

Vision Traction Controller User Manual



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1. Introducing Vision from VCI

1.1 General Description

The Vision Traction Controller seeks to build upon the long series of reliable controllers produced by Virginia Controls, Incorporated (VCI), starting back with our trusted relay based controllers, on to our many offerings of PLC (Programmable Logic Controller) based controllers, and ending with our most recent yet time proven dedicated micro-processor based controller, the MVFAC-3000.

Our new Vision platform accomplishes this via a considerable boost in processing power across the 2 CPU's within each controller, and by applying the appropriate serial communication networks between controller and car and hall I/O, and from controller to controller for "plug and play" connectivity.

In general, it is CANbus (Controller Area Network) serial communication, operating between CPU's and the I/O of the routine switches, push-buttons and lights of the car and hall, that accounts for the new and improved interconnectivity, but it does not end there:

- Each CPU has 4 CANbus channels to flexibly and independently connect to car and hall I/O.
- An Ethernet port per CPU provides for separate peep-to-peer and LAN/WAN networks.
- A USB port resides on every CPU permitting software and I/O revisions via Flash Drive.
- Safety related I/O is redundantly "read" and compared by software and hardware systems.

All this combines to provide speedy installations, high reliability, ease of trouble-shooting and long life.

1.2 General Specs

- 2-64 Landings from Single elevator up to 8-Car Group – Demand/Response operation.
- Up to 450FPM for traction applications
- Compatible with 208, 240, 380, 460 or 600VAC Building Supplies.
- Available drive arrangements: KEB, CT, Allen Bradley
- Custom car door openings per floor: 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: 30"W x 36"H (typical) wall mounted NEMA 1 w/Lift-Off Cover, NEMA 4 and 12 also.
- Single Phase Building Supply or Multi-Sequential Starting w/Branch Circuit Protection.

1.3 Updates from MVFAC-3000

- Dual CPU's and logic devices read redundant I/O on Safety Interface Board to eliminate Relay Interface.
- Serially connected I/O for both Car and Hall is less costly to install than point-to-point wiring methods.
- Rugged and reliable single car operation, while offering dispatcher-less, multi-car group operation.
- An absolute positioning system is an available alternative to a conventional car top selector system.
- User interface is improved with a 4-Line x 20-Character display and easy to use numeric keypad.
- Fault-logging is greater in size with more detailed information for ease of troubleshooting by technician.
- Software revisions can be emailed and installed to USB flash drive for convenient upgrades and fixes.
- Overall, a state-of-the-art and more versatile controller package that is compact and quicker to install.

1.4 Warranty Terms & Conditions

WARRANTY: VCI 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. VCI obligations under this warranty shall be strictly limited to repairing or replacing the documented defective material at VCI's option. Material may be returned only with prior authorization of VCI. 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 VCI. All material returned must be freight prepaid and insured for full value. VCI shall determine, in its sole discretion, whether the product is defective, and whether the warranty is applicable. VCI 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. VCI will not accept responsibility for equipment which has been modified in any way without the express written consent of an authorized officer of VCI, further, the unauthorized modification of any product supplied by VCI will render the here before stated warranty null, void, and unenforceable. **VCI makes no other warranties or guarantees, expressed or implied, and any implied warranties of merchantability or fitness for a particular purpose VCI 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. VCI shall not be liable for damages, direct or consequential, or delays if such occur.** VCI will not grant any allowances for any repairs or expenses without the express written consent of an authorized officer of VCI. No further warranties or guarantees given by the purchaser to its customers shall be binding upon VCI.

2. Pre-Installation Instructions and Notes

2.1 General Notes

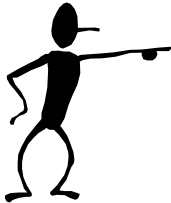
It is strongly recommended that you read this manual carefully before proceeding with the installation.

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 process.



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, valve solenoids, 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 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 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 stud that is labeled "GND" or "G". You must choose the proper conductor size. See national electrical code article 250-95, or the related local applicable code.

3. Controller Installation and Wiring

3.1 Controller Installation

3.1.1 Controller Location Selection and 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 (supply 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 fluctuations are within drive ratings ($\pm 10\%$).
- 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.
- Long term operation of the controller without the door or cover in place is not recommended.

3.1.2 Controller Grounding



Grounding of the controller must conform to all applicable electrical codes. Proper grounding is vital to the safe and reliable operation of the equipment.

- The grounding wire between controller and disconnect must be connected to a ground conductor within the disconnect that proceeds from the dedicated ground of the building's electrical distribution system.
- The grounding wire should be sized per applicable electrical codes.

3.2 Car and Selector Wiring

3.2.1 Traveling Cable Usage

With the use of CANbus and Remote I/O modules on the Car Top and in the Car Operating Panel, the quantity of conductors needed in the traveling cable is considerably less than using discreet (point-to-point) wiring of all I/O back to the controller.

The majority of car and car top connections may be made directly to the Car Top or C.O.P. I/O module which will relay the signals to the Vision controller over CANbus 2 twisted-pair to the Main CPU. Specific connections which are safety string and inspection related remain as discreet conductors/signals down the traveling cable to connect directly to the Safety Interface Board (SIB) of the Vision controller. These include Door Zone, Stop Switches, Door Contacts, and Inspection Inputs. Refer to the "FC" page of the schematics for specific traveling cable wiring designations.

3.2.2 Car Top Selector

The pulsing-type Car Top Selector provides Floor Change/Slowdown, Leveling, Door Zone, Binary Floor Reset, and Hoistway Access Zone signals as shown on the car top selector sheet in the schematic. All selector inputs are connected to a Remote I/O Board mounted in the car top, with the exception of the Door Zone Switch which is a safety related input wired to the SIB. An absolute positioning system (APS) may be specified in place of the Car Top Selector, however a separate Door Zone Switch would be retained. The following sections refer to a standard positioning selector. For controllers with an absolute positioning system, skip this section 3.2.2 and refer to Section 5.13 for installation instructions.

3.2.2.1 Slowdown and Floor Change Switches

The Up Slowdown switch closes at the slowdown distance below the floor (Car-Top I/O board Input 31), and the Down Slowdown switch closes at the slowdown distance above the floor (Car-Top I/O board Input 32). Refer to the selector installation sheet in the schematic for the exact requirements for the selector for each particular installation.

NOTE: Recommended slowdown distance is about 6" for every 25fpm of car speed, for speeds of up to 200fpm. Minimum recommended target length for the slowdown/floor switches is 1", but 6-10" in length is typical.

When the controller reads an Up Slowdown target signal while moving up, the car position indicator (PI) is incremented by 1. Likewise, when the controller reads a Down Slowdown target signal while moving down, the car PI is decremented by 1. If the car PI ever gets out of sync with the actual floor position, the PI is reset using floor reset targets located at every floor or at each terminal landing using slowdown targets, as described in Section 3.2.2.2.

For two-speed (or more) enabled traction controllers, an additional set of up slow speed (USS) and down slow speed (DSS) slowdowns are required to accommodate a 1-floor run speed between landings. The position for these targets are set to approximately half the distance between the shortest floor-to-floor distance. Refer to the selector diagram page of the schematics for specific layout instructions. For two-speed systems, the USS and DSS slowdowns are required between all landings to allow for correct floor change pulses while on inspection. Additional slowdown targets may be needed if using a three-speed (or more) system.

3.2.2.2 Floor Position Reset Switches

Floor position reset switches may be used at every landing using the Binary Floor Reset target inputs (Car-Top I/O board Inputs 1FP, 2FP, 4FP, 8FP), or only at terminal landings using the Up Slowdown and Down Slowdown targets (Car-Top I/O board Inputs 31 & 32).

If using slowdown targets for floor position reset at the terminal landings, the Up Slowdown signal should be energized while in the leveling zone at the top terminal landing, and the Down Slowdown signal should be energized while in the leveling zone at the bottom terminal landing. These extra slowdown targets are not used if using Binary Floor Reset target inputs at every landing.

If using Binary Floor Reset target inputs, the selector targets must be installed such that the energized 1FP, 2FP, 4FP, and 8FP inputs sum to the Floor Position of that landing while in the leveling zone. Refer to the car-top selector installation drawing (Sheet "CTS") in the schematics for the specific reset switch configuration at each landing.

3.2.2.3 Leveling and Door Zone Switches

The Up Level Switch (Car-Top I/O board Input 30) is a normally open contact that closes when the car is in the leveling zone below the floor, and the Down Level Switch (Car-Top I/O board Input 33) is a normally open contact that closes when the car is in the leveling zone above the floor. Adjust the distance between the Up Level Switch and the Down Level Switch to be equal to the length of the leveling vane/target plus the desired Dead Zone distance (usually 1/4" to 1/2"). The actual length of the leveling target is not critical (except in some short floor situations) and is usually 6-10". Position the leveling vane/target so that when the car is floor level the Up and Down Leveling Switches are centered around the vane/target, and both switches are open.

The Door Zone Switch (SIB Input 20) is a switch (or switches) activated by the leveling vane/target when the car is within 3" of floor level. If the leveling vane/target is 6" long, then only one switch is required, mounted between the Up and Down Leveling Switches, otherwise two switches wired in series should be provided.

3.2.2.4 Hoistway Access Zone Switches

The Hoistway Access Zone Limit Switches (Car-Top I/O board Inputs BD, BU, TD, and TU) limit the motion of the car on Hoistway Access, should it attempt to move away from the access floor. Install the zone switches to stop the car from running down if the top of the car goes below floor level at the top access floor, and to stop the car from running up if the car goes above the second floor while on Hoistway Access at the bottom floor.

3.2.3 Door Operator

3.2.3.1 Door Open and Close Limit Switches

The Door Open Limit Switch (Car-Top I/O board Input 7X) 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 at input 7XR.

The Door Close Limit Switch (Car-Top I/O board Input 8X) 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 at input 8XR.



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 to clear Fire Service, etc.). Always check the Door Open and Close Limit Switches if unusual operation of the elevator is observed.

NOTE: It is recommended that the Door Close Limit Switch be adjusted so that, as the doors are closing, the Car Door Contact closes before the Door Close Limit opens. Consult the Door Operator Manufacturer's installation instructions for further details on the adjustment of the doors.

NOTE: 2000 (or later) code compliant controllers will not run without the Door Close Limit operating properly.

NOTE: If a solid state door operator unit is being used, 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 for proper opening and closing torque adjustment.

3.2.3.2 Door Open and Close Outputs

The Door Open, Close, and Nudging Outputs are provided by the Car Top I/O board(s) for both front and rear door operators.

The Door nudging feature is enabled if the “DOOR NUDGING” setting is active, which will close the door at a reduced speed where appropriate. If using an infrared curtain unit/electric eye (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 has been active for 20 seconds (adjustable timer “ICU CUTOFF TIME”), and the feature setting “TIMED EYE CUTOFF” is enabled.

NOTE: The Door Close Output will be energized while the car is running to help prevent the door contacts or door close limit from tripping open 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 the setting “NO CLOSE ON INSP” to prevent the door from auto-closing while on inspection. The Door Close Output will still be energized while running.

NOTE: The Door Close Output is disabled while in Inspection Access.

The Door Operator Common for the Door Open and Door Close outputs is connected to terminal 3, which is the safety string common ahead of the In-Car Stop switch, a device which must not render the car door(s) inoperable. Should the safety string open ahead of terminal 3, then the doors are rendered inoperable. The Door Open Output is restricted to the Door Zone, and the Door Close Output is disabled during Inspection Access.

3.2.3.3 Safety Edge & Infrared Curtain Unit (ICU)

The Safety Edge and Infrared Curtain Unit (ICU) / Electric Eye inputs are connected to the Car-Top I/O board at Inputs 27S and 27E, and 27SR and 27ER for rear openings. The Safety Edge and ICU inputs are cut out while on Fire Service if the setting “ENABLE I.C.U.” is enabled, and will otherwise cause the door to reopen while the input(s) is on. The ICU also uses a timed cutout if the setting “TIMED EYE CUTOFF” is enabled, using the timer “ICU CUTOFF TIME”.

3.2.3.4 Car Gate Contacts

The Car Gate contacts for front and rear doors are part of the safety string which connect to the SIB at terminals 4 and 4R. If a rear car door is not present, then a jumper between terminals 3 and 4R is required to complete the safety string.

3.2.4 Safety String and Inspection Inputs

All Inspection switches and their associated run push-button inputs connect to 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 SIB inputs are left un-wired. Refer to the schematics for specific wiring of the inspection string.

3.2.4.1 Car Top Inspection

The Car Top Inspection switch connects to SIB terminals 1X, 21 (or 23B if used with In-Car Insp) and 23T where Input 23T is ON while on Car Top Inspection. Car Top run push-buttons are wired as follows: Car Top Enable to SIB Input 23E, and Car Top Up/Down Run to SIB Inputs 25/24.

3.2.4.2 In-Car Inspection

In-Car Inspection operation is available. The In-Car Inspection switch connects to SIB terminals 23B, 23X and 21, where Input 23X is ON while on In-Car Inspection. Up and Down In-Car run push-buttons are wired to SIB Inputs 24X and 25X, or by sharing the car call button inputs for running up (2C) and down (1C).

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

3.2.4.3 Inspection Access

The Inspection Access switch connects to the SIB terminals 22, 23, and 23A, where the input 23A is ON while Inspection Access is active.

3.2.4.4 Safety & Stop Switches

The safety string stop switch inputs for the car are connected in series between terminals 2 and 3. This string will typically include the Car Top Inspection Stop switch and Fire Operation Stop switch, and may include the Emergency Exit switch, Side Exit Switch, Car Safety Switch, and all other devices that must stop the car should they open. The In-Car Stop switch is connected between terminal 3 and the SIB Input 3X, which provides a dedicated input to allow the In-Car Stop switch to be bypassed during Fire Recall.

3.2.5 Car Operating Panel (C.O.P.) I/O Board Connections

Most of the C.O.P. input and output fixtures may be connected directly to Remote I/O boards mounted in the C.O.P., or also on the car top. Inputs and outputs on the Remote I/O boards are 120 VAC. Refer to the schematics for specific connections to the assigned Remote I/O board on CANbus 2 (Main). Possible connections are shown in the table below.

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

3.3 Hoistway Wiring

3.3.1 Safety String and Inspection Inputs

3.3.1.1 Safety and Stop Switches

The safety string inputs for the shaft are wired in series ahead of the door string, and each device is monitored by a discreet SIB input. Standard inputs include:

- Governor Switch (Input 1Y)
- Rope Brake Switch (Input 1T)
- Final Limit Switches (Input 1B)
- Pit Stop Switch (Input 2)
- Counterweight Safety Switch (Input 2 – In series with Pit Stop Sw.)

If any of these safety devices are not present or wired to the controller, a jumper must be put in place of the device to complete the safety string. If any safety string input is open, the controller will not run, and a fault will be logged describing the first break in the safety string.

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

3.3.1.2 Hall Door and Hall Lock Contacts

The Hall Door and Lock (if used) Contacts portion of the safety string is mostly wired in parallel, allowing the system to monitor critical door and lock contact inputs independently. The Hall Door string is separated out by Inspection Access openings, top and bottom, and by Front and Rear doors openings. See Table 1 below.

Table 1: Safety String inputs for Hall Door and Lock Contacts.

Door Description	Hall Door Contact	Hall Lock Contact
Top Access Door	5T	6T
Bottom Access Door	5B	6B
Front Doors (not Access)	5	6
Rear Doors (not Access)	5R	6R

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

Door checking is an available feature (setting “DOOR CHECK FAULT”), which compares the status of the door open limit and door close limit with the car door and hall door contacts at every landing for both front and rear doors. Door checking requires the 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 contacts based on which landing the car is located. Note that Door Checking does not apply for Hall Lock Contact inputs (6, 6B, 6T, 6R).

3.3.1.3 Inspection Access Hall Switches

The 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, and are connected to SIB terminals as follows:

- Top Access Up Run: Input 25T.
- Top Access Down Run: Input 24T.
- Bottom Access Up Run: Input 25B.
- Bottom Access Down Run: Input 24B.

These run inputs are subject to the Inspection Access Switch (Input 23A) being active in the car, and being in the corresponding top and bottom hoistway access zones (Inputs: TD, TU, BD, BU on the Car Top Remote I/O board).

3.3.2 Floor Switches

The Floor Switches, if used, are normally open contacts that should close under each of the following conditions:

1. The car is at the slowdown point above the floor, OR
2. The car is at the slowdown point below the floor, OR
3. The car is at the floor (optional), OR
4. The car is between the up and down slowdown points of that landing (optional).

Conditions (1) and (2) are required to change the floor position and initiate slowdown. Condition (3) is required at the terminal landings, but is optional at the intermediate landings. Condition (4) is optional.

There are many acceptable methods of providing the floor switch signals, such as by having a single Floor Switch at floor level, and an adjustable length cam on the car, or by having two Floor Switches per floor, and a fixed length cam on the car. The Floor Switches may be mounted on the car if they are in separate rows. It is recommended that the method used allow for separate adjustment of the up and down slowdown distances.

NOTE: Recommended slowdown distance is about 6" for every 25fpm of car speed, for speeds of up to 200fpm. Minimum recommended target length for the floor switches is 1", but 6-10" is typical.

If there are short floors, refer to the schematic for special instructions, if required.

NOTE: The terminal landing Floor Switches must be maintained while the car is within door zone of the terminal landing.

3.3.3 Terminal Landing Slowdown Limit Switches

The Terminal Landing Slowdown Limit Switch is a normally closed contact that opens when the car is closer to a terminal landing than the minimum slowdown distance. It will prevent the car from running into the terminal landing at full speed. It should be adjusted to open approximately one inch beyond the point where the normal slowdown (from the floor switches or the car top selector) is initiated. The Up Slowdown Limit Switch is connected to SIB Input IX2 and the Down Slowdown Limit Switch is connected to SIB input IX3.

For controllers with two or more speeds, an additional slowdown limit at each terminal landing is required for each speed. When using an ELGO Absolute Positioning System, the Terminal Slowdown Limit switch function is computed in software and hardware switches are not needed. Refer to Section 5.13 for ELGO Installation details.

3.3.4 Terminal Landing Normal Limit Switches

The Terminal Landing Normal Limit Switch (sometimes called a Directional Limit Switch) is a normally closed contact that opens when the car has traveled approximately 1" past floor level at a terminal landing. The car should not be on the Terminal Landing Normal Limit Switch when the car is floor level at the terminal landing. The Limit Switch will prevent the car from traveling further away from the normal area of car travel, but allows the car to run back towards the normal area of car travel. The Up Normal Limit Switch is connected to SIB Input IX1 and the Down Normal Limit Switch is connected to SIB Input IX4.

When using an ELGO Absolute Positioning System, the Terminal Slowdown Limit switch function is computed in software and hardware switches are not needed. Refer to Section 5.13 for ELGO Installation details.

3.3.5 Terminal Landing Final Limit Switches

The Terminal Landing Final Limit Switch (SIB Input 1B), where required by code, is a normally closed contact that opens when the car has gone a considerable distance beyond floor level at a terminal landing. It will prevent any further movement of the car in either direction. Consult the applicable codes for the proper setting of this switch.

3.3.6 Emergency Terminal Landing Slowdown Switch

The Emergency Terminal Landing Slowdown Switch (ETSD) is used to ensure that the car has started slowing down while approaching a terminal landing. This switch is normally required when contract speed is greater than 200 fpm, otherwise this function may be bypassed using a jumper. The switch is placed at half the distance from the floor as the terminal slowdown switch, and is used to set the rope brake if the car speed exceeds 90% of contract speed when riding onto the ETS switch. This speed check is performed by the Vision CPU, as well as the ETSD board (refer to Section 0) at all times while the input is low. The Up and Down Emergency Terminal Slowdown Switches are connected to the Controller Remote I/O board #8 (input 31X/32X) and the ETSD board (terminals ETU/ETD). These inputs may be disabled using the setting "USE ETSLOWDOWN", and by defeating the ETSD board.

When using an ELGO Absolute Positioning System and contract speed is less than 200 fpm, a hardware speed limiting switch is still required in the up and down direction. This provides speed limit protection in hardware in the event the ELGO Absolute Positioning System is computing the wrong position when reaching a terminal landing.

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

The Hall I/O Board provides 2 inputs (24VDC), 2 outputs (24VDC), and 24 VDC power, making it ideal for controlling hall fixtures while being mounted inside the fixture box. For applications which use 120 VAC inputs and outputs, use the Remote I/O Board instead. Refer to the schematics for specific connections to the assigned Hall I/O board(s) on CANbus 3 (Safety).

Possible hookups include:

- Hall Call fixture: Up and Down push-buttons and indicators. (2 inputs and 2 outputs, or 1 input and 1 output at terminal landings)
- Fire Recall (Phase 1) switch: ON & RESET. (2 inputs)
- Fire Service light. (1 output)
- Emergency Power Operation light. (1 output)
- Hall Lanterns: Up and Down arrows with gongs. (2 outputs)

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.

3.3.8 Hall I/O Board #63 (16-In / 16-Out) Connections

The Hall Remote I/O Board #63 receives 120 VAC inputs, and may be located in the shaft, hall riser, or machine room, 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 is too numerous for the 2-In/ 2-Out Hall I/O Board. Refer to the schematics for specific connections to the assigned Hall I/O board(s) on CANbus 3 (Safety).

Possible 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, ...).
- Position Indicator: Discreet (1F, 2F, ...), PI Driver (1PI, 2PI, 4PI, ...), PI Blanking (38).
- Direction Indicator: Up (36), Down (37).
- Hall Lanterns: Up (1UL, 2UL, ...), Down (2DL, 3DL, ...).
- Car to Lobby switches.

Depending on the I/O configuration for the controller, the Hall Remote I/O Board #63 may have few connections, or not be needed altogether. Refer to the job-specific drawings for specific information for I/O points, CANbus, and power connections.

3.4 Machine Room Wiring

Mount the controller firmly and install all required conduits before wiring the controller. Note where duct has been provided inside the controller for installer's field 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.

3.4.1 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 starter, 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.

3.4.2 Grounding

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

Proper grounding is essential for the 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 micro-processors and serial communication devices that 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.

- The grounding wire between controller and disconnect must be connected to a ground conductor within the disconnect that proceeds from the dedicated ground of the building's electrical distribution system.
- The grounding wire should be sized per the applicable codes.
- Connect the ground on the controller to the large ground bar labeled "GND" as shown in the controller schematic.

3.4.3 Motor and Drive Wiring

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

Refer to the schematic for the location of the motor connections to the Drive.

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

3.4.4 Machine Brake and Rope Brake Wiring

The brake coil is wired between terminals B1 and B2. The Brake Resistor Grid is wired between terminals BF and DB. The Brake Micro switch is wired to SIB input “SP”. The default configuration for the Brake Micro switch is normally closed, such that the input “SP” 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 Rope Brake coil is wired between terminals 1Z and 35. The Rope Brake Switch is wired between SIB terminals 1Y and 1T.

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

The Machine Brake is piloted by redundant relays BK1 and BK2, which are monitored by SIB inputs BS and BSX. Machine Brake power is rectified and monitored using the relay BP and a corresponding input on the Controller Remote I/O board #8. The brake is commanded to lift at the beginning of a run after the Drive ON signal is energized, and will set at the end of a run after the UDTX relay de-energizes after an adjustable delay, or if there is a fault which drops the P-contactor. Brake Fault monitoring may be disabled using the setting “NO BRAKE FAULTS”.

The Rope Brake is piloted by redundant relays RB1 and RB2, which are monitored by corresponding inputs on the Controller Remote I/O board #8. A rope brake relay monitoring check relay RBC is also used to ensure there are no issues with relays RB1 and RB2 before each run. The Rope Brake will set if a fatal fault is detected by the Vision CPU or ETSD board by de-energizing the RB1, RB2, and RBC relays. The rope brake relay monitoring check may be disabled when using the shutdown defeat input, or by disabling the setting “USE BRAKE CHECK”.

3.4.5 Controller I/O Board #8 (16-In / 16-Out) Connections

The Controller Remote I/O Board #8 is used for all non-safety related inputs that are located in the machine room, or hall inputs which are controller specific that cannot connect to the shared Hall I/O Safety CANbus 3 network. The I/O Board #8 communicates with Main and Safety CPUs over CANbus 0. Many factory connections for drive, brake, and relay monitoring are made to Controller Remote I/O Board #8, as shown in the schematics. Standard connections for customer field wiring are shown in the table below.

TB	Inputs	TB	Outputs
RST	Fault Reset	SDN	Shutdown Indicator
85	Shunt Trip	SHT	Shunt Trip Relay
FLS	Flood Switch	38	P.I. Blanking
31X, 32X	Emergency Terminal Slowdown Switches	1FP, 2FP, 4FP, 8FP, ...	P.I. Floor Position Binary signals (1, 2, 4, 8, ...)
		1F – 8F	P.I. Floor Position
		36	Up Direction Indicator
		37	Down Direction Indicator

4. Start-Up Instructions

If it is desired to run the car temporarily, 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 0 "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 the controller.

With the power off, remove the fuses from the secondary of the main control circuit transformer ("CCXF"). 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 the fuses are not removed, the meter will read a short 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 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 off check each output for grounds, also check for shorts to the hot side (terminal 1X). Note that some field devices, such as buzzers, will 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. Reinsert the fuses, one circuit at a time, checking each circuit before adding the next. Check for the proper voltage at the top of each fuse holder before installing the fuses for that circuit.

It is recommended that you start up the controller in Inspection mode, which can be done using the Controller Inspection Switch, assuming that the inspection string is wired such that SIB terminal 23 has power

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.

4.3.1.1 Connecting the “Run Bug” using the microprocessor

1. Connect the motor and encoder to the drive, as shown on the schematics.
2. Jump the following terminals. Ensure all of the corresponding LEDs are lit

DEVICE	Terminals to Jump	M-LEDs	S-LEDs
Governor Switch	1X – 1Y	M05	S05
Rope Brake Switch	1Y – 1T	M06	S06
Final Limit Switch	1T – 1B	M07	S07
Pit Stop Switch	1B – 2	M08	S08
Controller Stop Switch	2 – 3	M09	S09
In-Car Stop Switch	3 – 3X	M10	S10
Car Door Bypass Switch	Set switch to BYPASS	M14	S14
Hoistway Door Bypass Switch	Set switch to BYPASS	M15	S15
Hoistway Locks Bypass Switch	Set switch to BYPASS	M16	S16
In-Car Inspection Switch	1X – 23X	M29	S29
In-Car Inspection Up Run	Run-Bug Up – 25X	M36	S36
In-Car Inspection Down Run	Run-Bug Down – 24X	M40	S40
Up Normal Limit Switch (not if using ELGO)*	1X – 1X1*	M49	S49
Down Normal Limit Switch (not if using ELGO)*	1X – 1X4*	M52	S52
ELGO Absolute Pos. Sys. Tape Switch (if used)	2 – 2B	I/O board LED	I/O board LED
Emergency Power (if used)	1A – EP (I/O board #8)	I/O board LED	I/O board LED
Shutdown Defeat (on Safety Interface Board)	1X – S01	N/A	S01
Shutdown Defeat (on ETSD Board)	1X – SHTDFT	ETSD board LED	ETSD board LED
Fault Reset (must toggle off, then on)	1X – RST (I/O board #8)	I/O board LED	I/O board LED

3. If the LEDs listed in the table above are lit and motor and encoder are wired, the drive should start running at inspection speed when the UP Run signal to terminal 25X or DOWN Run signal to terminal 24X is energized.
4. *** If using an ELGO Absolute Positioning System, do not connect the Up or Down Normal Limit Switch inputs (1X – 1X1, 1X – 1X4). These signals are automatically enabled prior to ELGO Learn procedure. ***
5. If there is a fault, use a jumper from 1X to energize the Fault Reset input (RST) on Controller I/O board 8, input 16 to clear any shutdown faults.
6. To prevent most inspection, drive, brake, and relay faults, use a jumper from 1X to SIB terminal S01 to prevent most shutdowns from latching. Go to the Safety CPU settings menu, and set the Shutdown defeat mode to 3 to enable the Shutdown Defeat input for one week (see page 126 for details). The text “Shutdown Defeat” should appear on the Safety Status screen of the Safety CPU while active.
7. When finished, remove all temporary jumpers, and wire the field connections as shown on drawings.

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 settings and features be verified. To verify the system is configured to the job specifications, the correct job number should be displayed on the second line of the banner screen. To restore the controller to use factory configured values, 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 menu item until the "Reset Settings" screen is displayed. The password "911" should be entered when requested. Press **Esc** to return the elevator to service.

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

5.1 Inspection Operation

To run the car on Inspection Operation, the safety string (including the door contacts, terminal landing normal slowdowns and normal limits) must be operational.

The Car Gate, Hall Doors, and Hall Locks contact inputs (4,4R,5,5R,5B,5T,6,6R,6B,6T) on the SIB must be on.

The Drive Ready (RDY), Brake Power (BP), Phase Monitor (if used), Motor Overload (MOL), and Brake switch (SP,BS,BSX) relay signals should be active, and the Rope Brake is not set.

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) and INS relay should be de-energized, which will establish inspection speed for the drive.

Pressing the Up Run and Enable Buttons for the appropriate Inspection mode (i.e. Car Top Up Run Input 25 and Car Top Enable Input 23E on SIB) 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, UDX) 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 will be commanded to drop by the UDTX relay, and the drive enable relay (PX) and P-contactor (PP) will be 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 Floor Position and Slowdown

The floor position and fire service status are maintained in the Microprocessor FRAM flash memory and are held through power loss. The floor position may need to be reset when the controller is initially installed. This will be accomplished when the elevator hits any floor reset switch. With a pulsing type selector, the floor position is reset using binary floor reset inputs (1FP, 2FP, 4FP, 8FP) at each landing (if applicable), or at either terminal landing when a slowdown switch and a leveling or door zone switch are energized at the same time.

NOTE: If floor switches are used, they should be maintained at the terminal landings, so that they are energized whenever the car is in the slowdown zone at that landing.

Make your final adjustments for the slowdown targets. All slowdown distances should be equal.

If a pulsing selector arrangement is used, remember to install the reset targets at the terminal landings if binary resets are not already used at each floor.

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 Input 40 at the Car Top or C.O.P. Remote I/O Board.

On Independent Service, the hall calls will be ignored. The car will run from car calls only, and will park with the doors open until the Door Close Button (input 28 on Car Top) or Car Call Button Input (input 28X on Car Top) is held on.

To run the car from the machine room without the doors opening, use the Door Open Cutout Switch at the bottom left corner of the 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 SIB are correct.

NOTE: An alternative to using Independent Service for fine tune-up is to enable the Hall Call K/O and Door Open K/O Switches at the bottom left of the 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 at Remote I/O boards in the car and riser, calls may be placed using the keypad while in the “Car 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.

Car and Hall calls will be 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 will be cancelled. Car calls will be 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 will be 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.

If the doors attempt to open for too long, the open cycle will be stopped. The car will then respond to other calls, and try to open the doors again.

If the doors fail to close properly within a preset time, the doors will re-open, and try to close again. If the doors closed, but the car does not run in response to a call, the doors will re-cycle, and the car will try again.

For very slow doors, the Door Stuck Timer, which initiates the Door Open and Door Close Fail, as described above, may need to be increased. It is normally set at 15 seconds.

If Nudging Operation is activated, the Electric Eye will be disabled when the Nudging Timer has tripped and the doors are fully open. If the nudging timer trips while the doors are closing, the Nudging Buzzer will turn on, and the Electric Eye will remain active. If the doors do reopen fully, then the Electric Eye will be cut out. The Safety Edge Input remains active on nudging. Door nudging is also available while in Normal Operation if the electric eye input has been active for 20 seconds (adjustable setting “ICU CUTOFF TIME”), and the feature settings “TIMED EYE CUTOFF” and “DOOR NUDGING” are enabled.

5.7 Fire Service

Fire Recall (Phase 1) may be initiated by turning off a Smoke Sensor input (82 or 82M), or by energizing the Hall Fire Switch “On” Input 82X.

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) is reset 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 will be ignored, and the car will answer the other call(s). The car will return to the stuck button call as it answers other calls, and the stuck button timer sequence will be repeated.

5.8.2 Running Timers

If the car runs for an adjustable time, without changing floors, then running timer shutdown operation will be initiated. The car status screen will display “URnTmr Shutdown” if running up or “DRnTmr Shutdown” if running down, and the Shutdown LED on the Remote I/O Board 8, output 16 will be illuminated. The Shutdown could be caused by a problem with the motor starter circuit(s), or a problem with the drive system, or a problem with the selector. The car will stop immediately. It will then be shut down, with only the Door Open Button and door protective devices being operational if in Door Zone (SIB input 20). The fault can only be reset by toggling the Fault Reset input (RST) or Shutdown Defeat input (S01). 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 will be shut 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 will cut out leveling if the car has been leveling for over 25 seconds. This prevents the car from stalling in leveling. The car will not be shut down, but will not be allowed to relevel until the car has run to another floor.

If the car stops between floors, it will run down at False-Down-Level (FDL) speed until it energizes the Door Zone Input, or a Leveling Switch Input. This prevents the car from parking between floors.

5.8.3 Door Fault Timers

If the doors fail to open fully after an adjustable time, the open cycle will be 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 will be held open an adjustable time (setting “DOOR RESET TIME”) which allows the door motor to remain cool. The close cycle will be repeated until the doors close.

5.8.4 Door Check Circuitry

Door Check Circuitry is a feature required by code where doors that operate horizontally and are mechanically coupled are provided. A Door Contact fault condition is recognized 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 then the fault will be initiated after 0.2 seconds. When a Door Fault is initiated, the Door Check Fault message “DrChk” will be displayed on the Car Status screen, and the doors will be held open. The fault is cleared 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 will be 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 available list of adjustable settings, timers, and designated landings. Refer to Section 8 for descriptions of all available settings, timers, and designated landings.

The controller is already set up for the specific job when it is shipped from Virginia Controls. Any field changes can be reverted to factory defaults by choosing the “Reset Settings” selection from the “Setup Menu”, and confirming with the password 911. Resetting settings will revert all values to factory defaults as shown in the configuration page of the drawings. The settings or features that most often need adjustment are the door times, and fire service return floors.

5.10 Dispatcher Operation

Each car contains its own dispatcher, and is able to recognize up to 8 other cars with distinct indexes. Each controller receives and processes controller data for all connected cars, and processes dispatching decisions independently and simultaneously with other controllers.

The lead controller sends Hall I/O outputs over CANbus 3. 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. 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 on the Safety CPU. See Section 7.2.4 for details.

NOTE: All controllers in a group must each have a unique controller number, set by dip switches on the Main and Safety CPU boards. Each controller must also have the same IP address reference value. See Section 7.2.5.5 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 “DSPTCH REASSIGN” in the Safety 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 which will customize where a car will home to. Use the Homing menu in the Safety CPU – Setup Menu 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 homing landing 1. If homing landing 1 is already occupied, then move to homing landing 2. If both homing landing 1 and 2 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 0 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 Safety CPU dispatcher program. The Emergency Power input signals are received by the CANbus 3 Remote I/O board #63, which is shared 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 will be recalled to the main landing, running one at a time, and cycle its doors. After all cars have been recalled, then one car will be 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 will be allowed to run on Normal Operation while on Emergency Power. If no inputs are energized, then the first available car will be 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 Safety Status screen will display “Emergency Power” if the group is currently on Emergency Power.

5.10.3 Medical Emergency Hall Operation / Hospital Service

Medical Emergency Operation is a group operation which is processed in each controller’s Safety CPU 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 will be 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 will display “Medical Emergency” if Medical Recall is active in the group. The car which is currently being recalled will display “MEH” on the Car Status screen on the Main CPU.

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 Chapter 5 for additional details.

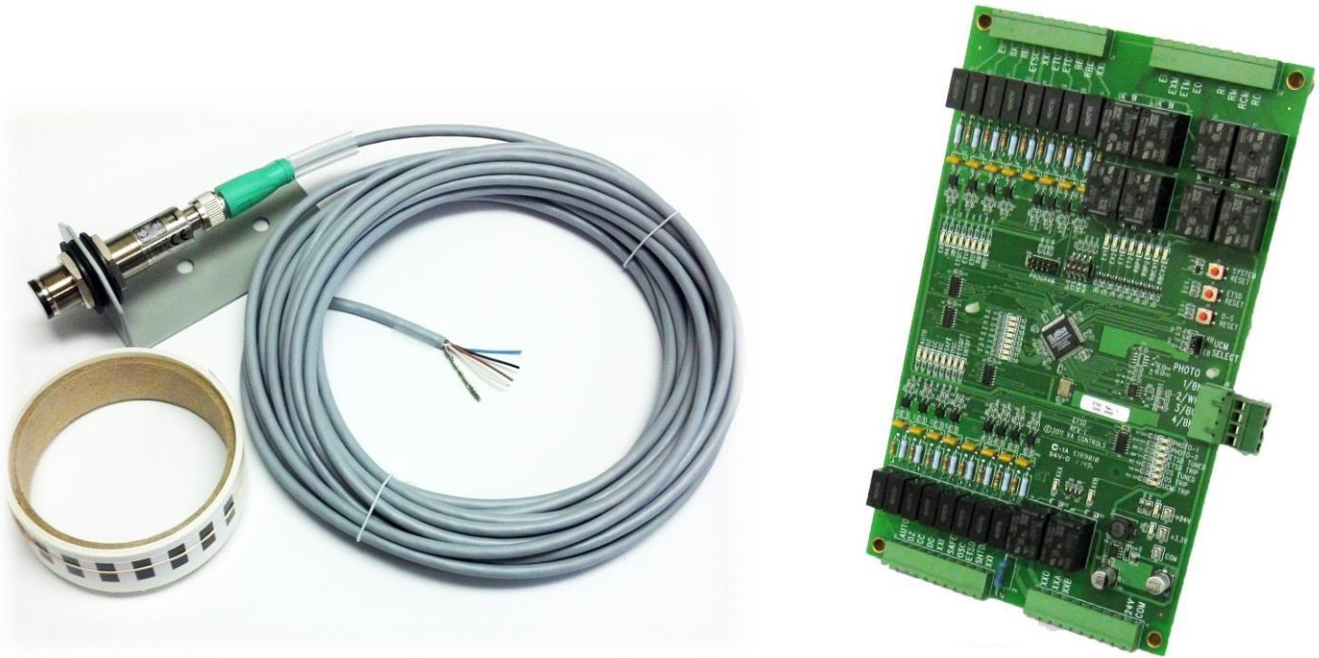


Figure 1: ETSD Monitoring System Hardware

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.

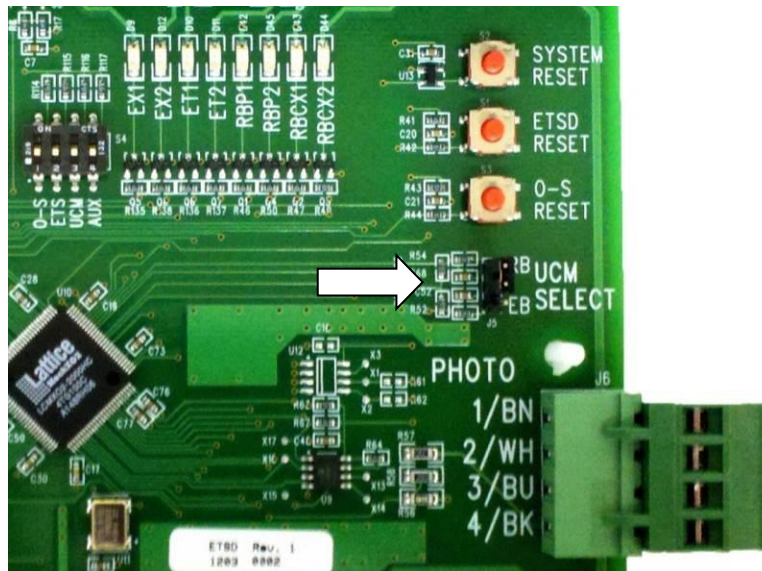


Figure 2: UCM SELECT Jumper

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. To begin construction, defeat the UCM System (and O-S & ETSD Systems) by placing a jumper from controller TB-1 to Inputs SHTDFT and ETSDFT.
3. Power up the controller and verify that Input LED's: “EII, ETSDFT & SHTDFT” are lit.



Figure 3: ETSDFT & SHTDFT Input Indicators

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

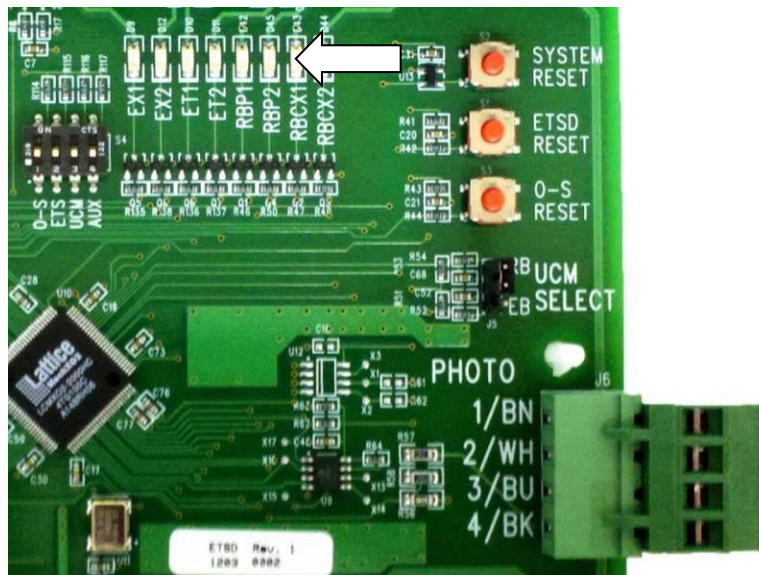


Figure 4: EX1, EX2, ET1, ET2, RBP1 & RBP2 Output Indicators

- Construction of the elevator may now proceed until it is decided that the O-S System should be tuned.
- Once the O-S System is tuned per the next "Setup of the O-S System" Section, the jumper from controller TB-1 to Input SHTDFT will be removed.
- The jumper from controller TB-1 to Input ETSDFT will be removed when the ETSD System is tuned per the final "Setup of the ETSD System" Section. (Required if car 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-1 to 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 free of oil and grease. Note, ETSD Tape runs at rope speed.



Figure 5: ETSD Tape

NOTE: The ETSD Tape is $\frac{3}{8}$ " wide by 10 feet long and should be trimmed to length and can be shaved in width once installed.

2. Insure that the ETSD Tape will not come in contact with the brake pad surfaces of the main or emergency brakes, nor lap over into a rope groove.
3. If not already assembled, mount the Speed Sensor in its steel, 90 ° angle mounting bracket with about half (or ≈ 1 ") of the 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 6: 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 approximately 5" ($\pm 1/4$ ") away from the ETSD Tape at an angle that is nearly, but slightly off (approx. 10°) perpendicular to the tape.
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 if possible, also ground the other metal conduit containing the motor leads in the same manner.

6. Wire the cable per markings the 4-Pole "PHOTO" connector on the ETSD board. Shorten the cable at the ETSD Board once its route through conduit is determined. Do not coil cable within the controller.

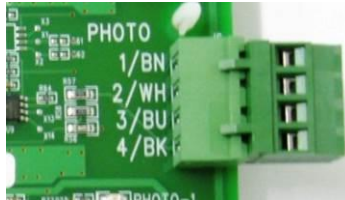


Figure 7: "PHOTO" Connector on ETSD Board

7. Connect the braided Drain wire of the Speed Sensor Cable to un-used ring lug at lower-right of ETSD Board. Remove the #8 nut of the ETSD Board mounting stud to crimp and secure drain wire of cable.
8. Align and plug in the connector (whether straight or right-angle) of the Speed Sensor Cable to the connector of the end of the Speed Sensor, then finger tighten this connection.

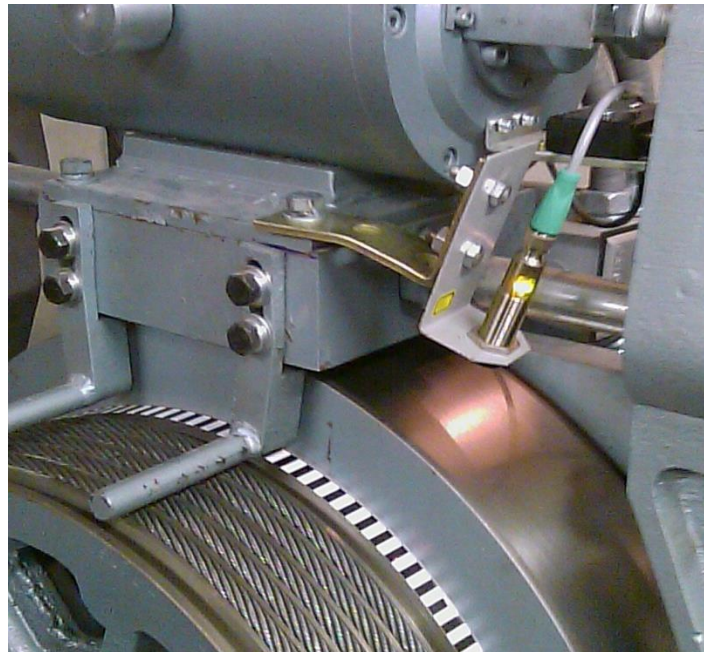


Figure 8: Installed ETSD Tape & Sensor

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

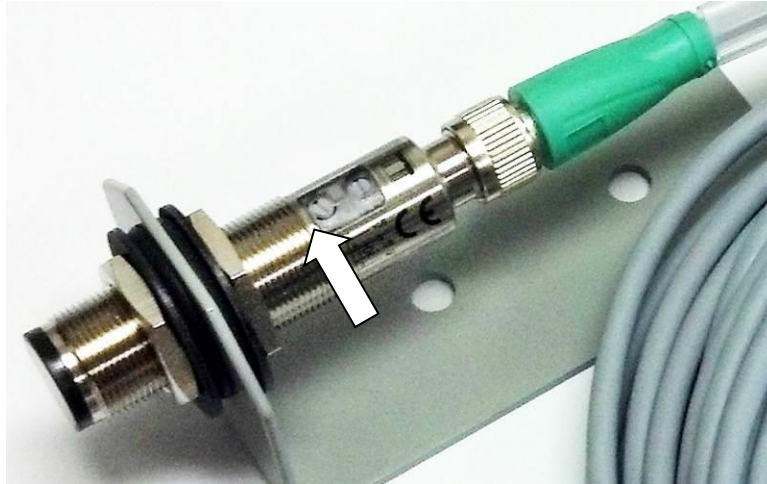


Figure 9: Sensor Green POWER LED Indicator

10. Verify that the Yellow “SENS.” LED of the Speed Sensor and the “PHOTO -1” LED on the ETSD Board are lit only when the red light beam of the Speed Sensor is pointed at a white segment of the ETSD Tape.

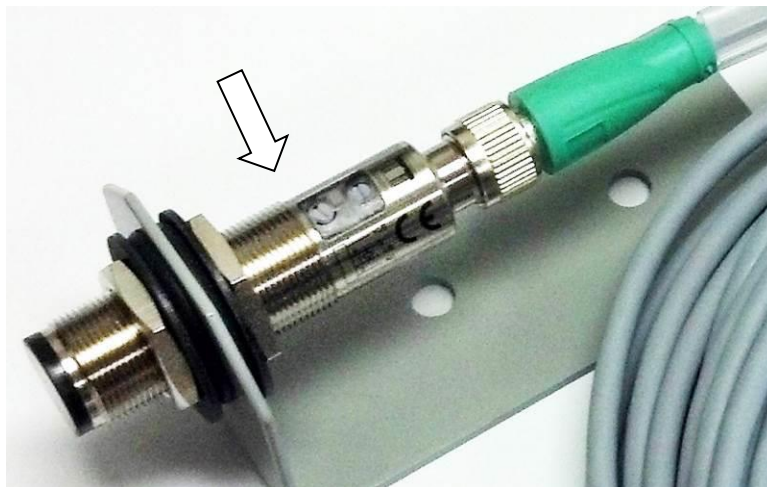


Figure 10: Sensor Yellow SENS. LED Indicator

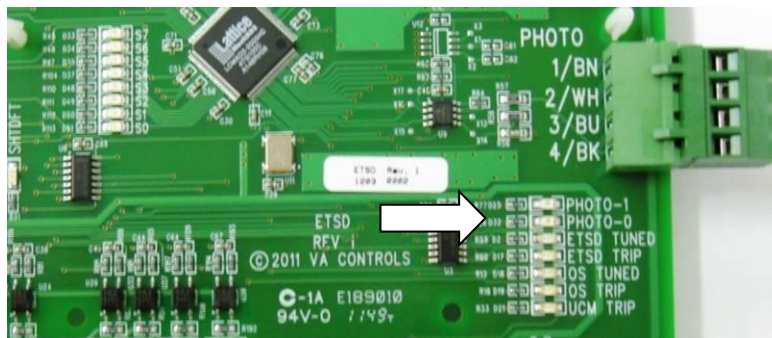


Figure 11: PHOTO-1 Indicator

11. Verify that the “PHOTO-0” LED on the ETSD Board lights only when the red light beam is pointed at a black segment of the ETSD Tape.

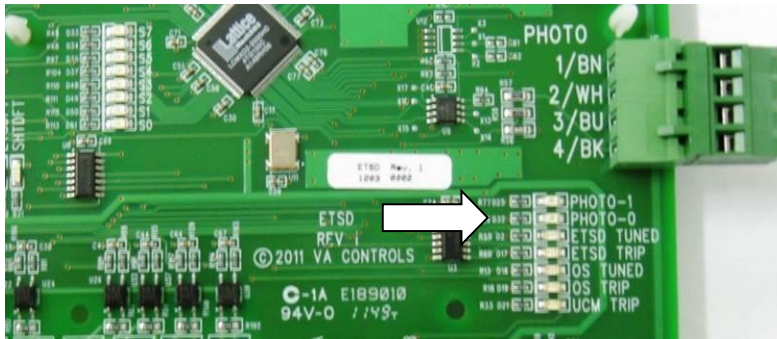


Figure 12: PHOTO-0 Indicator

12. **Important Step:** Perform the following checks to insure that “PHOTO-1” LED on the ETS Board lights only when the sensor is pointed at a white segment of the ETS 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” ($\pm 1/4$ ”) away from the ETS Tape.
- Speed Sensor is aligned slightly off (approx. 10°) perpendicular from tape.



Figure 13: Sensor L/D Switch

- **Important:** Increasing the angle of the sensor off 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 (<1mm Dia.) red light beam on the ETS Tape having maximum sensitivity to white segments while rejecting black segments.

NOTE: “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 ETS Tape.

13. Power down controller, and move the jumper from Input SHTDFT to Input OSC.

14. Power up controller, and verify that Input LED’s: “EII, OSC & ETSDF” are lit.

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

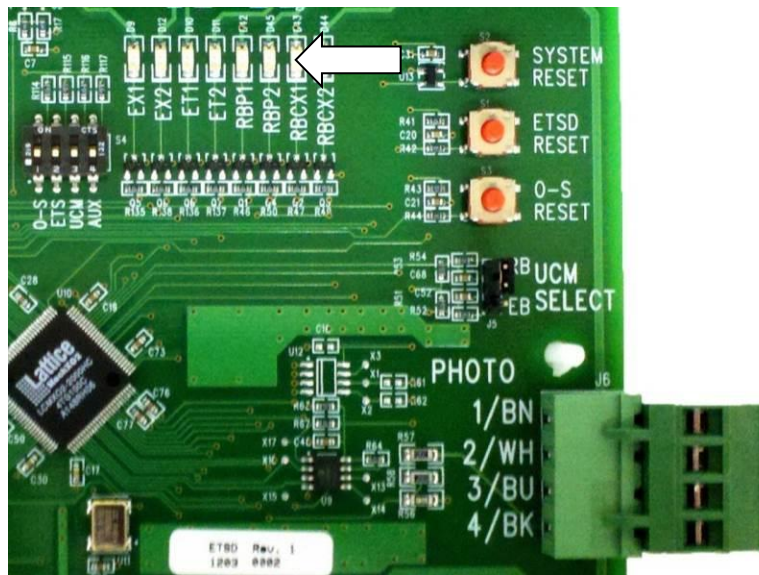


Figure 14: Output Indicators

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

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

- If elevator contract speed is 150FPM or lower, then set the drive (in previous step...) to 80%-90% of contract speed.
- When the elevator comes to a stop, remove jumper at Input OSC with power on. The "O-S TUNED" LED will light indicating a valid calibration of O-S System.

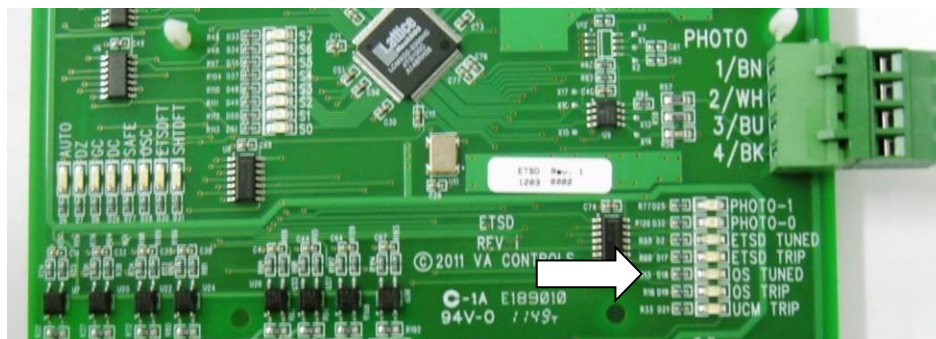


Figure 15: O-S TUNED Indicator

- Power down the controller to complete the removal of Input OSC jumper from controller TB-1.
- Power up controller, and verify Input LED's: "EII & ETSDFT" are lit, and that Relay Output LED's: "EX1 & EX2" are also lit. Other I/O LED's may be lit as well.
- Return the drive to its former Inspection Speed setting (40-50FPM).
- If contract speed is 150fpm or lower, limit the Inspection Speed setting on the drive to not more than 50%-60% of contract speed – well below O-S Calibration.
- 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 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 turning on DIP SW-4, “AUX”, only. These LED’s show car speed as a binary count that should ramp up & down 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 SW-4, “AUX” in the ON/Up position.

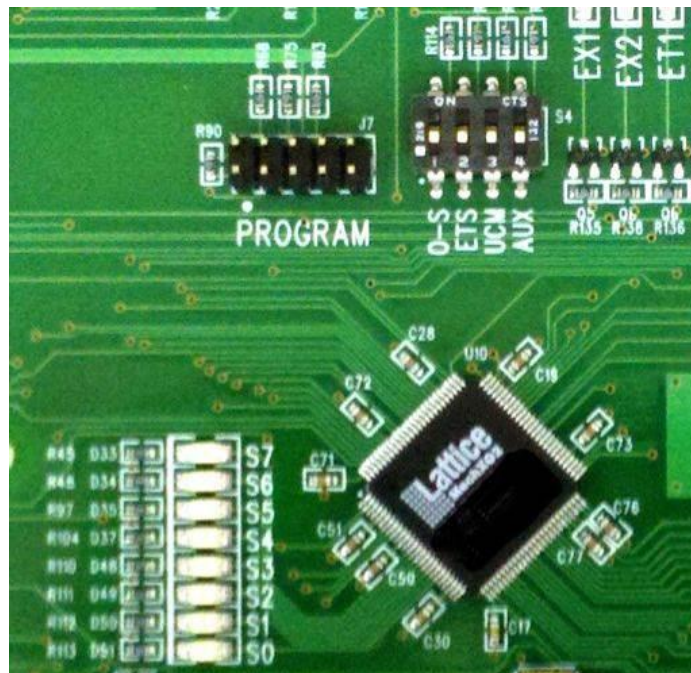


Figure 16: State LEDs and DIP Switches

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 was previously defeated in the “Setup of the O-S System” Section by jumping from controller TB-1 to Input ETSDFT.

If the elevator contract speed is 200FPM or less, then the ETSD System is not tuned, and the jumper from controller TB-1 to 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 2: 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 move the jumper from Input ETSDFT to Input ETSC.
2. Power up controller, and verify that Input LED’s: “EII, ETSC & AUTO” are lit.

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

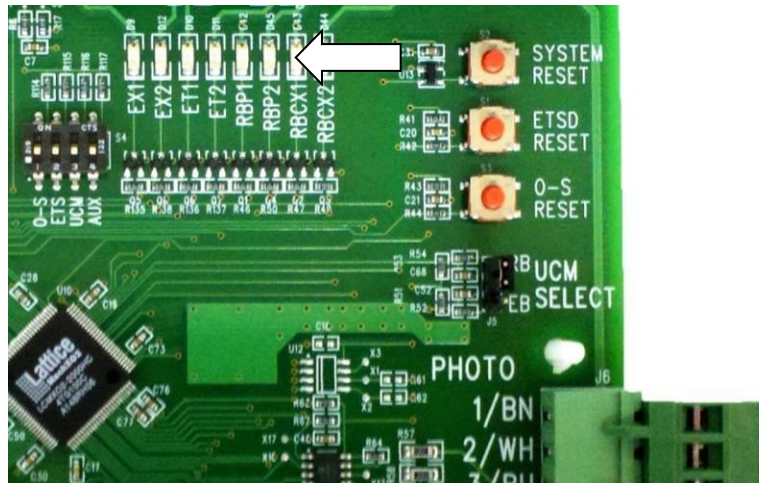


Figure 17: Output Indicators

- 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.
- When elevator comes to a stop, remove jumper at Input ETSC with power on. The "ETSD TUNED" LED will light indicating a valid calibration of the ETSD System.

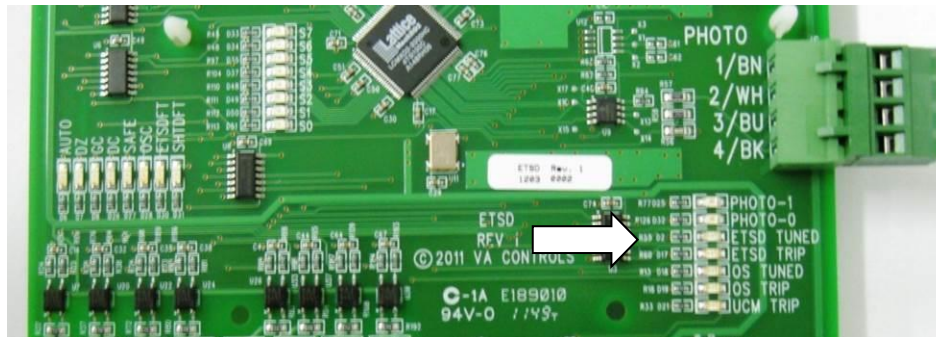


Figure 18: ETSD TUNED Indicator

- Return the drive to its former High (Contract) Speed setting.
- Power down to complete the removal of Input ETSC jumper from controller TB-1.
- Power up controller and verify 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.
- If on Normal Operation and the car is not on an ETS Switch, Relay Output LED's: "ET1 & ET2" should be lit. If lit, remove a wire from Input ETU or Input ETD of the ETSD Board, and verify that Relay Output LED's: "ET1 & ET2" turn off. Replace wire.
- 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 adjusted Speed Sensor. See Step 12 of Section 4.11.2, and Steps 12 & 13 (below).
12. **Important:** Car speed can be monitored on LED’s “S0-S7” by turning on DIP SW-4, “AUX”, only. These LED’s show car speed as a binary count that should ramp up & down 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 SW-4, “AUX”, in the ON/Up position.

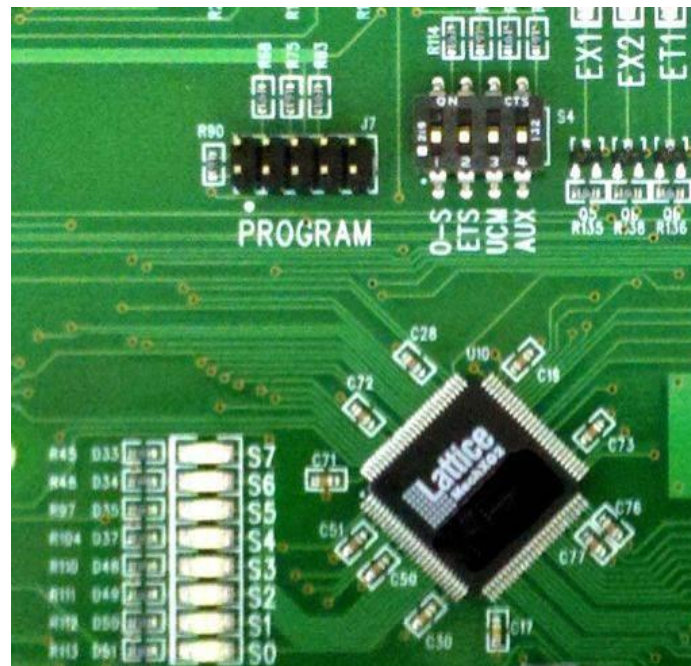


Figure 19: State LEDs and DIP Switches

13. **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; 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 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 7.1.8. 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 7.1.4.87.1.4.4). 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 will display “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 will return 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:

FLT #	Fault Label	Fault Description
166 167	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.
168	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.
170 171	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.
178	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.
179	INS OVERSPEED	Inspection Speed fault: Car speed exceeded 150 fpm while on inspection.
180	DOOROPEN OVRSPD	Uncontrolled Motion (UCM) fault: Car speed exceeded 50 fpm with doors open.
181	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.
183	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.
182	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.
186	RUNAWAY FAULT	Runaway fault: The car speed exceed 50 fpm while the car was not running.

5.13 Absolute Positioning System Installation

5.13.1 ELGO LIMAX22 DUE Installation

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

The magnetic band is installed vertically in the hoistway. Top fixation is either on the guide rail or directly bolted into the ceiling. The necessary tension in the band is provided by a tension spring (see Figure 20). A broken tape detection switch (see Figure 20, right) is mounted near the spring, which ensures the integrity of the system in the event of tape movement or failure.

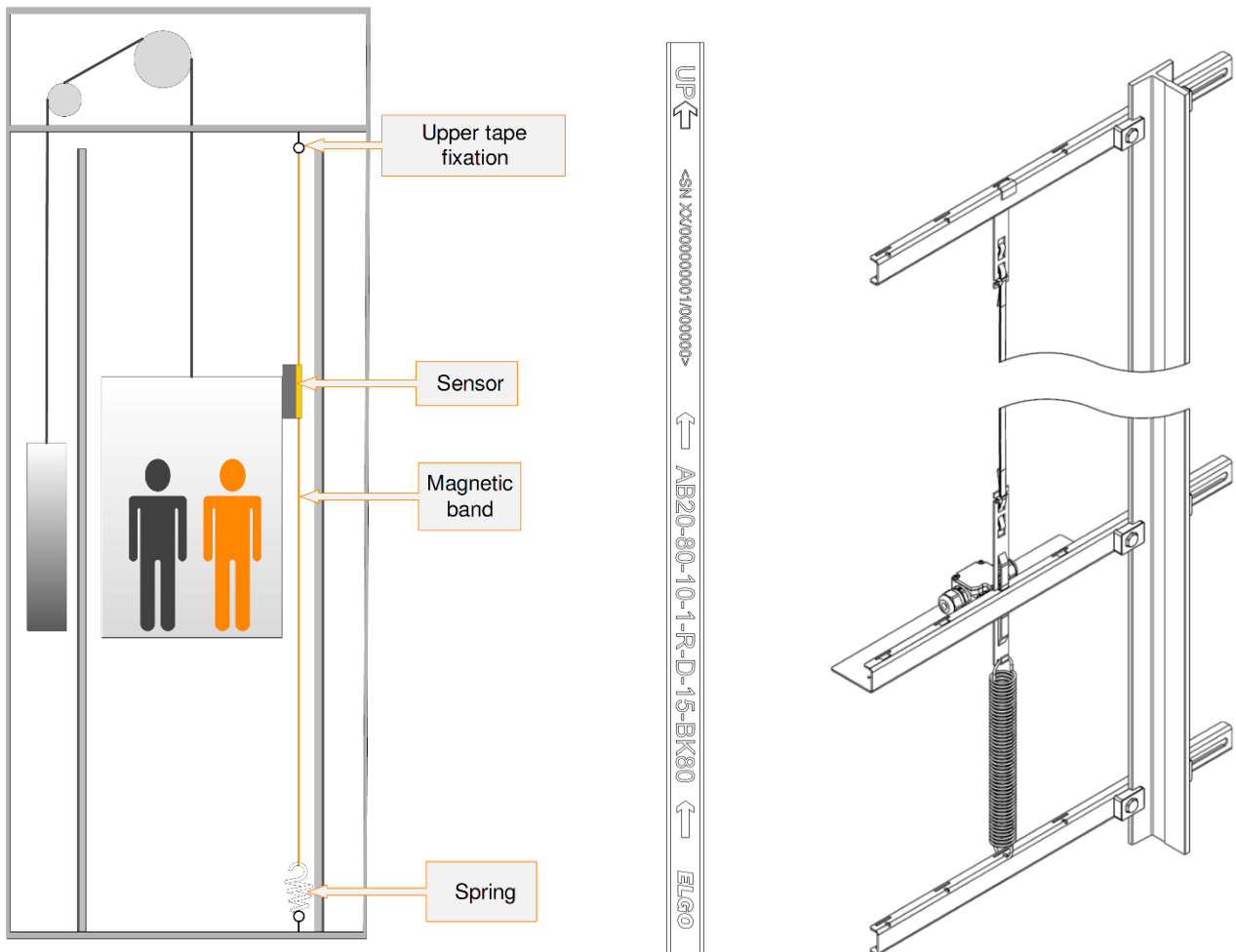


Figure 20: Rail Installation with tension spring (left). The arrow notated "UP" on the magnetic tape and sensor designates the direction towards the top of the shaft (center). The tape mounting assembly includes a broken tape switch (right).

During installation of the magnetic band in the sensor pay attention to the marks on the magnetic band and on the sensor head. The arrows printed on the magnetic band and sensor head point in positive counting direction (in the direction of the shaft head)!

WARNING: Wrong orientation of band vs. sensor head will yield incorrect position readings!

5.13.2 ELGO Mounting Bracket & Tape Switch Installation

Figure 21: Mounting Upper Crossbeam

Install first crossbeam in the top of the shaft by using the rail chips. Make sure that the clips screws all well tightened to at least 400lb-in, so that the crossbeam does not move. Slide the tape clamp onto the crossbeam as shown. Use any of the slots provided depending on your specific space situation in the installation. A position as close to the guide rail as possible is advantageous.

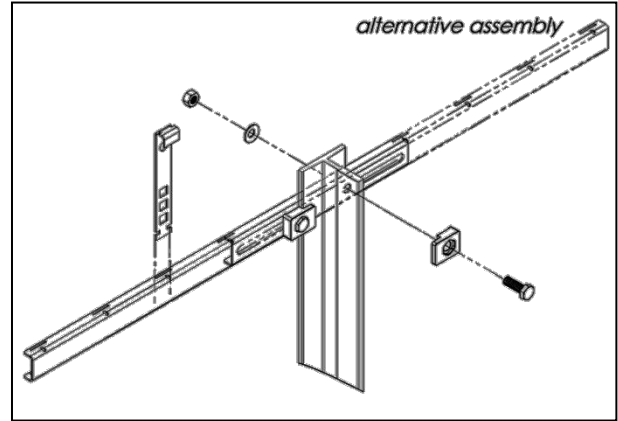


Figure 21: Mounting Upper Crossbeam

Figure 22: Attaching Upper End of Tape

This step must be done with the 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 spare 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 24).

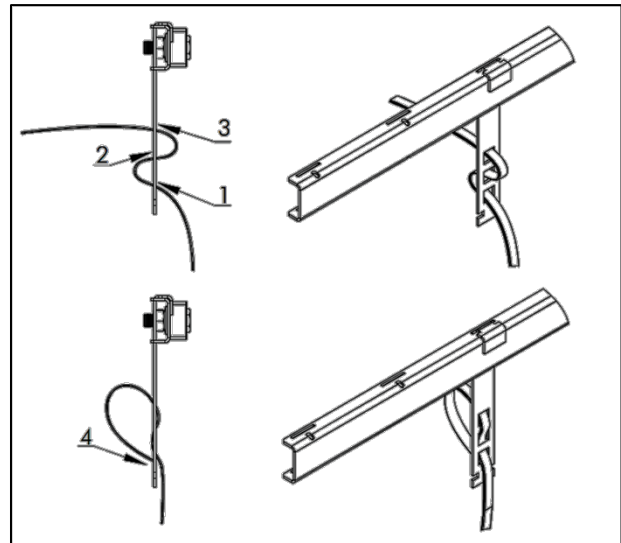


Figure 22: Attaching Upper End of Tape

Figure 23: Attaching Lower End of Tape

After the tape has been installed in the shaft, attach the tape fixture for the position switch to the lower end of the tape. Leave at least 8” at the spare 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 24).

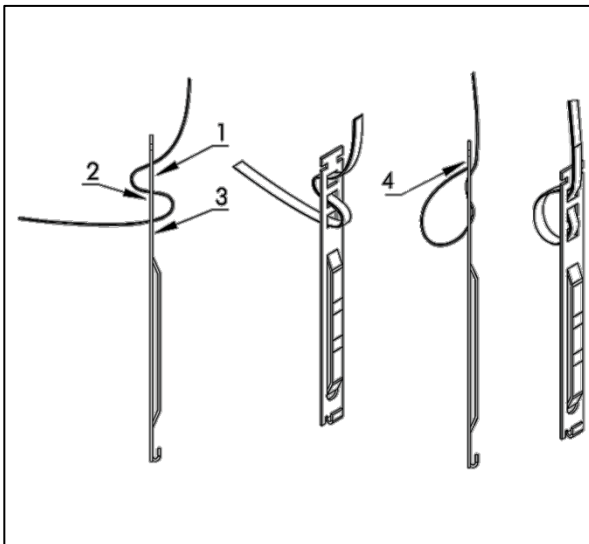


Figure 23: Attaching Lower End of Tape

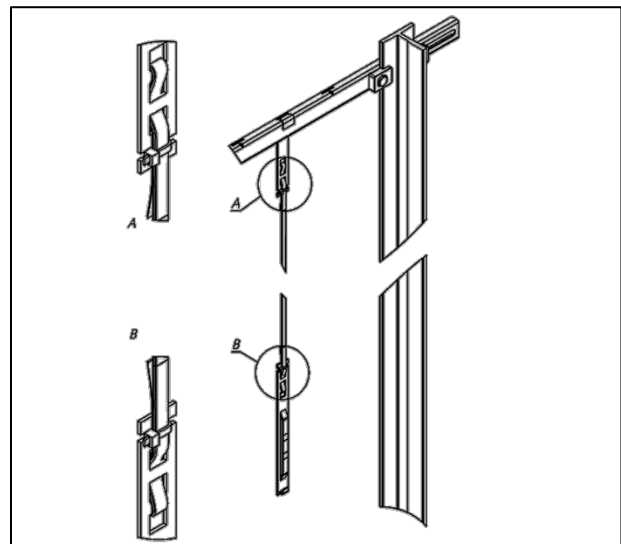


Figure 24: Securing Tape with Cable Tie

Figure 25: Mounting Lower Crossbeam

Now install the second crossbeam in the shaft pit with spring tensioning distance $A = 12'' \pm 0.5''$ below the bottom of the tape fixture. Make sure that the screws are well tightened to at least 175 lb-in, so that the crossbeam does not move.

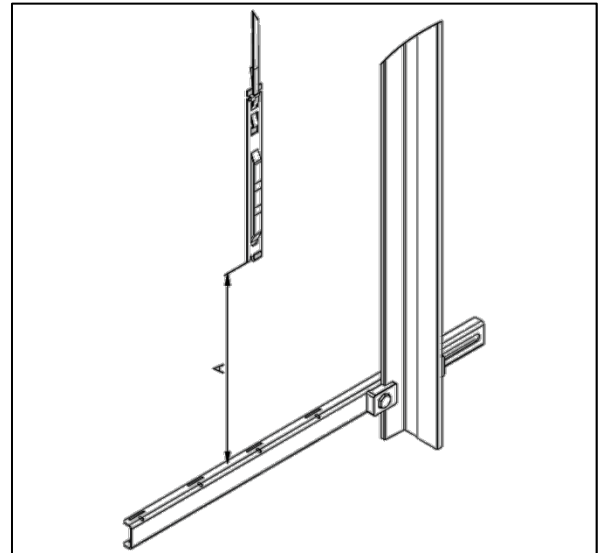


Figure 25: Mounting Lower Crossbeam

Figure 26: Mounting Tape Switch

The safety position switch should be pre-mounted to third crossbeam for the safety position switch prior to attaching to the elevator rail. Mount the cable screw connections (1 or 2 pieces) to the position switch. Align the position switch with the edge of the metal (see arrow). Then fasten the screws with 25lb-in. The position switch may be pre-wired before mounting if desired.

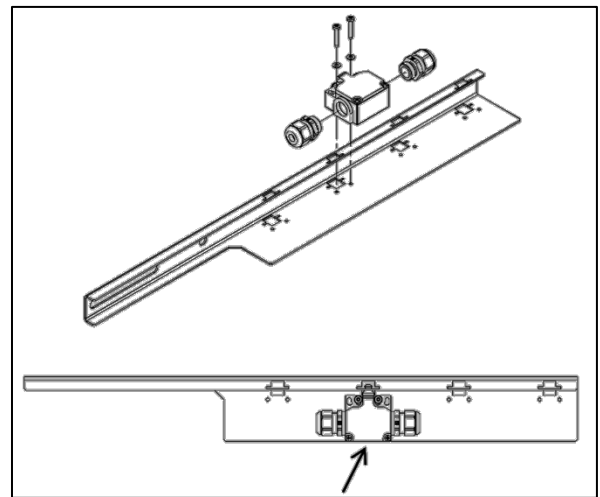


Figure 26: Mounting Tape Switch

Figure 27: Mounting Tape Switch Crossbeam

Mount the third crossbeam with the pre-mounted safety position switch to the elevator rail. Vertically align the safety position switch to be centered on the lower tape fixture. Fasten the screws only so tight that the crossbeam can still be moved for adjustment.

Figure 28: Mounting Tension Spring

The tape fixture is now inserted in the corresponding notch and hooked into the spring. Make sure the spring is correctly placed in the drill hole (detail A).

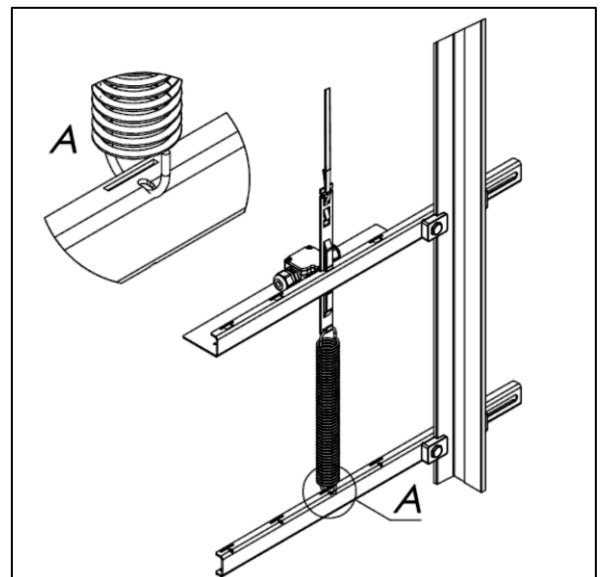


Figure 28: Mounting Tension Spring

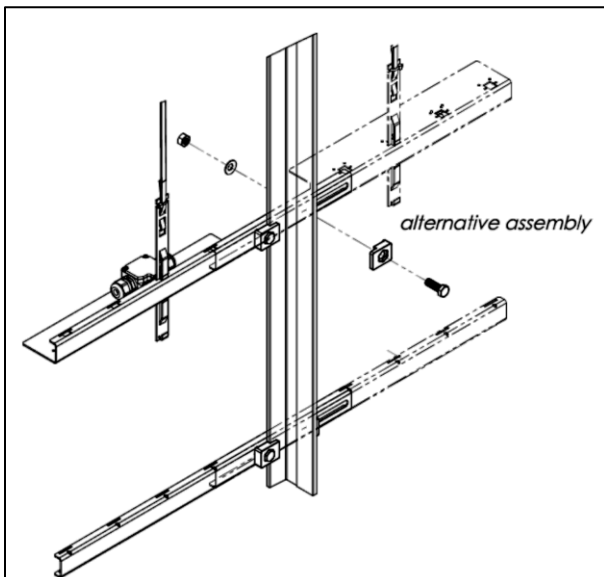


Figure 27: Mounting Tape Switch Crossbeam

Figure 29: Vertical Tape Switch Alignment

Adjust the vertical position of crossbeam for the safety position switch in such a way that only one marking on the tape clamp can be seen towards both the top and the bottom (see detail A). The crossbeam must be mounted in a 90° angle to the elevator rail. When the crossbeam has been correctly positioned, the screws are fastened with 175 lb-in while making sure that the crossbeam is not moved by accident.

Warning: an incorrect position of the crossbeam can compromise the functionality of the safety position switch.

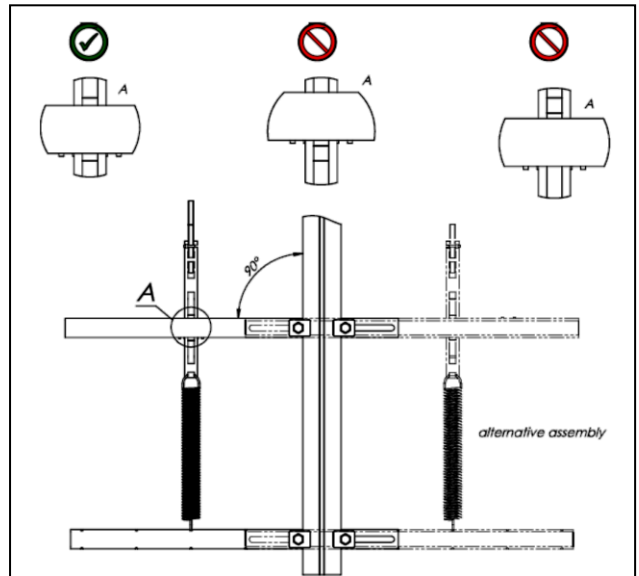


Figure 29: Vertical Tape Switch Alignment

Figure 30: Activating Tape Switch

Next, the safety position 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 is the end of the installation.

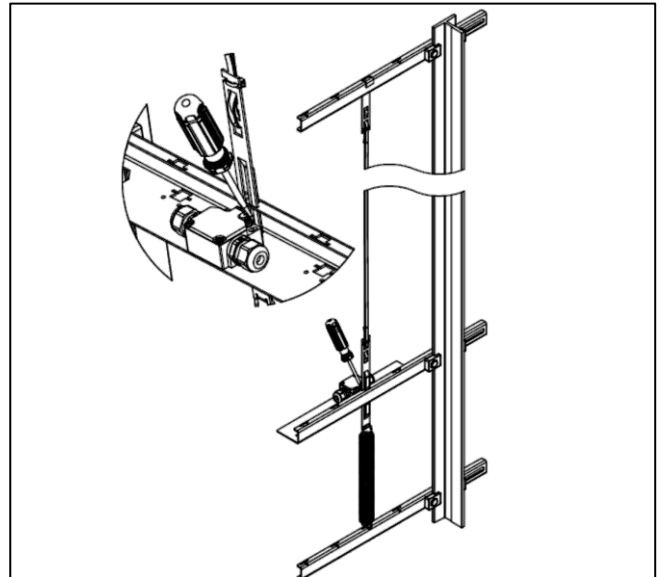


Figure 30: Activating Tape Switch

5.13.3 Hardware Installation Considerations

The magnetic band itself is not designed to withstand excessive mechanical wear. It is therefore important to ensure that the system is installed such that the mechanical contact between band and sensor head is mainly between the steel band and the polymer sensor guide. These two materials have been specifically paired for this application.

Avoiding contact between the magnetic side and the sensor could be achieved with a perfectly perpendicular installation of the band. Yet, in reality this is not practicable. It is therefore preferable to install the tape with a horizontal offset from the sensor. During operation this method will result in a forced contact between the steel side of the band and the polymer guide of the sensor which guarantees an optimal operation of the system.

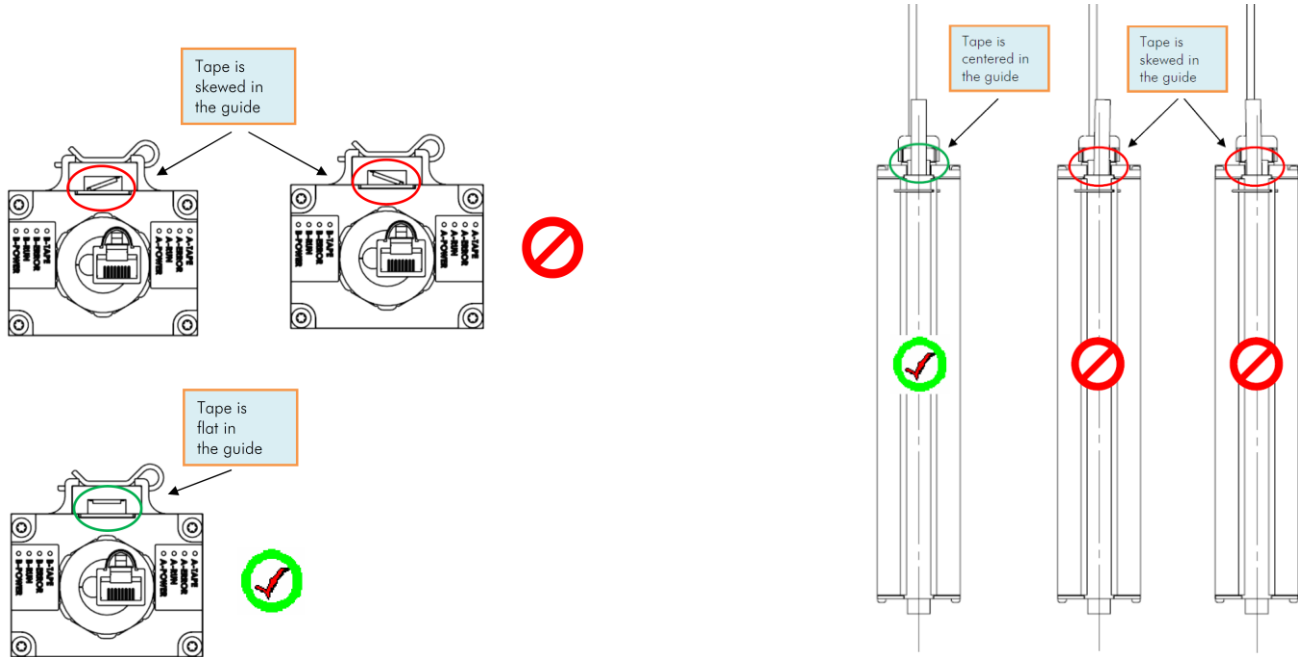


Figure 31: Angular Alignment Guideline

Figure 32: Perpendicular Alignment Guideline

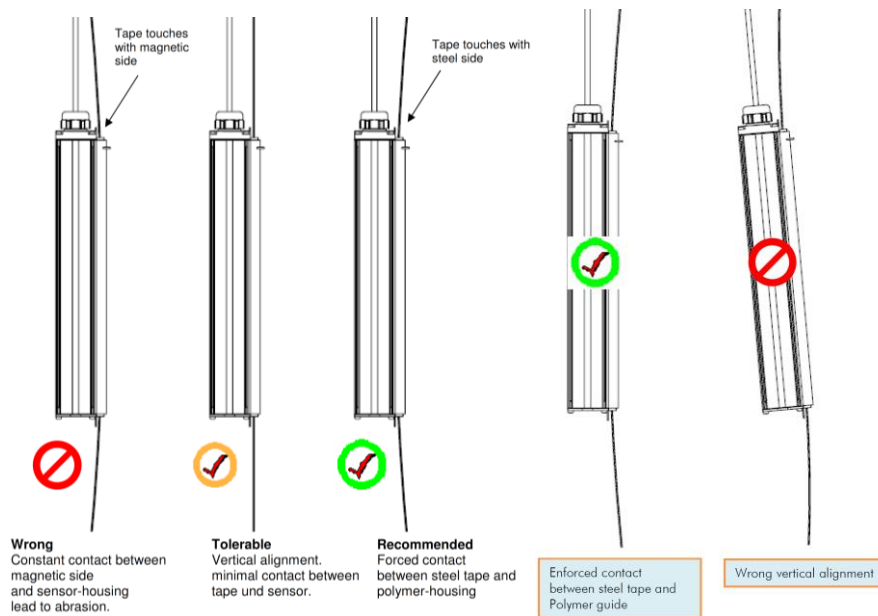


Figure 33: Horizontal Offset Alignment Guideline.

5.13.4 ELGO Tape and Sensor Installation Procedure

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

1. Attach the top end of the band in the shaft head with suitable installation hardware. Check for correct orientation of the band. The arrows on the magnetic side must point in upward direction. . Refer to Section 5.13.2 for tape mounting assembly instructions.
2. The magnetic side of the band must face the sensor body. In most situations this means that the steel side points to the hoistway wall.
3. Drive the car down the hoistway with inspection speed and unroll the band. The band can be unwound directly from the box without opening.
4. Attach the tape fixture for the position switch to the lower end of the tape, and secure the bottom of the fixture with a spring as described in Section 5.13.2.

The spring length should be 12" with an approximate elongation of approx. 3.5", resulting in a minimum tension of 7.5 kg. (see Figure 25)

Note that slightly higher tensile forces are not a problem, but avoid under-tensioning. In higher buildings it may even be preferable to slightly increase the tension in order to prevent flapping of the band during operation. However, if correctly installed, tensile forces of more than 10 kg should never be necessary.

5. Drive the car to the middle of the hoistway.
6. Attach the sensor to the car. The side with the cable outlet and the LED's must face upward.
7. Adjust the sensor using the band as a reference. First, align sensor and magnet band on their centerline.
8. Adjust now the distance between sensor and band. Up to a travel height of 50 m we recommend an offset of at least 15 mm. This will ensure steady contact between steel side of the band and the polymer guide of the sensor. In higher installations this distance may be increased. (see Figure 33)

Pay attention to a perpendicular alignment of the sensor. Misalignment will cause wear. (see Figure 32)

9. Pass the band through the sensor. Loosen the splint-pin and release the polymer guide. Insert the tape and re-attach the guide with the tape in its position. Take care of the plastic base which should remain in the enclosure.
10. Check for proper alignment of band vs. sensor. Any angular offset should be corrected. (see Figure 31)
11. **INSTALLATION CHECK:** Values for band tension and offset between band and sensor are guidelines based on experience. But in any case, a proper check after installation is mandatory. It must absolutely be avoided that the magnetic side constantly grinds on the sensor body during operation.

Run an inspection trip along the complete hoistway. Observe the system and pay attention to the respective positions of band and sensor. You have achieved an optimal installation if the steel side of the band is constantly pressed slightly against the polymer guide of the sensor. At some points in the hoistway also double-check the bottom side of the sensor. If the sensor is tilted it may look good on top but the band can still grind along the bottom edge of the sensor. (see Figure 33)

12. After completion of the installation, clean the magnet band. Beginning at the top of the hoistway drive down the complete travel distance pulling the magnet band through a dry cloth. Repeat the cleaning process before putting the elevator into service after complete 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 this may have an effect similar to sand paper.

5.13.5 ELGO Door Zone Sensor Installation

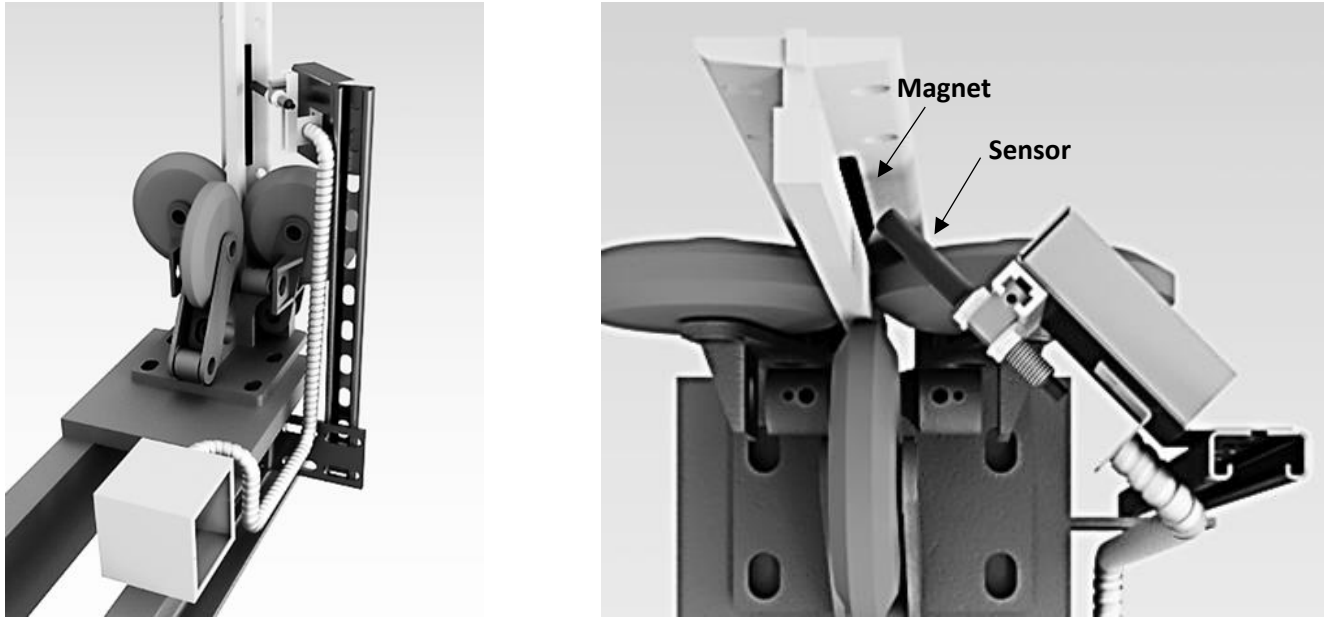


Figure 34: Magnetic door zone sensor mounted with magnets on the rail. (Left = side view, Right = top view)

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

The magnetic sensor may be mounted on the car above the roller guide wheels, and 6” magnets may be mounted on the rail, as shown in Figure 34. The sensor must be aligned perpendicular to the magnet, such that the sensor rides on and off the magnet while moving up and down. The sensor actuation method is passive, and does not require a power source. The switch contains a normally open contact which will close when the sensor is perpendicular within 1” of the magnet. The two wires will connect to the input common TB-1X and door zone input TB-20. Verify that the contact closes when riding the car onto the magnet, and that the contact opens immediately when riding off of the magnet. Check that the sensor contact changes state at each landing to verify the alignment and behavior is correct along the hoistway.

The magnets should be aligned vertically along the rail such that the sensor is directly in the center of each magnet when the car is at floor level. The top and bottom edge of the magnet will be measured by the ELGO positioning system during the learn operation, and the mid-point will set as the floor level position for that landing. If the magnet placement is not accurate for a given floor within ± 0.5 ” during the ELGO learn operation, then the magnet will need to be adjusted accordingly and the ELGO learn operation will need to be restarted.

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.

5.13.6 ELGO APS Hoistway 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” (Sections 7.1.8 or 7.2.9), setting ELGO parameters “Edit ELGO APS” (Section 7.1.4.9), and viewing floor position learn data “Display ELGO Floor Height Data” (Section 7.1.10).

5.13.6.1 ELGO APS Virtual Input Signals

The Main and Safety CPU process the position data from their respective ELGO sensor units. From this data, each processor virtually computes the state of conventional selector inputs, replacing the standard hardware terminal inputs as shown in the following table.

Table 3: ELGO APS Virtually Generated Selector Signals

CPU	ELGO Virtual Input Signals	Affected Terminals	State during ELGO Fault
MAIN	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, 4FP,...	OFF
SAFETY	Up/Down Normal Limits	IX1, IX4	ON
	Up/Down Slowdown Limits	IX2, IX3	OFF
BOTH	Door Zone	20	OFF

All selector target positions are determined relative to the center of a computed door zone signal at each landing. The computed door zone must be learned from a physical door zone input provided externally by a hardware door zone switch input (SIB terminal 20).

If data or communication from either ELGO sensor experiences a malfunction or if learn data is not calibrated properly, the affected CPU will register a fault and set all of its ELGO input signals to the state as shown in Table 3. In general during a faulted state, all ELGO input signals will be turned OFF, with the exception of the Up and Down Normal Limits. The Normal limits will be 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.

5.13.6.2 ELGO APS Learn Procedure

The ELGO position data for the Main and Safety CPU sensors are calibrated and learned simultaneously and independently during a learn run. Each CPU reads a different position of the magnetic encoded tape based on the physical offset between the ELGO sensors, such that the Safety CPU reads position data at 40mm greater than the Main CPU.

Verify ELGO Communication Status

1. Ensure that both ELGO A & B sensors are wired per the schematic, and that the ELGO hardware status LEDs are in the correct operational state (see Section 6.8.3).
2. On the Safety CPU, navigate to the “Show I/O Status” Menu, and press **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 will be blank (dashes) if CANbus communication is not established or wired properly.
3. 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 IX1, IX2, IX3, and IX4 are OFF.

4. Repeat steps 2-3 for the Main CPU.
5. While on the “Show I/O Status” screen on both CPUs at the same time, verify that the Safety CPU position data is 40mm greater than the Main CPU position data, and that velocity data is the same while moving up and down on inspection.

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” menu in the Main CPU Settings Menu using the default password 911.
4. With the cursor selected on “ELGO APS Learn”, press **Ent** to edit this parameter, and press **1** to set this value to “On” and press **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 **0** and **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 will actively monitor 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 and start running the car during the learn run, as there is no timeout.

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 record the bottom edge and top edge of each door zone input, and will set the dead zone to the average position (middle) at that landing. The system will automatically increment the floor position each time the door zone input signal is toggled high then low. If a door zone signal is skipped or if the signal flickers multiple times while passing a floor, the learn data will not compute the correct floor position, and learn procedure will need to 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”.
9. 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.
10. 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

11. Navigate to the “Display ELGO Floor Height Data” menu on each of the Main and Safety CPUs. Verify that the floor tables on each CPU show consistent data, such the position values on each floor (comparing both screens) are within +/- 0.3”. These position values are what each CPU uses for its computations at each floor. See example below.

Safety CPU			Main CPU		
Floor	1	0' 0.1"	Floor	1	0' 0.3"
Floor	2	8' 5.9"	Floor	2	8' 6.0"
Floor	3	17' 11.7"	Floor	3	18' 0.0"
Floor	4	25' 3.5"	Floor	4	25' 3.6"

12. Make sure that the Floor 1 values (1st row) is within +/- 0.5” of 0' 0.0”, otherwise the learn data is out of range. In this case, adjust the door zone target up or down by the appropriate amount so that the learn data is within “0.5” during the next learn run, and repeat steps 1-11.
13. Move the car while on inspection to floor level at each floor and record the position data read from the “Show I/O Status – CAN BUS 1 ELGO APS” screen. Compare the measured data with the floor table shown in the “Display ELGO Floor Height Data” menu at each floor, and compute the difference at each floor to be used as an offset correction factor in the next step.
14. Navigate to the “Edit ELGO APS” menu in the Main CPU Settings Menu. Scroll down to the “Floor To Trim” item in the menu using **Prv**, and press **Ent** to go into edit mode, and select a floor number to adjust by pressing the number key of the floor number, and press **Ent** to confirm.
15. 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”. While editing, the first selected field is for the sign (+/-) of the offset. Press **.** to change the sign (+/-), or press **Ent** to proceed to the next field, which is in terms of tenths of an inch. Press **Ent** to confirm the value.
16. The entered offset is added to the current position value, so a positive offset value will increase the floor position, and a negative offset value will decrease the position. After changing the offset values, the floor position values on the “Display ELGO Floor Height Data” will update to reflect that offset on BOTH Main and Safety CPUs, and both CPUs will refer to floor level of the updated position.

NOTE: The Floor Positions for the SAFETY CPU and MAIN CPU may vary slightly, but only the MAIN CPU floor position is used for leveling and door zone. Any floor offset trim will affect both CPUs position data, because both CPUs use to the same offset value.

17. Start by editing Floor 1, and enter the offset value which would cause the Floor 1 value in the “Display ELGO Floor Height Data” for the Main CPU to change to 0' 0”. The Floor 1 value will not always be set to 0' 0” during a learn run because the dead zone (center of door zone) is set to exactly 3” (half the Door Zone Range) below the top edge of the door zone at the bottom terminal landing. The initial value of 0' 0” is determined by the starting position of the learn run, and this may require adjustment of the door zone position if it is not centered correctly. Similarly, the top terminal landing floor position is set to exactly 3” (half the Door Zone Range) above the bottom edge of the door zone. Intermediate landing floor positions are computed as the average of the top and bottom edges of the measured door zone.
18. 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

19. Navigate to the “Display Car Top & ELGO APS Data” menu on the Main CPU, which will display current state of the Up/Down Leveling, Slowdowns, Normal Limits, Slowdown Limits, Access Zones, and Floor Switches computed by the APS data.
20. 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.
21. To adjust the positions of the selector signals, use the “Edit ELGO APS” menu, and refer to Table 4 for specific adjustment details. Initial ELGO settings will be set by the factory, as listed in the “Default” column.

Table 4: ELGO APS Adjustable Settings Menu Descriptions

Menu Item	Min	Max	Default	Unit	Description
Door Zone Range	3.0	6.0	6.0	inch	Width of computed Door Zone.
Dead Zone Range	0.1	0.8	0.5	inch	Width of Dead Zone, centered at floor level.
Floor To Trim	1	Top Ldg	1	floor	Select the floor to be edited using “Trim Offset”.
Trim Offset	-0.5	0.5	0.0	inch	Floor level offset value for the floor # in “Floor To Trim”.
Up Level Range	3.0	12.0	6.0	inch	Width of Up Level, starting from lower edge of Dead Zone.
Dn Level Range	3.0	12.0	6.0	inch	Width of Down Level, starting from upper edge of Dead Zone.
Up Slow Dist.	6.0	99.0	6” per 25 fpm	inch	Distance of leading edge of Up Slowdown (lower edge of floor switch) from below floor level.
Up Slow Range	3.0	12.0	6.0	inch	Length of Up Slowdown target, where lower edge is referenced by Up Slow Dist. Does not apply when using floor switches method.
Dn Slow Dist.	6.0	99.0	6” per 25 fpm	inch	Distance of leading edge of Down Slowdown (upper edge of floor switch) from above floor level.
Dn Slow Range	3.0	12.0	6.0	inch	Length of Down Slowdown target, where upper edge is referenced by Dn Slow Dist. Does not apply when using floor switches method.
Access Range	1.0	15.0	8.0	feet	Length of TU, BU, TD, BD Inspection Access Zone targets.
Access Offset	0.0	12.0	6.0	inch	Distance between starting/ending edges of TU and TD, referenced from floor level.
Up Slow Limit	6.0	99.0	6” per 25 fpm minus 1”	inch	Distance of Up Slow Limit below floor level at top terminal landing.
Dn Slow Limit	6.0	99.0	6” per 25 fpm minus 1”	inch	Distance of Down Slow Limit above floor level at bottom terminal landing.
Up Normal Limit (not shown)	n/a	n/a	1” above top ldg	n/a	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	1” below bottom	n/a	The Down Normal Limit Sw input is preset to 1” below the bottom terminal landing floor level, and is not adjustable.

5.13.7 ELGO APS Faults

In general, ELGO APS faults will cause all APS signals to be disabled, while enabling the Up and Down Normal limits to allow the car to be 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 Main CPU will display “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.

5.13.7.1 Door Zone Mismatch

The hardware door zone (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 will be shutdown. The cause of this fault may be a malfunctioning or misaligned door zone switch, or the APS position is not calibrated properly. The mismatch fault is 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.

Position	Virtual DZ State	Hardware DZ State	Description
Dead Zone (between Up and Down Level)	On	On	Correct State
	On	Off	Faulted State – Car will down level until Hardware DZ = ON
	Off	any	Invalid State - Virtual DZ must be On while in Dead Zone.
Leveling Zone	any	any	DZ states not checked while transitioning during Leveling.
Outside Leveling	Off	Off	Correct State
	Off	On	Faulted State – Car will go on Shutdown in place.
	On	any	Invalid State - Virtual DZ must be Off while outside Leveling.

5.13.7.2 ELGO Sensor Communication Error

A communication error between an ELGO APS sensor and the Vision CPUs will prevent position data from being updated, and cause the affected CPU to disable its APS selector signals and go on Shutdown. If the system is outside of door zone, the system will attempt to level down to a hardware door zone, and then go into Shutdown while the communication error persists. If communication is restored with no other fault conditions present, the system will go back in service.

5.13.7.3 ELGO Position Offset Mismatch

The two ELGO APS Sensors are positioned 40mm apart, and each CPU actively verifies that the difference between received position data to both CPUs is within tolerance, where Safety CPU position data is 40mm greater than Main CPU position data. While the system is moving, the tolerance is increased with increasing speed, accounting for the communication delay between CPUs while comparing data. If the data compared by the sensors are significantly deviant from 40mm, 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 counts.

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.

5.13.7.4 ELGO Tape Switch Fault

The integrity of the ELGO APS encoded magnetic tape is monitored by a tape switch, which will open if the tension from the tape is lost. The tape switch contacts are connected between terminals 3-3A, and is monitored by a SIB or Remote I/O board input. If the tape switch opens, the safety string will break and render the system valves inoperable. Jump the Tape Switch contact (TBs 3 - 3A) in order to allow the car to run on inspection.

5.13.7.5 ELGO Learn Data Error

The system verifies Learn data at the end of a Learn run to ensure that each landing has a measure door zone position, and that no values are in conflict. Until Learn data is saved and verified, the system will be 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. While ELGO APS Learn Data is missing, corrupt, or fails to verify, the Safety CPU “Safety Status” screen will display “Fault: ELGO APS Data”, and the Main CPU “Car Status” screen will display “ELGO-Err”.

5.13.7.6 Normal Limit and Slowdown Limit Behavior

While the system is not faulted, then the Up and Down Normal Limits will be active based on the top and bottom terminal landing positions. If the terminal landing positions were miscalculated (if a learn run was performed improperly), the Up or Down Normal Limits will 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 inputs (IX1 & IX4). The computed and hardware Normal and Slowdown Limits are processed using an Exclusive OR, such that the Limits will be disabled if the Hardware inputs are jumped while the virtual APS limits are being used. This prevents the user from attempting to bypass the Normal and Slowdown Limits while using the ELGO APS feature.

5.13.8 Testing ELGO APS Independent Systems.

The Main and Safety ELGO sensors operate as independent systems in both receiving and processing position data. It is possible to enable or disable either system independently, and allow the controller to respond to the corresponding hardware inputs instead of the computed signals. While both systems are enabled, then tape offset position cross-checking is available as an added layer of system reliability. Disabling ELGO APS operation on one CPU may be used to demonstrate the behavior of the ELGO system on the other CPU, or to allow for hardware inputs to be used instead of computed APS signals.

Disabling the Main CPU ELGO system has the effect of disabling all of the standard selector signals (Leveling, Slowdowns, Access Zones, etc...), while allowing the car to still be subject to the Safety CPU ELGO system’s control of the Normal and Slowdown Limit signals. This is useful while testing and installation to demonstrate that the car will safely slow down and stop at a terminal landing while the Main CPU has no control of the selector signals.

Disabling the Safety CPU ELGO system has the effect of disabling the Normal and Slowdown Limit signals, while allowing the car to be run using the hardware limit inputs (IX1, IX2, IX3, IX4). This is useful when hardware inputs for the Normal and Slowdown Limits are intended to be used instead of software computed signals, depending on user requirement or preference. It may also be useful during start-up installation, where the installers desire to have direct control over the Normal and Slowdown Limit inputs.

WARNING: Disabling ELGO APS on either CPU disables the functionality of the signals controlled by that system. Only disable ELGO if performing a specific safety test as needed.

To enable/disable the ELGO APS system on a particular CPU, go 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 will be available, and will be unavailable if disabled.

6. Hardware Description

The standard Vision controller consists of the Safety Interface Board (SIB), Main and Safety CPU boards, I/O boards, Power Supply system, Motor Control system, CANbus and Ethernet communication networks, ETSD/UCM system, and other included peripherals.

The Safety Interface Board performs many functions. The following list is a summary:

- Acts as a bridge between the Main and Safety CPUs.
- Provides for connection of the safety string and inspection operation devices.
- Contains the hardware-based Complex Programmable Logic Devices (CPLDs) required by code.
- Provides 8 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.
- Contains ± 12 volt, 5 volt and 3.3 volt DC power supplies.

The Main and Safety CPUs perform distinct tasks, in addition to cross-checking safety string inputs from the SIB. The Main CPU runs the application program for the general operation of the elevator, while the Safety CPU monitors the safety string and inspection inputs and handles dispatching duties with other Vision controllers. Each CPU includes a LCD screen and Keypad for user interface.

I/O boards provide serial connection to the controller via CANbus, and may be located where needed, such as in the Hall Riser, Hoistway, Car Top, Car Operator Panel, Machine Room, and within the controller itself.

The Power Supply system includes the required fuses, transformers, power supplies, phase monitor, relays, and electrical components to power the Safety Interface Board, Main and Safety CPU boards, I/O boards, door operator, safety devices, and car and hall fixtures.

The Motor Control system includes the drive, contactors, overloads, and relay circuits which run the drive.

The communication networks include 4 CANbus channels on each of the Main and Safety CPUs. An Ethernet connection is available on the Safety CPU for multi-car dispatching, and on the Main CPU for remote system monitoring.

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

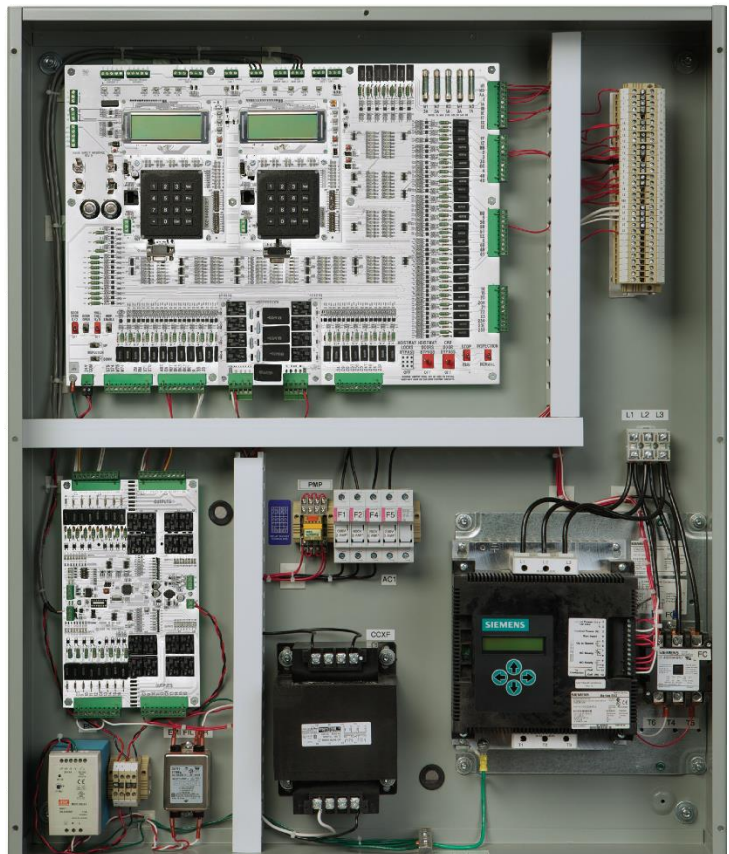


Figure 35: Standard Vision Enclosure Layout (hydro shown)

6.1 Safety Interface Board (SIB)

6.1.1 SIB Layout

The Safety Interface Board (SIB) layout is shown in Figure 36 and the descriptions are in Table 5. The Safety CPU is mounted on the left and the Main CPU is mounted on the right in the center of the SIB. The Safety inputs are connected along the right and bottom side of the SIB. The CANbus connections are made at the top of the SIB, and other auxiliary connections are made on the left side of the SIB. CANbus termination jumpers are located directly below the CANbus connectors. The encoder is connected on the left of the SIB, connected directly to the drive encoder terminals. LEDs for each safety input are arrayed next to the corresponding inputs, surrounding the Main and Safety CPUs mounted in the center of the SIB. The Auxiliary relay board is mounted at the bottom of the SIB. Fuses are provided for the safety string and I/O boards at the top-right corner of the SIB. The CPLD diagnostic LED indicators are located on the SIB between the Main and Safety CPUs, and the CPLD diagnostic DIP switches are located on the SIB to the right of the Main CPU. The Real Time Clock battery is mounted on the SIB to the left of the Safety CPU, above the power supply indicators and test points. The Inspection switch, Bypass switches, and Controller Stop switch are located on the bottom right of the SIB. Inspection Run buttons, Cutout switches, and an Auxiliary Door Open Button are located at the bottom left of the SIB. Specific details of each SIB hardware component are described in the following sections.

Table 5: SIB Layout Descriptions from Figure 36.

##	Description	##	Description
J1	Fuse and Safety String Inputs	A	JPS1-JPS4 CANbus Termination Jumpers
J2	Safety String and Gate Inputs	A*	JPS1-JPS4 CANbus Isolated Power Supplies
J3	Door & Lock Contact Inputs	B	J1H, J1L CANbus 1 Termination Jumpers
J4	Door Zone and Inspection String Inputs	C	JCG Group CANbus Common Jumper
J5	Inspection Run Inputs	D	JTH, JTL Group CANbus Termination Jumpers
J1A	Main CPU Relay Outputs \ Valve Connections	E	Fuses M1 - M5
J2A	Safety CPU Relay Outputs \ Valve Connections	F	Battery (3V CR2032) for Real Time Clock
J6	5V and ± 12V DC Power Supply Outputs	G	Isolated PS (UPS5) & ±12V, 5V, 3.3V LEDs
J7	NTS Limit Switch and Motor Starter Inputs	H	Main CPLD State & I/O LED Indicators
J8	System Power, Motor Starter and spare Inputs	I	Safety CPLD State & I/O LED Indicators
J9	Analog to Digital Inputs	J	Main CPLD State Select DIP Switches
J10	Digital to Analog Outputs	K	Safety CPLD State Select DIP Switches
J11	Speed Encoder Input	L	Redundant Safety Input LED Indicators
J12	Position Feedback - Buffered Output	M	Door Open Button
J13	Absolute Positioning System 24VDC Supply	N	Door Open Cutout Switch
J14	Safety CPU Absolute Position Input	O	Hall Call Cutout Switch
J15	Main CPU Absolute Position Input	P	Controller Inspection Enable Button
J16	TB for CANbus 0 (CONTROLLER)	Q	Controller Inspection Up Run Button
J17	TB for CANbus 1 - POSITION (SAFETY)	R	Controller Inspection Down Run Button
J18	TB for CANbus 1 - POSITION (MAIN)	S	Hoistway Locks Bypass Switch
J19	TB for CANbus 2 - SPARE (SAFETY)	T	Hoistway Doors Bypass Switch
J20	TB for CANbus 2 - CAR I/O (MAIN)	U	Car Door Bypass Switch
J21	TB for CANbus 3 - HALL RISER - IN (SAFETY)	V	Controller Inspection Switch
J22	TB for CANbus 3 - HALL RISER - OUT (SAFETY)	W	Controller Stop Switch
J23	TB for CANbus 3 - SPARE (MAIN)	X	Safety CPU Board
		Y	Main CPU Board
		Z	Auxiliary Relay Board

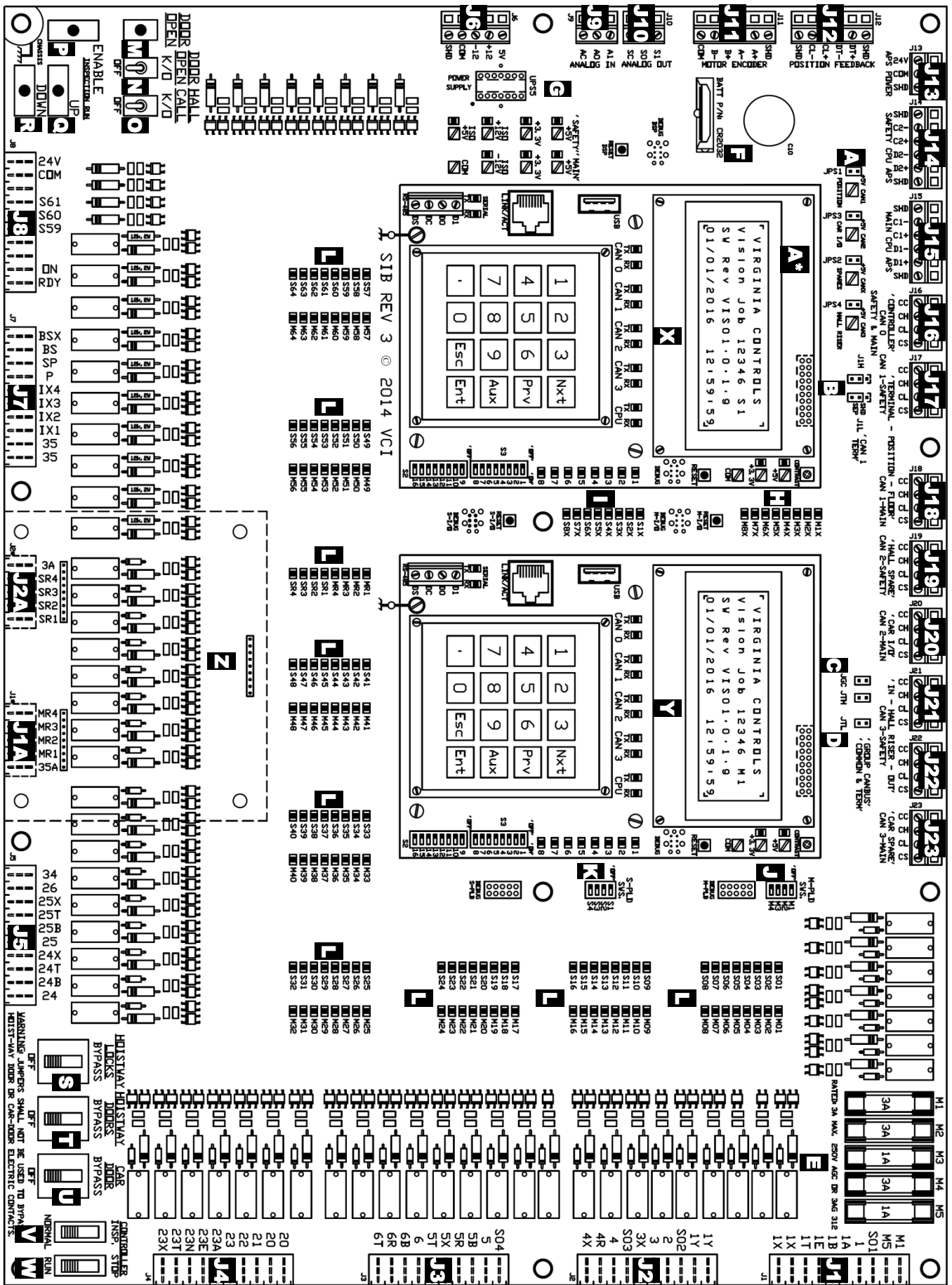


Figure 36: Safety Interface Board (SIB) layout.

6.1.2 CANbus I/O and Termination Jumpers

(See items A, A*, B, C, D, J16 – J23 in Figure 36)

The SIB acts as a hub for connecting CANbus between the Main or Safety CPU, I/O boards, and Absolute Positioning System (if equipped). All CANbus connections are made at the top of the SIB as seen in Figure 36. Each CPU is equipped with 4 CANbus channels.

Table 6: CANbus channels for Main and Safety CPUs.

CANbus Channel	Main CPU	Safety CPU
0	SIB and Controller I/O boards	SIB and Controller I/O boards
1	Absolute Positioning System Main	Absolute Position System Safety
2	Car Top and C.O.P. I/O boards	Car-specific Hall Lanterns
3	Spare	Hall Riser I/O boards & Multi-Controller Dispatching

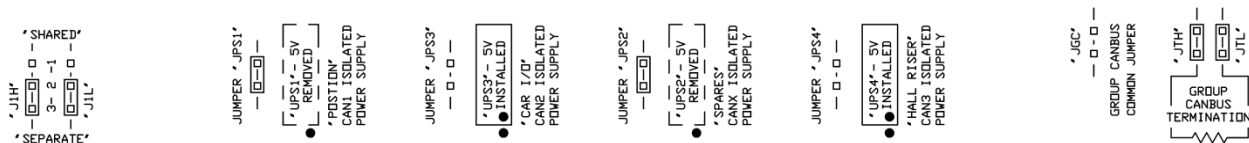


Figure 37: Termination and power supply diagrams for CANbus channels.

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 7. In general, one end of the communication cable for all of the CANbus channels will be terminated at the SIB, while the other end must be terminated at the last device/node in series.

J1H & J1L: Termination selection jumpers for CANbus 1. Install at pins 1-2 if CANbus 1 / “Absolute Position” devices are “shared” between Main and Safety CPUs. Install at pins 2-3 if devices on CANbus 1 are “separate” between Main & Safety CPUs. See Sheet “VN6” of the schematics for job specific configuration.

JPS1 – JPS4: Jumpers JPS1 – JPS4 are used to select whether power for each of the Main and Safety CANbus Channels 1-3 is supplied by the onboard SIB 5VDC power supply or a corresponding isolated 5VDC power supply (UPS1 – UPS4), located under the Safety CPU board. These selections are made based on the length of the CANbus networks and the supplies providing power and ground to the devices on the remote end.

Jumper	Isolated 5VDC Power Supply	Description	CANbus channels affected
JPS1	UPS1	Absolute Positioning System	CANbus 1 (MAIN) & CANbus 1 (SAFETY)
JPS2	UPS2	Spare I/O	CANbus 3 (MAIN) & CANbus 2 (SAFETY)
JPS3	UPS3	Car I/O	CANbus 2 (MAIN)
JPS4	UPS4	Hall I/O	CANbus 3 (SAFETY)

For a given CANbus channel, install the jumper if using the onboard SIB power supply for the corresponding table, or remove the jumper and ensure the corresponding isolated 5VDC power supply (UPS1-UPS4) for that channel is installed. See Sheet “VN6” of the schematics for job specific configuration.

JGC: Jumper for connection of Safety CANbus 3 Common (CC) to ground. Used to ensure that wire CC is grounded at one point only within the Safety CANbus 3/ “Hall Riser” network. Typically CC will be grounded at Hall board #63 when 24VDC fixtures are used for the hall riser. Otherwise, install the JGC jumper on the

controller to which the CANbus cable from the hall riser I/O is connected, regardless of single or multi-car operation. See Sheet “VN6” of the schematics for job specific configuration.

JTH & JTL: Termination jumpers for Safety 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 “VN6” of the schematics for job specific configuration.

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

Table 7: CANbus termination locations for each channel.

CANbus Channel	SIB Termination	Other Termination	CC to Ground
Main: 0 (Controller)	Hard-wired on SIB	Remote I/O board #8 (in controller)	On SIB
Safety: 0 (Controller)	Shared with Main CANbus 0	Shared with Main CANbus 0	On SIB
Main: 1 (Position)	Hard-wired on SIB	Absolute Positioning System (if used)	On SIB
Safety: 1 (Position)	J1H/J1L selection on SIB	Absolute Positioning System (if used)	On SIB
Main: 2 (Car)	Hard-wired on SIB	Remote I/O board - last board in series on Car Top or in the C.O.P.	On SIB
Safety: 2 (Lanterns)	Hard-wired on SIB	Hall I/O board – last board in series	On SIB
Main: 3 (Spare)	Hard-wired on SIB	Not used, or last device in series	On SIB
Safety: 3 (Hall)	JTH/JTL on last SIB in group	Hall I/O board – last board in series	Hall Board #63 or on SIB (JGC)

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 (CC) wire. To achieve termination, both the High signal and Low signal need to be tied together at the endpoint node(s) through a 120ohm resistor circuit preinstalled on the SIB and I/O boards. Termination is hardwired at the CANbus connections for most nodes on the SIB, with the exception of Safety CANbus 3 / “Hall Riser” which may require jumpers JTH & JTL (per above).

The CANbus Common (CC) signal wire must be referenced to Ground at one and only one node. For all channels besides Safety CANbus 3, CC is referenced to Ground at the SIB. For Safety CANbus 3, CC will be referenced to Ground at the Hall Riser I/O Board #63. If Board #63 is not provided, then CC will be referenced to ground at the SIB using jumper JGC. Refer to the schematics for job specific configuration.

When using an Absolute Positioning System, data is received by two separate “Position” CANbus channels, Main CANbus 1 and Safety CANbus 1. Main CANbus 1 is always terminated at the SIB. However, Safety CANbus 1 may be terminated at the same termination node of Main CANbus 1 using Jumpers J1H and J1L in the “Separate” position (bottom two pins).

Each CANbus channel requires a CAN driver chip and 5VDC power supply at each node. For the Main and Safety CPU, the drivers and power supplies are located on the SIB. For a given channel, the power supply may be referenced to the SIB power supply by installing the specified jumper(s) (JPS1, JPS2, JPS3, JPS4). A CANbus channel may be powered remotely by installing a 5VDC isolated power supply chip (UPS1, UPS2, UPS3, UPS4) at the specified location under the Safety CPU, as shown by label A* in Figure 36. Refer to the schematics for job specific configuration.

When two or more Vision controllers are connected in a group, the Hall Riser I/O is shared and each controller will communicate on the shared Safety CANbus 3 connection. The controllers are connected in series with each other and the Hall Riser I/O, but only the controller at the end of the CANbus channel is terminated using jumpers JTH and JTL.

6.1.3 Fuses

(See item E in Figure 36)

The fuses on the SIB are used to isolate various branches of power for the controller and field wiring. The fuse connections for M1-M4 at the 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 8 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 8: 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

6.1.4 Real Time Clock & 3V Battery

(See item F in Figure 36)

The system uses a battery powered Real Time Clock (RTC) mounted on the SIB to provide time data for the Main and Safety CPUs.

The RTC is set in the factory, but may be edited on the Safety CPU using the Time Setup Menu (see Section 7.2.5.7). Daylight savings may be enabled and configured using the DST Setup Menu, and the start date and ending date will be preset based on current date. The calculation for daylight savings time may also be edited, in the event that the starting month and week or ending month and week impacting daylight savings time are changed during the lifetime of the controller.

The RTC is powered by a CR2032 3V battery (see item F in Figure 36). The battery life is approximately 5 years.

NOTE: If the battery fails, the system will not be able to retain the current time if system power is cycled, and the time will reset and restart 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 top of the SIB.

WARNING: Do not use a metal (or conducting) device to remove or install the battery.

Replace a low battery by gently pushing the top of the battery downward until it is clear of the black housing, and then slide it out of the socket. Insert the new battery by sliding the edge under the metal retaining finger, then aligning 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 7.2.5.7)

6.1.5 CPLD (Complex Programmable Logic Device)

(See items H, I, J, K in Figure 36)

On each SIB of a Vision controller, two CPLDs, M-PLD (Main) and S-PLD (Safety), are used to process the safety inputs using gate logic, which operates in parallel with the application software running in the CPUs. The CPLDs function in a similar way a relay interface board uses hardware to process a series safety string on the former MH3000 design. The safety string inputs, limit switches, door contacts, and inspection inputs are all monitored and processed by the CPLDs, such that the valve relays will be prevented from energizing if any safety input is in an improper state. The CPLDs satisfy the requirement in safety code for safety related devices to be processed by a “non-software-controlled means”, eliminating the need for additional, external hardware.

The purpose of using two CPLDs is to monitor the safety inputs of the SIB and control both Main and Safety output relays in tandem with the CPUs, effectively cross-checking the safety inputs and each other. Additionally, the CPLDs and the software based CPUs provide the code required redundancy to prevent a single point of failure of a control device to which a safety device is connected. Each CPLD will independently monitor and process the safety string inputs and permit or prevent the corresponding valve/run output relay of the Auxiliary Relay Board from energizing based on the state of the safety inputs.

The M-PLD controls the Main auxiliary output relays (connections MR1, MR2, MR3, MR4), while the S-PLD controls the Safety auxiliary output relays (connections SR1, SR2, SR3, SR4). Aside from controlling different relays, the M-PLD and S-PLD are identical in how the safety inputs are processed.

Various conditions will cause the CPLD to prevent the valves from energizing, including:

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) is open, or if using the door bypass switches.

Safety String Limits or Stop Switches are Open: Any of these safety string inputs 1X,1Y,1T,1B,2,3,3X are open. Note that releveling in Normal Operation with doors open while in Door Zone is allowed. The In-Car Stop Switch will also be 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 valve output relays to energize.

Normal/Slowdown Limits (NTS) are Open: For each valve relay, the corresponding limit switch will prevent the valve relay from energizing.

MR1/SR1 - Up Normal. MR2/SR2 - Up Slowdown. MR3/SR3 - Down Slowdown. MR4/SR4 - Down Normal.

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

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

6.1.6 SIB Inputs & Input LEDs

(See items J1 – J8, L in Figure 36)

The safety string, limit switch, and inspection inputs are arranged around the right and bottom side of the SIB. Each input has one or two corresponding LED indicators which light when the input is high. The input LEDs for the Main CPU range from M01 to M64, and the input LEDs for the Safety CPU range from S01 to S64. All inputs are 120VAC, with the exception of terminal block J8, where inputs S59, S60, and S61 are 24VDC inputs. 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. Several spare inputs are available and may have job specific functions, including S01, S02, S03, S04, S59, S60, S61, and 4X. See Section 9.2 or Sheet “VNX” in the schematics for a detailed description of each SIB input and its corresponding LED indicator(s).

NOTE: The Main and Safety CPUs each read 64 inputs, but not all SIB inputs are read by both CPUs. Please refer to the schematics or Section 9.2 for specific details on which inputs are received by each CPU.

6.1.7 Door Open Button

(See item M in Figure 36)

The Door Open Button on the SIB operates the same way as the Door Open Button in the Car Operating Panel. It is available for convenience, and is active while the Door Open Cutout Switch (below) is thrown.

6.1.8 Door Open Cutout Switch

(See item N in Figure 36)

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

NOTE: The Door Open Cutout Switch does not disable hall calls or take the controller out of group operation. Use the Hall Call Cutout Switch to take the car out of service.

6.1.9 Hall Call Cutout Switch

(See item O in Figure 36)

When the Hall Call Cutout switch is set to “K/O” while in Normal Operation, the controller will stop answering hall calls, but will continue to respond to car calls and other recall functions such as Fire Service or Emergency Power. The car will be taken out of group operation, and assigned hall calls will be transferred to other available cars in the group. If no other cars are available to answer the existing hall calls, the hall calls will be cancelled.

6.1.10 Inspection Switches

(See items P, Q, R, V in Figure 36)

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

To operate the car, 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 car will continue 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 inspection run inputs are monitored by the system 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 will trigger a fault, and the car will immediately shutdown. Use the Fault Reset input (RST) on controller I/O board #8 to clear this shutdown.

6.1.11 Door Bypass Switches

(See items S, T, U in Figure 36)

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 required by elevator safety code. They may only be used while on Car-Top Inspection or In-Car Inspection operation.

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, and the Door Contacts Bypassed LEDs (S28 & M28) of the SIB will be lit. If desired, a “Door Bypassed” indicator (120VAC) can be connected to SIB terminal 26.

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

6.1.12 Controller Stop Switch

(See item W in Figure 36)

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 M09/S09 indicate the status of this safety input.

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

(See items J6, G in Figure 36)

The SIB receives 24VDC from the controller power supply, and uses onboard power supplies to produce 5VDC and 3.3VDC for CANbus drivers, the CPUs and other components. Approved external devices can access +5VDC, +12VDC, or -12VDC power using the J6 terminal block if the power supply UPS5 is installed by VCI. 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 large conditioning capacitor on the SIB (labeled C10) is used to stabilize the 24VDC incoming power supply.

6.1.14 Encoder & Motor Feedback Connections

(See items J9 – J12 in Figure 36)

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 5.12) 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 7.1.8) may be used to monitor the encoder data, and the “Edit High Speed Counter (HSC) Data” screen (see Section 7.1.4.8) may be used to calibrate the high speed counter at contract speed.

The Motor Feedback Connections (TB J12) and Analog inputs/outputs (TBs J9/J10) are not presently used.

6.1.15 Absolute Positioning System

(See items J13 – J15 in Figure 36)

The standard connections for an Absolute Positioning System (APS) uses CANbus 1, but provisions are available for an APS which uses the SSI protocol using terminal blocks J14 and J15. A 24VDC power terminal is also available on terminal block J13 or a dedicated 24VDC power supply in the Car Top module may be used to power the APS.

6.1.16 Auxiliary Relay Board

(See items J1A, J2A, L, Z in Figure 36)

An Auxiliary Relay Board is mounted on the 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 SR1 – SR4 relays on the left (Safety) connect to the high voltage labeled terminal 3A, while a corresponding MR1 – MR4 relay on the right (Main) connect to the low voltage common labeled terminal 35A. Each pair of Auxiliary Board Relays operate independently using the following nomenclature.

Drive Relays	Safety Relay Terminal	Main Relay Terminal
U1 / U2: Up Direction	SR1	MR1
FSU: Up Fast Speed	SR2	MR2
FSD: Down Fast Speed	SR3	MR3
D1 / D2: Down Direction	SR4	MR4
Common (Hot / Neutral)	3A	35A

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 will set a latched redundancy shutdown, and the relay monitor status will be recorded in the fault log. Such a fault is latched through a power loss, requiring the Fault Reset Input (RST) on Controller I/O Board #8 to clear.

Event:	Description:	Relay States:		Relay Monitors:	
		Main	Safety	Main	Safety
Initial State:	1. Main/Safety relays are both open.	Open	Open	Low	Low
Run Sequence:	2. Safety relay commanded to close.	Closed	Open	-	-
	3. Safety monitor checks Safety relay is closed.	Closed	Open	High	High
	4. Main relay commanded to close.	Closed	Closed	-	-
	5. Main monitor checks Main relay is closed.	Closed	Closed	High	Low
	6. Main relays commanded to open.	Closed	Open	-	-
Stop Sequence:	7. Main monitor checks Main relay is open.	Closed	Open	High	High
	8. Safety relay commanded to open.	Open	Open	-	-
	9. Main/Safety monitors check both relays are open.	Open	Open	Low	Low
	10. Go to Step 1.	-	-	-	-
Error Conditions:	Safety 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 will check for a stuck Main relay contact during a Stop Sequence (see step 7 above) only during a normal stop. If the controller is commanded to stop by a safety device or for any other abnormal reason, the Main and Safety Auxiliary Relays will both open immediately, ensuring the relay contacts are both open.

6.2 Main & Safety CPU boards

6.2.1 Hardware Layout

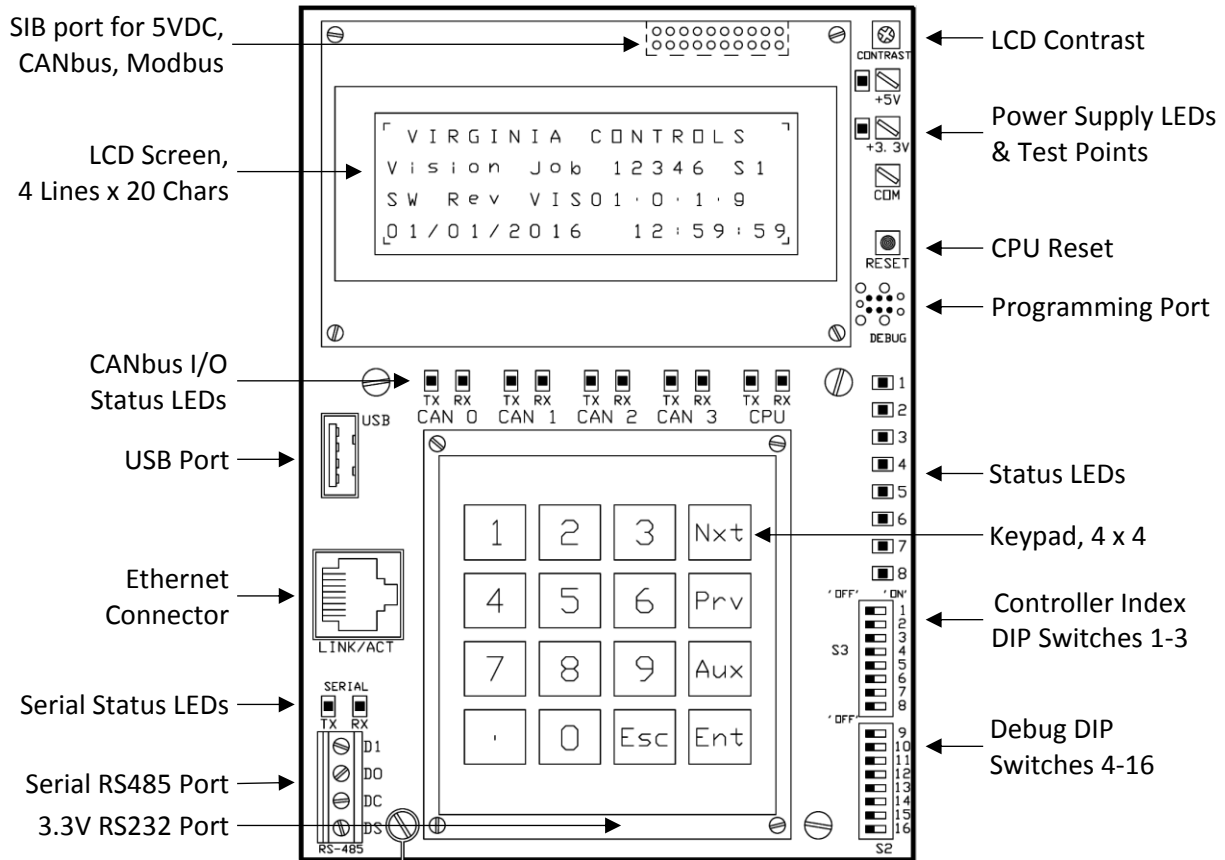


Figure 38: CPU Layout Diagram. Main and Safety CPU use identical hardware.

The Central Processing Unit (CPU) board contains the hardware that reads the inputs and enables the outputs which control the operation of the elevator. This section describes the major components on the board, and the function of the connectors and LEDs. While the two CPUs of the SIB perform different tasks and functions, the hardware of the Main CPU and Safety CPU is identical. They are programmed differently to define whether a CPU is Main or Safety via the USB port.

The Safety CPU must be installed on the left side of the SIB, and the Main CPU must be installed on the right. Incorrect installation will result in system faults which are displayed on the “Car Status” or “Safety Status” menu of the LCD screen.

6.2.2 Status LEDs

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

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

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, the four two-digit bytes of the top line on the screen are reflected by the status LEDs 1-4. If the two-digit byte is non-zero, then the LED will be lit, otherwise the LED will be 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 status and activity of each the 4 CANbus channels are reflected by the Tx/Rx LEDs.

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 status and activity of the Serial RS485/RS232 port is reflected by the Tx/Rx LEDs.

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.

6.2.3 CPU Reset Button

The CPU Reset button is located on the right side of the CPU board display. 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 reset 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 will reset the CPU, causing all outputs to be turned off and the car to stop immediately.

6.2.4 DIP Switches

There are two sets of 8 DIP switches on each CPU, labeled 1-16. DIP switches labeled 1-3 set the controller number index (in terms of letters A – H) for group operation, while the remaining switches 4-16 are only used for factory debugging and monitoring purposes.

To define the controller index, set the DIP switches to the binary value of the index as follows in Table 9. The index is defined as an alphanumeric value between A-H to distinguish each controller from another.

Table 9: 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 system can accommodate up to 8 cars connected within a group network. The Main and Safety CPU must be set to the same controller number index, and each controller must have a different index than any other connected systems in a group.

6.2.5 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.

If the display is blank or faint and does not respond to any keypresses, check that the power status LEDs to the right of the screen for 5V and 3.3V power. If the CPU appears to be powered up, try rotating the trim pot counter-clockwise if the display is too light or blank. Or if the LCD background is too dark or fully black, rotate the trim pot clockwise. If the display cannot be corrected by the trim pot, then the display may need to be replaced, or the contrast trim pot is damaged and the CPU board may need to be replaced. Contact VCI technical support for further troubleshooting assistance and to order replacement parts.

The LCD screen is fastened by four small screws, and is connected by a 16 pin header at the top right corner of the display. Make sure power is off before replacing the LCD screen.

6.2.6 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 of how to use the keypad in context with the menu interface.

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

6.2.7 Power

The CPU board receives 5V power from the 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, to permit a brief period of operation for the CPU and non-volatile RAM when power is removed from the controller. If a power loss of at least 100 milliseconds is detected by the SIB dsPIC, each CPU will begin a power down sequence where 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 will not be saved, but the system will still safely shutdown.

If the building power dips briefly and “browns-out”, this may trigger a processor reboot following the standard power-down procedure described above. The controller will automatically restart in the same state it was when shutting down, and will go back into service after a few seconds.

6.2.8 Serial Communication Ports

6.2.8.1 CANbus

Each CPU communicates with the SIB, I/O boards, and other connected controllers in a group over CANbus via the 2 x 10 pin connector/header between the CPU and SIB.

6.2.8.2 MODbus

The Main and Safety CPUs have a dedicated serial data communication channel using MODbus protocol over pins on the rear connector. This allows data to be shared between the Main and Safety CPUs.

6.2.8.3 Ethernet

Each CPU has an Ethernet port which allows the controller to communicate over an external network. The Safety CPU sends status data to other controllers in the same group for dispatching. The Ethernet port of the Main CPU is available for connection to a monitoring system. The Main and Safety CPUs also have a Telnet interface through the Ethernet port available for debugging purposes.

6.2.8.4 USB

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

6.2.8.5 Serial RS485 & RS232 3.3V Port

The serial RS232 and RS485 ports are used by the factory for debugging and for limited interaction with the CPU operating system. 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. The serial ports are not used in normal operation of the system.

6.2.8.6 Programming Port

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

6.3 Input/Output Boards

Input/Output boards are used to connect the CPU with the field devices. Wiring is done to the removable terminal blocks at the top (or bottom) of the I/O boards. 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 and the 2 point Hall I/O board. The Remote I/O board is useful for servicing many I/O points in one location, while the Hall I/O board is ideal 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 will be described in context of each component in the following sections.

The Remote I/O board receives inputs that are 120VAC (or 24VDC 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 39 for the layout of the Remote I/O board, and Figure 40 for the layout of the Hall I/O board. Both I/O Board types are powered by 24VDC.

6.3.1 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 or in the C.O.P, and if necessary, in the hoistway as well. Wiring is made to the removable terminal blocks at the top & bottom of the Remote I/O boards. Fusing for their I/O is provided externally on the SIB, not on the I/O boards. See Figure 39 for the layout of the Remote I/O board. Board power is 24VDC, the inputs are 120VAC, while relay outputs can be customized to the application.

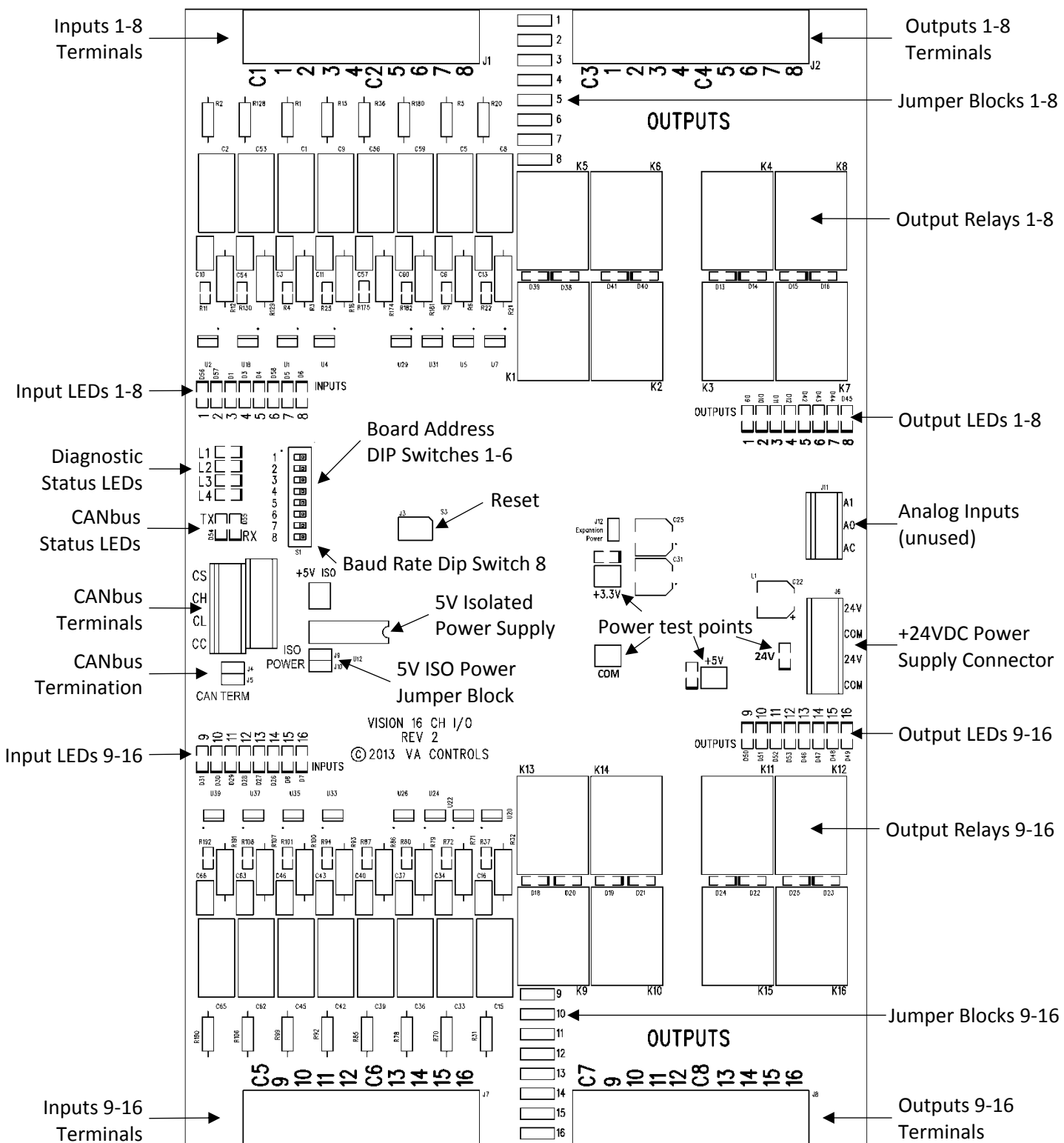


Figure 39: 16 Point Remote I/O Board Layout (drawn to scale).

6.3.1.1 Board Address Index

DIP Switches 1-6: The CANbus node address number of each I/O board is determined by the binary value of the DIP switches 1-6, ranging in decimal 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 10 for the binary-to-decimal conversion for each DIP switch.

Table 10: 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. The board CANbus node address is used in the “Show I/O Status” screen to indicate which board is being monitored.

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 500 kBPS. This setting is necessary to configure the Remote I/O boards depending on which CANbus channel is being used. Remote I/O boards located in or on the car or in the hoistway are always configured for 125 kBPS.

6.3.1.2 Connections

24VDC Power: Each Remote I/O board is powered by 24VDC, at 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 120VAC. The physical input connections for inputs 1-8 are at the top left of the Remote I/O board, and inputs 9-16 are connected at the bottom left. Each group of 4 inputs has a single 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 a single output common terminal labeled: C3, C4, C7, or C8. Refer to the schematics to determine whether the output commons are high (120VAC), 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.

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

6.3.1.3 I/O & Status LEDs

Inputs 1-16: Input LEDs illuminate if there is 120VAC across an input and its corresponding input common (C1, C2, C5, C6). The LEDs for inputs 1-8 are at the top left of the I/O board, near the physical input wire connections. The LEDs for inputs 9-16 are at the bottom left of the I/O board, near the physical input wire connections.

Outputs 1-16: Output LEDs will illuminate if an output bit is commanded high, or ON, by the controller, which will pilot the respective output relay. When an output bit is set, a circuit is made from that output’s control relay connection to a corresponding output common (C3, C4, C7, C8). The LEDs for outputs 1-8 are at the top

right of the I/O board, near the physical output wire connections. The LEDs for outputs 9-16 are at the bottom right of the I/O board, near the physical output wire connections.

Tx: CANbus message transmit – This LED is driven by overall CANbus transmission traffic.

Rx: CANbus message receive – This LED blinks if a message is received by a board for processing.

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.

6.3.1.4 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 (i.e.: Car and Hall), an isolated 5V power supply chip “U12” must be installed that allows the CANbus drivers of those boards to function with a shared common that 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, “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 a corresponding input and output 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 for call inputs and outputs, where a call push-button and indicator can be tied together. When used, I/O connections are made to the output terminals blocks of the I/O boards.

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 SIB, while the other end node is typically terminated at an I/O board. To terminate CANbus at an I/O board, place 2 jumpers on the 2 pin headers of jumper blocks J4 and J5, which terminate CANbus signals “CH” and “CL” signals respectively.

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 future use by the factory.

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

Hall Input/Output Boards are used to connect the CPU with hall and hall riser I/O that can be driven at 24VDC levels. These are compact boards intended to fit within the fixture boxes of the hall riser and hall lanterns, when used. Wiring is made to the removable terminal block at the bottom of the Hall I/O boards. Overcurrent protection is provided externally by the 24VDC supply that powers both the boards and their I/O. See Figure 40 for the layout of the Hall I/O board. Board power is limited at 24VDC as both inputs and outputs are solid state. Therefore, hall call fixtures must be provided with LED call indicators and limited to approximately 50mA. Hall lanterns too must be provided with LED arrow indicators, but are limited to 750mA when combined with the load of the solid state gong.

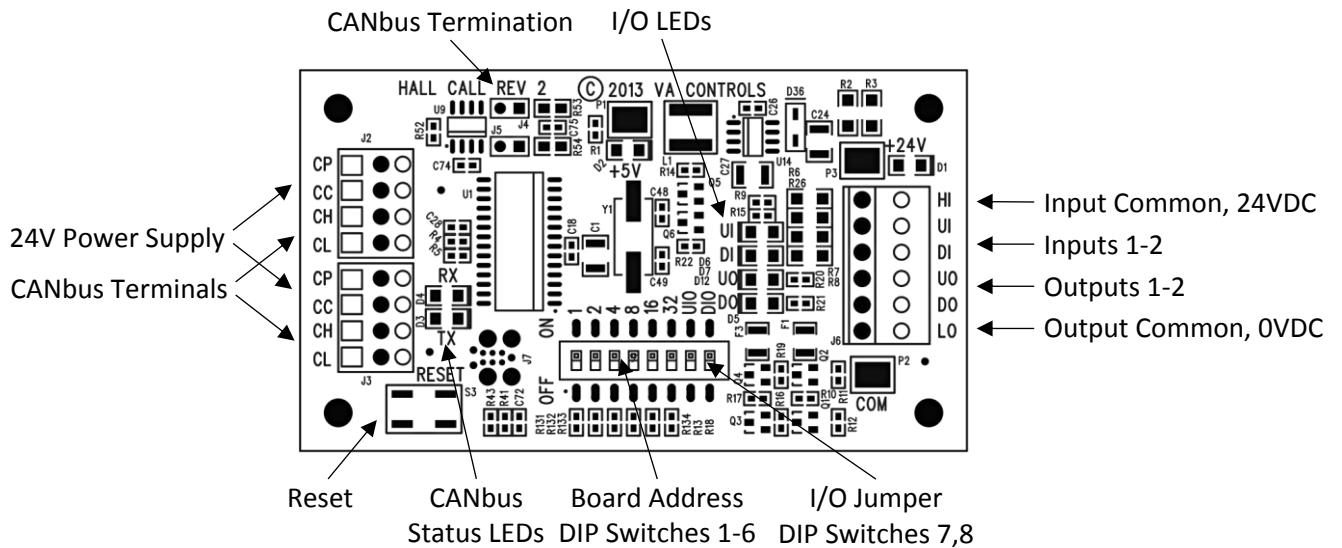


Figure 40: 2-In/ 2-Out Point Hall I/O Board Layout (drawn to scale)

6.3.2.1 Board Address Index

DIP Switches 1-6: The CANbus node address number of each I/O board is determined by the binary value of the DIP switches 1-6, ranging in decimal 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 11 for the binary-to-decimal conversion for each DIP switch.

Table 11: 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. The board CANbus node address is used in the “Show I/O Status” screen to indicate which board is being monitored.

NOTE: Hall I/O baud rates are fixed at 125 kbps regardless.

DIP Switch 7 – UIO: When DIP switch 7 is set ON, Input 1 (UI) will be electrically tied to Output 1 (UO) allowing one wire between call push-button and indicator to be connected to the I/O board at terminal “UO”. When set to OFF, The UI input and UO output may be read and controlled independently of each other.

DIP Switch 8 – DIO: When DIP switch 8 is set ON, Input 2 (DI) will be electrically tied to Output 2 (DO) allowing one wire between call push-button and indicator to be connected to the I/O board at terminal “DO”. When set to OFF, DI input and DO output may be read and controlled independently of each other.

6.3.2.2 Connections

24VDC Power: Each Hall I/O board is powered by 24VDC, at terminals “CP” and “CC”. There are two sets of these terminals on each board, tied together electrically, to allow for series connections. These terminals are a part of the CANbus communication connections, and they typically receive one of the 2 pairs 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)⁷. There are two sets of these terminals per board, tied together electrically, to allow for series connections. These terminals receive the second pair within the Hall I/O CANbus communication cable, which is 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 (a.k.a.: “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 labelled “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”, but the inputs may be connected to Fire Service or Emergency Power devices as needed. 24VDC power for the inputs is provided by the I/O board at terminal HI which comes from 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 labelled “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”, but the outputs may be connected to a Fire Service or Emergency Power indicator as needed. 24VDC power for the outputs is provided by the I/O board at terminal “HI” which comes from 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.

6.3.2.3 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 an output bit is commanded high, or ON by the controller, which will enable its respective output transistor. When an output bit is set, a circuit is made from that output’s transistor connection to its output common HI, or 24VDC. LEDs UO and DO are located near the center of the board just above the I/O connections.

Tx: CANbus message transmit – This LED is driven by overall CANbus transmission traffic.

Rx: CANbus message receive – This LED blinks if a message is received and processed by board.

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.

6.3.2.4 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 SIB, while the other end node is typically terminated at an I/O board. To terminate CANbus at an I/O board, place 2 jumpers on the 2 pin headers of jumper blocks J4 and J5, which terminate CANbus signals “CH” and “CL” signals respectively.

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.

6.4 CANbus & Ethernet Communication Networks

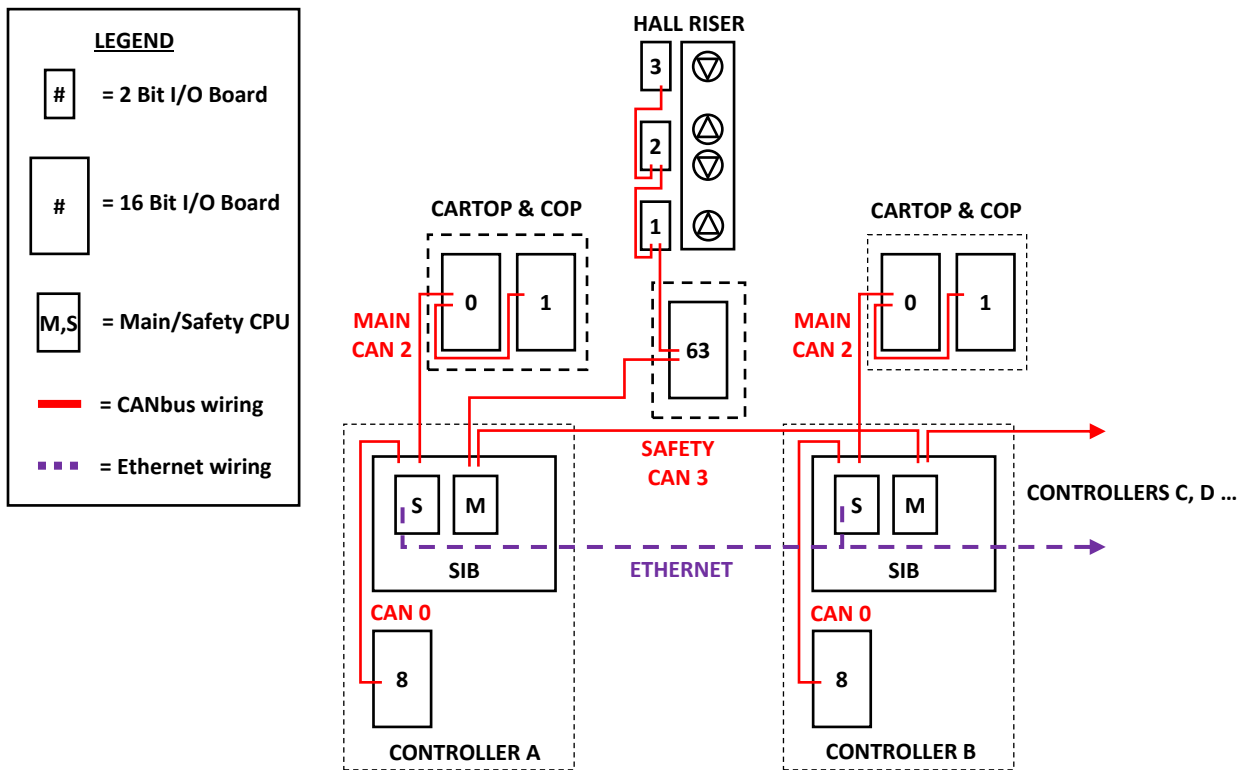


Figure 41: CANbus and Ethernet network representative diagram.

6.4.1 CANbus Configuration

There are 4 CANbus channels each for the Main and Safety CPU, resulting in 8 distinct CANbus channel networks as shown in Table 12. Each of these channels is distinct, with the exception of CANbus 0, which is shared between both Main and Safety CPUs. CANbus connections are started at the top of the SIB and each device is linked in series. A representative diagram of the CANbus networks is shown in Figure 41 above and on Sheet “VN6” in the wiring schematics.

Table 12: CANbus channels for Main and Safety CPUs.

CANbus Channel	Main CPU	Safety CPU
0	SIB and Machine Room I/O boards	Shared with Main CPU
1	Absolute Positioning System “A” Main	Absolute Positioning System “B” Safety
2	Car Top and C.O.P. I/O boards	Spare (Hall Lanterns)
3	Spare	Hall I/O boards and other controllers

In general, CANbus 0 connects to all components within the controller enclosure, CANbus 1 is dedicated to absolute positioning system communication (if equipped), CANbus 2 (Main) communicates to the Car I/O, and CANbus 3 (Safety) communicates to the Hall Riser I/O. For group operation, the controllers will share CANbus 3 (Safety) for the shared Hall Riser. The lead controller will control CANbus 3 (Safety) outputs, and if the lead controller goes offline, a new lead controller will be designated and resume control of CANbus 3 (Safety) outputs. CANbus 2 (Safety) and CANbus 3 (Main) are spare CANbus channels, which may be used for car-specific hall I/O such as hall lanterns, or other connected devices.

6.4.2 Ethernet Configuration

Ethernet connection is required for group operation, where each Safety CPU communicates its status to every other Safety CPU on the Ethernet network using the UDP protocol. If the controller is a single car, then no Ethernet connection is used on the Safety 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 is configured by the factory. Refer to Section 7.1.4.7 or 7.2.5.5 for details on changing IP settings.

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

6.5 Power System

6.5.1 Transformers

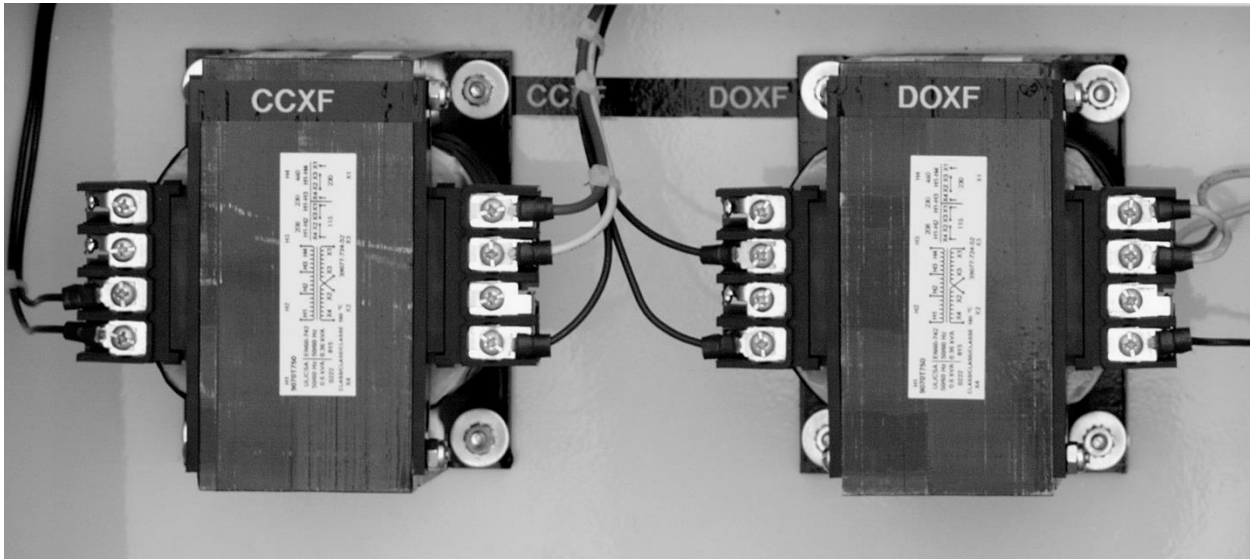


Figure 42: Control Transformers

“CCXF” is the Control Circuit Transformer. This will provide the controller with 120VAC. The primary connections will 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.

6.5.2 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	3A	250V	Door Operator Transformer (if needed)
F6 +	5A	250V	Door Operator 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.

6.5.3 Phase Monitor

If provided, the phase monitor unit provides protection for the motor by continuously measuring the voltage of each of the three phases using a microcomputer circuit designed to sense 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 will 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 will energize immediately.

The output relay will 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.

The technical characteristics of the phase monitor can be determined from the part number as follows:

Series	Line Voltage	Voltage Unbalance %	Trip Delay	Restart Delay
Example: TVM	460A	10	0.5S	3S

6.5.4 24VDC Power Supply

The 24VDC Power Supply supplies 24VDC for the SIB, I/O boards, and other devices in the controller enclosure. The Power Supply has onboard over-current protection. If the output is shorted, then the output will be turned off. If the Power Supply output is 0 volts, remove the load from the Power Supply, then measure the output again. If the output is now 24VDC, check the load to make sure it is not shorted.

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

6.6 Drive Control

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

6.7 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 operational integrity of each of these three sub-systems is verified by the elevator controller micro-processor.

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

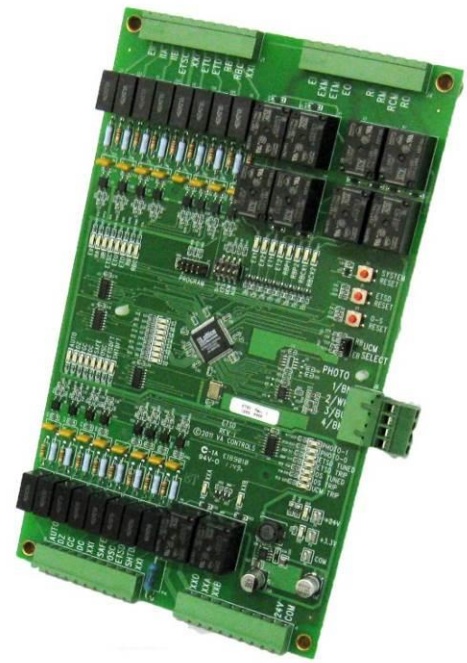


Figure 43 - ETSD Monitoring System

6.7.1 Unintended Car Movement (UCM) System

6.7.1.1 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).

6.7.1.2 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 RBP1 & RBP2 energize +1.0 second after power-up. 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.
4. A UCM System fault may occur in one of two specific situations, one occurring while on Normal operation and the other occurring while on Inspection.
 - a. When on Normal operation with the elevator in the Door Zone, if the Gate and Hall Door Contacts have been open and remain open, and if the Door Zone Input is lost, then the UCM System faults.
 - b. When on Inspection, if the Gate and Hall Door Contacts have been open and remain open, and the Safe Input is high ("P" Contactor is released), and if the elevator speed exceeds 2.5FPM for 1.0 second, then the UCM System faults.

- When faulted, the UCM System lights the “UCM TRIP” LED. A UCM System fault is latched through a power loss until reset.

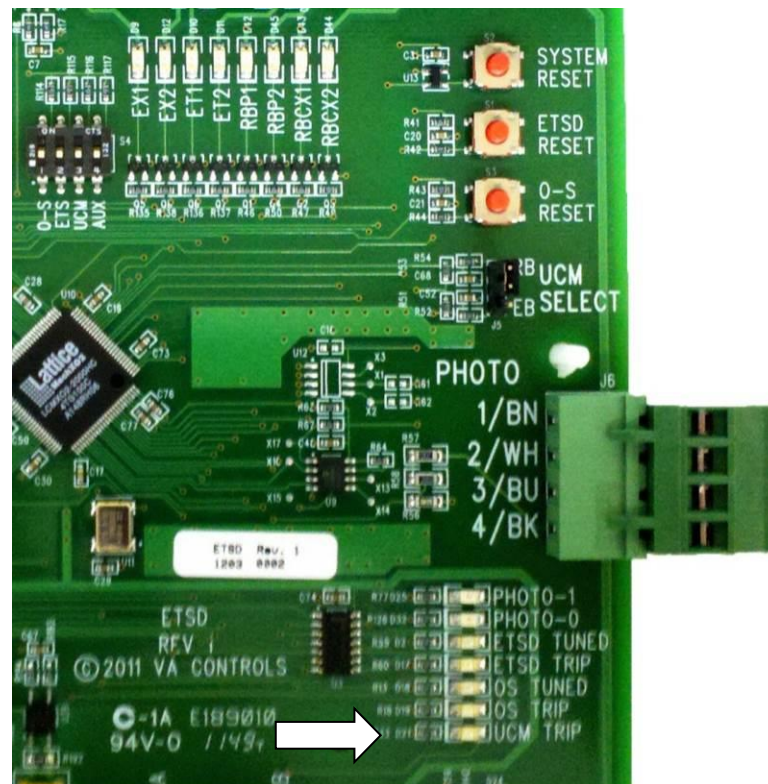


Figure 44 - UCM TRIP Indicator

- The UCM System is reset when Input SHTDFT goes high with power on.

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

- 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.
- 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.
 - To start, the 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.
 - Next, the 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.
 - This done, the processor re-energizes controller Relays RP & RPX causing UCM Input RB to go high, prompting the UCM System to re-energize Relays RBP1 & RBP2.
 - Lastly, the 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 processor Output RBC.
 - a. To start, UCM System Input RBC, which is connected to 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. Any deviation from these integrity checking sequences would result in an 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.

6.7.2 Over-Speed System (O-S) System

6.7.2.1 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.

6.7.2.2 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 contact 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 backup to the O-S System, but is calibrated at a lower speed, so 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 +1.0seconds 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. Relays ET1 & ET2 are released when on Normal operation (Input Auto is high) and the elevator has been sitting in the Door Zone, and Gate and Door Contacts have been open and remain open with the Safe Input low (Drive is enabled) for 1.0 second. Relays ET1 & ET2 are de-energized on Inspection and remain so.
7. During either of these two conditions, if 150FPM is exceeded, Relays EX1 & EX2 de-energize, opening the safety string and causing the O-S System to fault.

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

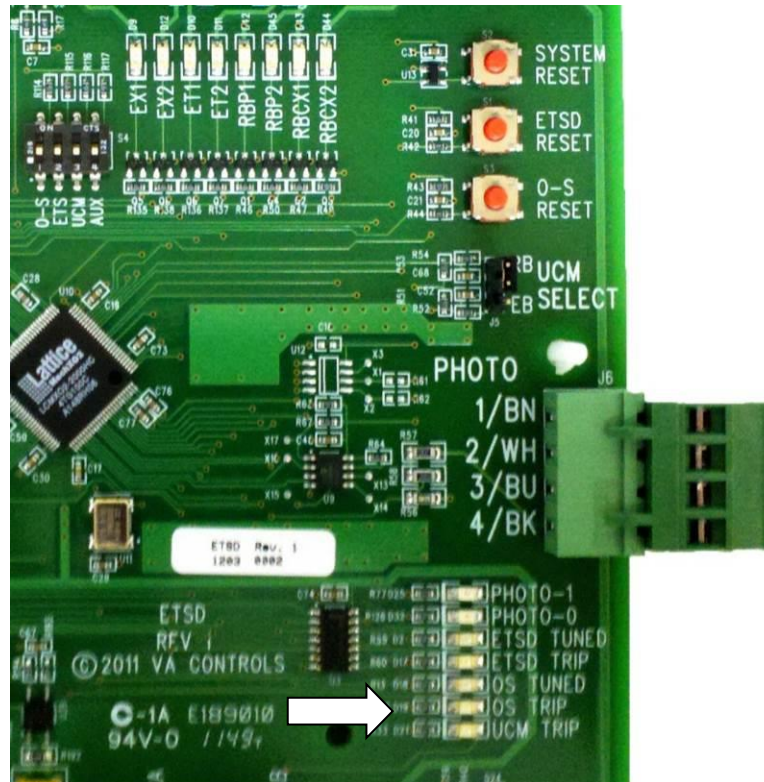


Figure 45 - O-S TRIP Indicator

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

- An O-S System fault is reset via the “O-S RESET” Push Button or by re-tuning.

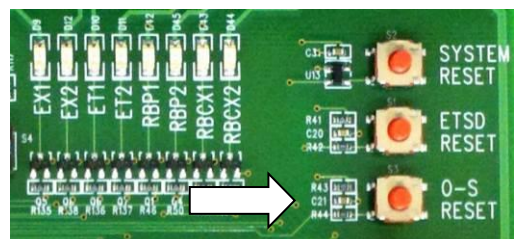


Figure 46 - O-S RESET Push Button

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

- For troubleshooting, a tuned O-S System can be defeated by jumping Input OSC high with power applied.

NOTE: Do not cycle power with Input OSC jumped or O-S calibration will be lost!

- A tuned, but defeated O-S System maintains Relays EX1 & EX2 regardless of car speed. Relays ET1 & ET2 function normally per the previous description.
- 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 micro-processor.
- The operational integrity of the speed monitoring system is checked as the controller micro-processor verifies its 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 Relays ET1 & ET2 is checked as the controller micro-processor verifies TB-ETM goes low (i.e.: Relays ET1 and ET2 drop) when on Inspection or on Normal operation when Leveling with doors open.
15. When the controller micro-processor Input ETSD is energized, then the operational integrity of the O-S System (Relays ET1, ET2 & Output XXA) is not checked.
16. If the controller micro-processor detects both its inputs at terminal blocks: EXM & ETM of the ESTD Board are low, and its Input LSM is high, then it logs a fault of the O-S System.

6.7.3 Emergency Terminal Slowdown Device (ETSD) System

6.7.3.1 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).

6.7.3.2 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 will verify 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 13 - 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 +1.0seconds after power-up. The ETSD System also energizes Relays ET1 & ET2 when the elevator is on Normal operation (Input Auto is high) and Inputs ETU & ETD are high (off of the ETS Switches in hoistway).
7. 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. Relays ET1 & ET2 remain energized until the elevator rides onto one of the ETS Switches in the hoistway 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.
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 “ESTD TRIP” LED lights.

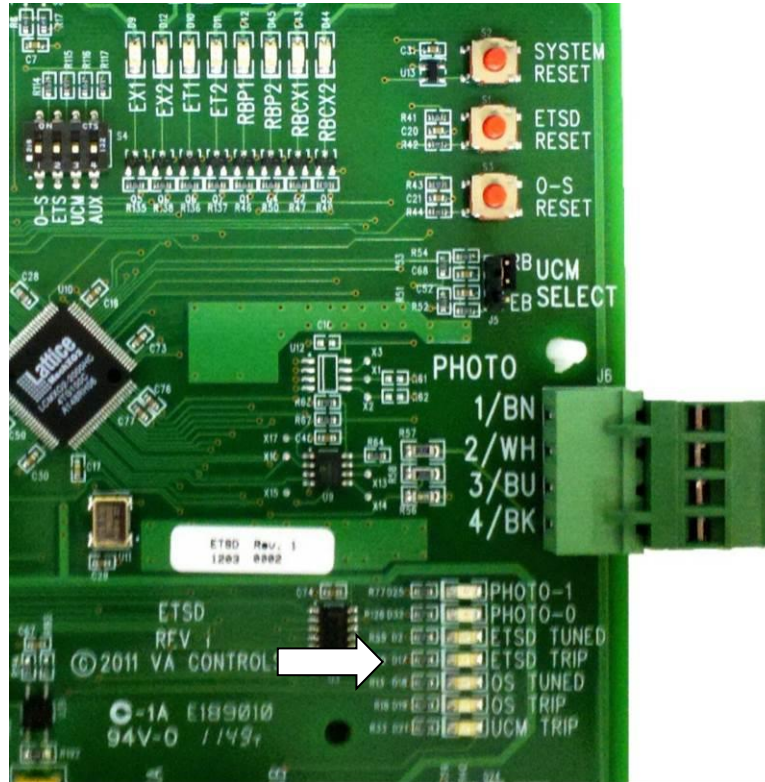


Figure 47 - ETSD TRIP Indicator

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

12. An ETSD System fault is reset via the “ETSD RESET” Push Button while on Automatic operation or by re-tuning.

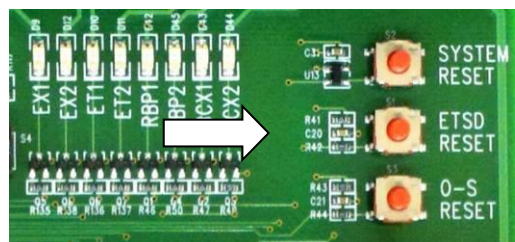


Figure 48 - ETSD RESET Push Button

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 jumping Input ETSDFT, or by putting the controller on Inspection operation.
14. A defeated, but tuned ETSD System maintains Relays ET1 & ET2, regardless of Inputs ETU & ETD. Relays EX1 & EX2 remain subject to car speed.
15. The operational integrity of the ETSD System is continuously checked by the controller micro-processor per the following.
16. The operational integrity of Relays EX1 and EX2 is checked as the controller micro-processor verifies TB-EXM goes low (i.e. Relays EX1 & EX2 drop) when traveling at over 90% of contract speed on Normal operation.

17. The operational integrity of Relays ET1 and ET2 is checked as the controller micro-processor verifies that TB-ETM goes low (i.e. Relays ET1 and ET2 drop) when the elevator encounters an ETS Switch in the hoistway (i.e. Input ETU or Input ETD goes low) while approaching a terminal landing on Normal operation.
18. Likewise, the controller micro-processor verifies that TB-ETM is high (i.e. Relays ET1 & ET2 energized) when off both ETS Switches (Inputs ETU & ETD are high).
19. When provided, the High Speed Counter of the processor provides a redundant 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 compared by the controller micro-processor against known car position. 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 micro-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 Inputs ETU/TB-31X and ETD/TB-32X as well.
22. If the controller micro-processor detects both its inputs at terminal blocks: EXM & ETM of the ETSD Board are low, and its Input LSM is low, then it logs a fault of the ETSD System.

6.7.4 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.



Figure 49 - ETSD Tape

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



Figure 50 - Speed Sensor

3. Check the alignment and focus of the Speed Sensor light beam. It should appear in the center of the ETS tape as a bright red dot 1/16" in size. If otherwise, see the "Setup of the O-S System" Section 4.11.2 for mounting, aligning and adjusting the Speed Sensor.
4. Check the "+24V" & "+3.3V" LED's on the ETS Board. If not lit, check the "+24V" & "COM" and "+3.3V" & "COM" Test Points on the ETS Board.

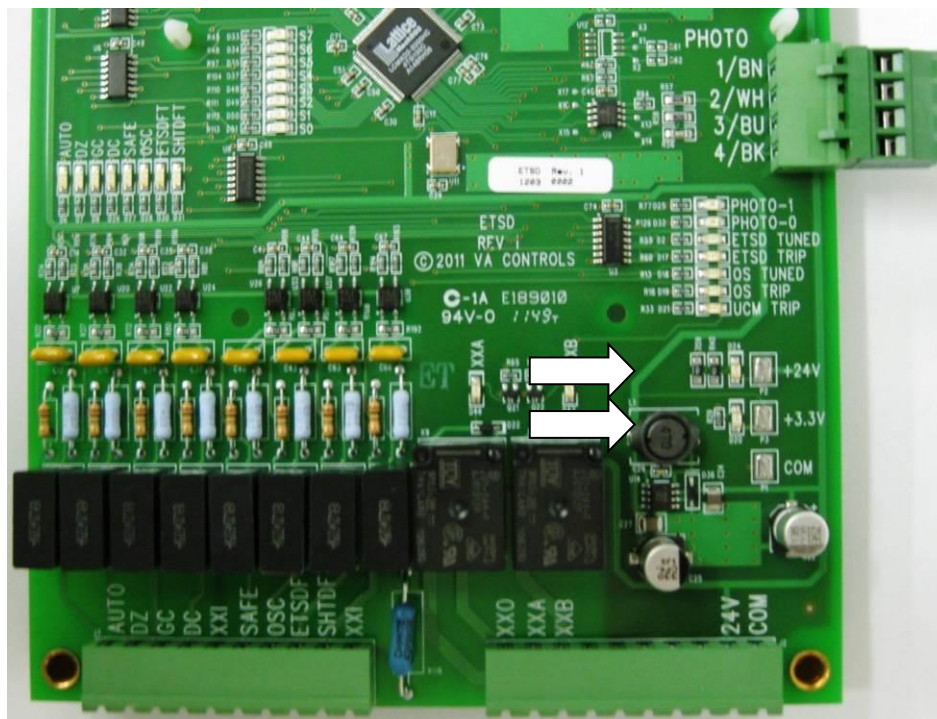


Figure 51 - +24V and +3.3V Indicators & Test Points

5. Check for the green "POWER" LED on the Speed Sensor. If not lit, check "PHOTO" Connector terminal blocks 1 & 3 for 24VDC.



Figure 52 - 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 both are lit on a "White" segment of the ETSD Tape. If otherwise, see "Setup of the O-S System" Section 4.11.2 for Speed Sensor adjustment.

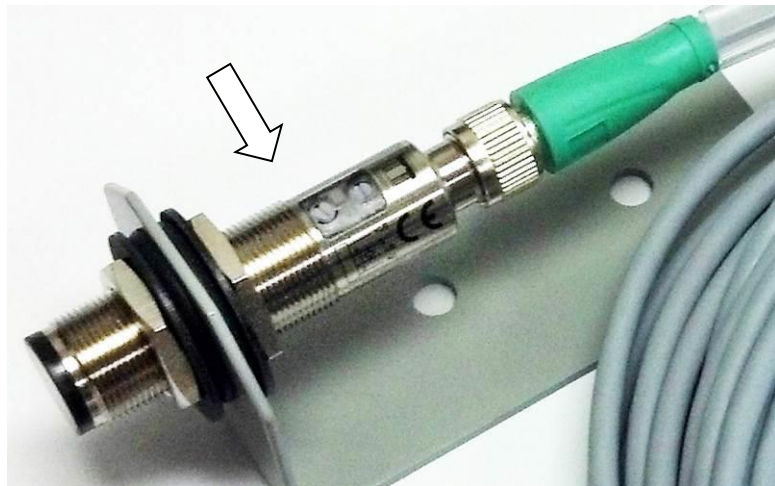


Figure 53 - Sensor SENS. LED Indicator

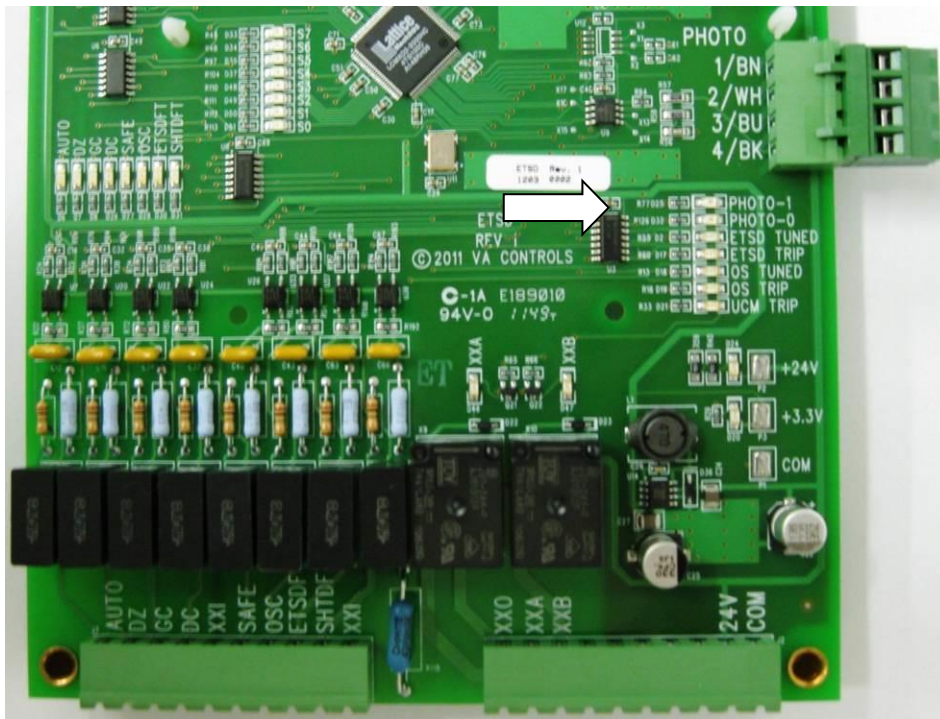


Figure 54 - PHOTO-1 Indicator

6.7.5 ETSD Board Specifications

Input Power	24VDC @ ½ 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) ETSD 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)	ETSD 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.) ETSD RESET (Resets an ETSD System Fault.) O-S RESET (Resets an Over-Speed Fault.)
DIP Switches	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 supply to Speed Sensor 4/BK – Black wire; output signal from Speed Sensor Ring Lug – braided Drain wire from Speed Sensor Cable
Dimensions	10”H x 6”W on 5/8” stand-offs
Environment	
Ambient Temp.	32° - 104°F (0° - 40°C)
Operating Temp.	32° - 122°F (0° - 50°C)
Storage	14° - 140°F (-10° - 60°C)
Humidity	5% - 95% non-condensing

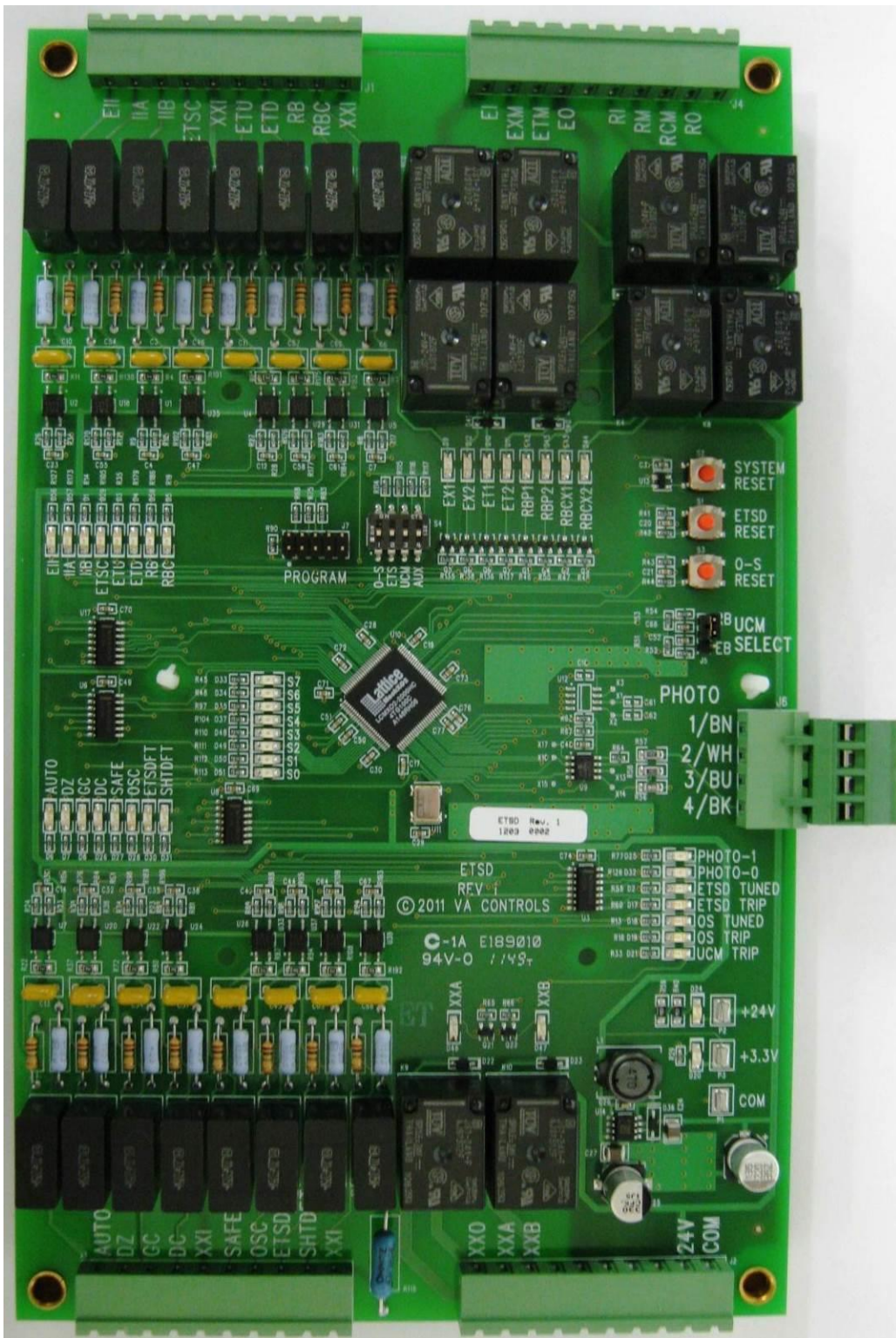


Figure 55 - ETSD Board

6.7.6 Speed (Photo) Sensor & Cable Specifications

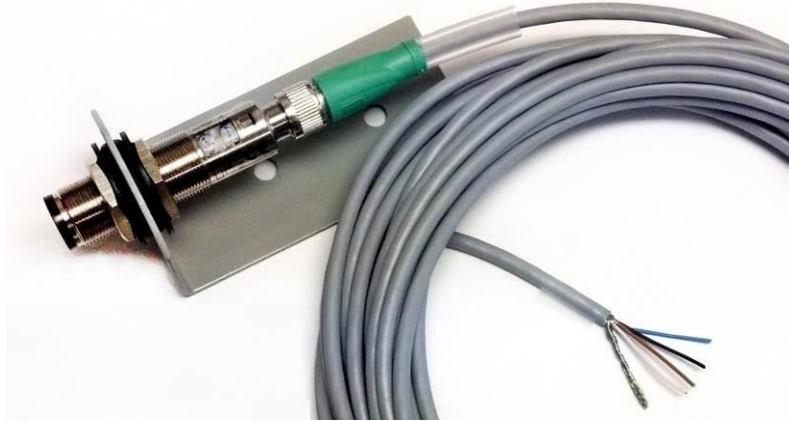


Figure 56 - Speed (Photo) Sensor & Cable

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	5/8" W x 10' L (36" max. sheave diameter); 1/4" alternating black & white stripes
Mounting (Bracket) (Position)	Steel angle bracket (2 1/4-20 bolts) w/Rubber Grommets & 2 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) Default = "L" – Light Examine carefully! SENS. (2-turn with clutch) Default = centered at on turn.
Indicators: (Green) (Yellow)	POWER (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.

6.8 Absolute Positioning System - ELGO LIMAX22 DUE

6.8.1 ELGO APS Overview

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

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 functionality of both sensors are monitored by the Main and Safety CPUs independently, 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 to install any arbitrary place in shaft. The tape will be mounted and freely suspended with the aid of a mounting kit through a plastic guide and sensor at the cabin. Tape measurement may be considered 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 measurement through contactless measurement.

The maximum encoded tape length is 850 ft (260 m), operating at speeds over 1000 fpm (50 m/s). The magnetic tape contains encoded position code with a resolution of 1mm. Position and Velocity data are measured and computed by each sensor and transmitted to the Main and Safety CPU over separate CANbus channels. The LIMAX22 DUE is designed to meet SIL 3 specifications in the sectors of position and speed detection.



Table 14: 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) on request
System accuracy in µm at 20°C	+/- (1000 µm + 20 µm x L) L = measuring length in meters	Protection task	IP50
Distance between the sensor and the magnetic tape	4 mm	Electrical data	
Distance between two sensors along magnetic tape	40 mm	Supply	10 - 30 VDC
Sensor housing material	Aluminum	Ripple	10 - 30 V: < 10 %
Sensor housing dimensions	L x B x H = 317 x 55 x 55 mm	Current draw	Max. 0,4 A
Necessary magnetic tape	AB20-80-10-1-R-D-15-BK80	Interfaces	SSI, CAN, RS422 CANopen (DS406, DS417),
Max. measuring length	260 m	Resolution	1 mm (others on request)
Cable connection	Open cable end	Travel speed	Max. 50m/s (physical)
Weight	Ca. 550 g without cable Cable: ca. 60 g per meter	Cable length	3 m standard-cable length, Others on request, Drag chain suitable

6.8.2 ELGO APS Wiring Configuration

Each of the two LIMAX22 DUE sensors are wired independently using the configuration shown in Table 15. Refer to page “CPS” of the schematics for a specific wiring diagram to the Car Top I/O Box.

LIMAX22 DUE power (24VDC) is provided by the SIB on TB J13, and is shared by sensor A and sensor B. The CANbus H & L signals for sensor A will connect to the CANbus 1 Main CPU terminals on the SIB (J18), and sensor B will connect to the CANbus 1 Safety CPU terminals (J17).

CANbus termination is provided internally at each LIMAX22 DUE sensor, while termination jumpers are required at the SIB (J1H/J1L). The standard configuration is to install jumpers in the separate position “SEP”, which will terminate each sensor on its own channel. The shared position “SHD” will merge the Main and Safety CAN0 channels onto the same bus and terminate them together. The Main and Safety CPUs are configured to receive and process CAN data only from its designated sensor.

6.8.3 ELGO APS Status LEDs

Each sensor has a bank of status LEDs located on the upper edge of the housing, as shown in Figure 58.

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 16 for specific status LED information.

Table 15: ELGO APS Wiring Configuration

Signal Description	Wire Color	CPU
CAN L sensor A	White/orange stripe	CAN 1 Main TB J18
CAN H sensor A	Orange solid	
0V GND sensor A	White/green stripe	
+Vcc sensor A	Blue solid	
0V GND sensor B	White/blue stripe	CAN 1 Safety TB J17
+Vcc sensor B	Green solid	
CAN L sensor B	White/brown stripe	
CAN H sensor B	Brown solid	

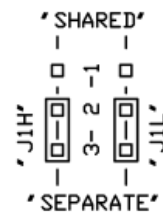


Figure 57: CANbus 0 termination jumpers.
Position 1-2 = "Shared". Position 2-3 = "Separate".

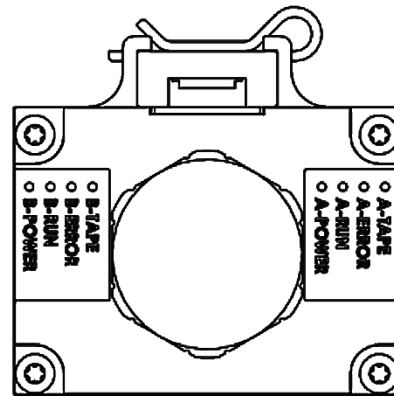


Figure 58: Status LEDs on housing.

Table 16: 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

6.8.4 ELGO APS Maintenance

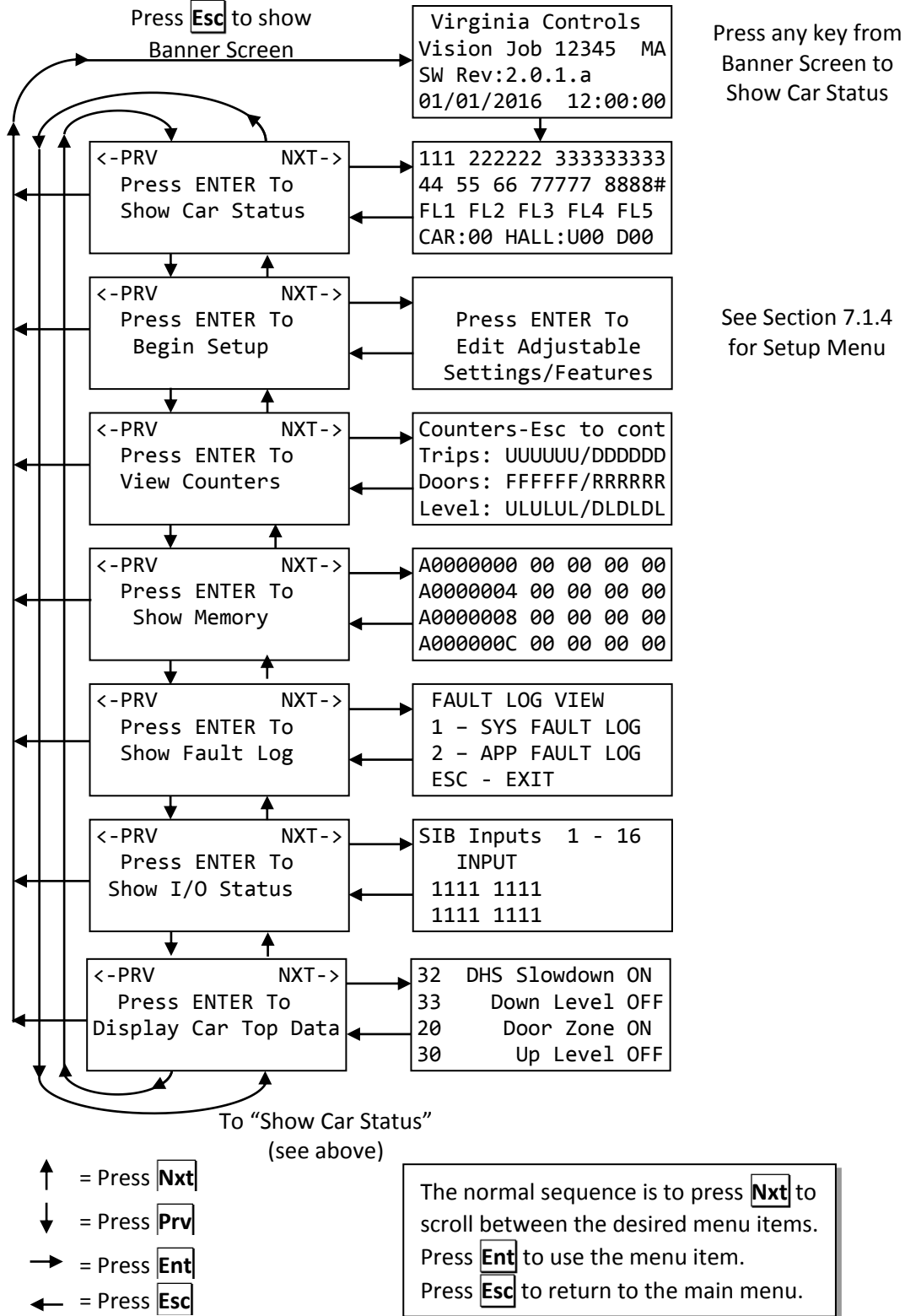
The LIMAX22 DUE shaft information system requires little maintenance. On the occasion of regular elevator inspection and maintenance do the following:

- Optical inspection of proper alignment between sensor and band. Worn off material indicates possible alignment flaws. Check for proper guiding of the band along the complete travel distance. Correct if necessary as described in the installation procedure.
- Optical inspection of the magnetic band. Check for abrasions or other mechanical damages. Small mechanical damages (scratches, dents, or even small chips) will not interfere with the measuring performance. However, a pre-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 flute, the tension can decrease over time. Readjust if necessary.
- Inspect the polymer guide for wear. Clean if dust and dirt have accumulated between polymer guide and sensor case. The polymer guide is a wearable part. Replace if necessary.
- Clean the magnetic band. Use 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 User Interface

7.1 Main CPU - LCD & Keypad Interface

7.1.1 Main CPU – Screens



7.1.2 Main CPU - Banner Screen

```
Virginia Controls  
Vision Job 12345 MA  
SW Rev:2.0.1.a  
01/01/2016 12:00:00
```

The Banner Screen displays general information for the controller which distinguishes it from other systems, and can be used to verify which schematics match the controller.

The first line always contains “Virginia Controls”.

The second line identifies the controller as the “Vision” model, then the Job serial number, followed by a CPU identifier “M” if the Main CPU or “S” if the Safety CPU, and finally the controller alphanumeric index. If the controller is not configured, the Job serial number will display “No Config”.

The third line displays the current software revision number.

The fourth line displays the current date and time.

7.1.3 Main CPU - Car Status

The “Show Car Status” screen displays the car status. Each area of the screen will display one of several messages that allow the user to see what the elevator is doing. Pressing the **Esc** key will transition the screen to the menu selection screen. It is recommended to leave the “Car Status” screen on the LCD. This will allow 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 **Aux** 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**, and the result will be displayed on the right-most side of the second line of the screen (see message 8888#). Pressing **Aux** will change the call from a front opening call to a rear opening call, and the letter “R” will appear 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 will be ignored. Press **Esc** to return to the previous screen.

NOTE: If connected in a multi-car group, only the lead controller will be able to process hall call inputs using the keypad.

NOTE: Any calls placed to landings or door openings which are not configured will be ignored.

7.1.3.2 Messages Displayed on the “Car Status” Screen

Each area of the screen will display one of several messages. The numbers in the sample screen below indicate the message areas. Each group of numbers will be replaced by the appropriate message, depending on the status of the car.

```
111 222222 33333333  
4 55 666 77777 8888#  
FL1 FL2 FL3 FL4 FL5  
CAR:00 HALL:U00 D00
```

Message 111 will be replaced with one of the following messages:

1. **INS:** The car is not in Normal Operation (Input 23N). This may include Car Top Inspection, In Car Inspection, Inspection Access, Controller Inspection, Door Bypass Operation, 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 (Input 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 will be replaced with one of the following messages:

1. **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.
2. **DrvFlt:** the Drive Ready Input is not on. Check the Drive.
3. **OvrSpd:** the car was running too fast with the doors open. (from input)
4. **INSFlt:** 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 (23T), In Car Insp (23X), Insp Access (23A), Controller Insp (23 with switch set to Insp), and/or Normal Operation (23N). Toggle the Fault Reset input (RST), or cycle the power to reset the fault.
5. **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.
6. **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.
7. **LSMFlt:** ETS fault. Trips if car speed > 95% contract speed, but low speed monitor is OFF while running on fast speed on normal operation. Or, low speed monitor is ON while car speed < 10 fpm.
8. **UCMFlt:** Indicates there is a UCM fault, where the EXM and ETM monitor inputs from the ETSD board are OFF during a stop.
9. **EXMFlt:** faults if the car speed from the High Speed Counter is > 95% contract speed, but the EXM input is still on.
10. **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).
11. **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.
12. **HSCFlt:** High Speed Counter/Encoder Fault. Speed > 100%, INS > 150fpm, Door Open > 50 fpm, speed < 10fpm during run, wrong direction
13. **ETSFIt:** 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.
14. **SHUNT:** The Shunt Trip mode is enabled from the Shunt Trip input (85). The car will stop at the next landing, open its doors, and shutdown.
15. **FLOOD:** The car is on Flood Operation from the Flood input (FLS).
16. **RunTmr:** The car has tripped the Shutdown Run Timer (Timer Setting "RUN TIMER SHTDN").
17. **LevSws:** Both of the Leveling Switch inputs (30 and 33) are on at the same time.

18. **DZ-Flt:** A Door Zone Fault was detected. The Door Zone input (20) came on during the slowdown of a fast speed run and before an Up or Down Level switch input (30 or 33) came on. Check the Door Zone Switch.
19. **SMOKE:** The Machine Room/Shaftway Fire detectors input (82F) is energized.
20. **FIRE-2:** The car is in Fire Service Operation mode in the Car (Phase 2).
21. **FIRE-1:** The car is in Fire Service Recall mode (Phase 1).
22. **SafStr:** The safety string input to the Controller Stop Switch (3) and/or In Car Stop Switch (3X) is low. This may be caused by any safety string device in series to be low (1X, 1Y, 1T, 1B, 2, 3, 3X), and the car is stopped.
23. **Out-DZ:** The car has stopped outside the Door Zone (Input 20) while in Normal Operation.
24. **Auto:** The car is in Automatic Operation and the car should respond to car and hall calls.
25. **NoCall:** The car is not answering Hall Calls. This 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 will be replaced with one of the following messages:

1. **CAN#Error:** A CANbus device which was configured is not communicating on CANbus channel “#”. This may apply to any I/O board, SIB, or APS signal which loses communication with the Main CPU. If communication is lost while the car is running on normal operation, the car will stop, run down on slow speed until reaching the next landing, stop, and go into shutdown until communication is restored.
2. **ELGO–Err:** An ELGO APS fault is present, and the car will go on shutdown until fault condition is corrected and reset. All computed selector signals will be disabled, while the Up and Down Normal Limits will be enabled in order to allow the car to creep to the nearest door zone, or to be run on inspection.
3. **Bad–Power:** The Reverse Phase Monitor “Ready” input (RDY) is off, while the Battery Lowering input (NP) was still on if the Battery Lowering feature (“USE BORIS INPUT”) is enabled.
4. **Emerg–Pwr:** The Emergency Power input (EP) is off.
5. **Shutdown:** The car is in shutdown.
6. **Power–OK:** None of the other fault conditions exist. The car is on normal power, and not on shutdown.

Message 44 will be replaced with one of the following messages:

1. The car position will be shown 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 will show “?”.

Message 55 will be replaced with 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 will be replaced with one of the following messages:

1. **UL:** The car is leveling up.
2. **DL:** The car is leveling down while on a Down Level target.
3. **FDL:** The car is leveling down while seeking the nearest floor (False Down Level).
4. **DZ:** The car is in the Door Zone.

5. **FS:** The car is running fast speed.
6. **1FR:** The car is running at an intermediate one-floor-run speed.
7. **SS:** The car is running slow speed.
8. **OD:** The car is not running, and it is not in the door zone.

Message 77777 will be replaced with one of the following messages:

1. **DrChk:** The Door Contact Inputs (4, 4R, 5, 5B, 5T, 5R) indicate the door is closed but the Door Closed Limit(s) are ON, implying that the Door Contact Input(s) may be jumped.
2. **DrLmt:** The Door Open Limit (F/R) and the Door Close Limit (F/R) are both off, implying an error state.
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# will be replaced with 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. **TDCl:** 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 will be cut out.
5. **Homing:** The car is in process of Homing to the designated 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 will be displayed if none of the four conditions above are present. If the entered call has been set to be a rear opening using the key **Aux**, the letter “R” will appear to the right of the entered floor number.

Message FL1 FL2 FL3 FL4 FL5 displays the fault codes for the 5 most recent APP faults present in the system, where the leftmost fault (FL1) is the most recent fault, but not necessarily active faults. 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 8 landings.

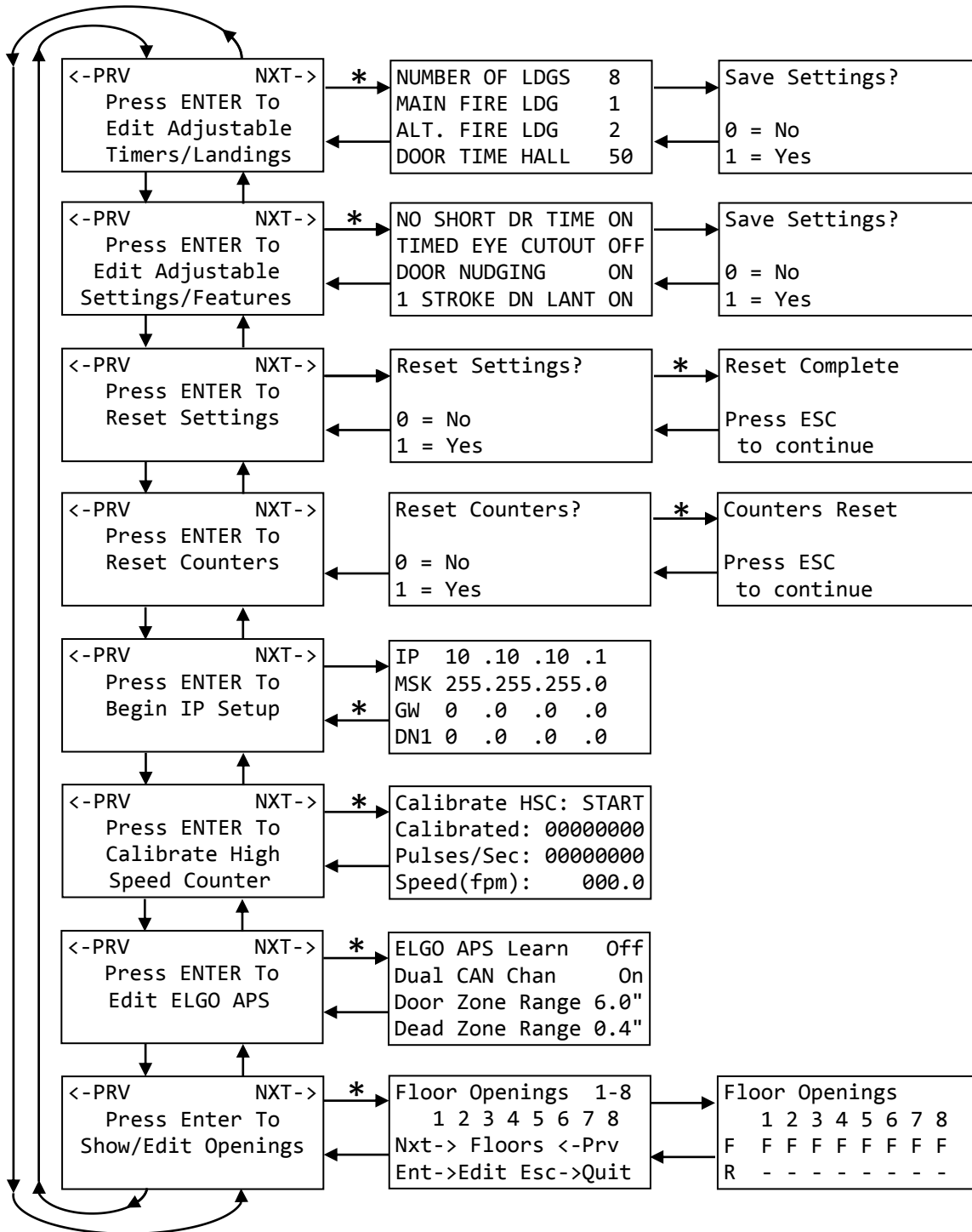
Message HALL:U00 displays the currently dispatched up hall calls in hexadecimal format, up to 8 landings.

Message D00 displays the currently dispatched down hall calls in hexadecimal format, up to 8 landings.

4th Line Fault Message: If there is a currently active fault condition, the fourth line of the car status will display the fault code and description. If multiple fault conditions exist, the most recent fault will be displayed. After the fault condition clears, the fourth line of the car status display will resume 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 **Nxt** → = Press **Ent**
- ↓ = Press **Prv** ← = Press **Esc**
- * = Enter Password to Continue

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.

7.1.4.2 Enter Password

Enter Password to
Confirm

Password:

When attempting to enter a menu screen which 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. Press **Ent** to confirm password or press **Esc** or to return to previous screen. If password is accepted, you may continue to the next screen, otherwise press **Esc** to return to the previous menu and any changes made will be 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 Inc. for this unique password.

NOTE: When entering a settings or timers menu, all changes will be applied immediately while in the settings menu. This will allow live settings or timer edits while the controller is running. A reminder of this will be 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 is used to display and edit the values for timers, landings, and other numerical settings. All values in this menu are saved in system memory (FRAM), and will be held during a power loss. Descriptions for the Edit Adjustable Timers/Landings Menu items may be found in Section 8.2.1.

Use the **Nxt** and **Prv** buttons to scroll between settings, and press **Ent** to edit the setting. For numerical settings such as timers or counters, enter the desired number using the keypad. To confirm the settings change, press **Ent** and the value will be applied to the controller immediately. Press **Esc** to return back to the Setup Menu. When exiting the menu, press **0** to confirm and save all changes, or press **1** to cancel all changes and revert all settings to previously saved values 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 will be further restricted to a defined range, and any entered edits which are out-of-bounds will be changed to the maximum (or minimum) limit. For example, the Main or Alternate Fire Service Landing cannot exceed the total number of landings.

See Section 10 for a full list of available standard feature timer and other numerical settings. Available settings are tailored to the job specifications by the factory. 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 is used to display and edit available feature settings which may be in the ON or OFF state. All values in this menu are saved in system memory (FRAM), and will be held during a power loss. Descriptions for the Edit Adjustable Settings/Features Menu items may be found in Section 8.2.2.

Use the **Nxt** and **Prv** buttons to scroll between settings, and press **Ent** to edit the setting. For two-state boolean (ON/OFF) settings, press **1** to enable the setting (ON), or press **0** to disable the setting (OFF). To confirm the settings change, press **Ent** and the value will be saved and applied to the controller immediately.

Press **Esc** to return back to the Setup Menu. When exiting the menu, press **0** to confirm and save all changes, or press **1** to cancel all changes and revert all settings to previously saved values prior to entering this menu.

See Section 10 for a full list of available standard feature settings. Available settings are tailored to the job specifications by the factory. Settings 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, press **1** to confirm, enter the password 911 and press **Ent**, or press **0** to cancel.

WARNING: Resetting the settings will clear all settings and system state variables to factory configured settings in the configuration file. If a configuration file is corrupted or not loaded, the system will revert to using default factory settings, and will render the system inoperable.

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 event counters and front and rear door cycle counters, press **1** to confirm, enter the password and press **Ent**, or press **0** to cancel. Counters for run events and door cycles are viewable in the main menu listing under “View Counters”.

7.1.4.7 IP Setup Menu

The IP Setup Menu will be preconfigured by the factory, and 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	VISIONCPU	Host name

Use the **Nxt** and **Prv** buttons to scroll between IP Setup Menu Settings, and press **Ent** to edit the setting. While editing a setting, use the **Nxt** and **Prv** buttons to scroll the cursor left and right along the available digits. Use the keypad to enter the desired number, and press **Ent** to confirm and save the changes. To enter hexadecimal values, use the **.** key to add 8 to the previously entered value. The conversion table is as follows:

1 + **.** = 9 **2** + **.** = A **3** + **.** = B **4** + **.** = C **5** + **.** = D **6** + **.** = E **7** + **.** = F

The MAC Address is automatically set by the factory to have a universally 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 will be 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, the system may not be recognized by other controllers in a group connected network.

The IP address for each CPU (Main and Safety) is calculated using the “IP” reference value, based on the following table. 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 computation for determining the actual IP address for each CPU (Main and Safety) using the IP Address Reference Value is as follows.

Main CPU: Multiply the controller number index (0-based) by 2 and add to the IP reference value.

Safety CPU: Multiply the controller number index (0-based) by 2, then add 1, and then add to the IP reference value.

Table 17: IP Address Table for IP Setup Menu

Controller Number	IP Reference Value	Main CPU IP Address	Safety CPU IP Address
A	10.10.10.1	10.10.10.1	10.10.10.2
B	10.10.10.1	10.10.10.3	10.10.10.4
C	10.10.10.1	10.10.10.5	10.10.10.6
D	10.10.10.1	10.10.10.7	10.10.10.8
E	10.10.10.1	10.10.10.9	10.10.10.10
F	10.10.10.1	10.10.10.11	10.10.10.12
G	10.10.10.1	10.10.10.13	10.10.10.14
H	10.10.10.1	10.10.10.15	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 High Speed Counter / Encoder Calibration Menu

```

Calibrate HSC: START
Calibrated: 00000000
Pulses/Sec: 00000000
Speed(fpm):  +000.0
    
```

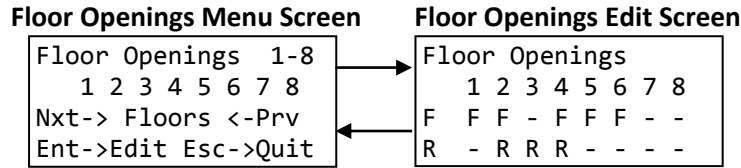
The High Speed Counter menu is used to calibrate and monitor the encoder signals which determine car speed. The first line is used to initiate the HSC Calibration routine. The second line displays the current calibration value for contract speed in encoder pulses per second. The third line displays the 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 will display will return to “Calibrate HSC: START”, the updated calibration values will be 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.

7.1.4.9 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 5.13.5 for details on using each menu item, and how to perform the ELGO APS Learn Procedure. Note that the Main CPU controls the ELGO settings for both Main and Safety CPU ELGO systems.

7.1.4.10 Show/Edit Floor Openings



The Floor Openings menu is used to view and edit the current door openings configuration at each landing. Door openings at each landing will be configured by the factory based on job specifications. Only door openings pre-configured by the factory may be enabled or disabled, which will prevent any non-physical door openings from being enabled. All door openings above the top landing are also permanently disabled.

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 will be displayed. A blinking cursor will highlight a particular floor number, and the front (F) or rear (R) opening. Press **1** to enable a floor, and press **0** to disable a floor at the cursor position. The display will show (F) or (R) if the floor opening is enabled, or (-) if the floor opening is disabled. Scroll between floors using **Nxt** and **Prv**. 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 including: 1-8, 9-16, 17-24, 25-32, 33-40, 41-48, 49-56, or 57-64. The number of landings available to edit will depend on the number of landings settings parameter.

If changes have been made to the floor openings, the system will require a password to confirm the changes.

NOTE: The floor openings table is configured by the factory using a job-specific configuration file, based on the ordered specifications. A factory reset will clear the floor openings table and set it to factory-configured settings. Contact Virginia Controls if any changes to the configured floor openings are needed.

7.1.5 Main CPU – View Counters

```

Counters-ESC to cont
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 leveling (UL0000), and down leveling (DL0000) events.

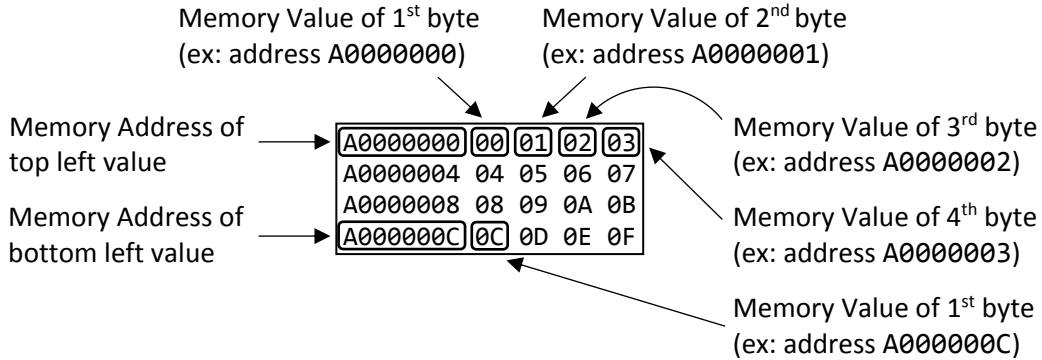
The up or down run counter increments every time the car initiates fast speed to move to another floor while in Normal Operation.

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 level counter will increment if the car initiates a slow-speed run while on a leveling target, representing a re-leveling event. The counter will 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 correction after overshooting a landing.

The counters may be reset by pressing **Aux** and entering the password (911), or by using the “SETUP MENU – RESET COUNTERS” menu, as described in Section 7.1.4.6.

7.1.6 Main CPU – Internal Memory



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, Inc. 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), and 0x9D0000000 and 0x9D07FFFF which is CPU FLASH Memory. Flash memory is accessed by entering **0** and SRAM is accessed by entering **8**.

7.1.6.1 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.

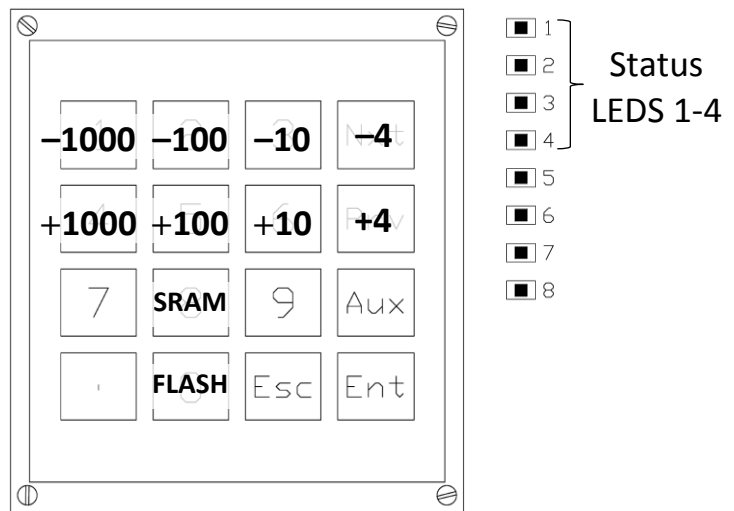
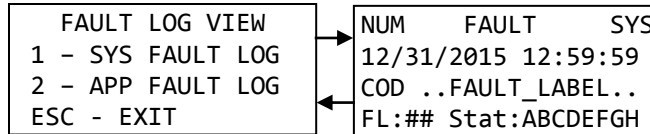


Figure 59: Keypad layout and Status LEDs in Memory mode.

7.1.6.2 Internal Memory Status LEDs

The Status LEDs 1 – 4 on the right side of the CPU board (see Figure 59) 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 will be lit as long as the corresponding memory byte is not equal to zero (00), and will be 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.

7.1.7 Main CPU – Fault Log



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, 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, or 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 will help 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 will be incremented consecutively, and up to 480 faults may be stored before being overwritten by newer faults. 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 will still 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 will depend on the type of fault, and will be described in the fault log descriptions in Section 10.2. Most faults will provide the following standard information.

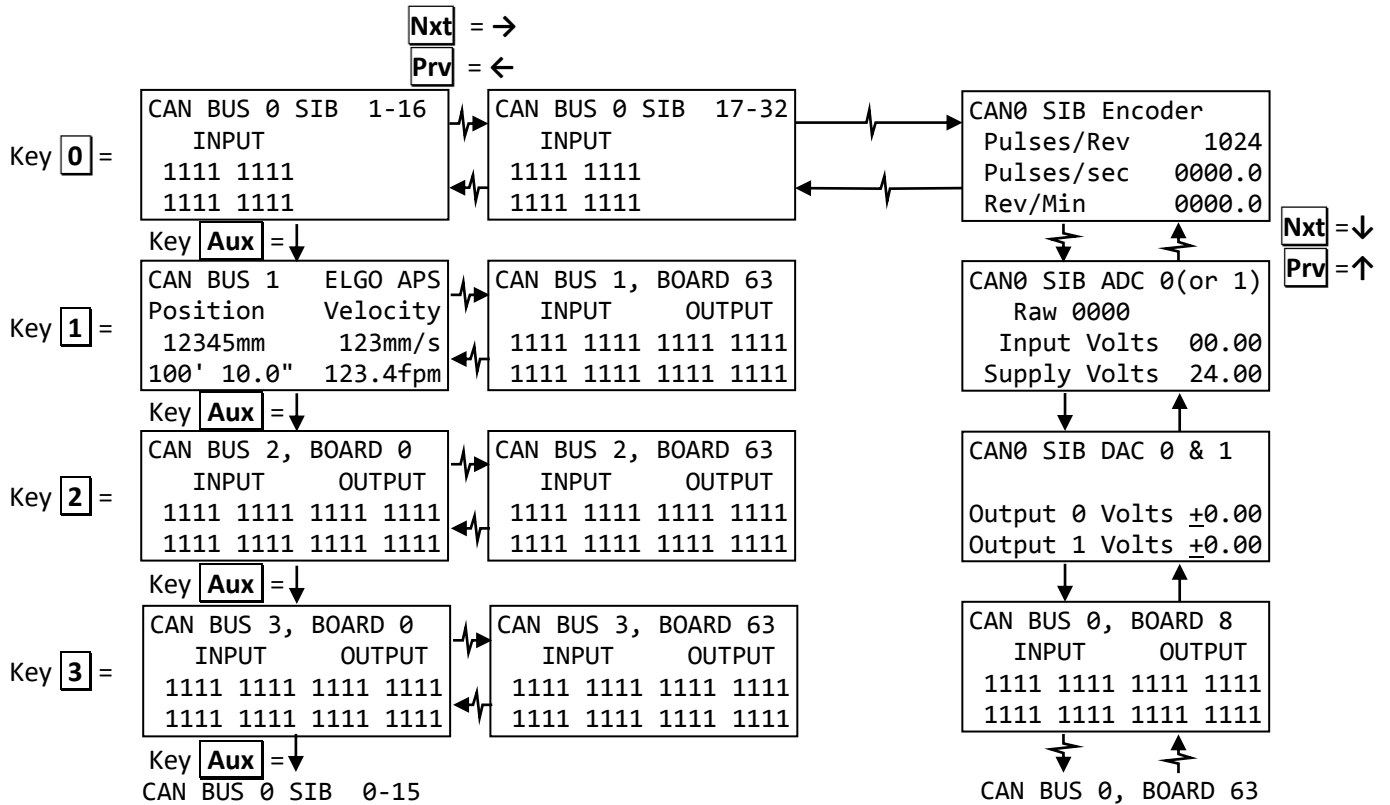
If the data is displayed in this format: “FL:## Stat:ABCDEFGH”, then FL:## refers to the current floor and Stat:ABCDEFGH is the car status when the fault occurred. There are 8 car status bits, labeled in order from left to right as ABCDEFGH. Each of these status bits are described in the following table.

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

7.1.7.1 Resetting the Fault Log

Press **[0]** while viewing the APP fault log to reset APP fault log data, or Press **[0]** while viewing the SYS fault log to reset SYS fault log data. It is recommended to not clear the fault log, because all existing faults are stored with a date and timestamp, and 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.

7.1.8 Main CPU – I/O Status



The Show I/O Status menu displays live data for the I/O boards, SIB inputs, analog inputs, analog outputs, 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.

Press the number keys **0** through **3** to navigate to the corresponding CANbus channels 0 – 3, or press **Aux** to increment from current the CANbus channel. Press **Nxt** and **Prv** to scroll between the I/O board numbers 0 – 63. All I/O is read through CANbus, so this menu is organized by CANbus channel and data received by board.

For CANbus 0, the 64 SIB inputs are read as CANbus messages using boards 0 – 3. The Encoder, ADC 0 and 1, and DAC 0 and 1 are read as CANbus messages using boards 4 – 7. This leaves boards 8 – 63 available to read as I/O boards, which explains why the controller I/O board in the enclosure is designated as starting at board 8. Use the **Nxt** and **Prv** keys to scroll between the SIB inputs, encoder data, ADC, DAC, and I/O board data on CANbus 0.

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 will be displayed in place of CANbus 1 in the “Show I/O Status” menu. The menu will display 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.

Firmware Version
Bus 0 - Board 08
1.0.1.2

To see the PIC firmware version of an I/O board or the SIB, press the **.** key while on the desired menu item.

7.1.9 Main CPU – Display Car Top Data

32	DHS Slowdown	ON
33	Down Level	OFF
20	Door Zone	ON
30	Up Level	OFF

This menu is provided to display the commonly used Car Top I/O 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”.

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 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.

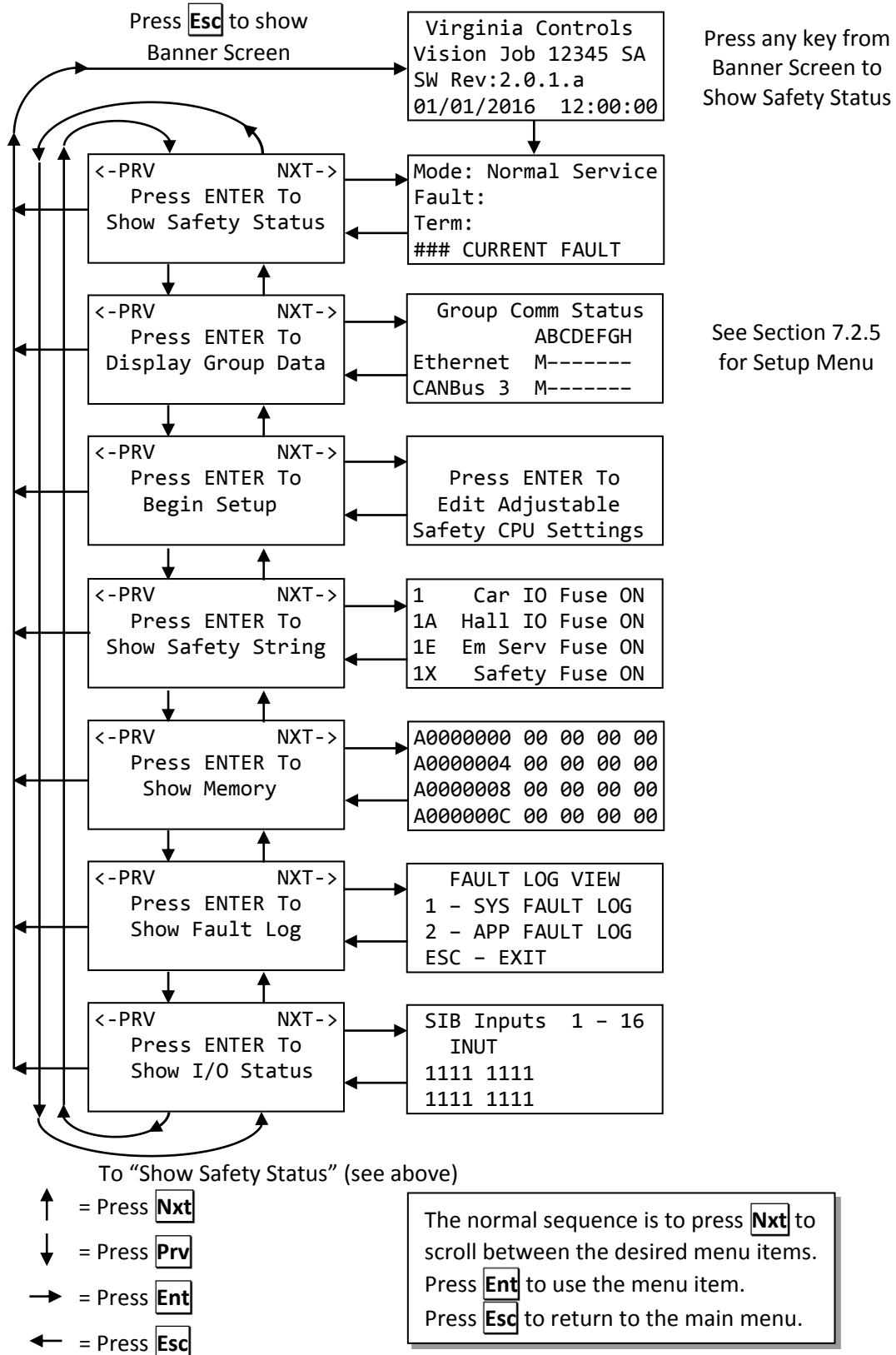
7.1.10 Main CPU – Display ELGO Floor Height Data

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

While using the ELGO Absolute Positioning System, the floor position data is displayed for each landing, relative to the bottom landing. Use this menu to verify that the floor positions have been learned properly, where floor level is given by the displayed values. The current position may be seen using the “Show I/O Status – CAN BUS 1 ELGO APS” menu, and is specific to each CPU. The position 0' 0" is determined by the starting point of the ELGO APS Learn Procedure at the bottom terminal landing, and the position of each landing may be fine adjusted +/- 0.5" using the “Edit ELGO APS” screen in the Setup Menu. Each CPU uses an independent sensor, and floor position data may vary slightly between Main and Safety CPUs.

7.2 Safety CPU Interface

7.2.1 Safety CPU - Screens



7.2.2 Safety CPU - Banner Screen

```
Virginia Controls
Vision Job 12346 SA
SW Rev:2.0.1.a
12/31/2015 12:59:59
```

The Safety CPU – Banner Screen is functionally identical to the Main CPU. See Main CPU Section 7.1.2 for details. Notice that the Safety CPU is denoted by an S and the Main CPU is denoted by an M in the second line of the screen.

7.2.3 Safety CPU - Safety Status

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

The Safety CPU – 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 relay fault, the Safety Status screen will display the fault conditions on the 2nd and 3rd line of the Safety Status screen. All inspection and relay faults will latch a shutdown, requiring a manual reset by toggling the Fault Reset input (RST). If a fault is currently active, the 4th line will display 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.

Mode:	Description	SIB input Terminals	SIB LED indicators
Normal Service	Normal Operation mode is active.	23N	M25/S25
Controller Ins	Controller Inspection mode is active.	Controller Inspection Switch & 23	M26/S26
Insp Access	Inspection Access mode is active.	23A	M27/S27
Bypass Sws	Bypass Operation mode is active.	26	M28/S28
In Car Insp	In Car Inspection mode is active.	23X	M29/S29
In Car Bypass	In-Car Bypass mode is active.	23X & 26	M29/S29, M28/S28
Car Top Insp	Car Top Inspection mode is active.	23T	M30/S30
CarTop Bypass	Car Top Bypass mode is active.	23T & 26	M30/S30, M28/S28
Relevel	Releveling while on Normal Operation.	UL/DL & 20 (DZ) & 23N	M25/S25, M32/S32
None	No inspection or normal mode input is active, or there are conflicting mode inputs. The controller is inoperable.	23, 23A, 23N, 23T, 23X, & 26 = OFF	M25/S25, M26/S26, M27/S27, M28/S28, M29/S29, M30/S30 = OFF
CAN Comm Loss	CANbus communication is disrupted.	N/A	N/A

The 2nd line of the display describes the fault description, as shown in the following table.

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 (MR1-MR4 or SR1-SR4) 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	The Up Slowdown Limit input (IX2) 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	The Down Slowdown Limit input (IX3) 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 (IX1) 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 (IX4) is off while the car position according to the PI is not at the bottom terminal landing.

The 3rd line of the display contains the terminal and label for the offending inspection mode input, inspection run input, or relay which is the cause of the fault, as shown in the following table;

Term:	Offending Inspection Input	SIB input Terminals	SIB LEDs
23T Car Top Sw	Car Top Inspection switch	23T	M30/S30
23X In Car Sw	In-Car Inspection switch	23X	M29/S29
23A Access Sw	Inspection Access switch	23A	M27/S27
Controller Sw	Controller Inspection switch	Controller Inspection switch & 23	M26/S26
23N Normal Op	Normal Operation	23N	M25/S25
23E Car Top En	Car Top Insp Enable input	23E	M31/S31
25 Car Top Up	Car Top Insp Up Run input	25	M33/S33
24 Car Top Dn	Car Top Insp Down Run input	24	M37/S37
25X In Car Up	In-Car Insp Up Run input	25X	M36/S36
24X In Car Dn	In-Car Insp Down Run input	24X	M40/S40
26 Bypass Sws	2 nd Pole of Bypass switches	26	M16/S16
Bypass Gate Sw	Car Gate Bypass switch	Car Gate Bypass switch	M14/S14
Bypass Door Sw	Hall Doors Bypass switch	Hall Doors Bypass switch	M15/S15
Bypass Lock Sw	Hall Locks Bypass switch	Hall Locks Bypass switch	M16/S16
25T Access T U	Top Access Up Run input	25T	M34/S34
24T Access T D	Top Access Down Run input	24T	M38/S38
25B Access B U	Bottom Access Up Run input	25B	M35/S35
24B Access B D	Bottom Access Down Run input	24B	M39/S39
Controller En	Controller Insp Enable input	Controller Enable switch	M63/S63
Controller Up	Controller Insp Up Run input	Controller Up Run switch	M62/S62
Controller Dn	Controller Insp Down Run input	Controller Down Run switch	M64/S64

7.2.4 Safety CPU - Display Group Data

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

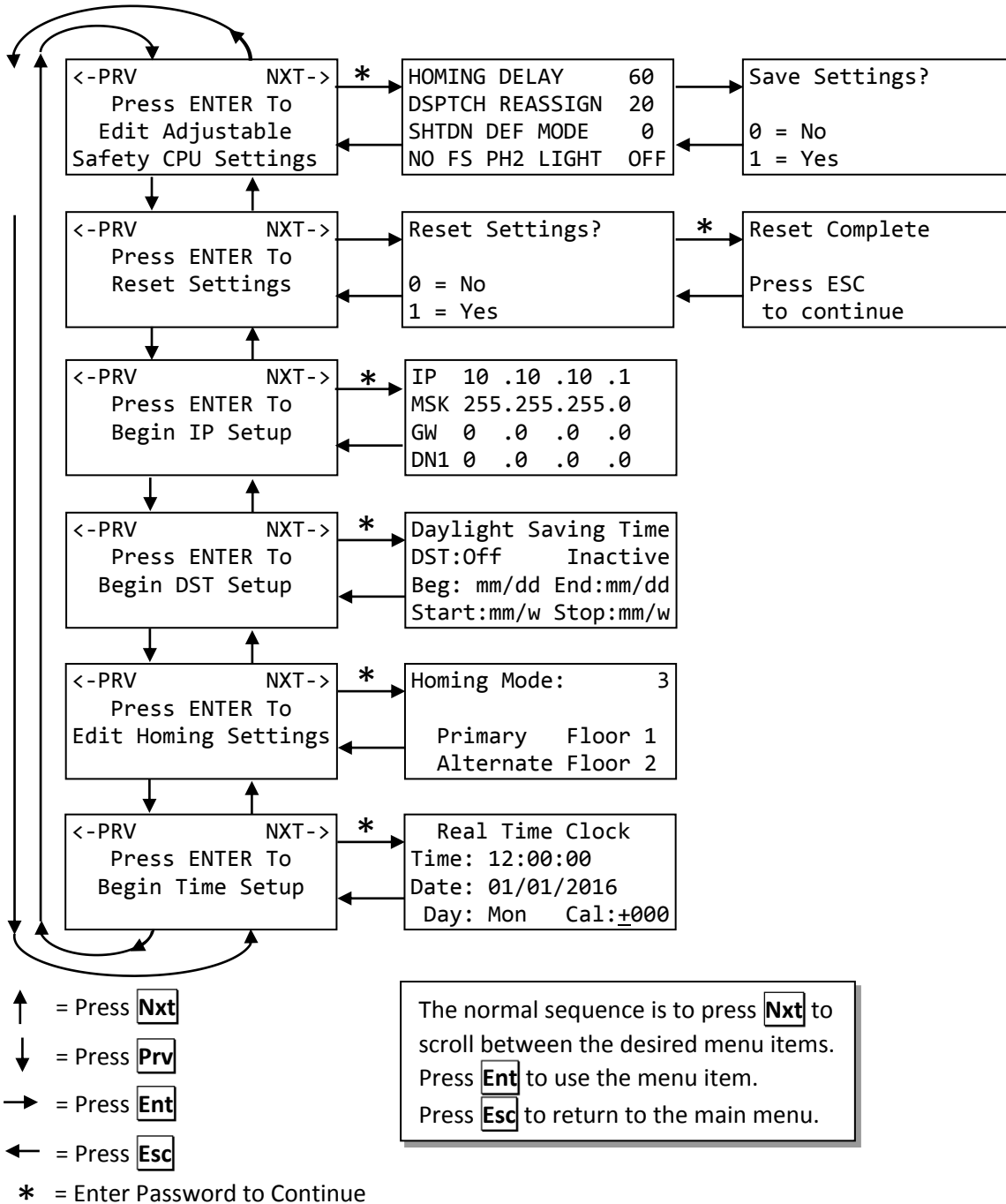
The Display Group Data screen contains information on the connection status of Vision controllers in a multi-car group. Each controller in a group needs to be connected via Ethernet and Safety CANbus 3. This menu displays the communication status for Ethernet and Safety CANbus 3 of each connected controller. Each column references the controller number, labelled A – H, and the communication status may be decoded as follows:

M	“ME”: This represents the place holder for the controller’s own number.
U	“UP”: The communication with this controller is active.
D	“DOWN”: The communication with this controller is not active, but was previously 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.

7.2.5 Safety CPU - Setup Menu

7.2.5.1 Safety CPU - Setup Menu Screens



7.2.5.2 Enter Password

The Safety CPU –Enter Password menu is functionally identical to Enter Password menu for the Main CPU. See Main CPU Section 7.1.4.2 for details.

7.2.5.3 Edit Safety Settings

The Safety CPU –Edit Safety Settings menu behaves like the Settings/Timers menu for the Main CPU, but contains unique dispatcher and homing settings. See Main CPU Section 7.1.4.4 for menu interface details.

7.2.5.4 Reset Settings

The Safety CPU –Reset Settings menu is functionally identical to the Reset Settings menu for the Main CPU. See Main CPU Section 7.1.4.5 for details.

7.2.5.5 IP Setup Menu

The Safety CPU – IP Setup menu is functionally identical to the IP Setup menu for the Main CPU. See Main CPU Section 7.1.4.7 for details.

7.2.5.6 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 on the Safety CPU. Use the **Nxt** and **Prv** buttons to select between DST ON/OFF and the customizable Starting/Stopping Month/Week DST settings, and press **Ent** to edit the setting. While editing the “DST” setting, use the **1** key to enable DST (On) and **0** to disable DST (Off), and press **Ent** to confirm. The controller will automatically adjust the time on the DST beginning and end times if the “DST” setting is set to ON, otherwise it will operate using Standard Time (ST). The second line of the display will show 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 of the display provides customization for the Starting/Stopping Month (mm) and Week (w) DST rules which 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 2016) 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.

When changing the DST settings, the settings will update when exiting the DST Setup Menu. Press **Esc** to exit the menu, enter the password (911), and the settings will update to the new settings immediately upon confirming the password by pressing **Ent**. This data is directly used by the RTC, which will automatically adjust the time at 2:00 am on the beginning and ending dates of daylight savings if DST is enabled.

7.2.5.7 Time Setup Menu

```
Real Time Clock
Time: 12:59:59
Date: 12/31/2015
Day: Mon   Cal:+000
```

The time setup menu is used to set the time, date, and calibration for the Real Time Clock (RTC) located on the SIB. After being set using this menu, the RTC actively provides time data to both Main and Safety CPUs. Use the **Nxt** and **Prv** buttons to select between Time, Date, or Calibration settings, and press **Ent** to edit the setting. A blinking cursor will indicate which setting is currently being edited. While in edit mode, enter the desired number using the keypad. 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 will be displayed on the 4th line.

When changing the RTC settings, the time will update when exiting the Time Setup Menu. Press **Esc** to exit the menu, enter the password (911), and the time will update to the new settings immediately upon confirming the password by pressing **Ent**.

The RTC calibration value is used 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 will slow 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 calibration of the lead controller.

7.2.5.8 Homing Settings Menu

Homing Mode: 0 Homing Disabled	Homing Mode: 1 Homing to Main Floor	Homing Mode: 2 Homing to Floor ##	Homing Mode: 3 Primary Floor 1 Alternate Floor 2
-----------------------------------	--	--------------------------------------	--

The Homing Settings Menu is used to customize homing behavior, and select between 4 standard modes of operation. 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, 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 homing landing 1. If homing landing 1 is already occupied, then move to homing landing 2. If both homing landing 1 and 2 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 which repeats 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 Time Step (1-4) 1 Morning 06:00 Pri: 1 Alt: 2	Homing Mode: 4 Time Step (1-4) 2 Lunch 11:30 Pri: 3 Alt: 1	Homing Mode: 4 Time Step (1-4) 3 Afternoon 12:30 Pri: 3 Alt: 2	Homing Mode: 4 Time Step (1-4) 4 Night 17:00 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. Use the **[Nxt]** and **[Prv]** keys to scroll between lines, and press **[Ent]** to edit that line’s data, and 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 will cycle 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. When editing the starting times for each block, the system will reject edits which 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.

7.2.6 Safety CPU - Safety String

1	Car IO Fuse	ON
1A	Hall IO Fuse	ON
1E	Em Serv Fuse	ON
1X	Safety Fuse	ON

This menu is dedicated to monitoring the 64 Safety String SIB inputs which are read by Safety 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 following table describes the possible displayed states.

Displayed Status	(M##) Status	(S##) Status	Description
OFF	OFF	OFF	Main and Safety Input (M## & S##) are both OFF.
ON	ON	ON	Main and Safety Input (M## & S##) are both ON.
---	N/A	N/A	The Main CPU is not communicating data to the Safety CPU.
ERR	ON	OFF	SIB input Error. The M## and S## are in conflict. (M## ON & S## OFF) or (M## OFF & S## ON).
	OFF	ON	

The majority of SIB inputs are shared and cross-checked Main CPU and Safety CPU inputs. However, there are several Main-only and Safety-only inputs, which are not cross-checked. If the inputs are shared, then the displayed status will be “ON” if both inputs are on, or “OFF” if both inputs are off. If the Main CPU is not communicating data with the Safety CPU, then “---” will be displayed because the input cannot be cross-checked. If the Main and Safety inputs do not read the same state during the cross-check, then this conflict is registered as an “ERR” indicating a SIB error, and a mismatch fault will be logged for the offending input.

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 64 Safety String inputs for the Main and Safety CPU, refer to the list found in Section 9.2 and the “VNX” page of the schematics.

7.2.7 Safety CPU - Internal Memory

The Safety CPU – Internal Memory menu is functionally identical to the Main CPU. This menu is used primarily for factory troubleshooting. See Main CPU Section 7.1.6 for details.

7.2.8 Safety CPU - Fault Log

The Safety CPU will capture its own unique System and Application faults and events, using the same fault codes as the Main CPU. See Main CPU Section 7.1.7 for fault menu details.

7.2.9 Safety CPU - I/O Status

The Safety CPU – I/O Status menu is functionally identical to the Main CPU. See Main CPU Section 7.1.87.1.6 for details.

7.2.10 Safety CPU – Display ELGO Floor Height Data

The Safety CPU – Display ELGO Floor Height Data menu is available to display floor level position data while using an ELGO Absolute Positioning system. Refer to Section 7.1.10 for details. Each CPU uses an independent sensor, and floor position data may vary slightly between Main and Safety CPUs.

8. System Configuration

Each Vision 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 banner screen of both the Main and Safety CPU (see Sections 7.1.2 and 7.2.2). If the controller configuration is corrupted or missing, then the system will not operate properly, and the banner screen will display “No Config”. If this is the case, Contact VCI technical support for assistance and follow the instructions in Section 8.4.2 to load the provided configuration file update if necessary.

Field changes to the settings and timers are available using the setup menu (see Section 7.1.4) and the descriptions for available settings are found below. Factory defaults for each setting and timer may be found in the configuration page of the job-specific schematics. The number of landings is set by the factory. If the factory setting is incorrect, contact VCI 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 VCI 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 7.1.4.10). Users are restricted from enabling door openings which are not pre-configured by the factory. Contact VCI technical support if the door openings need to be changed.

The controller number is configured using DIP switches on the Main and Safety CPU (see Section 6.2.4), where controller 0 is labeled “A”, up to controller 7 labeled “H”. Each controller in a group must have a unique controller number. Each CPU must also have a unique IP address, which is determined from the controller number and the IP address reference number (see Section 7.1.4.7).

If a change to the controller configuration is required, contact VCI technical support for assistance. Follow the instructions in Section 8.4 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 or may not 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 which are in the job specifications will be included.

Refer to the configuration sheet 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 and 999 unless otherwise stated).

NOTE: Not all settings shown below will be available for a given controller. The settings list on each controller is pre-configured by the factory. If a desired setting is not provided, contact VCI technical support for assistance.

8.2 MAIN CPU Settings Descriptions

8.2.1 MAIN CPU 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. This setting is read-only, and only adjustable by the factory. This value also determines which floor the controller will reset to when a top landing reset is initiated with a pulsing selector.

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 VCI 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 value set is based on the bottom floor being "1", the 2nd floor is "2" etc., even if this does not match the building designations. 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 value set is based on the bottom floor being "1", the 2nd floor is "2" etc., even if this does not match the building designations. The maximum value for this setting is the "NUMBER OF LDGS" setting.

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** (in tenths of a second) – This is the time in tenths of a second, that the doors will remain open, after they have opened fully, when the car has stopped in response to a hall call. After this time, the doors will start to close.

NOTE: If a car call is entered while the doors are open, the door time will be reduced to the "DOOR TIME CAR" setting. If the Door Close Button is pressed while the doors are open, the door time will be 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** (in tenths of a second) – This is the time in tenths of a second, that the doors will remain open, after they have opened fully, when the car has stopped in response to a car call only. 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 will be reduced to the "DOOR TIME SHORT" setting. This normal setting is 20, for a time of 2 seconds.

DOOR TIME SHORT **Door Time, Short** (in tenths of a second) – This is the time in tenths of a second, that the doors will remain open, after they have opened fully, when the doors 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 normal setting is 10, for a time of 1 second.

AUTO FLRCHG 2+FR **Auto Floor Change during 2-Floor-Run Speed** (in tenths of a second) – This is the time when the system will automatically increment 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 will be 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** (in tenths of a second) – This sets the delay before a High Speed Counter fault is initiated. The car will shut down, and the cause of the fault will be logged.

HSC START DELAY **High Speed Counter Start Delay** (in tenths of a second) – This sets the delay after the start of a run before the speed is checked for movement, and for proper direction.

ETS FAULT DELAY **Emergency Terminal Speed (ETS) Fault Delay** (in tenths of a second) – This sets the delay before an Emergency Terminal Speed fault is initiated. The car will shut down, and the cause of the fault will be logged.

DELAY DROP 0-P **Potential Contactor Hold Timer** (in tenths of a second) – This delay is used to hold the P-Contactor Relay “PP” energized for an additional time at the end of a run.

DELAY DROP 0-PX **Drive Enable Hold Timer** (in tenths of a second) – This delay is used to hold the Drive Enable Relay “PX” energized for an additional time at the end of a run.

STOP SW. DELAY **Stop Switch Delay** (in tenths of a second) – This sets the delay before causing the safety string to open after a stop switch is opened.

STOPPED FLT DLY **Stopping Fault Delay** (in tenths of a second) – This sets the time to wait while stopping at a landing before triggering run relay, machine brake, rope brake, ETSD, HSC, leveling, and door zone faults. This is also the amount of time required before allowing the next run to occur.

1FR HOLD DELAY **1FR Hold Delay** (in tenths of a second) – 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** (in tenths of a second) – This delay is used to transition to hold voltage after lifting the brakes.

BRAKE LIFT FAULT **Brake Lift Fault Delay** (in tenths of a second) – 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** (in tenths of a second) – 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** (in tenths of a second) – 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** (in tenths of a second) – This sets the delay before an Emergency Terminal Speed fault is initiated. The car will shut down, and the cause of the fault will be logged.

ROPE CHECK TIME **Rope Check Time** (in hundredths of a second) – This sets the window of time 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 will timeout using this timer.

UCM FAULT DELAY **ETSD/UCM Fault Delay** (in hundredths of a second) – 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** (in hundredths of a second) – This timer provides a delay to lift the brake while starting after the drive receives a speed command. This is not used for certain types of drives.

UDX SPEED DELAY **Speed Pattern Relay (UDX) Delay** (in hundredths of a second) – 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, and attempt to auto-reset, and false down

level 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** (in seconds) – This is the time delay before initiating door close nudging, if the features “DOOR NUDGING” and “TIMED EYE CUTOFF” are enabled. A call must be registered, and the car must be in automatic operation. The timer is reset when the doors get fully closed, or when the car starts a floor to floor run. The normal setting is 25 seconds.

ICU CUTOFF TIME **Electric Eye Cutout Time** (in seconds) – This is the time delay before cutting out the Electric Eye Input, after it has been continuously energized. It is reset when the car runs to the next floor. Turn on the setting “TIMED EYE CUTOFF” to enable this feature. The normal setting is 20 seconds.

CAR STUCK TIME **Car Stuck Time** (in seconds) – This is the time delay before calls at the same landing as the car are disabled, so that the car can answer other registered calls. This operates as a stuck button timer. The normal setting is 15 seconds.

DOOR STUCK TIME **Door Stuck Time** (in seconds) – This is the time delay before stopping a door open or close cycle. The normal setting is 20 seconds.

DOOR RESET TIME **Door Stuck Reset Time** (in seconds) – This is the time that the doors are held open after failing to close properly, before retrying to close. The normal setting is 10 seconds.

KILL IDS ON FIRE **Delay Before Canceling Independent Service on Fire Service** (in seconds) – 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 IMMEDIATE” that determine if and when Independent Service is cut out on Fire Service. The normal setting is 30 seconds.

DR CLOSE ON FIRE **Door Close Delay Time on Fire Service** (in seconds) – 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 normal setting is 30 seconds.

8.2.1.4 Ten Second Timers

The following settings are for timers. The timer values are in tens of seconds.

PI CUTOFF TIME **Position Indicator Cutout Time** (in tens of seconds) - This is the time delay before turning off the Position Indicators, after the car has become idle. If the doors are opened, or the car starts in response to a call, then the Position Indicators will turn on again. The normal setting is 30, for a time of 300 seconds or 5 minutes, unless using a PI driver board. To keep the PI's on at all times, enter a value of “0” for the Cutout Time.

CAR LIGHT CUTOFF **Car Light Cutout after Inactivity** (in tens of seconds) – After the car is inactive for this setting timeout value, the car light cutout output will be active. The inactivity timer begins when the car is on normal (automatic) operation with the doors closed and no car operating panel buttons have being pressed.

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 will attempt to auto-reset most shutdown conditions, as long as the it does not repeatedly fault more than the value of this setting while in door zone. If out of door zone, the system will attempt to reset up to 25 times, in an attempt to reach door zone.

8.2.2 MAIN CPU Feature Settings

NO SHRT DR TIME **No Shortened Door Time** – Normally the door time will be shortened by the Door Open Button/Safety Edge/Electric Eye/Infra-red Curtain. Enable this feature to prevent these devices from

shortening the door time. This is normally required in nursing homes, where the passengers need more time to enter the car. The Door Close Button will still shorten the door time.

TIMED EYE CUTOUT **Timed Electric Eye Cutout** – Enable this feature to allow the Electric Eye input to be disabled after the preset time (see the timer setting “EEYE 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 will be initiated 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 infra-red curtain) is used. Enabling this feature will cause the Safety Edge input to be disabled on Fire Service, and the Door Nudging feature to be initiated 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 is subject to the Timed Electric Eye Cutout and Nudging, 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.

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+ and 2005+ 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 have been 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 will have 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 will have 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 the 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.

REDUNDANCY FAULT **Enable Redundancy Fault Checking** – Turn this feature on to enable 2000 (or later) code redundancy fault checking. This enables the redundancy fault timers, and checks the leveling inputs and running inputs for stuck relays or contacts, according to the 2000 (or later) code.

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 will allow 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 then 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 will come on while the car is returning to the Medical Emergency floor in response to the hall Medical Emergency Switch. If the feature is enabled, the buzzer will come on 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) will always be 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) will always be 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, then the car will remain 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. The car will still not be able to run up, but Flood Service will remain 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 will return 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 will take precedence.

USE SHUNT TRIP **Enable Shunt Trip Delay Feature** – Turn on to enable the Delayed Shunt Trip feature. The input and output for this feature must have been assigned for this feature to work properly. This feature can be turned off to disable the Shunt Trip if it was supplied, but is not required. Shunt Trip operation can be accomplished externally to the controller, if desired. If the Shunt input is energized, the car will cancel all existing calls, stop normally at the nearest landing, and then shut down.

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 would require the doors to be closed manually. If this feature is left disabled, the Door Close output will energize when the operator attempts to run the car on Inspection. If the doors are already closed, the Door Close Output will be on 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 will only run 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. This will apply wherever the car is.

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 car is still 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 when 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 will cancel existing car calls, and the car will stop at the next floor.
- 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 VCI Technical Support for access to this unique password.
- BOT ACC AT REAR** **Bottom Access is at Rear Door** – Turn on to set the Bottom Access Door to use the rear door, otherwise use the front door. 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 use the front door. This setting is used by the door checking feature.
- BINARY FLR RESET** **Enable Binary Floor Resets** – Turn on to enable the Absolute Floor Encoding feature, such that the 1FP, 2FP, 4FP, and 8FP will set the floor position every time the car stops at a landing.
- ANTI-NUISANCE** **Cancel Car Calls if No Electric Eye/Safe Edge** – Turn on to enable the Anti-Nuisance feature, where all car calls will be canceled after several consecutive runs where the electric eye input is not tripped, implying 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 will stay 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 on the MAIN CPU during installation if desired. This setting is only available if configured by the factory.
- INCAR INSP 1C&2C** **Use Car Call Buttons 1C & 2C for In-Car Inspection** – Enable to use the 1C & 2C car call inputs to run down & up respectively for In-Car Inspection. Otherwise, use the 24X and 25X SIB inputs.
- 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 will be 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 will be 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.

8.3 SAFETY CPU Settings Descriptions

SHTDN DEF MODE **Shutdown Defeat Mode** – This setting selects the behavior of the shutdown defeat input (S01). If the shutdown defeat input is jumped, shutdown defeat will be active 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”.

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)

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 set to “ON”, the select switch is set to auto, such that if no car is selected, the dispatcher will automatically select one car to run on automatic operation. If set to “OFF”, the select switch is set to manual, such that if no car is selected, no cars will be allowed to run on automatic operation.

FLASH HALL FIRE **Enable Flashing Hall Fire Light** – Turn on to make the Hall Fire Light flash if the Machine Room Smoke Sensor has tripped. By default the car Fire Light will flash, 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 will cause 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 close 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.

MED EMERG CANCEL **Medical Emergency Mode Cancel Time** (in seconds) – Will cancel Medical Emergency mode if no call is placed within this time after Medical Emergency Hall recall.

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 on the SAFETY CPU during installation if desired.

DISABLE SLWDLMT **Disable Terminal Slowdown Limit Device for 1-run** – Use this feature to disable/bypass the terminal slowdown limit signals for 1-run. This setting may be used to perform a buffer test or verify the Normal Slowdown signals are functioning independent from the terminal slowdown limit. This setting auto-reverts to OFF after one run command.

8.3.1 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 is an adjustable dispatcher tuning parameter which determines when hall calls will be transferred from one controller to

another. A controller may transfer a hall call to another controller which has a better route time by at least the time value of this parameter. Increasing this timer will increase the time advantage requirement before a hall call is transferred, while reducing the timer will lead to hall calls being more frequently shared and distributed among controllers in a group.

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 will start after all cars are at rest. Enabling this feature will improve 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 have a car currently 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 simultaneously home 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, first homing 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 the 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 will still be 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.

8.4 Software Updates

The controller software is installed and updated with two files on each CPU, an application file and configuration file.

The application file includes the elevator (Main CPU) or dispatching (Safety CPU) program, 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 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.

8.4.1 Steps to Update Application File

1. Copy the *.bin files provided by VCI onto a formatted USB flash drive. The Main and Safety CPU will each have a separate *.bin file, labelled as MAIN.bin for the Main CPU, and SAFE.bin for the Safety CPU. File names may vary as the application software is updated over time. Each CPU will automatically recognize which files are compatible, in order to prevent accidental loading of incorrect *.bin programs.

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 will increase the time for the CPU to read the drive contents. Simply deleting files will not clear the flash memory, so it will still take longer to read the USB drive until it is reformatted.

2. Insert the USB flash drive into the USB port of the desired CPU to be re-programmed.
3. 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:
```

4. Press **2** to proceed to the “Load Application” file menu.

```
Enter for file list
(*) = current load
```

5. Press **Ent** to display all available *.bin programs on the USB drive. The system will automatically detect if any of the application *.bin file(s) on the USB drive match the currently loaded program on the CPU by displaying an asterisk (*) beside the loaded file name.
6. (optional) To save the currently loaded application file from the CPU onto the USB drive, press **0**, then **Ent**, and the file will be saved as “OLDMAIN.bin” if loaded from the Main CPU, or “OLDSAFE.bin” if loaded from the Safety CPU. These files may be sent to VCI technical support if requested during troubleshooting support.

```
(*) = current load
1 MAIN.BIN
2 SAFE.BIN
File # to load: 0
```

7. Select the desired *.bin 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, and the system will automatically reboot with the new program.

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.
10. After installing all desired file updates, remove the USB flash drive.
11. Manually reboot the CPU by either cycling power or pressing the CPU Reset button.

8.4.2 Steps to Update Configuration File

1. Copy the *.cfg files provided by VCI onto a formatted USB flash drive. The Main and Safety CPU will each have separate *.cfg files, labelled by CPU designation (M) or (S) and job number (ex: 12345), in the format M12345.cfg or S12345.cfg. File names may vary as the application software is updated over

time. Each CPU will automatically recognize compatible configuration file(s), in order to prevent accidental loading of incorrect *.cfg files.

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 will increase the time for the CPU to read the drive contents. Simply deleting files will not clear the flash memory, so it will still take longer to read the USB drive until it is reformatted.

2. Insert the USB flash drive into the USB port of the desired CPU to be re-programmed.
3. 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:
```

4. Press **1** to proceed to the “Load Config” file menu.

```
Enter for file list
(*) = current load
```

5. Press **Ent** to display all available *.cfg programs on the USB drive. The system will automatically detect if any of the application *.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 S12345.CFG
File # to load: 0
```

6. 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.
7. Wait for the screen to complete programming of the application file, and the system will automatically reboot 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 will be reset to factory defaults.

8. 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.
9. After installing all desired file updates, remove the USB flash drive.
10. 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 will be shown on the schematic by its coil.

SYMBOL	DESCRIPTION
BK1, BK2	BRAKE CONTACTORS
BP	BRAKE POWER RELAY
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 & LIGHTING POWER CUTOUT RELAY
MOL	MOTOR OVERLOAD CONTACTOR
N, NR	DOOR CLOSE NUDGING RELAY
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
VR, VA, VB, VC, ...	VOLTAGE TRANSFER RELAY (GROUP OPERATION)

9.2 SIB LEDs and Input Descriptions

The SIB inputs for the Main CPU use input LEDs M01 – M64, and the SIB inputs for the Safety CPU use input LEDs S01 – S64. Note that some LEDs do not have a corresponding SIB input, and some SIB inputs do not have corresponding LEDs. This list is also available in sheet “VNX” of the schematics.

Connector	TB's	Input LED	UL Cap	Function	
J1-1	M1			120VAC FUSE SUPPLY (FROM "CCXF")	
J1-2	M5			FUSE "M5" / uP (24VDC) SUPPLY	
J1-3	S01	S01	X	"SPARE" SAFETY INPUT (120VAC) – SHUTDOWN DEFEAT	
J1-4	1	M01	X	FUSE "M1" INPUT / CAR SUPPLY (3A)	
J1-5	1A	M02	X	FUSE "M2" INPUT / HALL SUPPLY (3A)	
J1-6	1B	M07	S07	FINAL LIMIT SWS.	
J1-7	1E	M03	X	FUSE "M3" INPUT / EM. SUPPLY (1A)	
J1-8	1T	M06	S06	ROPE BRAKE CONTACT	
J1-9	1X	M04	X	FUSE "M4" INPUT / SAFETY SUPPLY (3A)	
J1-10	1X			"SPARE" - TO TB'S: 1X	
J2-1	1Y	M05	S05	X	GOVERNOR SWITCH
J2-2	1Y			GOVERNOR SWITCH – SPARE TB	
J2-3	S02	S02	X	"SPARE" SAFETY INPUT (120VAC)	
J2-4	2	M08	S08	X	PIT STOP SWITCH
J2-5	3	M09	S09	X	STOP SWITCHES INPUT
J2-6	3X	M10	S10	X	IN CAR STOP SWITCH
J2-7	S03	S03	X	"SPARE" SAFETY INPUT (120VAC)	
J2-8	4	M11	S11	X	CAR DOOR CONTACT
J2-9	4R	M12	S12	X	REAR CAR DOOR CONTACT
J2-10	4X	M13	S13	X	DOOR POSITION MONITORING INPUT
		M14	S14		CAR DOOR BYPASS SW. INPUT
		M15	S15		HALL DOORS BYPASS SW. INPUT
		M16	S16		HALL LOCKS BYPASS SW. INPUT
J3-1	S04	S04	X	"SPARE" SAFETY INPUT (120VAC)	
J3-2	5	M18	S18	X	INTERMEDIATE FRONT HALL DOORS
J3-3	5B	M19	S19	X	BOTTOM (ACCESS) DOOR
J3-4	5R	M20	S20	X	INTERMEDIATE REAR HALL DOORS
J3-5	5T	M17	S17	X	TOP (ACCESS) DOOR
J3-6	5X				SPARE TB OR TIE POINT
J3-7	6	M22	S22	X	INTERMEDIATE HALL LOCKS
J3-8	6B	M23	S23	X	BOTTOM (ACCESS) LOCK
J3-9	6R	M24	S24	X	REAR LOCKS
J3-10	6T	M21	S21	X	TOP (ACCESS) LOCK
J4-1	20	M32	S32	X	DOOR ZONE INPUT
J4-2	20				DOOR ZONE INPUT - SPARE TB
J4-3	21				IN CAR INSP. - BYPASS SWS.
J4-4	22				INSP. ACCESS - BYPASS SWS.
J4-5	23				CONTROLLER INSP. SW.
J4-6	23A	M27	S27	X	INSPECTION ACCESS SWITCH
J4-7	23E	M31	S31	X	CAR TOP INSP. "ENABLE" P.B.
J4-8	23N	M25	S25	X	NORMAL OPERATION INPUT
		M26	S26	X	CONTROLLER INSP. INPUT
J4-9	23T	M30	S30	X	CAR TOP INSPECTION SW.
J4-10	23X	M29	S29	X	IN CAR INSPECTION SW.

Connector	TB's	Input LED	UL Cap	Function	
J5-1	24	M37	S37	X	CAR TOP INSP. "DOWN" P.B.
J5-2	24B	M39	S39	X	BOTTOM ACCESS "DOWN" P.B.
J5-3	24T	M38	S38	X	TOP ACCESS "DOWN" P.B.
J5-4	24X	M40	S40	X	IN CAR INSP "DOWN" OR SPARE
J5-5	25	M33	S33	X	CAR TOP INSP. "UP" P.B.
J5-6	25B	M35	S35	X	BOTTOM ACCESS "UP" P.B.
J5-7	25T	M34	S34	X	TOP ACCESS "UP" OR SPARE
J5-8	25X	M36	S36	X	IN CAR INSP "UP" OR SPARE
J5-9	26	M28	S28	X	DOOR BYPASS SWITCHES
J5-10	34				ACCESS SWS. (SEE TB: 23A)
J1(*)-1	35A				MAIN RUN OUTPUT COMMON
J1(*)-2	MR1	M41	S41	X	MAIN RUN OUTPUT #1 & MONITORING INPUTS
J1(*)-3	MR2	M42	S42	X	MAIN RUN OUTPUT #2 & MONITORING INPUTS
J1(*)-4	MR3	M43	S43	X	MAIN RUN OUTPUT #3 & MONITORING INPUTS
J1(*)-5	MR4	M44	S44	X	MAIN RUN OUTPUT #4 & MONITORING INPUTS
J2(*)-1	SR1	M45	S45	X	SAFETY RUN OUTPUT #1 & MONITORING INPUTS
J2(*)-2	SR2	M46	S46	X	SAFETY RUN OUTPUT #2 & MONITORING INPUTS
J2(*)-3	SR3	M47	S47	X	SAFETY RUN OUTPUT #3 & MONITORING INPUTS
J2(*)-4	SR4	M48	S48	X	SAFETY RUN OUTPUT #4 & MONITORING INPUTS
J2(*)-5	3A				SAFETY RUN OUTPUT COMMON
J7-1	35				115VAC COMMON (FROM "CCXF")
J7-2	35				"SPARE" - TO TB: 35X
J7-3	IX1	M49	S49	X	UP NORMAL LIMIT SWITCH
J7-4	IX2	M50	S50	X	UP SLOWDOWN LIMIT SWITCH
J7-5	IX3	M51	S51	X	DOWN SLOWDOWN LIMIT SWITCH
J7-6	IX4	M52	S52	X	DOWN NORMAL LIMIT SWITCH
J7-7	P	M53	S53	X	"P" CONTACTOR SAFETY INPUT
J7-8	SP	M54	S54	X	BRAKE MICRO SWITCH INPUT
J7-9	BS	M55	S55	X	BRAKE CONTACTOR BK1 RELAY MONITOR INPUT
J7-10	BSX	M56	S56	X	BRAKE CONTACTOR BK2 RELAY MONITOR INPUT
J8-1	RDY	M57	S57	X	DRIVE "READY" RELAY INPUT
J8-2	ON	M58	S58	X	DRIVE "ON" RELAY INPUT
J8-3					SPARE TB OR TIE-POINT
J8-4					SPARE TB OR TIE-POINT
J8-5	S59		S59		"SPARE" SAFETY CPU INPUT (24VDC)
		M59			HALL CALL K/O INPUT
J8-6	S60		S60		"SPARE" SAFETY CPU INPUT (24VDC)
		M60			DOOR K/O INPUT
J8-7	S61		S61		"SPARE" SAFETY CPU INPUT (24VDC)
		M61			DOOR OPEN INPUT
		M62	S62		CONTROLLER INSP. "UP" P.B.
		M63	S63		CONTROLLER INSP. "ENABLE" P.B.
		M64	S64		CONTROLLER INSP. "DOWN" P.B.
J8-8					SPARE TB OR TIE-POINT
8-9	COM				24VDC COMMON (FROM POWER SUPPLY)
J8-10	24V				24VDC "HOT" (FROM POWER SUPPLY)

10. Controller Diagnostics

10.1 CPLD LED Indicators

10.1.1 Main CPLD (M-PLD)

Num Value:	0	1	2	3	4	5	6	7	8
DIP Sw 1:	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
DIP Sw 2:	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF
DIP Sw 3:	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF
DIP Sw 4:	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
LED 1:	Door Zone Input	*M01	*M09	*M17	*M25	*M33	*M41	*M49	*M57
LED 2:	Car Top Inspection Mode	*M02	*M10	*M18	*M26	*M34	*M42	*M50	*M58
LED 3:	In Car Inspection Mode	*M03	*M11	*M19	*M27	*M35	*M43	*M51	*M59
LED 4:	Bypass Operation Mode	*M04	*M12	*M20	*M28	*M36	*M44	*M52	*M60
LED 5:	Inspection Access Mode	*M05	*M13	*M21	*M29	*M37	*M45	*M53	*M61
LED 6:	Controller Inspection Mode	*M06	*M14	*M22	*M30	*M38	*M46	*M54	*M62
LED 7:	Normal Operation	*M07	*M15	*M23	*M31	*M39	*M47	*M55	*M63
LED 8:	Safety String Status	*M08	*M16	*M24	*M32	*M40	*M48	*M56	*M64
All OFF:	No Operation Mode								

*For the S-PLD, these value are reading S01, S02, S03, etc.

Num Value:	9	10	11	12	13	14	15
DIP Sw 1:	ON	OFF	ON	OFF	ON	OFF	ON
DIP Sw 2:	OFF	ON	ON	OFF	OFF	ON	ON
DIP Sw 3:	OFF	OFF	OFF	ON	ON	ON	ON
DIP Sw 4:	ON	ON	ON	ON	ON	ON	ON
LED 1:	Safety String: 1X,1Y,1T,1B,2,3,3X	Serial In 0	Serial In 8	N/A	blink	blink	blink
LED 2:	Safety String: Door Contacts	Serial In 1	Serial In 9	N/A	blink	blink	blink
LED 3:	Safety String: Normal/Inspection	Serial In 2	Serial In 10	N/A	blink	blink	blink
LED 4:	Run Command Status	Serial In 3	Serial In 11	N/A	blink	blink	blink
LED 5:	Up Normal Limit	Serial In 4	Serial In 12	N/A	blink	blink	blink
LED 6:	Up Slowdown Limit	Serial In 5	Serial In 13	N/A	blink	blink	blink
LED 7:	Down Slowdown Limit	Serial In 6	Serial In 14	N/A	blink	blink	blink
LED 8:	Down Normal Limit	Serial In 7	Serial In 15	N/A	blink	blink	blink

DIP switch setting 0: Displays door zone, inspection mode, and safety string status.

***M01 – *M64:** The M-PLD reads the M## LED indicators which refer to the corresponding Main CPU SIB input. Similarly, the S-PLD reads the S## LED indicators which refer to the corresponding Safety CPU SIB input. See SIB Inputs nomenclature table in Section 9.2, or the Job-specific schematics.

DIP switch setting 9: Displays safety string status, running status, and slowdown and normal limit status.

Serial Inputs 0 – 15: Refer to CPU computed values which supplement the SIB safety inputs. See Table 18 in Section 10.1.3 for specific descriptions.

DIP switch settings 12-15: Spare unused CPLD LEDs. Settings 13 – 15 will blink to indicate CPLD is active.

10.1.2 Safety CPLD (S-PLD)

The Safety CPLD (S-PLD) is functionally identical to the Main CPLD, where the SIB inputs slightly differ. Refer to the M-PLD table in Section 10.1.1 for details on LED and DIP switch settings.

10.1.3 CPLD Serial Input Descriptions

The following serial inputs are computed and transmitted by the Main CPU to the M-PLD and S-PLD over SPIbus. This is required for the case when an absolute positioning system (APS) replaces the SIB inputs for access zones, or slowdown and normal limits. The CPLD also requires information from the controller when attempting to relevel with the doors open, or run 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 18: 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	unused

10.1.4 CPLD LEDs Fault Indicators

In addition to showing the safety string and inspection status, the CPLD LEDs will 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 prevent the relay outputs to energize. Or, if LED 3 is solid and LED 6 is blinking, this means that the In-Car inspection mode input is active, but a controller inspection up or down run input is active, which will also prevent 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 will automatically reset if the fault condition is corrected.

10.2 Fault Log Descriptions

10.2.1 SYS (SYSTEM) Event Descriptions

#	CODE	CPU	FAULT DESCRIPTION
1	SYS LOG RESET	Both	The SYS Fault Log was cleared. Press "0" in the fault log menu to clear the fault log.
2	SYSTEM BOOT	Both	Indicates system has initialized upon processor boot.
3	POWER FAIL	Both	Upon power down, relay outputs are shut off, and non-volatile parameters are saved.
4	I/O CAN UP	Both	CANbus communication is restored for Channel:X Board:X.
5	I/O CAN DOWN	Both	CANbus communication is lost for Channel:X Board:X.
6	I/O CAN MULTI	Both	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	Both	CANbus message transmit timeout.
8	CAN RX OVERFLOW	Both	CANbus message receive overflow.
9	CAN BUS RESET	Both	CANbus Channel:X has been reset because of communication timeout.
10	MAIN SIB CAN UP	Main	CANbus communication between Main CPU and SIB is active.
11	SAFE SIB CAN UP	Safety	CANbus communication between Safety CPU and SIB is active.
12	DSP SIB CAN UP	Both	CANbus communication between DSPIC and SIB is active.
13	MAIN SIB CAN DN	Main	CANbus communication between Main CPU and SIB is lost.
14	SAFE SIB CAN DN	Safety	CANbus communication between Safety CPU and SIB is lost.
15	DSP SIB CAN DN	Both	CANbus communication between DSPIC and SIB is lost.
16	MODBUS COMM DN	Both	Serial communication between Main and Safety CPUs through the Modbus protocol has been lost.
17	MODBUS COMM UP	Both	Serial communication between Main and Safety CPUs through the Modbus protocol has been established.
18	WATCHDOG TIMEOUT	Both	The system processor has malfunctioned and restarted from a hardware Watchdog timeout feature.
19	HALL OUT START	Safety	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	Safety	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.
21	DIPSW MISMATCH	Both	The Main and Safety CPUs are not recognizing each other as having the same controller index, as read from the S3 DIP switch on each CPU board.
22	CPLD MISMATCH	Both	The Main and Safety CPUs are receiving a conflicting status of the SIB inputs, as received and processed by the CPLD.

10.2.2 SYS (SYSTEM) Fault Descriptions – Safety CPU

#	CODE	FAULT DESCRIPTION
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 4 th 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 6.1.16
25	SAFETY 1Y FAULT	SIB input 1Y is off while any other safety string SIB input after 1Y is on.
26	SAFETY 1T FAULT	SIB input 1T is off while any other safety string SIB input after 1T is on.
27	SAFETY 1B FAULT	SIB input 1B is off while any other safety string SIB input after 1B is on.
28	SAFETY 2 FAULT	SIB input 2 is off while any other safety string SIB input after 2 is on.
29	SAFETY 3 FAULT	SIB input 3 is on while SIB input 2 is off.
30	SAFETY 3X FAULT	SIB input 3X is on while SIB input 2 is off.
31	SAFETY 4 FAULT	SIB input 4 is on while SIB input 2 is off.
32	SAFETY 4R FAULT	SIB input 4R is on while SIB input 2 is off.
33	SAFETY 4X FAULT	SIB input 4X is on while SIB input 2 is off.
34	SAFETY 5 FAULT	SIB input 5 is on while SIB input 2 is off.
35	SAFETY 5B FAULT	SIB input 5B is on while SIB input 2 is off.
36	SAFETY 5R FAULT	SIB input 5R is on while SIB input 2 is off.
37	SAFETY 5T FAULT	SIB input 5T is on while SIB input 2 is off.
38	SAFETY 6 FAULT	SIB input 6 is on while SIB input 2 is off.
39	SAFETY 6B FAULT	SIB input 6B is on while SIB input 2 is off.
40	SAFETY 6R FAULT	SIB input 6R is on while SIB input 2 is off.
41	SAFETY 6T FAULT	SIB input 6T is on while SIB input 2 is off.
42	SAFETY MISMATCH	SIB inputs are being read incorrectly by either Main or Safety CPU.
43	INSPECT NO MODE	No inspection mode input active. This includes any of the inputs 23T, 23X, 23A, 23N, or 23 while on controller inspection are active.
44	INSPECT MODES>1	Conflicting inspection mode inputs are active. Two or more of the inputs 23T, 23X, 23A, 23N, or 23 while on controller inspection are active.
45	NORMAL MODE FLT	Conflicting inspection mode inputs are active while on Normal Operation (23N).
46	INSP RUN FLT	An inspection run input is active while in a conflicting mode.
47	UP NORMAL FLT	The Up Normal Limit input (IX1) is off while the car position according to the PI is not at the top terminal landing.
48	UP SLOWDOWN FLT	While in door zone and normal operation, the Up Slowdown Limit input (IX2) is off while not at the top terminal landing, or the input is on while at the top terminal landing.
49	DN SLOWDOWN FLT	While in door zone and normal operation, the Down Slowdown Limit input (IX3) is off while not at the bottom terminal landing, or the input is on while at the bottom terminal landing.
50	DOWN NORMAL FLT	The Down Normal Limit input (IX4) 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 SIB with a 3V model CR2032.
52	ELGO OFFSET FLT	The measured difference between ELGO APS position data is out of tolerance with the expected 40mm offset.

10.2.3 APP (APPLICATION) Fault and Event Descriptions – Main CPU

#	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	RUN TIMER SHTDN	Fault	The car ran for the time specified by the "RUN SHTDN TMR" setting without passing a floor. The car will stop and shut down immediately. The doors may be opened if the car is in the Door Zone. Check that the setting of the shutdown timer is long enough for the car to run between floors. The normal shutdown timer setting is 25 seconds.
102	LVL TIMER SHTDN	Fault	Car was running up too long during a relevel, based on the field adjustable timer "RUN SHTDN TMR".
103	EMERGENCY POWER	Fault	The Emergency Power input (EP) went low, and EMPWR operation is initiated.
104	DOORS NOT OPEN	Fault	The door open output was on too long, and doors did not open at all (DCL off).
105	PARTIAL DR OPEN	Fault	The door open output was on too long, and doors opened partially but not fully (DCL on, DOL on).
106	DRCLS FULLY OPEN	Fault	The door close output was on too long, and doors did not close at all (DOL off).
107	DRCLS FLT DCL ON	Fault	The door close output was on too long, and the doors did not fully close (DOL on, DCL on).
108	GATE NOT CLOSED	Fault	The door close output was on too long, and the doors closed (DCL off), but the gate input (4) did not make.
109	DOORS NOT CLOSED	Fault	The door close output was on too long, and the doors closed (DCL off), but the hall door contact inputs did not make (5, and 5B or 5T if using front).
110	LOCKS NOT CLOSED	Fault	The door close output was on too long, and doors closed (DCL off), but the hall door locks inputs did not make (6, and 6B or 6T if using front).
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 (RDCL off).
113	PARTIAL RD OPEN	Fault	The rear door open output was on too long, and the doors opened partially but not fully (RDCL on, RDOL 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 (RDOL on, RDCL on).
116	RGATE NOT CLOSED	Fault	The rear door close output was on too long, and the doors closed, but the rear gate input (4R) did not make.
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 did not make (5R, and 5B or 5T if using rear).
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 did not make (6R, and 6B or 6T if using rear).
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 stop switch input (LEDs M09/S09) was off.
122	DCL TRIPPED ON	Fault	The car stopped during a run, and the door close limit was on.
123	CAR GATE OPENED	Fault	The car stopped during a run, and the car gate input (4 or 4R) was open.
124	HALL DOOR OPENED	Fault	The car stopped during a run, and a hall door contact (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 (20) went off while the car was stopped.
127	FSPD_OUT_OF_DZ	Fault	The car stopped outside of door zone (input 20) after a fast speed run.
128	LEVEL_OUT_OF_DZ	Fault	The car stopped outside of door zone (input 20) after re-leveling at slow speed.
129	DOOR_GATE_CHECK	Fault	The Car Gate input (4 or 4R) was ON while the door was open according to the door open limit (DOL = OFF).
130	HALL_DOOR_F_CHK	Fault	The front door contact input (5,5B, or 5T) was on while the front car door was open (DOL = OFF).
131	HALL_DOOR_R_CHK	Fault	The rear door contact input (5R, 5B, or 5T) was on while the rear car door was open (RDOL = OFF).
132	HALL+GATE_F_CHK	Fault	The front car gate and door contact inputs were on while the front door was open. (DOL = OFF)
133	HALL+GATE_R_CHK	Fault	The rear car gate and door contact inputs were on while the rear door was open.
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 (82X).
136	EFS_SENS_ALT_82	Event	Fire service was initiated by the hall smoke sensors which recall to the main landing (82).
137	EFS_SENS_MN_82M	Event	Fire service was initiated by the main landing smoke sensor which recalls to alternate (82M).
138	EFS_SMK_1st_82F	Event	Fire service was initiated by the machine room heat/smoke sensor (82F).
139	EFS_SMK_2nd_82F	Event	The machine room heat/smoke sensor input (82F) has tripped ON.
140	SHUNT_TRIP	Fault	The shunt trip sensor input (85) tripped on.
141	DOOR_ZONE_STUCK	Fault	The door zone switch input (20) came on before leveling during the slowdown sequence in Normal Operation.
144	NORMAL+CINS_FLT	Fault	Inspection Mode Fault: Normal operation (23N) and Controller Inspection (23) mode inputs were both on.
145	CINS+OTHER_FLT	Fault	Inspection Mode Fault: Controller Inspection (23) was on with either In-Car Inspection (23X), Inspection Access (23A), Car-Top Inspection (23T), or Door Contact Bypass (26) mode inputs.
146	NORMAL+OTHER_FLT	Fault	Inspection Mode Fault: Normal operation (23N) was on with either In-Car Inspection (23X), Inspection Access (23A), Car-Top Inspection (23T), or Door Contact Bypass (26) mode inputs.
147	ACCESS+OTHER_FLT	Fault	Inspection Mode Fault: Inspection Access (23A) was on with either In-Car Inspection (23X), Car-Top Inspection (23T), or Door Contact Bypass (26) mode inputs.
148	ICINS+TCINS_FLT	Fault	Inspection Mode Fault: Car-Top Inspection (23T) and In-Car Inspection (23X) mode inputs were both on.
149	DOOR_LOCK_OPENED	Fault	The car stopped during a run, and a hall door lock contact (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 which changes the floor position, this event will indicate that the car position was out of sync.
151	CAR_TOP_STOP_SW	Event	The Car Top Stop switch event is logged when the terminal 3 monitor (M09 & M10) is low while the terminal 2 monitor (M08) is high.
152	CONTROLLER_STOP	Event	The Controller Stop switch event is logged when the terminal 3 monitor (M09) is low while the terminal 2 monitor (M08) and the in-car stop switch input (M10) is high.
153	IN_CAR_STOP_SW	Event	The In Car Stop switch event is logged when the terminal 3X monitor (M10) is low while the terminal 2 monitor (M08) and the controller stop switch input (M09) is high.

#	CODE	TYPE	FAULT DESCRIPTION
154	GOVERNOR SW: 1Y	Event	The Governor switch event is logged when the terminal 1Y monitor (M05) is low while the terminal 1X monitor (M04) is high.
155	ROPE BRAKE: 1T	Event	The Rope Brake switch event is logged when the terminal 1T monitor (M06) is low while the terminal 1Y monitor (M05) is high.
156	FINAL LIMIT: 1B	Event	The Final Limit switch event is logged when the terminal 1B monitor (M07) is low while the terminal 1T monitor (M06) is high.
157	STOP PIT SW: 2	Event	The Pit Stop switch event is logged when the terminal 2 monitor (M08) is low while the terminal 1B monitor (M07) is high.
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 (FLS) has tripped on, and FLOOD mode has activated. The car will recall to the designated flood landing and be taken out of service.
161	MOTOR OVERLOAD	Fault	The MOL input (BS) has tripped on, and the P-contactor has been de-energized.
162	PHASE MONITR RDY	Fault	Phase Monitor input (RDY) was off, and the cause was not the BORIS input (NP).
163	M1 CAR I/O FUSE	Fault	The fuse M1 monitor input at terminal 1 for supplying powering the Car Top IO panel has gone low.
164	M2 HALL I/O FUSE	Fault	The fuse M2 monitor input at terminal 1A for powering the Hall Riser I/O has gone low.
165	M3 EM SERV FUSE	Fault	The fuse M3 monitor input at terminal 1E for powering the Emergency Services has gone low.
166	M4 SAF STR FUSE	Fault	The fuse M4 monitor input at terminal 1X for powering the Safety String has gone low.
167	HALL COMANDEERNG	Event	Car has been recalled using a Commandeering Hall input.
168	MED EMRGNCY HALL	Event	Car has been recalled using a Medical Emergency Hall input
169	MED EMRGNCY CAR	Event	Car has initiated Medical Emergency Car operation
170	ELGO APS TAPE SW	Fault	The ELGO APS Tape Switch input is low, indicating loss of tension in the APS tape.
171	ELGO DZ MISMATCH	Fault	The ELGO APS computed Door Zone is out of range of the hardware DZ input (20).
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 was OFF when the car was running. Brake timed out, and Drive ON stayed off
304	START:INPUT "P"	Fault	The P Input was ON while the car was running.
305	START:INPUT"BK1"	Fault	The BK1 Input was ON while the car was running.
306	START:INPUT"BK2"	Fault	The BK2 Input was ON while the car was running.
307	STOP:INPUT "P"	Fault	The P Input was OFF while the car was stopped.
308	STOP:INPUT "BK1"	Fault	The BK1 Input was OFF while the car was stopped.
309	STOP:INPUT "BK2"	Fault	The BK2 Input was OFF while the car was stopped.
310	STOP:INPUT "ON"	Fault	The Drive On Input was ON when the car was stopped.
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.

#	CODE	TYPE	FAULT DESCRIPTION
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 did not match the outputs. The ROPE Input was on when the ROPE Outputs were off.
317	ROPCHK INPUT FLT	Fault	A Rope Brake Monitoring Input did not match the outputs. The ROPEC Input was on when the ROPEC Output was off.
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. (not used)
321	UCM/ETSD RED FLT	Fault	UCM or ETSD Fault. This is a combination of Faults 166 to 176
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 signal was ON when the car was running up full speed.
327	DOWN RUN EXM FLT	Fault	EXM signal was ON when the car was running down full speed.
328	ETSD=ON, ETM=OFF	Fault	ETM signal was OFF but the ETSD Switches were ON.
329	ETSD=OFF, ETM=ON	Fault	ETM signal was ON but an ETSD Switch was OFF.
330	DOOROPEN ETM=ON	Fault	ETM signal was ON with the car running with the doors open
331	INSPECT ETM=ON	Fault	ETM signal was ON with the car on Inspection.
332	UCM ROPBRK FLT	Fault	THE UCM 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
338	WRONG DIR FLT	Fault	Car was running the wrong direction
339	ETSD SPEED FAULT	Fault	Car was running too fast when it was on the ETSD Switches
340	ETSD TERMINAL SW	Fault	ETSD Switch Fault. The car did not hot 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 Sw 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 was OFF.
346	INPUT DRV=OFF	Fault	DRV input was OFF.
347	DRV ON INPUT=OFF	Fault	Drive ON input 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.

#	CODE	TYPE	FAULT DESCRIPTION
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 (BSX) did not turn ON after the car stopped.
352	STOP:EBRK_RELAY	Fault	The Emergency Brake BK3/4 Contactor input(s) were still ON after the car stopped.
353	BSA/B_RELAY_FLT	Fault	The Brake Hold Voltage Switch input (BSX) did not turn ON after the car stopped.
354	START:EBRAKE_FLT	Fault	The Emergency Brake Micro Switch input (BSX) did not open after the car stopped.
355	START:INPUT_BK3	Fault	The Emergency Brake BK3 Monitor input did not turn ON after the car stopped.
356	START:INPUT_BK4	Fault	The Emergency Brake BK4 Monitor input did not turn ON after the car stopped.
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.

11. Parts List

All parts are commercially available from the manufacturer, or from Virginia Controls Inc. (ask for the Parts Department). Parts are subject to change without notice. Consult Virginia Controls, Inc. 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 #
<u>RELAYS, PHASE MONITORS</u>		
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
EMI Filter	Corcom	3VR1
<u>CONTACTORS, STARTERS, OVERLOAD</u>		
Vector Drive	KEB	17.R5.A1H-PLB2
Starting "P" Contactor	Schneider	LCD1-D 65-AG7
Auxiliary Contact Block	Schneider	LADN22, LADN02
Overload "MOL"	Schneider	LRD365
Brake "BK1"/"BK2" Contactor	Schneider	LC1-D 40 -AG7
Terminal Block	Klemsan	PEK4
Terminal Block	Bussman	16281-3, 16303-1
Terminal Block Connectors	On Shore	OSTTJ105153, 10-pole OSTTJ055153, 5-pole
<u>TRANSFORMERS, FUSES, TERMINALS</u>		
480/220-110V, 750VA Transformer "CCXF"	MCI	4-54-700
115/230V, 600VA Transformer	Micron	B600-0246-3F
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
600V Fuse Holder for Above Fuse	Bussman	R60030-1CR
3-Phase Line Reactor	TCI	KDRC22L

DESCRIPTION	MANUFACTURER	PART #
<u>RESISTORS - PART NUMBER IS RESISTANCE & WATTAGE - SEE THE SCHEMATIC</u>		
Power Panel Resistor Values 375W = 4, 8, 10, 25Ω 200W = 50, 100, 250, 500, 1000, 1500, 2500Ω	Huntington Resistors	See schematic
<u>MICRO-PROCESSOR</u>		
Microprocessor CPU board	V.C.I.	VISION-CPU
16-in/16-output Remote I/O Module	V.C.I.	VISION-REMOTEIO
2-in/2-output Hall I/O Module	V.C.I.	VISION-HALLIO
Keypad	V.C.I.	VISION-KEYPAD
LCD screen	V.C.I.	VISION-LCD
Safety Interface Board (S.I.B.)	V.C.I.	VISION-SIB
ETSD/UCM BOARD & Photo Eye Sensor	V.C.I.	ETSD
SIB battery for Real Time Clock	PANASONIC	CR2032
<u>MISCELLANEOUS</u>		
1"W x 2"H Duct	Beta	WH1X2
1"W x 3"H Duct	Beta	WH1X3
Varistors (See Schematic For Sizes)	Movistar, G.E.	V150LA2, V150LA10, V150LA20, V275LA10, V275LA20, V275LA40,
CAN Cable – 22Ga-TP w/Shield	Beldon	7895a, 3105a
Digital PI Driver Board	CE Electronics	SMCDU-C1X, SMCDUE-C2X
Rectifier “BRF”		SKB-25/12
Fan & Grill Kit	Toyo	

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 (additional troubleshooting instructions may be given, depending on the nature of the problem):

- **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, Inc. at (804)-225-5530 for technical assistance.

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 strands 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 Valve Solenoids or Motor Starter) check that they are physically sound. Look for signs of burn marks. Replace it if it looks damaged.

Check the Safety Interface Board 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 kept clean of dust and other debris. Keeping the machine room itself clean will help keep the controller clean.

13.2 Parts Replacement

13.2.1 CPU Exchange

To swap out the CPU board:

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 be 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 on I/O board:

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 will normally hold them in the proper place so that it is obvious which block goes where. 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. Are the Reset Targets necessary when using a pulsing selector?

Yes.

The reset targets are required at the terminal landings, as shown on the car top selector installation sheet, to establish or reset the floor position at the terminal landings.

Q. The doors do not operate properly on Fire Service

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 for the Main CPU and 7.2.5.4 for the Safety CPU). To reset Counters, use the Reset Counters Menu (Section 7.1.4.6). To clear the Fault Log, refer to Section 7.1.7.1. To reset ELGO Absolute Positioning Data, use the ELGO Menu (Section 7.1.4.9).

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 for Main CPU settings and 7.2.5.3 for Safety CPU settings)

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 Controller I/O board #8, input 16. If a fault condition is not currently present, the latched fault will reset, otherwise the fault re-latch. Use the Shutdown Defeat input jumper to prevent a nuisance fault from latching during installation and troubleshooting, TB: 1X – S01.

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 – S01, located on the Safety Interface Board (SIB). The shutdown defeat input will expire after an adjustable timeout, ranging from 1 hour to 1 week. Refer to Section 8.3 for more information. The reset input "RST" will only be able to reset shutdowns that are currently latched, but will 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 When equipped for Rope Brake Operation

1. Power down the system.
2. 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.
3. Power up the system.
4. Run the elevator on Automatic to the top landing.

NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.

5. As the elevator opens its doors at the top landing, remove the controller wire clipped to the temporary wire at Input DZ on the ETSD Board.
6. The UCM System will cause the "UCM TRIP" LED to light, and the Rope Brake to set.
7. Power down the system.
8. Restore the controller wiring at Input DZ.
9. Power up and briefly touch a wire from controller TB-1 (120VAC Hot) to Input SHTDFT on the ETSD Board to reset the UCM System and the Rope Brake.

16.1.2 When equipped for Emergency Brake Operation

1. Run the elevator on Automatic to top landing.

NOTE: Be sure to take the necessary steps to prevent anyone from boarding the elevator during the test.

2. Power down the system with the doors closed.
3. Remove the field wires at the car top I/O board, Terminals 30 & 33, Up & Down Leveling Switches. Temporarily connect a spare traveling cable wire into TB-33 (Down Level Input). This spare cable can then be jumped while at the controller.
4. Power up the system.
5. Press the Door Open Button Input on the Safety Interface Board to open the elevator doors.
6. With the doors open, clip the wire from controller TB-1 to the spare traveling cable wire that was just installed at car top I/O terminal TB-33, Down Level Switch.
7. The elevator will level down slowly until it rides out of the Door Zone.
8. UCM System will cause the "UCM TRIP" LED to light, and the Emergency Brake to set.
9. Power down the system.
10. Restore the field wires at the car top I/O board terminal blocks: 30 & 33, Up & Down Leveling Switches, and remove the spare traveling cable jumper from terminal 33.
11. Power up the system.
12. Touch a wire from TB-1 of the controller to Input SHTDFT of the ETSD Board to reset the UCM System and Rope Brake.
13. The elevator will close its door and relevel back to the floor.

16.2 O-S System Testing

1. With car at mid-hatch, place elevator on Inspection Operation from controller.
2. Power down the system.
3. Install a jumper from controller TB-1 to controller Input or TB: "SHTDFT". See the controller drawings for the location of this input or terminal.
4. Power up the system.
5. Set the drive for an Inspection Speed of 175FPM and run car.
6. The O-S System will fault causing the "O-S TRIP" LED to light, and stop the car.
7. Power down the system.
8. Remove the jumper from controller TB-1 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. Restore elevator to Normal Operation.

16.3 ETSD System Testing

1. With car at mid-hatch on Normal Operation, and at floor level, power down the system.
2. Install a jumper from controller TB-1 to controller Input or TB: "SHTDFT". See the controller drawings for the location of this input or 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 Relay Output LED's: "EX1 & EX2".
7. When these LED's go out, remove the field wire clipped to TB-31X.
8. The ETSD System will fault causing the "ETSD TRIP" LED to light, and stop the car.
9. Power down the system.
10. Remove the jumper from controller TB-1 to Input or TB: "SHTDFT".
11. Restore the field wire at controller TB-31X, Up ETS Switch.
12. Power up the system.
13. Use the "ETSD 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.

16.4 Normal terminal stopping devices

16.4.1 Up Normal Limit Switch

Disconnect the up normal limit switch input at controller terminal IX1. See that the car cannot run up on normal or inspection operation. Replace the wire on terminal IX1. Run the car up and have someone on top of the car physically open the up normal limit switch. The car will stop.

16.4.2 Down Normal Limit Switch

Disconnect the down normal limit switch input at controller terminal IX4. See that the car cannot run down on normal or inspection operation. Replace the wire on terminal IX4. Run the car up and have someone in the pit physically open the down normal limit switch. The car will stop.

16.5 Testing Firefighter's operation

16.5.1 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.

16.5.2 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 will enable input 80 on a Car I/O board. Run the car to various floors and verify proper door operation as outlined via local and national codes.
3. When tests are done, return car to main fire service floor on phase 2 fire service and place the phase 2 key switch back to the OFF position, which will enable 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.

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