



Pixel Control System **Installation & Adjustment** **For Traction Elevator Applications** Utilizing AC Vector or DC Drive Motor Control (For Pixel Software Version 2.0.0.0 or Later)

Product Documentation that's Simple to Navigate™
This is the Installation and Adjustment Manual that is the guide for installation, startup and final adjustment of all Pixel Traction Series elevator controllers. Other resources include:

- **Motor Drive Specific Manuals**
- **Maintenance & Troubleshooting Training Manual** provided in conjunction with Factory and Customer Site technical training classes
- **Telephone Technical Support** available for Customers at no charge
 - **call:** 916/428-1708
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Introduction

Conventions in this Manual

Warning, Caution, and Note Icons



NOTE: Throughout this manual you will find references to job prints with two names, for example QR7/ DPS where QR7 is the recent page numbering, both refer to same information, The Drive Parameters List.



CAUTION: Equipment installation must comply with all Local and other applicable Elevator and Electrical Codes and regulations.



NOTE: It is assumed that all switches serving as stop and overtravel limits – at both terminal landings – have been verified to be of the proper type, correctly placed and operating as intended.

Throughout this manual, icons call attention to text that issues safety warnings, cautions, and/or notes to which particular attention should be paid.



WARNING: Operating procedures or practices that may result in personal injury and/or equipment damage if not followed correctly.



CAUTION: Operating procedures and practices that may result in equipment damage if not correctly followed.



NOTE: Useful information or procedures.

All instructions in this manual assume that work will be done by qualified field personnel, trained and experienced in the installation of elevator equipment. No attempt has been made to define terms or procedures that should be familiar to qualified elevator personnel.

This manual is intended only to acquaint elevator personnel with the information required to successfully install the Pixel elevator control system. Installation personnel must be familiar with all codes and regulations pertaining to safe installation and operation of the elevator systems.



WARNING: THE AC POWER SUPPLIED to this equipment must be provided through a PROPERLY FUSED DISCONNECT OR CIRCUIT BREAKER. Improper circuit protection may create a HAZARDOUS CONDITION.



CAUTION: Restrict access to elevator control equipment and apparatus to qualified personnel only.



NOTE: Installation and wiring must be in accordance with the National Electrical Code and consistent with all local codes, as well as National elevator codes and regulations.



NOTE: Connection of field wiring to controller terminals must be accomplished in a neat and careful manner. Stranded wire conductors must be twisted together to avoid any strands that, if left out of terminals, would create potential shorts. All controller connections, field terminals, and cable connectors must be checked to be sure they are tight and properly seated. When connecting flat cable connectors, take care to match pin #1 marks (arrow symbol on connector, red stripe on cable) to prevent damage.

Conventions in this Manual

System Menu Navigation

The Pixel system has a very powerful and flexible set of menus.

To view and access selections, a high-resolution color LCD screen has been paired with an intuitive [Touch &Go™](#) selection knob. Simply rotate to scroll up and down any selection list. Then press to select the desired function (or setting) and keep right on working.

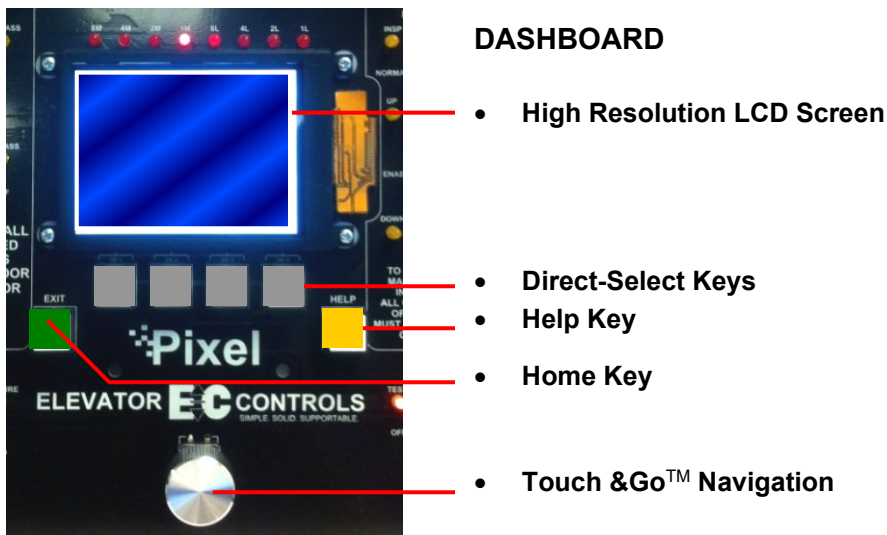


Figure i1 – System Access Point

Above the silver Touch & Go knob – within easy reach – are six keys. The GREEN key is [Home](#), the YELLOW key is [Help](#) and the four GREY keys between have menu-specific functions.

GREY keys are [Direct-Select keys](#), for which function labels appear just above the keys at the bottom of the LED screen, based on the specific menu being viewed.

Throughout this manual, visual shorthand is used to describe how to quickly locate and interact with various menus and options.






Pixel Navigation Icons	
Knob Rotate/Push	Key Press
 Rotate to locate	 Home
 Push to select	 Direct-Select
	 Help

Figure i2 – Pixel Visual Shorthand Navigation Icons

Narrative Navigation Instructions

This manual might instruct you to press the Green HOME key, and then use the Touch & Go knob to navigate to INSTALL. Once this selection is highlighted, select it by pressing the Touch & Go knob. Then use the knob again, to navigate to ABOUT. Press to select.



Visual Shorthand: Simplified version of the instructions above.



 Home 



 Install 



 About 



Another Example: Modify Fire Return Floor



 Home 

 Adjust 

 Select Car Performance 

 Fire Return Floor 

 Select New Value 

 **Save** or  Cancel

Section 1 – Pixel Overview

1.1 System Description, Capabilities & Advantages

The Pixel Traction Control System uses advanced technology to enable more routine tasks to be accomplished faster.

Everything about Pixel has been designed to save field labor time.

This digital elevator control system provides three points of system access – Machine Room, Cartop, and Inside the Cab – so the most convenient location can be used to complete tasks quickly and easily.

Each of the three system access points includes a vivid color LCD display, unique Touch & Go™ interface, one-button access to context-responsive help, and intuitive direct-select keys. Instant real-time awareness of current car operation is provided on all displays when not otherwise in use.

The Landa™ car positioning system provides absolute cab position information with high tech accuracy – using dual sensor heads to track cab position to 0.8 millimeter. Landa components are mounted quickly – all limits, slowdowns and landings are defined virtually, stored digitally, and easily readjusted. No need to install or wire vanes or switches in the hoistway (except top and bottom physical limit switches as required by elevator safety code).

Powerful yet simplified diagnostics are built into each system access point, including the ability to intuitively view and easily reprogram elevator “personality” parameters onsite. Review and adjust drive parameters, access fault diagnostics and playback the operating sequence leading to a fault notification.

The integrated Pixel control system package typically includes the car controller, cartop box with access point, COP access point, Landa positioning system, and hall nodes that communicate using EC’s enhanced **c-LINK™** CAN-bus serial communication system. **c-LINK** reduces wire count for hall, car and cartop signals without compromising EC’s Safe & Sensible™ standards.

Dual CAN-bus controller area networks provide high speed internal system communication. Use of this industrial standard communication protocol opens the door to interoperability with a variety of current and future products and peripherals – including the latest door operators.

Overall reliability is enhanced by surface-mount electronic components, large scale integrated circuits, and state-of-the-art PC boards.

When the power of technology is used to simplify essential tasks – including installation, adjustment, maintenance, and troubleshooting – everybody wins.

1.2 System Components

The Pixel system design is based on a dual high-speed CAN-bus controller area network communications architecture, which supports group operation for up to twelve cars. The most basic component – a car control system – is made up of the following:

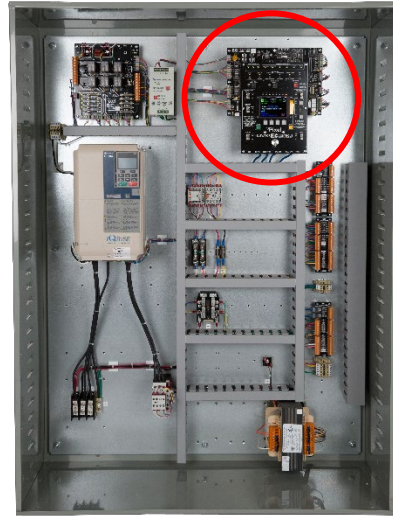
- a **Pixel** Car controller
- b **P-TOC** Pixel top of the car interface controller
- c **P-COP** Pixel car operation panel interface controller (one per COP; up to four per car supported)
- d **P-HALL** Pixel Hall nodes (as required for hall calls, fire recall, gongs, etc.)
- e **Landa™** dual sensor car positioning system

1.2.1 Typical System Components

The Pixel control system – depending on the specific application – typically includes:

a **Pixel Car Controller**

The Pixel car controller is usually located in a machine room or – in machine-room-less applications, in an equipment closet. Various enclosures are available to fit your specific application... and meet your NEMA rating requirements.



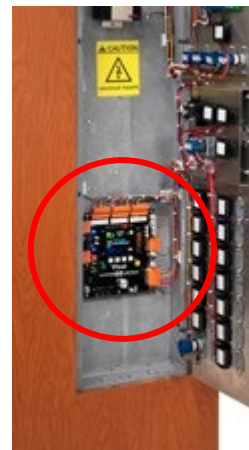
b **P-TOC Pixel Cartop Interface**

The cartop system access point provides access to configuration information, parameters and diagnostics. The cartop interface box provides a convenient wiring termination for Landa, door operator, load weighing, safety edge, cab light and fan, traveler cable and the provided TOC-to-COP wire harness. An optional (similar to photo) cartop inspection station with light and service outlet is available.



c **P-COP Pixel Car Operating Panel Interface**

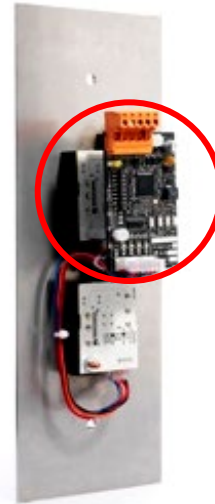
A system access point is located at each COP. EC-Ready COP Fixtures fully interconnect to the TOC box using the provided TOC-to-COP harness. One wiring harness is provided for each of up to four COP's per cab.



d **P-HALL Pixel Hall Nodes**

Universal hall nodes can provide connections for hall calls, fire recall, access, hall gongs, code blue calls and more.

Each CAN-driven node supports two I/O easily configurable using onboard switchgear.



e **Landa™ Dual Positioning System**

Landa is a dual positioning system that provides absolute cab location information without the need for vanes or switches in the hoistway. *

Dual communication channels, one for each positioning system, provide truly independent redundancy for failsafe operation.

Landa provides precision accuracy – tracking cab location to within 0.8 millimeter.



f * Top and bottom physical limit switches

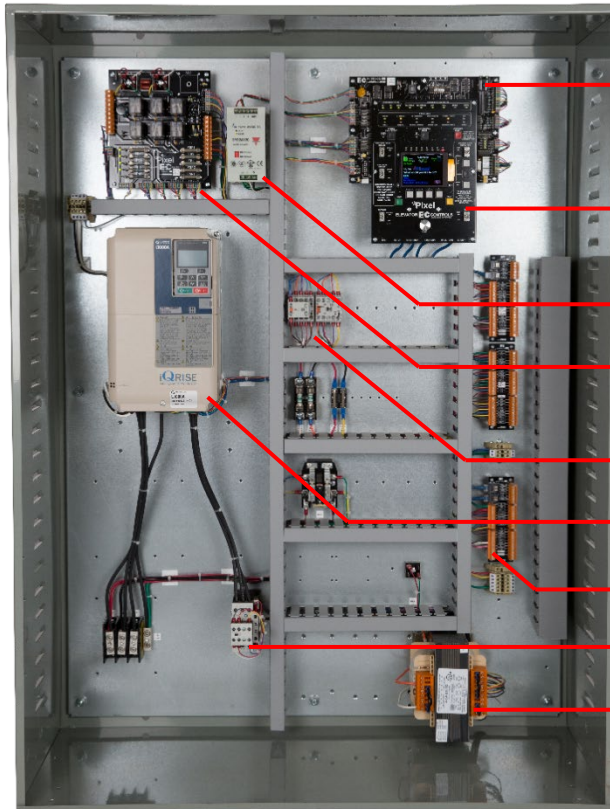
must be provided as required by elevator safety code.

1.2.2 Pixel Traction Series Capabilities

Speed	1400 fpm 7 mps
Stops	128 Stops maximum with selective door operation
Group Size	12 cars maximum
Environment	32 to 104 degrees Fahrenheit 0C to 40C degrees Altitude to 12,000 feet 3,658 meters 95% relative humidity (non-condensing)
Motor Control	AC induction or permanent magnet hoist motor Variable voltage variable frequency VVVF elevator drive with encoder feedback DC hoist motor SCR or IGBT elevator drive with encoder feedback
Positioning	Landa™ absolute car positioning system using dual sensor heads and coated tape to track position accuracy to 0.032" (0.8mm)

1.3 About Pixel

1.3.1 Typical Pixel Controller Layout



PC BOARDS & COMPONENTS

- **P-MP-IO Microprocessor**
Main Input/Output Safety Microprocessor
- **P-MP Pixel Microprocessor Board** with onboard diagnostics
- **24 VDC Power Supply**
- **P-PDB Power Distribution Board**
- **Brake and Potential Contactors**
- **Motor Control Drive**
- **Field Wiring Terminals**
- **Motor Isolation Contactor**
- **Power Transformer**

Figure 1.3.1 – Typical Pixel Car Controller

1.3.2 Typical Pixel TOC Top of Car Interface

The Pixel TOC Top of Car Interface is provided with all mounting hardware required to fasten it to the crosshead rail on the cartop.

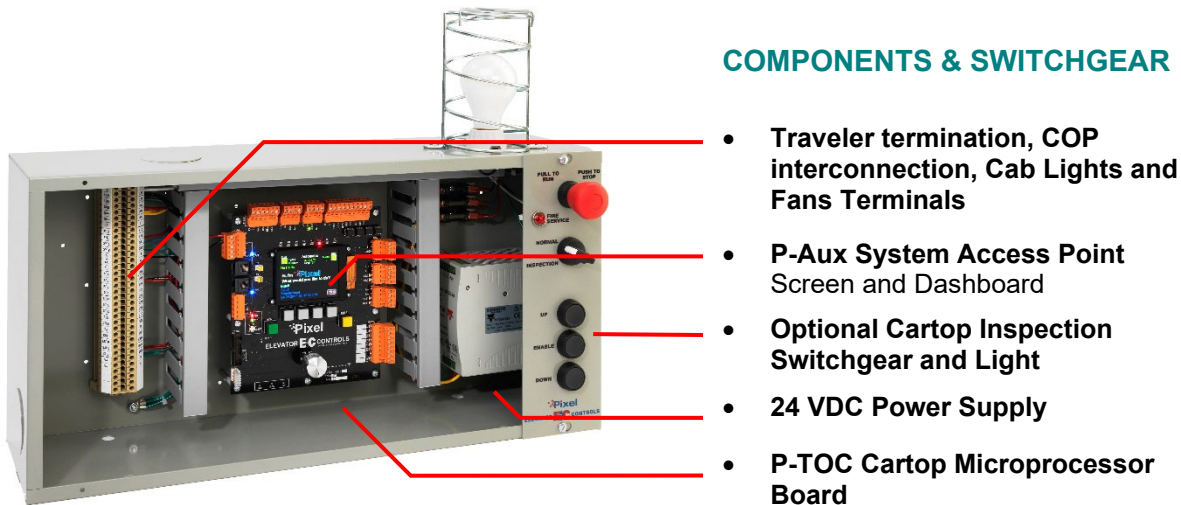


Figure 1.3.2 – Typical Pixel Cartop Interface



NOTE: The P-TOC Top-of-Car Interface can optionally include a cartop inspection station, with light and service outlet, as an option (similar to picture).

1.4 New Technology, New Terms

Our goal was to design the Pixel system using advanced technology to simplify routine tasks – so you can accomplish more, faster.

Lots of traditional tasks are done with Pixel using a new, time saving approach. Here's a quick tour of key system components. We've developed some new terms to make your transition to Pixel easy.

1.4.1 Pixel Dashboard – Overview

Complete tasks more easily and quickly by working from the most convenient location.

Pixel concentrates switchgear, indicators, readouts and a vivid color LCD display into an intuitive [dashboard](#). The primary [system access point](#) is the controller in the machine room.

Two convenient additional [system access point](#) locations are provided – on the cartop, and inside the car operating panel. These provide access for checking system status, viewing and resetting most system parameters, and powerful diagnostics for troubleshooting.

DASHBOARD

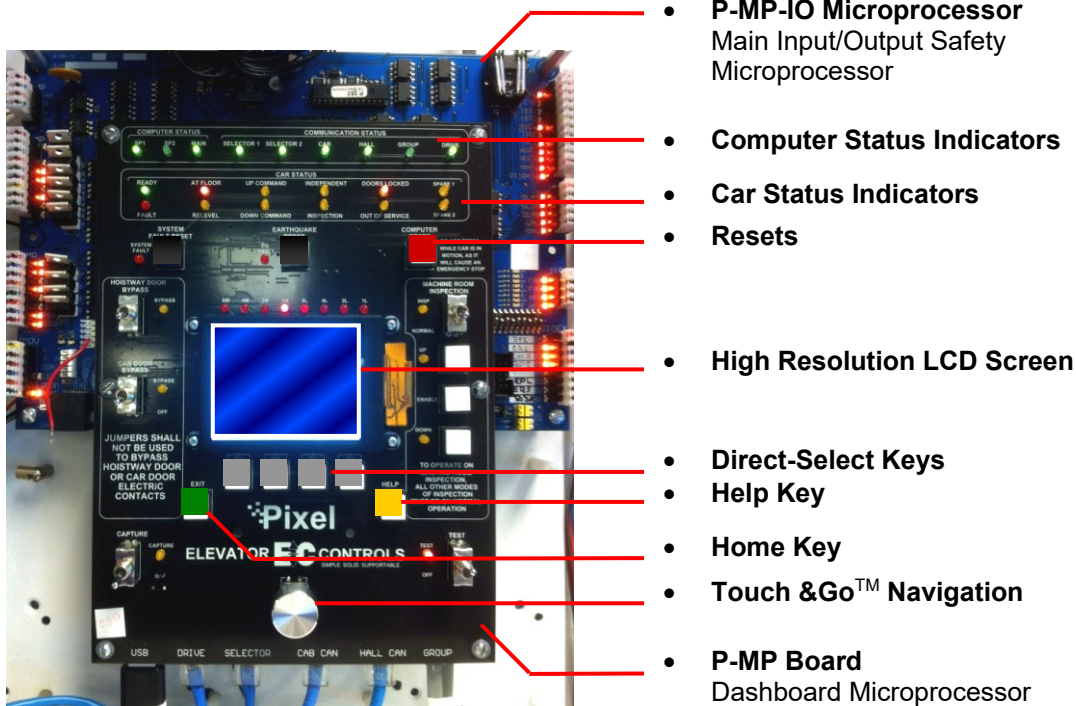


Figure 1.4.1 - Pixel Dashboard Overview

Pixel displays information on a vivid, full color LCD screen at each [system access point](#). Instant [real-time awareness](#) of current car operation is provided on all system screens, when not otherwise in use.

The vast majority of functions and parameters can be viewed and changed from any of the three [system access point](#) locations (there are just a few exceptions to meet safety requirements).

Each System Access Point provides:

- Elevator “personality” parameters that are easily viewed intuitively reprogrammed.
- Simplified access to review and adjustment of drive parameters
- Learn landing zones and readjust position virtually by entering offsets in inches or millimeters.
- View of faults and access to diagnostics
- Powerful, easy to use system diagnostic tools.

1.4.2 Pixel Dashboard – Screen and Navigation

Pixel uses a simple knob for navigation and selection – called ‘Touch and Go™’ – everything you need is at your fingertips.

Pixel’s high resolution color LCD [screen](#) is paired with a simple, intuitive selection knob called the [Touch &Go™](#) interface. Rotate to scroll up and down any selection list. Then – press this same knob – to select the desired function (or setting) and keep right on working.

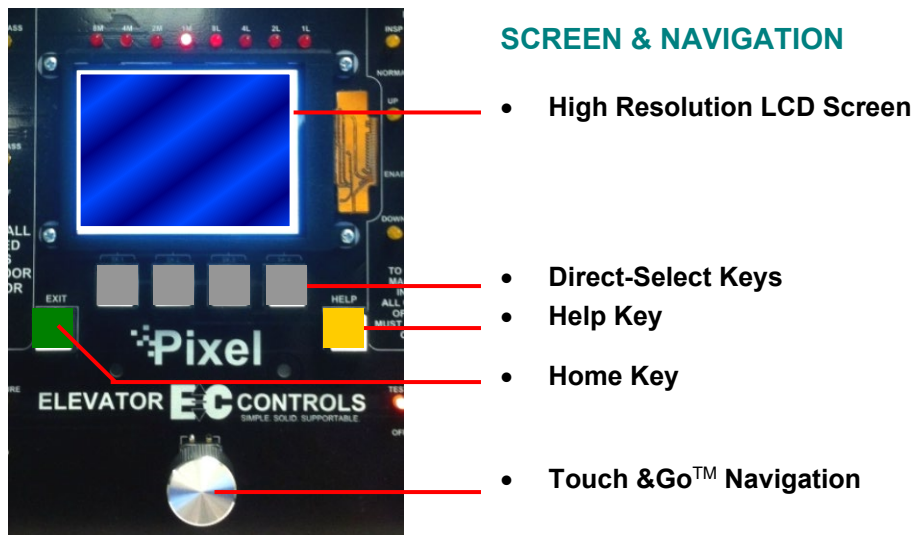


Figure 1.4.2 – Pixel Screen & Navigation

The [dashboard](#) provides a dedicated YELLOW button for immediate access to [con text-responsive help](#) if needed.

Depending on the menu or parameter display being viewed, flexible GREY [direct-select keys](#) are assigned helpful functions.

Return to the main menu at any time by pressing the GREEN [home](#) key.

1.4.3 Pixel Screen – Home/Startup Display

Pixel's screens continuously display information – understood 'at a glance' – from multiple system access points.



Figure 1.4.3a - Pixel Home Screen Display

The top third of the home screen displays useful system information – whether seen in the machine room, on the cartop, or in the cab.

This view appears on system startup **Figure 1.4.3a**. The icons and text information are each identified below for reference **Figure 1.4.3b** and described in detail on the following pages.

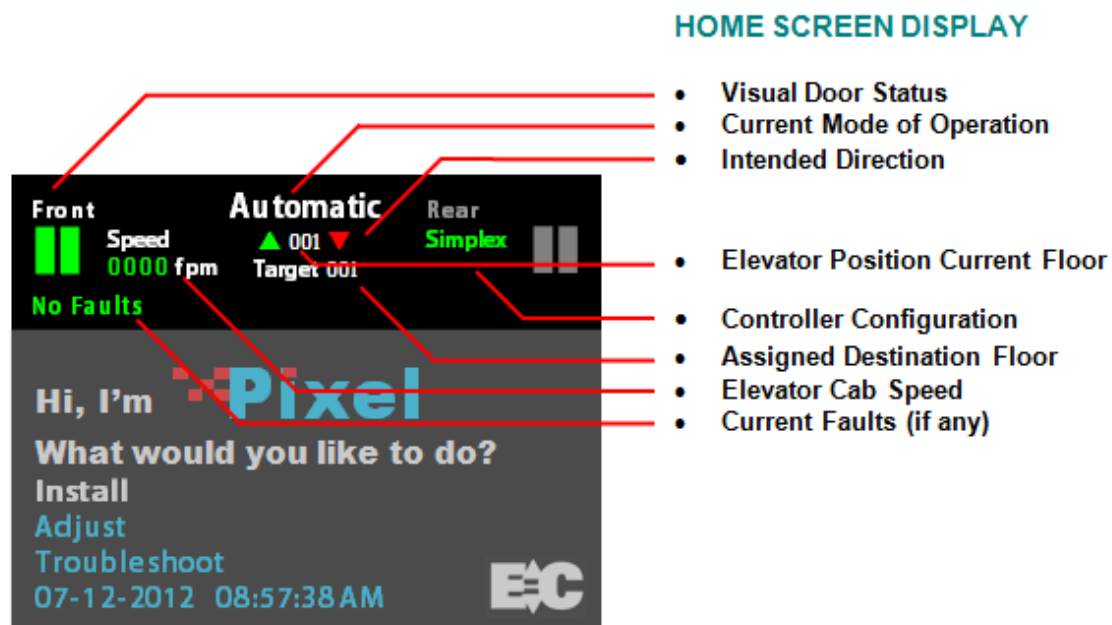


Figure 1.4.3b - Pixel Home Screen Display

1.4.4 Quick Reference Color Status

1.4.4.1.1 Visual Door Status

Available door openings are displayed as active (in green) or inactive (in grey) using center parting door icons. Visual door status is indicated as follows:

- Opened Small portion of door on each side of opening.
- Closed Solid green door panels indicated.
- Opening Animation: doors moving partly to fully open.
- Closing Animation: doors moving partly to fully closed.
- Faulted Solid red door panels indicated.

1.4.4.1.2 Mnemonic Color Code Status

Each mnemonic represents an input, output, or an internal process status; Refer to Appendix D, Mnemonic Description Translation Tables, for a listing of the most relevant mnemonics. Pixel implements a color scheme background to differentiate the mnemonic status for each of the safety processor SP1, SP2 and the elevator microprocessor MP as shown on Figure 1.4.4.1.2 – Pixel Screen Flag Status, GOV= SP1 active, SP2 and MP inactive, SAFC= SP1 and MP inactive, SP2 active, SAFH= SP1, SP2 and MP active, and RG= SP1, SP2 and MP inactive to march color key below:

- Black SP1, SP2 and MP inactive
- Blue SP1, SP2 and MP active
- Yellow SP1 active, SP2 and MP inactive
- Green SP1 and MP inactive, SP2 active



NOTE: Full color scheme above applies to safety input or output mnemonics; for MP input-outputs or internal process mnemonics only Black and Blue colors apply representing the MP status.

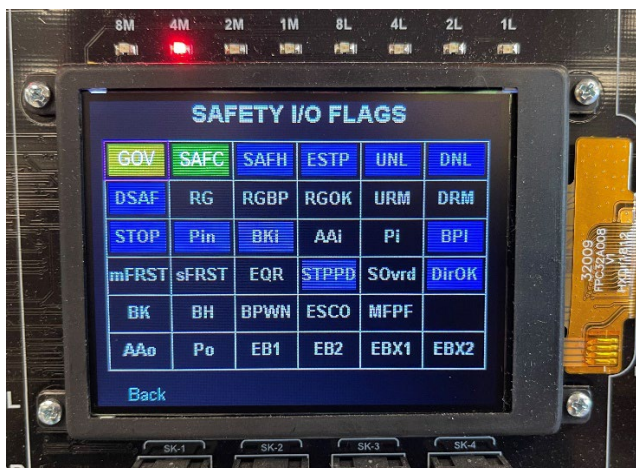


Figure 1.4.4.1.2 – Pixel Screen Flag Status

1.4.4.2 Modes of Operation

Construction mode, when enabled, restricts operation to inspection mode with limited speed and no positioning.

Pixel supports multiple modes of operation including:

Automatic

- Main Fire Recall
- Alternate Fire Recall
- Fire Phase 2
- Emergency Power Phase 1
- Emergency Power Phase 2
- Emergency Power Pre-transfer
- Battery Rescue Operation (traction)
- Battery Lowering Operation (hydraulic)
- Fire Service
- EMT Phase 1
- EMT Phase 2
- Hospital Service
- Earthquake Normal Mode
- Earthquake Abnormal Mode
- Test
- Capture
- Independent
- Wild / Sabbath
- Security
- Out of Service Recall
- Car to Lobby
- Flooded Pit Recall
- Piston Synchronization (hydraulic)
- Viscosity Operation (hydraulic)
- Car Overloaded
- Attendant Service

Inspection

- Cartop Inspection
- In Car Inspection
- Hoistway Access
- Machine Room Ins.

Construction

- Cartop Inspection
- Machine Room Ins.

1.4.4.3 Intended Direction

When car direction is determined, the Pixel screen will display a solid up Green or down Red directional arrow. If direction has not been assigned, both arrows appear in outline.

1.4.4.4 Current and Destination Floors

The Pixel screen always displays the current floor, found between the up and down directional arrows, indicated in three digits.

If a destination floor has been assigned, it will be displayed just below the current floor, labeled Target, indicated in three digits. The Target is dynamic and may change during a run.

1.4.4.5 Speed

The Pixel screen displays cab speed, just to the right of the Front door icon. Scale can be toggled between fpm (feet per minute) and mps (meters per second).

1.4.4.6 Control System Configuration

The Pixel screen displays system configuration, just to the left of the Rear Door icon. Car configuration can be Simplex or Group. In group configuration, the current priority to assume dispatching functions for the group is indicated, under the word 'Group'.

1.4.4.7 Active Fault

The Pixel screen displays the active fault with the highest priority or **No Faults** if none present.



NOTE: Faults are classified as either latching or non-latching. While non-latching faults self-reset, all faults are recorded in fault counters and logs.

1.5 Pixel New Features Quick Overview

1.5.1 Landa™ Dual Positioning System

No more time consuming and costly hoistway work mounting vanes, wiring and readjusting switches.

Landa is a [dual positioning system](#) that provides absolute cab location information. Dual communication channels, one for each positioning system, provide truly [independent redundancy](#) for failsafe operation.

Landa provides precision accuracy – tracking cab location to within 0.8 millimeter. All limits, slowdowns and landings are defined virtually, stored digitally, and easily readjusted. No wiring, vanes or switches are required in the hoistway (*except top and bottom physical limit switches as required by elevator safety code).

1.5.2 Virtual Safety Limits

Pixel remembers where the car is always.

The Landa car positioning system captures high resolution position data that is maintained through power cycling. During the hoistway 'learn' procedure, the control system generates and records the location and associated position for all required [virtual safety limits](#).

Once learned, virtual safety limits function in the same way that vane and switch systems worked in the past. Safety code requires placement of top and bottom physical limit switches, for which Pixel provides inputs (described in the wiring Section).

1.5.3 CAN-bus Network

Proven industrial standard communication protocol provides simplified interoperability using high speed dual CAN-bus networks.

The Pixel controller uses dual CAN-bus controller area networks to provide high speed internal system communication, including group to and between individual car controllers. Use of this industrial standard protocol opens the door to interoperability with a variety of current and future products and peripherals – including the latest door operators.

1.5.4 Parallel Independent Safety Processors

If at any time, Pixel's two independent safety systems do not agree, an automatic system shutdown is executed to keep passengers safe.

In compliance with current elevator safety code, Pixel's design incorporates parallel [independent safety processors](#). Two independent, redundant means are used to monitor safe operation. The logic output from both safety systems is continually compared.

EC design engineers devised **SP1**, a powerful software-based safety processor, which is [continually crosschecked](#) by **SP2**, a hardware-based FPGA (floating point gate array) safety processor.

1.5.5 Integrated I/O Testing and Remapping

Local diagnostics function whether or not the access point has an active connection to the system network.

Pixel has designed-in reliability and flexibility. Simple [onboard I/O testing](#) is supported at each [system access point](#). Every I/O is provided with an associated LED indicator.

If an I/O is found to have failed, [remap I/O](#) can be used to reassign this I/O to another location on the same PC board, or to another IO board, using an intuitive, visually based process.

1.5.6 Consolidated Field Wiring

Consolidated field wiring saves time while separating low and high voltage signals to help prevent component damaging wiring errors.

The Pixel controller cabinet has been designed so you can bring field wiring into a functional assigned color coded terminal strips – a convenience we call [consolidated field wiring](#).

1.5.7 Remote Assist™

Virtual tech support is delivered to your machine room on demand – with system access you always approve and control.

Elevator mechanics have long wished that support technicians could join them in the machine room with a simple call for help. [Remote Assist](#) enables the Pixel technical support team to virtually view the system you are working on, in real time, and provide guidance and recommendations.


1.6 Pixel Menu System Overview

Menu content is strategically organized, and logically sequenced, with related tasks grouped together.

The broad range of selections within the Pixel system are presented in menus, each containing a reasonable number of selections within each tier. The number of tiers has also been minimized to simplify navigation and selection.

The breadth and depth of the Pixel menu system provides access to the extensive parameters demanded by the most experienced. But many installers will find that the top two or three menu tiers will satisfy the majority of their needs.



1.6.1 Home/Startup Menu – Top Tier

The Pixel home menu displays on startup – or whenever the green  Home key is pressed.

This screen displays a greeting message, “Hi, I’m Pixel. What would you like to do?” along with the following Menu options:

- **Install**
- **Adjust**

- **Troubleshoot**
- **Date/Time display/reset**

Start by selecting one of three basic tasks – Install, Adjust, or Troubleshoot – by using the  Touch &Go™ knob to scroll through selection options. When your desired selection is highlighted, press the  knob to select.





NOTE: System date/time settings and preferences are accessed from the Home screen as well.

1.6.2 Install Menu – Second Tier

The Install menu presents a range of options which are roughly organized in the most likely sequence in which tasks will be completed:



- **About**
- **Initial Settings**
- **View Selector Data**
- **Learn Functions**
- **Code Compliance Test**
- **Construction Mode**
- **File Transfer**
- **I/O Mapping**
- **Contact**

Again, the  Touch &Go™ knob is used to scroll through selection options. When your desired selection is highlighted, press the  knob to select.

1.6.3 Adjust Menu – Second Tier

The Adjust menu presents a range of options for optimizing ride, car and group dispatching performance:

- **About**
- **Car Performance**
- **Ride Performance**
- **Group Performance**
- **Contact**



The  Touch &Go™ knob is used to scroll through selection options. When your desired selection is highlighted, press the  knob to select.

Each of these options, and their submenus, are presented in detail in **Section 4 – Final Adjustment**.

1.6.4 Troubleshoot Menu – Second Tier

The Troubleshoot menu presents a range of tools designed to simplify and expedite system troubleshooting if required:

- **About**
- **Single Call Enter**
- **Auto Car Call Simulation**
- **View Selector Data**
- **Serial Brake(s)**
- **Drive**
- **Controller Network**
- **Flags**
- **Event Logs**
- **Sequence Log**
- **Statistics Counters**
- **View Current Events**
- **Local Diagnostics**
- **Contact**

The  Touch &Go™ knob is used to scroll through selection options. When your desired selection is highlighted, press the  knob to select. Each of these options, and their submenus, are presented in **Section 7 – Troubleshooting**.

Section 2 – Your Installation Plan

2.1 General Information

This section contains important instructions and recommendations to ensure successful Pixel Control System installation.

Successful installation and reliable, trouble-free operation of all elevator control equipment depends on proper assessment of the installation environment and proper wiring methods. Completing both correctly protects equipment from disruption by external sources.

2.2 Installation Considerations

To Select the best location for the control equipment, consider the following:

- a. Make sure the control system is placed logically, while taking into consideration all elevator system components and non-elevator equipment sharing the space.
- b. Use four 1/2" in diameter, Grade 8 bolts and four 3" x 3" x 3/16" carbon steel plated washers in the designated enclosure mounting holes to secure controller cabinet.
- c. Provide adequate working space for control system installation, wiring, and maintenance.
- d. Do not install equipment where it may create a hazard.



WARNING: Install Pixel Control equipment according to all applicable electrical, fire, and building codes. Improper installation and/or equipment location may create a HAZARDOUS CONDITION.

- e. Do not install control system components in areas or on surfaces where there is exposure to vibration that may be produced by other equipment. Modern control systems contain socket-mounted parts whose function may be compromised by vibration.
- f. Provide adequate lighting for safety and efficiency.
- g. An internet connection, with a fixed IP address, is desirable for access to **Remote Assist™** from the EC factory technical support team.
- h. If wireless service at the installation location is poor or intermittent, have a wired phone installed in the machine room.

2.3 Environmental Considerations

The elevator control system should be installed according to the following requirements to ensure proper operation and longevity:

- a. Temperature inside the control system enclosure should be maintained between 32- and 104-degrees Fahrenheit (0 to 40 degrees Celsius). Temperatures outside this range may affect normal operation and/or

reduce system life. If required, make provisions for machine room air conditioning. EC can quote and provide an enclosure-mounted air conditioning unit.

- b. Air in the machine room should be free of corrosive gases and sufficiently dry to prevent condensation from moisture. NEMA 4 or NEMA 12 enclosures, with integral air conditioning units, are recommended for applications that do not meet these requirements. EC can quote and provide the full range of specialized NEMA rated enclosures for proper and safe operation in non-standard environments.
- c. Locate control system enclosures and components away from any window or opening to minimize the risk of equipment damage due to severe weather conditions.
- d. Protect control system equipment from exposure to extreme levels of electromagnetic (EM) and radio frequency (RF) radiation. EC control systems are certified to current EMI/RFI standards though independent testing by CKC Laboratories, Inc. However, note that EMI and RFI have the potential to interfere with normal operation of any electronic system.



NOTE: Hand-held communications devices used close to the system microprocessors have been known to generate disruptive RF interference.

2.4 Recommended Tools, Test Equipment & Manuals





The following tools are recommended for installation:


- a. Digital multi-meter
- b. Assorted tools used for electronics work such as pliers, cutters, flashlight, EC small straight blade screwdriver (supplied with each controller), etc.
- c. Amprobe or similar probe equipped ammeter
- d. Telephone
- e. Test weights
- f. Control system “as built” job wiring prints
- g. This installation and adjustment manual
- h. Motor Drive Control Manual (AC-Vector or DC-SCR or IGBT as required)
- i. Oscilloscope and meter that measures megohms may be desirable for advanced troubleshooting (rarely required)
- j. Tachometer to determine actual elevator car speed

2.5 Controller Wiring Guidelines



CAUTION: Restrict access to elevator control equipment and apparatus to qualified personnel only.


-  **NOTE:** It is very important to follow control system wiring guidelines to prevent problems with EMI/RFI interference and feeder line pollution.
-  **NOTE:** Wiring to controller terminals must be done neatly and carefully. Stranded wire conductors must be twisted together, avoiding stray strands that could create short circuits if not contained in terminals.
All terminals and cable connectors should be checked to ensure that they are properly and solidly seated.
-  **WARNING: DO NOT CONNECT BUILDING POWER DIRECTLY TO THE MOTOR CONTACTOR. This will DAMAGE power devices in the drive.**
-  **WARNING: METAL SHAVINGS AND/OR WIRE CLIPPINGS can cause immediate and delayed DAMAGE to circuits – in any part of the system – if they bridge or short any circuit or connection. They can also COMPROMISE SAFE AND PROPER SYSTEM OPERATION if they become positioned in a way that modifies a circuit or circuits.**

 **CAUTION:** Ensure that metallic shavings and/or wire clippings are minimized and prevented from remaining in any enclosure interior. Thoroughly check for and remove residue before applying power. Methods used to capture and remove metal fragments should not be allowed to create static buildup or discharge.

Good Practice: Soft, clean paint brush (gently sweep particles on enclosure bottom into pile and remove); masking tape (use to remove particles; create adhesive pocket under intended hole locations with tape to catch shavings when drilling).

Risky Practice: Use of small vacuum (potential ESD electrostatic discharge damage); compressed air (may drive particles into inaccessible or undetectable locations, potential for eye injury).

There are several wiring entry points provided to maintain proper separation between wiring for various purposes to ensure proper system operation, Study your control system layout to develop the best arrangement for keeping the wiring entry points separated and laid out logically to suit your application, refer to figure 2.5.1, **Power Wiring Routing**, below for suggested entry point locations.

-  **NOTE:** The standard EC NEMA 1 enclosures are provided with factory knockouts for recommended field wiring entry points. Alternate wiring entry points may be created in the field to accommodate specific installation conditions.

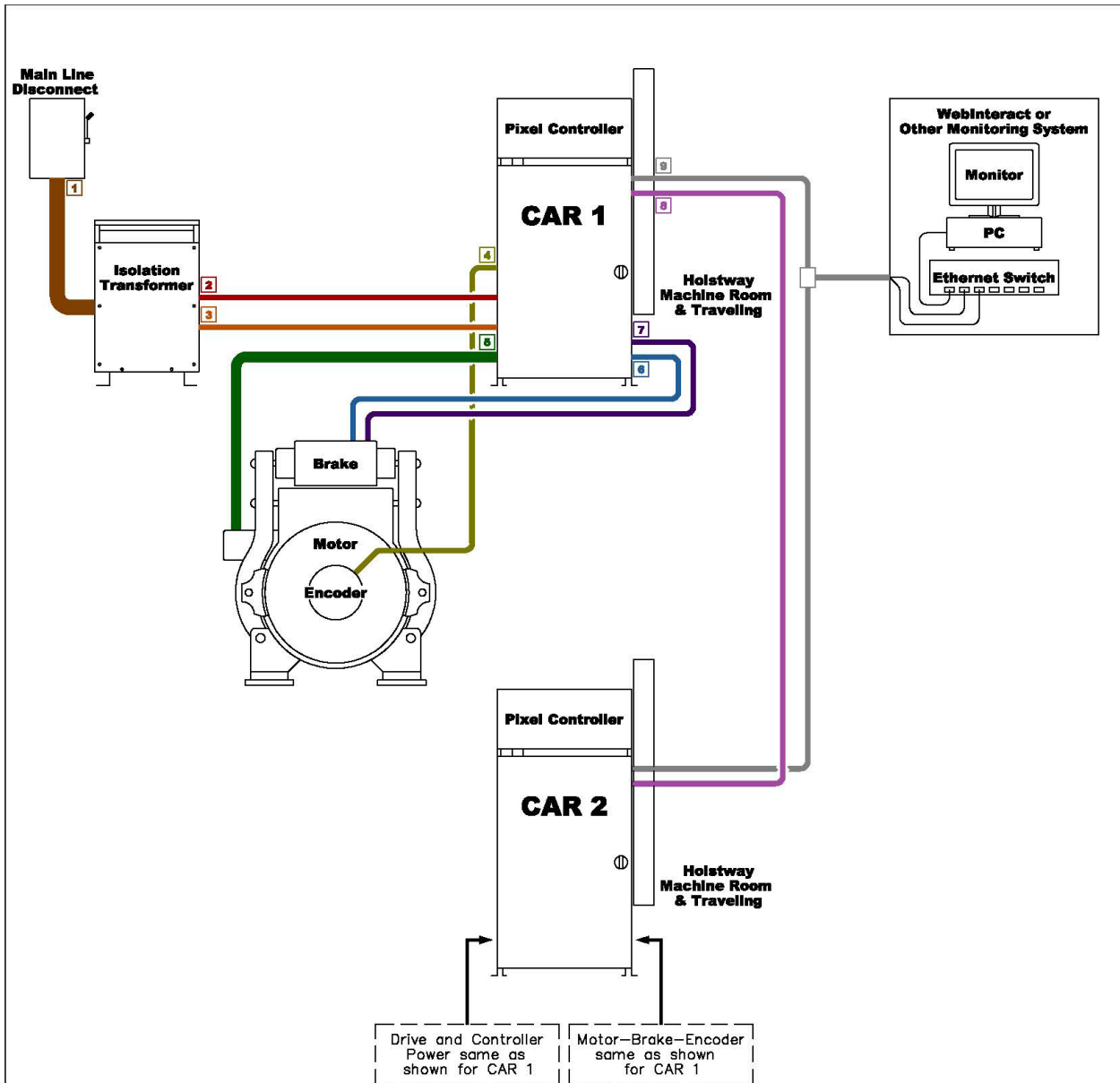


Figure 2.5.1 - Power Wiring Routing

- 1 MAIN LINE DISCONNECT POWER
- 2 CONTROLLER POWER
- 3 DRIVE UNIT POWER
- 4 ENCODER CABLE
- 5 MOTOR POWER & GROUND
- 6 BRAKE COIL(S) POWER
- 7 BRAKE MONITORING SWITCH(S)
- 8 GROUPLESS COMMUNICATION CAT5 WIRE(S)
- 9 WebInteract MONITORING SYSTEM CAT5 WIRE(S)

NOTES:

- A). IF ISOLATION TRANSFORMER IS NOT USED DUCTS 1, 2 AND 3 ARE REPLACED BY A SINGLE DUCT.
- B). FOR A SIMPLEX CAR DUCT 8 IS NOT USED.
- C). IF WebInteract OR A MONITORING SYSTEM IS NOT PROVIDED DUCT 9 IS NOT USED.
- D). FOR DC MOTOR APPLICATIONS DUCT 5 INCLUDES MOTOR ARMATURE AND MOTOR FIELD INCLUDING WIRING FOR DC-CHOKES.
- E). REPEAT FOR EACH ADDITIONAL CAR.

Section 3 – Install the Control System

3.1 Pixel Traction Control System Steps to Startup

Protect printed circuit boards from dust and foreign materials. Remove main fuses. Complete elevator controller mounting, installation, and wiring.

Observe controller field terminal locations in relation to wiring ducts to determine optimum locations for wiring to enter the control equipment enclosure.

Complete the steps in **Sections 3.2 through 3.4.5 below** to run the car in Construction mode.



CAUTION: Use care to protect circuit boards from metal debris when cutting.



CAUTION: Do **NOT** connect the building power supply to the motor contactor.



CAUTION: Power capacitors in the drive remain charged for some time after power is removed. Use caution to prevent shock injury.



NOTE: The standard Pixel traction controller enclosure has several 3/4" knockouts marked for wiring ducts which can be used as guides for location of knockouts required for each particular job.

3.2 Install the Controller Cabinet

In Section 2 you reviewed the general considerations for machine room layout and developed your installation plan. Now, proceed to locate and mount the controller enclosure.

3.3 Wire the Control System

3.3.1 Test Ground Continuity


Test all terminals for continuity to ground. If continuity is found, resolve the problem before proceeding.



NOTE: Terminal 3 is connected to ground and used as system common.


3.3.2 Remove Primary Controller Fuses


Remove fuses FL1, FL2, FCT1, FCT2, F4A to remove power to controller logic, brake(s) control circuits, and the door operator. Place **Machine Room Inspection** to **INSP** and the **Test** switch to **TEST**. Both switches are located on the P-MP board.

 **NOTE:** Always review job prints to confirm correct fuse designations and amperages, as well as to become familiar with job specific circuit requirements.

3.3.3 Place Disconnect Switch in Off Position


Place the disconnect in the off position then check voltage on the line side to verify that all three legs are correct based on job prints page QR4/ HMW.

 **WARNING: CONFIRM THAT FEEDER LINE VOLTAGE is within 10% of specified control voltage or PERMANENT DAMAGE could occur to both the motor drive and elevator control system logic. TURN OFF THE MAIN DISCONNECT and CORRECT any voltage problem BEFORE PROCEEDING with installation.**


 **CAUTION:** Remove any protective covering that may still be in place on PC boards and components before applying power.

3.3.4 Wire Main Line to Controller

Wire the main line from the disconnect to the terminal block provided in the controller enclosure as indicated on job prints page QR4/ HMW.

 **CAUTION:** Do **NOT** attempt to connect the building power supply to the motor contactor to prevent damage.

 **NOTE:** Use proper wire size for amperage.

 **NOTE:** Ground wire size must provide equal or greater ampacity than the incoming feeders.


3.3.5 Verify Supply Voltages at Equipment

Turn on the disconnect switch to verify that voltages at controller terminals are correct based on job prints page QR4/ HMW. For AC-Vector systems, you may check voltages on the EMI-RFI or Line Reactor filter input terminals (if the job includes such filters).

Turn off the disconnect switch then replace the fuses removed previously in Section 3.3.2 above.


Turn on the disconnect switch and confirm that the motor drive powers up. Verify that computer power supply input and output voltages are correct based on job prints page 2. Verify that buss voltages are 24 volts DC for terminals 6, 50, 50F, and S24V; and 120 VAC for terminal 4A.

Confirm that the P-MP color display is on and the screen shows the Pixel home/startup display, “Hi, I’m Pixel. What would you like to do?”

 **NOTE:** After verifying input voltages and fuses as required per job prints, if you are unable to correct conditions to confirm voltages and behaviors described, call Elevator Controls technical support at **916-428-1708**.

3.3.6 Pixel Dashboard Interface – Indicators

You will find multiple LED indicators have been provided on PC boards, and onboard computer diagnostics are included. Both are very useful tools that will save installation and troubleshooting time.

 **NOTE:** Review the Pixel system dashboard indicators and switchgear before continuing to Section 3.3.7.

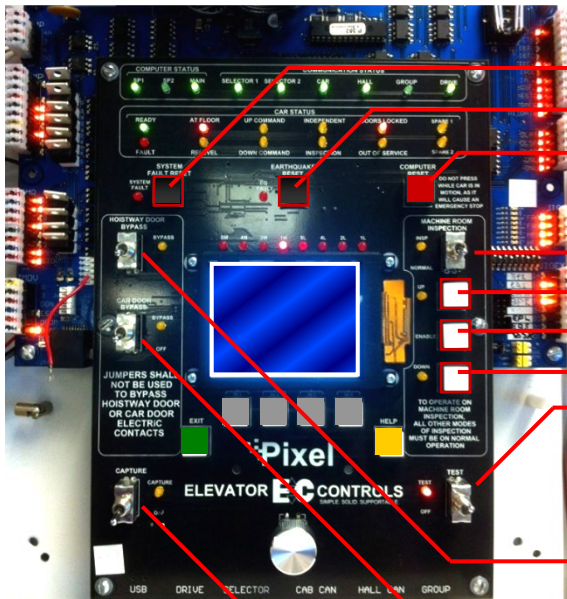


Figure 3.3.6a - Pixel

SWITCHGEAR

- System Fault Reset
- Earthquake Reset
- Computer Reset

MACHINE ROOM INSPECTION

- Inspection Switch
- Up Button
- Enable Button
- Down Button
- Test Switch

DOOR BYPASS PANEL

- Hoistway Door Bypass
- Car Door Bypass
- Capture Switch

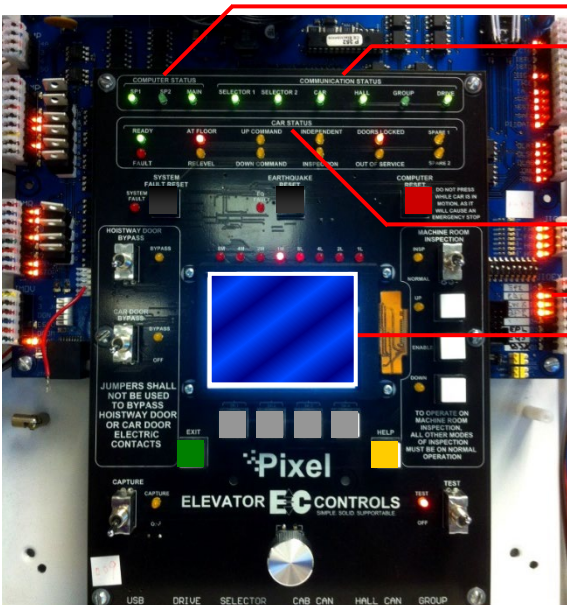


Figure 3.3.6b - Pixel Dashboard

INDICATORS

- Computer Status
- Communication Status
- Car Status Indicators
- I/O Indicators
- High Resolution LCD Display

3.3.7 Verify Motor, Encoder and Brake(s) Data Tag Information

This step confirms that the data provided to manufacture the control system agrees with actual nameplate data for key components: motor, encoder and brake.

- a. Compare motor nameplate data to that found on the job prints page 1.
- b. Compare encoder nameplate data, for type and PPR, to that found on the job prints page 1.
- c. Compare brake nameplate data, for pick voltage, hold voltage, and resistance, to that found on job prints page 2, for both Main and Auxiliary Brake if applicable.



WARNING: DO NOT CONTINUE if any DATA discrepancy is found.



NOTE: If any data does **NOT** agree with job prints, call Elevator Controls Technical Support at 916-428-1708. Be prepared with your job number, nameplate data, and job print data.

3.3.8 Identify the Correct Appendix for Your Drive

A wide variety of drives are available for each unique application to optimize best function for the specific job, budget considerations, and installing contractor familiarity and preferences. Appendices A (for AC) and B (for DC) contain drive-specific notes for your unique application, including parameters and motor auto tuning instructions. Using the following tables, identify the appendix that corresponds to the drive in your control system.

Appendix A – AC Vector Motor Control Drives

- | | |
|------------|---|
| A1 | L1000A drive for Induction Motors |
| A2 | L1000A drive for PM Motors |
| A3 | HPV-900 drive for Induction Motors |
| A4 | HPV-900 drive for PM Motors |
| A5 | Combivert F5 drive for Induction Motors |
| A6 | Combivert F5 drive for PM Motors |
| A7 | Quattro AC drive for Induction Motors |
| A8 | Quattro AC drive for PM Motors |
| A9 | M1000 drive for Induction Motors |
| A10 | M1000 drive for PM Motors |
| A11 | Combivert F5 LCD drive for Induction Motors |
| A12 | Combivert F5 LCD drive for PM Motors |

Appendix B – DC Motor Control Drives

- B1** DSD-412 DC drive for DC Motors
- B2** Quattro DC drive for DC Motors



NOTE: Identify the correct Appendix section for your drive, and then mark the first page for easy reference. If, for example, you are working with a L1000A drive and **THIS** manual says, “Adjust the drive gain, Refer to Appendix Section x1.6, it would refer to Appendix A1 Section A1.6.



WARNING: DO NOT ATTEMPT TO RUN THE CAR until Sections 3.3.9 to 3.3.13 below are completed.

3.3.9 Verify Drive Parameters

This step confirms that the parameters programmed in the drive agree with the job prints page QR7/ DPS. Refer to respective drive Appendix Section x1.2.



WARNING: DO NOT ATTEMPT TO MOVE THE CAR before making sure ALL PARAMETERS ARE SET in the drive per actual motor characteristics and MOTOR AUTO TUNING has been successfully completed.



NOTE: Before attempting to configure drive parameters, study the manufacturer's drive manual and the Appendix in **THIS** manual for your specific drive.



WARNING: DO NOT CONTINUE if any DATA discrepancy is found.



NOTE: If any drive parameters do **NOT** agree with job prints, call Elevator Controls Technical Support at 916-428-1708. Be prepared with your job number, nameplate data, and job print data.

3.3.10 Auto Tune Drive

This step allows the Drive to calculate the electrical characteristics of the hoist motor. Refer to Appendix Section x1.3.



WARNING: DO NOT ATTEMPT TO MOVE THE CAR before MOTOR AUTO TUNING has been successfully completed.











NOTE: If Auto Tune cannot be **completed successfully**, and you have exhausted instructions provided in the Drive manual, call Elevator Controls Technical Support at 916-428-1708 for assistance. Be prepared with your job number, nameplate data, and job print data.

3.3.11 Enable Construction Mode of Operation

The steps described starting in this section will allow you to operate the car in Construction mode when you reach the end of Section 3.4.5. Construction Mode allows the car to be operated on Cartop or Machine Room inspection modes without Landa™ selector feedback – while maintaining elevator safeties consistent with both inspection modes.


Construction mode is enabled or disabled by using the Touch & Go™ knob, navigate to:

-  Home 
-  Install 
-  Construction Mode 
-  **Enable** or  **Cancel**

Pixel Navigation Icons

Knob Rotate/Push

 Rotate to locate

 Push to select

Key Press

 Home

 Direct-Select

 Help






NOTE: Construction Mode must be set to Disable to Enable any automatic mode of operation.


3.3.12 Wire Circuits Required for Construction Mode

Construction Mode allows the car to be operated on Car Top or Machine Room inspection modes. All safety circuits required for these modes of operation must be operational:

- a. Governor switch contact wired between Terminals 4A and GOV.
- b. Car Safety String wired between terminals 4A and SAFC.
- c. Hoistway Safety String wired between terminals SAFC and SAFH.
- d. Wire Motor and Encoder unit, refer to page 1 of prints.
- e. Wire Brake and Auxiliary brake, refer to page 2 of prints.
- f. Set HOISTWAY DOOR BYPASS and CAR DOOR BYPASS SWITCHES to BYPASS position, to allow running the car on Cartop Inspection; OR ensure that all car and hoistway gates and locks are closed to run on either Car Top or Machine Room inspection mode.

-  **NOTE:** Use proper wire size for amperage, with the ground wire size of equal or greater ampacity than the motor power wires.
-  **NOTE:** Encoder must be wired with a single length of properly shielded cable to work correctly. An encoder cable that is too short must NOT be spliced but replaced. Contact the supplier that provided the original encoder cable for a replacement with the required length.
-  **NOTE:** Refer to job prints page 1 for the encoder wiring diagram. Care must be taken to properly connect shield wiring as shown on job prints for encoder to work correctly.
- g. Wire Inspection Station to controller terminals ICT, ICTE, ICTU, and ICTD as shown on job prints page QR1/ CW.

3.3.13 Verify Speed Parameters

-  **NOTE:** Even though Pixel's "This Job" parameters have been factory preset it is important to verify them, when this manual instructs you to do so, for optimum system performance.

Pixel's microprocessor MP calculates and generates the speed pattern that is fed to the drive to achieve optimum ride and performance. These calculations are dependent on programmed speed parameters, current car position, and car speed.

Verify that Pixel speed parameters match job requirement. View parameters, using the Pixel screen, and compare settings to the speed profile table below, navigate to:

 Home 

 Install 

 Initial Settings 

 **Speed Profile** 

Speed Profile Table

SPEED PROFILE	DEFAULT SETTING	L1000A or M1000
Contract Speed	XXX fpm Job Specific	XXX fpm Job Specific
Inspection Speed	40 fpm	40 fpm
Leveling Speed	5 fpm	5 fpm
Re-Leveling speed	5 fpm	5 fpm
Earthquake Speed	120fpm	120fpm
↻ Initial Jerk	060 fpm	060 fpm
↻ Roll Over Jerk	060 fpm	060 fpm
↻ Deceleration Jerk	060 fpm	060 fpm
↻ Acceleration	060 fpm	060 fpm
↻ Deceleration	060 fpm	060 fpm
Leveling Decel Time	0000 msec	0000 msec
SLDN End Marker	1.0 ft	1.0 ft
Pattern delay	0000 msec	0400 msec
Highspeed trip speed	Contract Speed + 10%	Contract Speed + 10%
Inspection Trip Speed	100 fpm	100 fpm
Leveling trip Speed	100 fpm	100 fpm
Earthquake trip Speed	132 fpm	132 fpm
Terminal % Trip Speed	10%	10%
Level Zone	0.83 ft	0.83 ft
Dead Zone	0.05 ft	0.05 ft
Traction Loss Speed %	50%	50%
Releveling Distance Speed %	.120 ft	.120 ft
Releveling Timeout	3000 msec	3000 msec
Releveling Offset	0.012 ft	0.0120 ft
Speed Pattern Scaling	OFF	OFF
Ramp to Stop	No	Yes
ISTU-ISTD Factor	1.50	1.50 (Test Parameter)
L1000A Reg. Release	No	Yes, for L1000A, No all Other
INS Speed Profile	100%	100%
Emergency Slowdown Factor	1.75	1.75



NOTE: Ramp to Stop parameter Yes setting is for Pixel controllers interfacing to L1000A or M1000 drive units.

If Ramp to Stop is set “Yes” set Pattern Delay parameter, in the drive unit, to 400 msec and Pixel Brake Pick Delay timer 00:00:30 seconds, adjust value to prevent excessive rollback or taking off with brake set.

A general rule of thumb can be useful when setting speed parameters with preliminary values. During final adjustment these values will be refined, example:

For Contract Speed up to 300 feet per minute

Divide contract speed by three, and use this value to set Jerks, Acceleration, and Deceleration parameters (marked with 🔄 in the table).

Example: Contract speed = 200 feet per minute
Compute $200/3 = 67$
Set parameters marked 🔄 to 67

For Contract Speed above 300 feet per minute

Set all parameters marked 🔄 to 100

Example: Contract speed = 400 feet per minute
Set parameters marked 🔄 to 100



WARNING: CONTRACT SPEED must be entered ACCURATELY to prevent personal injury and/or equipment damage. A single missing character (i.e.: 100 vs. 1000) will produce a GREATER THAN INTENDED EFFECT on the speed pattern calculated by Pixel.

3.4 Run the Car on Construction Mode




NOTE: Pixel will prevent the car from moving until the required Construction Mode signal status is achieved.



NOTE: Construction Mode allows the car to run On Car Top or Machine Room Inspection to a maximum speed of 50 fpm or the programmed inspection speed, whichever is less.

Navigate to the home screen, and then follow step-by-step instructions.

 Home

Confirm that the Pixel screen displays, “No Faults.”

If a fault condition is indicated

 Help

Read the fault description and follow instructions for resolving the issue.


Once recommended actions are completed press the

 System Fault Reset

This will clear a “fault latched” state.




NOTE: The highest priority fault is displayed on the Pixel home screen (No Faults is the default). Lower priority faults may be revealed once the first fault is resolved. Repeat instructions above until No Fault are displayed.

 **NOTE:** Events are classified as either latching or non-latching. While non-latching events self-reset, all events are recorded in fault counters and logs, refer to Section 7.3.1 for a Latching Event Table 7.3.1 and section 7.4 for Pixel Event Listing Table for explanation and possible causes and solutions.


3.4.1 Attempt to Move Car

Command the car to move on Inspection up or down while observing drive sheave directional rotation. If directional rotation agrees with commanded direction skip to section 3.4.2 below.

Refer to Appendix Section x1.4, Motor Rotation verification, if necessary, to correct reversed rotation.


 **WARNING:** Motor control, speed, and directional rotation must be confirmed **BEFORE PROCEEDING** to section 3.4.2 below.

3.4.2 Brake(S) Adjustment


 **NOTE:** Refer to Appendix F for Serial interface driven main brake for set-up and adjustment instructions, then continue at step 3.4.2.2 below.

3.4.2.1 Main Brake Relay Logic interface adjustment


While attempting to run the car, adjust the main brake pick and hold voltage outputs by adjusting power resistors for picking and holding voltages, refer to job prints Page 2 for brake power resistors adjustment instructions.

 **NOTE:** Brake power resistors are located inside the resistor cage on top of the controller.

3.4.2.2 Auxiliary Brake Relay Logic interface adjustment

 **NOTE:** Refer to Appendix F for Serial interface driven Auxiliary brake for set-up and adjustment instructions then continue step 3.4.3 or for Rope Gripper to respective manufacturer installation and adjustment for set-up and adjustment instructions then continue step 3.4.3 below.

While attempting to run the car, adjust Auxiliary brake pick and hold voltage outputs by adjusting power resistors for picking and holding voltages, refer to job prints Page 2 for brake power resistors adjustment instructions.

 **NOTE:** Brake power resistors are located inside the resistor cage on top of the controller.

3.4.3 Brake Mechanical Operation

Prove that the Main brake will properly hold at least an empty car. Perform any necessary mechanical adjustments to obtain proper brake operation. Refer to the brake manufacturer adjustment instructions to perform necessary brake adjustments.

3.4.4 Verify Car Speed

Command the car to move on Inspection up or down while measuring car speed, verify commanded vs. measured speed agree. If commanded vs. measured speeds agree skip to section 3.4.5 below.

Refer to Appendix Section x1.5, Commanded vs. Measured Speed Calibration, if necessary, to correct a speed mismatch.



WARNING: Commanded vs. Measured speed must agree BEFORE PROCEEDING to section 3.4.5 below.

3.4.5 System Startup Complete

At this point the system startup is complete: the elevator car should run correctly on Construction mode Machine Room Top Inspection or Machine Room Inspection modes.

If you are unable to run the car, review the steps in Section 3 to section 3.4.5 above, and repeat as required.

Elevator system hardware installation should be completed next, including installation of the Cartop box, Car Operating Panel, Landa™ dual head positioning system etc. to enable the car to transition from Construction Mode to Inspection and Automatic modes of operation.


3.5 System Components Installation and Wiring

3.5.1 TOC Box Installation

The Pixel TOC box is supplied with the necessary hardware to permanently attach it to the crosshead using Unistrut and clamps.

Survey the cartop and determine the best quadrant for mounting, setup, and ease of wiring to door operator(s), load weighing devices, Landa™ positioning hardware, fans and cab accessories to the TOC box. Refer to job prints page QR6/ TOC1 for instructions and details of TOC mechanical installation.



Install the TOC box provided. If your TOC box includes the optional pre-wired Car Top Inspection Station, install the TOC box the light bulb and light bulb mesh protection provided. Install the Emergency Stop push button switch.

-  **NOTE:** Pixel's pre-wired Car Top Inspection Station light bulb, light bulb mesh protection, and the Emergency Stop push button switch are shipped inside the TOC box.

Once the TOC box has been installed, if you did not order the pre-wired Car Top Inspection Station, wire the job Inspection Station provided by others to the TOC Box, referring to page QR3/ CW of the prints for wiring instructions.


3.5.2 COP Installation Wiring

Refer to your COP panel provider and cab manufacturer for any special installation instructions for the pre-wired COP panel. Use the harness provided to connect to the TOC box. Refer to job prints page QR3/ CW for harness wiring details.


-  **NOTE:** A color-coded harness is provided to simplify connection of the COP(s) to the TOC. One harness is shipped with the TOC box for each COP.
-  **NOTE:** Place the switch for Independent Service to on and leave it on to make sure car will open doors while transferring from TEST to Independent service as indicated in Section 4, final adjustment below, to ensure car will open doors to enable access to cab.

3.5.3 Traveler Cable Installation and Wiring

Install the Traveler Cable and wiring. Refer to your traveler cable provider and cab manufacturer for any special installation instructions. Refer to page QR3/ CW of the prints for traveler wire count as well as for one-to-one terminal wiring instructions.

-  **NOTE:** A separate terminal strip is provided, in the controller, to wire one to one the traveler cable conductors to the controller. Another terminal strip is located inside the TOC box. The top portion of the TOC box terminal strip is intended for termination of traveler cable conductors.

3.5.4 Positioning System Installation


-  **NOTE:** If using a CEDES APS position system instead of a Landa™, refer to Appendix E for installations instructions then skip to section 3.5.5 below.

3.5.4.1 Landa™ Encoded Tape

Landa™ Positioning System is supplied with necessary hardware to permanently attach it to the rails and crosshead using Unistrut and clamps. Survey the cartop and hoistway to determine the quadrant that provides clearance for the Encoded

Tape to run the entire length of the hoistway. Refer to page QR5/ PS1 of the prints for installation guidelines.


Start by fastening the top end of the tape to the top-of-hoistway bracket, and then allow the roll to descend the hoistway.

 **NOTE:** The Encoded Tape is polarized so it must be installed with the start position at the bottom of the hoistway. To simplify installation, tape has been coiled with the top end on the outside of the roll.

3.5.4.2 Landa™ Dual Sensor Head Installation and Wiring













The sensor heads can be mounted on any of their three sides to facilitate encoded tape position and sensor head assemble locations. Refer to page QR5/ PS1 of the prints for installation guidelines.

Connect the Sensor heads to the TOC box using the color-coded wiring harnesses provided. Refer to page QR5/ PS1 of the prints for wiring details.







 **NOTE:** The Auxiliary sensor head (selector 2) is the one mounted at the top of the Landa Dual Sensor Head bracket assembly. It connects to the TOC JASEL connector on the TOC board. The Main sensor head (selector 1) is the one mounted at the bottom of the bracket and connects to the TOC JMSEL connector.

3.5.4.3 Landa™ Positioning System Verification


Using the TOC access point, verify the distance between the two position sensor heads. Navigate to:

-  Home 
-  Install 
-  Learn Functions 
-  Virtual Limits 
-  Tape Reader Offset 
-  Learn or  Back

Verify proper operation of the Landa system. Navigate to:

-  Home 
-  Install 
-  View Selector Data 

- a. Confirm that the position displayed for selector 1 should be smaller than selector 2. If not, swap the pluggable terminal strips JMSEL and JASEL on the P-TOC board.
- b. Confirm that selector positions increment and decrement together as you run the car either up or down.
- c. Confirm that the RAW delta difference is between 0.7 to 1 feet, and roughly matches the physical distance between the two sensor heads as mounted.

 **NOTE:** If you cannot confirm performance as described above, repeat steps in Section 3.5.4 until the landing system operates correctly.

3.5.5 Cab and Hoistway Wiring


3.5.5.1 Mechanical Switches and Peripherals Wiring

Refer to page QR3/ CW of the prints for cab peripherals, such as Door Operator, Photo Detectors, Fans and Lights, etc. requirements and wiring guidelines. Install and wire as necessary.

Refer to page QR4/ HMW of the prints for hoistway switches requirements and wiring guidelines. Install and wire necessary mechanical switches.


3.5.5.2 Hall Network

Refer to your Fixture manufacturer for any special installation instructions for the EC-Ready pre-wired Hall Stations. See page QR4/ HMW of the prints for hall station node wiring guidelines.

 **NOTE:** CAN-driven hall station nodes require power and data wiring. Care must be observed not to interchange data wires and power wires so node(s) will be able to access the network and communicate.

3.5.5.2.1 Pixel RJ45 Hall Wiring Option

If the controller purchase included the optional Pixel RJ45 Hall Wiring option, consisting of all the necessary RJ45 cables and RJ45 cable splitters to wire the Hall network to Pixel, refer to page QR4/ HMW of prints and observe that the use of RJ45 splitters is optional the P-Hall boards have two RJ45 female jacks that can be used to interconnect the hall network eliminating the need of splitters and the three feet RJ45 cables used to connect from the splitter to the hall nodes.

 **NOTE:** The on-board P-Hall RJ45 female jacks can be used for either input or output to connect them directly to the hall network eliminating the RJ45 splitters and the three feet cables from splitter to hall nodes.

3.5.6 Verify Network Set Up


Pixel network is divided into Cab and Hall node networks to facilitate setup and troubleshooting. Pixel needs to be told what to expect as part of each network through configuration parameters that can be manipulated navigating to:

 Home 

 Install 


 Initial Settings 

 MP CAB Node Network  or  HALL Node Network 

 **NOTE:** Even though Pixel's "This Job" network parameters have been factory preset it is important to verify them or be able to re-configure to match job requirements.


3.5.6.1 MP Cab Node Network Setup Verification

The Cab Node Network window indicates to Pixel which nodes to expect as part of "This Job" Cab nodes, verify settings to match job requirements for the correct number and type COP nodes, Door Operator, and load weigh device.

 **NOTE:** If the door operator interface is not CAN driven set CAN Driven Door Operator to No. if no Load Weigh Device is to be used set Load Weigh device to None, or Discrete for dry contact interface, or CAN Based if CAN driven.

3.5.6.2 HALL Node Network Setup Verification

The Hall Node Network window indicates to Pixel which nodes to expect as part of "This Job" Hall Nodes on top of the Hall Call Nodes which are defaulted to be part of the network based on car landing eligibility, verify settings to match job requirements for the correct number and type.

 **NOTE:** If top or/ and bottom inspection access operation will be required and the job has front and rear doors openings, the top and bottom access nodes must be configured to the door opening access operation which locks will be bypassed while active.

3.5.7 Verify Network Communications

Once wiring has been completed, and the network set up verified, Pixel needs to acknowledge each node throughout the network, to facility this task Pixel network verification has been divided into four landscape windows as follows:

3.5.7.1 Car Network Landscape

Once cab wiring has been completed can be viewed navigating to:

 Home 

 Install 

 Learn Functions 



 **Car Network Landscape** 

Selecting the Car Network Landscape menu causes the Pixel MP to perform a node search for all available CAN-driven cab nodes and display a list of nodes found. Verify that the list confirms all expected and required cab nodes and correct wiring or Pixel nodes switchgear as needed to obtain expected network nodes listing.

3.5.7.2 Pixel Car Nodes Switchgear Configuration

Each Pixel node member having an on-board configuration switchgear, must be configured to behave for the selected task to be performed as follows:

- a. COP main front switch 1 On, switches 2, 3, and 4 Off
- b. COP Main Auxiliary front switch 2 On, switches 1, 3, and 4 Off
- c. COP main rear switch 1 and 2 On, switches 3, and 4 Off
- d. COP Main Auxiliary front switch 3 On, switches 1, 2, and 4 Off
- e. CNEX Nodes utilize switches 1 to 4 in binary mode to identify node number, with all switches off as reserved configuration, i.e. CNEX one will have switch 1 On, switches 2, 3, and 4 Off.

 **NOTE:** Press the  Refresh soft key if any node switch gear has been modified or if any node wiring has been correct to cause the Pixel MP to perform a node search and refresh window data.

3.5.7.3 Car Hall Network Landscape

Once hall wiring has been completed can be viewed navigating to:



 Home 

 Install 

 Learn Functions 

 **Car Hall Network Landscape** 

Selecting the Car Hall Network Landscape menu causes the Pixel MP to perform a node search for all available CAN-driven Car Hall nodes and display a list of nodes found. Verify that the list confirms all job required Car Hall nodes, i.e. Top and Bottom Access, Hall Gongs, Etc., refer to job prints page 9 for job required car hall node configuration switch gear.

 **NOTE:** Press the  Refresh soft key if any node switch gear has been modified or if any node wiring has been correct to cause the Pixel MP to perform a node search and refresh window data.

3.5.7.4 System Hall Network Landscape

Once hall wiring has been completed can be viewed navigating to:



 Home 

 Install 

 Learn Functions 

 **System Hall Network Landscape** 

Selecting the System Hall Network Landscape menu causes the Pixel MP to perform a node search for all available CAN-driven system nodes and display a list of nodes found. Verify that the list confirms all required System Hall nodes, i.e. Hall Calls, Fire Service, Hospital Calls, Etc, refer to job prints page 9 for job required system hall node configuration switch gear.

 **NOTE:** Press the  Refresh soft key if any node switch gear has been modified or if any node wiring has been correct to cause the Pixel MP to perform a node search and refresh window data.

3.5.7.5 Unknown Node Landscape

Once hall wiring has been completed can be viewed navigating to:

 Home 

 Install 


 Learn Functions 

 **Unknown Node Landscape** 

Selecting the Unknown Node Landscape menu causes the Pixel MP to perform a node search for all CAN-driven nodes whose switchgear has an invalid switchgear configuration and display a list of nodes found, this window is useful in helping to

determine if the correct number of nodes has been installed but their switch gear may not be properly configured, refer to job prints page 9 for job required system node configurations switch gear.



NOTE: Press the  Refresh soft key if any node switch gear has been modified or if any node wiring has been correct to cause the Pixel MP to perform a node search and refresh window data.

3.6 Verify Hoistway Clearance

Inspect the full length of the hoistway to ensure availability of required free running clearances. Check all door locks to ensure that they also have proper clearances.

While running the car, verify that the Landa encoded tape selector heads allow tape to pass freely with no continuous contact. Make necessary adjustments to correct any misalignment.



NOTE: The position of the Landa sensor heads in relation to the encoded tape must be consistently maintained throughout the entire hoistway for the system to function reliably.

3.7 Verify Connectors Properly Seated

Verify that all connectors in the system are correctly seated. Ribbon and plug in field wiring connectors can work loose during shipment or installation. Press firmly on all connectors to verify seating. If this car is part of a group system, verify that required car-to-car communications cables are installed, along with any #18 Awg. cross connection wiring according to the page QR4/ HMW of the prints.



CAUTION: Proper seating and secure latching of all connectors is critical to reliable system operation.

3.8 Hoistway Position Learn

Pixel needs to “learn” the position of the virtual door zone positions, as well as virtual positions for the top and bottom normal and access limit positions. This process can be completed all at once or by individual “target”. The learn process is broken into sections for clarity.




NOTE: Pixel must learn the virtual bottom landing door zone position first such position will be used to normalize all other virtual positions.

3.8.1 Floor Setup

3.8.1.1 Bottom Landing Setup

Pixel must “learn” the position of the bottom landing first; such position must be learned by positioning the car at the bottom landing position. The bottom landing position will be used to normalize the encoded position read from the tape at the bottom landing to 1.2 feet and use this virtual position to scale all other floors and virtual limits required by Pixel logic.

 **NOTE:** The bottom landing position does not have to be set precisely at this time, its value will be fine-tuned during Final Adjustment Section 4, and all other positions will be automatically adjusted to reflect change in bottom floor normalized position.

To learn the bottom landing position, drive the car to the approximate bottom landing location and navigate to:

 Home 

 Install 


 Learn Functions 



 Floor Set Up 


 Landing Number 


 **Rotate Landing Number value to select bottom landing** 

Press the  Learn soft key, to learn position.



Press the  Save soft key, to permanently store position.


 **NOTE:** Press the  Cancel soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

 **NOTE:** The Car’s Current Position value and the Door Zone Position values change to 1.2 ft value

 **NOTE:** The Down Normal Terminal virtual switch position, DNL, will be defaulted to a position 2 inches below the bottom landing Door Zone Position value, i.e. 1 ft, its position can be adjusted from 0.5 to 4 inches as needed to match elevator performance.

3.8.1.2 All Other Landings Setup

Pixel will use the bottom landing position to learn and normalize the remaining landing positions. Positions can be learned by Learn by Position (indicated by this symbol ) or Learn by Input Value (indicated by this symbol )

 **NOTE:** The landing position does not have to be set precisely at this time – values will be fine-tuned during Final Adjustment Section 4.

Learn by Position

Drive the car to the landing position to “**Learn**” and navigate to:

 Home 


 Install 

 Learn Functions 



 Floor Set Up 

 Landing Number 

 **Rotate to select landing position to be learn** 

Press the  Learn soft key, to learn position.


Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Cancel soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

Repeat Steps above for all landings.

Learn by Input Value

If the approximate landing to landing distance is known, such distance can be entered to Pixel database, instead of driving the car to the landing position to learn it.

 **NOTE:** To use this method, Step 3.8.1.1 Bottom Landing Setup must have been performed.

Examples of calculations for landing position entry values, assuming 10 feet from landing to landing:

- a. Landing Position second landing= Bottom Landing position + Distance from bottom to second landing.

$$\text{Landing position second landing} = 1 \text{ ft} + 10\text{ft} = 11\text{ft}.$$

- b. Landing Position fifth landing = Bottom Landing position + Distance from bottom to fifth landing.

$$\text{Landing Position fifth landing} = 1\text{ft} + (4 \text{ landings} \times 10 \text{ ft per landing})$$

$$\text{Landing Position fifth landing} = 1\text{ft} + 40 \text{ ft} = 41 \text{ ft}$$

Calculate values for all landings then navigate to:



 Home 

 Install 

 Learn Functions 



 Floor Set Up 



 Landing Number 


 Rotate to select landing position to be entered 

 Rotate to enter calculated value for Landing Position 

Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Cancel soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

 **NOTE:** The x1  soft key can be used to adjust the magnitude/size of rotational increments by 1, 10, 100, or 1000, back to 1. Repeat Steps above for all but bottom landing landings.

 **NOTE:** The FLOOR SETUP window allows the manipulation of the position indicator landing labels displayed, as well as verification of individual landing CAN-driven network devices. This area will be explored further in Final Adjustment Section 4 of this manual.

3.8.2 Limit Switches

Pixel logic will default the Up , Up Normal Limit (UNL), and Down, Down Normal Limit (DNL), normal travel positions to be two inches below the bottom landing for the down normal limit position of travel and two inches above the top landing for the up normal limit position of travel.

The UNL and DNL positions can be adjusted to be a maximum of 4 inches past the direction of travel if required, navigating to:

 Home 

 Install 



 Learn Functions 



 Limit Switches 


 Up Normal Limit (UNL)  or  Down Normal Limit (DNL) 

 Rotate to desired position value to be entered 

Press the  Save soft key, to permanently store position.


 **NOTE:** Press the  Cancel soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

 **NOTE:** The x1  soft key can be used to adjust the magnitude/size of rotational increments by 1, 10, 100, or 1000, back to 1.

 **NOTE:** The Top and Bottom Terminal Markers are not currently used by pixel logic, changing their value has no effect on the elevator behavior.

3.8.3 Virtual Limits

3.8.3.1 Top and Bottom Access Virtual Limits

Pixel must “learn” the position of top and bottom access travel positions. Choose from two learn methods below: Learn by Position (indicated by this symbol ) or

Learn by Input Value (indicated by this symbol ) .



Learn by Position



On inspection mode, drive the car to the bottom access travel position. Navigate to:

 Home 


 Install 



 Learn Functions 

 Virtual Limits 

 Bottom Access Limit (BAL) 

Press the  Learn soft key, to learn position.

Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Back soft key to abort learning position and make a new selection, or to return to the previous menu without saving. Repeat procedure at the top of the hoistway.

Navigate to:

 Home 


 Install 



 Learn Functions 

 Virtual Limits 


 **Top Access Limit (TAL)** 

Press the  Learn soft key, to learn position.

Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Back soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

Learn by Input Value

-  **NOTE:** To use this method, Step 3.8.1 Bottom Landing Setup must have been performed.
- Note the positions for the Bottom and Top landing recorded on Step 3.8.1.1 and 3.8.1.2 above.
 - Determine the allowed travel distance, based on your cab size and elevator code requirements.
 - BAT position = Bottom landing Position + allowed travel distance from b above
 - TAL position = Top landing Position - allowed travel distance from b above



Navigate to:

 Home 

 Install 

 **Learn Functions** 

 Virtual Limits 



 Bottom Access Limit (BAL) 



 Rotate to desired value for BAL position 

 Top Access Limit (TAL) 


 **Rotate to desired value for TAL** 

Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Cancel soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

 **NOTE:** The x1  soft key can be used to adjust the magnitude/size of rotational increments by 1, 10, 100, or 1000, back to 1.

3.8.3.2 Mid-Hoistway Virtual Position

 **WARNING:** Mid-Hoistway position must be learned for installations requiring seismic operation, otherwise skip section 3.8.3.2.

Pixel must “learn” the position where the counterweight meets the elevator cab to determine direction of movement away from the counterweight in the event of earthquake detection. All do position can be entered by value it is recommended to be learned by actually driving the car to the position where the top of the elevator cab meets the bottom of the counterweight as described below:

Learn by Position

On inspection mode, drive the car to the position where the top of the elevator cab meets the bottom of the counterweight position, navigate to:

 Home 


 Install 



 **Learn Functions** 

 Virtual Limits 

 Mid-Hoistway 



Press the  Learn soft key, to learn position.

Press the  Save soft key, to permanently store position.

 **NOTE:** Press the  Back soft key to abort learning position and make a new selection, or to return to the previous menu without saving.

3.9 Transfer of Hoistway Layout



Sections 3.2 to 3.8 above allowed Pixel MP Microprocessor to create a virtual image of the hoistway, such image needs to be transferred to the safety microprocessors as part of the Safety Configuration for Pixel to allow the car to operate under TEST mode once Construction Mode is disabled, to transfer the Safety Configuration File to SP1 and SP2 microprocessors follow instructions in File Transfer submenu, navigate to:


 Home 

 Install 

 File Transfer 

 Safety Configuration Upload 

Press the  **Transfer** soft key to transfer a configuration file to safety microprocessors or the  **Back** soft key to abort transfer.

 **NOTE:** Through this procedure Pixel will prompt you to wait while the system enters and exits file transfer mode operation. **Do not press any keys during a wait timeout to prevent file transfer corruptions.** Wait for Pixel to confirm that it is ready to receive dashboard command.



3.10 Disable Construction Mode of Operation


Pixel components have now been installed and functional operation verified. You can now transition Pixel from Construction Mode to Inspection Mode. Construction mode is enabled or disabled by using the Touch&Go™ knob navigate to:

 Home 

 Install 

 Construction Mode 

 **Disable** or  **Cancel**

 **NOTE:** Construction Mode must be set to Disable to Enable any automatic mode of operation.

Section 4 – Final Adjustment

4.1 Door Adjustment

The elevator door operator (or operators) should be adjusted to provide desired door performance.

- a. Position the car in a convenient location within the hoistway to adjust car doors to a preliminary setting.
- b. Place the car in inspection mode then follow the adjustment procedure provided by the door operator manufacturer.



NOTE: Most solid-state door control systems use adjustment procedures that require no interaction with the elevator controller.

4.1.1 MOVFE CAN-bus Door Operator Adjustment

If the controller has been provided with the MOVFE CAN-bus interface, refer to page QR3 of the job prints and the MOVFE door operator manual for programming the MOVFE door operator parameters to allow communications with Pixel controller and verify the following parameters in Pixel, from any of Pixel's three access points, Navigate to:

 Home 

 Install 


 Initial Settings 

 MP Cab Node Network 

 **Front Door Operator ; Set to MOVFE, for front doors**

And/ Or

 **Rear Door Operator ; Set to MOVFE, for Rear doors**

Press the  Save soft key, to permanently store selection(s).



NOTE: Pixel Allows for discrete & CAN-bus door interfaces to coexist.



NOTE: Pixel emulates the MOVFE door operator programming tool functionality making available through any of Pixel's three access points to facilitate and validate adjustment and performance from within the Cab.

4.2 Check Hoistway Clearances

For the door operator to operate properly, all door equipment clutches, rollers, etc. must be adjusted to the correct running clearances.

Make sure all hoistway and car doors for this elevator are closed and locked.

Run the car the entire length of the hoistway on inspection, while riding the cartop, to be sure that the hoistway is completely clear of obstructions. View the cartop system access point to confirm that the positioning system tape and sensor head continuously track car position. Navigate to:

 Home 

 Install 



 **View Selector Data** 

Make any necessary adjustments to tape alignment before proceeding.

4.3 Use of Test Switch

Place the TEST switch in the “Test” position (the TEST switch is located on the lower right of the P-MP board). In the test position the controller will not open doors (either front or rear) and the car will behave as on Independent Service mode of operation.

Switch from inspection to normal operation. The car should travel to the closest landing.

 **NOTE:** If this does not happen, view the Pixel screen from any system access point and see if a fault condition is displayed. Consult onboard help by pressing the yellow  **Help** key for guidance to resolve any fault that might prevent the car from moving.

The car will be ready to respond to car call demand as soon as the **READY** and **AT FLOOR** indicators are lit and the **RE-LEVEL** indicator is off. This confirms that the car has completed leveling at a landing. If any door opening device is active – Door Open Button, DOB, Safety Edge, SE, Photo Eye Sensor PHE, Door Lock, Door Closed, Car Gate not closed – the car will be prevented from responding to car call demand.

Observe door input status by navigating to:

 Home 

 Troubleshoot 

🚩 Flags 🚩

🚩 Door Flags 🚩

Correct wiring or repair any device necessary to eliminate the active input that is preventing car movement.

Refer to **Section 7 – Troubleshooting** in this manual for more troubleshooting assistance.

4.4 Speed Profile Parameters

This section is intended to empower the adjustor with an understanding of the relationship between Pixel and its Speed Profile Parameters. This understanding is essential to obtain maximum ride performance and comfort during final ride adjustment.

4.4.1 Position & Velocity Feedback System (PVF)

Pixel uses the elevator's speed and position – captured using a dual feedback servo loop – to deliver optimum ride and performance. The Position and Velocity Feedback system (PVF) firmware uses jerk rates, acceleration rates and deceleration rates to generate a steeples speed pattern. **Figure 4.4.1** illustrates these basic physical characteristics of motion.

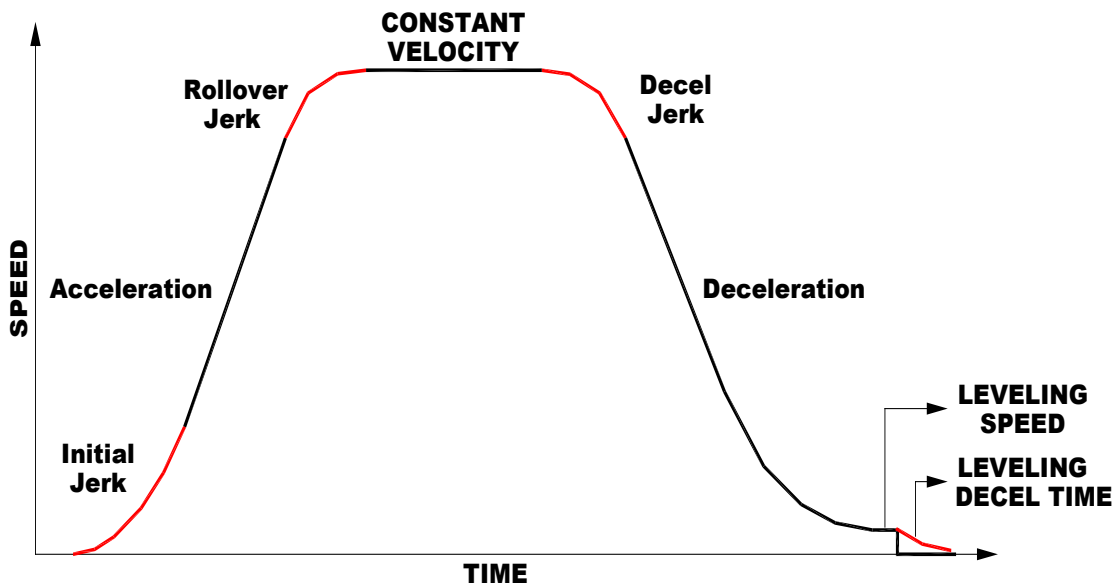


Figure 4.4.1 Physical Characteristics of Motion

4.4.2 Parameters for Position & Velocity Feedback (PVF)

Table 4.4-1 lists adjustable parameters available to customize car speed and performance profiles. **Sections 4.4.3 through 4.4.30** provide a brief description for each parameter, the adjustment range, and a more detailed explanation for each available parameter.

Table 4.4-1 Parameters for Position & Velocity Feedback	
4.4.3 Contract Speed	4.4.18 Leveling Trip Speed
4.4.4 Inspection Speed	4.4.19 Earthquake Trip Speed
4.4.5 Leveling Speed	4.4.20 Terminal % Trip Speed
4.4.6 Re-Leveling Speed	4.4.21 Level Zone
4.4.7 Earthquake Speed	4.4.22 Dead Zone
4.4.8 Initial Jerk	4.4.23 Traction Loss % Speed
4.4.9 Roll Over Jerk	4.4.24 Releveling Distance
4.4.10 Deceleration Jerk	4.4.25 Releveling Timeout
4.4.11 Acceleration	4.4.26 Releveling Offset
4.4.12 Deceleration	4.4.27 Speed Pattern Scaling
4.4.13 Leveling Decel Time	4.4.28 Ramp to Stop
4.4.14 SLDN End Marker	4.4.29 ISTU-ISTD Factor
4.4.15 Pattern Delay	4.4.30 L1000A Reg. Release
4.4.16 Highspeed Trip Speed	4.4.31 INS Speed Profile
4.4.17 Inspection Trip Speed	4.4.32 Emergency Slowdown Factor

4.4.3 Contract Speed

Brief Description: The Contract Speed parameter must be set to the contract speed of this car. The value is preset at the factory based on the speed specified on your data sheets.

Adjustment Range: 25 - 1400 fpm

Units of Measure: feet per minute

Detailed Explanation: The Contract Speed parameter sets the scale values for all other parameters of the PVF loop. This parameter must be set correctly for all other speed parameters to function properly.

4.4.4 Inspection Speed

Brief Description: Inspection Speed parameter limits maximum car speed on inspection mode, higher values in inspection speed result in faster speeds during movement on inspection.

Adjustment Range: 0 - 150 fpm
Default: 040 fpm
Units of Measure: feet per minute
Detailed Explanation: Acceleration parameter controls the rate at which the car reaches inspection speed. The higher the acceleration value the sharper the rate.

4.4.5 Leveling Speed

Brief Description: Leveling Speed parameter controls the final speed of the car when coming onto a floor. Increasing leveling speed will increase this final speed.

Adjustment Range: 1 - 50 fpm
Default: 05 fpm
Units of Measure: feet per minute
Detailed Explanation: Decreasing leveling speed will reduce the stop shock felt when the break sets. If the leveling speed is set too high it will cause the car to overshoot the floor. Once Leveling Speed is set, use SLDN End Marker to eliminate any overshoot.

4.4.6 Re-leveling Speed

Brief Description: Re-leveling Speed parameter limits maximum car speed during re-leveling. Higher values in re-leveling speed result in faster speeds during a re-level.

Adjustment Range: 03 - 50 fpm
Default: 06 fpm
Units of Measure: feet per minute
Detailed Explanation: Acceleration parameter controls the rate at which the car reaches re-leveling speed. The higher the acceleration value the sharper the rate.

4.4.7 Earthquake Speed

Brief Description: Earthquake Speed parameter limits maximum car speed during Earthquake normal operation higher values in Earthquake speed result in

faster speeds during Earthquake Normal mode of operation.

Adjustment Range: 25 - 125 fpm

Default: 120 fpm

Units of Measure: feet per minute

Detailed Explanation: Earthquake speed will replace the Contract speed value for cars allowed to operate in automatic mode once an earthquake normal mode of operation has been initiated.

4.4.8 Initial Jerk

Brief Description: The Initial Jerk parameter controls the softness of the start of the velocity pattern. Larger values result in car occupants feeling a greater g-force when starting. With larger jerk values, the car reaches contract speed more rapidly, since the pattern spends less time in rounding.

Adjustment Range: 25 - 500 fpm/s/s

Default: 80 fpm/s/s

Units of Measure: feet per minute per second per second

Detailed Explanation: The exact amount of time spent in rounding depends on the acceleration rate. Rounding time is **acceleration ÷ initial jerk** and should normally be adjusted between 0.6 to 1.3 seconds. You can easily set a one second round by setting the jerk numerically equal to the acceleration.

If the acceleration is 200 FPM/S, an initial jerk value of 200 FPM/S/S will provide one second of initial rounding. The jerk rate should not be set so low that the car cannot reach contract speed. Initial rounding should never take more than one half of the total time to reach contract speed.

The minimum jerk J_{min} is equal to:

$$J_{min} = \frac{(\text{Acceleration} \times \text{Acceleration})}{\text{Contract Speed}}$$

4.4.9 Rollover Jerk

Brief Description: The Rollover Jerk parameter controls the softness of the transition of velocity pattern to constant velocity. Larger values result in a greater g-force felt in the car when attaining maximum speed. With larger jerk values, the pattern also spends less time in rounding and reaches contract speed sooner. If the car overshoots contract speed, decrease the rollover jerk to reduce overshoot.

Adjustment Range: **25 - 500 fpm/s/s**

Default: **80 fpm/s/s**

Units of Measure: **feet per minute per second per second**

Detailed Explanation: The exact amount of time spent in rounding depends on the acceleration rate. The time is $\text{acceleration} \div \text{rollover jerk}$ and should normally be 0.6 to 1.3 seconds. You can easily set a one second rounding time by setting the jerk numerically equal to the acceleration. If the acceleration is 200 FPM/S, roll over jerk value of 200 FPM/S/S will give one second of rollover rounding. The jerk should not be so low that the car cannot reach contract speed. Rollover rounding should never take more than one half of the total time to reach contract speed.

The minimum jerk J_{min} is equal to:

$$J_{min} = (\text{Acceleration} \times \text{Acceleration}) / \text{Contract Speed}$$

4.4.10 Deceleration Jerk

Brief Description: The Deceleration Jerk parameter controls the softness of the transition from constant velocity to constant deceleration. Larger values resulting in car occupants feeling a greater g-force when rounding into constant deceleration. With larger jerk values, the car reaches leveling speed more rapidly; since the pattern spends less time in rounding reaches leveling speed sooner.

Adjustment Range: **25 – 500 fpm/s/s**

Default:	80 fpm/s/s
Units of Measure:	feet per minute per second per second
Detailed Explanation:	<p>The exact amount of time spent in rounding depends on the deceleration. Rounding time is deceleration ÷ deceleration jerk and should normally be adjusted between 0.6 to 1.3 seconds. You can easily set a one second rounding time by setting the jerk numerically equal to the deceleration. If the deceleration is 200 FPM/S, a deceleration jerk value of 200 FPM/S/S will provide one second of deceleration rounding. The jerk should not be so low that the drive cannot slowdown from contract speed. Deceleration rounding should never take more than one half of the total time to reach leveling speed.</p> <p>The minimum jerk Jmin is equal to:</p> <p><i>Jmin= (Deceleration x Deceleration) / Contract Speed</i></p>

4.4.11 Acceleration

Brief Description:	<p>Acceleration parameter defines the rate at which the car reaches contract speed. The higher the acceleration value, the sharper the rate. For example, with Contract Speed set at 350 FPM, and Acceleration set to 100 FPM/S, the car will reach contract speed in 3.5 seconds (this calculation does not allow for rounding). Each rounding corner will normally add about half of its rounding time to the time required to reach contract speed.</p>
Adjustment Range:	25 – 300 fpm/s
Default:	80 fpm/s
Units of Measure:	feet per minute per second
Detailed Explanation:	<p>The acceleration parameter is also used to control the pattern ramp-up during re-level or inspection mode. Changing this parameter will change the rate at which respective rated speeds are attained for automatic run patterns, inspection patterns and re-level patterns.</p>

 **NOTE:** Divide FPM/S by 60 to get ft/s²

4.4.12 Deceleration

Brief Description:	Deceleration parameter defines the rate at which the car reaches leveling speed. The higher the deceleration value, the sharper the rate.
Adjustment Range:	25 – 300 fpm/s
Default:	80 fpm/s
Units of Measure:	feet per minute per second
Detailed Explanation:	For example, with Contract Speed set at 350 FPM, and Deceleration set to 100 FPM/S, the car will reach leveling speed in 3.5 seconds. This calculation is before rounding is considered. Each rounding corner will normally add about half of its rounding time to the time to reach contract speed.

4.4.13 Leveling Decel Time

Brief Description:	Leveling Decel. Time parameter creates a pattern ramp down from leveling speed to stop, instead of a step from leveling speed to stop. The default value for this parameter is 0 and should remain 0 for most applications.
Adjustment Range:	0 - 1000 msec
Default:	0000 msec
Units of Measure:	milliseconds
Detailed Explanation:	Increasing this parameter will allow car to “float” further into the dead zone after leveling has completed using a time controlled “level decel rate”. A value of zero, or too high a value, may cause overshoot.



NOTE: With Leveling Decel. Time set to zero, leveling speed output is maintained until an up or down command drops (no “level decel” applied).

4.4.14 SLDN End Marker

Brief Description:	SLDN End Marker determines where the car begins targeting the floor. The larger the value, the further away targeting begins. SLDN End Marker also controls the softness of the final rounding during an automatic run.
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Larger values produce softer approaches to the floor.

Adjustment Range: 0.1 - 2.0 ft

Default: 1.0 ft

Units of Measure: feet

Detailed Explanation: SLDN End Marker works with leveling speed to determine how the car comes into a floor. High values of SLDN End Marker and low leveling speeds produce more accurate and softer approaches to the floor. Reducing leveling speed will reduce stop shock as the brake sets. However, softer and more accurate approaches also mean longer brake-to-brake times.

4.4.15 Pattern Delay

Brief Description: Pattern Delay timer holds the pattern at zero speed for the amount of time specified, after the UP or DN command is sent to the motor drive unit.

Adjustment Range: 000 - 2000 msec

Default: 0000 msec

Units of Measure: milliseconds

Detailed Explanation: Use pattern delay to compensate for a sluggish brake pick. If the car pulls through the brake at start, increase pattern delay to hold zero pattern longer time at start, which will allow time for the brake to pick before pattern begins to accelerate the car.

4.4.16 Highspeed Trip Speed

Brief Description: Speed value at which the safety processors, SP1 or SP2 will declare an Overspeed condition to trigger a Contract Overspeed latching fault bringing the car to a halt.

Adjustment Range: 0001 - Contact Speed + 25%

Default: Contract Speed + 10%

Units of Measure: feet per minute

Detailed Explanation: Adjust Contract Trip Speed in conjunction with

the motor drive unit response to prevent safety processors, SP1 or SP2 from intermittently declaring an Overspeed latching fault. Contract Overspeed condition usually occurs while the car is transitioning from reaching contract speed to stable contract speed, thus reducing the Rollover Jerk value allows for smoother transition demanding less torque from the motor drive unit lowering contract speed overshoot.

4.4.17 Inspection Trip Speed

Brief Description:	Speed value at which the safety processors, SP1 or SP2 will declare an Overspeed condition to trigger an Inspection Overspeed latching fault bringing the car to a halt.
Adjustment Range:	000 – 187 fpm
Default:	100 fpm
Units of Measure:	feet per minute
Detailed Explanation:	Adjust Inspection Trip Speed in conjunction with the motor drive unit response to prevent safety processors, SP1 or SP2 from intermittently declaring an Inspection Overspeed latching fault. Inspection overspeed condition usually occurs while the car is transitioning from reaching inspection speed to stable inspection speed, thus reducing the Acceleration parameter value allows for smoother transition demanding less torque from the motor drive unit lowering contract inspection speed overshoot.

4.4.18 Leveling Trip Speed

Brief Description:	Speed value at which the safety processors, SP1 or SP2 will declare an Overspeed condition to trigger a Leveling Overspeed latching fault bringing the car to a halt.
Adjustment Range:	000 - 187 fpm
Default:	100 fpm
Units of Measure:	feet per minute

Detailed Explanation: Adjust Leveling Trip Speed in conjunction with the motor drive unit response to prevent safety processors, SP1 or SP2, from intermittently declaring a Leveling Overspeed latching fault. Leveling overspeed conditions usually occur while the car enters the Leveling Zone. Decreasing the Deceleration parameter value allows for lower speeds while entering the Leveling Zone.



NOTE: Leveling Trip Speed is not monitoring the Leveling or Re-Leveling final speeds, rather the maximum speed allowed for the car to be running within the Leveling Zone.

4.4.19 Earthquake Trip Speed

Brief Description: Speed value at which the safety processors, SP1 or SP2 will declare an overspeed condition to trigger an Earthquake overspeed latching fault bringing the car to a halt.

Adjustment Range: **000 - 150 fpm**

Default: **150 fpm**

Units of Measure: **feet per minute**

Detailed Explanation: Adjust Earthquake Trip Speed in conjunction with the motor drive unit response to prevent safety processors, SP1 or SP2 from intermittently declaring an Earthquake Overspeed latching fault. Earthquake Overspeed conditions usually occur while the car is transitioning from reaching earthquake speed to stable earthquake speed. Reducing the Rollover Jerk value allows for smoother transition, demanding less torque from the motor drive unit, and lowering earthquake speed overshoot.

4.4.20 Terminals % Trip Speed

Brief Description: This is the percentage speed value from learned slowdown speed profiles – up and down – at which the safety processors, SP1 or SP2, will declare a Slowdown Overspeed condition that in turn will trigger a Slowdown Speed latching fault, bringing the car to a halt.

Adjustment Range: **000 - 100 %**

Default: 10 %
Units of Measure: Percentage of digitized learned pattern
Detailed Explanation: Adjust Percentage Overspeed in conjunction with the motor drive unit response to prevent safety processors, SP1 or SP2 from intermittently declaring a Slowdown Overspeed latching fault.



NOTE: Percentage Overspeed monitors the difference between the learned slowdown position and speed and compares it to the current the current car position and speed dynamically.

4.4.21 Level Zone

Brief Description: Level Zone, or Trucking Zone, defines the Door Zone area where leveling and door operations are allowed.

Adjustment Range: 0.01 - 1.00 ft
Default: 0.83 ft
Units of Measure: feet
Detailed Explanation: Increasing the Level Zone increases the area where door operations and leveling speed monitoring take place.

4.4.22 Dead Zone

Brief Description: Area within Door Zone, or Trucking Zone, where the car is considered to be leveled with the floor, the accuracy value is the parameter value divided by two to account for above and below the car leveled center position.

Adjustment Range: .01 - .25 ft
Default: 0.05 ft
Units of Measure: feet
Detailed Explanation: Increasing the Dead Zone allows less accuracy while leveled with the floor, decreasing the re-leveling operation.

4.4.23 Traction Loss Speed %


Brief Description: Parameter determines the % differential of how much less the measured speed from commanded speed is permitted before a Traction Loss Fault is triggered.

Adjustment Range: 001 – 100 %
Default: 050 %
Units of Measure: Percentage of Commanded Speed

Detailed Explanation: The higher the % value the larger speed differential allowed; it works in conjunction with Traction Lost Timer so that the speed differential has to be larger than the programmed % for a timeout larger than the programmed timeout to declare a Traction Loss Fault.



Traction Lost Timer location navigate to:

 Home 

 Adjust 

 Car Performance 

 Timers 

 Traction Timers 

 Traction Loss Timer  **Default Value to 10 Seconds**

4.4.24 Releveling Distance

Brief Description: Area within the Leveling Zone where releveling operation will be timed before execution to allow for the Cab to settle.

Adjustment Range: .000 - .500 ft

Default: 0.120 ft

Units of Measure: feet

Detailed Explanation: Enter a distance value corresponding to the cable stretch at the lowest landing where the car will be allowed to settle before releveling, to prevent up-down releveling rocking motion.

4.4.25 Releveling Timeout

Brief Description: Timeout period allowed for the car to settle before releveling operation is allowed, while the car is within the Releveling Distance area.


Adjustment Range: 0000 - 8000 msec
Default: 2500 msec
Units of Measure: Thousands of a Second
Detailed Explanation: Enter a timeout value required to allow for the rope stretching settling, to allow releveled operation.

4.4.26 Releveling Offset

Brief Description: Offset value added to the Leveling Up or Down location to allow Pixel to drive the car further towards the center of the Dead Zone on a Relevel Up or Down operation.

Adjustment Range: 0 – 0.250 Feet
Default: 0.012 ft
Units of Measure: Feet

Detailed Explanation: Incrementing parameter value allows Pixel to drive the cab farther into the Dead Zone area to avoid leaving the cab at a position too close to the up or down leveling position to prevent excessive releveled.

 **NOTE:** Make sure that the value entered for Releveling Offset parameter is less than the Dead Zone Parameter value divided by 2 to prevent leveling zones overlaps during releveled operation.

4.4.27 Speed Pattern Scaling

Brief Description: Drive speed command is scaled down to the programmed percentage value.

Adjustment Range: OFF- 001 – 100%
Default: OFF
Units of Measure: Percentage of Speed Command

Detailed Explanation: The speed command sent to the drive unit is scaled down, to allow running of a motor at job contact speed below the minimum drive programmable speed output.

4.4.28 Ramp to Stop

Brief Description: Drive direction command at stop.
Adjustment Range: No / Yes

Default: No

Units of Measure: None

Detailed Explanation: Directs Pixel's logic if set to Yes to remove drive direction from the drive command while at Stop Position Lock, if set No to keep direction as part of the drive stop command.

4.4.29 ISTU-ISTD Factor

Brief Description: Factory test parameter set at 1.50.

4.4.30 L1000A Reg. Release

Brief Description: Parameter indicates Pixel that the L1000 Drive parameter P1-04 has been set to 20 instead of 4B to switch register U1-12 with U1-20 in the communicated buffer from the L1000A drive to Pixel.

Adjustment Range: No / Yes

Default: Yes

Units of Measure: None

Detailed Explanation: Using information from register U1-20 Pixel can optimize brake pick control by turning on the brake control logic after the L1000A drive has turned on its brake release control output driving the RUN relay through terminals M1-M2 configured through parameter H2-01 for brake control output with a value of 50.



NOTE: Pixel jobs provided with the L1000A drive unit set drive parameter H2-01 to 50 regardless of the setting of L1000A Reg. Release parameter settings. If setting L1000A Reg. Release to Yes will require a setting of P1-04 =20, if set to No will require a setting of P1-04 =4B.

4.4.31 INS Speed Profile

Brief Description: Parameter allows scaling the acceleration ramp from takeoff to inspection speed.

Adjustment Range: 10% to 100%

Default: 100%

Units of Measure: Percentage of acceleration ramp

Detailed Explanation: Inspection ramp speed uses the automatic mode acceleration speed ramp, without Initial or Roll Over jerks, which may be too abrupt,

this parameter modifies the ramp increments based on programed increment percentage.

4.4.32 Emergency Slowdown Factor

Brief Description:	Multiplier applied to the Deceleration rate during an emergency slowdown speed ramp.
Adjustment Range:	1.00 – 2.50
Default:	1.75
Units of Measure:	None
Detailed Explanation:	Multiplier determines the rate of change added to decelerate the car during an emergency slowdown approach such as the one generated during a NTS, Normal Terminal Stop, event or upon seismic detection. A value of 1 utilizes the same rate as the deceleration rate, while a value of 2 will decelerate the car at twice the rate of deceleration.



NOTE: Lower parameter value if the motor drive unit is unable to follow the deceleration speed pattern without generating a fault during an emergency slowdown. Consult with Elevator Controls technical support if value needs to be set below 1.30.

4.5 Motor/ Brake Timers

This section is intended to empower the adjustor with an understanding of Pixel brake and emergency brake timing parameters available to customize brake and emergency brake activation and release to improve on the hoist motor performance, table 4.5-1 below list the timers while sections 4.5.1 through 4.5.7 provide a brief description their adjustment range and a functional explanation for each available timer.

Table 4.5-1 Motor/ Brake Timers	
4.5.1 Brake Pick Delay	4.5.5 BPI Input Timeout
4.5.2 Brake Drop Delay	4.5.6 Aux Brake Hold Delay
4.5.3 Brake Hold Delay	4.5.7 Aux Brake Idle Timer
4.5.4 Zero Speed Hold Delay	



NOTE: Timer's resolution is in minutes, seconds, and tenths of a second.

4.5.1 Brake Pick Delay

Brief Description:	Time delay that the BK, Brake Output, is penalized at the start of every run.
---------------------------	---

Adjustment Range: 00:00:00 – 59:59:10
Default: 00:00:00
Units of Measure: Minutes: Seconds: Tenths of a Second
Detailed Explanation: Brake Pick Delay controls the time the BK output, driving the BK relay, will be held off at the start of all automatic or inspection runs after Pixel has determined that it is safe to start a run, usually adjusted to prevent roll-back on takeoff or to compensate for a fast-responding brake unit.

4.5.2 Brake Drop Delay

Brief Description: Time delay added to the BK, Brake Output, at the end of every run.
Adjustment Range: 00:00:00 – 59:59:10
Default: 00:00:00
Units of Measure: Minutes: Seconds: Tenths of a Second
Detailed Explanation: Brake Drop Delay controls the time the BK output, driving the BK relay, will be held on at the end of all automatic or inspection runs after Pixel has determined that it is safe to stop the motor, usually adjusted to allow the motor to complete an electrical stop before setting the brake.

4.5.3 Brake Hold Delay

Brief Description: Time delay that the BH, Brake Hold Output, is penalized at the start of every run.
Adjustment Range: 00:00:00 – 59:59:10
Default: 00:02:00
Units of Measure: Minutes: Seconds: Tenths of a Second
Detailed Explanation: Brake Hold Delay controls the time the BH output, driving the BH relay, will be held off at the start of all automatic or inspection runs after Pixel has determined that it is safe to start a run, adjusted to allow the brake to fully pick, keep nominal brake voltage applied to brake coil, before switching the brake voltage to holding.

4.5.4 Zero Speed Hold Delay


Brief Description: Time delay added at the end of every run while Pixel commands zero speed to the drive unit and holds the AA, Motor Contactor output on to allow the drive unit to perform a motor electrical stop and position lock processes.

Adjustment Range: 00:00:00 – 59:59:10

Default: 00:02:00

Units of Measure: Minutes: Seconds: Tenths of a Second

Detailed Explanation: Most solid-state motor control units execute an electrical stop and position lock process at the end of each run. Zero Speed Hold timeout is programmed to allocate time for these processes to take place.

 **NOTE:** 100ms are added to Zero Speed Hold timeout after zero speed command is removed before turning off AA output to prevent AA contactor arching and to protect drive unit transistor logic.

4.5.5 BPI Input Timeout


Brief Description: Timeout allowed for the brake auxiliary contact to indicate to the controller through the BPI input that the brake has lifted.

Adjustment Range: 00:00:00 – 59:59:10



Default: 00:02:00

Units of Measure: Minutes: Seconds: Tenths of a Second

Detailed Explanation: Pixel monitors the brake operation through a monitor contact on the brake unit and declares a fault if the contact feedback does not indicate that the brake has lifted before the car is taken out of service with a Brake Did Not Lift latching fault.



 **NOTE:** The BPI input polarity, behavior, and the number of consecutives runs the car can execute before the Brake Did Not Lift latching fault is declared are adjustable navigating to:

 Home 

 Adjust 



 Car Performance 

Traction Options

 Break Pick Input Option ; Enables or disables BPI monitoring, with following configuration options:

- a. No = Brake input detection disabled
- b. Dest = Allows the car to travel to the current destination landing
- c. NextFlr = Allows the car to travel to the next available landing

 BPI NO NC Option ; Polarity of contact normally open or closed

 BPI Fault Threshold ; # of runs allowed before latching BPI fault, default to 3, for detection on the first occurrence set to 1.

4.5.6 Aux Brake Hold Delay

Brief Description: Time delay that the BK, Brake Output, is penalized at the start of run in both up and down directions.

Adjustment Range: 00:00:00 – 59:59:10

Default: 00:00:00

Units of Measure: Minutes: Seconds: Tenths of a Second

Detailed Explanation: Brake Pick Delay controls the time the BK output, driving the BK relay, will be held off at the start of all automatic or inspection runs after Pixel has determined that it is safe to start a run, usually adjusted to prevent roll-back on takeoff to compensate for fast responding brake units.

4.5.7 Aux Brake Idle Timer

Brief Description: Time delay that the BK, Brake Output, is penalized at the start of run in both up and down directions.

Adjustment Range: 00:00:00 – 59:59:10

Default: 00:00:00



Units of Measure: Minutes: Seconds: Tenths of a Second

Detailed Explanation: Brake Pick Delay controls the time the BK output, driving the BK relay, will be held off at the start of all automatic or inspection runs after Pixel has determined that it is safe to

start a run, usually adjusted to prevent roll-back on takeoff to compensate for fast responding brake units.

4.6 Alternate Speed Profile Parameter Set



Pixel provides a set of alternate speed profile parameters to allow for an equal or lesser performing speed control operation, which can be selected to operate from the configuration of the Alternate Spd Profile parameter navigating to:

 Home 

 Install 



 Initial Settings 

 Basic Pixel Settings 

 Alternate Spd Profile ; Set to enable/ Disable the Alternate Spd Profile functionality with following configurations:

- a. Disabled = No Alternate Speed Profile functionality
- b. L.W. Comm Loss = Enabled by the loss of communications with the load weighing device.
- c. ASP Input = Enabled by an input, requires P-MP IO mapping for input.
- d. EPI = Enabled while running under emergency power operation
- e. CTF = Enabled while car to floor mode of operation is active
- f. ASP + EPI = Either or both c and d above enable operation
- g. ASP + CTF = Either or both c and e above enable operation
- h. ASP + EPI + CTF= Either c, d , e or all three above will enable operation

The speed profile parameters and motor brake timers involved in the alternate speed profile generation are listed on tables 4.6-1 and 4.6-2 below, each parameter retain the same functionality as its counterpart parameter listed on sections 4.4 and 4.5 above, and are accessible navigating to:



 Adjust 

 Ride Performance 

 Alternate Speed Profile 

Table 4.6-1 Alternate Speed Profile Parameters	
4.6-1.1 Contract Speed	4.6-1.5 Deceleration Jerk
4.6-1.2 Earthquake Speed	4.6-1.7 Acceleration
4.6-1.3 Initial Jerk	4.6-1.8 Deceleration
4.6-1.4 Roll Over Jerk	

And to:


 Adjust 

 Ride Performance 

 Alternate Motor/Brake Timers 

Table 4.6-2 Motor/ Brake Timers	
4.6-2.1 Brake Pick Delay	4.6-2.4 Zero Speed Hold Delay
4.6-2.2 Brake Drop Delay	4.6-2.5 Aux Brake Hold Delay
4.6-2.3 Brake Hold Delay	4.6-2.6 Aux Brake Idle Timer

4.7 Speed Profile Adjustment

 **NOTE:** After the speed pattern is adjusted as well as possible from the machine room, the adjuster should ride the car. The speed pattern parameters are accessible from the COP access point. There is simply no substitute for adjusting while riding the car.

4.7.1 Get Car Ready to Run in Test Mode

Set the Machine Room Inspection switch located in Pixel MP Board to INSP and the TEST switch to TEST position, release the car from car top, in car, or Access inspection modes to allow it to be operated from Machine Insp. Mode.

Set pixel display to Home/Startup and observe for Machine Insp. and **No Faults** display indication, press the HELP push button for guidance in resolving any reported fault condition.

Using the onboard Machine Room Inspection station drive the car past the bottom landing until the down terminal switch opens and the display reports Down Terminal Switch Open fault. At this position the car should be positioned within a couple of inches below the bottom floor.



Enable **ETS Bypass** to prevent SP1 and SP2 safety processors from triggering Slowdown Terminal Overspeed faults, navigate to:

 Home 

 Install 

 Learn Functions 



 ETS Learn 

 ETS Learn Up 


 ETS Bypass Option 

 Yes

Press the  **Save** soft key, to enable bypass.


 **NOTE:** Press the  **Cancel** soft key to abort and make a new selection, or to return to the previous menu without saving.

Remove the car from Machine Insp. observe for **TEST** mode and **No Faults** display indication. Press the **HELP** push button for guidance in resolving any reported fault condition, and section 4.7.2 below to reset Non-TEST Mode of operation. The car should re-level up to the floor.

 **NOTE:** The car will attempt to re-level into floor position once Inspection Mode of operation switches to TEST Mode.

4.7.2 Reset Non-TEST Modes

If Pixel main window displays other Mode of operation, such as Emergency Power, Hospital Service, Fire Service, etc. such modes must be cleared to allow TEST Mode functional operation, in order to reset non latching modes of operation one must clear the mode triggering input, and for latching modes of operation such Fire Service and Earthquake Operation they can be reset by clearing the triggering inputs, then entering and exiting Construction Mode. Refer to section 3.10 to Disable Construction Mode of Operation

 **NOTE:** At this point Pixel's screen should display TEST Mode, doors closed, and No Fault for the car to run in TEST Mode.

4.7.3 Entering Calls to Run in Test Mode

















Pixel provides an **Auto Call Simulation** menu to allow car calls to be entered in TEST Mode. Four choices are provided in this menu as follows:

- a. **Up and Down from xxx to yyy**, where xxx and yyy represent the landing numbers where the car will run to and from.



- b. **Circle** xx floors around landing yyy, where xx represents the number of floors above and below the landing yyy where the car will run to and from.
- c. **xx floors to runs Up and Down**, where xx represents the number of floors to runs, one, two, etc.. floor runs up or down until the end of hoistway in the direction of travel before proceeding with the same pattern in the opposite direction.
- d. **Run to floor xxx**, where xxx represents the destination landing.

Auto Call Stop Dwell Timer, from 00 to 99 seconds, represents the timeout to be allowed between each run for entries a, b, and c above.

To access the Auto Call Simulation menu, navigate to:


-  Home 
-  Adjust 
-  Ride Performance 
-  **Auto Call Simulation** 
-  Desired entry from a to d above" 
-  Select xxx and yyy landing numbers 
-  Auto Call Stop Dwell Timer 
-  "Dial up time out period" 

Press the  **Enable** soft key, to enable and start auto call simulation.

 **NOTE:** As soon as the  **Enable** soft key is press the car call entry process will start and the car may start a run.

4.7.4 Run Car to Every Landing

Verify the car can run to every landing on TEST Mode from the machine room using Auto Call Simulation section 4.7.3 above. Refer to Drive Unit x1.6 Motor Control, to correct oscillations and stabilize ride if required.

 **NOTE:** The ride quality must be acceptable before proceeding forward; steps below require riding the car.



NOTE: The COP Independent Service switch was switched to ON position during installation of the COP, before switching car TEST Mode operation OFF verify it still on the ON position.

Place the CAPTURE switch to CAPTURE, to prevent the car from participating in any hall system dispatching, remove the car from TEST MODE, and place it in Independent Service Mode and be able to run it from within the car while enabling door operation.

4.7.5 Adjust Floor Levels

To prevent SP1 and SP2 safety processors from triggering **Unintended Movement Fault** latching fault, while adjusting floor levels, place the CAPTURE switch on the P-PM board to CAPTURE, Independent Service Mode of operation inside the cab, and enable **Unintended Movement Bypass** navigating to:

Home

Install

Code Compliance Test

Unintended Movement

Unintended Movement Bypass

Yes

Press the **Save** soft key, to enable bypass.



NOTE: Press the **Cancel** soft key to abort and make a new selection, or to return to the previous menu without saving.

The task to verify and correct the learned landing level position is best performed from inside the cab on Independent Service mode of operation and is accomplished by driving the car to every landing and adjusting the landing level position Learned during initial set up to its final “perfectly” level position, to perform this task from the COP access point navigate to:



Home



Install


Learn Functions









Floor Setup

 Landing Number 

 Door Zone Position 


 “Adjust current Position up-down as needed” 

Press the  **Save** soft key, to save modified position or the Cancel soft key to reset to back value to last stored position.


-  **NOTE:** As soon as the  **Save** soft key is press the car will re-level into the saved floor level position.
-  **NOTE:** The PI Label can also be modified while performing the floor level task from within this menu by Selecting PI Label menu entry and manipulating its contents to match those on the COP landing push buttons.
-  **NOTE:** The Hall Call and Hall Gong nodes operation can also be verified from within this menu by Selecting Verify Floor Hall Nodes menu entry.
-  **NOTE:** Disable Unintended Movement Bypass option as soon as floor levels adjusting have been completed by following procedure to enable **Unintended Movement Bypass** above replacing last selection  Yes with  No.
-  **NOTE:** An Unintended Movement Bypass option fault will be triggered as soon as Capture or Independent service switch change from on to off, preventing any mode of Automatic operation while **Unintended Movement Bypass** enabled.

4.7.6 Final Ride Adjustment

It is more of an art than science to Adjust speed pattern. There are two goals in this process: maximize ride comfort and minimize brake-to-brake time.

-  **NOTE:** Seasoned adjustors will tell you it's best to work on one goal at a time.

4.7.6.1 Load Weighing Device Installation and Pre-Torque


-  **NOTE:** Skip to section 4.7.6.2 if Pre-Torque option is not part of this installation.

Refer to appendix “C” at the end of this manual for Load Weighing Device

Calibration and Pre-Torque operation Setup


4.7.6.2 Speed Pattern Adjustment

The two goals are not exclusive; both can be achieved. The sections below provide information and hints to help fine-tune the elevator for optimum performance and comfort. Best results are achieved if you first review and thoroughly familiarize yourself with these sections. Then go through the step-by-step adjustment process as required.


-  **NOTE:** For controller equipped with Serial Brake(s) control feature refer to Appendix F section F4 “Brake Fine Tuning Adjustment” for guidance in improving brake(s) performance to contribute in improving takeoff and stop ride comfort.

4.7.6.3 Decreasing Brake-to-Brake Time


- a. Increase Acceleration “Acceleration to speed”.

-  **NOTE:** When you do this, you will probably have to increase Initial Jerk “Soft Start” and Rollover Jerk “Round up to speed.” The jerk values should be larger than or equal to the Acceleration value. Example: if Acceleration is set to 100 FPM/s, Initial Jerk and Rollover Jerk should be set between 100 FPM/s/s and 200 FPM/s/s.


- b. Increase Initial Jerk “Soft Start” and Rollover Jerk “Round up to speed”.

-  **NOTE:** Both parameters should be changed whenever “Acceleration to speed” is changed significantly. For quick brake-to-brake times, use 1.4 to 2 times the Acceleration value. Higher jerk values cause the pattern to reach contract speed faster.

- c. Increase Decel “Deceleration”.

-  **NOTE:** Deceleration value is typically set from 25 to 50 FPM/s less than the Acceleration value. This improves passenger comfort and also makes final approach into the floor more accurate.

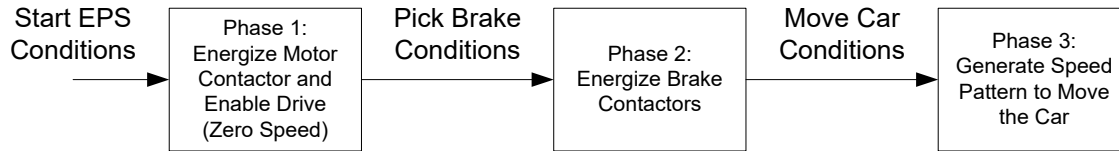
- d. Decrease SLDN End Marker “Final approach”.

-  **NOTE:** SLDN End Marker should normally be greater than 6”. A good working range is 8” to 12”.

- e. Pre-Start functionality

To improve elevator floor-to-floor performance the Pre-Start option, EPS, can be used to minimize the hoist motor preconditioning delays associated with the start of a run. The EPS begins the hoist motor preconditioning prior of the doors being in

the fully close-locked position upon activation of the Door Position Monitoring cam (DPM input) usually set to activate about 6" from the doors fully close-locked position. The EPS process is comprised of the following major phases, each with a set of conditions that allows that phase to commence:



The initiation of the EPS function is initiated when there is a demand to move the elevator to another floor, it has completed demand at its current floor (i.e., no further reason to open or hold open the doors), and it is in a state that indicates that departure is imminent.

The “departure is imminent” is defined as the time when the motor control start sequence shall begin as controlled by the Pre-Start configuration parameters found navigating to:

Home

Adjust

Ride Performance

Elevator Pre-Start

PS Option ; Default setting = OFF


1. OFF = Pre-Start Option Disabled, motor start sequence will commence upon door(s) being closed and Locked.
2. Timed = Motor start sequence will commence upon expiration of the PS Door Close Timeout.
3. Doors Closed = Motor start sequence will commence upon the DPM, Door Position Monitoring input(s) Closing.


PS Brake Pick ; Default setting = Doors Locked



1. Immediate = Brake Picking sequence will commence in conjunction with motor preconditioning. Verify the car does not roll back since pattern generation will not start until doors are locked, setting only recommended if Pre-Torque functionality is part of this controller options.
2. Doors Locked = Brake Picking sequence will commence once doors are closed and locked.
3. Doors Closed = Brake Picking sequence will commence once doors are closed. Verify the car does not roll back since pattern generation will not start until doors are locked, setting only recommended if Pre-Torque functionality is part of this controller options.

 PS Door Close Timeout  ; Default setting = 3 Seconds

Timer associated with PS Option while set to Timed, the PS sequence will commence after the specified timeout has passed since the doors started closing. This timer should be set such that the timer expires within a few inches of the doors being locked.

 **NOTE:** If PS Door Close Timeout is set to 0, the system will not start the PS sequence until after the doors are closed and locked.


 **NOTE:** The brake sequence will only be allowed after the drive provides Pixel with Regulation Release status active, indicating that the drive has control of the motor regardless of how the “PS Brake Pick” option described above is set, and the brake sequence will always be allowed to start if the car gate and door lock contacts are all closed.

 PS Timeout  ; Default setting = 8 Seconds


PS Timeout once expired will abort the Pre-Start sequence if unable to complete the PS process to prevent from keeping the elevator locked in Pre-Start condition.

4.7.6.4 Improving Passenger Comfort

a. Increase “Pattern Delay”.


 **NOTE:** Increasing this setting is only useful if the car is pulling through the brake when the pattern starts. Increasing pattern delay produces a wait for a fixed user defined amount of time, allowing the brake to pick.

b. Decrease “Leveling Speed”.

 **NOTE:** Leveling speed is typically set high at the factory, so the car will not stall coming into a floor. In most applications, leveling speed will need to be decreased, to about 4 to 5 FPM, in order to eliminate any bump felt when stopping.


c. Decrease Initial Jerk “Soft Start”.


 **NOTE:** Excessively high jerk values can cause passenger discomfort.

 **NOTE:** Some motors cannot follow high jerk values. The resulting overshoot can cause bumps during the ride.

d. Decrease Rollover Jerk “Round down to decel”.

e. Decrease Deceleration “Decel”.



 **NOTE:** Excessively “Deceleration” values can cause passenger discomfort and can also cause the car to overshoot the floor.


 **NOTE:** At this point the car should be performing as expected and required by the job installation. Steps below will need to be re-done if speed parameters are modified.

4.7.6.5 Improve Re-Leveling Performance.

To prevent the car from releveling up-down in a rocking motion due to rope stretch and passengers entering and exiting the cab follow procedure below:

- a. Determine the distance on cab movement in ft and enter value into parameter “Releveling Distance.”
- b. Determine timeout required for the rope stretch to settle and enter value into “Releveling Timeout” , navigate to:

 Home 


 Adjust 


 Ride Performance 

 Speed Profile 

 Releveling Distance  “Enter distance value for a above” 


 Releveling Timeout  “Enter Timeout value for b above” 

Press the  **Save** soft key, to save values entered or the Cancel soft key to reset values to last stored position.

 **NOTE:** Minimum values for parameters above will Increase overall elevator performance.

4.7.7 ETS Learn

After all ride adjustments described above are complete, Pixel needs to learn the speed profiles as the car approaches the terminal landings this task is accomplished through the ETS Learn menu and following display instructions, ETS Learn menu can be accessed by navigating to:



 **NOTE:** Take the car to a terminal landing placing a car call, the car must be at a terminal landing for Pixel to enable ETS Learn operation.

 Home 

 Install 

 Learned Functions 


ETS Learn


-  **NOTE:** As the car will need to perform one run up and one run down through the entire length of the hoistway to perform this task.
-  **NOTE:** The learned terminal landings speed profiles will must be transferred to SP1 and SP2 safety microprocessors follow displayed instructions to perform transfer or the car will not be allowed to run automatic modes of operation.

Reset ETS Bypass option and verify that the car can run the entire length of the hoistway runs without triggering a Slowdown Overspeed fault. Refer to section 4.7.1 above to access and reset ETS bypass option.

4.8 Verify Overall Car Performance

Pixel car controller must be operating with to desired performance, verify and correct following operations:

- c. Position Indicator displays proper landing labels.
 - d. Car calls can be entered through the COP push buttons.
 - e. Every push button in the COP performs its function Door Open, Door Close, Passing Gong Enable, etc.
 - f. Car responds to all capable Hall Calls.
 - g. Hall and Car gongs performance.
 - h. Overall car functionality and performance.
-
-  **NOTE:** If Alternate Speed profile functionality is part of this job adjust the Alternate Speed Profile parameters to match expected performance, refer to section 4.6 and 4.7 above.

-  **WARNING:** Safety tests sections 5 and 6 below, overall car function performance, and all local safety inspections must be completed before releasing the car to the public.

4.9 Transfer Safety Configuration File to Microprocessors



To transfer the Safety Configuration File to SP1 and SP2 microprocessors follow instructions in File Transfer submenu as follows:



 Home 

 Install 

 File Transfer 

 **Safety Configuration Upload** 

Press the  **Transfer** soft key to transfer a configuration file to safety microprocessors or the  **Back** soft key to abort transfer.

-  **NOTE:** Through this procedure Pixel will prompt you to wait while the system enters and exits file transfer mode operation. **Do not press any keys during a wait timeout to prevent file transfer corruptions.** Wait for Pixel to confirm that it is ready to receive dashboard command.
-  **NOTE:** If this car is part of a Pixel Multi Car Groupless system refer to Appendix G of this manual for integration to the groupless system.

Section 5 – Speed Monitoring Adjustment

5.1 Car Speed Monitoring System

The Pixel Elevator Controller – working in conjunction with the Landa™ dual head positioning unit – monitors the position and speed of the elevator throughout the entire hoistway.

The Landa™ Positioning System provides actual car position “on demand” (absolute position is read from the Landa™ Encoded Tape) and car speed is calculated based upon change in car position over a time interval.

The SP1 and SP2 safety processors individually read the Landa™ Positioning System at a rate of approximately once every 10 milliseconds for current car position.

The Landa™ Positioning System includes dual sensor heads. These redundant heads continuously read encoded tape and position information from each which is compared against the other for validation (“Main Tape Position” and “Auxiliary Tape Position”). A free-running timer is used to provide an accurate measure of the time between position samples, which is used to calculate car speed as follows:

$$\begin{aligned} \text{Cab speed} &= \Delta\text{position} \div \Delta\text{time, where} \\ \Delta\text{position} &= (\text{previous cab position}) - (\text{current cab position}) \\ \Delta\text{time} &= (\text{previous cab position time}) - (\text{current cab position time}) \end{aligned}$$

5.1.1 Defining Overspeed

Pixel’s SP1 and SP2 safety processors always monitor car speed to detect car speeds in excess of the car’s programmed speeds, including overspeed conditions as the car approaches the terminal landings.


To determine if the speed of the car is normal or an overspeed as the car approaches either terminal landing, Pixel’s main computer learns the landing zone for each floor during the hoistway position learning process. It also learns the “normal speed profile” that is executed as the car approaches the terminal landings to compare the two. The normal speed profile is learned from the moment the car begins its deceleration process to the final stop at the terminal landing. Both up and down terminal deceleration profiles are learned and stored.

The learn process once performed and verified during elevator installation will be transferred and permanently stored by the three microprocessors that make up the Pixel controller’s main processing unit (MP, SP1, SP2). The learn process must be accomplished and transferred before the car can be run on any passenger automatic mode of operation (otherwise the car is only allowed to run on Machine Room Test operation).


5.1.2 Monitoring Overspeed


Pixel's SP1 and SP2 safety processors independently monitor the following overspeed conditions:

- a. **Elevator Highspeed Trip Speed** elevator cab speed exceeds programmed Contract trip speed.
- b. **Inspection Trip Speed** elevator cab speed exceeds 150 ft-min or programmed Inspection trip speed, whichever is less.
- c. **Leveling Trip Speed** elevator cab speed exceeds 150 ft-min or programmed Leveling trip speed within the landing leveling zone, whichever is less.


 **NOTE:** Leveling Trip Speed does not monitor the target programmed final leveling speed. Speeds at which the cab approaches the landing zone are normally faster than the programmed final leveling speed.

- d. **Earthquake Trip Speed** elevator cab speed exceeds 150 ft-min or programmed Earthquake trip speed, whichever is less.
- e. **Terminals % Trip Speed** elevator cab speed in the direction of travel exceeds learned terminal speed profile plus programmed % trip speed.

 **NOTE:** Speed monitoring final adjustments should be performed only after elevator speed performance has been attained. It must be readjusted following any speed parameter change.

 **NOTE:** Confirm that Pixel's main screen displays contract speed and speed performance correctly before proceeding with final speed monitor adjustments. Refer to the Drive Appendix Section x1.5 to synchronize commanded and measured speed values.


5.1.3 Speed Monitoring Adjustment


 **NOTE:** Place the car in TEST Mode of operation before proceeding with speed monitoring adjustments.

Pixel speed monitoring parameters are part of the Speed Profile group and can be accessed by navigating to:

 Home 

 Install 

 Initial Settings 

 Speed Profile 

 **High Speed Trip Speed**  (entry 14 of 20)

Set to contract speed value plus 10%

OR


 **Inspection Speed Trip Speed**  (entry 15 of 20)

Set to Inspection Speed times two, up to a maximum value of 150 ft/min.

OR

 **Leveling Trip Speed**  (entry 16 of 20)


Set to Leveling Speed times 10, up to a maximum value of 150 ft/min.

 **NOTE:** Leveling Trip Speed does not monitor the target programmed final leveling speed. Speeds at which the cab approaches the landing zone are normally faster than the programmed final leveling speed.

OR

 **Earthquake Trip Speed**  (entry 17 of 20)



Set to Earthquake speed value plus 10%, up to a maximum value of 150 ft/min.

 **NOTE:** Earthquake Trip Speed does not need to be set if car does not include Earthquake operation. Simply leave at the 132 ft/min default factory setting.

OR

 **Terminal's % Trip Speed**  (entry 18 of 20)

Set Terminal's % Trip Speed parameter to 10% then run the car from the top to the bottom landing, increment % value as needed to prevent car from tripping Slowdown Overspeed Fault while adjusting drive response to have the car follow the commanded speed, refer to Drive Appendix section x1.6 Motor Control for guidance.

Press the  **Save** soft key, to save modified speed trip value or the  **Cancel** soft key to abort speed monitoring value change.


Run the car to confirm that revised settings do not cause a speed monitoring fault. Verify that speed Commanded vs. Measured is working properly by using the Drive Performance Data submenu which can be accessed by navigating to:

 Home 


 Troubleshoot 


 Drive 

 **Drive Performance Data** 

 **NOTE:** Drive Performance Data is a view only submenu parameters cannot be changed from here.

If Speed Monitoring Trips are occurring as the car runs, adjust the corresponding trip speed value. Refer to Drive Appendix Section x1.6 Motor Control to increase drive response as required. Also see Section 4.7.5 above for how to prevent car commanded vs. measured speed overshoots.

 **NOTE:** Verification of Speed Monitoring will be performed in Code Compliance Verification Section 6 following.

 **NOTE:** Refer to section 4.9 above to perform a file transfer of the Safety Configuration File to SP1 and SP2 microprocessors.

Section 6 – Code Compliance Verification

A17.1/B44 Elevator Safety Tests & Inspection

6.1 Performing Elevator Safety Tests & Inspections



WARNING: Safety tests should be performed by a **QUALIFIED ADJUSTER OR SERVICE PERSONNEL**. A helper should always be present and prepared to turn off the main line disconnect to remove power from the elevator if needed when the car is run with safety switches bypassed. **PROCEED WITH CAUTION.**













CAUTION: Perform each test procedure below only after the elevator system has been adjusted and verified to comply with job performance requirements and transfer of final safety configuration data from the MP to the SP1 and SP2 processors has been performed.





NOTE: The following procedure is intended as a guide while performing periodic inspection and safety tests of the elevator system. Please refer to the Safety Code for Elevators and all applicable local codes for specific requirements.

6.2 Machine Brake Test (ASME 17.1 Section 2.24.8.8 (c))

Instructions on how to allow-drive elevator speed up to 125% of contract speed, to verify the Driving Machine Brake compliance with section 2.24.8.3 (c) for Pixel traction elevator controllers.



- a. Verify the cab is empty, place the car on Test Mode to prevent door open operation, and drive it to the bottom landing.
- b. Set the High Trip Speed parameter to desired trip speed up to 125% value from contract speed, Navigating to:
 -  Home 
 -  Adjust 
 -  Ride Performance 
 -  Speed Profile 
 -  **High Speed Trip**  ; set it to desired trip speed, 125% of contract speed.
- c. Perform a Safety Configuration file transfer, for the safety processors to allow overspeed run, Navigating to:

 Home 

 Install 

 File Transfer 

 **Safety Configuration Upload** 

Press the  **Transfer** soft key to transfer a configuration file to safety microprocessors or the  **Back** soft key to abort transfer.

- d. Bypassed the Governor electrical contact to prevent deployment of the emergency brake.
- e. Refer to Appendix Section x12.7, Overspeed Using the Drive to Run the Hoist Motor, corresponding to this controller motor drive unit for instructions on how to set up the drive unit to overspeed the car and set it for 125% of contract speed.
- f. Place a car call to one landing below or the top terminal landing to start the test.
- g. Once the test has been completed:
 - 1. Place the car in machine room Inspection
 - 2. Remove the governor electrical contact bypass means.



WARNING: Verify that tripping the Governor electrical contact triggers a Governor tripped fault. Reset fault before continuing to entry 3 below.

- 3. Revert High Speed Trip parameter, per entry b above, replacing overspeed value with original trip value speed.
- 4. Perform a safety configuration file transfer to revert Pixel to original settings, per entry c above.
- 5. Run the car up and down, in machine room inspection, to ensure it is free to move in the hoistway.
- 6. Remove the car from machine room inspection and allow it to reposition to the closest available landing.
- 7. Run the car in Test mode the entire length of the hoistway to verify operation before returning to car to automatic mode of operation.

6.3 Ascending Car Overspeed

The Pixel Ascending Car Overspeed test is accomplished using a simple menu driven process and the procedure below:



NOTE: Test verifies operation and deployment of the emergency brake by Pixel, if electrical overspeed contact of the governor activates from empty car overspeed detection in the up direction.



NOTE: For DC hoist motor applications, remove power from controller to disconnect RM1, motor armature shunt resistor, by disconnecting wires from terminals R1 and R2, once test has been completed, turn power off and replace wiring to terminals R1 and R2, refer to page 1 of prints for motor armature circuit wiring.

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Drive the car below the counterweight position to allow enough distance from the top landing for the car to accelerate and overspeed due to gravity.
- d. On Pixel control navigate to:

 **Home** 


 **Install** 

 **Code Compliance** 

 **Overspeed Tests** 

 **Ascending Car Overspeed** 

Press the  **Back** soft key to abort test or  **Page Up** to enter test.

- e. Once ready to perform test Press the  **Page Up** soft key, to enter Ascending Car Overspeed test mode.
- f. The LCD will display instructions prior to Ascending Car Overspeed test, follow directions on the Screen to enable Pixel to lift the main brake without commanding the motor drive unit, refer to this job drive appendix xx.8, and observe the car to travel by gravity in the up direction until the electrical contact from the governor activates deploying the emergency brakes to stop the car.



NOTE: The main brake will remain lifted for as long as the Enable and Up Machine Room Inspection push button are held push in, allowing verification of auxiliary brake capacity to stop the car upon failure of main brake.

- g. Cycle power on control unit and verify **Governor Latching Fault** remains after power cycle.
- h. Reset the drive Run Enable to Brake in the motor control in the drive unit.
- i. Press the System Fault Reset push button to clear **Governor Latching Fault**.
- j. Set Machine Room Inspection switch to Normal and observe Pixel repositioning the cab to its closest landing zone.
- k. Set CAPTURE, TEST switches to OFF position to return car to service.

6.4 Safety Speed Tests

6.4.1 Car Buffer Test – Fully Loaded Car

The Pixel Car Buffer test is accomplished using a simple menu driven process and the procedure below:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Place full load test weights in the car.
- c. Drive the car to the top landing by entering a Car Call.
- d. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- e. Turn off the main power to the controller.
- f. Verify that the CAB Final Terminal Stop Switch will permit full compression of the buffer during test or relocate as needed to comply with code requirements Section 8.10.2.2.5, Entry (C) (6).
- g. Turn on the main power to the controller.
- h. Navigate to:

 Home 

 Install 

 Code Compliance Tests 

 Safeties Speed Tests 

 Car Buffer 



ETS Buffer Strike Speed

Set **Buffer Strike Speed** to the rated buffer striking speed

ETS Bypass Option


Set **ETS Bypass Option** to **Yes**

Press the  **Save** soft key to Save **ETS Bypass Option** selection or  **Cancel** to abort test.

Press the  **Run Test** soft key to start the **Car Buffer** test run or the  **Back** soft key to abort test run.



CAUTION: Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the down direction until the car strikes the car buffer. Once the car strikes the car buffer, and drive sheave slips under the cables, flip the controller inspection switch to the INSP position to stop the hoist motor from continuing to drive the car into the buffer.

- i. Turn off the main power to the controller.
- j. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.
- k. Jump from SAFC to SAFH terminals to bypass the CAB Final Terminal Stop Switch if tripped.
- l. Turn on the main power to the controller.
- m. Using Controller Inspection, run the car up past the bottom landing door zone area. Remove jumper placed in item k above.
- n. Reset ETS Bypass option,  **ETS Bypass Option**, Set to **No**
- o. Set the TEST switch to the off position and remove test weights from the car.
- p. Set the CAPTURE switch off, which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.2 Counterweight Buffer Test – Empty Car

The Pixel Counterweight Buffer test is accomplished using a simple menu driven process and the procedure below:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the empty car to the bottom landing by entering a Car Call.

- c. Set TEST switch, located on the MP board, to TEST which will enable Test Mode operation, and disable door operation.
- d. Turn off the main power to the controller.
- e. Verify that the Counterweight Final Terminal Stop Switch will permit full compression of the buffer during test or relocate as needed to comply with code requirements Section 8.10.2.2.5, Entry (C) (6).
- f. Turn on the main power to the controller.
- g. Navigate to:



 Home 

 Install 

 Code Compliance Tests 



 Safeties Speed Tests 

 **Counterweight Buffer** 

 ETS Buffer Strike Speed  ; Set to buffer rated or desired strike speed

 ETS Bypass Option  ; Set to **Yes**


Press the  **Save** soft key to Save **ETS Bypass Option** selection or  **Cancel** to abort test.

Press the  **Run Test** soft key to start the **Counterweight Buffer** test run or the  **Back** soft key to abort test run.



CAUTION: Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the up direction until the car strikes the counterweight buffer. Once the car strikes the counterweight buffer, and drive sheave slips under the cables, flip the controller inspection switch to the INSP position to stop the hoist motor from continuing to drive the car into the buffer.

- h. Turn off the main power to the controller.
- i. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.
- j. Jump from SAFC to SAFH terminals to bypass the Counterweight Final Terminal Stop Switch if tripped.
- k. Turn on the main power to the controller.
- l. Using Controller Inspection run the car down past the top landing door zone area. Remove jumper placed in j above.

- m. Reset ETS Bypass option,  **ETS Bypass Option**, Set to **No**
- n. Set the TEST switch to the off position.
- o. Set the CAPTURE switch off, which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.3 Safeties Overspeeds



WARNING: Safeties Overspeed tests should only be performed if speed governor(s) are fully adjusted and verified, refer to Section 6.6 below for Governor Test procedure.

6.4.3.1 Car Safeties Overspeed

The Pixel Car Safety Overspeed test is accomplished using a simple menu driven process and the procedure below:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Place full load test weights in the car
- c. Drive the car to the top landing by entering a Car Call.
- d. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- e. Turn off the main power to the controller.
- f. Place a jumper from controller terminals 4A to GOV (Governor Electrical Contact).
- g. Turn on the main power to the controller.
- h. Refer to Drive section xx.7 “Overspeed Using the Drive to Drive the Hoist Motor” to set up the drive to overspeed the car to 140% of contract speed.
- i. Navigate to:



 Home 

 Install 

 Code Compliance Tests 

 Safeties Speed Tests 

 **Car Safeties Overspeed** 

Press the  **Run Test** soft key to start the **Car Safeties Overspeed** test run or the  **Back** soft key to abort test run.



CAUTION: Once the Run Test soft key has been pressed, the car will accelerate to 140% of contract speed in the down direction until the car safeties set. Once the car safeties set, flip the controller inspection switch to the INSP position.

- j. Refer to Drive section xx.7 “Overspeed Using the Drive to Drive the Hoist Motor” to return drive parameter settings to limit motor to contract speed.
- k. Turn off the main power to the controller.
- l. Remove jumper placed in item e above.
- m. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.
- n. Follow car safeties manufacturer instructions to reset the car safeties.
- o. Turn on the main power to the controller.
- p. Toggle the CONTROLLER INSPECTION switch to NORMAL which will enable the car to re-level into the closest landing.
- q. Toggle the TEST switch off. And remove the load from the car.
- r. Set the CAPTURE switch off which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.3.2 Counterweight Safeties Overspeed

The Pixel Counterweight Safety Overspeed test is accomplished using a simple menu driven process and the procedure below:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the car to the bottom landing by entering a Car Call.
- c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- d. Turn off the main power to the controller.
- e. Place a jumper from controller terminals 4A to GOV (Governor Electrical Contact).
- f. Turn on the main power to the controller.
- g. Refer to Drive section xx.7 “Overspeed Using the Drive to Drive the Hoist Motor” to set up the drive to overspeed the car to 140% of contract speed.
- h. Navigate to:



 Home 

 Install 

 Code Compliance Tests 

 Safeties Speed Tests 

 **Counterweight Safeties Overspeed** 

Press the  **Run Test** soft key to start the **Counterweight Safeties Overspeed** test run or the  **Back** soft key to abort test run.



CAUTION: Once the Run Test soft key has been pressed, the car will accelerate to 140% of contract speed in the down direction until the car safeties set. Once the car safeties set, flip the controller inspection switch to the INSP position.

- i. Refer to Drive section x.x.7 “Overspeed Using the Drive to Drive the Hoist Motor” to return drive parameter settings to limit motor to contract speed.
- j. Turn off the main power to the controller.
- k. Remove jumper placed in item e above.
- l. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.
- m. Follow car safeties manufacturer instructions to reset the car safeties.
- n. Turn on the main power to the controller.
- o. Toggle the CONTROLLER INSPECTION switch to NORMAL which will enable the car to re-level into the closest landing.
- p. Toggle the TEST switch off.
- q. Set the CAPTURE switch off which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.4 Emergency Terminal Stop (ASME A17.1, Section 2.25.4)

Pixel can be configured to drop the main brake while keeping the emergency brake lifted during an Emergency Terminal Stop Event or to drop both brakes navigating to:

 Home 

 Adjust 

 Car Performance 

 Traction Options 

 SD Overspeed Drops Both Brakes  ; default = 0, only drop main brake.

To enable functionality set option on, set the value to 01. Then Pixel controller will wait 1 loop (100 milliseconds) between dropping the main brake and dropping the auxiliary brake.

The Pixel Emergency Terminal (up and down) Stop tests are accomplished using simple menu driven process and the procedures below:



Down Direction:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the car to the top landing by entering a Car Call.
- c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- d. Navigate to:

 Home 

 Install 



 Code Compliance Tests 

 Safeties Speed Tests 

 **Emergency Terminal Stop** 



NOTE: The Emergency Terminal Stop parameter “Slowdown Position” represents the hoistway position at which the car must start its deceleration into the bottom landing (relative to the down normal limit).

Press the  **Run Test** soft key to start the **Emergency Terminal Stop** test run or the  **Back** soft key to abort test run.



CAUTION: Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the down direction and run past the Slowdown Position.



- e. Observe that the Display shows a **Slowdown Overspeed** Trip latching fault, and that the car comes to a halt.
- f. Press the System Fault Reset key to clear the fault and enable the car to re-level into the closest landing.

Up Direction:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the car to the bottom landing by entering a Car Call.

c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.

d. Navigate to:


 Home 



 Install 


 Code Compliance Tests 

 Safeties Speed Tests 

 **Emergency Terminal Stop** 

 **NOTE:** The Emergency Terminal Stop parameter “Slowdown Position” represents the hoistway position at which the car must start its deceleration into the top landing (relative to the up normal limit).

Press the  **Run Test** soft key to start the **Emergency Terminal Stop** test run or the  **Back** soft key to abort test run.

 **CAUTION:** Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the up direction and run past the Slowdown Position.

- e. Observe that the Display shows a **Slowdown Overspeed** Trip latching fault, and that the car comes to a halt.
- f. Press the System Fault Reset key to clear the fault and enable the car to re-level into the closest landing.


6.4.5 NTS Slowdown Test (ASME A17.1, Section 2.25.2)

The NTS Slowdown test forces the car to execute an emergency slowdown into the terminal landing (up and down) utilizing the Landa Auxiliary sensor head Only to verify that the failure of the primary terminal slowdown device, the Main Landa Sensor head, does not prevent the car from landing into terminal landing position, the NTS Slowdown tests are accomplished using simple menu driven process and the procedures below:

Down Direction:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the car to the top landing by entering a Car Call.
- c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.

d. Navigate to:


 Home 



 Install 


 Code Compliance Tests 

 Safeties Speed Tests 

 **NTS Slowdown Test** 

 **NOTE:** The NTS Slowdown Test parameter “Slowdown Position” represents the hoistway position at which the car must start its deceleration into the bottom landing (relative to the virtual down normal limit).

Press the  **Run Test** soft key to start the **NTS Slowdown Test** run or the  **Back** soft key to abort test run.

 **CAUTION:** Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the down direction and run past the Slowdown Position.

- e. Observe that the Display shows an **NTS Slowdown Overspeed** Trip latching fault, and that the car comes level to the bottom landing.
- f. Press the System Fault Reset key to clear the fault and enable the car.

Up Direction:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Drive the car to the bottom landing by entering a Car Call.
- c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- d. Navigate to:


 Home 



 Install 


 Code Compliance Tests 

 Safeties Speed Tests 

NTS Slowdown Test

 **NOTE:** The NTS Slowdown Test parameter “Slowdown Position” represents the hoistway position at which the car must start its deceleration into the top landing (relative to the virtual up normal limit).

Press the  **Run Test** soft key to start the **NTS Slowdown Test** run or the  **Back** soft key to abort test run.

 **CAUTION:** Once the Run Test soft key has been pressed, the car will accelerate to contract speed in the up direction and run past the Slowdown Position.

- e. Observe that the Display shows an **NTS Slowdown Speed** Trip latching fault, and that the car comes level to the top landing.
- f. Press the System Fault Reset key to clear the fault and enable the car

6.5 Overspeed Tests

The Pixel safety microprocessors monitor four different overspeed states, depending on elevator operational mode, and provide a menu driven interface to verify overspeed monitoring performance as follows:

6.5.1 Inspection Overspeed

Inspection Overspeed monitors cab speed during all four inspection modes of operation Car Top, In Car, Access, or Controller inspection. Use the following process for verification:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Place the car on Controller Inspection.
- d. Navigate to:


 Home 



 Install 

 Code Compliance Tests 

 Overspeed Tests 

 **Inspection Overspeed** 


 **NOTE:** The Inspection Overspeed display shows the programmed inspection speed parameter, overspeed tripping speed setting, and prompts for entry of the inspection tripping speed parameter to be used when running an inspection trip detection test. Enter a speed below the current inspection speed parameter setting before running the test.

Press the  **Run Test** soft key to enable – for the next inspection run only –to detect **Inspection Overspeed** condition using the **Test Trip Speed** parameter or the  **Back** soft key to abort test run.

- e. Use the Machine Room Inspection switchgear, located on the MP board, to run the car up or down.
- f. Observe that the Display shows an Inspection Overspeed Trip latching fault, and that the car comes to a halt.
- g. Verify the car will not accept a command to run while the latched fault is present.
- h. Press the System Fault Reset key to clear the fault and enable the car to accept a command to move.
- i. Toggle the MACHINE ROOM Inspection switch to NORMAL which will enable the car to re-level into the closest landing.
- j. Set the TEST and CAPTURE switches off, which will enable the car to service hall calls and return to Automatic Mode operation.

6.5.2 Leveling Overspeed

Leveling Overspeed monitors cab speed while the car is running within the door zone or trucking zone and is in the process of leveling into a landing. Use the following process for verification:

 **NOTE:** Leveling Trip Speed does not monitor the target final programmed leveling speed. Pixel's car landing zone approach is normally greater than the final programmed leveling speed code permits speeds of up to 150 ft/min within the leveling zone.

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Navigate to:


 Home 



 Install 

 Code Compliance Tests 

 Overspeed Tests 

 Leveling Overspeed 


 **NOTE:** The Leveling Overspeed display shows the programmed Leveling speed parameter, overspeed tripping speed setting, and prompts for entry of the leveling tripping speed parameter to be use when running a leveling trip detection test. Enter a speed below the current leveling speed parameter setting before running test.

Press the  **Run Test** soft key to enable – for the next leveling run only – to detect **Leveling Overspeed** condition using the **Test Leveling Overspeed** parameter or the  **Back** soft key to abort test run.

- d. Observe that the Fault Display entry for the safety processors shows a Leveling Overspeed latching fault as the car slows down into the target landing's door zone, and that the car comes to a halt.
- e. Verify the car will not accept a command to run while the latched fault is present.
- f. Press the System Fault Reset key to clear the fault and enable the enable the car to accept a command to move.
- g. Verify that the car re-levels into the closest landing.
- h. Set place the TEST and CAPTURE switches to off, which will enable the car to accept hall calls and return to Automatic Mode operation.

6.5.3 Earthquake Overspeed



Earthquake Overspeed monitors the cab speed while the car is running in Earthquake Normal automatic mode. Use the following process for verification:

 **NOTE:** Car must be provided with earthquake mode operation, if not skip test.

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from accepting additional Hall Calls.
- b. Momentarily disconnect the field wire at terminal EQA to simulate seismic activity condition.
- c. Observe that the Fault Display shows Earthquake Abnormal mode operation.
- d. Reconnect the EQA field wire and wait for the time out period (default is 30 seconds) for Pixel to switch from abnormal to Normal Earthquake mode of operation.


e. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.

f. Navigate to:


 Home 



 Install 

 Code Compliance Tests 

 Overspeed Tests 

 **Earthquake Speed** 

 **NOTE:** The Earthquake Speed display shows the programmed Earthquake speed parameter, overspeed tripping setting, and prompts for entry of a tripping speed parameter to be used when running an earthquake speed trip detection test. Enter a speed below the current earthquake speed parameter setting before running test.

Press the  **Run Test** soft key to enable – for the next earthquake automatic run only to detect **Earthquake Overspeed** condition using the **Tripping Speed** parameter or the  **Back** soft key to abort test run.

- g. Observe the display Fault entry for the safety processors to declare a latching Earthquake Overspeed fault, and the car will come to a halt.
- h. Verify the car will not be commanded to run while the latched fault is present.
- i. Press the System Fault Reset push button to clear the fault and observe the car to re-level to its closest landing.
- j. Press the Earthquake Reset push button, located in the MP board, to reset Earthquake Mode.
- k. Set the TEST and CAPTURE switches off, which will enable the car to accept hall calls and return to Automatic Mode operation.

6.5.4 Contract Overspeed

Contract Overspeed monitors the cab speed while car is running on automatic mode use the following process for verification:


- a. Set the CAPTURE switch, located in the MP board, to CAPTURE to remove car from servicing Hall Calls.
- b. Set TEST switch, located in the MP board, to TEST which will enable Test Mode operation and disable door operation.

- c. Place a car call to a terminal landing to be able to run test.
- d. Navigate to:


 Home 



 Install 

 Code Compliance Tests 

 Overspeed Tests 

 **Contract Overspeed** 

 **NOTE:** The Contract Overspeed Speed display shows the programmed contract speed parameter, overspeed tripping setting, and prompts for entry of a tripping speed parameter to be used when running a Contract Overspeed speed trip detection test. Enter a speed below the current Contract Overspeed speed parameter setting before running test.

Press the  **Run Test** soft key to enable – for the next automatic run only to detect **Contract Overspeed** condition using the **Tripping Speed** parameter or the  **Back** soft key to abort test run.

- e. Observe the display Fault entry for the safety processors to declare a latching Contract Overspeed fault and the car come to a halt.
- f. Verify the car will not be commanded to run while the latched fault is present.
- g. Press the System Fault Reset push button to clear the fault and observe the car to re-level to its closest landing.
- h. Set the TEST and CAPTURE switches off, which will enable the car to accept hall calls and return to Automatic Mode operation.


6.6 Governor Test (ASME A17.1-2000 Section 2.19.1)

There are three components to be verified to confirm proper operation of the Governor device and controller interface circuits. They are the Governor Overspeed Electrical contact, the Governor inputs to the safety processors, and the Governor set trip speed. Follow procedure below to verify operation:

Governor Electrical Contact and GOV Inputs to Safety Microprocessors:


 **NOTE:** Refer to page 4 of prints: Governor Interface circuits.

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE to prevent the car from responding to hall call demand.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Manually momentarily trip and reset the governor overspeed switch, then verify that the following occurs:
 - Pixel screen displays **Governor Latching Fault**
 - Relays EB1-EB2, EBX1-EBX2, located in the PDB board drop, setting the Emergency Brake or “Rope Gripper”.
 - The car cannot be commanded to run.
 - Cycle power and confirm that the fault condition has not been cleared.
- d. Press the **System Fault Reset** button to clear the fault condition and pick the EB1-EB2 or EBX1-EBX2 relays to energize the Emergency Brake or “Rope Gripper”.

 **NOTE:** If performing Governor Electrical Contact test on Car Top Inspection toggling the Car Top Inspection switch Off and back to On Position will reset the **Governor Latching Fault**.

Governor Device Operation Verification:

- a. Set Machine Room Inspection switch, located on the MP board, to INSP.
- b. Lift the governor cable off the Governor, and then spin the Governor while measuring its speed. View the Pixel display to observe and note electrical and mechanical tripping speeds.

 **NOTE:** A variable speed drill motor is a good method for spinning the governor. Refer to Governor manufacturer instructions for tripping speed calibration as needed.

- c. Once the Governor trips verify that the following occurs:
 - Pixel screen displays **Governor Latching Fault**
 - Relays EB1-EB2, EBX1-EBX2, located in the PDB board drop out, setting the Emergency Brake or “Rope Gripper”.
 - The car cannot be commanded to run.
 - Cycle power and confirm that the fault condition has not been cleared.
 - Confirm that the measured tripping speed, shown on the Pixel display, agrees with the tripping speed requirements for this elevator.

- d. Replace the Governor Cable, lifted off in step f above, and return the Governor overspeed switch to the normal position.
- e. Press the **System Fault Reset** button to clear the fault condition and pick the EB1-EB2 or EBX1-EBX2 relays to energize the Emergency Brake or “Rope Gripper”.
- f. Repeat steps in the procedure above for a counterweight Governor, if required.

6.7 Terminal Stopping Devices

6.7.1 Normal Terminal Stopping Devices

Down Direction:

- a. Set Machine Room Inspection switch, located on the MP board, to INSP.



NOTE: Stopping positions function identically in both inspection and automatic operation.

- b. Run the car down past the bottom landing. The car should stop when the Down Normal Stopping position is reached.
- c. Verify that the Pixel screen displays **Down Terminal Switch Open**.
- d. Run the car up. The car should move in the up direction.
- e. Return Machine Room Inspection switch, on the MP board, to NORMAL.

Up Direction:

- a. Set Machine Room Inspection switch, located on the MP board, to INSP.



NOTE: Stopping devices function identically in both inspection and automatic operation.


- b. Run the car up past the top landing. The car should stop when the Up Normal Stopping position is reached.
- c. Verify that the Pixel screen displays **Up Terminal Switch Open**.
- d. Run the car down. The car should move in a down direction.
- e. Return Machine Room Inspection switch, on the MP board, to NORMAL.

6.7.2 Final Terminal Stopping Devices (ASME A17.1Section 2.25.3)

Down Direction:

Position the car at the bottom landing.

- d Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- e Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- f Set Machine Room Inspection switch, located on the MP board, to INSP.



 **NOTE:** Final Stopping devices (FSTD) function identically in both Construction and automatic modes of operation.

- g Set the car to Construction mode using the Touch& Go™ knob to navigate:


 Home 

 Install 

 Construction Mode 

 **Enable** or  **Cancel**

Press the  **Enable** soft key to enable


 **NOTE:** Construction Mode must be set to Disable in order to Enable any automatic mode of operation.

- h Run the car down in Machine Room Inspection, past the bottom landing. The car should stop when the Final Stopping device (FTSD) contact is opened.
- i Attempt to run the car. It should not move in either direction.
- j Verify that the Safety String is open by measuring 0 volts between terminal 3 and the SAFC and SAFH terminals with a voltmeter.
- k Verify that the Pixel screen displays **Hoistway Safety String Open**.
- l Turn the main power to controller off.
- m Place jumper between controller terminals 4A to SAFC and 4A to SAFH.
- n Turn the main power to controller on.
- o Run the car in Machine Room Inspection up to the bottom landing door zone area.
- p Turn the main power to controller off.
- q Remove jumpers between terminals 4A to SAFC and 4A to SAFH.
- r Turn the main power to controller on.
- s Return Machine Room Inspection, TEST, and Capture switches on the MP board, to NORMAL and OFF positions respectively.

- t Remove the car from Construction Mode.

Up Direction:

- a. Position the car at the top landing.
- b. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.
- c. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- d. Set Machine Room Inspection switch, located on the MP board, to INSP.



 **NOTE:** Final Stopping devices (FSTD) function identically in both Construction and automatic modes of operation.

- e. Set the car to Construction mode using the Touch& Go™ knob to navigate:


 Home 

 Install 

 Construction Mode 

 **Enable** or  **Cancel**

Press the  **Enable** soft key to enable.


 **NOTE:** Construction Mode must be set to Disable in order to Enable any Automatic mode of operation.

- f. Run the car up in Machine Room Inspection, past the top landing. The car should stop when the Final Stopping device (FTSD) contact is opened.
- g. Attempt to run the car. It should not move in either direction.
- h. Verify that the Safety String is open by measuring 0 volts between terminal 3 and the SAFC and SAFH terminals with a voltmeter.
- i. Verify that the Pixel screen displays **Hoistway Safety String Open**.
- j. Turn the main power to controller off.
- k. Place jumper between controller terminals 4A to SAFC and 4A to SAFH.
- l. Turn the main power to controller on.
- m. Run the car in Machine Room Inspection down to the top landing door zone area.
- n. Turn the main power to controller off.
- o. Remove jumpers between terminals 4A to SAFC and 4A to SAFH.

- p. Turn the main power to controller on.
- q. Return Machine Room Inspection, TEST, and Capture switches on the MP board, to NORMAL and OFF positions respectively.
- r. Remove the car from Construction Mode.

6.8 Landa™ Redundant Position System Verification

Critical Component:	Landa™ Main and Auxiliary Position Sensor Heads
Redundant Component:	Landa™ Main and Auxiliary Position Sensor Heads
Monitored Component:	Car Speed, and Position

 **NOTE:** The following tests verify that Pixel can safely position the cab using either of the two independent sensor heads that comprise the Landa™ positioning system.


The Pixel control uses a dual head positioning system – Landa™ – incorporating a positional encoded tape that runs the entire length of the hoistway. This system uses each sensor head to provide absolute position information independent of the other. Refer to page 6 of the prints for Landa™ interface circuits.

The Main Positioning head communicates its absolute position to the main processor via dedicated RS485 serial port while the Auxiliary Positioning head communicates its absolute position to the main processor via CAN.

The Landa™ positioning system verifies absolute cab position to 0.032” (0.8mm) accuracy throughout the entire length of the hoistway.

The Pixel computer network, MPU, will “learn” and then build a positional image of the entire hoistway including:

- Door Zone or Trucking Zone, one per landing
- Top and Bottom Access Limits
- Mid hoistway position
- Physical open position for the top and bottom normal limit switches
- A speed profile deceleration ramp for the top and bottom landings

 **NOTE:** The landing zones are limited to a maximum of six inches plus or minus learned position and are set at a factory default of three inches.

The learn process – once performed and verified during elevator installation – will be transferred and permanently stored by the three microprocessors that make up the Pixel controller’s main processing unit (MP, SP1, SP2). The learn process must be accomplished and transferred before the car can be run on any passenger automatic mode of operation.



NOTE: Pixel always “knows” the car position by reading it from the encoded tape and validating it through comparison to the learned/stored positional image.

Verification of Landa™ Main Sensor Head:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Enter a car call to a floor several floors away from current car position (if two stop elevator place a call to the other floor).
- d. While car is running, unplug the Main Selector RJ45 cable labeled “SELECTOR” from Pixel MP, and observe that Pixel displays a **Main Selector Fault**, makes an emergency slowdown, and positions the elevator cab at the next available landing.
- e. Pixel will remove the car from service until proper Landa™ Main sensor head communications is re-established.
- f. Verify that the car will not respond to car calls.
- g. Reconnect the RJ45 cable at the Pixel MP. Confirm that Pixel clears the **Main Selector Fault**, and that the car responds to car call demand.
- h. Return the CAPTURE and TEST switches to their off positions, which will enable the car to return to Automatic Mode of operation and serve hall call demand.

Verification of Landa™ Auxiliary Sensor Head:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE, which will prevent the car from responding to hall call demand.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Enter a car call to a floor several floors away from current car position (if a two-stop elevator place a call to the other floor).
- d. While car is running, unplug the cable labeled “CAB CAN” from the Pixel MP, and observe that Pixel displays **Aux. Selector Fault** makes an emergency slowdown and positions the elevator cab at the next available landing.
- e. Pixel will remove the car from service until proper Landa™ Auxiliary sensor head communication is re-established.
- f. Verify that the car will not respond to car calls.
- g. Reconnect the RJ45 cable at the Pixel MP. Confirm that Pixel clears the **Aux. Selector Fault**, and that the car responds to car call demand.

- h. Return the CAPTURE and TEST switches to their off positions, which will enable the car to return to Automatic Mode of operation and serve hall call demand.

6.9 Monitoring Compliance Verification


Monitoring Critical Circuits ASME 17.1 Sections 2.26.9.3 and 2.26.9.4

6.9.1 EB1-EB2 and EBX1-EBX2 Relays Contacts

Critical Component: EB1-EB2 and EBX1-EBX2 Relay Contacts

Redundant Component: RG1-RG2 and RGBP1-RGBP2, SP1 and SP2 Computer Monitoring Inputs


Monitored Component: EB1-EB2 and EBX1-EBX2 Relay Contacts

 **NOTE:** Test verifies that Pixel can detect failure of Emergency Brake relay contacts to open and responds by preventing car motion. Refer to page 2 of prints for Emergency Brake circuits.

Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.

Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.

Place Machine Room Inspection switch to INSP.


 **NOTE:** EB1-EB2 and EBX1-EBX2 Relays Contacts Verification function identically in both inspection and automatic modes of operation.

Momentarily short RG to RGBP inputs by using a jumper to bridge pin 3 to pin 4 on the PDB board at the JSMP harness connector.

Verify that the Pixel screen displays **EB Relay Fault** or **EBX Relays Fault**, the EB1-EB2 and EBX1-EBX2 relays are off, and the Emergency brake sets.

Verify that the car will not accept a run command while the fault is present.

Cycle power and confirm that the fault condition has not been cleared.

Press the  **System Fault Reset** button to clear the fault condition. Verify that either the EB1-EB2 or EBX1-EBX2 relays activate, and that the car will accept a run command.

Set the TEST and CAPTURE switches off, which will enable the car to accept hall calls and return to Automatic Mode operation.

Place Machine Room Inspection switch to NORMAL.



NOTE: Pixel alternates the use of EB1-EB2 and EBX1-EBX2 relay contacts that provide power to the emergency brake circuits, at the end of every run. Proper contact opening operation is verified prior to allowing the next run.

6.9.2 AA Motor Contactor Force Guided Relay

Critical Component: AA Relay

Redundant Component: STOP1-STOP2, SP1 and SP2 Computer Monitoring Inputs

Monitored Component: AA Relay Contacts



NOTE: Test confirms that Pixel correctly detects a motor contactor failure to open. Pixel checks for a stuck contact at the end of every run before allowing the next run. Refer to page 1 and 4 of prints.

Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.

Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.

Place Machine Room Inspection switch to INSP.



NOTE: AA Contactor Verification functions identically in both inspection and automatic modes of operation.

Manually press and hold the AA contactor movable and verify that the Pixel screen displays **AA Relay Fault**. Then release and confirm that the fault condition has been cleared (screen displays **No Faults**).

While holding AA contactor movable, use Controller Inspection to command the car Up or Down.

Verify that the car will not accept a run command while the fault is present.

Release the AA contactor movable and confirm that the Pixel screen displays **No Faults**.

Return the Controller Inspection, TEST and CAPTURE switches to their off positions, which will enable the car to return to Automatic Mode of operation and serve call demand.


Place Machine Room Inspection switch to NORMAL.

6.9.3 Potential Force Guided Relay

Critical Component: P Relay

Redundant Component: Pin1-Pin2, SP1 and SP2 Computer Monitoring Inputs


Monitored Component: P Relay Contacts

 **NOTE:** Test confirms that Pixel correctly detects a P relay failure to open. Pixel checks for a stuck contact at the end of every run before allowing the next run. refer to page 1 and 4 of prints. P contactor is one of two force-guided relays that provide power to the brake circuits.

Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.

Set the TEST switch, located on the MP board, to TEST, which will enable Test Mode operation and disable door operation.

Place Machine Room Inspection switch to INSP.

 **NOTE:** P Relay Verification functions identically in both inspection and automatic modes of operation.

Manually press and hold the P relay movable and verify that the Pixel screen displays **P Relay Fault**. Then release and observe that the fault condition has been cleared (screen displays **No Faults**).

While holding the P relay movable, use Machine Room Inspection to command the car Up or Down.

Verify that the car will not accept a run command while the fault is present.

Release the P contactor actuator and confirm that the Pixel screen displays **No Faults**.

Return the Controller Inspection, TEST and CAPTURE switches to their off positions, which will enable the car to return to Automatic Mode of operation and serve call demand.


Place Machine Room Inspection switch to NORMAL.

6.9.4 BK Brake Relay

Critical Component: BK Relay

Redundant Component: BK11-BK12, SP1 and SP2 Computer Monitoring Inputs

Monitored Component: BK Relay Contacts

 **NOTE:** Test confirms that Pixel correctly detects a BK relay failure to open. Pixel checks for a stuck contact at the end of every run before allowing the

next run. Refer to page 1 and 4 of prints. BK contactor is one of two force-guided relays that provide power to the brake circuits.

Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.

Set the TEST switch, located on the MP board, to TEST, which will enable Test Mode operation and disable door operation.

Place Machine Room Inspection switch to INSP.



NOTE: BK Relay Verification functions identically in both inspection and automatic modes of operation.

Manually press and hold the BK relay movable and verify that the Pixel screen displays **BK Relay Fault**. Then release and observe that the fault condition has been cleared (screen displays **No Faults**).

While holding BK relay movable, use Machine Room Inspection to command the car Up or Down.

Verify that the car will not accept a run command while the fault is present.

Release the BK contactor actuator and confirm that the Pixel screen displays **No Faults**.

Return the Controller Inspection, TEST and CAPTURE switches to their off positions, which will enable the car to return to Automatic Mode of operation and serve call demand.

Place Machine Room Inspection switch to NORMAL.

6.9.5 Hoistway & Car Door Bypass Switches

Critical Component: Hoistway and Car Door Bypass Switches

Redundant Component: HDB1-HDB2 and CDB1-CDB2, and SP1 and SP2 Computer Monitoring Inputs

Monitored Component: Hall and Car Door Bypass Switches



NOTE: This test verifies that Pixel will only allow the car to operate in

Cartop or In Car Inspection modes under the following conditions: (1)

Hoistway bypass switch is on BYPASS; (2) Car Door Bypass switch is on BYPASS; (3) both are on BYPASS.

Hoistway Door Bypass Switch:

- a. While the car is in Automatic Mode of Operation, place the **Hoistway Door Bypass** switch to the BYPASS position.
- b. Confirm that the Pixel screen displays **Inspection Mode** and a **Hall Door Bypass w/o Inspection fault**.
- c. Verify that the car will not respond to a car or hall call demand and will not move in Controller or Access inspection modes.
- d. Place the controller on **Cartop Inspection** and verify that the car will respond to an up or down cartop inspection command with any hoistway door in the not fully closed position.
- e. With a hoistway door still in the not fully closed position, place the **Hoistway Door Bypass** switch to OFF position. Verify that the car will not respond to an up or down cartop inspection command.
- f. Fully close the test door. Verify that the car will now respond to an up or down cartop inspection command.


Car Door Bypass Switch:

- a. While the car is in Automatic Mode of Operation, place the **Car Door Bypass** switch to the BYPASS position.
- b. Confirm that the Pixel screen displays **Inspection Mode** and also a **Car Door Bypass w/o Inspection fault**.
- c. Verify that the car will not respond to a car or hall call demand and will not move in Controller or Access inspection modes.
- d. Place the controller on **Cartop Inspection** and verify that the car will respond to an up or down cartop inspection command with the car door in the not fully closed position.
- e. With the car door still in the not fully closed position, place the **Car Door Bypass** switch to OFF position. Verify that the car will not respond to an up or down cartop inspection command.
- f. Fully close the car door. Verify that the car will now respond to an up or down cartop inspection command.

Hoistway and Car Door Bypass Switches:


- a. While the car is in Automatic Mode of Operation, place the **Hoistway and Car Door Bypass** switches to the BYPASS position.
- b. Confirm that the Pixel screen displays **Inspection Mode** and also a **Hoistway Door Bypass w/o Inspection fault**.
- c. Verify that the car will not respond to a car or hall call demand and will not move in Controller or Access inspection modes.

- d. Place the controller on **Cartop Inspection** and verify that the car will respond to an up or down cartop inspection command with any hoistway and car door in the not fully closed position.
- e. With any hoistway and car door still in the not fully closed position, place the **Car Door Bypass** switch to OFF position. Verify that the car will not respond to an up or down cartop inspection command.
- f. Fully close the hoistway doors and car door. Verify that the car will now respond to an up or down cartop inspection command.

 **NOTE:** Referring to page MP of job prints, observe that both Hoistway and Car Door Bypass switches are being monitored on the Normally Open and The Normally Closed sides of their respective contacts. If the input state of SP1 and SP2 are not opposite, a **Car Door Bypass System Fault** or **Hoistway Door Bypass System Fault** will be displayed on the Pixel screen and the car will be prevented from moving.

6.9.6 Detection of Jumpers on Door Safety String (DLM)

Critical Component:	Car Gate and Hoistway Door Locks Redundant Component: SP1 and SP2 computer Monitoring Inputs
Monitored Inputs:	Front Doors: CGF1-CGF2, DLAT1-DLAT2, DLSF1-DLSF2, DLAB1-DLAB2 Additional inputs for front and rear doors Rear Doors: CGR1-CGR2, DLSR1-DLSR2,

 **NOTE:** Test verifies that Pixel will detect jumpers placed on the door safety string and prevent doors from closing and any car movement. Refer to page 4 of the prints for job required door safety string inputs.

- a. B. Place the car on Independent Service and run the car to the bottom landing. The car will automatically open the doors.
- b. Place a jumper from 4A to CGF. Confirm that the Pixel screen displays **Door Lock System Fault**.
- c. Verify that the car will not respond to a car call demand.
- d. Remove jumper from 4A to CGF. Confirm that the Pixel screen displays **No Faults**.
- e. Place a jumper from 4A to DLAB. Confirm that the Pixel screen displays **Door Lock System Fault**.
- f. Verify that the car will not respond to a car call demand.

- g. Remove jumper from 4A to DLAB. Confirm that the Pixel screen displays **No Faults**.
- h. Run the car to an intermediate landing.
- i. Place a jumper from 4A to DLSF. Confirm that the Pixel screen displays **Door Lock System Fault**.
- j. Verify that the car will not respond to a car call demand.
- k. Remove jumper from 4A to DLSF. Confirm that the Pixel screen displays **No Faults**.
- l. Run the car to the top landing.
- m. Place a Jumper from 4A to DLAT. Confirm that the Pixel screen displays **Door Lock System Fault**.
- n. Verify that the car will not respond to a car call demand.
- o. Remove Jumper from 4A to DLAT. Confirm that the Pixel screen displays **No Faults**.



NOTE: Skip to step W below if car has no rear doors.


- p. Run the car to a rear door landing and open the rear doors.
- q. Place a jumper from 4A to CGR. Confirm that the Pixel screen displays **Door Lock System Fault**.
- r. Verify that the car will not respond to a car call demand.
- s. Remove jumper from 4A to CGR. Confirm that the Pixel screen displays **No Faults**.
- t. Place a jumper from 4A to DLSR. Confirm that the Pixel screen displays **Door Lock System Fault**.
- u. Verify that the car will not respond to a car call demand.
- v. Remove jumper from 4A to DLSR. Confirm that the Pixel screen displays **No Fault**.
- w. Release car from Independent service.

6.9.7 Door Open and Close Simultaneously


Critical Component: Door Open & Door Close Limits

Redundant Component: DOL and DCL Computer Monitoring Inputs

Monitored Component: Door Opened & Door Close Limits

 **NOTE:** Test verifies that Pixel will detect a condition where the door open and door close limit switches are opened simultaneously.

- a. Place the car on Cartop Inspection.
- b. Turn the main power to the controller off.
- c. Remove and isolate the wire from the DCLF terminal on the P-TOC board.
- d. Remove the car from Cartop Inspection and place the car on Independent service.
- e. Turn the main power to the controller on.
- f. Allow the car to reposition to the closest landing and open the doors.
- g. Confirm that the Pixel screen displays **Front Door Limit Switches Fault**.
- h. Verify that doors will not close by pressing the door close button in the COP.
- i. Place the car on Cartop Inspection.
- j. Reconnect wire to the DCLF terminal.
- k. Remove car from Cartop Inspection. Confirm that the Pixel screen displays **No Faults**.
- l. Remove Car from Independent Service. Confirm that doors operate normally.

 **NOTE:** Repeat for rear doors if car has front and rear door operation. Use DCLR and DOLR in place of DOLF and DCLF to perform steps above.

6.9.8 Unintended Movement (ASME 2.19.2)

Critical Component: Car Gate and Hoistway Door Locks

Redundant Component: SP1 and SP2 safety microprocessors, Landa™ Position System

Monitored Inputs: **Front Doors:** CGF1-CGF2, DLAT1-DLAT2, DLSF1-DLSF2, DLAB1-DLAB2

Additional inputs for front and rear doors
Rear Doors: CGR1-CGR2, DLSR1-DLSR2



NOTE: Test verifies operation and deployment of the emergency brake by Pixel if the cab travels outside a landing zone with both car and the hoistway doors open.



NOTE: Refer to Section 4, Landa™ Selector Design, for verification of position system operation.

- a. On Pixel control Verify **Unintended Movement Bypass option is set to No**, navigate to:

Home

Install

Code Compliance

Unintended Movement

Unintended Movement Bypass

No

Press the **Save** soft key, to disable bypass.

- b. Enable **Unintended Movement Test**, UIM test, navigate to:

Home

Install

Code Compliance

Unintended Movement

Unintended Movement Test

- c. Follow UIM test directions on Pixel LCD.



WARNING: Place approved barricade across elevator door opening. Station qualified supervision at opening. PREVENT ACCIDENTAL INGRESS ATTEMPT DURING TEST.

- d. Once ready to perform test Press the **Page Up** soft key, to enter UIM test mode.
- e. The LCD will display instructions and current distance information prior to UIM test, follow directions on the Screen to enable Pixel to lift the main

brake without commanding the motor drive unit, refer to this job drive appendix xx.8, and observe the car to travel by gravity out of the door zone area triggering an Unintended Movement latching Fault deploying the emergency brakes to stop the car.



NOTE: The main brake will remain lifted for as long as the Enable and Up Machine Room Inspection push button are held push in, allowing verification of auxiliary brake capacity to stop the car upon failure of main brake.

- f. Verify on Pixel Screen that the Distance Moved by the car is less than or equal to 48 inches, if Distance Moved is more than 48 inches, auxiliary brake adjustment must be performed to comply with the code maximum stooping distance allowed for Unintended Movement, please refer to the auxiliary brake manufacturer for instructions on brake adjustment and repeat UIM test.
- g. Cycle power on control unit and verify Unintended Movement Fault remains after power cycle.
- h. Reset the drive Run Enable to Brake in the motor control in the drive unit.
- i. Press the System Fault Reset push button to clear Unintended Movement Fault.
- j. Set Machine Room Inspection switch to Normal and observe Pixel to close the cab doors and reposition the cab to its closest landing zone.
- k. Remove barricades, set Capture switch to off, to conclude UIM test.

6.9.9 Single Ground

Critical Component:	N/A
Redundant Component:	F4A Fuse
Monitored Component:	N/A

Test Verification of Single Ground:

- a. Place the car on Machine Room Inspection.



NOTE: The Single Ground Test can be performed either automatic or inspection operation.



NOTE: The system logic is driven by a source of 110 Volts AC, and has one side already connected to ground, the 3 buss. The other side, the 4A bus, is protected by a fuse feeding the logic power. Any accidental grounding will result in a blown fuse F4A, which will remove controller power to the safety string and logic circuits.

- b. Short terminal SAFH to ground. Verify that fuse F4A blows, and the Pixel screen displays **Safety String Open Fault**.

- c. Turn the main power to controller off.
- d. Replace fuse F4A.
- e. Turn the main power to controller on.
- f. Confirm that the Pixel screen displays **No Faults**.
- g. Remove the car from Machine Room Inspection.

6.9.10 Permit Car Speeds Over 150 fpm ASME 2.26.9.3.c except 2.26.1.5.10(b)

Critical Component: Landa™ Main and Auxiliary Selectors

Redundant Component: Landa™ Main and Auxiliary Selectors

Monitored Component: Car Speed



NOTE: Refer to Section 6.6, Landa™ Redundant Position System Verification, for verification of the speed and position feedback system.



NOTE: Refer to Section 6.3.1, Inspection Overspeed and 6.3.2 Leveling Overspeed, for verification of inspection and leveling overspeed.

6.9.11 Traction Loss verification procedure

Pixel system provides menu driven test capabilities to verify operation for “Traction Loss”, where a car commanded to run does not follow the commanded speed, even do the motor is rotating at the commanded RPM by providing a modified pattern to the drive unit only to run the car slower from commanded speed provided to Pixel’s safety microprocessors as follows:

- a. Set the CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls and wait for car to finish servicing any pending car calls.
- b. Set the TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
- c. Navigate to:
 - Home
 - Install
 - Code Compliance Tests
 - Traction Lost
- d. Follow directions on Pixel Screen window to perform test.



NOTE: The display shows the programmed Traction Lost Time Out corresponding to the time Pixel will wait before declaring Traction Loss fault, and the Traction Lost Trip Percentage corresponding to the percentage of speed the car will be allowed to run below commanded speed to trigger timeout and traction loss fault.



- e. Once Traction Loss fault is declared, cycle controller power to verify the fault will remain latched through power outages.
- f. To clear the fault, press the System Fault Reset.
- g. Set CAPTURE and TEST switches to OFF position to release car back to Automatic.



NOTE: Traction Loss feature is available from software version 2.0.1.12 or higher, refer to section 4.7.22 Traction Loss % to set up parameters to enable feature, and perform a Safety Configuration file transfer to transfer the Traction Loss parameter settings to SP1 and SP2 safety microprocessors, refer section 4.9 for instructions to perform transfer.

6.9.12 Executable Software, USI, Verification

The executable version of the controller running software can be viewed navigating to:

 Home 

 Install 



 About 

Software version: Parameter displays Elevator Microprocessor Logic Version

SP1 Software version: Parameter displays Safety Microprocessor Version



6.9.13 Remote Monitoring, RIO, Functionality

Enabling-Disabling RIO functionality can be performed navigating to:


 Home 

 Install 


 RIO Functionality 

 **Enable** or  **Disable**; Press Enable or Disable Soft Key to Enable-Disable RIO interaction functionality.

RIO **Enable** mode functionality allows Pixel to assert commands from devices connected remotely to the controller via WebInteract or Intermediate Remote monitoring interface device, as listed in the RIO Commands table, enabled column entries with green background, below.

 **NOTE:** The orange background entries listed under the Enabled column are view- only regardless of RIO status mode.

RIO **Disable** mode functionality prevents Pixel from asserting commands from devices connected remotely to the controller via WebInteract or Intermediate Remote monitoring interface device, as listed in the RIO Commands table, Disabled column entries with orange background, below.

 **NOTE:** While on RIO Disabled mode of operation Pixel Home Screen will display “**RIO-Disabled**” to indicate this operational status mode.

To verify RIO **Enable** functionality, enable RIO following steps above and confirm entering of car calls or any other Enabled, allowed, and selected command behavior using a remotely connected device.

To verify RIO, **Disable** functionality, Disable RIO following steps above and confirm entering of car calls or any other disabled, Not-allowed, command behavior using a remotely connected device is not allowed.

RIO Commands		Enabled	Disabled
Register Car and Hall Calls		Yes	No
Activate/De-Activate Lockouts		Yes	No
Schedule Lockouts		Yes	No
Lockout Bypass		Yes	No
Car to Lobby		Yes	No
Independent Service		Yes	No
Shutdown Out of Service		Yes	No
Emergency Recall (Car to Floor)		Yes	No
Disable All Commands		Yes	No
Restricted Lobby Operation		Yes	No
Up Peak Operation		Yes	No
Down Peak Operation		Yes	No
Lobby Peak Operation		Yes	No
Disable All Command		Yes	No
Download I/O File		Yes	Yes
Download Config File		Yes	Yes
Edit Config File		Yes	No
	Speed Profile	No	No
	Door Options	Yes	No
	Fire Service		
	Options	No	No
	Front Door Timers	Yes	No
	Rear Door Timers	Yes	No
	Hydraulic Timers	No	No
	Traction Timers	No	No
	Motor Brake Timers	No	No
	Controller Timers	Yes	No
10 Most Recent Event List Request		Yes	Yes
Event Files		Yes	Yes

6.9.14 Cybersecurity Protection Functionality

Cybersecurity is relevant for an internet connected or connectivity enabled device interfaced (directly or indirectly) to an elevator controller. Pixel controller does not connect to the internet, it uses an intermediate device, PC or third-party black box, containing two separate hardware-ethernet ports to keep Pixel isolated from the internet, one private port is exclusively used for Pixel inter-communications private network and the other is exclusively used for public network communications. Cybersecurity is provided for the ethernet port connected to the internet only.

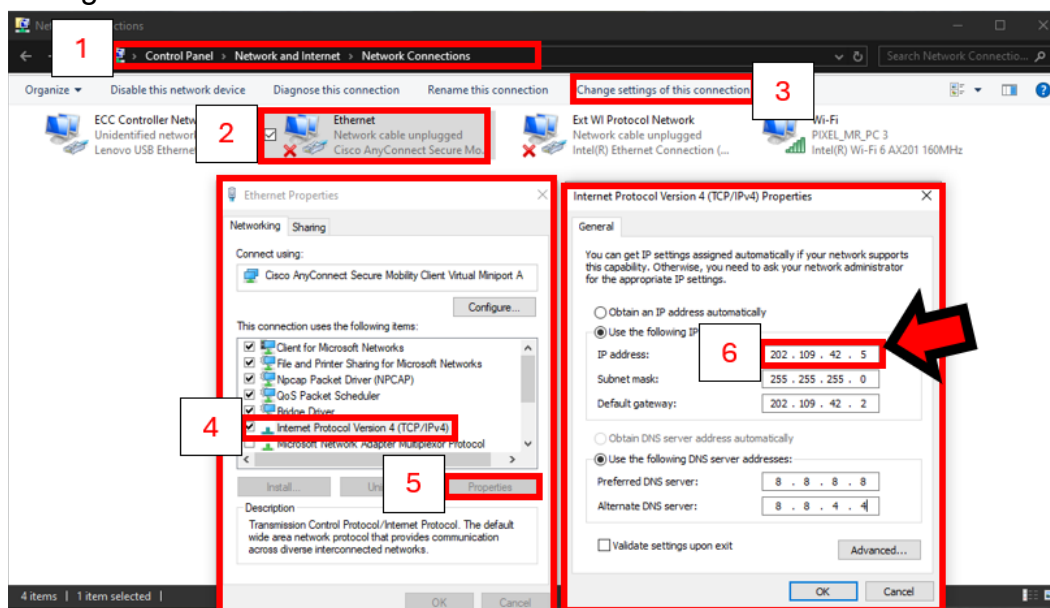
Cybersecurity functionality is enabled-disabled through a two position, ENABLE and OFF, key switch, usually located at the lobby, or building security panel labeled, Cybersecurity, wired to Pixel controller CySI input.to virtually disable any communications to and from the controller by virtually disconnecting Pixel from the internet.

To verify cybersecurity, **OFF** functionality, rotate the key switch to the OFF position and confirm communications with Pixel by entering car calls or any other Enabled, allowed, and selected command behavior using a remotely connected device.

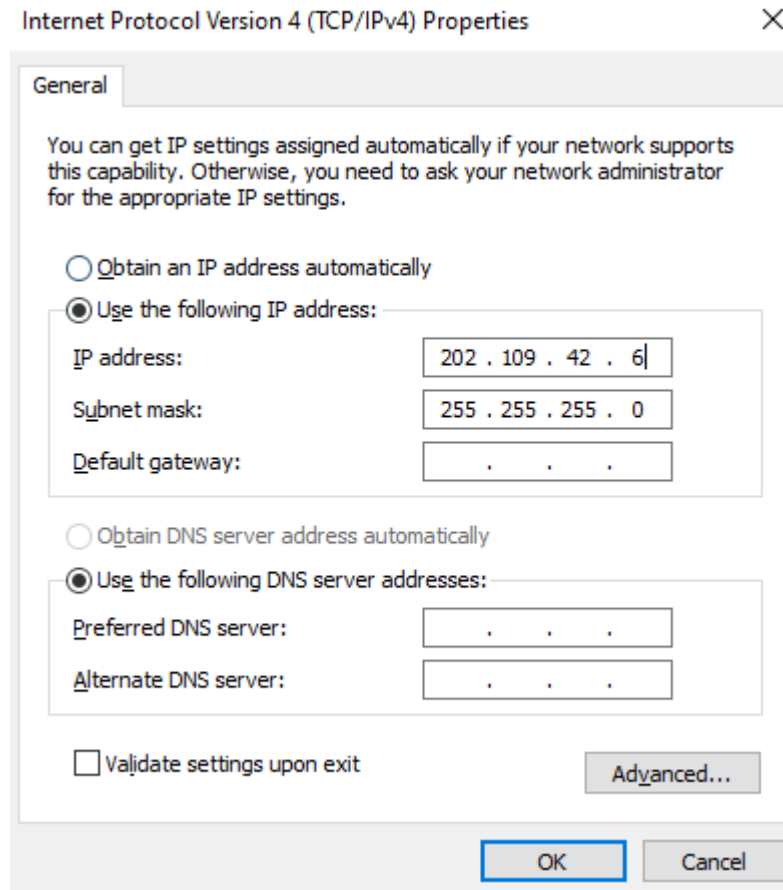
To verify cybersecurity, **Enable** functionality, rotate the key switch to the ENABLE position and confirm communications with Pixel have stopped by entering of car calls or any other Enabled, allowed, and selected command behavior using a remotely connected device.

6.9.14.1 Ethernet Port Hardware Disable Test Using a PC

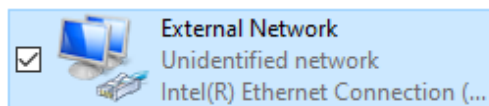
1. Obtain and document the IP address of the network adapter that is used to provide external access, indicated by the box numbered 6, from the machine room PC navigating to the control panel and following steps 1 through 5 shown below.



2. Configure the testing PC network adapter by opening the same Network Connections window shown in the last step to set the IP address the same as the machine room PC with the last number in the IP address increased by one. The subnet will be the same and other settings are left blank.



3. Use an RJ45 Ethernet cable to connect the testing PC ethernet port to the machine room PC providing the Internet connections. Remove RJ45 cable from this port if one is already present.
4. Verify communication between the testing and machine room PCs have been established, navigating on any of two PCs to Network connections and observing the following prompt.



If prompt displays a red "X", indicating no connection review steps 1 through 4 above to verify and correct any settings preventing from establishing communications.

5. On the test PC use the Windows search menu to open the “Command Prompt” to use the ping command to verify communications between the two PCs by typing at the command prompt, 10.0.0.10 and observing response below, indicating communications enabled.

```
P:\>ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time<1ms TTL=128
Reply from 10.0.0.10: bytes=32 time<1ms TTL=128
Reply from 10.0.0.10: bytes=32 time<1ms TTL=128
Reply from 10.0.0.10: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

6. Set the Cybersecurity switch to the ENABLE position.
7. On the test PC use the Windows search menu to open the “Command Prompt” to use the ping command and verify communications between the two PCs have been disabled by typing at the command prompt, 10.0.0.10 and observing response below, indicating communications are disabled.

```
C:\>ping 202.109.42.5

Pinging 202.109.42.5 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 202.109.42.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

8. Remove the RJ45 cable connected between the two PCs and reconnect RJ45 cable if it was removed on step 3 above.
9. Set the Cybersecurity switch to the OFF to enable remote communications access.

Section 7 – Troubleshooting



The Elevator Controls Microprocessor Controller is the most reliable part of any elevator system. While problems are possible, the most efficient troubleshooting approach is to first look to the “outside world” for the source of malfunctions that most frequently take elevators out of service.


7.1 General Troubleshooting Tips.


Pixel controller is equipped with multiple indicators designed to help troubleshoot at a glance; significant time and frustration can be avoided by simply paying attention to the indicators on the MP and P-I/O boards.


7.2 General Checklist


- a. The Pixel home screen always displays the most prominent fault preventing the car from Automatic operation.

-  **NOTE:** If an active fault is displayed, pressing the  **HELP** button will display the fault help screen and possible corrective action. Refer to section 7.3 below for example of fault and HELP diagnostics navigation.
- b. Verify that each power control step-down transformer has the correct input and output voltages (refer to job prints page 2 for terminal and fuse numbers). Replace fuses as necessary.
 - c. Verify that the 24 VDC power supply module green LED is illuminated, and that voltage output is within 10 % tolerance. If not, check the following:
 - i. Verify input power to the power supply.
 - ii. Check the power supply input switch setting, set per job prints page 2.
 - iii. Verify that fuses FSP1 and FSP2 are good.
 - d. Check voltage between terminals 4A and 3 to confirm approximately 110 VAC.
 - e. Check voltage between terminals 6 and 3; 50 and 3; and 50F and 3. Confirm approximately 24 VDC. If any of the above power supply voltages are not within range, check the appropriate fuses.

-  **NOTE:** System common is the 3 bus (normally terminal 3 is connected to chassis ground). Unless otherwise noted, all DC voltages are measured with respect to Terminal 3.

-  **NOTE:** Refer to Appendix D for complete list of mnemonic descriptions.

-  **NOTE:** Refer to Section 7.4, Pixel Fault Listing Table, for a complete list of Help Menu fault entries with expanded Possible Causes/ Solutions.

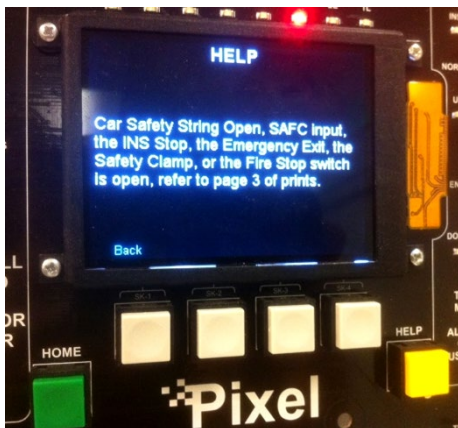
 **NOTE:** Refer to Appendix G for Pixel Multi Car Groupless system communication configuration and troubleshooting.


7.3 Fault Help Menu Navigation Example


Pixel recognizes over two hundred faults. All faults can be resolved using the same method. The example below illustrates the use of the HELP menu in correcting a Car Safety String Open fault.



Pixel home screen displays **Car Safety String Open** Fault (shown in red).




Press the yellow  **HELP** button and details about how to resolve the fault are displayed.

 **NOTE:** Every fault Pixel declares follows the same display and HELP menu format.


7.3.1 Troubleshooting Example

Continuing with the **Car Safety String Open** fault from above, use the help menu instructions to troubleshoot and correct fault per the example below:

- Verify the SAFC input LED, located on the P-I/O, board is not illuminated; indicating that SAFC input voltage is missing.
- Open the job prints, page 3, as indicated by the HELP menu.

- c. Verify that the power between terminals 3 and 4A is approximately 120 VAC. For the example purposes consider that voltage measured is within range. Power supply voltage troubleshooting is covered in Section 7.2 above, General Check List.
- d. Verify that power between terminals 3 and SAFC is not present.
- e. Verify that the COP Fire Panel Stop Switch is closed, and power between terminals 3 to 20B is approximately 120 VAC inside the COP. For the example purposes the Fire Panel Stop Switch is closed and the voltage measured is within range.
- f. Access the top of the car and place the car on Cartop Inspection mode.
- g. Verify that the power between terminals 3 and 20B at the TOC terminal strip is approximately 120 VAC. For example, purposes the voltage measured is within range.
- h. Determine which device is open between terminals 20B and SAFC in the TOC terminal strip. Correct as required.
- i. Verify power between terminals 3 and SAFC is approximately 120 VAC on the TOC terminal strip.
- j. Verify voltage at the controller traveler terminal strip SAFC and SAFC LED is illuminated on the P-I/O board.
- k. Press  **HOME** to return to Pixel main menu and verify fault has cleared.



NOTE: Some faults are latching and require that the  **RESET** System Fault Reset button be pressed to clear fault after it is no longer present. Refer to Table 7.3.1 below for a list of latching faults requiring manual reset.

- l. If another fault is displayed, follow steps 1 to 11 above to correct and return the car to service.





Latching Event Table 7.3.1

Table 7.3.1 Latching Faults Table	Traction	Hydraulic
1. Unintended Movement	Yes	N/A
2. Governor Switch Open	Yes	Yes
3. EB1-EB2 Relays Fault	Yes	Yes
4. EBX1-EBX2 Relays Fault	Yes	Yes
5. Inspection Overspeed	Yes	Yes
6. Slowdown Overspeed	Yes	Yes

7. Earthquake Overspeed	Yes	Yes
8. Leveling Overspeed	Yes	Yes
9. Highspeed Overspeed	Yes	Yes
10. Motor Limit Timeout	Yes	Yes
11. Pit Flood	No	Yes
12. U Relay Fault	No	Yes
13. D Relay Fault	No	Yes
14. Brake Did Not Lift	Yes	N/A
15. I2C Bus Error	Yes	Yes
16. Opposite Direction Motion	Yes	N/A
17. Following Error/Traction Loss	Yes	N/A
18. Front PHE Cycle Test Failed	Yes	Yes
19. Rear PHE Cycle Test Failed	Yes	Yes
20. Low Oil Input Active	N/A	Yes
21. Hot Oil Input Active	N/A	Yes
22. Drive Speed Regulator Fault	Yes	N/A
23. Broken Suspension Detected	Yes	N/A
24. Plunger Input Active	N/A	Yes
25. Cycle Test Failed	Yes	Yes

7.4 Pixel Event Listing Table

The Pixel Event Listing is intended to provide an explanation of the event conditions that may be generated by Pixel controller and to empower the troubleshooter with a better understanding of each event to expedite corrective actions.

-  **NOTE:** Events are listed in alphabetical order.
-  **NOTE:** Events for P-Brake and GALX-1050 Main and Aux. Serial Brake boards are listed together.
-  **NOTE:** Under the Event Message column, the message description portion in () parenthesis is for Pixel software versions 3.0.3.xx and prior.
-  **NOTE:** Under the Event Message column, the message description portion in { } curly brackets is used to provide an explanation about the XX portion of the event message and will not be displayed as part of the event message

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
AA Contactor/STOP Input	The AAo Motor Contactor output state is off but its monitored contact did not close or AAo state is on but its monitored contact did not Open, AA Contactor failed to pick, drop or it has a bad Auxiliary Contact, verify contact(s) wired to the STOP input and AAo contactor output triacs; refer to page 4 of prints.	TRACTION AAo = 1 STOP = 1 OR AAo = 0 STOP = 0 HYDRO w/Contactor Proof Option SU = 0 SD = 0 AAo = 0 STOP = 0 HYDRO w/o Contactor Proof Option AAo = 0 STOP = 0	<ul style="list-style-type: none"> • Verify the AA Auxiliary Contacts are properly seated • Manually actuate the AA motor contactor and observe the STOP input Led on the P-MPIO board turns off as contactor is pressed and turns on when released. • Verify the operation of the STOP input on the P-MPIO Board – Navigate to Troubleshoot→Flags →Safety I/O Flags and observe the STOP flag changing states in memory when the AA motor contactor is manually actuated. • If the STOP flag doesn't change state in memory, but it does change state on the P-MPIO status LED– Replace the P-MPIO Board • If STOP flag does change state in memory and it matches the LED status – Navigate to Troubleshoot→Flags →Safety I/O Flags observe the AAo output flag to match the AAo output status LED on the P-MPIO, if it does not replace AAo output triacs Q4 and Q5 on the P-MPIO Board and repeat this step. • If step above did not fix the problem, Replace the P-MPIO Board
Alternate Pattern Error	Error is generated when Acceleration, Deceleration, and Jerk parameters for the Alternate Speed Profile are out of range to allow Pixel the generation of a continuous speed pattern output.	Initial Jerk Roll Over Jerk Deceleration Jerk Acceleration Deceleration	<ul style="list-style-type: none"> • The parameters entered into the alternate speed profile are out of range– Refer to Section 4.6 of the Pixel Manual for allowed range values. • Enter factory default values and adjust parameters as needed for best performance Navigate to Adjust→Ride Performance→Alternate Speed Profile to verify and enter speed parameters
Aux Brake Tripped	The auxiliary brake monitor input RGOK status is off, the emergency brake failed to lift, refer to Page2 of prints to verify Auxiliary Brake and to pages 2 and 3 for RGOK input interface and wiring	EB1 and EB2 = 1 or EBX1 and EBX2 = 1 And RGOK = 0	<ul style="list-style-type: none"> • Verify RG, RGBP, and RGOK slide jumpers setting on the PDB board and Auxiliary Brake interface wiring; refer to page2 of the prints. • Verify voltage or terminal RG3 to be 120 or 240 VAC as required for this job; refer to page 2 of the prints. • Verify RGOK input LED on the P-MPIO is on, then Navigate to Troubleshoot → Flags → Safety I/O Flags to verify that RGOK input flag matches input LED status, if not replace the P-MPIO board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Aux Brake Comm Lost Or Main Brake Comm Lost	The P-Brake or GALX-1050 Serial Brake has not received a message from P-MP within the user specified CAN Rx Timeout or has not sent a CAN message within user specified CAN Tx Timeout. The P- Brake board upon event detection will turn on the FLT LED and the GALX-1050 board will stop blinking and turn off the COMM LED		<ul style="list-style-type: none"> • Verify wiring of the Serial Brake board for data communications and control logic and the on-board configuration switch gear is properly configured, Refer to Page 2 of the prints. • Verify Comm Loss Timer, Navigate to Adjust → Ride Performance → Serial Brake(s) Adjust → Aux Brake Parameters Comm Loss Timer is set to 250ms, or increment value to 500ms. • Replace the Serial Brake Board
Aux Brake EEPROM Mismatch Or Main Brake EEPROM Mismatch	Parameter CRC value stored in the P-Brake or GALX-1050 Serial Brake do not match its CRC calculated value or Parameter CRC value does not match the parameter CRC value calculated by the P-MP board.		<ul style="list-style-type: none"> • Parameters must be re-synced between P-Brake or GALX-1050 Serial Brake and P-MP. Navigate to Install → File Transfer → Serial Brake Configuration Upload → Perform a Transfer function.
Aux Brake High Demand Or Main Brake High Demand	Requested command output voltage is higher than the P-Brake or GALX-1050 Serial Brake DC buss power supply voltage		<ul style="list-style-type: none"> • Verify wiring of the Serial Brake board for Power and control logic, Refer to Page 2 of the prints. • For the GALX-1050 Aux. Brake only, verify while car is commanded to move that the EB1-EB2 or EBX2-EBX2 relays are energized, and proper voltage is supplied to the brake board terminals AC1-AC2-AC3, refer to page 2 of the prints. • Verify brake parameters are properly set and match the brake data tag and page 2 of the prints brake data; Navigate to Adjust → Ride Performance → Serial Brake(s) Adjust → Aux Brake Parameters • Bridge rectifier(s) may be bad, or Voltage sensing circuit may be bad. Replace board.
Aux Brake Low DC Bus Or Main Brake Low DC Bus	Rectified AC voltage is lower than expected in the P-Brake or GALX-1050 Serial Brake DC buss power supply.		<ul style="list-style-type: none"> • Verify wiring of the Serial Brake board for Power and control logic, Refer to Page 2 of the prints. • For the GALX-1050 Aux. Brake only, verify while car is commanded to move that the EB1-EB2 or EBX2-EBX2 relays are energized, and proper voltage is supplied to the brake board terminals AC1-AC2-AC3, refer to page 2 of the prints. • Bridge rectifier(s) may be bad, or DC bus Voltage sensing circuit may be bad. Replace the Serial Brake Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Aux Brake No Current Or Main Brake No Current	Voltage is being commanded by the P-Brake or GALX-1050 Serial Brake board, but no current flow to the brake coil circuit is detected.		<ul style="list-style-type: none"> • Verify brake coil resistance agrees with brake nameplate data up to Pixel controller terminals. • Verify the wiring of the Brake Coil according to job prints; Refer to Page 2 of the prints. • Bad current sensor. Replace board.
Aux Brake No DC Bus Or Main Brake No DC Bus	The P-Brake or GALX-1050 Serial Brake do not sense-measure any rectified AC voltage in its DC buss power supply.		<ul style="list-style-type: none"> • Verify wiring of the Serial Brake board for Power and control logic, Refer to Page 2 of the prints. • For the GALX-1050 Aux. Brake only, verify while car is commanded to move that the EB1-EB2 or EBX2-EBX2 relays are energized, and proper voltage is supplied to the brake board terminals AC1-AC2-AC3, refer to page 2 of the prints. • Bridge rectifier(s) may be bad, or Voltage sensing circuit may be bad. Replace the Serial Brake Board
Aux Brake No Output V Or Main Brake No Output V	Voltage is being commanded by the P-Brake or GALX-1050 Serial Brake board but output voltage is not being detected		<ul style="list-style-type: none"> • Verify the wiring of the P-Brake or GALX-1050 Serial Brake board; Refer to Page 2 of the prints. • Bad current sensor. Replace board.
Aux Brake Over Current Or Main Brake Over Current	Output current detected by the P-Brake or GALX-1050 Serial Brake board exceeds board current limit.		<ul style="list-style-type: none"> • Verify brake coil wiring, resistance and make sure is not leaking current to ground. • Verify brake parameters are properly set and match the brake data tag and page 2 of the prints brake data; Navigate to Adjust → Ride Performance → Serial Brake(s) Adjust → Aux Brake Parameters • Verify that the brake board matches the brake coil current demand. <ul style="list-style-type: none"> a. P-Brake up to 10 amps at 120 VDC b. P-Brake up to 5 amps at 240 VDC c. GALX-1051AN, up to 10 amps d. GALX-1051-BN, 10 to 30 amps • Bad current sensor. Replace board.
Aux Brake Over Load Or Main Brake Over Load	Output power detected by the P-Brake Serial Brake board exceeds maximum board limit.		<ul style="list-style-type: none"> • Verify brake coil wiring, resistance and make sure is not leaking current to ground. • Verify brake parameters are properly set and match the brake data tag and page 2 of the prints brake data; Navigate to Adjust → Ride Performance → Serial Brake(s) Adjust → Aux Brake Parameters • Verify that the brake parameters do not exceed the brake P-Brake maximum power limit of 1200 watts. <ul style="list-style-type: none"> a. P-Brake up to 10 amps at 120 VDC b. P-Brake up to 5 amps at 240 VDC

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Aux Brake Over Temperature Or Main Brake Over Temperature	Measured Temperature for the P-Brake power output IGBT transistor exceeds normal operating temperature.		<ul style="list-style-type: none"> • Verify brake coil wiring, resistance and make sure is not leaking current to ground. • Verify brake parameters are properly set and match the brake data tag and page 2 of the prints brake data; Navigate to Adjust → Ride Performance → Serial Brake(s) Adjust → Aux Brake Parameters • Verify that the brake board matches the brake coil current demand. <ol style="list-style-type: none"> a. P-Brake up to 10 amps at 120 VDC b. P-Brake up to 5 amps at 240 VDC • Bad temperature sensor. Replace board.
Aux Brake Over Voltage Or Main Brake Over Voltage	Measured output voltage by the P-Brake or GALX-1050 Serial Brake board is greater than commanded voltage by at least 20 VDC.		<ul style="list-style-type: none"> • Verify wiring of the Serial Brake board for Power and control logic, Refer to Page 2 of the prints. • Bad current sensor. Replace board.
Aux Brake RAM CRC Mismatch Or Main Brake RAM CRC Mismatch	Parameter CRC calculated value by the P-Brake Serial Brake do not match the CRC calculated value by the P-MP board.		<ul style="list-style-type: none"> • Parameters must be re-synced between P-Brake or GALX-1050 Serial Brake and P-MP. Navigate to Install → File Transfer → Serial Brake Configuration Upload → Perform a Transfer function.
Aux Brake Type Change Or Main Brake Type Change	The P-Brake reports that it's on-board configuration switch gear has changed or has been changed.		<ul style="list-style-type: none"> • Verify the on-board configuration switch gear is properly configured, Refer to Page 2 of the prints. • Parameters must be re-synced between P-Brake or GALX-1050 Serial Brake and P-MP. Navigate to Install → File Transfer → Serial Brake Configuration Upload → Perform a Transfer function.
Aux Cedes Checksum Error	CEDES APS Sensor response fails the Pixel Checksum Integrity Check. Verify the connection from the device to P-TOC is correct; refer to page 6CEDES APS of the prints.		<ul style="list-style-type: none"> • Verify the connection between the CEDES APS Sensor and the P-TOC board is correct. Refer to page 6CEDES APS of the prints. • After verifying the connection is correct, interchange the Main and Auxiliary connection on the CEDES APSC and confirm on the View Selector Data Window (Install → View Selector Data) that the fault is now displayed on the Main data. • If the fault does not move to the Main device, then replace the Auxiliary Cedes P-HNA board. • If the fault does move to the Main device, replace the CEDES APS Sensor.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Aux Cedes Unit Position Error	CEDES APS Sensor cannot read the code tape correctly. Clean the optical window, code tape, and verify the alignment of sensor with the code tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the alignment of the device is centered to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual. • If the fault does not clear, replace the CEDES APS Sensor device
Aux Landa Unit Bad Integrity Data	Bad/Corrupted data packets from the Auxiliary Landa unit are being received.		<ul style="list-style-type: none"> • Verify the wiring of the Auxiliary Landa Sensor Unit for data and shield wires. Refer to page 6b of the prints. • Replace Auxiliary Landa wire harness to the TOC and verify operation, continue with steps below if problem persist. • Replace Auxiliary Landa Sensor Unit and verify operation, continue with step below if problem persists • Replace P-TOC board
Aux Landa Unit Completely Off Rail	The Landa Tape is not aligned inside the Auxiliary Landa sensor unit; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Auxiliary Landa Sensor Unit is misaligned and is unable to read positional data. Verify Auxiliary Landa Sensor Unit alignment. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift. • Navigate to Install→View Selector Data Window and verify the Landa tape alignment while running on Inspection the entire length of the hoistway. If properly aligned, replace the Auxiliary Landa Sensor Unit, refer to page QR5 of the prints for tape installation directions.
Aux Landa Unit has Invalid Data	Auxiliary Landa Sensor unit is constantly reading a position of 0.00ft, Refer to page QR5 of the prints for Landa tape installation directions.		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data Window and verify if the Auxiliary Landa sensor unit reads a position of 0.00ft • If the position is 0.00ft, verify that the Landa tape is installed properly by ensuring that the arrows on the Landa tape are pointing in the UP direction. • If pointing down Landa tape is hanging upside down and needs to be flipped. • If arrows are located to run inside sensor unit, the tape is backwards and needs to be turned. i.e. arrows need to be away from sensor unit reading area. refer to page QR5 of the prints for tape installation directions.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Aux Landa Unit Can't Read Pos. A Or Can't Read Pos. B (Pos. A: Aux Landa Unit Lost 1) or (Pos. B: Aux Landa Unit Lost 2)	Auxiliary Landa Sensor Unit cannot calculate the current position, clean sensor unit reading area and verify it is free from scratches, if scratched replace sensor unit.		<ul style="list-style-type: none"> • Clean the optical unit of any possible dirt. • Verify the direction of reading relative to code rail is correct. • Verify the wire harness connection between the Landa unit and the P-TOC board is secured tightly. • Verify that the plastic liner is not scratched; if it is then the unit must be replaced.
Aux Landa Unit Partially Off Rail	The Landa Tape is partially misaligned inside of the Auxiliary Landa Sensor unit; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Auxiliary Landa Sensor units are partially misaligned and is unable to read positional data. Verify the Auxiliary Landa Sensor unit alignment. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift. Refer to page QR5 of the prints for tape installation directions. • Navigate to Install→View Selector Data Window and verify the Landa alignment while running on Inspection the entire length of the hoistway. If properly aligned replace the Auxiliary Landa Sensor unit
Aux Landa Unit Checksum Error (Aux Landa Unit Read Data Error)	The CRC of the data packet did not match the calculated CRC; Bad/Corrupted data packets from the Auxiliary Landa Unit are being received.		<ul style="list-style-type: none"> • Verify the wiring of the Auxiliary Landa Sensor unit for data and shield wires. Refer to Page 6b of the prints. • Replace Auxiliary Landa wire harness to the TOC and verify operation, continue with steps below if problem persist. • Replace Auxiliary Landa Sensor unit and verify operation, continue with step below if problem persists • Replace P-TOC board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Battery Lowering	The building power has failed and the battery power to lower the elevator and let passengers out has been engaged, the Battery Lowering input BPL is active; refer to pages 1 & 5 of the prints	BPL = 1	<ul style="list-style-type: none"> • If building power is not available the behavior is correct, wait for building power service to be reestablished. • If building power is available verify power fed to the controller matches job requirements, refer to page 1 of the prints. • Verify battery lowering unit is operating properly, refer to Pages. 1 & 5 of prints. BPL input should be wired to a normally open contact. • Verify that BPL input is not active, voltage is not present on BPL terminal, if active refer to battery lowering unit manual to determine and correct input activation behavior. • If not active, BPL IO input may have failed, verify BPL input IO Mapping matches its terminal assignment • If it matches, verify that the input state matches in Local Diagnostics. Navigate to Troubleshoot → Local Diagnostics, and then select the board BPL is mapped on. • If it does not match, try reassigning BPL input to a different IO input or replace the board if no spare available IO inputs are available. I/O mapping navigate to:(Install→I/O Mapping→ select board and BPL input location)
BK Contactor Fault	The BKO Brake contactor output state is off but its monitored contact did not close. BK Contactor failed to drop or it has a bad Auxiliary Contact, verify contact(s) wired to the BKi input and BKO contactor output triac; refer to page 4 of prints.	BK = 0 BK _i = 0	<ul style="list-style-type: none"> • Verify Mechanical Operation of BK contactor and its auxiliary contacts. • Manually actuate the BK contactor and observe the BK_i input Led on the P-MPIO board turns off as contactor is pressed and turns on when released. • Verify the operation of the BK_i input on the P-MPIO Board – Navigate to Troubleshoot→Flags →Safety I/O Flags and observe the BK_i flag changing states in memory when the BK motor contactor is manually actuated, if the BK_i flag doesn't change state in memory, but it does change state on the P-MPIO status LED – Replace the P-MPIO Board. • If BK_i flag does change state in memory Navigate to Troubleshoot→Flags →Safety I/O Flags observe the BKO output flag matches the output status LED on the P-MPIO board, if it does not match replace BKO output triacs Q1_05 on the P-MPIO Board and repeat this step. • If step above did not fix the problem, Replace the P-MPIO Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Both Landa Units Bad Integrity Data	Bad/Corrupted data packets from both Main and Auxiliary Landa Unit are being received		<ul style="list-style-type: none"> • Verify the wiring for both Main and Auxiliary Landa Sensor units for data and shield wires. Refer to Page 6b of the prints. • Replace Main and Auxiliary Landa Sensor units wire harnesses to the TOC and verify operation, continue with steps below if problem persist. • Replace Main and Auxiliary Landa Sensor units and verify operation, continue with step below if problem persist • Replace P-TOC board
Both Landa Units Completely Off Rail	The Landa Tape is not aligned inside the sensor units; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Main and Auxiliary Landa Sensor units are misaligned and are unable to read positional data. Verify Main and Auxiliary Landa Sensor unit alignment. Refer to page QR5 of the prints for Landa installation directions. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift. • Navigate to Install→View Selector Data Window and verify the Landa tape alignment while running on Inspection the entire length of the hoistway. If properly align replace Main and Auxiliary Landa Sensor units.
Both Landa Units Have Invalid Data	Both Main and Auxiliary Landa Sensor units are constantly reading a position of 0.00ft, Refer to page QR5 of the prints for Landa tape installation directions.		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data Window and verify Main and Auxiliary Landa sensor unit read a position of 0.00ft • If the position is 0.00ft, verify that the Landa tape is installed properly by ensuring that the arrows on the Landa tape are pointing in the UP direction • If pointing down Landa tape is hanging upside down and needs to be flipped • If arrows are located to run inside sensor unit tape is backwards and needs to be turned, i.e. arrows need to be away from sensor unit reading area, refer to page QR5 of the prints for tape installation directions.
Both Landa Units Can't Read Pos. A Or Can't Read Pos. B (Pos. A: Both Landa Unit Lost 1) or (Pos. B: Both Landa Unit Lost 2)	Main and Auxiliary Landa Sensor Unit cannot calculate the current position, clean sensor units reading area and verify it is free from scratches, if scratched replace sensor unit(s).		<ul style="list-style-type: none"> • Clean the optical units of any possible dirt. • Verify the direction of reading relative to code rail is correct. • Verify the wire harness connection between the Landa unit and the P-TOC board is secured tightly. • Verify that the plastic liner is not scratched; if it is then the unit(s) must be replaced.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Both Landa Units Partially Off Rail	The Landa Tape is partially misaligned inside the Main and Auxiliary Landa Sensor units; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Main and Auxiliary Landa Sensor units are partially misaligned and are unable to read positional data. Verify Main and Auxiliary Landa Sensor unit alignment. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift, refer to page QR5 of the prints for tape installation directions. • Navigate to Install→View Selector Data Window and verify the Landa alignment while running on Inspection the entire length of the hoistway. If properly aligned replace the Main and Auxiliary Landa Sensor units
Both Landa Units Checksum Error (Both Landa Units Read Data Error)	The CRC of the data packet did not match the calculated CRC; Bad/Corrupted data packets from Main and Auxiliary Landa Units are being received.		<ul style="list-style-type: none"> • Verify the wiring of the Main and Auxiliary Landa Sensor units for data and shield wires. Refer to Page 6b of the prints. • Replace Main and Auxiliary Landa wire harness to the TOC and verify operation, continue with steps below if problem persist. • Replace Main and Auxiliary Landa Sensor units and verify operation, continue with step below if problem persist. • Replace P-TOC board
Brake Did Not Lift {Main} {Aux} {Both}	<p>The brake monitored input BPI indicates the brake(s) failed to lift, refer to Pages 2 and 5 of prints for Relay Logic and GAL-1050 brake control and Page 2bk for P-Brake control.</p> <p>Note: For P-Brake control BPI = BPS (main) Or BPI = BPS (Aux) Or BPI = BPS (main) && BPS (Aux) Depending on this job brake(s) interface.</p>	<p>BPI Option = NO BK= 1 and BPI = 1+ BPI Timeout Expired OR BPI Option = NC BK=0 and BPI = 0 + BPI Timeout Expired</p>	<ul style="list-style-type: none"> • Verify brake and brake auxiliary contact mechanical operation. • BPI failed to change states for a set number of trips. Could be high or low based on what contact polarity used (normally open/ normally closed) – Verify BPI contact functionality/ ensure that BPI changes states on the controller. Navigate to Troubleshoot→Flags→ Safety I/O Flags • If BPI is changing states in memory – Ensure that the controller is set to the type of contact being used. Navigate to Adjust→Car Performance→Traction Options→ BPI NO NC Option. Select NO for normally open or select NC for normally closed contact. • Extend the timeout to declare the fault to allow the brake contact to properly engage by increasing the BPI Timeout timer, Navigate to Adjust→Ride Performance→Motor/Brake Timers→BPI Timeout. • Verify settings for BPI timeout and desired detection performance refer to controller manual section for BPI Input Timeout

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Brake Drop During Run	BKI input turned on while car was traveling at a speed greater than 10fpm, indicating that the BK monitored contact closed, possibility of a bad BK, P, or AA Relay or one of their auxiliary contacts, or the drive dropped the Run Relay output, refer to Pages2 and 4 of prints.	SU or SD = 1 BK = 1 BKI = 1 Speed > 10fpm (Event disabled for P-Brake or GAL1051 electronic brake control)	<ul style="list-style-type: none"> • Verify proper Brake Pick and Hold voltages at terminals B1 and B2 and adjust resistors taps as required to apply required brake voltages, refer to page 2 of the prints. • Verify the operation of the P and AA auxiliary contacts in series with the BK relay coil, refer to page 4 of the prints, Note: An intermittent auxiliary contact will generate an intermittent fault behavior • Verify that the BKI input goes low when BK picks, Navigate to Troubleshoot→Flags→Safety I/O Flags It's possible that the BK output is not causing the BK contactor to pick – Verify that when the BK output goes high in memory the BK contactor picks. Navigate to Troubleshoot→Flags→Safety I/O Flags If BK goes high but contactor BK contactor does not pick replace Q5 output triac. • After verifying functionalities for all relays and replacing Q5 triac if the problem persists – Replace the P-MPIO Board.
CAB Comm. Failed	Unable to establish CAN communication between the P-MP and any of the Cab Nodes (P-TOC, P-COP or P-CNEX). Refer to Pages. 6 & 8 of the prints		<ul style="list-style-type: none"> • Verify traveler wiring from controller to TOC and from the TOC to COP(s), refer to Pages. 6 & 8 of the prints • Verify COP(s) configuration node ID SW2 switch settings refer to Page 8 of the prints • Verify CAB network to make sure all expected boards are being accounted by Pixel navigate to →Install →Learn Functions→Car Network Landscape • Verify CAB Network Status Good versus Bad counts. Navigate to Troubleshoot→Controller Network→Car CAN Network
Car Call Disconnect Tripped	The Car Call Disconnect function has been tripped causing all car calls to be dropped, refer to statistics counter window for the trigger code.	CCD = 1	<ul style="list-style-type: none"> • Navigate to Troubleshoot→Statistic Counters→CCD Trigger Code • Use the trigger code to guide you on seeking a solution.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Car Door Bypass Switch	SP1 and SP2CDB1 and CDB2 inputs are both on or both off simultaneously, Pixel monitors both sides of the switch status for. Refer to Page3 of prints	CDB1 = 1 CDB2 = 1 OR CDB1 = 0 CDB2 = 0	<ul style="list-style-type: none"> • Navigate to Troubleshoot → Flags → Inspection Flags and make sure that CDB is either black or blue • Verify the communication status for SP1 and SP2 by navigating to Troubleshoot → Controller Network → (SP1) and (SP2) • If the SP1 and SP2 processors still read the same status and are communicating correctly – Replace the P-MP Board; the switch may have failed. If they are not communicating correctly – Replace both the P-MP and P-MPIO Boards
Car Door Bypass w/o Inspection	The Car Door Bypass switch is active while the car is not on Car Top inspection or In Car inspection	ICT = 1 IIC = 1 CDB = 1	<ul style="list-style-type: none"> • Car door bypass switch cannot be active while the controller is not on either car top or in car inspection – Turn off Car Door Bypass switch • If the car door bypass switch is off – verify that the switch is off in memory. Navigate to Troubleshoot → Flags → Inspection Flags and look at the status of CDB. The flag is low if the switch is off and high if the switch is on. • If the switch status doesn't change and/ or is reflected incorrectly in memory – Change the P-MP Board; the switch may have failed.
Car Safety Sting Open	Voltage lost to the Car Safety String (SAFC) Terminal on the P-MPIO Board OR not making it to memory. Fire Panel Stop Switch, Safety Clamp, Emergency Exit Switch, or Cartop Inspection Stop Switch is open. Refer to Pages 3 and 6 of the prints	SAFC = 0	<ul style="list-style-type: none"> • Voltage loss on 4A (120VAC) – Check Fuse F4A on PDB Board (Page2 of prints). Note jobs with Cycle Testing will reference 4CT rather than 4A. • Fire Panel Stop Switch, Safety Clamp, Emergency Exit Switch, or Cartop Inspection Stop Switch is open. – Verify that full voltage is making it to SAFC. If it's not, trace backwards until the voltage loss is found refer to Pages 3 & 6 of prints) • Verify the yellow jumpers SAFC1 and SAFC2 located on the right lower corner of the P-MP-IO board are set to the left (closed position). • If 120VAC voltage has been verified on terminal SAFC and the SAFC LED is lit, then navigate to Troubleshoot → Flags → Safety I/O Flags and ensure that SAFC is ON in memory. If the SAFC flag is low in memory – Replace the P-MPIO Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Car Timed Out of Service	Demand exists and the car was held at the floor for a time greater than the programmed amount of the Time Out of Service Timer	TOS = 1	<ul style="list-style-type: none"> • Verify the closing attempts fault counter is not set too low – Navigate to Adjust→Car Performance→Door Options→Closing Attempts Fault Counter. This is the number of times it will try to close the doors before the fault comes up. Current default setting is 5 times. (If set to 0, it will try to close indefinitely) • Doors may not be responding to the close command from the controller – Ensure that DCF output is coming in. Navigate to Troubleshoot→Flags→Door Flags. Look at DCFF or DCFR (front or rear). • DCF is making it to the door operator, but there is a door operator issue. – Verify the door operator. • A stuck photo-eye (PHE), door open button (DOB), car call, or hall call might be preventing the doors from closing. • Make sure the Time Out of Service timer is programmed with an appropriate value, the factory default is 45 seconds. Extend the timer as necessary.
Car Out of Service	Car was unable to close its doors and or respond to call service demand and the Time Out of Service timeout expired and then the Car Out of Service Timer timeout also expired placing the car out service and to cancel call demand(s).	COS =1 TOS = 1	<ul style="list-style-type: none"> • Verify the closing attempt's fault counter is not set too low – Navigate to Adjust→Car Performance→Door Options→Closing Attempts Fault Counter. This is the number of times it will try to close the doors before the fault comes up. Current default setting is 5 times. (If set to 0, it will try to close indefinitely) • Doors may not be responding to the close command from the controller – Ensure that DCF output is coming in. Navigate to Troubleshoot→Flags→Door Flags. Look at DCFF or DCFR (front or rear). • DCF is making it to the door operator, but there is a door operator issue. – Verify the door operator. • A stuck photo-eye (PHE), door open button (DOB), car call, or hall call might be preventing the doors from closing. • Make sure the Time Out of Service timer is programmed with an appropriate value, the factory default is 45 seconds and the car out service timer is set for at least 5 times the time out of service value, default is 6 minutes, extend the timers as necessary

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Car-Top Inspection Switch	SP1 and SP2 ICT1 and ICT2 or ICTE1 and ICTE2 inputs status are not the same or ICTE input is active and the car is not on Car Top Inspection Mode Refer to Pages 3 and 6 of the prints	ICT1 = 1 ICT2 = 0 OR ICT1 = 0 ICT2 = 1 OR ICTE1 = 0 ICTE2 = 1 OR ICTE1 = 1 ICTE2 = 0 OR ICT = 1 ICTE = 1 OR ICT = 1 ICTU = 1 OR ICT = 1 ICTD = 1 OR ICTE = 0 ICTU = 1 OR ICTE = 0 ICTD = 1	<ul style="list-style-type: none"> • If the Fault is generated when the car is not in Car Top Inspection Mode, verify that ICTE, ICTU, and ICTD LEDs are off on the P-MPIO board, refer to pages 3 and 6 of the prints. • If fault is observed while commanding the car to move, verify the ICT LED status on the P-MPIO board is off as the car top inspection switch is placed to Inspection. • If the fault persists, Navigate to Troubleshoot → Flags → Inspection Flags and verify that ICT and ICTE, ICTU, and ICTD follow their respective switch setting, refer to page 6 of the prints, if they do not follow replace the P-MPIO Board • If the flags for ICT or ICTE are a color other than black or blue, then a mismatch exists when the Safety processors SP1 and SP2 read these inputs. – Replace the P-MPIO Board
Cedes Communication Error	CEDES APS Sensor Communication error. Verify the connection from the device to P-TOC is correct; refer to Page 6CEDES APS of the prints. This error can be caused by the power supply not being within +/- 20% of the 24VDC and can also be cleared by a power cycle to the device.		<ul style="list-style-type: none"> • Unplug the CEDES APS unit from the P-TOC to remove power then plug it back in and verify the fault has been cleared. • Verify the connection between the CEDES APS Sensor and the P-TOC board is correct. Refer to Page 6CEDES APS of the prints. • After verifying the connection is correct, interchange the Main and Auxiliary connection on the CEDES APSC and confirm on the View Selector Data Window (Install→View Selector Data) that the fault is now displayed on the Auxiliary data. • If the fault does not move to the Auxiliary device, then replace the Main Cedes P-HNA board • If the fault does move to the Auxiliary device, replace the CEDES APS Sensor.
Cedes Internal Error	CEDES APS Sensor internally generated error. This error can be caused by the power supply not being within +/- 20% of the 24VDC and can also be cleared by a power cycle to the device.		<ul style="list-style-type: none"> • Unplug the CEDES APS unit from the P-TOC to remove power then plug it back in and verify the fault has been cleared. • Verify the 24VDC power supply is within a +/- 20% range. • If the fault continues to appear, replace the CEDES APS Sensor.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Cedes Partially OFF Rail Left Or Cedes Partially OFF Rail Right	CEDES APS Sensor cannot read the code tape correctly, because the camera is positioned partially off rail to the left or to the right of the tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the alignment of the device is centered to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual • If the fault does not clear, replace the CEDES APS Sensor device.
Cedes OFF Rail Left Or Cedes OFF Rail Right	CEDES APS Sensor cannot read the code tape correctly, because camera is positioned too far to the left or too far to the right.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the alignment of the device is centered to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual • If the fault does not clear, replace the CEDES APS Sensor device
Cedes Too Close Or Cedes Partially Too Close	CEDES APS Sensor cannot read the code tape correctly, because camera is positioned too close to the tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the distance and alignment of the device to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual. • If the fault does not clear, replace the CEDES APS Sensor device
Cedes Too Far Back Or Cedes Partially Too Far Back	CEDES APS Sensor cannot read the code tape correctly, because camera is positioned too far away from the tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the distance and alignment of the device to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual. • If the fault does not clear, replace the CEDES APS Sensor device

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Cedes Service Recommended	CEDES APS Sensor is almost or completely out of reading range. Verify that mounting and alignment of the code tape and the device is correct utilizing the device LED(s). Clean the optical window, code tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the alignment of the device is centered to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual. • If the fault does not clear, replace the CEDES APS Sensor device
Company Exclusive Mismatch	P-MP, P-TOC, and P-COP company exclusive version codes do not match one another		<ul style="list-style-type: none"> • Contact Elevator Controls Technical Support • Navigate to Install→Initial Settings→Exclusive Conversion to resolve the mismatch.
COP Aux Front Comm. Failed	Unable to maintain CAN Communications between the MP and the Aux. Front COP. Refer to Page8X of the prints to verify CAB CAN network wiring.		<ul style="list-style-type: none"> • Verify the correct COP configuration settings are correct to account for this car's COP nodes, Navigate to Install→ Initial Settings → MP Cab Node Network → COP Config • Verify the COP dipswitch (COP CONFIG) is set accordingly, refer to page 8X of the prints • Verify wiring from the TOC to COP Aux Font. • Make sure CAN-H and CAN-L are wired the CAB CAN either on JCCB1 or JCCB RJ45 Type Connector NOT to the local COP CAN Bus.
COP Aux Rear Comm. Failed	Unable to maintain CAN Communications between the MP and the Aux. Rear COP. Refer to Page 8RX of the prints to verify CAB CAN network wiring.		<ul style="list-style-type: none"> • Verify the correct COP configuration settings are correct to account for this car's COP nodes, Navigate to Install→ Initial Settings → MP Cab Node Network → COP Config • Verify the COP dipswitch (COP CONFIG) is set accordingly, refer to page 8RX of the prints • Verify wiring from the TOC to COP Aux Rear. • Make sure CAN-H and CAN-L are wired the CAB CAN either on JCCB1 or JCCB RJ45 Type Connector NOT to the local COP CAN Bus.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
COP Main Front Comm. Failed	Unable to maintain CAN Communications between the MP and the Main Front COP. Refer to Page 8 of the prints to verify CAB CAN network wiring.		<ul style="list-style-type: none"> • Verify the correct COP configuration settings are correct to account for this car's COP nodes, Navigate to Install → Initial Settings → MP Cab Node Network → COP Config • Verify the COP dipswitch (COP CONFIG) is set accordingly, refer to page 8 of the prints • Verify wiring from the TOC to COP Main Front. • Make sure CAN-H and CAN-L are wired the CAB CAN either on JCCB1 or JCCB RJ45 Type Connector NOT to the local COP CAN Bus.
COP Main Rear Comm. Failed	Unable to maintain CAN Communications between the MP and the Main Rear COP. Refer to Page 8 of the prints to verify CAB CAN network wiring.		<ul style="list-style-type: none"> • Verify the correct COP configuration settings are correct to account for this car's COP nodes, Navigate to Install → Initial Settings → MP Cab Node Network → COP Config • Verify the COP dipswitch (COP CONFIG) is set accordingly, refer to page 8 of the prints • Verify wiring from the TOC to COP Main Rear. • Make sure CAN-H and CAN-L are wired the CAB CAN either on JCCB1 or JCCB RJ45 Type Connector NOT to the local COP CAN Bus.
Cycle Test Failed	Flags in RED failed Cycle Test, refer to pages 3 and 4 of the prints (GOV, DLAT, DLSF, DLAB, ICT, ICTE, HDB, CDB, ESTP, IA, IIC, ESCO, SAFC, SAFH, IMR, IICE, CGF, CGR, DLSR, DCAT, DCAB, DCSF, DCSR)		<ul style="list-style-type: none"> • Verify the CTR relay picks when the CTR output on the P-MPIO Board turns on. Refer to Page 5 of the prints. • Verify the inputs failing test are using as common 4CT and not the 4A bus. Refer to pages 2, 3, 4, and 5 of the prints. • If wired correctly verify that the failed input flag is changing states in memory. Navigate to Troubleshoot → Flags → Safety I/O Flags and confirm that the failed input flag changes states in memory when its corresponding field wire is removed, if it does not replace the P-MPIO board
DNL Offset Corrupted	Data integrity error has been detected with the learned DNL Position.		<ul style="list-style-type: none"> • Try a Computer Reset and verify that the fault cleared. • If the fault persists after the Computer Reset, perform a bottom landing Floor Setup Procedure, refer to section 3.8 of controller manual • If error persists, replace the P-MP Board. and perform a new Floor Setup Procedure, refer to section 3.8 of controller manual

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Drive Command Aborted	If speed command is greater than 3 FPM and the AA motor contactor is picked, Pixel verifies the “During Run” status to be active, if not the run is aborted, this fault is declared, and a new run process is attempted. (L1000A Only)	There may be condition or minor fault holding the Drive in the stopped state, “During Run” bit can be seen using the monitoring drive parameter, U1-12, bit 0 Refer to drive manual U:Monitors section	<ul style="list-style-type: none"> • Verify the L1000A drive parameters are programmed correctly: P1-01 = AC P1-02 = 26 P1-03 = 45 P1-04 = 20 • Verify the pending counts for the Drive Command Aborted fault are set correctly. Navigate to Troubleshoot→Event Logs→Event Pending Counts→Monitor Event Pending Counts→Drive Command Aborted: MP=010, SP=005. • Verify the drive Safe Disable Input 1 and 2 are asserted when the AA contactor picks, refer to page 1 of the prints. • If the Pixel Emergency Slowdown Command Output (ESCO) is on, the fast stop drive input, drive terminal S7, will be activated forcing the drive to stay in the STOPPED State, verify that ESCO output is off. Terminal S7 status can be monitored through drive parameter U1-10 bit 6. • Navigate to Troubleshoot → Flags → Safety I/O Flags to verify the ESCO flag. • If ESCO is low in memory but the output LED is high, you can try replacing the U9 chip on the right side of the P-MPIO board, spare chips were provided in the pixel spare replacement parts kit that comes with the controller or replace the P-MPIO board.
Drive Fault	Unable to establish communication between the P-MP and the drive. Refer to Page 1 of the prints	(Traction Only)	<ul style="list-style-type: none"> • Verify the Drive model and type is programmed correctly. Navigate to Install→Initial Settings→Basic Pixel Settings→ Drive Selection. • Verify RJ485 communication drive port wiring, refer to page 1 of the prints • Verify Drive Status Good versus Bad counts. Navigate to Troubleshoot → Controller Network → Drive • If the fault continues – Replace P-MP Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Drive is Not Ready	While car is stopped Pixel verifies the Drive is ready before starting a new run. Check the drive display for any drive fault or that drive is not in programming mode. (L1000A Only)	Monitoring Drive Parameter U1-12, Bit 5 = Drive Ready Refer to drive manual U: Monitors section	<ul style="list-style-type: none"> • Verify the L1000A was not left in the programming mode; hold ESC key for 2-3 seconds to return to the Main Screen. • Correct any faults displayed on drive screen, refer to drive manual. • Verify the L1000A drive parameters are programmed correctly: P1-01 = AC P1-02 = 26 P1-03 = 45 P1-04 = 20
Drive Safeties Tripped	The Drive fault relay output is active indicating a drive tripped condition; refer to Motor Drive Unit Manual and Page 1 of the prints	DSAF = 0	<ul style="list-style-type: none"> • Drive fault relay output is active – Check Drive for Faults, refer to Motor Drive Unit Manual and Page 1 of the prints • If there are no drive faults, verify DSAF input LED on the P-MPIO board is on. • If it is on verify Pixel input status, Navigate to Troubleshooting→Flags→Safety I/O Flags and observe the DSAF flag to be on. • If it is not on replace the P-MPIO Board. • If input LED is off, verify wiring and voltage at MB and MC drive terminals to verify Drive Fault Relay operation.
Earthquake Overspeed	Car speed exceeded the programmed earthquake overspeed threshold.		<ul style="list-style-type: none"> • The Car, while in Earthquake operation, exceeded the earthquake trip speed. – Verify that the Earthquake trip speed is not set lower than the earthquake speed but rather is set to about 10% above earthquake speed setting, Navigate to Install→Initial Settings→Speed Profile→Earthquake Trip Speed.
EB1-EB2 Relays Fault (Aux Brake Main Relays Fault)	EB1 and EB2 relays cycle testing verification failed. RG input did not match EB1-EB2 status state, refer to pages 2 & 3 of the prints	EB1 and EB2 = 0 RG = 1 OR EB1 and EB2 = 1 RG = 0	<ul style="list-style-type: none"> • Verify RG, RGBP, and RGOK slide jumpers setting on the PDB board; refer to page2 of the prints. • Verify EB1 and EB2 output LEDs match RG input LED on the P-MPIO, if doesn't match replace Q1 03 and Q1 04 output triacs, if replacing triacs does not resolve the problem it's possible that one or more relays could have failed, try replacing EB1 and/ or EB2 relays; refer to pages 2 and 3 of the prints. • Once Output and Input LEDs match, if the problem persists, navigate to Troubleshoot→Flags →Safety I/O Flags to verify that EB1 and EB2 outputs vs. RG input status, if they do not match replace the P-MPIO board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
EBX1-EBX2 Relays Failure (Aux Brake Aux Relays Fault)	EBX1 and EBX2 relays cycle testing verification failed. RGBP input did not match EBX1- EBX2 status state, refer to pages 2 & 3 of the prints	EBX1 and EBX2 = 0 RGBP = 1 OR EBX1 and EBX2 = 1 RGBP = 0	<ul style="list-style-type: none"> • Verify RG, RGBP, and RGOK slide jumpers setting on the PDB board; refer to page 2 of the prints. • Verify EBX1 and EBX2 output LEDs match RGBP input LED on the P-MPIO, if doesn't match replace Q1_01 and Q1_02 output triacs, if replacing triacs does not resolve the problem it's possible that one or more relays could have failed, try replacing EBX1 and/or EBX2 relays; refer to pages 2 and 3 of the prints. • Once Output and Input LEDs match, if the problem persists, navigate to Troubleshoot → Flags → Safety I/O Flags to verify EBX1 and EBX2 outputs vs. RGBP input status. If they do not match replace the P-MPIO board.
Emergency Stop Switch Open	The Emergency Stop switch in the COP has been set to Stop, return to Run position or SP1 and SP2 do not read the same switch status for the ESTP1 & ESTP2, refer to Pages 6 and 3 of prints	ESTP1 = 0 ESTP2 = 0 CSB = 0 OR ESTP1 = 0 ESTP2 = 1 OR ESTP1 = 1 ESTP2 = 0	<ul style="list-style-type: none"> • Verify the Emergency Stop switch in the COP is set to Run position • Confirm that the Emergency Stop switch is wired correctly, refer to Pages 3 and 6 of the prints • Verify 120 VAC are measured at the ESTP terminal on the P-TB board. • Verify ESTP LED is on the P-MPIO board, and observe memory flag status, Navigate to Troubleshoot → Flags → Safety I/O Flags. • If flag status color is other than black or blue, SP1 and SP2 are not agreeing on the ESTP input status, replace the P-MPIO board • If the flag status doesn't match the LED, replace the P-MPIO board
ETS Bypass Enabled	The ETS Bypass option is not allowed during Automatic Operation, reset the ETS Bypass option	ETS Bypass = On	<ul style="list-style-type: none"> • The ETS Bypass Option is set to yes while the car is on automatic mode of operation. Navigate to Install → Learn Functions → ETS Learn → ETS Learn Up (or Down) and set the ETS Bypass option off

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
ETS Learn Required	The Up/Down ETS, Emergency Terminal Slowdown, learn has not been performed or a parameter configuration change has been performed to landing positions or speed profile parameters requiring a new ETS learn be performed	ESTD = 1	<ul style="list-style-type: none"> • Perform an ETS learn for both the up & down directions. – Place the car at a terminal landing. Navigate to Install→Learn Functions→ETS Learn. • Select either ETS Learn Up or Down based on car current landing position then follow the on-screen instructions to complete the ETS learns. • Once the ETS learns are complete – Navigate to Install→File Transfer → (follow the on-screen instructions to get into file transfer mode) → Safety Configuration Upload. Hit the transfer button in the bottom right corner to begin the transfer. Once the transfer is complete, hit the home button to return to the home screen. <p>The Emergency Slowdown Table Done (ESTD) flag is reset by changes to any of the parameters below, forcing Pixel to request for a new ETS learn be performed in order to clear the fault condition:</p> <ul style="list-style-type: none"> Floor Positions Top/Bottom Floor Number Contract Speed Leveling Speed Acceleration Deceleration Initial Jerk Rollover Jerk Decel Jerk Hydro STD Offset DNL/ UNL Position
Fault PB Stuck	The System Fault Reset PB is stuck in the ON position	FRST = 1 Fault Reset PB Stuck Timer Expired	<ul style="list-style-type: none"> • Navigate to Troubleshoot→Flags→Safety IO Flags and verify the mFRST flag is only on when the System Fault Reset pushbutton is being pressed. • If it is always on – Replace the P-MP Board.
Fault Reset Switch	SP1 and SP2 FRST1 and FRST2 input status are the same, refer to Page 3 of prints	FRST1 = 0 FRST2 = 0 OR FRST1 = 1 FRST2 = 1	<ul style="list-style-type: none"> • If flag status color is other than black or blue, SP1 and SP2 are not agreeing on the FRST input status, replace the P-MPIO Board • Verify the flag mFRST changes state accordingly. Navigate to Troubleshoot→Flags→Safety I/O Flags verify that is on when System Fault Reset push button is pressed and low when released. • If it does not go low when released, replace both the P-MP and P-MPIO Boards.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Discrete Fire Ph1 Switch (Fire Ph1 Switch)	The Fire Ph1 Switch has none of its inputs active, must have at least one input active to be on a valid state, refer to page 9 of the prints	Discrete Ph1 switch interface AND {FOFF = 0 RES = 0 FON = 0 OR FON = 1 RES = 1 OR FON = 1 FOFF = 1 OR RES = 1 FOFF = 1}	<ul style="list-style-type: none"> • Verify wiring of the Fire Ph1 Switch; refer to Page 5b or 5Zb of the prints, Navigate to Troubleshoot→Flags→Emergency Service Flags and verify only one of the Fire Ph1 Switch inputs is active.
Fire Phase 2 switch	The Fire Ph2 Switch has none of its inputs active, must have one input active to be on a valid state, or has more than one active at the same time, refer to page 8 of the prints	FCS = 0 F2OFF = 0 FDHD = 0 OR FCS = 1 F2OFF = 1 OR FCS = 1 FDHD = 1 OR F2OFF = 1 FDHD = 1	<ul style="list-style-type: none"> • Verify the wiring of the Fire Ph2 Switch and the P-COP Configuration switch settings. Refer to Page. 8 of the prints. • Navigate to Troubleshoot→Flags→Emergency Service Flags and verify only one of the Fire Ph2 Switch inputs is active. Note: Navigation to screen above is available through the P-COP on board diagnostics also.
Floor DZ Pos. Corrupted	Data integrity error has been detected with one or more of the learned Per Floor Door Zone Positions.		<ul style="list-style-type: none"> • Try a Computer Reset and verify that the fault is cleared. • If the fault persists after the Computer Reset, perform a new Floor Setup Procedure, refer to section 3.8 of controller manual. • If the error persists, replace the P-MP Board. and perform a new Floor Setup Procedure, refer to section 3.8 of controller manual

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Following Error/ Traction Loss	The car is running at a speed lower than the commanded speed and the difference is more than the percentage programmed in Traction Loss Speed % for a time longer than the programmed in Traction Loss timer	Navigate to the Drive Performance Data Window and observe the Command and Measured Speed.	<ul style="list-style-type: none"> • Verify programmed contract speed matches the actual car speed. Navigate to Adjust→Ride Performance→Speed Profile→Contract Speed: _ _ _ FPM • Verify the settings that trigger this fault are set correctly. <ol style="list-style-type: none"> a) Adjust→Car Performance→Timers→Traction Timers→Traction Loss Timer: 00:10.00. b) Adjust→Ride Performance→Speed Profile→Traction Loss Speed %:050% • The fault can be due to traction loss caused by wear and tear in the ropes or sheave. • Verify and make “100% “sure that your brake is physically opening
Front Door Bounced At Floor XX XX = Landing number	The Front door bounced open while the car was taking off from a floor on an automatic run	SDI Pattern = Soft Start H = 1 HI = 1 AND CGF= 0 DLKF = 1 OR CGF= 1 DLKF = 0 OR CGF= 0 DLKF=0 *DLKF flag comprises the Status of All the Front Door Locks and Front Door Close Contacts when the door option is configured to Freight or Manual door.	<ul style="list-style-type: none"> • DLKF or CGF dropped momentarily during takeoff. Navigate to Troubleshoot→Event Logs→Event Playback→Standard DDR Event Log and review the door flags for this fault to confirm which of the door signals dropped during takeoff. • At the floor number displayed in the fault, verify the door closing adjustments prevent any door bouncing from a slammed closing • Verify that doors don’t roll back or relax open on takeoff.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
<p>Front Door Clipped At Floor XX</p> <p>XX = Landing number</p>	<p>The front car gate or one of the interlocks clipped, while the car was travelling in high speed</p>	<p>H = 1 HI = 1</p> <p>AND</p> <p>CGF = 0 DLKF = 1 OR CGF = 1 DLKF = 0 OR CGF = 0 DLKF = 0</p> <p>*DLKF flag comprises the Status of All the front Door Locks and front Door Close Contacts when the door option is configured to Freight or Manual door</p>	<ul style="list-style-type: none"> DLKF or CGF dropped momentarily while traveling on high-speed. Navigate to Troubleshoot→Event Logs→Event Playback→Standard DDR Event Log and review the door flags for this fault to confirm which of the door signals dropped during the run. At the floor number displayed in the fault, verify door clearances as the car travels through the hoistway.
<p>Front Door Limit Switches</p>	<p>The front door open limit and door closed limit are both low at the same time.</p> <p>Front Door limits valid states: Door Fully Open DOLF = 0, DCLF = 1</p> <p>Door Fully Closed DOLF = 1, DCLF = 0</p> <p>Door Partially Close-Open DOLF = 1, DCLF = 1</p>	<p>DOLF = 0 DCLF = 0</p>	<ul style="list-style-type: none"> DOLF and DCLF are both low in memory – Verify the current position of the doors/ verify the status of the door limits on the door operator. If the door operator limits are in the correct state – Verify that the door limit signals are reflected correctly on the P-TOC board terminals DOLF and DCLF. If the door limits are not displayed correctly on the TOC Board – Correct/verify the door limit wiring/ setup. If the DOLF and DCLF signals seem correct on the P-TOC board – Verify that they match in memory. Navigate to Troubleshoot→Flags→Door Flags If the door limits status on the TOC and their status in memory does not match – Then the DOLF/ DCLF inputs could be damaged. Replace the P-TOC Board
<p>Front Door Locks Fault</p>	<p>The front door open limit is open; indicating that the doors are fully open, but either or both the front car gate or front hoistway door locks are still closed.</p>	<p>DOLF = 0 CGF = 1 DLKF = 0 OR DOLF = 0 CGF = 0 DLKF = 1</p>	<ul style="list-style-type: none"> The car gate or the door lock didn't open – Verify status of DOLF, DLKF & CGF. Navigate to Troubleshoot→Flags→Door Flags and Figure out which flag is in the wrong state. Verify that the door contacts are open by ensuring that there is no voltage on CGF or the door lock contact for that floor Refer to Page4 of the prints. If there is no voltage but it stays high in memory – Replace the P-MPIO Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Front Door Not Fully Closed	<p>The front door close limit is closed while the doors are locked.</p> <p>OR</p> <p>The front door close limit is open, but either the car gate or door lock is not closed.</p>	<p>CGF = 1 DLKF = 1 DCLF = 1 OR CGF = 0 DLKF = 1 DCLF = 0 OR CGF = 1 DLKF = 0 DCLF = 0</p>	<ul style="list-style-type: none"> • Either the front door close limit, the car gate closed contact, or a hoistway door closed contact is in the incorrect state. – Verify which state the doors are in. Navigate to Troubleshoot→Flags→Door Flags. Verify and correct whichever flag isn't in the correct state. • Verify that the door contacts are closed by ensuring that there is voltage (120VAC) on CGF and the door lock contacts, refer to Page4 of the prints • If there is voltage but corresponding input(s) stay low in memory – Replace the P-MPIO Board
Front PHE Cycle Test Failed	Front Photo Eye has failed its cycle test, test performed after the door has reached its fully opened position and before door closing starts	<p>PHETF = 1 PHEF = 0 PEMF = 0 OR PHETF = 1 PHEF = 0 PEMF = 1 OR PHETF = 1 PHEF = 1 PEMF = 0</p>	<ul style="list-style-type: none"> • Verify the PHETF output picks the PHETF relay and verify both the PHEF and the PEMF inputs come in when the PHETF relay is picked. Refer to pages 6 and 6b of the prints. • Verify that the Input PEMR and Output, PHETF, are mapped correctly in the Pixel System. Navigate to Install→IO Mapping. <p>Test information detail:</p> <ul style="list-style-type: none"> • Prior to the door closing PHETR output will be turned on to signal door operator to test the reopening device. Pixel will wait for about 5 seconds for PHEF and PEMF inputs to both are active to terminate or fail test.
Front PHE Fault	PHEF input remained high for more than the programmed Photo Eye Fail Timer value	<p>PHEF = 1 Photo Eye Fail Timer Expired</p>	<ul style="list-style-type: none"> • Verify the PHEF input is not stuck in the active state by disconnecting the field wire from its assigned location and viewing the status by navigating to Troubleshoot→Flags→Door Flags • Extend the Photo Eye Fail Timer as needed, default value of 5 minutes, Navigate to Adjust→Car Performance→Timers→Front Door Timers→Photo Eye Fail

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Governor Switch Opened	Governor auxiliary monitored contact opened. Verify the Governor mechanical operation, reset the Governor and press the System Fault Reset pushbutton on the P-MP board. Refer to Page 3 of the prints	GOV = 0	<ul style="list-style-type: none"> • Verify and make sure the Governor switch is closed. • If the Governor switch is closed –verify voltage on the GOV Terminal (120VAC), if there is no voltage on GOV terminal Verify Governor Switch wiring, refer to Page 3 of the prints. • If there is voltage, verify that GOV flag is active in memory. Navigate to Troubleshoot → Flags → Safety I/O Flags. • If GOV has voltage but is off in memory, replace the P-MPIO Board. • If the flag for GOV is a color other than black or blue, then a mismatch exists when the Safety processors SP1 and SP2 read this input – Replace the P-MPIO Board
Hall Board Lost (Name of Node Lost)	Communication to the named P-Hall node was lost. Verify P-Hall node wiring, refer to page 9 of the prints		<ul style="list-style-type: none"> • Verify named Hall node wiring or integrity of RJ45 cables and that the cables are properly seated into RJ-45 sockets. • If a P-Hall Node has been physically reconfigured to a different node (change in the dipswitch) this fault will occur since the previous setting is no longer detected. Press the Fault Reset Button to clear the message from the Main Window
Hall Call Disconnect Tripped	The Hall Call Disconnect function has been tripped causing all hall calls to be dropped, refer to statistics counter window for the trigger code.	HCD = 1	<ul style="list-style-type: none"> • Navigate to Troubleshoot→Statistic Counters→HCD Trigger Code • Use the trigger code to guide you on seeking a solution.
Hall Comm. Failed	Successful communication to at least one Hall node was established, but all Hall communication has stopped, verify nodes configuration and wiring. Refer to Page 9 of the prints		<ul style="list-style-type: none"> • Remove the Hall Nodes network from the controller and install a known good Hall Node board and verify that the Hall LED status indicator on the P-MP board comes on, if it does not turn on replace the P-MP board; if it turned on verify hall network wiring, refer to page 9 of the prints.
Hall Door Bypass w/o Inspection	The Hall Door Bypass switch is active while the car is not on Car Top inspection or In Car inspection	ICT = 1 IIC = 1 HDB = 1	<ul style="list-style-type: none"> • Hall door bypass switch cannot be active while the controller is not on either car top or in car inspection – Turn off Hall Door Bypass switch. • If the hall door bypass switch is off – verify that the switch is off in memory. Navigate to Troubleshoot → Flags → Inspection Flags and look at the status of HDB. The flag is low if the switch is off and high if the switch is on. • If the switch status doesn't change and/ or is reflected incorrectly in memory – Change the P-MP Board; the switch may have failed.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Heat Detector Tripped	Heat Sensor input has been activated. Refer to Pages 5or 5b of the prints.	HSR = 1	<ul style="list-style-type: none"> • Heat Detector input was or still is active triggering the Heat Detector mode of operation. • Verify Heat Detector device operation if temperature is not above detection settings. • Verify the polarity of the input is set correctly. Navigate to Adjust→Car Performance→Fire Service Options→Heat Sensor Input • Verify the state of the physical input using the Local Diagnostics. Navigate to the appropriate window depending on where the Input is mapped to, Troubleshoot→Local Diagnostics, if input does not match voltage at input terminal try re-mapping the HSR input to an unused input if available or replace the Pixel board where the HSR input is mapped.
Heavy Load In Car	The load-weighing device indicates that the car is loaded to capacity. When a Heavy Load Condition is registered the Hall Calls are bypassed until the condition is cleared.	HLI = 1	<ul style="list-style-type: none"> • The HLI input is activated, and the car will bypass hall calls, if the car is empty, verify the load weighing device configuration and operation. • For discrete load weighing unit, if there is no voltage on HLI – Ensure that HLI is low in memory. Go to Troubleshoot → Flags → Service Flags, if not low try remapping HLI input to an unused input if available or replace Pixel board where input is mapped. • For CAN Based Load Weighing unit, verify the settings for Heavy Load are programmed correctly, navigate to: Install→Initial Settings→Load Weighing Config, i.e., about 80% of full load capacity. • Verify Load Weigh Readings to be in line with current load weight in the cab, if not in line refer to Pixel Controller manual Appendix C for Load weighing device Zero and recalibration processes

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
High Overspeed	Car speed exceeded the programmed contract overspeed threshold.		<ul style="list-style-type: none"> The Car, while in Automatic operation, exceeded the contract overspeed threshold. Verify that the High Speed trip speed is not set lower than the contract speed but rather is set to about 5% to 10% above contract speed setting, Navigate to Install→Initial Settings→Speed Profile→Highspeed Trip Speed Verify car is not overshooting contract speed during acceleration; Navigate to Troubleshoot →Drive→ Drive Performance Data and observe that the measured speed does not reach the overspeed threshold value. If close to the threshold value decrease speed profile parameters Acceleration and Roll Over Jerk values and adjust drive response as needed to prevent car from overshooting contract speed
Hoistway Access CGF is Open	The car cannot be commanded to move in Hoistway Access because the car gate front, CGF, is open and Access operation is assigned to bypass the rear gate and locks	CGF = 0 IA = 0 And Access Operation assigned to the rear doors	<ul style="list-style-type: none"> Verify the front car gate is closed. If closed verify CGF LED is on in the P-MPIO board, if is not on verify CGF wiring refer to pages 4 and 6b of the prints If LED is on verify the CGF flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in replace the P-MPIO board. <p>Note: Access door operation assignment parameters can be adjusted by navigating to Install→Initial Settings→Hall Node Network (Top Access Node and Bottom Access Node)</p>
Hoistway Access CGR is Open	The car cannot be commanded to move in Hoistway Access because the car gate rear, CGR, is open and Access operation is assigned to bypass the front gate and locks	CGR = 0 IA = 0 And Access Operation assigned to the front doors	<ul style="list-style-type: none"> Verify the rear car gate is closed. If closed verify CGR LED is on in the P-MP-REAR board, if is not on verify CGR wiring refer to pages 4 and 6R of the prints If LED is on verify the CGR flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in replace the P-MP-REAR board. <p>Note: Access door operation assignment parameters can be adjusted by navigating to Install→Initial Settings→Hall Node Network (Top Access Node and Bottom Access Node)</p>

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Hoistway Access DCAB is Open	The car cannot be commanded to move in Hoistway Access because the door close contact, DCAB, bottom is open and the car is not within the bottom access zone.	DCAB = 0 IA = 0 And Car not within the bottom access zone	<ul style="list-style-type: none"> • Verify the bottom access door close contact is closed. • If closed verify DCAB LED is on in the P-MP-REAR board, if is not on verify DCAB wiring refer to page 4 of the prints • If LED is on verify the DCAB flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MP-REAR board.
Hoistway Access DCAT is Open	The car cannot be commanded to move in Hoistway Access because the door close contact, DCAT, top is open and the car is not within the top access zone.	DCAT = 0 IA = 0 And Car not within the top access zone	<ul style="list-style-type: none"> • Verify the top access door close contact is closed. • If closed verify DCAT LED is on in the P-MP-REAR board, if is not on verify DCAT wiring refer to page 4 of the prints • If LED is on verify the DCAT flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MP-REAR board.
Hoistway Access DCSF is Open	The car cannot be commanded to move in Hoistway Access because the intermediate front door close contacts string, DCSF, is not closed	DCSF = 0 IA = 0	<ul style="list-style-type: none"> • Verify all intermediate front door close contacts are closed. • If closed verify DCSF LED is on in the P-MP-REAR board, if is not on verify DCSF wiring refer to page 4 of the prints. • If LED is on verify the DCSF flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MP-REAR board.
Hoistway Access DCSR is Open	The car cannot be commanded to move in Hoistway Access because the intermediate rear door close contacts string, DCSR, is not closed	DCSR = 0 IA = 0	<ul style="list-style-type: none"> • Verify all intermediate rear door close contacts are closed! • If closed verify DCSR LED is on in the P-MP-REAR board, if is not on verify DCSR wiring refer to page 4 of the prints. • If LED is on verify the DCSR flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MP-REAR board.
Hoistway Access DLAB is Open	The car cannot be commanded to move in Hoistway Access because the door lock bottom, DLAB is open and the car is not within the bottom access zone.	DLAB = 0 IA = 0 And Car not within the bottom access zone	<ul style="list-style-type: none"> • Verify the bottom access door lock contact is closed. • If closed verify DLAB LED is on in the P-MPIO board, if is not on verify DLAB wiring refer to page 4 of the prints. • If LED is on verify the DLAB flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MPIO board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Hoistway Access DLAT is Open	The car cannot be commanded to move in Hoistway Access because the door lock top, DLAT is open and the car is not within the top access zone.	DLAT = 0 IA = 0	<ul style="list-style-type: none"> • Verify the top access door lock contact is closed • If closed verify DLAT LED is on in the P-MPIO board, if is not on verify DLAT wiring refer to page 4 of the prints • If LED is on verify the DLAT flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MPIO board.
Hoistway Access DLSF is Open	The car cannot be commanded to move in Hoistway Access because the intermediate front door lock contacts string, DLSF, is not closed	DLSF = 0 IA = 0	<ul style="list-style-type: none"> • Verify all intermediate front door lock contacts are closed • If closed verify DLSF LED is on in the P-MPIO board, if is not on verify DLSF wiring refer to page 4 of the prints • If LED is on verify the DLSF flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MPIO board.
Hoistway Access DLSR is Open	The car cannot be commanded to move in Hoistway Access because the intermediate rear door lock contacts string, DLSR, is not closed.	DLSR = 0 IA = 0	<ul style="list-style-type: none"> • Verify all intermediate rear door lock contacts are closed • If closed verify DLSR LED is on in the P-MP-REAR board, if is not on verify DLSR wiring refer to page 4 of the prints • If LED is on verify the DLSR flag is active, Navigate to Troubleshoot → Flags →Door Flags, if not active in memory replace the P-MP-REAR board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Hoistway Access Insp. Switch	SP1 and SP2 IA1 and AI2 inputs status are not the same or a top or bottom access command to move is active and access operation is not enabled and Refer to Pages 3, 7 and 9 of the prints	IA1 = 1 IA2 = 0 OR IA1 = 0 IA2 = 1 OR IA1=IA2= 1 and IATU or IATD or IABU or IABD is 1	<ul style="list-style-type: none"> • Fault will be generated if access command to move is requested when the car is not in Inspection Access mode. If the fault is observed when trying to command the car to move, verify that the activation of the in car access switch places the car on Inspection Access mode of operation. • Verify that the IA LED in the P-MPIO board turns off as the in-car access inspection switch is placed to access and Pixel mode of operation changes to access mode, verify switch wiring, and refer to pages 7 and 9 of the prints. If LED status does not match the switch position; replace the P-MPIO board. • If the fault clears as soon as the in car switch is place on access a command to move from one of the access hall nodes is being received, Navigate to Troubleshoot → Flags → Inspection Flags and verify that IA flag status follows the in car Access switch settings and do the same for the IATU, IATD, IABU and IABD, refer to page 9 of the prints for top and bottom access to access node boards wiring. • If the flag for IA is a color other than black or blue, then a mismatch exists when the Safety processors SP1 and SP2 read this input – Replace the P-MPIO Board
Hoistway Access Out of Zone Fault	The car's current position is either above the Bottom Access Limit (BAL) or below the Top Access Limit (TAL) while in Access Inspection		<ul style="list-style-type: none"> • If car inspections access zones are at the top and bottom landings zero out values for the Top and Bottom Access Marker parameters Navigate to Install→Learn Functions→Virtual Limits→TAM and BAM = 000.000 ft • Verify the Car's current position is within the BAL or TAL position and that their respective positions agree with job requirements • Press the Help pushbutton in the Virtual Limits window for a pictorial view of how-to setup these limits.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Hoistway Door Bypass Switch	SP1 and SP2 HDB1 and HDB2 inputs are both on or both off simultaneously, Pixel monitors both sides of the switch status for. Refer to Page 3 of prints	HDB1 = 1 HDB2 = 1 OR HDB1 = 0 HDB2 = 0	<ul style="list-style-type: none"> • Navigate to Troubleshoot → Flags → Inspection Flags and make sure that HDB is either black or blue • Verify the communication status for SP1 and SP2 by navigating to Troubleshoot → Controller Network → (SP1) and (SP2) • If the SP1 and SP2 processors still read the same status and are communicating correctly – Replace the P-MP Board; the switch may have failed. If they are not communicating correctly – Replace both the P-MP and P-MPIO Boards
Hoistway Not Learned	The hoistway Position Learn has not been complete to allow the car to run on automatic mode. Verify all landing and virtual limit switches positions.		<ul style="list-style-type: none"> • All landing positions have not been learned. – Complete the hoistway Position Learn, refer to section 3.8 Hoistway Position Learn for tractions and hydraulics in the installation and adjustment manuals, • Verify the learned DNL position is below the Bottom Landing learned position. • Verify the learned UNL position is above the TOP Landing learned position. • Verify each floor's learned position has a learned position greater than the previous floor.
Hoistway Safety String Open	Voltage lost to the SAFH Terminal on the P-MPIO Board or not making it to memory. The pit stop switch, buffer switch, or the up / down terminal switches are open. Refer to Pages3 of the prints	SAFH = 0 SAFC = 1	<ul style="list-style-type: none"> • For Traction: The Up or Down Terminal Switches, the Buffer Switches, or the Pit Stop Switch is open. – Verify that full voltage is making it to SAFH. If it's not, trace backwards until the voltage loss is found., refer to Page3 of the prints • For Hydro: Up Over Travel Limit, Plunger Following Guide (if required), Slack Cable (if required), or Pit Access Door (if required) may be open. – Verify that full voltage is making it to SAFH. If it's not, trace backwards until the voltage loss is found, refer to Page3 of the prints • After confirming the SAFH terminal has 120VAC verify that the SAFH LED is lit, then navigate to Troubleshoot → Flags → Safety I/O Flags and ensure that SAFH is ON in memory. If the SAFH flag is low in memory – Replace the P-MPIO Board.
I2C Bus Error	Communication error on the I2C bus for the Safety Processors.		<ul style="list-style-type: none"> • Perform a Computer Reset and verify the condition still exists. If the fault is still active – Replace the P-MPIO Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
In-Car Inspection Switch	SP1 and SP2 IIC1 and IIC2 or IICE1 and IICE2 inputs status are not the same or IICE input is active and the car is not on In Car Inspection Mode Refer to Pages 3 and 7 of the prints	<p>IIC1 = 1 IIC2 = 0 OR IIC1 = 0 IIC2 = 1 OR IICE1 = 0 IICE2 = 1 OR IICE1 = 1 IICE2 = 0 OR IIC = 1 IICE = 1</p>	<ul style="list-style-type: none"> • If the Fault is generated when the car is not In Car Inspection Mode, verify that IICE, LED is off on the P-MPIO board and IICU and IICD LEDs are off on the P-COP board, refer to pages 3 and 7 of the prints. • If fault is observed while commanding the car to move, verify the IIC LED status on the P-MPIO board is off as the in car inspection switch is placed to Inspection. • If the fault persists, Navigate to Troubleshoot → Flags → Inspection Flags and verify that IIC and IICE, IICU, and IICD follow their respective switch setting, refer to page 7 of the prints, if IIC and IICE do not follow replace the P-MPIO board or if the IICU or IICD do not follow replace the P-COP board. • If the flags for IIC or IICE are a color other than black or blue, then a mismatch exists when the Safety processors SP1 and SP2 read these inputs, replace the P-MPIO board
Inspection Up and Down	Both inspections up and down are active at the same time for one or more modes of inspection operation, refer to pages 3, 6, and 7 of the prints	<p>ICTU = 1 ICTD = 1 OR IICU = 1 IICD = 1 OR IATU = 1 IATD = 1 OR IABU = 1 IABD = 1 OR IMRU = 1 IMRD = 1</p>	<ul style="list-style-type: none"> • Verify which inspection signals are active when the fault condition occurs – Navigate to Troubleshoot → Flags → Inspection Flags. • Verify wiring/inspection switches, refer to pages 3, 6, and 7 of the prints, verify whether the issue goes away if the wire in question is removed (car top inspection up/ ICTU for example) • If the flag goes low when the wire is removed – Then the issue is in the field wiring. Could be a stuck button or a button failure. • If the flag does not go low when the wire is removed replace the Pixel board where input is connected.
Inspection Overspeed	Car speed exceeded the programmed inspection overspeed threshold during an Inspection Run		<ul style="list-style-type: none"> • The Car, while running on Inspection operation, exceeded the overspeed threshold • Verify that the inspection trip speed (Default 100fpm) isn't set lower than the inspection speed. Navigate to Install → Initial Settings → Speed Profile → Inspection Trip Speed. • If the Controller is a Hydraulic System and has the High Speed on inspection Option enabled, Pixel will use the High-Speed Trip Speed instead of the inspection trip • Navigate to the speed profile as shown above, then verify / adjust the Car's High-Speed Trip Speed settings.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
IO Mapping File Corrupted	Data integrity error has been detected with the IO Mapping file, reset P-MP board or re-enter all job programmable Inputs and Outputs.		<ul style="list-style-type: none"> • Navigate to Install→File Transfer→System Restore and try reloading a previously saved IO Mapping file to the P-MP. • Navigate to Install→File Transfer→IO Mapping Download and try reloading a previously saved IO Mapping file to the P-MP • If no previously saved file is available, contact Elevator Controls Technical Support for the default IO Mapping for the specific job or navigate to the IO Mapping Window Install → IO Mapping) and remap all job programmable IO(s)
Leveling Overspeed	Car speed exceeded the programmed Leveling Overspeed threshold while leveling or Releveling into a landing		<ul style="list-style-type: none"> • The Car, while in Automatic operation, exceeded the leveling overspeed threshold, verify that the leveling trip speed (default 100fpm) isn't set lower than the speed of the car as it enters the leveling zone from an automatic run • Navigate to Install→Initial Settings→Speed Profile→Leveling Trip Speed. • <i>Note:</i> Leveling overspeed condition usually occurs while the car enters the Leveling Zone. Decreasing the Deceleration parameter value allows for lower speeds while entering the Leveling Zone
Load Weigh Communication	Unable to establish communications between Load Weigh Device and the Pixel, verify wiring from the TOC or the P-TB-C board to Load Weigh Device. Refer to Page QR3 or QR4 of the prints		<ul style="list-style-type: none"> • Verify Load Weigh Device is powered ON • Verify Communication wiring; refer to Page QR3 or QR4 of the prints. • Verify Load Weigh Device Communication Baud rate is set to 125kbps on the device itself., refer to Appendix D of controller manual for Load Weighing set up and installation instructions

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Load Weigh Error	Both inputs Light Load and Heavy Load Input are simultaneously active, refer to page 6 of the prints	HLI = 1 LLI = 1	<ul style="list-style-type: none"> • Verify the load weigh device operation • If the Load Weigh Device is a CAN based device, verify the Heavy Load and Light Load settings are set correctly, about 80% and 20% of full load, Navigate to Install→Initial Settings→Load Weighing Config • If the Load Weigh Device is dry contact based, Navigate to Troubleshoot→Flags→Services Flags to verify the status of HLI and LLI inputs in memory, if both inputs are active remove field wiring, if condition remains, try re-mapping one or both inputs to unused inputs if available or replace the Pixel board where the inputs are mapped.
Logical Physical IO Map	The Pixel I/O Mapping file either did not load properly during power up or it did not save properly during a recent update to the I/O Mapping file		<ul style="list-style-type: none"> • Perform a Computer Reset on the Pixel Controller • If the fault still occurs, reload the saved IO Mapping File to the Pixel Controller. Navigate to Install→File Transfer→System Restore or IO Mapping Upload • If no previously saved file is available, contact Elevator Controls Technical Support for the default IO Mapping for the specific job or navigate to the IO Mapping Window Install → IO Mapping) and remap all job programmable IO(s)
LWD Re-Cal failure	Load Weigh Device has failed the recalibration process. A manual auto-zero process must be performed. Verification of the Load Weighing device must be performed.		<ul style="list-style-type: none"> • Verify the Car is at the Bottom landing, place the Pixel Controller on Test. Navigate to Install→Learn Functions→Load Weighing Learn→Load Weighing Readings, and press an Auto Zero soft key pushbutton to perform auto-zero. • Place known weights inside the cab and verify it agrees with Pixel Controller display values navigating to: Install →Learn Functions→Load Weighing Learn→Load Weighing Readings. If reading does not agree a load weighing verification may need to be performed, refer to Appendix C of the controller manual for directions.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Main Cedes Checksum Error	CEDES APS Sensor response fails the Pixel Checksum Integrity Check. Verify the connection from the device to P-TOC is correct; refer to page 6 CEDES APS of the prints.		<ul style="list-style-type: none"> • Verify the connection between the CEDES APS Sensor and the P-TOC board is correct. Refer to page 6 CEDES APS of the prints. • After verifying the connection is correct, interchange the Main and Auxiliary connection on the CEDES APSC and confirm on the View Selector Data Window (Install→View Selector Data) that the fault is now displayed on the Auxiliary data. • If the fault does not move to the Auxiliary device, then replace the Main Cedes P-HNA board. • If the fault does move to the Auxiliary device, replace the CEDES APS Sensor.
Main Cedes Unit Position Error	CEDES APS Sensor cannot read the code tape correctly. Clean the optical window, code tape, and verify the alignment of sensor with the code tape.		<ul style="list-style-type: none"> • Clean the optical window on the CEDES APS Sensor device. • Clean the coded tape from any dust or grease. • Verify the alignment of the device is centered to the coded tape. Be sure to use the position indicators on the device to verify alignment, refer to Appendix E of Controller manual. • If the fault does not clear, replace the CEDES APS Sensor device
M. Landa & A. Landa Units Swapped	The Main Selector cable is attached to the Aux Selector connector on the P-TOC Board, and vice versa		<ul style="list-style-type: none"> • The Aux. Landa Unit is physically connected to the Main Landa Unit connection (JMSEL on the P-TOC) is reporting a higher position than the Landa Unit connected to the Auxiliary Landa Unit position (JASEL on the P-TOC) • Swap the JMSEL and the JASEL plugs on the P-TOC Board. The Main Landa Unit should be at the bottom & the Auxiliary Landa Unit should be at the top of the Landa Bracket. Refer to Page 6b of the prints.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Machine Rm Inspection Switch	<p>Machine Room Inspection Enable Input IMRE is active but IMR1 and IMR2 state NOT for Machine Room Inspection.</p> <p>OR</p> <p>SP1 and SP2 do agree on switches status for the Machine Room Inspection and/ or Machine Room Inspection Enable. Refer to Page 3 of prints</p>	<p>IMR = 0 IMRE = 1 OR IMR1 = 1 IMR2 = 0 OR IMR1 = 0 IMR2 = 1 OR IMRE1 = 1 IMRE2 = 0 OR IMRE1 = 0 IMRE2 = 1</p>	<ul style="list-style-type: none"> • Verify the flags IMR and IMRE change state accordingly. Navigate to Troubleshoot → Flags → Inspection Flags and verify that IMR and IMRE are both in the same state when both are activated. • If they are both high – Verify that they go low when deactivated • If they do not go low – Replace both the P-MP and P-MPIO Board. • If the flags for IMR or IMRE are a color other than black or blue, then a mismatch exists when the Safety processors SP1 and SP2 read these inputs – Replace both the P-MP and P-MPIO Board.
Main Aux Landa Mismatch	Both the Main and the Auxiliary Landa Sensor Units read positions that deviate above learned offset distance between the two sensor units		<ul style="list-style-type: none"> • Verify both Landa Sensor Units' mechanical placement on top of the car • Perform a Landa Tape Reader Offset learn. • Navigate to Install→Learn Functions→Virtual Limits→Tape Reader Offset. • Press Learn / Save when Tape Reader Offset is highlighted
Main Landa unit Bad Integrity Data	Bad/Corrupted data packets from the Main Landa unit are being received.		<ul style="list-style-type: none"> • Verify the wiring of the Main Landa Sensor Unit for data and shield wires. Refer to page 6b of the prints. • Replace Main Landa wire harness to the TOC and verify operation, continue with steps below if problem persist. • Replace Main Landa Sensor Unit and verify operation, continue with step below if problem persist • Replace P-TOC board
Main Landa Unit Completely Off Rail	The Landa Tape is not aligned inside the Main Landa sensor unit; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Main Landa Sensor Unit is misaligned and is unable to read positional data. Verify Main Landa Sensor Unit alignment. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift. • Navigate to Install→View Selector Data Window and verify the Landa tape alignment while running on Inspection the entire length of the hoistway. If properly align replace the Main Landa Sensor Unit. Refer to page QR5 of the prints for tape installation directions.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Main Landa Unit has Invalid Data	Main Landa Sensor unit is constantly reading a position of 0.00ft, Refer to page QR5 of the prints for Landa tape installation directions.		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data Window and verify if the Main Landa sensor unit reads a position of 0.00ft • If the position is 0.00ft, verify that the Landa tape is installed properly by ensuring that the arrows on the Landa tape are pointing in the UP direction. • If pointing down Landa tape is hanging upside down and needs to be flipped. • If arrows are located to run inside sensor unit, tape is backwards and needs to be turned. i.e. arrows need to be away from sensor unit reading area. • Refer to page QR5 of the prints for tape installation directions
Main Landa Unit Can't Read Pos. A Or Can't Read Pos. B (Pos. A: Main Landa Unit Lost 1) or (Pos. B: Main Landa Unit Lost 2)	Main Landa Sensor Unit cannot calculate the current position, clean sensor unit reading area and verify it is free from scratches, if scratched replace sensor unit.		<ul style="list-style-type: none"> • Clean the optical unit of any possible dirt. • Verify the direction of reading relative to code rail is correct • Verify the wire harness connection between the Landa unit and the P-TOC board is secured tightly • Verify that the plastic liner is not scratched; if it is then the unit must be replaced.
Main Landa Unit Partially Off Rain	The Landa Tape is partially misaligned inside the Main Landa Sensor unit; refer to page QR5 of the prints for tape installation directions.		<ul style="list-style-type: none"> • Main Landa Sensor unit is partially misaligned and is unable to read positional data. Verify the Main Landa Sensor unit alignment. • Ensure that the tape is straight though the entire length of the hoistway and that is braced at appropriate intervals to prevent excessive drift. Refer to page QR5 of the prints for tape installation directions. • Navigate to Install→View Selector Data Window and verify the Landa alignment while running on Inspection the entire length of the hoistway. If properly align replace the Auxiliary Landa Sensor unit
Main Landa Unit Checksum Error (Main Landa Unit Read Data Error)	The CRC of the data packet did not match the calculated CRC; Bad/Corrupted data packets from the Main Landa Unit are being received.		<ul style="list-style-type: none"> • Verify the wiring of the Main Landa Sensor unit for data and shield wires. Refer to Page 6b of the prints. • Replace Main Landa wire harness to the TOC and verify operation, continue with steps below if problem persist. • Replace Main Landa Sensor unit and verify operation, continue with step below if problem persist • Replace P-TOC board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Motor Limit Timeout	The car exceeded the maximum time allowed to complete a run and was shut down to prevent motor damage		<ul style="list-style-type: none"> • Default Motor Limit Timer Value is 3.00 min. Verify that the timer has not been adjusted to a value that is too low. Navigate to Adjust→Car Performance→Timers→Controller Timers→Motor Limit Timer. Increase as necessary to allow time a complete top to bottom run plus 25%. • If the timer is set correctly verify <ul style="list-style-type: none"> For Traction cars: <ol style="list-style-type: none"> a. The brake mechanical performance and Brake Pick and hold voltages b. Inch the car up and down at several landings, including the top and bottom, to make sure is able to relevel c. Verify the drive unit fault logs to determine if the drive unit faulted and address drive fault(s) For Hydraulic cars: <ol style="list-style-type: none"> a. Verify motor rotation and starter interface wiring b. Verify Valves circuits and voltages. c. Inch the car up and down at several landings, including the top and bottom, to make sure is able to relevel • Navigate to Troubleshoot→Event Logs → Event Playback → Standard DDR Event Play Back, to play back and analyze data collected and stored by Pixel that led to the triggering of this event.
MP Board Settings CRC	The P-MP Board IP Settings are Invalid.		<ul style="list-style-type: none"> • Navigate to Install→File Transfer→Board Settings and perform a default on the P-MP board. Note that this will require a Computer Reset after executing the default command. • If the fault continues after the Computer Reset – Replace the P-MP Board.
MP Firmware CRC Fault	MP Internal Flash CRC did not pass, perform a USB MP software upgrade.		<ul style="list-style-type: none"> • If after a software update the fault persists – Replace the P-MP Board.
MP Invalid Configuration	The current configuration file on the P-MP is invalid.		<ul style="list-style-type: none"> • Navigate to Install→File Transfer→System Configuration Download and try reloading a previously saved configuration file to the P-MP. • Or navigate to Install→File Transfer→System Restore and try reloading a previously saved configuration file to the P-MP. • If no previously saved configuration file is available, contact Elevator Controls Technical Support for the default configuration for this job.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Multiple Front Door Locks	The front door open limit is open; indicating that the doors are fully open, and multiple front hoistway door locks have opened.	DOLF = 0 AND DLAT = 1 DLSF = 0 DLAB = 0 OR DLAT = 0 DLSF = 1 DLAB = 0 OR DLAT = 0 DLSF = 0 DLAB = 1	<ul style="list-style-type: none"> The door open limit is open and more than one of the hoistway doors are open – Verify status of DLAT, DLSF & DLAB. Navigate to Troubleshoot→Flags→Door Flags and Figure out which flag is in the wrong state. If there is voltage but it stays low in memory – Replace the P-MPIO Board.
Multiple Rear Door Locks	The rear door open limit is open; indicating that the doors are fully open, and multiple rear hoistway door locks have opened.	DOLR = 0 AND DLAT = 1 DLSR = 0 DLAB = 0 OR DLAT = 0 DLSR = 1 DLAB = 0 OR DLAT = 0 DLSR = 0 DLAB = 1	<ul style="list-style-type: none"> The door open limit is open and more than one of the hoistway doors are open – Verify status of DLAT, DLSR & DLAB. Navigate to Troubleshoot→Flags→Door Flags and Figure out which flag is in the wrong state. If there is voltage but it stays low in memory – Replace the P-MPIO Board.
Pattern Error	Pattern Error is caused when Acceleration and Jerk parameters are set to values that will not allow Pixel to generate continuous speed pattern curve		<ul style="list-style-type: none"> There is an issue with the parameters entered into the speed profile – Refer to Section 4.6 of the Pixel Manual for allowed Acceleration and Jerk parameters range values. Navigate to Adjust→Ride Performance→Speed Profile and verify parameter settings

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
P Contactor Fault	The Po contactor output state is off but its monitored contact did not close or Po output state is on but its monitored contact did not Open, P Contactor failed to pick, drop, or it has a bad Auxiliary Contact, verify contact wired to the Pin input and Po contactor output triacs; refer to Page 4 of prints	Po = 0 Pin = 0 OR Po = 1 Pin = 1	<ul style="list-style-type: none"> • Verify the P Auxiliary Contacts, if loaded, are properly seated • Manually actuate the P contactor and observe the Pin input LED on the P-MPIO board turns off as contactor is pressed and turns on when released. • Verify the operation of the Pin input on the P-MPIO Board – Navigate to Troubleshoot→Flags →Safety I/O Flags and observe the Pin flag changing states in memory when the P motor contactor is manually actuated. • If the Pin flag doesn't change state in memory, but it does change state on the P-MPIO status LED – Replace the P-MPIO Board • If Pin flag does change state in memory and it matches the LED status – Navigate to Troubleshoot→Flags →Safety I/O Flags observe the Po output flag to match the Po output status LED on the P-MPIO, if it does not replace Po output triacs Q2 and Q3 on the P-MPIO Board and repeat this step. • If step above did not fix the problem, Replace the P-MPIO Board
Pit Flood Operation Complete	The Pit Flood input has been activated and the car is now at the Pit Flood recall landing.	PITI = 1	<ul style="list-style-type: none"> • Pit Flood input was or still is active latching the Pit Floor recall operation • Verify that the pit is not flooded. • If the pit is not flooded, verify the state of the PITI input if active, verify that the pit flood switch works correctly (measure 24VDC voltage when active, and remove the wire from PITI and see if the input goes low). • If PITI is low – Reset the condition by pressing System Fault Reset push button

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Rear Door Bounced At Floor XX {XX = Landing number}	The rear door bounced open while the car was taking off from a floor on an automatic run	SDI Pattern = Soft Start H = 1 HI = 1 AND CGR = 0 DLKR = 1 OR CGR = 1 DLKR = 0 OR CGR = 0 DLKR = 0 *DLKR flag comprises the Status of All the Rear Door Locks and Rear Door Close Contacts when the door option is configured to Freight or Manual door.	<ul style="list-style-type: none"> DLKR or CGR dropped momentarily during takeoff. Navigate to Troubleshoot→Event Logs→Event Playback→Standard DDR Event Log and review the door flags for this fault to confirm which of the door signals dropped during take off At the floor number displayed in the fault, verify the door closing adjustments prevent any door bouncing from a slammed closing Verify that doors don't roll back or relax open on takeoff.
Rear Door Clipped At Floor XX {XX = Landing number}	The rear car gate or one of the interlocks clipped, while the car was travelling in high speed	H = 1 HI = 1 AND CGR = 0 DLKR = 1 OR CGR = 1 DLKR = 0 OR CGR = 0 DLKR = 0 *DLKR flag comprises the Status of All the Rear Door Locks and Rear Door Close Contacts when the door option is configured to Freight or Manual door	<ul style="list-style-type: none"> DLKR or CGR dropped momentarily while traveling on high-speed. Navigate to Troubleshoot→Event Logs→Event Playback→Standard DDR Event Log and review the door flags for this fault to confirm which of the door signals dropped during the run At the floor number displayed in the fault, verify door clearances as the car travels through the hoistway.
Rear Door Comm. Loss	Communication to the serial rear door operator has been lost.		<ul style="list-style-type: none"> Verify the wiring between the P-TOC board and the Rear Door operator for data and shield wires Refer to Page 6R of the prints.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Rear Door Limit Switches	<p>The rear door open limit and door closed limit are both low at the same time.</p> <p>Rear Door limits valid states: Door Fully Open DOLR = 0, DCLR = 1 Door Fully Closed DOLR = 1, DCLR = 0 Door Partially Close-Open DOLR = 1, DCLR = 1</p>	DOLR = 0 DCLR = 0	<ul style="list-style-type: none"> • DOLR and DCLR are both low in memory – Verify the current position of the doors/ verify the status of the door limits on the door operator. • If the door operator limits are in the correct state – Verify that the door limit signals are reflected correctly on the P-TOC board terminals DOLR and DCLR • If the door limits are not displayed correctly on the TOC Board – Correct/verify the door limit wiring/ setup. • Also verify that the rear door limits are mapped correctly per the print. • If the DOLR and DCLR signals seem correct on the P-TOC board – Verify that they match in memory. Navigate to Troubleshoot→Flags→Door Flags • If the door limits status on the TOC and their status in memory does not match – Then the DOLR/ DCLR inputs could be damaged. Replace the P-TOC Board or the board the inputs are mapped to.
Rear Door Locks Fault	<p>The rear door open limit is open; indicating that the doors are fully open, but either the rear car gate or rear hoistway door locks are still closed.</p>	DOLR = 0 CGR = 1 DLKR = 0 OR DOLR = 0 CGR = 0 DLKR = 1 OR DOLR = 0 CGR = 1 DLKR = 1	<ul style="list-style-type: none"> • The car gate, the door lock, or both didn't open – Verify status of DOLR, DLKR & CGR. Navigate to Troubleshoot→Flags→Door Flags and Figure out which flag is in the wrong state. • Verify that the door contacts are open by ensuring that there is no voltage on CGR or the door lock contact for that floor Refer to Page 4 of the prints • If there is no voltage but it stays high in memory – Replace either the P-MPIO Board or P-MP-REAR Board.
Rear Door Not Fully Closed	<p>The rear door close limit is closed while the doors are locked. OR The rear door close limit is open, but either the car gate or door lock is not closed.</p>	CGR = 1 DLKR = 1 DCLR = 1 OR CGR = 0 DLKR = 1 DCLR = 0 OR CGR = 1 DLKR = 0 DCLR = 0	<ul style="list-style-type: none"> • Either the rear door close limit, the car gate closed contact, or a hoistway door closed contact is in the incorrect state. – Verify which state the doors are in. Navigate to Troubleshoot→Flags→Door Flags. Verify and correct whichever flag isn't in the correct state. • Verify that the door contacts are closed by ensuring that there is voltage (120VAC) on CGR and the door lock contacts, refer to Page 4 of the prints • If there is voltage but corresponding input(s) stay low in memory – Replace the P-MP-REAR Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Rear PHE Cycle Test Failed	Rear Photo Eye has failed its cycle test, test performed after the door has reached its fully opened position and before door closing starts	PHETR = 1 PHER = 0 PEMR = 0 OR PHETR = 1 PHER = 0 PEMR = 1 OR PHETR = 1 PHER = 1 PEMR = 0	<ul style="list-style-type: none"> • Verify the PHETR output picks the PHETR relay and verify both the PHER and the PEMR inputs come in when the PHETR relay is picked. Refer to Pages 6B and 6R of the prints • Verify that the Inputs, PHER and PEMR, and Output, PHETR, are mapped correctly in the Pixel System. Navigate to Install→IO Mapping. • Test information detail: • Prior to the door closing PHETR output will be turned on to signal door operator to test the reopening device. Pixel will wait for about 5 seconds for PHER and PEMR inputs to become active to terminate or fail the test.
Rear PHE Fault	PHER input remained high for more than the programmed Photo Eye Fail Timer value	PHER = 1 Photo Eye Fail Timer Expired	<ul style="list-style-type: none"> • Verify the PHER input is not stuck in the high state by disconnecting the field wire from its assigned location and viewing the status by navigating to Troubleshoot→Flags→Door Flags • Verify the Photo Eye Fail Timer is not set too short(default value of 5 minutes) • Navigate to Adjust→Car Performance→Timers→Rear Door Timers→Photo Eye Fail
Regulator Release Aborted	Pixel did not get confirmation from the L1000A drive unit that the requested run command has been accepted forcing run command to be aborted and re-entered.		<ul style="list-style-type: none"> • Verify Regulator Release option is set correctly. Navigate to Install→Initial Settings→Speed Profile →Regulator Release • Yes for L1000A drives only, No for all other drives • Verify fault pending counts Navigating to: Troubleshoot → Event Logs →Pending Counts →Regulator Release Aborted and set MP = 025 and SP = 005 • Verify the L1000A drive has the following programmed options. H2-01 = 50 and P1-04 = 20 • Verify job has been upgraded with auxiliary motor contactor upgrades, i.e. it has two normally open AA auxiliary contacts wired in parallel to enable the drive Safe Enable 1 and 2 inputs, refer to page 1 of the prints

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Re-Leveling Down	The car is repositioning Down into door zone center after being bounced up out of position, people walking in and out of car/ rope stretch		<ul style="list-style-type: none"> Adjust the Releveling Timeout value to allow the car to settle before declaring the need to relevel. This helps for cases when people are walking in and out of the car. Adjust the Releveling Offset. This will give the car a push more towards the center of the Door Zone. If the Car is arriving to the floors correctly and not over/under shooting the floor, increase the Dead Zone. All speed control parameters can be found by navigating to Adjust → Ride Performance → Speed Profile Refer to controller manual for traction section 4.6 and for hydraulic to section 4.7 for detailed information on speed profile parameters description and adjustments
Re-Leveling Up	The car is repositioning Up into door zone center after being bounced down out of position, people walking in and out of car/ rope stretch		<ul style="list-style-type: none"> Adjust the Releveling Timeout value to allow the car to settle before declaring the need to relevel. This helps for cases when people are walking in and out of the car. Adjust the Releveling Offset. This will give the car a push more towards the center of the Door Zone. If the Car is arriving to the floors correctly and not over/under shooting the floor, increase the Dead Zone. All speed control parameters can be found by navigating to Adjust → Ride Performance → Speed Profile Refer to controller manual for traction section 4.6 and for hydraulic to section 4.7 for detailed information on speed profile parameters description and adjustments
Retiring Cam Failure	<p>The retiring cam while picked is failing to lock the doors.</p> <p>The retiring cam RCO output is on, and the retiring cam timeout allowed for locking the door has expired.</p>	RCO = 1 DLK = 0 And Retiring Cam Timer Expired	<ul style="list-style-type: none"> If DLK goes high when the retiring cam is picked – Ensure that the retiring cam picks when RCO is high. Verify setting of Retiring CAM timer, (default value of 10 seconds) Navigate to: Adjust → Car Performance → Timers → Flags → Front Door Timers → Retiring Cam Timer If DLK doesn't go high when the retiring cam is picked – Verify the status of the door flags. Navigate to Troubleshoot → Flags → Door Flags. Compare the status of the flags with the inputs shown on Page 4 of the prints. Verify which flag is stopping DLK from making up to help identify problem.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Security Codes Invalid	Security codes read from internal flash are invalid.		<ul style="list-style-type: none"> • If Security Codes have been previously saved to a USB, reload saved security codes into Pixel, and perform a Computer Reset. Insert USB with the Security Codes and navigate to Install→File Transfer→Security Restore. • If the above does not work, a new set of codes needs to be entered utilizing the Security Floor Setup window (Adjust→Car Performance→Functional Options→Security→Floor Setup). • Note: A Computer Reset is required to load the Security Codes and verify the fault condition no longer exists. If the condition still exists replace the P-MP Board.
Serial COP Comm. Loss	Communication to serial COP interface has been lost.		<ul style="list-style-type: none"> • Verify the wiring between the P-COP board (Connector JCOP/JCOP1) and the Serial COP fixture for data and shield wires Refer to Pages 7 or 7R of the prints • If there is no Serial COP, verify the option is disabled. Navigate to Install →Basic Pixel Settings →COP Touchscreen Option and set it to “None”
Service Request	Service Timer has expired and needs to be renewed		<ul style="list-style-type: none"> • Navigate to Install→Initial Settings→Password Access and enter the service request password
Slowdown Overspeed	Car speed exceeded the learned terminal landings speed profile, perform a new slowdown speed learn if any speed parameters have been modified		<ul style="list-style-type: none"> • At a terminal slowdown, the car was travelling faster than the learned approach speed profile. If any changes were made that could affect the speed of the car – An ETS Learn in both directions must be completed. Navigate to Install→Learn Functions→ETS Learn
SP1 Aux Selector Comm Failed	Unable to establish communications between the SP1 and the Auxiliary Landa Sensor Unit, verify traveler wiring from the Controller to TOC and the TOC to Landa. Refer to pages 6 & 6b of the prints		<ul style="list-style-type: none"> • Verify Auxiliary Selector Status Good versus Bad counts. Navigate to Troubleshoot→Controller Network→Auxiliary Selector • If there are more Bad counts versus Good counts, verify traveler wiring from controller to TOC and from the TOC to Landa. • If there are Good Counts only – Replace the P-MPIO Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Landa Aux. Sensor Unit Fault (SP1 Aux Vend. Fault)	Safety Processors are reporting a fault being generated by the Auxiliary Landa Sensor Unit		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data and verify which of the faults is being reported. • If no faults are being reported – Replace the P-MPIO Board. • If a fault is being reported seek guidance under Fault Message description in this document
SP1 Both Main Aux Sel Fault (SP1 Both Main and Aux Vend Fault)	Safety Processors are reporting a fault being generated by the Main and Auxiliary Landa Sensor Units		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data and verify which of the faults is being reported. • If no faults are being reported – Replace the P-MPIO Board. • If a fault is being reported seek guidance under Fault Message description in this document
Landa Main Sensor Unit Fault (SP1 Main Vend. Fault)	Safety Processors are reporting a fault being generated by the Main Landa Sensor Unit		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data and verify which of the faults is being reported. • If no faults are being reported – Replace the P-MPIO Board. • If a fault is being reported seek guidance under Fault Message description in this document
SP1 Comm. Failed	Unable to establish SPI Communications between the P-MP and the SP1		<ul style="list-style-type: none"> • Navigate to Troubleshoot→ Controller Network and select SP1 to verify communications good counts. • Navigate to Troubleshoot→About and verify the SP1 Software Version Number is not 0.0.0.0. • If there are no good counts or the Version Number is 0.0.0.0, perform an individual software update to the SP1. • If the fault continues – Replace P-MPIO Board.
SP1 Invalid Configuration	The current configuration file for the Safety Processors is invalid. Perform a Safety Configuration Upload		<ul style="list-style-type: none"> • Navigate to Install → File Transfer (must be on Construction or Machine Room Inspection to enable) • Wait for the 10 second count down to complete • Select Safety Configuration Upload and perform a Transfer. • Once the Transfer is complete, hit the home button • If the Fault remains, replace the P-MPIO Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
SP1 Main Selector Comm. (SP1 Main Sel Fault)	Unable to establish communications between the SP1 and the Main Landa Sensor Unit, verify traveler wiring from the Controller to TOC and from the TOC to Landa. Refer to Pages 6 and 6b of the prints		<ul style="list-style-type: none"> • Verify Main Selector Status Good versus Bad counts. Navigate to Troubleshoot→Controller Network→Main Selector • If there are more Bad counts versus Good counts, verify traveler wiring from controller to TOC and from the TOC to Landa. • If there are Good Counts only – Replace the P-MPIO Board.
SP1 Landa Main Sensor Unit Fault (Landa Main Sensor Unit)	SP1 Safety Processors is reporting a fault being generated by the Main Landa Sensor Unit		<ul style="list-style-type: none"> • Navigate to Install→View Selector Data and verify which of the faults is being reported. • If no faults are being reported – Replace the P-MPIO Board. • If a fault is being reported seek guidance under Fault Message description in this document
SP MP Configuration Mismatch (SP1 MP Configuration Mismatch)	The main processor configuration file does not match the configuration file on the safety processors. Perform a Safety Configuration Upload.		<ul style="list-style-type: none"> • SP and MP Configuration files do not match • Navigate to Install → File Transfer (must be on Construction or Machine Room Inspection to enable) • Wait for the 10 second count down to complete • Select Safety Configuration Upload and perform a Transfer. • Once the Transfer is complete, hit the home button • If the Fault remains, replace the P-MPIO Board.
SP1 and SP2 IO Mismatch	A mismatch has occurred in the Safety IO status between the SP1 and SP2 Safety Processors		<ul style="list-style-type: none"> • Navigate to Troubleshoot→Controller Network and verify the SP1 and SP2 Good Counts only are incrementing • If only one of the SP1 or SP2 Bad Counts is incrementing replace the P-MPIO Board. • If both Bad Counts are incrementing, then replace both the P-MP and P-MPIO boards. • Navigate to Troubleshoot→Flags→Safety IO Flags to verify which input or output status is in conflict. This will be shown with a different color other than Black or Blue for the current status. • If they are in conflict, perform a Computer Reset; if conflict remains, replace P-MPIO Board.

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
SP2 Comm. Failed	Unable to establish SP1 Communications between the P-MP and the SP2		<ul style="list-style-type: none"> • Navigate to Troubleshoot→ Controller Network and select SP2 to verify communications good counts. • If there are no good counts, try to do an individual software update to the SP2. • If the fault continues – Replace P-MPIO Board.
TOC Comm. Failed	Unable to maintain CAN Communications between the MP and the TOC. Refer to Page 6 of the prints to verify CAB CAN network wiring.		<ul style="list-style-type: none"> • Verify traveler wiring from the Controller to the TOC • Make sure CAN-H and CAN-L are wired properly and the connections are done to the CAB CAN on the JTRAV connector.
UIM Bypass Enabled	The UIM Bypass option is not allowed during Automatic Operation, reset the UIM Bypass option	UIM Bypass = On	<ul style="list-style-type: none"> • The UIM Bypass Option is set to yes while the car is on automatic operation. • Navigate to Install → Code Compliance Test → Unintended Movement → Unintended Movement Bypass and set it to no.
Unable to Close Front Door	Unable to close the front door after the programmed number of allowable attempts.	DCLF = 1 DCFF = 1 Door Close Protection Timer Expired And Closing attempts = number of attempts allowed by the Closing Attempts Fault Counter	<ul style="list-style-type: none"> • Verify the doors are not blocked. • Verify Door Close protection timer (default 30 seconds) is set properly. Navigate to Adjust → Car Performance → Timers → Front Door Timers → Close Protection • Verify Door Closing attempts (default 10 attempts) is set properly. Navigate to Adjust → Car Performance → Door Options → Closing Attempts Fault Counter • If the doors are not blocked but are physically open – Verify that the DCFF signal is making it to the door operator. (Page 6b of prints) • If the doors are physically closing, verify that the door close limit is functioning correctly. The DCLF input should open when the door close limit breaks. • Verify that the DCLF LED on the P-TOC board turns off as the doors reach their closed limit position; if it does not turn off adjust the limit position. • If the door close limit is functioning correctly, verify that DCLF is changing states in memory. Navigate to Troubleshoot→Flags→Door Flags and confirm that the state of DCLF in memory is reflected correctly, low when doors are fully closed otherwise high. • If DCLF is incorrect in memory, but the LED input status is correct, replace the P-TOC Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Unable to Close Rear Door	Unable to close the rear door after the programmed number of allowable attempts.	<p>DCLR = 1 DCFR = 1 Door Close Protection Timer Expired And Closing attempts = number of attempts allowed by the Closing Attempts Fault Counter</p>	<ul style="list-style-type: none"> • Verify the doors are not blocked. • Verify Door Close protection timer (default 30 seconds) is set properly. Navigate to Adjust → Car Performance → Timers → Rear Door Timers → Close Protection • Verify Door Closing Attempts (default 10 attempts) is set properly. Navigate to Adjust → Car Performance → Door Options → Closing Attempts Fault Counter • If the doors are not blocked but are physically open – Verify that the DCFR signal is making it to the door operator. (Page 6b of prints) • If the doors are physically closing, verify that the door close limit is functioning correctly. The DCLR input should open when the door close limit breaks. • Verify that the DCLR LED on the P-TOC board turns off as the doors reach their closed limit position; if it does not turn off adjust the limit position. • If the door close limit is functioning correctly, verify that DCLR is changing states in memory. Navigate to Troubleshoot → Flags → Door Flags and confirm that the state of DCLR in memory is reflected correctly; low when doors are fully closed, otherwise high. • If DCLR is incorrect in memory, but the LED input status is correct, replace the P-TOC Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Unable to Open Front Door	Unable to open the front door before the Door Open Protection Timer expired.	DOLF = 1 DOFF = 1 Door Open Protection Timer Expired	<ul style="list-style-type: none"> • Confirm whether or not the doors actually attempt to open. • If the doors do not physically open, verify that the DOFF signal is actually reaching the door operator. (Page 6b of Prints) • If the doors are physically opening, verify that the door open limit is functioning correctly. The DOLF input should open when the door open limit breaks. • Verify that the DOLF LED on the P-TOC board turns off as the doors reach their open limit position; if it does not turn off adjust the limit position • If the door open limit is functioning correctly, verify that DOLF is changing states in memory. Navigate to Troubleshoot →Flags→Door Flags and confirm that the state of DOLF in memory is reflected correctly; low when doors are fully open, otherwise high. • If DOLF is incorrect in memory, but the LED input status is correct, replace the P-TOC Board
Unable to Open Rear Door	Unable to open the rear door before the Door Open Protection Timer expired.	DOLR = 1 DOFR = 1 Door Open Protection Timer Expired	<ul style="list-style-type: none"> • Confirm whether or not the doors actually attempt to open. • If the doors do not physically open, verify that the DOFR signal is actually reaching the door operator. (Page 6b of Prints) • If the doors are physically opening, verify that the door open limit is functioning correctly. The DOLR input should open when the door open limit breaks. • Verify that the DOLR LED on the P-TOC board turns off as the doors reach their open limit position; if it does not turn off adjust the limit position • If the door open limit is functioning correctly, verify that DOLR is changing states in memory. Navigate to Troubleshoot →Flags→Door Flags and confirm that the state of DOLR in memory is reflected correctly; low when doors are fully open, otherwise high. • If DOLR is incorrect in memory, but the LED input status is correct, replace the P-TOC Board

Event Message	Description	Logical Conditions	Possible Causes/ Solutions
Un-Intended Movement	Car moved out of the door zone area with both the car gate and the hoistway doors open	$DZ = 0$ $CGF = 0$ $DLKF = 0$ OR $DZ = 0$ $CGR = 0$ $DLKR = 0$	<ul style="list-style-type: none"> • Verify break operation and adjust as necessary. • Verify the car does not roll back excessively or bounce up and down at a landing as passengers enter or exit the cab • Verify Level Zone setting. Navigate to Adjust → Ride Performance → Speed Profile → Level Zone and increment value from 0.5 to 0.83Ft to open your door zone area from 2 to 4 inches in each direction then refer to traction manual section 4.7.6.5 Improve Re-Leveling Performance for releveling adjustment directions. • Verify and adjust drive performance to prevent excessive roll back while performing a re-leveling run.
Virtual Down Terminal Open	Car traveled beyond the learned Down Terminal Position preventing car from continue moving in the down direction.	$DNL = 0$	<ul style="list-style-type: none"> • Verify the Car's current position vs. the learned DNL position Navigate to Install → Learn Functions → Limit Switches • If the car is below the DNL value – Then run the car up on inspection • Verify the learned position for the bottom landing to be 0.2 feet above the DNL position, • If it is not performing a bottom landing position learn and verify all other landing positions, refer to Floor Set Up section of the controller manual for directions for learning landing positions.
Virtual Up Terminal Open	Car traveled beyond the learned-Up Terminal Position preventing car from continue moving in the up direction.	$UNL = 0$	<ul style="list-style-type: none"> • Verify the Car's current position vs. the learned UNL position Navigate to Install → Learn Functions → Limit Switches • If the car is above the UNL value – Then run the car down on inspection • Verify the learned position for the top landing to be 0.2 feet below the UNL position, • If it is not performing a top landing position learn and verify all other landing positions, refer to Floor Set Up section of the controller manual for directions for learning landing positions.

Section 8 – Intentionally Left Blank

Section 9 – Maintenance

9.1 Maintenance

The Pixel elevator controller has been designed to require as little routine maintenance as possible. In fact, mechanical interconnections are the least reliable portion of the solid-state system, so the less they are disturbed, the more likely the system is to continue to function properly.

The elevator itself, however, is a complex mechanical apparatus that requires routine preventive maintenance. This includes lubrication of various moving parts, and regular cleaning and inspection of door lock contacts, since exposed contacts are susceptible to dirt and corrosion. Doors themselves receive a lot of wear, since they often make two or three cycles at each floor. Rotating machinery, including belts and couplings, should be routinely inspected for wear.

If the elevator system develops intermittent problems, or fails to operate, refer to the Troubleshooting guide in Section 7 of this manual.

9.2 Replacement Parts List

9.2.1 Elevator Controls PC Boards

- | | |
|-------------------|--|
| a. P-MP | Pixel microprocessor board |
| b. PMP-IO | Pixel safeties input-output board |
| c. P-TOC | Pixel top of the car microprocessor board |
| d. P-COP | Pixel COP microprocessor board |
| e. P-HALL | Pixel hall node board |
| f. P-CN-EX | Pixel general purpose 16 IO expander board |
| g. PDB | Pixel power distribution board |
| h. P-Brake | Pixel Brake control board |

9.2.2 Relays

- | | |
|-----------------------|---|
| K10P-11A15-120 | Tyco Electronics
Two pole ice-cube 120 VAC coil |
| CA7-16-01 | Sprecher+Schuh
contactor 120 VAC coil |
| 199ABX-14 | Tyco YCO PRD-11AH0-120 2 POLE 20A
120VAC Coil, Power Relay (With DC
Blowout Magnet) |

9.2.3 Fuses

AGC ¼, 1, 2, 3, 5, 6,10, 15 AMP 250VOLT

MDA TYPE 3, 5, 10 & 15 AMP 250 VOLT

FRN-R 10, 20, 30, 60 AMP 250 VOLT (208 to 240 VAC power supply)

FNQ 5, 10, 15A 500 VOLT (440 to 480 VAC power supply)

9.2.4 Modules

Switching Power Supply Weidmuller Proeco, 24 VDC-5 Amps

Landa Sensor Head WCS3 Pepperel+Fuchs

CEDES APS Camera CEDES APS Camera System

9.2.5 Semiconductors

Bridge Rectifier	35A 1000V	MB3510 Motorola
Triac	16A 800V	BTA16-800CW3G ST
Triac Housing		TO220AB
Triac	4A 800V	T405-800T ST
Triac Housing		TO220AB

Appendix A1

L1000A Vector Drive for Induction Motors

A1 L1000 Elevator Drive Overview

The L1000A elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of induction and permanent magnet (PM) motor applications in geared and gearless elevator systems.

Review and become familiar with the manufacturer's L1000A Drive User Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A1.1 Drive Interface Overview

Pixel's interface to the L1000A drive requires the drive to operate in closed loop vector mode, i.e., the drive interface must include an encoder attached to the motor for speed feedback. The job prints Page 1 describe the interface to the drive which consists of following basic drive inputs:

- a. Hardware disable and Transistor Base Block enable inputs
- b. RS422 Communications channel
- c. Power inputs to terminals R/L1, S/L2 and T/L3
- d. Encoder inputs
- e. Motor Regeneration Circuits

The basic drive outputs are:

- a. 3-Phase output power to the motor through the contactor
- b. Fault output (drops fault relay if a fault condition is detected)
- c. Drive Run output (enables brake)



WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CARE to prevent injury.

A1.2 Job Parameters Verification

Select the Modified Constants menu in the Drive Interface to verify that the parameter list – provided on page QR7/ DPS of the job prints – agrees with actual drive programmed parameters.

The Modified Constants menu allows scrolling only through the list of parameters that have been modified from the Drive's default settings. This provides a simple way to view and verify required job-specific parameters.

Page QR7/ DPS of the job prints allocates three columns for parameter settings. The first column is the **Default Settings** value. The second column is the **EC Settings** list of starting values that have been programmed in the drive. The third column is the **Field Settings** which the adjustor must enter as final parameter adjustment values.



NOTE: While performing a job startup, make sure parameters programmed agree with the **EC Setting** column. If replacing the drive, make sure parameters agree with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7/ DPS of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

A1.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance. Ideally, Autotuning is performed with the motor disconnected from the load, a procedure called rotational Autotuning. When this is not possible, a stationary Autotuning procedure can be done instead.

A1.3.1 Preset Pixel Interface for Autotuning

Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. **Enable SAFE DISABLE hardware inputs on terminals H1 and H2.**
Bridge H1 and H2 terminals to HC using the shunt provided in the drive terminal strip.
- b. **Disable transistor base block input terminal S8.** Temporarily reprogram the H1-08 base block parameter from 9 to F, terminal not used.
- c. **Lower the Drive Speed Control Loop Proportional Gain.** Temporarily reprogram the drive C5-01 and C5-19 Speed Control Loop Proportional Gains from 15.00 to 3.00.

A1.3.2 Motor Autotuning

The Drive provides a dedicated menu to perform the motor Autotuning. This menu allows scrolling through only the parameters required to perform motor Autotuning. Keypad instructions are also provided for selecting the Autotuning method.

Select the Autotuning menu to start Autotuning process.

- a. Select the Autotuning method to be used
 - For Rotational, set T1-01= 00
 - For Stationary, set T1-01= 04
- b. Enter all motor parameters when prompted by the drive interface.
- c. When prompted, press the Run Key to start the tuning process. The motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed.



NOTE: Using an Ohmmeter, confirm that manual activation has caused motor contactor contacts to close. Some large contactors do not close when pressed from the front and must be activated using the contactor bar on the side to make them close.

- d. Press the Run key while holding the motor contactor closed until the drive indicates that the Autotuning process has been completed.
- e. If the drive displays an **Autotuning Successful** message, the process is complete, and you may skip to step g below.
- f. If the drive displays an Autotuning error, refer to the section of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.

A1.3.3 Reset Pixel Interface following Autotuning

- a. Remove the shunt previously placed to bridge H1 and H2 terminals to HC.
- b. Enable transistor base block input terminal S8 by reprogramming the H1-08 parameter to 9.
- c. Set the drive Speed Control Loop Proportional Gains in parameter C5-01 and C5-02 back to 15.00.

A1.4 Motor Rotation Verification

Pixel and the Drive need to be in sync regarding motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, the following steps must be taken:

- a. Change drive parameter B1-14 from 0 to 1, or if already set to 1, to 0, in order to reverse the drive's three phase output power to reverse motor rotation.

- b. Run the car to verify that rotation command direction for Pixel and the drive agree. If no drive fault occurs, the process has been successfully completed.
- c. If a drive Encoder fault is triggered, change drive parameter F1-05 from 0 to 1, or if already set to 1, to 0, in order to reverse encoder feedback order.
- d. If other drive faults are triggered during Autotuning, refer to the Drive manual for fault troubleshooting guidance.

A1.5 Commanded vs. Measured Speed Calibration


Pixel commanded speed needs to agree with actual elevator cab speed, during initial installation and prior to installing Landa a handheld tachometer must be used to measure speed, once Landa has been installed the cab speed is displayed as the measured speed value, both Commanded and Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

 Home 

 Troubleshoot 

 Drive 

 **Drive Performance Data** 

 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Measure/ observe and write down value of Measured Speed, while measuring/ observing speed allow for the speed to stabilize before taking measurement, if on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic mode have the car perform as long a possible multi floor run
- b. Obtain parameter values E1-04 and E1-06 from the drive unit.
- c. If the car is running below the commanded speed and E1-04 and E1-06 are set to 60 Hz, call Elevator Controls with data findings for guidance.
- d. If car is running above commanded speed lower the value of E1-04 and E1-06 proportional to the change of speed desired, example:
 - i. Car contract speed is 300 ft/ min
 - ii. Car measured speed is 320 ft/ min
 - iii. Parameters E1-04 and E1-06 are set to 60

- iv. Calculate new value for E1-04 & E1-06, $(60 \times 300) / 320 = 56.2$
- e. Program E1-04 and E1-06 new value of 56.2 and repeat process, if necessary, until speed agrees within 1% accuracy.

A1.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel commanded speed this is achieved by adjusting the “Drive Gains” thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are three sets of Gain parameters utilized by the drive unit to best control motor performance, each set affects the control performance at different stages of the motor run as follows:

- a. C5-01, speed control proportional gain, and C5-02, speed control integral gain, this set affects the performance of the car through the entire run, increment or decrement both values together for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance throughout all run performance.
- b. C5-19, speed control proportional gain at position lock-stop, and C5-20, speed control integral gain at position lock-stop, this set affects the performance of the car as the speed commanded reaches zero speed command, increment or decrement both values together for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance while commanding zero speed and final stop.
- c. S3-01 proportional gain, position lock gain, at start, S3-02 Anti-rollback control gain at position start, S3-03 position lock gain at stop these gain parameters add their value to the C5-19 and C5-20 values for a period of time programmed in S1-04 and S1-05 position lock timeout periods, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance at the start and stop of each run.



NOTE: While manipulating gain parameter settings it must be observed that while incrementing values vibration and performance instability are not generated, and while decrementing that rollback and floor overshoots do not occur due to lack of control.

Gain manipulation should start with C5-01 and C5-02 by incrementing or decrementing EC setting values with increments of 10% for more control and accuracy throughout the entire run, and then fine tune as needed with other 2 sets of gains to obtain desired performance while maintaining ride stability and comfort.



NOTE: Larger gain values equal more control and may lead to vibration and ride discomfort, while lower gain values equal less control and, in most cases, softer ride and rollbacks on takeoff and overshoots on stops.

A1.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a frequency larger than the hoist motor base input frequency to create an overspeed condition by manipulating parameters E1-04 and E1-06, Maximum Output Frequency.

To overspeed the car to 125% of contract speed perform following steps:

- a. Set TEST switch, located on the MP board, to TEST which will enable Test Mode operation, and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Multiply the value in E-04 by 1.25, and program the result into both E1-04 and E1-06.
- d. Enter a car call for an intermediate landing.
- e. Car will overspeed to 125% of contact speed.



WARNING: When performing an overspeed test, **MAKE SURE E1-04 and E1-06 PARAMETERS ARE RESET to the original values when testing is completed.**

A1.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Program drive parameter H2-01 to 6, Drive Ready Output. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN **relay** coil power supply circuit.
- b. Once the test has been completed, reset drive parameter H2-01 to 50, Brake Control.

Appendix A2

L1000A Vector Drive for PM Motors

A2 L1000 Elevator Drive Overview

The L1000A elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of induction and permanent magnet (PM) motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's L1000A Drive User Manual (the Drive Manual). Pay attention to all safety precautions. This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A2.1 Drive Interface Overview

Pixel's interface to the L1000A drive requires the drive to operate in closed loop vector mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware disable and Transistor Base Block enable inputs
- b. RS422 Communications channel
- c. Power inputs to terminals R/L1, S/L2 and T/L3
- d. Encoder inputs
- e. Motor Regeneration Circuits

The basic drive outputs are:

- a. 3-Phase output power to the motor through the contactor
- b. Fault output (drops fault relay if a fault condition is detected)
- c. Brake Control output (enables brake)




WARNING: Power capacitors in the drive **REMAIN CHARGED** for some time after power is removed. **USE CAUTION** to prevent injury.


A2.2 Job Parameters Verification

Select the Modified Constants menu in the Drive Interface to verify that the parameter list – provided on page QR7/ DPS of the job prints – matches with actual drive programmed parameters.

The Modified Constants menu displays only the list parameters that have been modified from the Drive manufactures default settings. This menu provides a simple method to view and verify required job-specific parameters.

Page QR7/ DPS of the job prints allocates three columns for parameter settings. The first column is the manufactures **Default Settings**. The second column is the **EC Settings** of starting values that have been programmed in the drive. The third column is the **Field Settings**, which the adjustor must enter as the final parameter values.

 **NOTE:** While performing the installation startup, make sure parameters programmed match with the **EC Setting** column. If replacing the drive, make sure parameters match with the **EC Settings** and **Field Settings** columns.

 **NOTE:** Do not change any parameters except those found on Page QR7/ DPS of the job prints. Other parameters are either not used for your application or are pre-programmed by EC to default settings.

A2.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance. Ideally, Autotuning is performed with the motor disconnected from the load, a procedure called rotational Autotuning. When this is not possible, a stationary Autotuning procedure can be performed in lieu of rotational Autotuning (**Not recommended use as last resort only**).

A2.3.1 Preset Pixel Interface for Autotuning

Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. **Enable SAFE DISABLE hardware inputs on terminals H1 and H2.** Temporarily bridge H1 and H2 terminals to HC using the shunt provided in the drive terminal strip.
- b. **Disable transistor Base Block input terminal S8.** Temporarily reprogram the drive H1-08 Base Block parameter from 9 to F, terminal not used.
- c. **Lower the Drive Speed Control Loop Proportional Gain.** Temporarily reprogram the drive C5-01 and C5-19 Speed Control Loop Proportional Gains from 15.00 to 3.00.

A2.3.2 Motor Autotuning

The Drive provides a dedicated menu to perform the motor Autotuning. This menu provides editing ability for the parameters required to perform motor Autotuning. Drive keypad instructions are also provided for selecting the Autotuning method. Permanent Magnet motors require a three or four step Autotuning procedure depending on whether rotational Autotuning is performed (4 steps) or non-rotational Autotuning is performed (3 steps).



NOTE: If the drive displays an Autotuning error, refer to the section of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.

1. Autotuning – Motor Data Input:

- a. To begin the Autotuning Input Motor Data process, set Autotuning parameter T2-01 to 1 then press enter. The drive keypad will display “Entry Accepted”.
- b. Using the keypad Up Arrow button, enter the motor parameters when prompted until the drive keypad displays a prompt to Press the Run Key to begin the Autotuning process. The motor parameters are shown on page QR7/ DPS of the job prints. Refer to drive parameters E5-02 (motor kW), E1-05 (motor voltage), E5-03 (motor full load amps), E5-04 (number of motor poles) and F1-05 (encoder pulses per revolution) for programming the motor data.



NOTE: Most often the motor data tag on PM motors depicts the maximum output capability of the motor and this data most often **IS NOT** the correct motor data required to operate the elevator system. For this reason, refer to the motor parameters on page QR7/ DPS of the job prints for inputting the motor data into the drive.

- c. Prior to pressing the drive keypad Run Key, the motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed (Tune Successful).



NOTE: Using an Ohmmeter, confirm that manual activation of the motor contactor causes motor contactor contacts to close. Some large contactors do not close when pressed from the front and must be activated using the contactor bar on the side to make them close.



WARNING: In the event the motor contactor opens during an Autotuning process, the motor contactor may sustain permanent damage.

- d. Once the motor contactor has been manually activated, press the drive keypad's Run Key to start the Autotuning process.
- e. Once the drive Keypad indicates the Autotuning process has been completed, the motor contactor can be released.

2. Autotuning – Initial Magnet Pole Search:

- a. To begin the Autotuning Initial Magnet Pole Search process, set Autotuning parameter T2-01 to 3 then press enter. The drive Keypad will display "Entry Accepted".
- b. Press the keypad Up Arrow button, the drive keypad displays a prompt to Press the Run Key to begin the Autotuning process.
- c. Prior to pressing the drive keypad Run Key, the motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed.
- d. Once the motor contactor has been manually activated, press the drive keypad's Run Key to start the Autotuning process.
- e. Once the drive Keypad indicates the Autotuning process has been completed (Tune Successful), the motor contactor can be released.

3. Autotuning – Rotational Encoder Offset:



NOTE: This is the preferred Autotuning method to be used when the motor is un-roped and can rotate freely. If the motor is roped, skip this step and proceed to step 4 below.

- a. Prior to initiating a rotation Auto-tune, temporarily change the Brake Control drive parameter to Drive Ready by changing parameter H2-01 from 50 (Brake Control) to 6 (Drive Ready).
- b. To begin the Autotuning Rotational Encoder Offset process, set Autotuning parameter T2-01 to 10 then press enter.
- c. Press the keypad Up Arrow button, the drive keypad displays a prompt to Press the Run Key to begin the Autotuning process.
- d. Prior to pressing the drive keypad Run Key, the motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed (Tune Successful).
- e. Once the motor contactor has been manually activated, press the drive keypad's Run Key to start the Autotuning process.

- f. Once the drive Keypad indicates the Autotuning process has been completed (Tune Successful), the motor contactor can be released.
- g. Next, perform a Rotational Back EMF Auto-tune by setting parameter T2-01 to 11.
- h. Press the keypad Up Arrow button, the drive keypad displays a prompt to Press the Run Key to begin the Autotuning process.
- i. Prior to pressing the drive keypad Run Key, the motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed.
- j. Once the motor contactor has been manually activated, press the drive keypad's Run Key to start the Autotuning process.
- k. Once the drive Keypad indicates the Autotuning process has been completed, the motor contactor can be released (Tune Successful).
- l. Modify drive parameter H2-01 back to 50 for Brake Control.

4. Autotuning – Non-Rotational Encoder Offset:



NOTE: Skip this step if the Rotational Autotuning procedure in step 3 has been performed. Use the following step if the motor is roped and a Rotational Auto-tune cannot be performed.

- a. To begin the Autotuning Non-Rotation Encoder Offset process, set Autotuning parameter T2-01 to 4 then press enter.
- b. Press the keypad Up Arrow button, the drive keypad displays a prompt to Press the Run Key to begin the Autotuning process.
- c. Prior to pressing the drive keypad Run Key, the motor contactor must be manually activated to allow the drive to connect to the motor and must be kept engaged until the drive indicates that the Autotuning process has been completed.
- d. Once the motor contactor has been manually activated, press the drive keypad's Run Key to start the Autotuning process.
- e. Once the drive Keypad indicates the Autotuning process has been completed (Tune Successful), the motor contactor can be released.

Once the car is running in the proper direction and operating smoothly, record learned Auto-tune drive parameters recorded in E5-05 through E5-24 on page QR7/ DPS of the job prints.

A2.3.3 Reset Pixel Interface following Autotuning

- Remove the shunt previously placed to bridge H1 and H2 terminals to HC.
- Enable transistor base block input terminal S8 by reprogramming the H1-08 parameter to 9.
- Set the drive Speed Control Loop Proportional Gains in parameter C5-01 and C5-02 back to 15.00.

A2.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, the following steps must be taken.



NOTE: In the event the parameters in this section require adjustment to achieve proper motor and encoder rotation, the Autotuning processes listed above must be repeated.

- Change drive parameter B1-14 from 0 to 1, or if already set to 1, to 0, in order to reverse the drive's three phase output power to reverse motor rotation.
- Run the car to verify that commanded direction for Pixel and the drive agree. If no drive fault occurs, no further adjustments are required.
- If a drive Encoder fault or Over Current fault is triggered, change drive parameter F1-05 from 0 to 1, or if already set to 1, to 0, in order to reverse encoder feedback order.

A2.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and the Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

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 Drive 

 Drive Performance Data 



NOTE: Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.
- b. Obtain parameter values E1-04 and E1-06 from the drive unit.
- c. If the car is running below commanded speed and E1-04 and E1-06 are set to the frequency listed on page QR7/ DPS on the job prints, contact Elevator Controls with data findings for guidance.
- d. If car is running above commanded speed lower the value of E1-04 and E1-06 proportional to the change of speed desired, example:
 - i. Car contract speed is 300 ft/ min
 - ii. Car measured speed is 320 ft/ min
 - iii. Parameters E1-04 and E1-06 are set to 22 Hz.
 - iv. Calculate the new value for E1-04 & E1-06 $(22\text{Hz.} \times 300\text{fpm}) / 320 \text{ fpm} = 20.63\text{Hz.}$
 - v. Program E1-04 and E1-06 new value of 20.63 and repeat process, if necessary, until car speed is accurate within 1%.


A2.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are three sets of Gain parameters utilized by the drive unit to best control motor performance. Each set affects the control performance at different stages of the motor control as follows:


- a. C5-01 (speed control proportional gain) and C5-02 (speed control integral gain) parameters affect the performance of the car throughout the entire run. Increment or decrement these parameters for tighter or looser motor response. Increments and decrements should be performed in increments no larger than 10% of the current value and should be evaluated for performance throughout the run.
- b. C5-19 (speed control proportional gain at position lock) and C5-20, (speed control integral gain at position lock) parameters affect the performance of the car when the commanded speed is zero (both start and stop). Increment or decrement both values for tighter or looser motor control. Increments and decrements should be performed in increments no larger

than 10% of the current value and should be evaluated for performance while commanding zero speed at start and final stop.

- c. S3-01 (position lock gain at start), S3-02 (anti-rollback control gain at start) and S3-03 (position lock gain at stop) parameters add their values to the C5-19 and C5-20 values for the period of time programmed in S1-04 (position lock time at start) and S1-05 (position lock time at stop). Increments and/or decrements should be performed in increments no larger than 10% of the current value and should be evaluated for performance at the start and stop of each run.

 **NOTE:** While manipulating drive gain parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive gain parameters, observe that rollback and floor overshooting does not occur due to lack of control.

Gain manipulation should start with C5-01 and C5-02 by incrementing or decrementing EC setting values with increments of 10% for more control and accuracy throughout the entire run, and then fine tune as needed with the other sets of gains to obtain desired performance while maintaining ride stability and comfort.

 **NOTE:** Larger gain values equate to tighter motor response but may lead to vibration and ride discomfort. Lower gain values equate to less motor response. Lower gain values can induce rollback on takeoff and overshooting on final floor approach.

A2.7 **Overspeed Using the Drive to Drive the Hoist Motor**

The drive unit can be configured to run the hoist motor at a frequency larger than the hoist motor base input frequency to create an overspeed condition by manipulating parameters E1-04 and E1-06, Maximum Output Frequency. To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Multiply the value in E-04 by 1.25, and program the result into both E1-04 and E1-06.
- d. Enter a car call for an intermediate landing.
- e. Car will overspeed to 125% of contract speed.



WARNING: When performing an overspeed test, **MAKE SURE E1-04 and E1-06 PARAMETERS ARE RESET** to the original values once testing has been completed.

A2.8 Brake Control Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive parameter H2-01 to 6 (Drive Ready). The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once the test has been completed, reset drive parameter H2-01 to 50 (Brake Control).

Appendix A4

HPV-900 Drive for PM Motors

A4 HPV-900 Elevator Drive Overview

The HPV-900 elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of AC motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's HPV-900 Drive User Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A4.1 Drive Interface Overview

Pixel's interface to the HPV-900 drive requires the drive to operate in closed loop mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware drive enable inputs and motor contactor closure confirmation.
- b. RS422 Communications channel
- c. Power inputs to terminals R/L1, S/L2 and T/L3
- d. Encoder inputs
- e. Optional thermistor motor temperature monitor, if motor equipped with thermal resistor unit.
- f. Motor Regeneration Circuits

The basic drive outputs are:

- a. 3-Phase output power to the motor through the contactor
- b. Drive Fault output (drops DSAF controller input if a fault condition is detected)
- c. Speed Reg. Rel. output to enable motor brake control circuits.
- d. Motor Contactor dry contact output (Contactor redundancy monitoring)





WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CAUTION to prevent injury.

A4.2 Job Parameters Verification

Use the Drive Interface to verify that the parameter list – provided on page QR7/DPS of the job prints – matches with actual drive programmed parameters.


Page QR7/ DPS of the job prints allocates three columns for parameter settings. The first column is the manufactures **Default Settings**. The second column is the **EC Settings** of starting values that have been programmed in the drive. The third column is the **Field Settings**, which the adjustor must enter as the final parameter values.


 **NOTE:** While performing the installation startup, make sure parameters programmed match with the **EC Setting** column. If replacing the drive, make sure parameters match with the **EC Settings** and **Field Settings** columns.

 **NOTE:** Do not change any parameters except those found on Page QR7/ DPS of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

A4.3 Autotuning

The motor Autotuning is divided into two processes Rotor Alignment and Autotune, both covered in detail in drive manual Appendix – PM Startup Procedure and Appendix – Autotune Procedure respectively. Rotor Alignment Procedure will allow the drive to determine the position of the motor permanent magnets in relation to the encoder position while the Auto Tune Procedure will allow it to determine the motor stator resistance and inductances. Rotor Alignment (U0 UTILITY, U10 ALIGNMENT) can be performed Rotational, Open Loop Alignment, preferred method, or Static, Auto Alignment, not recommended only if rotational is not possible, while Auto Tune (U0 UTILITY, U12 AUTOTUNE SEL) procedure is performed statically.

 **NOTE:** Rotor Alignment must be performed prior to Auto Tune procedure.

 **NOTE:** Follow Appendix- PM Startup Procedure and Appendix – Auto Tune directions to perform Autotuning, refer to page QR4/ HMW of the prints to identify encoder type for this job.

A4.3.1 Preset Pixel Interface for Autotuning

- a. Pixel controller must be set to Construction Mode operation, refer to section 3.3.11 Enable Construction Mode of Operation.
- b. Read though drive manual Appendix – PM Startup Procedure, Appendix – Auto Tune Procedure and drive manual insert.

- c. If possible, the hoist motor should be decoupled, for geared machines, or the traction ropes for gearless machines should be lifted to allow free motor rotation.
- d. Pixel controller should be capable of commanding Up or Down direction to the drive unit and to lift the brake(s).
- e. The machine brake and emergency brake (if applicable) must be operational.
- f. Verify Encoder installation and wiring.



NOTE: Skip steps g through i below for motor coupled encoder units, steps g through i apply only to **brake surface driven incremental encoder** units.

- g. Verify the Brake Surface Friction Driven Encoder and Hall Effect sensor mechanical installation and wiring follow the drive manual insert sections Mechanical Mounting Instructions.
- h. Verify the drives Encoder PPR in menu A1 matches the EC Setting listed on page QR7/DPS of the job prints.
- i. Verify drive parameter Z Edge Count within menu D1 increments each time the Hall Effect sensor passes over the motor rotor mounted target by mechanically lifting the brakes and manually rotating the motor. Make any necessary adjustments if necessary.

A4.3.2 Motor Autotuning

The Drive provides two dedicated menus to perform the motor Autotuning. Permanent Magnet motors require a two-step Autotuning procedure.



NOTE: If the drive displays an Autotuning error, refer to the section of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.

1. Autotuning – Rotor Alignment (Rotational):



NOTE: This is the preferred Autotuning method to be used when the motor is decoupled or un-roped and can rotate freely. If the motor is coupled or roped, skip this step and proceed to step 2 below.

- a. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
- b. Press the UP or DOWN arrow on the drive until the Alignment (U10) sub-menu is displayed.

- c. Press ENTER on the drive then the UP arrow until Alignment Method is selected.
- d. Press ENTER on the drive then set the Alignment Method to Open Loop, then press ENTER again.
- e. Press the DOWN arrow on the drive until Alignment is selected.
- f. Press ENTER on the drive then set Alignment to ENABLE, and then press ENTER again.
- g. Press the DOWN arrow on the drive until Begin Alignment is selected.
- h. Press ENTER on the drive then set Begin Alignment to ON RUN, then press ENTER again.
- i. Run the controller on Machine Room Inspection until the drive displays ALIGNMENT IS DONE.
- j. Press ENTER on the drive to return to the U10 sub menu.

2. Autotuning – Rotor Alignment (Non-Rotational):



NOTE: Skip this step if the Rotation Autotuning procedure in step 1 has been performed. Use the following steps if the motor is coupled or roped and a Rotational Autotune cannot be performed.

- a. Turn off power to the controller and remove a fuse to open the machine brake circuit (typically the fuse labeled FB1, refer to job prints).
- b. Apply power to the controller. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
- c. Press the UP or DOWN arrow on the drive until the Alignment (U10) sub-menu is displayed.
- d. Press ENTER on the drive then the UP arrow until Alignment Method is selected.
- e. Press ENTER on the drive then set the Alignment Method to Auto Align, then press ENTER again.
- f. Press the DOWN arrow on the drive until Alignment is selected.
- g. Press ENTER on the drive then set Alignment to ENABLE, and then press ENTER again.
- h. Press the DOWN arrow on the drive until Begin Alignment is selected.
- i. Press ENTER on the drive then set Begin Alignment to ON RUN, then press ENTER again.
- j. Run the controller on Machine Room Inspection until the drive displays ALIGNMENT IS DONE.
- k. Press ENTER on the drive to return to the U10 sub menu.

- l. Turn off the power to the controller and reinstall the machine brake circuit fuse.
- m. Apply power to the controller.
- n. Verify that the motor can be commanded to run Up or down and that speed matches commanded speed; refer to section A4.4 below to reverse motor rotation if required.

3. Autotuning Motor Resistance and Inductance (Non-Rotational):

- a. Turn off power to the controller and remove a fuse to open the machine brake circuit (typically the fuses labeled FB1 and FB2, refer to Page 2 of prints).
- b. Apply power to the controller. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
- c. Press the UP or DOWN arrow on the drive until the AUTOTUNE (U12) sub-menu is displayed.
- d. Press ENTER on the drive then set the Autotune Select to ON RUN, then press ENTER again.
- e. Run the controller on Machine Room Inspection until the drive displays AUTOTUNE IS DONE.
- f. Press ENTER on the drive to return to the U10 sub menu.
- g. Turn off the power to the controller and reinstall the machine brake circuit fuse.
- h. Apply power to the controller.

A4.3.3 Reset Pixel Interface following Autotuning

Once the above Autotuning procedures have been completed successfully, the hoist ropes can be reapplied to the traction machine or the motor can be coupled to the machine in the event they were previously removed or decoupled.



A4.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, reverse the Motor Rotation in the drives C1 menu.

A4.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and


the Measured speed values can be viewed in the Drive Performance Data window, which can be accessed navigating to:

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 Drive 

 **Drive Performance Data** 

 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.
- b. Obtain the Contract MTR SPD parameter value from menu A1 in the drive unit.
- c. If the car is running below commanded speed and the Contract MTR SPD (A1 menu) is set as listed on page QR7/ DPS on the job prints, contact Elevator Controls with data findings for guidance.
- d. If car is running above commanded speed lower the Contract MTR SPD (A1 menu) value proportional to the change of speed desired, example:
 - v. Car contract speed is 150 ft/ min
 - vi. Car measured speed is 170 ft/ min
 - vii. Contract MTR SPD (A1 menu) is set to 121rpm.
 - viii. Calculate the new value for the Contract MTR SPD (A1 menu) $(121\text{rpm} \times 150\text{fpm}) / 170\text{fpm} = 106.7\text{rpm}$.
 - ix. Program Contract MTR SPD (A1 menu) to the new value of 106.7rpm and repeat process if necessary, until car speed is accurate within 1%.

A4.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort.

A4.6.1 Verify Proper Counterbalance

With a balanced load in the cab, run the elevator up and down at contract speed while observing the Motor Torque within drive menu D2. If the value displayed is larger than 15%, the system is not balanced correctly. Make any necessary adjustments to correct the system counterbalance.

A4.6.2 System Inertia Calculations

The drive software can calculate the inertia for the elevator system, which is used accurately for tuning of the drives speed regulation. The following procedure can be used to estimate the elevator system inertia:

- a. With a balanced load in the elevator cab, run the car at 100% contract speed from the top floor to the bottom floor then back to the top floor while observing the drives EST INERTIA parameter in the D1 menu.
- b. Make notes of the EST INERTIA value in the drives D1 menu for both the up and down directions.
- c. Average the up and down EST INERTIA values in the drives D1 menu and enter this value in the drives INERTIA parameter in the A1 menu.

A4.6.3 Motor Response Adjustment

The drive response sets the sensitivity of the drive's speed regular software to follow the speed profile reference. The response needs to be adjusted to achieve optimum motor control while maintaining stability. If the motor control is sluggish in responding to the controller's speed command increase the RESPONSE parameter in the drive's A1 menu. If the motor current and speed become unstable, reduce the RESPONSE parameter value.



NOTE: While manipulating drive gain parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive gain parameters, observe that rollback and floor overshooting does not occur due to lack of control.

A4.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a higher rpm than the hoist motor rpm to create an overspeed condition by manipulating drive parameter OVERSPEED MULT (overspeed percentage) in the drive's A1 menu and parameter OVERSPEED TEST in the drives U4 menu.

To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.

- c. Set the value in drive parameter OVERSPEED MULT in menu A1 for the percentage the car is desired to overspeed.
- d. Set the value in drive parameter OVERSPEED TEST in menu U4 to YES.
- e. Enter a car call for an intermediate landing.
- f. The car will overspeed to the percentage of contact speed programmed in drive parameter OVERSPEED MULT in menu A1.
- g. If additional overspeed tests are required, the OVERSPEED TEST parameter in menu U4 will have to be programmed to YES for each subsequent test.
- h. Once the overspeed tests have been completed, confirm that the drive parameter OVERSPEED TEST in menu U4 is programmed to NO.

A4.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive parameter Relay Coil 2 from SPD REG RLS to NOT ALARM in menu C3. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once the test has been completed, reset drive parameter Relay Coil 2 from NOT ALARM to SPD REG RLS in menu C3.

Appendix A6

KEB Combivert F5 Drive for PM Motors

A6 Combivert F5 AC Elevator Drive Overview

The Combivert F5 AC elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of AC motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's Combivert F5 AC Drive User Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A6.1 Drive Interface Overview

Pixel's interface to the Combivert F5 AC drive requires the drive to operate in closed loop mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware drive enable input.
- b. RS422 Communications channel
- c. Power inputs to terminals L1, L2 and L3 or through PB and ++ terminals for line regenerative drives
- d. Encoder inputs
- e. Motor Regeneration Circuits

The basic drive outputs are:


- a. 3-Phase output power to the motor through AA motor contactor
- b. Drive Ready output (drops fault relay if a fault condition is detected)
- c. Brake Control output (enables brake)




WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CAUTION to prevent injury.

A6.2 Job Parameters Verification


Use the Drive Interface to verify that the parameter list – provided on page QR7 of the job prints – matches with actual drive programmed parameters.


 **NOTE:** While performing the installation startup, make sure parameters programmed match with the **User Setting** column. If replacing the drive, make sure parameters match with the **User Settings** column.

 **NOTE:** Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

A6.3 Autotuning

The motor Autotuning is divided into three processes Auto-Tuning PM motors, Stationary Pole Identification (SPI) and Absolute Encoder Setup (no ropes), all covered in detail in drive manual Initial Start-up Section.

 **NOTE:** Auto-Tuning PM motors must be performed prior Stationary Pole Identification (SPI) which must be performed prior to Absolute Encoder Setup (no ropes) procedure.

 **NOTE:** Follow Initial Start Up section in the manual to perform Autotuning, refer to page QR4 of the prints to identify encoder type for this job.

A6.3.1 Preset Pixel Interface for Autotuning

- a. Pixel controller must be set to Construction Mode operation, refer to section 3.3.11 Enable Construction Mode of Operation.
- b. Read through drive manual Start-up Section, Running the Motor sub-section.
- c. Pixel controller should be capable of commanding Up or Down direction to the drive unit and to lift the brake(s) in Controller Inspection Mode operation.
- d. The machine brake and emergency brake (if applicable) must be operational.
- e. Verify Encoder installation and wiring.
- f. Set drive gain parameters A.LF.31 = D.LF.31 = P.LF.31 = 300, A.LF.32 = D.LF.32 = P.LF.32 = 50, and A.LF.33 = D.LF.3 = Off

A6.3.2 Motor Autotuning

Permanent Magnet motors require a twostep Autotuning procedure; The Drive provides dedicated settings for LF.3 parameter to perform these procedures.



NOTE: If the drive displays an Autotuning error, refer to the section of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.

1. Auto-Tuning PM motors



NOTE: The Auto-Tuning PM Motors function allows the drive to measure the resistance and inductance of the hoist motor under the brake without sheave movement.

- a. Turn off power to the controller and remove fuses to open the machine brake circuit (typically the fuses labeled FB1 and FB2, refer to Page 2 of prints).
- b. Apply power to the controller. Set Parameter LF.3 = S Lrn and observe the Drive display to change to StArt.
- c. Set Inspection Speed, in Pixel's Speed Profile parameters, to 000fpm.
- d. Command and hold controller Inspection UP, the motor sheave should not turn, and the Drive will display values being measured.
- e. Once complete, donE will be displayed on the Drive. Release the Inspection Up command, the Drive will display CALC while updating parameters with measured values.
- f. Continue with Pole Identification process below.

2. Pole Identification

Encoder position in relation to the motor permanent magnet poles needs to be determined by the drive by one of the following two methods, with Absolute Encoder Setup (no ropes) being most accurate recommended if motor could be decoupled, for geared machine, or ropes can be lifted from gearless machine or if Stationary Pole Identification (SPI) is not successful.

2.1 Stationary Pole Identification (SPI)



NOTE: The Stationary Pole Identification SPI function allows the drive to learn the absolute encoder position for a PM machine under the brake without sheave movement.

- a. Verify the correct encoder feedback card is installed in the drive. See parameter 0.LF.26. Enter the encoder PPR in parameter LF.27. Make sure LF.28 = 0 and the sample time, LF.29 = 4 (4mSec.)
- b. Set Inspection Speed, in Pixel's Speed Profile parameters, to 000fpm
- c. Set Parameter LF.3 =SPI and observe the Drive display to change to StArt.

- d. Command and hold controller Inspection UP, the motor sheave should not turn, and the drive display will show position values of the encoder.
- e. Once complete, donE will be displayed on the Drive. Release the Inspection Up command and make note of the final position number in drive parameter LF.77.



NOTE: This position number is valid only for this motor and encoder. If the encoder is physically removed from the motor, this process will need to be done again.

- f. Turn off power to the controller and install the machine brake circuit fuses (typically the fuses labeled FB1 and FB2, refer to Page 2 of prints).
- g. Verify encoder position is correct by running the car and monitoring the current drive parameter LF.93. If the current is excessive, the encoder rotation may be incorrect. In this case change LF.28 from a value of 0 to 1 or from 1 to 0, else from 2 to 3 or from 3 to 2 and repeat the Stationary Pole Identification SPI process.

2.2 Absolute Encoder Setup (no ropes)



NOTE: The Absolute Encoder Setup (no ropes) allows the Drive to align the absolute encoder to the permanent magnet motor poles. The motor must be decoupled for a geared machine or the ropes must be lifted for a gearless machine and be able to spin freely.

- a. Verify the correct encoder feedback card is installed in the drive. See parameter 0.LF.26. Enter the encoder PPR in parameter LF.27. Make sure LF.28 = 0 and the sample time, LF.29 = 4 (4mSec.)
- b. Set Inspection Speed, in Pixel's Speed Profile parameters, to 000fpm.
- c. Set Parameter LF.3 =P Lrn and observe the Drive display to change to StArt.
- d. Command and hold controller Inspection UP. Motor current will begin to flow in one phase and the current will ramp up to the motor's rated value. The motor sheave should turn slowly and then stop when the motor rotor has lined up with one of the motor poles. The display should show the actual position value of the encoder as the motor moves this value will change. When the motor rotor has aligned with a pole, the value will stabilize. At this point, the alignment has been found. Continue holding the inspection switch as the drive will then try to move the motor clockwise and counterclockwise to verify the motor's rotation is consistent with the encoder's rotation.

If the motor keeps rotating for more than 30 seconds, the phasing between the encoder and the motor is not correct. Verify the motor

connection U to U, V to V, etc. and make sure LF.28 = 0. Go back to step c above.

If the drive triggers the error E.ENC1, the encoder's counting maybe backwards. Release the inspection switch. The drive will then automatically swap the encoder channels by changing the value of LF.28 and then display retry. Go back to step c above.

If the drive displays E.ENC1 again the motor is not able to rotate freely. Release the inspection switch and verify the brake is opening completely and that there is not excessive friction. The sheave should be able to turn by hand. Verify the motor phasing U to U, V to V etc. and make sure LF.28 = 0. Go back to step c above.

- e. Once complete, donE will be displayed on the Drive. Release the Inspection Up command and make note of the final position number in drive parameter LF.77.



NOTE: This position number is valid only for this motor and encoder. If the encoder is physically removed from the motor, this process will need to be done again.

A6.3.3 Reset Pixel Interface following Autotuning

Once the above Autotuning procedures have been completed successfully follow steps below to enable Pixel to run the car.

- a. Set drive gain parameters A.LF.31, D.LF.31, P.LF.31, A.LF.32, D.LF.32, P.LF.32, A.LF.33, and D.LF.3 per page QR7 of the job prints.
- b. Set Drive Parameter LF.3 to Run.
- c. Hoist ropes can be reapplied to the traction machine or the motor can be coupled to the machine in the event they were previously removed or decoupled.
- d. Set Inspection Speed, in Pixel's Speed Profile parameters, to comfortable construction speed setting, typically 040fpm.

A6.4 Motor Rotation Verification

To determine whether the encoder is aligned with the motor, run the car on inspection in both the up and down direction. If the motor turns out of control, at the wrong speed or the current going to the motor (see LF.93) is greater than the motor FLA, the encoder is reversed. This can be corrected by adjusting parameter LF.28 from 0 to 1.

Run the car again in both the up and down direction. The motor should now be running in a controlled manner but possibly in the wrong direction, meaning

inspection up drives the car down or inspection down drives the car up. Parameter LF.28 can also be used to correct this. If LF.28 = 0 then change the value to 2. If LF.28 = 1 then change the value to 3. Now the motor should be controlled and run in the correct direction.

A6.5 Commanded vs. Measured Speed Calibration


Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and the measured speed values can be viewed in the Drive Performance Data window, which can be accessed navigating to:

 Home 

 Troubleshoot 


 Drive 

 Drive Performance Data 

 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Verify the Rated Motor Speed LF.11, Contract Speed LF.20, Traction Sheave Diameter LF.21, and Gear Reduction Ratio LF.22 are set to job required values.
- b. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.

-  **NOTE:** Measured vs. commanded speed should be within 10% or the motor data, traction sheave diameter and contract speed parameters are in conflict, contact Elevator Controls with all this information for guidance.
- c. If the car is running slightly above commanded speed increase the value of LF.21 parameter if slightly running below commanded speed decrease value and repeat measurements and process as needed calibrate speed.

A6.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort.

A6.6.1 Verify Proper Counterbalance

With a balanced load in the cab, run the elevator up and down at contract speed while observing the Motor Torque within drive in parameter ru.17. If the value displayed is larger than 5%, the system is not balanced correctly. Make any necessary adjustments to correct the system counterbalance by adding or removing weight from the counterweight.

A6.6.2 Motor Response Adjustment

The drive response sets the sensitivity of the drive's speed regular to follow the speed profile reference. The response needs to be adjusted to achieve optimum motor control while maintaining stability. If the motor control is sluggish in responding to the controller's speed command increase the gain parameters. If the motor current and speed become unstable, reduce the gain parameters value. Refer to drive manual Initial Start Up section, Speed Gain Adjustment sub-section for gain parameter manipulation guidance.



NOTE: While manipulating drive gain parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive gain parameters, observe that rollback and floor overshooting does not occur due to lack of control.

A6.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a higher rpm than the hoist motor rpm to create an overspeed condition by manipulating drive parameter LF.22, Gear Reduction Ratio.

To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Set the value of LF.22 to 1.25 of its current setting, i.e. if 1 to 1.25.
- d. Enter a car call for an intermediate landing.
- e. The car will overspeed to 125% of contact speed.
- f. Set the value of LF.22 to its original setting.

A6.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive parameter do.83, Output Relay 2, from brC BRAKE CONTROL, to Rdy, Ready. Verify the RUN relay energizes if the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once the test has been completed, reset drive parameter do.83 to brC, BRAKE CONTROL.

Appendix A8

Quattro AC Drive for PM Motors

A8 Quattro AC Elevator Drive Overview

The Quattro AC elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of AC motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's Quattro AC Drive User Manual (the Drive Manual). Pay attention to all safety precautions. This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A8.1 Drive Interface Overview

Pixel's interface to the Quattro AC drive requires the drive to operate in closed loop mode – i.e. the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- f. Hardware drive enable inputs and safety logic power.
- g. RS422 Communications channel
- h. Power inputs to terminals R, S and T
- i. Drive Logic Power to Terminals F1 and F2
- j. Encoder inputs
- k. Motor Regeneration Circuits

The basic drive outputs are:

- e. 3-Phase output power to the motor through the ME drive contactor
- f. Drive Fault output (drops DSAF controller input if a fault condition is detected)
- g. Speed Reg. Rel., Brake Pick, output to enable motor brake control circuits.
- h. ME Motor Contactor dry contact for contactor performance monitoring



WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CAUTION to prevent injury.

A8.2 Job Parameters Verification

Use the Drive Interface to verify that the parameter list – provided on page QR7 of the job prints – matches with actual drive programmed parameters.

Page QR7 of the job prints allocates three columns for parameter settings. The first column is the manufactures **Default Settings**. The second column is the **EC Settings** of starting values that have been programmed in the drive. The third column is the **Field Settings**, which the adjustor must enter as the final parameter values.



NOTE: While performing the installation startup, make sure parameters programmed match with the **EC Setting** column. If replacing the drive, make sure parameters match with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your application or are pre-programmed by EC to default settings.

A8.3 Autotuning

The motor Autotuning is divided into two processes Rotor Alignment and Autotune, both covered in detail in drive manual Appendix – PM Startup Procedure and Appendix – Autotune Procedure respectively. Rotor Alignment Procedure will allow the drive to determine the position of the motor permanent magnets in relation to the encoder position while the Auto Tune Procedure will allow it to determine the motor stator resistance and inductances. Rotor Alignment (U0 UTILITY, U10 ALIGNMENT) can be performed Rotational, Open Loop Alignment, preferred method, or Static, Auto Alignment, recommended only if rotational is not possible, while Auto Tune (U0 UTILITY, U12 AUTOTUNE SEL) procedure is performed statically.



NOTE: Rotor Alignment must be performed prior to Auto Tune procedure



NOTE: Follow Appendix- PM Startup Procedure and Appendix – Auto Tune directions to perform Autotuning, refer to page QR4 of the prints to identify encoder type for this job.

A8.3.1 Preset Pixel Interface for Autotuning


Pixel controller must be set to Construction Mode operation, refer to section 3.3.11 Enable Construction Mode of Operation.

- e. Read though drive manual Appendix – PM Startup Procedure, Appendix – Rotor Alignment, and Appendix – Auto Tune.


- f. If possible, the hoist motor should be decoupled, for geared machines, or the traction ropes for gearless machines should be lifted to allow free motor rotation.
- g. Pixel controller should be capable of commanding Up or Down direction to the drive unit and to lift the brake(s).
- h. The machine brake and emergency brake (if applicable) must be operational.
- i. Verify Encoder installation and wiring.

A8.3.2 Motor Autotuning

The Drive provides two dedicated menus to perform the motor Autotuning. Permanent Magnet motors require a two-step Autotuning procedure.

 **NOTE:** If the drive displays an Autotuning error, refer to the section of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.

1. Autotuning – Rotor Alignment (Rotational):

-  **NOTE:** This is the preferred Autotuning method to be used when the motor is decoupled or un-roped and can rotate freely. If the motor is coupled or roped, skip this step and proceed to step 2 below.
- h. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
 - i. Press the UP or DOWN arrow on the drive until the Alignment (U10) sub-menu is displayed.
 - j. Press ENTER on the drive then the UP arrow until Alignment Method is selected.
 - k. Press ENTER on the drive then set the Alignment Method to Open Loop, then press ENTER again.
 - l. Press the DOWN arrow on the drive until Alignment is selected.
 - m. Press ENTER on the drive then set Alignment to ENABLE, and then press ENTER again.
 - n. Press the DOWN arrow on the drive until Begin Alignment is selected.
 - o. Press ENTER on the drive then set Begin Alignment to ON RUN, then press ENTER again.
 - p. Run the controller on Machine Room Inspection until the drive displays ALIGNMENT IS DONE.
 - q. Press ENTER on the drive to return to the U10 sub menu.

2. Autotuning – Rotor Alignment (Non-Rotational):



NOTE: Skip this step if the Rotation Autotuning procedure in step 1 has been performed. Use the following steps if the motor is coupled or roped and a Rotational Autotune cannot be performed.

- f. Turn off power to the controller and remove a fuse to open the machine brake circuit (typically the fuses labeled FB1 and FB2, refer to job prints).
- g. Apply power to the controller. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
- h. Press the UP or DOWN arrow on the drive until the Alignment (U10) sub-menu is displayed.
- i. Press ENTER on the drive then the UP arrow until Alignment Method is selected.
- j. Press ENTER on the drive then set the Alignment Method to Auto Align, then press ENTER again.
- k. Press the DOWN arrow on the drive until Alignment is selected.
- l. Press ENTER on the drive then set Alignment to ENABLE, and then press ENTER again.
- h. Press the DOWN arrow on the drive until Begin Alignment is selected.
- i. Press ENTER on the drive then set Begin Alignment to ON RUN, then press ENTER again.
- j. Run the controller on Machine Room Inspection until the drive displays ALIGNMENT IS DONE.
- k. Press ENTER on the drive to return to the U10 sub menu.
- l. Proceed to perform Autotuning Motor Resistance and Inductance below.

3. Autotuning Motor Resistance and Inductance (Non-Rotational):

- a. Turn off power to the controller and remove a fuse to open the machine brake circuit (typically the fuses labeled FB1 and FB2, refer to Page 2 of prints).
- b. Apply power to the controller. Press the RIGHT or LEFT arrows on the drive until the U0 Utility menu is displayed.
- c. Press the UP or DOWN arrow on the drive until the AUTOTUNE (U12) sub-menu is displayed.
- d. Press ENTER on the drive then set the Autotune Select to ON RUN, then press ENTER again.
- e. Run the controller on Machine Room Inspection until the drive displays AUTOTUNE IS DONE.
- f. Press ENTER on the drive to return to the U10 sub menu.

- g. Turn off power to the controller and reinstall the machine brake circuit fuse.
- h. Apply power to the controller.

A8.3.3 Reset Pixel Interface following Autotuning

Once the above Autotuning procedures have been completed successfully, the hoist ropes can be reapplied to the traction machine or the motor can be coupled to the machine in the event they were previously removed or decoupled.

A8.4 Motor Rotation Verification

Pixel and the Drive need to be in sync regarding motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, reverse the Motor Rotation in the drives C1 menu.

A8.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and the Measured speed values can be viewed in the Drive Performance Data window, which can be accessed navigating to:

 Home 

 Troubleshoot 

 Drive 

 **Drive Performance Data** 



NOTE: Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- d. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.
- e. Obtain the Contract MTR SPD parameter value from menu A1 in the drive unit.

- f. If car is running below commanded speed and the Contract MTR SPD (A1 menu) is set as listed on page QR7 on the job prints, contact Elevator Controls with data findings for guidance.
- g. If car is running above commanded speed lower the Contract MTR SPD (A1 menu) value proportional to the change of speed desired, example:
 - x. Car contract speed is 150 ft/ min
 - xi. Car measured speed is 170 ft/ min
 - xii. Contract MTR SPD (A1 menu) is set to 121rpm.
 - xiii. Calculate the new value for the Contract MTR SPD (A1 menu) $(121 \text{ rpm} \times 150 \text{ fpm}) / 170 \text{ fpm} = 106.7 \text{ rpm}$.
 - xiv. Program Contract MTR SPD (A1 menu) to the new value of 106.7rpm and repeat process if necessary, until car speed is accurate within 1%.

A8.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort.

A8.6.1 Verify Proper Counterbalance

With a balanced load in the cab, run the elevator up and down at contract speed while observing the Motor Torque within drive menu D2. If the value displayed is larger than 10%, the system is not balanced correctly. Make any necessary adjustments to correct the system counterbalance.

A8.6.2 System Inertia Calculations

The drive software has the ability to calculate the inertia for the elevator system, which is used accurately for tuning of the drives speed regulation. The following procedure can be used to estimate the elevator system inertia:

- a. With a balanced load in the elevator cab, run the car at 100% contract speed from the top floor to the bottom floor then back to the top floor while observing the drives EST INERTIA parameter in the D1 menu.
- b. Make notes of the EST INERTIA value in the drives D1 menu for both the up and down directions.
- c. Average the up and down EST INERTIA values in the drives D1 menu and enter this value in the drives INERTIA parameter in the A1 menu.

A8.6.3 Motor Response Adjustment

The drive response sets the sensitivity of the drive's speed regular software to follow the speed profile reference. The response needs to be adjusted to achieve optimum motor control while maintaining stability. If the motor control is sluggish in responding to the controller's speed command increase the RESPONSE parameter in the drive's A1 menu. If the motor current and speed become unstable, reduce the RESPONSE parameter value.



NOTE: While manipulating drive gain parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive gain parameters, observe that rollback and floor overshooting does not occur due to lack of control.

A8.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a higher rpm than the hoist motor rpm to create an overspeed condition by manipulating drive parameter OVERSPEED MULT (overspeed percentage) in the drive's A1 menu and parameter OVERSPEED TEST in the drives U4 menu.

To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Set the value in drive parameter OVERSPEED MULT in menu A1 for the percentage the car is desired to overspeed.
- d. Set the value in drive parameter OVERSPEED TEST in menu U4 to YES.
- e. Enter a car call for an intermediate landing.
- f. The car will overspeed to the percentage of contact speed programmed in drive parameter OVERSPEED MULT in menu A1.
- g. If additional overspeed tests are required, the OVERSPEED TEST parameter in menu U4 will have to be programmed to YES for each subsequent test.
- h. Once the overspeed tests have been completed, confirm that the drive parameter OVERSPEED TEST in menu U4 is programmed to NO.

A8.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive parameter Relay Coil 1 from BRAKE PICK to NOT ALARM in menu C3. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once the test has been completed, reset drive parameter Relay Coil 2 from NOT ALARM to BRAKE PICK in menu C3.

Appendix A9

M1000 Vector Drive for Induction Motors

A9 M1000 Elevator Drive Overview

The Magnetek M1000 elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of induction and permanent magnet (PM) motor applications in geared and gearless elevator systems.

Review and become familiar with the manufacturer's M1000 Drive Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A9.1 Drive Interface Overview

Pixel's interface to the M1000 drive requires the drive to operate in closed loop vector mode – i.e., the drive interface must include an encoder attached to the motor for speed feedback. The job prints Page 1 describe the interface to the drive which consists of following basic drive inputs:

- a. Hardware drive enabled input.
- b. RS422 Communications channel
- c. Power inputs to terminals R/L1, S/L2, T/L3 and ground
- d. Encoder inputs
- e. Motor regeneration circuits

The basic drive outputs are:

- a. 3-Phase output power to the motor through the AA motor contactor
- b. Drive Ready Relay Fault output (drops fault relay if a fault condition is detected)
- c. Drive Relay output 1, Brake Control (enables brake)



WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CARE to prevent injury.

A9.2 Job Parameters Verification

Select the U2 Modified Constants Sub-Menu in the Drive Interface to verify that the parameter list – provided on page QR7 of the job prints – agrees with actual drive programmed parameters.

The U2 Modified Constants Sub-Menu allows scrolling only through the list of parameters that have been modified from the Drive's default settings. This provides a simple way to view and verify required job-specific parameters.

Page QR7 of the job prints allocates three columns for parameter settings. The first column is the **Default Settings** value. The second column is the **EC Settings** list of starting values that have been programmed in the drive. The third column is the **Field Settings** which the adjuster must enter as final parameter adjustment values.



NOTE: While performing a job startup, make sure parameters programmed agree with the **EC Setting** column. If replacing the drive, make sure parameters agree with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your application or are pre-programmed by EC to default settings.

A9.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance.

A9.3.1 Preset Pixel Interface for Autotuning

Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. Place Pixel in Construction Mode and Machine Room Inspection
- b. Disable transistor base block input terminal S8, for line regenerative applications only, program the C2 logic input Term S8 Func Sel= Term Not Used.
- c. Disable the brake, by removing fuses FB1 and FB2 from the P-PDB board or by disconnecting the brake wires from terminals B1 and B2, refer to page 2 of the job prints for brake connections.

A9.3.2 Motor Autotuning

The Drive provides a dedicated menu to perform the motor Autotuning. This menu allows scrolling through the parameters required to perform motor Autotuning. Select the U9 Autotune menu to start Autotuning process, refer to section 6 Autotune of the drive manual for additional information.

- a. Select the motor Autotuning method to Tune-No Rotate 1
- b. Use the drive Key-Pad keys to enter all motor parameters when prompted by the drive interface.

- c. When the drive displays Tuning Ready, close the AA motor contactor by manually activating the button on the front of the contactor, using a non-conductive tool. Press & hold the AA motor contactor and then press the ENTER button on the drive keypad. Autotuning will begin. Continue to hold the AA contactor closed until autotune is complete.
- d. If the drive displays **Tune Successful** message, the process is complete, and you may skip to step A9.3.3 below.
- e. If the drive displays an Autotune Fault, refer to section 7 of the drive manual to address and correct the problem/ or fault reported by the drive during the Autotuning process, then repeat the Autotuning process until successful.

A9.3.3 Reset Pixel Interface following Autotuning

- a. Enable transistor base block input terminal S8, for line regenerative applications only, program the C2 logic input Term S8 Func Sel= Base Block N.C.
- b. Enable the brake, by reversing process performed on step A9.3.1 entry c.

A9.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, the following steps must be taken:

- a. If the motor is running slowly/uncontrolled and drawing high current, swap the C1 Encoder Connection parameter (Forward/Reverse) and verify that the encoder is working.
- b. If the elevator is running at controlled/proper speed but in the opposite direction of commanded, swap both the C1 Encoder Connect (Forward/Reverse) and C1 Motor Rotation (Forward/Reverse).
- c. If the drive faults are triggered refer to the Drive manual for fault troubleshooting guidance.

A9.5 Commanded vs. Measured Speed Calibration


Pixel commanded speed needs to agree with actual elevator cab speed, during initial installation and prior to installing Landa a handheld tachometer must be used to measure speed, once Landa has been installed the cab speed is displayed as the measured speed value, both Commanded and Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

 Home 

 Troubleshoot 

 Drive 

 Drive Performance Data 


 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The actual speed scaling needs to be adjusted in the drive unit as follows:

- a. Measure/ observe and write down value of Actual Speed, while measuring/ observing speed, allow for the speed to stabilize before taking measurement, if on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic mode have the car perform as long as possible multi floor run.
- b. If car is running below commanded speed adjust drive's parameter under menu A1 Contract Mtr Spd value up, if running above commanded speed adjust parameter value down.

The following formula may be used to calculate desired contract speed

$$\text{New Contract Mtr Spd} = \frac{\text{old Contract Mtr Spd} \times \text{Desired elevator Speed}}{\text{Measured Actual Speed}}$$

 **NOTE:** Perform a controller power cycle after manipulation of Contract Mtr Spd parameter for change to take effect.

A9.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel commanded speed this is achieved by adjusting the “Drive Gains” thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are several sets of Gain parameters utilized by the drive unit to best control motor performance, each set affects the control performance at different stages of the motor run as follows:

- a. **Response (A1)** parameter affects the speed tracking of the commanded vs. actual speed performance of the car through the entire run, increment or decrement value for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance throughout all run performance.

The parameters listed on Response Customization Parameters table below can be used to manipulate the Response parameter at different stages of the run refer to the drive manual for detail explanations of parameters and guidance for application and adjustment.

Response Customization Parameters

Parameter Name	Parameter Description
Gain Change Level (A1)	Sets the speed level at which the Response (A1) gain will begin to be reduced for low gain mode
Gain Reduce Mult (A1)	This parameter is the percentage that the Response (A1) value will be reduced by when in low gain mode.
Notch Frequency (A1)	Sets the center frequency of the notch filter
Notch Depth (A1)	Sets the attenuation level of the notch filter
Inertia (A1)	Sets the equivalent of the system inertia in terms of the time it takes to accelerate to motor base speed at rated torque.
Tach Rate Gain (A1)	Setting of this parameter helps with reducing the effects of rope Resonance.

b. **Electrical Stop** purpose is to have the motor stopped prior to the brake seating and achieved by the drive performing position lock at the stop by a timeout determined the Dc Brk Time Stop (A1) in conjunction with a response parameter SpCtrlGn@PosLck (A1) & SpCtrlTim@PosLck (A1)

Adjust parameter Dc Brk Time Stop value to coordinate brake setting with expiration of this timeout while incrementing/ Decrementing Gain values to increase control or to reduce response if vibrations or instability occurs.

- c. **Position Lock at start** is a function that will reduce the amount of roll back in an elevator without Pre-Torque functionality, If Pre-Torque is used position lock will be disabled.



NOTE: Skip this step if Pre-Torque feature is part of this installation or there is no roll back observed.

Verify that the following drive parameters are set for Position Lock at Start:

Pre-Torq Cmd Src (C1) = Disable

Term A1 FuncSel (C5) = Not set to Pre-Torque

Term A2 FuncSel (C5) = Not set to Pre-Torque

Increase parameter StrPosLckGain 1 (A1), until rollback is eliminated; if instability or vibration surfaces reduce parameter value until stability or vibration is eliminated. If the StrPosLckGain 1 (A1) had to be reduced to maintain stability and rollback remains, fine tune the position lock at start by increasing StrPosLckGain 2 (A1) until rollback is eliminated.

The following parameters determine the time and response the drive will perform during position lock:

DC Brk TimeStart (A1): Determines how long start position lock should be performed at start (EC default = 0.40 sec)



NOTE: DC Brk TimeStart (A1) value must be less than the Pixel value set in Adjust>Ride Performance>Motor/Brake Timers> Pattern Delay.

Gain2 Dec Time (A1): Time spend by the drive at higher position lock start gain before it starts to decrease to the lower gain (EC default = 0.10 sec)

Gain2 Reduce T (A1): The rate in seconds that the StrPosLockGain will reduce to the lower gain (EC default = 0.10 sec) The max. setting is: DC Brk TimeStart - Gain2 Dec Time.

Gain2 Redc Fact (A1): Sets the reduction factor for the position lock at start (lower gain). Lower Gain = (StrPosLockGain 1 + StrPosLockGain 2) x Gain2 Redc Fact (EC default = 0.50)



NOTE: Parameter gain increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance for every adjustment.

- d. **Torque Ramp Down** is a function that will gradually ramp the torque down to help alleviate a “Bump” that may be created while transferring the load from the motor to the brake. Gradually increment parameter TorqRamp@Stp (A1) value in increments of 100 until “Bump” is eliminated.



NOTE: The Torq Ramp@Stp (A1) value must be less than the Pixel value set in Adjust>Ride Performance>Motor/Brake Timers>Zero Speed Hold Delay.

A9.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a frequency larger than the hoist motor base input frequency to create an overspeed condition, to overspeed the car, for an overspeed test, perform following steps:

- a. Set TEST switch, located on the MP board, to TEST which will enable Test Mode operation, and disable door operation and hall calls.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Calculate value for desired overspeed using following formula:
$$\text{Ovrspd Tst Mult} = (\text{Required Overspeed} / \text{Elevator Contract Speed}) \times 100$$
- d. Program calculated value into parameter Ovrspd Tst Mult (A1).
- e. Set Overspeed Test? (U4) parameter to Enabled.
- f. Enter a car call for a landing that will allow the car to accelerate and overspeed.



NOTE: After one run test the drive, the drive overspeed U4 parameter will be automatically set to Disabled; if another overspeed test needs to be performed steps from b to f above will need to be repeated.

A9.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Program drive parameter under menu C3 M1-M2 Func Sel from Brake Control to Drive Ready. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Set Overspeed Test? (U4) parameter to Enabled.
- c. Once the test has been completed, reset drive parameter C3 M1-M2 Func Sel from Drive Ready back to Brake Control.

Appendix A10

M1000 Vector Drive for PM Motors

A10 M1000 Elevator Drive Overview

The Magnetek M1000 elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of induction and permanent magnet (PM) motor applications in geared and gearless elevator systems.

Review and become familiar with the manufacturer's M1000 Drive Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A10.1 Drive Interface Overview

Pixel's interface to the M1000 drive requires the drive to operate in closed loop vector mode – i.e. the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware drive enabled input
- b. RS422 communications channel
- c. Power inputs to terminals R/L1, S/L2, T/L3 and ground
- d. Encoder inputs
- e. Motor regeneration circuits

The basic drive outputs are:

- a. 3-Phase output power to the motor through the AA Motor contactor
- b. Fault output (drops fault relay if a fault condition is detected)
- c. Brake Control output (enables brake)



WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CAUTION to prevent injury.

A10.2 Job Parameters Verification

Select the U2 Modified Constants Sub-Menu in the Drive Interface to verify that the parameter list – provided on page QR7 of the job prints – agrees with actual drive programmed parameters.

The U2 Modified Constants Sub-Menu allows scrolling only through the list of parameters that have been modified from the Drive's default settings. This provides a simple way to view and verify required job-specific parameters.

Page QR7 of the job prints allocates three columns for parameter settings. The first column is the **Default Settings** value. The second column is the **EC Settings** list of starting values that have been programmed in the drive. The third column is the **Field Settings** which the adjustor must enter as final parameter adjustment values.



NOTE: While performing a job startup, make sure parameters programmed agree with the **EC Setting** column. If replacing the drive, make sure parameters agree with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

A10.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance.

A10.3.1 Preset Pixel Interface for Autotuning

Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. Place Pixel in Construction Mode and Machine Room Inspection
- b. Disable transistor base block input terminal S8, for line regenerative applications only, program the C2 logic input Term S8 Func Sel= Term Not Used.
- c. Disable the brake, by removing fuses FB1 and FB2 from the P-PDB board or by disconnecting the brake wires from terminals B1 and B2, refer to page 2 of the job prints for brake connections.

A10.3.2 Motor Autotuning

The Drive provides a dedicated menu to perform the motor Autotuning, this menu allows scrolling through the parameters required to perform the motor Autotuning. Select the U9 Autotune menu to start Autotuning process, refer to section 6 Autotune of the drive manual for additional information.

The PM Motor Autotune is a three-step tune process:

- Tune-No-Rotate, motor resistance and inductance
- InitPoleEstPrms, rotor alignment

- PolePos-norotate, position of the magnets in the motor



NOTE: If the drive displays an Autotuning error, refer to section 7 of the drive manual addressing Autotuning errors to identify and correct the problem, then repeat the Autotuning process until successful.



NOTE: The data plate on the machine should correspond with the motor parameters on page QR7 of the job prints. If the machine data plate does not correspond with the information on page QR7, the PM machine may have been de-rated for the elevator application. An application data plate should be provided for the machine, contact the machine manufacturer.



WARNING: In the event the motor contactor opens during an Autotuning process, the motor contactor may sustain permanent damage.

1. Autotuning – Tune-No-Rotate:

- a. Select the U9 AUTOTUNE menu in the drive to Tune-No-Rotate, press enter then the down key to enter all required motor data, until the drive Keypad displays “Tuning Ready”.
- b. When the drive displays Tuning Ready, close the AA motor contactor by manually activating the button on the front of the contactor, using a non-conductive tool. Press & hold the AA motor contactor and then press the ENTER button on the drive keypad. Autotuning will begin. Continue to hold the AA contactor closed until Autotune is complete.
- c. If the drive displays **Tune Successful** message, the process is complete and you may continue to step 2, Autotuning InitPoleEstPrms, rotor alignment.
- d. If the drive displays an Autotune Fault, refer to section 7 of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the PM Tuning Mode – Tune-No Rotate process (steps a – c) until successful.

2. Autotuning InitPoleEstPrms, rotor alignment

- a. Select the U9 AUTOTUNE menu in the drive to InitPoleEstPrms, press enter then the down key to enter all required motor data, until the drive Keypad displays “Tuning Ready”.
- b. When the drive displays Tuning Ready, close the AA motor contactor by manually activating the button on the front of the contactor, using a non-conductive tool. Press & hold the AA motor contactor and then press the ENTER button on the drive keypad. Autotuning will begin. Continue to hold the AA contactor closed until Autotune is complete.
- c. If the drive displays **Tune Successful** message, the process is complete and you may continue to Autotuning PolePos-norotate, position of the magnets in the motor.

- d. If the drive displays an Autotune Fault, refer to section 7 of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the PM Tuning Mode – Tune-No Rotate process (steps a – c) until successful.
3. Autotuning – PolePos-norotate, position of the magnets in the motor
 - a. Select the U9 AUTOTUNE menu in the drive to PolePos-norotate, press enter then the down key to enter all required motor data, until the drive Keypad displays “Tuning Ready”
 - b. When the drive displays Tuning Ready, close the AA motor contactor by manually activating the button on the front of the contactor, using a non-conductive tool. Press & hold the AA motor contactor and then press the ENTER button on the drive keypad. Autotuning will begin. Continue to hold the AA contactor closed until Autotune is complete.
 - c. If the drive displays **Tune Successful** message, you have completed the drive’s autotune process. Record the Enc Z-Pulse Offs (A5) calculated from the alignment.
 - d. If the drive displays an Autotune Fault, refer to section 7 of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the PM Tuning Mode – PolePos-norotate process (steps a – c) until successful.

A10.3.3 Reset Pixel Interface following Autotuning

- a. Enable transistor base block input terminal S8, for line regenerative applications only, program the C2 logic input Term S8 Func Sel= Base Block N.C.
- b. Enable the brake, by reversing process performed on step A10.3.1 entry c.

A10.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, the following steps must be taken:

- a. If the motor is running slowly/uncontrolled and drawing high current, swap the C1 Encoder Connection parameter (Forward/Reverse) and verify that the encoder is working. Then repeat Autotuning U9 PolePos-norotate process.
- b. If the elevator is running at controlled/proper speed but in the opposite direction of commanded, swap both the C1 Encoder Connect (Forward/Reverse) and C1 Motor Rotation (Forward/Reverse), Then repeat Autotuning U9 PolePos-norotate process.
- c. If the drive faults are triggered refer to the Drive manual for fault troubleshooting guidance.

A10.5 Commanded vs. Measured Speed Calibration


Pixel commanded speed needs to agree with actual elevator cab speed, during initial installation and prior to installing Landa a handheld tachometer must be used to measure speed, once Landa has been installed the cab speed is displayed as the measured speed value, both Commanded and Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

 Home 

 Troubleshoot 

 Drive 

 **Drive Performance Data** 


 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The actual speed scaling needs to be adjusted in the drive unit as follows:

- a. Measure/ observe and write down value of Actual Speed, while measuring/ observing speed, allow for the speed to stabilize before taking measurement, if on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic mode have the car perform as long as possible multi floor run.
- b. If car is running below commanded speed adjust drive's parameter under menu A1 Contract Mtr Spd value up, if running above commanded speed adjust parameter value down.

The following formula may be used to calculate desired contract speed

$$\text{New Contract Mtr Spd} = \frac{\text{old Contract Mtr Spd} \times \text{Desired elevator Speed}}{\text{Measured Actual Speed}}$$

 **NOTE:** Perform a controller power cycle after manipulation of Contract Mtr Spd parameter for change to take effect.

A10.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel commanded speed this is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are several sets of Gain parameters utilized by the drive unit to best control motor performance, each set affects the control performance at different stages of the motor run as follows:

- a. **Response (A1)** parameter affects the speed tracking of the commanded vs. actual speed performance of the car through the entire run, increment

or decrement value for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance throughout all run performance.

The parameters listed on Response Customization Parameters table below can be used to manipulate the Response parameter at different stages of the run refer to the drive manual for detail explanations of parameters and guidance for application and adjustment.

Response Customization Parameters

Parameter Name	Parameter Description
Gain Change Level (A1)	Sets the speed level at which the Response (A1) gain will begin to be reduced for low gain mode
Gain Reduce Mult (A1)	This parameter is the percentage that the Response (A1) value will be reduced by when in low gain mode.
Notch Frequency (A1)	Sets the center frequency of the notch filter
Notch Depth (A1)	Sets the attenuation level of the notch filter
Inertia (A1)	Sets the equivalent of the system inertia in terms of the time it takes to accelerate to motor base speed at rated torque.
Tach Rate Gain (A1)	Setting of this parameter helps with reducing the effects of rope Resonance.

b. **Electrical Stop** purpose is to have the motor stopped prior to the brake seating and achieved by the drive performing position lock at the stop by a timeout determined the Dc Brk Time Stop (A1) in conjunction with a response parameter SpCtrlGn@PosLck (A1) & SpCtrlTim@PosLck (A1)

Adjust parameter Dc Brk Time Stop value to coordinate brake setting with expiration of this timeout while incrementing/ Decrementing Gain values to increase control or to reduce response if vibrations or instability occurs.

- c. **Position Lock at start** is a function that will reduce the amount of roll back in an elevator without Pre-Torque functionality, If Pre-Torque is used position lock will be disabled.



NOTE: Skip this step if Pre-Torque feature is part of this installation or there is no roll back observed.

Verify that the following drive parameters are set for Position Lock at Start:

Pre-Torq Cmd Src (C1) = Disable

Term A1 FuncSel (C5) = Not set to Pre-Torque

Term A2 FuncSel (C5) = Not set to Pre-Torque

Increase parameter StrPosLckGain 1 (A1), until rollback is eliminated; if instability or vibration surfaces reduce parameter value until stability or vibration is eliminated. If the StrPosLckGain 1 (A1) had to be reduced to maintain stability and rollback remains, fine tune the position lock at start by increasing StrPosLckGain 2 (A1) until rollback is eliminated.

The following parameters determine the time and response the drive will perform during position lock:

DC Brk TimeStart (A1): Determines how long start position lock should be performed at start (EC default = 0.40 sec)



NOTE: DC Brk TimeStart (A1) value must be less than the Pixel value set in Adjust>Ride Performance>Motor/Brake Timers> Pattern Delay.

Gain2 Dec Time (A1): Time spend by the drive at higher position lock start gain before it starts to decrease to the lower gain (EC default = 0.10 sec)

Gain2 Reduce T (A1): The rate in seconds that the StrPosLockGain will reduce to the lower gain (EC default = 0.10 sec) The max. setting is: DC Brk TimeStart - Gain2 Dec Time.

Gain2 Redc Fact (A1): Sets the reduction factor for the position lock at start (lower gain). Lower Gain = (StrPosLockGain 1 + StrPosLockGain 2) x Gain2 Redc Fact (EC default = 0.50)



NOTE: Parameter gain increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance for every adjustment.

- d. **Torque Ramp Down** is a function that will gradually ramp the torque down to help alleviate a “Bump” that may be created while transferring the load from the motor to the brake. Gradually increment parameter TorqRamp@Stp (A1) value in increments of 100 until “Bump” is eliminated.



NOTE: The Torq Ramp@Stp (A1) value must be less than the Pixel value set in Adjust>Ride Performance>Motor/Brake Timers>Zero Speed Hold Delay.

A10.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a frequency larger than the hoist motor base input frequency to create an overspeed condition, to overspeed the car, for an overspeed test, perform following steps:

- a. Set TEST switch, located on the MP board, to TEST which will enable Test Mode operation, and disable door operation and hall calls.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.

- c. Calculate value for desired overspeed using following formula:
$$\text{Ovrspd Tst Mult} = (\text{Required Overspeed} / \text{Elevator Contract Speed}) \times 100$$
- d. Program calculated value into parameter Ovrspd Tst Mult (A1).
- e. Set Overspeed Test? (U4) parameter to Enabled.
- f. Enter a car call for a landing that will allow the car to accelerate and overspeed.



NOTE: After one overspeed test, the drive Overspeed Test? (U4) parameter will be automatically set to Disabled; if another overspeed test is required, repeat steps b to f above.

A10.8 Brake Control Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Program drive parameter under menu C3 M1-M2 Func Sel from Brake Control to Drive Ready. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Set Overspeed Test? (U4) parameter to Enabled.
- c. Once test has been completed, reset drive parameter C3 M1-M2 Func Sel from Drive Ready back to Brake Control.

Appendix A11

Combivert F5 LCD Drive for IM Motors

A11 Combivert F5 LCD Elevator Drive Overview

The KEB Combivert F5 LCD elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of induction (IM) motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's Combivert F5 LCD Drive Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A11.1 Drive Interface Overview

Pixel's interface to the KEB Combivert F5 LCD drive requires the drive to operate in closed loop vector mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware drive enabled, Emergency Slowdown and Drive Fault Reset inputs.
- b. Serial communications channel
- c. Power inputs to terminals L1, L2, L3 and PE (ground)
- d. Encoder inputs
- e. Motor regeneration circuits

The basic drive outputs are:


- a. 3-Phase output power to the motor through the AA Motor contactor
- b. Drive Ready output (drops Drive Ready relay if a fault condition is detected)
- c. Brake Control output (enables brake)




WARNING: Power capacitors in the drive REMAIN CHARGED for some time after power is removed. USE CAUTION to prevent injury.


A11.2 Job Parameters Verification

Verify that the parameter list provided on page QR7 of the job prints agrees with actual drive programmed parameters.

 **NOTE:** Verify parameters tagged with >> in page QR7 of the job prints match the actual motor and job site data, call Elevator Controls technical support if different.

Page QR7 of the job prints allocates two columns for parameter settings. The first column is the **EC Settings** list of starting values that have been programmed in the drive; the second column is the **Field Settings** which the adjustor must enter as final parameter adjustment values.

 **NOTE:** While performing a job startup, make sure parameters programmed agree with the **EC Setting** column. If replacing the drive, make sure parameters agree with the **EC Settings** and **Field Settings** columns.

 **NOTE:** Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your application or are pre-programmed by EC to default settings.

A11.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance.

A11.3.1 Preset Pixel Interface for Autotuning

Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. Place Pixel in Construction Mode and Machine Room Inspection
- b. Position the elevator cab near the middle of the hoistway,
- c. Set Pixel Inspection Speed to 000 fpm, navigating to:

 Home 

 Adjust 

 Ride Performance 

 Speed Profile 

 Inspection Speed , set to 000 fpm

- d. Disable the brake by disconnecting the brake wires from terminals B1 and B2, refer to page 2 of the job prints for brake connections.

A11.3.2 Motor Autotuning

The IM Motor Autotune is a single step tune process:



WARNING: In the event the motor contactor opens during an Autotuning process, the motor contactor may sustain permanent damage.

Motor Learn:

- a. Set parameter LL01 Motor Tuning to Start
- b. Press and hold the Machine Room Inspection Enable and Up push buttons, until completed, located on the Pixel P-MP board. The process should take 2-5 minutes and will emit a high-pitched noise while the drive measures various motor parameters.
- c. The drive will confirm a successful motor learn, and LED 1 and 2 will flash, indicating it is time to release the Enable and Up push buttons.
- d. If the drive displays an Autotune Fault, refer to section 7.5, Learn Procedure Troubleshooting, of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the Motor Learn procedure until successful.

A11.3.3 Reset Pixel Interface following Autotuning

Set Pixel Inspection Speed to setting prior to start of the Autotuning process, reverse step A11.3.1 entry c and d above.

A11.4 Motor Rotation Verification

Pixel and the Drive need to be in sync regarding motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. Verify motor rotation by running the elevator on machine room inspection and adjusting LE03 (Swap Encoder 1 Channels), if necessary:

Monitor the drive current using the Home screen on the drive. If the current is excessive or the motor operation is erratic, then swap the encoder channel by setting LE03 to A-B Swapped.

If the current is reasonable but the elevator runs in the opposite direction of what is being commanded. Then set LE03 to Inverted Rotation or A-B Swap & Inverted Rotation.

A11.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed needs to agree with actual elevator cab speed, during initial installation and prior to installing Landa a handheld tachometer must be used to measure speed, once Landa has been installed the cab speed is displayed as the measured speed value, both Commanded and Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

■ Home 

 Troubleshoot 

 Drive 

 **Drive Performance Data** 



NOTE: Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The actual speed scaling needs to be adjusted in the drive unit as follows:

- a. Verify parameter LN01(Traction Sheave Diameter), ideally this value would be measured from the center of the rope.
- b. Read parameter LN05 (Estimated Gear Reduction Ratio), after verifying parameter values LM02 (Motor Speed), US06 (Contract Speed), LN03 (Roping Ratio).
- c. Enter this value into LN02 (Gear Reduction Ratio).
- d. If the car is running above commanded speed decrease LN02 value, if running below commanded speed increase LN02 value to match commanded vs. measured speed.

A11.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel commanded speed this is achieved by adjusting the “Drive Gains” thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are several sets of Gain parameters utilized by the drive unit to best control motor performance, each set affects the control performance at different stages of the motor run as follows:

- a. Set LC30 (Maximum Torque) 250. The default setting of 150 is to protect the motor from excessively high current which may occur during the startup process if there are incorrect parameter settings. Under normal high-speed operation, LC30 typically is set to 200-250.

- b. **Inertia**, for optimum control of the elevator, it is recommended to learn the system inertia and activate the feed forward torque controller (FFTC) per following procedure:
1. Verify the car is running at contract speed over a multiple floor run.
 2. Place balance load in the cab and run on inspection in the middle of the hoist way and monitoring the actual torque via Diag screen #3. The motor torque in the up and down directions should be equal but in opposite direction. If this is not the case, adjust the counterweights before proceeding.
 3. Run the car from bottom to top and top to bottom. For taller buildings, run between at least 10 floors in the middle of the hoist way (5 above and 5 below). This function will also consider rope compensation or lack thereof.



NOTE: It is necessary for the car to reach and maintain contract speed for at least 2 seconds and to make this measurement in the middle of the hoistway.

4. Set parameter LL10 Inertia Learn to Start
 5. Follow the directions on the keypad. After each run, the user will have the option to calculate the inertia for that run. After four runs, the drive will automatically calculate the inertia based on the averages.
- c. **Response, Control Setting Parameters**, the drive provides a set of gain parameters that affect the speed tracking of the commanded vs. actual speed performance of the car through the entire run, increment or decrement value for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance throughout all run performance.

If the inertia learn procedure has been completed, then the LC02 (Speed Gain Optimization) can provide a quick adjustment of the speed control response on a scale between 0 = Soft and 25 = Hard. From the learned inertia value, the drive determines a ratio between the proportional and integral gain and the adjustment of LC02 will scale each accordingly. For reference LC02 = 10 normalizes the KP value to 3000 and the KI gains will be calculated accordingly.

The Control Setting Parameters, listed on Response Customization Parameters table below are divided into two functional groups **Proportional Gain and Integral Gain**, refer to section 6.8 LC-Control Setting Parameters of the drive manual for detailed parameter explanations & adjustment guidance, and additional parameters.

Response Customization Parameters

Parameter Name	Parameter Description
LC03 KP Speed Acceleration	Proportional speed control gain during acceleration and high speed.
LC04 KP Speed Deceleration	Proportional speed control gain during deceleration and low speed.
LC05 KP Speed Pretorque	Proportional speed control gain for synthetic pre-torque.
LC08 KI Speed Acceleration	Integral speed control gain during acceleration and high speed.
LC09 KI Speed Deceleration	Integral speed control gain during deceleration and low speed.
LC10 KI Speed Pretorque	Integral speed control gain for synthetic pre-torque.
LC11 KI Offset Acceleration	The integral offset gain for starting acceleration (low speed)
LC12 KI Offset Deceleration	The integral offset gain for stopping deceleration (low speed)
LC25 KP High Speed	Percentage increase or decrease of the proportional gain at high speed after the point of resonance has been

11.7 Overspeed Using the Drive to Run the Hoist Motor

The drive unit can be configured to run the hoist motor at a speed higher than the programmed contract speed to create an overspeed condition, to overspeed the car, for an overspeed test, perform following steps:

- a. Set TEST switch, located on the MP board, to TEST which will enable Test Mode operation, and disable door operation and hall calls.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Set parameter LL15 overspeed test mode to 1, Start With Scaling
- d. Set parameter LL16 to the required overspeed value in feet per minute.
- e. Enter a car call for a landing that will allow the car to accelerate and overspeed.



NOTE: After one overspeed test, the drive Overspeed Test LL15 and LL16 parameters will be automatically set to default; if another overspeed test is required, repeat steps a through e above.

A11.8 Brake Control Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Set drive parameter LO20 from Brake Control to Drive Ready. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Set drive parameter LX13, Speed Following Error from 2 to 0 to prevent drive from generating a following error fault.
- c. Once the test has been completed, reset drive parameters LO20 from Drive On back to Brake Control and LX13 to 2.

Appendix A12

Combivert F5 LCD Drive for PM Motors

A12 Combivert F5 LCD Elevator Drive Overview

The KEB Combivert F5 LCD elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of permanent magnet (PM) motor applications for gearless elevator systems.

Review and become familiar with the manufacturer's Combivert F5 LCD Drive Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

A12.1 Drive Interface Overview

Pixel's interface to the KEB Combivert F5 LCD drive requires the drive to operate in closed loop vector mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware drive enabled, Emergency Slowdown and Drive Fault Reset inputs.
- b. Serial communications channel
- c. Power inputs to terminals L1, L2, L3 and PE (ground)
- d. Encoder inputs
- e. Motor regeneration circuits

The basic drive outputs are:


- d. 3-Phase output power to the motor through the AA Motor contactor
- e. Drive Ready output (drops Drive Ready relay if a fault condition is detected)
- f. Brake Control output (enables brake)




WARNING: Power capacitors in the drive **REMAIN CHARGED** for some time after power is removed. **USE CAUTION** to prevent injury.


A12.2 Job Parameters Verification

Verify that the parameter list provided on page QR7 of the job prints agrees with actual drive programmed parameters.

 **NOTE:** Verify parameters tagged with >> in page QR7 of the job prints match the actual motor and job site data, call Elevator Controls technical support if different.

Page QR7 of the job prints allocates two columns for parameter settings. The first column is the **EC Settings** list of starting values that have been programmed in the drive; the second column is the **Field Settings** which the adjuster must enter as final parameter adjustment values.

 **NOTE:** While performing a job startup, make sure parameters programmed agree with the **EC Settings** column. If replacing the drive, make sure parameters agree with the **EC Settings** and **Field Settings** columns.

 **NOTE:** Do not change any parameters except those found on Page QR7 of the job prints. Other parameters are either not used for your application or are pre-programmed by EC to default settings.

A12.3 Autotuning

The Autotuning process automatically calculates the motor parameter settings required for optimum motor performance.

A12.3.1 Preset Pixel Interface for Autotuning


Pixel's interface disables the drive while stopped, to prevent transistor misfiring, or when unintended motion occurs. To perform a motor Autotune process these circuits must be enabled through the following process:

- a. Place Pixel in Construction Mode and Machine Room Inspection
- b. Position the elevator cab near the middle of the hoistway,
- c. Set Pixel Inspection Speed to 000 fpm, navigating to:

 Home 

 Adjust 

 Ride Performance 

 Speed Profile 

 Inspection Speed , set to 000 fpm

- d. Disable the brake, by disconnecting the brake wires from terminals B1 and B2, refer to page 2 of the job prints for brake connections.

A12.3.2 Motor Autotuning

The PM Motor Autotune is a three-step tune process:

- Motor Learn, motor resistance and inductance.
- SPI Encoder Learn, stationary motor pole Identification.
- Encoder Synchronization, determine correct encoder A/B channel phasing.



NOTE: The application data plate on the machine should correspond with the motor parameters on page QR7 of the job prints. If the machine data plate does not correspond with the information on page QR7, the PM machine may have been de-rated for the elevator application. An application data plate should be provided for the machine, contact the machine manufacturer.



WARNING: In the event the motor contactor opens during an Autotuning process, the motor contactor may sustain permanent damage.

1. Motor Learn:
 - a. Set parameter LL01 Motor Tuning to Start
 - b. Press and hold the Machine Room Inspection Enable and Up push buttons, until completed, located in Pixel P-MP board. The process should take 2-5 minutes and will emit a high-pitched noise while the drive measures various motor parameters.
 - c. The drive will confirm a successful motor learn, and LED 1 and 2 will flash, indicating it is time to release the Enable and Up push buttons.
 - d. If the drive displays an Autotune Fault, refer to section 7.5, Learn Procedure Troubleshooting, of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the Motor Learn procedure until successful.



NOTE: If the motor noise is excessive during the tuning process reduce LL02 to 50.

2. SPI Encoder Learn:
 - a. Set parameter LL05 SPI to Start
 - b. Press and hold the Machine Room Inspection Enable and Up push buttons, until completed, located in Pixel P-MP board Upon successful learn, the pole position will be written to parameter LE06, and LED 1

and 2 will flash, indicating it is time to release the Enable and Up push buttons.

- c. If the drive displays an Autotune Fault, refer to section 7.5, Learn Procedure Troubleshooting, of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the SPI Encoder Learn procedure until successful.
3. Encoder Synchronization:
- a. Restore the settings changed in A12.3.1 steps c & d.
 - b. Set parameter LL07 Encoder Synchronization to Start
 - c. Follow the directions on the keypad. The drive will iteratively run the elevator and swap the phasing and direction of the A/B channels as needed.
 - d. If the drive displays an Autotune Fault, refer to section 7.5, Learn Procedure Troubleshooting, of the drive manual to address and correct the problem or fault reported by the drive during the Autotuning process, then repeat the Encoder Synchronization procedure until successful.

A12.3.3 Reset Pixel Interface following Autotuning

Restore the settings changed in A12.3.1 steps c & d, if not already done while performing the Encoder Synchronization Autotuning process.

A12.4 Motor Rotation Verification

Pixel and the Drive need to be in sync regarding motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the down direction, set parameter LE03 from 0 (Not Inverted Rotation) to 2 (Inverted Rotation) or vice versa to correct rotation vs. command direction.

A12.5 Commanded vs. Measured Speed Calibration


Pixel commanded speed needs to agree with actual elevator cab speed, during initial installation and prior to installing Landa a handheld tachometer must be used to measure speed, once Landa has been installed the cab speed is displayed as the measured speed value, both Commanded and Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

■ Home 

 Troubleshoot 


 Drive 

Drive Performance Data

 **NOTE:** Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.


The actual speed scaling needs to be adjusted in the drive unit as follows:

- a. Verify parameter LN01 (Traction Sheave Diameter) ideally this value would be measured from the center of the rope, LN02 (Gear Reduction Ratio) set to 1 and LN03 (Roping Ratio), matches the job requirements 1 or 2
- b. Measure/observe and write down the value of Actual Speed. Allow for the speed to stabilize before taking the speed measurement, if on Inspection mode allow a few seconds for inspection speed to stabilize, if on Automatic mode have the car perform as long multi floor run to allow the high speed to stabilize.
- c. If the car is running below commanded speed decrease LN01 (Traction Sheave Diameter) parameter, if the car is running above commanded speed increase LN01.

 **NOTE:** While adjusting the LN01, Traction Sheave Diameter, parameter value use increment or decrement values of one tenth of an inch or less

A12.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel commanded speed this is achieved by adjusting the “Drive Gains” thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort. There are several sets of Gain parameters utilized by the drive unit to best control motor performance, each set affects the control performance at different stages of the motor run as follows:

 **NOTE:** Set LC30 (Maximum Torque) 250. The default setting of 150 is to protect the motor from excessively high current which may occur during the startup process if there are incorrect parameter settings. Under normal high-speed operation, LC30 typically is set to 200-250.

- a. **Inertia**, for optimum control of the elevator, it is recommended to learn the system inertia and activate the feed forward torque controller (FFTC) per following procedure:
 1. Place balance load in the cab and run on inspection in the middle of the hoist way and monitoring the actual torque via Diag screen #3. The motor torque in the up and down directions should be equal but in opposite direction. If this is not the case, adjust the counterweights before proceeding.

2. Run the car from bottom to top and top to bottom. For taller buildings, run between at least 10 floors in the middle of the hoist way (5 above and 5 below). This function will also consider rope compensation or lack thereof.



NOTE: It is necessary for the car to reach and maintain contract speed for at least 2 seconds and to make this measurement in the middle of the hoistway.

3. Set parameter LL10 Inertia Lear to Start
4. Follow the directions on the keypad. After each run, the user will have the option to calculate the inertia for that run. After four runs, the drive will automatically calculate the inertia based on the averages.

- b. **Response, Control Setting Parameters**, the drive provides a set of gain parameters that affect the speed tracking of the commanded vs. actual speed performance of the car through the entire run, increment or decrement value for tighter or looser motor control, increments and decrements should be performed in increments no larger than 10% of set value and should be evaluated for performance throughout all run performance.

If the inertia learn procedure has been completed, then the LC02 (Speed Gain Optimization) can provide a quick adjustment of the speed control response on a scale between 0 = Soft and 25 = Hard. From the learned inertia value, the drive determines a ratio between the proportional and integral gain and the adjustment of LC02 will scale each accordingly. For reference LC02 = 10 normalizes the KP value to 3000 and the KI gains will be calculated accordingly.

The Control Setting Parameters, listed on Response Customization Parameters table below are divided into two functional groups **Proportional Gain and Integral Gain**, refer to section 6.8 LC-Control Setting Parameters of the drive manual for detailed parameter explanations & adjustment guidance and additional gain parameters.

Response Customization Parameters

Parameter Name	Parameter Description
LC03 KP Speed Acceleration	Proportional speed control gain during acceleration and high speed.
LC04 KP Speed Deceleration	Proportional speed control gain during deceleration and low speed.
LC05 KP Speed Pretorque	Proportional speed control gain for synthetic pre-torque.
LC08 KI Speed Acceleration	Integral speed control gain during acceleration and high speed.

Parameter Name	Parameter Description
LC09 KI Speed Deceleration	Integral speed control gain during deceleration and low speed.
LC10 KI Speed Pretorque	Integral speed control gain for synthetic pre-torque.
LC11 KI Offset Acceleration	The integral offset gain for starting acceleration (low speed)
LC12 KI Offset Deceleration	The integral offset gain for stopping deceleration (low speed)
LC25 KP High Speed	Percentage increase or decrease of the proportional gain at high speed after the point of resonance has been

A12.7 Overspeed Using the Drive to Run the Hoist Motor

The drive unit can be configured to run the hoist motor at a speed higher than the programmed contract speed to create an overspeed condition, to overspeed the car, for an overspeed test, perform following steps:

- Set the TEST switch, located on the P-MP board, to TEST which will enable Test Mode operation, and disable door operation and hall calls.
- Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- Set parameter LL15 overspeed test mode to 1, Start With Scaling.
- Set parameter LL16 to required overspeed value in feet per minute.
- Enter a car call for a landing that will allow the car to accelerate and overspeed.



NOTE: After one overspeed test, the drive Overspeed Test LL15 and LL16 parameters will be automatically set to default; if another overspeed test is required, repeat steps a through e above.

A12.8 Brake Control Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- Set drive parameter LO20 from Brake Control to Drive Ready. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- Set parameter LX13 = 0, to disable the drive following error fault
- Once the test has been completed, reset drive parameters LO20 from Drive On back to Brake Control and LX13 to 2.

Appendix B1

DSD 412 SCR Drive for DC Motors

B1 DSD 412 Elevator Drive Overview

The DSD 412 elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of DC motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's DSD 412 Drive User Manual (the Drive Manual). Pay attention to all safety precautions.

This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

B1.1 Drive Interface Overview

Pixel's interface to the DSD 412 drive requires the drive to operate in closed loop mode – i.e. the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- a. Hardware enable inputs
- b. RS422 Communications channel
- c. Power inputs to terminals L1, L2 and L3
- d. Encoder inputs

The basic drive outputs are:

- a. Armature Variable DC voltage to the motor through the contactor
- b. Motor field Variable DC Voltage
- c. Drive Ready output (drops DSAF controller input if a fault condition is detected)
- d. Run Engaged output (enables brake)
- e. Loop Pickup Output (enables motor contactor)

B1.2 Job Parameters Verification

Use the Drive Interface to verify that the parameter list – provided on page QR7/ DPS of the job prints – matches with actual drive programmed parameter page QR7/ DPS of the job prints allocates three columns for parameter settings. The first column is the manufactures **Default Settings**. The second column is the **EC Settings** of starting values that have been programmed in the drive. The third

column is the **Field Settings**, which the adjustor must enter as the final parameter values.



NOTE: While performing the installation startup, make sure parameters programmed match with the **EC Setting** column. If replacing the drive, make sure parameters match with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7/ DPS of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

Reference the parameter table below to conform to the job specific motor control parameters:

Function Number:	Drive Parameter:	Description:
2	ON	When ON the drive uses the data calculated following a Self-Tune at functions 613, 614 and 615. When OFF the drive uses the manually entered values at functions 4, 6 and 51.
3	Rated Armature Amps	The value entered in this parameter should match the Motor Nameplate Armature Amps as listed on page 1 of the job prints.
7	Rated Armature Volts	The value entered in this parameter should match the Motor Nameplate Armature Voltage as listed on page 1 of the job prints.
9	Nominal AC Input	The value entered in this parameter should match the Isolation Transformer Secondary voltage supplied as listed on the page 1 of the job prints.
10	Encoder PPR	The value entered in this parameter should match the Encoder resolution supplied as listed on the page 1 of the job prints.
11	Rated Motor RPM	The value entered in this parameter should match the Motor Nameplate RPM as listed on page 1 of the job prints.

17	Rated Car Speed	The value entered in this parameter should match the Rated Car Speed as listed on page 1 of the job prints.
49	Weakening Field Current	The value entered in this parameter should match the Motor Field Running Voltage divided by the Motor Field Resistance as listed on page 1 of the job prints.
50	Full Field Current	The value entered in this parameter should match the Motor Field Forcing Voltage divided by the Motor Field Resistance as listed on page 1 of the job prints.
52	Rated Field Volts DC	The value entered in this parameter should match the Motor Field Forcing Voltage as listed on page 1 of the job prints.
53	Standby Field Amp Percentage	The value entered in this parameter should match the Motor Field Standing Voltage divided by the Motor Forcing Voltage as listed on page 1 of the job prints.
55	Field Control AC Source Volts	The value entered in this parameter is automatically set to the value entered in Function 9. When an external Motor Field transformer is used to buck or boost the Motor Field AC input supply, enter the AC voltage measured at drive terminals AC1 and AC2. Refer to page 1 of the job prints to determine if an external transformer is being used for the Motor Field AC input.
183	Relay K3 Logic Output Selection	The value entered in this parameter should be set to 3 as listed on page 1 of the job prints.



NOTE: The drive does not automatically save parameters that have been altered. In the event the drive power is cycled, or the drive is reset, any changed drive parameters will be lost and have to be reprogrammed. Refer to section B2.1.1 below for directions to permanently store drive modified parameters.

B1.2.1 Saving Drive Parameters

Drive Function 994 must be used to save drive parameters into the drive's non-volatile memory. Use the following procedure to save changed drive parameters:

- a. Access drive Function 994 via the user interface.
- b. Press the DATA/FCTN key until the drive displays "rESt".
- c. Press the drive-up arrow key until the drive displays "SAVE".
- d. On the upper right side of the drive there is a slide switch that when placed in the up position will illuminate the drives "NV RAM NOT PROTECTED" indicator, place this switch in the up position.
- e. Press the drive "ENT" key, the drive should now display "994".
- f. Place the NV RAM protect switch in the down position such that the "NV RAM NOT PROTECTED" indicator is not illuminated.
- g. The drive parameters have now been saved such that the save parameters will be the default parameters following a power cycle or drive reset.

B1.3 Autotuning

The drive has a built-in self-diagnostics and current regulator Self Tuning functions that allows the user to verify drive hardware integrity and motor adaptive tuning, perform both functions below to ensure proper motor Autotuning.

B1.3.1 Self Diagnostics

The drive has a built diagnostic routine that can be performed to test the integrity of the built-in line fuses, SCR's and motor field current. Drive function 998 is used to perform the Self Diagnostics as follows:



WARNING: Have personnel prepared to remove main line disconnect power during this procedure in the event the motor begins to rotate. If the motor rotates, immediately remove power from the controller by turning off the main line disconnect switch.

- a. Access parameter 998 via the user interface.
- b. Press the DATA/FCTN key until the drive displays "Entr", and then press the ENT button on the drive.
- c. While the drive is performing the Self Diagnostics, the drive displays "tESt".
- d. The motor contactor will pick and drop a few times while the drive is performing the Self Diagnostics.
- e. Once the drive successfully completes the Self Diagnostics routine, the drive displays "PASS".

- f. In the event the drive displays an error code, refer to Page 39 of the drive manual to diagnose the issue.
- g. Once the drive has successfully performed the Self Diagnostics, press the drive RESET button.



NOTE: The Self Diagnostics function must be successfully performed, contact Elevator Controls technical support department if unable to succeed.

B1.3.2 Motor Adaptive Tuning

The drive has a built-in current regulator Self Tuning function. When the Self Tuning function is activated, the drive measures the motor armature circuit resistance, inductance including wiring and the motor field resistance and inductance. Drive function 997 is used to perform the Motor Adaptive Tuning as follows:



WARNING: Have personnel prepared to remove main line disconnect power during this procedure in the event the motor begins to rotate. If the motor rotates, immediately remove power from the controller by turning off the main line disconnect switch.

- a. Access drive Function 997 via the user interface.
- b. On the upper right side of the drive there is a slide switch that when placed in the up position will illuminate the drives “NV RAM NOT PROTECTED” indicator, place this switch in the up position.
- c. Press the DATA/FCTN key until the drive displays “Entr”, and then press the ENT button on the drive.
- d. While the drive is performing the Self Tune, the drive displays “tESt”.
- e. The motor contactor will pick and drop a few times while the drive is performing the Self Diagnostics.
- f. Once the drive successfully completes the Self Tune routine, the drive displays “PASS”. In the event the drive displays an error code, refer to Page 38 of the drive manual to diagnose the issue.



NOTE: If Motor Adaptive Tuning triggers a fault, try increasing the Rated Armature Volts, parameter 7, by 50 volts and re-try procedure once successful return Rated Armature Volts to original value.



NOTE: The drive does not automatically save the Motor Adaptive Tuning parameters. It is important to perform the manually initiated save process using drive function 994. Refer to section B1.2.1 and save the drive parameters.

- g. Once the drive has successfully performed the Self Tune and the drive parameters have been saved, press the drive RESET button.



NOTE: The Motor Adaptive Tuning function must be successfully performed, contact Elevator Controls technical support department if unable to succeed.

B1.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the opposite direction or if the motor runs too fast, the following steps must be taken.

- a. When commanding an Inspection up direction, if the car runs too fast in the up direction, reverse the encoder wires at drive terminals A+ and A- (TB1-2 and TB1-3).
- b. When commanding an Inspection up direction, if the car runs too fast in the down direction, turn off main line power for 60 seconds then reverse motor field wires F1 and F2.
- c. When commanding an Inspection up direction, if the car runs in a controlled speed in the down direction, turn off main line power for 60 seconds then reverse motor field wires F1 and F2 and reverse the encoder wires at drive terminals A+ and A- (TB1-2 and TB1-3).

B1.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and the Measured speed values can be viewed in the Drive Performance Data window which can be accessed navigating to:

 Home 

 Troubleshoot 

 Drive 

 Drive Performance Data 



NOTE: Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.
- b. Obtain the value for function 11 (motor rpm) from the drive unit.
- c. If the car is running below commanded speed, increase drive function 11 (motor rpm).
- d. If car is running above commanded speed lower the value of function 11 (motor rpm), for example:
 - i. Car contract speed is 350 ft/ min
 - ii. Car measured speed is 370 ft/ min
 - iii. Drive function 11 is set to 125 rpm.
 - iv. Calculate the new value for function 11 $(125 \text{ rpm} \times 350\text{fpm}) / 370\text{fpm} = 118 \text{ rpm}$.
 - v. Program function 11 for new value of 118 rpm and repeat process, if necessary, until car speed is accurate within 1%.
 - vi. Observe that the correct car speed is displayed in drive function 600.
- e. Refer to section B1.2.1 to permanently store the new rpm parameter value.

B1.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort.

B1.6.1 Verify Proper Counterbalance

With the cab in the middle hoistway with balanced load, verify the up and down current output at drive function 611 (motor armature current) is equal in magnitude but opposite in polarity. Make any necessary weight adjustments to the cab or counterweight to achieve a proper balanced load.



NOTE: Balanced load is defined to be between 40% and 50% of the rated elevator load capacity, use 45% to verify proper counterbalance.

B1.6.2 Gain Parameters Adjustment

There are three sets of Gain parameters utilized by the drive unit to best control motor performance. Each set affects the control performance at different stages of the motor control as follows:

- a. Run the elevator at contract speed and verify the car speed with a handheld tachometer. Make any adjustments required to fine-tune the contract speed by adjusting drive function 11 (motor rpm).
- b. Run the elevator to a floor near the bottom of the hoistway. Place a full load in the elevator.
- c. Place the controller on Test mode of operation. On the drive access function 610 (motor armature voltage). Press the data/function button to display the motor armature voltage.
- d. Place a car call near the top of the hoistway while observing the motor armature voltage displayed on the drive.
- e. Compare the observed motor armature voltage to the motor nameplate armature voltage. If the observed drive motor armature voltage is above the motor nameplate armature voltage, reduce drive function 49 (motor field weakening current) until the motor nameplate armature voltage is achieved while running full load in the up direction.



NOTE: If the elevator system utilizes a geared machine, motor field weakening adjustments will likely not be required. On geared installations it may be required to increase drive function 50 (full motor field current) to achieve rated motor armature voltage while running full load in the up direction.



WARNING: Use caution not to exceed rated motor field current to prevent damage to the motor fields.

- f. If the observed drive motor armature voltage is below the motor nameplate armature voltage, increase drive function 49 (motor field weakening current) until the motor nameplate armature voltage is achieved while running full load in the up direction.
- g. Once the motor field has been calibrated, the per unit system inertia (drive function 41) must be calibrated. Use the drive default values for function 39 (high speed bandwidth = 6.0), 40 (low speed bandwidth = 6.0), 41 (per unit inertia = 2.00) and 42 (stability = 1.0). With a balanced load in the cab, run the elevator up and down between two selected landings that are far enough apart that the elevator reaches contract speed. Observe the car speed at drive function 600 while repeatedly running between the two landings. The objective is to have the car accelerate to contract speed without speed overshoot or undershoot in either direction of travel. If speed overshoot is observed, increase the drive function 41 (per unit inertia) proportionally to the amount of overshoot. If the speed ramps up as expected, but slowly creeps in to contract speed (undershoot), decrease drive function 41 (per unit inertia). Once the drive's per unit inertia (function

41) has been optimized, refer to section B1.2.1 to save the drive parameters.

- h. Once the per unit inertia has been optimized, adjust function 40 (low speed bandwidth) and function 42 (stability) for optimum performance empty car, balanced car and full car for both long and short floor runs.
- i. In the event rope resonance is observed or vibration when traveling into upper landings is observed, increase function 107 (tach rate gain) in 0.1% increments until resonance or vibration is eliminated. It is advisable to set this function for the lowest possible value to maintain consistent performance.



NOTE: While manipulating drive parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive parameters, observe that rollback and floor overshooting does not occur due to lack of control.



NOTE: Parameter manipulation should be performed in the following sequence: Function 41 (per unit inertia), function 40 (low speed bandwidth), function 42 (stability) then function 107 (tach rate gain).

- j. Once the final drive adjustment has been completed, refer to section B1.2.1 to save the drive parameters.

B1.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a higher rpm than the hoist motor rpm to create an overspeed condition by manipulating drive function 12 (overspeed percentage), 80 (overspeed test) and 81 (overspeed multiplier).

To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Multiply the value in drive function 12 (overspeed percentage) by 1.25.
- d. Change drive function 80 (overspeed test) from OFF to On. This will allow for the drive to overspeed the elevator for one run only.
- e. Multiply the value in drive function 81 (overspeed multiplier) by 1.25.
- f. Enter a car call for an intermediate landing.
- g. Car will overspeed to 125% of contract speed.



NOTE: If additional overspeed tests are required, drive function 80 will have to be set to On for each subsequent test.



WARNING: When performing an overspeed test, **MAKE SURE** function 12, 80 and 81 **ARE RESET** to the original values once testing has been completed.

B1.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive function 183 to 1 (excessive motor field current). The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once the test has been completed, reset drive function 183 to 3 (run engaged).


Appendix B2

Quattro SCR Drive for DC Motors

B2 Quattro Elevator Drive Overview

The Quattro elevator drive unit (the Drive from here on) incorporates innovative technology and special hardware to deliver a long, maintenance free service life. Advanced control functions provide optimum operation of DC motor applications for geared and gearless elevator systems.

Review and become familiar with the manufacturer's Quattro Drive User Manual (the Drive Manual). Pay attention to all safety precautions. This Appendix contains no explanation of the digital operator interface – refer to the Drive Manual.

 **NOTE:** The Quattro drive is normally provided in its own enclosure, separate from Pixel control enclosure, therefore interconnect wiring between the two must be field performed.

B2.1 Drive Interface Overview

Pixel's interface to the Quattro drive requires the drive to operate in closed loop mode – i.e., the drive interface must utilize speed feedback via an encoder coupled to the hoist motor. Page 1 of the job prints illustrates the interface to the drive, which consists of following basic drive inputs:

- l. Hardware enable inputs
- m. RS422 Communications channel
- n. Power inputs to terminals TB1-1, TB1-2 and TB1-3
- o. Encoder inputs
- p. Safety Chain Input

The basic drive outputs are:

- i. Armature Variable DC voltage to the motor through the contactor
- j. Motor field Variable DC Voltage
- k. Drive Ready output (drops DSAF controller input if a fault condition is detected)
- l. Brake Pick output
- m. Drive Output Power (to controller Safety Chain contacts)
- n. Motor Contactor dry contact output (Contactor redundancy monitoring)

B2.2 Job Parameters Verification

Use the Drive Interface to verify that the parameter list – provided on page QR7/ DPS of the job prints – matches with actual drive programmed parameters.

Page QR7/ DPS of the job prints allocates three columns for parameter settings. The first column is the manufactures **Default Settings**. The second column is the **EC Settings** of starting values that have been programmed in the drive. The third column is the **Field Settings**, which the adjustor must enter as the final parameter values.



NOTE: While performing the installation startup, make sure parameters programmed match with the **EC Setting** column. If replacing the drive, make sure parameters match with the **EC Settings** and **Field Settings** columns.



NOTE: Do not change any parameters except those found on Page QR7/ DPS of the job prints. Other parameters are either not used for your particular application or are pre-programmed by EC to default settings.

Reference the parameter table below to confirm the job specific motor control parameters:

A1 Menu	Drive Parameter:	Description:
CONTRACT CAR SPEED	Rated Car Speed	The value entered in this parameter should match the Rated Car Speed as listed on page 1 of the job prints.
CONTRACT MTR SPEED	Rated Motor RPM	The value entered in this parameter should match the Motor Nameplate RPM as listed on page 1 of the job prints.
ENCODER PULSES	Encoder PPR	The value entered in this parameter should match the Encoder resolution supplied as listed on the page 1 of the job prints.

A5 Menu	Drive Parameter:	Description:
INPUT L-L VOLTS	AC Line Voltage Input	The value entered in this parameter should match the Drive input voltage at terminals TB1-1, TB1-2 and TB1-3 as listed on page 1 of the job prints.

A6 Menu	Drive Parameter:	Description:
RATED MOTOR CURR	Rated Armature Current	The value entered in this parameter should match the Motor Nameplate Armature Amps as listed on page 1 of the job prints.
RATED ARM VOLTS	Rated Armature Voltage	The value entered in this parameter should match the Motor Nameplate Armature Voltage as listed on page 1 of the job prints.
FULL FLD CURRENT	Rated Field Current	The value entered in this parameter should match the Motor Field Forcing Voltage divided by the Motor Field Resistance as listed on page 1 of the job prints.
WEAK FLD CURRENT	Weakening Field Current	The value entered in this parameter should match the Motor Field Running Voltage divided by the Motor Field Resistance as listed on page 1 of the job prints.
STANDBY FIELD	Standby Field Current	The value entered in this parameter should match the Motor Field Standing Voltage divided by the Motor Field Resistance as listed on page 1 of the job prints.

B2.3 Autotuning

The drive has a built in Autotuning function. When the Autotuning function is performed, the drive calculates the motor armature circuit inductance, armature circuit resistance, motor field resistance, motor field inductance, motor field time constant and the motor armature voltage drop at motor rated current. The following procedure can be use to perform motor Autotuning:



WARNING: Have personnel prepared to remove main line disconnect power during this procedure in the event the motor begins to rotate. If the motor rotates, immediately remove power from the controller by turning off the main line disconnect switch.

- a. Remove the field wire at controller terminal B1 (brake coil) to prevent the brake from lifting during the Autotuning process.
- b. The drive must not have any faults in order to proceed with the Autotuning.
- c. The controller safety circuit must be made up in order to proceed with Autotuning.
- d. 15 seconds must elapse prior to reattempting Autotuning.
- e. The Autotuning process may take up to 1 minute to complete. The drive will display AUTOTUNE DONE when the procedure is complete.
- f. To perform the motor Autotuning, access the AUTO TUNE MOTOR parameter in the drives A4 menu.
- g. Press the Enter key. If there are any active faults, the drive will display Not Available at This Time and the Autotuning procedure cannot be completed.
- h. If there are not any faults present, the drive will display PRESS ENTER TO CONFIRM REQUEST.
- i. Press Enter to begin the Autotuning process. There will be 5 sections within the Autotuning process (Tuning #1, Tuning #2, Tuning #3, Tuning #4 and Tuning #5).
- j. If the motor Autotuning is successful, the drive will display AUTO TUNE DONE.
- k. If the motor Autotuning is not successful, the drive will display AUTO TUNE HAS ABORTED. Pressing the drives Enter key will display the fault the occurred during Autotuning.
- l. Once Autotuning has been completed, reconnect the field wire to controller terminal B1 (brake coil).

B2.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regard to motor rotation vs. command direction. For example, if Pixel issues a command to drive the cab up, the motor must drive the cab in the up direction. If this command results in the motor driving the cab in the opposite direction or if the motor runs too fast, the following steps must be taken.

- a. When commanding an Inspection up direction, if the car runs too fast and the drive trips with a Speed Deviation fault, reverse the encoder direction from its current setting using the ENCODER CONNECT parameter in the drives C1 menu. The encoder phasing should match the motor rotation.
- b. When commanding an Inspection up direction, if the car runs in the down direction reverse the motor direction from its current setting using the MOTOR ROTATION parameter in the drives C1 menu.

B2.5 Commanded vs. Measured Speed Calibration

Pixel commanded speed must be calibrated to the actual elevator car speed. During initial Construction Mode installation, prior to the installation of the Landa Landing System, a handheld tachometer must be used to verify the car speed. Once the Landa Landing system has been installed, both the Commanded and the Measured speed values can be viewed in the Drive Performance Data window which can be accessed as follows:

 Home 

 Troubleshoot 

 Drive 

 Drive Performance Data 



NOTE: Drive Performance Data is a view only submenu, no parameter manipulation is allowed in this window.

The commanded speed scaling needs to be adjusted in the drive unit as follows:

- a. Using a handheld tachometer, measure the car speed. If measuring the car speed on Inspection mode allow a few seconds for inspection speed to settle, if on Automatic operation have the car perform as long a possible multi floor run. Make note of the measured car speed.
- b. Obtain the value of parameter CONTRACT MTR SPD in the drive's A1 parameter menu.
- c. If the car is running below commanded speed, increase the CONTRACT MTR SPD parameter (motor rpm).
- d. If car is running above commanded speed lower the value of CONTRACT MTR SPD (motor rpm), for example:
 - i. Car contract speed is 350 ft/ min
 - ii. Car measured speed is 370 ft/ min
 - iii. Drive function CONTRACT MTR SPD is set to 125 rpm.
 - iv. Calculate the new value for the CONTRACT MTR SPD parameter $(125 \text{ rpm} \times 350 \text{ fpm}) / 370 \text{ fpm} = 118 \text{ rpm}$.
 - v. Program CONTRACT MTR SPED for the new value of 118 rpm and repeat process, if necessary, until car speed is accurate within 1%.
 - vi. Observe that the correct car speed is displayed in the Speed Feedback parameter in the drives D1 menu.

B2.6 Motor Control

The drive unit needs to provide both speed regulation and ride comfort regardless of Pixel's commanded speed. This is achieved by adjusting the "Drive Gains" thus changing the sensitivity with which the drive follows the commanded speed without undesirable vibration or discomfort.

B2.6.1 Verify Proper Counterbalance

With the cab in the middle hoistway with balanced load, verify the up and down current output in the Armature Current parameter in the drives D2 menu is equal in magnitude but opposite in polarity. Make any necessary weight adjustments to the cab or counterweight to achieve a proper balanced load.



NOTE: Balanced load is defined to be between 40% and 50% of the rated elevator load capacity, use 45% to verify proper counterbalance.

B2.6.2 Gain Parameters Adjustment

B2.6.2.1 Motor Field Adjustment

The hoist motor field should be adjusted such that rated hoist motor armature voltage is achieved running full load in the up direction.

- a. With a full load in the elevator cab, compare the measured motor armature voltage to the motor nameplate armature voltage while running in the up direction. If the measured armature voltage is above the motor nameplate armature voltage, reduce drive parameter WEAK FLD CURRENT in the drives A6 menu until the nameplate armature voltage is achieved while running full load in the up direction.



NOTE: If the elevator system utilizes a geared machine, motor field weakening adjustments will likely not be required. On geared installations it may be required to increase drive parameter FULL FLD CURRENT in the drives A6 menu to achieve rated motor armature voltage while running full load in the up direction.



WARNING: Use caution not to exceed rated motor field current to prevent damage to the motor fields.

- b. If the observed drive motor armature voltage is below the motor nameplate armature voltage, increase drive parameter WEAK FLD CURRENT in the drives A6 menu until the motor nameplate armature voltage is achieved while running full load in the up direction.

B2.6.2.2 System Inertia Calculations

The drive software can calculate the inertia for the elevator system, which is used to accurate tuning of the drives speed regulation. The following procedure can be used to estimate the elevator system inertia:

- a. To properly calculate the system inertia, the drive cannot be weakening the motor field. Make a note of the current setting of the WEAK FLD CURRENT in the drives A6 menu. To temporarily disable motor field weakening, set the WEAK FLD CURRENT in the drives A6 menu equal to the FULL FLD CURRENT in the drives A6 menu.
- b. With a balanced load in the elevator cab, run the car at 100% contract speed from the top floor to the bottom floor then back to the top floor while observing the drives EST INERTIA parameter in the D1 menu.
- c. Make notes of the EST INERTIA value in the drives D1 menu for both the up and down directions.
- d. Average the up and down EST INERTIA values in the drives D1 menu and enter this value in the drives INERTIA parameter in the A1 menu.
- e. Re-enter the original value of the WEAK FLD CURRENT in the drives A6 menu.

B2.6.2.3 Motor Response Adjustment

The drive response sets the sensitivity of the drive's speed regulator software to follow the speed profile reference; Response needs to be adjusted to achieve optimum motor control while maintaining stability. The following procedure can be used to adjust the drives response:

- a. Once the per unit inertia has been optimized, adjust the RESPONSE parameter within the drive's A1 menu for optimum performance empty car, balanced car and full car for both long and short floor runs.
- b. In the event rope resonance is observed or vibration when traveling into upper landings is observed, increase parameter Tach Rate Gain in the drives A1 menu in 0.1% increments until resonance or vibration is eliminated. It is advisable to set this function for the lowest possible value to maintain consistent performance.



NOTE: While manipulating drive parameters, observe that incrementing values does not induce vibration or performance instability. When decrementing drive parameters, observe that rollback and floor overshooting does not occur due to lack of control.



NOTE: Parameter manipulation should be performed in the following sequence: Inertia, Response, and Tach Rate Gain.

B2.7 Overspeed Using the Drive to Drive the Hoist Motor

The drive unit can be configured to run the hoist motor at a higher rpm than the hoist motor rpm to create an overspeed condition by manipulating drive parameter OVERSPEED MULT (overspeed percentage) in the drive's A1 menu and parameter OVERSPEED TEST in the drives U4 menu.

To overspeed the car to 125% of contract speed perform following steps:

- a. Set the TEST switch, located on the MP board, to the TEST position to enable Test Mode operation and disable door operation.
- b. Run an empty car to the bottom landing, or a fully loaded car to the top landing.
- c. Set the value in drive parameter OVERSPEED MULT in menu A1 for the percentage the car is desired to overspeed.
- d. Set the value in drive parameter OVERSPEED TEST in menu U4 to YES.
- e. Enter a car call for an intermediate landing.
- f. Car will overspeed to the percentage of contact speed programmed in drive parameter OVERSPEED MULT in menu A1.
- g. If additional overspeed tests are required, the OVERSPEED TEST parameter in menu U4 will have to be programmed to YES for each subsequent test.
- h. Once the overspeed tests have been completed, confirm that the drive parameter OVERSPEED TEST in menu U4 is programmed to NO.

B2.8 Program Run Output to Drive Ready

The drive can be configured so that the RUN output can be turned on to facilitate safeties testing such as for Unintended Movement Test, Ascending Car Overspeed, etc. to allow the brake to energize without the drive unit brake control enable.

- a. Temporarily re-program drive parameter Relay Coil 1 from Brake Pick to Not Alarm in menu C3. The RUN relay will energize once the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
- b. Once test has been completed, reset drive parameter Relay Coil 1 from Not Alarm to Brake Pick in menu C3.

Appendix C

Load Weighing Device Installation and Pre-Torque

i **NOTE:** For the Henning Weight Watcher AE12 load weigh device skip to Section C2 below.

C1 Dinacell DCLO Load Weighing Device

The DLCO load weighing device has great flexibility. It can operate with several different load weigh sensor types. The sensors also can be easily changed or removed, via the USB Load Cell Ports. Due to this flexibility, it is necessary to configure a number of parameters before calibrating the DLCO Load Weigh Device (LWD).



C1.1 Load Weighing Device Components

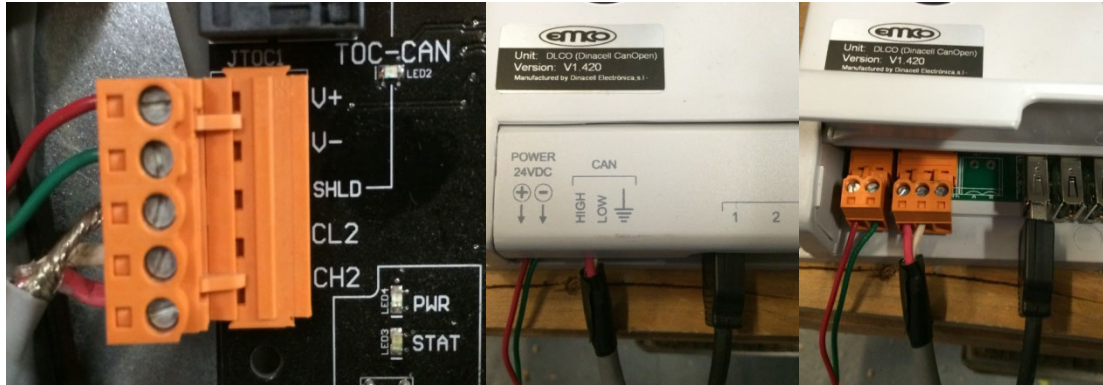
Dinacell DLCO CAN-OPEN Microprocessor Unit Software Version 1.420 or later, support interface sensor types below:

- SWK = Rope Sensors (one sensor per rope). Number of ropes and rope diameter required.
- LCA = Rope Sensor System (single unit for all ropes). Number of ropes and rope diameter required.
- TCA = Under the Cab Sensor (isolated platform sensors). Each sensor has a maximum capacity of 1,763lbs (800kg). A maximum of 8 TCA sensors can be grouped together in parallel for a capacity of 14,100lbs (6,400kg).
- SV-3000 = Crosshead Deflection Sensor. Additional sensors may be added for increased load accuracy.

C1.2 Setup Installation

1. Install the DLCO LWD on the elevator car top or in the machine room as required for your installation, refer to job prints pages QR3 or QR4.

2. For Car Top Installation using (2) 18AWG and (1) Shielded Pair to interconnect the DLCO LWD to the P-TOC board. Refer to Pixel cartop wiring diagrams for more details.
P-TOC (JTOC1)toDLCO LWD
V+toPower 24VDC +
V-toPower 24VDC –
CH2toCAN HIGH
CL2toCAN LOW
Connect the shield to the SHLD terminal on the P-TOC board only.



P-TOC Board JTOC1 terminal block DLCO LWD connection terminals

3. Machine room installation, where the load weighing rope sensors will be installed by the car Shackles, use (2) 18AWG and (1) Shielded Pair interconnect the DLCO LWD to controller P-TB-C and P-TB-M boards. Refer to, refer to job prints pages QR4 for wiring details.

NOTE: Place the DLCO LWD unit close to the car shackle's location to allow the rope sensors wires to reach the USB connections in the DLCO LWD unit.


C1.3 DLCO LWD Configuration Setup


There are three different buttons at the DLCO LWD:



MENU –This button enters and navigates through the programming menu. With this key you can also confirm any parameter changes. When a parameter is modified, you must press MENU, then the display will blink for a few seconds, and


you must confirm the new parameter value by pressing MENU again. If MENU is not pressed as the display blinks, the value will not be changed.

 (RT Arrow) This button is used to access modification mode of any parameter when displayed. This button is used to change the blinking digit at modifying mode.

 (UP Arrow) This button is used to increase the value of the blinking digit at modifying mode.

Example of modifying a parameter setting:

1. Press the MENU button to enter the Quick Navigation Menu. Press the MENU button again to skip to the next parameter in the menu.
2. To access the parameter, press the RT Arrow. The parameter will be displayed.
3. To modify the parameter, press the UP Arrow. To select the next digit, press the RT Arrow.
4. To confirm the changes to the parameter, press the MENU button and the value will blink for a few seconds. Press the MENU button again while the value is blinking to confirm and save the new value. Otherwise, the value will not be changed.

 **NOTE:** At power-up verify the DLCO LWD software version displayed is (1.420) and if the CAN LED is not flashing, remove the two-position power connector from the DLCO unit and wait three seconds and reinstall.

C1.4 Parameter Configuration

Configure the following parameters prior to installing the load weigh sensors:

1. Perform a Factory Default parameter reset, refer to section C2.10 below.
2. **nSEn** = Number of sensors. This parameter must be set with the number of sensors for the installation. The range values are 1-10.
3. **SEnS** = Type of sensor. This parameter must be set with the type of sensor installed.
 - a. **S__1**= SWK Rope Sensors
 - b. **SV_3**= Crosshead Deflection Sensors
 - c. **TCA** = Under the Cab Sensors
 - d. **LCA**= Rope Sensor System
4. **dIA** = If applicable – Diameter of Rope Sensors (6, 8, 9, 10, 11, 12, 13, 14, 15, 16)
5. **IrEF** = If applicable – Rope Sensor Error Offset
The rope sensor error offset for SWK and LCA sensors must be completed

uninstalled from the ropes. Every sensor plugged into the USB connectors has an offset error; this error is eliminated by setting the initial reference (IrEF) of the sensor. The IrEF operation must be done for all rope sensors. The sensors must be plugged into USB 1 from left to right. Press RT Arrow, and then use the UP Arrow to select ALL. Press the MENU button and as ALL blinks press the MENU button again. The display will go back to IrEF.

6. **tYPE** = If applicable - Roping 1:1 or 2:1
7. **bAud** = _125 or _250. This should be set to _125 (125kbits/s) for Pixel Controllers.
8. **Unit** = set to _Lb for up to 9999 Lbs capacity and to _Lb1 for jobs 10000 Lbs or more capacity.
9. Verify the CAN LED is flashing (this confirms communication to the P-TOC board).

C1.5 Calibrating the DLCO Load Weighing Device

With the elevator Cab at the bottom landing follow calibration process below for empty and full load car, make sure test weights are available to be placed in the cab as instructed:

1. Mount the load weigh sensors according to the installation instructions provided with the sensor.
2. **CerO** (Zero Setting Operation): This process will calibrate an empty carload.
 - a. Press and hold down the MENU button for 2 seconds, until CerO is displayed.
 - b. Press the RT Arrow button. 0005 will be displayed. This is the countdown timer for the user to step off of the cartop. The timer can be changed, if additional time is required to exit the cartop.
 - c. Verify the car is empty.
 - d. Press the MENU button and the display will begin to blink, and then press the MENU button while the display is blinking. The countdown timer will begin. Once the countdown has completed the empty car value is saved. The display will return to CerO.
3. Press the MENU button to get to PESO (Load Learn Operation) place full load capacity in the cab.
 - a. Press the RT Arrow at the PESO display.
 - b. Using the RT Arrow to navigate the digits and the UP Arrow to change the value, enter the weight (lbs) that will be installed into the elevator cab.

i **NOTE:** For jobs with capacity over 9999 Lbs, Load weighing device loaded with software version 1.440 or latter is required. The weight value over 10000 pounds will be displayed by the four digits and a dot on the lower right corner of the least significant digit, i.e 1500. indicates 15000 lbs.

- c. Load the test weights (lbs) into the elevator cab.
 - d. Press the MENU button and the display will begin to blink, and then press the MENU button while the display is blinking. The countdown timer will begin. Once the countdown has elapsed the load in the car will be saved. The display will return to PESO.
4. The remaining parameters are used for diagnostic purposes and can be skipped by pressing the MENU button, until the load weight is displayed. For applications using SV_3, Crosshead Deflection Sensor(s), AUTO parameter requires a setting of 0000.

CELL = 1000-9000

PSEn = Individual sensor weight

AUTO = 0000 no automatic reset.

i **NOTE:** SV_3, Crosshead Deflection Sensors applications require setting of Parameter AUTO = 0000.

rESE = A setting of YES cause all parameters to be defaulted

5. While observing the DLCO display, remove the weight from the elevator cab. The weight displayed on the LWD should be fairly accurate corresponding to the amount of weight being removed. If not, verify all of the above procedures were completed in the proper order and the load sensor devices were installed according to the manufacturer installation instructions.

C2 Henning Weight Watcher AE12 load weigh device

The Henning Weight Watcher AE12 load weigh device has great flexibility. It can operate with several different load weigh sensor types which can be easily added, removed or exchanged, via the Load Cell Ports. Due to this flexibility, it is necessary to configure a number of parameters before using the Henning Weight Watcher AE12 Load Weigh Device (LWD).



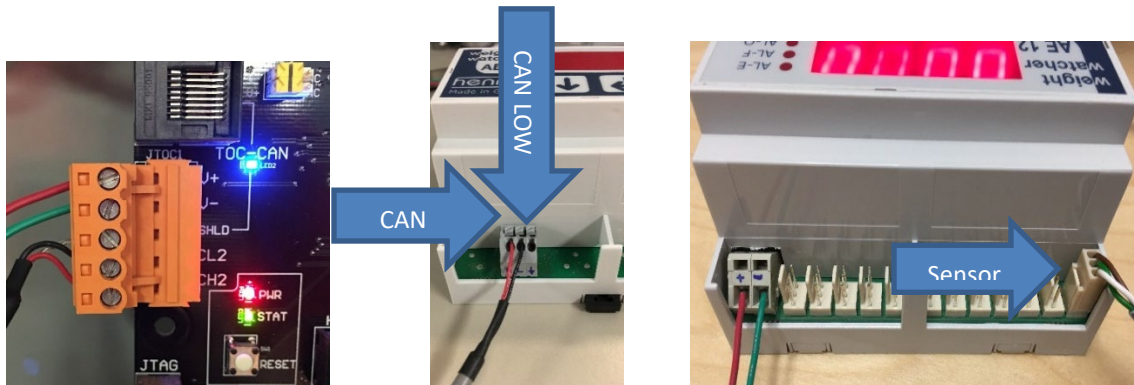
C2.1 Load Weighing Device Components

The Henning Weight Watcher AE12 CAN-OPEN Load Weigh Unit Version 1.24H or latter supports the following sensor types:

- a. LS 12 = Load sensor LS 1 and load sensor LS 2 (one sensor per rope)
- b. 300 = Donut sensor RC 300 (one sensor per rope)
- c. 500 = Donut sensor RC 500 (one sensor per rope)
- d. 1000 = Donut sensor RC 1000 (one sensor per rope)
- e. 3500 = Donut sensor RC 3500 (one sensor per rope)
- f. 2000 = Load sensor LS 2000 (one sensor per rope)

C2.2 Setup Installation

1. Install the Henning Weight Watcher AE12 on the elevator car top or in the machine room as required for your installation, refer to job prints pages QR3 or QR4.
2. Car Top Installation using (2) 18AWG and (1) Shielded Pair to interconnect the DLCO LWD to the P-TOC board. Refer to Pixel cartop wiring diagrams for more details
P-TOC (JTOC1)toDLCO LWD
V+toPower 24VDC +
V-toPower 24VDC –
CH2toCAN HIGH
CL2toCAN LOW
Connect the shield to the SHLD terminal on the P-TOC board only.



P-TOC Board JTOC1 terminals Henning Weight Watcher AE12 LWD connection terminals


3. Machine room installation, where the load weighing rope sensors will be installed by the car Shackles, use (2) 18AWG and (1) Shielded Pair interconnect the Henning Weight Watcher AE12 to controller P-TB-C and P-TB-M boards. Refer to, refer to job prints pages QR4 for wiring details.



NOTE: Place the Henning Weight Watcher AE12 unit close to the car shackle's location to allow the rope sensors wires to reach the harness connections in the Henning Weight Watcher AE12 unit.

4. Connect the load sensors starting from left at channel 1, add in sequence, no gaps in between sensor ports.

C2.3 Henning Weight Watcher AE12 Configuration Setup

 **NOTE:** The LED Status indicators are not used for CAN based applications.

There are three different buttons at the Henning Weight Watcher AE12:



- (DN Arrow) This button enters and navigates through the programming menu.




- (LT Arrow) This button is used to access the modification mode of any parameter when displayed. This button is used to change the blinking digit at modifying mode and also to confirm parameter changes.



- (X Button) This button is used to cancel the modified value. Repeatedly pressing this button will also lead to the display of the total current measured weight.

Example of modifying a parameter setting:

1. Press the DN Arrow to enter the individual items menu. Press the DN Arrow again to skip to the next parameter.
2. To access the parameter, press the LT Arrow. The parameter value will be displayed.
3. To modify the parameter, press the DN Arrow. To select the next digit, press the LT Arrow.
4. To save the new parameter value, press the LT Arrow until the individual item's menu is displayed.

 **NOTE:** The Henning Weight Watcher AE12 software version can be displayed by pressing the DN Arrow repeatedly until 1.24H or later is displayed.

C2.4 Parameter Configuration

Configure the following parameters prior to installing the load weigh sensors:

1. **SEnS** = Sensor model. This is the type of sensor being installed.
 - a. **LS 12** = Load sensor LS 1 and load sensor LS 2
 - b. **dnut**: The following selections are available for the donut sensors
 - i. 300 = Donut sensor RC 300
 - ii. 500 = Donut sensor RC 500
 - iii. 1000 = Donut sensor RC 1000

- iv. 3500 = Donut sensor RC 3500
 - c. 2000 = Load sensor LS 2000
- 2. **rCnt** = Number of sensors. This parameter must be set with the number of sensors for the installation. The range value is 1-12.
- 3. **rFCt** = Roping ratio
 - a. 1:1 set to 01
 - b. 2:1 set to 02
- 4. **Unit** = Unit adjustment of the displayed weight. Set to **LbS** to display weight in pounds.
- 5. **CAn** = Adjustments of the CAN Open parameters
 - a. **Id** = Required CAN ID. Set to 0001.
 - b. **bAUd** = baud rate(kbit/s) for the CAN communication. Set to 125.
 - c. **tPdo** = COB-ID and PDO settings. Enter to adjust the following parameter:
 - i. **t-id** = COB-ID. Set to 0385.

C2.5 Calibrating the AE12 load weigh device

With the elevator cab at the bottom landing follow the tare process, to eliminate the empty car weight and just measuring the load in the cab:

1. Mount the load weigh sensors according to the installation instructions provided with the sensor.
2. **CeRO** (Zero Setting Operation): This process will calibrate an empty car load.
 - a. Verify the car is empty.
 - b. Press the DN Arrow until the CEro menu is displayed.
 - c. Press the LT Arrow twice, 9999 will be displayed and the countdown timeout to allow the user to step off from the cartop for units installed on top of the car. This timeout is fixed and cannot be adjusted.



NOTE: Full load calibration does not need to be performed.

3. While observing the Load weighing display, add and remove weight from the elevator cab, the weight displayed on the device should be accurate. If not, verify steps on sections C2.4 and C2.5 above were completed in the proper order and the load sensor devices were installed according to the manufacturer installation instructions.

C3 Load Weighing and Pre-Torque Overview

Load weighing information provides Pixel car controller with desirable information to optimize elevator call assignment, anti-nuisance functionality, and may be used to enable Pre-Torque operation to reduce or eliminate rollback, Pixel will utilize

the load weighing information to create a pre-torque command to be applied to the motor control speed command before starting a run. The amount & direction (positive or negative) of pre-torque applied at the start of motion is calculated based on the following:

1. Position Based Component: load due to the length of hoist ropes hanging on either side of the sheave depending on the position of the car in the hoistway shaft.
2. Load Based Component: cab weight, in-car load, items hanging from the bottom of the cab (e.g., traveler cable, compensation ropes).

The “Position Based Component” is calculated based upon the knowledge of car position and an empirically determined calibration setting at the top and bottom landings.

The “Load Based Component” is calculated and learned using the load-weighing device (CAN based communication) values for full and empty load at each landing.

C3.1 Load Weighing and Pre-Torque Operation Requirements

- a. Calibrated CAN based Load Weigh Device
- b. Learn Empty and Full Cab values for each landing
- c. Set the Pre-Torque Option = YES
- d. Positional Learn calibration at top and bottom landing (balanced load)
- e. Pre-Torque Up Percentage calibration (full load at hoistway midpoint)
- f. Pre-Torque Down Percentage calibration (empty cab at mid hoistway)



NOTE: For load weigh device installation procedures refer to Appendix C1.1 for Dinacell DCLO or C2.1 for Henning Weight Watcher AE12 above.

C3.2 Verify Pixel Parameter Settings

Verify Pixel parameters are set to interface with a CAN Based load weighing device navigate to:

 **Home** 





 **Install** 

 **Initial Settings** 

 **Load Weighing Config** 

 **Load Weighing Device**   **CAN Based** 

 **Cab Capacity**   **“Set to Full load capacity of Cab”** 

 **Overload Capacity**   **“100% to 115% of Full Load Capacity”** 

🔧 Heavy Load Capacity 🟢 🔧 “80% to 100% of Full Load Capacity” 🟢

🔧 Light Load Capacity 🟢 🔧 “20% to 30% Full Load Capacity” 🟢

🔧 Directional Load Capacity 🟢 🔧 “50% Full Load Capacity” 🟢

🔧 Pre-Torque Option 🟢 🔧 “No” 🟢, To be set = YES once load learn Process has been completed, section C.2.4 below.

🔧 Automatic Recalibration 🟢 🔧 “Daily (default) or Weekly” 🟢

🔧 Recalibration Day 🟢 🔧 “Recalibration Day of the week” 🟢

🔧 Recalibration Start Time 🟢 🔧 “Hour to start Recalibration process” 🟢

🔧 Recalibration End Time 🟢 🔧 “Hour to end Recalibration process” 🟢

📘 **NOTE:** Recalibration Start and End Times should be set to the hour interval when less elevator service demand may be present.

📘 **NOTE:** Verify Pixel time and date settings are correct for selected on time Load Weighing recalibration execution time.

🔧 # of Weigh Samples 🟢 🔧 “015” 🟢; number of sample weight readings averaged to create current weight value

🔧 Absolute Position Diff 🟢 🔧 “003” 🟢; reference position from last to new reading to allow new reading to take place (1 → 0.03). i.e., make sure the car is not moving to allow for new reading to be accurate.

🔧 Absolute Weight Diff 🟢 🔧 “0200” 🟢; weight used to filter unexpected readings while creating the average # of weight Samples entries


📘 **NOTE:** Setting the # of Weight Samples to ‘0’ will completely disable load weighing weight sample filtering, Pixel will continue reading weight values direct from the CAN Based Load Weigh Device without any filtration.

The Load Weighing Recalibration Timer can be adjusted to the required amount of time that the car must be idle (no demand) before the Auto Zero Operation is initiated navigating to:

🏠 Home 🟢

🔧 Install 🟢

 **Adjust** 

 **Car Performance** 

 **Timers** 

 **Load Weighing Recalibration Timer**  “Default 5 minutes”

The load weighing device errors can be tracked and store in Pixel fault logs by enabling the load weighing fault pending counts navigating to:


 **Home** 

 **Troubleshoot** 

 **Event Logs** 

 **Event Pending Counts** 

 **Communication Event Pending Counts** 

 **LWD Re-Cal Failure Fault**  “MP = 1 and SP = 0”

 **Load Weigh Communication**  “MP = 50 and SP = 0”

Then navigate to:

 **Home** 

 **Troubleshoot** 

 **Event Logs** 

 **Event Pending Counts** 

 **Function Event Pending Counts** 

 **Load Weigh Error**  “MP = 5 and SP = 0”

C3.3 Verify Load Weighing Device Performance



Verify the load weigh device is properly setup by placing the car on Independent service and a known load into the car at the bottom landing and navigating to:

 **Home** 


 **Install** 

 Learn Functions 

 Load Weighing Learn 

 Load Weighing Readings 

Under “Current Weight” observe displayed weight value, it should be within 5 to 10 pounds accurate.

 **NOTE:** The carload is weighed only when the car is stopped, and the doors are in the open position. A capacity setting of 000% will disable the corresponding load weighing dispatching function. Load weigh dispatch functions will not operate until both the Pixel Load Weighing Learn (empty & full load) process has been completed. All load weigh dispatch functions are disabled during fire service operation.

C3.4 Load Weighing Learn

Pixel needs to learn the weight of the cab empty and full to be able to calculate the Pre-Torque value required to dynamically compensate for load.

C3.4.1 Learn Empty CAB

1. Set Pre-Torque option = No, refer to section C3.2 Above.
2. Remove all weight from the cab.
3. Place the controller on TEST Mode operation.
4. Navigate to Learn Empty CAB and follow instructions on Pixel Display.

 Home 


 Install 


 Learn Functions 

 Load Weighing Learn 

 Learn Empty CAB 

 Cab Stop Settling Time  " Adjust setting time 30 Seconds"

 **NOTE:** The Cab Stop Settling Time is the amount of time the car will stop at the landing before recording the carload weight. This allows the load value to stabilize before it is saved, value may need to be increased, if the load measurement is not stable after 30 seconds.

5. Press the  Learn soft key, to learn position. Once activated the car will go to the bottom landing served and stop at each landing for the Cab Stop Settling Time. Then the empty load weight will be saved for the corresponding landing. After all landings have been learned the car will return to the landing where the Learn Empty CAB function was initiated.
6. Remove car from TEST to be able to allow door open operation.

C3.4.2 Learn Full CAB

1. Place full load into the cab and verify load value using on screen weight displayed, refer to section C3.3 above.
2. Place the controller on TEST Mode operation.
3. Navigate to Learn Full CAB and follow instructions on Pixel Display.

 Home 


 Install 


 Learn Functions 


 Load Weighing Learn 

 Learn Full CAB 

 Cab Stop Settling Time  " Adjust setting time 30 Seconds"

 **NOTE:** The Cab Stop Settling Time is the amount of time the car will stop at the landing before recording the carload weight. This allows the load value to stabilize before it is saved, value may need to be increased, if the load measurement is not stable after 30 seconds.

4. Press the  Learn soft key, to learn position. Once activated the car will go to the bottom landing served and stop at each landing for the Cab Stop Settling Time. Then the Full load weight will be saved for the corresponding landing. After all landings have been learned, the car will return to the landing where the Learn Full CAB function was initiated.
5. Remove car from TEST to be able to allow door open operation.
6. Remove test weights from the cab

 **NOTE:** Learned load weighing readings can be verified for empty and full load following procedure C2.3 above on a per landing basis.

C3.5 Manually Zero Load Weighing Device

To manually Zero the load weigh unit, in the event that the load weighing got out of calibration prior to scheduled Auto Recalibration timeout, drive the empty car to the bottom landing where the positional load does not affect the empty carload, navigate to:

 **Home** 

 **Install** 

 **Learn Functions** 

 **Load Weighing Learn** 

 **Load Weighing Readings** 

Press the  **Auto Zero** soft key.

C3.6 Pre-torque Calibration Procedure

The Pixel controller calculates and provides the drive the required amount of pre-torque for a given run, to prevent rollback at start of motion. In order to calculate the correct amount of pre-torque the following information needs to be learned by the Pixel controller:

1. Pre-torque value required for a balanced car at the top landing served.
 2. Pre-torque value required for a balanced car at the bottom landing served.
 3. Pre-torque value required for full car.
 4. Pre-torque value required for empty car.
- Midpoint: Location in the hoistway where the counterweight is adjacent to the car
 - Balanced load: The required carload that makes the counterweight equal to the total car weight. Example: If the elevator is 40% counterweighted, then the balanced load should be 40% of full load car capacity. Capacity 3,500lbs, balanced load would be $3500 \times 0.40 = 1,400\text{lbs}$.

Verify the calculated balanced load for the elevator is truly a balanced load. This can be achieved by the following methods: Place the calculated balanced load inside the car and run the car to the midpoint position on machine room inspection.

1. While monitoring the drive output current move the car in the up direction. From the midpoint run the car in the down direction. If the drive output current is equal in both directions, then the car is properly balanced. If not, note which direction required more current and adjust the carload to achieve the true balanced load condition.

2. Manually lift the machine brake (with no electrical control placed on the hoist motor) and observe if the car drifts away from the midpoint position. If it remains relatively stable, then the car is properly balanced. If the car drifts, note the direction of travel and adjust the carload to achieve a true balanced load condition.

C3.7 Positional Learn



To learn the pre-torque gain offset required based on the car position in the hoistway follow procedure below:

1. Set Pixel pre-torque parameters values to zero navigating to:

 Home 

 Install 

 Learn Functions 

 Pre-Torque Learn 

 Final Tuning 



To set the values for Position Top, Position Btm, Load Up and Load Down percentages to a value of 000.00%

2. Place a balanced load in the car.
3. Place the controller on TEST Mode operation.
4. Set the **Pre-torque Option = Yes**; refer to section C3.2 Verify Pixel Parameter Settings above.
5. Move the car to the top landing and navigate to:


 Home 

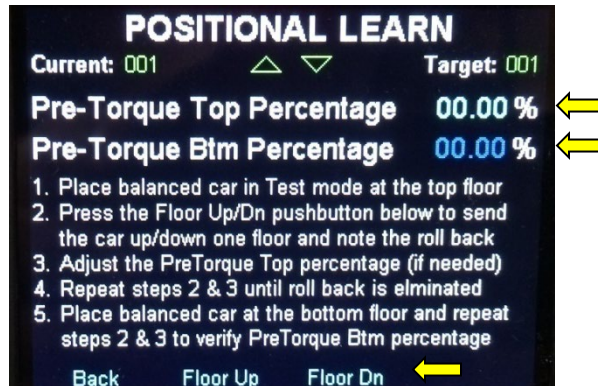
 Install 

 Learn Functions 



 Pre-Torque Learn 

 Position Learn , To display screen shoot below.

 **NOTE:** Verify the Pre-torque values for Positional Learn and Load Lean are all defaulted to 00.00%.



6. Using the Floor Dn and Floor Up buttons run the car between the top and 2nd from the top landings, while observing the drive sheave. If the car has rollback, adjust the Pre-Torque Top Percentage as needed (range of -99.99 to 99.99). Start in small increments of -1.00 and fine tune. Repeat the car runs between the two top landings until the rollback is eliminated. If the car starts to pull through, then the Pre-Torque Top Percentage has been set to high and it needs to be decreased.
7. Move the car to the bottom landing.
8. Using the Floor Up and Floor Dn buttons run the car between the bottom and 2nd landings, while observing the drive sheave. If the car has rollback, adjust the Pre-Torque Btm Percentage as needed (range of -99.99 to 99.99). Start in small increments of 1.00 and fine tune. Repeat the car runs between the two bottom landings until the rollback is eliminated. If the car starts to pull through, then the Pre-Torque Btm Percentage has been set to high and it needs to be decreased.

-  **NOTE:** Elevators with compensation systems (compensation cables), typically do not require pre-torque positional values. Or the values may be very low.
-  **NOTE:** If the car has severe rollback at the start of motion, do not use the terminal landings for the pre-torque positional learn. Use the landing below the top and the landing above the bottom; this will prevent the possibility of rolling back onto the final limits during the adjustment.

C3.8 Load Learn

To learn the pre-torque gain offset required based on the carload follow procedure below:

1. Place a full load in the car.
2. Place the controller on TEST Mode operation!
3. Move the car to the hoistway midpoint.
4. Place the controller on machine room inspection.

5. Record existing value and set Inspection Speed = 000fpm, navigate to:

■ Home U

⌚ Install U

⌚ Initial Settings U

⌚ Speed Profile U

⌚ **Inspection Speed** U ⌚ Set value to 000 fpm

Press the ■ **Save** soft key to Save

6. Navigate to:

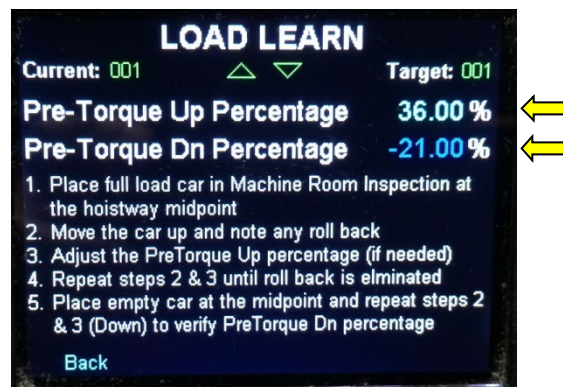
■ Home U

⌚ Install U .

⌚ Learn Functions U

⌚ Pre-Torque Learn U

⌚ Load Learn U, To display screen shot below.



7. Press the machine room inspection up and enable button (0fpm) and observe the direction of rollback on the drive sheave. Typically, the car should rollback in the down direction due to the full load. Increase the Pre-Torque Up Percentage (range of -99.99 to 99.99) in increments of 5.00 and fine tune. Repeat the inspection zero speed activation until the rollback is eliminated. If the car starts to pull through, then the Pre-Torque Up Percentage has been set to high and it needs to be decreased.

8. Remove all weight from the car (empty car)

9. Move the car to the hoistway midpoint (restore inspection speed setting, if required to position car at mid-point, refer to entry 5 above then set it back to 000fpm)
10. Press the machine room inspection down and enable button (0fpm) and observe the direction of rollback on the drive sheave. Typically, the car should rollback in the up direction due to the counterweight. Increase the Pre-Torque Dn Percentage (range of -99.99 to 99.99) in increments of -5.00 and fine tune. Repeat the inspection zero speed activation until the rollback is eliminated. If the car starts to pull through, then the Pre-Torque Up Percentage has been set to high and it needs to be decreased.
11. Restore Inspection Speed = recorded value from entry 5 above.

C3.9 Final Tuning

The final step is to test the ride quality under a range of load conditions. This can be achieved by placing a different load in the car and observing how the elevator starts motion at different landings.




The brake should be fully lifted before motion is started. If the car appears to be pulling through the brake at start, a speed delay may need to be added. This allows the brake to fully lift before the speed pattern is sent to the drive. Adjust the Pattern Delay in small increments (50msec) navigating to:

 Home 

 Install 

 Initial Settings 

 Speed Profile 

 **Pattern Delay**   Set value to ensure brake is picked prior to pattern speed command.

Adjust the Load Up and Load Dn Percentages to eliminate rollback under various load conditions and positions in the hoistway, navigate to:

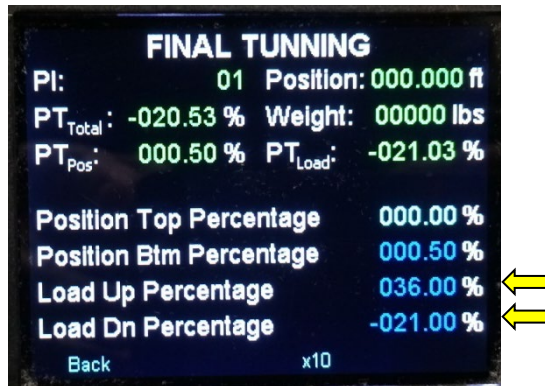
 Home 

 Install 

 Learn Functions 

 Pre-Torque Learn 

 Final Tuning , to display screen shot below



NOTE: The pre-torque output to the drive (PTTotal), pre-torque positional value (PTPos) and pre-torque load value (PTLoad) are displayed here, additionally, the car current PI, car position and carload are displayed to facilitate pre-torque fine-tuning.

NOTE: Safety and buffer tests may affect the load weigh device calibration. You may need to repeat the following setup procedures:

1. Load weighing device calibration
2. Empty and full load learn for each landing.
3. Pre-torque Up and Down Percentage calibrations

C3.10 Factory Default for Dinacell DCLO Load Weighing Only

Performing a Factory Default procedure will reset all internal device settings to factory defaults and prevent any previously stored settings from affecting a new set up. Follow steps below to reset unit to factory default settings:

1. Press and hold down the MENU button for 2 seconds, until the CerO is displayed.
2. Press the MENU button until rESE is displayed.
3. Press the RT Arrow button at the rESE display.
4. Press the UP Arrow button until YES is displayed.
5. Press the MENU button once and the YES being displayed will begin to blink.
6. Press the MENU button once again and the rESE will be displayed. This indicates that the Reset has been completed.

NOTE: The display will flash bOFF indicating that the load weighing device is no longer communicating. To resolve this, continue with instructions at C1.4 entry 2 above.

Appendix D –

Mnemonic Description Translation Tables

The Mnemonic may represent a Computer Input “I”, Output “O”, or an internally generated flag “F”. Each table below represents a group of Mnemonics associated with a screen shot on Pixel Display.



NOTE: Some flags are duplicated on several screens; this is done to facilitate troubleshooting while observing flags behavior.

Safety I/O Flags

Name	I/O/F	Description
GOV	I	Governor Switch
SAFC	I	Car Safety String
SAFH	I	Hoistway Safety String
ESTP	I	Emergency Stop Switch
UNL	F	Up Normal Limit Position
DNL	F	Down Normal Limit Position
DSAF	I	Drive Safety
RG	I	EB1-EB2 Contacts Monitor
RGBP	I	EBX2-EBX2 Contacts Monitor
RGOK	I	Rope Gripper Contact
TTM	I	Not currently used
BTM	I	Not currently used
STOP	I	AA Contactor Monitored Contact
Pin	I	P Contactor Monitored Contact
BKi	I	BK Contactor Monitored Contact
AAi	I	AA Contactor Output monitor
Pi	I	P Contactor Output monitor
BPI	I	Brake Picked Contact
mFRST	I	Logic Microprocessor Fault Reset
sFRST	I	Safety Processors Fault Reset
EQR	I	Earthquake Reset Push Button
STPPD	F	Car Stopped
SOvrd	F	Landa Position Override
DirOK	F	Pattern and Car Movement Agree
BK	O	BK Contactor Output
BH	O	BH Relay Output
BPWN	O	Brake Failed to Pick Warning Ind.
ESCO	O	Emergency Stop Override
MFPF	F	Motor Field Weakening Enabled
-	-	
AAo	O	AA Contactor Output
Po	O	P Contactor Output
EB1	O	EB1 Relay Output
EB2	O	EB2 Relay Output
EBX1	O	EBX1 Relay Output
EBX2	O	EBX2 Relay Output

Door Flags

Name	I/O/F	Description
DLAT	I	Door Lock Access Top
DLAB	I	Door Lock Access Bottom
DCAT	I	Door Closed Access Top
DCAB	I	Door Closed Access Bottom
NUDG	O	Nudging output Active
DLK	F	DLKF and DLKR both closed
CGF	I	Car Gate Front
DLSF	I	Int. Door Locks Front Closed
DCSF	I	Int. Door Closed Contacts Front Closed
DCLF	I	Door Close Limit Front
DOLF	I	Door Open Limit Front
DLKF	F	Front Door Locks & Contacts Closed
CGR	I	Car Gate Rear
DLSR	I	Int. Door Locks Rear Closed
DCSR	I	Int. Door Closed Contacts Rear Closed
DCLR	I	Door Close Limit Rear
DOLR	I	Door Open Limit Rear
DLKR	F	Rear Door Locks & Contacts Closed
PHEF	I	Photo Eye Front
SEF	I	Safety Edge Front
DHDF	I	Door Hold Button Front
PHER	I	Photo Eye Rear
SER	I	Safety Edge Rear
DHDR	I	Door Hold Button Rear
DCBF	I	Door Close Button Front
DCFF	O	Door Close Function Front
DCPF	F	Door Close Power Front
DOBF	I	Door Open Button Front
DOIF	F	Door Open Intent Front
DOFF	O	Door Open Function Front
DCBR	I	Door Close Button Rear
DCFR	O	Door Close Function Rear
DCPR	F	Door Close Power Rear
DOBR	I	Door Open Button Rear
DOIR	F	Door Open Intent Rear
DOFR	O	Door Open Function Rear

Inspection Flags

Name	I/O/F	Description
ICT	I	Car Top Inspection
ICTE	I	Car Top Inspection Enable
ICTU	I	Car Top Inspection Up
ICTD	I	Car Top Inspection Down
HDB	I	Hoistway Door Bypass
CDB	I	Car Door Bypass
IIC	I	In Car Inspection
IICE	I	In Car Inspection Enable
IICU	I	In Car Inspection Up
IICD	I	In Car Inspection Down
SAFH	I	Car Safety String
SAFC	I	Hoistway Safety String
IA	I	Access Inspection
IATU	I	Top Access Up
IATD	I	Top Access Down
IABU	I	Bottom Access Up
IABD	I	Bottom Access Down
IAOZ	F	Cab Outside Access Zones
IMR	I	Machine Room Inspection
IMRE	I	Machine Room Inspection Enable
IMRU	I	Machine Room Inspection Up
IMRD	I	Machine Room Inspection Down
RC	O	Retiring Cam Output Front
RCR	O	Retiring Cam Output Rear
DCLF	I	Door Close Limit Front
CGF	I	Car Gate Front
DLKF	F	Front Door Locks & Contacts Closed
DPMF	I	Door Position Front
DCFF	O	Door Close Function Front
DBF	O	Door Boost Function Front
DCLR	I	Door Close Limit Rear
CGR	I	Car Gate Rear
DLKR	F	Rear Door Locks & Contacts Closed
DPMR	I	Door Position Rear
DCFR	O	Door Close Function Front
DBR	O	Door Boost Function Rear

Emergency Service Flags

Name	I/O/F	Description
FON2	I	Alternate Fire Recall Switch
RES	I	Main Fire Recall Switch Reset Position
FOFF	I	Main Fire Recall Switch Off Position
FON	I	Main Fire Recall Switch On Position
FRA	I	Alternate Fire Recall Smog Detectors
FRS	I	Main Fire Recall Smog Detectors
HF1	I	Hoistway Smog Detectors Main Recall
HF2	I	Hoistway Smog Detectors Alt. Recall
FCS	I	Fire Phase 2 Switch On Position
F2OFF	I	Fire Phase 2 Switch Off Position
FCC	I	Fire Phase 2 Car Call Cancel
FDHD	I	Fire Phase 2 Switch Hold Position
FS1	O	Fire Phase 1 Output
85X	O	Fire Service Hat Indicator
FWI	O	Fire Warning Buzzer
CSAM	O	Canada Main Fire Indicator Output
CSAA	O	Canada Alternate Fire Indicator Output
CSB	F	Car Stop Bypass
HIS	I	Hospital Service Request
HSW	I	Hospital Service in Car Switch
HSEL	I	Car Selected for Hospital Service
ESTD	F	Emergency Slowdown Table Done
EmrSD	F	Emergency Slowdown Active
-	I	
EMT	I	Mass. Emergency Medical Svc. Request
EMT11	I	Mass. Emergency MedicalPhase1
EMT12	I	Mass. Emergency Medical Phase 2
EMTp1	O	Mass. Emergency Medical Phase1 Ind.
EMTp2	O	Mass. Emergency Medical Phase2 Ind.
EPS	F	Emergency Power Selected to Run
EPI	I	Emergency Power Active
EPPT	I	Emergency Power Pre-Transfer
CSI	I	Car Selected to Run on Emergency Pwr.
EPR	F	Car Running W/ Emergency Power
EP1	O	Emergency Power Phase1 Ind.
EP2	O	Emergency Power Phase2 Ind.

Motion Control Flags

Name	I/O/F	Description
SU	F	Car Intention to Run Up
SD	F	Car Intention to Run Down
RSU	F	Car Run Up
RSD	F	Car Run Down
SUA	O	Up Arrow
SDA	O	Down Arrow
HD	F	High Speed Delay
STU	F	Step Up
ISTU	F	Intermediate Step Up
STD	F	Step Down
ISTD	F	Intermediate Step Down
STC	F	Stepping Complete
H	F	High Speed
HI	F	High Intermediate Speed
RL	F	Car Releveling
LU	F	Car Leveling Up
LD	F	Car Leveling Down
RUN	F	Car in Motion
LVL	F	LU or LD
DZ	F	Car Inside Door Zone
TFX	F	Stepping Transfer Function
CSB	F	Car Stop Switch Bypass
EQS	I	Earthquake Operation Mode Active
MLT	F	Motor Limit Time Out
DMU	F	Demand Up
UPD	F	Up Previous Direction
UDP	F	Demand Up Previous Demand
FLU	F	Fudge Leveling Up
FLD	F	Fudge Leveling Down
PTR	F	Car Has Permission to Run
DMD	F	Demand Down
DPD	F	Down Previous Direction
DDP	F	Demand Down Previous Demand
ArRLU	F	Armed Releveling Up
ArRLD	F	Armed Releveling Down
DRun	F	Drive in Running Mode

Call Demand Flags

Name	I/O/F	Description
CCA	F	Car Call Above Car
CCB	F	Car Call Below Car
UPF	F	Up Front Hall Call
UPR	F	Up Rear Hall Call
DNF	F	Down Front Hall Call
DNR	F	Down Rear Hall Call
CCCIF	F	A Car Call Front Being Pressed
CCCIR	F	A Car Call Rear Being Pressed
UCAX	I	Up Hall Call Above Car
UCBX	I	Up Hall Call Below Car
DCAX	I	Down Hall Call Above Car
DCBX	F	Down Hall Call Below Car
CCF	F	Car Call Cancel Front
CCR	F	Car Call Cancel Rear
UCF	F	Up Call Cancel Front
UCR	F	Up Call Cancel Rear
DNCF	F	Down Call Cancel Front
DNCR	F	Down Call Cancel Rear
CCD	F	Car Call Disconnect
HCR	0	Hall Call Reject
HCD	F	Hall Call Disconnect
LCD	F	Lobby Call Disconnect
LT	F	Lobby Door Timer
TOS	F	Car Timed Out of Service
SDTF	F	Short Door Timer Front
CCTF	F	Car Call Door Timer Front
CCTR	F	Car Call Door Timer Rear
HCTF	F	Hall Call Door Timer Front
ADACF	F	A.D.A. Car Call Timer Front
ADAHF	F	A.D.A. Hall Call Timer Front
ISR	F	Car In Service and Ready
ISRT	F	Car Truly In Service and Ready
ISV	F	Car In Service
HCTR	F	Hall Call Door Timer Rear
ADACR	F	A.D.A. Car Call Timer Rear
ADAGR	F	A.D.A. Hall Call Timer Rear

Services Flags

Name	I/O/F	Description
LLI	I	Light Load Weight in Cab
HLI	I	Heavy Load Weight in Cab
OLI	I	Overload Weight in Cab
DRLW	F	Directional Load Weight
DCWB	O	Door Close Warning Buzzer Front
DCWBR	O	Door Close Warning Buzzer Rear
iCWI	I	Counterweight Derail Input
iEQI	I	Seismic Detected Input
eCWI	F	Latched Counterweight Derail Input
eEQI	F	Latched Seismic Detected Input
CWI	F	iCWI + eCWI
EQI	F	iEQI + eEQI
EQA	F	Earthquake Abnormal Mode
EQN	F	Earthquake Normal Mode
EQS	F	Earthquake Operation Mode Active
STRE	I	EQ Counterweight Stop Timer
EQR	I	Earthquake Reset Push Button
ACS	I	Alternate Call Scheme Selected
PGO	O	Passing Gong Output
PGI	I	Passing Gong Enable Input
MLT	F	Motor Limit Timeout
OOS	F	Car Out of Service
HOBF	I	Hoistway Door Open Button Front
HOBR	I	Hoistway Door Open Button Rear
RepoC	F	Car Repositioning to a Landing
CTL	I	Car to Lobby
EGR	I	Emergency Recall Command Active
BTR	I	Traction Battery Rescue Mode
HCBF	I	Hoistway Door Close Button Front
HCBR	I	Hoistway Door Close Button Rear
WILD	F	Car in Back Up Dispatch Mode
SAB	I	Car in Sabbath Dispatch Mode
IND	I	Independent Service
IRSU	I	Rescue Operation Mode Active
HSBF	I	Hoistway Door Stop Button Front
HSBR	I	Hoistway Door Stop Button Rear

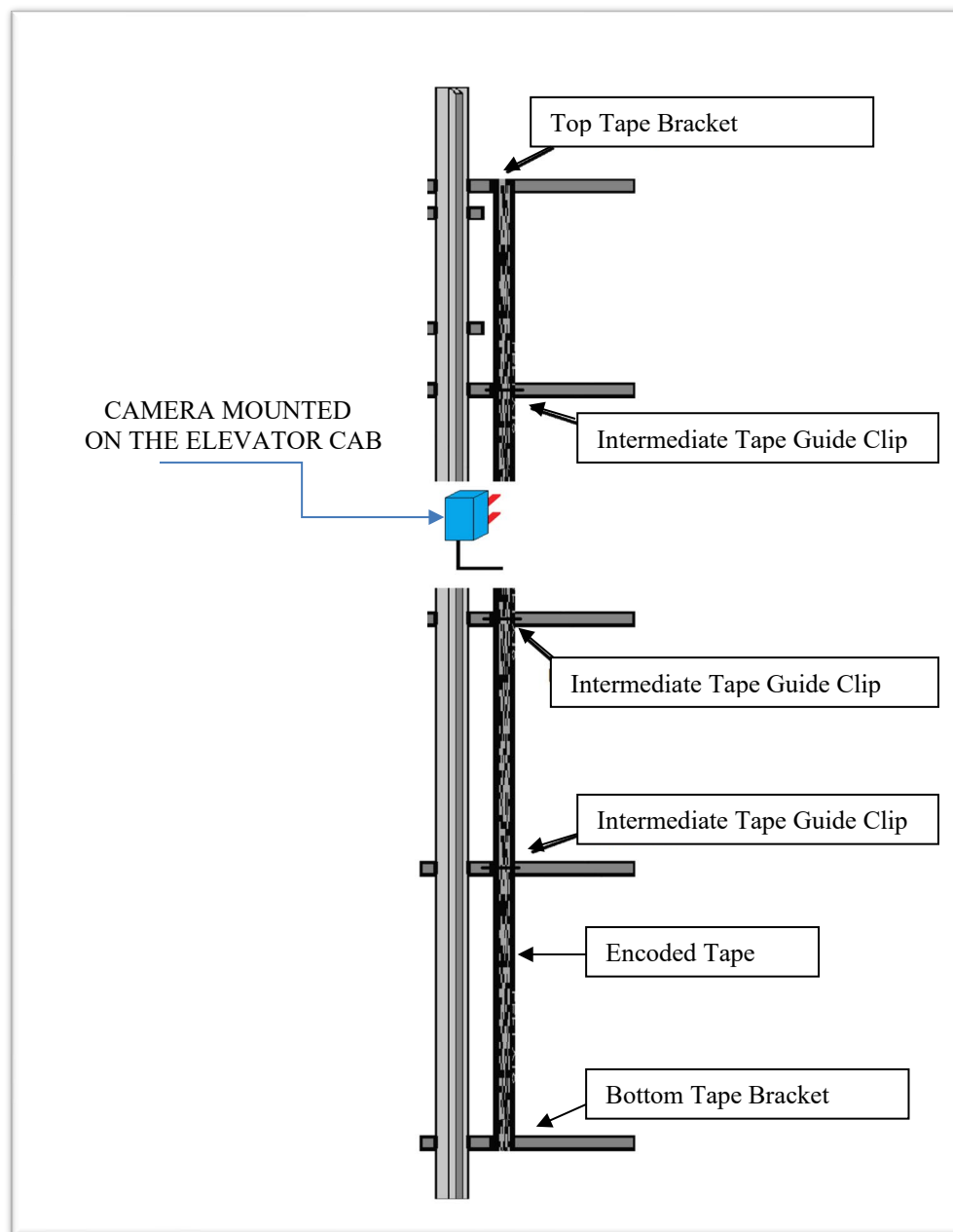
Dispatching Flags

Name	I/O/F	Description
BAL	I/F	Balance Demand
INT	I/F	Intermittent Demand
DDP	I/F	Demand Down Peak
LUP	I/F	Lobby Up Peak
DUP	I/F	Demand Up Peak
RESs	I	Fire Service Recall Sw. Reset "System"
FOFFs	I	Fire Service Recall Sw. Off "System"
FONs	I	Fire Service Recall Sw. On "System"
FON2s	I	Fire Service Recall 2 Sw. On "System"
EPIs	I	Emergency Power "System"
AUTOs	I	Emergency Power Auto-select
EP1s	O	Emergency Power Phase 1 "System"
EP2s	O	Emergency Power Phase 2 "System"
HSIs	F	Hospital Service Request "System"
ACSs	I/F	Alternate Call Scheme Dispatch Mode
HCDD	F	Hall Call Disconnect "System"
All	F	All Cars in Service
NCII	F	No cars in Service
ECS1	I/F	Car 1 Selected to Run on Emergence Pwr.
ECS2	I/F	Car 2 Selected to Run on Emergence Pwr.
ECS3	I/F	Car 3 Selected to Run on Emergence Pwr.
ECS4	I/F	Car 4 Selected to Run on Emergence Pwr.
ECS5	I/F	Car 5 Selected to Run on Emergence Pwr.
ECS6	I/F	Car 6 Selected to Run on Emergence Pwr.
Hsel1	F	Car 1 Selected to Run Hospital Service
Hsel2	F	Car 2 Selected to Run Hospital Service
Hsel3	F	Car 3 Selected to Run Hospital Service
Hsel4	F	Car 4 Selected to Run Hospital Service
Hsel5	F	Car 5 Selected to Run Hospital Service
Hsel6	F	Car 6 Selected to Run Hospital Service
PTR1	F	Car 1 Has Permission to Run
PTR2	F	Car 2 Has Permission to Run
PTR3	F	Car 3 Has Permission to Run
PTR4	F	Car 4 Has Permission to Run
PTR5	F	Car 5 Has Permission to Run
PTR6	F	Car 6 Has Permission to Run

Appendix E –

CEDES APS Positioning System

The CEDES APS positioning system provides Pixel with an absolute position, through the entire length of the hoistway utilizing a dual camera system which scans the code tape with its own IR illumination, with a resolution 0.5 mm, approximately 1/10th of an inch. A system view diagram of the Absolute Position System Selector is shown below:



CEDES APS Absolute Position System Selector Overview

E1 Install CEDES APS Positioning System

Step 1: Mount top bracket and connect the optical absolute encoded tape

- Mount the top J-hook selector bracket to the rail.
- Make sure the bracket is high enough that when the car is all the way at the top, the tape can still be read by the camera and the bracket is not hit by any part of the elevator.
- Connect the encoded tape to the Top Tape Bracket. See Figure E1.1.
- Make sure you feed the tape through the front side of the bracket first, the side facing the car and then bend it around the top and lace it back down. See Figure E1.2
- Fasten it down with the supplied bracket and screws.



Figure E1.1: Top Tape Bracket

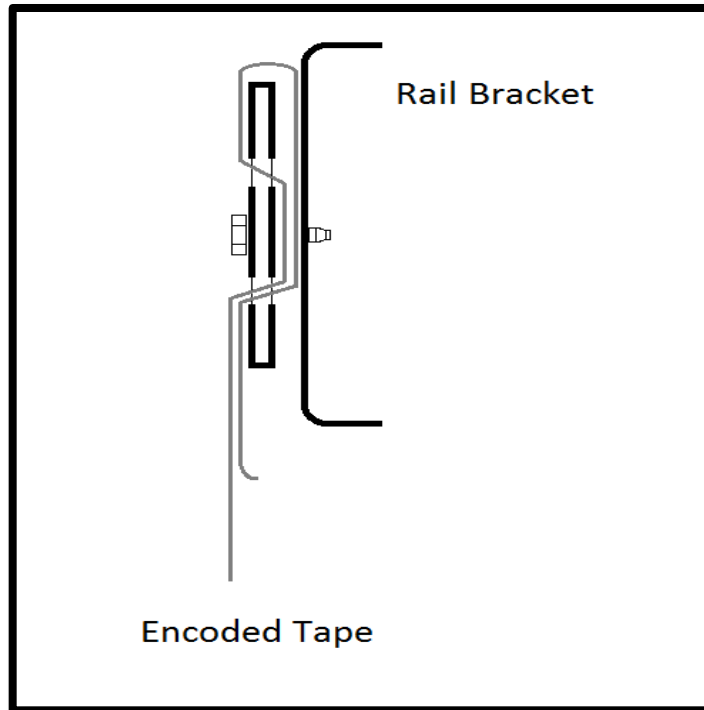


Figure E1.2: Encoded Tape Connected to Top Tape Bracket

Step 2: Run down on inspection while unrolling the absolute encoded tape.

- Run down on inspection while unrolling the tape. See Figure E1.3.
- Make sure you do not kink the tape or bend it in too tight of a radius. The tape can be damaged, and it should be handled with care.
- Make sure your hands are clean and you do not leave any grease or dirt on the front of the tape.



Figure E1.3: Unroll the tape

Step 3: Mount the bottom bracket and connect the absolute encoded tape.

- Mount the bottom selector bracket.
- Make sure the bracket is low enough, that when the car all the way at the bottom, the camera can still read the tape and the bracket is not hit by any part of the elevator. See Figure E1.4.
- Connect the encoded tape the rail bracket with the slack tape switch.
- Make sure you feed the tape through the front side of the bracket, the side facing the car, first and then bend it back up toward the back of the tape. See Figure E1.5
- Push the bracket down until the springs are depressed to the mark, this will put the equivalent of a 10kg weight. See Figure E1.6.



Figure E1.4: Bottom Tape Bracket

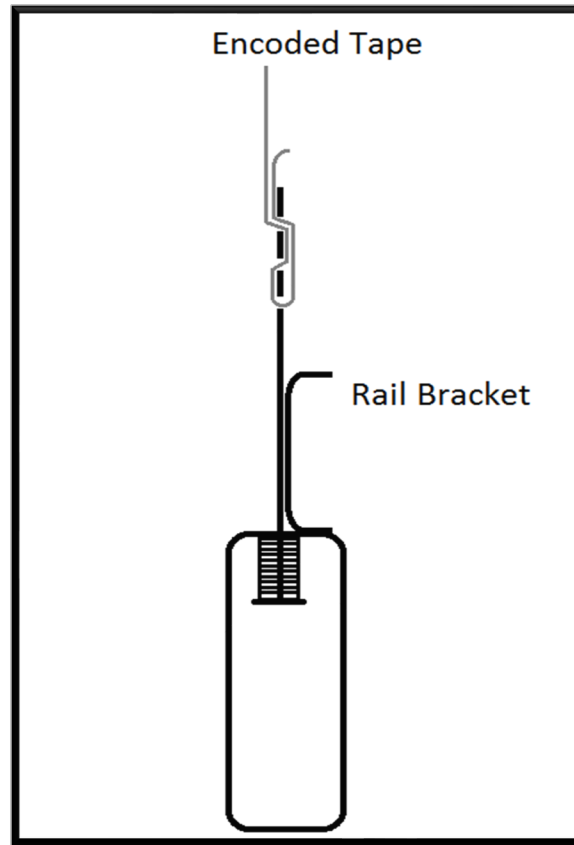


Figure E1.5: Encoded Tape connection.

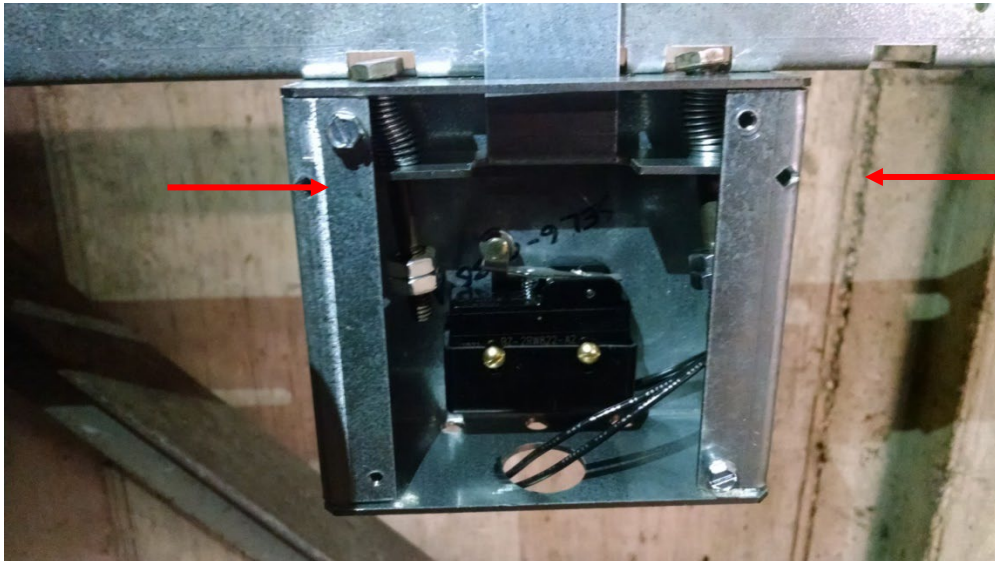


Figure E1.6: Bottom Tape Bracket with springs depressed to the mark

Step 4: Mount the CEDES APS camera mounting bracket to the cross head.

- Mount the CEDES APS camera mounting bracket to the cross head.
- Use the roller or slide shoe guide bolts to hold the camera bracket. The face of the bracket should be about 5 ½ inches from the back of the rail. See Figure E1.7.
- The back of the bracket should be as close as possible to the crosshead channel.
- Use a level and make sure it is plumb up and down.



Figure E1.7: CEDES APS Camera Mounting Bracket

Step 5: Mount the CEDES APS Camera.

- Mount the camera on the mounting bracket. The camera should be centered with the encoded channel on the tape.
- The face of the camera should be 4 inches from the face of the tape. See Figure E.1.8.

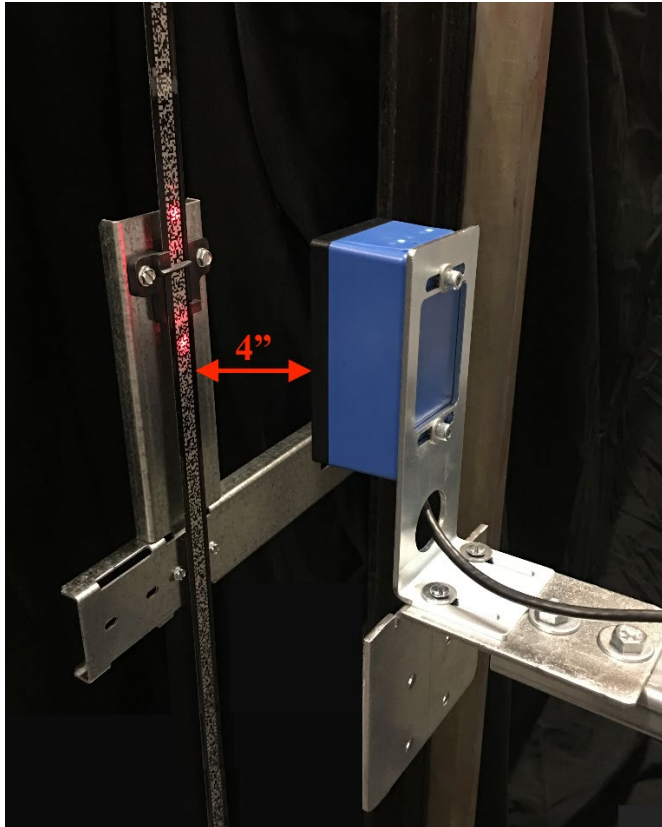


Figure E1.8: Camera 4 inches from tape

Step 6: Connect the CEDES APS Camera to APSC RJ45 Splitter in the TOC box.

Electrical connection for power and communications to the APS Camera is achieved through an RJ45 cable, prewired to the CEDES APS Camera with an RJ45 connector to be plugged into the APSC RJ45 cable splitter located inside the P-TOC box, refer to page QR3 of the prints for a descriptive diagram.

Step7: Fine adjustment of the Camera

- Make the fine adjustment of the camera using the LED's on top the camera, adjust the camera position so only the green light in the middle of the 4 red arrows is on, manipulate per adjustments shown in Figure E.1.9 below.

- Put your hand in front of the camera for 5 seconds. Remove your hand from in front of the camera. You should see 2 LED's on the encoded tape. Adjust the camera so the LED's are in the center of the encoded tape.

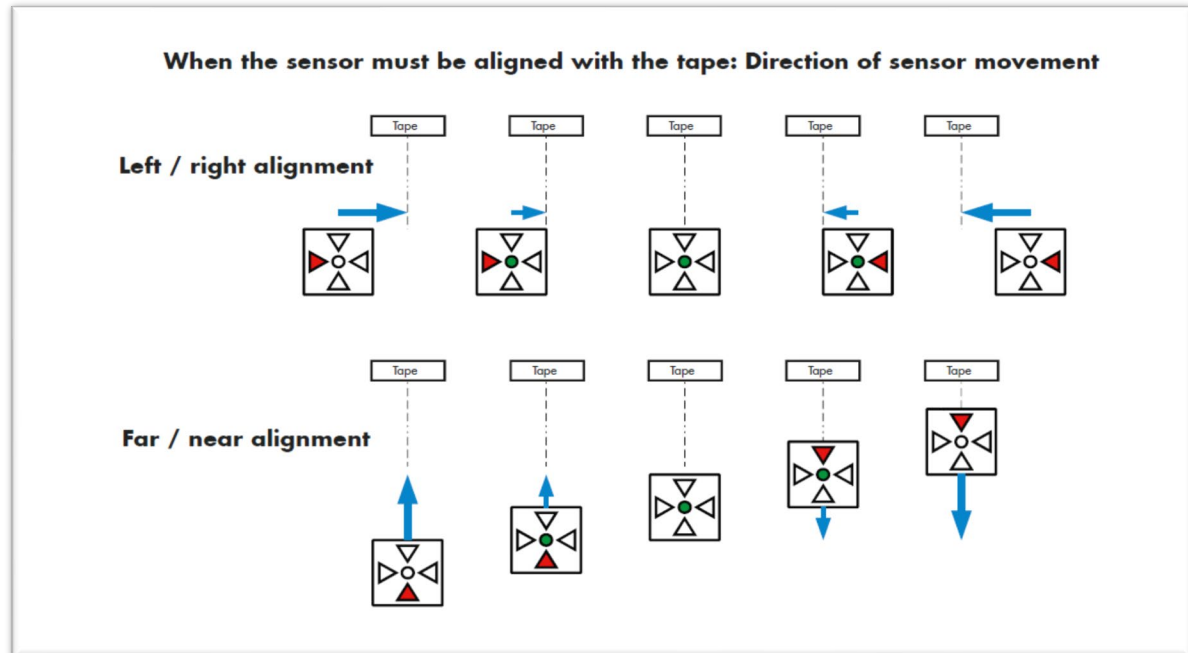


Figure E.1.9: Camera Sensor Alignment

- Level the camera with a leveling device, the CEDES APS camera must be mounted to be parallel and square to the encoder tape.

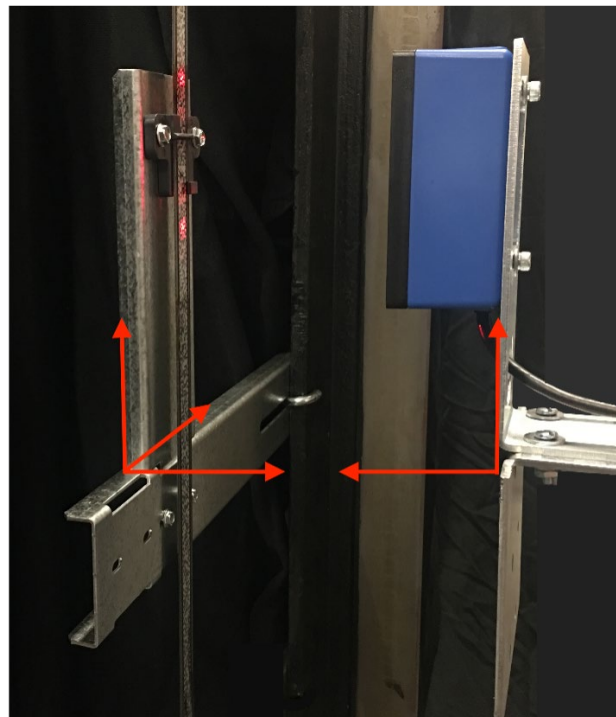


Figure E1.10: Camera Level alignment

E2 CEDES APS Positioning System Verification

E2.1 Verify CEDES APS to Pixel Communications

Using the TOC access point, verify the distance between the two cameras inside the camera sensor head. Navigate to:

 Home

 Install 

 Learn Functions 

 Virtual Limits 

 Tape Reader Offset 

- a. Confirm that the RAW delta difference is between 0.15 to 0.30 feet and press the Learn soft key to store value into Pixel

 **Learn** or  **Back**

Verify proper operation of the Landa system. Navigate to:

 Home

 Install 

 View Selector Data 

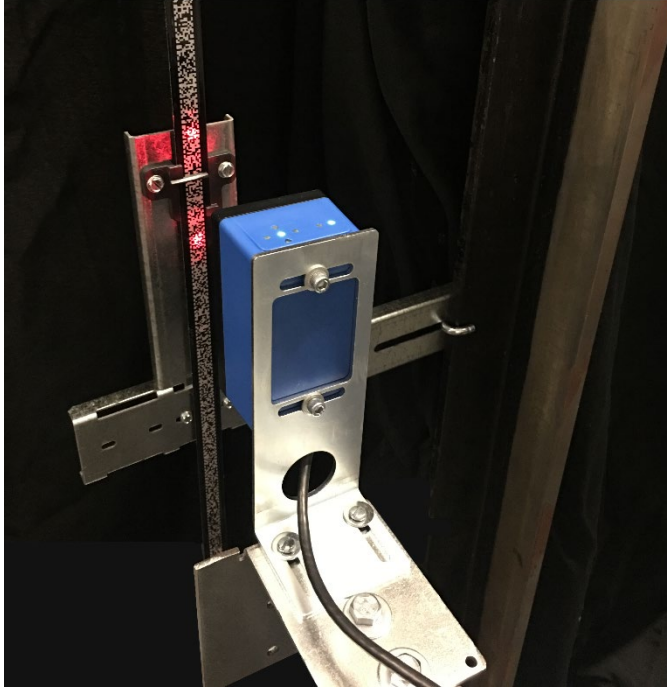
- b. Confirm that selector positions are not both zero, increment and decrement together as you run the car either up or down, and Selector 1 position is smaller than Selector 2.



NOTE: If you cannot confirm performance as described above, repeat steps in Section E1 above until the landing system operates correctly.

E2.2 Install Intermediate Tape Brackets

Install intermediate rail tape brackets with a tape holder clip at approximately every 20ft from one bracket to the next, then position the rail bracket and clip so it is centered in-between the two red LED's on the encoded tape. If the red LED's are not visible put your hand in between the camera and encoded tape for 5 seconds. See Figure E2.1



FigureE2.1: Red Setup LED's.

 **NOTE:** Continue with job installation at Section 3.5.5 of this manual.

Appendix F

Serial Brake(s) Setup and Adjustment

F1 Serial Brake(s) Interface Overview

Pixel firmware is capable of selectively driving a P-Brake or GALX-1051 CAN interface driven electronic brake control board to drive the Main, Auxiliary or both brakes as applicable for brake control, this section deals with the setup and adjustment of both hardware and parameter adjustments available to achieve best brake(s) control performance.


F2 P-Brake Serial Brake(s)


 **NOTE:** Skip to section F3 for GALX-1050 Serial Brake board configuration.

F2.1 P-Brake Hardware Configuration

Verify that the P-Brake board in the controller is capable of outputting the required brake current for the main and the auxiliary brake, if applicable, up to 1200 Watts and the on board SW1 configuration switch gear is set to match job requirements per following chart:

Switch Number	Main Brake	Auxiliary Brake
PRI/SEC	Off (Down)	On (Up)
125/116	Off (Down)	Off (Down)
SW3	Off (Down)	Off (Down)
TERM.	Off (Down)	Off (Down)

 **NOTE:** TERM. switch connects a CAN Bus terminator resistor, during initial installation may need to be placed to the On position if the P-Brake board is the last node board in the CAB CAN Network and switched to the Off position as soon as any CAB CAN node board is installed.

 **NOTE:** Brake board(s) switch gear configuration and expected brake(s) coil characteristics data is available for reference on the job prints page 2.

F2.2 Voltage AC Input vs. DC Output Requirements

The P-Brake input power is single phase 0 to 240 VAC with the following input to output voltage relationship:

Brake Pick Voltage (DC)	P-Brake Board input (AC)	Suggested ECC Xformer Conf.
0 to 120 DC	96 VAC	(120-24)
121 to 150 DC	120 VAC	(120)
151 to 190 DC	144 VAC	(120+24)
191 to 250 DC	216 VAC or 220 VAC	(240-24)

Verify that the required brake coil(s) DC voltage is within range of the brake input output voltage.

F2.3 P-Brake Serial Brake(s) Parameter Configuration

F2.3.1 Enable-Disable P-Brake Firmware



Pixel interface to the P-Brake Serial board(s) is enabled by following parameters that can be accessed and adjusted navigating to:

 Home



 Install 

 Initial Settings 

 Basic Pixel Settings 

 Main Serial Brake  ;set to P-Brake to Enable the main brake interface.



Or

 Rope Gripper Option  ;set to P-Brake to Enable the Aux brake interface.



F2.3.2 Brake Configuration Parameters

The following parameters enable Pixel logic input voltage, communications timeout, and DC converter output frequency; parameters are available for both main and auxiliary brake configuration and can be accessed and adjusted navigating to:

 Home



 Adjust 

 Ride Performance 

 Serial Brake(s) Adjust 



 Main Brake Parameters  ;select to adjust Main P-Brake parameters.









Or

 Aux Brake Parameters  ;select to adjust Auxiliary P-Brake parameters.

 AC Phase  ;non-programable defaulted to Single for P-Brake












 Input Voltage  ;set to measured voltage across P-Brake terminals L-N


 Comm Loss Timer  ;defaulted at 250ms, timeout before declaring comm. loss.

-  Carrier Frequency  ;defaulted to 02000hz, shopping frequency used to drive the power transistor to produce the DC brake voltage, increase value to reduce audible noise from the brake.
-  Releveling Profile  ;defaulted to Disabled, Set to Enable to Enable Releveling brake profile **for the Main Brake only**.
-  Fault Drop Timer  ;defaulted to 010s, timeout after which the P-Brake will drop the brake output after a Comm Loss Fault.
-  Fault Reset Timer  ;defaulted to 005s, timeout after which the P-Brake will Clear event once event is no longer active.

F2.3.3 Brake Performance Configuration Parameters

Pixel brake control firmware has been implemented to generate the brake(s) control performance shown in Figure F2.3.3.1, Main Brake Profile, and though parameters listed in Table F2.3.3.1 Serial Brake Parameters below, profile parameters can be accessed and adjusted navigating to:

-  Home
-  Adjust 
-  Ride Performance 
-  Serial Brake(s) Adjust 
-  Main Brake Profile  Or  Aux Brake Profile 

 **NOTE:** The same set of parameters is available for both Main and Auxiliary brakes for independent configuration set up.

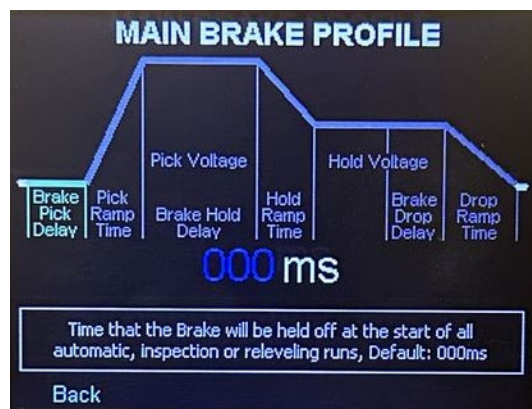


Figure F2.3.2.1, Main Brake Profile

Table F2.3.3.1, Serial Brake Parameters

Parameter	Settings	Default	Parameter Description
Brake Pick Delay Time (Main Brake Only)	00:00:00 to 59:59:99	0000sec	Time that the brake will be held off at the start of all automatic, inspection or releveing runs.
Pick Ramp Time	000 to 02.55 seconds	100ms	Time to ramp up Brake voltage from 0v to Pick voltage
Brake Hold Delay	00:00:00 to 59:59:99	02.00sec	Time the Brake voltage output will be held at Pick output before ramping down to Hold voltage.
Hold Ramp Time	000 to 02.55 seconds	100ms	Time to ramp down the Brake voltage from Pick to Hold voltage.
Brake Drop Delay (Main Brake Only)	00:00:00 to 59:59:99	000ms	Time the Brake output voltage will be held on at the end of all automatic, inspection, or releveing runs.
Drop Ramp Time (Main Brake Only)	000ms to 2.5 Sec	000ms	time to ramp the Brake voltage from Hold to 0v at the end of all automatic, inspection, or releveing.
Pick Voltage	0 to brake DC rated voltage	Set to Rated brake voltage	Set to the rated brake DC voltage
Hold Voltage	0 to brake DC Hold voltage	Set to brake hold voltage	Set to brake DC holding voltage

F2.3.4 Brake Releveling Configuration Parameters



NOTE: Releveling parameters are available for main brake control only.

Pixel brake control firmware provides an independent main brake Releveling run control performance shown in Figure F2.3.4.1, Main Brake Releveling Profile, and though parameters listed in Table F2.3.4.1, Main Brake Releveling Profile below, parameters can be accessed and adjusted navigating to:

Home

Adjust

Ride Performance

Serial Brake(s) Adjust

Main Brake Releveling Profile

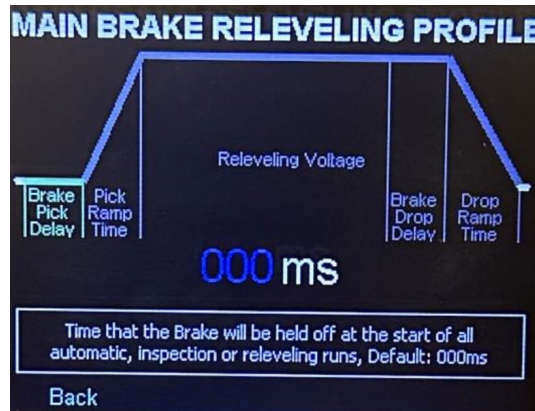


Figure F2.3.4.1, Main Brake Releveling Profile

Table F2.3.4.1, Main Brake Releveling Profile

Parameter	Settings	Default	Parameter Description
Brake Pick Delay	00:00:00 to 59:59:99	0000sec	Time that the brake will be held off at the start of all automatic, inspection or releveling runs
Pick Ramp Time	000 to 02.55 seconds	100ms	Time to ramp up voltage from 0v to Releveling Voltage
Brake Drop Delay	00:00:00 to 59:59:99	000ms	Time the Brake output voltage will be held on at the end of all automatic, inspection, or releveling runs.
Drop Ramp Time	000ms to 2.5 Sec	000ms	time to ramp the Brake voltage from hold or releveling to 0v at the end of all automatic, inspection, or releveling runs
Releveling Voltage	0 to brake DC rated voltage	N/A	Set to the desired releveling brake DC voltage

F2.3.5 P-Brake Serial Brake Adjustment

The break(s) pick and drop performance can be manipulated to help improve the take off and stop elevator performance, in conjunction with the motor control drive unit, by adjusting the serial brake control parameters, to access these parameters refer to section F2.3.3, Brake Performance Configuration Parameters, and Figure F2.3.2.1, Main Brake Profile above for corresponding adjustment as follows:

- Verify brake data tag vs Pixel's brake data, refer to Page 2 of the job prints, if different call Elevator Controls technical support group for guidance.
- Verify that Serial Brake(s) is enabled in Pixel, refer to section F2.3.1 Enable-Disable P-Brake Firmware above.
- Set brake performance parameters to the default values per table. F2.3.3.1, Serial Brake Parameters in section F2.3.3 above, during initial installation increment the Brake Pick Delay time to reduce roll back while preventing the car from starting a run under the brake.

- d. During final elevator ride performance for takeoff to control roll back and to control mechanical brake engagement, increase Brake Pick Time value, while observing that the car does not take off from under the brake by incrementing Pattern Delay timeout.
- e. For smooth transition from brake Pick to Hold adjust the brake Hold Time.
- f. For transition from brake hold to brake drop adjust Drop Time to prevent the brake from slamming on to the brake drum and creating audible noise while making sure the Brake Drop Delay timer, parameter under Motor/ Brake Timers is also adjusted to account for by the Drop Time ramp down timer.

F2.3.6 P-Brake Performance Verification

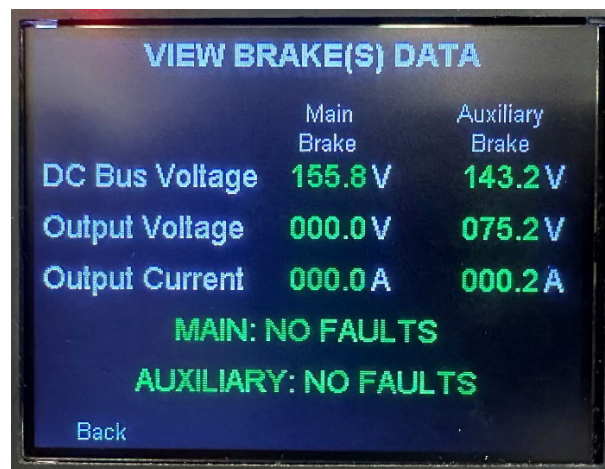
Pixel provides two GUI windows that can be used to troubleshoot and verify the brake control performance. First is the “Brake Data” window displaying the most relevant data for both a main and emergency brake, while attempting to move the car verify that output voltage matches the required brake(s) voltage and the brake mechanically operates, window can be viewed navigating to:

■ Home

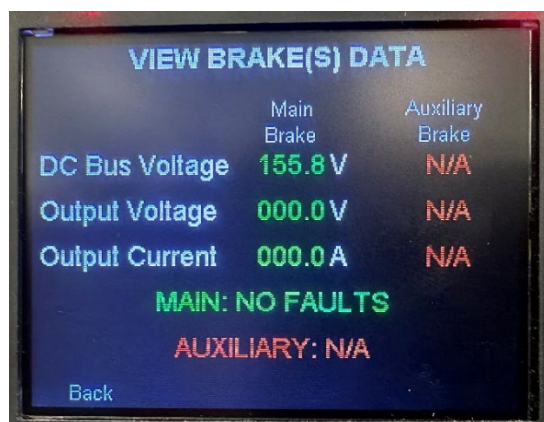
🔄 Troubleshoot 🟢

🔄 Serial Brake(s) 🟢

🔄 View Brake(s) Data 🟢



If either brake is disabled, not being driven by a P-Brake board, the "View Brake Data" screen will display N/A". An example of what the Brake Data window looks like with the emergency brake is disabled shown below:



The second GUI window is the "Brake(s) Performance Data" window displaying detailed performance and input-output status information, with functionality data contents description indicated by its corresponding letter and listed below, window can be viewed navigating to:

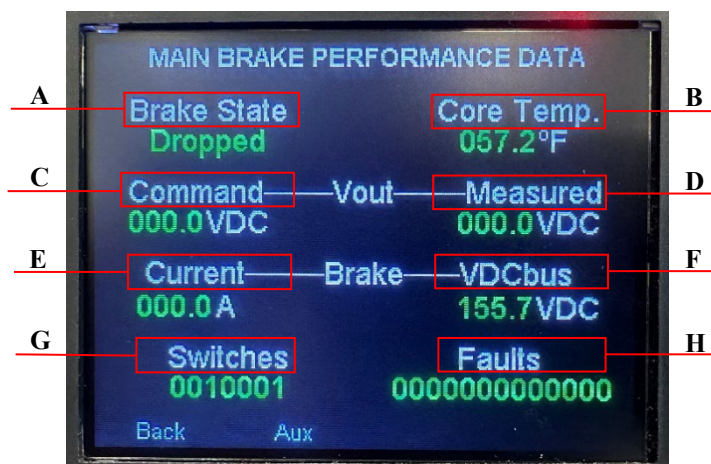
■ Home

🔄 Troubleshoot 📶

🔄 Serial Brake(s) 📶

🔄 Main Brake Performance Data 📶

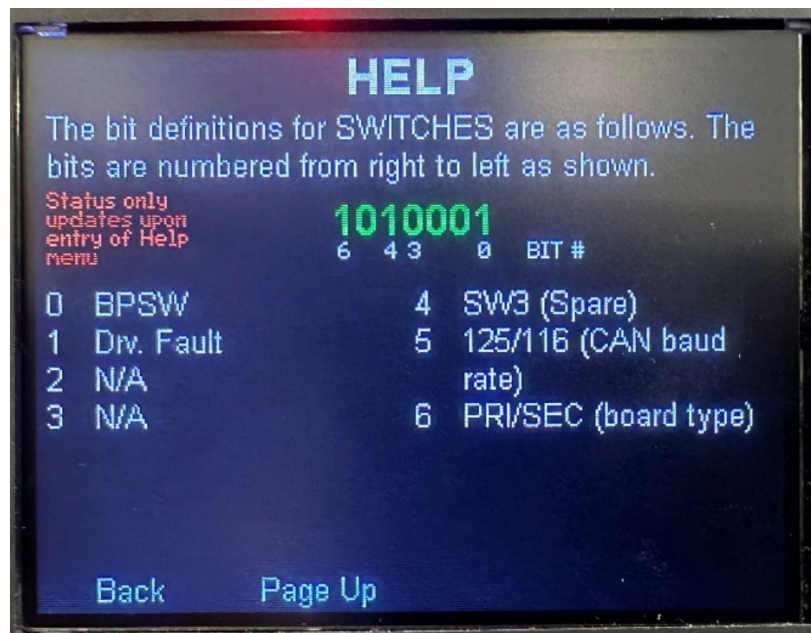
NOTE: Press the Aux or Main soft key to toggle between Main and Auxiliary brake displayed data.



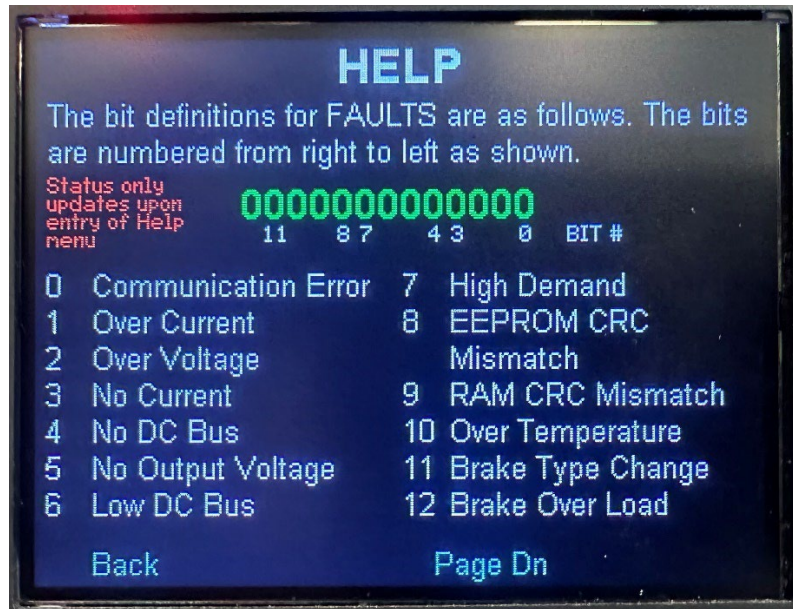


NOTE: A 1% to 5% discrepancy between commanded and measured values is within the acceptable range.

- A) Active operational state of the P-brake.
 - 1. Dropped: output is disabled, Output voltage is 0V.
 - 2. Picked: outputting PICK voltage.
 - 3. Hold: outputting HOLD voltage.
 - 4. RLVL and PICK: outputting releveling voltage
- B) Temperature of the power IGBT driving the DC brake voltage.
- C) Commanded output voltage by Pixel to Brake Control board.
- D) Measured output voltage to the brake coil.
- E) Measured output current to the brake coil.
- F) Measured DC voltage of the rectified AC input.
- G) Switches, displays on board switchgear settings and input status described in the GUI help window below, that can be accessed while on Brake Performance Data viewing selection by pressing the yellow “HELP” push button in Pixel’s on-board diagnostics switch gear.



- H) Faults, displays active fault(s) described by the help GUI window below, that can be accessed while on Brake Performance Data viewing selection by pressing the yellow “HELP” push button in Pixel’s on-board diagnostics switch gear.



- NOTE:** Toggle between the two windows above by pressing the Page Up or Page Dn soft keys or press the Back soft key to return to the Brake Performance window.
- NOTE:** Functional events detected by the P-Brake and or the P-MP dealing with the Main or Aux. P-Brake control are included in Section 7, Troubleshooting” of this manual as part of the Pixel Event Listing Table Section 7.4.

F3 GALX-1050 Serial Brake Board(s) Hardware Configuration

F3.1 GALX-1050 Hardware Configuration

There are two versions of the GALX-1051 board. A 10-amp GALX-1051AN, and 50-amp GALX-1051BN, verify that the board in the controller is capable of outputting the required brake current for the main and the auxiliary brake if applicable; also verify that the on board SW2 configuration switch gear is set to match job requirements per following chart:

Switch Number	GALX-1051AN (10 Amps)	GALX-1051BN (50 Amps)	Main Brake	Auxiliary Brake
EBRK			Off	On
3	Off	Off		
2	Off	On		
1	Off	Off		

- NOTE:** Brake board(s) switch gear configuration and expected brake(s) coil characteristics data is available for reference on the job prints page 2.

F3.2 Voltage AC Input vs. DC Output Requirements

The GALX-1051board brake input power can be single or three phase power from 0 to 290 VAC with the following input to output relationship:

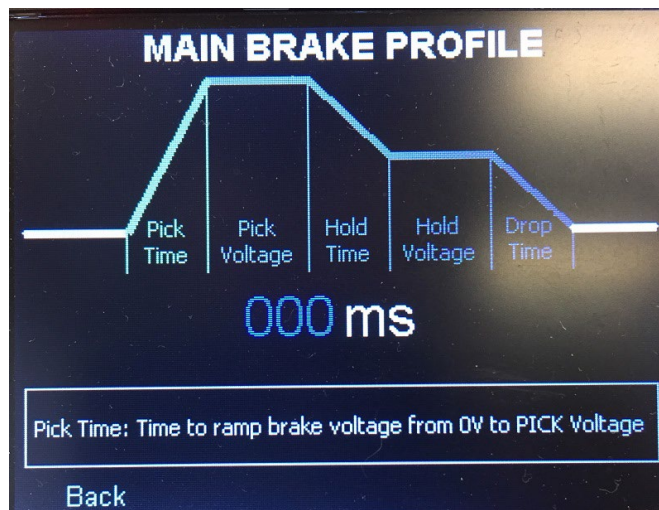
- g. Single Phase Input: $DC\ Output = AC\ Input * 0.75$
- h. Three Phase Input: $DC\ Output = AC\ Input * 1.20$

Verify that the required brake coil(s) DC voltage is within range of the brake input voltage.

F3.3 Serial Brake(s) Parameter Configuration

Pixel firmware interface to the brake board has been implemented to generate a brake control performance as shown on Figure F1, Main Brake Profile, though parameters listed Table F1, Serial Brake Parameters, below.

NOTE: The same set of parameters is available for both Main and Auxiliary brakes for independent configuration and set up.



Parameter	Settings	Default	Parameter Description
Main Serial Brake	Enable/ Disable	Disabled	Set to Enable for Serial Brake board interface
Rope Gripper Option	Rope Gripper/ Auxiliary Brake/ Serial Brake	Rope Gripper	Set to Serial Brake for Serial Brake board interface
AC Phase	Single/ Three	N/A	Set to match the brake board power AC input characteristics
AC input Voltage	000 to 290 VAC	N/A	Set to match the brake board power AC input RMS voltage

Comm Loss Timer	000 to 999 ms	250 ms	Timeout used to declare loss of communications between the P-MP and the GALX-1051 (Parameter to remain at default value)
Pick Time	000 ms to 2.5 Sec	000 ms	Time to ramp brake voltage from 0 to rated DC voltage
Pick Voltage	0 to brake DC rated voltage	N/A	Set to the rated brake DC voltage
Hold Time	000 ms to 2.5 Sec	000 ms	Time to ramp brake voltage from rated to holding voltage
Hold Voltage	0 to brake DC Hold voltage	N/A	Set to brake DC holding voltage
Drop Time	000 ms to 2.5 Sec	000 ms	Time to ramp brake voltage from holding to 0 volts

Table F1, Serial Brake Parameters

F3.4 Initial Serial Brake Adjustment

The brake initial adjustment will be performed as three step process input parameters, output parameters and performance verification:

F3.4.1 Input Parameters

Similar adjustments will need to be performed for the Main and Auxiliary brakes by Navigating to:



 Home



 Adjust 

 Ride Performance 

 Serial Brake(s) Adjust 


 Main Brake Parameters  or  Aux Brake Parameters 

 AC Input Phase  ; Set to Single or Three phase to match input voltage to terminals AC1-AC2-AC3 on the brake board, refer to page job prints.

 AC Input Voltage  ; Set to measured voltage across terminals AC1-AC2 on the brake board.

Press the  **Save** soft key, to permanently store values in Pixel.



NOTE: Press the  **Cancel** soft key to abort and make a new selection, or to return to the previous menu without saving.



F3.4.2 Output Control Parameters

Similar adjustments will need to be performed for the Main and Auxiliary brakes by Navigating to:



 Home



 Adjust 

 Ride Performance 



 Serial Brake(s) Adjust 

 Main Brake Profile  or  Aux Brake Profile 


 Pick Time  ; Set to 000 ms

 Pick Voltage  ; Set to Rated Brake voltage.


 Hold Time  ; Set to 000 ms

 Hold Voltage  ; Set to Brake Holding voltage.

 Drop Time  ;Set to 000 ms

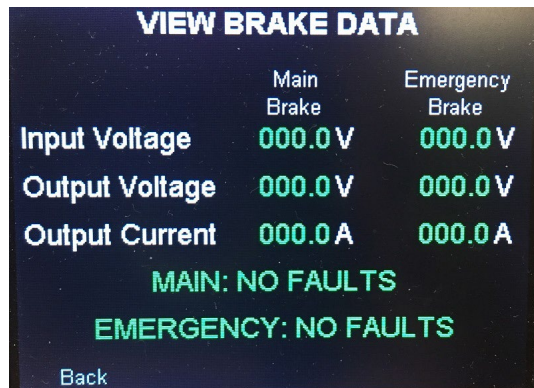
Press the  **Save** soft key, to permanently store values in Pixel.



NOTE: Press the  **Cancel** soft key to abort and make a new selection, or to return to the previous menu without saving.

F3.5 Performance Verification

Pixel provides two GUI windows that can be used to trouble shoot and verify the brake control performance. First is the “Brake Data” window responsible for showing the most relevant data for both a main and emergency brake, while attempting to move the car verify that output voltage matches the required brake(s) voltage.

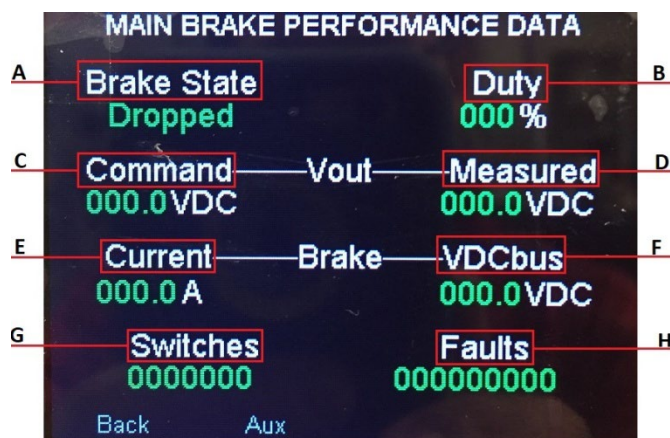


If either brake is disabled, the “View Brake Data” screen will display N/A”. An example of what the Brake Data window looks like with the emergency brake is disabled shown below.

The second is the “Brake Performance Data” window that provides performance and diagnostics information to aid in troubleshooting, with functionality data contents description indicated by its corresponding letter and listed below.

NOTE: Press the Aux soft key to toggle between Main and Auxiliary brake displayed data.

If the expected measured values do not match brake job requirements repeat steps F3.1 to F3.3 above to make sure proper input voltage and parameter settings are correct.



NOTE: A 3 to 5% discrepancy between commanded and measured values is within the acceptable range.

- a. Current operation state of the brake module is in.
 - 1) Dropped: output is disabled, Output voltage is 0V.
 - 2) Picked: outputting PICK voltage.

- 3) Hold: outputting HOLD voltage.
- B) Duty cycle for the brake power IGBT.
- C) Commanded output voltage by Pixel to Brake Control board
- D) Measured output voltage to the brake coil.
- E) Measured output current to the brake coil.
- F) Measured DC voltage of the rectified AC input.
- G) Input Switches Status = 00000000
- | | |
|-------------|--------------------------|
| ++++++----- | Manual Brake Pick Enable |
| +++++----- | Ebrake |
| ++++----- | BKS2 |
| +++----- | BKS1 |
| ++----- | Switch 3 |
| +----- | Switch 2 |
| ----- | Switch 1 |
- H) Faults = 000000000
- | | |
|--------------|---------------------|
| +++++++----- | Communication error |
| +++++++----- | Over Current |
| +++++++----- | Over Voltage |
| +++++----- | No Current |
| ++++----- | No DC Buss |
| +++----- | No Output Voltage |
| ++----- | Low DC Bus |
| +----- | High Demand |
| +----- | EEPROM CRC error |



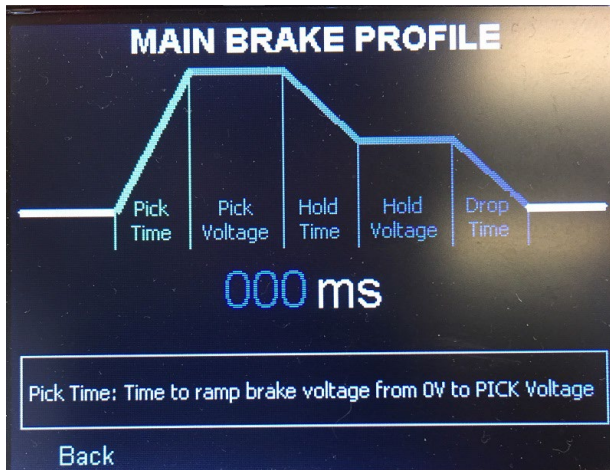
NOTE: Brake performance will be fine-tuned during final adjustment, return to section **3.4.6 Brake Mechanical Operation** to continue with installation.

F3.6 Serial Brake Fine Tuning Adjustment

The break(s) mechanical pick and drop performance can be manipulated to help improve the take off and stop elevator performance by adjusting the serial brake control parameters, Pick Time, Hold Timer and Drop Time, for access to these parameters refer to section F3.2 ,Output Control Parameters, above, and to Main Brake Profile picture below for corresponding adjustment as follows:



NOTE: The same set of parameters is available for both Main and Auxiliary brakes for independent set up and configuration.



- a. For takeoff to control roll back and to control mechanical brake engagement, increase Pick Time value, while observing that the car does not take off from under the brake by incrementing Pattern Delay timeout, parameter under Speed Profile GUI set.
- b. For smooth transition from brake Pick to Hold adjust the Hold Time
- c. For transition from brake hold to brake drop adjust Drop Time to prevent the brake from slamming on to the brake drum and creating audible noise while making sure the Brake Drop Delay timer, parameter under Motor/ Brake Timers GUI set, is also adjusted to account for by the Drop Time ramp down timer.

F3.7 Serial Brake Troubleshooting

The GALX-1050 board incorporates a set four diagnostics LEDs, 5V, MCU, COMM, and FAULT, to help troubleshooting and to determine current board functional state as follows:

- a. 5V LED indicates that the 5-volt board generated power supply is on. If this LED is off the board will not function, verify that the 120 VAC power supply wired to terminals S10 and GND is present, refer to page 2 of the job prints for wiring details, if 120 VAC power supply is present the GALX-1050 board needs to be replaced.
- b. MPU LED will flash about once every second to indicate that the on-board microprocessor is operating, if the LED is off replace the board.
- c. COMM LED will flash once per second if CAN communications with Pixel P-MP are healthy, if off verify CAN communications wiring to board at terminals SHLD, CAN-H, and CAN-L, refer to page 2 of the job prints for wiring details.
- d. FAULT LED will be off if no fault is detected if a fault is detected it will flash about once every second; refer to the Pixel P-MP home screen for

indication of event detected and to the Serial Brake Event Listing Table below for event overview and possible corrective action.




NOTE: The same diagnostics tools available for all Pixel events, including Event Play Back are available for the Serial Brake interface; refer to section 7 of this manual for troubleshooting guidance.

Appendix G

Multi Car Groupless Setup & Troubleshooting


G1 Groupless Network Overview

Pixel Multi Car Groupless system uses a Bi-Directional, Half Duplex (2 wire) RS485 communications network to exchange information among all cars P-MP and P-HNA, Pixel Hall Network Adapter, boards requiring for all members in the network to be wired in a daisy-chain topology with communication bus termination only at each end of the network.

 **NOTE:** CAT5 Pixel Multi Car Groupless cables must be installed in a separate metal “**non-shared**” conduit for reliable car to car network communications.

G2 Bus Termination and On-Board Location

The P-MP board has a configurable 120-ohm resistor, located on the back of the board to the right of TEST switch labeled GTR, it is configurable using an on-board sliding jumper that when place to the OFF, up position, disconnects the termination resistor and when placed to the ON, down position, connects the termination resistor.

 **NOTE:** The P-MP board does not need to be removed to set the P-MP sliding jumper, jumper is accessible through the side of the board.

The P-HNA board has a configurable 120-ohm resistor, located near the front top right corner of the board labeled JP1. It is configurable using an on-board sliding jumper when place to the NC, right position, disconnects the termination resistor and when placed to the ON, left position, connects the termination resistor.

G3 Hardware Field Configuration

G3.1 First Car Housing the P-HNA Board(s)

The first car of a multi-car group usually is the one housing the P-HNA board(s) that allow access to the system Hall Calls and input-output system logic is the first car to be installed, verify the following settings:

- a. Set the P-MP GTR to ON, the down position.
- b. Set, only one of the P-HNA boards if more than one, to ON, the Left position, all other P-HNA boards to NC, the right position.

G3.2 Adding a Second Car to the Network

To incorporate the second car to the network, once its corresponding GPLS CAT5 cable has been installed, modify sliding switches as follows:

- a. Set the P-HNA JP1 sliding jumper to NC, the right position.
- b. Set the second car P-MP GTR sliding jumper to ON, the down position.

G3.3 Adding a Third or More Cars to the Network

To incorporate a third car to the network, once its corresponding GPLS CAT5 cable has been installed, determine which cars are physically at each end of the network and set corresponding GTR sliding switches as follows:

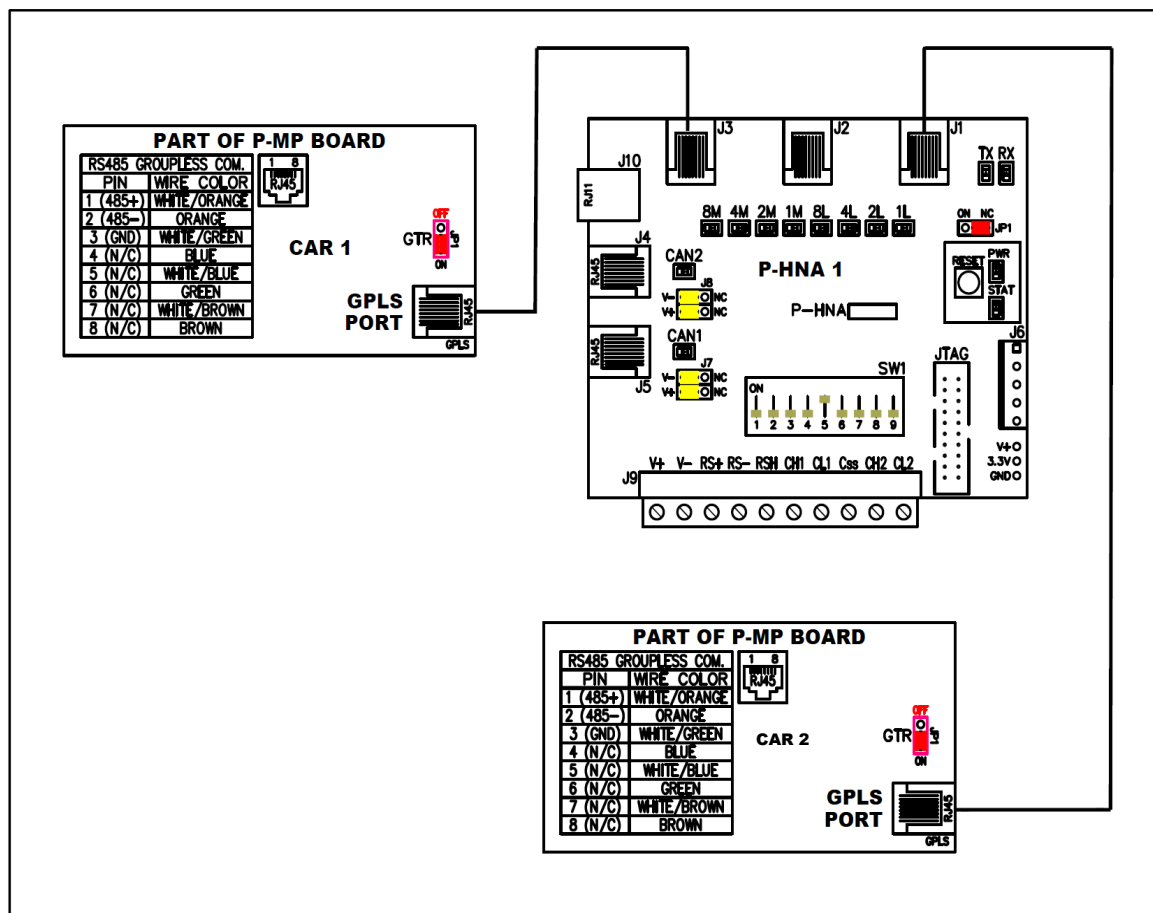
- Set the car in the middle P-MP GTR sliding jumper to OFF, the up position.
- Set the other two cars P-MP GTR sliding jumper to ON, the Down position.



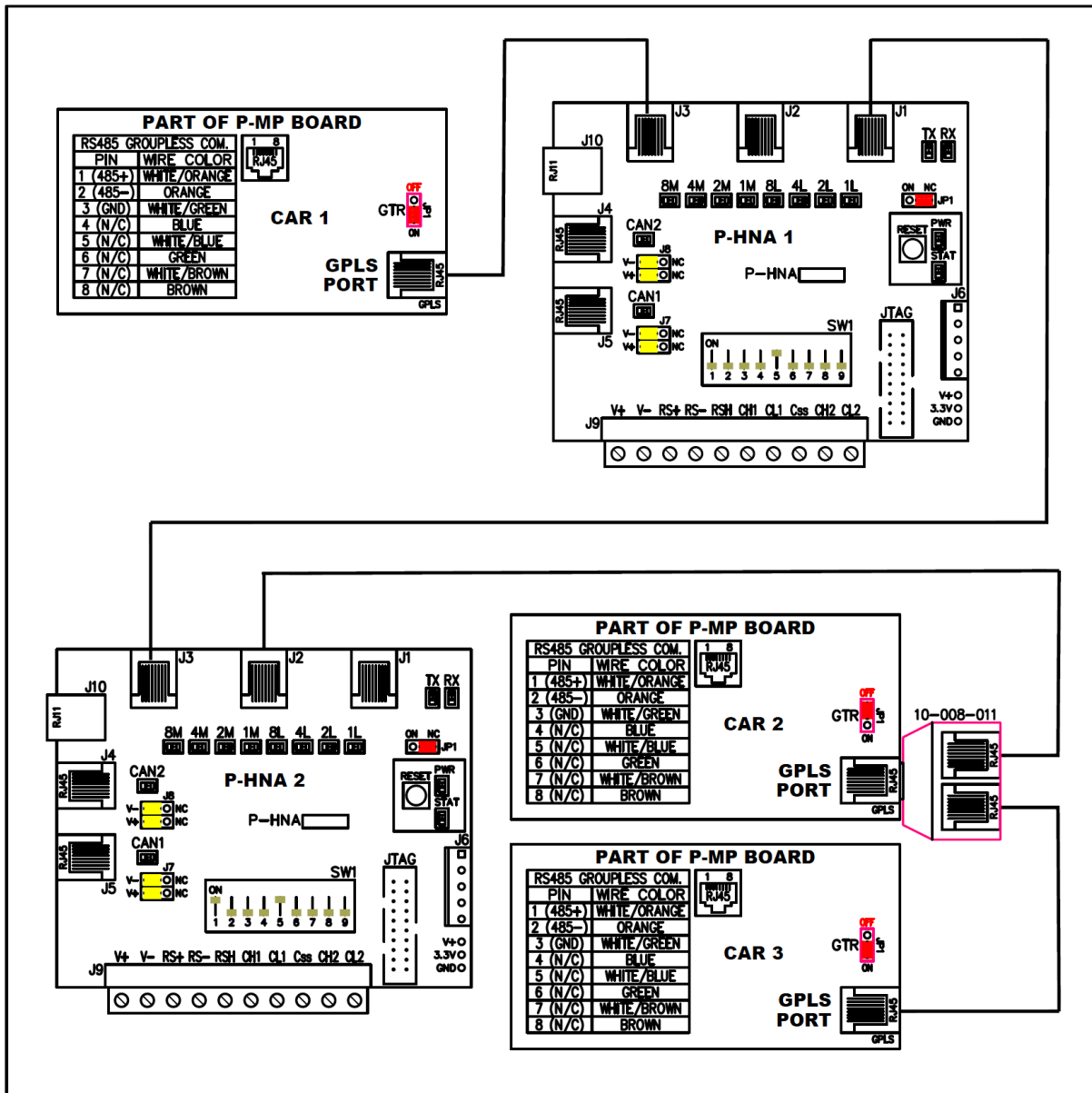
NOTE: To add more cars to the network repeat steps a and b above as each car is incorporated into the network.

G3.4 Examples of Multi Car Groupless Block Diagrams

a. Two Car Group One P-HNA Board



b. Three Car Group Two P-HNA Boards



G4 System Parameter Configuration



Pixel multi car groupless network parameters are pre-programmed at the factory, below is a subset dealing with the basic configuration that allows the cars to address the system hardware and provides pixel with an overview of the number of cars making up the groupless system; these parameters allow Pixel to set up its firmware to support “this job” communications network and can be verified navigating to:

Home



Install



 Initial Settings 

 Basic Pixel Settings 

 Pixel Cars in Group  ; Set to the number of cars making up the group, i.e.
2 car group = 02, 4 car group = 04.

 Pixel Car Priority  ; Set this car priority, i.e., car A or 1= 01, car E or 5= 05

 Number of P-HNA(s)  ; Set to the number of P-HNA node boards in the
groupless RS485 communications network, i.e.,
01 for one P-HNA, 03 for three P-HNA boards.

 System Type  ; Set to Simplex if a single car or Pixel Group for 2 or more
Pixel car groupless system.

G5 Network Validation and Troubleshooting

Pixel multi car groupless network performance can be validated through Pixel's on boards diagnostics tool, where any of cars can take the master role but only one master car is allowed at a time.

G5.1 Determining Which Is the Master Car

The master, dispatcher role, can be taken by any of the cars making up the groupless system through arbitration process on power up or when an acting master car is power down or its P-MP is reset then another car in the system will take its role and hold it until a new arbitration process is executed.

The acting master car role is displayed in Pixel's main menu window top left corner as Master or if the car is being dispatched by a master car it will display Slave instead.

G5.2 Group LED Status Indicator

The GROUP status LED located in the P-PM board, under the COMMUNICATIONS STATUS, top right corner provides the following communication status:

- a. On, the car is constantly receiving and able to validate data packages from other cars in the system.
- b. Off, the car is not receiving or being able to validate any packages being received.
- c. Intermittently, the car can receive and validate packages from other cars in the system at a rate lower than expected.



NOTE: If GROUP LED behavior matches b or c above, perform network validation per entries G2, G3 and G4 above.

G5.3 Group Communications Network Validation

The acting master car provides three screen displays, to help validate the system performance and help narrow down members that may not be performing up to their expected communication performance, that can be accessed navigating to:


 Home


 Troubleshoot 


 Controller Network 


 Group 

1. Group, this screen provides a system performance for all communication attempts from the master car to all expected slaved cars and P-HNA boards making up the group system, with following entries.
 - a. Good Count: The number of validated information packages from all members in the system.
 - b. Bad Count: The number of expected replies to packages from any or all members in the system that were not received or if received were not deemed as valid.
 - c. System Up Time: Displays the elapsed time frame that a and b above have been tracked, since the last power up or from the last statistical counter Reset.

 **NOTE:** Pressing the Reset softkey simultaneously resets all Group, Cars, and P-HNA communication counters.

 **NOTE:** Pressing the More softkey navigates to the next Car or P-HNA or back to Group screen display.

 **NOTE:** If a car or a P-HNA board is not connected it will generate bad count entries at a rate of 4 to 6 times per second.

 **NOTE:** If Good Count does not increase at an expected rate of approximately 10 times per second, refer to entries 2 and 3 below to narrow down possible non-performing member and perform a network validation per entries G2, G3 and G4 above.

2. Car 01 through Car 12, one screen for each possible 1 to 12 cars, providing individual car performance from the master car perspective, with following entries.
 - a. Tx Count: The number of attempted transmitted packages by this car.
 - b. Rx Count: The number of addressed, received, and validated packages for this car.
 - c. CRC Count: The number of addressed, received, and invalidated packages for this car.

- d. System Up Time: Displays the elapsed time frame that a and b above have been tracked, since the last power up or from the last statistical counter Reset.



NOTE: For the master car the screen display counters will display zero.



NOTE: If Tx and Rx Counts do not increment at the expected rate of approximately 10 times per second, perform a network validation per entries G2, G3 and G4 above.

3. HNA 1 through HNA 8, one screen for each possible 1 to 8 P-HNA boards, providing individual P-HNA performance from the master car perspective, with following entries.
 - a. Tx Count: The number of attempted transmitted packages by this P-HNA board.
 - b. Rx Count: The number of addressed, received, and validated packages for this P-HNA board.
 - c. CRC Count: The number of addressed, received, and invalidated packages for this P-HNA board.
 - d. System Up Time: Displays the elapsed time frame that a and b above have been tracked, since the last power up or from the last statistical counter Reset.



NOTE: If Tx and Rx Counts do not increment at the expected rate of approximately 10 times per second, perform a network validation per entries G2, G3 and G4 above.

G5.4 Dispatching Events

Dispatching events provides five statical data counters, for when this car is or has acted as the master, that can be accessed or reset navigating to:



Home



Troubleshoot



Event Logs



Event Counters



Dispatching Events

1. Balance Demand: How many times has the Up vs. Down Demand been balanced.
2. Up Peak Mode: How many times has the dispatching mode switched to Up Peak Dispatching mode.
3. Down Peak Mode: How many times the dispatching mode has switched to Dwon Peak Dispatching mode.

4. Lobby Up Peak Mode: How many times has the dispatching mode switched to Lobby Up Peak Dispatching mode.
5. Dispatcher Car: How many times is or has this car has been the master car.