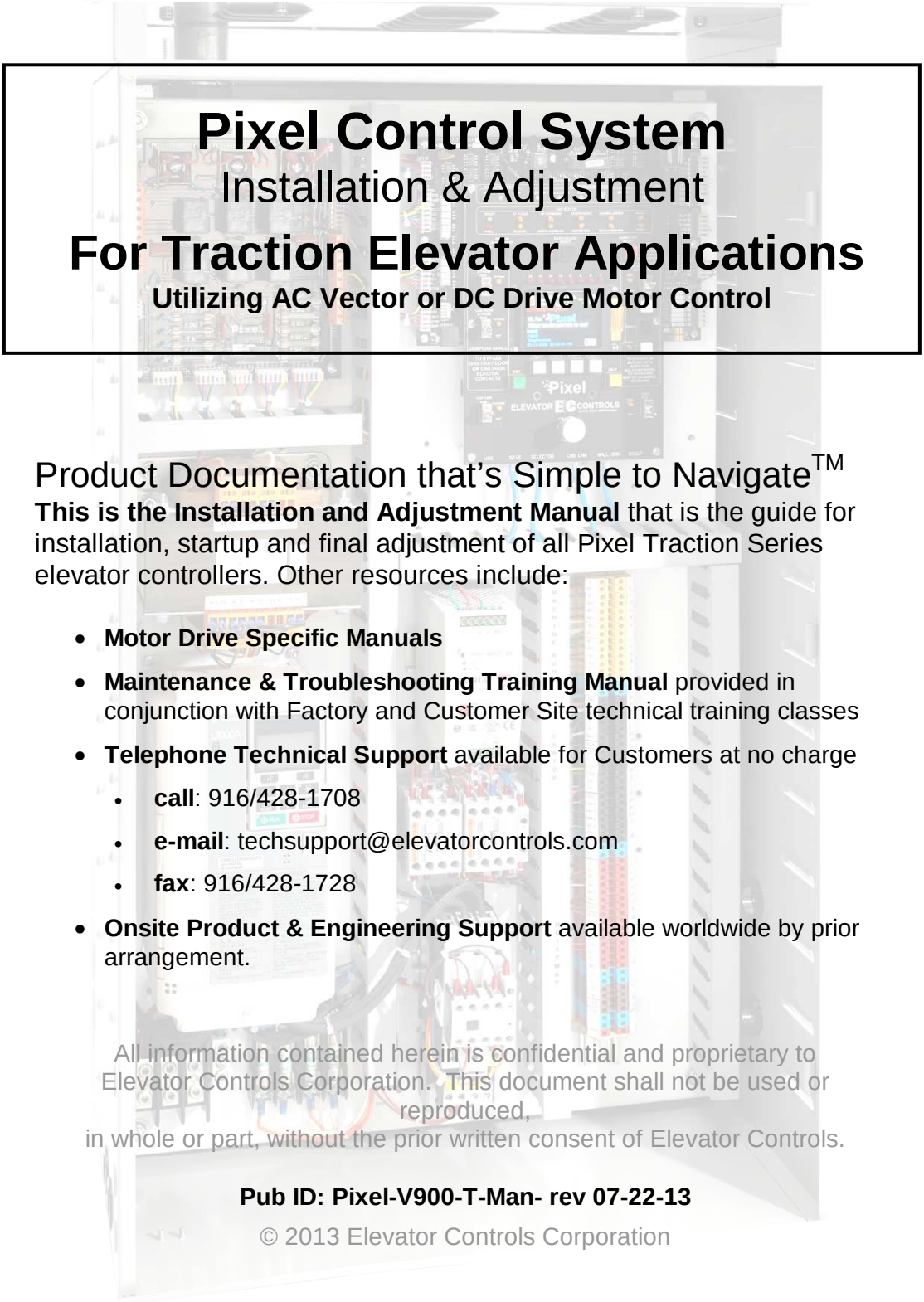
ELEVATOR EC CONTROLS
SIMPLE. SOLID. SUPPORTABLE.

Pixel Control System

Installation & Adjustment

For Traction Elevator Applications

Utilizing AC Vector or DC Drive Motor Control



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
  - **e-mail**: techsupport@elevatorcontrols.com
  - **fax**: 916/428-1728
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Appendix A4 HPV-900 Drive for PM Motors

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Introduction

Conventions in this Manual

Warning, Caution, and Note Icons

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.

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.

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.

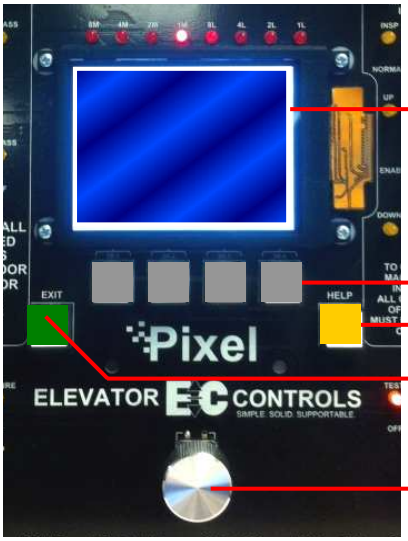
NOTE: Installation and wiring must be in accordance with the National Electrical Code and consistent with all local codes, as well as National elevator codes and regulations.

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.

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.



DASHBOARD

- **High Resolution LCD Screen**
- **Direct-Select Keys**
- **Help Key**
- **Home Key**
- **Touch & Go™ Navigation**

Figure i1 – System Access Point

Above the silver Touch & Go knob – within easy reach – are six key. 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.

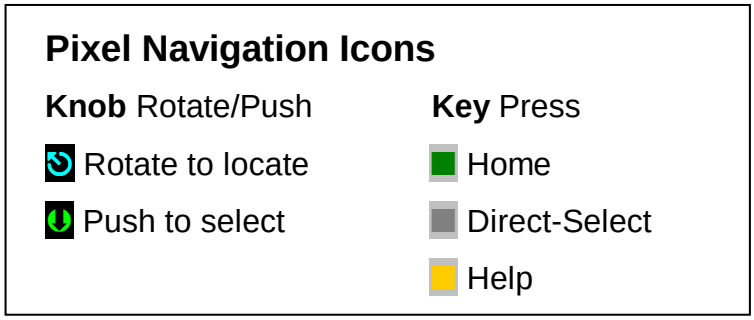


Figure i2 – Pixel Visual Shorthand Navigation Icons

Narrative Navigation Instructions too Complicated
This manual might instruct you to press the Green HOME key, 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)

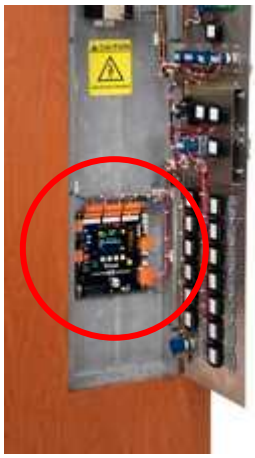
e **Landa™** dual sensor car positioning system

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 weigher, safety edge, cab light and fan, traveler cable and the provided TOC-to-COP wire harness. 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.

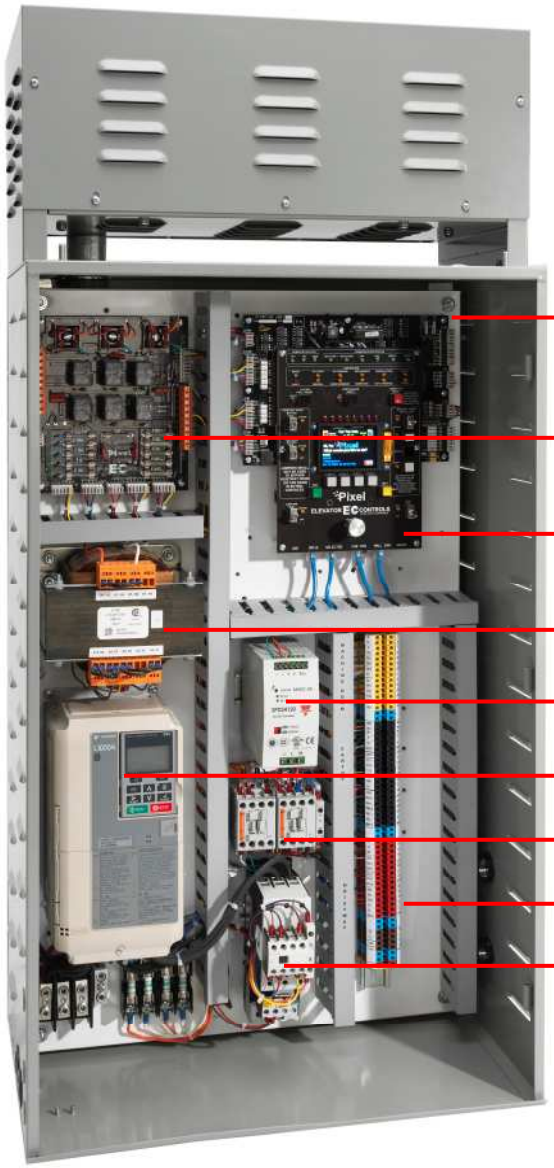
* Top and bottom physical limit switches *must be provided as required by elevator safety code.*

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

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.

COMPONENTS & SWITCHGEAR

- **Traveler termination, COP interconnection, Cab Lights and Fans Terminals**
- **P-Aux System Access Point** Screen and Dashboard
- **Optional Cartop Inspection Switchgear and Light**
- **24 VDC Power Supply**
- **P-TOC Cartop Microprocessor Board**

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.

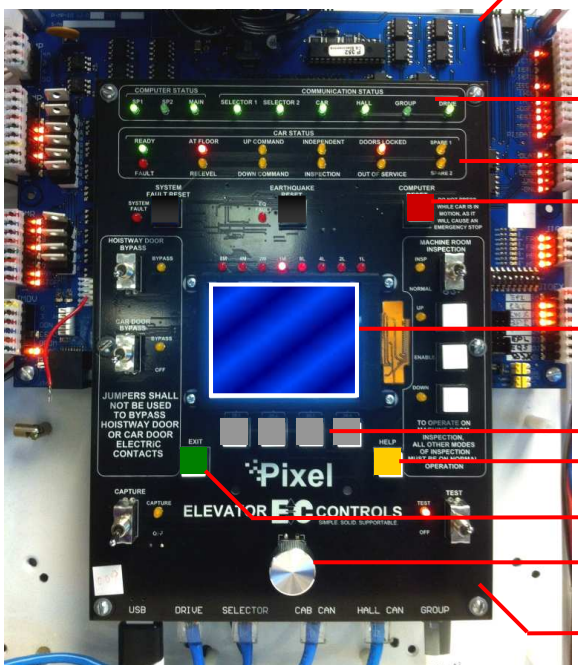
1.4.1 Pixel Dashboard – Overview

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

- **P-MP-IO Microprocessor**
  Main Input/Output Safety Microprocessor
- **Computer Status Indicators**
- **Car Status Indicators**
- **Resets**
- **High Resolution LCD Screen**
- **Direct-Select Keys**
- **Help Key**
- **Home Key**
- **Touch & Go™ Navigation**
- **P-MP Board**
  Dashboard Microprocessor

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.

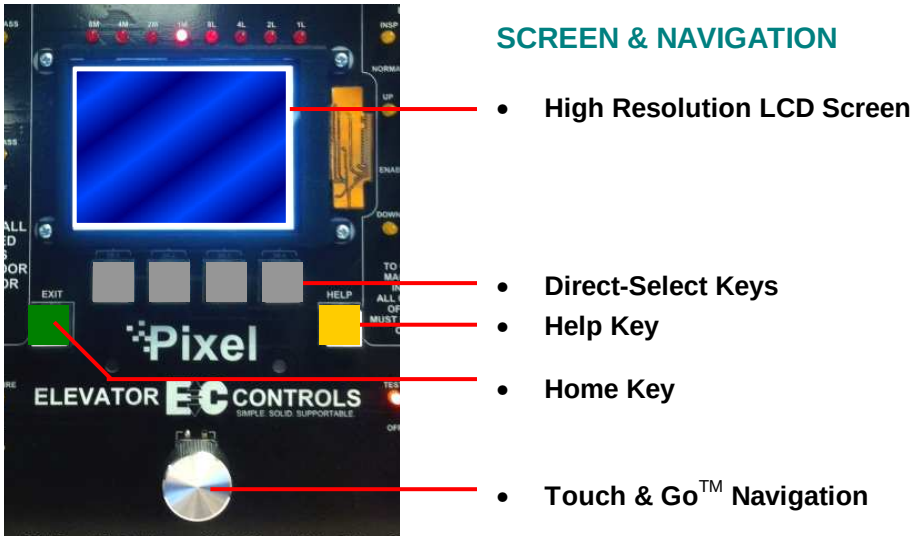


Figure 1.4.2 – Pixel Screen & Navigation

The dashboard provides a dedicated YELLOW button for immediate access to context-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.

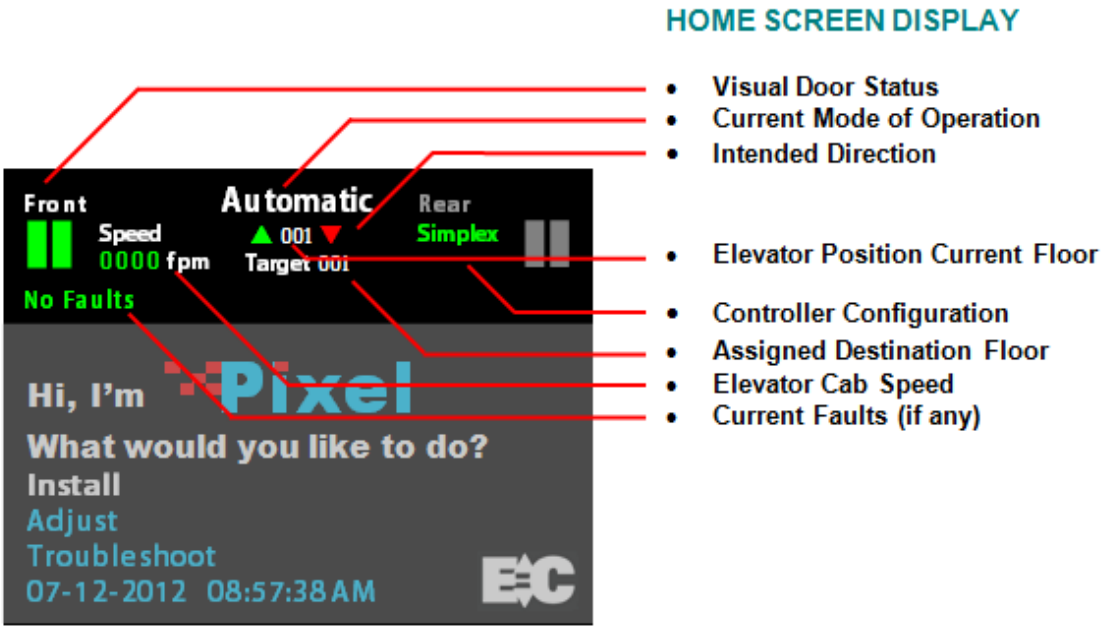


Figure 1.4.3b - Pixel Home Screen Display

1.4.4 Quick Reference to Home/Startup Screen Display

1.4.4.1 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

1.4.4.2 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
- Controller Inspection

Construction

- Cartop Inspection
- In Car Inspection

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 displays the current floor at all times, 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 at all times.

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 adjuster. 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 that 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.
Each of these options, and their submenus, are presented in detail in **Section 3 – Install the Control System**.

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**
- **Drive**
- **Controller Network**
- **Flags**
- **Fault Logs**
- **Sequence Log**
- **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 detail 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

When selecting the best physical 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. Provide adequate working space for control system installation, wiring, and maintenance. Elevator Controls standard equipment enclosures require front access only. This eliminates many constraints that would otherwise limit how equipment can be located.

c. 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.

d. 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.

e. Provide adequate lighting for safety and efficiency.

f. An internet connection, with fixed IP address, is desirable for access to **Remote Assist™** from the EC factory technical support team.

g. 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 effect 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, flash light, 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 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.

NOTE: All terminals and cable connectors should be checked to ensure that they are properly and solidly seated. When connecting flat cable connectors, be certain to match pin #1 marks (arrow symbol on connectors; red stripe on cable) to prevent mechanical damage to connectors and electrical damage to system components.

There are five wiring entry points provided in order to maintain proper separation between wiring for various purposes to ensure proper system operation:

a. **Power Wiring**: The line power feeders and ground coming from the elevator service disconnect.

b. **Motor Wiring**: Power wiring to hoist motor, brake and ground.

c. **Safety and Logic Wiring**: All wiring to fixtures and switches, as well as signal cross-connect cables from one car to another in a multi-car group system.

d. **Communications Cable**: Communication cables run from one controller to another in a group of two or more cars.

e. **Encoder Feedback Cables**: Wiring used to provide motor performance information from the encoder to the drive for speed control.

WARNING: **DO NOT CONNECT BUILDING POWER DIRECTLY TO THE MOTOR CONTACTOR. This will DAMAGE power devices in the drive.**

NOTE: The standard EC NEMA 1 enclosure is provided with factory knockouts for recommended ideal field wiring entry points.

Knockouts and intended use are listed:

a. Top right side
   - **Communication cable**

b. Middle left side
   - **Encoder Feedback cable**

c. Middle right side
   - **Safety & Logic wiring**

d. Lower left and right side
   - **Main Line Power wiring**
   - **Motor and Brake wiring**

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).

NOTE: Alternate wiring entry points may be created in the field to accommodate specific installation conditions.

NOTE: Study your control system layout to develop the best arrangement for keeping the five entry points separated and laid out logically to suit your particular application. Following is a proposed ideal Pixel controller field wiring layout.

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** in order to run the car on 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 ¾" 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 in order to remove power to controller logic, brake 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 1.

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 1.

CAUTION: Do **NOT** attempt to connect the building power supply to the drive or 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 1. 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 the Section 3.3.7.

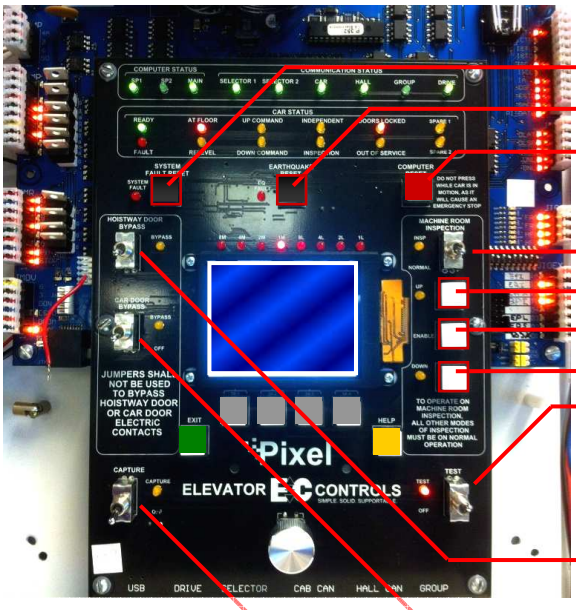


Figure 3.3.6a - Pixel

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

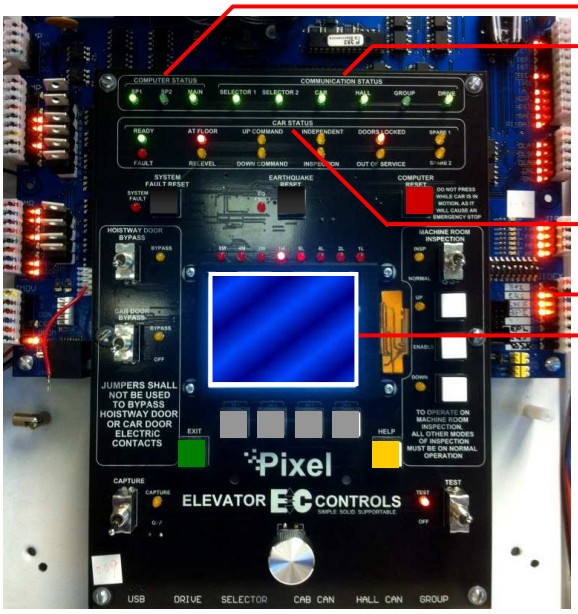


Figure 3.3.6b - Pixel Dashboard

INDICATORS

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

3.3.7 Verify Motor, Encoder, and Brake 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.

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 in order 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 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 PM Motors
A7	Quattro AC drive for Induction Motors
A8	Quattro AC drive PM Motors

Appendix B – DC Motor Control Drives

B1 DSD-412 DC drive

B2 Quattro DC drive

NOTE: Identify the correct Appendix section for your drive, 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 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 In-Car inspection without Landa™ selector feedback – while maintaining elevator safeties consistent with both of these inspection modes.

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

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

Pixel Navigation Icons

Knob Rotate/Push	**Key** Press
Rotate to locate	Home
Push to select	Direct-Select
	Help

NOTE: Construction Mode must be set to Disable in order 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 In Car 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. In Car Emergency Stop Switch between terminals 4A and ESTP.

e. Normal limits wired for UP (terminals 4A and UNL) and DOWN (terminals 4A and DNL).

f. Set HOISTWAY DOOR BYPASS and CAR DOOR BYPASS SWITCHES to BYPASS position; OR ensure that all car and hoistway gates and locks are closed.

g. If a Rope Gripper is required, wire monitoring contact between terminals RG2 and RG3.

h. Wire Motor to Motor Contactor

NOTE: Use proper wire size for amperage.

NOTE: Ground wire size must provide equal or greater ampacity than the motor power wires.

i. Wire Brake between terminals B1and B2

j. Wire Emergency brake as required, one of the two following:

1. Rope Gripper between terminals RG1 and RG2

OR

2. Auxiliary (secondary) Brake between terminals B1A and B2A

k. Wire Encoder directly to the drive encoder terminals

NOTE: Encoder must be connected 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 of sufficient length.

NOTE: Refer to job prints page 1 for the encoder wiring diagram. Particular care must be taken to properly connect shield wiring as shown on job prints for encoder to work correctly.

l. Wire Inspection Station to controller terminals ICT, ICTE, ICTU, and ICTD as shown on job prints page 3.

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.

Home

Install

Initial Settings

Speed Profile

Pixel Navigation Icons

Knob Rotate/Push	**Key** Press
Rotate to find	Home
Push to select	Direct-Select
	Help

Speed Profile Table

SPEED PROFILE	DEFAULT SETTING
Contract Speed	XXX fpm Job Specific
Inspection Speed	40 fpm
Leveling Speed	6 fpm
Re-Leveling speed	12 fpm
👍 Initial Jerk	**060 fpm**
👍 Roll Over Jerk	**060 fpm**
👍 Deceleration Jerk	**060 fpm**
👍 Acceleration	**060 fpm**
👍 Deceleration	**060 fpm**
Leveling Decel Time	0000 msec
Leveling Distance	1.0 ft
Pattern delay	0000 msec
Pre-Torque	No
Highspeed trip speed	Contract Speed + 10%
Inspection Trip Speed	100 fpm
Leveling trip Speed	100 fpm
Earthquake trip Speed	132 fpm
Percentage Overspeed	10%
Level Zone	0.50 ft
Door Zone Center	0.2 ft

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 (ie: 100 vs 1000) will produce a GREATER THAN INTENDED EFFECT on speed pattern calculated internally 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 In Car Inspection to a maximum speed of 50 fpm or the programmed inspection speed, whichever is less.

Navigate to the home screen, 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: Faults are classified as either latching or non-latching. While non-latching faults self reset, all faults are recorded in fault counters and logs.

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 Adjustment

First, while attempting to run the car, adjust brake pick voltage output by adjusting RB1 power resistor, and brake holding voltage by adjusting RB2 power resistor to the desired voltage output, 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 brake will properly hold at least an empty car. Perform any necessary mechanical adjustments to obtain proper brake operation. Refer to 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 correc 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 in Car Top Inspection or In Car 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. in order 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 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 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 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 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 CW of the prints for traveler wire count as well as for one-to-one terminal wiring instructions.

NOTE: A separate black terminal strip is provided, in the controller, to wire one to one the traveler cable conductors to the controller. Another identical 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 Landa™ Positioning System Installation

3.5.4.1 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 PS1 of the prints for installation guidelines.

Start by fastening the top end of the tape to the top-of-hoistway bracket, then allow the roll to descend down 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 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 6 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. Navigating 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 to1 foot, 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 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 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 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.

3.5.6 Verify Network Communication

Once wiring has been completed, verify that all network devices are recognized by the Pixel MP.

Navigate to the home screen, then follow step-by-step instructions to View Car Network Landscape and Hall Network Landscape Data.

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 required cab nodes are recognized (i.e. COP(s), TOC, Load Weighing Device, Door Operator, Etc).

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 required Car Hall nodes are recognized (i.e. Top and Bottom Access, Hall Gongs, Etc.)

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 Car Hall 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).

NOTE: Refer to Communication Troubleshooting, Section 7.5 of this manual, for guidelines to activate any missing network nodes.

3.6 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 to navigate:

Home

Install

Construction Mode

Disable or **Cancel**

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

3.7 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.

3.8 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 HMW of the prints.

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

3.9 Hoistway Position Learn

Pixel needs to “learn” the position of mechanical top and bottom Normal limit switches, virtual door zone positions, as well as virtual positions for the top and bottom 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 mechanical Down Normal Limit position first such position will be used to normalize all other mechanical or virtual positions.

3.9.1 Mechanical Limit Switches

Pixel must “learn” the position of the Up and Down Normal mechanical Limit switches. Follow the procedure below:

On Car Top Inspection mode, drive the car to the bottom of the hoistway until the car stops (the position at which Down Normal mechanical limit opens).

Navigate to:

- Home
- Install
- Learn Functions
- Limit Switches
- Down Normal Limit Switch (DNL)

Press the Learn soft key, to learn 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 this procedure after driving the car to the top of the hoistway.

Navigate to:

- Home
- Install
- **Learn Functions**
- Limit Switches
- Up Normal Limit Switch (UNL)

Press the Learn soft key, to learn 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.

3.9.2 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.

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.

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 3.9.1 Mechanical Limit Switches must have been performed.

a. Note the positions for the UNL and DNL limit switches recorded on Step 3.9.1 above.
b. Determine the allowed travel distance, base on your cab size and elevator code requirements.
c. BAT position = DNL Position + allowed travel distance from b above
d. TAL position = UNL 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 Learn soft key, to learn 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 to1.

3.9.3 Floor Setup

Pixel must “learn” the position of each door landing. Choose from two learn methods below: 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

On inspection mode drive the car to the landing position to “**Learn**”

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.

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

NOTE: To use this method, Step 3.9.1 Mechanical Limit Switches must have been performed.

a. Note the positions for the UNL and DNL limit switches recorded on Step 3.9.1 above.

b. Landing Position = DNL Position + Distance from DNL to landing door zone.

Navigate to:

- Home
- Install
- Learn Functions
- Floor Set Up
- Landing Number

Rotate to select landing position to be learn

Rotate to desired value for Landing Position from b above

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 to1.

Repeat Steps above for all 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.

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 on 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.

4.2 Check Hoistway Clearances

In order 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 Intentionally Left Blank

4.5 Intentionally Left Blank

4.6 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.

4.6.1 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 stepless speed pattern. **Figure 4.6.1** illustrates these basic physical characteristics of motion.

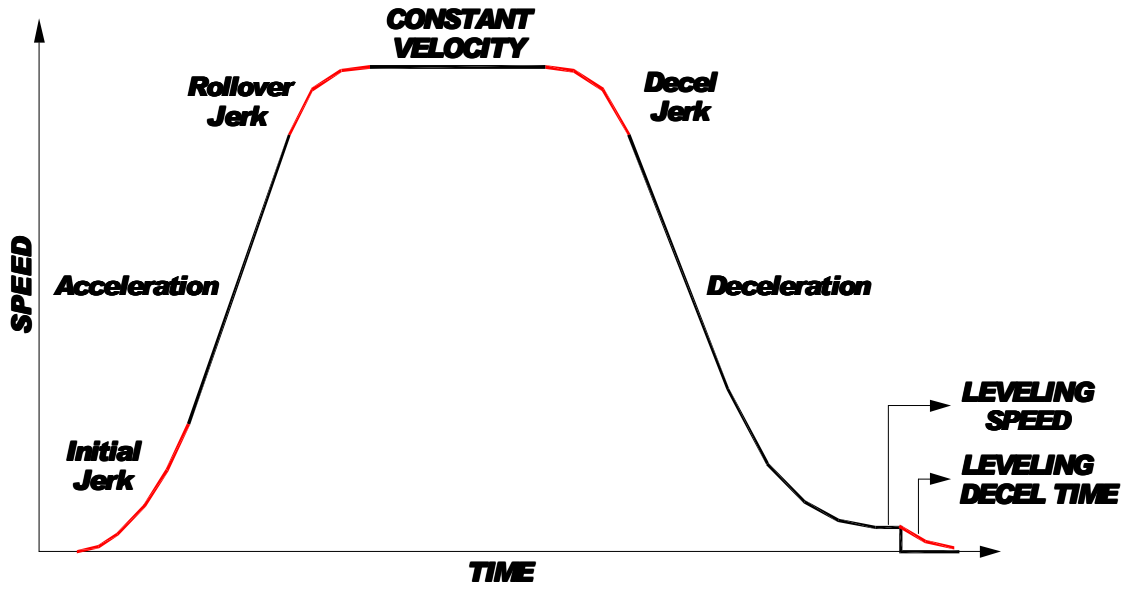


Figure 4.6.1 Physical Characteristics of Motion

4.6.2 Parameters for Position & Velocity Feedback (PVF)

Table 4.6-1 lists adjustable parameters available to customize car speed and performance profiles. **Sections 4.6.3** through **4.6.15** provide a brief description for each parameter, the adjustment range, and a more detailed explanation for each available parameter.

Table 4.6-1 Parameters for Position & Velocity Feedback	
4.6.3 Contract Speed	4.6.13 Leveling Distance
4.6.4 Inspection Speed	4.6.14 Pattern Delay
4.6.5 Leveling Speed	4.6.15 Pre-Torque Option
4.6.6 Re-Leveling Speed	4.6.16 Highspeed Trip Speed
4.6.7 Initial Jerk	4.6.17 Inspection Trip Speed
4.6.8 Roll Over Jerk	4.6.18 Leveling Trip Speed
4.6.9 Deceleration Jerk	4.6.19 Earthquake Trip Speed
4.6.10 Acceleration	4.6.20 Terminal % Trip Speed
4.6.11 Deceleration	4.6.21 Level Zone
4.6.12 Leveling Decel Time	4.6.22 Door Zone Center

4.6.3 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 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.

4.6.4 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.

4.6.5 Leveling Speed

Brief Description: Leveling Speed parameter controls the final speed of the car when coming into 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 leveling speed is set too high it will cause the car to overshoot the floor. Once Leveling Speed is set, use Leveling Distance to eliminate any overshoot.

4.6.6 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.

4.6.7 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 Jmin is equal to:

Jmin= (Acceleration x Acceleration) / Contract Speed

4.6.8 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 acceleration ÷ 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 Jmin is equal to:

Jmin= (Acceleration x Acceleration) / Contract Speed

4.6.9 Deceleration Jerk

Brief Description: The Deceleration Jerk parameter controls the softness of the transition from constant velocity to constant deceleration. Larger values result 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: 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.

The minimum jerk Jmin is equal to:

Jmin= (Deceleration x Deceleration) / Contract Speed

4.6.10 Acceleration

Brief Description: 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.

Adjustment Range: **25 – 300 fpm/s**

Default: **80 fpm/s**

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

Detailed Explanation: 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.

NOTE: Divide FPM/S by 60 to get ft/s^2

4.6.11 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 ftm/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.

4.6.12 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).

4.6.13 Leveling Distance

Brief Description: Leveling Distance determines where the car begins targeting the floor. The larger the value, the further away targeting begins. Leveling distance also controls the softness of the final rounding during an automatic run. 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: Leveling distance works with leveling speed to
determine how the car comes into a floor. High values of leveling distance 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.

4.6.14 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.

4.6.15 Pre-Torque Option

Brief Description: Pre-Torque Option allows Pixel to modify the initial speed command given to the motor drive unit to compensate for over or under load in the cab.

Adjustment Range: **Yes | No**

Default: **No**

Units of Measure: **N/A**

Detailed Explanation: Pre-Torque option is to be used in conjunction with a CAN-driven load weighing unit capable of providing weight status information to Pixel and after pre torque learn process has been executed. Refer to Appendix C Pre-Torque to set the load weighing device and Pixel to perform this function.

4.6.16 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.

4.6.17 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.

4.6.18 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 condition usually occurs 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.

4.6.19 Earthquake Trip Speed

Brief Description: Speed value at which the safety processors, SP1 or SP2 will declare an overspped condition to trigger a 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 condition usually occurs 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.

4.6.20 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 an 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.

4.6.21 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: **0.5 ft**

Units of Measure: **feet**

Detailed Explanation: Pre-Torque option is to be used in conjunction with a Can Driven Load Weighing unit capable of providing weight status information to Pixel and after pre-torque learn process has been executed. Refer to Appendix C Pre-Torque to set the load weighing device and Pixel to perform this function.

4.6.22 Door Zone Center

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

Adjustment Range: **.01 - .25 ft**

Default: **0.03 ft**

Units of Measure: **feet**

Detailed Explanation: Increasing the Leveling Zone allows Pixel speed profile generator to target leveling speed further away from the landing delivering a softer slower approach and final stop while sacrificing performance.

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 pass 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 3.3.7 to Enable/ Disable Construction Mode of Operation

NOTE: At this point Pixel's screen should display TEST Mode, doors closed, and No Fault in order 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 represent 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 represent 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 4.7.2 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, to 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

Place the CAPTURE switch to CAPTURE, and on Independent service inside the car for the Unintended Movement Bypass option not to trigger an Unintended movement bypass fault and prevent the car from moving.

Enable **Unintended Movement Bypass** to prevent SP1 and SP2 safety processors from triggering Unintended Movement fault s while floor adjustments are being performed from within the car.

Navigate to:

- **Home**
- Install
- Code Compliance Test
- Unintended Movement
- Unintended Movement Byapass
- 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 accomplish 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 has been completed by following procedure to enable **Unintended Movement Bypass** above replacing last selection Yes with No

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 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.

4.7.6.2 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 of these 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 Leveling Distance “Final approach”.

NOTE: Leveling distance should normally be greater than 6”. A good working range is 8” to 12”.

4.7.6.3 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.

4.7.7 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 accomplish 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 hioistway 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:

a. Position Indicator displays proper landing labels.
b. Car calls can be entered through the COP push buttons.
c. Every push button in the COP performs its function Door Open, Door Close, Passing Gong Enable, etc.
d. Car Responds to all capable Hall Calls.
e. Hall and Car gongs performance.
f. Overall car functionality and performance.

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

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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:

$$\textit{Cab speed} = \Delta\textit{position} \div \Delta\textit{time, where}$$
$$\Delta\textit{position} = \textit{(previous cab position)} - \textit{(current cab position)}$$
$$\Delta\textit{time} = \textit{(previous cab position time)} - \textit{(current cab position time)}$$

5.1.1 Defining Overspeed

Pixel’s SP1 and SP2 safety processors monitor car speed at all times 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 in order 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 transfer the Safety Configuration File to SP1 andSP2 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 Intentionally Left Blank

6.3 Intentionally Left Blank

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 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 TEST switch, located on the MP board, to TEST which will enable Test Mode operation and disable door operation.
e. Turn off main power to the controller.
f. Place jumpers from controller terminals 4A to DNL (Down Normal Limit), 4A to SAFC (Car Safety), and 4A to SAFH (Hoistway Safety), to bypass safety switches for the Car Buffer Test.

g. Turn on main power to the controller.

h. Navigate to:

Home

Install

Code Compliance Tests

Safeties Speed Tests

Car Buffer

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. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.

j. Using Controller Inspection, run the car up past the bottom landing door zone area. Remove all jumpers placed in item f above.

k. Reset ETS Bypass option, **ETS Bypass Option**, Set to **No**

l. Toggle the TEST switch to the off position and remove test weights from the car.

m. Set the CAPTURE switch to 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 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 main power to the controller.

e. Place jumpers from controller terminals 4A to UNL (Up Normal Limit), 4A to SAFC (Car Safety), and 4A to SAFH (Hoistway Safety) to bypass safety switches for the Car Buffer Test.

f. Turn on main power to the controller.

g. Navigate to:

Home

Install

Code Compliance Tests

Safeties Speed Tests

Counterweight Buffer

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 **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. spect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.

i. Using Controller Inspection run the car down past the top landing door zone area. Remove all jumpers placed in e above.

j. Reset ETS Bypass option, **ETS Bypass Option**, Set to **No**

k. Toggle the TEST switch to the off position.

l. Set the CAPTURE switch to off, which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.3 Safety Overspeed – Fully Loaded Car

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

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

e. Turn off main power to the controller.

f. Place a jumper from controller terminals 4A to GOV (Governor Electrical Contact).

g. Turn on main power to the controller.

h. Refer to Drive section x1.7 “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

Safety Overspeed

Press the **Run Test** soft key to start the **Safety 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.

a. Refer to Drive section x1.7 “Overspeed Using the Drive to Drive the Hoist Motor” to return drive parameter settings to limit motor to contract speed.
b. Turn off main power to the controller.
c. Remove jumper placed in item e above.
d. Inspect the mechanical condition of the cab, traction cables, etc. to ensure the car can be returned to service.
e. Follow car safeties manufacturer instructions to reset the car safeties.
f. Turn on main power to the controller.
g. Toggle the CONTROLLER INSPECTION switch to NORMAL which will enable the car to re-level into the closest landing.
h. Toggle the TEST switch to off. And remove load from the car.
i. Set the CAPTURE switch to off which will enable the car to service hall calls and return to Automatic Mode operation.

6.4.4 Emergency Terminal Stop

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

Down Direction:

a. Set 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 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 dropdown window 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 Speed 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 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 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 Speed 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.

6.5 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 CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.

b. Set 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 use 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.

g. Observe that the Display shows an Inspection Overspeed Trip latching fault, and that the car comes to a halt.

f. Verify the car will not accept a command to run while the latched fault is present.

g. Press the System Fault Reset key to clear the fault and enable the enable the car to accept a command to move.

h. Toggle the MACHINE ROOM Inspection switch to NORMAL which will enable the car to re-level into the closest landing.

i. Set the TEST and CAPTURE switches to 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 CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from servicing Hall Calls.

b. Set 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. Enter a Car Call to run the car.

h. 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 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 the time out period (default is 30 seconds) for Pixel to switch from abnormal to Normal Earthquake mode of operation.

e. Set 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 eathquake 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 **Eathquake Overspeed** condition using the **Tripping Speed** parameter or the **Back** soft key to abort test run.

g. Place a car call to run the car.

i. Observe the display Fault entry for the safety processors to declare a latching Earthquake Overspeed fault, and the car 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 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 to 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 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 fault and observe the car to re-level to its closest landing

h. Set the TEST and CAPTURE switches to 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 Overpeed 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 CAPTURE switch, located on the MP board, to CAPTURE to prevent the car from responding to hall call demand.

b. Set 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”.

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, 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 Terminal Stopping Devices (ASME A17.1, Section 2.25)

Down 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. Turn main power to controller off.

c. Place jumpers from controller terminals 4A to SAFC, and from 4A to SAFH (Car and Hoistway Safeties), to bypass safety switches.

d. Turn main power to controller on.

e. Run the car down past the bottom landing. The car should stop when the Down Normal Stopping Device (NTSD) contact is opened.

f. Verify that the Down Normal switch is open by measuring 0 volts between terminal 3 and the DNL terminal with a voltmeter.

g. Verify that the Pixel screen displays **Down Terminal Switch Open**.

h. Run the car up. The car should move in the up direction, allowing the NTSD contact to close.

i. Turn main power to controller off.

j. Remove jumpers placed in step c above.

k. Restore main power to controller.

l. 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. Turn main power to controller off.

c. Place jumpers from controller terminals 4A to SAFC, and from 4A to SAFH (Car and Hoistway Safeties), to bypass safety switches.

d. Turn main power to controller on.

e. Run the car up past the top landing. The car should stop when the Up Normal Stopping Device (NTSD) contact is opened.

f. Verify that the Up Normal switch is open by measuring 0 volts between terminal 3 and the UNL terminal with a voltmeter.

g. Verify that the Pixel screen displays **Up Terminal Switch Open**.

h. Run the car down. The car should move in the down direction, allowing the NTSD contact to close.

i. Turn main power to controller off.

j. Remove jumpers placed in step c above.

k. Restore main power to controller.

l. 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:

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. Turn main power to controller off.

c. Place a jumper from controller terminals 4A to DNL, to bypass the down NTSD safety switch.

d. Turn main power to controller on.

e. Run the car down, past the bottom landing. The car should stop when the Final Stopping device (FTSD) contact is opened.

f. Attempt to run the car. It should not move in either direction.

g. Verify that the Safety String is open by measuring 0 volts between terminal 3 and the SAFC and SAFH terminals with a voltmeter.

h. Verify that the Pixel screen displays **Hoistway Safety String Open**.

i. Turn main power to controller off.

j. Place jumper between controller terminals 4A to SAFC and 4A to SAFH.

k. Turn main power to controller on.

l. Run the car down until the car buffer is fully compressed.

m. Turn main power to controller off.

n. Remove the jumper from terminals 4A to SAFC and 4A to SAFH.

o. Turn main power to controller on.

p. Verify that the FTSD remains actuated by measuring 0 volts from terminal SAFH to terminal 3 with a voltmeter.

q. Turn main power to controller off.

r. Replace jumpers between terminals 4A to SAFC and 4A to SAFH, and remove jumper between terminals 4A and DNL.

s. Turn main power to controller on.

t. Move the car up to the bottom landing door zone area.

u. Turn main power to controller off.

v. Remove jumpers between terminals 4A to SAFC and 4A to SAFH.

w. Turn main power to controller on.

x. 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. Turn main power to controller off.

c. Place a jumper from controller terminals 4A to UNL, to bypass the up NTSD safety switch.

d. Turn main power to controller on.

e. Run the car up, past the top landing. The car should stop when the Final Stopping device (FTSD) contact is opened.

f. Attempt to run the car. It should not move in either direction.

g. Verify that the Safety String is open by measuring 0 volts between terminal 3 and the SAFC and SAFH terminals with a voltmeter.

h. Verify that the Pixel screen displays **Hoistway Safety String Open**.

i. Turn main power to controller off.

j. Place jumper between controller terminals 4A to SAFC and 4A to SAFH.

k. Turn main power to controller on.

l. Run the car up until the counterweight buffer is fully compressed.

m. Turn main power to controller off.

n. Remove the jumper from terminals 4A to SAFC and 4A to SAFH.

o. Turn main power to controller on.

p. Verify that the FTSD remains actuated by measuring 0 volts from terminal SAFH to terminal 3 with a voltmeter.

q. Turn main power to controller off.

r. Replace jumpers between terminals 4A to SAFC and 4A to SAFH, and remove jumper between terminals 4A and UNL.

s. Turn main power to controller on.

t. Move the car down to the top landing door zone area.

u. Turn main power to controller off.

v. Remove jumpers between terminals 4A to SAFC and 4A to SAFH.

w. Turn main power to controller on.

x. Return Machine Room Inspection switch, on the MP board, to NORMAL.

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 system – Landa™– incorporating a positional encoded tape that runs the entire length of the hoistway. This system enables each either 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 CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.

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

b. Set 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 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 to respond 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.

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

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

b. Place Machine Room Inspection switch to INSP.

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

c. 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.

d. 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.

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

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

g. 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.

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

i. Place Machine Room Inspection switch to NORMAL.

NOTE: Pixel alternates 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 1and 4 of prints.

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

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

c. Place Machine Room Inspection switch to INSP.

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

d. 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**).

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

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

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

h. 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

i. Place Machine Room Inspection switch to NORMAL.

6.9.3 P 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.

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

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

c. Place Machine Room Inspection switch to INSP.

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

d. 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**).

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

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

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

h. 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.

i. Place Machine Room Inspection switch to NORMAL.

6.9.4 BK Brake Relay

Critical Component: BK Relay

Redundant Component: BKI1-BKI2, 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.

a. Set CAPTURE switch, located on the MP board, to CAPTURE which will prevent the car from responding to hall call demand.
b. Set TEST switch, located on the MP board, to TEST, which will enable Test Mode operation and disable door operation.
c. Place Machine Room Inspection switch to INSP.

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

d. 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**).
e. While holding BK relay movable, use Machine Room Inspection to command the car Up or Down.
f. Verify that the car will not accept a run command while the fault is present.
g. Release the BK contactor actuator and confirm that the Pixel screen displays **No Faults**.
h. 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.
i. 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 on Automatic Mode of Operation, place the **Hoistway Door Bypass** switch to the BYPASS position.

b. Confirm that the Pixel screen displays **Inspection Mode** and also 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 on 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 on 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

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. Place the car on Independent Service and run the car to the bottom landing. 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 with 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.

j. Remove jumper from 4A to DLSF. Confirm that the Pixel screen displays **No Faults**.

k. Run the car to the top landing.

l. Place a Jumper from 4A to DLAT. Confirm that the Pixel screen displays **Door Lock System Fault**.

m. Verify that the car will not respond to a car call demand.

n. 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.

o. Run the car to a rear door landing and open the rear doors.

p. Place a jumper from 4A to CGR. Confirm that the Pixel screen displays **Door Lock System Fault**.

q. Verify that the car will not respond to a car call demand.

r. Remove jumper from 4A to CGR. Confirm that the Pixel screen displays **No Faults**.

s. Place a jumper from 4A to DLSR. Confirm that the Pixel screen displays **Door Lock System Fault**.

t. Verify that the car will not respond to a car call demand.

u. Remove jumper from 4A to DLSR. Confirm that the Pixel screen displays **No Fault**

v. 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 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 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™ 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 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 adjustments 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 on 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 buss, 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 main power to controller off.
d. Replace fuse F4A.
e. Turn 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.

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.

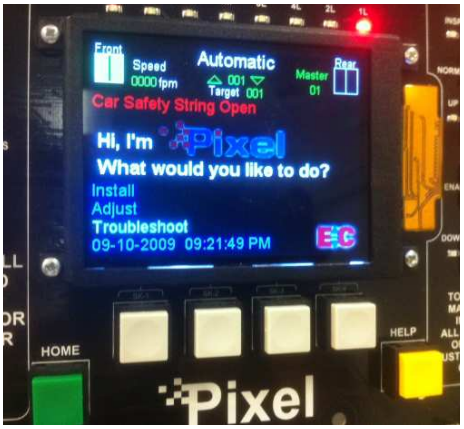
d. Check voltage between terminals 4A and 3 to confirm approximately 110 VAC.

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 buss (normally terminal 3 is connected to chassis ground). Unless otherwise noted, all DC voltages are measured with respect to Terminal 3.

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:

a. Verify the SAFC input LED, located on the P-I/O, board is not illuminated, indicating that SAFC input voltage is missing.

b. Open the job prints, page 3, as indicated by the HELP menu.

c. Verify that power between terminals 3 and 4A is approximately 120 VAC. For 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 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 Fault Table 7.3.1

1. Unintended Movement
2. Governor Switch Open
3. Aux. Brake Main Relays
4. Aux. Brake Aux. Relays
5. Inspection Overspeed
6. Slowdown Overspeed
7. Leveling Overspeed
8. Earthquake Overspeed
9. High Speed Overspeed
10. Motor Limit Time Out
11. Pit Flood

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.	**MP**	Pixel microprocessor board
b.	**MP-IO**	Pixel safeties input-output board
c.	**MP-TOC**	Pixel top of the car microprocessor board
d.	**MP-COP**	Pixel COP microprocessor board
e.	**HALL**	Pixel hall node board
f.	**CN-EX**	Pixel general purpose16 IO expander board
g.	**PDB**	Pixel power distribution 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

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	SPD24120, C.G. 24 VDC-5 Amps
Landa Sensor Head	WCS3 Pepperel+Fuchs

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 particular 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 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 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 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 Autotune these circuits, the following disable process must be followed:

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 C5-01and 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 Ohmeter, 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 C5-01and C5-02 back to 15.00.

A1.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regards 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. 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 hand held 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 car is running below 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-O6, (60 x300)/ 320 = 56.2

e. Program E1-O4 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 peed 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 C5-01and 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 equals more control and may lead to vibration and ride discomfort, while lower gain values equals 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 the Unintended Movement Test, Option 2, Section 6.9.

a. Program drive parameter H2-01 to 6, Drive Ready Output. The RUN relay will energize once when the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.

b. Once Unintended Movement Test, Option 2, Section 6.9.8 has been completed, reset drive parameter H2-01 to 50, Brake Control.

Appendix A2
L1000A Vector Drive for Permanent Magnet 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 particular 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:

f. 3-Phase output power to the motor through the contactor
g. Fault output (drops fault relay if a fault condition is detected)
h. 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 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 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 DPS of the job prints. Other parameters are either not used for your particular 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 Auto-tune the drive, the following process must be followed:

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 C5-01and 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 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 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 Key Pad 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 Key Pad 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 Key Pad 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 H1-02 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 Key Pad 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 Key Pad indicates the Autotuning process has been completed, the motor contactor can be released (Tune Successful).

l. Change drive parameter H1-02 back to 50 for Brake Control.

4. Autotuning – Non-Rotational Encoder Offset:

NOTE: Skip this step if the Rotation 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.

b. To begin the Autotuning Non-Rotation Encoder Offset process, set Autotuning parameter T2-01 to 4 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.

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 Key Pad 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 DPS of the job prints.

A2.3.3 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 C5-01and C5-02 back to 15.00.

A2.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regards 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.

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 commanded direction for Pixel and the drive agree. If no drive fault occurs, no further adjustments are required.

c. 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 hand held 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 hand held 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 car is running below commanded speed and E1-04 and E1-06 are set to the frequency listed on page 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 (22Hz. x 300fpm)/ 320fpm = 20.63Hz.

   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 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 C5-01and 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 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 contact 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 Brake Control output temporarily changed to Drive Ready to facilitate Unintended Movement testing, Section 6.9 Option 2.

a. Temporarily re-program drive parameter H2-01 to 6 (Drive Ready). The RUN relay will energize once when the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.
b. Once Unintended Movement Test, Option 2, Section 6.9.8 has been completed, reset drive parameter H2-01 to 50 (Brake Control).

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 particular 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:

i. Hardware enable inputs
j. RS422 Communications channel
k. Power inputs to terminals L1, L2 and L3
l. Encoder inputs

The basic drive outputs are:

m. Armature Variable DC voltage to the motor through the contactor
n. Motor field Variable DC Voltage
o. Drive Ready output (drops DSAF controller input if a fault condition is detected)
p. Run Engaged output (enables brake)
q. Loop Pickup Output (enables motor contactor)

B1.2 Job Parameters Verification

Use the Drive Interface to verify that the parameter list – provided on page DPS of the job prints – matches with actual drive programmed parameters.

Page 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 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 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 direction to permanently store drive modified parameters

B1.2.1 Saving Drive Parameters

Drive Function 994 must be used to save drive parameters into the drives 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 I 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 routines 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”, 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 and 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”, then press the ENT button on the drive.
d. While the drive is performing the Self Tune, the drive displays “tESt”.

h. The motor contactor will pick and drop and few times while the drive is performing the Self Diagnostics.

i. 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.

e. 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 regards 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 in the 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 in the 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 the at 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 hand held 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 hand held 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 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 rpm x 350fpm)/ 370fpm = 118 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 B1.2.1to 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 hand held 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 achieve 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.

f. 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 drives per unit inertia (function 41) has been optimized, refer to section B1.2.1to save the drive parameters.

g. 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.

h. 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).

i. Once final drive adjustment has been completed, refer to section B1.2.1to 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 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 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 contact 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 Brake Control output temporarily changed to Drive Ready to facilitate Unintended Movement testing, Section 6.9 Option 2.

a. Temporarily re-program drive function 183 to 1 (excessive motor field current). The RUN relay will energize once when the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.

b. Once Unintended Movement Test, Option 2, Section 6.9.8 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 particular 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:

a. Hardware enable inputs
b. RS422 Communications channel
c. Power inputs to terminals TB1-1, TB1-2 and TB1-3
d. Encoder inputs
e. Safety Chain Input

The basic drive outputs are:

f. Armature Variable DC voltage to the motor through the contactor
g. Motor field Variable DC Voltage
h. Drive Ready output (drops DSAF controller input if a fault condition is detected)
i. Brake Pick output
j. Drive Output Power (to controller Safety Chain contacts)

k. 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 DPS of the job prints – matches with actual drive programmed parameters.

Page 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 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 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 the 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 ellapse 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, acess 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 Autotuing 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 at controller terminal B1 (brake coil).

B2.4 Motor Rotation Verification

Pixel and the Drive need to be in sync in regards 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.

d. When commanding an Inspection up direction, if the car runs too fast and the drive trips with an 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.

e. 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 hand held 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:

f. Using a hand held 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.

g. Obtain the value of parameter CONTRACT MTR SPD in the drives A1 parameter menu.

h. If car is running below commanded speed, increase the CONTRACT MTR SPD parameter (motor rpm).

i. If car is running above commanded speed lower the value of CONTRACT MTR SPD (motor rpm), for example:

vii. Car contract speed is 350 ft/ min

viii. Car measured speed is 370 ft/ min

ix. Drive function CONTRACT MTR SPD is set to 125 rpm.

x. Calculate the new value for the CONTRACT MTR SPD parameter (125 rpm x 350fpm)/ 370fpm = 118 rpm.

xi. Program CONTRACT MTR SPED for the new value of 118 rpm and repeat process if necessary until car speed is accurate within 1%.

xii. 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 has the ability to 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:

g. 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.

h. 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.

i. Make notes of the EST INERTIA value in the drives D1 menu for both the up and down directions.

j. 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.

k. 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 drives 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, 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 drives A1 menu and parameter OVERSPEED TEST in the drives U4 menu.

To overspeed the car to 125% of contract speed perform following steps:

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

i. Run an empty car to the bottom landing, or a fully loaded car to the top landing.

j. Set the value in drive parameter OVERSPEED MULT in menu A1 for the percentage the car is desired to overspeed.

k. Set the value in drive parameter OVERSPEED TEST in menu U4 to YES.

l. Enter a car call for an intermediate landing.

m. Car will overspeed to the percentage of contact speed programmed in drive parameter OVERSPEED MULT in menu A1.

n. If additional overspeed tests are required, the OVERSPEED TEST parameter in menu U4 will have to be programmed to YES for each subsequent test.

o. 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 Brake Pick control output temporarily changed to No Alarm to facilitate Unintended Movement testing, Section 6.9 Option 2.

c. Temporarily re-program drive parameter Relay Coil 1 from Brake Pick to Not Alarm in menu C3. The RUN relay will energize once when the P relay is closed manually. Refer to page 4 of the prints for RUN relay coil power supply circuit.

d. Once Unintended Movement Test, Option 2, Section 6.9.8 has been completed, reset drive parameter Relay Coil 1 from Not Alarm to Brake Pick in menu C3.