Vision 2.0 Traction Controller
User Manual
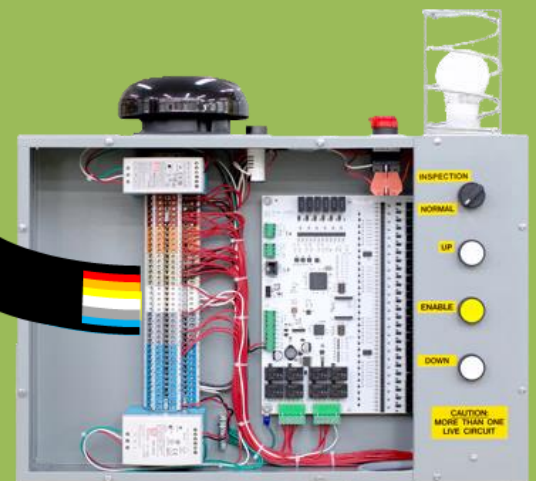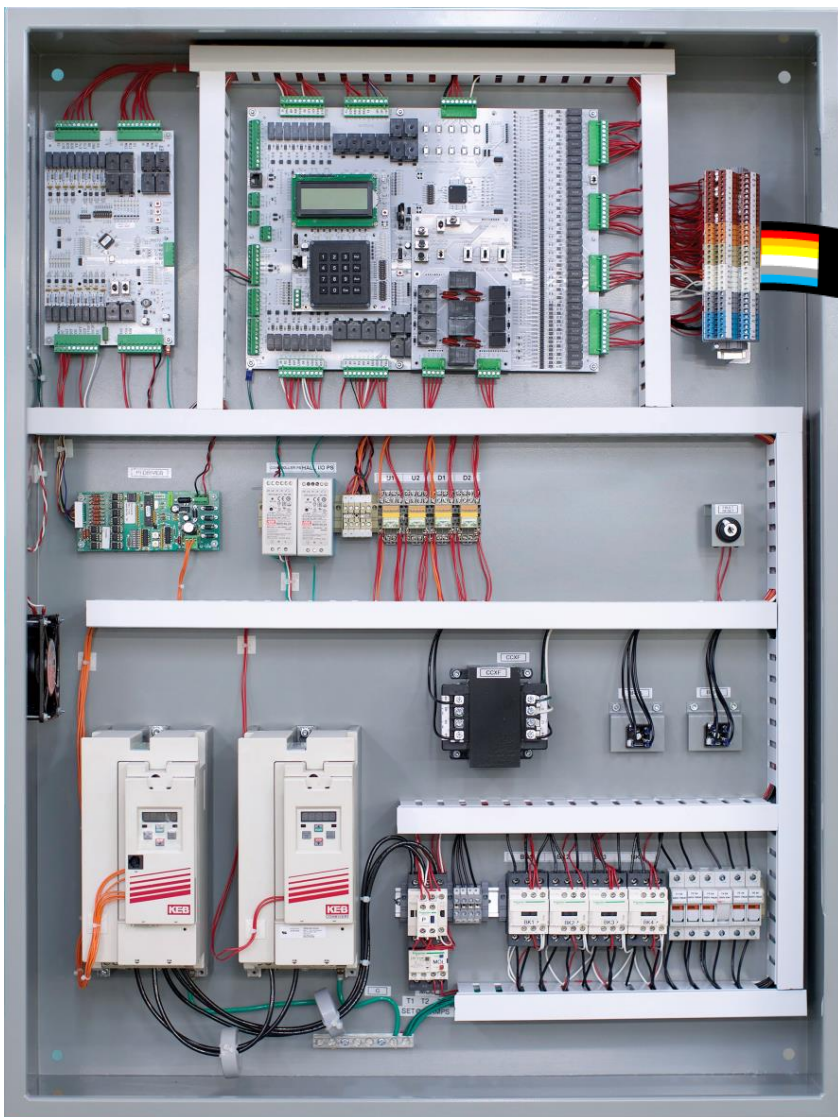
VC
VIRGINIA CONTROLS

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1. Vision 2.0 Introduction

1.1 General Description

The Vision 2.0 Traction Controller is the newest microprocessor offered by Virginia Controls, featuring a more compact and installer-friendly redesign of the Vision serial I/O platform. The Vision 2.0 package includes a factory pre-wired Car Top Inspection Station with color-coded traveling cable for convenient field hookups to a standardized terminal strip.

Vision 2.0 includes improvements to CPU power and capabilities, allowing controller processing, dispatching, and monitoring to be served by a single CPU. The CPU is also Wi-Fi compatible, allowing for wireless CPU keypad controller during installation and maintenance with any Wi-Fi enabled device.

Serial communication to I/O boards, absolute positioning system and other remote devices are handled using CANbus (Controller Area Network).

Safety processing is shared by dedicated safety processors in both the machine room controller and Car Top Inspection Station for more direct signal hookups while reducing the traveling cable conductor count.

This combination of features results in speedy installations, high reliability, ease of troubleshooting, and a long-lasting elevator control system.

1.2 What's New

New hardware, more compact design, and improved plug and play package, including:

Machine Room controller, compact 36" x 48" x 12" enclosure with standardized layout, with all field connections to color-coded terminal blocks.

Car Top Inspection Station, with all field connections to color-coded terminal blocks.

Vision 2.0 traveling cable, color-coded for connections between main controller and Car Top Inspection Station.

C.O.P. Remote I/O board, for serial connection to C.O.P. fixtures. Fixture pre-wiring available on request.

C.O.P. – Car Top cable, color-coded for connections between C.O.P. and Car Top Inspection Station.

Hall I/O boards, for serial connection to hall calls at each landing and fire service key switch. Fixture pre-wiring available on request. Available with either screw terminal or RJ-45 connections.

Hoistway serial cable, for connecting Vision hall boards for communication and providing 24VDC fixture power.

Absolute positioning system, now with single RJ-45 connection to Car Top Inspection Station.

Upgraded CPU and interface with backlit screen for all-in-one dispatching, safety checking and controller logic.

Wireless access to CPU screen & keypad through Wi-Fi interface on local WAN.

Construction/Rescue operation, which allows machine room inspection control even while car safety board is offline.

1.3 General Specs

- 2-64 Landings from Simplex to dispatcher-less 8-Car Group – Demand/Response operation.

- Up to 500FPM for traction applications

- Compatible with 208, 240, 380, 460 or 600VAC Building Supplies.

- Available drive arrangements: KEB, CT, Allen Bradley

- Max. 64 car door openings: In-Line or Front and Rear; Selective or Non-Selective operation.

- Compatible with the typical array of new or existing door operators – passenger and freight.

- Applicable Codes: ASME A17.1/CSA B44 – Safety, and ASME A17.5/ CSA B44.1 – Electrical.

- Available with standard Car Top Selector or Absolute Positioning System (NTS included).

- Optional: Emergency Power, Hospital Service, EMT Service, and SBC or SAPB Operations.

- Local or Remote Monitoring capabilities via Ethernet, with configurable IP Addresses.

- Enclosure: 36"W x 48"H (typical) wall mounted NEMA 1 w/Lift-Off Cover; NEMA 4 and 12 also.

- Single Phase Building Supply to Multi-Sequential Starting w/Branch Circuit Protection.

1.4 Warranty Terms & Conditions

WARRANTY: Virginia Controls (VC) warrants that all products will be free from defects in material and workmanship for a period of one (1) year from date of shipment. This warranty is extended to the original purchaser only and is not transferable to any subsequent purchaser. VC obligations under this warranty shall be strictly limited to repairing or replacing the documented defective material at VC's option. Material may be returned only with prior authorization of VC. Unused material must be in its original carton and in resalable condition. A Restocking Charge of 25% will apply unless waived, in writing, by an authorized officer of VC. All material returned must be freight prepaid and insured for full value. VC shall determine, in its sole discretion, whether the product is defective, and whether the warranty is applicable. VC will not be responsible for damage due to misapplication, misuse, improper hookup, incompatible peripheral devices, transients and voltage spikes, or the use of improper fusing or voltages. VC will not accept responsibility for equipment which has been modified in any way without the express written consent of an authorized officer of VC, further, the unauthorized modification of any product supplied by VC will render the here before stated warranty null, void, and unenforceable. **VC makes no other warranties or guarantees, expressed or implied, and any implied warranties of merchantability or fitness for a particular purpose VC hereby disclaims and excludes from any agreement made by acceptance of this order. There are no warranties, either expressed or implied which extend beyond the face hereof. VC shall not be liable for damages, direct or consequential, or delays if such occur.** VC will not grant any allowances for any repairs or expenses without the express written consent of an authorized officer of VC. No further warranties or guarantees given by the purchaser to its customers shall be binding upon VC.

2. Pre-Installation Instructions and Notes

2.1 General Notes

It is strongly recommended that you read this manual carefully before proceeding with the installation.

Important information is highlighted by the headings: WARNING, CAUTION, or NOTE. These headings are defined as follows:

> **WARNING - Warnings are used to indicate instructions which, if not followed correctly, will probably result in personal injury or substantial damage to equipment.**

> **CAUTION - Cautions are used to indicate instructions or information which, if not observed, may result in some damage to equipment if care is not taken.**

> **NOTE - Notes are used to indicate instructions or information which is especially helpful in understanding and operating the equipment, and which will usually speed up the installation.**
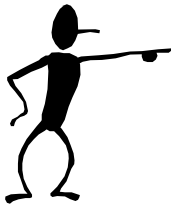
Pay special attention to points highlighted in this manner. They are of special consideration and are frequently overlooked.

2.2 Important Precautions and Notes

The following general rules and safety precautions must be observed for safe and reliable operation of your system.

> **WARNING: The elevator controller must be installed by experienced field installation personnel. The field installation personnel must know and follow all the rules and regulations pertaining to the safe installation and running of elevators. Additional information for specific devices (such as the door operator, drive, motors, etc.) is the responsibility of the manufacturers of those devices.**
>
> **WARNING: This equipment is designed and built to comply with ASME A17.1 / CSA B44 and ASME 17.5 /CSA B44.1 codes and must be installed by a qualified contractor. It is the responsibility of the contractor to make sure that the final installation complies with all applicable local, state and national codes and is installed safely.**
>
> **WARNING: The 3 phase AC power supply to this equipment must come from a fused disconnect switch or circuit breaker which is sized in accordance with all applicable national, state and local electrical codes, in order to provide the necessary branch circuit protection for the controller and motor. Incorrect motor branch circuit protection may create a hazardous condition.**
>
> **WARNING: The 3 phase AC power supply must be provided with a suitable ground conductor that is connected to the dedicated ground of the building's electrical distribution system.**
>
> **WARNING: Proper grounding is vital for the safe operation of your system. Bring the ground wire to the ground bar labeled "GND" or "G". You must choose the proper ground wire size. See national electrical code article 250-95 or the related local applicable code.**

3. Controller Installation and Wiring

3.1 Controller Location Selection & Environment

Mount the controller in a location that provides:

- Adequate support for the weight of the controller.

- Adequate lighting for installation and maintenance.

- Convenient access for the routing of required conduits and cables.

- Convenient access to other devices in the machine room.

- A minimum of vibration (provide additional bracing or reinforcement if required).

For improved controller reliability:

- Keep the machine room clean.

- Do not install the controller in a dusty area.

- Do not install the controller in a carpeted area, or area where static electricity is a problem.

- Keep room temperature between 0°C to 40°C (32°F to 104°F), and 95% non-condensing relative humidity. Extended high temperatures will shorten the life of electronic components. Provide adequate ventilation or air-conditioning as required if necessary.

- Keep the controller away from sources of condensation and moisture (such as open windows) as these can create a hazardous condition and can damage the equipment.

- Do not install the controller in a hazardous location and where excessive amounts of dust, vapors, or chemical fumes may be present. A NEMA 4 or NEMA 12 rated enclosure can be provided if necessary.

- Make sure power line voltage fluctuations are within drive ratings ($\pm$ 10%) of intended voltage.

- High levels of radio frequency emissions may cause interference with the controller microprocessor, and produce unexpected results. Proper grounding and operation with enclosure doors in place on the controller should address typical RFI/EMI issues.

3.2 Machine Room Wiring

Mount the controller firmly and install all required conduits before wiring the controller. Note where wire duct has been provided inside the controller for field wire and traveling connections before deciding where to locate conduit openings.

> **WARNING: Do not allow any metal shavings to get into relays or contactors, or in or behind the electronic components, as these could cause serious damage to personnel or the equipment. Take reasonable measures to protect the electronic equipment.**

3.2.1 Incoming Power

> **WARNING: THE 3 PHASE AC POWER SUPPLY TO THIS EQUIPMENT MUST COME FROM A FUSED DISCONNECT SWITCH OR CIRCUIT BREAKER WHICH IS SIZED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL, STATE AND LOCAL ELECTRICAL CODES, IN ORDER TO PROVIDE THE NECESSARY OVERLOAD PROTECTION FOR THE CONTROLLER AND MOTOR. INCORRECT MOTOR BRANCH CIRCUIT PROTECTION MAY CREATE A HAZARDOUS CONDITION.**

Incoming AC power wiring should be done by a qualified and licensed electrician, using the appropriate size wires for the installation. Consider the motor size and type of drive, and also the length of wire required from the main power distribution center in determining the proper wire size.

Proper branch circuit protection and disconnect device(s) must be provided, as required by applicable local, state and national codes.

3.2.2 Grounding

> **WARNING: PROPER GROUNDING IS VITAL FOR THE SAFE OPERATION OF YOUR SYSTEM. BRING THE GROUND WIRE TO THE GROUND BAR THAT IS LABELED "GND" OR "G". YOU MUST CHOOSE THE PROPER GROUND WIRE SIZE AND MINIMIZE THE RESISTANCE TO GROUND BY USING SHORTEST POSSIBLE ROUTING. SEE NATIONAL ELECTRICAL CODE ARTICLE 250-95, OR THE RELATED LOCAL APPLICABLE CODE.**

Proper grounding is vital to reliable operation of the elevator. It is not only mandated by multiple codes for the safe operation of the controller, it is required for the consistent performance of microprocessors and serial communication devices, which depend on grounding and shielding to mitigate RFI & EMI noise issues. This controller has been tested to withstand the electrical interference levels specified by ISO 22200 for safety circuits. Passing these requirements is only achieved with proper grounding and with the controller enclosure doors in place.

- The ground wire between the controller and the building power disconnect switch must be connected to a ground conductor within the disconnect that proceeds from the dedicated ground of the building's electrical distribution system.

- The ground wire should be sized per the applicable codes. A ground wire of the same size as the incoming power conductors is always sufficient as well.

- Connect the ground wire on the controller to the large ground bar labeled "GND" as shown in the controller schematic.

3.2.3 Motor and Drive Wiring

Connect the motor to the drive as shown on sheet "VM1" of the schematic. Consult the applicable codes for proper wire sizing and circuit protection for the motor being used.

Connect the encoder as shown on the schematic, if required.

3.2.4 Machine Brake, Rope Brake & Emergency Brake Wiring

Wire the brake coil between terminals B1 and B2. Wire the Brake Resistor Grid between terminals BF and DB. Wire the Brake Micro switch to terminal "29" (MR-SIB input M23). If used, wire the secondary Emergency Brake Micro switch to terminal "29X" (MR-SIB input M24). The default configuration for the Brake Micro switch is normally closed, such that the input "P" is high while the brake is set. Change the value of the setting "INVERT BRAKE SW" to ON if using a normally open contact. Refer to the schematics for specific wiring details.

The following Brake Control relays are pre-wired by the factory:

The **Machine Brake** is piloted by redundant contactors BK1 and BK2, which are monitored by MR-SIB input M26.Machine Brake power is rectified and monitored using the relay BP via a corresponding input on the MR-SIB. At the beginning of a run, the Drive ON signal energizes, then the brake is commanded to lift. At the end of a run, the brake sets when the UDTX relay de-energizes after an adjustable delay. The brake also sets if there is a fault which drops the P-contactor. To disable Brake Fault monitoring, enable the setting "NO BRAKE FAULTS".

The **Rope Brake** is piloted by redundant relays RB1 and RB2. These redundant relays are monitored by corresponding inputs on the MR-SIB. A rope brake monitoring check relay RBC is cycled before each run to verify correct operation of relays RB1 and RB2. If the Vision CPU or ETSD board detects a fatal fault, relays RB1, RB2, and RBC de-energize, setting the Rope Brake. The rope brake relay monitoring check may be disabled when using the shutdown defeat input or by disabling the setting "USE BRAKE CHECK". The Rope Brake coil is wired between terminals 1Z and 35. The Rope Brake Switch is wired between terminals 1Y and 1T and monitored by MR-SIB input 1T.

If not equipped with a Rope Brake, two additional contactors BK3 and BK4 pilot a secondary **Emergency Brake**. These redundant contactors are monitored by corresponding inputs on the MR-SIB. At the beginning of a run, the Emergency Brake lifts with the machine brake. It drops shortly after the machine brake at the end of a run, using an adjustable timer "EBRAKE AFTER RUN". Refer to the schematics for wiring connection for the emergency brake switch input.

3.2.5 MR-SIB I/O Connections

MR-SIB I/O board #8 is shown on Sheet VM5 of the schematics and is used for non-safety related inputs located in the machine room or for hall inputs & outputs that are connected in the machine room enclosure. The I/O Board #8 data is transmitted to the controller CPU over CANbus channel 0. Standard connections are made to terminal blocks as shown in the table below:

Table 1: Machine Room I/O Connections to Terminal Blocks.

TB	Inputs	TB	Outputs
RBM	Rope Brake Relays Monitoring	RB	Rope Brake Relays
RBCM	Rope Brake Check Relays Monitoring	RBC	Rope/Emergency Brake Check
RM	UCM Monitoring	BSA	Brake Economy Contactor
RCM	UCM Crosscheck Monitoring	BSB	Em. Brake Economy Contactor
31X	Up Emergency Terminal Slowdown Switch	1F – 8F	Position Indicator Floor
32X	Down Emergency Terminal Slowdown Switch	1PI – 8PI	P.I. Driver Binary Position
EXM	ETSD Speed Relay Monitoring	36	Up Direction Indicator
ETM	ETSD Switch Relay Monitoring	37	Down Direction Indicator
DRV	Drive Ready	38	P.I. Blanking (Fire Service Active)
BP	Brake Power	TLK	Voice Annunciator Strobe
EQ	Seismic Switch	URX	Up Arrival Lantern/Gong
LSM	Low Speed Monitoring	DRX	Down Arrival Lantern/Gong
82	Fire Sensors – Recall to Main	NDG	Door Nudging Indicator
82M	Fire Sensors – Recall to Alternate	PX	Drive Enable Relay
82F	Fire Sensors – Flashing Hat	PP	Potential Contactor Pilot Relay
EP	Emergency Power Operation	STOP	Stopping Relay
EPT	Emergency Power Pre-Transfer	89	Battery Lowering Indicator
EPS	Emergency Power Manual Select	SDN	Shutdown Indicator
UD1	UD1 Run Relay Monitoring		
UD2	UD2 Run Relay Monitoring		
NP	Battery Lowering (BORIS)		
DFT	Shutdown Defeat		
RST	Fault Reset		

3.3 Hoistway Wiring

3.3.1 Safety String and Inspection Inputs

3.3.1.1 Safety and Stop Switches

Hoistway safety string inputs are wired in series ahead of hall door & lock contacts and the car safety string. Each safety device is monitored by a discrete MR-SIB input – per Sheet VM3. Standard inputs include:

- Governor Switch (Terminal 1Y, Input M01)
- Rope Brake Switch (Terminal 1T, Input M02)
- Final Limit Switches (Terminal 1B, Input M03)
- Buffer Switch (Terminal 1B, Input M03 – in series with Final Limit Sws.)
- Pit Stop Switch (Terminal 2, Input M04)
- Counterweight Safety Switch (Terminal 2, Input M04 – in series with Pit Stop Sw.)
- ELGO Positioning System Broken Tape Switch (Terminal 2, Input M04 – in series with Pit Stop Sw.)

If any of these safety devices are not required and therefore not connected to the controller, a jumper (by factory or in field) must be put in place of the device to complete the safety string. If any safety string input is open, the controller cannot run, and a fault is logged describing the first break in the safety string.

> **NOTE: Every Safety String monitoring input to the MR-SIB must be active/on in order for the car to run. If any of these safety inputs (1Y, 1T, 1B, 2) are not active, then a safety fault is logged describing which input is missing.**

3.3.1.2 Hall Door and Hall Lock Contacts

The Hall Door and Lock (if used) Contacts section of the safety string is wired mostly in parallel, allowing multiple safety systems to monitor critical door and lock contact inputs independently. The Hall Door safety string branches into Top Inspection Access opening, Bottom Inspection Access opening, and intermediate Front and Rear door openings, all of which are wired in series. See Sheet VM3 of the schematics and Table 2 below.

Table 2: Safety String inputs for Hall Door and Lock Contacts.

Door Description	Hall Door Contact		Hall Lock Contact	
	Terminal	Input LED	Terminal	Input LED
Top Access Door	5T	M09	6T	M13
Bottom Access Door	5B	M10	6B	M14
Front Doors (not Access)	5	M11	6	M15
Rear Doors (not Access)	5R	M12	6R	M16

All hall door and lock contact inputs are actively read by the MR-SIB, so any unused door or lock inputs must be jumped active/on from controller terminal 2, as shown on the job-specific drawings. Top and Bottom Access Door and Lock contacts (if used) are received as separate inputs to allow these contacts to be bypassed while using Inspection Access. The Front and Rear inputs for Hall Doors and Locks (if used) receive all other remaining door contacts or lock contacts (if used) in series.

Door Checking is a required feature (setting "DOOR CHECK FAULT") for elevators with a powered car door that operates horizontally and is mechanically coupled to hall doors. Door checking compares the door open limit state to the state of car gate and hall door contacts at the current landing and opening, either front or rear, where the elevator is stopped with open doors. Door checking requires Top and Bottom Access Doors to be identified as front or rear (settings "TOP ACC AT REAR" and "BOT ACC AT REAR"). Door checking occurs every

time a car door is fully opened and verifies there are no closed or jumped door contacts at the landing and opening where the car is stopped. Note, Door Checking does not use Hall Lock Contact inputs (6, 6B, 6T, 6R).

3.3.1.3 Inspection Access Hall Switches

Inspection Access Up and Down Run switches are located in the door jambs of the terminal landings (front or rear) designated for Hoistway Access operation. They connect to MR-SIB terminals, per Sheet VM3, as follows:

- Top Access Up Run (Terminal 25T, Input M17)

- Top Access Down Run (Terminal 24T, Input M18)

- Bottom Access Up Run (Terminal 25B, Input M19)

- Bottom Access Down Run (Terminal 24B, Input M20)

These run inputs are subject to the Inspection Access Switch in the car (CT-SIB input T16 / terminal 23A) being active/on. Additionally, the car must be within the corresponding top or bottom hoistway access zones. Access zones are tuned/adjusted within the Absolute Positioning System settings menu.

3.3.2 Terminal Landing Slowdown Limit Switches

When using an ELGO Absolute Positioning System, the Slowdown Limit switch function is computed in software and hardware switches are not used. Refer to Section 4.4 for ELGO APS Installation details.

3.3.3 Terminal Landing Normal Limit Switches

When using an ELGO Absolute Positioning System, the Normal Limit switch function is computed in software and hardware switches are not used. Refer to Section 4.40 for ELGO APS Installation details.

3.3.4 Emergency Terminal Landing Slowdown Switch

The Emergency Terminal Landing Slowdown Switch (ETSD) ensures that the car has begun decelerating when it approaches a terminal landing. This switch is normally required when contract speed is greater than 200 fpm. Otherwise, bypass this function using a jumper from 1X-SHTDFT . Install the switch at half the distance from the floor as the terminal slowdown switch. If the car speed exceeds 90% of contract speed when riding onto the ETSD switch, the rope brake engages. For safety redundancy, both the controller CPU and the ETSD board (refer to Section 6.9) perform this speed check at all times while the ETSD input is low. The Up and Down Emergency Terminal Slowdown Switches connect to the MR-SIB via input terminals 31X (UP) and 32X (DOWN) as shown on sheet "VM5". They also connect to the ETSD board at input terminals ETU (UP) and ETD (DOWN) as shown on sheet "VNE". These inputs may be disabled using the setting "USE ETSLOWDOWN" and by defeating the ETSD board.

3.3.5 Terminal Landing Final Limit Switches

Where required by local code, Terminal Landing Final Limit Switches wire between safety string terminals 1T & 1B (MR-SIB Input M03) and have normally closed contacts that open when the car has gone considerably beyond floor level at a terminal landing. They prevent any further movement of the car in either direction by opening the safety string. Refer to Sheet VM3 of the schematics, and consult local/applicable codes for proper switch positioning.

3.3.6 Hall I/O (2-In / 2-Out) Board Connections

Each Hall I/O Board provides 2 inputs (24VDC), 2 outputs (24VDC), and 24 VDC power, making it ideal for controlling hall fixtures. The boards can be mounted inside or on the backside of the hall fixture box. For applications which use 120 VAC inputs and outputs, use the Remote I/O Board instead. Refer to the schematic Sheets HL1 & HL3 for the primary Hall Riser and Sheet HLL for Hall Lanterns (if used) for specific connections to the assigned Hall I/O board(s) on CANbus 2 or 3.

Possible Hall I/O hookups include:

- Hall Call Riser: Up & Down push-buttons and lights per floor

- Fire Recall (Phase 1) switch & light: ON & RESET

- Hall Lanterns – Up and Down arrows with gongs

- Emergency Power Operation light

- EMT (Massachusetts) Operation Hall Keyswitch & light

- Hospital Service: Recall push-button and indicator per floor

Depending on the location of the fire service or emergency power light, the I/O may be mapped to use the spare input and output of the bottom terminal landing Hall I/O board. Otherwise a separate Hall I/O board may be used, or the wiring may be routed to/from a Remote I/O board.

3.3.7 Hall I/O Board #63 (16-In / 16-Out) Connections for Group I/O

A Hall Remote I/O Board #63 accepts either 120 VAC or 24VDC inputs and may be located in the shaft, hall riser, machine room, or wherever is most convenient. The purpose of the I/O board is to receive I/O at a landing such as the lobby where I/O may be too numerous for the 2-In/ 2-Out Hall I/O Board. When used, refer to the schematic Sheet HL2 for specific connections to the assigned Hall I/O board on CANbus 3 (Safety).

Possible Hall I/O Board #63 hookups include:

- Hall Calls, Fire Recall (Phase 1), and Emergency Power Operation light

- Fire Sensors: Main (82M), Alternate (82), Shaftway/Machine Room (82F)

- Emergency Power: Normal Power (EP), Pre-Transfer (EPT), Selector switch (EPA, EPB, EPC, …)

- Hall Riser Position Indicator: Discrete (1F, 2F, …), PI Driver (1PI, 2PI, 4PI, …), PI Blanking (38)

- Hall Riser Direction Indicator: Up (36), Down (37)

- Hall Lanterns: Up (1UL, 2UL, …), Down (2DL, 3DL, …)

- Car to Lobby switch

- Lobby/Fire Panel status indicators

Depending on the I/O configuration for the controller, the Hall Remote I/O Board #63 may have few connections or may be unnecessary. Refer to the job-specific drawings for specific information regarding I/O points, CANbus, and power connections.

3.4 Car and Selector Wiring

3.4.1 Traveling Cable & C.O.P. Cable

Refer to schematic pages "CTB", MTC" & "CTC" for Vision 2.0 color-coded traveling cable specifications and wiring diagrams. One end of the traveling cable will terminate on the color-coded terminal blocks in the machine room enclosure, while the other end terminates on the color-coded terminal blocks in the Vision 2.0 Car Top Inspection Station. It is not recommended to split the traveling cable or terminate in the car station (C.O.P.), as all connections are provided in the Vision 2.0 Car Top Inspection Station.

Refer to schematic pages "CTB" & "COP" for Vision 2.0 color-coded C.O.P. cable specifications and wiring diagrams.

The use of CANbus communication and Remote I/O modules on the Car Top and in the Car Operating Panel considerably reduces the number of conductors required in the traveling cable compared to discrete (point-to-point) wiring of I/O to the controller.

The majority of car and car top connections are made directly to the Car Top Safety Interface Board (CT-SIB) mounted in the Car Top Inspection Station and serial I/O board(s) in the Car Operating Panel. I/O data is relayed to the CPU over CANbus using the twisted-pair "CAN 0". Specific connections, such as those related to safety string and inspection operation, remain discrete signals transmitted through traveling cable conductors wired directly to the Machine Room Safety Interface Board (MR-SIB) of the Vision 2.0 controller. These include: Stop Switches, Gate Contacts, Inspection Inputs and Door Zone. Refer to Sheet "CTB" of the schematics for specific traveling cable wiring designations and conductor counts.

3.4.2 Safety String and Inspection Inputs

All Inspection switches and their associated run push-button inputs connect to CT-SIB or MR-SIB terminals, with the exception of In-Car inspection which may use car call buttons 1C and 2C for run inputs. If any inspection mode is not used on a specific job, those inputs are left un-wired. Refer to the schematics Sheets VM3 and VT1 for specific wiring of the car safety string and inspection inputs.

3.4.2.1 Safety & Stop Switches

The safety string stop switch inputs for the car connect in series between terminals 1X, 3, 3E & 3X. This string includes the Car Top Inspection Stop switch, Fire Operation Stop switch, Emergency Exit switch, and all other devices that must stop the car should they open. The In-Car Stop switch connects between terminal 3 and terminal 3X (CT-SIB Input T04), providing a dedicated input, which allows the In-Car Stop switch to be bypassed during Fire Recall, when required by code.

The Car Safety Switch connects between terminal 1X and terminal 3A (CT-SIB Input T01).

3.4.2.2 Car Gate Contacts

Car Gate contacts for front and rear doors are part of the safety string which connect between controller terminal 2 and terminal 4 (MR-SIB input M05) for front & terminal 4R (MR-SIB input M06) for rear. If a rear car door is not present, then a wire jumper between controller terminals 2 & 4R is required to complete the safety string.

3.4.2.3 Car Top Inspection

The Car Top Inspection switch connects at car top terminals 1X, 23Y and 23T (see page VT1) where CT-SIB input T09 is active/on while on Car Top Inspection. Car Top run push-buttons are wired as follows: Car Top Enable to car top terminal 23E (CT-SIB input T11) and Car Top Up/Down Run to terminals 25/24 (CT-SIB input T10/T12).

3.4.2.4 In-Car Inspection

In-Car Inspection operation is available using CT-SIB inputs T13, T14 & T15. The In-Car Inspection switch connects to car top terminals 23B, 23X, and 23Y, where Input T13 is active/on while on In-Car Inspection. Up & Down In-Car run push-buttons are wired to car top terminals 24X & 25X (CT-SIB inputs T13 & T15), or by sharing the car call button inputs for running up (2C) and down (1C). Terminal blocks for the In-Car inspection switch are provided in the Car Top Inspection Station, and are jumped out by the factory when not used.

> **NOTE: In-Car Inspection may use the 1C (down) and 2C (up) car call buttons for up and down run inputs, instead of terminals 24X (down) and 25X (up), if enabled by the factory. Refer to Section 10.1 for troubleshooting details if using these inputs.**

3.4.2.5 Inspection Access

The Inspection Access switch connects to the car top terminals 22, 23, and 23A, where the CT-SIB input T16 is active/on while on Inspection Access.

3.4.3   Door Operator

3.4.3.1 Door Open and Close Limit Switches

The Door Open Limit Switch (Car-Top terminal 7X, CT-SIB input T29) is open when the doors are fully open, and closed at all other times. It will de-energize the door open relays in the door operator when the doors have opened fully. When using both front and rear doors, an additional Door Open Limit switch input is used (Car-Top terminal 7XR, CT-SIB input T25).

The Door Close Limit Switch (Car-Top terminal 8X, CT-SIB input T30) is open when the doors are fully closed, and closed at all other times. It will de-energize the door close relays in the door operator when the doors have closed fully. When using both front and rear doors, an additional Door Close Limit switch input is used (Car-Top terminal 8XR, CT-SIB input T26).

> NOTE: Many problems in operation can be attributed to failures in the Door Open or Close Limit Switches (including long door times, improper door operation on Fire Service, inability to go on or clear Fire Service, etc.). Always check the Door Open and Close Limit Switches if the elevator is operating unusually.
>
> NOTE: It is recommended that the Door Close Limit Switch be adjusted so as the doors are closing, the Car Gate Contact closes before the Door Close Limit opens. See the manufacturer's Door Operator Installation Instructions for further details on the adjustment of the doors.
>
> NOTE: 2000 (or later) code compliant controllers cannot run on Normal Operation without the Door Close Limit operating properly, i.e. the limit opens while doors are closed.
>
> NOTE: If using a solid-state door operator unit, check the appropriate schematics to see if any changes are required on the actual operator. These may include changing resistors in the operator and adding a diode and a power resistor for proper opening and closing torque adjustment.

3.4.3.2 Door Open and Close Outputs

Door Open, Close & Nudging Outputs are provided by the Car Top Safety Interface Board for both front and rear door operators (if used) – per schematics Sheet "VT2".

The Door Operator Common for Door Open, Close & Nudging outputs is typically connected to terminal 1X. The Door Open Output is restricted to the Door Zone, and the Door Close Output is disabled while on Inspection Access.

> NOTE: The Door Close Output is energized while the car is running to help prevent door contacts from opening or the door close limit from closing/making while the car is moving.
>
> NOTE: If the car door is open while on inspection, the controller will attempt to auto-close the doors when commanded to run. Enable Main CPU setting "NO CLOSE ON INSP" to prevent the door from auto-closing while on inspection. The Door Close Output is energized while running.

The Door nudging feature is enabled if Main CPU setting "DOOR NUDGING" is active, which will close the door at a reduced speed where appropriate. If using an infrared curtain unit/electric eye (Main CPU setting "ENABLE I.C.U."), door nudging may activate if the doors are being held for any reason during a Fire Service Recall or Medical Emergency Recall. Door nudging is also available while in Normal Operation if the Electric Eye input 27E has been active for 20 seconds (adjustable Main CPU timer "ICU CUTOUT TIME"), and Main CPU setting "TIMED EYE CUTOUT" is enabled.

3.4.3.3 Infrared Curtain Unit (ICU)/Electric Eye & Safety Edge

Infrared Curtain Unit (ICU) / Electric Eye (EE) and Safety Edge are connected to Car-Top terminals 27E and 27S (CT-SIB input T 31 & T32), and terminals 27ER and 27SR (CT-SIB input T27 & T28) for rear openings. Safety Edge and

EE/ICU inputs are cut out while on Fire Service if Main CPU setting "ENABLE I.C.U." is enabled, and will otherwise cause door(s) to reopen while the input(s) are on. The ICU also uses a timed cutout if Main CPU setting "TIMED EYE CUTOUT" is enabled, using the Main CPU timer "ICU CUTOUT TIME".

3.4.4 CT-SIB I/O Connections

The Vision 2.0 Car Top Inspection Station is pre-wired by the factory to terminal blocks, allowing convenient hookup for car safety I/O, door operator signals, positioning system I/O, and various other car top signals. Refer to schematic sheets "VT1" & "VT2" for wiring details. Possible connections are shown in the table below.

Table 3: CT-SIB I/O Connections.

TB	Inputs	TB	Outputs
7X,8X,7XR,8XR	Door Open, Close Limits (Front, Rear)	O, C, N	Front Door Open, Close, Nudge
27E, 27ER	Electric Eye / Infrared Curtain	OR, CR, NR	Rear Door Open, Close, Nudge
27S, 27SR	Safety Edge (if used) (Front, Rear)	LIT	Car Fan/Light Cutout relay
30, 31, 32, 33	IP-8300 leveling, slowdown inputs	81, 81X	Fire Operation Light/Buzzer
BU,BD,TU,TD	IP-8300 inspection access zones		
LWB	Load Weighing Bypass (skip hall calls)		
LWOL	Load Weighing Overload (cancel calls)		
RJ45 plug	ELGO absolute positioning system		

3.4.5 Car Operating Panel (COP) I/O Board #20 Connections

Car fixture inputs and outputs typically connect to Remote I/O boards mounted in the Car Operating Panel or on the car top. Inputs and outputs on the Remote I/O boards are 24VDC (or 120 VAC available on request). Refer to schematic Sheets: CR1, CR2 & CR3 as needed, for specific connections to the assigned Remote I/O board #20 on controller CANbus 0. Possible connections are shown in the table below.

Table 4: COP I/O Board Connections.

TB	Inputs	TB	Outputs
1C, 2C, 3C, …	Car Call Buttons (1C, 2C, 3C…)	1C, 2C, 3C, …	Car Call Lights
1CKO, 2CKO, …	Car Call Cutout Switches	92	Nudging Buzzer
27, 28	Door Open/Close Buttons	39	Passing Gong
28X	Car Call Buttons, 2nd Pole	81, 81X	Fire Operation Light/Buzzer
80, 88	Fire Operation (Phase II) Switch	83, 84	Car Traveling Lanterns
80 & 88	Fire Operation Call Cancel Button	EMTL, EMTB	EMT/Hospital Service Light/Buzzer
EMT	EMT/Hospital Service Switch	1F, 2F, 3F, …	Position Indicators
ATT	Attendant Service Switch	36, 37	Direction Indicators
40	Independent Service Switch	CKO	Car Call Cutout Bypass Relay
		IUL	In Use Light
		BFG	Barrier Free Gong

4. Start-Up Instructions

If it is desired to run the car temporarily from a "Run Bug" during construction, the microprocessor must still be used to move the car. All normal inputs and safety devices will be required for the microprocessor to run the car. If a safety device is not installed yet, all necessary safety precautions should be made before jumping out the device. It remains the responsibility of the installing technicians to make sure that the elevator is run in a safe mode, and that all operators are aware of any safety devices that may have been disabled. Refer to Section 4.3 "Temporary Run Connections" for running the controller during installation. Otherwise proceed through each of these steps and checks before applying power.

4.1 Before Applying Power

The system has been programmed and tested for the specific elevator project, so no further changes should be made without consulting with Virginia Controls.

4.1.1 Power and Grounding

> **WARNING: Confirm that the voltage of the incoming power matches the controller before applying power to the controller.**

Check the system for proper grounding before applying power to controller. Refer to Section 3.2.2 again!

With the power off, remove the fuses F4, M1, M2, M3, M4, and M5 from the secondary of the main control circuit transformer ("CCXF") – see Sheet VM1. Check the safety circuit (terminals 1, 1X through 6) for grounds.

Using a Volt-Ohm meter, connect one lead to terminal 35 (ground) and touch the other lead to each terminal to be tested. The resistance should be considerably greater than 100 ohms.

> **NOTE: If CCXF secondary fuses are not removed, a short may be measured by a VOM through the windings of the main control circuit transformer.**

With the fuses still removed, apply power to the controller, and verify that the voltage at the secondary of the main control circuit transformer ("CCXF") is 110-125VAC.

4.1.2 Input/Output Wiring

> **NOTE: The input/output boards are equipped with quick disconnect terminal blocks. During the initial installation, you may want to remove the terminal blocks, hook up your field wires to the terminal blocks, test the field wiring for no shorts to ground or hot (terminals 1 & 1X) before plugging these terminals back into the I/O boards.**

With the power off, and the fuses still removed, check each input point for grounds, as described in the previous section, "Power and Grounding". If a ground is observed, check the schematic to determine if this is correct (It usually is NOT!).

With the power still off, check each output for grounds, also check for shorts to the hot side (terminal 1X). Note that some field devices, such as buzzers, have very low resistance.

> **WARNING: Each output point should be isolated from ground and the hot side.**

4.2 Applying Power

Remove all fuses before applying power. Check for the proper voltage at the top of each fuse holder before installing the fuses for that circuit. Reinsert fuses one circuit at a time, and check for the proper voltage on the base of each fuse before moving on to the next circuit.

It is recommended that you start up the controller in Construction mode, which can be done using the Controller Inspection Switch and CPLD dip switches 7 & 8 (see instructions in Section 4.3.1).

4.3 Temporary Run Connections

WARNING: It is up to the operator to ensure safe movement of the car/platform. It is solely up to the mechanic operating the Temporary Run Buttons to ensure that no damage or personal injury will occur when moving the car. Use extreme caution when moving the car/platform.

4.3.1 Connecting the "Run Bug" using the Vision 2.0 Construction Operation

NOTE: Use Construction mode to run on inspection without the Car Top Safety Interface Board. All Car Top signals will be bypassed and disabled while Construction mode is active

1. Connect the motor and encoder to the drive, as shown on Sheet "VM1" of the schematics.

2. Jump the connections as shown on the next page, Table 5. Ensure all corresponding LEDs are lit.

3. Enable Construction Mode by turning on CPLD DIP switches 7 & 8, and turn CONSTRUCTION MODE setting ON in Setup Menu. See Section 7.1.4.4 for details.

4. To run up, energize terminal 25B. To run down, energize terminal 24T.

5. To clear any latched faults, momentarily jumper 1X – TB:RST (Fault Reset).

6. When finished, remove all temporary jumpers, and wire the field connections as shown on drawings.

7. Disable Construction Mode by turning off CPLD DIP switches 7 & 8, and turn setting OFF in Setup Menu.

Table 5: Terminals to Jump for Construction Operation

DEVICE	Terminals to Jump	MR-SIB LEDs
Governor Switch	1X – 1Y	M01
Rope Brake Switch	1Y – 1T	M02
Final Limit Switch	1T – 1B	M03
Pit Stop Switch & ELGO Tape Switch	1B – 2	M04
Car Gate Contacts, Front / Rear	1X – 4, 1X – 4R	M05, M06
Controller Stop Switch	Set switch to RUN	M07
Hall Door Contacts: Front / Rear / Top / Bottom	1X – 5, 1X – 5R, 1X – 5B, 1X – 5T	M09, M10, M11, M12
Hall Lock Contacts: Front / Rear / Top / Bottom	1X – 6, 1X – 6R, 1X – 6B, 1X – 6T	M13, M14, M15, M16
Brake Micro Switch (jump 29 – M26 if not used)	1X – 29	M23
Emergency Brake Micro Switch (if used)	1X – 29X	M24
Run-Bug Safety Signal Common	1X – Run Bug Common	N/A
Run-Bug Up to Construction Up Run input	Up Signal – 25B	M19
Run-Bug Down to Construction Down Run input	Down Signal – 24T	M18
Car Safety String #1	1X – 4A	M31
Car Safety String #2	1X – 4B	M32
Controller Inspection Switch	Set switch to INSP.	M41
Emergency Power (if used)	1A – EP	(see schematics)
Shutdown Defeat (will timeout after 1-week)	1X – DFT	Input LED #15
Fault Reset (single use only, do not jump)	1X – RST	Input LED #16
Inspection String Common	1X – 23	n/a
Enable Construction Mode in CPLD safety device	CPLD DIP switches 7 & 8 = ON	n/a
Enable Construction Mode in CPU (Setup Menu)	"CONSTRUCTION MODE" = ON	n/a
ETSD Board Shutdown Defeat	1X – SHTDFT	ETSD board LED

4.4 Absolute Positioning System Installation

4.4.1 ELGO LIMAX22 DUE Installation

The ELGO LIMAX22 DUE magnetic tape can be mounted vertically in any quadrant in the shaft, and the sensor head can be mounted onto the car body or car frame. The following installation instructions are provided for mounting and alignment guidelines. Refer to the ELGO LIMAX22 DUE User Manual for further details.

The upper fixation of the magnetic tape is via a rail crossbeam on the top guide rail. The required tensioning of the tape is provided by a tape spring (see Figure 1 below) at the bottom crossbeam and guide rail. A broken tape switch (see Figure 1 below) is mounted above the spring. The switch will stop the car and alert the controller of a broken tape.
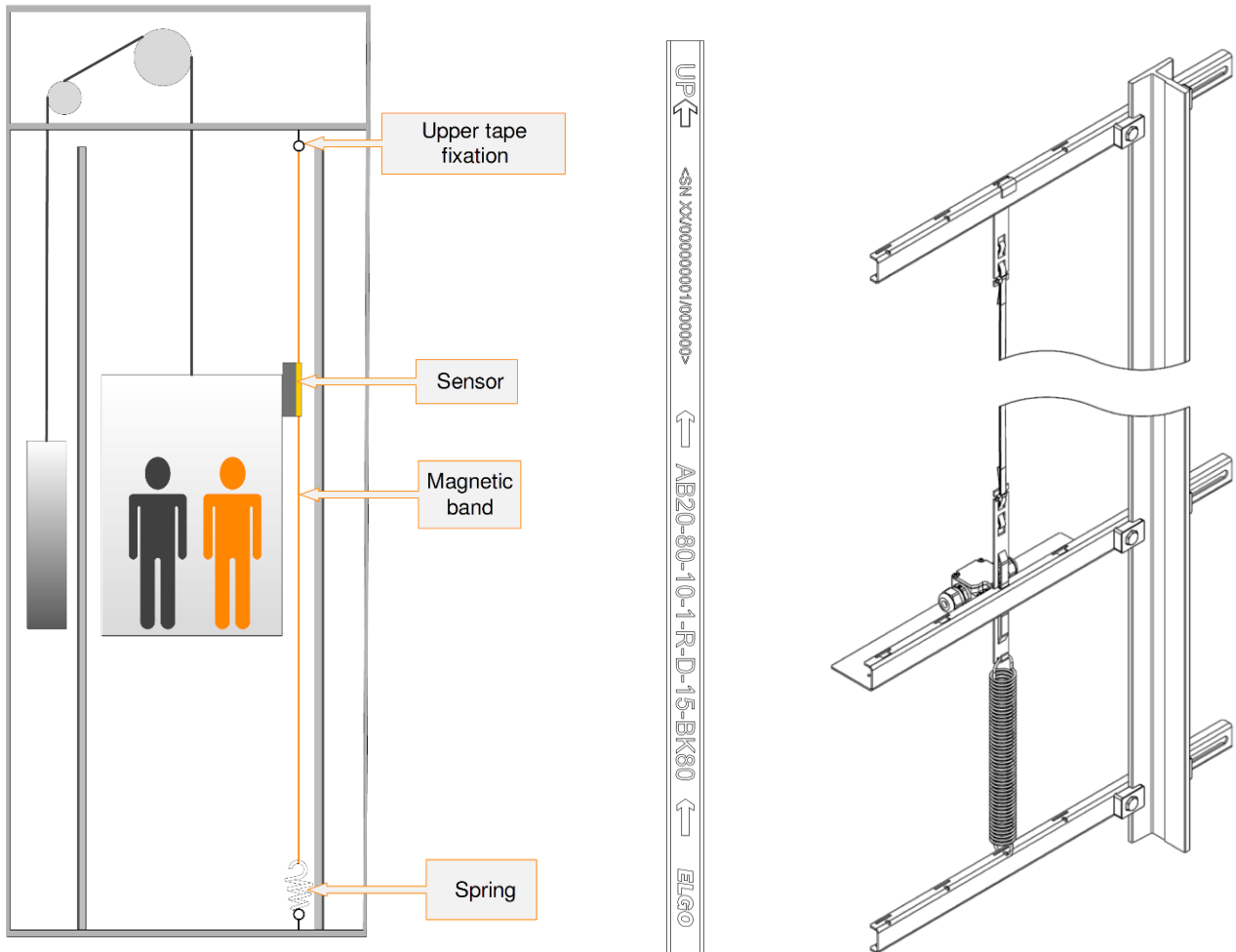
Figure 1: Tape installation with tension spring (left). The "UP" arrow notation on magnetic tape (center) and "TOP" designation on sensor head indicates the direction towards the top of the shaft. The tape mounting assembly including a broken tape switch (right).

During placement of the magnetic tape in the sensor head, pay attention to the markings on tape & head that point to the top of the shaft. "UP" arrows printed on the magnetic tape and proper sensor head orientation provide positive APS counting during upward travel in the shaft.

WARNING: Wrong orientation of tape or sensor head will yield incorrect position readings!

4.4.2 ELGO Mounting Bracket & Tape Switch Installation

Figure 2: Mounting Upper Crossbeam

Install a crossbeam in the top of the shaft by using rail chips. Make sure the clips screws are securely tightened to at least 15 ft-lb, so crossbeam does not move. Drop the top tape clamp into a slot of the crossbeam as shown. Use any slot provided depending on the installation, however the tape positions closest to the guide rail are preferred.

Figure 3: Attaching Upper End of Tape

This step is done with the top tape clamp mounted to the crossbeam. Thread the tape through the clamp and back down, as shown. Mind the orientation of the tape – the magnet side must face the sensor body later on. Basically, the fixture works like a self-locking belt. Leave at least 8" of tape at the top end. Press the loops flat in the clamp. There should be a break in the upper loop. At the end, secure the tape with a cable tie at the bottom of the clamp (see Figure 5).

Figure 4: Attaching Lower End of Tape

After tape is hung from top cross-beam, unroll the tape while run the car down the hoistway on inspection speed. Attach the lower tape clamp for the broken tape switch to the lower end of tape. Leave at least 8" at the lower end and press the loop flat in the clamp. There should be a break in the lower loop. At the end, secure the tape with a cable tie at the top of the clamp. (See Figure 5).

Figure 2: Mounting Upper Crossbeam

Figure 3: Attaching Upper End of Tape
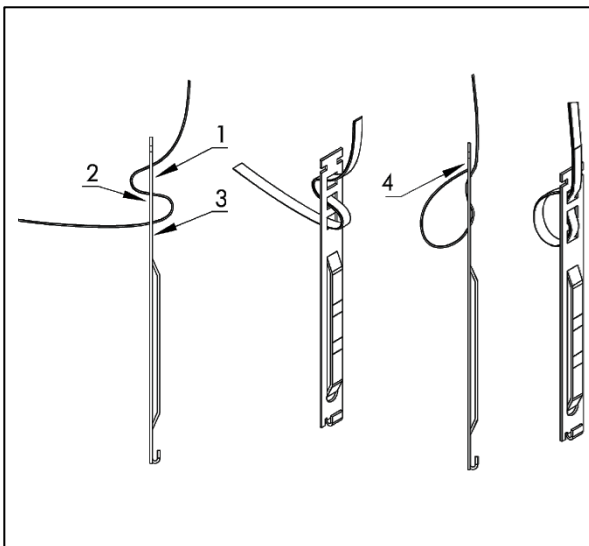
Figure 4: Attaching Lower End of Tape

Figure 5: Securing Tape with Cable Tie

Figure 6: Mounting Lower Crossbeam

Install a second crossbeam in the shaft pit with a spring tensioning distance A = 12" $\pm$0.5" below the bottom tape clamp. Make sure that the screws are well tightened to at least 15 ft-lb, so that the crossbeam does not move.

Figure 7: Mounting Broken Tape Switch

The broken tape switch should be (pre-)mounted to third (middle) crossbeam prior to attachment to the guide rail. Mount cable screw-clamp connections (1 or 2 pieces) to the broken tape switch. Align back of switch with the back edge of the metal crossbeam (see arrow). Then, fasten/tighten with screws at 25 in-lbs (3Nm). The broken tape switch may be pre-wired before mounting if desired.

Figure 9: Mounting Tape Switch Crossbeam

Mount the third (middle) crossbeam with the pre-mounted broken tape switch to the guide rail. Vertically align the safety position switch to be centered on the lower tape clamp. Fasten the rail clip screws only so tight so that the crossbeam can be moved later for adjustment.

Figure 8: Mounting Tape Tension Spring

Insert lower tape clamp through corresponding slot of tape switch crossbeam, then clip onto tensioning spring of lower crossbeam. (Spring will elongate by 3.5" for 17-22Lbs tension.) Verify spring is correctly placed in the lower crossbeam hole (detail A).

Figure 6: Mounting Lower Crossbeam

Figure 7: Mounting Broken Tape Switch
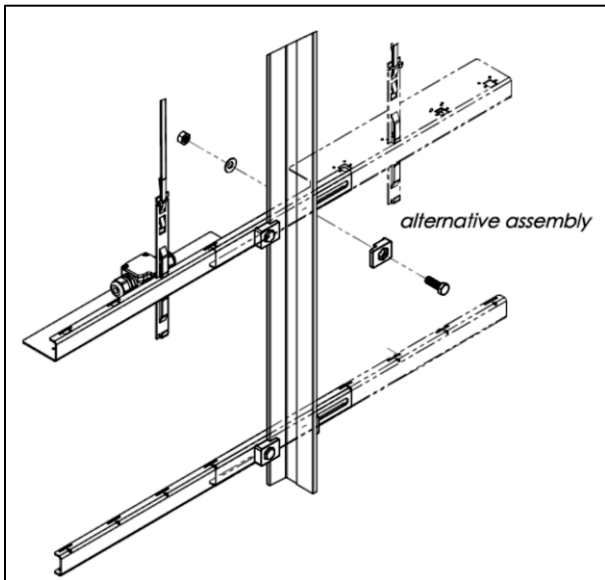
Figure 9: Mounting Tape Switch Crossbeam
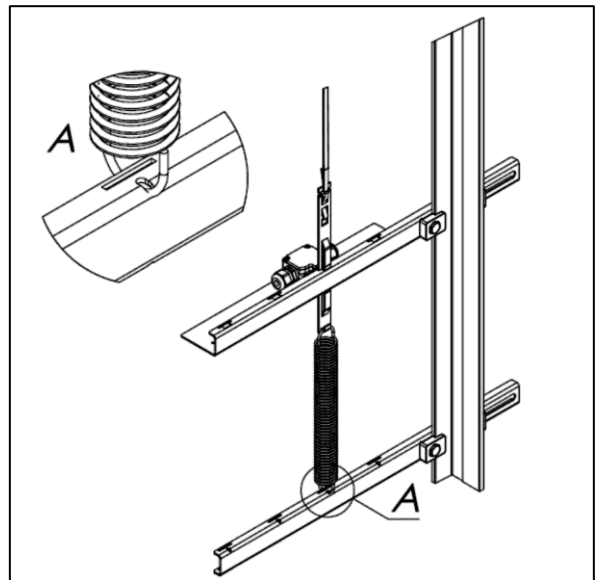
Figure 8: Mounting Tape Tension Spring

Figure 10: Vertical Alignment

Adjust the height of the tape switch (middle) crossbeam in such a way that only one marking, top & bottom, can be seen on the actuator cam of the lower tape clamp (see detail A). The crossbeam must be mounted perpendicular (90° angle) to the guide rail. When this crossbeam has been correctly positioned, tighten its rail clip screws to 15 ft-lb ensuring the crossbeam cannot move by accident.

Warning: incorrect positioning of the middle crossbeam can compromise the effectiveness of the broken tape switch.
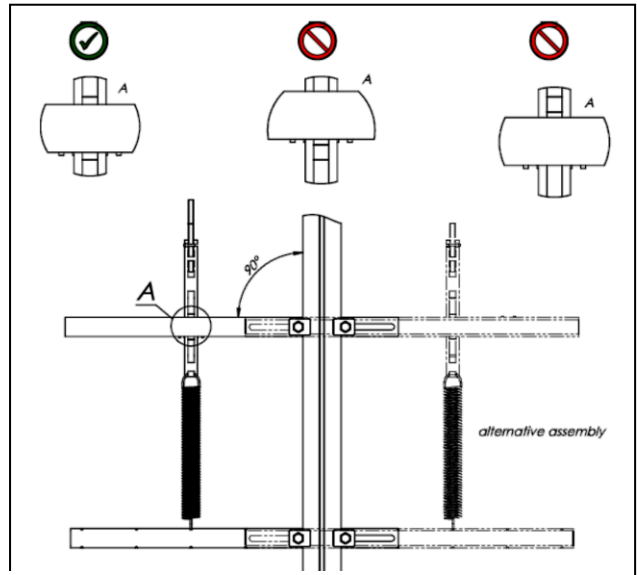
Figure 10: Vertical Alignment of Broken Tape Sw.

Figure 11: Activating Broken Tape Switch

Next, the broken tape switch must be activated. To do this, the actuator is pulled out with a screw driver. Take care not to damage the rubber sleeve on the actuator. This ends the installation.
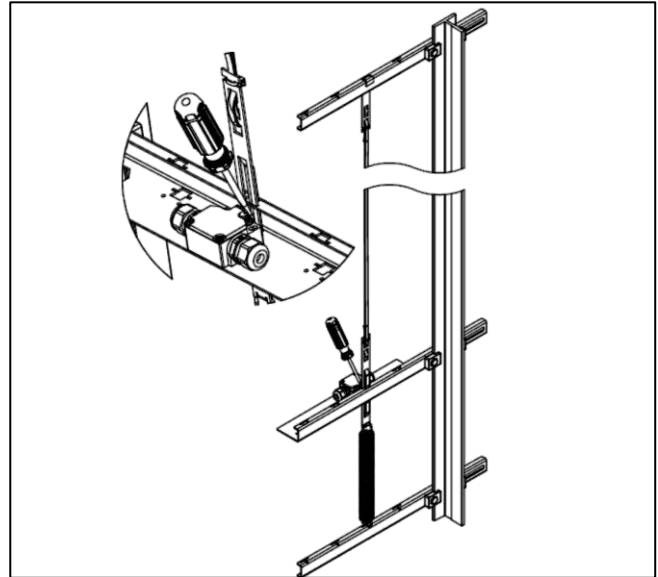
Figure 11: Activating Broken Tape Switch

4.4.3 ELGO Hardware Installation Considerations

The magnetic band on the steel tape is not designed to withstand excessive mechanical wear. It is important therefore to install the system so that mechanical contact between tape and head is between the steel side of the tape and the polymer sensor head guide. These two materials are specifically paired for this application.

Avoiding contact between the magnetic band of the tape and the sensor head can be achieved with a perfectly vertical/parallel installation of the tape, yet in reality this is not practicable. It is preferable therefore to install the tape with a horizontal offset from the sensor head. This arrangement causes slight contact between the steel side of the tape and the polymer guide of the sensor head during operation, and provides for optimal performance of the system.
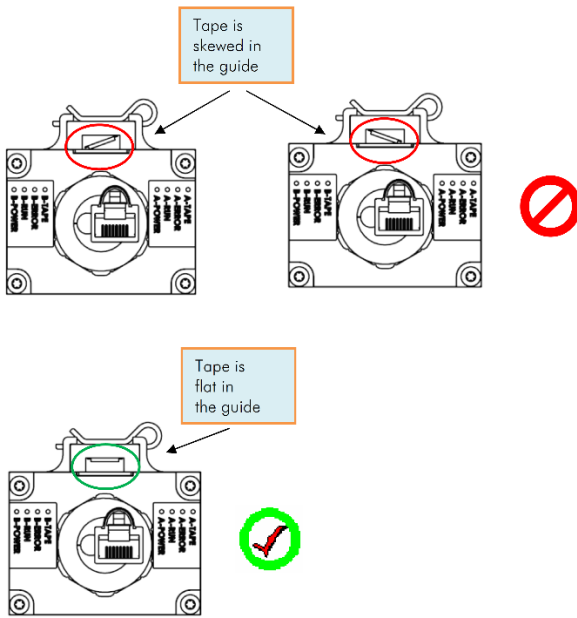
Figure 12: Angular Alignment Guideline
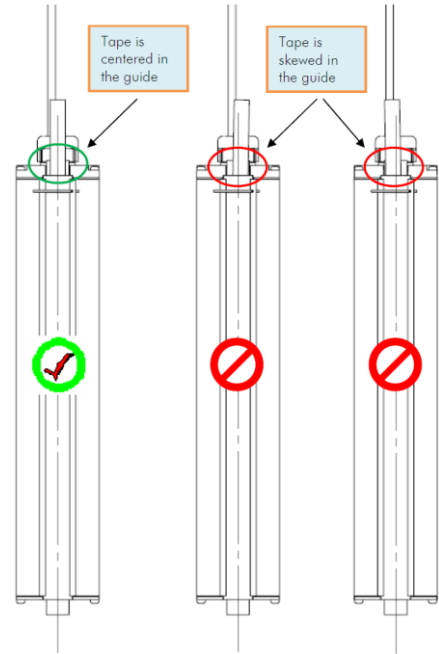
Figure 13: Perpendicular Alignment Guideline
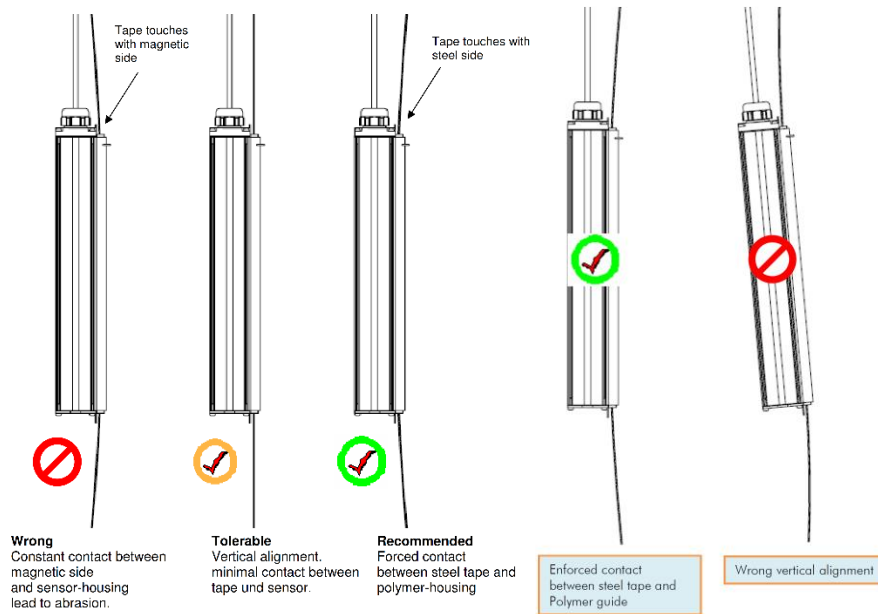
Figure 14: Horizontal Offset Alignment Guideline.

4.4.4 ELGO Sensor Head Installation

Locate the optimal installation space for tape and sensor. Placement is possible at any position in the hoistway.

1. Check for correct orientation of the tape – "UP" arrows on magnetic side must point upward. Magnetic side of tape must face sensor head. Refer to Section 4.4.2 for tape assembly mounting instructions.

2. Run the car to the middle of the hoistway on inspection speed.

3. Attach the sensor head to the top of the car using the angle mounting bracket provided. The end of the head with the cable outlet and LED's must face upward.

4. Adjust the sensor head using the magnetic tape as a reference. First, align the centerline of the head to the centerline of the tape.

5. Adjust now the distance between sensor head and tape. Up to a travel height of 165ft, we recommend an offset of at least 0.6" (15mm). This will ensure steady contact between steel side of the tape and the polymer guide of the sensor. In higher installations, this distance may be increased (see Figure 14).

   Pay attention to the perpendicular alignment of the sensor head. Misalignment will cause wear. (see Figure 14)

6. Pass the tape through the sensor. Carefully loosen the cotter key and release/hold the polymer guide. Insert the tape and re-attach the guide with cotter key with the tape in position.

7. Check for proper alignment of tape vs. sensor. Any angular offset should be corrected. (See Figure 12-Figure 14 above)

8. INSTALLATION CHECK: Values for tape tension and offset between tape and sensor head are guidelines based on experience. In any case, a proper check after installation is mandatory. Contact between the magnetic side of the tape and the sensor head anywhere throughout the hoistway must absolutely be avoided.

   Run an inspection trip the entire length of the hoistway. Observe the system paying attention to the respective positions of tape and sensor. You have achieved an optimal installation if the steel side of the tape is constantly but slightly pressed against the polymer guide of the sensor. At several points in the hoistway, double-check the bottom side of the sensor head. If the sensor is tilted it may look good on top but the tape can still grind along the bottom edge of the sensor. (See Figure 14)

9. After completion of the installation, clean the magnetic tape. Starting at the top of the hoistway, run down on inspection the complete travel distance pulling the magnet band through a dry cloth. Repeat the cleaning process before putting the elevator into service near the completion of the installation.

   Be specifically alert if steel construction work is taking place in the hoistway. Steel particles released by grinding, welding, or such work will adhere to the magnetic band. Clean this debris off instantly as it may have an effect similar to sand paper.

4.4.5 APS Door Zone Sensor Installation
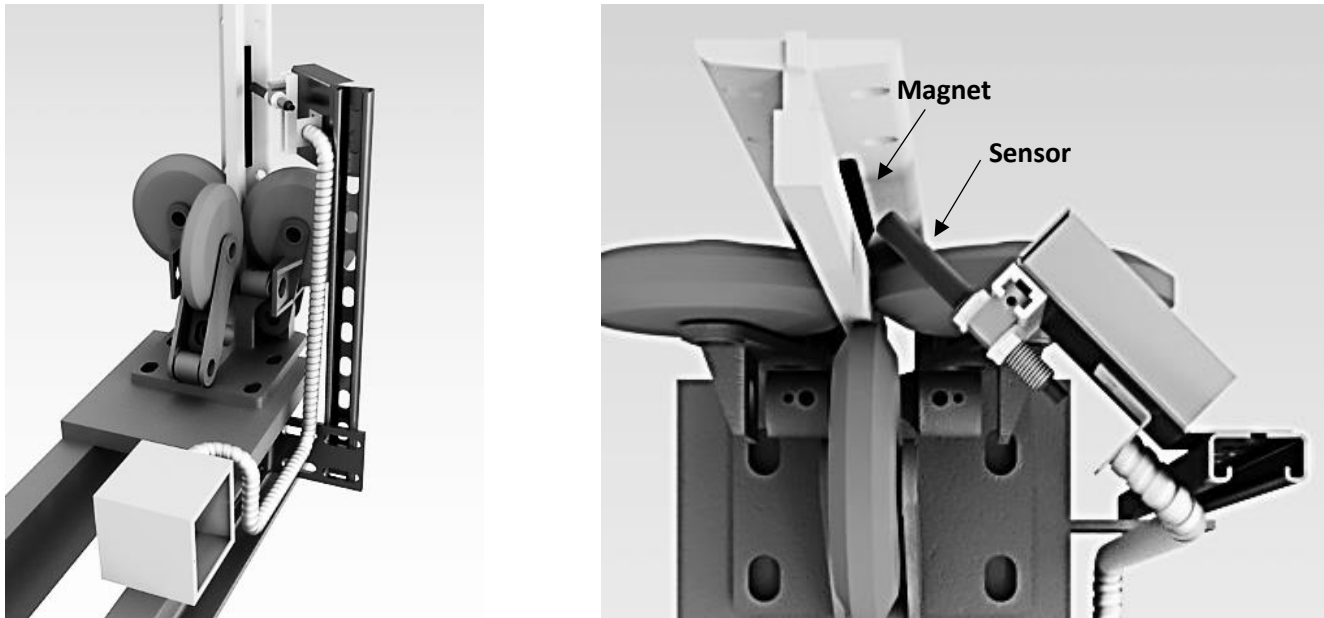
Figure 15: Magnetic door zone sensor mounted with magnets on the rail. (Left = side view, Right = top view)

A separate magnetic door zone sensor must be installed when using an ELGO absolute positioning system. This sensor system serves as an independent door zone switch in hardware, while providing the ELGO positioning system a reference for learning the floor positions during a hoistway / ELGO Learn procedure.

The barrel of the magnetic sensor may be mounted on the car above the roller guide wheels, and the 6" door zone magnets may be mounted to guide rails, as shown in Figure 15. The sensor switch barrel must be aligned perpendicular to the magnets such that the sensor rides on and off a magnet while moving up or down. The actuation of the sensor is passive and does not require a power source. The sensor switch is a normally open contact which closes when the sensor is perpendicular within 3/8" of the magnet. The two wires of the sensor connect between controller terminal 1X and Door Zone terminal 20. Verify that the sensor switch contact closes when riding the car onto a magnet, and then opens immediately when riding off. Check that the sensor switch contact changes state at each landing (over each magnet) to verify: the horizontal alignment of sensor & magnet; its distance from each magnet; and that system behavior is correct along the entire hoistway.

Magnets should be aligned vertically along the guide rails such that the sensor is directly centered in height over a magnet when the car is at floor level. Top and bottom edges of each magnet are measured by the ELGO positioning system during the learn operation, and the mid-point of each magnet is set as the floor level position for each landing. If a magnet placement is not accurate within $\pm$0.5" for a particular floor during an ELGO Learn operation, then that magnet(s) will need to be adjusted – raised or lowered – accordingly, and the ELGO Learn operation will need to be repeated.

After the ELGO position for all floors has been successfully saved and no further adjustments are needed, the magnets may be secured to the rail using epoxy or glue if desired.

5. Final Adjustments

When the controller is ready to be run in automatic, it is recommended that either a factory reset be performed or the values of the controller CPU settings and features be verified using Sheet VNP of the schematics. To begin, verify the system is configured to job specifications by matching the job number displayed on the second line of the CPU banner screens with the drawing number of the job schematics.

To restore the controller to use factory configured values for settings & timers, a factory reset can be done by using the keypad. Press `Nxt` until the menu item "Go to Setup Menu" is displayed, then press `Ent`, and press `Nxt` until the "Reset Settings" screen is displayed. The password should be entered when requested. Press `Esc` to return the elevator to service.

As the wiring is completed, the following modes of operation should be checked and used.

5.1 Inspection Operation

To run the car on Inspection Operation, the safety string and terminal landing normal limits (if using hard-wired limit switches) must be operational.

The Car Gate, Hall Doors, and Hall Locks contact signals (MR-SIB input terminals 4, 4R, 5, 5R, 5B, 5T, 6, 6R, 6B, 6T) must be on.

The Drive Ready (RDY), Brake Power (BP), Phase Monitor (if used), Motor Overload (MOL), Brake switch (29), and Brake and Potential Contactor "Safe" input signals should be active, and the Rope Brake is not set. Typically these signals are configured to MR-SIB inputs: M21, M23, M24, M26, M27, M28, M29, M30. Refer to Sheet "VM4" for the job-specific I/O configuration.

Only one Inspection Mode Input (Car Top: 23T, In-Car: 23X, Access: 23A, or Controller: 23) should be energized, and the Normal Operation Input (23N) should be de-energized.

Press the Up Run and Enable Buttons for the appropriate Inspection mode. For example, Car Top Up Run signal (Terminal 25 / CT-SIB input T10) and Car Top Enable signal (Terminal 23E / CT-SIB T11) will set the Up Direction and the door close output(s) will turn on. If enabled, the system will first perform a rope brake check using relay outputs RB1, RB2, and RBC and relay monitor inputs RBM and RBCM. The Drive Enable Relay (PX), direction relays (U1,U2), running relays (UDT,UDTX), P-contactor (PP) will energize, and the system will wait for the drive to respond. When the drive ON relay energizes, the Brake Contactors (BK1,BK2) will energize, lifting the brake at zero speed, until the UDX speed pattern relay energizes and a speed is established.

Within a few seconds, the controller will check various relay monitors to ensure that the brake contactors (BK1, BK2) and Potential contactor (P) are pulled in, the brake switch has lifted (SP), and that the ON relay stays energized throughout the duration of the run. If this starting sequence is correct and the safety string is still fully closed, then the car should begin to run at inspection speed.

When stopping, the run and direction relay outputs (U1, U2) will drop, and the UDT and UDTX relays will remain on for an adjustable time, allowing the drive to establish zero speed. Then the brake contactors are commanded to drop by the UDTX relay, and the drive enable relay (PX) and P-contactor (PP) are commanded to drop by the UDT relay, which should cause the Drive ON relay to also drop. The system then will continue actively monitoring the Brake and Potential contactors and Drive ON relay monitors while the system is stopped until the next run.

Down direction behaves in a similar way with the Down Run Button, Down Direction indicator, and Down Run outputs.

NOTE: If Hoistway Access is used to get on top of the car, then the doors will be open when Top of Car Inspection is initiated. In this case, the doors will close when the Up (or Down) Run and Run (or Enable) buttons are pressed. If it is required that the doors should only operate manually on Inspection, then the Feature setting "NO CLOSE ON INSP" should be enabled. In this case the doors must be closed manually or by means of the Door Close button on the Door Operator (if provided).

5.2 Absolute Positioning System Setup

5.2.1 Absolute Positioning System Software Configuration

After ELGO APS hardware installation is complete, the controller will need to learn the absolute position of the hoistway. Before following this learn run procedure, become familiar with the ELGO Menu screens for viewing CANbus 1 data "I/O Status – CAN BUS 1 ELGO APS" (Section 7.1.10), setting ELGO parameters "Edit ELGO APS" (Section 7.1.4.8), and viewing floor position learn data "Display ELGO Floor Height Data" (Section 7.1.12).

5.2.1.1 ELGO APS Virtual Input Signals

The controller CPU processes position data from the ELGO sensor and computes various position states, replacing the need for hardware terminal limit switch inputs as shown in the following table:

Table 6: ELGO APS Virtually Generated Selector Signals

ELGO Virtual Input Signals	Equivalent Terminals	State during ELGO Fault
Up/Down Level	30, 33	OFF
Up/Down Slowdowns	31, 32	OFF
Up/Down Top/Bottom Access Zones	TU, TD, BU, BD	OFF
Floor Reset Switches	1FP, 2FP, 3FP, …	OFF
Up/Down Normal Limits	14, 16	ON
Up/Down Slowdown Limits	18, 19	OFF
Door Zone	20	OFF

The controller computes the position of each virtual input signal based on a door zone signal at each landing. Physical inputs in the hoistway allow the system to learn door zone locations. An external hardware door zone switch (terminal 20 / MR-SIB input M08) detects magnets positioned at door zone locations, and this position data is used to compute all virtual input signals.

If data or communication from the ELGO sensor experiences a malfunction, or if learn data is not calibrated properly, the Vision 2.0 CPU will register a fault and set the ELGO virtual input signals to the states shown in Table 6. In general, during a faulted state, all ELGO input signals are turned OFF with the exception of the Up and Down Normal Limits. The Normal limits are enabled in order to allow the car to be moved on Inspection operation, or home to the nearest door zone while on Normal Operation at slow speed and automatically go into Shutdown.

5.2.1.2 ELGO APS Learn Procedure

The ELGO APS reads position data using two sensors within the ELGO Limax unit (channels A & B). These sensors are offset by a distance of 40mm. Position data for both channel A & B sensors is calibrated and learned simultaneously during a learn run. Each sensor A & B reads a different position on the magnetic encoded tape due to their physical offset (40mm). The Vision 2.0 CPU evaluates data from each channel to ensure the ELGO APS is functioning properly.

Verify ELGO Communication Status

1. Ensure that the ELGO sensor is connected to the RJ-45 (Ethernet) port of the CT-SIB per the schematic, and that the ELGO hardware status LEDs are in the correct operational state (see Section 6.10.3). The RJ45 plug should be connected directly to the CT-SIB connector J10 as shown on page VT3 of the schematics. The traveler connections for "APS CAN1" should be made at both ends, terminating directly on the MR-SIB and CT-SIB.

```
CAN BUS 1 ELGO APS A
Position     Velocity
 12345mm      123mm/s
100' 10.0"  123.4fpm
```

2. Using the Vision 2.0 CPU screen and keypad, navigate to the "Show I/O Status" Menu, and press $\boxed{1}$ to view the "CAN BUS 1 ELGO APS" screen. Verify that position and velocity data is being read on line 3 (in mm). The position data should read anywhere from 0mm to 260000mm depending on the section of tape being used. The data on the screen is blank if CANbus communication is not established or wired properly.

3. While on the "Show I/O Status" screen, verify that channel "B" position data is 40mm greater than channel "A" position data. Use the $\boxed{\text{Nxt}}$ and $\boxed{\text{Prv}}$ keys to switch between channel "A" and "B".

4. Run the controller on inspection, and verify that the position data on line 3 increases smoothly and that velocity is positive while moving up, and vice versa while moving down.

> **NOTE: If the controller does not move on inspection or is unable to move in one direction, use the ELGO Settings Menu to reset all ELGO settings and clear all position data. Ensure that the standard Normal or Slowdown limit switch inputs M25, M26, M27 and M28 are OFF.**

Begin Learn Procedure

1. Ensure that all physical hardware door zone targets are installed and centered such the door zone sensor is in the middle of each target while at floor level. Fine tuning adjustments of up to 0.5" are allowed. If any door zone target is misaligned outside of 0.5", that target will need to be re-aligned, and the learn procedure must be re-done.

2. Move the car on inspection to floor level of the bottom terminal landing. This will establish the 0' 0" position height, relative to the other floor positions.

3. Navigate to the "Edit ELGO APS" screen in the "Setup Menu" and press $\boxed{\text{Ent}}$. Type the default password 911. Press $\boxed{\text{Ent}}$ to continue.

```
ELGO APS Learn    Off
Dead Zone Rng    0.2"
Floor To Trim      1
Trim Offset     +0.1"
```

4. With the cursor selected on "ELGO APS Learn", press $\boxed{\text{Ent}}$ to edit this parameter, and press $\boxed{1}$ to set this value to "On". Press $\boxed{\text{Ent}}$ to confirm, which will initiate the learn operation. At any time, the learn may be cancelled by editing and setting this parameter to "Off" by pressing $\boxed{0}$ and $\boxed{\text{Ent}}$ to confirm.

During Learn Run

5. Run the car up on inspection at slow speed until reaching the bottom edge of the top landing door zone.

6. The system actively monitors the ELGO position data while stopped or running up, but the learn mode will be invalidated and cancelled if the system is commanded to run down on inspection. Feel free to stop the car during the learn run, but resume running up so that the learn mode is not cancelled. Additionally, no timeout will cancel the learn run while the car is stopped.

> **NOTE: Fast speed is disabled during a learn run in order to accurately read the top and bottom edge of each door zone signal as the car passes each floor.**

7. As the car passes each landing, the system will measure and record the bottom edge and top edge of each door zone target. The system will automatically increment the floor position each time the door zone input signal is toggled high then low. The bottom landing floor level is computed as 3" below the top edge of the bottom door zone. The intermediate landings will set the floor level to the average position of the top and bottom edges of each door zone target or, in other words, the center of the door zone target. The top landing floor level is computed as 3" above the bottom edge of the top landing door zone target.

> **WARNING: If a door zone signal is skipped or if the signal flickers multiple times while passing a floor, the learn data cannot compute the correct floor position, and learn procedure must be restarted.**

Completing the Learn Run

8. Once the bottom edge of the top terminal landing door zone is registered, the learn operation will automatically end and the screen will update the display to "ELGO APS Learn Off". The car will stop and the newly calculated positioning signals become active, including the normal limits, etc. Normal Operation is now enabled and the car may now run floor to floor using car calls and hall calls.

9. Press ⬚Esc⬚ to exit the ELGO APS Setup Menu, and press ⬚1⬚ to save the floor height data into non-volatile system memory.

> **WARNING: If the screen updated to "Off" before reaching the top terminal landing door zone, there was likely a problem with reading the door zone signal, or the learn was cancelled by the user using the menu or by running down.**
>
> **If the screen still reads "ELGO APS Learn On" after reaching the top terminal landing, then the controller is trying to look for a door zone signal at an additional landing. This implies there was a problem with reading the door zone signal at one (or more) of the landings, or the Learn operation was not started at the bottom terminal landing, so the controller is out of sync.**

Fine Adjustment of Floor Level / Dead Zone

10. Navigate to the "Display ELGO Floor Height Data" menu screen. These position values are what the ELGO system has measured as the mid-point of the 6" Door Zone targets, and will use for floor level at each landing. Verify that the floor table shows data that accurately represents the travel length between floors. See example below:

```
Floor  1    0' 0.1"
Floor  2    8' 5.9"
Floor  3   17'11.7"
Floor  4   25' 3.5"
```

> **NOTE: The displayed values are calibrated such that 0' 0.0" is defined as the controller position at the start of the Learn operation. It is not necessary for floor level for Floor 1 to be exactly 0' 0.0", since the actual floor level is computed as 3" below the top door zone edge.**

11. Run the car to each floor on Normal Operation, and observe where the car stops after leveling into each floor. Measure the position of the car relative to actual floor level (in inches or millimeters) which can be adjusted in the next steps. If the car stops more than $\pm$ 0.5" above or below the floor, then the door zone target is not properly centered to floor level, and the learn operation must be restarted (Steps 1-9) after adjusting the door zone targets.

> **NOTE: To accurately determine the exact floor level correction offset at each landing, use the "Show I/O Status" screen to record the exact position of the car (in mm) while stopped on Normal Operation. Then move the car on inspection to exact floor level, and record this new car position (in mm). The difference between position values yields the correction offset values to be used in steps 12-14.**

> **WARNING: The floor heights must be adjusted to ensure the car stops within 1/8" of floor level, which will otherwise cause a tripping hazard. Even if door zone appears exactly centered, the floor heights must be manually inspected due to potential variation on how the door zone targets are measured during the learn operation.**

```
ELGO APS Learn    Off
Dead Zone Rng    0.2"
Floor To Trim      1
Trim Offset     +0.1"
```

12. Navigate to the "Edit ELGO APS" screen in the "Setup Menu". Scroll down to the "Floor To Trim" item in the menu using `Prv`, and press `Ent` to go into edit mode. Then select a floor number to adjust by pressing the number key of the floor number, and press `Ent` to confirm.

13. Scroll down one line to "Trim Offset", which represents the currently saved offset for the floor number selected in the "Floor To Trim" line above. To edit different floors, simply change the "Floor To Trim" to the desired floor, and edit the "Trim Offset" value. The floor position at each floor may be fine adjusted up to +/- 0.5".

14. Press `Ent` to edit the sign (+/-) of the offset. Press `.` to change the sign (+/-), where "+" will raise the car height if the car is too low, and "-" will lower the car height if the car is too high. Press `Ent` to proceed to the next field, which is in terms of tenths of an inch. Press `Nxt` to increase the value and `Prv` to decrease the offset value. Press `Ent` to confirm the value.

15. The entered offset is added to the saved floor height, so a positive offset value will increase the floor height, and a negative offset value will decrease the floor height. After changing the offset values, the floor position values on the "Display ELGO Floor Height Data" will update to reflect that offset for each respective landing.

> **NOTE: After adjusting and confirming the Trim Offset while the car is at the updated floor, the car will immediately relevel while on Normal Operation. To accurately verify floor level, run the car away and call it back to the floor to observe the stopping position after a full-speed run from both directions.**

16. For all remaining landings, edit the corresponding offset that causes the ELGO Floor Height Data to match the physical position while at floor level.

Configure Leveling and Slowdown Positions

17. Navigate to the "Display Car Top & ELGO APS Data" menu screen, which displays current state of the Up/Down Leveling, Slowdowns, Normal Limits, Slowdown Limits, Access Zones, and Floor Switches computed by the APS data.

18. Verify that the values of each target are in the correct state while moving throughout the shaft. All positions are computed relative to the floor position values given by the "Display ELGO Floor Height Data" menu, and relative positions may be adjusted using the "Edit ELGO APS" menu.

19. To adjust the positions of the selector signals, use the "Edit ELGO APS" menu, and refer to **Table 7** for specific adjustment details. Initial ELGO settings are set by the factory, as listed in the "Default" column.

Table 7: ELGO APS Adjustable Settings Menu Descriptions

Menu Item	Unit	Min	Max	Default	Description
Dead Zone Range	inch	0.1	0.9	0.2	Width of Dead Zone, centered at floor level.
Floor To Trim	floor	1	Top Ldg	1	Select the floor to be edited using "Trim Offset".
Trim Offset	inch	-0.5	0.5	0.0	Floor level offset value for the floor # in "Floor To Trim".
Up Level Range	inch	3.0	12.0	6.0	Width of Up Level, starting from lower edge of Dead Zone.
Dn Level Range	inch	3.0	12.0	6.0	Width of Down Level, starting from upper edge of Dead Zone.
UHS/USS Dist.	inch	6.0	999	6" per 25 fpm	Distance of leading edge of Up High/Slow Speed Slowdown (UHS/USS) (lower edge of floor switch) from below floor level.
Up Slow Range	inch	3.0	12.0	6.0	Length of Up Slowdown target, where lower edge is referenced by Up Slow Dist.
DHS/DSS Dist.	inch	6.0	999	6" per 25 fpm	Distance of leading edge of Down High/Slow Speed Slowdown (DHS/DSS) (upper edge of floor switch) from above floor level.
Dn Slow Range	inch	3.0	12.0	6.0	Length of Down Slowdown target, where upper edge is referenced by Dn Slow Dist.
Access Top Range	feet	1.0	20.0	8.0	Length of top landing TU & TD Inspection Access Zones.
Access Bot Range	feet	1.0	20.0	8.0	Length of bottom landing BU & BD Inspection Access Zones
Access Offset	inch	0.0	36.0	6.0	The Up and Down Access Zone offset defines how far the car can drift out of a zone, while still being able to run in the opposite direction.
UHS/USS Limit	inch	6.0	999	6" per 25 fpm minus 1"	Distance of Up Fast/Slow Speed Limit below floor level at top terminal landing.
DHS/DSS Limit	inch	6.0	999	6" per 25 fpm minus 1"	Distance of Down Fast/Slow Speed Limit above floor level at bottom terminal landing.
Up Normal Limit (not shown)	n/a	n/a	n/a	1" above top ldg	The Up Normal Limit Sw input is preset to 1" above the top terminal landing floor level, and is not adjustable.
Down Normal Limit (not shown)	n/a	n/a	n/a	1" below bottom	The Down Normal Limit Sw input is preset to 1" below the bottom terminal landing floor level, and is not adjustable.
Reset ELGO Settings	n/a	n/a	n/a	n/a	Use to reset all ELGO settings parameters to factory default.
Clear ELGO Data	n/a	n/a	n/a	n/a	Clears all ELGO floor position data. A relearn operation is required.

5.2.2 ELGO APS Faults

In general, ELGO APS faults will cause all APS signals to be disabled, while enabling the Up and Down Normal limits, allowing the car to run on inspection or level down to the nearest door zone while on Normal Operation. During an ELGO fault, the "Car Status" screen on the Vision 2.0 CPU displays "ELGO-Err". Clearing an ELGO fault requires a manual reset using the Fault Reset input (RST), and may require ELGO data to be relearned using the ELGO APS Learn Procedure.

5.2.2.1 Door Zone Mismatch

The hardware door zone (MR-SIB input 20) is actively cross-checked with the virtual door zone position saved during the ELGO APS Learn Operation. The hardware door zone input is used by the controller logic to represent actual door zone, while the virtual door zone target is used as a position reference for all other selector signals. Only the hardware door zone input is used to allow the doors to open, while the virtual door zone is used to determine floor level position. If the hardware and virtual door zone states do not agree during normal operation, this will trigger a Door Zone Mismatch Fault and the controller shuts down. The cause of this fault may be a malfunctioning or misaligned door zone switch, or the APS position is not properly calibrated. The mismatch fault is checked while at floor level or between floors and disabled while in leveling, where both the hardware and virtual door zones are expected to transition. See the table below for the expected behavior for a given Virtual and Hardware Door Zone state.

Table 8: Virtual and Hardware Door Zone States.

Position	Virtual DZ State	Hardware DZ State	Description
Dead Zone (not Leveling)	On	On	Correct State
	On	Off	Faulted State – On Auto, the car levels down until Hardware DZ = ON.
Leveling Zone	any	any	DZ states not checked while transitioning during Leveling.
Outside Leveling	Off	Off	Correct State
	Off	On	Faulted State – Car shuts down while Hardware DZ = ON.

5.2.2.2 ELGO Sensor Communication Error

A communication error between an ELGO APS sensor and the controller CPU or CT-SIB prevents position data from being updated and causes the controller to disable its APS selector signals and go on Shutdown. If the system is outside of door zone, it will seek a floor by leveling down until it detects a hardware door zone signal. The system then goes into Shutdown while the communication error persists. If communication is restored with no other fault conditions present, the controller will resume normal operation.

5.2.2.3 ELGO Position Offset Mismatch

The two ELGO APS Sensors are positioned 40mm apart within the sensor head, and the controller CPU actively verifies that the difference between received position data from both sensors is within tolerance, where ELGO channel "B" position data is 40mm greater than ELGO channel "A" position data. If the data compared by the sensors significantly deviates from 40mm while moving, an ELGO Offset Fault is triggered, and the system will stop and level down to the nearest door zone and go on Shutdown. An ELGO Offset Fault may also registered if either ELGO Sensor position data is out-of-bounds of either the bottom or top terminal position by +/- 1000 mm.

In practice, this fault should not occur unless the ELGO sensors are installed incorrectly, the ELGO tape is damaged or defective, or if one of the sensors cannot properly read from the tape.

5.2.2.4 ELGO Tape Switch Fault

The integrity of the ELGO APS encoded magnetic tape is monitored by a tape alignment switch, which will open if the tension from the tape is lost. The tape switch contacts are connected between terminals 1B-2 in series with the pit stop switch, which is monitored by MR-SIB input M07. If the tape switch opens, the safety string will break and render the drive and brake inoperable. Jump the Tape Switch contact (TBs 1B-2) in order to allow the car to run on inspection.

5.2.2.5 ELGO Learn Data Error

The system verifies Learn data at the end of a Learn run to ensure that each landing has a measured door zone position, and that no values are in conflict. Until Learn data is saved and verified, the system is in an ELGO faulted state, where only the Normal Limits are functional. Repeat the ELGO APS Learn Procedure until the Learn data is verified by the controller. If the ELGO APS Learn data is missing, corrupt, or fails to verify, the "Safety Status" screen displays "Fault: ELGO APS Data", and the "Car Status" screen displays "ELGO-Err".

5.2.2.6 Normal Limit and Slowdown Limit Behavior

While the system is not faulted, the Up and Down Normal Limits are active based on the top and bottom terminal landing positions. If the terminal landing positions were miscalculated (if an ELGO learn run was performed improperly), the Up or Down Normal Limits may or may not be operational outside of the calculated limits. It is possible to run the car beyond the APS computed Normal Limits by jumping the hardware Normal Limit MR-SIB inputs (1X – M25 & 1X – M28). The car is prevented from running if the hardware MR-SIB inputs M25 or M28 are jumped while the computed software Normal and Slowdown Limits are active. This prevents the user from attempting to bypass the Normal and Slowdown Limits while using the ELGO APS feature.

5.2.3 Bypassing ELGO APS computed signals

The ELGO sensors (channels A & B) operate as independent systems, and the computed data from each sensor is processed by separate safety processors. The terminal normal limit and slowdown limit positions are computed using data from the ELGO channel B received and processed by the CT-SIB processor and transmitted to the MR-SIB safety processor via the traveler. The leveling and floor-to-floor slowdown positions are computed using data from the ELGO channel A received and processed by the controller CPU via the MR-SIB. It is possible to temporarily bypass various computed elements of the positioning system by using jumpers or by setting a temporary mode in the CPU settings menu.

To bypass the normal limits, the following conditions must be true:

1. Disable ELGO in the settings menu, and jump MR-SIB inputs M25 & M28.

   OR

2. Disconnect the ELGO sensor from the CT-SIB with the ELGO setting enabled to put the car into pre-installation construction mode.

   OR

3. Leaving ELGO enabled in the settings menu, run the car on inspection past the normal limit until it stops. Then jump MR-SIB inputs M25 (up) or M28 (down) to resume running the car past the normal limit. If the car is not beyond the normal limit when the M25 or M28 jumper is installed, the car is unable to run.

To bypass the slowdown limits for one run with ELGO enabled:

1. Enable on the "DISABLE SLDN LMT" in the settings menu. This will temporarily allow the car to run Fast Speed one time on inspection or automatic, after which the setting will automatically revert to OFF.

To bypass the slowdown limits for multiple runs:

1. Set the UHS Limit (or DHS Limit) to 0 in the ELGO settings menu. Be sure to update the slowdown limit distance to the correct distance after the buffer test.

To bypass the floor-to-floor slowdowns for one run:

1. Enable on the "DISABLE SLOWDOWN" in the settings menu. This will temporarily allow the car to run Fast Speed one time on inspection or automatic, after which the setting will automatically revert to OFF. The car will continue running on automatic until reaching the terminal slowdown limit, or timing out based on the Up/Dn Run Shutdown timer.

To bypass the floor-to-floor slowdowns for multiple runs:

1. Set the UHS Distance and DHS Distance to 0 in the ELGO settings menu. Be sure to update the values to the correct distance after finishing the test.

To enable/disable the ELGO APS system, go to the "Edit Adjustable Settings" screen in the Setup Menu, and navigate to the "ELGO APS ENABLE" line item. While ELGO APS is enabled, the "Display ELGO Floor Height Data", "Edit ELGO APS", and "I/O Status – CAN BUS 1 ELGO APS" menus are available to navigate.

5.3 Position Indicators

Verify that the floor position changes properly as the car goes past each landing. Floor change should take place at the slowdown point before each landing.

If the Position Indicator does not match the actual car position, run the car to a terminal landing reset target (with pulsing selector only).

5.4 Independent Service

Independent Service is useful for final tune-up of the car. Initiate Independent Service by turning on the Independent Service Switch in the car, using C.O.P board input 40.

On Independent Service, hall calls are cancelled and disabled. The car runs from car calls only, and parks with the doors open until the Door Close Button (C.O.P board input 28/28R) or Car Call Button input (C.O.P. input 28X) is held on at constant pressure.

To run the car from the machine room without the doors opening, use the Door Open Cutout Switch located on the auxiliary relay/switch board mounted to the middle of the MR-SIB, where position UP = cutout.

> **NOTE: If the car does not run, verify that no door protective device (Door Open Button, Safety Edge, Electric Eye, Infra-red Curtain) is holding the doors open. Verify that the car is not stuck in leveling. Verify that the Door Close Limit is de-energized. Verify that all Safety String inputs to the MR-SIB are correct.**
>
> **NOTE: An alternative to using Independent Service for final tune-up is to enable the Door Open K/O Switches located on the auxiliary relay/switch board mounted to the middle of the MR-SIB, and then using the Door Open Push-Button at same location for initiating door operation. See Section 7.1.3.1 to set car calls from the controller using the LCD screen and keypad.**

5.5 Car and Hall Calls

To observe the operation of the car and hall calls, the system must be in automatic operation. Verify that all car and hall calls work. Since car and hall call inputs are located on the serial I/O boards in the C.O.P. and hall riser, calls may be placed using the keypad while in the "Car Status and Safety Status" menu. Refer to Section 7.1.3.1 for instructions.

> **NOTE: Use the keypad and LCD screen to enter Car and Hall calls from the controller. Refer to Section 7.1.3.1 for instructions.**

If both up and down hall calls are entered at an intermediate landing, and no other calls are in the system, the doors will close after answering one of the calls, then re-open in response to the other call.

A Car or Hall call is canceled when the car initiates slowdown for the call, or when the doors start to re-open for the call if the car is already at the floor.

If there is a condition that causes the elevator to go out of service, such as a stop switch or door timer, all hall calls for that car are cancelled. Car calls are cancelled if the car is rendered inoperable or during a Fire Recall or Medical Emergency Recall operation. For a multi-car group, any unanswered hall calls are transferred to other cars in the group. If all cars are out of service, then all hall calls for the group are cancelled.

5.6 Door Operation

Verify that any required changes to the door operator, as shown on the door operator drawings, have been made correctly.

Check the Door Open and Close Limits for proper operation. The door limits are wired using N.C. (normally closed) contacts, such that the signal turns OFF while the door is on the limit.

If the doors attempt to open or close for too long, based on the preset time "DOOR STUCK TIME", a door open or close fault will trigger.

If a door is unable to fully open, the door will close and the car will then respond to other calls before trying to open the doors again.

If a door is unable to fully close, the doors will fully re-open before trying to close again. For very slow doors, "DOOR STUCK TIME" may need to be increased to prevent a nuisance Door Close Fault. The factory default for "DOOR STUCK TIME" is normally set at 20 seconds.

To enable Door Nudging to close the door at slow speed while the Electric Eye (EE) or Infrared Curtain Unit (ICU) is active while in Normal Operation, enable the feature settings "TIMED EYE CUTOUT" and "DOOR NUDGING". The Nudging timer will start once the doors are ready to close but there is an obstruction (ICE, EE, Safety Edge, or Door Open Button) preventing the door from closing. After the adjustable time "ICU CUTOUT TIME" (20 seconds by default), the nudging buzzer will sound, and the door will close at nudging speed even while the EE/ICU is energized, but will remain open if the Door Open Button or Safety Edge is active, unless Fire Service is also active. If the doors are closing when the Nudging Timer trips, the Nudging Buzzer will turn on and the EE/ICU will remain active. If the doors do reopen fully, the EE/ICU are then cut out.

5.7 Fire Service

Fire Recall (Phase 1) may be initiated by turning off a Smoke Sensor input (82, 82M, or 82F N/C), or by energizing the Hall Fire Switch "On" input (CAN3 board #0, input UI).

Confirm that the car returns to the correct Main and Alternate landings.

Confirm that the car operates as required on Car Fire Service (Phase 2) operation.

> **NOTE: To reset Hall Fire Recall (Phase 1), most codes require the Fire Bypass input be energized. On 2000 (or later) Fire Code, Fire Recall (Phase 1) resets when the Hall Fire Switch is turned from Bypass to Off.**
>
> **NOTE: If Car Fire Operation (Phase 2) appears to be operating incorrectly, check the Door Open and Close Limits for proper operation. Most codes require that the doors be fully open before allowing a change in the mode of operation on Car Fire Service. Most codes require that Hall Fire Recall (Phase 1) be in effect for the car to return automatically to the main fire landing when the Car Fire Switch is turned to the OFF position.**
>
> **NOTE: To disable Fire Service, set the "NO FIRE SERVICE" feature setting to ON.**
>
> **NOTE: Fire Service behavior is adjustable to match the requirements of various Fire Codes, including A17/B44 national codes for 1998, 2000, 2005, 2007, and 2016, as well as other local codes. The Fire Code settings should be pre-programmed by the factory based on the provided specifications. If changes are required in the field, refer to Section 8.2.2 and page "VNP" in the schematics for the list of available settings, and refer to Section 7.1.4.4 for instructions.**

5.8 Failure Timers

5.8.1 Stuck Button Timer

If a car or hall call button remains on for an adjustable time (setting "CAR STUCK TIME"), and other calls are registered, the stuck button call is ignored, and the car will answer the other call(s). The car returns to the stuck button call as it answers other calls, and the stuck button timer sequence is repeated.

5.8.2 Running Timers

If the car runs for an adjustable time without changing floors, then running timer shutdown operation initiates, and the car status screen displays "RunTmr Shutdown". The Shutdown could be caused by a problem with the motor starter circuit(s), a problem with the drive system, or a problem with the selector. The car will stop immediately. It will then shut down, allowing only the Door Open Button and door protective devices to operate, if in Door Zone (MR-SIB input 20). Reset the fault by toggling the Fault Reset input (RST) or Shutdown Defeat input (DFT). The Run Shutdown Timer is adjustable using the timer setting is "RUN TIMER SHUTDN".

> **NOTE: If a Reverse Phase Relay or Emergency Power circuitry is supplied, these will also initiate a shutdown signal if the inputs are not energized.**

A sequence fault timer monitors key inputs from the drive system, such as Drive Enabled, Brake Micro Switch, and contacts of the key drive contactors. If these fail to change state properly as the car starts or stops, then the car shuts down. The fault can be reset by cycling the Main Line Disconnect Switch, by toggling the Fault Reset input (RST).

A leveling timer is provided that cuts out leveling if the car has been leveling for over 25 seconds. This prevents the car from stalling in leveling. The car does not shut down, but the car does not attempt relevel until it has run to another floor.

If the car stops between floors, it will run down at False Down Level (FDL) speed until it enters and then rides off leveling within Door Zone. This prevents the car from parking between floors.

The car shuts down after 20 attempts if it is repeatedly unsuccessful in reaching the next floor during a fast speed run on Normal Operation

5.8.3 Door Fault Timers

If the doors fail to open fully after an adjustable time, the open cycle is canceled. The door time will expire as normal, the doors will close, and the car will continue to answer calls.

If the doors fail to close after an adjustable time (setting "DOOR STUCK TIME"), the doors will reopen, and attempt to close again. The doors are then held open for an adjustable time (setting "DOOR RESET TIME") which allows the door motor to remain cool. The close cycle repeats until the doors close.

If the doors fail to close after repeatedly cycling the door open/close outputs, the car shuts down after 20 attempts.

5.8.4 Door Check Circuitry

Door Check Circuitry is a feature required by code when using mechanically-coupled doors that operate horizontally. A Door Contact fault registers when the following conditions occur:

1. Car Gate and Hall Doors are physically fully open, AND

2. All Car Gate and Hall Door Contact Input(s) are energized for all landings (top: 5T, intermediate: 5, bottom: 5B, front:4 and rear:4R/5R), AND

3. The Door Open Limit Input is de-energized (the car door is fully open).

If the above fault condition exists, the fault initiates after 0.2 seconds. When a Door Check Fault initiates, the message "DrChk" is displayed on the Car Status screen, and the doors are held open. The fault clears when the door contacts input(s) go off. The Front and Rear doors are monitored independently, and the offending Car Gate and/or Hall Door Contact is specified in the fault log.

5.9 Field Adjustable Features

Refer to Sections 7.1.4.3 and 7.1.4.4 to edit the adjustable settings, timers, and designated landings. Refer to Section 8 for descriptions of all available settings, timers, and designated landings.

The Virginia Controls factory configures the controller with job-specific default settings. Any field changes may be reverted to factory defaults by selecting "Reset Settings" from the "Setup Menu" submenu, and confirming with the password. All values will revert to the factory defaults as shown on the configuration page "VNP" of the drawings. The settings or features that most often need adjustment are door times and fire service return floors.

5.10 Dispatcher Operation

Each controller contains its own dispatcher capabilities and is able to recognize up to 7 other controllers in a multi-car group. Each controller receives and processes controller data for all connected cars, and processes dispatching decisions independently and simultaneously with other controllers.

In a multi-car group, the controller with the lowest index in the group is designated as the lead controller, which is automatically determined by software. The lead controller sends Hall I/O outputs over CANbus 3. Cars must be connected over Ethernet and CANbus 3 in order to be considered connected.

Group communication status may be seen on the "Display Group Data" menu screen. See Section 7.1.14 for details.

> **NOTE: All controllers in a group must each have a unique controller number, set by dip switches on the Vision 2.0 CPU board. Each controller must also have the same IP address reference value. See Section 7.1.4.7 for details.**

Dispatching hall calls is determined by a route-time minimization algorithm. Every hall call is assigned to the "best" car in the group at any given moment. Once a car has been assigned to a call, it is committed unless conditions change that would allow another car to reach the requested floor faster. A timing parameter "HC TRANSFER TIME" in the Adjustable Timers/Landings Settings Menu may be altered to tune the timing threshold before allowing a hall call to be transferred to another car.

5.10.1   Homing Operation

There are several Homing Operation modes available, allowing more customization for car homing behavior. Use the Homing menu in the Setup Menu submenu to adjust the following Homing settings:

Mode 0 – Homing for this car is disabled.

Mode 1 - After homing delay, car is recalled to the main landing.

Mode 2 - After homing delay, car is recalled to the specified homing landing.

Mode 3 - After homing delay, car will move to primary homing landing. If primary homing landing is already occupied, then move to secondary homing landing. If both primary and secondary homing landings are occupied, then do nothing.

Mode 4 – Allows for homing mode 3 to be customized based on the time of day using 4 blocks of time.

> Block 1 (Morning) – example: Cars are recalled to the lobby
>
> Block 2 (Lunch) – example: Cars are split between the lobby and middle floors
>
> Block 3 (Afternoon) – example: Cars are distributed at the middle floors
>
> Block 4 (Night) – Homing is disabled

A car will home if the following conditions are met for the "HOMING DELAY" time.

1. Homing is enabled (see above homing mode options).
2. The car is in group operation (not on Inspection, Independent Service, Fire Service, Load Weighing, etc.
3. The Stop Switch is not thrown.
4. The car is not stuck.
5. The doors are closed (unless using "PARK OPEN – MAIN" or "PARK OPEN ALWAYS" settings).
6. A car is not already at the homing landing.
7. The car is not running and has no other demand to run.
8. Another car is not running or homing.

Refer to Section 8.2.2.3 for Homing related adjustable settings such as Homing Delay Time and Group Homing options.

5.10.2 Emergency Power Operation

Emergency Power Operation (if equipped) is a group operation which is processed in each controller's dispatcher program. The Emergency Power input signals are received by all controllers in the connected group.

The Emergency Power input (EP) is always ON while in Normal Operation, and Emergency Power Operation will initiate if the EP input turns OFF for at least 1 second. All cars are recalled to the main landing, running one at a time, and each car cycles its main door open then closed. After all cars have been recalled, one car is selected to run on Normal Operation while the other cars remain on shutdown.

The Emergency Power Pre-Transfer input (EPT) will cause all running cars to stop at the next landing and go out of service while the input is ON. This is used to allow cars in the group to smoothly come to a complete stop during the transition between normal power and emergency power.

The Emergency Power Selection inputs (EPA, EPB, EPC,...) are used to manually select which car is allowed to run on Normal Operation while on Emergency Power. If no inputs are energized, then the first available car is auto-selected to run on Emergency Power while all other cars remain on shutdown. If an auto-selected car happens to go out of service, then the system will attempt to select another car to run on Emergency Power in its stead.

The Car Status screen displays "Emerg-Pwr" if the car is currently on Emergency Power, and the Safety Status screen displays "Emergency Power" if any car in the group is currently on Emergency Power.

If all cars are able to run simultaneously while on Emergency Power, assuming adequate building electrical provisions, enable the setting "EM PWR SIMPLEX". All cars will recall and transition into Normal Operation independent of any other car in the group.

5.10.3 Medical Emergency Hall Operation / Hospital Service

Medical Emergency Operation is a group operation which is processed in each controller's dispatcher program. When a Medical Emergency hall input is energized, the dispatcher will select the closest available car and force it to recall to that landing by cancelling its current car and hall calls and energizing the Medical Emergency Light and Buzzer. The Medical Emergency Call is held until the assigned car arrives at the landing and opens its doors. The car doors are held open until Medical Emergency Car input is energized or after a timeout "MED EMERG CANCEL", adjustable in the timers menu. If the originally selected car goes out of service, or does not arrive and open its doors within 30 seconds, then the next closest car is selected to recall to the landing instead.

The Safety Status screen displays "Medical Emergency" if Medical Recall is active in the group. The car which is currently being recalled displays "MEH" on the Car Status screen.

5.11 ETSD Monitoring System Setup

The ETSD board by Virginia Controls is a hardware system for traction elevator controllers that provides a level of redundancy for a specific set of control functions required by the A17.1 Safety Code for Elevators and Escalators.

See Section 6.9.5 for additional details.
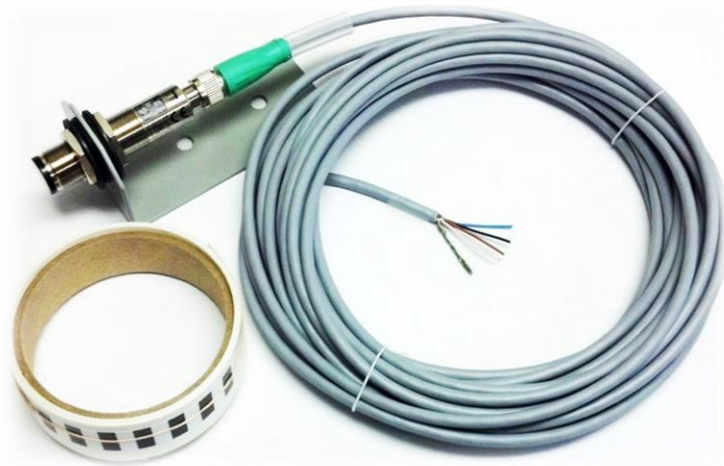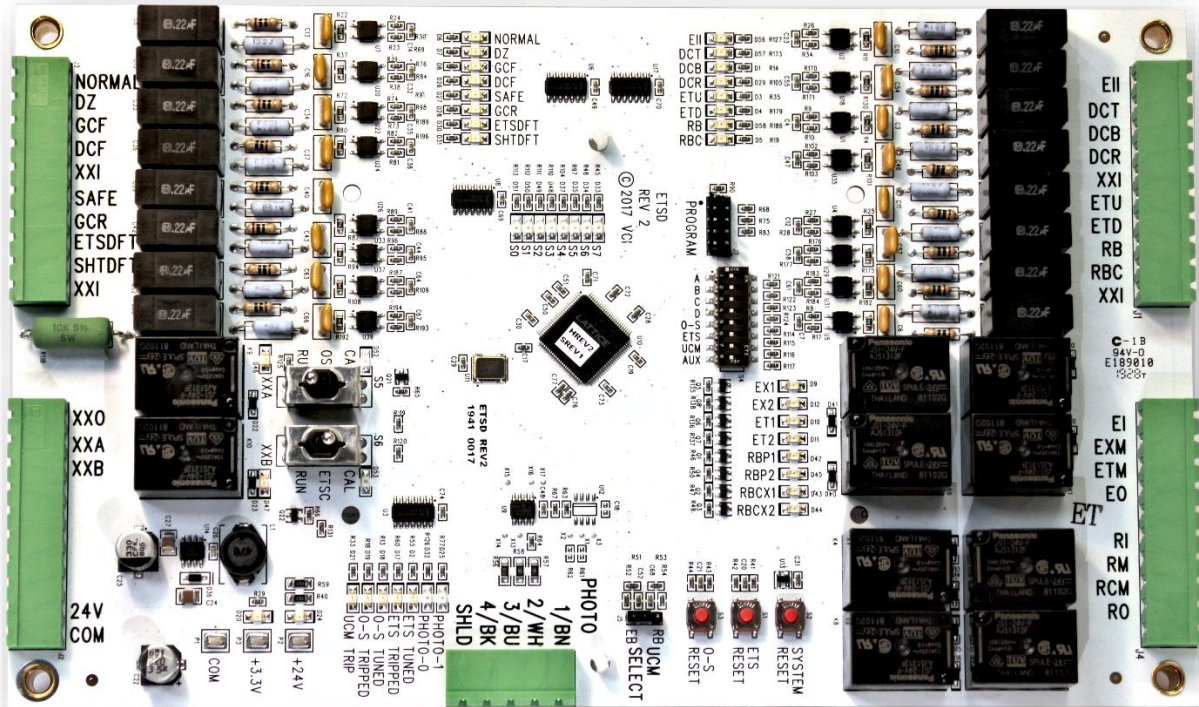
Figure 16: ETSD Monitoring System Hardware

5.11.1 Setup of the UCM (Unintended Car Movement) System

1. With power off, verify that UCM Select Jumper is set to "RB" for use with a Rope Brake device, or set to "EB" for use with a Hoist Machine Emergency Brake.
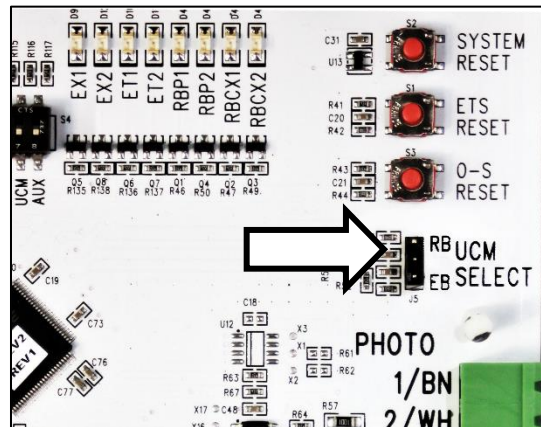
Figure 17: UCM SELECT Jumper

> **NOTE: Follow the prints for setting the UCM Select Jumper. If a label was applied to the board for setting this jumper, then follow it, but it should agree with the prints.**

2. Verify the "OSC" & "ETSC" Calibration Switches are down in the "RUN" position.
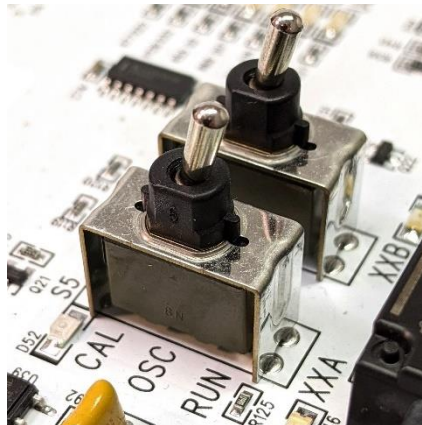
Figure 18: "OSC" and "ETSC" Calibration Switches (in RUN position)

3. To begin installation, and with power still removed from controller, defeat the UCM System (and O-S & ETSD Systems) by placing a jumper from controller TB-1X (120VAC) to ETSD Inputs SHTDFT and ETSDFT at bottom of ETSD Board.
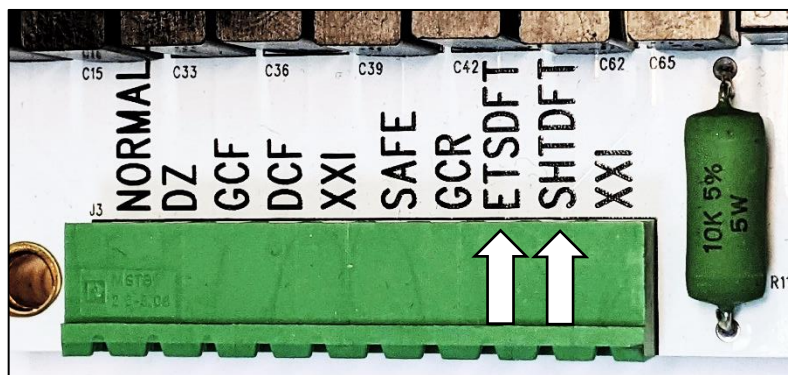
Figure 19: SHTDFT and ETSDFT Inputs

4. Power up the controller and verify that ETSD Board Input LED's: "EII, ETSDFT & SHTDFT" are lit.
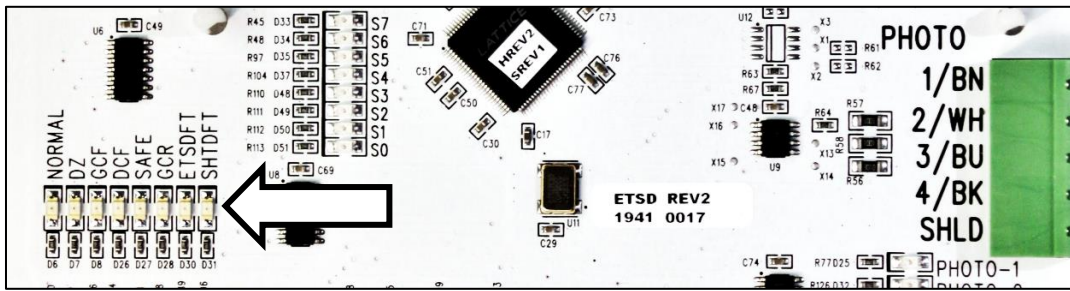
Figure 20: ETSDFT & SHTDFT Input Indicators

5. Other Input LED's may be lit as well, but also verify that ETSD Board Relay Output LED's: "EX1, EX2, ET1, ET2, RBP1 & RBP2" are lit to permit temporary movement of the elevator.

Figure 21: EX1, EX2, ET1, ET2, RBP1 & RBP2 Output Indicators

6. Construction of the elevator may now proceed until it is decided that the O-S System should be tuned.

7. Once the O-S System is tuned (see next Section, "Setup of the O-S System"), remove the jumper from controller TB-1X (120VAC) to ETSD Board Input SHTDFT.

8. Removal of the jumper from controller TB-1X (120VAC) to ETSD Board Input ETSDFT occurs when ETSD System is tuned per the final section, "Setup of the ETSD System" – required when contract speed is greater than 200FPM.

5.11.2 Setup of the O-S (Over Speed) System

> **The un-tuned O-S System was previously defeated in the "Setup of the UCM System" Section by a jumper from controller TB-1X to ETSD Input SHTDFT.**
>
> **During construction, once the elevator is running in a controlled and consistent manner, the O-S System can be tuned while on Inspection, therefore start here!**
>
> **NOTE: An un-tuned O-S System powers up with "O-S TRIP" & "O-S TUNED" LED's off.**

1. Apply the ETSD Speed Sensor Tape around a machined surface of a sheave (either machine driver or deflector sheave) that is and will remain relatively free of oil and grease. Note, the ETSD Tape runs at, or close to, rope speed at rope diameter on sheave.

Figure 22: ETSD Tape

> **NOTE: The ETSD Tape is ⅝" wide by 10 feet long and should be trimmed to length and can be shaved in width once installed on sheave.**

2. Ensure that the ETSD Tape does not come in contact with the brake pad surfaces of the main or emergency brakes of a gearless machine, nor lap over into a rope groove of any sheave.

3. If not already assembled, mount the Speed Sensor in its steel 90° angle mounting bracket with 1" of its threaded barrel extending through the bracket, and with the controls & LED's of the sensor facing outward for viewing. Note the arrangement/order of the grommet & washers.

Figure 23: Speed Sensor & Mounting Bracket

> **IMPORTANT NOTE: The rubber grommet & washers are provided to isolate the speed sensor electrically from the mounting bracket & motor, otherwise damage may occur.**

4. Use the mounting bracket to position the Speed Sensor +5" (±1/4") away from the ETSD Tape at an angle that is nearly perpendicular to the tape but slightly off by approximately 10°.

5. With power off, route the 30ft Speed Sensor Cable through a metal conduit to the ETSD Board.

> **NOTE: Be sure the metal conduit is grounded at the motor end, and ground the separate metal conduit containing motor leads in the same manner, if possible.**

6. Wire the cable per markings at the 5-Pole "PHOTO" connector (removable) on ETSD board. Shorten the cable at the ETSD Board once routing of the conduit is determined. Do not coil the cable within controller.
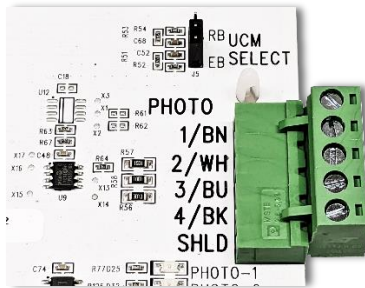
Figure 24: "PHOTO" Connector on ETSD Board

7. Check the braided/bare Drain wire of the Speed Sensor Cable at the "SHLD" terminal of ETSD Board. Check for a 14Ga Green GND wire at the #8 nut at lower-right ETSD Board mounting stud.

8. Align and plug in the connector (whether straight or right-angle style) on the Speed Sensor Cable to the connector end of the mounted Speed Sensor, then finger tighten this connection.
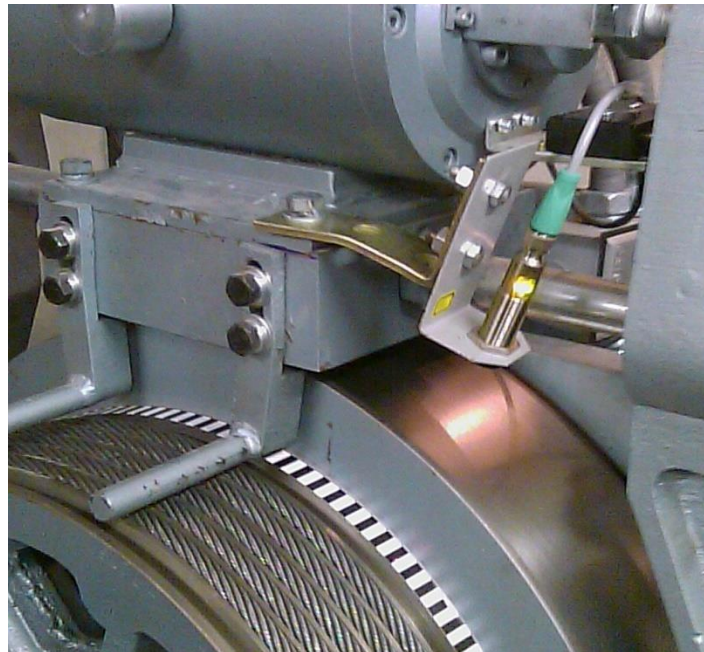
Figure 25: Installed ETSD Tape & Speed Sensor

9. Power up controller, and verify that the Green "POWER" LED is lit on the Speed Sensor.

Figure 26: Sensor Green POWER LED Indicator

10. Verify that the Yellow "SENS." LED of Speed Sensor and the "PHOTO -1" LED on the ETSD Board are lit <u>only</u> when the red light beam of the Speed Sensor is pointed at a white segment of the ETSD Tape.
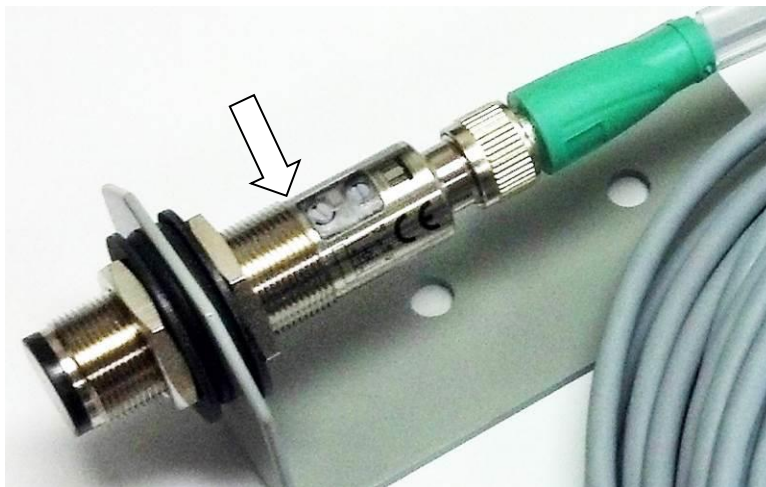
Figure 27: Sensor Yellow SENS. LED Indicator
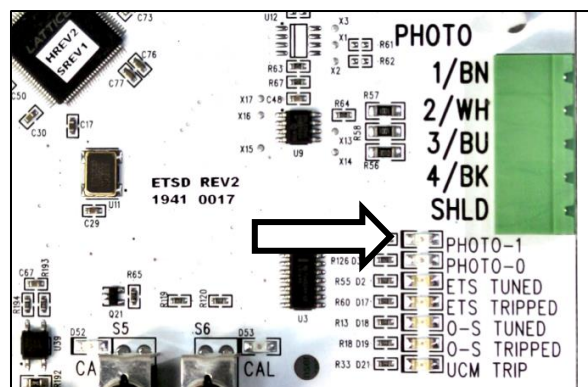
Figure 28: PHOTO-1 Indicator

11. Verify that the "PHOTO-0" LED on the ETSD Board lights <u>only</u> when the red light beam is pointed at a black segment of the ETSD Tape.
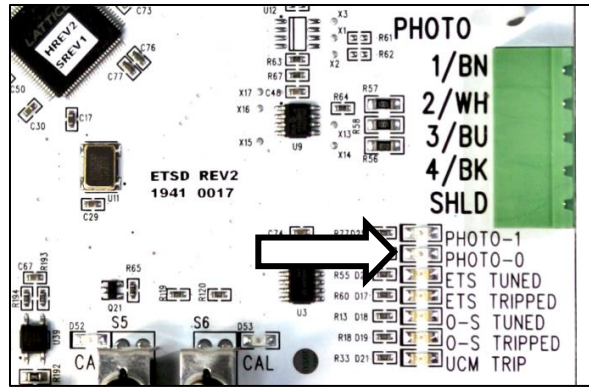
Figure 29: PHOTO-0 Indicator

12. Important Step: Perform the following checks to ensure that "PHOTO-1" LED on the ETSD Board lights only when the sensor is pointed at a white segment of the ETSD Tape, and to prevent "PHOTO-0 & PHOTO-1" LED's from oscillating while the sheave is still, and perhaps pointed at a black segment:

- "L/D" (Light/Dark) Switch of Speed Sensor is set to "L" or Light position. (Check carefully!)
- "SENS." Potentiometer of Speed Sensor (2-turn w/clutch) is set on turn - middle.
- Speed Sensor is about 5" (±1/4") away from the ETSD Tape.
- Speed Sensor is aligned slightly off (approx. 10°) perpendicular from tape.
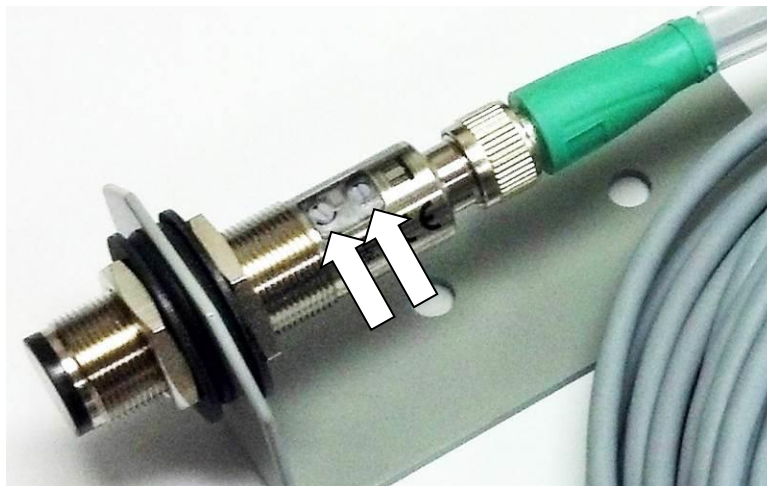
Figure 30: Sensor L/D Switch & SENS. Potentiometer

- Important: Increasing the angle of the sensor off (≈10°) perpendicular with the tape, or adjusting the "SENS." Potentiometer per the P+F Adjustment Instructions included with the Sensor, may be required to eliminate these issues.

> **NOTE: The goal of these steps is a focused (<1/16" Dia.) red light beam on the ETSD Tape having maximum sensitivity to white segments while rejecting the black segments.**
>
> **NOTE: ETSD "PHOTO-1 & PHOTO-0" LED's should never oscillate when the red light beam is resting on a seam or edge between white & black segments of the ETSD Tape.**

13. Power down controller, and remove the jumper between controller TB-1X and ETSD Board Input SHTDFT at bottom of ETSD board. (The jumper at ETSD Board Input ETSDFT remains for now.)

14. Move the "OSC" Calibration Switch from the "RUN" to "CAL" position. Verify OSC "CAL" LED lights in next step.

15. Power up controller, and verify that ETSD Board Input LED's: "EII & ETSDFT" are lit.

16. Other Input LED's may be lit as well, but also verify that ETSD Board Relay Output LED's: "EX1, EX2, ET1, ET2, RBP1 & RBP2" are lit to permit temporary movement of the elevator.
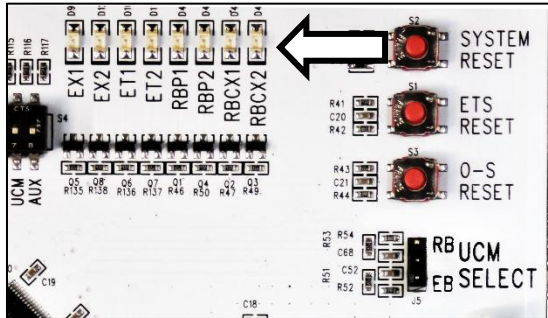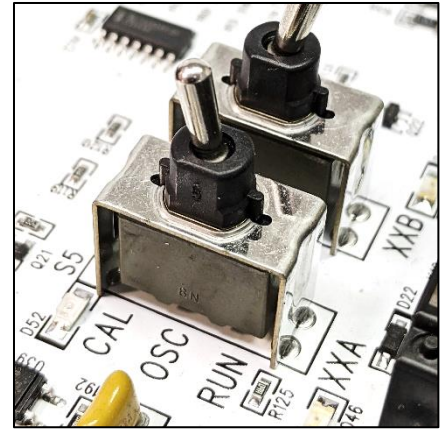
Figure 31: Output Indicators

17. Set the drive for an Inspection speed of 150FPM and run the car for about 5 seconds.

> **NOTE: Car speed should be checked with hand tachometer, or repeat when available.**

18. If elevator contract speed is 150FPM or lower, then set the drive (in previous step) to approx. 80% of contract speed, but still comfortably above desired operational Inspection speed.

19. When the elevator comes to a stop, move the "OSC" Switch from the "CAL" to "RUN" position with power on. The "O-S TUNED" LED will light, indicating a valid calibration of the O-S System.
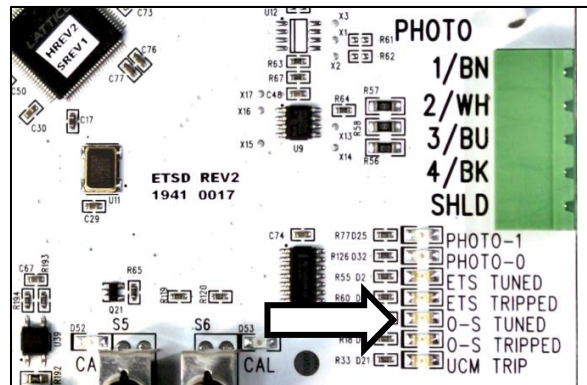
Figure 32: O-S TUNED Indicator

20. Verify ETSD Board Input LED's: "EII & ETSDFT" are lit, and that ETSD Board Relay Output LED's: "EX1 & EX2" are also lit. Other I/O LED's may be lit as well, and that the "OSC CAL" LED is off.

21. Return the drive to its former Inspection Speed setting (30-50FPM).

22. If contract speed is 150fpm or lower, limit the Inspection Speed setting on the drive to not more than 50%-60% of contract speed – therefore, well below the O-S Calibration.

23. The UCM & O-S Systems are now operational.

> **NOTE: The ETSD System alone remains defeated until final adjustments are made on Normal operation.**

24. Important: If the O-S System should fault intermittently, it is most likely caused by "noise" that is picked up by the Speed Sensor Cable due to its proximity to the motor leads of the Drive, or by a poorly aligned or mis-adjusted Speed Sensor. See Step 12 (above) and Steps 25 & 26 (below).

25. Important: Car speed can be monitored on LED's "S0-S7" by only turning on "AUX" DIP Switch. These LED's show car speed as a binary count that should ramp up & down smoothly with Accel & Decel, and appear stable at constant speed, with dithering (or flashing) on the lowest one or two bits only.

LED's "S0-S7" represent an 8 Bit count (1, 2, 4, etc.) where each bit accounts for 5FPM (or, one ¼" of tape travel sampled over 250mS). Example: LED's "S1 + S2 + S3 + S4" = (2 + 4 + 8 + 16) x 5 = 150FPM.

Leave the "AUX" DIP Switch in the ON / Up position for speed monitoring.
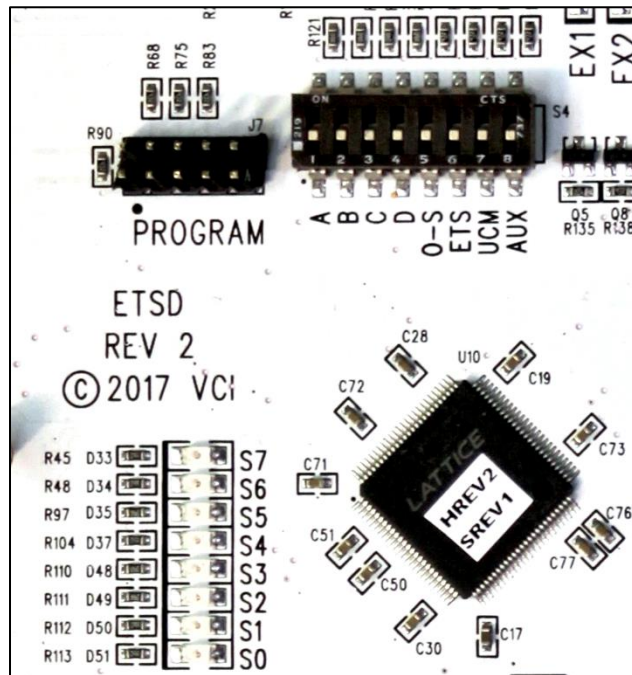
Figure 33: State LEDs and DIP Switches

26. Important: While running, if LED's "S0-S7" flash off and on randomly, without a pattern: check that the Speed Sensor Cable is ran separate and away from line & motor leads; check conduit grounding; and check the alignment and adjustment of the Speed Sensor per Step 12. Then, recalibrate O-S System.

5.11.3 Setup of the ETSD (Emergency Terminal Stopping Device) System

> The un-tuned ETSD System remained defeated in the "Setup of the O-S System" Section by a jumper from controller TB-1X to ETSD Input ETSDFT.
>
> If the elevator contract speed is 200FPM or less, then the ETSD System is not tuned, and the jumper from controller TB-1X to ETSD Input ETSDFT remains in place. Stop here!
>
> If contract speed is greater than 200fpm, proceed with ETSD tuning.
>
> The ETSD System can be tuned only after the O-S System has been tuned.
>
> An un-tuned ETSD System powers up with "ETSD TRIP" & "ETSD TUNED" LED's off.
>
> NOTE: Minimum ETS Switch Cam lengths are 6ft for 200-500FPM to provide approximately 0.5 Sec of dwell time. The ETS Switches may also be maintained to the Final Limit Switch as most cam lengths are the height of the car.
>
> Once the elevator has been fully adjusted for Normal operation (Contract Speed set along with Accel/Decel & Jerk Rates), and the ETS Switches and Cam are installed, then ETSD System can be tuned.

Table 9: Recommended ETS Switch Placement (one N.C. switch per terminal & direction)

Car Speed (FPM)	Switch Placement
225	2'-3"
250	2'-6"
300	3'-6"
350	4'-3"
400	5'-3"
450	6'-6"
500	7'-6"

1. Power down controller, and remove the jumper between controller TB-1X and ETSD Board Input ETSDFT at the bottom of ETSD Board.

2. Move the "ETSC" Calibration Switch from the "RUN" to "CAL" position. Verify ETSC "CAL" LED lights in next step.

3. Power up controller, and verify that ETSD Board Input LED's: "EII & NORMAL" are lit.

4. Other Input LED's may be lit as well, but also verify that ETSD Board Relay Output LED's: "EX1, EX2, ET1, ET2, RBP1 & RBP2" are lit to permit movement of the elevator.
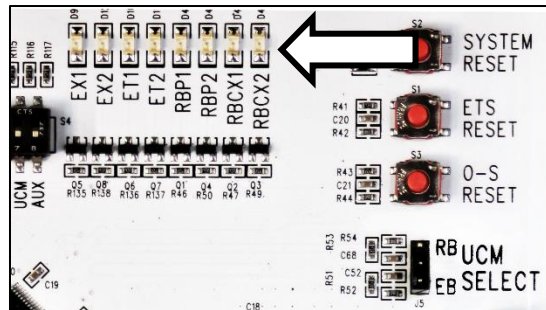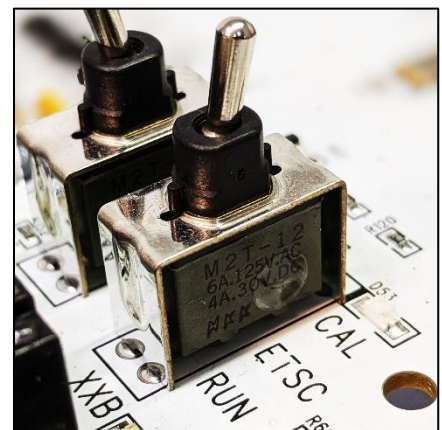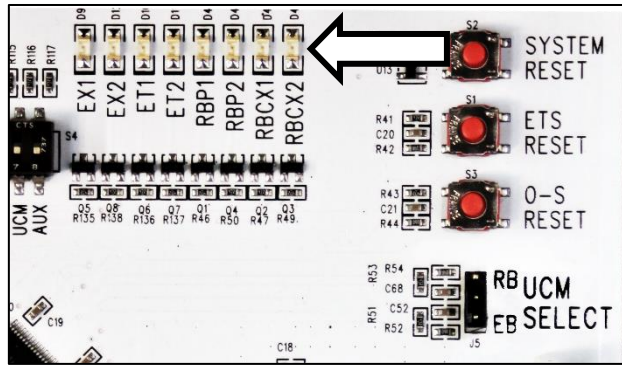
Figure 34: Output Indicators

5. Set the drive for a High Speed setting of 90% of contract speed, and send the elevator on a multi-floor run on Normal operation. Verify that the elevator obtains this speed.

6. When the elevator comes to a stop, move the "ETSC" Switch from the "CAL" to "RUN" position with power on. The "ETS TUNED" LED will light, indicating a valid calibration of the ETSD System.
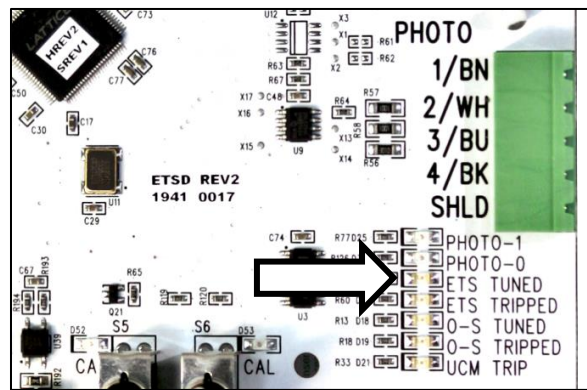
Figure 35: ETS TUNED Indicator

7. Verify ETSD Board Input LED "EII" is lit, and that Relay Output LED's: "EX1 & EX2" are also lit. Other Input & Output LED's may be lit as well, and that the "ETS CAL" LED is off.

8. Return the drive to its former High (Contract) Speed setting.

9. If on Normal Operation and the car is not on an ETS Switch, then ETSD Board Relay Output LED's: "ET1 & ET2" should be lit. If lit, remove a wire from ETSD Board Input ETU or Input ETD and verify that ETSD Board Relay Output LED's: "ET1 & ET2" turn off. Replace ETU or ETD Input wire.

10. The UCM, O-S & ETSD Systems are now operational. Run the elevator into the terminal landings. If the ETSD System should fault intermittently, then move the ETS Switch(es) toward the terminal landing(s) by 6" to 1' (depending on car speed) to eliminate nuisance ETSD faults.

11. Important: If the ETSD System persists with nuisance faults, it is most likely caused by "noise" that is picked up by the Speed Sensor Cable due to its proximity to the motor leads of the Drive, or by a poorly aligned or mis-adjusted Speed Sensor. See Step 12 of Section 5.11.2, and Steps 12 & 13 (below).

12. Important: Car speed can be monitored on LED's "S0-S7" by only turning on "AUX" DIP Switch. These LED's show car speed as a binary count that should ramp up & down smoothly with Accel & Decel and appear stable at constant speed, with dithering (or flashing) on the lowest one or two bits only.

LED's "S0-S7" represent an 8 Bit count (1, 2, 4, etc.) where each bit accounts for 5FPM (or, one ¼" of tape travel sampled over 250mS). Example: LED's "S1 + S2 + S6" = (2 + 4 + 64) x 5 = 350FPM.

Leave the "AUX" DIP Switch in the ON / Up position for speed monitoring.
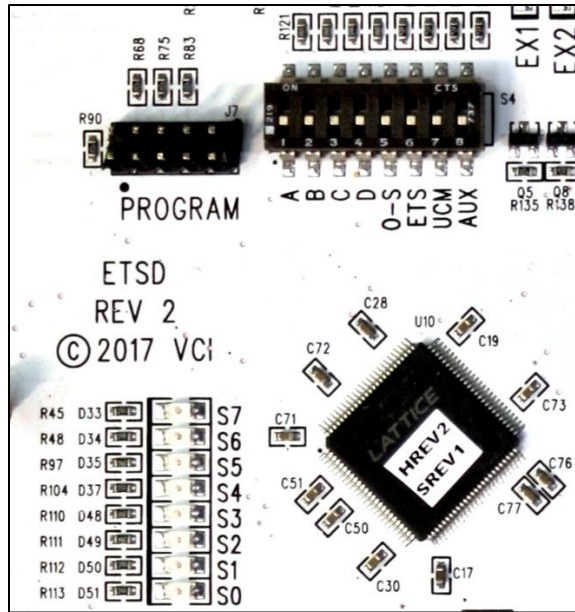
Figure 36: State LEDs and DIP Switches

13. <u>Important</u>: While running, if LED's "S0-S7" flash off and on randomly, without a pattern: check that the Speed Sensor Cable is ran separate and away from line & motor leads; check conduit grounding; and check the alignment and adjustment of the Speed Sensor per Step 12 of Section 4.11.2.

Then, recalibrate both O-S & ETSD Systems.

5.12   High Speed Counter/Encoder Calibration

5.12.1 Encoder Signals

The encoder wires are connected directly to the drive, while factory wires connect the encoder to the Safety Interface Board for additional speed and direction monitoring. The Vision 2.0 controller includes a High Speed Counter (HSC) which converts the quadrature pulses into speed and direction data for processing in the Main CPU. The HSC requires manual calibration at contract speed during installation, described in this section.

Prior to encoder calibration, the High Speed Counter (HSC) may be defeated in the controller if the setting "USE HIGH SPD CNTR" is set to OFF, or if using the Shutdown Defeat input. To observe encoder speed data directly, use the "Show I/O Status" menu of the Main or Safety CPU, and navigate to the "SIB Encoder" screen, as described in Section 7.1.10. On this screen, speed data is measured in terms of counts, pulses per second, and revolutions per second for the given encoder pulse per revolution (PPR).

5.12.2 HSC Calibration Procedure

It is recommended to calibrate the high speed counter (HSC) after the drive has been tuned to accurately run at contract speed. The calibration value is used to reference encoder pulse signals to contract speed and set thresholds for inspection (150 fpm), Emergency Terminal Slowdown (ETS) (90% of contract speed), and Uncontrolled Movement (UCM) (50 fpm). Contract speed is preprogrammed by the factory, and is not adjustable by the user. Contact Virginia Controls if the

To use and calibrate the High Speed Counter, ensure that the setting "USE HIGH SPD CNTR" is enabled. During startup, the HSC speed data processing may be disabled when this setting is set to "OFF", or using the Shutdown Defeat input (S01). The calibration menu will only be available when the HSC setting is enabled.

To calibrate the High Speed Counter, navigate to the "Edit High Speed Counter (HSC) Data" menu in the Main CPU "Setup Menu" (refer to Section 7.1.4.4). The top line of the screen should read "Calibrate HSC: START". Press **Ent** to select "START" and press **Ent** again to initiate calibration, otherwise press **Esc** to back out. The screen displays "Calibrating: ### fpm", indicating the system is actively reading encoder speed data, and calibrating to the factory value of ### fpm. Now perform a multi-floor run up at contract speed, and the system will automatically start measuring speed data after starting to move and continue reading data until the car finishes the run. The system will then save the maximum measured encoder speed count into memory. After calibration, it is recommended that the user observe the computed car speed data on line 4 of the HSC menu during another full speed run, and verify that the displayed encoder speed matches the speed measured by a tachometer. After calibration, the top line returns to the initial state, ready for another calibration run if desired.

> NOTE: It is possible to change screens while calibrating by pressing **Esc** after starting calibration. It is recommended to navigate to the "Show Car Status" screen which can be used to enter car calls or hall calls using keypad entry (refer to Section 7.1.3.1).

5.12.3 HSC faults

When an ETSD/UCM Board or a High Speed Counter Processor is used, additional checks are used that check for proper operation. The message "REDUCM" on the main status screen indicates a problem with the ETSD/UCM board. "HSC-ETS" indicates a speed related problem. Go to the Fault Log and check the status line to determine the cause. Refer to the Fault Log to get the detailed fault information. See the section for Fault Log later in this manual for a description of the Fault Status bits for these faults.

If the setting "USE HIGH SPD CNTR" is enabled, the Main CPU monitors the speed and direction data to verify proper operation. The encoder speed is used to monitor for the following fault conditions:

Table 10: UCM & Speed Monitoring Faults

FLT #	Fault Label	Fault Description
322 323	UP RUN LSM=OFF DOWN RUN LSM=OFF	Low Speed Monitor fault: The low speed monitor (LSM) input was OFF while running up (or down) at contract speed. This implies that the HSC and/or ETSD board is not correctly tuned to 150fpm, because LSM must be ON when < 10fpm.
324	STOPPED LSM=ON	Low Speed Monitor fault: The low speed monitor (LSM) was ON while the car was stopped. This implies that the HSC and/or ETSD board may not be correctly tuned to 150fpm, because LSM should be OFF when > 10fpm.
326 327	UP RUN EXM FLT DOWN RUN EXM FLT	ETSD fault: The EXM input was ON when the car was running at contract speed. This indicates that the HSC and/or ETSD board is not correctly tuned to 90% of contract speed, because EXM should be OFF.
334	110% OVERSPEED	Overspeed Fault: The car speed is exceeding 110% contract speed, which either implies an overspeed condition, or that the HSC is not correctly tuned.
335	INS OVERSPEED	Inspection Speed fault: Car speed exceeded 150 fpm while on inspection.
336	DOOROPEN OVRSPD	Uncontrolled Motion (UCM) fault: Car speed exceeded 50 fpm with doors open.
337	TACH LOSS FLT	HSC fault: Car speed was too slow during a fast speed run. This implies that the HSC is not tuned, or the encoder is not functioning or communicating properly.
339	ETSD SPEED FAULT	ETS fault: The car speed exceeded 90% of contract speed when either the Up or Down ETSD switches (inputs 31X, 32X) were low while running in that direction.
338	WRONG DIR FLT	Encoder fault: The encoder speed is running in the wrong direction. The encoder signals must be rewired such that the up direction yields a positive HSC velocity.
342	RUNAWAY FAULT	Runaway fault: The car speed exceed 50 fpm while the car was not running.

6. Hardware Description

The standard Vision 2.0 controller package includes the following components:

Machine Room Enclosure:

- Machine Room Safety Interface Board (MR-SIB)
- CPU board.
- Power Supply system.
- Drive/Motor Control system.
- Brake Control system
- ETSD/UCM system
- CANbus and Ethernet communication networks.
- Color-coded terminal blocks.

Car Top Inspection Station:

- Car Top Safety Interface Board (CT-SIB).
- 24VDC power supply.
- Color-coded terminal blocks.

Absolute Positioning System

- LIMAX22DUE positioning system, by ELGO Electronics

Car Operating Panel (C.O.P.):

- I/O board for fixtures, 16pt. (24VDC standard, other voltage configurations available on request)
- Pre-wiring available through fixture company.

Hall Riser:

- I/O boards, 2pt. for Hall Calls & Fire Service recall switch.
- Pre-wiring available through fixture company.

Cables:

- Color-coded traveler, with matched wire-labels for both machine room and car top enclosures.
- Color-coded C.O.P. multi-conductor, with matched wire-labels for both Car Top Inspection Station and C.O.P.
- Hall riser communication cable.
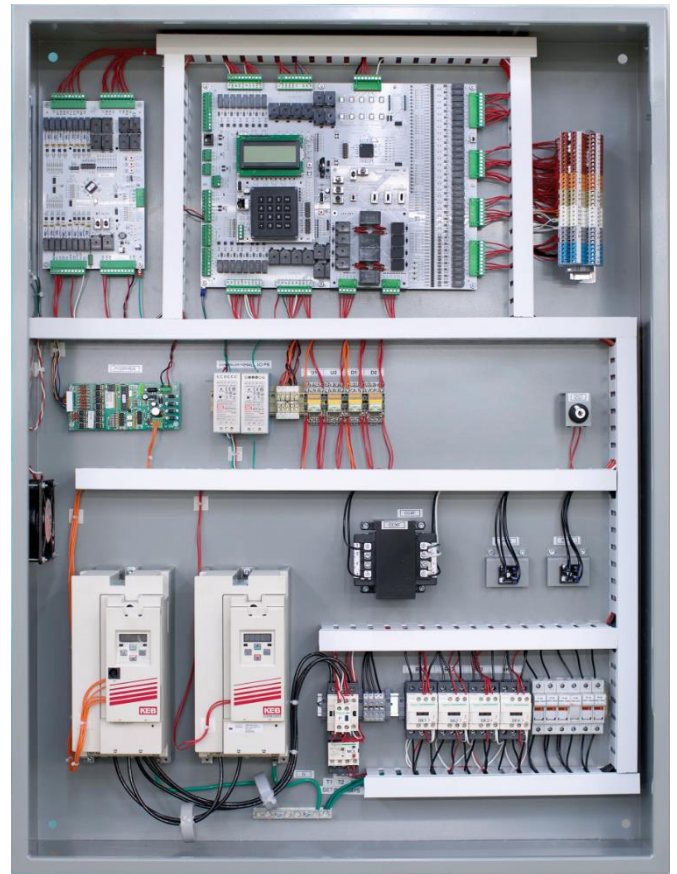
Figure 37: Standard Vision 2.0 Enclosure Layout

The MR-SIB performs many functions. The following list is a summary:

- 50 Safety Inputs (42 - 120VAC, 8- 24VDC)
- Provides for connection of the safety string and inspection operation devices
- Contains the hardware-based Complex Programmable Logic Devices (CPLDs) required by code
- Provides 4 CANbus communication connections to remote I/O and other CANbus connected systems
- Provides the connections for an Absolute Positioning System
- Provides redundant monitored output relays for Up and Down Direction commands to drive
- Provides the connections for encoder high speed counter velocity feedback

The CT-SIB performs many functions related to car operation, such as:

- 32 Inputs (120VAC) for Car Safety, Inspection Operation, and Door Safety Inputs
- 8 Outputs (120VAC/24VDC) for Door Operation, Fire Service Light & Buzzer, and Car Safety String
- Provides connection for ELGO Absolute Positioning System
- Provides connection to Car Operating Panel board(s)
- Contains the hardware-based Complex Programmable Logic Devices (CPLDs) required by code
- Provides redundant monitored output relays for door operator or other car top inspection outputs

The CPU performs distinct tasks:

- Runs the application program for the general operation of the elevator, with field configurable settings
- Monitors the safety string and inspection inputs, w/fault log diagnostics.
- Handles dispatching duties with other Vision 2.0 controllers.
- Includes a 4-line LCD screen and Keypad for user interface.
- Provides serial connection to drive for velocity feedback control using Service 50.

I/O boards:

- Serial connection to the controller via CANbus.
- May be located where needed, such as in the Hall Riser, Hoistway, Car Top, Car Operator Panel, Machine Room, and within the controller itself.

Power supply system:

- Fuses
- Transformers for controller power and door operator.
- 24VDC supplies for controller & hall riser
- Phase Monitor (internal to soft-starter, if used)
- Battery backup (B.O.R.I.S.) – powers door operator, safety devices, valve solenoids, and car and hall fixtures.

Motor control system:

- Drive, contactors, overloads, and relay circuits which run the drive

Communication network

- CANbus, 4-channels in controller, 3-channels on car top
  - Machine Room - 0: Safety & General I/O, 1: Positioning System, 2: spare, 3: Hall riser I/O
  - Car Top: - 0: Safety & General I/O, 1: Positioning System, 2: spare
- Ethernet port, for dispatching and remote monitoring

The ETSD board is available as a safety device for ETS and UCM protection.

6.1 Safety Interface Boards (MR-SIB and CT-SIB)

6.1.1 Machine Room Safety Interface Board (MR-SIB) Hardware Layout

The Machine Room Safety Interface Board (MR-SIB) layout is shown in Figure 38 and the descriptions in Table 11.

Table 11: MR-SIB Layout Descriptions from Figure 38.

##	Description	##	Description
J1	Safety String, Car Gate, and Door Zone inputs	A	Communication status and Power status LEDs
J2	Hall Door & Lock Contact Inputs	C0	CANbus 0 termination jumpers (controller I/O)
J3	Inspection Access & Starter monitoring inputs	C1	CANbus 1 termination jumpers (positioning)
J4	NTS Limit bypass, Car Safety and Inspection inputs	C3	CANbus 3 termination jumpers (hall I/O) and JCG Group CANbus Common Jumper
J1A	Controller CPU Relay Outputs \ Run Connections	D	Controller I/O status LEDs.
J2A	CPLD (Safety) Relay Outputs \ Run Connections	E	Battery (3V CR2032) for Real Time Clock
J5	Controller outputs 9-16	F	Fuses M1 - M5
J6	Controller inputs 9-16	G	USB port for firmware updates
J7	Controller inputs 1-8	H	CPLD state & I/O LED indicators
J8	Controller outputs 1-8	I	I/O processor DIP switches
J9	Fused Power Supply terminals	J	CPLD safety processor DIP switches
J10	Digital to Analog Outputs	L	Safety input LED indicators
J11	Motor Encoder Speed Input	M	mikroBus auxiliary device port (for future use)
J12	CANbus 0 connections, to CT-SIB and other I/O	N	Door Open Cutout Switch
J13	Absolute Positioning System CANbus to drive	O	Door Open Button
J14	Absolute Positioning System CANbus from CT-SIB	P	Controller Inspection Enable Button
J15	CANbus 2 connection, spare (PI driver board)	Q	Controller Inspection Up Run Button
J16	CANbus 3 connection, hall riser I/O	R	Controller Inspection Down Run Button
J17	CANbus 3 RJ45 connection, hall riser I/O	S	Hoistway Locks Bypass Switch
		T	Hoistway Doors Bypass Switch
		U	Car Door Bypass Switch
		V	Controller Inspection Switch
		W	Controller Stop Switch
		X	Controller CPU Board
		Y	Auxiliary Relay and Switch Board
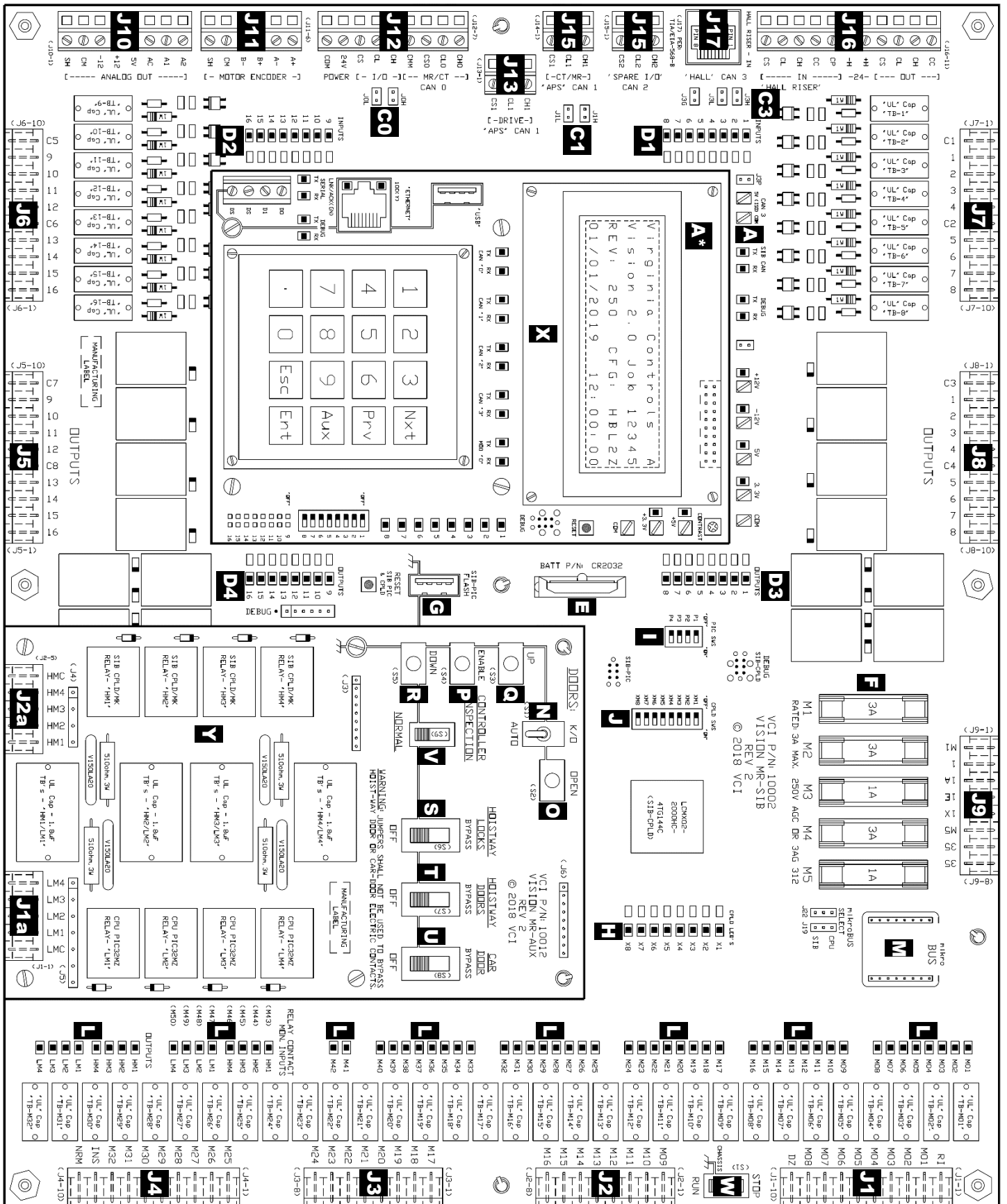
Figure 38: Machine Room Safety Interface Board (MR-SIB) layout.

6.1.2 Car Top Safety Interface Board Hardware Layout

The Car Top Safety Interface Board (CT-SIB) layout is shown in Figure 39 and the descriptions are in Table 12.

Table 12: CT-SIB Layout Descriptions from Figure 39.

##	Description	##	Description
J1	Car Safety String inputs	A	ELGO APS RJ45 Connection
J2	Car Inspection inputs	C	Communication status and Power status LEDs
J3	Spare inputs	F	USB port for firmware updates
J4	Door limits, Infrared Curtain, Safety Edge inputs	L	Safety input LED indicators
J5	Outputs 5-8	M	mikroBus auxiliary device port (for future use)
J6	Outputs 1-4	O	Output LED indicators
J7	CANbus 0 connections, to MR-SIB and C.O.P. board	P	I/O processor DIP switches
J8	CANbus 1 connections, to APS	R	I/O processor & CPLD reset button
J9	CANbus 0 connections, spare	T	CPLD safety processor DIP switches
J10	Digital to Analog Outputs	X	CPLD state & I/O LED indicators
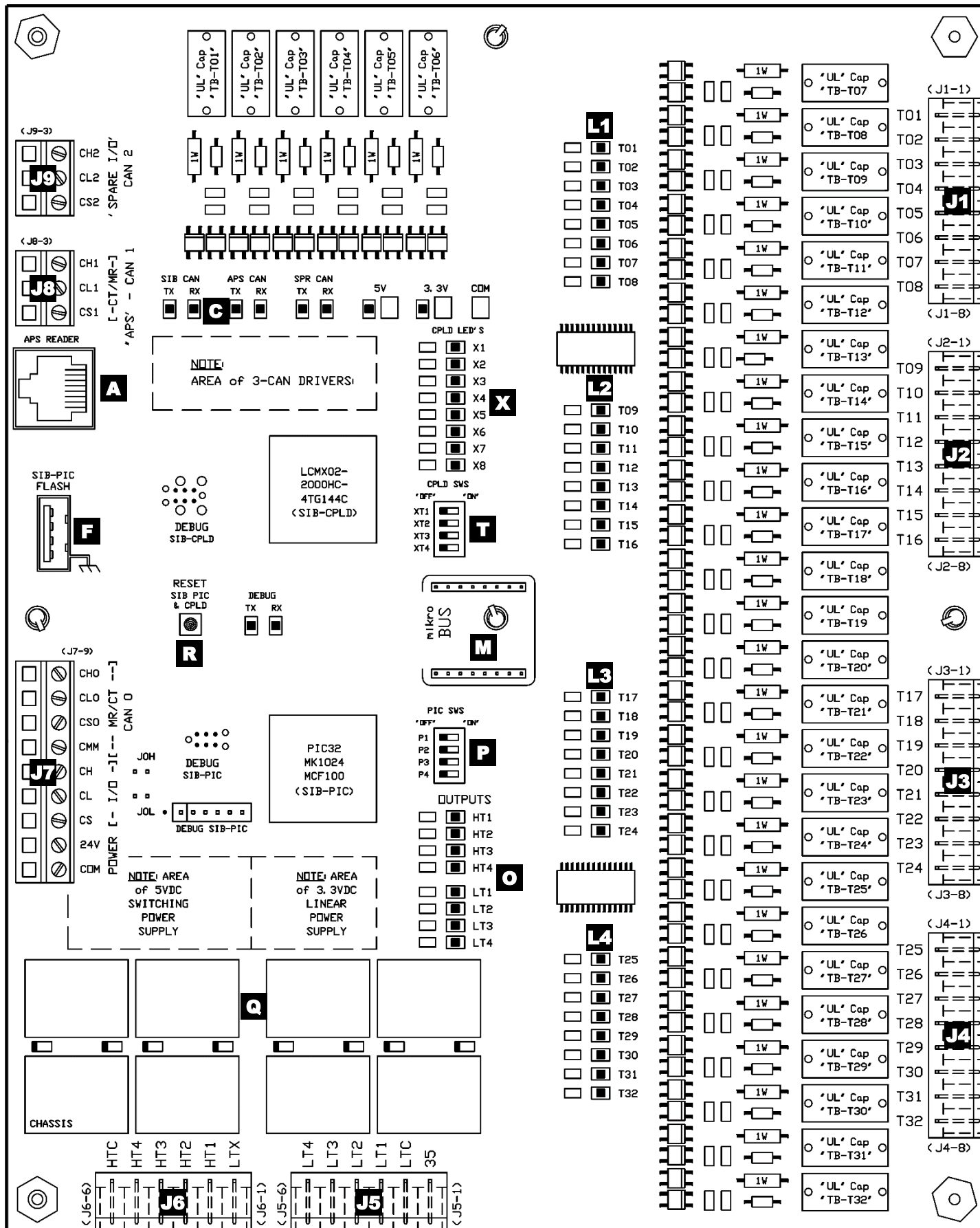
Figure 39: Car Top Safety Interface Board (CT-SIB) layout

6.2 Safety Interface Board Features

6.2.1 CANbus I/O Connections

(See MR-SIB items A, A*, C0, C1, C3, J13 – J17 in Figure 38)

(See CT-SIB items J7, J8, J9 in Figure 39)

The MR-SIB acts as a hub for connecting CANbus between the controller CPU, I/O boards, CT-SIB, and Absolute Positioning System (channel A). All CANbus connections are made at the left of the MR-SIB, as seen in Figure 38. The MR-SIB is equipped with 4 CANbus channels.

The CT-SIB acts as a hub for connecting CANbus between the MR-SIB, I/O boards, and Absolute Positioning System (channel B). All CANbus connections are made at the left of the CT-SIB, as seen in Figure 39. The CT-SIB is equipped with 3 CANbus channels.

The MR-SIB and CT-SIB share connection to CANbus 0, but the other channels are independent, as described below in Table 13.

Table 13: CANbus channels for Machine Room & Car Top SIBs.

CANbus Channel	Machine Room SIB	Car Top SIB
0	Safety & General I/O	Safety & General I/O
1	Absolute Positioning System Channel A	Absolute Position System Channel B
2	spare	spare
3	Group & Hall Riser I/O	N/A

Communication status LEDs for each channel are located on the top left of both the MR-SIB & CT-SIB, as well as on the controller CPU.

6.2.1.1 CANbus Termination

Each device on any given CANbus channel is considered to be a node, and CANbus connections are made such that nodes are connected in series, with the requirement that each channel be terminated at both ends of the communication cable. A general description for termination of each CANbus channel is shown in Table 14. In general, one end of the communication cable for all of the CANbus channels is terminated at the MR-SIB, while the other end must be terminated at the last device/node in series.

Table 14: CANbus Termination Locations for Each Channel.

CANbus Channel	MR-SIB Termination	Other end Termination
0	MR-SIB jumpers J0H & J0L	C.O.P. I/O board #20
1	MR-SIB jumpers J1H & J1L	ELGO APS sensor
2	Always terminated on MR-SIB	Hall Lantern / C.E.E. PI Driver
3	MR-SIB jumpers J3H & J3L	Hall I/O board

J0H & J0L: Termination jumpers for CANbus 0. Install if the MR-SIB is the only machine room device connected to CANbus 0, while being the end node in the channel. See Sheet "VM6" of the schematics for job specific configuration.

J1H & J1L: Termination jumpers for CANbus 1. Install if connecting a CANbus 1 / "Absolute Position" device (ELGO APS channel "A") to the MR-SIB, while being the end node in the channel. See Sheet "VM6" of the schematics for job specific configuration. If a drive is connected to CANbus 1, use terminal block J13.

JGC: Jumper for connection of CANbus 3 Common (CC) to ground. Used to ensure that wire CC is grounded at one point only within the CANbus 3/ "Hall Riser" network. See Sheet "VM6" of the schematics for job-specific configuration.

J3H & J3L: Termination jumpers for CANbus 3 / "Hall Riser". These are installed on a single car installation, or on the last controller in line of a multi-car group. See Sheet "VM6" of the schematics for job-specific configuration.

J3P & CAN3 ISO 5V Power Supply: Jumper J3P is used when CANbus 3 is to be powered directly by the onboard MR-SIB 5VDC power supply. Otherwise, the CAN3 ISO 5V Power Supply chip may be used to provide isolated 5VDC power to the channel, which is located under the controller CPU board. This determination is based on the length of the CANbus network and the supplies providing power and ground on the remote end.

> NOTE: For proper operation, each CANbus channel must be terminated with 120 ohm resistors at each end of a CANbus. The MR-SIB and Remote I/O boards contain the resistors to terminate CANbus channels by the installation of two termination jumpers per end.

The communication cable for each CANbus channel includes a High signal (CH) wire and a Low signal (CL) wire, arranged as a shielded (CS) pair with a separate Common signal wire (CMM for CANbus 0; CC for CANbus 3). To achieve termination, both the High signal and Low signal need to be tied together at the endpoint node(s) through a 120Ω resistor circuit preinstalled on the MR-SIB and I/O boards. Termination is hardwired for the CANbus 2 connection (CH2 & CL2) on the MR-SIB.

The CANbus Common (CMM or CC) signal wire must be referenced to Ground at one and only one node. For all channels besides CANbus 3, CC is referenced to Ground at the MR-SIB. Refer to the schematics for job-specific configuration.

6.2.2 Safety Inputs & Input LEDs

(See MR-SIB & CT-SIB items J1 – J4, L in Figure 38 & Figure 39)

The safety string, limit switch, and inspection inputs are arranged around the right side of both the MR-SIB and CT-SIB. Each input has one or two corresponding LED indicators that light when the input is high. The input LEDs for the MR-SIB range from M01 – M50, while the CT-SIB ranges from T01 – T32. The common reference for each input is the neutral common of the controller, terminal 35. Some inputs may also serve as connections for external uses, such as terminal 26, used as a Door Contacts Bypassed Light, and terminal 23N, which is high while on Normal Operation. See Section 9.2 or Sheet "VNX" in the schematics for a detailed description of each MR-SIB and CT-SIB input and its corresponding LED indicator(s).

6.2.3 CPLD (Complex Programmable Logic Device)

(See MR-SIB items H, J in Figure 38)

(See CT-SIB items X, T in Figure 39)

There is a CPLD safety processor on both the MR-SIB and CT-SIB of a Vision 2.0 controller. Each CPLD reads and processes the safety inputs using gate logic, serving as a redundant hardware device to the controller CPU. Each CPLD monitors and processes the safety string inputs, limit switches, door contacts, and inspection inputs, such that the run relays are prevented from energizing if any safety input is in an improper state. The CPLD satisfies the requirement in safety code that safety-related devices be processed by "non-software-controlled means", eliminating the need for additional external hardware.

The purpose of the CPLD is to

- monitor the safety inputs of the MR-SIB or CT-SIB,
- control the MR-SIB or CT-SIB output relays in tandem with the controller CPU, and
- together with the software-based CPU, provide code-required redundancy.

Each CPLD independently monitors and processes the safety string inputs and permits or prevents the corresponding safety relay output of the MR-SIB or CT-SIB from energizing based on the state of the safety inputs.

On the MR-SIB, the CPLD directly controls the output relays HM1-4 while the MR-SIB I/O processor controls the output relays LM1-4.

On the CT-SIB, the CPLD directly controls the output relays HT1-4 while the CT-SIB I/O processor controls the output relays LT1-4.

Each CPLD also sends and receives serial data with the controller CPU over SPIbus, which allows each CPLD to know which mode the controller is in, as well as the state of the I/O from the other devices in the system. See Section 10.1.3 for details.

Various conditions may cause the CPLD to prevent the drive from running, including the following:

Inspection Run Input Fault: An inspection up or down run input for one mode is registered while in a different inspection mode.

Safety String Door Contacts are Open: Any car gate, hall door, or hall lock input is low while the controller is in a mode other than inspection access or door bypass mode. The safety string can still close while using inspection access if the car door input (3 or 3R) and corresponding top or bottom hall door input (4B or 4T) are open, or when using the door bypass switches.

Safety String Limits or Stop Switches are Open: Any of these safety string inputs 1X, 1Y, 1T, 1B, 2, 3, 3A, 3E ,3X, 4A, or 4B are open. Note that releveling in Normal Operation with the doors open while in Door Zone is allowed. The In-Car Stop Switch is also bypassed during a Fire Service Recall or Medical Emergency Recall operation.

Safety String Normal/Inspection Mode Fault: Multiple Inspection mode inputs are active. While on inspection, the CPLD waits for an inspection run input before permitting the run output relays to energize.

No Run Command: The CPLD waits for a run command from the Main CPU before allowing any run output relay to energize.

DIP switches and LEDs for each CPLD (on MR-SIB and CT-SIB) are used for diagnostics and monitoring in the field. See Section 10.1 for specific details on the CPLD DIP switch and LED descriptions.

6.2.4 Fuses

(See MR-SIB item F in Figure 38)

The fuses on the MR-SIB are used to isolate various branches of power for the controller and field wiring. The fuse connections for M1-M4 at the MR-SIB are routed to separate terminal blocks for field wiring convenience. The voltage rating for the fuses M1-M5 are 250VAC, and the current rating is either 1A or 3A depending on the fuse. Refer to the schematics or Table 15 for details. The fuses used are type 250V AGC or 3AG 312 Series glass fuses.

> **NOTE: Only replace fuses with fuses of the same type and rating.**

Table 15: Fuses for SIB

Label	Current	Voltage	TB	Description
M1	3A	250VAC	1	Car I/O Power Supply
M2	3A	250VAC	1A	Hall I/O Power Supply
M3	1A	250VAC	1E	Emergency Services Power Supply
M4	3A	250VAC	1X	Safety String Power Supply
M5	1A	250VAC	+/-	24VDC Controller Power Supply

6.2.5 Real Time Clock & 3V Battery

(See MR-SIB item E in Figure 38)

The system uses a battery powered Real Time Clock (RTC) mounted on the MR-SIB to provide time data for the controller CPU.

The RTC is set by the factory, but may be edited using the Time Setup Menu (see Section 7.1.4.11). Daylight savings may be enabled and configured using the DST Setup Menu.

The RTC is powered by a CR2032 3V battery (see item E in Figure 38). The battery life is approximately 5 years.

> **NOTE: If the battery fails, the system cannot retain the current time the next time system power is cycled. The time then resets and restarts at the default of 00:00:00, 01/01/2001.**

> **WARNING: Replace the battery with 3V Lithium battery, Part No. CR2032 only. Use of another battery may present a risk of Fire or Explosion.**
>
> **WARNING: Orient the battery properly in the battery holder. The positive side of the battery is marked on the battery, and faces towards the right of the MR-SIB.**
>
> **WARNING: Do not use a metal (or conducting) device to remove or install the battery.**

Replace a low battery:

1. gently push the top of the battery downward until it is clear of the black housing
2. slide it out of the socket

Insert the new battery:

1. slide the edge under the metal retaining finger
2. align it in the black housing

Be careful not to short out the battery. Dispose of the old battery properly – do *not* incinerate.

The RTC will retain its time if the battery is removed and replaced while the controller has power; otherwise, the time will reset to the default of 00:00:00, 01/01/2001. Use the Time Setup Menu on the Safety CPU to edit the time. (See Section 7.1.4.11)

6.2.6 Door Open Button

(See MR-SIB item O in Figure 38)

The Door Open Button on the MR-SIB provides an alternate way to open the doors on Normal Operation aside from the C.O.P. door open button input(s). The controller Door Open Button bypasses the Door Open Cutout Switch while pressed.

6.2.7 Door Open Cutout Switch

(See MR-SIB item N in Figure 38)

When the Door Open Cutout Switch is set to "K/O", the doors are prevented from opening automatically when on Normal operation and hall calls are also disabled. While the switch is in the "K/O" state, car calls may still be placed, and the doors still open if the Door Open Button on the MR-SIB or Car Operating Panel is pressed. This switch is also bypassed during a Fire Service Recall, and doors are allowed to open.

6.2.8 Inspection Switches

(See MR-SIB items P, Q, R, V in Figure 38)

The Controller Inspection switches allow the elevator to run on Inspection from the machine room.

To operate the car, do the following:

Slide the Controller Inspection switch from "NORMAL" to "INSP."

To run up, press and hold the "ENABLE" button, then press the "UP" button.

To run down, press and hold the "ENABLE" button, then press the "DOWN" button.

The "UP" or "DOWN" button must be pushed within three seconds of pushing the "ENABLE" button or the input is ignored. The car continues to run until either the "ENABLE" or "UP" or "DOWN" buttons are released, or a safety string device has opened. Once the car has stopped, the "ENABLE" button must be released and repressed before another run can occur.

> **WARNING: Use extreme caution when operating the car from the machine room. Make sure it is safe to run the car.**
>
> **WARNING: The system monitors the run inputs at all times. If any inspection run button is pressed while the car is not in the corresponding inspection mode, including Normal Operation, the system then triggers a fault, and the car immediately shuts down. Use the Fault Reset input (RST) on MR-SIB input #16 to clear this shutdown.**

6.2.9 Door Bypass Switches

(See MR-SIB items S, T, U in Figure 38)

The Door Bypass Switches bypass the Car Gate Contact(s), the Hall Door Contact(s) or the Hall Lock Contact(s), either individually or in combination, as elevator safety code requires. They may only be used while operating in Car-Top Inspection or In-Car Inspection.

Elevator safety code permits the use of these switches to run the car on Car-Top Inspection when the electrical contact(s) of the gate, doors, and/or locks are unable to make up. Enabling any of these switches puts the elevator into Inspection Bypass mode, which disables Normal Operation, Controller Inspection, and Hoistway Access mode.

The following Table 16 lists potential bypassed Safety signals and their corresponding MR-SIB inputs:

Table 16: Door Bypass Safety Signals

Bypass Switch	LED	Safety signals bypassed		
Car Door Bypass	M40	Front Car Gate contact	TB:4	input M05
		Rear Car Gate contact	TB:4R	input M06
Hoistway Doors Bypass	M39	Top (Access) Hall Door contact	TB:5T	input M09
		Front Hall Door contacts	TB:5	input M10
		Bottom (Access) Hall Door contact	TB:5T	input M11
		Rear Hall Door contacts	TB:5R	input M12
Hoistway Locks Bypass	M38	Top (Access) Hall Lock contact	TB:6T	input M13
		Front Hall Lock contacts	TB:6	input M14
		Bottom (Access) Hall Lock contact	TB:6T	input M15
		Rear Hall Lock contacts	TB:6R	input M16

WARNING: Use extreme caution when using these switches, and always make sure it is safe to operate the car with these switches activated.

6.2.10 Controller Stop Switch

(See MR-SIB item W in Figure 38)

The controller stop switch breaks the safety string, preventing the car from running and causing the doors to open if in door zone and normal operation. The LEDs M07 indicates the status of this safety input.

6.2.11 Onboard 12VDC, 5VDC, 3.3VDC Power Supplies

(See MR-SIB items J10, A in Figure 38)

The MR-SIB receives 24VDC from the controller power supply, and uses onboard power supplies to produce 5VDC and 3.3VDC for CANbus drivers, the CPU, and other components. Approved external devices can access +5VDC, +12VDC, or -12VDC power using the J10 terminal block if the power supply UPS5 is installed by Virginia Controls. The LED indicators for the 5VDC and 3.3VDC power supplies should all be illuminated upon power up. Test points are provided for all the power supplies as a trouble-shooting aid. The 12VDC power supply chip is located under the controller CPU.

6.2.12 Encoder & Motor Feedback Connections

(See MR-SIB item J11 in Figure 38)

When using the encoder, the quadrature signal wires (A+, A-, B+, B-) are connected on the left side of the SIB at terminal block J11. Follow the Encoder Calibration procedure (see Section 5.11) to determine whether or not the polarity needs to be corrected, such that the up direction indicates a position speed count. The "Show I/O Status" screen (see Section 7.1.10) may be used to monitor the encoder data, and the "Edit High Speed Counter (HSC) Data" screen (see Section 7.1.4.13) may be used to calibrate the high speed counter at contract speed.

The Analog outputs (TB J10) are not presently used, but are available for drive control in custom applications.

6.2.13 Absolute Positioning System (ELGO LIMAX Connections)

(See MR-SIB items J13, J14 in Figure 38)

(See CT-SIB items A, J8 in Figure 39)

 The standard connection for the ELGO LIMAX Absolute Positioning System (APS) is the RJ45 port located on the CT-SIB labeled "APS READER". This connection provides 24VDC power to and receives CANbus communication from both ELGO sensors A & B in the LIMAX sensor head. Internal to the CT-SIB, there is circuitry to split channels A & B to be read separately by different devices. ELGO channel A is routed to the CT-SIB terminal block J8, to be read by the controller CPU via the traveling cable and MR-SIB terminal block J14. ELGO channel B is received directly by the CT-SIB processor, which processes the data and transmits computed positioning values back to the MR-SIB and controller CPU using CANbus 0 via the traveling cable.

If the MR-SIB is not the end terminating node on the CANbus 1 positioning channel, connect the next device in series to MR-SIB terminal block J13 and ensure that termination jumpers J1H & J1L are removed. This is common for systems where the drive is configured to communicate with the controller and ELGO APS serially using the CANOpen Lift communication protocol.

6.2.14 mikroBUS expansion port

(See MR-SIB & CT-SIB item M in Figure 38 & Figure 39)

The mikroBUS expansion port supports a variety of devices, and is available for future use by the factory.

6.2.15 Auxiliary Relay Board – MR-SIB Outputs

(See MR-SIB items J1A, J2A, Y in Figure 38)

An Auxiliary Relay Board is mounted on the MR-SIB with 8 relays used in 4 pairs to control the drive speed and direction relays. Each drive signal relay is connected to a pair of Auxiliary Relay contacts, where the HM1-HM4 relays on the left connect to the high voltage labeled terminal HMC, while corresponding LM1-LM4 relays on the right connect to the low voltage common labeled terminal LMC. Each pair of Auxiliary Board Relays operate independently using the following nomenclature:

Drive Relays	HM Relay Terminal J2	LM Relay Terminal J1
U1 / U2: Up Direction	HM1	LM1
FS: Fast Speed	HM2	LM2
1FR: One Floor Run Speed	HM3	LM3
D1 / D2: Down Direction	HM4	LM4
Common (Hot / Neutral)	HMC	LMC

Each pair of Auxiliary Board Relays follow the Run and Stop sequence as shown in the table below. The system actively monitors the state of the relays to check for stuck or malfunctioning relay contacts. If there is a relay monitor fault, the system sets a latched redundancy shutdown, and the relay monitor status is recorded in the fault log. Such a fault is latched through a power loss, requiring the Fault Reset input (RST) on MR-SIB input #16 to be set high to clear the fault.

Table 17: Auxiliary Board Relays Run and Stop Sequences.

Event:	Description:	Relay States: HM	Relay States: LM	Relay Monitors: HM	Relay Monitors: LM
Initial State:	1. HM/LM relays are both open.	Open	Open	Low	Low
Run Sequence:	2. HM relay is commanded to close.	Closed	Open	-	-
	3. HM monitor verifies HM relay is closed.	Closed	Open	High	High
	4. LM relay is commanded to close.	Closed	Closed	-	-
	5. LM monitor verifies LM relay is closed.	Closed	Closed	High	Low
Stop Sequence:	6. LM relays is commanded to open.	Closed	Open	-	-
	7. LM monitor verifies LM relay is open.	Closed	Open	High	High
	8. HM relay is commanded to open.	Open	Open	-	-
	9. HM/LM monitors verify both relays are open.	Open	Open	Low	Low
	10. Go to Step 1.	-	-	-	-
Error Conditions:	HM relay is open, and either monitor input is high.	Open	Open	High	High
	Timeout during any part of Run or Stopping Sequence.	-	-	-	-

> **NOTE: The system checks for a stuck LM relay contact during a stop sequence (see step 7 above) only during a normal stop. If a safety device or any other abnormality commands the controller to stop, the HM and LM auxiliary relays will both open immediately, ensuring the relay contacts are both open.**

6.2.16 CT-SIB Outputs

(See CT-SIB items Q, J5, J6 in Figure 39)

The CT-SIB is equipped with 8 output relays which are used for the car safety string, door control and other Car Top Inspection Station outputs. The outputs are separated into three groups across the terminal blocks J5 & J6.

Output Common:	HTC		LTX		LTC			
Output Terminal:	HT1	HT2	HT3	HT4	LT1	LT2	LT3	LT4

The commons are separated to allow flexibility to wire the output common to different connections, depending on the door operator or Car Top Inspection Station output requirements. Refer to the schematics page "VT2" for job-specific wiring.

6.3 Controller CPU board

6.3.1 Hardware Layout
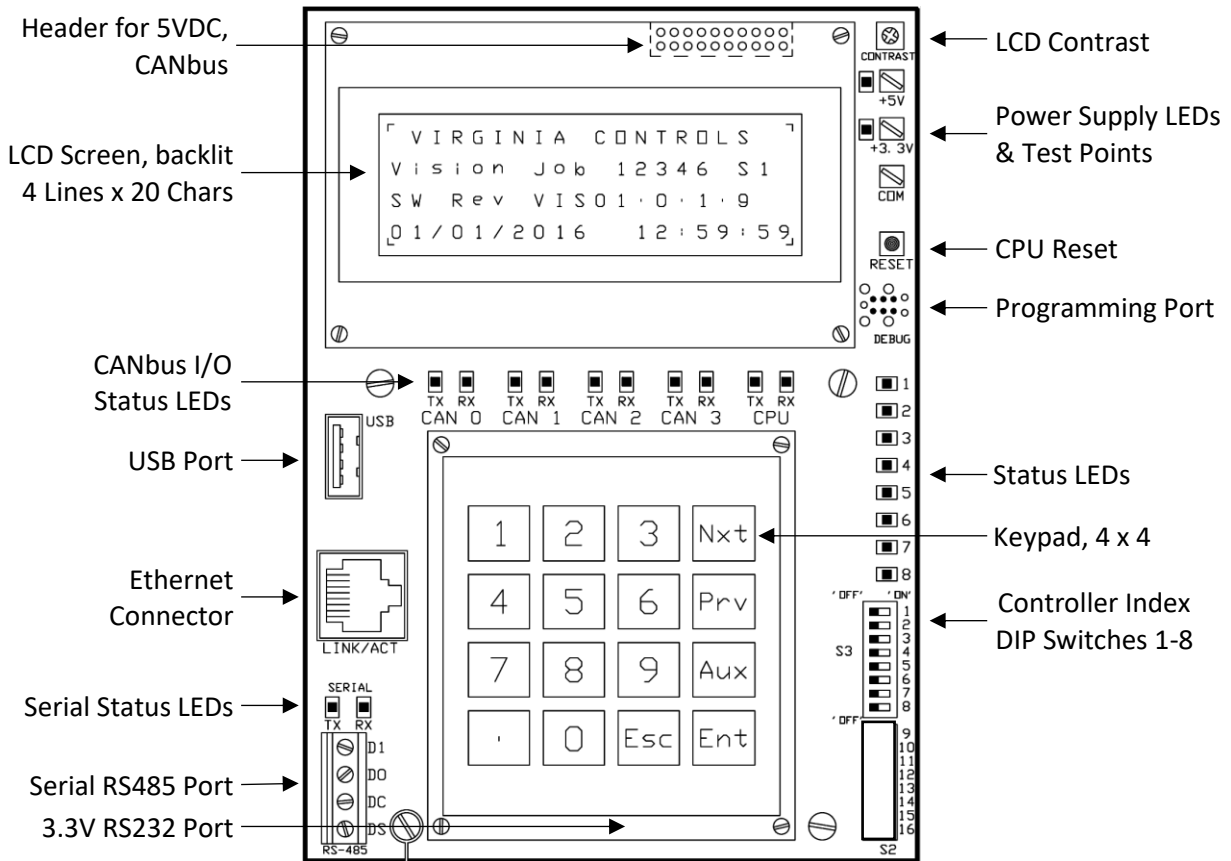
Figure 40: CPU Layout Diagram

The controller Central Processing Unit (CPU) board contains the hardware that reads the inputs and enables the outputs that control the operation of the elevator. The controller CPU is mounted on the MR-SIB and performs all software tasks and functions. The controller CPU is field programmable via the USB port. This section describes the major components on the board and the function of the connectors and LEDs.

6.3.2 Status LEDs

There are eight LEDs located at the right side of each CPU board.

Status LED 1: Watchdog CPU monitor. It flashes at 1 Hz to indicate that the CPU is running.

Status LED 4: Second screen mode: LED 4 is ON while in status mode, or OFF while in setup mode. Press the Aux key to switch between screens.

Status LEDs 2-8: CPU Load monitor. Each LED starting from 8 to 2 represents an increasing CPU load, where the CPU load is 5% times the number of lit LEDs.

Status LEDs 1-4: While in the "Show Memory" status menu screen, LEDs 1-4 reflect the status of the four two-digit bytes of the top line on the screen, respectively. If the two-digit byte is non-zero, then the corresponding LED is lit. Otherwise, the LED is off if the byte is zero, causing the LED to flash on and off if the data state changes. This feature is useful to visually observe memory data at a faster rate than is refreshed on the LCD screen.

CANbus LEDs: The Tx/Rx LEDs reflect the status and activity of each the 4 CANbus channels
Tx: CANbus message transmit – This LED blinks when the CANbus is transmitting.
Rx: CANbus message receive – This LED blinks when the CANbus is receiving.

Serial Status LEDs: The Tx/Rx LEDs reflect the status and activity of the Serial RS485/RS232 port.
Tx: Serial RS485/RS232 transmit – This LED blinks when the RS485/RS232 interface is transmitting.
Rx: Serial RS485/RS232 receive – This LED blinks when the RS485/RS232 interface is receiving.

6.3.3 CPU Reset Button

The CPU Reset button is located on the right side of the CPU board display. The CPU Reset button should only be used when performing a software update (refer to Section 8.3). The CPU reset button restarts the CPU, and interrupts any elevator processing immediately. It is recommended to cycle power at the main disconnect to restart elevator processing, rather than resetting the CPU directly.

> **WARNING: Resetting the CPU using the CPU Reset Button prevents the controller from processing and saving any status bits, so the controller will likely not restart in the same state.**

> **NOTE: Pressing the CPU Reset button is NOT the same as doing a factory reset.**

> **WARNING: Pressing the CPU Reset button resets the CPU, causing all outputs to be turned off and the car to stop immediately.**

6.3.4 DIP Switches

There is one set of 8 DIP switches on the CPU, labeled 1-8.

DIP switches labeled 1-3 set the controller number index (in terms of letters A – H) for group operation.

DIP switch 4 is ON when performing a software update. The system boot up time is delayed to allow detection of a USB flash drive. Turn DIP switch 4 OFF when not updating software to allow quicker boot up timing.

To define the controller index, set the DIP switches to the binary value of the index as follows in Table 18. The index is defined as an alphanumeric value between A-H to distinguish each controller from another.

Table 18: Controller Index DIP Switch Settings

	Controller Index							
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
DIP Switch 1	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**
DIP Switch 2	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
DIP Switch 3	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**

> **NOTE: The Vision 2.0 system can accommodate up to 8 cars connected within a group network. Each controller CPU in a group must have a unique index, so that each controller has a distinct designation.**

6.3.5 LCD Screen

The LCD screen features a 4 line display with 20 characters per line. The contrast may be adjusted using the trim pot directly to the right of the screen on the CPU board. The Vision 2.0 controller CPU now features a backlit screen which activates upon any keypress, and times out after 1 hour of inactivity.

6.3.6 Keypad

The Keypad features a set of 16 button inputs, `0` through `9` , `.` , `Nxt`, `Prv`, `Aux`, `Ent`, and `Esc`. Refer to Section 7 for specific details about how to use the keypad in the context of the menu interface.

If it is necessary to troubleshoot the keypad, contact Virginia Controls technical support, and make sure the power is off before replacing the Keypad.

6.3.7 Power

The CPU board receives 5V power from the MR-SIB. An onboard 3.3V power supply provides power to the onboard components. The status of the 5V and 3.3V power supplies is shown by LEDs to the right of the display.

There is a supercapacitor under the CPU board display that provides 5V power for the CPU board, permitting a brief period of operation for the CPU and non-volatile RAM when power is removed from the controller. If the MR-SIB detects a power loss of at least 100 milliseconds, the CPU begins a power-down sequence during which status values are saved and the fault log is updated before the supercapacitor loses power. There is a 30-second timer to ensure that the supercapacitor is fully charged. If the CPU has been running for less than 30 seconds, the current state is not be saved, and the system will revert to a previously saved state upon next boot up.

If the building power dips briefly and "browns-out", this may trigger a processor reboot following the standard power-down procedure described above. Then the controller automatically restarts in the same state it was in when shutting down and, after a few seconds, goes back into service.

6.3.8 Serial Communication Ports

6.3.8.1 CANbus

The CPU communicates with the MR-SIB, CT-SIB, I/O boards, Absolute Positioning System, drive, and other connected controllers in a group over CANbus via the 2 x 10 pin connector/header between the CPU and MR-SIB.

6.3.8.2 Ethernet

Each CPU has an Ethernet (RJ45) port which allows the controller to communicate over an external network. Possible connections include:

1. Dispatching: Peer-to-peer connection between grouped controllers sharing dispatching status data.

2. Monitoring Interface: available protocols include: TCP-IP, Modbus-IP, UDP, or others upon request.

3. Wi-fi Application: If connected to a Wi-fi router, the controller can serve a webpage interface for controlling the CPU keypad and display. See Wi-fi App instructions in Section 7.2 for details.

6.3.8.3 USB

The USB port is used to install software updates and configuration files. Refer to Section 8 for instructions on installing software updates.

6.3.8.4 Serial RS485 & RS232 3.3V Port

The serial RS232 and RS485 ports are used for direct connections with serial devices based on the application. The 6-pin serial RS232 port is located underneath the CPU, and uses a 3.3VDC interface which is compatible with the USB-to-RS232 cable model # FTDI TTL 232R 3V3.

6.3.8.5 Programming Port

The J-tag port to the right of the LCD screen is used by the factory to update microprocessor firmware.

6.4 Input/Output (I/O) Boards

Input/Output (I/O) boards are used to connect field devices to the controller via serial interface. Wiring of discrete signals is done to removable terminal blocks, while serial connection is made back to the controller via CANbus over a twisted shielded pair. Fuses are provided externally, not on the I/O boards.

There are two available types of I/O boards:

- the 16 point Remote I/O board, for servicing many I/O points in one location, and

- the 2 point Hall I/O board, for connecting small fixtures in the hall.

Each board communicates to the controller using CANbus, and are interchangeable in the field using DIP switches to set the board index. The features and hookups for the Hall I/O board and Remote I/O board are similar and are described in context of each component in the following sections.

The Remote I/O board receives inputs that are 24VDC (or 120VAC on request), and provides dry relay contact outputs through a common terminal. The Hall I/O board receives inputs and sends outputs at 24VDC. See Figure 41 for the layout of the Remote I/O board, and Figure 42 for the layout of the Hall I/O board. Both I/O Board types are powered by 24VDC.

6.4.1 Remote (16-In/16-Out) I/O Board

Remote Input/Output Boards are used to connect CPUs with field devices. These boards can be located in the controller, in the machine room, on the car top, in the C.O.P, and in the hoistway as required. Wiring is made to the removable terminal blocks at the top and bottom of the Remote I/O boards. Fusing for their I/O is provided externally on the MR-SIB, not on the I/O boards. See Figure 41 for the layout of the Remote I/O board. Board power is 24VDC, and the inputs are 24VDC (or 120VAC upon request), while relay outputs can be customized to the application.

Figure 41: 16 Point Remote I/O Board Layout (drawn to scale).

6.4.1.1 Board Address Index

DIP Switches 1-6: These switches assign a CANbus node address number to each I/O board using binary values, converted to decimal, ranging from "0" to "63". For a given board address value, set the corresponding DIP switches to ON, such that the sum of each binary-to-decimal converted value equals the desired board address number. Refer to Table 19 for the binary-to-decimal conversion for each DIP switch.

Table 19: Board Address DIP Switch binary to decimal conversion.

DIP Switch # (binary)	1	2	3	4	5	6
Value (decimal)	1	2	4	8	16	32

> **NOTE: If a board has failed, its replacement must be set to the same address as the board it is replacing.**
>
> **NOTE: I/O board communication and input/output status may be monitored using the "Show I/O Status" menu screen. Refer to Section 7.1.10.**

DIP Switch 7: Un-assigned at present.

DIP Switch 8: When DIP switch 8 is set OFF, the CANbus baud rate is set to 125 kBPS. If set to ON, the baud rate is 250 kBPS. Remote I/O boards used by the Vision 2.0 controller are always configured for 125 kBPS.

6.4.1.2 Connections

24VDC Power: Each Remote I/O board is powered by 24VDC, using terminals "24V" and "COMM" on the right. There are two sets of these terminals on each board, tied together electrically, to allow for series connections.

CANbus: Remote I/O boards communicate via CANbus over 4 connections: CAN High (CH), CAN Low (CL), CAN Common (CC), and cable shield (CS). There are two sets of CANbus terminals on each board, tied together electrically to allow for series connections.

Inputs 1-16: The inputs of the Remote I/O board are normally 24VDC (or 120VAC on request). The physical connections for inputs 1-8 are at the top left of the Remote I/O board, while inputs 9-16 are connected at the bottom left. Each group of 4 inputs has an input common terminal labeled: C1, C2, C5, or C6.

Outputs 1-16: The outputs of the Remote I/O boards are relays with N.O. contacts. The physical output connections for outputs 1-8 are at the top right of the Remote I/O board, and outputs 9-16 are connected at the bottom right. Each group of 4 inputs has an output common terminal labeled: C3, C4, C7, or C8. Refer to the schematics to determine whether the output commons are high (24VDC), low (0V), or open (not used in traction).

> **NOTE: The terminal blocks for the inputs and outputs are removable, so before power is applied, remove the terminal blocks and check for grounds at the terminal blocks.**

6.4.1.3 I/O & Status LEDs

Input LED: Input state LEDs are provided for each of the 16 inputs. The LED for each input is on when there is 24VDC (or 120VAC on request) across the input pin and its corresponding common.

Output LED: Output state LEDs are provided for each of the 16 outputs. The LED for each output illuminates when the board receives an ON command over CANbus for that output. When the output is on, the corresponding relay is energized, connecting the outputs connector pin to its corresponding common.

Tx: CANbus message transmit – This LED indicates that the I/O board is transmitting on the CANbus.

Rx: CANbus message receive – This LED indicates that there is traffic on the CANbus.

L1: Watchdog indicator – This LED toggles on and off once per second to indicate the board processor is active.

L2: Transmit status – This LED indicates the I/O board is attempting to transmit input data over CANbus.

L3: Receive status – This LED indicates the I/O board has received output data over CANbus.

L4: Receive Timeout – This LED indicates that the I/O board has not received data from the CPU for > 2 seconds.

Power Indicators: 24V, 5V, 3.3V indicators – These LEDs indicate that power is active on the CPU board. There are voltage test points for each of the 24V, 5V, and 3.3V indicators, referencing the COM point.

6.4.1.4 Jumper Blocks

5VDC Isolated Power Supply: Each board has a built in 5VDC power supply for its onboard processor that is able to power its own CANbus driver as well. However, for CANbus networks extending beyond the immediate controller (e.g. Car and Hall), an isolated 5V power supply chip 'U12' must be installed. This chip allows the CANbus drivers of those boards to function with a shared common, which is referenced to ground either back at the controller or to another specific point. (The U12 chip should be tie-wrapped in place.) If the isolated power supply chip U12 is *not* called for in the drawings, then jumpers J9 and J10 must be installed. These jumpers connect a CANbus driver to its onboard 5V supply and connect CAN Common, or "CC", to the 24VDC power supply common. Refer to the drawings for job-specific details.

I/O Jumpers: Each of the 16 inputs and outputs have a jumper block that can tie the corresponding input and output terminals together. The jumper blocks for inputs/outputs 1-8 are located in the upper middle of the board, and the jumper blocks for inputs/outputs 9-16 are located in the lower middle of the board, between corresponding input and output terminal blocks. These are used primarily to achieve a 3-wire call system, where a call push-button and indicator can be tied together. When used, I/O connections are made to the output terminal blocks of the I/O boards.

CANbus Termination: Each CANbus channel requires termination at the nodes at each end of the bus. One node of each bus is typically terminated internally at the MR-SIB, while termination at the other end node is made at the last I/O board or device in the chain. To terminate the bus at an I/O board, insert jumpers on pin headers J4 and J5.

> **NOTE: Only place termination jumpers at the last endpoint node for a given CANbus channel. If termination is present on any node between the endpoints, the CANbus communication may not be able to pass freely between all nodes.**

Expansion Power Jumper: This +5VDC jumper port is available for powering any expansion boards that may be mounted on top of the Remote I/O board. This port is presently unused and is for the factory's future use.

6.4.2 Hall (2-In / 2-Out) I/O Board

Hall Input/Output Boards are available for modular connection in the hall riser, specifically for use with 24VDC fixtures. These compact boards are designed to fit within the hall riser fixture boxes for hall calls and hall lanterns. Wiring is made to the removable terminal block at the bottom of the Hall I/O boards. The Hall I/O power supply, located in the controller, provides 24VDC to the boards and their I/O, as well as overcurrent protection. See Figure 42 for the layout of the Hall I/O board. Hall call fixtures must be provided with LED call indicators limited to approximately 50mA. Hall lanterns must be provided with LED arrow indicators, but are limited to 750mA when combined with the load of the solid state gong.

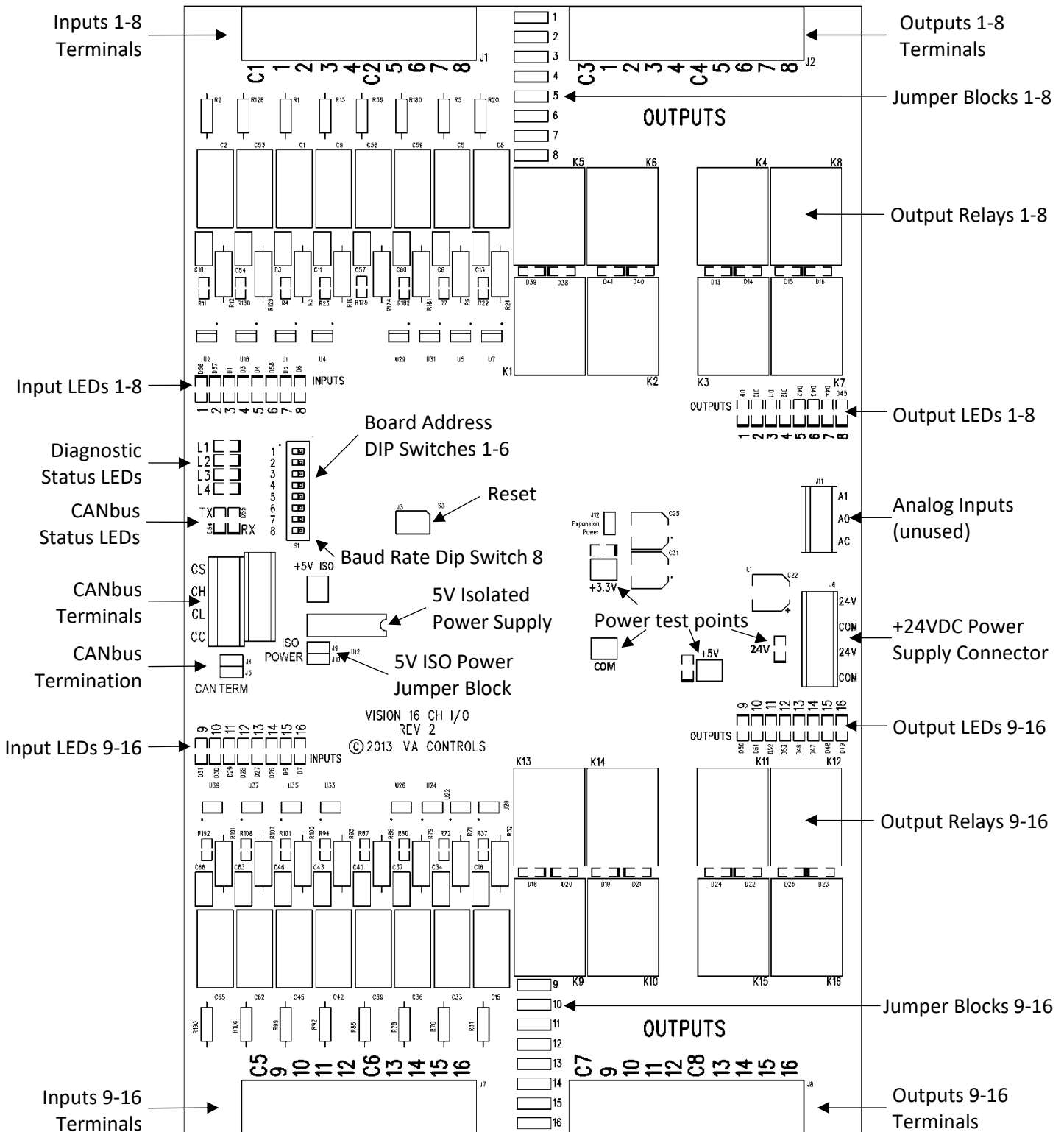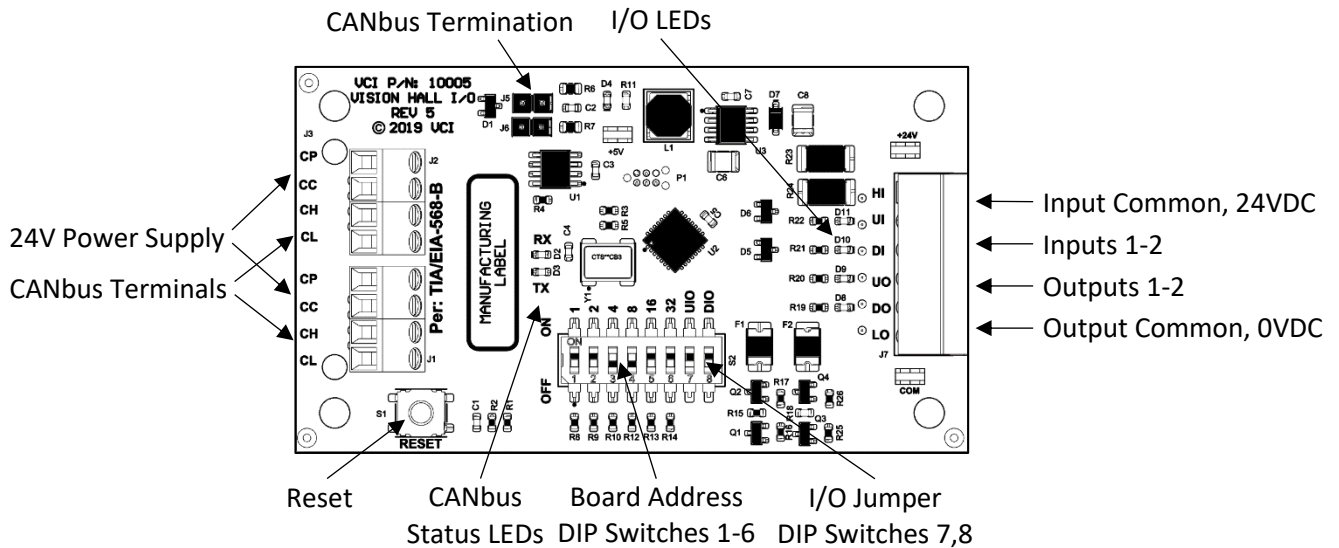**Figure 42: 2-In/ 2-Out Point Hall I/O Board Layout (drawn to scale)**

6.4.2.1 Board Address Index

DIP Switches 1-6: These switches assign a CANbus node address number to each I/O board using binary values, converted to decimal, ranging from "0" to "63". For a given board address value, set the corresponding DIP switches to ON, such that the sum of each binary-to-decimal converted value equals the desired board address number. Refer to Table 19 for the binary-to-decimal conversion for each DIP switch.

Table 20: Board Address DIP Switch binary to decimal conversion.

DIP Switch # (binary)	1	2	3	4	5	6
Value (decimal)	1	2	4	8	16	32

> **NOTE: If a board has failed, its replacement must be set to the <u>same address</u> as the board it is replacing.**
>
> **NOTE: I/O board communication and input/output status may be monitored using the "Show I/O Status" menu screen. Refer to Section 7.1.10.**
>
> **NOTE: Hall I/O baud rates are fixed at 125 kBPS.**

DIP Switch 7/8 – UIO/DIO: When DIP switch 7 is set ON, input 1 (UI) is electrically tied to output 1 (UO). Similarly, when DIP switch 8 is set ON, input 2 (DI) is electrically tied to output 2 (DO). These settings allow the use of one wire to connect the call push-button and indicator to the I/O board at terminal "DO" or "UO". When either of these switches are set to OFF, the UI/DI input and UO/DO output may be read and controlled independently of each other.

6.4.2.2 Connections

24VDC Power: Each Hall I/O board is powered by 24VDC, at terminals "CP" (Can Power) and "CC" (Can Common). Each board has two sets of these terminals, tied together electrically, to allow for series connections between boards. These terminals are part of the CANbus communication connections, and they typically receive one of the two pairs of wires within the Hall I/O CANbus communication cable. In this case, the board power supply and CANbus signals share the same common reference of "CC".

CANbus: Hall I/O boards communicate via CANbus over 2 connections: CAN High (CH) and CAN Low (CL). There are two sets of these terminals per board, tied together electrically, to allow for series connections between boards. These terminals receive the second pair of wires within the Hall I/O CANbus communication cable, intended for communication signals rather than power. The "common" connection always required in a series of CANbus nodes is "CC" (described above in item "24VDC Power"). The shield of the communication cable ("CS") should connect on one end of each cable to a grounded fixture box per Sheet "HL1".

Inputs UI, DI: The inputs for the Hall I/O boards are 24VDC. The two inputs for the Hall I/O boards are labeled "UI" and "DI", where "UI" is considered input 1 and "DI" is input 2 in the "Show I/O Status" screen. The up hall call input is generally connected to "UI", and the down hall call input is generally connected to "DI". However, the inputs may be connected to Fire Service or Emergency Power devices as needed. The 24VDC source for input contacts is terminal "HI", which is connected internally to the "CP" terminal. Inputs are referenced to a common of 0VDC at the "CC" terminal.

Outputs UO, DO: The outputs for the Hall I/O boards are 24VDC. The two outputs for the Hall I/O boards are labeled "UO" and "DO", where "UO" is considered output 1 and "DO" is output 2 in the "Show I/O Status" screen. The up hall call output is generally connected to "UO", and the down hall call output is generally connected to "DO". However, the outputs may be connected to a Fire Service or Emergency Power indicator as needed. The 24VDC source for outputs is terminal "HI", which is connected internally to the "CP" terminal. Outputs are powered across 24VDC and a 0VDC common at terminal "LO", which is tied to the "CC" terminal.

> NOTE: The terminal blocks for the inputs and outputs are removable, so *before* power is applied, remove the terminal blocks and check for grounds at the terminal blocks.

Programming Port: Each board has a J-Tag port used for updating the board firmware. This port is for factory use only.

6.4.2.3 I/O & Status LEDs

Inputs UI, DI: Input LEDs illuminate if there is 24VDC across an input and its input common LO. LEDs UI and DI are located near the center of the board just above the input/output connections.

Outputs UO, DO: Output LEDs illuminate if the controller commands an output bit to be set ON. Doing so enables the output's respective output transistor to close the output terminal to the 24VDC output common "HI". LEDs UO and DO are located near the center of the board just above the I/O connections.

Tx: CANbus message transmit – This LED indicates that the I/O board is transmitting on the CANbus.

Rx: CANbus message receive – This LED indicates that there is traffic on the CANbus.

Power Indicators: 24VDC and 5VDC indicators – These LEDs indicate that power is active on the CPU board. There are voltage test points for each of the 24VDC and 5VDC indicators referenced to the COM point.

6.4.2.4 Jumper Blocks

CANbus Termination: Each CANbus channel requires termination at the nodes at both ends of the communication network. One end node of each channel is typically terminated at the MR-SIB, while the other end node is typically terminated at an I/O board. To terminate CANbus at an I/O board, place jumpers on pin headers J4 and J5.

> **NOTE: Only place termination jumpers at the last endpoint node for a given CANbus channel. If termination is present on any node between the endpoints, the CANbus communication may not be able to pass freely between all nodes.**

6.5 CANbus & Ethernet Communication Networks
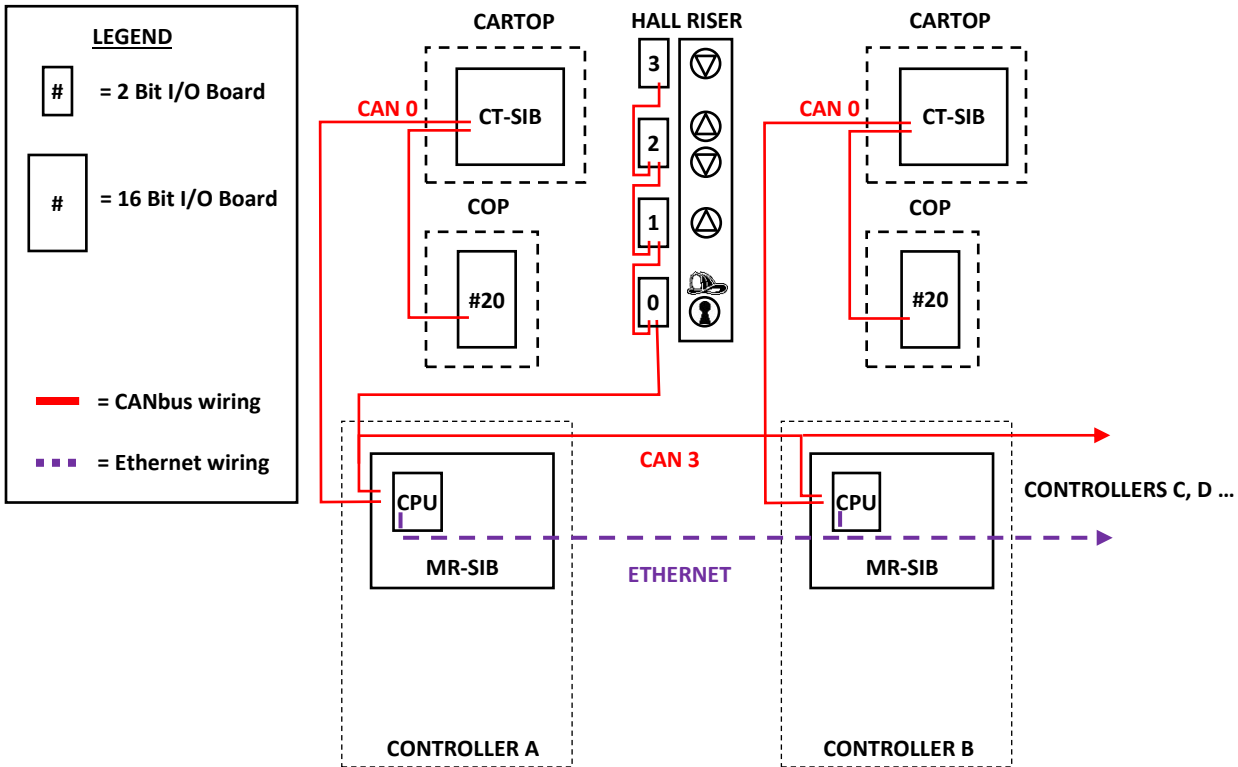
Figure 43: CANbus and Ethernet network representative diagram.

6.5.1 CANbus Configuration

There are 4 CANbus channels on the MR-SIB, used to serially connect all I/O boards to the machine room controller for processing. Each of these channels is distinct, categorized by controller I/O, positioning data, shared group I/O, and a spare channel for other accessory devices. CANbus connections are made at the left side of the MR-SIB and each device is linked in series. A representative diagram of the CANbus networks is shown in Figure 43 above and on Sheet "VM6" in the wiring schematics.

Table 21: CANbus channels for MR-SIB and CT-SIB.

CANbus Channel	MR-SIB	CT-SIB
0	CT-SIB and I/O boards	Shared with MR-SIB
1	Absolute Positioning System sensor "A"	Absolute Positioning System sensor "B"
2	Hall Lanterns & Position Indicators	Spare
3	Hall I/O boards and shared group I/O	

In general,

- CANbus 0 connects to all controller boards, including MR-SIB, CT-SIB and C.O.P. I/O board(s)
- CANbus 1 is dedicated to absolute positioning system communication
- CANbus 2 is available for spare, connecting to auxiliary devices as needed
- CANbus 3 is dedicated to Hall Riser I/O and other shared group I/O

For group operation, controllers share CANbus 3 for the shared Hall Riser, and one controller is automatically designated as lead dispatcher. The lead controller controls CANbus 3 outputs and, if the lead controller goes offline, a new lead controller is then designated and assumes control of CANbus 3 outputs.

6.5.2 Ethernet Configuration

For dispatching, if there are more than two cars in a group, an Ethernet switch is required. Each controller CPU communicates its status to every other controller CPU on the Ethernet network using the UDP protocol. If the controller is a single car, then no Ethernet connection is used on the controller CPU. Use the "Show Group Data" menu for Ethernet and CANbus communication status of connected cars. Each car requires a unique IP address and MAC address, which the factory configures. Refer to Section 7.1.4.7 for details on changing IP settings.

The controller CPU can communicate status to a local or remote monitoring system over an Ethernet connection.

6.6 Power System

6.6.1 Transformers
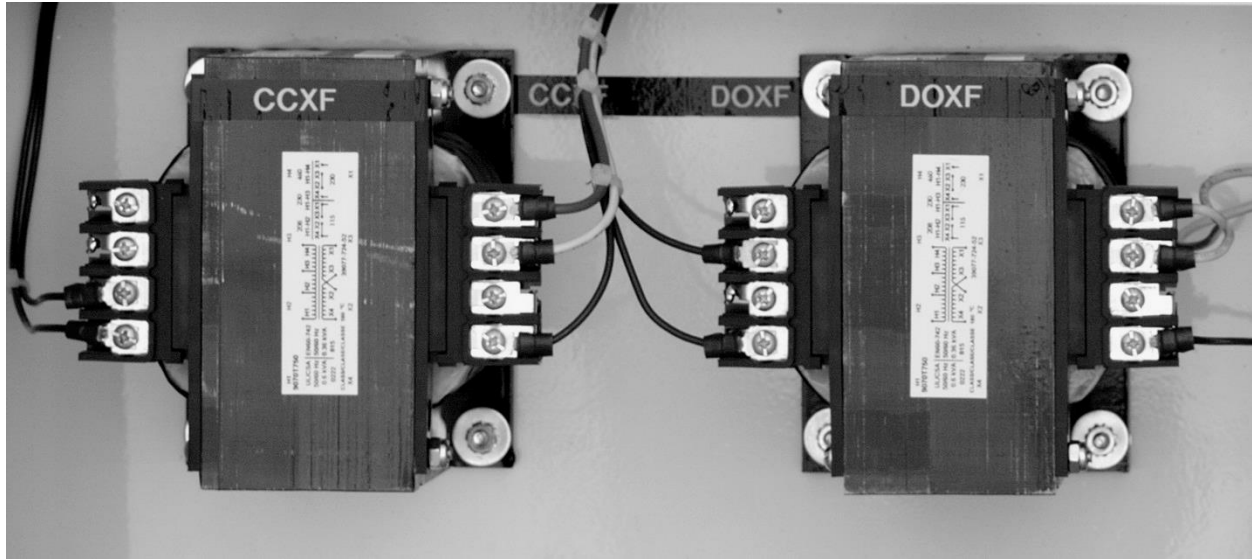
Figure 44: Control Transformers

"CCXF" is the Control Circuit Transformer, which provides the controller with 120VAC. The primary connections vary depending on the Building Power. See the schematic for sizing and wiring information.

"DOXF" or "DXF" are the Door Circuit Transformer(s). The size and quantity of these transformers will depend on the type of doors used. See the schematic for sizing and wiring information.

"BXF" is the Brake Circuit Transformer(s). The size and quantity of this transformer will depend on the type of brakes used. See the schematic for sizing and wiring information.

6.6.2 Fuses

Table 22: Fuses.

Label	Current	Voltage	Description
F1	6A	600V	L1 to Controller, Phase Monitor, Door Operator Transformer, and Brake
F2	6A	600V	L2 to Controller, Phase Monitor, Door Operator Transformer, and Brake
F3	6A	600V	L3 to Phase Monitor, Door Operator Transformer, and Brake
F4	8A	250V	CCXF Secondary to Controller and Rope Brake
F5	5A	250V	Door Operator Transformer (if needed)
F6 +	5A	250V	Door Operator / Brake Transformer (if needed)

NOTE: Only replace fuses with the same type and rating. The fuse type and specific ratings may vary between controllers. Refer to the schematics for correct fuse specifications.

6.6.3 Phase Monitor

If provided, the phase monitor unit provides protection for the motor by continuously monitoring under- and overvoltage, voltage unbalance, phase loss, and phase reversal.

A trip delay is provided to prevent nuisance tripping. A restart delay is provided to prevent short cycling after a momentary power outage. Upon application of line voltage, the restart delay begins. The output relay is de-energized during restart delay and the LED flashes green.

Under normal conditions, the output energizes and the LED glows green after the restart delay. Under voltage, over voltage and voltage unbalance must be sensed for a continuous trip delay period before the output is de-

energized. The output does not de-energize if the fault is corrected during the trip delay. The LED flashes red during the trip delay, then glows red when the output is de-energized. The restart delay begins as soon as the output relay de-energizes. If the restart delay is completed when the fault is corrected, the output relay energizes immediately.

The output relay does not energize if a fault or phase reversal is sensed as the three phase voltage is applied. The LED alternately flashes green then red if a phase reversal is sensed.

Reset is automatic upon correction of a fault.

6.6.4 24VDC Power Supply

Several 24VDC power supplies are used to provide 24VDC to the MR-SIB, CT-SIB, I/O boards, positioning system, and other devices interfaced with the controller. The provided power supplies have onboard over-current protection. If the output is shorted, then the output is turned off. If the power supply output is 0 volts:

1. remove the load from the Power Supply,

2. then measure the output again, and

3. check the load to make sure it is not shorted.

> **NOTE: Output voltages outside of 24VDC +/- 10% may cause erratic operation.**

6.7 Drive Control

A wide variety of drive starting options are available. Please consult the as-built schematics to determine the exact drive configuration.

6.8 BORIS (Battery Operated Rescue Initiation System)

> **NOTE: Battery rescue operation for traction applications requires a third party battery system to power the drive and motor, which needs to interface with the Vision 2.0 controller through external connections. Refer to the manufacturer for documentation, and refer to the Vision 2.0 controller schematics for external wiring connections. A standard BORIS unit will be provided in addition to the third party system to provide battery backup power of the control system only.**

BORIS is a fast transfer, line-interactive, uninterruptible power supply. It is designed to

- prevent blackouts, brownouts, sags, swells, and surges from reaching the protected load under normal conditions,

- filter out small utility-line fluctuations, and

- isolate the protected load from large disturbances by internally disconnecting from the utility line while supplying power from its internal batteries until the utility line returns to normal.

While operating on battery, an internal alarm intermittently beeps. The "ON/TEST" button may be pressed to silence the alarm. If the line utility does not return and the battery continues to power the protected load, a low battery shutdown may occur.

Advance warning of a low-battery condition begins approximately two minutes before the final shutdown. This alarm is a continuous beeping sound and cannot be silenced. Normally, this condition should not occur (if the batteries were previously charged fully) due to remote shutdown capability of BORIS and Virginia Controls controller.

Special features include

- surge protection,

- EMI/RFI filtering,

- high and low voltage correction, (without draining the batteries), as well as

- automatic battery testing during power up and every 14 days thereafter.

User-replaceable batteries can be replaced without having to remove power from the loads.

For installation instructions and operation details, consult the *Battery Operated Rescue Initiation System Operating Manual*. A copy of this manual can be obtained from our website at **www.vacontrols.com**.
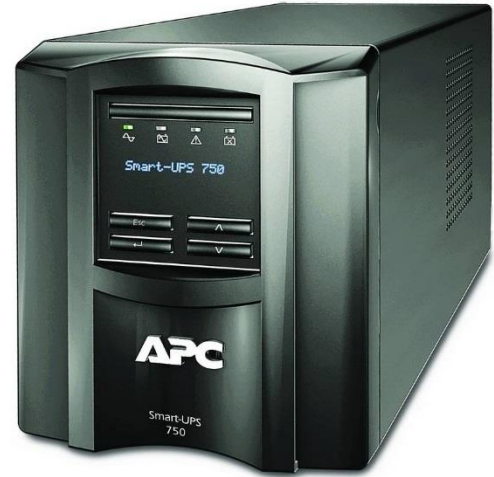
6.9 ETSD Monitoring System

The ETSD board by Virginia Controls is a hardware system for traction elevator controllers that provides a level of redundancy for a specific set of control functions required by the A17.1 Safety Code for Elevators and Escalators.

These functions are accomplished by three control sub-systems that are combined into a single ETSD Board. The three individual ETSD Board sub-systems are known as:

1. Unintended Car Movement (UCM) System
2. Over-Speed (O-S) System
3. Emergency Terminal Stopping Device (ETSD) System

The elevator controller micro-processor verifies the operational integrity of each of these three sub-systems.

The ETSD Monitoring System includes:

1. ETSD Printed Circuit Board
2. Speed (Photo) Sensor &
3. Sensor Mounting Bracket
4. Sensor Cable (30Ft/10m)
5. Striped ETSD Adhesive Tape
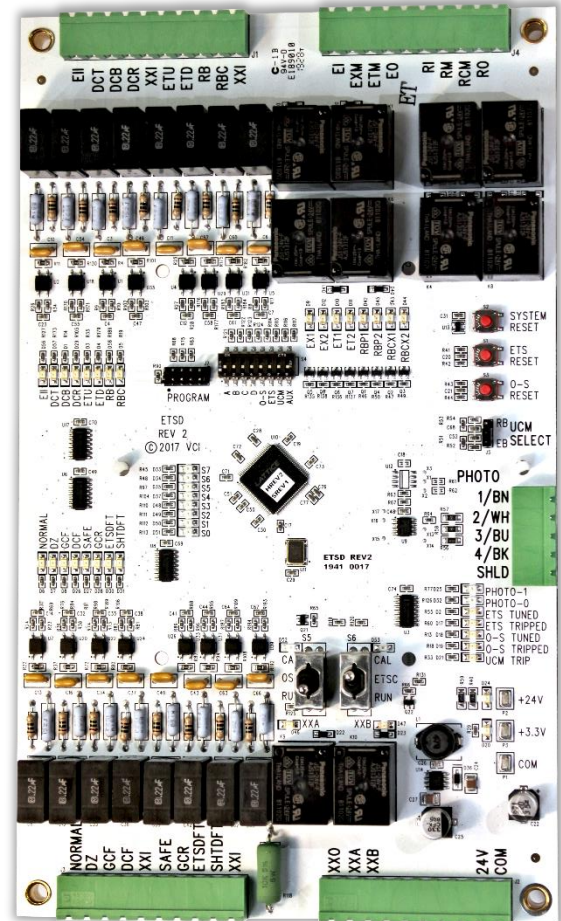
Figure 45 - ETSD Monitoring System

6.9.1 Unintended Car Movement (UCM) System

6.9.1.1 Requirements for UCM System

The ASME A17.1 Safety Code for Elevators, under section *Unintended Car Movement Protection,* requires a traction elevator controller be equipped to detect uncontrolled movement by the elevator away from a landing for any reason while the elevator doors are open. Upon detection, the required braking device is activated. It may act directly on the elevator ropes or on the drive sheave. This system must meet the following requirements:

- It activates if the elevator leaves the door zone of a landing, and both car and hoistway doors are open, whether on Normal operation or on Inspection.

- If the UCM System requires power for operation, then the loss of power results in the application of the UCM braking device.

- When activated, the elevator shall not be restored to operation until the UCM system is manually reset.

  NOTE: Cycling power is not considered a valid reset.

- If activated, the UCM System may remove power from machine motor & brake.

- The braking device may be applied (not activated) to a stopped elevator, and may be applied (not activated) when an Electrical Protective Device (EPD) is opened.

- The UCM System is classified by code as an Electrical Protective Device (EPD).

6.9.1.2 Description of UCM System

1. The UCM System mimics in hardware what the controller micro-processor performs in software using a small number of control signals shared between them.

2. When operating, Relays ETSD Board RBP1 & RBP2 energize +1.0 second after power-up. ETSD Board Relays RBCX1 & RBCX2 remain de-energized until integrity checking is initiated.

3. If the car should move out of the door zone with its gate and hall door open, the UCM system will release Relays RBP1 & RBP2 causing a UCM System fault and setting the braking device.

4. A UCM System fault occurs in one of two specific situations, one occurring while on Normal operation and the other occurring while on Inspection. (Refer to Sht."VNE" of Drawings.)

   a. When the elevator is on Normal operation and in the Door Zone, if the Gate and Hall Door Contacts have opened and remain open and Door Zone Input is lost, the UCM System faults.

   b. When on Inspection, if the Gate and Hall Door Contacts have opened and remain open, the Safe Input is high ("P" Contactor is released), and elevator speed exceeds 2.5FPM for 1.0 second, the UCM System faults.

5. When faulted, the UCM System lights the "UCM TRIP" LED. A UCM System fault is latched through a power loss until reset.
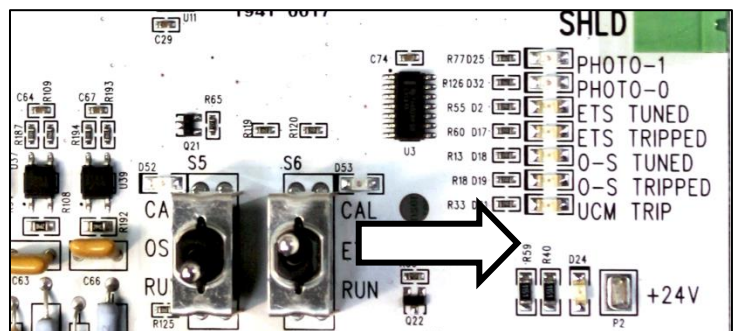
Figure 46 - UCM TRIP Indicator

6. The UCM System <u>resets</u> when ETSD Board Input SHTDFT goes high with power on.

> **NOTE: ETSD Input SHTDFT defeats the UCM System if jumped at power-up, then left in place. It does not reset a UCM System fault at power-up. Use only during construction.**

7. The operational integrity of the UCM System is checked prior to leaving a landing when on Normal operation, and is performed differently for Rope Brake operation versus Emergency Brake operation.

8. When equipped for Rope Brake operation, the controller is provided with Relays: RB, RBX & RBC, from which UCM System Inputs RB & RBC synchronize the integrity checking of UCM System Relays: RBP1, RBP2 & RBCX1, RBCX2.

   a. To start, the micro-processor energizes controller Relay RBC causing UCM System Input RBC to go high, which prompts the UCM System to energize Relays RBCX1 & RBCX2 causing TB-RCM, as monitored by the processor to go high.

   b. Next, the micro-processor releases controller Relays RB & RBX causing UCM System Input RB to go low. This prompts the release of UCM System Relays RBP1 & RBP2 causing UCM System TB-RM, as monitored by the processor to go low indicating proper operation of these UCM System relays.

   c. This done, the micro-processor re-energizes controller Relays RP & RPX causing UCM Input RB to go high, prompting the UCM System to re-energize Relays RBP1 & RBP2.

   d. Lastly, the micro-processor releases controller Relay RBC causing UCM Input RBC to go low, prompting the UCM System to release Relays RBCX1 & RBCX2 causing UCM System TB-RCM, as monitored by the processor to go low indicating proper operation of these UCM System relays.

9. When equipped for Emergency Brake operation, there are situations where the controller is permitted to release the Emergency Brake due to lack of demand or due to the machine manufacturer's specifications for the Emergency Brake itself. In this case, the controller is not provided with Relays RB, RBX & RBC, therefore integrity checking of the UCM System is initiated by controller micro-processor Output RBC.

   a. To start, UCM System Input RBC, which is connected to micro-processor Output RBC, goes high when integrity checking is initiated, prompting the UCM System to energize Relays RBCX1 & RBCX2 causing TB-RCM, as monitored by the processor, to go high.

   b. After a brief timed interval, the UCM System releases Relays RBP1 & RBP2 causing TB-RM, as monitored by the processor, to go low indicating proper operation of these UCM System relays.

   c. After another brief interval, the UCM System re-energizes Relays RBP1 & RBP2.

   d. After a final brief interval, the UCM System releases Relays RBCX1 & RBCX2 causing TB-RCM, as monitored by the processor to go low indicating proper operation of these UCM System relays.

10. Deviation from these integrity checking sequences will result in a UCM System Redundancy fault.

11. If the micro-processor detects both its inputs at terminal blocks: RM & RCM of the ETSD Board are low, then it logs a fault of the UCM System.

6.9.2 Over-Speed System (O-S) System

6.9.2.1 Requirements for O-S System

The ASME A17.1 Safety Code for Elevators, under section *Control and Operating Circuits*, states that a failure of a software system designed without a SIL rating in circuits that control car speed while Leveling with doors open, or while operating on Inspection or Hoistway Access, shall not permit elevator speed to exceed 150fpm. A system, known as the Over Speed or O-S System, satisfies the safety code by meeting the following requirements:

- This system is not defined in the code as an Electrical Protective Device (EPD), but is described in virtually identical terms.

- A hardware-based system is then used to monitor and limit car speed.

6.9.2.2 Description of O-S System

1. The O-S System provides the electronic hardware and a speed (photo) sensor, which is aimed at a striped adhesive tape affixed to the machine drive sheave, to monitor elevator speed without the need to determine elevator direction.

2. This speed monitoring hardware is also used by the ETSD System (required above 200fpm), which is calibrated at a higher percentage of contract speed.

3. The O-S System is calibrated at and operates with a 150fpm threshold.

4. When provided, the High Speed Counter of the controller processor is retained as a software-based backup to the O-S System. It is calibrated at a lower speed so that it will act first.

> NOTE: The High Speed Counter of the controller processor is calibrated at a 125FPM threshold for Inspection and at a 50FPM threshold while Leveling with doors open.

5. When tuned and operating and if Input EII is high, the O-S System energizes Relays EX1 & EX2 at +1.0 seconds after power-up. The O-S System also energizes Relays ET1 & ET2 when the controller is on Normal operation and out of Door Zone, or when on Normal operation and in the Door Zone with doors closed.

6. The O-S System releases Relays ET1 & ET2 when on Normal operation (Input NORMAL is high) and the elevator has been sitting in the Door Zone, and Gate and Door Contacts are open, and remain open, with the Safe Input low (Drive is enabled) for 1.0 second. Relays ET1 & ET2 are de-energized while on Inspection. (Refer to Sht."VNE" of Drawings.)

7. During either of these two conditions, if 150FPM is exceeded, ETSD Board Relays EX1 & EX2 de-energize, opening the safety string and causing the O-S System to fault.

8. When faulted, the "O-S TRIP" LED lights and latches UCM System Relay XXA, Low Speed Monitor.

Figure 47 - O-S TRIP Indicator

> **NOTE: O-S System faults are latched through a loss of power.**

9. An O-S System fault resets via the "O-S RESET" Push Button or by re-tuning.
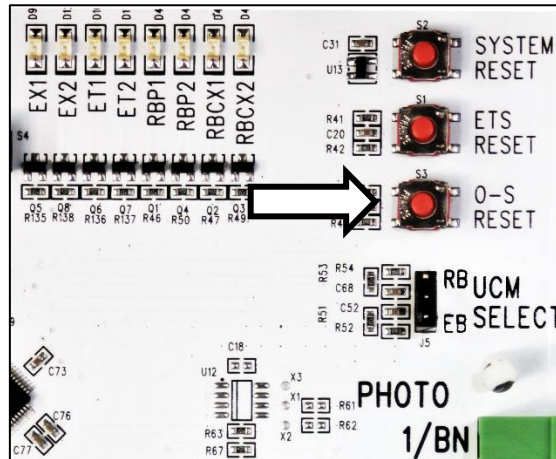
Figure 48 - O-S RESET Push Button

> **NOTE: If the O-S System is re-tuned, the ETSD System must be re-tuned also.**

10. For troubleshooting, a tuned O-S System can be defeated by putting the "OSC" Calibration Switch into the "CAL" position while power is applied.

> **NOTE: Do not cycle power with "OSC" Switch in "CAL" position, or O-S System calibration will be lost!**

11. A tuned, but defeated O-S System maintains ETSD Board Relays EX1 & EX2 regardless of car speed. ETSD Relays ET1 & ET2 function normally per the previous description.

12. A tuned O-S System energizes its Relay XXA when car speed exceeds 150FPM. This output serves as "Low Speed Monitor" or LSM Input for the controller processor.

13. The operational integrity of the speed monitoring system is checked as the controller processor verifies that Input LSM (O-S System Relay XXA) energizes when car speed exceeds 150FPM and de-energizes when car speed drops below 50FPM.

14. The operational integrity of ETSD Board Relays ET1 & ET2 is checked as the controller processor verifies ETSD TB-ETM goes low (i.e.: Relays ET1 and ET2 drop) when on Inspection or on Normal operation while Leveling with doors open.

15. When the controller processor Input ETSD is energized, then the operational integrity of the O-S System (ETSD Board Relays: ET1, ET2 & Output XXA) is not checked.

16. If the controller processor detects both its inputs at ETSD terminal blocks: EXM & ETM are low, and its Input LSM is high, then it logs a fault of the O-S System.

6.9.3 Emergency Terminal Slowdown Device (ETSD) System

6.9.3.1 Requirements for ETSD System

The ASME A17.1 Safety Code for Elevators, under section *Emergency Terminal Stopping Device*, requires a traction elevator with static control and a contract speed over 200FPM to have a speed and position monitoring system that stops the car when excessive speed is detected as the elevator approaches a terminal landing. This system, known as the Emergency Terminal Stopping Device or ETSD System, has the following code requirements:

- It is activated in response to a failure of both the normal stopping means and the normal terminal stopping device to slowdown and stop the elevator at or near a terminal landing.

- The ETSD System must function independently of the normal terminal stopping device and the normal speed control system.

- When activated, the ETSD System shall remove power from the driving machine motor and brake without regard for where the elevator comes to a stop.

- The general intent of this system is to prevent the car or counterweight from running onto their buffers at or above contract speed.

- The ETSD System is classified by code as an Electrical Protective Device (EPD).

6.9.3.2 Description of ETSD System:

1. The ETSD System requires a speed monitoring system with inputs for a set of hoistway switches that signal when the elevator approaches a terminal landing.

2. The speed monitoring hardware is provided for and shared with the O-S System where it is calibrated at the lower speed of 150FPM.

3. In the case of the ETSD System, the calibration speed is 90% of contract speed whenever contract speed is greater than 200FPM.

4. The ETSD System verifies that the elevator has slowed down to 90% of its contract speed with 50% or half of its slowdown distance remaining per the placement of Up & Down ETS Switches at terminal blocks: 31X & 32X.

Table 23 - Recommended ETS Switch Placement (one N.C. switch per terminal & direction)

Car Speed (FPM)	Switch Placement
225	2'-3"
250	2'-6"
300	3'-6"
350	4'-3"
400	5'-3"
450	6'-6"
500	7'-6"

5. Minimum ETS Switch Cam lengths are 6ft for 200-500FPM to provide approximately 0.5 seconds of dwell time. ETS Switches may also be maintained to the Final Limit Switch as most cam lengths are the height of the car.

6. When tuned and operating and if Input EII is high, the ETSD System energizes Relays EX1 & EX2 at +1.0 seconds after power-up. The ETSD System also energizes Relays ET1 & ET2 when the elevator is on

Normal operation (Input NORMAL is high) and Inputs ETU & ETD are high – elevator is both off ETS Switches in hoistway near the terminal landings.

7. ETSD Board Relays EX1 & EX2 remain energized until car speed exceeds 90% of contract speed at which time they are released causing the safety string to be subject to Relays ET1 & ET2. Relays EX1 & EX2 re-energize just below 90% of contract speed.

8. ETSD Board Relays ET1 & ET2 remain energized until the elevator rides onto one of the ETS Switches near a terminal landing causing either Input ETU or Input ETD to go low.

9. On a "typical" full speed run into a terminal landing, the elevator decelerates below 90% of contract speed before it encounters an ETS Switch. This allows Relays EX1 & EX2 to re-energize before Relays ET1 & ET2 release. (Refer to Sht."VNE" of Drawings.)

10. On an "over-speed" run into a terminal landing (+90% of contract speed with just 50% of slowdown distance remaining), Relays EX1 & EX2 stay released while over 90% of car speed. Then, as an ETU or ETD Switch is encountered, Relays ET1 & ET2 are released, opening the safety string and causing an ETSD System fault.
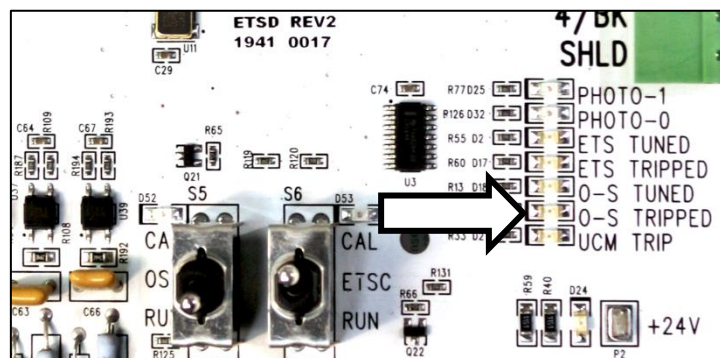
11. When faulted, the "ETS TRIP" LED lights.
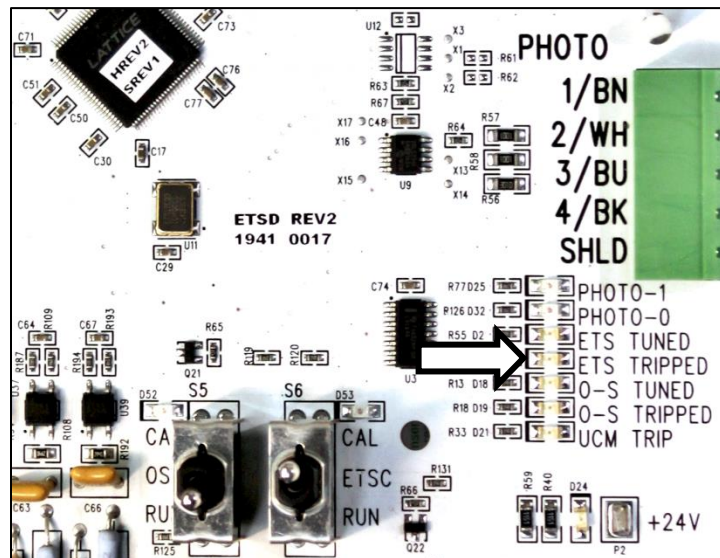
Figure 49 - ETS TRIP Indicator

NOTE: ETSD System faults are latched through a loss of power.

12. An ETSD System fault resets via the "ETS RESET" Push Button while on Normal operation or by re-tuning.
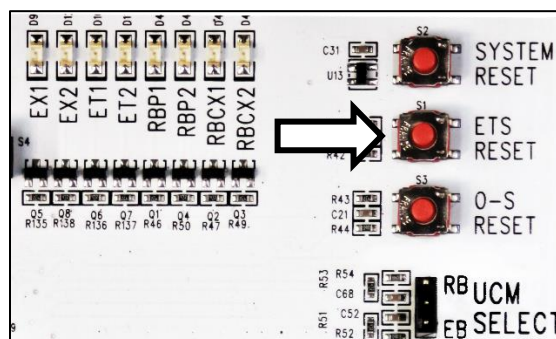
Figure 50 - ETS RESET Push Button

NOTE: The ETSD System must be re-tuned, if the O-S System is re-tuned.

13. For troubleshooting, a tuned ETSD System can be defeated by putting the "ETSC" Calibration Switch into the "CAL" position, or by putting the controller on Inspection operation.

14. A tuned, but defeated ETSD System maintains Relays ET1 & ET2, regardless of Inputs ETU & ETD. Relays EX1 & EX2 remain subject to car speed to aid in trouble-shooting.

15. The operational integrity of the ETSD System is continuously checked by the controller processor per the following.

16. The operational integrity of ETSD System Relays EX1 and EX2 is checked as the controller processor verifies ETSD TB-EXM goes low (i.e. Relays EX1 & EX2 drop) when car speed is over 90% of contract speed on Normal operation.

17. The operational integrity of ETSD System Relays ET1 and ET2 is checked as the controller processor verifies that ETSD TB-ETM goes low (i.e., Relays ET1 and ET2 drop) when the elevator encounters an ETS Switch (i.e. Input ETU or Input ETD goes low) in the hoistway while approaching a terminal landing on Normal operation.

18. Likewise, the controller processor verifies that ETSD TB-ETM is high (i.e., Relays ET1 & ET2 energized) when off both ETS Switches (i.e. Inputs ETU & ETD are high).

19. When provided, the High Speed Counter of the controller processor provides a redundant software-based ETSD System using the same ETS Switch Inputs, and using the motor mounted encoder to determine car speed.

20. ETS Switches, at TB-31X & TB-32X, are checked by the controller processor at known landing positions. If these switches fail to open when the car slows down and stops at a terminal landing, an ETSD Hardware Fault occurs.

21. When controller processor Input ETSD is energized, then the operational integrity of Relays EX1, EX2 & ET1, ET2 of the ETSD System is not being checked along with that of ETS Switch Inputs ETU/TB-31X and ETD/TB-32X.

22. If the controller processor detects both its inputs at ETSD terminal blocks: EXM & ETM are low, and its Input LSM is low, then it logs a fault of the ETSD System.

6.9.4 ETSD Monitoring System Routine Maintenance

1. Check the ETSD Tape for dirt, oil or grease. If present, wipe gently with a clean soft cloth until removed. Replace the tape if it becomes damaged.

2. Check the lens of the Speed Sensor for dust & dirt. If present, wipe gently with a clean soft cloth until removed.

3. Check the alignment and focus of the Speed Sensor light beam. It should appear in the center of the ETSD tape as a bright red dot approx. 1/16" in diameter. If otherwise, see the "Setup of the O-S System" Section 5.11.2 for mounting, aligning and adjusting the Speed Sensor.

4. Check the "+24V" & "+3.3V" LED's on the ETSD Board. If not lit, check the "+24V" & "COM" and "+3.3V" & "COM" Test Points, and then the 24V & COM terminals on the ETSD Board (See Figure 53 below).

Figure 51 - ETSD Tape

Figure 52 - Speed Sensor
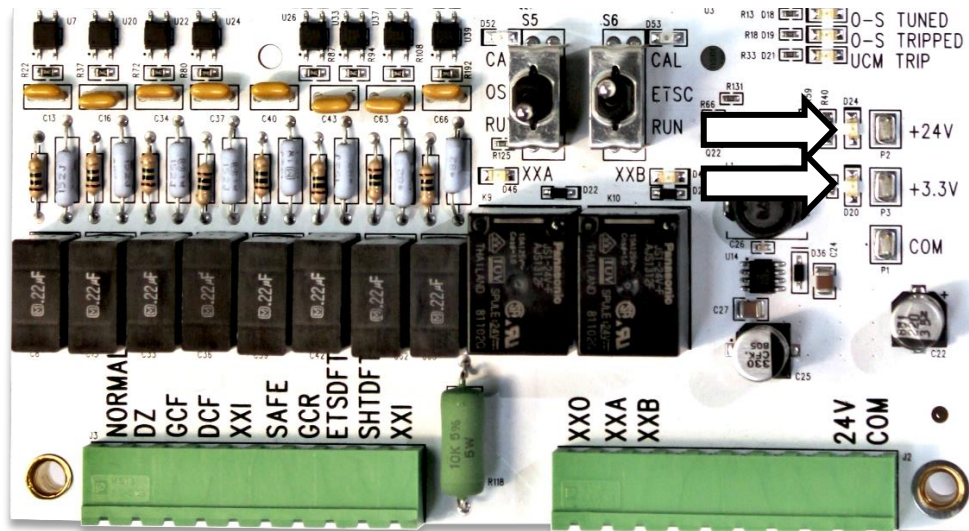
Figure 53 - +24V & +3.3V LED Indicators, Test Points and Supply Terminals

5. Check for the green "POWER" LED on the Speed Sensor. If not lit, check "PHOTO" Connector terminal blocks 1/BN (+24V) & 3/BU (COM) for 24VDC.
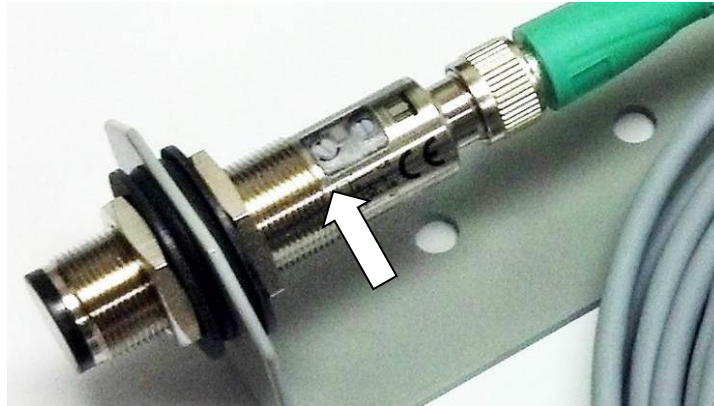
Figure 54 - Sensor POWER LED Indicator

6. Check that the yellow "SENS." LED of the Speed Sensor and "PHOTO- 1" LED on ETSD Board operate in unison, and that both are lit on a "White" segment of the ETSD Tape. If otherwise, see "Setup of the O-S System" Section 5.11.2 for Speed Sensor adjustment.
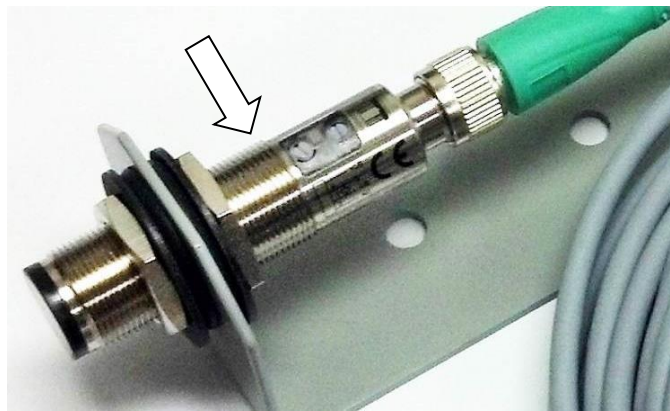
Figure 55 - Sensor SENS. LED Indicator
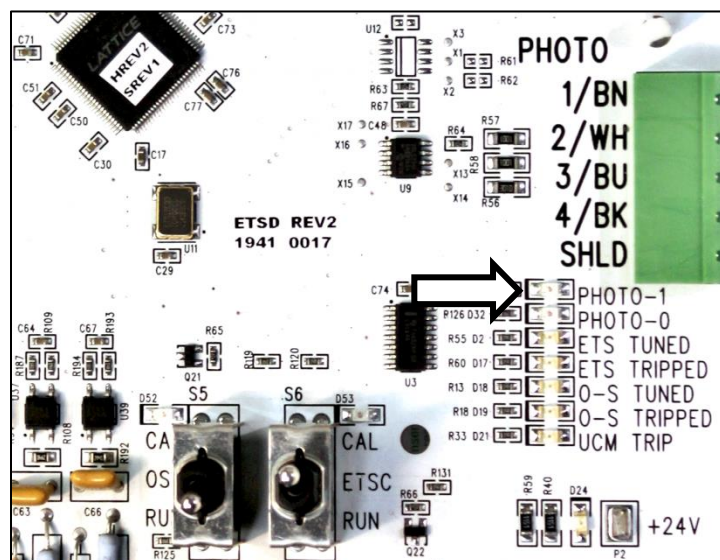
Figure 56 - PHOTO-1 Indicator

6.9.5 ETSD Board Specifications

Input Power	24VDC @ ⅓ amp (external)
On-board Power	3.3VDC
I/O	16 – 120VAC Inputs / 10 – Relay Outputs
LED Indicators (Green)	+24V (voltage present) +3.3V (voltage present) 16 – 120VAC Inputs (energized) 10 – Relay Outputs (energized) ETS TUNED (ETSD sub-system operational) O-S TUNED (O-S sub-system operational)
LED Indicators (Yellow)	PHOTO-1 (indicating white segment of ETSD tape) PHOTO-0 (indicating black segment of ETSD tape) S0 – S7 (Monitors states of 3 control sub-systems, and indicates car speed when "AUX" DIP Switch is selected.)
LED Indicators (Red)	ETS TRIP (ETSD Sub-System fault) O-S TRIP (O-S Sub-System fault) UCM TRIP (UCM Sub-System fault)
Push Buttons	SYSTEM RESET (Returns the 3 sub-systems to initial state.) ETS RESET (Resets an ETSD System Fault.) O-S RESET (Resets an Over-Speed Fault.)
Toggle Switches	OSC Calibrate (Selects between calibration and operation.) ETS Calibrate (Selects between calibration and operation.)
DIP Switches	A-D; O-S; ETS; UCM; AUX (One selection to be made at a time.) Selects among the sub-systems to be monitored, or car speed.
Jumpers	UCM SELECT (selects Rope Brake or Emergency Brake operation)
Test Points	+24V; +3.3V & COM
Connectors PHOTO; 4-pole	1/BN – Brown wire; +24VDC supply to Speed Sensor 2/WH – White wire; no function 3/BU – Blue wire; Common of supply to Speed Sensor 4/BK – Black wire; output signal from Speed Sensor SHLD – braided Drain wire of Speed Sensor Cable
Dimensions	10"H x 6"W on ⅝" stand-offs
Environment Ambient Temp. Operating Temp. Storage Humidity	 32° - 104°F (0° - 40°C) 32° - 122°F (0° - 50°C) 14° - 140°F (-10° - 60°C) 5% - 95% non-condensing

Figure 57 - ETSD Board

6.9.6 Speed (Photo) Sensor & Cable Specifications

Figure 58 - Speed (Photo) Sensor & Cable

WARNING: The Speed Sensor is Class 1 Laser Product. Avoid eye contact with Red light source.

Manufacturer	Pepperl+Fuchs
Model: (Photo Sensor) (Shielded Cables)	VT18-8-400-M-LAS/40a/118/128 – P/N: 801135 Note: Class 1 Laser Product V1-G-10M-PUR-ABG – P/N: 221508 (10 meter length) Or, V1-W-10M-PUR-ABG – P/N: 219640 (10 meter length w/90° Connector)
ETSD Speed Tape	⅜"W x 10Ft (36" max. Sheave Dia.); ¼" alternating Black & White segments
Mounting (Bracket) (Position)	Steel Angle Bracket (use ¼-20 bolts) w/Rubber Grommet & Fiber Washers Position photo sensor slightly off perpendicular from tape by 5° - 15° to inhibit reflection (an ON state) while on a "Black" segment of ETSD Tape.
Distance (Sensor to Tape)	5" (±1/4") between Sensor face (Red) & Tape on Sheave
Output	5VDC @ 9mA (ON state) square wave
Frequency (Max.)	500Hz from Sensor Output
Speed: (Max.) (Operating)	1250FPM (500Hz) w/1:1 Roping 1000FPM (400Hz; 20% safety margin)
Adjustment: (Rotary Sw.) (Potentiometer)	L/D (Light / Dark – 2-Pos.) Default = "L" – Light *Examine carefully!* SENS. (2-turn with clutch) Default = centered at one turn.
Indicators: (Green) (Yellow)	POWER (Lit solid or flashes if sensor output is shorted.) SENS. (Lights when beam is reflected by WHITE segment of tape.)

NOTE: Be certain to retain all Pepperl+Fuchs product information for troubleshooting.

6.10   Absolute Positioning System - ELGO LIMAX22 DUE

6.10.1 ELGO APS Overview

LIMAX22 DUE by ELGO is an absolute measuring system (APS), which consists of the LIMAX22 DUE sensor and a magnetic tape containing encoded position information.

The LIMAX22 DUE consists of two independent sensors embedded in an aluminum housing. Both sensors perform the same function and operate independently, offset by 40mm along the tape. The controller CPU and CT-SIB safety processor monitor the functionality of both sensors to ensure proper operation. This redundancy is required by code such that if one sensor fails, the second sensor permits safe operation of the elevator, allowing it to stop at a landing during a single-point malfunction.

The LIMAX22 DUE is easy to mount and is flexible enough to install anywhere in the shaft. Using a mounting kit, the tape suspends freely in the shaft while being fed through the plastic guide in the sensor housing. After proper installation, tape measurement is virtually contactless, since the guide is only used to align the tape a defined distance from the sensor.

The LIMAX22 DUE magnetic measurement system is highly robust and suitable for environmentally-demanding applications. Dust, dirt, moisture, smoke, and temperature do not affect the contactless measurement.

The maximum encoded tape length is 850 ft (260 m) and operates up to 1000 fpm (5 m/s). The magnetic tape contains encoded position data with a resolution of 1mm or 0.5mm. Each sensor measures and computes position and velocity data, which is transmitted to the controller CPU and CT-SIB over separate CANbus channels. The LIMAX22 DUE is designed to meet SIL 3 specifications in the sectors of position and speed detection.

Table 24: Technical Data - LIMAX22 DUE

Mechanical data		Environmental condition	
Measuring principle	Absolute Position Encoded Magnetic Tape	Storage temperature	-25… +85 °C
Repeat accuracy	+/- 1 mm	Operating temperature	-10… +70 °C (-25… +85 °C by request)
System accuracy in µm at 20°C	+/- (1000 µm + 20 µm x L) L = measuring length in meters	Protection task	IP50
		Electrical data	
Distance between the sensor and the magnetic tape	4 mm	Supply	10 - 30 VDC
Distance between two sensors along magnetic tape	40 mm	Ripple	10 - 30 V: < 10 %
		Current draw	Max. 0,4 A
Sensor housing material	Aluminum	Interfaces	SSI, CAN, RS422 CANopen (DS406, DS417),
Sensor housing dimensions	L x B x H = 317 x 55 x 55 mm	Resolution	1 mm / 0.5mm
Necessary magnetic tape	AB20-80-10-1-R-D-15-BK80	Travel speed	Max. 50m/s (physical)
Max. measuring length	260 m	Cable length	3 m standard-cable length
Cable connection	RJ45, shielded		
Weight	Ca. 550 g without cable Cable: ca. 60 g per meter		

6.10.2 ELGO APS Wiring Configuration

Each of the two LIMAX22 DUE sensors are internally wired independently using the configuration shown in Table 25. Refer to pages "VT3" & "CPS" of the schematics for a specific wiring diagram to the CT-SIB in the Car Top Inspection Station.

LIMAX22 DUE power is provided by a 24VDC power supply in the Car Top Inspection Station, which is fed through the CT-SIB via the hardwired RJ45 connector. 24VDC power is shared by sensor A and sensor B.

Channel A is passed through from the RJ45 connector to terminal block J8, where it is passed through the traveling cable to the MR-SIB terminal J14. Channel B is processed directly by the CT-SIB I/O processor, and the data is then retransmitted to the controller CPU via CANbus 0.

Table 25: ELGO APS Wiring Configuration

Signal Description	Wire Color	PIN #
CAN L sensor A	White/orange stripe	1
CAN H sensor A	Orange solid	2
0V GND sensor A	White/green stripe	3
+Vcc sensor A	Blue solid	4
0V GND sensor B	White/blue stripe	5
+Vcc sensor B	Green solid	6
CAN L sensor B	White/brown stripe	7
CAN H sensor B	Brown solid	8

CANbus termination is provided internally at each LIMAX22 DUE sensor, while termination jumpers are required at the MR-SIB (J1H/J1L). The controller CPU and CT-SIB I/O processor are configured to receive and process CAN data only from its designated sensor.

6.10.3 ELGO APS Status LEDs

Each sensor has a bank of status LEDs located on the upper edge of the housing, as shown in Figure 59.

During normal operation, the status LEDs for both sensors should be in the following states:

- TAPE: OFF   = Tape media sensed
- ERROR: OFF   = System Operational
- RUN: Flashing = Communication Active
- POWER: ON   = Power Supply OK

See Table 26 for specific status LED information.
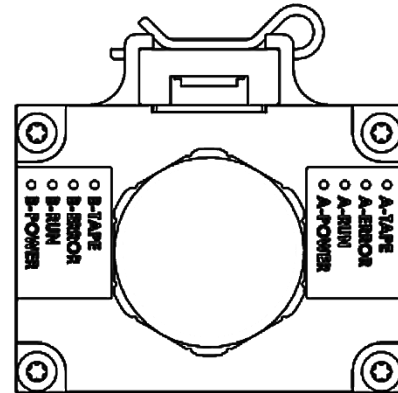
Figure 59: Status LEDs on housing.

Table 26: ELGO LIMAX22 DUE Status LED descriptions.

LABEL	COLOR	DESCRIPTION	LED STATE
TAPE	YELLOW	Magnetic Tape Status	ON = Magnet tape is missing OFF = Magnet tape available
ERROR	RED	Interface Status	ON = State error, system not operational OFF = State OK, system ready for operation
RUN	GREEN	Device Status	ON = device status OK OFF = device status NOT OK
PWR	YELLOW	Supply Voltage	ON = Supply voltage OK OFF = Supply voltage not provided

6.10.4 ELGO APS Maintenance

The LIMAX22 DUE shaft information system requires little maintenance. On the occasion of regular elevator inspection and maintenance do the following:

- Perform an optical inspection of proper alignment between sensor and band. Worn tape guides indicate possible alignment error. Check for proper band alignment along the complete travel distance. Correct if necessary, as described in the installation procedure.

- Perform an optical inspection of the magnetic band. Check for abrasions or other mechanical damages. Small mechanical damages (scratches, dents, or even small chips) do not interfere with the measuring performance. However, a damaged band is more exposed to mechanical stress and is prone to further wear.

- Check for proper tension of the magnetic band. If the mounting was via a pipe, the tension can decrease over time. Readjust if necessary.

- Inspect the polymer guide for wear. Clean if dust and dirt have accumulated between the polymer guide and sensor case. The polymer guide is a wearable part. Replace if necessary.

- Clean the magnetic band. With a dry and clean cloth, begin at the head of the hoistway and ride down the complete travel distance pulling the magnetic band through a dry cloth.

7. Vision 2.0 User Interface

7.1 Main CPU - LCD & Keypad Interface

7.1.1 Main CPU – Screens

Press **Esc** to show
Banner Screen

```
Virginia Controls  A
Vision 2.0 Job 54321
REV: 293 CFG: TSE4Z
01/02/2019 12:34:56
```
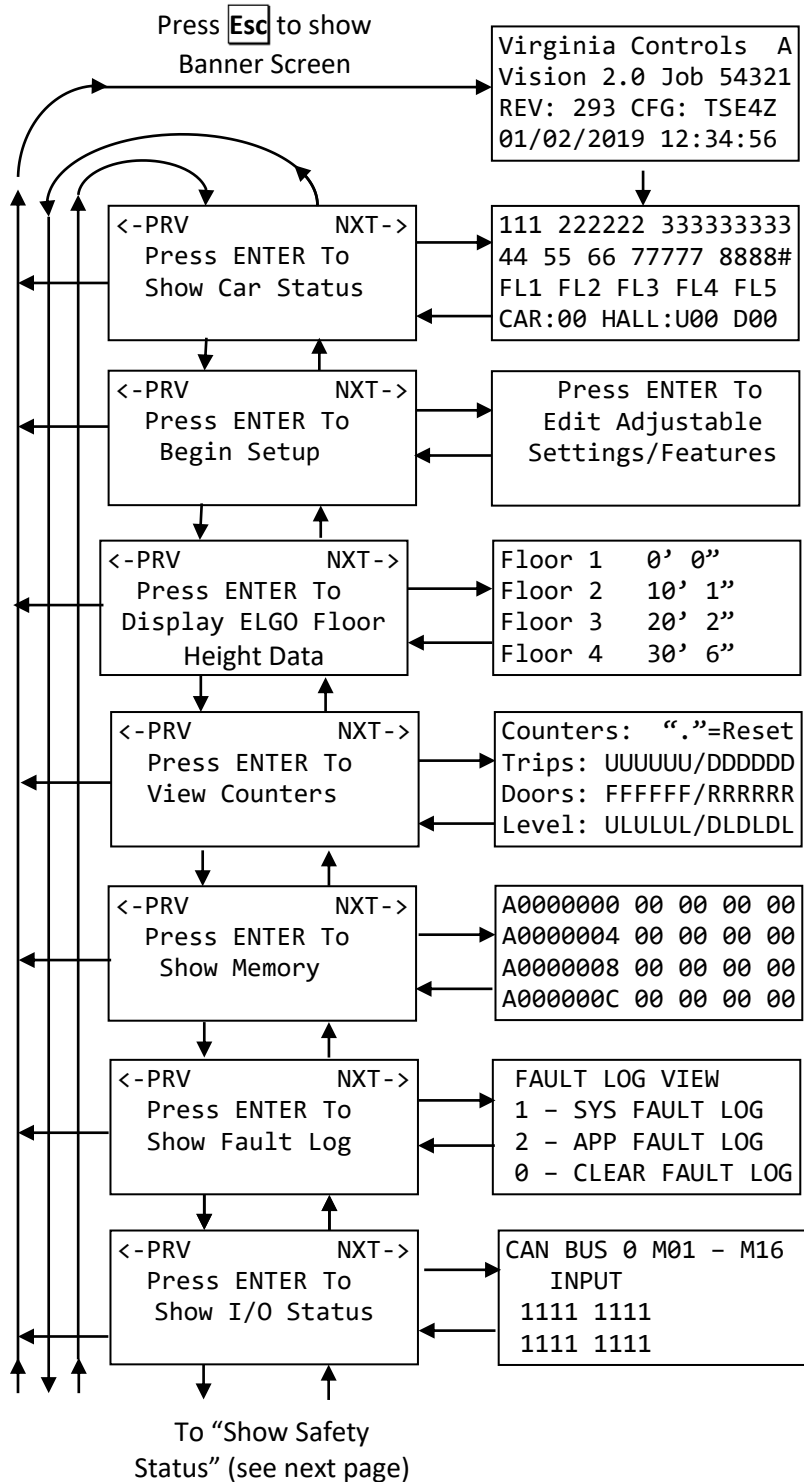
Press any key from
Banner Screen to
Show Car Status

```
<-PRV          NXT->
   Press ENTER To
   Show Car Status
```

```
111 222222 333333333
44 55 66 77777 8888#
FL1 FL2 FL3 FL4 FL5
CAR:00 HALL:U00 D00
```

```
<-PRV          NXT->
   Press ENTER To
   Begin Setup
```

```
    Press ENTER To
   Edit Adjustable
   Settings/Features
```

See Section 7.1.4
for Setup Menu

```
<-PRV          NXT->
   Press ENTER To
  Display ELGO Floor
     Height Data
```

```
Floor 1    0' 0"
Floor 2   10' 1"
Floor 3   20' 2"
Floor 4   30' 6"
```

The normal sequence is to press **Nxt** to scroll between the desired menu items. Press **Ent** to use the menu item. Press **Esc** to return to the main menu.

```
<-PRV          NXT->
   Press ENTER To
   View Counters
```

```
Counters:  "."=Reset
Trips: UUUUUU/DDDDDD
Doors: FFFFFF/RRRRRR
Level: ULULUL/DLDLDL
```

```
<-PRV          NXT->
   Press ENTER To
   Show Memory
```

```
A0000000 00 00 00 00
A0000004 00 00 00 00
A0000008 00 00 00 00
A000000C 00 00 00 00
```

↑ = Press **Nxt**

↓ = Press **Prv**

→ = Press **Ent**

← = Press **Esc**

```
<-PRV          NXT->
   Press ENTER To
   Show Fault Log
```

```
FAULT LOG VIEW
1 – SYS FAULT LOG
2 – APP FAULT LOG
0 – CLEAR FAULT LOG
```

```
<-PRV          NXT->
   Press ENTER To
   Show I/O Status
```

```
CAN BUS 0 M01 – M16
   INPUT
 1111 1111
 1111 1111
```

To "Show Safety
Status" (see next page)

Main CPU – Screens (continued)

To "Show I/O Status screen"
(see prev. page)

Press **Esc** to show
Banner Screen

```
<-PRV          NXT->
    Press ENTER To
  Show Safety Status
```

```
Mode: Normal Service
Fault:
Term:
### CURRENT FAULT
```

The normal sequence is to press **Nxt** to scroll between the desired menu items.
Press **Ent** to use the menu item.
Press **Esc** to return to the main menu.

```
<-PRV          NXT->
    Press ENTER To
  Display Group Data
```

```
  Group Comm Status
          ABCDEFGH
Ethernet  M-------
CANBus 3  M-------
```

```
<-PRV          NXT->
    Press ENTER To
  Show System Status
```

```
Machine Room SIB   OK
Machine Room IO    OK
Car Top      SIB   OK
Car Op Panel IO    OK
```

↑ = Press **Nxt**

↓ = Press **Prv**

→ = Press **Ent**

← = Press **Esc**

```
<-PRV          NXT->
    Press ENTER To
    Display Machine
       Room Data
```

```
M01 1Y GovernrSw  ON
M02 1T Roped Saf  ON
M03 1B Final Lmt  ON
M04 2   Pit Stop  ON
```

```
<-PRV          NXT->
    Press ENTER To
   Display Car Top
    & ELGO Data
```

```
30      Up Level OFF
31   Up Slowdown OFF
20      Door Zone  ON
32   Dn Slowdown OFF
```

To "Show Car Status" (see prev. page)

7.1.2 Banner Screen

```
Virginia Controls  A
Vision 2.0 Job 54321
REV:510   CFG: TSE4Z
01/01/2021  12:34:56
```

The Banner Screen displays general information for the controller that distinguishes it from other systems, based on Job # and software version.

- The first line always contains "Virginia Controls", followed by the controller alphanumeric index.

- The second line identifies the controller as the "Vision 2.0" model, followed by the Job serial number. If the controller is not configured, the Job serial number displays "No Config".

- The third line displays the current software revision number and configuration version.

- The fourth line displays the current date and time.

7.1.3 Car Status

The "Show Car Status" screen displays the car status. Each area of the screen displays one of several messages that allow the user to see what the elevator is doing. Pressing the `Esc` key transitions the screen to the menu selection screen. It is recommended to leave the "Car Status" screen on the LCD. Doing so allows a technician to quickly see a fault and state of the controller without having to scroll between screens.

7.1.3.1 Car and Hall Call Entry

The keys `0` through `9`, `Ent`, `Nxt`, `Prv`, and `.` may be used to manually enter car calls and hall calls from this screen.

- Type the desired floor number for the call using the keys `0` through `9`. The result is displayed on the right-most side of the second line of the screen (see message 8888#).

- Press `.` to change the call from a front opening call to a rear opening call. The letter "R" appears beside the entered floor number.

- After entering the desired floor number, press `Ent` to assign a car call.

- Press `Nxt` to assign an up hall call.

- Press `Prv` to assign a down hall call.

- Or press `0` to clear the entered call number. If the entered call is not enabled in the "Setup Menu – Floor Openings" menu, the call is ignored.

- Press `Esc` to return to the previous screen.

> **NOTE: If connected in a multi-car group, only the lead controller accepts hall call inputs using the keypad.**
>
> **NOTE: Any calls placed to landings or door openings that are not configured are ignored.**

7.1.3.2 Messages Displayed on the "Car Status" Screen

Each area of the screen displays one of several messages. The numbers in the sample screen below indicate the message areas. Depending on the status of the car, the appropriate message replaces the number group.

```
111 222222 333333333
4 55 666 77777 8888#
FL1 FL2 FL3 FL4 FL5
CAR:00  HALL:U00 D00
```

Message 111 displays one of the following messages:

1. **INS**: The car is not in normal operation mode. This may mean Car Top Inspection, In Car Inspection, Inspection Access, Controller Inspection, or Door Bypass Operation is active, or no inspection mode inputs are active.

2. **MEC**: The Medical Emergency Car Operation, or the EMT (Emergency Medical Technician Service) Car Operation mode is active.

3. **IDS**: The Independent Service Operation mode (C.O.P. Input TB:40) is active.

4. **MEH**: The car is responding to a Medical Emergency Call from the Hall, or an EMT call from the Hall.

5. **ATT**: The car is in the Attendant Service Operation mode.

6. **NRM:** The car is in Normal Operation (Input 23N), and not in any of the modes described above.

Message 222222 displays one of the following messages:

1. **SHUNT**: The Shunt Trip mode is enabled from the Shunt Trip input (85). In this mode, the car stops at the next landing, opens its doors, and shuts down.

2. **SMOKE**: The Machine Room/Shaftway Fire detectors input (82F) is energized.

3. **FIRE-2**: The car is in Fire Service Operation mode in the Car (Phase 2).

4. **FIRE-1**: The car is in Fire Service Recall mode (Phase 1).

5. **FLOOD**: The car is on Flood Operation from the Flood input (FLS).

6. **RopBrk:** The Rope Brake tripped. Check the Fault Log to see what caused this. To reset this fault, the Shutdown Defeat Input must be turned on momentarily. If it is already on, turn it off then back on.

7. **DrvFlt:** The Drive Ready Input is not on. Check the Drive.

8. **OvrSpd:** The car was running too fast with the doors open.

9. **RunTmr**: The car has tripped the Shutdown Run Timer (Timer Setting "RUN TIMER SHTDN").

10. **INSMod**: An Inspection Mode Fault has been detected. This fault occurs when there are more than one inspection mode inputs active at the same time, specifically the mode inputs for Car Top Insp (TB:23T), In Car Insp (TB:23X), Insp Access (TB:23A), Controller Insp (TB:23 with switch set to Insp), and/or Normal Operation. This fault will auto-reset when the inspection inputs are not indicating a conflict.

11. **BrkFlt:** Brake Relay Fault, for either Main Machine, Emergency, or Rope Brake Relays. A Brake relay monitoring point is in conflict with the corresponding relay output while stopped.

12. **UD-Flt:** UD Relay Fault. A U1, U2, D1, or D2 relay monitor input is OFF while the car is running, or ON while the car is stopped.

13. **LSMFlt:** ETS fault. Trips if car speed > 95% contract speed, but low speed monitor from the ETSD board is OFF while running on fast speed on normal operation. Or, low speed monitor is ON while car speed < 10 fpm.

14. **UCMFlt**: Indicates there is a UCM fault, where the EXM and ETM monitor inputs from the ETSD board are OFF during a stop.

15. **EXMFlt**: Faults if the car speed from the High Speed Counter is > 95% contract speed, but the EXM input from the ETSD board is still on.

16. **ETMFlt**: ETSUP or ETSDN fault. The ETM input is on while either ETSUP or ETSDN inputs are off. Or, the ETM input is off while both ETSUP and ETSDN inputs are ON. In order to fault, the door needs to be fully closed on normal operation and ETSD enabled. This status also occurs if the ETM input is ON after being previously low on inspection, or the door is open while running (leveling).

17. **RM/RCM:** the UCM board detected a rope brake fault. The I_RM and I_RCM are low, and common ahead of the Rope Brake Switch (1Y) is high, so cause is likely the rope brake, not an effect of something else.

18. **HSCFlt:** High Speed Counter/Encoder Fault. Speed > 100%, INS > 150fpm, Door Open > 50 fpm, speed < 10fpm during run, wrong direction

19. **ETSFlt:** An ETSDN or ETSUP input were OFF while running fast speed, which indicates the car did not slow down ahead of the switches, or the ETSDN or ETSUP switches are faulty.

20. **DZ-Flt**: A Door Zone Fault was detected. The Door Zone input (TB:20) was stuck on during the slowdown of a fast speed run and before an Up or Down Level signal came on. Check the Door Zone sensor.

21. **SafStr**: The safety string inputs for either the MR-SIB or CT-SIB is low, which may be caused by any safety string device being open at TB: 1X, 1Y, 1T, 1B, 2, 3, 3A, 3E or 3X.

22. **Out-DZ**: The car has stopped outside the Door Zone (TB:20) while in Normal Operation.

23. **Auto**: The car is in Automatic Operation and the car should respond to car and hall calls.

24. **NoCall**: The car is not answering Hall Calls while in Normal Operation mode, which may be caused by Inspection, Independent Service, Fire Service, Medical Emergency Service, Shutdown, Door Check Fault, etc. The cause is likely shown in one of the other car status or fault messages.

Message 3333333333 displays one of the following messages:

1. **CAN#Error**: A configured CANbus device is not communicating on CANbus channel "#". This may apply to any I/O board, MR-SIB, CT-SIB, or APS signal that loses communication with the Main CPU. If communication to an I/O board or the APS system is lost while the car is running on normal operation, the car stops, runs down on slow speed until reaching the next landing, stops, and shuts down until communication is restored.

2. **ELGO–Err**: An ELGO APS fault is present, and the car shuts down until the fault condition is corrected and reset. All computed selector signals are disabled, while the Up and Down Normal Limits are enabled in order to allow the car to run at slow speed to the nearest door zone, or to be run on Inspection.

3. **BORIS–EmP**: The Battery Rescue Operation input is off.

4. **Bad–Power**: The Reverse Phase Monitor "Ready" input (RDY) is off, or the Motor Overload input is tripped, if applicable.

5. **Emerg–Pwr**: The Emergency Power input (TB:EP) is off.

6. **Shutdown**: The car is in shutdown.

7. **Power–OK**: None of the other fault conditions exist. The car is on normal power, and not on shutdown.

Message 44 displays one of the following messages:

1. The car position is displayed as a number between 1 and 64, with 1 as the bottom landing.

2. If the floor position is not known (such as on initial installation), then message 44 shows "??".

Message 55 displays one of the following messages:

1. **UP**: The car is running up.

2. **DN**: The car is running down.

3. **DC**: The car gate and hall doors contact inputs are ON.

4. **DO**: The car gate and/or hall doors contact inputs are OFF.

Message 666 displays one of the following messages:

1. **UL**: The car is leveling up.

2. **DL**: The car is leveling down.

3. **FDL**: The car is leveling down while seeking the nearest floor (False Down Level).

4. **FS**: The car is running fast speed.

5. **SS**: The car is running slow speed.

6. **1FR**: The car is running at an intermediate one-floor-run speed.

7. **DZ**: The car is in the Door Zone.

8. **OD**: The car is not running, and it is not in the door zone.

Message 77777 displays one of the following messages:

1. **DrChk**: The Door Contact Inputs (TBs: 4, 4R, 5, 5B, 5T, 5R) indicate that all door contacts are closed but the Door Closed Limit(s) are ON.

2. **DrLmt**: The Door Open Limit (F/R) and the Door Close Limit (F/R) are both OFF.

3. **OPNG**: The door open output is active, and a door (Front or Rear) is opening.

4. **CLSG**: A door(s) (Front or Rear) is closing. Note that the door close output is ON while the car is running.

5. **OPEN**: A door(s) (Front or Rear) is fully open.

6. **CLSD**: The doors are fully closed.

7. **STOP**: The doors have stopped and are not fully open or fully closed.

Message 8888# displays one of the following messages:

1. **Nudge**: Door Nudging Operation is active.

2. **TDOpn**: The Door Open Timer has tripped because the doors failed to open fully within the adjustable time "DOOR STUCK TIME".

3. **TDCls**: The Door Close Timer has tripped, because the doors failed to close fully within the door stuck time.

4. **T-EYE**: The Electric Eye Cutout Timer has tripped. The Electric Eye Input is cut out.

5. **Homing**: The car is in process of Homing to the designated homing landing.

6. **(no message)**: None of the conditions above are present.

7. **(Floor #)**: The entered floor number used for entering car calls and halls calls from the keypad is displayed if none of the other conditions above are present. If the entered call has been set to be a rear opening using the key $\boxed{.}$, the letter "R" appears to the right of the entered floor number.

Message FL1 FL2 FL3 FL4 FL5 displays the fault code history for the 5 most recent, but not necessarily active, APP faults present in the system, where the leftmost fault (FL1) is the most recent fault. Refer to the fault log to see specific fault details, such as the timestamp and car status bits.

Message CAR:00 displays the currently active car calls in hexadecimal format, up to 64 landings.

Message HALL:U00 displays the currently dispatched up hall calls in hexadecimal format, up to 64 landings.

Message D00 displays the currently dispatched down hall calls in hexadecimal format, up to 64 landings.

4th Line Fault Message: If there is a currently active fault condition, the fourth line of the car status displays the fault code and description. If multiple fault conditions exist, the most recent fault is displayed. After the fault condition clears, the fourth line of the car status display resumes showing the "CAR:00 HALL:U00 D00" information.

7.1.4 Main CPU - Setup Menu

7.1.4.1 Main CPU - Setup Menu Screens

```
Press ENTER To
Edit Adjustable
Timers/Landings
```
 * →
```
NUMBER OF LDGS    8
MAIN FIRE LDG     1
ALT. FIRE LDG     2
UP RUN SHTDN TMR 25
```
→
```
Save Settings?


0 = No
1 = Yes
```

```
<-PRV         NXT->
Press ENTER To
Edit Adjustable
Settings/Features
```
 * →
```
NO SHORT DR TIME ON
TIMED EYE CUTOUT OFF
DOOR NUDGING     ON
1 STROKE DN LANT ON
```
→
```
Save Settings?


0 = No
1 = Yes
```

```
<-PRV         NXT->
Press ENTER To
Reset Settings
```
→
```
Reset Settings?


0 = No
1 = Yes
```
 * →
```
Reset Complete

Press ESC
 to continue
```

```
<-PRV         NXT->
Press ENTER To
Edit Homing Data
```
→
```
Homing Mode:      0



  Homing Disabled
```

```
<-PRV         NXT->
Press ENTER To
Edit ELGO APS
```
 * →
```
ELGO APS Learn   Off
Dead Zone Rng  0.2"
Floor To Trim     1
Trim Offset    +0.1"
```

↑ = Press **Nxt**
↓ = Press **Prv**
→ = Press **Ent**
← = Press **Esc**
 * = Enter Password to Continue

```
<-PRV         NXT->
Press ENTER To
Begin IP Setup
```
 * →
```
IP  10 .10 .10 .1
MSK 255.255.255.0
GW  0  .0  .0  .0
DN1 0  .0  .0  .0
```

```
<-PRV         NXT->
Press Enter To
Show/Edit Openings
```
 * →
```
Floor Openings  1-8
   1 2 3 4 5 6 7 8
Nxt-> Floors <-Prv
Ent->Edit Esc->Quit
```
→
```
Floor Openings
   1 2 3 4 5 6 7 8
F  F F F - - - - -
R  R - - R - - - -
```

```
<-PRV         NXT->
Press ENTER To
Begin DST Setup
```
 * →
```
Daylight Saving Time
DST:Off      Inactive
Beg: mm/dd End:mm/dd
Start:mm/w Stop:mm/w
```

The normal sequence is to press **Nxt** to
scroll between the desired menu items.
Press **Ent** to use the menu item.
Press **Esc** when you are finished.

```
<-PRV         NXT->
Press ENTER To
Begin Time Setup
```
 * →
```
  Real Time Clock
Time: 12:59:59
Date: 12/31/2015
 Day: Mon   Cal:+000
```

> **NOTE: The Setup Menu is disabled while using the second-screen mode, where the** ⌈Aux⌋ **key toggles between Full Access Setup mode (CPU LED #4 = OFF) and Status-only mode (CPU LED #4 = ON). After a system boot, the CPU screen will default to Full Access Setup mode.**

7.1.4.2 Enter Password

```
Enter Password to
   Confirm

Password:
```

When attempting to enter a menu screen that allows for changes to be made to the controller, the password entry screen acts as a safeguard against unauthorized changes. The default password is 911.

1. Press ⌈Ent⌋ to confirm password or press ⌈Esc⌋ or to return to previous screen.

2. If password is accepted, you may continue to the next screen, otherwise press ⌈Esc⌋ to return to the previous menu and any changes made are then reverted.

A job specific password may be used if the "SECURE PASSWORD" feature is enabled. Please refer to the job schematics or contact Virginia Controls, LLC for this unique password.

> **NOTE: When entering a settings or timers menu, all changes are immediately applied while in the settings menu. This allows live settings or timer edits while the controller is running. A reminder of this is displayed on the password entry screen.**

> **WARNING: Settings may be edited while the controller is active. While most settings may not noticeably affect the controller behavior while in Normal Operation, it is recommended that the controller be manually taken out of service while making modifications to the settings and timers.**

7.1.4.3 Edit Adjustable Timers/Landings

The Edit Adjustable Timers/Landings menu displays and edits the values for timers, landings, and other numerical settings. System memory (FRAM) retains all values in this menu in case of power loss. Descriptions for the Edit Adjustable Timers/Landings Menu items may be found in Section 8.2.1.

1. Use the ⌈Nxt⌋ and ⌈Prv⌋ buttons to scroll between settings.

2. Press ⌈Ent⌋ to edit the setting.

3. For numerical settings such as timers or counters, enter the desired number using the keypad.

4. To confirm the settings change, press ⌈Ent⌋ and the value is immediately applied to the controller.

5. Press ⌈Esc⌋ to return back to the Setup Menu.

6. When exiting the menu, press ⌈1⌋ to confirm and save all changes, or press ⌈0⌋ to cancel all changes and revert all settings to the values saved prior to entering this menu.

For numerical settings, the standard minimum and maximum editable range is 0 – 999. Certain settings, such as timers and landings, are further restricted to a defined range, and any entered edits that are out-of-bounds are changed to the maximum (or minimum) limit. For example, the Main or Alternate Fire Service Landing cannot exceed the highest landing.

See Section 10 for a list of standard feature timer and other numerical settings. The factory tailors the available settings to the job specifications. Refer to the schematic for job-specific factory settings and defaults.

7.1.4.4 Edit Adjustable Settings/Features

The Edit Adjustable Settings/Features menu displays and edits available feature settings, which may be in the ON or OFF state. System memory (FRAM) retains all values in this menu in case of power loss. Descriptions for the Edit Adjustable Settings/Features Menu items may be found in Section 8.2.2.

1. Use the `Nxt` and `Prv` buttons to scroll between settings.

2. Press `Ent` to edit the setting.

3. For two-state Boolean (ON/OFF) settings, press `1` to enable the setting (ON), or press `0` to disable the setting (OFF).

4. To confirm the settings change, press `Ent`. The value is saved and immediately applied to the controller.

5. Press `Esc` to return to the Setup Menu.

6. When exiting the menu, press `1` to confirm and save all changes, or press `0` to cancel all changes and revert all settings to values saved prior to entering this menu.

See Section 10 for a full list of standard feature settings. The factory tailors the available settings to the job specifications. Refer to the schematic for job-specific factory settings and defaults.

7.1.4.5 Reset Settings

All settings, timers, and the floor openings table may be reset to factory-configured default values using this menu option. To reset the user-defined settings to factory configured defaults:

1. Press `1` to confirm.

2. Enter the password.

3. Press `Ent` to confirm or press `0` to cancel.

> **WARNING: Resetting clears all settings and system state variables to factory configured settings in the configuration file.**

Refer to the schematic configuration page for job-specific factory settings and defaults.

7.1.4.6 Reset Counters

To reset the up and down run counters and front and rear door cycle counters:

1. Press `1` to confirm.

2. Enter the password.

3. Press `Ent` to confirm or press `0` to cancel.

Counters for run events and door cycles are viewable in the main menu listing under "View Counters". Counters may be directly reset in the "View Counters" screen by pressing the `.` key.

7.1.4.7 IP Setup Menu

The IP Setup Menu is preconfigured by the factory. This menu is available to update the IP Address, Gateway, DNS, or MAC Address to the controller. These settings must be configured correctly in order for the controllers to communicate dispatching and monitoring data over an Ethernet network.

	Data Format	Description
IP	10 .10 .10 .1	IP Address reference value. All IP addresses are computed from this.
MSK	255.255.255.0	Mask
GW	0 .0 .0 .0	Gateway
DN1	0 .0 .0 .0	DNS1
DN2	0 .0 .0 .0	DNS2
MAC	0004A3000000	MAC Address
HST	VISION_MZ_CPU	Host name

1. Use the **Nxt** and **Prv** buttons to scroll between IP Setup Menu Settings.

2. Press **Ent** to edit the setting.

3. While editing a setting, use the **Nxt** and **Prv** buttons to scroll the cursor left and right along the available digits.

4. Use the keypad to enter the desired number.

5. Press **Ent** to confirm and save the changes.

6. To enter hexadecimal values, use the **.** key to add 8 to the previously entered value. The conversion table is as follows:

   2 + **.** = A   **3** + **.** = B   **4** + **.** = C   **5** + **.** = D   **6** + **.** = E   **7** + **.** = F

The MAC Address is set by the factory to a unique address. The Gateway, DNS1, and DNS 2 settings should be set to 0.0.0.0 unless otherwise specified in the schematics.

> **NOTE: The IP settings are pre-configured by the factory, and should not be modified in the field. It may be necessary to update the IP address if a CPU is ever replaced or updated. If the IP addresses are not set correctly, other controllers in a group network may not recognize the system.**

The IP address for the controller CPU is calculated using the "IP Reference" value, based on Table 27. The default IP address reference value is 10.10.10.1, but may be adjusted if necessary to avoid IP conflict with other connected systems. If that is the case, all controllers in a connected group must use the same "IP Reference" value menu setting.

The computed IP address is determined based on the controller number to ensure each CPU in a connected group has a unique IP address, based on the following rule:

RULE: Multiply the controller number index (0-based) by 2, then add 1, and then add to the IP reference value.

This rule allows for cross-compatibility between Vision 1.0 and Vision 2.0 systems, where dispatching systems in a group communicate using even-numbered IP addresses.

Controller Number	DIP sw 1	DIP sw 2	DIP sw 3	IP Reference Value	Computed CPU IP Address
A	OFF	OFF	OFF	10.10.10.1	10.10.10.2
B	ON	OFF	OFF	10.10.10.1	10.10.10.4
C	OFF	ON	OFF	10.10.10.1	10.10.10.6
D	ON	ON	OFF	10.10.10.1	10.10.10.8
E	OFF	OFF	ON	10.10.10.1	10.10.10.10
F	ON	OFF	ON	10.10.10.1	10.10.10.12
G	OFF	ON	ON	10.10.10.1	10.10.10.14
H	ON	ON	ON	10.10.10.1	10.10.10.16

After updating the CPU IP settings, the CPU must be rebooted. Restart the CPU by either cycling power or using the CPU Reset button next to the LCD screen.

7.1.4.8 Show/Edit Floor Openings

Floor Openings Menu Screen

```
Floor Openings  1-8
   1 2 3 4 5 6 7 8
Nxt-> Floors <-Prv
Ent->Edit Esc->Quit
```

Floor Openings Edit Screen

```
Floor Openings
   1 2 3 4 5 6 7 8
F   F F - F F F - -
R   - R R R - - - -
```
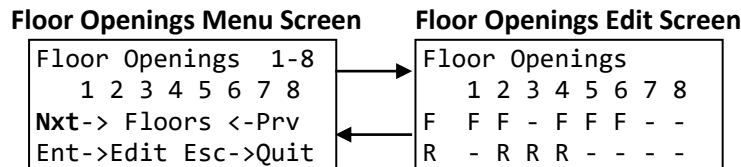
The Floor Openings menu views and edits the current door openings configuration at each landing. The factory configures door openings at each landing based on job specifications. Only door openings pre-configured by the factory may be enabled or disabled, which prevents any non-physical door openings from being enabled. All door openings above the top landing are also permanently disabled.

1. Press **Ent** to proceed to the Floor Openings Edit screen, and press **Esc** to return to the Floor Openings Menu Screen. While on the Edit screen, the currently configured door openings at each floor are displayed. A blinking cursor highlights a particular floor number, and the front (F) or rear (R) opening.

2. Press **1** to enable a floor, and press **0** to disable a floor at the cursor position. The display then shows (F) or (R) if the floor opening is enabled, or (-) if the floor opening is disabled.

3. Scroll between floors using **Nxt** and **Prv**.

4. To edit the rear openings, scroll past the front openings (top line) by continuing to press **Nxt** until the cursor reaches the bottom line of the screen.

Each screen contains 8 distinct landings. For systems with greater than 8 landings, use **Nxt** and **Prv** while on the Floor Openings Menu Screen to select which landings to edit in groups of 8, i.e. 1-8, 9-16, etc. The number of landings available to edit will depend on the number of landings settings parameter.

When making changes to the floor openings, the system requires a password to confirm the changes.

> **NOTE: The factory configures the floor opening table using a job-specific configuration file, based on the ordered specifications. A factory reset clears the floor openings table and sets it to factory-configured settings. Contact Virginia Controls if any changes to the configured floor openings are needed.**

7.1.4.9 Edit ELGO APS Settings

When using an ELGO Absolute Positioning System, the parameters and Learn Procedure may be accessed using this menu. Refer to Section 5.2 for details on using each menu item, and how to perform the ELGO APS Learn Procedure.

7.1.4.10 DST (Daylight Savings Time) Setup Menu

```
┌─────────────────────┐
│Daylight Saving Time │
│DST:Off      Inactive│
│Beg: mm/dd End:mm/dd │
│Start:mm/w Stop:mm/w │
└─────────────────────┘
```

Daylight Savings may be enabled and customized using the DST Setup Menu.

1. Use the **Nxt** and **Prv** buttons to select between DST ON/OFF and the customizable Starting/Stopping Month/Week DST settings.

2. Press **Ent** to edit the setting.

3. While editing the "DST" setting, use the **1** key to enable DST (On) and **0** to disable DST (Off).

4. Press **Ent** to confirm.

The controller then automatically adjusts the time on the DST beginning and end times if the "DST" setting is set to ON. Otherwise, it operates using Standard Time (ST).

- The second line of the display shows whether DST is currently active or inactive for the current time and date.

- The third line of the display shows the calculated beginning and ending dates for DST for the current year, where (mm) represents the 2-digit month, and (dd) is the 2-digit day of the month.

- The fourth line displays the computed Starting/Stopping Month (mm) and Week (w) DST rules that are used to calculate the actual beginning and ending DST schedule, shown in the third line of the display.

The current rules for DST (as of 2021) were set by the United States Congress in 2007, where DST begins at 2:00 am on the 2nd Sunday of March and ends at 2:00 am on the 1st Sunday of November, which are the set factory defaults.

After changing the DST settings, the settings update when exiting the DST Setup Menu.

5. Press **Esc** to exit the menu, enter the password.

6. The settings then update immediately upon confirming the password by pressing **Ent**.

7.1.4.11 Time Setup Menu

```
┌─────────────────────┐
│   Real Time Clock   │
│Time: 12:59:59       │
│Date: 12/31/2015     │
│ Day: Mon    Cal:+000│
└─────────────────────┘
```

The time setup menu sets the time, date, and calibration for the Real Time Clock (RTC) located on the MR-SIB. After being set using this menu, the RTC provides time data to the controller CPU.

1. Use the **Nxt** and **Prv** buttons to select between Time, Date, or Calibration settings.

2. Press **Ent** to edit the setting. A blinking cursor indicates which setting is currently being edited.

3. While in edit mode, enter the desired number using the keypad.

4. To confirm the settings change, press **Ent** to proceed to the next item, or **Esc** to go to the previous item.

Based on the entered date, the current day of the week is displayed on the 4th line.

When changing the RTC settings, the time updates when exiting the Time Setup Menu. Press **Esc** to exit the menu, and enter **1** to save the time.

The RTC calibration value is preset by the factory to fine-tune the RTC accuracy relative to internet standard time. If the clock seems to be running fast over time, increasing the calibration value slows the clock, and vice-versa to speed up the clock. A change of 1 calibration count speeds up or slows down the clock by approximately 44 milliseconds/day, allowing for very precise control. The RTC calibration ranges from -127 to +128. Use the .key to change the calibration sign between +/-.

The RTC is designed to auto-calibrate when connected in a multi-car group. The lead controller acts as the time master, and all other controllers automatically adjust their RTC calibration to match the time of the lead controller.

7.1.4.12 Homing Settings Menu

```
Homing Mode:       0 Homing Mode:       1 Homing Mode:       2 Homing Mode:       3

                                                               Primary    Floor 1
   Homing Disabled    Homing to Main Floor Homing to Floor ##  Alternate Floor 2
```

The Homing Settings Menu is used to customize homing behavior, and selects between 4 homing modes. Use the top line of the screen to select the homing mode by pressing **Ent** and then the number of the desired mode as follows:

Mode 0 – Homing for this car is disabled.

Mode 1 – After homing delay, the car is recalled to the main landing.

Mode 2 – After homing delay, the car is recalled to the specified homing landing.

Mode 3 – After homing delay, the car moves to homing landing 1. If homing landing 1 is already occupied, then the car moves to homing landing 2. If both homing landing 1 and 2 are occupied, then the car does not move.

Mode 4 – Allows for homing mode 3 to be customized based on the time of day using 4 blocks of time that repeat every 24 hours.

Block 1 (Morning) – example: Cars are recalled to the lobby

Block 2 (Lunch) – example: Cars are split between the lobby and middle floors

Block 3 (Afternoon) – example: Cars are distributed at the middle floors

Block 4 (Night) – Homing is disabled

```
Homing Mode:       4 Homing Mode:       4 Homing Mode:       4 Homing Mode:       4
 Time Step (1-4)  1   Time Step (1-4)  2   Time Step (1-4)  3   Time Step (1-4)  4
  Morning    06:00     Lunch      11:30     Afternoon  12:30    Night      17:00
  Pri: 1  Alt: 2       Pri: 3  Alt: 1       Pri: 3  Alt: 2       Homing Disabled
```

Use the 2nd line of the Homing Mode 4 screen to select one of the 4 blocks of time to be edited on lines 3 and 4. For each block, the starting time may be edited by using the 3rd line, and the Primary and Alternate Homing floors may be edited using the 4th line.

1. Use the **Nxt** and **Prv** keys to scroll between lines.

2. Press **Ent** to edit that line's data.

3. Press **Esc** to cancel each edit. The data is updated immediately.

The ending of each time block is defined by the starting time of the next time block, so the system cycles through each time block sequentially, such that one block is active at any given moment. Blocks 1-3 provide two homing landings (only the Primary Floor is used if not connected in group operation), which behave like Homing Mode 3, while Block 4 is available to disable homing. If only one homing landing is desired while in group operation, set both the primary and alternate floor to the same landing. It is possible to skip a time block by

defining its starting time to match the next block's starting time, effectively giving it a duration of zero time. While editing the starting times for each block, the system rejects edits that cause a conflict with the time of the next or previous block, where the starting time of one block is later than the starting time of the next block.

7.1.4.13 High Speed Counter / Encoder Calibration Menu

```
Calibrate HSC: START
Calibrated: 00000000
Pulses/Sec: 00000000
Speed(fpm):  +000.0
```

The High Speed Counter menu calibrates and monitors the encoder signals that determine car speed.

The first line initiates the HSC Calibration routine.

The second line displays the current calibration value for contract speed in encoder pulses per second.

The third line displays the live measured data from the encoder in pulses per second.

The fourth line displays the calibrated speed of the car in feet per minute.

The user may calibrate the high speed counter by pressing Ent, and setting the value to ON by pressing 1 then Ent. The first line will change to "Calibrating – xxx fpm" and the system will begin calibration during the next full speed run. At the end of the next full speed run, the first line display returns to "Calibrate HSC: START", the updated calibration values are displayed on lines 2 and 4, and the system is ready to calibrate again if desired.

It is possible to exit this menu screen during the calibration routine. After the "Calibrating – xxx fpm" prompt is shown on the screen, the calibration sequence is armed and will automatically begin measuring speed data during the next full speed run. It is recommended to return to the "Car Status" menu screen, where the user may place car calls and send the car on a full speed run. Return to the High Speed Counter menu to confirm calibration is complete and the speed data is accurate on the next run.

7.1.5 Machine Room Data

```
M01 1Y GovernrSw  ON
M02 1T Roped Saf  ON
M03 1B Final Lmt  ON
M04 2   Pit Stop  ON
```

This menu monitors the 50 MR-SIB inputs, which are read by the controller CPU. The "Show I/O Status" menu displays similar information, but this menu provides a descriptive label for each input for convenience. The left side describes the terminal block label, the middle contains the input description label, and the right side describes the current input state.

The MR-SIB inputs are cross-checked by the controller CPU, comparing input data from both the CPLD and MR-SIB I/O processor. If there is a cross-check conflict, then "ERR" is displayed, indicating a hardware issue. If no data is being received from the MR-SIB I/O processor, then "– – –" is displayed, indicating a hardware issue.

Use the **Nxt** and **Prv** keys to scroll through the menu one item at a time, and use the **1** and **4** keys to page up and page down four items at a time.

For the full list of 50 MR-SIB inputs, refer to the list found in Section 9.2 or the "VNX" page of the schematics.

7.1.6 System Status

```
Machine Room SIB  OK
Machine Room IO   OK
Car Top      SIB  OK
Car Op Panel IO   OK
```

The System Status menu shows the communication status of all connected boards and devices at a glance. Use the **Nxt** and **Prv** keys to scroll up and down the screen. If the status is not OK, then that device is not communicating.

7.1.7 View Counters

```
Counters:  "."=Reset
Trips: U00000/D00000
Doors: F00000/R00000
Level: UL0000/DL0000
```

The View Counters menu shows the accumulated total of:

- Up runs (U00000)
- Down runs (D00000)
- Front door cycles (F00000)
- Rear door cycles (R00000)
- Up re-leveling events (UL0000)
- Down re-leveling events (DL0000)

The up or down run counter increments every time the car initiates fast speed to move to another floor while in Normal Operation.

The front or rear door cycle counter increments every time the door close limit input activates, indicating the door has been opened from a closed position.

The up or down re-level counter increments if the car initiates a slow-speed run while on a leveling target. The counter does not increment during a normal fast speed run and is intended to capture an event when the car re-

levels while already stopped at a landing, such as rope stretch compensation or leveling correction after overshooting a landing.

The counters may be reset by pressing $\boxed{.}$ and entering the password, or by using the "SETUP MENU – RESET COUNTERS" menu, as described in Section 7.1.4.6.

7.1.8 Internal Memory

Memory Value of 1st byte
(ex: address A0000000)

Memory Value of 2nd byte
(ex: address A0000001)

Memory Address of
top left value →

Memory Address of
bottom left value →

```
A0000000  00  01  02  03
A0000004  04  05  06  07
A0000008  08  09  0A  0B
A000000C  0C  0D  0E  0F
```

Memory Value of 3rd byte
(ex: address A0000002)

Memory Value of 4th byte
(ex: address A0000003)

Memory Value of 1st byte
(ex: address A000000C)

The "Show Memory" screen shows the live contents of the CPU memory map, which is specific to the controller firmware version number. This menu is primarily used for factory troubleshooting. Contact Virginia Controls technical support for assistance before attempting to use the memory map.

The left 8 digits of the Memory menu display the hexadecimal address of the leftmost byte, followed by 4 pairs of digits, which each represent 8 bits (or one byte) of data. The readable memory ranges from:

- 0XA0000000 to 0XA001FFFF which is CPU Static RAM (SRAM)

- 0x9D0000000 and 0x9D07FFFF which is CPU FLASH Memory

Flash memory is accessed by entering 0 and SRAM is accessed by entering 8.

7.1.8.1 Navigating Internal Memory Menu

A specific memory location can be accessed by scrolling, using the following keypad commands:

Press 1 to decrease by 1000 (Hex).

Press 4 to increase by 1000 (Hex).

Press 2 to decrease by 100(Hex).

Press 5 to increase by 100 (Hex).

Press 3 to decrease by 10 (Hex).

Press 6 to increase by 10 (Hex).

Press Nxt to decrease by 4 (Hex).

Press Prv to increase by 4 (Hex).

Press Esc to return to the menu screens.

Press 0 to access FLASH memory.

Press 8 to access SRAM memory.
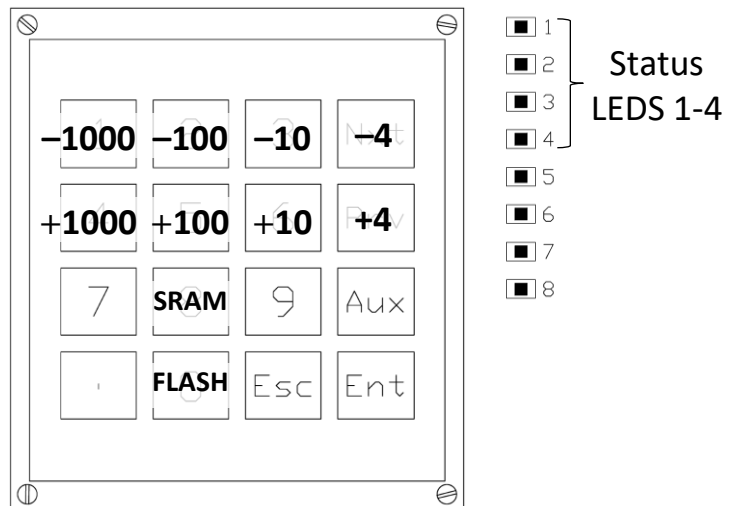
Figure 60: Keypad layout and Status LEDs in Memory mode.

7.1.8.2 Internal Memory Status LEDs

The Status LEDs 1 – 4 on the right side of the CPU board (see Figure 60) have an assigned behavior while in "Show Memory" mode. Each LED corresponds to the logic state of one of the four 2-digit memory bytes on the top line of the display. Status LED 1 corresponds to 1st memory byte, LED 2 corresponds with the 2nd memory byte, and so on. Each Status LED is lit as long as the corresponding memory byte is not equal to zero (00), and is off while the byte is equal zero (00). This allows the LEDs to show rapid changes in the status of the internal memory more reliably than using the LCD screen.

7.1.9 Fault Log

```
   FAULT LOG VIEW           NUM    FAULT     SYS
 1 - SYS FAULT LOG          01/01/2021 12:59:59
 2 - APP FAULT LOG          COD ..FAULT_LABEL..
 0 - CLEAR FAULT LOG        FL:## Stat:ABCDEFGH
```
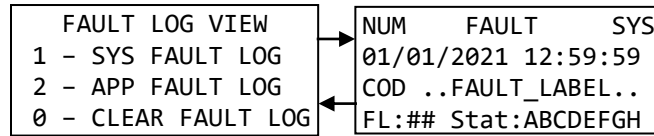
The Fault Log is divided into two sections, which may be selected when first entering the fault log menu. See Section 10.2 for fault log descriptions.

The System Fault Log (SYS) includes relevant system information events and faults involving the CPU, CANbus network, group communication, MR-SIB, CT-SIB, I/O board, or Auxiliary Relay board status.

The Application Fault Log (APP) includes operational events and faults, such as:

- Fire Service
- Stop Switches
- Door fault
- Starter and Running timeouts

Each entry in the fault log is further categorized as either a FAULT or EVENT, as displayed in the center of the top line of the fault log display. This helps describe the fault log entry at a glance, where an EVENT refers to a noncritical change in the state of the elevator system, while a FAULT refers to the likely cause of a malfunction.

- Use the **Nxt** and **Prv** keys to scroll between faults in chronological order, where the most recent fault number is set to 001 (see NUM in diagram above). Older faults are incremented consecutively, and up to 480 faults may be stored before newer faults overwrite them.

- Use the **3** and **6** keys to page up and page down in 10 fault increments.

The second line of the display shows the timestamp for the fault, to the nearest second. If multiple faults occur at the same time, the faults display in order of occurrence.

The third line of the display shows the fault code (COD) and fault label. Refer to Section 10.2 for a description of all faults and events in fault code order.

The fourth line of the display shows additional information provided for each logged fault or event. The information displayed depends on the type of fault, and is described in the fault log descriptions in Section 10.2. Most faults will provide the following standard information:

If the data is displayed in this format "FL:## Stat:ABCDEFGH", then:

- FL:## refers to the current floor

- Stat:ABCDEFGH is the car status when the fault occurred.

There are 8 car status bits, labeled in order from left to right as ABCDEFGH. Each of these status bits are described in the following table:

Table 28: Car Status Bits.

Status Bit	Status Description
FL:##	Floor Position: 1 = bottom landing
A	Car Door Contacts Status
B	Safety String Status
C	Door Open Limit
D	Door Close Limit
E	Direction Status: Up = 1, Down = 0
F	The car was running
G	The car was running in fast speed
H	Door Zone

7.1.9.1 Resetting the Fault Log

To reset APP fault log data, press `0` while viewing the APP fault log. To reset the SYS fault, press `0` while viewing the SYS fault log. To reset both the APP and SYS fault logs at once, press `0` while on the fault log menu screen. Clearing the fault log is not recommended. Old faults are automatically overwritten after the fault log is filled to its 480 fault capacity. A password is required to reset the fault log.

7.1.10 I/O Status

The Show I/O Status menu displays live data for the I/O boards, MR-SIB inputs, CT-SIB inputs, analog inputs, encoder data, and absolute position data. This allows for remote monitoring of all I/O, which is not accessible in the machine room. The I/O status menu is organized by CANbus channels 0 – 3. All I/O is read through CANbus, so this menu is organized by CANbus channel and data received by the board.
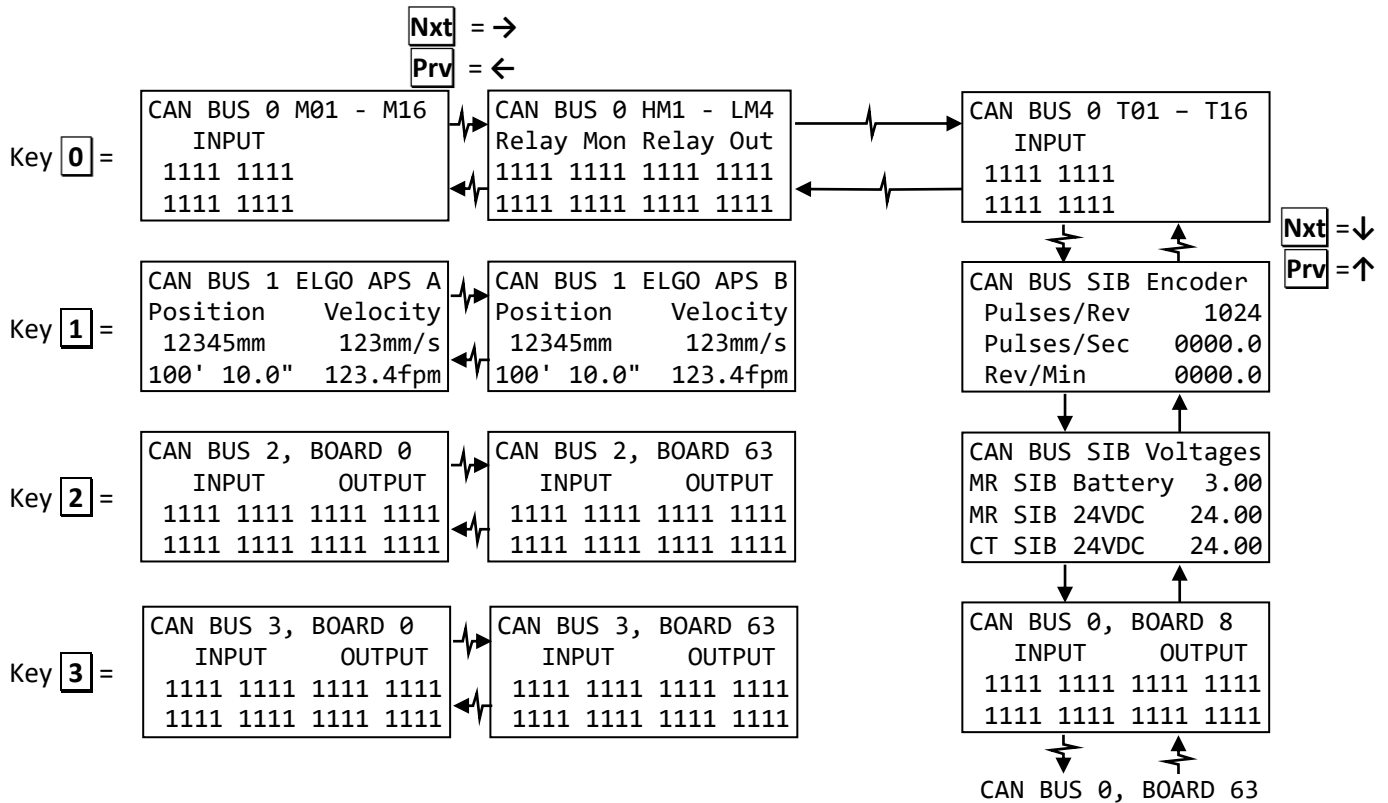
1. Press the number keys `0` through `3` to navigate to the corresponding CANbus channels 0 – 3.

2. Press `Nxt` and `Prv` to scroll between the I/O board numbers 0 – 63, based on which boards are communicating and configured. If a board displays all dashes " – ", then the board is not communicating. If the board index does not match the configuration, the board displays its data based on its DIP switch assigned board number.

> NOTE: The MR-SIB inputs 1-16 and outputs 1-16 are designated as CANbus 0 board #8.

For Remote I/O boards (16-In / 16-Out), the 16 inputs are shown using the left two columns, and the 16 outputs are shown using the right two columns. For Hall I/O boards (2-In / 2-Out), only the first 2 input bits are used on the left two columns, and only the first 2 output bits are used on the right two columns.

When using an Absolute Positioning (APS) system on CANbus 1, the positioning data is displayed in place of CANbus 1 in the "Show I/O Status" menu. The menu displays the absolute position counts in mm, and the converted position in feet and inches in real time. Velocity is displayed in both mm/s and feet per min. Press **Nxt** and **Prv** to switch between ELGO channel "A" and "B", which should always read 40mm apart.

```
┌─────────────────────────┐
│     Firmware Version     │
│    Bus 0 - Board 08      │
│         1.0.1.6          │
│                          │
└─────────────────────────┘
```

Press the **.** key to see the I/O Board Processor firmware version of an I/O board, MR-SIB, or CT-SIB.

7.1.11 Display ELGO APS & Car Top Data

```
┌─────────────────────────┐
│ 31      Up Level ON      │
│ 30   Up Slowdown OFF     │
│ 20      Door Zone ON     │
│ 33   Dn Slowdown OFF     │
└─────────────────────────┘
```

This menu displays the commonly used Car Top I/O and ELGO positioning signal states while at the controller, as an alternative to the Car Status and I/O Status menus. The "Show I/O Status" menu displays specific I/O board inputs and outputs as bits, while this menu provides a descriptive label for each input for convenience. The left side describes the terminal block label, the middle contains the input description label, and the right side describes the current input state, "ON" or "OFF".

1. Use the **Nxt** and **Prv** keys to scroll through the menu one item at a time.

2. Use the **1** and **4** keys to page up and page down four items at a time.

For items not included in this list, refer to the "Show I/O Status" menu for the full list of inputs and outputs on all I/O boards.

7.1.12 Display ELGO Floor Height Data

```
┌─────────────────────────┐
│ Floor  1    0' 0.1"      │
│ Floor  2    8' 5.9"      │
│ Floor  3   17'11.7"      │
│ Floor  4   25' 3.5"      │
└─────────────────────────┘
```

When using the ELGO Absolute Positioning System, this screen displays floor position data for each landing, relative to the bottom landing. Use this menu to verify that the floor positions have been learned properly by comparing the displayed values to the actual floor heights. The current position may be seen using the "Show I/O Status – CAN BUS 1 ELGO APS" menu. The position 0' 0" is determined by the starting point of the ELGO APS Learn Procedure at the bottom landing. There are two independent sensors within the ELGO unit, offset by 40mm, and this floor height data is shared between the controller CPU (channel A) and CT-SIB (channel B). The position of each landing may be fine adjusted +/- 0.5" using the "Edit ELGO APS" screen in the Setup Menu. See Section 5.2.1.2 for details.

7.1.13 Safety Status

```
Mode: Normal Service
Fault:
Term:
### CURRENT FAULT
```

The Safety Status screen contains information on the current Inspection Mode, and whether there is an existing fault in the inspection string or run relays.

If there is an inspection fault or run relay fault, the Safety Status screen displays the fault conditions on the 2nd and 3rd line. All inspection and relay faults latch a shutdown, requiring manual reset by toggling the Fault Reset input (RST). If a fault is currently active, the 4th line displays the fault label until the fault condition is cleared.

The 1st line of the display describes the currently active mode of operation, as shown in the following table:

Table 29: 1st Line of Display - Currently Active Modes of Operation.

Mode	Description	Terminals	LED indicators
Normal Service	Normal Operation mode is active.	23 & NRM=ON	M42
Controller Ins	Controller Inspection mode is active.	23 & INS = ON	M41
Insp Access	Inspection Access mode is active.	23A	T16
Bypass Sws	Bypass Operation mode is active.	n/a (use switches)	M38 or M39 or M40
In Car Insp	In Car Inspection mode is active.	23X	T13
In Car Bypass	In-Car Bypass mode is active.	23X	T13
Car Top Insp	Car Top Inspection mode is active.	23T	T09
CarTop Bypass	Car Top Bypass mode is active.	23T & 26	T09
Leveling	Releveling while on Normal Operation.	NRM & 20 & leveling	M42 & M08
Construction	Construction mode: (if enabled)	INS w/CPLD sws 7 & 8	M41
None	No inspection or normal mode input is active, or there are conflicting mode inputs. The controller is inoperable.	23,23A,23T,23X = OFF	T09, T13, T16, M42, M41 = OFF
CANbus # Comm Error	CANbus communication for channel #X is disrupted.	n/a	n/a

The 2nd line of the display describes the fault description, as shown in the following table.

Table 30: 2nd Line of Display – Fault / Group Status Descriptions.

Fault	Description
Insp Str Open	Inspection String is open. No inspection or normal mode input is active.
Insp Mode Flt	Inspection Mode Fault. More than one inspection or normal mode input is active.
Insp Run Input	Inspection Run Input Fault. An inspection run input is active while not in the correct mode.
Normal Op Flt	Normal Operation Fault. An inspection mode or run input is active while on normal operation.
Run Relay Err	A run relay error (LM1-LM4 or HM1-HM4) has been detected. A relay monitoring input has detected a stuck open or closed relay contact. Refer to the fault log for specific details.
UpSlowdown Flt	(not used with ELGO APS) The Up Slowdown Limit input (M26) was on while floor position is at the top terminal landing. Or, the input was off while not at the top terminal landing according to the PI.
DnSlowdown Flt	(not used with ELGO APS) The Down Slowdown Limit input (M27) was on while floor position is at the bottom terminal landing. Or, the input was off while not at the bottom terminal landing according to the PI.
Up Normal Flt	The Up Normal Limit input (M25) is off while the car position according to the PI is not at the top terminal landing.
Dn Normal Flt	The Down Normal Limit input (M28) is off while the car position according to the PI is not at the bottom terminal landing.
Shutdown Defeat	The controller is in Shutdown Defeat mode. Most shutdown faults are defeated or auto-reset.

Fire Service Active	At least one car in a multi-car group is in Fire Recall or Fire Operation mode.
Medical Emergency	At least one car in a multi-car group is in Medical Emergency Recall or Car operation mode.
Emergency Power	At least one car in a multi-car group is in Emergency Power Recall or EP Run mode.
ELGO APS Data	The ELGO Absolute Positioning System data is not learned. Car may run on inspection only.
ELGO APS Comm	The ELGO Absolute Positioning System communication status is down. Check connections.

The 3rd line displays the terminal and label of the offending inspection mode input, inspection run input, or relay causing the fault, as shown in the following table:

Table 31: 3rd Line - Terminals and Labels.

Term	Offending Inspection Input	MR-SIB/CT-SIB input Terminals	MR-SIB/ CT-SIB LEDs
23T Car Top Sw	Car Top Inspection switch	23T	T09
23X In Car Sw	In-Car Inspection switch	23X	T13
23A Access Sw	Inspection Access switch	23A	T16
Controller Sw	Controller Inspection switch	23 & INS	M41
23N Normal Op	Normal Operation	23 & NRM	M42
23E Car Top En	Car Top Insp Enable input	23E	T11
25 Car Top Up	Car Top Insp Up Run input	25	T10
24 Car Top Dn	Car Top Insp Down Run input	24	T12
25X In Car Up	In-Car Insp Up Run input	25X	T14
24X In Car Dn	In-Car Insp Down Run input	24X	T15
Bypass Gate Sw	Car Gate Bypass switch	Car Gate Bypass switch	M40
Bypass Door Sw	Hall Doors Bypass switch	Hall Doors Bypass switch	M39
Bypass Lock Sw	Hall Locks Bypass switch	Hall Locks Bypass switch	M38
25T Access T U	Top Access Up Run input	25T	M17
24T Access T D	Top Access Down Run input	24T	M18
25B Access B U	Bottom Access Up Run input	25B	M19
24B Access B D	Bottom Access Down Run input	24B	M20
Controller En	Controller Insp Enable input	Controller Enable switch	M36
Controller Up	Controller Insp Up Run input	Controller Up Run switch	M35
Controller Dn	Controller Insp Down Run input	Controller Down Run switch	M37
Car Ins Normal	CT-SIB Normal Operation input	23	T07

7.1.14 Display Group Data

```
      Group Comm Status
             ABCDEFGH
Ethernet  M-------
CANBus 3  M-------
```

The Display Group Data screen contains information on the connection status of Vision 2.0 controllers in a multi-car group. Each controller in a group needs to be connected via Ethernet and CANbus 3. This menu displays the communication status for Ethernet and CANbus 3 of each connected controller. Each column references the controller number, labeled A – H, and the communication status may be decoded as follows:

Table 32: Display Group Data Communication Status.

M	"ME": Placeholder for the controller's own number.
U	"UP": Communication with this controller is active.
–	The communication with this controller is not active, and was not seen previously.

NOTE: Use the Display Group Data menu to confirm that all controllers are connected and communicating in a multi-car group.

7.2 Wireless Screen Access

7.2.1 Description

The Vision 2.0 Traction Controller may be configured for Wireless Screen Access (WSA). This allows the installer/maintainer to access all of the controller's LCD screens wirelessly through a dedicated Wireless Access Point (WAP) with a user supplied handheld smartphone or tablet with WiFi and web browser capabilities.

The controller CPU contains all of the software required, so there is no software to install on the phone or tablet.

7.2.2 WAP Installation

The recommended WAP is TP-Link AC1350 Ceiling Mount Access Point Model EAP225 – although other WAP will also work.

The EAP225 has the following features:

- 1000 MHz Ethernet
- Power Over Ethernet (POE) providing 24VDC power on the Ethernet cable
- Dual 2.4 and 5 GHz bandwidth
- Wall or Ceiling mounting

Mount the WAP on the hoistway wall, at approximately the midway point.

Run CAT5 or better Ethernet cable from the WAP to the provided power supply. Connect the power supply to any convenient 120VAC outlet in the machine room or hoistway. Connect another Ethernet cable from the power supply to the supplied Ethernet switch if this is a group installation or directly to the RJ45 Ethernet connector (J7) on the CPU card for a simplex installation. Ensure that the green light on the WAP is on solid.
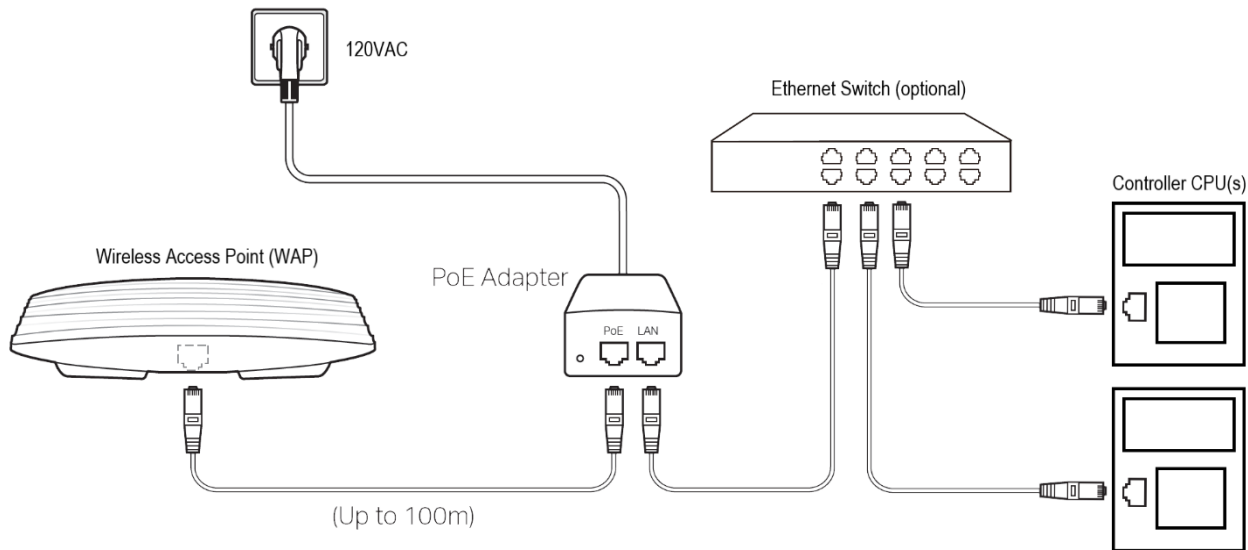
Figure 61: Wireless Access Point Power over Ethernet (PoE) suggested hookup diagram

7.2.3 WSA Operation

From the WiFi settings on the phone or tablet, select the TP-Link WAP. After a few seconds, the device may display a warning message that internet access is not available. This message is expected and can be ignored.

Open a web browser on the phone or tablet and enter www.vision.us or www.visiona.us for a simplex installation or for the first car of a multi-car group. For car B of a multi-car group, enter www.visionb.us. For car C, enter www.visionc.us, etc. If the controller does not connect, then alternatively manually enter the IP address of the controller into the browser, which is 10.10.10.2 by default for car A.

A duplication of the CPU LCD panel and keypad is displayed on the phone or tablet screen. All of the menus, screens and keypad functions available at the CPU are available on the phone or tablet.

> **Note: The CPU LCD and WSA always display the same data. Changing the screen on the CPU changes the display on the WSA and vice versa.**

7.2.4 WSA Security

Security in a wireless environment is a valid concern.

By default, the TP-Link WAP is configured as an open network, meaning that it does not require a password. Security can be enabled and a password set by following the instructions included with the WAP. The choice to enable security is left up to the installer.

As already described, the Vision 2.0 Controller CPU requires a password to change any settings, reset the log files, etc. Without the password, status and fault log information may be viewed, but nothing can be changed.

The ultimate protection for a wireless network is to secure it by unplugging either the WAP power supply or the WAP Ethernet cable whenever WSA is not in use.
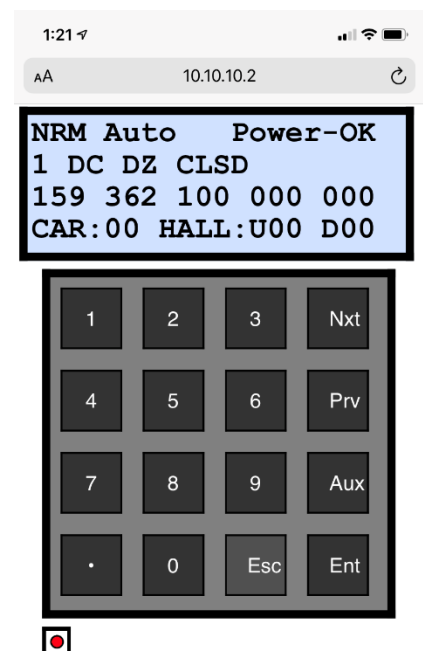

Figure 62: Wireless Screen Access display

8. System Configuration

Each Vision 2.0 controller is pre-configured by the factory with job-specific I/O board inputs and outputs, and factory defaults for settings, timers, and landing information based on the specifications. The controller serial number (job number) is shown on the CPU banner screen (see Section 7.1.2).

If the controller configuration file is corrupted or missing, the system cannot operate properly. If an incompatible configuration file is loaded, the banner screen displays "VerErr". If this is the case, contact Virginia Controls technical support for assistance and follow the instructions in Section 8.3.2 to load the provided configuration file update.

Field changes to the settings and timers are available using the setup menu (see Section 7.1.4). The descriptions for available settings are found below. Factory defaults for each setting and timer may be found in the configuration page (VNP) of the job-specific schematics. The number of landings is preset by the factory. If the factory setting is incorrect, contact Virginia Controls technical support for assistance.

I/O board configuration is printed in the job-specific schematics for each installed I/O board. Any changes to the I/O board inputs or outputs may only be made by the factory. If changes are desired, contact Virginia Controls technical support for assistance.

Door openings at each landing are also pre-configured by the factory. Users may enable or disable the door openings using the "Edit Floor Openings" menu (see Section 7.1.4.8). Users are restricted from enabling door openings that are not pre-configured by the factory. Contact Virginia Controls technical support if the door openings need to be changed.

The controller number is configured using DIP switches on the controller CPU (see Section 6.3.4), where controller 0 is labeled "A", up to controller 7 labeled "H". Each controller in a group must have a unique controller number. If a change to the controller configuration is required, contact Virginia Controls technical support for assistance. Follow the instructions in Section 8.3 to update the controller software and configuration file using a USB flash drive.

8.1 Settings and Timer Descriptions

The following sections include the list of all possible settings and timers that may be present in the Settings and Timer menus for a given controller. The list is preconfigured by the factory, and only items related to features in the job specifications are displayed.

Refer to the configuration sheet (VNP) in the drawings to see the settings and features provided for each particular job. The Settings listed here are standard. (NOTE: editable values range from 0 to 999, unless otherwise stated).

> **NOTE: Not all settings shown below are available for a given controller. If a desired setting is not provided, contact Virginia Controls technical support for assistance.**

8.2 Settings Descriptions

8.2.1 Numerical Settings

`NUMBER OF LDGS` **Number of Landings** –This is the number of landings that the controller can serve, and is a value typically between 2 and 64 for a traction elevator.

> NOTE: The "NUMBER OF LDGS" setting is read-only, and only adjustable by the factory. If the number of landings needs to be changed, contact Virginia Controls technical support for assistance.

`MAIN FIRE LDG` **Main Fire Landing** – This is the number corresponding to the Main Fire Landing, and is a number between 1 and 64. The maximum value for this setting is the "NUMBER OF LDGS" setting.

`ALT. FIRE LDG` **Alternate Fire Landing** – This is the number corresponding to the Alternate Fire Landing, and is a number between 1 and 64. The maximum value for this setting is the "NUMBER OF LDGS" setting.

`SHTDN DEF MODE` **Shutdown Defeat Mode** – This setting selects the behavior of the shutdown defeat input (DFT). If the shutdown defeat input is jumped, shutdown defeat is activated until the time expires based on the following table. Once the time expires, the input must be toggled off before being active again. The factory default setting is 1 week, which is the value "3".

Table 33: Shutdown Defeat Time Expiration.

Setting Value	Shutdown Defeat Input Expiration Time
0	1 Scan (one-shot)
1	1 Hour
2	1 Day (24 hours)
3	1 Week (7 days)

8.2.1.1 Tenth of a Second Timers

The following settings are for timers. The timer values are in tenths of a second.

`DOOR TIME HALL` **Door Time, Hall Call** – This is the amount of time that the doors remain open (after fully opening) when the car has stopped at in response to a hall call. After this time, the doors start to close.

> NOTE: If a car call is entered while the doors are open, the door time is reduced to the "DOOR TIME CAR" setting. If the Door Close Button is pressed while the doors are open, the door time is reduced to the "DOOR TIME SHORT" setting. This setting is normally 50, for a time of 5 seconds.

`DOOR TIME CAR` **Door Time, Car Call** – This is the amount of time that the doors remain open (after fully opening) when the car has stopped in response to a car call and there is no hall call present at that landing. After this time, the doors will start to close.

> NOTE: If a car call is entered, or the Door Close Button is pressed, while the doors are open, the door time is reduced to the "DOOR TIME SHORT" setting. The default setting is 20, for a time of 2 seconds.

`DOOR TIME SHORT` **Door Time, Short** – This is the amount of time that the doors remain open (after fully opening) when they have reopened in response to a Door Open Button/Safety Edge/Electric Eye/Infra-red Curtain and no hall call is entered. After this time, the doors will start to close. The default setting is 10, for a time of 1 second.

`REVERSAL DELAY` **Reversal Delay** – This is the minimum time the car waits before changing direction. Normally the doors cycle when the car stops, and that time exceeds the Reversal Delay. But if the car

reverses on Fire Service, or for some other reason, without cycling the doors, then this setting determines the delay before running in the other direction.

`AUTO FLRCHG 2+FR` **Auto Floor Change during 2-Floor-Run Speed** – This determines when the system increments the floor position after starting a 2-floor-run (or more) when using a two-speed system. This represents the delay before committing to two-floor-run speed, otherwise one-floor-run speed is used if a call is placed at the next landing. The timer should be set to increment the floor shortly after leaving the floor during initial acceleration, such that the drive can smoothly transition to one-floor-run speed if stopping at the next landing.

`HSC FAULT DELAY` **High Speed Counter Fault Delay** – This sets the delay before a High Speed Counter fault is initiated. The car shuts down, and the cause of the fault is logged.

`HSC START DELAY` **High Speed Counter Start Delay** – This sets the delay after the start of a run before the speed is checked for movement and proper direction.

`ETS FAULT DELAY` **Emergency Terminal Speed (ETS) Fault Delay** – This sets the delay before an Emergency Terminal Speed fault is initiated. The car shuts down, and the cause of the fault is logged.

`DELAY DROP O-P` **Potential Contactor Hold Timer** – This delay is used to hold the P-Contactor Relay "PP" energized for additional time at the end of a run.

`DELAY DROP O-PX` **Drive Enable Hold Timer** – This delay is used to hold the Drive Enable Relay "PX" energized for additional time at the end of a run.

`STOP SW. DELAY` **Stop Switch Delay** – This sets the delay before the safety string opens after a stop switch is opened.

`STOPPED FLT DLY` **Stopping Fault Delay** – This sets the time to wait before triggering run relay, machine brake, rope brake, ETSD, HSC, leveling, and door zone faults while the car is stopping at a landing. This is also the amount of time required before the next run can occur.

`1FR HOLD DELAY` **1FR Hold Delay** – This sets the delay to hold the 1FR output when the car is running full speed and slows down. It allows the car to pass the leveling zone of the previous floor, so that it stops at the correct floor.

`BRAKE VOLT DELAY` **Brake Hold Voltage Delay** – This delay is used to transition to hold voltage after lifting the brakes.

`BRAKE LIFT FAULT` **Brake Lift Fault Delay** – This delay determines how long to wait for the brake to lift before triggering a Brake Hold Fault.

`EBRAKE AFTER RUN` **Emergency Brake Hold Delay** – This is the delay after a stop before dropping the Emergency Brake. This delay is only active if the "BRAKE DELAYS RUN" setting is enabled.

`BRAKE DROP FAULT` **Brake Drop Fault Delay** – This determines how long to wait for the brake to drop before triggering a Brake Drop Fault.

8.2.1.2 Hundredth of a Second Scan Timers

These scan timers are used to avoid nuisance faults and provide brief delays during drive and brake sequences. Entered values are in terms of 1/100 of one second.

`ETS FAULT DELAY` **Emergency Terminal Speed (ETS) Fault Delay** – This sets the delay before an Emergency Terminal Speed fault is initiated. The car shuts down, and the cause of the fault is logged.

`ROPE CHECK TIME` **Rope Check Time** – This sets the window of time in which the rope brake check routine must be completed before triggering a rope brake relay check fault. If a relay contact monitor is in the wrong state, the system times out.

`UCM FAULT DELAY` **ETSD/UCM Fault Delay** – This sets the delay before an ETSD/UCM Monitoring Fault is logged. It should be set long enough to prevent nuisance faults.

`BRAKE LIFT DELAY` **Brake Lift Delay** – This timer provides a delay to lift the brake after the drive receives a speed command. This is not used for certain types of drives.

`UDX SPEED DELAY` **Speed Pattern Relay (UDX) Delay** – This timer provides a delay between the drive enable signal and a drive speed signal.

8.2.1.3 One Second Timers

The following settings are for timers. The timer values are in seconds.

`SHTDN RUN TIMER` **Shutdown Run Timer** (in seconds) – If the car runs up or down without passing a floor for this time, then shutdown will be initiated. The car will stop, attempt to auto-reset, and run at intermediate false down level speed to the nearest floor. If the car has faulted too many times, use the Fault Reset or Shutdown Defeat input to manually reset the fault. The default setting is 25 seconds.

`DR NUDGING TIME` **Door Nudging Time** – This is the time delay before initiating door close nudging while on normal operation, if the features "DOOR NUDGING" and "TIMED EYE CUTOUT" are enabled. A call must be registered, and the car must be in automatic operation. The timer resets when the doors are fully closed, or when the car starts a floor-to-floor run. The default setting is 25 seconds.

`ICU CUTOUT TIME` **Electric Eye Cutout Time** – This is the time delay before cutting out the Electric Eye Input, after it has been continuously energized. It resets when the car runs to the next floor. Turn on the setting "TIMED EYE CUTOUT" to enable this feature. The default setting is 20 seconds.

`CAR STUCK TIME` **Car Stuck Time** – This is the amount of time before disabling calls from the same landing as the car, so that the car can answer other registered calls. This operates as a stuck button timer. If the door is being held open by a door open button or safety edge input, the door will stay open and a "CAR STUCK" event is logged in the Fault log. The default setting is 15 seconds.

`DOOR STUCK TIME` **Door Stuck Time** – This is the time delay before stopping a door open or close cycle. This timeout would apply during a door open cycle if the door open limit input is not transitioned, or during a door close cycle if the door close limit input is not transitioned. The default setting is 20 seconds.

`DOOR RESET TIME` **Door Stuck Reset Time** – This is the amount of time that the doors are held open after failing to close properly, before retrying to close. The default setting is 10 seconds.

`KILL IDS ON FIRE` **Delay Before Canceling Independent Service on Fire Service** – This is the time delay before Independent Service is cut out when Fire Service Phase 1 is initiated. This feature can be modified by the features "NO TIME KILL IDS", "NEVER KILL IDS", and "KILL IDS IMMED" that determine if and when Independent Service is cut out on Fire Service. The default setting is 30 seconds.

`DR CLOSE ON FIRE` **Door Close Delay Time on Fire Service** – This is the delay before closing the doors after the car has returned to the designated fire landing and the car is in shutdown. This is required on 2000 (or later) Fire Code. The default setting is 30 seconds.

`IN-USE-LITE TIME` **In-Use Light Time** – This timer determines how long the In-Use light is left on after a call is answered. The default setting is 6 seconds.

`DR HOLD OPEN BTN` **Door Hold Open Button Timer** – This determines how long the door is held open after pressing and releasing the DHOB input. Set the value to "0" if using a switch.

`MED EMERG CANCEL` **Medical Emergency Mode Cancel Time** – After a Medical Emergency Recall is initiated, the car opens its doors for this amount of time, allowing transition to Medical Car Operation mode. After this timeout, Medical Emergency mode is cancelled and the car returns to Normal service.

8.2.1.4 Ten Second Timers

The following settings are for timers. The timer values are in tens of seconds.

`PI CUTOUT TIME` **Position Indicator Cutout Time** - This is the time delay before turning off the Position Indicators after the car becomes idle. If the doors are opened, or the car starts in response to a call, then the Position Indicators will turn on again. The default setting is 30, for a time of 300 seconds or 5 minutes. To keep the PI's on at all times, or when using a digital PI driver board, enter a value of "0".

`CAR LIGHT CUTOUT` **Car Light Cutout after Inactivity** – The car light cutout relay output (TB:LIT) activates after the car has been inactive for this timeout value. The inactivity timer begins when the car is on Normal (automatic) operation with the doors closed and no car operating panel buttons have been pressed. As long as the doors remain closed and no C.O.P. buttons are pressed, the car lights will turn off when the timer has elapsed.

8.2.1.5 Other Numerical Settings

`# AUTO FLT RESET` **Number of Auto Fault Resets while in Door Zone** - If the "FAULT AUTO RESET" setting is enabled, the car attempts to auto-reset most shutdown conditions, as long it does not repeatedly fault more than the value of this setting while in door zone. If out of door zone, the system attempts to reset up to 25 times, in an attempt to reach door zone.

`45DAY SHUTDN CLK` **Maintenance Shutdown Clock** (in 45 day intervals) – If the feature is enabled, the elevator shuts down for maintenance after 45 days multiplied by the entered value. This feature is only available on request.

`ANTI-NUIS STOPS` **Anti-Nuisance Max # of Calls with no Electric Eye** (# of car calls) – If anti-nuisance is enabled, this determines the number of times the elevator stops without triggering the electric eye input, implying the car is stopping without a passenger entering or leaving the elevator. This feature is automatically disabled if there is a malfunction wherein the electric eye input is stuck off.

8.2.2 Feature Settings

`NO SHRT DR TIME` **No Shortened Door Time** – Normally, the Door Open Button/Safety Edge/Electric Eye/Infra-red Curtain shortens the door time. Enable this feature to prevent these devices from shortening the door time. The Door Close Button still shortens the door time.

`TIMED EYE CUTOUT` **Timed Electric Eye Cutout** – Enable this feature to allow disabling of the Electric Eye input after the preset time. (See the timer setting "ICU CUTOUT TIME" for the delay before cutting out the Electric Eye). This feature is often provided in the Electric Eye unit itself.

`DOOR NUDGING` **Door Nudging** – Enable this feature to allow the door to close at reduced nudging speed while the nudging buzzer is active and the doors are closing. The nudging buzzer initiates if a call is registered and the doors have been prevented from closing for the preset Door Nudging time.

> **NOTE: Door Nudging operation requires an optional Nudging Buzzer output and Reduced Speed Door Closing output.**

`1 STROKE DN LANT` **One Stroke Down Lanterns** – The lanterns are normally provided with two strokes for the down direction. Enable this feature to provide only one stroke for the down direction.

`ENABLE I.C.U.` **Proximity Detector** – Enable this feature if a Proximity Detector (such as an infrared curtain) is used. Enabling this feature disables the Safety Edge input (TB:27S) on Fire Service. It also initiates the Door Nudging feature while the doors are closing on Fire Service. The Proximity Detector may be connected to the Safety Edge Input or the Electric Eye Input, as desired. (The Electric Eye Input (TB:27E) is subject to the Timed Electric Eye Cutout and Nudging timer, whereas the Safety Edge Input is not.)

> **NOTE: Door Nudging operation requires an optional Nudging Buzzer output and Reduced Speed Door Closing output.**

`NO FIRE SERVICE` **Disable Fire Service** – Turn this feature on to disable Fire Service. This feature should be turned on if Fire Service is not provided. It may also be turned on during initial installation, if the Smoke Sensors or Fire Switches have not yet been installed.

`2000+ FIRE CODE` **Enable 2000+ ANSI Fire Code** – Turn this feature on to enable 2000 or later National Fire Code. The default code is 1998 Fire Code.

`2005+ FIRE CODE` **Enable 2005+ ANSI Fire Code** – Turn this feature on to enable 2005 or later National Fire Code. You must also turn on the 2000+ Fire Code feature.

`2007+ FIRE CODE` **Enable 2007+ ANSI Fire Code** – Turn this feature on to enable 2007 or later National Fire Code. You must also turn on the 2000+ and 2005+ Fire Code features.

`2016+ FIRE CODE` **Enable 2016+ ANSI Fire Code** – Turn this feature on to enable 2016 or later National Fire Code. You must also turn on the 2000+, 2005+, and 2007+ Fire Code features.

`NYC FIRE CODE` **Enable New York Fire Code** – Turn this feature on to enable New York Fire Code.

`CHICAGO 01 FIRE` **Enable 2001 Chicago Fire Code** – Turn this feature on to enable 2001 Chicago Fire Code.

`REMOTE FIRE SW` **Enable Building Remote Fire Switch for 2000 Fire Code** – Turn this feature on to enable the Remote Fire Switch on 2000 Fire Code. The input for this feature must be assigned for this feature to work properly.

`KILL IDS IMMED` **Kill Independent immediately on Fire Service** – Turn this feature on to allow Fire Service to override Independent Service immediately.

`NO TIME KILL IDS` **No Timed Kill of Independent on Fire Service** – Turn this feature on to prevent Fire Service from overriding Independent Service while the doors are open. Independent Service must be turned off or the doors closed by the operator to allow the car to run on Fire Service.

`NEVER KILL IDS` **Never kill Independent on Fire Service** – Turn this feature on to prevent Fire Service from overriding Independent Service. Independent Service must be turned off to allow the car to run on Fire Service.

`FIRE MAIN = REAR` **Main Fire Landing at Rear Opening** – Turn this feature on to use the rear opening at the designated fire opening, instead of the front opening. If there is only one opening at the designated fire landing, then this feature has no effect.

`FIRE ALT = REAR` **Alternate Fire Landing at Rear Opening** – Turn this feature on to use the rear opening at the alternate fire opening, instead of the front opening. If there is only one opening at the alternate fire landing, then this feature has no effect.

`NO SHUNT ON FS2` **Disable Shunt Trip on Fire Service Phase 2** – Turn this feature on to disable Shunt Trip operation when the car is on Fire Service Phase 2.

`SHUNT ON INSPECT` **Enable Shunt Trip on Inspection** – Turn this feature on to enable Shunt Trip operation when the car is on Inspection.

`4 WIRE CALLS` **Enable Separate Call I/O (4 Wire Calls)** – Turn this feature on to enable separate wiring for the inputs and outputs for both car and hall calls. If this feature is disabled, then the car and hall call inputs are connected to the corresponding outputs.

`DOOR CHECK FAULT` **Enable Door Check Feature** – Turn this feature on to enable the Door Check feature. This allows the status of the Car Door and the Hall Doors to be checked according to the appropriate codes.

`HALL LANT = CAR` **Use Car Lantern outputs for Hall Lanterns** – Turn this feature on to use the Car Lantern outputs as Hall Lanterns. If there are only two landings, then the Hall Lanterns can be connected directly to the Car Lantern outputs. If there are more than two landings, then additional external relays are needed to enable the appropriate lantern at each floor.

`CKO ON INDEPEND` **Enable Car Call Cutout Override on Independent** – Turn this feature on to energize the CKO Car Call Cutout Override output on Independent Service. This allows car calls to be registered without the use of access keys.

`DIR IND ON ATTEN` **Direction Indicators show actual direction on Attendant** – Turn this feature on to make the Attendant Direction Indicators show the direction that the car will run next. If this feature is not enabled, they will show whether there are calls registered in either direction. For example, with this feature off, and the car at an intermediate floor with calls above and below the car, then both Attendant Direction Indicators would be on, since there are calls above and below the car. If the feature was enabled, then the indicators would be the same as the normal Direction Indicators, and only one indicator would be on, depending on which direction had actually been selected.

`ME BUZZ ON INDEP` **Medical Emergency Buzzer on Independent only** – Turn this feature on to change the operation of the Medical Emergency Buzzer output. With the feature disabled (factory default), the buzzer sounds when the car is returning to the Medical Emergency floor in response to the hall Medical Emergency Switch. If the feature is enabled, the buzzer sounds if the car is on Independent Service and a hall Medical Emergency Switch is turned on. This alerts the operator to release the car.

`ALLOW DOB - FRNT` **Always Enable Door Open Button at Front Openings** – Turn this feature on to allow the Front Door Open Button to always open the doors at selective openings (where there is a front and rear opening at the same landing). With this feature disabled, the doors must have been opened, or still be open, for the Door Open Button to operate. This allows a measure of security at these landings. The Door Open Button(s) is always enabled while on Fire Operation (Phase 2) or Medical Emergency operation.

`ALLOW DOB - REAR` **Always Enable Door Open Button at Rear Openings** – Turn this feature on to allow the Rear Door Open Button to always open the doors at selective openings (where there is a front and rear opening at the same landing). With this feature disabled, the doors must have been opened, or still be open, for the Door Open Button to operate. This allows a measure of security at these landings. The Door Open Button(s) is always enabled while on Fire Operation (Phase 2) or Medical Emergency operation.

`FLOOD TO 3RD LDG` **Flood Return Landing is 3 (not 2)** – Turn this feature on to make the car return to the third landing from the bottom if Flood Service is initiated. The default floor is the second floor from the bottom.

`FLOOD TO TOP LDG` **Flood Return Landing is Top Landing (not 2)** – Turn this feature on to make the car return to the top landing if Flood Service is initiated. The default floor is the second floor from the bottom.

`FLOOD OVER INDEP` **Flood overrides Independent, Attendant & Medical Emergency** – Turn this feature on to allow Flood Service to override Independent Service, Attendant Operation and Medical Emergency Operation. If this feature is not enabled, the car remains under the control of the operator if the Flood Service input is energized.

`FLOOD OVER SHTDN` **Flood overrides Shutdown** – Turn this feature on to allow Flood Service to override shutdown functions that would normally return the car to the bottom landing. In this case, the car is still unable to run up, but Flood Service remains in effect even though a shutdown feature is in effect.

`FLD NOT BLO MAIN` **Do Not Run Down Below Main on Flood and Shutdown** – Turn this feature on to prevent the car from running if it is at or below the Main Floor and the car is on Flood Service and Shutdown Operation.

`FIRE OVER FLOOD` **Fire Service Overrides Flood Operation** – Turn this feature on to allow Fire Service to override Flood Service. The car returns to the Main Fire Floor, even if that is the bottom landing.

`FLOOD OVER FIRE` **Flood Operation Overrides Hall Fire Service** – Turn this feature on to allow Flood Service to override Fire Service and cause the car to leave the bottom landing, even if that is the designated Fire landing. If this feature is not set, then whichever feature (Fire Service or Flood Service) is initiated first takes precedence.

`USE SHUNT TRIP` **Enable Shunt Trip Delay Feature** – Turn on to enable the Delayed Shunt Trip feature. If the Shunt input is energized, the car cancels all existing calls, stops normally at the nearest landing, and then shuts down once the doors are opened.

`USE BORIS INPUT` **Enable Battery Rescue Operation Feature** – Turn on to enable the Battery Rescue Operation (BORIS) feature. This feature is available upon request.

`NO CLOSE ON INSP` **Disable Door Close on Inspection** – Turn on to prevent the Door Close output from energizing if the doors are already open while on Inspection. This requires the doors to be closed manually. If this feature is left disabled, the Door Close output energizes when the operator attempts to run the car on Inspection. If the doors are already closed, then the Door Close Output is energized while the car is running on Inspection.

`ALLOW FDL ON EF2` **Enable False Down Leveling on Car Fire Service** – Turn on to allow the car to False Down Level when it stops between floors, on Fire Service Phase 2. False Down Level is used to return a car to a landing if it stops outside the door zone. The default is to disable False Down Leveling on Fire Service Phase 2, so that the car only runs when a car call is registered. If this feature is not enabled and the car is on Fire Service Phase 2, and the Stop Switch has been opened then closed, then a car call button must be pressed to initiate False Down Level.

`PARK OPEN ALWAYS` **Enable Park with Doors Open (all landings)** – Turn on to make the car park with the doors open at all landings.

`PARK OPEN - MAIN` **Enable Park with Doors Open (Main landing)** – Turn on to make the car park with the doors open at the main landing only.

`MECar OVER FIRE` **Medical Emergency Car Operation overrides Fire Service** – Turn on to override fire service while the car is in Medical Emergency Car Operation.

`ENABLE EMT` **Enable EMT Operation** – Turn on to enable EMT service.

`EMT CALL CANCEL` **Enable Call Cancel while on EMT Operation** – Turn on to cancel car calls while on EMT in-car operation and the car EMT switch is turned to the off position. If this feature is not enabled, the EMT key can be turned off before arriving at the destination floor, in preparation for exiting the elevator. If this feature is enabled, turning the key off cancels existing car calls, and the car stops at the next floor.

`BOT ACC AT REAR` **Bottom Access is at Rear Door** – Turn on to set the Bottom Access Door to use the rear door; otherwise, a front door is assumed. This setting is used by the door-checking feature.

`TOP ACC AT REAR` **Top Access is at Rear Door** – Turn on to set the Top Access Door to use the rear door; otherwise, a front door is assumed. This setting is used by the door-checking feature.

`ANTI-NUISANCE` **Cancel Car Calls if No Electric Eye/Safe Edge** – Turn on to enable the Anti-Nuisance feature, where all car calls are canceled after several consecutive runs where the electric eye input is not tripped, implying that no passengers are entering or leaving the elevator. The number of calls is adjustable using the "ANTI-NUIS STOPS" setting.

`CANCEL CC ON REV` **Cancel Car Calls on Direction Reversal** – Turn on to cause all car calls to be cancelled when the car changes direction.

`DOORS HOLD LIGHT` **Hold Car Light on with Doors Open** – Turn this feature off to allow the car light to turn off after inactivity while the doors are being held open. If this feature is on, the car light stays on while the doors are open.

`ELGO APS ENABLE` **Enable ELGO Absolute Positioning System** – Enable this feature when using an ELGO Absolute Positioning System (APS). This setting may be used to temporarily disable the use of an ELGO APS during installation, at which point jumpers must be used to enable the Normal Limit inputs (M25 & M28).

`INCAR INSP 1C&2C` **Use Car Call Buttons 1C & 2C for In-Car Inspection** – Enable to use the 1C and 2C car call inputs to run down and up respectively for In-Car Inspection. Otherwise, use the 24X and 25X terminals (CT-SIB inputs T14 and T15).

`SECURE PASSWORD` **Secure Password** – Enable this feature to use a job-specific password for changing settings, floor openings, or resetting settings and counters. If this feature is disabled, the default password for all menus is "911". Contact Virginia Controls Technical Support for access to this unique password.

`DHOB FULLY OPEN` **Door Hold Open Button/Switch while door is fully open** – Enable this feature to require the door to be fully open before latching the door hold open signal. This feature is OFF by default, which will cause the door to re-open in addition to holding the door open for the preset time.

`BRAKE DELAYS RUN` **Delay Start of Run Until Brake has Lifted** – Enable this feature to delay the start of a run until the Brake(s) have lifted.

`LEVEL LIFTS BRAK` **Use Partial Voltage on Brake during Relevel** – Enable this feature to use partial hold voltage on Main Brake during a re-level.

`USE EBRAKE BK3/4` **Enable Emergency Brake** – Enable this feature to enable Emergency Brake functionality. This setting is internally pre-set by the factory.

`USE EBRAKE DELAY` **Enable Time Delay for Emergency Brake after Machine Brake** – Enable this feature to use a time delay between dropping the Machine Brake and Emergency Brake at the stop of a run, using "EBRAKE AFTER RUN" timer setting.

`DRIVEFAULT CHECK` **Enable Drive "ON" Input Fault Checking** – Enable this feature to set a fault if the Drive ON relay input (ON) turns off prematurely during a fast speed run.

`USE ROPE BRAKE` **Enable Rope Brake** – If this feature is enabled, the system will perform a rope brake check prior to every run, and will latch a fault if any relay monitoring inputs for the rope brake relays (RB1, RB2, RBC) show an error state.

`O–PX TIMED DROP` **Enable PX Relay Timed Drop Delay (HPVC drives)** – Enable this feature to hold the PX Drive Enable relay output energized for "DELAY DROP O–PX" after stopping at the end of a run. Otherwise the PX relay will de-energize immediately when stopping.

`DR PRE–OPEN DZ` **Doors will Pre-Open while in Door Zone** – Enable this feature to allow the doors to begin opening while leveling into the floor and in door zone. Otherwise, the doors will only start to begin opening after the car has come to a complete stop.

> **WARNING: The settings "DR PRE–OPEN DZ" and "NO LVL DRS OPEN" should not both be enabled. In this case, the car is unable to complete levelling into floor level if the doors have started opening early, and will result in the car stopping outside of the dead zone.**

`NO LVL DRS OPEN` **Disable Re-Leveling while Doors are Open** – Enable this feature to prevent the car from releveling while the doors are open while on a leveling target. The car is able to re-level after the doors are fully closed.

`USE ETSD/UCM` **Enable ETSD/UCM Board** – Enable this bit feature when the ETSD/UCM Board is used. It enables the Rope Brake check and Redundancy Faults used with the ETSD/UCM Board. The system will monitor the RM, RCM, ETM, and EXM inputs to ensure that the corresponding ETSD board relays are cycling properly.

`DEFEAT UCM CHECK` **Disable UCM Board Redundancy Faults** – Enable this bit feature to disable Redundancy Faults from the UCM Board. Does not apply if "USE ETSD/UCM" setting is already disabled.

`USE HI SPD CNTR` **Enable High Speed Counter** – Enable this bit feature to enable the High Speed Counter feature, which reads speed data from the encoder quadrature signals. This can be turned off temporarily during setup to disable HSC faults, or by using Shutdown Defeat. This enables the High Speed Counter Calibration menu and speed checking for ETSD board faults.

`USE ETSLOWDOWN` **Enable Emergency Terminal Slowdowns (ETS)** – Enable this bit feature when using an ETS system with the ETSD/UCM Board.

`INSP SHTDN TIMER` **Latch Shutdowns while on Inspection (2010 ANSI code)** – Enable this feature to comply with 2010 ANSI code, such that the Shutdown Run timer is enabled while running on inspection, and any shutdowns caused by tripping the run timer require a manual reset using the Fault Reset or Shutdown Defeat inputs.

`2FLOOR RUN SPEED` **Enable One and Two-Floor-Run Speeds** – Enable this bit feature when a separate speed is provided for One Floor Runs. This requires the use of slowdown signals and limits for each additional speed, and changes how floor position is computed between floors.

`LONG FLOOR ?-?` **Enable Long Floor From ? to ?** – Enable one of these bit features when there is a long floor at the specified floors. The car will then run full speed between those two floors, rather than the default one-floor-run speed.

`FAULT AUTO RESET` **Enable Fault Auto Reset** – Enable this feature to allow faults to attempt an auto-reset if a shutdown fault has been triggered. If the system repeatedly goes on shutdown after auto-resetting up to 25 times while out of door zone or an amount from the setting "# FAULT RESETS" while in door zone, the system will require a manual reset to clear the shutdown.

`INVERT BRAKE SW` **Invert Brake Switch Contacts** – Enable this feature when the Brake Switch Input is Normally Open. By default, the Brake Switch input is Normally Closed.

`USE BK HOLD VOLT` **Use Brake Hold Voltage Contactors** – Enable this feature to enable the Brake Hold Voltage Contactor monitoring. This setting is preset by the factory, and is not available for adjustment.

`DISABLE SLOWDOWN` **Disable Normal Slowdown Device for 1-run** – Use this feature to disable the normal slowdown signals for 1-run. This setting may be used to perform a buffer test or verify the Terminal Slowdown limits are functioning independent from the normal slowdown means. This setting auto-reverts to OFF after one run command.

`SNG BTN COLLECT` **Single Button Collective Operation** – Enable this feature to use Single Button Collective Operation. Make sure that Selective Operation setting "SELCT COLLECTIVE" is OFF. If both "SNG BTN COLLECT" and "SELCT COLLECTIVE" features are turned OFF, then Single Automatic Pushbutton Operation is enabled.

`SELCT COLLECTIVE` **Selective Collective Operation** – Enable this feature to use Selective Collective Operation. Make sure that Single Button Collective Operation setting "SNG BTN COLLECT" is OFF. If both

"SNG BTN COLLECT" and "SELCT COLLECTIVE" features are turned OFF, then Single Automatic Pushbutton Operation is enabled.

8.2.2.1 Manual/Power Freight Door Settings

`OPEN MAIN DR Ph1` **Hold Doors Open On Fire 1** – Enable this feature to hold doors open during Fire Recall phase 1. This feature is normally off to allow the doors to be closed manually at the Fire Return landing (Main or Alternate) during Fire Recall phase 1.

`HOLD MAIN DR Ph2` **Enable Fire 2 Hold At Main On Fire 1** – Enable this feature to enable Fire Operation phase 2 Hold at the fire return (main or alternate landing) during Fire Recall phase 1. This holds the doors open at the fire return landing during Fire Recall phase 1, since the door open / close buttons would be disabled.

`AUTO CLOSE CCALL` **Enable Door Auto Close From Car Calls** – Enable this feature to enable a door auto close signal when a car call is registered.

`ENABLE AUTOCLOSE` **Enable Door Auto Close with Manual Doors** – Enable this feature to enable a door auto close signal. This feature must be enabled to allow the "AUTO CLOSE CCALL" and "AUTO CLOSE HCALL" features to work.

`AUTO CLOSE HCALL` **Enable Door Auto Close From Hall Calls** – Enable this feature to enable a door auto-close signal when a hall call is registered.

`AUTO CLOSE TIMED` **Enable Door Auto Close After Timeout** – Enable this feature to enable a door auto-close signal after an adjustable timeout "AUTO CLOSE TIMER" in seconds.

`AUTO CLOSE DELAY` **Door Auto Close Delay Time (x1 sec)** – When the setting "AUTO CLOSE TIMER" is enabled, this is the amount of time before a door auto-close signal initiates.

`SHTDN MAIN DRCLS` **Allow Door Close At Main On Fire & Shutdown** – Enable this feature to allow a door close signal at the fire return landing (main or alternate) while on fire and shutdown.

`CAR LANT AT STOP` **Enable Car Lantern After Stop** – Enable this feature to enable the car lantern outputs after a stop, even if the door does not open. This feature mostly applies when using manual doors.

`COURION Ph2 REOP` **Enable Courion Door Reopen On Fire 2** – Enable this feature to enable Courion-type power freight doors to reopen while on Fire Operation phase 2.

`MANUAL DR 2007+` **Fire Operation change allowed after doors close** – Enable this feature to enable 2007+ code operation with manual doors. This feature allows change in fire operation mode with doors closed if they were opened once at the fire return landing (main or alternate).

8.2.2.2 Group/Dispatching Settings

`EP AUTO SELECT` **Emergency Power Auto/Manual Select** – When using Emergency Power, this setting determines whether the Emergency Power Select switch is used as a manual select or auto select switch. If Auto Select is enabled and no car is selected, the dispatcher automatically selects one car to run on automatic operation. Otherwise, if no car is selected, no cars are allowed to run on automatic operation.

`FLASH HALL FIRE` **Enable Flashing Hall Fire Light** – Enable to make the Hall Fire Light flash if the Machine Room Smoke Sensor has tripped. By default the car Fire Light flashes, but not the hall Fire Light.

`NO FS PH2 LIGHT` **No Hall Fire Light if in Group and Fire Operation (Phase 2)** – Enabling this setting causes the Hall Fire Light to go out if there is a car in Fire Operation (phase 2) while the other cars are returned to Normal Operation using the Fire Reset switch. This setting only applies for a multi-car group.

`INVERT SMOKE SWS` **Fire Sensors are Normally Open Inputs** – Turn this feature on if the Smoke Sensor inputs are normally open on normal operation, and closed when a fire is detected. The default is to use Smoke Sensors that are closed on normal operation and open when a fire is detected.

`ENABLE CODE BLUE` **Enable Medical Emergency Hospital Operation (CODE BLUE)** – Turn on to enable Medical Emergency Hall and Car operation.

8.2.2.3 Homing/Dispatching Settings

`HOMING DELAY` **Homing Delay Time** (in seconds) – This is the delay before homing a car to the home landing, after it has answered all calls, and is sitting with its doors closed. The default setting is 60 seconds.

`HC TRANSFER TIME` **Dispatching Hall Call Transfer Reassignment Time** (in seconds) – This value determines how hall calls are reassigned in a multi-car group. Normally, when a hall call is entered, the car that can service the call fastest is assigned to the call. But after assignment, a different car may be able to service the call sooner should it be reassigned. To stabilize the system, however, calls are reassigned only when the time saved equals or exceeds this value.

`HOME IF ANY FREE` **Home if any Car is Idle/Free** (Group Homing Mode 3 or 4 only) – Enable this feature to start the homing delay timer if any car is idle or at rest. If not enabled, the homing timer starts after all cars are at rest. Enabling this feature improves homing responsiveness, while disabling allows homing to occur only after there is no more demand.

`LOBBY STARTS TMR` **No Car at Lobby Starts Homing Timer** (Group Homing Mode 3 or 4 only) – Enable this feature to start the homing delay timer as soon as the primary homing landing is unoccupied and does not currently have a car homed to it. Use this setting to allow homing to be initiated sooner if there is no car at the primary homing landing.

`SIMULTANEOUS HOM` **Simultaneously Home to Primary and Alternate Landing** (Group Homing Mode 3 or 4 only) – Enable this feature to allow multiple cars to home simultaneously to the Primary and Alternate Homing landings after the homing timer elapses. Disable this feature to allow only one car to home at a time. The car first homes to the Primary homing landing, then, after another homing delay time to the Alternate homing landing. Disable this feature to reduce homing activity while there is no demand.

`HCALLS GOTO FREE` **Hall Calls Go to Free Car** (Group Homing Mode 3 or 4 only) – Enable this feature to prioritize hall calls to be answered by another free car if this car is homed. If there are too many calls for the free car to answer in a timely fashion, then calls are still transferred to the homed car. Disable this feature to allow a homed car to respond to nearby hall calls equally with the free car.

`ALT HOMES TO PRI` **Car at Alternate Homes to Primary** (Group Homing Mode 3 or 4 only) – Enable this feature to allow a car currently homed to the Alternate homing landing to home to the primary homing landing if no other car is free.

8.3 Software Updates

The controller software is installed and updated on the controller CPU with two files: an application file and a configuration file.

The application file includes the full elevator program, dispatcher, user interface, and system initialization data. The configuration file is used to set the job specific configurations for the I/O board inputs and outputs and factory presets for all settings, timers, number of landings, and door openings at each landing.

The application file is standard for all Vision 2.0 controllers, while the configuration is unique for each controller. The application file may be updated if there is a change to the elevator programming, such as changing or adding features, while the configuration file may be updated to enable pre-programmed features and settings or make changes to the I/O configuration.

8.3.1 Steps to Update Application File

1. Copy the *.hex and *.md5 files provided by Virginia Controls onto a formatted USB flash drive. File names may vary as the application software is updated over time. The .hex file will be loaded onto the controller CPU, while the .md5 is a checksum file to verify the .hex file is not corrupt.

    > **NOTE: It is recommended to format the USB flash drive prior to loading new application or configuration file(s) onto the controller. If other files exist on the USB flash drive, it increases the time for the CPU to read the drive contents. Simply deleting files does not clear the flash memory, so it still takes longer to read the USB drive until it is reformatted.**

2. Insert the USB flash drive into the USB port of the controller CPU to be re-programmed.

3. Set controller CPU DIP switch #4 to ON. This will increase the boot loader delay time to allow the USB flash drive to be read.

4. Press the CPU Reset button on the CPU board, or cycle power, to cause the system to reboot and read data from the USB flash drive.

    ```
    1 – Load Config
    2 – Load Application

    Enter Selection:
    ```

5. Press 2 to proceed to the "Load Application" file menu.

    ```
    Enter for file list
    (*) = current load
    ```

6. Press **Ent** to display all available *.hex programs on the USB drive. The system automatically detects whether any of the application *.hex file(s) on the USB drive match the currently loaded program on the CPU by displaying an asterisk (*) beside the loaded file name.

    ```
    (*) = current load
     1 TSE3Z.HEX
     2 TSE4Z.HEX
    File # to load: 0
    ```

7. Select the desired *.hex file to load by pressing the corresponding number key (1 – 9) and pressing **Ent** to confirm. Use the **Nxt** and **Prv** keys to scroll up and down the list if necessary.

8. Wait for the screen to complete programming of the application file. During this process, the display shows "Erasing Flash" and then "Programming Flash".

WARNING: Do not cycle power, press the CPU Reset button, or remove the USB flash drive while the controller is re-programming. Wait for the system to automatically reboot in order to safely remove the USB drive.

9. After the system reboots, the screen may again display the option to load another application or configuration file. If loading another file, repeat steps 1-8. To verify the correct application file is loaded, repeat steps 2-6 and verify the asterisk (*) is displayed next to the desired filename.

10. After installing all desired file updates, remove the USB flash drive and set controller CPU DIP switch #4 to OFF.

11. Manually reboot the CPU by either cycling power or pressing the CPU Reset button.

8.3.2 Steps to Update Configuration File

1. Copy the *.cfg files provided by Virginia Controls onto a formatted USB flash drive. File names may vary as the application software is updated over time.

2. Insert the USB flash drive into the USB port of the controller CPU to be re-programmed.

3. Set controller CPU DIP switch #4 to ON. This will increase the boot loader delay time to allow the USB flash drive to be read.

4. Press the CPU Reset button on the CPU board, or cycle power, to cause the system to reboot and read data from the USB flash drive.

```
1 – Load Config
2 – Load Application

Enter Selection:
```

5. Press 1 to proceed to the "Load Config" file menu.

```
Enter for file list
(*) = current load
```

6. Press **Ent** to display all available *.cfg programs on the USB drive. The system automatically detects whether any of the configuration *.cfg file(s) on the USB drive match the currently loaded program on the CPU by displaying an asterisk (*) beside the loaded file name.

```
(*) = current load
 1 M12345.CFG
 2 M123452.CFG
File # to load: 0
```

7. Select the desired *.cfg file to load by pressing the corresponding number key (1 – 9) and pressing **Ent** to confirm. Use the **Nxt** and **Prv** keys to scroll up and down the list if necessary.

8. Wait for the screen to complete programming of the configuration file. The system then automatically reboots with the new configuration file.

WARNING: Do not cycle power, press the CPU Reset button, or remove the USB flash drive while the controller is re-programming. Wait for the system to automatically reboot in order to safely remove the USB drive.

Note: When loading a new configuration file, all settings, timers, and door openings are reset to factory defaults.

9. After the system reboots, the screen may again display the option to load another application or configuration file. If loading another file, repeat steps 1-8. To verify the correct configuration file is loaded, repeat steps 2-6 and verify the asterisk (*) is displayed next to the desired filename.

10. After installing all desired file updates, remove the USB flash drive and set controller CPU DIP switch #4 to OFF.

11. Manually reboot the CPU by either cycling power or pressing the CPU Reset button.

9. Controller Nomenclature

9.1 Relay Nomenclature

The symbols listed below are typical symbols. Refer to the schematic for all relays and contactors actually used on a particular job. The function of the relay or contactor is shown on the schematic by its coil.

Table 34: Relay Nomenclature.

SYMBOL	DESCRIPTION
BK1, BK2, BK3, BK4	BRAKE CONTACTORS
BP	BRAKE POWER RELAY
BSA, BSB	BRAKE HOLD VOLTAGE CONTACTORS
C, CR	DOOR CLOSE RELAY (IN MODSS ON TOP OF THE CAR, IF USED)
CKO, CKO1-2, …	CAR CALL CUTOUT BYPASS RELAY
D / D1-2, DX	DOWN RUN REVERSING CONTACTOR / RELAYS
DC	DOOR CLOSED RELAY
ESX	EMERGENCY STOP RELAY
FDL	FALSE DOWN LEVEL SPEED RELAY
FS, FSU, FSD	FAST SPEED RELAY
INS	INSPECTION SPEED RELAY
LIT	CAR FAN AND LIGHTING POWER CUTOUT RELAY
MOL	MOTOR OVERLOAD CONTACTOR
N, NR	DOOR CLOSE NUDGING RELAY (IN MODSS ON TOP OF THE CAR, IF USED)
NP	EMERGENCY POWER BATTERY SUPPLY TO DOOR OPERATOR
O, OR	DOOR OPEN RELAY (IN MODSS ON TOP OF THE CAR, IF USED)
ON	DRIVE ON RUNNING RELAY
OSF	OVERSPEED FAULT RELAY
P, PP, PX	POTENTIAL CONTACTOR, PILOT RELAY
PIX, PIX1-2, …	PI BLANKING RELAY
PX	DRIVE ENABLE RELAY
RB1, RB2, RBC	ROPE BRAKE CHECK RELAYS
RDY	DRIVE READY TO RUN RELAY
RP	REVERSE PHASE MONITOR
RU	MOTOR RUN CONTACTOR (WYE-DELTA START)
SHT	SHUNT TRIP DELAY RELAY
STOP	STOPPING RELAY
STR	MOTOR START CONTACTOR (WYE-DELTA START)
TRU	WYE-DELTA MOTOR RUN RELAY (WYE-DELTA START)
U / U1-2	UP RUN REVERSING CONTACTOR / RELAYS
UDX	SPEED PATTERN DELAY RELAY
UDT, UDTX	CAR RUNNING DELAY DROP OUT RELAYS
UPS	UNINTERUPTABLE POWER SUPPLY (BATTERY BACKUP) SOURCE POWER
VR, VA, VB, VC, …	VOLTAGE TRANSFER RELAY (GROUP OPERATION)

9.2 MR-SIB LEDs and Input Descriptions

The MR-SIB inputs for the controller CPU use input LEDs M01 – M42. Note that some input LEDs do not have a corresponding MR-SIB terminal.

This list is also available in sheet "VNX" of the schematics.

Table 35: MR-SIB inputs and corresponding LEDs list.

Connector	Controller TB's	MR-SIB Label	Input LED	UL Cap	Function
J1-1	1Y	R1			Spare – not used
J1-2	1Y	M01	M01		GOVERNOR SWITCH
J1-3	1T	M02	M02		ROPE BRAKE CONTACT
J1-4	1B	M03	M03		FINAL LIMIT SWS.
J1-5	2	M04	M04		PIT STOP SWITCH & ELGO TAPE SWITCH
J1-6	4	M05	M05		CAR DOOR CONTACT
J1-7	4R	M06	M06		REAR CAR DOOR CONTACT
J1-8	2	M07	M07		CONTROLLER STOP SWITCH
J1-9	20	M08	M08		DOOR ZONE
J1-10	20	DZ			DOOR ZONE (SPARE TB)
J2-1	5T	M09	M09		TOP (ACCESS) DOOR
J2-2	5	M10	M10		INTERMEDIATE FRONT HALL DOORS
J2-3	5B	M11	M11		BOTTOM (ACCESS) DOOR
J2-4	5R	M12	M12		INTERMEDIATE REAR HALL DOORS
J2-5	6T	M13	M13		TOP (ACCESS) LOCK
J2-6	6	M14	M14		INTERMEDIATE HALL LOCKS
J2-7	6B	M15	M15		BOTTOM (ACCESS) LOCK
J2-8	6R	M16	M16		REAR LOCKS
J3-1	25T	M17	M17		TOP ACCESS "UP"
J3-2	24T	M18	M18		TOP ACCESS "DOWN"
J3-3	25B	M19	M19		BOTTOM ACCESS "UP"
J3-4	24B	M20	M20		BOTTOM ACCESS "DOWN"
J3-5		M21	M21		DRIVE READY/BRAKE POWER/MOL/PHASE MONITOR
J3-6		M22	M22		DRIVE ON RELAY
J3-7	29	M23	M23		BRAKE MICRO SWITCH
J3-8	29X	M24	M24		EMERGENCY BRAKE MICRO SWITCH
J4-1		M25	M25		UP NORMAL LIMIT BYPASS
J4-2		M26	M26		BRAKE CONTACTOR SAFE / DOWN SLOWDOWN LIMIT
J4-3		M27	M27		BRAKE CONTACTOR SAFE / UP SLOWDOWN LIMIT
J4-4		M28	M28		DOWN NORMAL LIMIT BYPASS
J4-5		M29	M29		SPARE
J4-6		M30	M30		POTENTIAL CONTACTOR SAFE INPUT
J4-7	4A	M31	M31		CAR SAFETY STRING #1
J4-8	4B	M32	M32		CAR SAFETY STRING #2
J4-9	23	INS	M41		CONTROLLER INSPECTION SW.
J4-10	23	NRM	M42		IN CAR INSP. - BYPASS SWS.
			M33		DOOR & HALL CALL K/O INPUT
			M34		DOOR OPEN P.B. INPUT
			M35		CONTROLLER INSP. "UP" P.B.
			M36		CONTROLLER INSP. "ENABLE" P.B.
			M37		CONTROLLER INSP. "DOWN" P.B.
			M38		HALL LOCKS BYPASS SW. INPUT
			M39		HALL DOORS BYPASS SW. INPUT
			M40		CAR DOOR BYPASS SW. INPUT

Connector	Controller TB's	MR-SIB Label	Input LED	UL Cap	Function
J1(*)-1	35	LMC			RUN (CPU) RELAY OUTPUT COMMON
J1(*)-2	LM1	LM1	LM1		RUN (CPU) RELAY OUTPUT #1 & INPUT MONITOR
J1(*)-3	LM2	LM2	LM2		RUN (CPU) RELAY OUTPUT #2 & INPUT MONITOR
J1(*)-4	LM3	LM3	LM3		RUN (CPU) RELAY OUTPUT #3 & INPUT MONITOR
J1(*)-5	LM4	LM4	LM4		RUN (CPU) RELAY OUTPUT #4 & INPUT MONITOR
J2(*)-1	HM1	HM1	HM1		SAFE (CPLD) RELAY OUTPUT #1 & INPUT MONITOR
J2(*)-2	HM2	HM2	HM2		SAFE (CPLD) RELAY OUTPUT #2 & INPUT MONITOR
J2(*)-3	HM3	HM3	HM3		SAFE (CPLD) RELAY OUTPUT #3 & INPUT MONITOR
J2(*)-4	HM4	HM4	HM4		SAFE (CPLD) RELAY OUTPUT #4 & INPUT MONITOR
J2(*)-5	2	HMC			SAFE (CPLD) RELAY OUTPUT COMMON
J9-1	35	35			I/O COMMON, NEUTRAL
J9-2	35	35			I/O COMMON, NEUTRAL
J9-3	M5	M5			FUSE M5 – CONTROLLER POWER SUPPLY
J9-4	1X	1X			FUSE M4 – SAFETY STRING POWER SUPPLY
J9-5	1E	1E			FUSE M3 – EMERGENCY SERVICES POWER SUPPLY
J9-6	1A	1A			FUSE M2 – HALL I/O POWER SUPPLY
J9-7	1	1			FUSE M1 – CAR I/O POWER SUPPLY
J9-8	M1	M1			FUSED INCOMING POWER SUPPLY

9.3 CT-SIB LEDs and Input Descriptions

The CT-SIB inputs for the controller CPU use input LEDs T01 – T32. This list is also available in sheet "VNX" of the schematics.

Table 36: CT-SIB inputs and corresponding LEDs list.

Connector	Controller TB's	CT-SIB Label	Input LED	UL Cap	Function
J1-1	3A	T01	T01		CAR POWER INPUT
J1-2	3E	T02	T02		EMERGENCY EXIT SW.
J1-3	3	T03	T03		CAR TOP / FIREFIGHTERS STOP SW.
J1-4	3X	T04	T04		IN CAR STOP SW.
J1-5		T05	T05		SPARE
J1-6		T06	T06		SPARE
J1-7	23	T07	T07		
J1-8	20	T08	T08		DOOR ZONE
J2-1	23T	T09	T09		CAR TOP INSPECTION SW.
J2-2	25	T10	T10		CAR TOP INSP. "UP" P.B.
J2-3	23E	T11	T11		CAR TOP INSP. "ENABLE" P.B.
J2-4	24	T12	T12		IN CAR INSP "DOWN" OR SPARE
J2-5	23X	T13	T13		IN CAR INSPECTION SW.
J2-6	25X	T14	T14		IN CAR INSP "UP" OR SPARE
J2-7	24X	T15	T15		CAR TOP INSP. "DOWN" P.B.
J2-8	23A	T16	T16		INSPECTION ACCESS SWITCH
J3-1		T17	T17		SPARE
J3-2		T18	T18		SPARE
J3-3		T19	T19		SPARE
J3-4		T20	T20		SPARE
J3-5		T21	T21		SPARE
J3-6		T22	T22		SPARE
J3-7		T23	T23		SPARE
J3-8		T24	T24		SPARE
J4-1	7XR	T17	T25		DOOR OPEN LIMIT, REAR
J4-2	8XR	T18	T26		DOOR CLOSE LIMIT, REAR
J4-3	27ER	T19	T27		INFRARED CURTAIN UNIT / ELECTRIC EYE, REAR
J4-4	27SR	T20	T28		SAFETY EDGE, REAR (IF USED)
J4-5	7X	T21	T29		DOOR OPEN LIMIT, FRONT
J4-6	8X	T22	T30		DOOR CLOSE LIMIT, FRONT
J4-7	27E	T23	T31		INFRARED CURTAIN UNIT / ELECTRIC EYE, FRONT
J4-8	27S	T24	T32		SAFETY EDGE, FRONT (IF USED)
J5(*)-1	35	35			CT-SIB INPUTS COMMON
J5(*)-2	35	LTX			CAR TOP OUTPUTS 3-4 COMMON
J5(*)-3	35	LTC			CAR TOP OUTPUTS 7-8 COMMON
J5(*)-4		LT1	LT1		CAR LIGHTING K/O RELAY / DOOR NUDGING REAR
J5(*)-5	O	LT2	LT2		DOOR OPEN FRONT
J5(*)-6	C	LT3	LT3		DOOR CLOSE FRONT
J5(*)-7	N	LT4	LT4		DOOR NUDGING FRONT
J6(*)-1	4A	HT1	HT1		CAR SAFETY STRING OUTPUT #1
J6(*)-2	4B	HT2	HT2		CAR SAFETY STRING OUTPUT #2
J6(*)-3	81L	HT3	HT3		CAR TOP FIRE SERVICE LIGHT / DOOR OPEN REAR
J6(*)-4	81X	HT4	HT4		CAR TOP FIRE SERVICE BUZZER / DOOR CLOSE REAR
J6(*)-5	1X	HTC			CAR TOP OUTPUTS 1-4 COMMON

10. Controller Diagnostics

10.1 CPLD LED Indicators

10.1.1 MR-CPLD

Table 37: MR-CPLD, DIP switch combinations, 1-3 ON, 4 & 5 OFF

DIP Sw 1:	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**
DIP Sw 2:	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
DIP Sw 3:	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
DIP Sw 4:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DIP Sw 5:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LED 1:	Door Zone Input	M01	M09	M17	M25	M33	M41	HM1 Input
LED 2:	Car Top Inspection Mode	M02	M10	M18	M26	M34	M42	HM2 Input
LED 3:	In Car Inspection Mode	M03	M11	M19	M27	M35	N/A	HM3 Input
LED 4:	Bypass Operation Mode	M04	M12	M20	M28	M36	N/A	HM4 Input
LED 5:	Inspection Access Mode	M05	M13	M21	M29	M37	N/A	HM1 Input
LED 6:	Controller Inspection Mode	M06	M14	M22	M30	M38	N/A	HM2 Input
LED 7:	Normal Operation	M07	M15	M23	M31	M39	N/A	HM3 Input
LED 8:	Safety String Status	M08	M16	M24	M32	M40	N/A	HM4 Input
All OFF:	No Operation Mode							

Table 38: MR-CPLD, DIP switch combinations, 4 is ON

DIP Sw 1:	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**
DIP Sw 2:	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
DIP Sw 3:	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
DIP Sw 4:	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
DIP Sw 5:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LED 1:	Safety String: 1B,1X,1Y,1T,2	HM1 Run	HM1 Output	N/A	N/A	N/A	BLINK	BLINK
LED 2:	Safety String Car Top: 4A & 4B	HM2 Run	HM2 Output	N/A	N/A	N/A	BLINK	BLINK
LED 3:	Safety String: Door Contacts	HM3 Run	HM3 Output	N/A	N/A	N/A	BLINK	BLINK
LED 4:	Safety String: Normal/Inspection	HM4 Run	HM4 Output	N/A	N/A	N/A	BLINK	BLINK
LED 5:	Up Normal Limit	LM1 Run	LM1 Output	N/A	N/A	N/A	BLINK	BLINK
LED 6:	Up Slowdown Limit	LM2 Run	LM2 Output	N/A	N/A	N/A	BLINK	BLINK
LED 7:	Down Slowdown Limit	LM3 Run	LM3 Output	N/A	N/A	N/A	BLINK	BLINK
LED 8:	Down Normal Limit	LM4 Run	LM4 Output	N/A	N/A	N/A	BLINK	BLINK

DIP switches all OFF: Displays door zone, inspection mode, and safety string status.
DIP switches 1-3 combo: The MR-CPLD reads the M01-M42 LED indicators, which refer to the corresponding Main CPU MR-SIB input. See SIB Inputs nomenclature table in Section 9.2 or the Job-specific schematics.
DIP switches 1-3 ALL ON: Displays the HM1-4 and LM1-4 monitoring inputs (M43-M50).
DIP switch 4 ON: Displays safety string status, slowdown, and normal limit status.
DIP switches 1,4 ON: Displays the relay output command from the controller CPU, prior to MR-CPLD processing.
DIP switches 2,4 ON: Displays the relay output state, computed after MR-CPLD processing.
DIP switch 1,2,3,4,other: Spare unused CPLD LEDs. Settings 14 – 15 will blink to indicate CPLD is active.

DIP Sw 1:	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
DIP Sw 2:	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**	**ON**
DIP Sw 3:	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**
DIP Sw 4:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
DIP Sw 5:	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
LED 1:	Serial In 0	Serial In 8	Serial In 16	Serial In 24	Serial In 32	Serial In 40	Serial In 48	Serial In 56	N/A
LED 2:	Serial In 1	Serial In 9	Serial In 17	Serial In 25	Serial In 33	Serial In 41	Serial In 49	Serial In 57	N/A
LED 3:	Serial In 2	Serial In 10	Serial In 18	Serial In 26	Serial In 34	Serial In 42	Serial In 50	Serial In 58	N/A
LED 4:	Serial In 3	Serial In 11	Serial In 19	Serial In 27	Serial In 35	Serial In 43	Serial In 51	Serial In 59	N/A
LED 5:	Serial In 4	Serial In 12	Serial In 20	Serial In 28	Serial In 36	Serial In 44	Serial In 52	Serial In 60	N/A
LED 6:	Serial In 5	Serial In 13	Serial In 21	Serial In 29	Serial In 37	Serial In 45	Serial In 53	Serial In 61	N/A
LED 7:	Serial In 6	Serial In 14	Serial In 22	Serial In 30	Serial In 38	Serial In 46	Serial In 54	Serial In 62	N/A
LED 8:	Serial In 7	Serial In 15	Serial In 23	Serial In 31	Serial In 39	Serial In 47	Serial In 55	Serial In 63	N/A

Table 40: MR-CPLD, CONSTRUCTION MODE, with DIP switches 7 & 8 ON

DIP Sw 1:	OFF	OFF	**ON**	OFF
DIP Sw 2:	OFF	OFF	OFF	**ON**
DIP Sw 3:	OFF	OFF	OFF	OFF
DIP Sw 4:	OFF	**ON**	**ON**	**ON**
DIP Sw 5:	OFF	OFF	OFF	OFF
DIP Sw 6:	OFF	OFF	OFF	OFF
DIP Sw 7:	**ON**	**ON**	**ON**	**ON**
DIP Sw 8:	**ON**	**ON**	**ON**	**ON**
LED 1:	Door Zone Input	Safety String: 1B,1X,1Y,1T,2	HM1 Run	HM1 Output
LED 2:	Safety String Car Top: 4A & 4B	Safety String Car Top: 4A & 4B	HM2 Run	HM2 Output
LED 3:	Construction Run Up (25B)	Safety String: Door Contacts	HM3 Run	HM3 Output
LED 4:	Construction Run Down (24T)	Inspection/Normal Mode Safe	HM4 Run	HM4 Output
LED 5:	Construction Mode (CPU setting = ON)	Up Normal Limit	LM1 Run	LM1 Output
LED 6:	Controller Inspection input (M41)	Up Slowdown Limit	LM2 Run	LM2 Output
LED 7:	N/A	Down Slowdown Limit	LM3 Run	LM3 Output
LED 8:	N/A	Down Normal Limit	LM4 Run	LM4 Output

DIP switch 5 ON: Displays the serial inputs 0-63 transmitted to the MR-CPLD serially over SPI-bus from the controller CPU computed values, which supplement the MR-SIB safety inputs. See Table 43 in Section 10.1.3 for specific descriptions.

DIP switches 7,8 ON: Construction mode is enabled within the MR-CPLD when DIP switches. 7 & 8 are active. Various monitoring LED states are available, as shown in Table 40.

10.1.2 CT-CPLD

Table 41: CT-CPLD, DIP switch settings 0-7.

Num Value:	0	1	2	3	4	5	6	7
DIP Sw 1:	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP Sw 2:	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP Sw 3:	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP Sw 4:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LED 1:	Door Zone Input	T01	T09	T17	T25	Safety String: input T01	HM1 Run	HM1 Output
LED 2:	Car Top Inspection Mode	T02	T10	T18	T26	Safety String: inputs T02,T03	HM2 Run	HM2 Output
LED 3:	In Car Inspection Mode	T03	T11	T19	T27	Safety String: input T04	HM3 Run	HM3 Output
LED 4:	Bypass Operation Mode	T04	T12	T20	T28	Inspection/Normal Mode Safe	HM4 Run	HM4 Output
LED 5:	Inspection Access Mode	T05	T13	T21	T29	HM1 Output 4A	LM1 Run	LM1 Output
LED 6:	Controller Inspection Mode	T06	T14	T22	T30	HM2 Output 4B	LM2 Run	LM2 Output
LED 7:	Normal Operation	T07	T15	T23	T31	N/A	LM3 Run	LM3 Output
LED 8:	Car Safety String Status	T08	T16	T24	T32	N/A	LM4 Run	LM4 Output
All OFF:	No Operation Mode							

Table 42: CT-CPLD, DIP switch settings 8-13.

Num Value:	8	9	10	11	12	13
DIP Sw 1:	OFF	ON	OFF	ON	OFF	ON
DIP Sw 2:	OFF	OFF	ON	ON	OFF	OFF
DIP Sw 3:	OFF	OFF	OFF	OFF	ON	ON
DIP Sw 4:	ON	ON	ON	ON	ON	ON
LED 1:	Door Zone Input	Serial In 0	Serial In 8	Serial In 16	Serial In 24	Serial In 32
LED 2:	Safety String Car Top: 4A & 4B	Serial In 1	Serial In 9	Serial In 17	Serial In 25	Serial In 33
LED 3:	Construction Run Up (25B)	Serial In 2	Serial In 10	Serial In 18	Serial In 26	Serial In 34
LED 4:	Construction Run Down (24T)	Serial In 3	Serial In 11	Serial In 19	Serial In 27	Serial In 35
LED 5:	Construction Mode (CPU setting = ON)	Serial In 4	Serial In 12	Serial In 20	Serial In 28	Serial In 36
LED 6:	Controller Inspection input (M41)	Serial In 5	Serial In 13	Serial In 21	Serial In 29	Serial In 37
LED 7:	N/A	Serial In 6	Serial In 14	Serial In 22	Serial In 30	Serial In 38
LED 8:	N/A	Serial In 7	Serial In 15	Serial In 23	Serial In 31	Serial In 39

DIP switches all OFF: Displays door zone, inspection mode, and safety string status.

DIP switch setting 1-4: The MR-CPLD reads the T01-T32 LED indicators, which refer to the corresponding Main CPU CT-SIB input. See CT-SIB Inputs nomenclature table in Section 9.2 or the Job-specific schematics.

DIP switch setting 5: Displays safety string status and slowdown and normal limit status.

DIP switch setting 6: Displays the relay output command from the controller CPU, prior to CT-CPLD processing.

DIP switch setting 7: Displays the relay output state, computed after CT-CPLD processing.

DIP switch setting 8: Construction mode monitoring states. Note: CT-CPLD processing is bypassed while using construction mode.

DIP switch settings 9-13: Displays the serial inputs 0-39 transmitted to the CT-CPLD serially over SPI-bus from the controller CPU computed values, which supplement the CT-SIB safety inputs. See Table 43 in Section 10.1.3 for specific descriptions.

DIP switch settings 14-15: Spare unused CPLD LEDs. Setting 15 will blink to indicate CPLD is active.

10.1.3 CPLD Serial Input Descriptions

The controller CPU computes and transmits the following serial inputs to the MR-CPLD & CT-CPLD over SPIbus via the MR-SIB & CT-SIB I/O processors, respectively. This is required for the case when an absolute positioning system (APS) replaces the MR-SIB inputs for access zones or slowdown and normal limits. Each CPLD also requires information from the controller when releveling with the doors open or while the Emergency Stop Switch is bypassed while in Fire Service. Additionally, provisions are made in the case where In Car inspection run inputs are being channeled through the COP CANbus I/O network instead of being input to the SIB.

Table 43: MR-CPLD Serial Input Descriptions

Serial In 0	Up Normal Limit (APS computed)
Serial In 1	Down Normal Limit (APS computed)
Serial In 2	Up Slowdown Limit Switch (APS computed)
Serial In 3	Down Slowdown Limit Switch (APS computed)
Serial In 4	Top Access Up Zone Up (APS computed)
Serial In 5	Top Access Down Zone (APS computed)
Serial In 6	Bottom Access Up Zone (APS computed)
Serial In 7	Bottom Access Down Zone (APS computed)
Serial In 8	Emergency Stop Switch Bypass (during Fire Service Recall or EMT Service Recall)
Serial In 9	Releveling mode (Up/Down Level & Door Zone during Normal operation)
Serial In 10	Top Access Rear Door settings bit "TOP ACC AT REAR"
Serial In 11	Bottom Access Rear Door settings bit "BOT ACC AT REAR"
Serial In 12	In Car Inspection Up Run input from C.O.P. I/O Board
Serial In 13	In Car Inspection Down Run input from C.O.P. I/O Board
Serial In 14	Unused
Serial In 15	Construction/Rescue Inspection mode (setting "CONSTRUCTION MODE" = ON)

10.1.4 CPLD LEDs Fault Indicators

In addition to showing the safety string and inspection status, the CPLD LEDs blink when there is an offending inspection run input or conflicting inspection mode inputs while using CPLD DIP switch setting 0.

For example, if LED 2 and LED 5 are blinking, then both of the mode inputs for Car-Top Inspection and Inspection Access are active, causing the CPLD to fault and preventing the relay outputs from energizing. Or, if LED 3 is solid and LED 6 is blinking, the In-Car inspection mode input is active, but a controller inspection up or down run input is also active, preventing the car from running.

Use these LEDs to correct inspection string wiring. There is no way to bypass the CPLD and allow the car to run if any safety string or inspection fault condition exists. Refer to the fault log for details if a CPLD fault condition is present. The CPLD automatically resets if the fault condition is corrected.

10.2 Fault Log Descriptions

10.2.1 SYS (SYSTEM) Event Descriptions

Table 44: System Fault/Event descriptions list

#	CODE	FAULT DESCRIPTION
1	SYS LOG RESET	The SYS Fault Log was cleared. Press "0" in the fault log menu to clear the fault log.
2	SYSTEM BOOT	Indicates system has initialized upon processor boot.
3	POWER FAIL	Upon power down, relay outputs are shut off, and non-volatile parameters are saved.
4	I/O CAN UP	CANbus communication is restored for Channel:X Board:X.
5	I/O CAN DOWN	CANbus communication is lost for Channel:X Board:X.
6	I/O CAN MULTI	Multiple boards have the same CANbus node DIP switch index for Channel:X Board:X. Communication is restored once the DIP switches are corrected.
7	CAN TX LOST	CANbus message transmit timeout.
8	CAN RX OVERFLOW	CANbus message receive overflow.
9	CAN BUS RESET	CANbus Channel:X has been reset because of communication timeout.
10	MR SIB CAN UP	CANbus communication between controller CPU and MR-SIB processor is active.
11	CT SIB CAN UP	CANbus communication between controller CPU and CT-SIB processor is active.
13	MR SIB CAN DN	CANbus communication between controller CPU and MR-SIB processor is lost.
14	CT SIB CAN DN	CANbus communication between controller CPU and CT-SIB processor is lost.
15	DSP SIB CAN DN	CANbus communication between DSPIC and SIB is lost.
18	WATCHDOG TIMEOUT	The system processor has malfunctioned and restarted from a hardware Watchdog timeout feature.
19	HALL OUT START	This controller has been designated for setting CANbus 3 Hall I/O board outputs. This is default if acting as a simplex with no other connected controllers. Otherwise, the lead controller is based on having the least controller number of the connected group.
20	HALL OUT STOP	CANbus 3 Hall I/O board outputs have been reassigned to another controller. This event triggers when a controller turns off its own CANbus 3 Hall I/O outputs when it detects another lead controller. This is not applicable while in simplex mode.
22	CPLD MISMATCH	The MR-CPLD or CT-CPLD inputs state are conflicting with the MR-SIB or CT-SIB inputs.
23	SAFETY NORMAL	System has recovered from safety fault condition (faults 24-52), including jumped safety string input, inspection mode fault, and up/down normal/slowdown limit. The fault code for the corresponding cleared fault condition is displayed on the 4th line in the log.
24	RUN RELAY FAULT	A relay fault occurred in the Main and Safety Relay Output state machine. This may occur from a stuck or jumped relay contact or a relay sequencing error. Refer to Section 6.2.15.
25	SAFETY 1Y FAULT	MR-SIB input M01 (TB:1Y) is off while any other safety string MR-SIB input after TB:1Y is on.
26	SAFETY 1T FAULT	MR-SIB input M02 (TB:1T) is off while any other safety string MR-SIB input after TB:1T is on.
27	SAFETY 1B FAULT	MR-SIB input M03 (TB:1B) is off while any other safety string MR-SIB input after TB:1B is on.
28	SAFETY 2 FAULT	MR-SIB input M04 (TB:2) is off while any other safety string MR-SIB input after TB:2 is on.
29	SAFETY 3 FAULT	CT-SIB input T01 (TB:3) is on while CT-SIB input TB:1X is off.
30	SAFETY 3X FAULT	CT-SIB input T04 (TB:3X) is on while CT-SIB input 1X is off.
33	SAFETY 3E FAULT	CT-SIB input 3E is on while CT-SIB input 1X is off.

#	CODE	FAULT DESCRIPTION
34	SAFETY 5 FAULT	MR-SIB input M10 (TB:5) is on while MR-SIB input M04 (TB:2) is off.
35	SAFETY 5B FAULT	MR-SIB input M11 (TB:5B) is on while MR-SIB input M04 (TB:2) is off.
36	SAFETY 5R FAULT	MR-SIB input M12 (TB:5R) is on while MR-SIB input M04 (TB:2) is off.
37	SAFETY 5T FAULT	MR-SIB input M10 (TB:5T) is on while MR-SIB input M04 (TB:2) is off.
38	SAFETY 6 FAULT	MR-SIB input M14 (TB:6) is on while MR-SIB input M04 (TB:2) is off.
39	SAFETY 6B FAULT	MR-SIB input M15 (TB:6B) is on while MR-SIB input M04 (TB:2) is off.
40	SAFETY 6R FAULT	MR-SIB input M16 (TB:6R) is on while MR-SIB input M04 (TB:2) is off.
41	SAFETY 6T FAULT	MR-SIB input M13 (TB:6T) is on while MR-SIB input M04 (TB:2) is off.
42	SAFETY M07 FAULT	MR-SIB input M07 is on while MR-SIB input 2 is off.
43	INSPECT NO MODE	No inspection mode input active. This includes any of the input TBs:23T, 23X, 23A or INS.
44	INSPECT MODES>1	Conflicting inspection mode inputs are active. Two or more of the input TBs:23T, 23X, 23A or INS are active
45	NORMAL MODE FLT	Conflicting inspection mode inputs are active while on Normal Operation (NRM).
46	INSP RUN FLT	An inspection run input is active while in a conflicting mode.
47	UP NORMAL FLT	(not used with ELGO APS equipped systems) The Up Normal Limit input (M25) is off while the car position, according to the PI, is not at the top terminal landing.
48	UP SLOWDOWN FLT	(not used with ELGO APS equipped systems) While in door zone and normal operation, the Up Slowdown Limit input (M26) is off while not at the top terminal landing, or the input is on while at the top terminal landing.
49	DN SLOWDOWN FLT	(not used with ELGO APS equipped systems) While in door zone and normal operation, the Down Slowdown Limit input (M27) is off while not at the bottom terminal landing, or the input is on while at the bottom terminal landing.
50	DOWN NORMAL FLT	(not used with ELGO APS equipped systems) The Down Normal Limit input (M28) is off while the car position, according to the PI, is not at the bottom terminal landing.
51	RTC BATTERY LOW	The real time clock battery is low. Replace battery on the MR-SIB with a 3V model CR2032.
52	ELGO OFFSET FLT	The measured difference between ELGO APS position data of channels A & B is out of tolerance with the expected 40mm offset, or the position is out-of-bounds of the top or bottom terminal by over +1000 mm.
53	ELGO APS COMM UP	CANbus communication between controller CPU and ELGO sensor (channel A or B) is active.
54	ELGO APS COMM DN	CANbus communication between controller CPU and ELGO sensor (channel A or B) is lost.
55	ELGO APS DATA UP	Non-zero ELGO position data is being read from the tape.
56	ELGO APS DATA DN	ELGO position data from the tape is lost. The tape is either defective or not properly installed.
57	CT SAFETY RELAY	The CT-SIB car safety string output relay check while on normal operation failed. Check the connections of 4A & 4B and verify communication with the CT-SIB.

10.2.2 APP (APPLICATION) Fault and Event Descriptions – Main CPU

Table 45: Application Fault/Event descriptions List

#	CODE	TYPE	FAULT DESCRIPTION
99	APP LOG RESET	Event	The Application Fault Log has been cleared. Press "0" in the fault log menu to clear the fault log.
100	APPLICATION STRT	Event	The system has rebooted and the application has successfully started.
101	UP RUN TMR SHTDN	Fault	Car was running up too long when going between floors, based on the field adjustable timer "UP RUN SHTDN TMR".
102	UP LVL TMR SHTDN	Fault	Car was running up too long during a relevel, based on the field adjustable timer "UP RUN SHTDN TMR".
103	EMERGENCY POWER	Fault	The Emergency Power input (TB:EP) went low, and Emergency Power operation has initiated.
104	DOORS NOT OPEN	Fault	The door open output was on too long, and doors did not open at all (DCL-TB:8X = OFF).
105	PARTIAL DR OPEN	Fault	The door open output was on too long, and doors opened partially, but not fully. (Both DOL-TB:7X = ON & DCL-TB:8X = ON)
106	DRCLS FULLY OPEN	Fault	The door close output was on too long, and doors did not close at all. (DOL-TB:7X = ON)
107	DRCLS FLT DCL ON	Fault	The door close output was on too long, and the doors did not fully close. (both DOL-TB:7X = ON & DCL-TB:8X = ON)
108	GATE NOT CLOSED	Fault	The door close output was on too long, and the doors closed (DCL-TB:8X = OFF), but the gate input (TB:4) is still low.
109	DOORS NOT CLOSED	Fault	The door close output was on too long, and the doors closed (DCL-TB:8X = OFF), but the hall door contact inputs are still low. (TB:5, if using front access: TB:5B, TB:5T)
110	LOCKS NOT CLOSED	Fault	The door close output was on too long, and the doors closed (DCL-TB:8X = OFF), but the hall door locks inputs are still low. (TB:6, or if using front access: TB:6B, TB:6T)
111	FRNT DRCLOSE TMR	Fault	The front door close output was on too long before a run while doors were closed.
112	REAR NOT OPEN	Fault	The rear door open output was on too long, and the doors did not open at all. (Rear DCL-TB:8XR = OFF)
113	PARTIAL RD OPEN	Fault	The rear door open output was on too long, and the doors opened partially but not fully. (both Rear DOL-TB:7XR = ON & Rear DCL-TB:8XR = ON)
114	RDCL FULLY OPEN	Fault	The rear door close output was on too long, and the doors were fully open. (RDOL off)
115	RDCL NOT OPEN	Fault	The rear door close output was on too long, and the doors did not fully close. (both Rear DOL-TB:7XR = ON & Rear DCL-TB:8XR = ON)
116	RGATE NOT CLOSED	Fault	The rear door close output was on too long, and the doors closed, but the rear gate input (TB:4R) are still low.
117	RDOOR NOT CLOSED	Fault	The rear door close output was on too long, and the doors closed, but the rear hall door contact inputs are still low. (TB:5R, or if using rear access: TB:5B, TB:5T)
118	RLOCK NOT CLOSED	Fault	The rear door close output was on too long, and the doors closed, but the rear hall door lock inputs are still low. (TB:6R, or if using rear access: TB:6B, TB:6T)
119	REAR DRCLOSE TMR	Fault	The rear door close output was on too long before a run while doors were closed.
120	CAR DELAYED	Event	The car had a direction, but did not run for an adjustable time, likely due to the door being held open by a door open button, safety edge, or electric eye input.
121	SAFETY OPENED	Fault	The car stopped during a run, and the safety string was opened, which includes terminals 1B, 1T, 1Y, 2, 3, 3A, 3E, or 3X.
122	DCL TRIPPED ON	Fault	The car stopped during a run, and the door close limit (TBs:8X or 8XR) was on.
123	CAR GATE OPENED	Fault	The car stopped during a run, and the car gate input (TBs:4 or 4R) was open.
124	HALL DOOR OPENED	Fault	The car stopped during a run, and a hall door contact (TBs:5, 5R, 5B, 5T) was open.
125	STOP OUT OF DZ	Fault	The car stopped during a run, safety and door string was closed/normal.

#	CODE	TYPE	FAULT DESCRIPTION
126	DOOR ZONE OFF	Fault	The door zone input M08 (TB:20) went off while the car was stopped.
127	FSPD OUT OF DZ	Fault	The car stopped outside of door zone (input M08/TB:20) after a fast speed run.
128	LEVEL OUT OF DZ	Fault	The car stopped outside of door zone (input M08/TB:20) after re-leveling at slow speed.
129	DOOR GATE CHECK	Fault	The Car Gate input (TBs:4 or 4R) was On while the door was open, according to the door open limit. (TBs:7X or 7XR = OFF)
130	HALL DOOR F CHK	Fault	The front door contact inputs (TBs:5, 5B, & 5T) was on while the front car door was open. (TB:7X = OFF)
131	HALL DOOR R CHK	Fault	The rear door contact inputs (TBs:5R, 5B, & 5T) was on while the rear car door was open. (TB:7XR = OFF)
132	HALL+GATE F CHK	Fault	The front car gate and door contact inputs (TBs: 4, 5,5B, & 5T) were on while the front door was open. (TB:7X = OFF)
133	HALL+GATE R CHK	Fault	The rear car gate and door contact inputs (TBs: 4R, 5R,5B, & 5T) were on while the rear door was open. (TB:7XR = OFF)
134	UL+DL BOTH ON	Event	The up and down level inputs were on at the same time.
135	EFS HALL SW 82X	Event	Fire service was initiated by the hall recall fire switch input. (Hall I/O board #0, input UI)
136	EFS SENS ALT 82	Event	Fire service was initiated by the hall smoke sensors which recall to the main landing (TB:82).
137	EFS SENS MN 82M	Event	Fire service was initiated by the main landing smoke sensor which recalls to the alternate landing (TB:82M).
138	EFS SMK 1st 82F	Event	Fire service was initiated by the machine room heat/smoke sensor (TB:82F).
139	EFS SMK 2nd 82F	Event	The machine room heat/smoke sensor input (TB:82F) has tripped ON.
140	SHUNT TRIP	Fault	The shunt trip sensor input (TB:85) tripped ON.
141	DOOR ZONE STUCK	Fault	The door zone switch input M08 (TB:20) came on before leveling during the slowdown sequence in Normal Operation. This implies a stuck/malfunctioning door zone sensor.
144	NORMAL+CINS FLT	Fault	Inspection Mode Fault: Normal operation mode input M42 and Controller Inspection mode input M41 were both on.
145	CINS+OTHER FLT	Fault	Inspection Mode Fault: Controller Inspection input M41 (TB:23) was on with either In-Car Inspection input T13 (TB:23X), Inspection Access input T16 (TB:23A), Car-Top Inspection input T09 (TB:23T), or Door Contact Bypass switch mode inputs (M38, M39, M40).
146	NORMAL+OTHER FLT	Fault	Inspection Mode Fault: Normal operation input M42 (TB:23) was on with either In-Car Inspection input T13 (TB:23X), Inspection Access input T16 (TB:23A), Car-Top Inspection input T09 (TB:23T), or Door Contact Bypass switch mode inputs (M38, M39, M40).
147	ACCESS+OTHER FLT	Fault	Inspection Mode Fault: Inspection Access input T16 (TB:23A) was on with either In-Car Inspection input T13 (TB:23X), Car-Top Inspection input T09 (TB:23T), or Door Contact Bypass switch inputs (M38, M39, M40).
148	ICINS+TCINS FLT	Fault	Inspection Mode Fault: Car-Top Inspection input T09 (TB:23T) and In-Car Inspection input T13 (TB:23X) were both on.
149	DOOR LOCK OPENED	Fault	The car stopped during a run, and a hall door lock contact (TBs:6, 6R, 6B, 6T) was open.
150	FLOOR PI RESET	Event	Every time the car stops at a floor, the floor reset inputs (1FP, 2FP, 4FP, UHS, DHS) are compared to the current floor position. If a reset occurs that changes the floor position, this event then indicates that the car position was out of sync.
151	CAR TOP STOP SW	Event	The Car Top Stop switch safety string input T03 (TB:3) is opened.
152	CONTROLLER STOP	Event	The Controller Stop switch safety string input M07 (TB:2) is opened.
153	IN CAR STOP SW	Event	The In Car Stop switch safety string input T04 (TB:3X) is opened.
154	GOVERNOR SW: 1Y	Event	The Governor switch safety string input M01 (TB:1Y) is opened.
155	ROPE BRAKE: 1T	Event	The Rope Brake switch safety string input M02 (TB:1T) is opened.

#	CODE	TYPE	FAULT DESCRIPTION
156	FINAL LIMIT: 1B	Event	The Final Limit switch safety string input M03 (TB:1B) is opened.
157	STOP PIT SW: 2	Event	The Pit Stop switch safety string input M04 (TB:2) is opened.
158	NORMAL LIMIT TOP	Fault	The top normal limit was turned off while in Normal Operation.
159	NORMAL LIMIT BOT	Fault	The bottom normal limit was turned off while in Normal Operation.
160	FLOOD SWITCH	Fault	Flood switch input (TB:FLS) has tripped on and FLOOD mode has activated. The car recalls to the designated flood landing and is taken out of service.
161	MOTOR OVERLOAD	Fault	The Motor Overload (MOL) monitoring input has tripped.
162	PHASE MONITR RDY	Fault	The Phase Monitor (RP) input has tripped.
168	MED EMRGNCY HALL	Event	Medical Emergency Hall recall operation initiated to recall floor.
169	MED EMRGENCY CAR	Event	Medical Emergency Car operation initiated, and hall calls are disabled.
171	ELGO DZ MISMATCH	Fault	ELGO APS computed Door Zone is out of alignment with the hardware DZ input M08 (TB:20).
172	LOAD WEIGHING OL	Fault	The Load Weighing Overload input is tripped. Car is shut down until load is reduced.
173	CAR SAFTY 3A FLT	Fault	The Car Safeties safety string input T01 (TB:3E) is opened. This safety string input may be bypassed using the setting "BYPASS CAR SAFTY" while on inspection (see Section 8.2.2) or by using construction mode (Section 4.3.1).
174	CAR EMRGNCY EXIT	Fault	The Emergency Exit switch safety string input T02 (TB:3A) is opened.
175	HALL POWER FAULT	Fault	The Hall I/O power monitoring input is OFF, indicating fixture power supply failure.
301	START/STOP FLT	Fault	A key input failed to change state properly as the car started or stopped.
302	BRAKE SW FAULT	Fault	Brake Micro Sw input did not change when the car started or stopped. This indicates a failure in the Brake or Brake Micro Sw.
303	START:INPUT "ON"	Fault	The Drive On input (M22) failed to transition when the car started running.
304	START:INPUT "P"	Fault	The P-Contactor input (M30) failed to transition when the car started running.
305	START:INPUT"BK1"	Fault	The BK1 brake contactor input (M26) failed to transition when the car started running.
306	START:INPUT"BK2"	Fault	The BK2 brake contactor input (M26) failed to transition when the car started running.
307	STOP:INPUT "P"	Fault	The P-Contactor input (M30) failed to transition when the car stopped running.
308	STOP:INPUT "BK1"	Fault	The BK1 brake contactor input (M26) failed to transition when the car stopped running.
309	STOP:INPUT "BK2"	Fault	The BK2 brake contactor input (M26) failed to transition when the car stopped running.
310	STOP:INPUT "ON"	Fault	The Drive On input (M22) failed to transition when the car stopped running.
311	DRIVE RESET	Fault	The Drive had excessive resets.
312	UP LEVEL FAULT	Fault	The car was leveling too long. This fault will stop the car, and prevent a relevel, but the car may still run to another floor. It is not shut down.
313	DN LEVEL FAULT	Fault	The car was leveling too long. The timer tripped when the car was running floor-to-floor, and was on the Down Level Switch. This fault will stop the car, and prevent a relevel, but the car may still run to another floor. It is not shut down.
314	UP RELEVEL FAULT	Fault	The car was leveling too long. The timer tripped when the car was on the Up Level Switch and was re-leveling. This fault will stop the car, and prevent a relevel, but the car may still run to another floor. It is not shut down.
315	DN RELEVEL FAULT	Fault	The car was leveling too long. The timer tripped when the car was on the Down Level Switch and was re-leveling. This fault will stop the car, and prevent a relevel, but the car may still run to another floor. It is not shut down.
316	ROPBRK INPUT FLT	Fault	A Rope Brake Monitoring input (RBM) did not match the outputs (RB).
317	ROPCHK INPUT FLT	Fault	A Rope Brake Monitoring input (RBCM) did not match the output (RBC).
318	UD RELAY OFF FLT	Fault	A UD1 or UD2 Monitoring input was OFF while the car was running.
319	UD RELAY ON FLT	Fault	A UD1 or UD2 Monitoring input was ON while the car was stopped.
320	REDUNDANCY4 FLT	Fault	Custom Redundancy Fault. (placeholder for future use)
321	UCM/ETSD RED FLT	Fault	UCM or ETSD Fault. (placeholder for future use)

#	CODE	TYPE	FAULT DESCRIPTION
322	UP RUN LSM OFF	Fault	LSM input was OFF when the car was running up full speed.
323	DOWN RUN LSM=OFF	Fault	LSM input was OFF when the car was running down full speed.
324	STOPPED LSM=ON	Fault	LSM input was ON when the car had stopped.
325	ETSD OVRSPD FLT	Fault	ETSD board detected an overspeed fault.
326	UP RUN EXM FLT	Fault	EXM input was ON when the car was running up full speed.
327	DOWN RUN EXM FLT	Fault	EXM input was ON when the car was running down full speed.
328	ETSD=ON, ETM=OFF	Fault	ETM input was OFF but the ETSD Switches were ON.
329	ETSD=OFF, ETM=ON	Fault	ETM input was ON but an ETSD Switch was OFF.
330	DOOROPEN ETM=ON	Fault	ETM input was ON with the car running with the doors open.
331	INSPECT ETM=ON	Fault	ETM input was ON with the car on Inspection.
332	UCM ROPBRK FLT	Fault	THE UCM system on the ETSD board detected a Rope Brake Fault.
333	FS COUNT FLT	Fault	The car tried to run Fast Speed but failed to get to the next floor after 20 attempts. This can be caused by a Door Contact bouncing, or the Door String failing to close properly before the run.
334	110% OVERSPEED	Fault	Car exceeded 110% of contract speed.
335	INS OVERSPEED	Fault	Car exceeded 150FPM on Inspection.
336	DOOROPEN OVRSPD	Fault	Car exceeded 50FPM with the doors open.
337	TACH LOSS FLT	Fault	Car Speed was too slow on fast speed run, indicating encoder malfunction.
338	WRONG DIR FLT	Fault	Car was running the wrong direction.
339	ETSD SPEED FAULT	Fault	Car was running too fast when it reached the ETSD switches.
340	ETSD TERMINAL SW	Fault	ETSD switch fault. The car did not transition an ETSD switch at a terminal landing.
341	ROPEBRAKE FAULT	Fault	Rope Brake tripped.
342	RUNAWAY FAULT	Fault	Car speed indicated the car is moving when it should be stopped.
343	BRAKE SW FLT	Fault	Brake micro switch input indicates the Brake did not drop when it should have.
344	UCM OUT-DZ FAULT	Fault	Car moved out of the Door Zone with the doors open.
345	BRAKE PWR=OFF	Fault	Brake Power input (BP) was OFF.
346	INPUT DRV=OFF	Fault	Drive Ready input (DRV) was OFF.
347	DRV ON INPUT=OFF	Fault	Drive ON input (M22) went OFF as the car was running. The input was previously ON.
348	FAULT AUTO RESET	Fault	Car did a fault reset, up to selectable "# FAULT RESETS" times in door zone, and 25 times out of door zone.
349	EXCESS RST DZ	Fault	Car had excessive resets, and shut down at floor level.
350	EXCESS RST OUTDZ	Fault	Car had excessive resets, and shut down between floors.
351	STOP:EBRK SW FLT	Fault	The Emergency Brake Micro Switch input (29X) did not turn ON after the car stopped.
352	STOP:EBRK RELAY	Fault	The Emergency Brake BK3/4 Contactor input(s) did not turn ON after the car stopped.
353	BSA/B RELAY FLT	Fault	The Brake Hold Voltage Switch input (BSA/B) did not turn ON after the car stopped.
354	START:EBRAKE FLT	Fault	The Emergency Brake Micro Switch input (29X) did not turn OFF while running.
355	START:INPUT BK3	Fault	The Emergency Brake BK3 Monitor input did not turn OFF while running.
356	START:INPUT BK4	Fault	The Emergency Brake BK4 Monitor input did not turn OFF while running.
357	TRACTION LOSS	Fault	Difference between the Encoder and Absolute Positioning Speed implies rope slippage.
358	TUNE ENCODER HSC	Fault	Encoder calibration required. The encoder data must be referenced to contract speed.
359	ETSD FLOOR FAULT	Fault	ETSD input (31X:Up/32X:Down) is ON while at the terminal ldg, or OFF at any other ldg.
360	ETSD RUNNING FLT	Fault	ETSD input (31X:Up/32X:Down) tripped off while running Fast Speed.
361	EARTHQUAKE SHTDN	Fault	The Earthquake/Seismic sensor input has initiated a shutdown.
362	ETM/EXM SAFE FLT	Fault	An ETSD fault has opened the safety string. Both ETM/EXM inputs are OFF.

11. Parts List

All parts are commercially available from the manufacturer, or from Virginia Controls (Ask for the Parts Department). Parts are subject to change without notice. Consult Virginia Controls for current pricing information. Non-standard material is identified on the schematic. Refer to the schematic for non-standard parts not listed here.

DESCRIPTION	MANUFACTURER	PART #
RELAYS, PHASE MONITORS		
4PDT, 120VAC, Plug-In Relay	Idec	RU4S-A110
4PDT, 110VDC, Plug-In Relay	Idec	RU4S-D110
4PDT, 24VDC, Plug-In Relay	Idec	RU4S-D24
Phase Monitor	MotorSaver	202
CONTACTORS, STARTERS, OVERLOAD		
Vector Drive	KEB	Ex: 17.R5.A1H-PLB2
Starting "P" Contactor	Schneider	Ex: LCD1-D65–AG7
Auxiliary Contact Block	Schneider	LADN22, LADN02
Overload "MOL"	Schneider	Ex: LRD365
Brake "BK1"/"BK2" Contactor	Schneider	LC1-D40 –AG7
Terminal Block	Klemsan	PIK4N
Terminal Block	Bussman	16281-3, 16303-1
Terminal Block Connectors	On Shore	OSTTJ105153, 10-pole
		OSTTJ055153, 5-pole
TRANSFORMERS, FUSES, TERMINALS		
115/230V, 600VA Transformer	SquareD	9070T600D136
Battery Lowering UPS (750VA)	APC	SUA750
Grounding Bar	SquareD	PK0GTA-6
24VDC Power Supply (230/115V Input)	Meanwell	MDR-100-24, RS-50-24
250V Instantaneous Fuse	Bussman	Type BAF
250V Fuse Holder	Klemsan	E2541000
3 Pole Terminal, 600V, 50A	Klemsan	K305130
3 Pole Terminal, 600V, 90A "L1,L2,L3"	Bussmann	NC3-WH
3 Pole Terminal, 600V, 175A "BF, - , DB"	Bussmann	NDN111
Mounting Track for Terminals and 250V Fuse Holders	Wago	DIN-35
600V Time Delay Fuse	Bussman	Type FNQR

DESCRIPTION	MANUFACTURER	PART #
600V Fuse Holder for Above Fuse	Bussman	R60030-1CR
3-Phase Line Reactor	TCI	EX: KDRC22L
RESISTORS - PART NUMBER IS RESISTANCE & WATTAGE - SEE THE SCHEMATIC		
Power Panel Resistor Values 375W = 4, 8, 10, 25Ω 200W = 50, 100, 250, 500, 1000, 1500, 2500Ω	Huntington Resistors	See schematic
MICRO-PROCESSOR		
Microprocessor CPU board	Virginia Controls	VISION2-CPU
16-in/16-output Remote I/O Module	Virginia Controls	VISION-REMOTEIO
2-in/2-output Hall I/O Module	Virginia Controls	VISION-HALLIO
Keypad	Virginia Controls	VISION-KEYPAD
LCD screen	Virginia Controls	VISION2-LCD
Machine Room Safety Interface Board	Virginia Controls	VISION-MR-SIB
Car Top Safety Interface Board	Virginia Controls	VISION-CT-SIB
ETSD/UCM BOARD & Photo Eye Sensor	Virginia Controls	ETSD
MR-SIB battery for Real Time Clock	PANASONIC	CR2032
MISCELLANEOUS		
1"W x 2"H Duct	Beta	WH1X2
1"W x 3"H Duct	Beta	WH1X3
Neons, On Relay Panel	I.D.I.	1030
Varistors (See Schematic For Sizes)	Movistar, G.E.	V150LA2, V150LA10, V150LA20, V275LA10, V275LA20, V275LA40
CAN Cable – 22Ga-TP w/Shield	Beldon	7895a, 3105a
Pushbutton, on Switch Panel	Carling	
Toggle Switch, on Switch Panel	Carling	
Digital PI Driver Board	CE Electronics	SHCDUE-C1X / VCI-001
Rectifier "BRF"		SKB-25/12
Fan & Grill Kit	Ice Qube	IQ150FPW-126-SS-N4X

12. Troubleshooting Suggestions

(to be provided in future manual update)

12.1   Factory Assistance

IMPORTANT: If troubleshooting assistance is required from Virginia Controls, get the following information before calling:

- **THE VIRGINIA CONTROLS DRAWING NUMBER** (located at the bottom right of the schematic).

- **AN EXACT DESCRIPTION OF THE PROBLEM.**

- **THE STATUS OF ALL THE INPUT AND OUTPUT POINTS.**

- **THE STATUS OF THE LIGHTS ON THE POWER SUPPLY.**

Contact Virginia Controls at (804)-225-5530 for technical assistance. Additional troubleshooting instructions may be given, depending on the nature of the problem.

13. Controller Maintenance

WARNING: MAKE SURE THE POWER IS OFF BEFORE CONNECTING OR DISCONNECTING ANY CONNECTORS, ADDRESS JUMPERS OR CABLES ON THE CPU OR I/O BOARDS.

13.1   Periodic Maintenance

WARNING: Turn off the power before touching the terminals or wiring.

Check that all wires are tight and properly located in the terminals. Make sure no stray stands of wire are sticking out of the terminal strips.

Check the Motor Starter contacts and Door Operator contacts (if provided) for wear.

Make sure all relays are fully seated in their sockets.

If any varistors are provided in parallel with inductive loads (such as the motor and brake contactors) check that they are physically sound. Look for signs of burn marks. Replace them if they look damaged.

Check the MR-SIB battery. This can be done by cycling the power, then checking to make sure the onboard clock is still correct. To check the time, look at the 4th line of the banner screen on boot up. If the date had been set, and it now shows the date as 01/01/2001, then the battery is dead. Change the battery and set the time.

Keep the controller clean and dry. Power supplies and processor chips in particular should be keep clean of dust and other debris. Keeping the machine room itself clean helps keep the controller clean.

13.2   Parts Replacement

13.2.1 CPU Exchange

To swap out the CPU board, do the following:

1. Turn off the power to the controller.

2. Note the location of all cables and wires. It is recommended that all cables and wires be marked so that they can be returned to the correct terminal or connector and oriented properly.

3. Remove the four screws holding the CPU board in place.

4. Remove the CPU board.

5. Install the new CPU board in the reverse order, ensuring that the pins are aligned with the pin connector.

13.2.1.1 Input/Output Board Exchange

To exchange an I/O board, do the following:

1. Change the Address Switches on the new I/O board to match the board it will replace.

2. Turn off the power to the controller.

3. Unplug all the removable I/O terminal strips from the top and bottom of the I/O board. It is not usually necessary to mark the terminal blocks, since the wiring normally holds them in the proper place. If there is any doubt about their location, then mark the terminal blocks to show where they should be re-installed.

4. Disconnect the CANBus and 24VDC power wires from their respective terminals.

5. Remove the screws holding the I/O board in place.

6. Install the new I/O board by reversing the previous steps.

7. Ensure that all termination jumpers, power supply chips, and I/O jumper blocks are swapped with the new board.

14. Frequently Asked Questions

Suggestions for other Frequently Asked Questions are welcomed. Please submit them to Virginia Controls Technical Support.

14.1   Questions on Field Devices

Q.   The Doors Do Not Operate Properly on Fire Service

A.   Check the Door Open and Door Close Limit Switches for proper operation. Most problems with Fire Service are a result of one or both of these switches not operating properly. Also check to make sure the correct Fire Code has been selected in the Adjustable Settings and Features. Refer to the schematic adjustment sheet.

14.2 Questions on the Controller

Q.   How Do I Reset All Settings and Features Back to the Original Values?

A.   Use the Settings Reset Menu. (Follow instructions in Sections 7.1.4.5). To reset Counters, use the Reset Counters Menu (Section 7.1.4.6). To clear the Fault Log, refer to Section 7.1.9.1. To reset ELGO Absolute Positioning Data, use the ELGO Menu (Section 7.1.4.8).

Q.   How do I check the current values of the settings and features?

A.   Use the Edit Adjustable Settings Menu. (Follow instructions in Sections 7.1.4.4)

Q.   How do I reset a latched fault or shutdown?

A.   Toggle the Reset input "RST" by momentarily connecting a jumper between TB: 1X – RST, which is typically located on MR-SIB input 16. If a fault condition is not currently present, the latched fault then resets. Otherwise, the fault re-latches. Use the Shutdown Defeat input jumper to prevent a nuisance fault from latching during installation and troubleshooting, TB: 1X – DFT (MR-SIB input 15).

Q.   How do I prevent a fault or shutdown condition from latching?

A.   Use the Shutdown Defeat input jumper to prevent a nuisance fault from latching during installation and troubleshooting: TB: 1X – DFT (MR-SIB input 15). The shutdown defeat input expires after an adjustable timeout, ranging from 1 hour to 1 week. Refer to Section 8.2.1.5 for more information. The reset input "RST" is only able to reset shutdowns that are currently latched, but does not defeat existing shutdown conditions.

15. Drive Special Instructions

Refer to the job schematic for connection information.

The drive has been set up and tested, so only minor adjustments should be necessary.

If the motor data is different from that supplied to Virginia Controls (motor horsepower, currents, voltages, etc.) then consult with Virginia Controls before powering up the system.

Refer to the Parameter sheet in the schematic for the actual settings for each particular job.

For additional explanations of drive parameters, see the Magnetek Technical Manual.

Customer should record any parameter changes and keep this information in a safe place for future reference.

15.1 Over Speed Test

It is recommended that the over speed test be done with the car on "Inspection". This allows complete control of the car at all times. When the test is complete, restore all parameters back to their original values.

Refer to the Parameter sheet in the schematic for additional details.

16. ETSD Monitoring System Testing

> **NOTE: When performing these tests, especially while the elevator is on Normal operation, first verify that the car is empty and that Hall Calls are cut out.**

16.1 UCM System Testing

16.1.1 Equipped for Rope Brake Operation (Static Test)

1. Run the elevator on Automatic to top landing, or to the bottom if basement traction.

> **NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.**

2. Power down the system with doors closed.

3. Remove the controller wire at Input DZ, "Door Zone", on the ETSD Board. Clip this controller wire to a short wire temporarily installed in its place.

4. Power up the system, then use the Door Open Push Button in the controller to open car doors.

5. As the elevator opens its doors, remove the controller wire clipped to the temporary wire at Input DZ on the ETSD Board.

6. The UCM System will cause the Rope Brake to set, and the "UCM TRIP" LED to light.

7. Power down the system.

8. Restore the controller wiring at Input DZ.

9. Power up the system, and briefly touch a wire from controller TB-1X (120VAC) to ETSD Input SHTDFT to reset the UCM System.

10. The controller processor may need to be reset as well, in much the same way, before the Rope Brake will reset and lift. Jump 1X-RST, or toggle the pre-installed reset keyswitch in the machine room controller.

16.1.2 Equipped for Em. Brake Operation (Dynamic Test)

1. Run the elevator on Automatic to top landing, or to the bottom if basement traction.

> **NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.**

2. Enable the "UCM TEST" parameter in the Settings Menu and select a test direction that levels the car away from the Normal Terminal Limit, whether the elevator is parked at top or bottom landing.

3. Use the Door Open Button in the controller to open car doors.

4. Initiate the software UCM Test once the doors have opened, and observe the elevator run at leveling speed in the selected direction.

5. Once the elevator has leveled beyond the Door Zone boundary, the UCM System will cause the Emergency Brake to set, and the "UCM TRIP" LED to light.

6. Briefly touch a wire from controller TB-1X (120VAC) to ETSD Input SHTDFT to reset the UCM System.

7. The controller processor may need to be reset as well, in much the same way, before the Emergency Brake will reset, allowing the elevator to close its doors and relevel. Jump 1X-RST, or toggle the pre-installed reset keyswitch in the machine room controller.

16.2   O-S System Testing

1.   With elevator at mid-hatch (approx.), place on Inspection from controller.

2.   Power down the system.

3.   Install a jumper from controller TB-1X to controller processor Input or TB: "SHTDFT". See the controller drawings for the location of this input or controller terminal.

4.   Power up the system.

5.   Set the drive for an Inspection Speed of 175FPM and run car in either direction.

6.   The O-S System will fault, causing an elevator brake stop and the "O-S TRIP" LED to light.

7.   Power down the system.

8.   Remove the jumper from controller TB-1X to Input or TB: "SHTDFT".

9.   Power up the system.

10.   Restore the drive to its original Inspection Speed.

11.   Use the "O-S RESET" Push Button on the ETSD Board to reset the O-S System.

12.   Test for desired Inspection speed, then return elevator to Normal Operation.

16.3   ETSD System Testing

1.   With elevator at mid-hatch, on Normal Operation and at floor level, power down the system.

2.   Install a jumper from controller TB-1X to controller processor Input or TB: "SHTDFT". See the controller drawings for the location of this input or controller terminal.

3.   Remove the field wire from controller TB-31X, Up ETS Switch, and clip this field wire to a short piece of wire temporarily installed in its place.

4.   Power up the system.

5.   Set a Car Call in the Up direction that causes the car to run multiple floors at contract speed.

6.   Monitor car speed by observing ETSD Board Relay Output LED's: "EX1 & EX2".

7.   When these Relay Output LED's go out, remove the field wire clipped to TB-31X.

8.   The ETSD System will fault, causing an elevator brake stop and the "ETSD TRIP" LED to light.

9.   Power down the system.

10.   Remove the jumper from controller TB-1X to controller processor Input or TB: "SHTDFT".

11.   Restore the field wire at controller TB-31X, Up ETS Switch.

12.   Power up the system.

13.   Use the "ETS RESET" Push Button on the ETSD Board to reset ETSD System.

14.   The elevator will level to a landing on Normal Operation.

15.   If desired, repeat steps in Down Direction using TB-32X, the Down ETS Switch.

17. Periodic Testing Procedures

17.1 Normal terminal stopping devices

17.1.1 Up Normal Limit Switch

The Up Normal Limit switch is controlled by the ELGO absolute positioning system. To test the operation of the limit switches, run the car on inspection past the upper terminal landing, and observe that the car will stop approx. 1" past floor level.

> **NOTE: The Up Normal Limit switch is bypassed while the ELGO APS system is not fully installed, does not have floor position data, or is in an error state. While on inspection, this allows the car to run up or down at slow speed while the computed state of the normal limits are indeterminable. While on Normal Operation, the car is allowed to perform a rescue operation, where the car will level down at slow speed until reaching door zone, at which point the car will stop and shut down with doors being operable.**

If a hardware Up Normal Limit switch is used, disconnect the Up Normal Limit Switch Input at MR-SIB input M25. See that the car cannot run up on normal or inspection operation. Replace the wire on MR-SIB input M25. Run the car up and have someone on top of the car physically open the up normal limit switch. The car then stops.

17.1.2 Down Normal Limit Switch

The Down Normal Limit switch is controlled by the ELGO absolute positioning system. To test the operation of the limit switches, run the car on inspection past the lower terminal landing, and observe that the car will stop approx. 1" past floor level.

If a hardware Down Normal Limit switch is used, disconnect the Down Normal Limit Switch Input at MR-SIB input M28. See that the car cannot run down on normal or inspection operation. Replace the wire on terminal MR-SIB input M28. Run the car up and have someone in the pit physically open the down normal limit switch. The car then stops.

17.2 Testing Firefighter's operation

17.2.1 Phase 1 Tests

1. With the car on automatic operation and running normally, set off the main floor smoke sensor, or remove wire 82M at the controller. See that the car runs to the alternate fire landing. Reconnect 82M and reset the controller by turning the hall key switch to the RESET position then back to OFF, or by temporarily enabling and disabling the "NO FIRE SERVICE" setting in the adjustable settings page of the Setup Menu.

2. With the car on automatic operation and running normally, set off a non-main floor smoke sensor, or remove wire 82 at the controller. See that the car runs to the main fire landing. Reconnect 82 and reset the controller by turning the hall key switch to the RESET position then back to OFF, or by temporarily enabling and disabling the "NO FIRE SERVICE" setting in the adjustable settings page of the Setup Menu.

3. With the car on automatic operation and running normally, set off a shaftway or machine room smoke sensor, or jump 1-82F in the controller for about 2 seconds. See that the car runs to the main or alternate fire landing (depending on how the sensors are wired) and that the fire hat in the car flashes on and off. Reset by turning the key switch to the RESET position, or by temporarily enabling and disabling the "NO FIRE SERVICE" setting in the adjustable settings page of the Setup Menu.

17.2.2 Phase 2 Tests

1. With the car at the main floor, turn the fire service key switch to the ON position to initiate phase 1 fire service.

2. In the car, place the car on phase 2 fire service by turning the key switch to the ON position, which enables input 80 on a Car I/O board. Run the car to various floors and verify proper door operation, as required in local and national codes.

3. When the tests are done, return the car to the main fire service floor on phase 2 fire service, and place the phase 2 key switch back to the OFF position, which enables input 88 on a Car I/O board.

4. Reset Phase 1 fire service via the key switch in the hall, or by temporarily enabling and disabling the "NO FIRE SERVICE" setting in the adjustable settings page of the Setup Menu.

17.3 Safety Tests

17.3.1 Bypass Normal Limits

1. Run the car to the top (or bottom) terminal landing.

2. Run the car up (or down) on inspection until the car automatically stops upon reaching the Normal Limit.

3. Jump the MR-SIB inputs 1X – M25 (up) or 1X – M28 (down) to allow the car to resume past the normal limit. Run the car up (or down) on inspection to the desired position.

4. If any other safety devices open the safety string, refer to the wiring schematic pages VM3 & VT1 for information on which terminals to jump to allow the car to run on inspection. Use the fault reset input terminal RST to reset any resulting faults.

5. When finished, remove the jumpers from 1X – M25 (and 1X – M28) to return to normal operation.

> **NOTE: If the car is not beyond the normal limit when the M25 or M28 jumper is installed, the car will be unable to run.**
>
> **NOTE: Refer to Section 5.2.3 for more details on bypassing the normal limits which are controlled by the ELGO Absolute Positioning System.**

17.3.2 Bypass Slowdown Limits

1. Run the car to an intermediate (non-terminal) landing.

2. Navigate to the Edit Adjustable Settings/Features submenu in the Setup Menu. Enable the settings "DISABLE SLOWDOWN" and "DISABLE SLWDNLMT", which will internally bypass the internal up & down slowdown limits for one fast speed run on normal operation.

3. Place a car call or hall call to the desired terminal landing, and the car will run without stopping until the car runs into the terminal buffer, or the run timer times out.

4. If any other safety devices open the safety string, refer to the wiring schematics page VM3 for information on which terminals to jump to allow the car to run on inspection. Use the fault reset input terminal RST to reset any resulting faults. The car should return to normal operation.

> **NOTE: Refer to Section 5.2.3 for more details on bypassing the terminal slowdown limits which are controlled by the ELGO Absolute Positioning System.**

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