLDN T.O.	
	21	Down slowdown timeout	DN SLDN T.O.	
	22	Up normal termi-nal	UP NORM TERM	

Table 5.1 States Table (Car V 6.282 and HHU Version 6.262 *03/07*)

	23	Down normal terminal	DN NORM TERM	
25 Drive Control Error	0	No error		
	1	Safety line open	SAFETY LINE	
	2	Drive cannot run up	CANNOT RUN UP	
	3	Drive cannot run down	CANNOT RUN DN	
	4	Drive cannot run	DRIVE FAILURE	
	5	Rope gripper activated	ROPE GRIPPER	
	6	Door failure	DOOR FAILURE	
	7	Relevel oscillation	RELEVEL OSC.	
	8	State 8	STATE 8	

Car Errors

This screen shows the last 50 errors that occurred on the controller. The first error listed (Error number 1) is the last error that occurred on the controller. As a new error occurs, the oldest error drops off the list (if there are over 50 errors). Following is a list of possible errors. Note that errors may occur in any order. Order is dictated by error and time. Errors that occur only on NYCHA controllers are marked with an asterisk (*).

Table 5.2 Car Errors Display Table (v6.282)

ERROR NAME	HELP	PARAMETER
Between Floors *	Car stopped in between floors	Floor
Bottom Final Limit Operated *	Bottom final limit operated	Floor
Brake Drop Error	Brake proving contact did not close when controller dropped the brake.	Floor
Brake Lift Error	Brake proving contact did not open when controller lifted the brake.	Floor
Cannot Close Door	Door operator cannot fully close the door	Floor
Cannot Close Rear Door	Cannot close rear door	Floor
Cannot Drop Cam	The cam did not drop at the indicated floor	Floor
Cannot Lock (Gate)	The door operator cannot lock the door because the gate contact does not close.	Floor
Cannot Lock (GL)	The door operator cannot lock the door because the GL input is off.	Floor
Cannot Lock (Lock)	The door operator cannot lock the door because the lock contacts do not close.	Floor
Cannot Lock Rear (Gate)	The door operator cannot lock the rear door because the gate contact does not close	Floor
Cannot Lock Rear (GL)	The door operator cannot lock the rear door because the GL input is off	Floor
Cannot Lock Rear (Lock)	The door operator cannot lock the rear door because the lock contacts do not close	Floor
Cannot Open Door	The car was unable to open the front door	Floor
Cannot Open or Close Door	Door cannot open or close	Floor
Cannot Open Rear Door	Cannot open the rear door	Floor
Car Call Ack Indicators Fuse *	Car call acknowledge indicators fuse is open	Floor
Car Call Buttons Fuse *	Car call buttons fuse is open	Floor
Car Set to Fire Ph. 1 *	Car was set to fire phase 1	Floor
Car Set to Fire Ph. 2 *	Car was set to fire phase 2	Floor
Car Set to Independent Service	Car was set to independent service	Floor
Car Set to Inspection	Car was set to inspection	Floor
Car Stop Switch Is Open *	The car stop switch is open	Floor
Close Limit Opened While Running	Close limit opened while running	Floor
Comp Sheave Switch Operated *	Comp. Sheave switch operated	Floor
Controller Stop Switch Is Open *	Controller stop switch is open	Floor
Door Overload Tripped *	Door Overload Tripped	Floor
Down Leveling Timeout	Timed out while leveling in the down direction	Floor
Down Limit Slowdown	Slowdown initiated by limits in the down direction	Floor
Down Normal Terminal	Down normal terminal stopped the car	Floor
Down Releveling Timeout	Timed out while re-leveling in the down direction	Floor

Table 5.2 Car Errors Display Table (v6.282)

Down Run Timeout	Down run timeout	Floor
Down Slowdown Timeout	Down slowdown timeout	Floor
Drive Fault	The drive faulted	Floor
Emerg. Power	Car entered emergency power operation	Floor
Error Log Cleared	The error log has been cleared	No parameter
Escape Hatch Open *	Escape hatch open	Floor
Gate and Locks Jumped	The gate and lock contacts are made although the doors are opened, doors cannot close because it is presumed that the gate and lock contacts are jumped-out.	Floor
Gate Jumped	The gate contact is made although the doors are opened, doors cannot close because it is presumed that the gate contact is jumped-out.	Floor
Gate Opened While Running	Gate contact opened while the car was running	Floor
Governor Operated *	Governor operated	Floor
Hall Ack Indicators Fuse Car *	Hall ack. lights fuse on the car local hall board is open.	Floor
Hall Ack Indicators Fuse Disp *	Hall acknowledgement indicators fuse on the dispatcher is open	Floor
Hall Call Buttons Fuse Car *	Hall buttons fuse on the car local hall board is open	Floor
Hall Call Buttons Fuse Disp *	Hall buttons fuse on the dispatcher is open	Floor
Invalid IDZ Magnet	The car is lost or the zone magnet for this floor is not here or there should be no zone magnet at this floor and one is installed	Floor
Invalid Rear IDZ Magnet	The car is lost or the rear zone magnet for this floor is not here or there should be no rear zone magnet at this floor and one is installed	Floor
Lobby Fuse Car *	Lobby button fuse on the car local hall board is open	Floor
Lobby Fuse Disp *	Lobby up button fuse on the dispatcher is open	Floor
Locks Jumped	The lock contacts are made although the doors are opened; doors cannot close because it is presumed that the lock contacts are jumped-out	Floor
Locks Opened While Running	Lock contacts opened while car was moving	Floor
Lost GL While Running	GL input lost while running	Floor
Low Oil	Low oil level (hydraulic)	Floor
MG Switch Operated	The car has been stopped by either the in-car MG switch or the lobby MG switch	Floor
Missing Down Slowdown Vane	A down slowdown vane is missing below floor given	Floor
Missing Up Slowdown Vane	An up slowdown vane is missing above floor given	Floor
Motor Field Fault *	Motor field fault	Floor
No Communications With	No communication with a remote board	Card name
No Dispatcher Com	The car lost communication with the dispatcher	Floor
No Floors Defined	No floors defined	No parameter
Oil Buffer Switch *	Oil buffer switch	Floor
Overload Tripped	Car weight limit exceeded	Floor
Overspeed	The car overspeed, the governor 110% speed switch, opened	Floor
Pit Stop Switch Operated *	Pit stop switch operated	Floor
Plank Switch Operated *	Plank switch operated	Floor

Table 5.2 Car Errors Display Table (v6.282)

Position Reset	Position was reset	Floor
Possible counterweight derailment	Seismic operation - possible counterweight derailment	No parameter
Primary Lock Lost *	The (swing doors) primary locks opened while the car was moving or while the car was halted	Floor
Primary Rear Lock Lost *	The (swing doors) rear primary locks opened while the car was moving or while the car was halted	Floor
Rear Close Limit Opened While Running	Rear close limit opened while running	Floor
Relays Drop Error	Relays failed to operate properly, they did not drop	Floor
Relays Pick Error	Relays failed to operate properly, they did not pick	Floor
Relevel Oscillation	The car tried too many times to relevel at a floor from both directions	Floor
Reset	A hardware reset has occurred, indicating that the car controller power has been cycled	No parameter
Rope Gripper Tripped	The rope gripper was tripped due to uncontrolled movement of the car	Floor
Safety Edge Obstruction *	Safety edge input remains on 30 seconds after the car went on nudging	Floor
Safety Edge Rear Obstruction *	Safety edge rear input remains on 30 seconds after the car went on nudging	Floor
Safety Line Open	The safety line opened	Floor
Safety Line Open in Flight	The safety line opened while the car was moving	Floor
Seismic switch activated	Seismic operation - seismic switch active	No parameter
Timed Out of Service	Car was unable to respond within designated time and is now out of service	Floor
TOC Stop Switch Operated *	Car top stop switch operated	Floor
Too Many Consecutive Drive Faults	The drive incurred too many consecutive faults	Floor
Top Final Limit Operated *	Top final limit operated	Floor
Up Leveling Timeout	Timed out while leveling in the up direction	Floor
Up Limit Slowdown	Slowdown initiated by limits in the up direction	Floor
Up Normal Terminal	Up normal terminal stopped the car	Floor
Up Releveling Timeout	Timed out while re-leveling in the up direction	Floor
Up Run Timeout	Up run timeout	Floor
Up Slowdown Timeout	Up slowdown timeout	Floor
Up/Down Slowdowns at the Same Time	Up and Down slowdowns opened at the same time	No parameter

Input & Outputs

Field inputs and outputs are physically connected to pluggable-connectors on I/O 24 circuit boards inside the Tricon control cabinet. The I/O tables in this section are ANSI A17.1 2000 examples. The actual input/output configuration for your job may be different. Please refer to the document/drawings package accompanying a job for I/O tables specific to that job.

- Controller Board
- Car Top Board
- Car Station Board
- Hall Board
- Dispatcher Hall Board
- Dispatcher EP Hall Board
- Extension 1 Board

Note

When used as Hall, Car Station, or Dispatcher Hall boards, multiple I/O 24 boards may be employed (typically, but not always, stacked one-above-the-other). When this is the case, the first board has only the base label (i.e., Hall); the second is labeled and numbered “2;” the third is labeled and numbered “3.”

The following table lists the software label that will appear on the I/O 24 board upper left corner IC and its name as displayed by the HHU.

Table 5.3 Software Label to HHU Display

BOARDS - LABEL ON CHIP	HHU
CTRL	Control Card
EXT1	Ext1 Board (or Ext Board A17.1)
Hall	Hall Card
Hall(2 - n)	Hall Card(2 - n)
CTOP	Car top Card
CSTA	Car Station
CSTA2	Car Station 2
PI	Position Board
CCL	Car Call Lock Board
Dispatcher	**HHU**
Dhall	Group Hall Calls
Dhall2	Group Hall Calls 2

The hand held unit allows real time observation of all I/O 24 board inputs and outputs. If the hand held screen below a selected I/O board is blank, the board is not available or is not communicating. If the board is operating properly, all 24 inputs and 24 outputs will be displayed at once— inputs to the left, outputs to the right. When an input is turned ON (voltage at the pin), it will display a I. An input turned OFF (no voltage at the pin) will display a period (.). The example display below is for a Car Station board. Active outputs display an O; inactive outputs a period (.).

Figure 5.2 Input/Output Activity Display Example

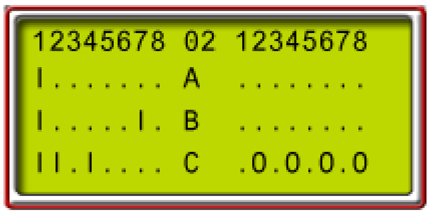
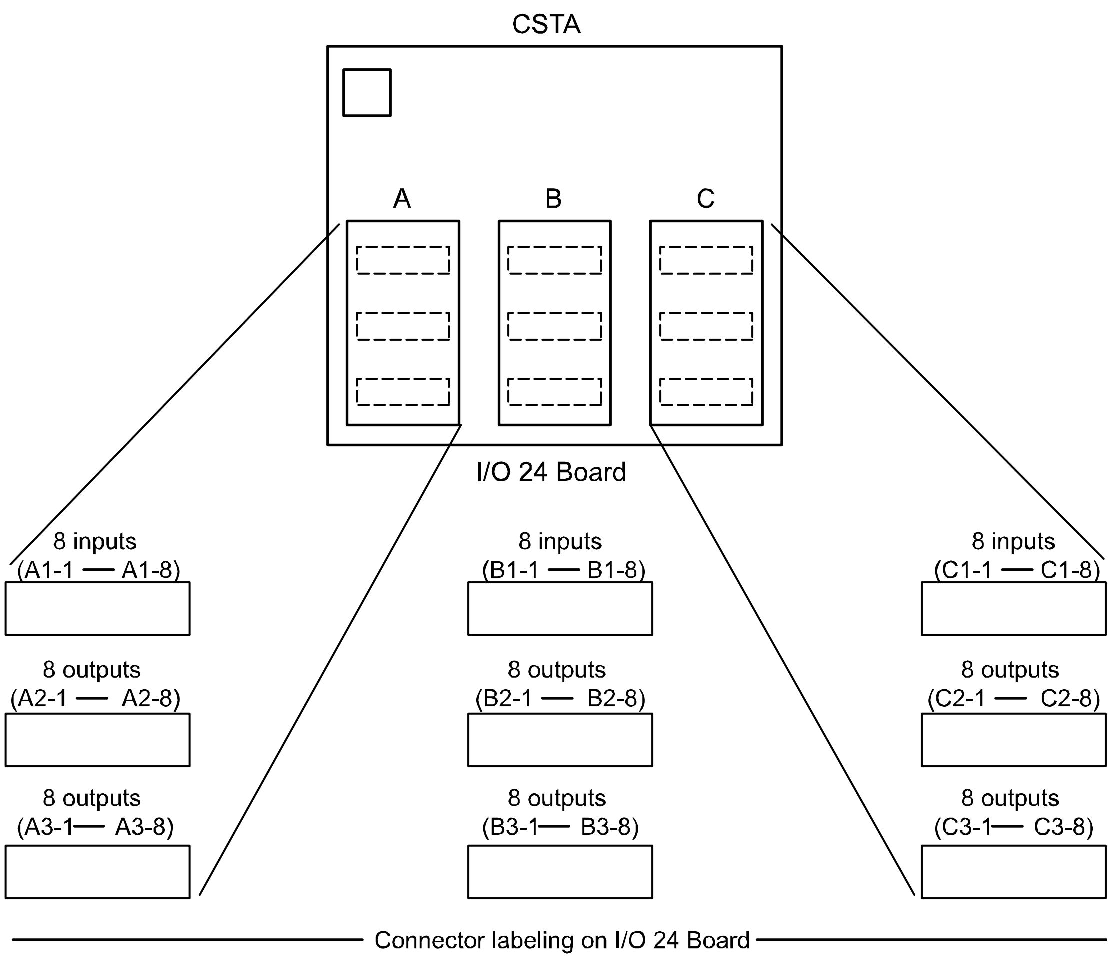


Figure 5.3 Input/Output to Connector Correlation



Controller Board The controller board is always located in the controller cabinet and has inputs and outputs related to equipment found in the machine room.

Table 5.4 Car Controller Board (CTRL-N) v6.2 Input Examples (A17.1 2000)

Car Controller Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AF-1	A1-1	Controller inspection switch	COINS
AF-2	A1-2	Controller inspection up button	CUIB
AF-3	A1-3	Controller inspection down button	CIDB
AF-4	A1-4	Doors disable switch	DD
AF-5	A1-5	Relay sequence	RSEQ
AF-6	A1-6	Drive fault	DRF
AF-7	A1-7	Overloads	OVL
AF-8	A1-8	Primary locks (swing door)	PRL
BF-1	B1-1	Safety line	SAF
BF-2	B1-2	Gate	GATE
BF-3	B1-3	Locks	LOCKS
BF-4	B1-4	Gate & Locks	GL
BF-5	B1-5	Up normal terminal	UNT
BF-6	B1-6	Up slowdown limit	USL
BF-7	B1-7	Down normal terminal	DNT
BF-8	B1-8	Down slowdown limit	DSL
CF-1	C1-1	Brake drop switch	BDS
CF-2	C1-2	Up high speed limit	HUSL
CF-3	C1-3	Controller inspection switch 2	COINS2
CF-4	C1-4		
CF-5	C1-5		
CF-6	C1-6	Down high speed limit	HDSL
CF-7	C1-7		
CF-8	C1-8		

Table 5.5 Car Controller Board (CTRL-N) v6.2 Output Examples (A17.1 2000)

Car Controller Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AF-25, AF26	A3-1 to A3-2	Run up	UP
AF-17, AF-18	A2-1 to A2-2	Run down	DN
AF-27, AF-28	A3-3 to A3-4	Brake	BK
AF-19, AF20	A2-3 to A2-4	High speed	HS
AF-29, AF30	A3-5 to A3-6	Medium speed	MS
AF-21, AF-22	A2-5 to A2-6	Door bypass	DBYP
AF-31, AF-32	A3-7 to A3-8	Access top lock bypass	ATLB
AF-23, AF-24	A2-7 to A2-8	Access bottom lock bypass	ABLB
BF-25, BF-26	B3-1 to B3-2	Door open	DO
BF-17, BF-18	B2-1 to B2-2	Rear door open	RDO
BF27, BF-28	B3-3 to B3-4	Door close	DC
BF-19, BF-20	B2-3 to B2-4	Rear door close	RDC
BF-29, BF-30	B3-5 to B3-6	Door Nudging/Freight doors Fire command	NUDG
BF-21, BF-22	B2-5 to B2-6	Rear door nudging/Freight doors fire car command	RNUG
BF-31, BF-32	B3-7 to B3-8	Door cam	CAM
BF-23, BF-24	B2-7 to B2-8	Drive reset	DRES
CF-25, CF26	C3-1 to C3-2	Pump or MG start	STRT
CF-17, CF-18	C2-1 to C2-2	Pump or MG run	RUN
CF-27, CF-28	C3-3 to C3-4	Brake lift	BL
CF-19, CF20	C2-3 to C2-4	Brake relevel	BRL
CF-29, CF30	C3-5 to C3-6	Full field	FF
CF-21, CF-22	C2-5 to C2-6	Drive pattern enable	PE
CF-31, CF-32	C3-7 to C3-8	Approach speed	AS
CF-23, CF-24	C2-7 to C2-8	Leveling speed	LS

Car Top Board The car top board may be mounted in either the controller cabinet, the cartop box or in the car station. Its inputs and outputs are connected to equipment normally located on the top of the car or in the cabinet.

Table 5.6 Cartop Board (CTOP-N) v6.2 Input Examples (A17.1 2000)

CarTop Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AF-1	A1-1	Top of car inspection switch	TINS
AF-2	A1-2	Top of car up inspection button	TIUB
AF-3	A1-3	Top of car down inspection button	TIDB
AF-4	A1-4	Access and in-car inspection 2	CIN2
AF-5	A1-5	Attendant	ATT
AF-6	A1-6	Cam dropped contact	CDC
AF-7	A1-7	Half load switch	HLSW
AF-8	A1-8	Access Gate Monitor	AGM
BF-1	B1-1	Open limit	DOL
BF-2	B1-2	Close limit	DCL
BF-3	B1-3	Safety edge	SE
BF-4	B1-4	Electric eye	EE
BF-5	B1-5	Simplex switch	SPLX
BF-6	B1-6	Hospital emergency switch	HEM
BF-7	B1-7	Rear open limit	RDOL
BF-8	B1-8	Rear close limit	RDCL
CO-1	C1-1	Leveling up	LU
CO-2	C1-2	Leveling down	LD
CO-3	C1-3	Rear inner door zone	RIDZ
CO-4	C1-4	Inner door zone	IDZ
CO-5	C1-5	Up step	US
CO-6	C1-6	Down step	DS
CO-7	C1-7	Rear safety edge	RSE
CO-8	C1-8	Rear electric eye	REE

Table 5.7 Cartop Board (CTOP-N) v6.2 Output Examples (A17.1 2000)

CarTop Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AF-25, AF26	A3-1 to A3-2	Car lantern up	CLU
AF-17, AF-18	A2-1 to A2-2	Car lantern down	CLD
AF-27, AF-28	A3-3 to A3-4	Up direction arrow	UDA
AF-19, AF20	A2-3 to A2-4	Down direction arrow	DDA
AF-29, AF30	A3-5 to A3-6	Access inspection gate bypass rear	AGBR
AF-21, AF-22	A2-5 to A2-6	Rear door car lantern up	RCLU
AF-31, AF-32	A3-7 to A3-8	Rear door car lantern down	RCLD
AF-23, AF-24	A2-7 to A2-8	Access inspection gate bypass front	AGBP
BF-25, BF-26	B3-1 to B3-2	Door open	DO
BF-17, BF-18	B2-1 to B2-2	Rear door open	RDO
BF27, BF-28	B3-3 to B3-4	Door close	DC
BF-19, BF-20	B2-3 to B2-4	Rear door close	RDC
BF-29, BF-30	B3-5 to B3-6	Door nudging	NUDG
BF-21, BF-22	B2-5 to B2-6	Rear door nudging	RNUD
BF-31, BF-32	B3-7 to B3-8	Door cam	CAM
BF-23, BF-24	B2-7 to B2-8	Code blue/Hosp emerg ind	CBCI
CO-26	C3-1 to C3-2	Position indicator 1	PI1
CO-18	C2-1 to C2-2	Position indicator 2	PI2
CO-28	C3-3 to C3-4	Position indicator 3	PI3
CO-20	C2-3 to C2-4	Position indicator 4	PI4
CO-30	C3-5 to C3-6	Position indicator 5	PI5
CO-22	C2-5 to C2-6	Position indicator 6	PI6
CO-32	C3-7 to C3-8	Position indicator 7	PI7
CO-24	C2-7 to C2-8	Position indicator 8	PI8

Car Station Board The car station board can be located either in the controller cabinet or in the car. All its inputs and outputs are connected to equipment generally located in the car station.

Table 5.8 Car Station Board (CSTA-N) v6.2 Input Examples (A17.1 2000)

Car Station Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AF-1	A1-1	In-car inspection switch	CINS
AF-2	A1-2	Access inspection switch	AINS
AF-3	A1-3	Fire car switch	FCAR
AF-4	A1-4	Fire hold switch	FHLD
AF-5	A1-5	Calls reset button	RES
AF-6	A1-6	Independent switch	IND
AF-7	A1-7	Door open button	DOB
AF-8	A1-8	Door close button	DCB
BO-1	B1-1	Handicap chime enable / Attendant hall bypass	HEN
BO-2	B1-2	Top of car insp 2	TIN2
BO-3	B1-3	Attendant up button/front door hold	ATTU
BO-4	B1-4	Attendant down button/rear door hold	ATTD
BO-5	B1-5	Car MG switch	CMG
BO-6	B1-6	Rear door open button	RDOB
BO-7	B1-7	Rear door close button	RDCB
BO-8	B1-8	Stop switch monitor	SSM
CL-1	C1-1	Car call button for floor 1	CC1
CL-2	C1-2	Car call button for floor 2	CC2
CL-3	C1-3	Car call button for floor 3	CC3
CL-4	C1-4	Car call button for floor 4	CC4
CL-5	C1-5	Car call button for floor 5	CC5
CL-6	C1-6	Car call button for floor 6	CC6
CL-7	C1-7	Car call button for floor 7	CC7
CL-8	C1-8	Car call button for floor 8	CC8

Table 5.9 Car Station Board (CSTA-N) v6.2 Output Examples (A17.1 2000)

Car Station Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AF-25, AF26	A3-1 to A3-2	Fire lock bypass	FBP
AF-17, AF-18	A2-1 to A2-2	Stop switch fire bypass 2	SBY2
AF-27, AF-28	A3-3 to A3-4	Stop switch fire bypass	SBYP
AF-19, AF20	A2-3 to A2-4	Buzzer (fire, attendant, handicap, etc.)	BUZ
AF-29, AF30	A3-5 to A3-6	Fire light	FLT
AF-21, AF-22	A2-5 to A2-6	Passing chime	PCH
AF-31, AF-32	A3-7 to A3-8	Attendant up light	AUL
AF-23, AF-24	A2-7 to A2-8	Attendant down light	ADL
BO-26	B3-1 to B3-2	Position indicator 1	PI1
BO-18	B2-1 to B2-2	Position indicator 2	PI2
BO-28	B3-3 to B3-4	Position indicator 3	PI3
BO-20	B2-3 to B2-4	Position indicator 4	PI4
BO-30	B3-5 to B3-6	Position indicator 5	PI5
BO-22	B2-5 to B2-6	Position indicator 6	PI6
BO-32	B3-7 to B3-8	Position indicator 7	PI7
BO-24	B2-7 to B2-8	Position indicator 8	PI8
CL-1	C3-1 to C3-2	Car call ack. Light floor 1	CCA1
CL-2	C2-1 to C2-2	Car call ack. Light floor 2	CCA2
CL-3	C3-3 to C3-4	Car call ack. Light floor 3	CCA3
CL-4	C2-3 to C2-4	Car call ack. Light floor 4	CCA4
CL-5	C3-5 to C3-6	Car call ack. Light floor 5	CCA5
CL-6	C2-5 to C2-6	Car call ack. Light floor 6	CCA6
CL-7	C3-7 to C3-8	Car call ack. Light floor 7	CCA7
CL-8	C2-7 to C2-8	Car call ack. Light floor 8	CCA8

Hall Board

Table 5.10 Hall Board (HALL-N) v6.2 Input Examples (A17.1 2000)

HALL-N			
Terminals	**Connectors**	**Name**	**Label**
AO-1	A1-1	Fire recall switch	FIRE
AO-2	A1-2	Fire smoke detectors bypass switch	FBYP
AO-3	A1-3	Smoke detectors	SMOK
AO-4	A1-4	Lobby smoke detector(s)	LSMK
AO-5	A1-5	Lobby recall switch / EP pre transfer	LREC
AO-6	A1-6	Lobby MG Stop switch	LMG
AO-7	A1-7	Machine Room smoke detector	MSMK
AO-8	A1-8	Lower hoistway smoke detector	LHSM
BL-1	B1-1	Hall Call button 1	HCB1
BL-2	B1-2	Hall Call button 2	HCB2
BL-3	B1-3	Hall Call button 3	HCB3
BL-4	B1-4	Hall Call button 4	HCB4
BL-5	B1-5	Hall Call button 5	HCB5
BL-6	B1-6	Hall Call button 6	HCB6
BL-7	B1-7	Hall Call button 7	HCB7
BL-8	B1-8	Hall Call button 8	HCB8
CL-1	C1-1	Hall call button 9	HCB9
CL-2	C1-2	Hall call button 10	HCB10
CL-3	C1-3	Hall call button 11	HCB11
CL-4	C1-4	Hall call button 12	HCB12
CL-5	C1-5	Hall call button 13	HCB13
CL-6	C1-6	Hall call button 14	HCB14
CL-7	C1-7	Hall call button 15	HCB15
CL-8	C1-8	Hall call button 16	HCB16

Table 5.11 Hall Board (HALL-N) v6.2 Output Examples (A17.1 2000)

HALL-N Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AO-26	A3-1 to A3-2	Position indicator 1	HP1
AO-18	A2-1 to A2-2	Position indicator 2	HP2
AO-28	A3-3 to A3-4	Position indicator 3	HP3
AO-20	A2-3 to A2-4	Position indicator 4	HP4
AO-30	A3-5 to A3-6	Position indicator 5	HP5
AO-22	A2-5 to A2-6	Position indicator 6	HP6
AO-32	A3-7 to A3-8	Position indicator 7 or Up direction arrow	HP7U
AO-24	A2-7 to A2-8	Position indicator 8 or Down direction arrow	HP8D
BL-1	B3-1 to B3-2	Hall call acknowledge light 1	HCA1
BL-2	B2-1 to B2-2	Hall call acknowledge light 2	HCA2
BL-3	B3-3 to B3-4	Hall call acknowledge light 3	HCA3
BL-4	B2-3 to B2-4	Hall call acknowledge light 4	HCA4
BL-5	B3-5 to B3-6	Hall call acknowledge, light 5	HCA5
BL-6	B2-5 to B2-6	Hall call acknowledge light 6	HCA6
BL-7	B3-7 to B3-8	Hall call acknowledge light 7	HCA7
BL-8	B2-7 to B2-8	Hall call acknowledge light 8	HCA8
CL-1	C3-1 to C3-2	Hall call acknowledge light 9	HCA9
CL-2	C2-1 to C2-2	Hall call acknowledge light 10	HCA10
CL-3	C3-3 to C3-4	Hall call acknowledge light 11	HCA11
CL-4	C2-3 to C2-4	Hall call acknowledge light 12	HCA12
CL-5	C3-5 to C3-6	Hall call acknowledge light 13	HCA13
CL-6	C2-5 to C2-6	Hall call acknowledge light 14	HCA14
CL-7	C3-7 to C3-8	Hall call acknowledge light 15	HCA15
CL-8	C2-7 to C2-8	Hall call acknowledge light 16	HCA16

Dispatcher Hall Board

Table 5.12 Dispatcher Hall Board (DHALL-N) v6.2 Input Examples

DHALL Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AO-1	A1-1	Fire recall switch	FIRE
AO-2	A1-2	Fire smoke detectors bypass switch	FBYP
AO-3	A1-3	Smoke detectors	SMOK
AO-4	A1-4	Lobby smoke detector(s)	LSMK
AO-5	A1-5	Machine room smoke detectors	FMRS
AO-6	A1-6	Low hoistway smoke detectors	FLHS
AO-7	A1-7	Remote fire switch, ON position	FRON
AO-8	A1-8	Remote fire switch, OFF position	FROF
BL-1	B1-1	Hall Call 1	HC1
BL-2	B1-2	Hall Call 2	HC2
BL-3	B1-3	Hall Call 3	HC3
BL-4	B1-4	Hall Call 4	HC4
BL-5	B1-5	Hall Call 5	HC5
BL-6	B1-6	Hall Call 6	HC6
BL-7	B1-7	Hall Call 7	HC7
BL-8	B1-8	Hall Call 8	HC8
CL-1	C1-1	Hall call 9	HC9
CL-2	C1-2	Hall call 10	HC10
CL-3	C1-3	Hall call 11	HC11
CL-4	C1-4	Hall call 12	HC12
CL-5	C1-5	Hall call 13	HC13
CL-6	C1-6	Hall call 14	HC14
CL-7	C1-7	Hall call 15	HC15
CL-8	C1-8	Hall call 16	HC16

Table 5.13 Dispatcher Hall Board (DHALL-N) v6.2 Output Examples

DHALL Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AO-26	A3-1 to A3-2	Fire recall switch ON indicator	FONI
AO-18	A2-1 to A2-2	Fire OFF switch ON indicator	FOFI
AO-28	A3-3 to A3-4		
AO-20	A2-3 to A2-4		
AO-30	A3-5 to A3-6		
AO-22	A2-5 to A2-6		
AO-32	A3-7 to A3-8		
AO-24	A2-7 to A2-8		
BL-1	B3-1 to B3-2	Hall call ack, light 1	HCA1
BL-2	B2-1 to B2-2	Hall call ack, light 2	HCA2
BL-3	B3-3 to B3-4	Hall call ack, light 3	HCA3
BL-4	B2-3 to B2-4	Hall call ack, light 4	HCA4
BL-5	B3-5 to B3-6	Hall call ack, light 5	HCA5
BL-6	B2-5 to B2-6	Hall call ack, light 6	HCA6
BL-7	B3-7 to B3-8	Hall call ack, light 7	HCA7
BL-8	B2-7 to B2-8	Hall call ack, light 8	HCA8
CL-1	C3-1 to C3-2	Hall call ack. light 9	HCA9
CL-2	C2-1 to C2-2	Hall call ack. light 10	HCA10
CL-3	C3-3 to C3-4	Hall call ack. light 11	HCA11
CL-4	C2-3 to C2-4	Hall call ack. light 12	HCA12
CL-5	C3-5 to C3-6	Hall call ack. light 13	HCA13
CL-6	C2-5 to C2-6	Hall call ack. light 14	HCA14
CL-7	C3-7 to C3-8	Hall call ack. light 15	HCA15
CL-8	C2-7 to C2-8	Hall call ack. light 16	HCA16

Dispatcher EP Hall Board

Table 5.14 Dispatcher EP Hall Board (DHALL-N) v6.2 Input Examples (A17.1 2000)

DHALL Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AO-1	A1-1	Fire recall switch	FIRE
AO-2	A1-2	Fire smoke detectors bypass switch	FBYP
AO-3	A1-3	Smoke detectors	SMOK
AO-4	A1-4	Lobby smoke detector(s)	LSMK
AO-5	A1-5	Machine room smoke detectors	FMRS
AO-6	A1-6	Low hoistway smoke detectors	FLHS
AO-7	A1-7	Remote fire switch, ON position	FRON
AO-8	A1-8	Remote fire switch, OFF position	FROF
BL-1	B1-1	Emergency Power Select 1	EP1
BL-2	B1-2	Emergency Power Select 2	EP2
BL-3	B1-3	Emergency Power Select 3	EP3
BL-4	B1-4	Emergency Power Select 4	EP4
BL-5	B1-5	Emergency Power Select 5	EP5
BL-6	B1-6	Emergency Power Select 6	EP6
BL-7	B1-7	Emergency Power pre-transfer	PRE
BL-8	B1-8	Emergency Power ON	EP
CL-1	C1-1	Hall call 1	HC1
CL-2	C1-2	Hall call 2	HC2
CL-3	C1-3	Hall call 3	HC3
CL-4	C1-4	Hall call 4	HC4
CL-5	C1-5	Hall call 5	HC5
CL-6	C1-6	Hall call 6	HC6
CL-7	C1-7	Hall call 7	HC7
CL-8	C1-8	Hall call 8	HC8

Table 5.15 Dispatcher EP Hall Board (DHALL-N) v6.2 Output Examples (A17.1 2000)

DHALL Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AO-26	A3-1 to A3-2	Fire recall switch ON indicator	FONI
AO-18	A2-1 to A2-2	Fire OFF switch ON indicator	FOFI
AO-28	A3-3 to A3-4		
AO-20	A2-3 to A2-4		
AO-30	A3-5 to A3-6		
AO-22	A2-5 to A2-6		
AO-32	A3-7 to A3-8		
AO-24	A2-7 to A2-8		
BL-1	B3-1 to B3-2		
BL-2	B2-1 to B2-2		
BL-3	B3-3 to B3-4		
BL-4	B2-3 to B2-4		
BL-5	B3-5 to B3-6		
BL-6	B2-5 to B2-6		
BL-7	B3-7 to B3-8		
BL-8	B2-7 to B2-8		
CL-1	C3-1 to C3-2	Hall call ack. light 1	HCA1
CL-2	C2-1 to C2-2	Hall call ack. light 2	HCA2
CL-3	C3-3 to C3-4	Hall call ack. light 3	HCA3
CL-4	C2-3 to C2-4	Hall call ack. light 4	HCA4
CL-5	C3-5 to C3-6	Hall call ack. light 5	HCA5
CL-6	C2-5 to C2-6	Hall call ack. light 6	HCA6
CL-7	C3-7 to C3-8	Hall call ack. light 7	HCA7
CL-8	C2-7 to C2-8	Hall call ack. light 8	HCA8

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Extension Board (EXT1-N)

Table 5.16 Extension Board (EXT1-N) v6.2 Input Examples (A17.1 2000)

Extension Board Inputs			
Terminals	**Connectors**	**Name**	**Label**
AL-1	A1-1	Locks bypass switch	LBS
AL-2	A1-2	Gate bypass switch	GBS
AL-3	A1-3	Governor 110% overspeed switch	GOV1
AL-4	A1-4	Fire remote switch ON	FRON
AL-5	A1-5	Fire remote switch OFF	FROF
AL-6	A1-6		
AL-7	A1-7	Gate bypass monitor	GBM
AL-8	A1-8	Lock bypass monitor	LBM
BL-1	B1-1	Access top zone limit	ATUL
BL-2	B1-2	Access top zone up button	ATUS
BL-3	B1-3	Access top zone down button	ATDS
BL-4	B1-4	Access bottom zone limit	ABUL
BL-5	B1-5	Access bottom zone up button	ABUS
BL-6	B1-6	Access bottom zone down button	ABDS
BL-7	B1-7	Access top monitor	ATM
BL-8	B1-8	Access bottom monitor	ABM
CL-1	C1-1	Displacement switch	CWS
CL-2	C1-2	Seismic switch	SAS
CL-3	C1-3	Seismic reset switch	SRE
CL-4	C1-4	Counterweight position switch	POS
CL-5	C1-5		
CL-6	C1-6		
CL-7	C1-7		
CL-8	C1-8	Peelle door open contact (X15/16)	DOL

Table 5.17 Extension Board (EXT1-N) Output Examples (A17.1 2000)

Extension Board Outputs			
Terminals	**Connectors**	**Name**	**Label**
AF-25, AF26	A3-1 to A3-2	Door locks bypass enable	DLB
AF-17, AF-18	A2-1 to A2-2	Car gate bypass enable	GBY
AF-27, AF-28	A3-3 to A3-4	Rope gripper reset 1	RGR1
AF-19, AF20	A2-3 to A2-4	Rope gripper reset 2	RGR2
AF-29, AF30	A3-5 to A3-6	Out of service indicator	OSV
AF-21, AF-22	A2-5 to A2-6	Fire recall switch ON indicator	FONI
AF-31, AF-32	A3-7 to A3-8	Fire OFF switch ON indicator	FOFI
AF-23, AF-24	A2-7 to A2-8	Seismic indicator	SAL
BF-25, BF-26	B3-1 to B3-2		
BF-17, BF-18	B2-1 to B2-2		
BF27, BF-28	B3-3 to B3-4		
BF-19, BF-20	B2-3 to B2-4	Peelle X11, Fire 1	FP1
BF-29, BF-30	B3-5 to B3-6	Peelle X12, Designated landing	FDL
BF-21, BF-22	B2-5 to B2-6	Peelle X13, Fire 2	FP2
BF-31, BF-32	B3-7 to B3-8	Peelle X14, Fire hold	FHD
BF-23, BF-24	B2-7 to B2-8	Peelle X18, Fire car OFF	OFF
CO-26	C3-1 to C3-2	Peelle D03-D05, inspection	INS
CO-18	C2-1 to C2-2	Peelle, D06-D08, auto-close disable	ACH
CO-28	C3-3 to C3-4	Peelle D06-D07, auto close	ACO
CO-20	C2-3 to C2-4	Peelle D01-D012, hall PB cutout	FHB
CO-30	C3-5 to C3-6	Peelle D060-D070, inspection rear, C line	RINS
CO-22	C2-5 to C2-6	Peelle D060-D050, Auto-close Disable rear, C line	RACH
CO-32	C3-7 to C3-8	Peelle D060-D080, Auto-close rear, C line	RACO
CO-24	C2-7 to C2-8	Peelle D010-D022, hall PB cutout rear, C line	RFHB

Car Setup Menu

The Car Setup menu includes:

- Parameters
- Floor Table
- Group Assignments
- Car Soft Lockouts
- Position Indicator
- PI Board Setup
- CE Indicator Setup
- BMS Setup
- Car Lockouts Setup
- Clock
- Reset Errors

Parameters

The following table provides a list of editable parameters, the value range across which they may be set, the factory default value, and a supporting description.

Table 5.18 Car Setup, Parameters Screen

Version 6.2	Hand Held Display	Value Range	Default Value	Units	Help
1	Door: Nudging mode 0 = disabled 1 - 5 (see manual)	0 - 5	0	enum	0=No nudging 1= Buzzer only 2= Buzz + Electric Eye bypass 3= Buzz + EE bypass +Safe Edge stops door 4= Buzz + EE bypass +low pressure close 5= Buzz + EE bypass +low pressure close + SE stops Selects nudging mode, Off, keep closing, stop doors but not reopen, or reopen (buzzer only).
2	Door: Time after closing start to begin nudging	0 - 255	20	sec	If the car has a direction and the doors cannot close, the door will begin nudging after this time expires
3	Front Door: Minimum reopen time	0 - 25.5	2	sec	After reopening, door will remain open for at least this time
4	Front Door: Car call minimum time if EE, SE, or DCB detected	0 -25.5	1	sec	Time door will remain fully open when opened due to a car call at the floor. This time cannot be reduced by the electric eye or door close button.
5	Front Door: Car call max time if no EE, SE or DOB	0 - 25.5	5	sec	Maximum time doors will remain open due to a car call only (no Electric Eye, Safe Edge, or Door Open Button).
6	Front Door: Hall call minimum time	1 - 25.5	2	sec	Minimum time door will remain fully open when opened due to hall call. Time cannot be reduced by electric eye or door close button.
7	Front Door: Hall and car call door maximum time	0 - 25.5	6	sec	Maximum time doors will stay fully open due to a hall or combination hall and car call.

Table 5.18 Car Setup, Parameters Screen

8	Front Door: Number door failure cycles before retry wait	0 - 255	3	each	If the door cannot open, close, or lock, it will retry the operation as many times as set in this parameter and then stop. If this parameter is set to zero, doors will retry indefinitely.
9	Front Door: Wait time before recycling doors again	0 - 255	60	sec	Time the doors will sit idle before retrying the last operation.
10	Front Door: Freight hold time 0=feature disable	0 - 255	0	sec	When this time is set to a value other than zero, and the car is not in Attendant mode, the attendant Up and Down buttons will behave as Freight door hold front and rear respectively. In Attendant mode, these inputs will function normally. This parameter applies to both front and rear doors.
11	Front Door: Pre-open front door in inner door zone	yes/no	no	yes/no)	The front door will start to open when the car reaches the inner door zone.
12	Front Door: Front hall doors are swing type	yes/no	no	yes/no	Use for swing door with manually operated hall door.
13	Front Door: Door Type 1=Peelle 2=Peelle w/OL 3=Courion	0 - 10	0	each	Sets door and door operator type. 0 = standard (manual or automatic) 1 = Peelle freight doors w/o open limit 2 = Peelle freight doors with open limit 3 = Courion freight doors
14	Freight door: Auto-open on hall calls	yes/no	no	yes/no	When set to yes, registered hall calls will cause the door to open if so equipped. If the car is used unattended, set parameter to no to avoid having the car stopped with doors open due to a hall call registered but no passenger waiting. This parameter only applies to the manual door CPU chip version CARM and is intended to be used with freight doors. Applies to both front and rear doors. Y = freight doors open automatically. N = door open button must be pressed.
15	(reserved)	0 - 255	0	each	
16	(reserved)	0 - 255	0	each	
17	Front Door op: Door open failure timeout	0 - 25.5	14	sec	If the door cannot open in this time, it will reclose and try again until the retry count is reached.
18	Front Door op: Door close failure timeout	0 - 25.5	14	sec	If the doors do not fully close within this time, they will reopen and try again.
19	Front Door op: Door lock failure timeout	0 - 25.5	3	sec	If the doors close but cannot lock within this time, they will reopen.
20	Front Door op: Flag 1	yes/no	no	yes/no	
21	Front Door op: Open output stays On when door opened	yes/no	no	yes/no	Door open output will be kept always ON while door is opening or opened. WARNING! Some door operators could be damaged if this flag is set.
22	Front Door op: Door close output turns OFF when door closed	yes/no	no	yes/no	Set this flag for door operators that do not run with power. Example - Moline.

Table 5.18 Car Setup, Parameters Screen

23	Front Door op: Door has no Close Limit Switch	yes/no	no	yes/no	Set this flag if the door operator does not have a close limit. The controller uses the door gate contact to detect a closed door.
24	Front Door op: Test jumped gate and locks while closing	yes/no	no	yes/no	When set to Yes, the computer will verify that gate and locks are open when the close limit is made.
25	Door op: Flag 3	yes/no	no	yes/no	
26	Front Door op: Cam drop timeout (0 = no cam)	0 - 25.5	0	sec	If the cam does not drop in this time, an error will be generated. If the door has no cam, set this to zero (0).
27	Front Door op. Hold close and open after limits opened	0 - 25.5	0	sec	Extends operation of open & close relays after limits have been reached. It is used on door operators that have no hysteresis on their limits and also to ensure that the doors will make the gate and locks after the close limit has been reached.
28	Rdoor: Minimum reopen time	0 - 25.5	0.5	sec	After reopening, door will remain open for at least this time while in normal operation.
29	Rdoor: Car call mini-mum time if EE, SE or DCB detected	0 - 25.5	3	sec	Time the door will remain fully opened due to a car call at the floor with no Electric Eye, Safe Edge, or Door Close Button detected. Time cannot be reduced by electric eye or door close button.
30	Rdoor: Car call max time if no EE, SE or DOB detected	0 - 25.5	10	sec	Maximum time doors will remain open due to a car call only with no Electric Eye, Safe Edge, or Door Open Button detected.
31	Rdoor: Hall call mini-mum time	0 - 25.5	5	sec	Minimum time door will remain fully opened when opened for a hall call. Time cannot be reduced by electric eye or door close button.
32	Rdoor: Hall and car call door maximum time	0 - 25.5	10	1sec	Maximum time doors will stay fully opened due to hall or combination hall and car call.
33	Rdoor: Number of door failure cycles before retry wait	0 - 255	5	each	If rear door cannot close, it will retry as many times as set here, after which it will stop for the time set in the retry wait time parameter, then start the cycle again. If set to zero, doors will keep trying indefinitely.
34	Rdoor: Wait time before recycling doors again	0 - 255	60	sec	Time the rear doors will sit idle before retry-ing the last operation.
35	Parameter 35	0 -255	0	each	
36	Rdoor: Preopen rear door in the inner door zone	yes/no	no	yes/no	When this flag is set, the doors will start to open when the slowing car reaches the inner door zone.
37	Rdoor: Rear door hall doors are swing type	yes/no	no	yes/no	Set to Yes if door is swing type with manu-ally operated hall doors.
38	RDoor: Door 1 = Peelle 2 = Peele with OL 3 = Courion	0 - 10	0	each	Sets door and door operator type. 0 = standard (manual or automatic) 1 = Peelle freight doors w/o open limit 2 = Peelle freight doors with open limit 3 = Courion freight doors
39	Parameter 39	0 - 255	0	each	

Table 5.18 Car Setup, Parameters Screen

40	Rdoor: nudging mode 0 = disabled 1 - 5 see manual	0 - 5	0	enum	0=No nudging 1= Buzzer only 2= Buzz + Electric Eye bypass 3= Buzz + EE bypass +SE stops door 4= Buzz + EE bypass +low pressure close 5= Buzz + EE bypass +low pressure close + SE stops Selects one of five nudging operating modes.
41	Rdoor: Time after closing start to begin nudging	0 - 255	20	each	If the car has a direction and the doors cannot close within this time, door will begin nudging operation.
42	Rdoor op: Open time-out time	0 - 25.5	15	sec	If doors cannot open within this time, they will reclose then try again until the retry count is reached.
43	Rdoor op: Close time-out time	0 - 25.5	15	sec	Rear door close T.O. time.
44	Rdoor op: Door lock failure timeout time	0 - 25.5	3	sec	Rear door lock T.O. time.
45	Rdoor op: Flag 1	yes/no	no	yes/no	
46	Rdoor op: Open output stays ON when door opened	yes/no	no	yes/no	The rear door open output will be kept always ON while the door is opening or opened. WARNING! Some door operators could be damaged if this flag is set.
47	Rdoor op: Close output turns OFF when door closes	yes/no	no	yes/no	Set this flag for door operators that do not run with power. Example - Moline.
48	Rdoor op: No close limit	yes/no	no	yes/no	Set to yes if the door operator does not have a close limit. The controller uses the door gate contact to detect a closed door.
49	Rdoor op: Test jumped gate and locks while closing	yes/no	no	yes/no	When set to Yes, computer will verify that gate and locks are open when close limit is made.
50	Rdoor op: Flag 3	yes/no	no	yes/no	
51	Rdoor op: cam drop timeout (0= no cam)	0 - 25.5	0	sec	If the cam does not drop within this time, an error will be generated. If the door has no cam, set this to zero (0).
52	Rdoor op. Hold close and open limits opened	0 - 25.5	0	sec	Extends operation of open and close relays after limits have been reached. Used on door operators that have no hysteresis on their limits and also to ensure that the doors will make the gate and locks after the close limit has been reached.
53	Signals: Advanced position indicator	yes/no	no	yes/no	If set to Yes, position indicator and lantern enable signals are advanced.
54	Signals: Use last two pos outputs as direction arrows	yes/no	no	yes/no	Set to Yes to convert the last two hall position indicator outputs into direction arrows.
55	Signals: Flash PI on nudging or out of service	yes/no	no	yes/no	If set to yes, car PI will flash if the door is on nudging or the car is out of service.
56	Signals: Pulse buzzer when on nudging	yes/no	no	yes/no	Pulse buzzer when on nudging.

Table 5.18 Car Setup, Parameters Screen

57	Signals: Flash and pulse rate on nudging	0 - 25.5	1	sec	Sets rate of PI flashing and buzzer pulse during nudging.
58	Signals: Position indicator timeout time	0 - 255	0	sec	Determines how long the position indicator will remain on after the car stops with no direction and car call priority expired.
59	Signals: Lantern output on/off time interval	0 - 25.5	1	sec	When the lantern executes a double ding, sets the time the lantern will stay ON and the time it will shut OFF before the second ding.
60	Signals: Passing chime ON time interval	0 - 25.5	0.4	sec	Passing chime ON time.
61	Signals: Buzzer also used as passing chime	yes/no	no	yes/no	When set to Yes, pulses buzzer output together with passing chime output. Allows use of only one buzzer for all functions.
62	Passing chime will always operate in automatic service	yes/no	yes	yes/no	When set to Yes, passing chime will always operate in automatic service.
63	Drive: Run timeout time, reset at each floor	5 - 255	20	sec	If the car takes longer than this time to run between two floors, it will stop and generate an error.
64	Drive: Minimum time to wait before re-starting	0 - 25.5	0	sec	Once the drive has stopped, it will not restart until this time has elapsed.
65	Drive: Slowdown timeout time	5 - 255	20	sec	If the car takes more than this time to slow down at a floor, an error will be produced and the car will stop.
66	Drive: Time it takes to fully stop from maximum speed	0 - 25.5	5	sec	Time it takes the car to fully stop if running at top speed under ANY condition (power loss, emergency, safety line, etc.) Prevents the car from re-starting before it is fully stopped.
67	Time to abort releveling if trying up/down for too long	0 - 255	15	sec	If the car does not achieve stable leveled condition within this time (leveled for at least ‘leveled validation time’), abort releveling altogether.
68	Releveling stall timeout time	5 - 255	15	sec	If the car is releveling continuously in one direction for this time, relevel is aborted.
69	A car level for this time is considered level	0 - 25.5	3	sec	If this car is continuously leveled for this time, it is considered leveled OK and the relevel timeout timer is reset.
70	Field: Motor field weakens (timed) when flag is set	yes/no	yes	yes/no	When set, the motor field goes into weakening after the field weaken time has elapsed.
71	Drive: Restart in approach speed	yes/no	yes	yes/no	If the car stops away from a floor, it will restart in approach speed instead of medium speed.
72	Drive: Monitor LU, LD and DZ	yes/no	no	yes/no	When set to Yes, operation of LU, LD, and DZ is monitored for stuck sensors.
73	Drive: Consecutive drive faults count	0 - 255	5	each	If the drive accumulates this number of faults and/or run timeouts, it will set to DRIVE FAULT and will refuse to move. Can only be reset by setting the car to inspection or cycling power.

Table 5.18 Car Setup, Parameters Screen

74	Consecutive drive faults time	0 - 255	120	sec	If this time elapses without any drive faults or timeouts, the consecutive faults counter is reset to zero. The consecutive faults counter is incremented every time a fault or timeout occurs. If too many successive faults occur, the counter will reach the value set in parameter 73 (consecutive faults count) and the car will be shut down.
75	Drive: Number of drive reset attempts before giving up	0 - 255	5	each	Determines number of times the drive will try to reset before giving up.
76	Drive: Time to hold drive run after brake drops (insp)	0 - 25.5	0	sec	Time to hold drive running after brake output is turned off. Applies only to inspection operation.
77	Drive: Time to hold drive run after brake drops (auto)	0 - 25.5	1	sec	Time to hold drive running after brake output is turned off. Applies only to automatic operation.
78	Drive: Time to wait before releveling (relev debounce)	0 - 25.5	0	sec	Car will not attempt to relevel until this time has elapsed. This prevents the rapid switching of relays if the car bounces.
79	Drive: Time reset output ON when drive resets	0 - 25.5	3.5	sec	Drive reset line On time.
80	Drive: Time reset output OFF when drive reset	0 - 25.5	4.0	sec	Drive reset line Off time.
81	Brake: Time to delay the brake lift (auto)	0 - 25.5	0	sec	Time to delay the brake lift.
82	Brake: How long brake lift voltage is applied	0 - 25.5	3.5	sec	Determines how long brake lift voltage will be applied. It must be long enough to allow the brake to lift fully.
83	Brake: Time Brake remains ON after car becomes level (auto)	0 - 25.5	0	sec	Determines how long brake will hold after car reaches full leveled position. Allows car to fully stop motion before setting brake.
84	Brake: Time to delay the brake lift (insp)	0 - 25.5	0	sec	Brake lift delay in Inspection mode.
85	Brake: Time brake remains ON after car stops (insp)	0 - 25.5	0	sec	Brake drop delay in Inspection mode.
86	Brake: Time to delay the brake lift (relevel)	0 - 25.5	0	sec	Brake lift delay when releveling. Allows drive to pre-torque before starting, preventing rollback.
87	Brake: Time Brake remains ON after car becomes level (relevel)	0 - 25.5	0	sec	Determines how long brake will hold after car reaches full leveled position. Allows car to fully stop motion before setting brake.
88	Brake: Brake has contact which opens when brake lifts	yes/no	no	yes/no	Set to Yes if brake has a contact that opens when brake is lifted. If brake does not have this contact, set to NO.
89	Brake: Brake uses BRL output when releveling	yes/no	no	yes/no	Set to 'Yes' if a separate relevel setting is desired. WARNING! If the controller does not have hardware for brake relevel (BRLR relay or electronic brake control) DO NOT set this parameter to Yes. The brake will not pick if this parameter is set to Yes and there is no hardware installed.
90	Brake: Flag 1	yes/no	no	yes/no	

Table 5.18 Car Setup, Parameters Screen

91	Brake: Parameter 1	0 - 255	0	each	
92	Field: Speed at which the motor field weakens	0 -2000	1000	fpm	Speed at which the field weakens.
93	Field: Time before dropping from full to run field	0 - 25.5	2.5	sec	Time to apply full field before dropping to run field strength.
94	Field: Time field is held high after the car stops	0 - 25.5	2.5	sec	Time the field is held high after the car stops.
95	Field: Time to reach full motor field	0 - 25.5	0	sec	Time to reach full motor field.
96	Field: Relays proving delay 0=disabled	0 - 25.5	1	sec	The controller will check if the relays have dropped after the car has stopped completely and this timer expires. RSEQ input should turn ON before this time has elapsed.
97	MG: Time Wye stays ON before run contractor turns ON	0 - 25.5	3.5	sec	Time the start Wye contactor will stay ON before the run contactor turns ON.
98	MG: Time MG stays ON after car stops (Automatic mode)	0 - 255	6	min	Time the MG keeps running even if the car has no direction. A time of zero will keep the MG running indefinitely.
99	MG: Time MG stays ON after car stops (Inspection mode)	0 - 255	6	min	Time the MG will keep running even if the car has no direction. A time of zero will keep the MG running indefinitely.
100	MG: MG (or pump) delay time after stop	0 - 255	2	sec	Time the MG (or pump) will keep running after the car stops. Helps to avoid pump starts when the car stops and then relevels immediately. Do not confuse with the MG shut down time, which is very long. The MG hold time has a maximum time of 25 seconds.
101	MG: Start MG set as soon a a direction is established	yes/no	no	yes/no	Start the MG set as soon as direction is established. If set to No, MG will start when doors are closing with calls away.
102	Pattern: Time delay for pattern start (auto)	0 - 25.5	0	sec	Time to wait before pattern starts building.
103	Pattern: Time delay for pattern start on relevel	0 - 25.5	0	sec	Time to hold the pattern after the direction relays have picked during relevel.
104	Pattern: Speed set to 'leveling' when LU or LD 'on'	yes/no	yes	yes/no	When set to Yes, speed will be set to leveling speed as soon as car reaches the leveling zone.
105	Pattern: Speed set to 'leveling' when ODZ 'on'	yes/no	no	yes/no	When set to Yes, speed set to leveling speed when reaching outer door zone.
106	Pattern: Time delay for pattern start on inspection	0 - 25.5	0	sec	Pattern start delay on inspection.
107	Drive: High speed	yes/no	no	yes/no	Set to high speed (YES).
108	Fire: Main recall floor	1 - 32	2	floor	Fire Phase 1 recall floor.
109	Fire: Alternate recall floor	1 - 32	3	floor	Fire Phase 1 alternate recall floor.
110	Fire: Smoke detectors are reset by lobby recall switch	yes/no	no	yes/no	When set to Yes, smoke detectors set to latch (parameter 117 Yes) will clear when the lobby recall switch is operated.

Table 5.18 Car Setup, Parameters Screen

111	Fire: Constant pressure on DOB to open doors	yes/no	yes	yes/no	If set to Yes, doors will open with constant pressure on DOB button. If released before doors are fully open, doors will reclose.
112	Fire: Constant pressure on DCB to close doors	yes/no	no	yes/no	If set to Yes, doors will close with constant pressure on DCB button. If released before doors are fully closed, doors will reopen.
113	Fire: Allow recall while in att or ind operation	yes/no	yes	yes/no	If set to Yes, the car will auto recall while in attendant or independent mode.
114	Fire: Recall wait time if car on att. or ind.	0 - 25.5	25	sec	When fire recall is activated when car is in attendant or independent, car will wait for time set here before initiating recall. Interacts with Parameter 113.
115	Fire: Close doors with nudging speed during fire recall	yes/no	no	yes/no	If set to Yes, doors will close at nudging speed during fire recall.
116	Fire: Has remote fire recall switch	yes/no	no	yes/no	Set to yes to enable the input for a remote fire switch.
117	Fire: Lobby bypass switch resets ALL smoke detector	yes/no	yes	yes/no	Causes smoke detectors to reset, or be reset and bypassed, when lobby switch is set to bypass position. Bypass/reset = A17.1, 1996. Reset = A17.1, 2000. If there is no bypass or reset switch in the lobby (NYC), set to No.
118	Fire: Allow fire phase2 when recalled by MR smoke detector	yes/no	no	yes/no	When set to Yes, car recalled by machine room or hoistway smoke detector will be allowed to initiate Fire Phase 2 operation.
119	Fire: Allow Phase 2 change without open doors	yes/no	no	yes/no	When set to Yes, car can leave Fire Phase 2 or change in and out of Fire Hold without the doors having to be fully open.
120	Fire: Operation flags	0 - 255	0	each	0= A17.1, 1996 or NYC RS18 1= ANSI 2000 fire code: Car fire bypass input operation becomes fire-reset operation as defined in this code. 2= Complete recall before reverting to normal service 4= Lobby smoke detector overrides other smoke detectors. 8= Ignore gate and locks jumped. 16= Once the car is returned to the designated level from the alternate level using the Phase 1 switch(es), the designated level will remain the recall level thereafter, even after the Phase 1 switch is returned to the OFF position (A17.1a-2005 / B44-04U1). 32= Car goes on door nudging without a call demand. (B44 for buildings without fire sensors under NBCC). 64= Ignore gate and locks jumped on fire Phase 2 only. To set multiple flags, determine and set their combined value (i.e., 2 and 8, set to 10).
121	Fire: Open rear door when at recall floor	yes/no	no	yes/no	If set to Yes, open rear instead of front door at fire Phase I recall floor. If set to no, front door will open.

Table 5.18 Car Setup, Parameters Screen

122	Fire: Open the rear door when at alt. recall floor	yes/no	no	yes/no	If set to Yes, open rear instead of front door at fire Phase I alternate recall floor. If set to no, front door will open.
123	Independent: Electric eye will reopen doors	yes/no	no	yes/no	If set to Yes, electric eye will reopen doors on independent operation.
124	Independent: Allow doors to close with no calls registered	yes/no	no	yes/no	If Yes, allow doors to close when no calls registered. If OFF, doors will not close if there are no car calls registered.
125	Enable gate and locks bypass switches	yes/no	no	yes/no	When set to yes, gate and lock bypass switches on RB board will be operational.
126	Rope gripper 0=none 1=GAL	0 - 2	0	each	No rope gripper -> 0 GAL rope gripper -> 1 When set, the 110% overspeed input is activated. If not connected to the governor, must be wired to +110VDC. Changing this parameter requires a controller powerdown afterwards.
127	Insp: Open door if level at a floor and on IN CAR insp	yes/no	no	yes/no	If set to Yes, and on in-car inspection, doors will open automatically if car is leveled at a floor.
128	Insp: Enable contr. Insp. With bypass switches	yes/no	no	yes/no	Allow construction Inspection with bypass switches.
129	Insp: Disable top of car inspection switch	yes/no	no	yes/no	If set to Yes, controller ignores top of car inspection input. Set to Yes if car does not have top of car inspection switch.
130	Insp: Disable in-car inspection switch	yes/no	yes	yes/no	If set to Yes, controller ignores IN CAR inspection switch input, disabling in-car inspection operation.
131	Normal: Independent riser mode (1 to 3) 0=off	0 - 3	1	each	Independent riser behaves as follows: 0 Disabled, will not accept calls 1 Normal, will work only on SIMPLEX 2 Concurrent, will work together with group calls 3 Automatic, car will switch to independent riser and out of group if any calls are made on the independent riser.
132	Inspection: High inspection speed	yes/no	no	yes/no	Set both APP and LEV outputs when moving, this allows inspection speed and approach speed to be set separately with certain drives (Mitsubishi VVVF).
133	Car switch: Enable car switch operation	yes/no	no	yes/no	Set to yes for car switch (attendant) operation.
134	Normal: Pulse buzzer with car call registered	yes/no	no	yes/no	If set to Yes, buzzer will sound briefly when a car call is registered.
135	Normal: Hold car last direction when stopping	yes/no	no	yes/no	If set to Yes, when stopping at a floor, the car will establish direction from a hall call or will keep the last direction. It will always light the proper lantern.
136	Normal: Disable doors reopening with calls at the floor	yes/no	no	yes/no	If set to Yes, closed doors will not reopen due to a hall call.
137	Normal: Car has a local hall call riser	yes/no	no	yes/no	Set to Yes if the car has a local riser.

Table 5.18 Car Setup, Parameters Screen

138	Normal: Car is part of a group	yes/no	no	yes/no	Set to Yes if the car belongs to a group.
139	Normal: Out of service timeout time	0 - 255	90	sec	If the car has calls away but cannot move from the floor, it will be taken out of service when this time expires. If the time is set to zero, the car will never go out of service.
140	Normal: Between floors delay to start	0 - 255	15	sec	Time to wait before starting to move while stopped between floors.
141	Parking: Parking floor 0=no parking	0 - 32	0	floor	Set to desired parking floor for this car. 0=no parking
142	Parking: Delay before moving car to parking floor	0 - 255	60	sec	Time to wait before moving an idle car to a parking floor.
143	Parking: Open door once 0=no 1=front 2=rear 3=both	0 - 3	0	each	Once parked, the car will cycle the selected door(s) one time.
144	Parking: Hold door open 0=no 1=front 2=rear 3=both	0 - 3	0	each	Once parked, the car will open and hold open the selected door.
145	Normal: Reverse direction without closing doors	yes/no	no		If no calls away and hall call in the opposite direction, reverse direction without closing doors.
146	Normal: Car calls are dropped on direction reversals	yes/no	no	yes/no	Calls behind the car are dropped when the car reaches the last call in the current direction. This is an anti-nuisance feature.
147	Normal: Anti-nuisance count	0 - 32	0	each	If car calls in excess of this number are registered without the electric eye verifying passenger entries, the calls will be cancelled. 0 = feature disabled.
148	Disable access inspection switch.	0 - 255	1	each	0 = Enable 1 = Disable 2 = Bottom rear 3 = Top rear
149	Parameter 149		0	each	
150	Encoder: Medium speed look ahead distance	0 - 120	0	each	Reserved. Not currently used.
151	Encoder: High speed look ahead distance	0 - 250	0	each	Reserved. Not currently used.
152	Encoder: Medium speed slowdown distance	24-1000	48	each	Reserved. Not currently used.
153	Encoder: High speed slowdown distance	0 - 72	1200	each	Reserved. Not currently used.
154	Encoder: Disable auto reset	yes/no	no	yes/no	Reserved. Not currently used.
155	Emerg. Power: Enable emergency power operation	yes/no	no	yes/no	Set to yes if emergency power operation is allowed for this car.
156	Emerg. Power: Recall cars on Indep. Or Attendant	yes/no	no	yes/no	When set to Yes, Emergency Power Recall recalls cars on Independent or Attendant operating modes.

Table 5.18 Car Setup, Parameters Screen

157	Lobby return: Return floor	0 - 32	0	floor	Determines lobby return floor. A zero will disable lobby return feature.
158	Lobby return: Drop car calls immediately	yes/no	no	yes/no	When set, activation of the lobby return switch will immediately drop all registered car calls.
159	Lobby return: Open door once 0=no 1-front 2=rear 3=both	0 - 3	0	each	When the car is returned to the lobby recall floor, cycle the selected door(s) one time.
160	Lobby ret: Hold doors open 0=no 1=front 2=rear 3=both	0 - 3	0	each	When the car is returned to the lobby recall floor, open and hold open the selected door(s).
161	Service: set mode 0=none (normal op) 1=IND 2=DD 3=FR	0 - 3	0	each	Set car to one of the following services. 0=Normal operation 1=Independent 2=Door disconnect 3=Fire recall
162	Enable redundant inspection check	yes/no	no	yes/no	When set to yes, the inputs for car top and in-car inspection are duplicated.
163	Disable lockouts on independent and atten-dant	yes/no	no	yes/no	When set to Yes, car call lockouts (restricted calls) are ignored if the car is on Indepen-dent or Attendant operation.
164	Hydro: Relevel only if out of door zone	yes/no	no	yes/no	When set to Yes, and a car has the doors closed, it will initiate a relevel only if it drifts beyond the door zone. This is designed to reduce the number of relevels the car will make when at rest for a long period.
165	Normal: Non-directional hall calls	yes/no	no	yes/no	Setting to yes makes hall calls non-direc-tional. The car will stop for either up or down hall calls on arriving at the floor from either direction and will cancel both once it stops. When this parameter is set to Yes, there is no need to define both an up and a down button per floor because both up and down buttons will operate identically. To save inputs, only one button per floor may be set in the floor table.
166	Fire: service from local hall board	yes/no	no	yes/no	When set to yes, the car will read the fire inputs from its own hall board instead of the group dispatcher. If the car is simplex, this flag has no effect.
167	Set to yes to reset fire, low oil, etc.	yes/no	yes	yes/no	When set to yes, the car will reset its mem-orized fire state, position, low oil condition, etc. After reset, the parameter will automat-ically reset to no.

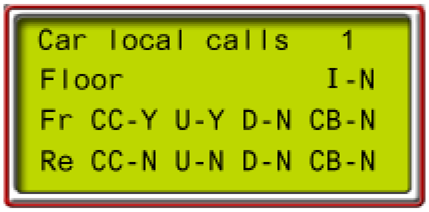
Table 5.18 Car Setup, Parameters Screen

168	Seismic flags. Add the numbers of those conditions you want to set and enter that number. Example: Enable the first two conditions by adding 1 + 2 = 3, and entering the value 3.	0 - 255	0	each	1 = Enable seismic operation 2 = Do not allow reduced speed run with counterweight displacement switch on. 4 = Allow fire phase 1 reduced speed run when counterweight displacement switch on. 8 = Allow fire phase 1 reduced speed run when counterweight displacement switch on but fire recall floor is above the counterweight position.
169	Parameter 169	0 - 255	0	each	
170	Parameter 170	0 - 255	0	each	
171	Parameter 171	0 - 255	0	each	

Floor Table

The floor table setup screen describes the building to the car controller. As delivered, it can handle 32 front and 32 rear floors, front and or rear doors, etc. The floor table describes to the software how the building is distributed.

Figure 5.4 Floor Table Screen



Note

When the screen is selected from the menu, the first floor is displayed. However, the first car floor may not be the cars bottom floor since, in a group, not all cars may go to the bottom floor.

Table 5.19 Parameter Examples, Floor Table

Editable Fields	Explanation	Value
Floor Number	Floor Number (See note above)	1 - 32
Floor Designation	Use keypad to enter a name up to five characters. The characters can be letters, digits or punctuation marks.	
I	Imaginary stop - The car will count this floor but it has no opening here. Used mainly for blind hatches and to synchronize position indicators.	Yes / No
Front CC	Front - Car Calls (For local & group)	Yes / No
Front U	Front - Up Hall Call (Local hall calls per floor, simplex, independent riser)	Yes / No
Front D	Front - Down Hall Call (Local hall calls per floor, simplex, independent riser)	Yes / No
Front CB	Front - Code Blue (Simplex, IR)	Yes / No
Rear CC	Rear - Car Call (For local & group)	Yes / No
Rear U	Rear - Up Hall Call (Local hall calls per floor, simplex, independent riser)	Yes / No
Rear D	Rear - Down Hall Call (Local hall calls per floor, simplex, independent riser)	Yes / No
Rear CB	Rear - Code Blue (Simplex, IR)	Yes / No

To view all the floors use the:

- 2 or up arrow key to move backwards one (1) floor
- 8 or down arrow key to move forward one (1) floor

To edit a floor:

- Press the # key when you are on the desired floor. You will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Press the right or left arrow keys to move between characters in a multi-character field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Press the # key to accept. You will move to the next field. If you are on the last field, you will move back to a view screen.
- Press the * key to abort change and move back to a view screen.
- To return to the Floor Table menu (must be at a view screen), use the * key.

Note

The car will reject up calls at the top floor and down calls at the bottom floor. Therefore, if you are adding floors, add the top and the bottom floor first. Then, add all the intermediate floors.

Floor Table Special Conditions

- Empty Floors: If a floor table entry has all flags off (a No entered under each variable), that floor becomes an empty floor. The car will not stop at this floor. It will not change the position indicator or light the lanterns. The car position indicator will skip this floor. The floor will not exist as far as the car is concerned.
- Setting Openings (Rear Doors): All existing openings must be set in the floor table. The setting of at least one rear opening in the floor table will activate the rear door control software. If a rear door opening is set by mistake in a car that does not have rear openings, the rear door opening should be cleared and then the car should be reset (by switching off power). This will disable the rear door control software.
- Setting Hall Calls: If the car is a group car with no local hall riser, no hall calls need be set in the floor table. If the car does have a conspicuous riser (simplex riser), then the hall calls for that riser should be set. If a hall call is not set in the floor table, its corresponding input will not be allocated.
- Imaginary floors: An imaginary floor is a floor that has no openings and where the car does not stop but that has a position in the position indicator. It could be described as a chalk mark in the elevator hatch. The slowdown vanes or magnets for this floor must be installed like any other floor but no leveling vane or magnet is needed since the car will not stop at this floor.
- Group Considerations: All cars in a group should know a particular floor by its floor name (1 to 8). Some cars in a group may not serve all floors, in this case, floors not served by those cars should be designated as empty floors for them.

Group Assignments -View & Edit Screen

Figure 5.5 Car Group Assignments Screen

```
Car group calls    1
Floor
Front HU-N HD-N CB-N
Rear  HU-N HD-N CB-N
```

Note

When the screen is selected from the menu, the first floor is displayed. However, the first car floor may not be the cars bottom floor since, in a group, not all cars may go to the bottom floor.

Table 5.20 Group Dispatcher Parameters Only

Editable Fields	Explanation	Value
Floor Number	Floor Number (See note above)	1 - 32
Floor Designation	Use keypad to enter a name up to five characters. The characters can be letters, digits or punctuation marks.	
Front HU	Car has front door up hall call at this floor	Yes / No
Front HD	Car has front door down hall call at this floor	Yes / No
Front CB	Car has front door Code Blue at this floor (from dispatcher)	Yes / No
Rear HU	Car has rear door up hall call at this floor	Yes / No
Rear HD	Car has rear door down hall call at this floor	Yes / No
Rear CB	Car has rear door Code Blue at this floor (from dispatcher)	Yes / No

To view all the floors use the:

- 2 or up arrow key to move backwards one (1) floor
- 8 or down arrow key to move forward one (1) floor

To edit a floor:

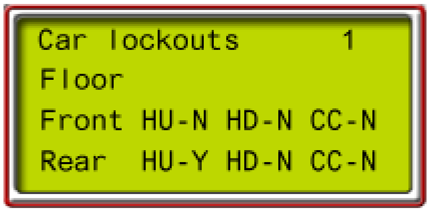
- Press the # key when you are on the desired floor. You will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Press the # key to accept. (You will move to the next field. If you are on the last field, you will move back to a view screen.)
- Press the * key to abort change. (You will move back to a view screen.)
- To return to the Floor Table menu (must be at a view screen), use the * key.

Note

The car will reject up calls at the top floor and down calls at the bottom floor. Therefore, if you are adding floors, add the top and the bottom floor first. Then, add all the intermediate floors.

Car Soft Lockouts -View & Edit Screen

Figure 5.6 Car Soft Lockouts Screen



Note

When the screen is selected from the menu, the first floor is displayed. However, the first car floor may not be the cars bottom floor since, in a group, not all cars may go to the bottom floor.

Table 5.21 Simplex and Group Dispatcher Parameters

Editable Fields	Explanation	Value
Floor Number	Floor Number (See note above)	1 - 32
Floor Designation	Use keypad to enter a name up to five characters. The characters can be letters, digits or punctuation marks.	
Front HU	Car has front door up hall call lockouts at this floor	Yes - Lockout / No - Nothing Out
Front HD	Car has front door down hall call lockouts at this floor	Yes / No
Front CC	Front - Car Call lockouts	Yes / No
Rear HU	Car has rear door up hall call lockouts at this floor	Yes / No
Rear HD	Car has rear door down hall call lockouts at this floor	Yes / No
Rear CC	Rear - Car Call lockouts	Yes / No

To view all the floors use the:

- 2 or up arrow key to move backwards one (1) floor
- 8 or down arrow key to move forward one (1) floor

To edit a floor:

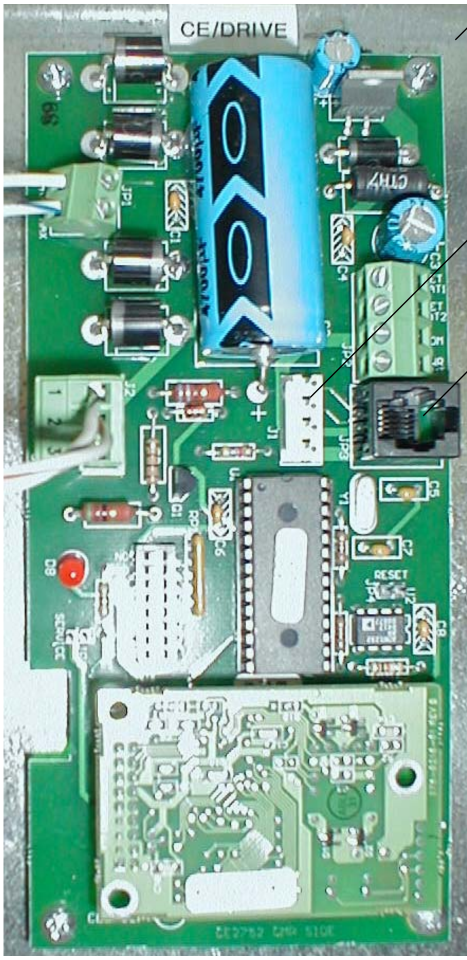
- Press the # key when you are on the desired floor. You will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Press the # key to accept. (You will move to the next field. If you are on the last field, you will move back to a view screen.)
- Press the * key to abort change. (You will move back to a view screen.)
- To return to the Floor Table menu (must be at a view screen), use the * key.

Note

The car will reject up calls at the top floor and down calls at the bottom floor. Therefore, if you are adding floors, add the top and the bottom floor first. Then, add all the intermediate floors.

CE Indicator Set Up -View & Edit Screen

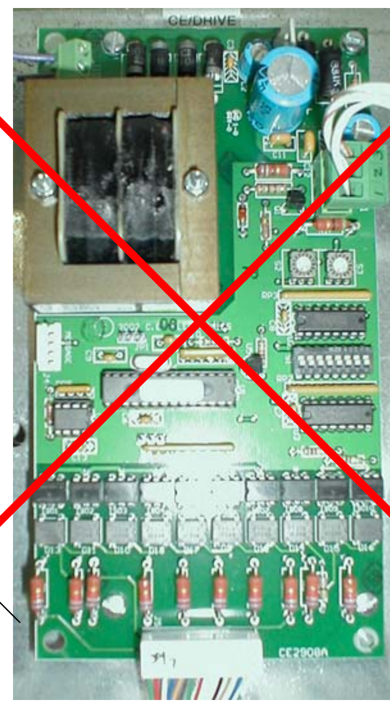
This setup menu is used to program the “heavy duty” CE fixture driver board that has an Echelon (LON) networking chip and is directly connected to the Tricon serial network. This configuration is typically used when more than four CE fixtures are being driven.



Heavy Duty CE Driver Board

Connection to Tricon serial network

HHU programming jack



Light Duty CE Driver Board
Please refer to “Position Indicators-View & Edit Screens (CTOP, CSTA, or HALL Board)” on page 5-57 if your system uses the CE “light duty”

Note

Each system is factory-configured according to particular job requirements before shipment. Typically, you will **not** need to program position indicator outputs but will only need to connect them as shown in the prints for the particular job.

Note

When the screen is selected from the menu, the first floor is displayed. However, the first car floor may not be the cars bottom floor since in a group, not all cars may go to the bottom floor.

Figure 5.7 CE Indicator Screen

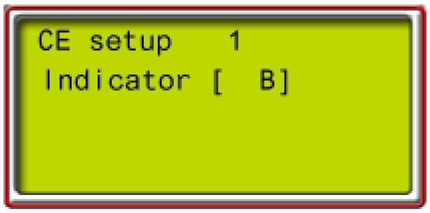


Table 5.22 CE Indicator Set Up Parameters

Editable v	Explanation	Value
Floor Number	Floor Number (See note above)	1 - 32
Indicator	Key in what is to be displayed. Use # key to start entry.	Use keypad to enter a name up to five characters. The characters can be letters, digits, or punctuation marks.

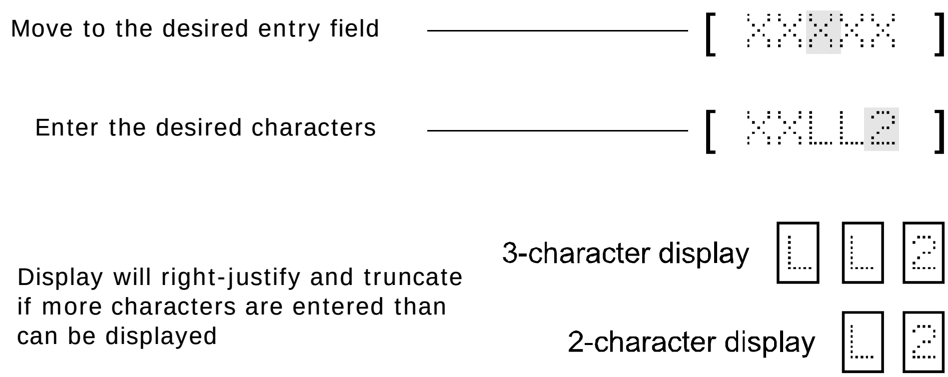
The Hand Held Unit lists floors in groups of three (upper right hand corner of display). Use the up/down arrow keys (or 2 or 8 keys) to move the cursor to the floor you want to set up.

To select a floor to view:

- 2 or up arrow key to move backwards one (1) floor
- 8 or down arrow key to move forward one (1) floor

To edit the selected floor:

- Press the # key when the cursor is on the desired floor.
- Keep pressing the # key until you reach the desired field.
- Use the left and right arrow keys to move in multi-character fields.



- Enter the value using the numeric keypad or the Yes / No keys to scroll through other character selections.
- Press the # key to accept. (You will move to the next field. If you are on the last field, you will move back to a view screen.)
- Press the * key to abort change. (You will move back to a view screen.)

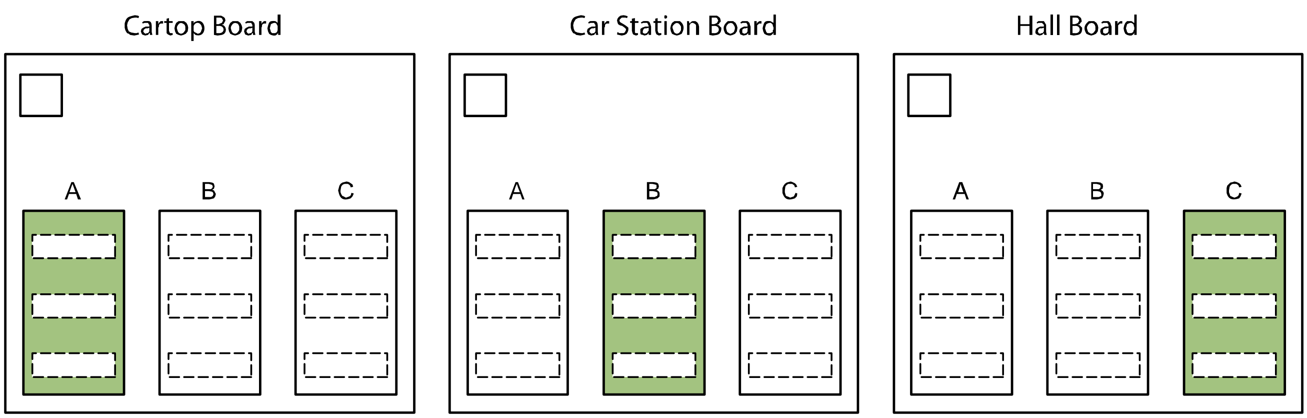
Position Indicators- View & Edit Screens (CTOP, CSTA, or HALL Board)

O-type Terminal boards, mounted in specific locations on Cartop, Car station, or Hall (I/O 24) boards may be used to drive position indicators directly or to control a “light duty” CE fixture driver board. If your PI needs are limited, this may provide an economical display solution. The Position Indicators menu allows you to set up from one to three of the O-type Terminal boards to directly drive indicators or to set up one O-type Terminal board to drive a light duty CE fixture board that, in turn, controls the indicators.

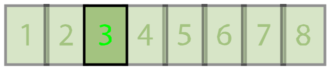
Note

Each system is factory-configured according to particular job requirements before shipment. Typically, you will **not** need to program position indicator outputs but will only need to connect them as shown in the prints for the particular job.

Figure 5.8 Terminal Board Locations on CTOP, CSTA, or HALL Boards

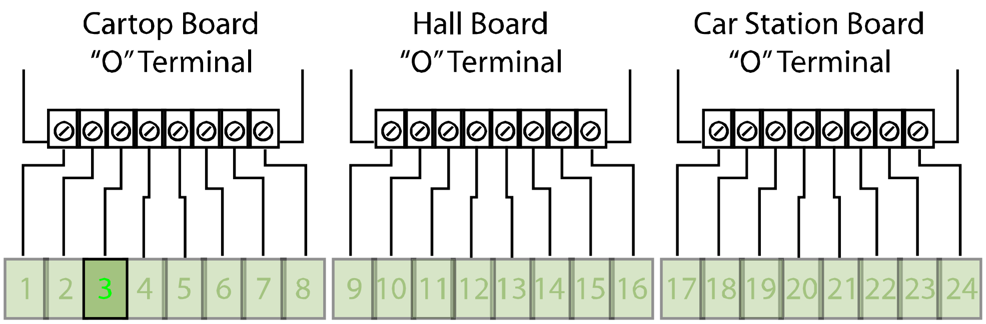


- Please refer to “PI Driven Directly from O-type Terminals” on page 5-58 if you are driving PI indicators directly from O-type Terminal boards.
- Please refer to “Light Duty CE Fixture Drivers” on page 5-60 if you are driving a light duty CE driver board from an O-type Terminal board.

PI Driven Directly from O-type Terminals The O-type Terminal boards may be used to drive PI displays directly. Each O-type Terminal board has eight outputs. When used to drive indicators directly, each output is typically used to light a position in a "strip" or multi-light display. 

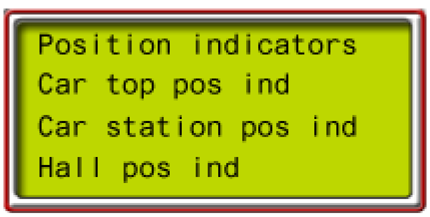
The illustration below shows a typical output progression for up to 24 indicators.

Figure 5.9 PI Driven Directly from "O" Terminal Boards (CTOP, HALL, and CSTA)

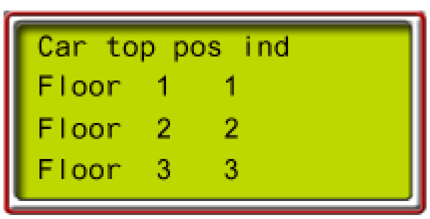


To program O-type Terminal boards to directly drive indicators:

- From the Position Indicators menu, select the Cartop, Hall, or Car Station board.



- From the selected board menu, select the floor to be programmed.

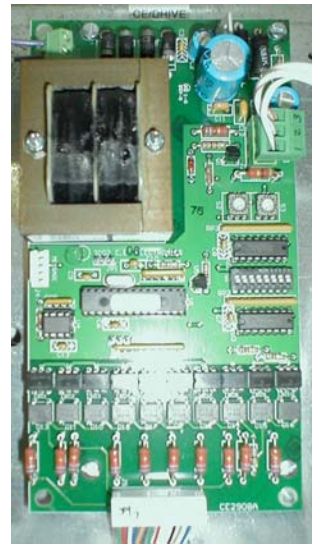


Floors are typically programmed according to the following table.

Table 5.23 PI Programming Using One Output per Lamp/Floor

Car top board		Hall board		Car station board	
Floor	Entry	Floor	Entry	Floor	Entry
1	1	9	1	17	1
2	2	10	2	18	2
3	4	11	4	19	4
4	8	12	8	20	8
5	16	13	16	21	16
6	32	14	32	22	32
7	64	15	64	23	64
8	128	16	128	24	128
9-32	0	1-8,17-32	0	1-8, 9-16	0

Light Duty CE Fixture Drivers The "light duty" CE driver board may be used to drive up to three CE digital position indicators. In this configuration, the outputs of an O-type Terminal board (on the **Hall board for Simplex** cars or on the **Car Top board for Group** cars) are used to control the CE driver board. The CE driver board in turn drives a three-wire serial bus supporting up to three CE digital position indicators.



Light duty CE driver board inputs driven by Hall or Car Top board, O-type Terminal board outputs.

To program O-type Terminal boards to directly drive indicators:

- From the Position Indicators menu, select the Hall or Cartop Station board as appropriate.
- From the selected board menu, select the floor to be programmed.

Position Indicators	
Car top ind	
Car station ind	
Hall pos ind	

Car top position ind	
Floor 1	
Floor 2	
Floor 3	

Floors are typically programmed according to the following table.

Table 5.24 PI Programming Using CE Light Duty Driver

Car top or Hall board					
Floor	**Entry**	**Other Characters**	**Entry**	**Other Characters**	**Entry**
1 - 32	1 - 32	Blank	0	XX	46
		B	33	LL	47
		B1	34	L1	48
		B2	35	L2	49
		B3	36	G	50
		L	37	GR	51
		PH	38	R	52
		M	39	SB	53
		P1	40	GF	54
		P2	41	P3	55
		C	42	1R	56
		MZ	43	G1	57
		X	44	G2	58
		EX	45	G3	59

PI Board Setup - View & Edit

This menu allows you to program PI boards. PI boards allow flexible, programmable enabling of up to 24 outputs (three groups of 8-outputs each) on a per-floor basis. Typically, one group of outputs is used to drive hall-mounted position indicators while the two remaining groups are used to drive directional arrows and hall lanterns or gongs.

PI boards are I/O 24 boards with special position indicator software and up to three O-type Terminal boards. Terminal boards may be programmed so that each activates a single output per floor (output-per-floor/lamp) or so that each activates a combination of its outputs per floor (digital indicators). If required, multiple PI boards can be used on the car network. Each PI board stores its own configuration information.

Note

Each system is factory-configured according to particular job requirements before shipment. Typically, you will **not** need to program position indicator outputs but will only need to connect them as shown in the prints for the particular job.

Note

When configuring a PI board, the serial communication to any other PI board on the system **MUST be disconnected**. If this is not done, information on the other boards will be corrupted. To disconnect boards not to be programmed, unplug the communication connector from the PI boards that you are not configuring.

The PI Board Setup menu consists of three (3) sub menus:

- Floor Setup: There is a Floor Setup menu for each floor served by the car. You scroll through the floors to the floor you want to program, select it, then set up position indicator outputs and make settings that tell the controller if there are lanterns/gongs associated with the opening. If lantern/gong outputs are indicated, they are automatically assigned to outputs not used for position indicators or directional arrows.
- Indicator Parameters: Per floor, this menu allows you to set up blink times for the position indicator outputs if desired and also to make a setting that tells the controller if directional arrows are associated with the opening. If so, two directional arrow outputs are automatically assigned to outputs not used for position indicators.
- Lantern Parameters: Per floor, this menu allows you to set up blink/sound times for hall lanterns and/or gongs.

To move between the sub-menus use:

- 4 or left arrow key to move left
- 6 or right arrow key to move right

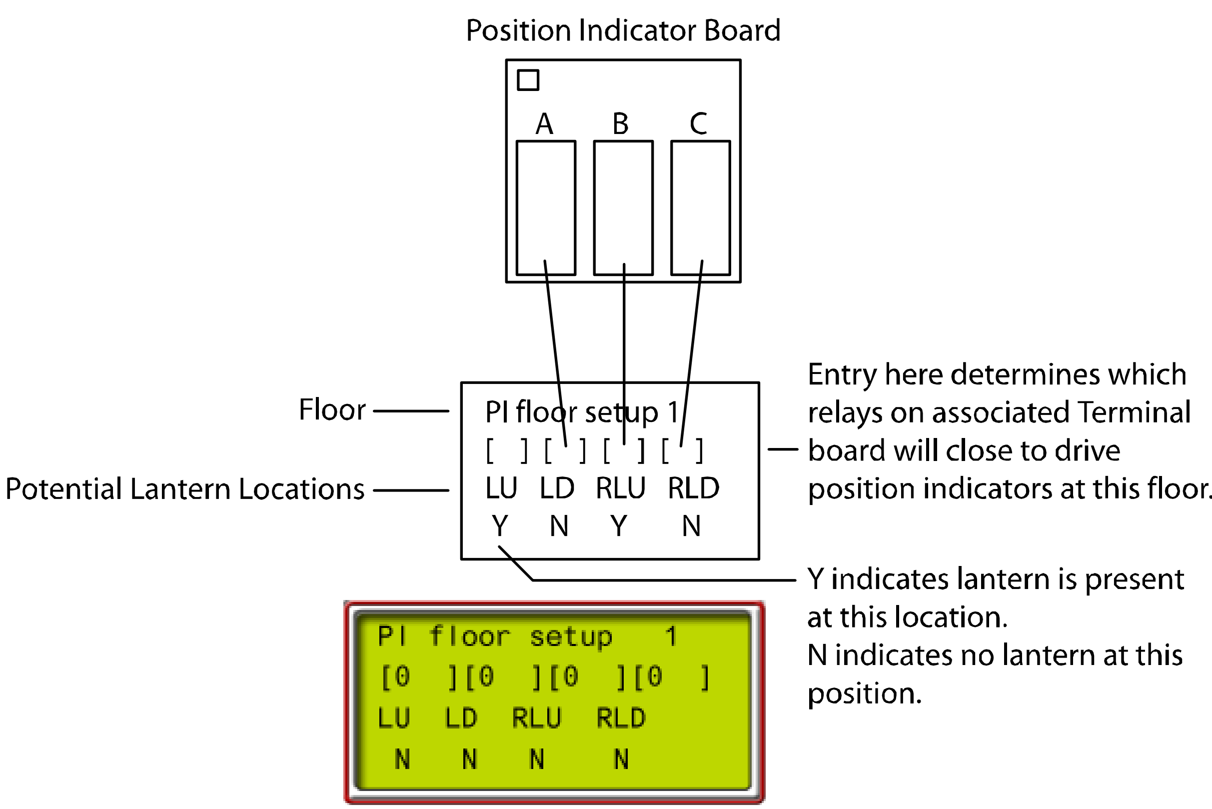
To move into the sub-menu use:

- 8 or # key to move into sub-menu (making it the current menu)
- To return to the previous menu use the * key

Floor Setup This Floor Setup screen has fields to enter values for position indicator outputs and to indicate whether or not there are hall lanterns associated with an opening.

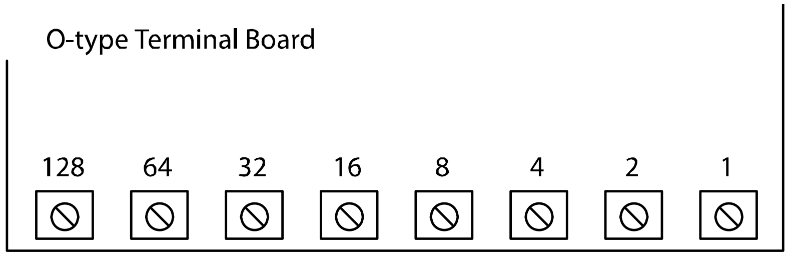
- To move into the Floor Setup screen use the 8 or # key
- To return to the previous menu use the * key

Figure 5.10 PI Board Setup, Floor Setup Menu



- LU: Front opening, Up lantern.
- LD: Front opening, Down lantern.
- RLU: Rear opening, Up lantern.
- RLD: Rear opening, Down lantern.

- If a value is entered in a PI entry field, the associated board is used to drive position indicator outputs at this floor. The value entered determines which relay or relays in the group will be enabled.



If the value associated with an output is entered, ONLY that output will be active.

If any other value from 1 to 255 is entered, outputs that together add up to that value will be active. For example: an entry of 27 would enable outputs 16, 8, 2, and 1.

- If a hall lantern/gong is indicated at a location, an output is assigned to it by software. (Next available output not used by position indicator or directional arrow.)
- The three (3) groups of eight (8) outputs of the position indicators can be programmed to any output combination at any floor.
- If you are enabling only a single position indicator output in each group (output-per-lamp/floor), and you have more than eight floors, you may program a second group to drive position indicators for the next eight floors. If this is the case, set one position indicator group for floors 1 to 8 and the other position indicator group for floors 9 to 16.

To **select** the desired floor:

- 2 or up arrow key to move up one floor
- 8 or down arrow key to move down one floor

To **edit** a floor:

- Press the # key when you are on the desired floor. You will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Press the # key to accept. (You will move to the next field. If you are on the last field, you will move back to the Floor Setup screen.)
- Press the * key to abort change. (You will be back to the Floor Setup screen.)
- To return to the PI Board setup menu, use the * key.

Note

Yes/No keys: If you are using an output group to drive a light duty CE driver board that in turn drives CE digital indicators, special characters may be displayed by entering a value larger than 32. Please refer to “PI Programming Using CE Light Duty Driver” on page 5-60.

Example 1 : Single output per floor/lamp

- Set up for 9th floor PI Board position indicator and lantern and gong (not activated):

PI Floor setup 9 [ ] [ ] [1] [ ] LU LD RLU RLD N Y N N	Ten (10) floor building: No hall lanterns and gongs. Enables #1 output of group in position "B." (Single output per floor)

Example 2 : Multiple closures used to drive light duty CE board

Set up for 4th floor PI Board position indicator and lantern and gong:

PI Floor setup 4 [ ] [ ] [ ] [4] LU LD RLU RLD N Y N Y	Four (4) floor building -With hall lanterns and gongs for front and rear door (Binary outputs)

Note

If configured:
Lantern outputs will map themselves in this sequence -
The first output will start at the bottom floor,
-front door up lantern,
-front door down lantern,
-rear door up lantern,
-rear door down lantern

Lanterns will map themselves in the next available output after position indicators and direction arrows. (Direction arrows are configured in the Indicator Parameters submenu.

Indicator Parameters This screen contains fields to modify indicator behavior.

- To move into the Indicator Parameters screen use: 8 or # key.
- To return to the previous menu use: * key.
- To **edit** a field: keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Use the # key to accept. (You will move to the next field. If you are on the last field, you will move back to the Indicator Parameters screen.)
- Use the * key to abort change. (You will move back to the Indicator Parameters screen.)

Table 5.25 Indicator Parameters Edit Screen

Editable Field	Description	Value
Blink ON time	This sets the time the lights will stay ON when position indicator blinks	1/100 seconds
Blink OFF time	This sets the time the lights will stay OFF when position indicator blinks	1/100 seconds
Sleep time	If there is no position and/or direction change for longer than the time set in this field, the position indicator will shut off. Setting this time to zero will turn the indicators ON indefinitely.	1/100 seconds
Has dir arrows	If set to YES, two outputs will be allocated for direction arrows.	Yes / No

- To return to the PI Board setup menu use the * key.

Lantern Parameters This screen contains several parameters related to the hall lanterns.

- To move into the Lantern Parameters screen use: 8 or # key.
- To return to the previous menu use: * key.
- To **edit** a field: Keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad.
- Use the # key to accept. (You will move to the next field. If you are on the last field, you will move back to the Lantern Parameters screen.)
- Use the * key to abort change. (You will move back to the Lantern Parameters screen.)
- To return to the PI Board setup menu, use the * key.

Table 5.26 Indicator Parameters Edit Screen

Editable Field	Description	Value
Blink ON time	This sets the time the lantern will stay ON for the first blink of the down direction. If set zero, there will be no double-ding for the down direction.	
Blink OFF time	This sets the time the lantern will stay OFF after the first ding of the down direction double-ding.	
Wait time	This sets the time the lantern will stay OFF if switching from Up to Down or vice-versa.	

BMS Setup

Figure 5.11 Car BMS Setup Screen

The BMS board provides a modem control interface between the Tricon controller and a remote monitoring system. (Grayed areas apply only to group/dispatcher application.)

Table 5.27 BMS Screen Parameters

Version 6.2	HHU Display	Value Range	Default Value	Units	Help
1	Job identification name (8 characters)				
2	Phone number 1				Enter the primary dial out phone number.
3	Phone number 2				Enter the secondary dial out phone number.
4	Call time 1 start hour (24=off)	0 - 24	23	hours	Enter the time at which the primary dial out phone should be dialed. 0=midnight. 23=11pm.
5	Call time 1 end hour	0 - 24	23	hours	Enter the time at which the primary dial out phone should be hung up. 0=midnight. 23=11pm.
6	Call time 2 start hour (24=off)	0 - 24	23	hours	Enter the time at which the secondary dial out phone should be dialed. 0=midnight. 23=11pm.
7	Call time 2 end hour	0 - 24	23	hours	Enter the time at which the secondary dial out phone should be hung up. 0=midnight. 23=11pm.
8	Number of cars in group	1 - 6	2	each	Enter the number of cars in this group (1).
9	Number of floors	2 - 32	2	floor	Enter the number of floors served by this car.
10	Car 1 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
11	Car 2 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
12	Car 3 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
13	Car 4 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
14	Car 5 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
15	Car 6 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.

Table 5.27 BMS Screen Parameters

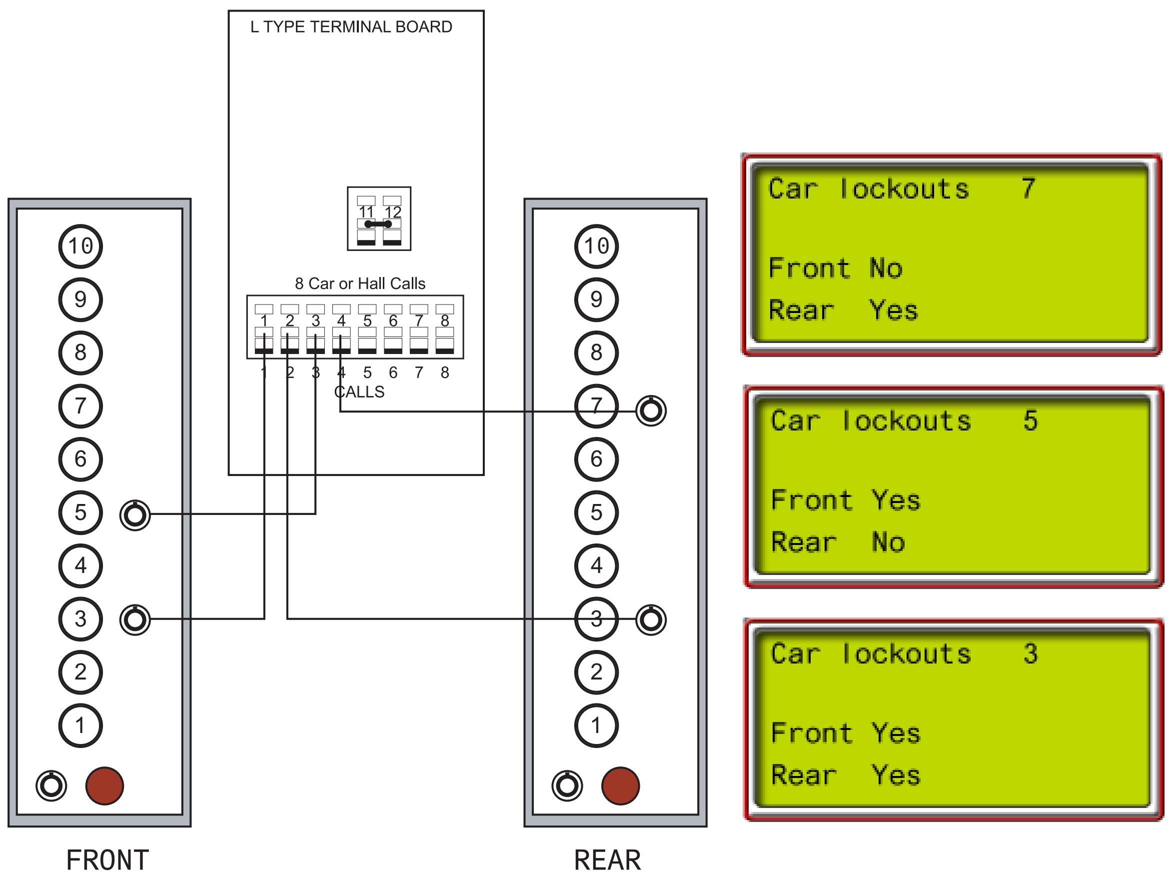
16	Car 1 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
17	Car 2 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
18	Car 3 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
19	Car 4 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
20	Car 5 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
21	Car 6 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
22	Car 1 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
23	Car 2 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
24	Car 3 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
25	Car 4 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
26	Car 5 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
27	Car 6 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
28	Modem initialization string 1				Enter the initialization string for the modem used for the primary dial out line. (See modem documentation.)
29	Modem initialization string 2				Enter the initialization string for the modem used for the secondary dial out line. (See modem documentation.)

Car Lockout Setup

Car lockouts prevent a car from being sent to a particular floor using front and/or rear car panel buttons unless a key switch authorizing that access is also enabled. Car lockouts are implemented in hardware through a CCL (Car call lockout) I/O 24 board typically mounted in the car panel enclosure. On any operating mode other than Automatic, the key switches are bypassed and full access is allowed.

When setting up car call lockouts, you start with Car lockouts screen 1, which corresponds to the first floor served by the car, and progress up through the building. In the example below, we programmed Front and Rear lockouts on Floor 3; Front lockout only on Floor 5; and Rear lockout only on Floor 7.

Figure 5.12 Car Lockouts Example



When wiring the key switch inputs though, note that each lockout switch is wired to the next available terminal board input. Only Yes responses cause an input to be reserved. No responses mean no input is required so none is reserved.

Lockouts are wired to the CCL I/O 24 board which may be in the car station or in the controller. The software “identity” chip in the upper left corner of the CCL board will be labeled “CCL.”

To **select** the desired floor:

- 2 or up arrow key to move up one floor.
- 8 or down arrow key to move down one floor.

To **edit** a floor:

- Press the # key. When you are on the desired floor, you will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Enter the value using the Yes / No keys.
- Use the # key to accept. (You will move to the next field. If you are on the last field, you will move back to the Car Lockouts screen.)
- Use the * key to abort change. (You will move back to the Car Lockouts screen.)
- To return to the Car Setup menu, use the * key.

Clock

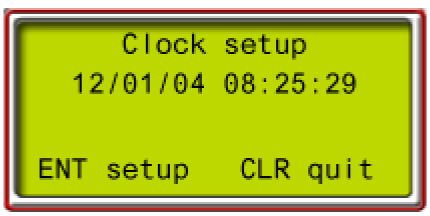
The controller contains a realtime clock that may be set from this screen.

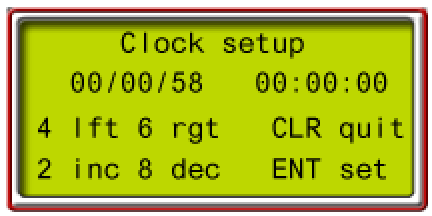
- To move into the Clock Setup view screen, use: 8 or # key.
- To return to the previous menu, use: * key.
- To move between the Clock Setup view and edit screen, use: # key.
- To return to the previous menu, use: * key.

To **edit**:

- To reach the desired field, 6 or right arrow key to move right one field, 4 or left arrow key to move left one field.
- When you reach the desired field, 2 or up arrow to increase one increment, 8 or down arrow to decrease one increment.
- When satisfied, press the # key to start clock.
- Press the * key to abort change. (You will move back to the Clock screen.)
- To return to the Car Setup menu, use the * key.

Figure 5.13 Car Clock Screen



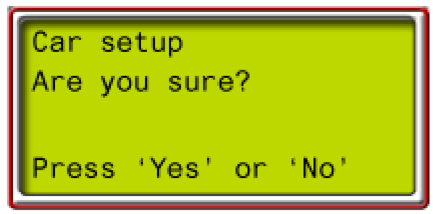


Reset Errors

This screen resets the error log. An entry to show time of reset will be displayed.

- To move into the Reset Error edit screen, use: 8 or # key.
- To return to the previous menu, use: * key.
- To answer (reset): press Yes or No key on the keypad.
- Press # key to update.
- Press # to return to Car Setup menu.
- Press * key to abort change (will return to Car Setup screen).

Figure 5.14 Car Reset Errors Screen



Reset Parameters

This screen resets car parameters to their default values.

Figure 5.15 Car Reset Parameters Screen

Reset Floor Table

This screen resets car floor tables to their default values.

Figure 5.16 Car Reset Floor Table Parameters Screen

Reset BMS

This screen resets car modem/dial out properties to their default values.

Figure 5.17 Car Reset BMS Parameters Screen

Dispatcher Setup

The Dispatcher Setup menu includes:

- Parameters
- Floor table
- Disp. Inputs & Outputs
- Clock
- BMS Setup

Parameters

The dispatcher setup screen allows viewing and modification of car controller parameters.

- To move into the Parameter screen, use: 8 or # key.
- To return to the previous menu, use: * key.
- To **view** all the parameters, use the: 2 or up arrow key to move backwards one (1) parameter, 7 & 1 keys together to move backwards ten (10) parameters, 9 & 3 keys together to move backwards twenty (20) parameters, 8 or down arrow key to move forward one (1) parameter, 7 & 1 keys together to move forward ten (10) parameters, 9 & 3 keys together to move forward twenty (20) parameters.

To **change** a numeric parameter:

- Press the # key. You will see a blinking cursor.
- Enter the value using the numbers on the key pad.
- Press the # key to accept. (You will move back to a view screen.)
- Press the * key to abort change. (You will move back to a view screen.)

To **change** a Yes / No flag:

- Press the # key. You will see a blinking cursor.
- Press the “Yes” or 2 key for yes. Press the “No” or 8 key for no.
- Press the # key to accept. (You will move back to a view screen.)
- Press the * key to abort change. (You will move back to a view screen.)
- To return to the Parameters menu (must be at a view screen), use the * key.

The following table provides a list of parameters.

Table 5.28 Dispatcher, Parameter Screen Parameters

Version 6.2	HHU Display	Value Range	Default Value	Units	Help
1	Maximum number of cars	1 - 8	2	each	Sets the maximum number of cars in the dispatcher group.
2	ETA: Brake-to-brake run time	0 - 25.5	8.0	sec	Enter approximate one floor run time. Used by the dispatcher in determining assignments.
3	ETA: High speed floor run time	1 - 25.5	2.0	sec	Enter approximate one floor high speed run time.Used by the dispatcher in determining assignments.
4	ETA: Door open or close time	1 - 25.5	2.5	sec	Enter approximate time to open or close door. Used by the dispatcher in determining assignments.
5	ETA: Door transition time	0 - 25.5	4.0	sec	Enter approximate average door open time. Used by the dispatcher in determining assignments.
6	ETA: Reassignment penalty	0 - 25.5	5.0	sec	When the dispatcher analyzes ETA times and considers reassigning a hall call already assigned to a particular car, the period of time set here is added to the ETA of the car under consideration. This “penalty” compensates for the additional time the dispatcher will consume in reassigning the call.
7	Reset fire status	Yes=1 No=0	1	yes/no	Setting this parameter to 1 (yes) resets all internal (memorized) fire conditions. If no fire input is active, the group will return to normal operation. DO NOT use this technique if in an actual fire situation. The parameter will automatically return a “No” state after resetting.
8	Parameter 8				
9	Parameter 9				
10	Parking - Main parking floor	0 - 32	0	floor	Set this to the floor where at least one car should always park. Setting this to zero will instruct the dispatcher to dynamically select all parking floors.
11	Parking - second priority floor	0 - 32	0	floor	If an idle car is available to park, and the Main parking floor (when set to a number other than 0) has a parked car, the available car will be assigned to this floor.

Table 5.28 Dispatcher, Parameter Screen Parameters

12	Parking - third priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
13	Parking - fourth priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
14	Parking - fifth priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
15	Parking -sixth priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
16	Parking - seventh priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
17	Parking - eighth priority floor	0 - 32	0	floor	If an idle car is available to park, and floors with higher priority (with a valid floor setting) have a parked car, the available car will be assigned to this floor.
18	Open doors once at parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the “Hold door open.” parameter for this floor (pars 26-33).
19	Open doors once at second parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the “Hold door open.” parameter for this floor (pars 26-33).

Table 5.28 Dispatcher, Parameter Screen Parameters

20	Open doors once at third parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the "Hold door open." parameter for this floor (pars 26-33).
21	Open doors once at fourth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the "Hold door open." parameter for this floor (pars 26-33).
22	Open doors once at fifth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the "Hold door open." parameter for this floor (pars 26-33).
23	Open doors once at sixth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the "Hold door open." parameter for this floor (pars 26-33).
24	Open doors once at seventh parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the "Hold door open." parameter for this floor (pars 26-33).

Table 5.28 Dispatcher, Parameter Screen Parameters

25	Open doors once at eighth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will cycle (open/close) indicated doors. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter is overridden by the “Hold door open.” parameter for this floor (pars 26-33).
26	Hold doors open at first parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
27	Hold doors open at second parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
28	Hold doors open at third parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
29	Hold doors open at fourth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).

Table 5.28 Dispatcher, Parameter Screen Parameters

30	Hold doors open at fifth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
31	Hold doors open at sixth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
32	Hold doors open at seventh parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
33	Hold doors open at eighth parking floor	0 - 3	0	see Help column	After parking at this floor, the car will hold the indicated doors open. 0= Do not open doors. 1= Open front doors. 2= Open rear doors. 3= Open both doors. This parameter overrides the “Open doors once.” parameter for this floor (pars 18-25).
34	Parameter 34				
35	Em. Power: Recall time-out time	0-255	0	sec	Determines the length of time the dispatcher will attempt to recall a non-responding car during emergency power operation before declaring it out of service.
36	Em. Power: Manual operation Phases 1 and 2	yes/no 1-0	0	yes (1) no (0)	When set to 1 (yes), emergency power selection for recall or running under emergency power will be by manual switch only.
37	Em. Power: Manual Phase 2 select	yes/no 1-0	0	yes (1) no (0)	When set to 1 (yes) emergency power recall will be performed by the dispatcher but car may be selected to run under emergency power by manual switch only.

Table 5.28 Dispatcher, Parameter Screen Parameters

38	Em Power: Maximum number of cars auto Phase 2	1 - 8	1	each	Determines the maximum number of cars that will be allowed to run simultaneously during emergency power operation.
39	Parameter 39				
40	Cross cancellation enabled	yes/no 1-0	0	yes (1) no (0)	
41	Parameter 41.				
42	Code Blue: Override independent and attendant	yes/no 1-0	0	yes (1) no (0)	If set to 1 (yes), a car in independent or attendant mode will close its doors and recall immediately to the code blue floor. (Code blue overrides independent and attendant service.)
43	Code Blue: Override Fire Recall	yes/no 1-0	0	yes (1) no (0)	If set to 1 (yes), a car in Fire Service will close its doors and recall immediately to the code blue floor. (Code blue overrides Fire Service.)
44	Code Blue: Wait time	0 - 255	45	sec	Determines how long a car called to a floor for emergency medical service will wait for in-car activation before returning to normal service.
45	Parameter 45				
46	Fire: Fire bypass resets all smoke detectors	yes/no 1-0	1	yes (1) no (0)	Determines whether or not the primary fire switch being set to Bypass will reset all smoke detectors.
47	Fire: Has remote fire switch	yes/no 1-0	0	yes (1) no (0)	Set to yes if there is a remote fire switch installed for this job. (Directs the dispatcher to monitor the appropriate input.)
48	Fire: Recall overrides code blue	yes/no 1-0	1	yes (1) no (0)	Determines whether or not fire service operation will override emergency medical service operation.
49	Fire: Recall switch resets smoke detectors	yes/no 1-0	0	yes (1) no (0)	Determines whether or not the primary fire switch being set to the ON and then the OFF position will reset all smoke detectors.
50	Parameter 50				

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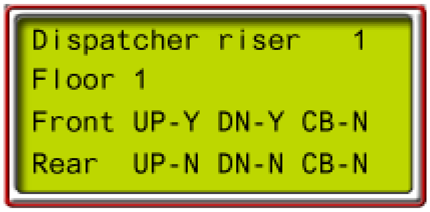
Table 5.28 Dispatcher, Parameter Screen Parameters

51	Fire: Flags	0 - 255	0	Ea	0= A17.1 / NYC RS18 1= A17.1, 2000: Car fire bypass input operation becomes fire-reset operation as defined in code. 2= Not used. 4= Lobby smoke detector overrides other smoke detectors. 8= Not used. 16=Once the car is returned to the designated level from the alternate level using the Phase 1 switch(es), the designated level will remain the recall level thereafter, even if the Phase 1 switch is returned to the OFF position. (ANSI A17.1a-2005 / B44-04U1) Add the flag numbers of those flags you want set. To set multiple flags, determine and set their combined value (i.e., 2 and 8, set to 10).

Floor Table

The floor table setup screen describes the building to the dispatcher.

Figure 5.18 Dispatcher Floor Table Screen



- To move into the Floor Table screen, use: 8 or # key.
- To return to the previous menu, use: * key.

Table 5.29 Dispatcher, Floor Table Parameters

Editable Fields	Description	Value
Riser #		1 - 32
Floor #		1 - 33
Front up		yes / no
Front down		yes / no
Rear up		yes / no
Rear down		yes / no
CB front	Code Blue	yes / no
CB rear	Code Blue	yes / no

To **view** all the floors use the:

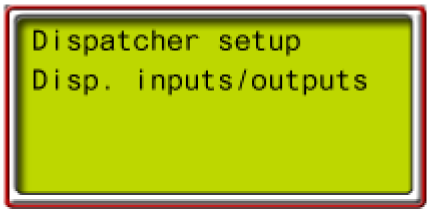
- 2 or up arrow key to move backwards one (1) floor.
- 8 or down arrow key to move forward one (1) floor.

To **edit** a floor:

- Press the # key. When you are on the desired floor, you will see a blinking cursor.
- Keep pressing the # key until you reach the desired field.
- Enter the value using the numbers on the keypad or the Yes / No keys.
- Press the # key to accept. (You will move to the next field. If you are on the last field, you will move back to a view screen.)
- Press the * key to abort change. (You will be back to a view screen.)
- To return to the Dispatcher Setup menu, use the * key.

Dispatcher Input & Outputs

Figure 5.19 Dispatcher Inputs and Outputs Screen



The Input & Output menu consists of three (3) sub menus [I/O boards].

- DHALL card
- DHALL2 card
- DHALL3 card

To move between the sub-menus use:

- 4 or left arrow key to move left.
- 6 or right arrow key to move right.

To move into the desired Input & Output sub-menu [I/O boards] view screens use:

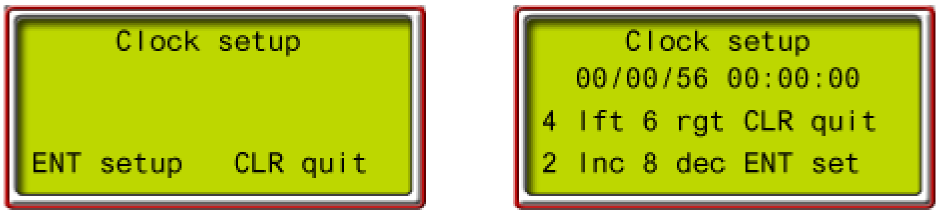
- 8 or # key
- To return to the previous menu, use: * key

This screen allows real time observation of all I/O 24 board inputs and outputs. If the screen below the desired I/O board is blank, the board is not available or is not communicating. If the board is operating properly, all 24 inputs and 24 outputs will be displayed at once; inputs on the left side and outputs on the right. When an input is turned ON (voltage at the pin), it will show as a 1. An output turned ON (voltage at the pin) will show as an 0.

- To return to the Input & Output menu, use the * key. (You will need to do this to view other I/O boards.)

Clock

Figure 5.20 Dispatcher Clock Set Screen



The dispatcher contains a realtime clock that may be set from this screen.

- To move into the Clock Setup view screen, use: 8 or # key.
- To return to the previous menu, use: * key.
- To move between the Clock Setup view and edit screen, use: # key.
- To return to the previous menu, use: * key.

To **edit**:

- To reach the desired field, 6 or right arrow key to move right one field, 4 or left arrow key to move left one field.
- When you reach the desired field, 2 or up arrow to increase one increment, 8 or down arrow to decrease one increment.
- When satisfied, press the # key to start clock.
- Press the * key to abort change. (You will move back to the Clock screen.)
- To return to the Dispatcher Setup menu, use the * key.

BMS Setup

The BMS board provides a modem control interface between the Tricon dispatcher and a remote monitoring system.

Table 5.30 BMS Screen Parameters

Version 6.2	HHU Display	Value Range	Default Value	Units	Help
1	Job identification name (8 characters)				
2	Phone number 1				Enter the primary dial out phone number.
3	Phone number 2				Enter the secondary dial out phone number.
4	Call time 1 start hour (24=off)	0 - 24	23	hours	Enter the time at which the primary dial out phone should be dialed. 0=midnight. 23=11pm.
5	Call time 1 end hour	0 - 24	23	hours	Enter the time at which the primary dial out phone should be hung up. 0=midnight. 23=11pm.
6	Call time 2 start hour (24=off)	0 - 24	23	hours	Enter the time at which the secondary dial out phone should be dialed. 0=midnight. 23=11pm.
7	Call time 2 end hour	0 - 24	23	hours	Enter the time at which the secondary dial out phone should be hung up. 0=midnight. 23=11pm.
8	Number of cars in group	1 - 6	2	each	Enter the number of cars in this group.
9	Number of floors	2 - 32	2	floor	Enter the number of floors served by this group.
10	Car 1 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
11	Car 2 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
12	Car 3 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
13	Car 4 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
14	Car 5 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
15	Car 6 has rear doors	1=yes 0=no	0	1=yes 0=no	Set to 1 (yes) if car has rear openings.
16	Car 1 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
17	Car 2 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
18	Car 3 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
19	Car 4 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
20	Car 5 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.

Table 5.30 BMS Screen Parameters

21	Car 6 number of floors	2 - 32	2	floor	Enter the number of floors serviced by this car.
22	Car 1 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
23	Car 2 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
24	Car 3 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
25	Car 4 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
26	Car 5 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
27	Car 6 lobby floor number	1 - 32	1	floor	Enter the lobby floor for this car.
28	Modem initialization string 1				Enter the initialization string for the modem used for the primary dial out line. (See modem documentation.)
29	Modem initialization string 2				Enter the initialization string for the modem used for the secondary dial out line. (See modem documentation.)

Reset Dispatcher Parameters

This screen allows you to reset dispatcher parameters to their default values.

Reset Dispatcher Floor Table

This screen allows you to reset dispatcher floor tables to their default values.

Reset Dispatcher BMS Parameters

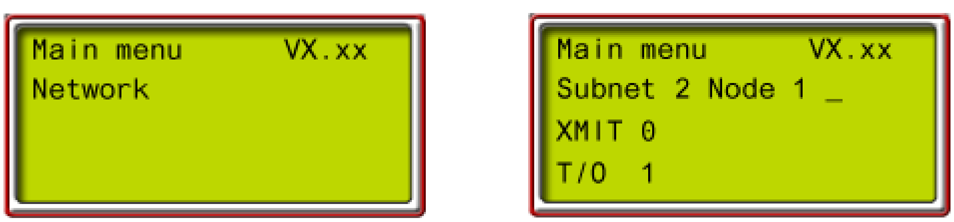
This screen allows you to reset dispatcher BMS (modem) parameters to their default values.

Network

The Network screen allows you to view parameters for serial communication between system components.

- To move into the edit screen, use: 8 or # key.
- To return to the previous menu, use: * key.

Figure 5.21 Network Screen



Fireman Operation Setup

Fireman operation can be configured to comply with various national and local codes. NYC, A17.1, 1996 and A17.1, 2000 fire operation can be obtained by adjusting these parameters. Different codes have different names for the fire devices. The following table correlates code nomenclature with this documentation.

Table 5.31 Code Nomenclature Correlation

ASME A17.1-2000	ASME A17.1-1996	NYC
Lobby Phase 1 Recall Switch Reset, Off, On	**Lobby Phase 1 Recall Switch** Bypass, Off, On	**Lobby Phase1 Recall Switch** Normal, Fireman Service
Car Phase 2 Switch Off, Hold, On	**Car Phase 2 Switch** Off, Hold, On	**Car Phase 2 Switch** Normal, Hold, Fireman Service

Operation

The car and dispatcher parameters listed below must be set to the proper values in order to comply with different codes and regulations. The dispatcher parameters are applicable where a dispatcher is provided and the hall Phase 1 fire service is controlled from this dispatcher. When a dispatcher is used, the car fire service parameters must be set the same as the dispatcher.

Parameters

- 108: Main recall floor. Default value, 2
  - Set to the Fire Phase 1 recall floor.
- 109: Alternate recall floor. Default value, 3
  - Set to the Fire Phase 1 alternate recall floor.
- 110: Dispatcher parameter 49, Smoke detectors are reset by lobby recall switch. Default value, No
  - When this parameter is set to ‘Yes’, fire smoke detectors that are set to latch on the controller (117 set to yes) can be cleared when the lobby recall switch is operated.
- 111: Constant pressure on DOB to open doors. Default value, Yes.
  - When set to ‘Yes’, the doors will open only with constant pressure on the open button. When the doors are fully opened, they will remain open. If the open button is released before the doors are fully open, they will close. If set to ‘No’, a single operation of the open button will open the doors.
- 112: Constant pressure on DCB to close doors. Default value, No.
  - When set to ‘Yes’, the doors will close only with constant pressure on the door close button. If set to ‘No’, a single operation of the close button will close the doors.
- 113: Allow recall while in attendant or independent operation. Default value, Yes.
  - When set to ‘Yes’, if a car is in attendant or independent mode, it will be forcibly recalled to the Fire recall floor after a timer has elapsed.
- 114: Recall wait time if car on attendant or independent. Default value, 25.0 sec.
  - Sets the timer for parameter 114.
- 115, Close doors with nudging speed during fire recall. Default value, No
  - If set to ‘Yes’, the nudging control will be operated every time the doors close during recall. The purpose of this operation is to avoid injuring passengers with closing doors since the electronic eye is being ignored.

- Car parameter 116, Dispatcher parameter 47, Has remote fire recall switch. Default value, No.
  - When set, enables operation of the remote fire switch. This switch requires an on and off position. When enabled, Phase 1 operation is changed as required when a remote switch is used. This parameter will enable the remote on and off light outputs on the EXT1 board.
- Car parameter 117, Dispatcher parameter 46: Lobby bypass resets ALL smoke detectors. Default value, Yes.
  - In some operation modes, smoke detectors are reset, or reset and bypassed, by the lobby switch being turned to the Bypass position. Bypass / reset is A17.1, 1996 and reset is A17.1, 2000. For either of these operations, this parameter should be set to yes. Where there is no bypass or reset switch in the lobby switch (NYC), this parameter should be set to no.
- 118: Allow fire Phase 2 when recalled by machine room smoke detector. Default value, No.
  - When a car is recalled due to activation of the machine room smoke detector, it is normally not allowed to operate on Phase 2. Setting this parameter to 'Yes' overrides this stipulation.
- 119: Allow Phase 2 change without open doors. Default value, No.
  - A17.1, 2000 and some local codes require the car to leave fire Phase 2 or be set to HOLD when the doors are closed. If set to a yes, the car will do a Phase 1 recall when the Phase 2 switch is turned off with the car in motion or the door closed.
- Car parameter 120, Dispatcher parameter 51: Fire flags
  - Multiple options can be enabled by adding their flag values together and entering the sum in this parameter. A value of "0" sets ANSI A17.1, 1996 or NYC RS18, 1996 fire operation. Currently NYC requires door and gate switch monitoring to be turned off. To do this, set an 8 in parameter 120. Other fire parameters listed above must be set to define the door and smoke detector operation.
    - Flag 1: A17.1, 2000 code car fire bypass input operation becomes fire-reset operation as defined in A17.1 2000, code. Setting a value of 1 enables A17.1, 2000 code.
    - Flag 2: Latch Phase one fire recall operation key switch inputs.
    - Flag 4: Lobby smoke detector overrides other smoke detectors.
    - Flag 8: Removes the jumped door and gate detection operation.
    - Flag 16: Once the car is recalled to the designated level from the alternate level using the Phase 1 key switch(es), the designated level will remain the recall level thereafter, even after the Phase 1 switch is returned to the "OFF" position.
    - Flag 32: Car goes on door nudging without a call demand.
    - Flag 64: Removes the jumped door and gate detection operation on fire Phase 2 only.
    - Flag 128: Currently not used.
- 121: Open rear door when at recall floor.
  - If set to 'Yes', open the rear door instead of the front when at the recall floor.
- 122: Open rear door when at alternate recall floor.
  - If set to 'Yes', open the rear door instead of the front when at the alternate recall floor.

Code Differences

The following are parameter settings for various codes. You may requires changes if rear doors are at the recall floor or due to local codes addenda.

New York City, prior to ANSI A17.1b-2003 with Appendix K Modifications

- 112 – No, Constant pressure DCB to close door
- 113– Yes, Allow recall of attendant or independent cars
- 116 – No, Has a Remote recall switch
- 117 – No, Dispatcher 46 – No, Lobby bypass input resets smoke detectors
- 118 – Yes – Allow Phase 2 operation after MR smoke recall
- 119 – No, Allow Phase 2 change without open doors
- 120 – Dispatcher 51, Flag 8

New York City ANSI A17.1b-2003 with Appendix K Modifications

(NYC still requires their traditional NYC fire code modifications to the A17.1 Code under the new Appendix K modifications.)

- 112 – No, Constant pressure DCB to close door
- 113– Yes, Allow recall of attendant or independent cars
- 116 – No, Has a Remote recall switch
- 117 – No, Dispatcher 46 – No, Lobby bypass input resets smoke detectors
- 118 – Yes – Allow Phase 2 operation after MR smoke recall
- 119 – No, Allow Phase 2 change without open doors
- 120 – Dispatcher 51, Flag 64

ANSI A17.1 1996

- 112 – Yes, Constant pressure DCB to close door
- 113 – Yes, Allow recall of attendant or independent cars
- 116 – No, Has a Remote recall switch (requires the EXT1 board when used)
- 117 – Yes, Dispatcher 46 – Yes, Lobby bypass input resets smoke detectors
- 118 – Yes, Allow Phase 2 operation after MR smoke recall
- 119 – No, Allow Phase 2 change without open doors
- 120 – Dispatcher 51, Flag 0

ANSI A17.1 2000

- 112 – Yes, Constant pressure DCB to close door
- 113 – Yes, Allow recall of attendant or independent cars
- 116 – No, Has a Remote recall switch (requires the EXT1 board when used)
- 117 – Yes, Dispatcher 46 – Yes, Lobby bypass input resets smoke detectors
- 118 – Yes, Allow Phase 2 operation after MR smoke recall
- 119 – Yes, Allow Phase 2 change without open doors
- 120 – Dispatcher 51, Flag 1

ANSI A17.1a-2005 / B44-04U1

- 112 – Yes, Constant pressure DCB to close door
- 113 – Yes, Allow recall of attendant or independent cars
- 116 – No, Has a Remote recall switch (requires the EXT1 board when used)
- 117 – Yes, Dispatcher 46 – Yes, Lobby bypass input resets smoke detectors
- 118 – Yes, Allow Phase 2 operation after MR smoke recall
- 119 – Yes, Allow Phase 2 change without open doors
- 120 – Dispatcher 51, Flags 1 and 16

B44 (Buildings without fire sensors under the jurisdiction of the National Building Code of Canada (NBCC) only)

- 120 – Dispatcher 51, Flag 32

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