Claddagh Electronics Ltd.

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REDUNDANT SAFETY BOARD (2000+ CODE)

FIELD OPERATIONS MANUAL

A Primer for Installation & Field Engineers

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Contents

0 . INTRODUCTION

The **Redundant Safety Board** is a microprocessor control monitoring system to independently check several critical safety issues as required by code. The microprocessor receives position, direction of travel and velocity information from the **IP8300+** perforated tape reader in the shaft-way. In addition to the tape reader, it also receives **Slowdown Limits** and **Door Zone** information. Force-Guided relays contacts are checked for proper operation. Uncontrolled motion is also checked.

The following items are checked:

0.0 EMERGENCY TERMINAL SLOWDOWN SPEED CHECK

When the elevator travels at high speed to a terminal floor, the elevator is expected to slowdown when arriving at the **Terminal Slowdown** device. A speed check is initiated at "ETS '*x*' inches" past the slowdown device. If the speed is not less than the parameter set in "**ETS '*x*' FPM**", the power will be removed from the brake and motor. After a short time period, the elevator is allowed to restart and return to normal service.

0.1 THE 150 FPM SPEED CHECK

It is required to check that the elevator does NOT exceeded **150 FPM** on **Inspection Operation** and when **Leveling into the Floor** with doors open. If a fault is detected, power will be removed from the brake, motor and hoist rope gripper. A manual reset is required to run the elevator again.

0.2 TRIP SPEED CHECK

If the elevator speed (Up or Down) exceeds the parameter set in "**Trip Speed '*x*' FPM**", an **Over-Speed Fault** will occur. This fault will remove power from the brake, motor and hoist rope gripper. A manual reset is required to run the elevator again.

0.3 UNCONTROLLED MOTION

If the elevator is commanded to go in one direction, but moves in the opposite direction, a fault will occur. If no command to move is given and motion is detected, a fault will occur. If the elevator is out of **Leveling Zone** and the cab door is open, a fault will occur. This fault will remove power from the brake, motor and hoist rope gripper. A manual reset is required to run the elevator again.

0.4 FORCE-GUIDED RELAYS AND NON-FORCE-GUIDED RELAYS

Relays and Contactors that operate critical circuits are required to be force-guide type contacts. A test is preformed on these critical relays/contactors after each stop of the elevator. On the force-guide type, a normally closed contact is added to the **'Start Permission'** input. The hoist machine brake, normally closed contact, must be wired into the 'Start Permission' circuit provided. If any of these series connected force-guided normally closed contacts do not make, then permission is not given to restart the elevator and the doors will remain open.

Relays that are energized most of the time, except when faulted, for example 'RG1', RG2', 'RG3' and 'RG4', these relays are sequenced after each elevator stop and the contacts are tested . If a failure is detected, power is removed from the safety circuit. The contact and / or relay fault must be corrected before a manual reset will allow the elevator to run again.

0.5 HOISTWAY DOOR CONTACTS CHECK

When the doors are fully open, the hoist-way door contacts and cab door contact (gate switch) are monitored to detect a short circuit or a jumper across this circuits. A fault will prevent the elevator from moving and will not allow the doors to closing until this fault is cleared.

1. SAFETY BOARD INITIALIZATION

When preparing the elevator for normal operation, high speed, the Redundant Safety Board parameters must be set according to your job data. Before a **'Learn'** can be done, the following items must be installed first:

- IP8300+ Tape Reader
- Leveling Targets for each floor
- Binary Position Targets for each floor
- Slowdown Limits
- Normal Limits (limits must be set to allow the elevator to run on Inspection Level with the terminal floor)
- Enter Parameters

1.1 SETTING BASIC PARAMETERS

Setting Parameters is done via the LCD & Push-Button on the Redundant Safety Board. The LCD is a 2x16 back-lit display. The Push-Button consists of four individual switches, **UP, DOWN, MODE and ENTER** (see **Fig. 1**) below.

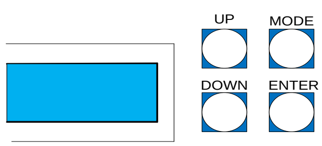

Fig. 1: LCD & Push-Button

The following **Fig. 2** shows the Menu Items in order:

	MAIN MENU	SUB-MENU	SUB-SUB-MENU	E.g. & Notes
1	Car Status	PI: 0 Cnts: 3824 Car Speed: 0		
2	Fault Finder	8226t Finder Lost Serial Comm		Vel 0 Pos3824 Car PLC
3	Reset Faults			
4	Set ETS Speed	Set ETS Speed 500 FPM	ETS Emergency Terminal Speed Check in 'FPM'	Min: 1 FPM Max: 500 FPM
5	Set ETS Inches	Set ETS Inches 72 Inches	ETS Emergency Terminal Speed Check in 'inches' from terminal floor	Min: 1 Inch Max: 72 Inches
6	Set 150FPM Limit	Set 150FPM Limit 150 FPM	Over-Speed check for leveling & inspection	Min: 1 FPM Max: 150 FPM
7	Set Trip Speed	Set Trip Speed 600 FPM	Over-Speed check for top speed	Min: 1 FPM Max: 150 FPM
8	Multi-Floor Run	Multi-Floor Run No	Multi-Floor Run Yes	
9	Set Step High	Set Step High 96 Inches	Slowdown distance in inches for High Speed	Min: 1 Inch Max: 96 Inches
10	Set Step Low	Set Step Low 42 Inches	Slowdown distance in inches for One-Floor-Run (if multi-floor option above is selected)	Min: 1 Inch Max: 42 Inches
11	Learn Shaftway	Flr: 1 Cnts: 100 Learning Shaft	Flr: 7 Cnts: 888 Learning Done	
12	Floor Counts	Flr: 1 Cnts: 100 Flr: 2 Cnts: 214		
13	Set Hole Ct Deb	Set Hole Ct Deb 4.050 mSec		
14	Read HC1 Width	Read HC1 Width 0.000 mSec		
15	Read HC2 Width	Read HC2 Width 0.000 mSec		
16	Read HC Overlap	Read HC Overlap 0.000 mSec		
17	Set UL/DL Deb	Set UL/DL Deb 5.025 mSec		
18	Read UL Width	Read UL Width 0.000 mSec		
19	Read DL Width	Read DL Width 0.000 mSec		
20	Read UL/DL Over	Read UL/DL Over 0.000 mSec		
21	Set Unc. Motion	Set Unc. Motion 6.00 Inches		
22	Set Mis Dir Cnt	Set Mis Dir Cnt 10 Cycles		
23	Time to UL/DL	Time to UL/DL 0.20 Sec		
24	Floor Update	Floor Update 10 Cycles		
25	Read AC Inputs	Read AC Inputs 1 0000 0000		
26	Read AC Outputs	Read AC Outputs 0101 0000 0000		
27	Show Version #	Show Version # 19		

Fig. 2: MENU items on LCD

1.2 EXAMPLES - SETTING PARAMETERS

Here we will look at two examples on 'Setting Parameters'. The first example is for an application that does not consist of 'Multi-Floor-Run' option while the second example does consist of this option.

1.2.1 EXAMPLE 1: MULTI-FLOOR-OPTION - NO

- **Contract Speed** = 200fpm, 7 floors, 'No" multi-floor-run option
- **ETS Speed** = 165 fpm (Emergency Terminal Slowdown speed check)
- **ETS Inches** = 11 inches (distance past slowdown limit ETS speed check)
- **Speed Limit** =150 fpm speed limit
- **Trip Speed** = 230 fpm (approximately 115% of contract speed)
- **Multi-Floor-Run** = No (contract speed < than 250fpm, based upon floor heights)
- **Set Step High** = 42 inches (one-floor-run & multi-floor-run slowdown distance)
- **Set Step Low** = not applicable (Multi-floor-run set to 'No')

(**Fig. 3** shows what the LCD menu items will look like for this example).

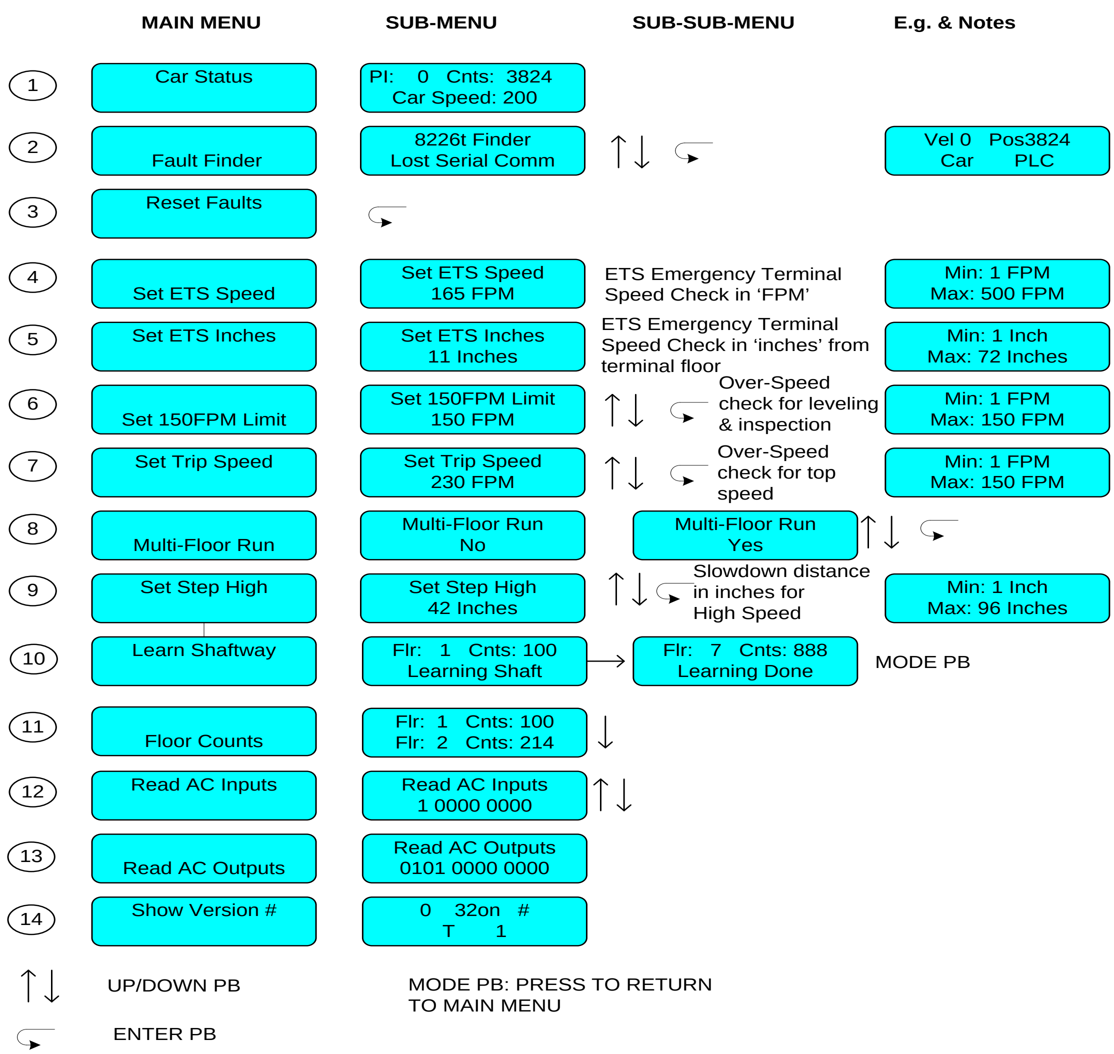

Fig. 3: SHOWS THE SETTINGS FOR EXAMPLE 1 (MULTI-FLOOR-RUN)

1.2.2 EXAMPLE 2: MULTI-FLOOR-OPTION – YES

- **Contract Speed** = 250fpm, 7 floors, 'Yes" multi-floor-run option
- **ETS Speed** = 215 fpm (Emergency Terminal Slowdown speed check)
- **ETS Inches** = 13 inches (distance past slowdown limit ETS speed check)
- **Speed Limit** = 150 fpm speed limit
- **Trip Speed** = 285 fpm (approximately 115% of contract speed)
- **Multi-Floor-Run** = Yes
- **Set Step High** = 50 inches (multi-floor-run slowdown distance)
- **Set Step Low** = 42 inches (one-floor-run slowdown distance)

(**Fig. 4** shows what the LCD menu items will look like for this example).

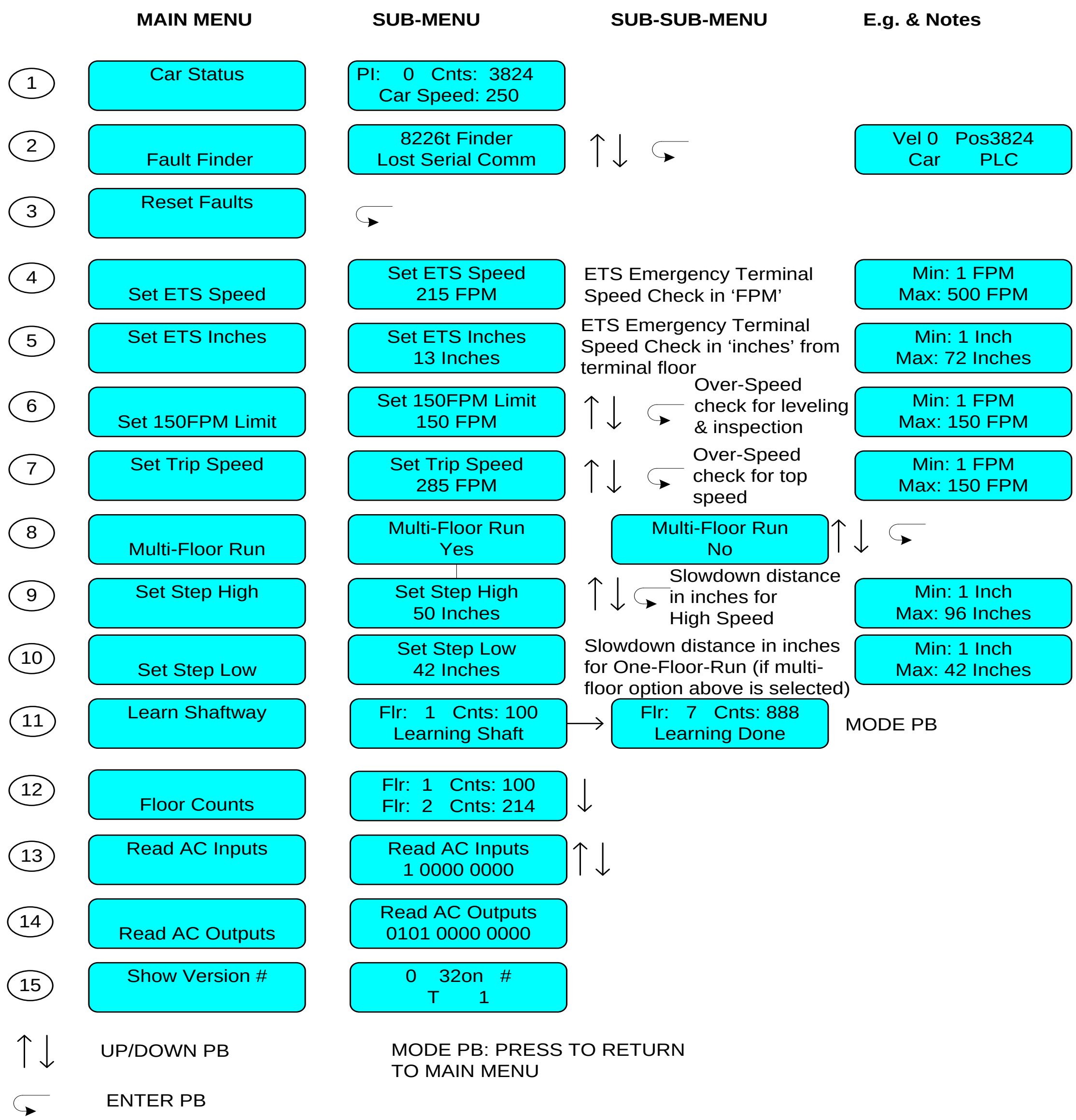

Fig. 4: SHOWS THE SETTINGS FOR EXAMPLE 2 (NO MULTI-FLOOR-RUN)

The following **Table. 1** shows some other typical settings:

Warning!
These are shown ONLY as examples. Consult your Field Engineer or Claddagh Controls Engineers when setting or changing parameters.

#	*Function*							
	High Speed	100fpm	150fpm	200fpm	250fpm	300fpm	350fpm	400fpm
4	Set ETS Speed	85	125	165	215	255	300	340
5	Set ETS inches	8”	9”	11”	13”	15”	17”	19”
6	Set 150fpm Limit	100 fpm	150 fpm	150 fpm	150 fpm	150 fpm	150 fpm	150 fpm
7	Set Trip Speed	115 fpm	175 fpm	230 fpm	285 fpm	345 fpm	400 fpm	460 fpm
8	Multi-Floor Run	No	No	No	*Yes/No	Yes	Yes	Yes
9	Set # of Floors							
10	Set Step High	30”	36”	42”	50”	58”	66”	74”
11	Set Step Low	n/a	n/a	n/a	42”	50”	50”	50”

**Based upon Floor-to-Floor Distance*

Table 1: Other Typical Parameters

The **Slowdown Limits** in the Shaft-way should be set at the same distance as the distance set in **‘Set Step High’.**

The **Normal Limits** in the Hoist-way should be set to satisfy **Stopping on Inspection** at a terminal landing approximately level.

1.3 SETTING ADVANCED PARAMETERS

This section deals with setting the more advanced parameters in the system. The functions discussed here serve the critical role of noise-filtering and correction in the Hole Counting and UL/DL circuits of the system.

1.3.1 “SET HOLE CT DEB” MENU SELECTION

This menu item allows the user to dynamically select the Hole Count (HC1 and HC2) debounce time. This menu item allows the user to select debounce times from **0 to 19.125 milliseconds** in **75 microsecond** increments.

The Hole Count debounce cycle consists of two phases. The first phase occurs when a low-to-high transition is detected on HC1 (speed). When the HC1 low-to-high transition occurs, the Redundant Safety Board monitors HC1 to verify that it stays high for the entire debounce time. It also monitors HC2 (direction) during the first debounce phase in order to average the direction.

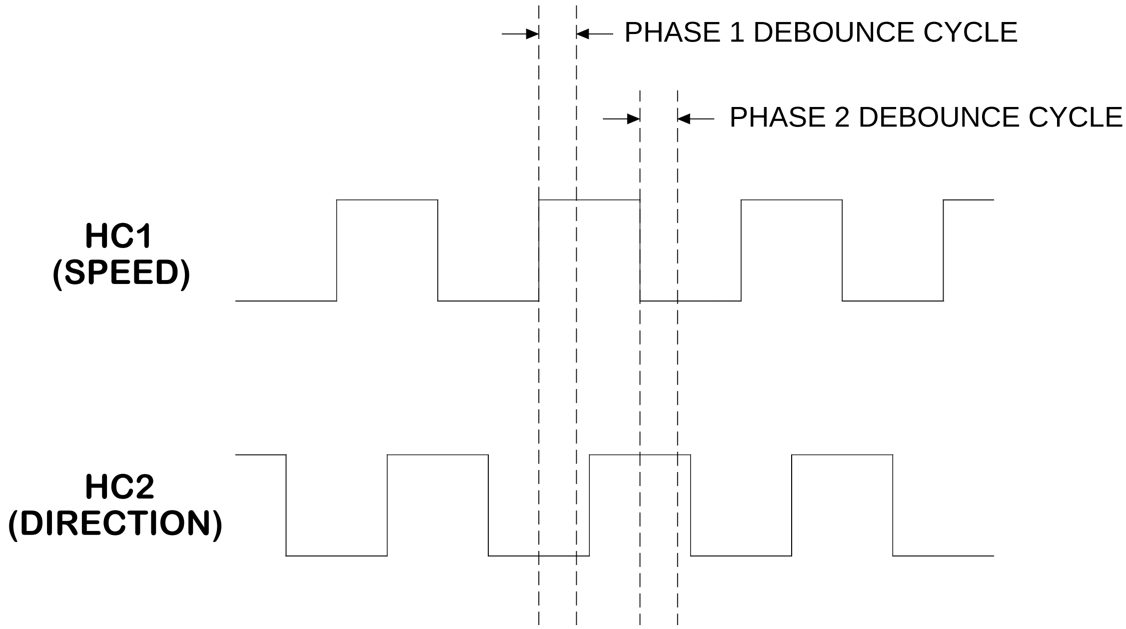

Figure 5 – Hole Count Debounce Cycle

If HC1 does not successfully complete phase 1, phase 2 is not executed and the speed pulse is ignored. Upon completion of a successful phase 1, the Redundant Safety Board waits for a high-to-low transition on HC1. When the transition occurs, HC1 is monitored to verify that it stays low for the entire debounce time.

The Redundant Safety Board utilizes a "window" debounce architecture as opposed to a pure debounce architecture. This means that anytime HC1 is sampled in the incorrect polarity then the debounce state machine is reset and debouncing occurs on the next valid signal transition. This allows the Redundant Safety Board to look for a floating "window" instead of a fixed debounce time start/stop cycle.

The hole count debounce time must be long enough to compensate for any noise on HC1, however, it must not be too long or an erroneous direction detection may occur as well as incorrect car speed indications.

The faster the car speed, the lower the Hole Count debounce time must be.

1.3.1.1 CAR SPEED TO HOLE COUNT FREQUENCY CONVERSION

The Redundant Safety Board calculates car speed as follows:

150 Feet/Minute Conversion:

Convert to inches by multiplying with 12:
150 Feet/Minute * 12 Inches = 1800 Inches/Minute

Convert to seconds by dividing with 60:
1800 Inches/Minute / 60 Seconds = 30 Inches/Second

Convert to tape hole distance (0.75”) by dividing with 0.75:
30 Inches/Second / 0.75 = 40 Holes/Second

Convert to the cycle time by calculating the reciprocal of the Holes/Second:
1 / 40 Holes/Second = 25 Milliseconds = 150 Feet/Minute

1.3.1.2 DETERMINING CAR DIRECTION FROM HC1 AND HC2

If HC2 is high for a valid HC1 debounce cycle (phase 1), the car is traveling in the “UP” direction. Conversely, if HC2 is low, the car is traveling in the “DOWN” direction.

1.3.2 “READ HC1 WIDTH” MENU SELECTION

This menu selection allows the user to monitor the positive width of the HC1 signal. HC1 is used to determine the actual car speed.

The width of HC1 is displayed in milliseconds and has an accuracy of **+/-150 microseconds**. This selection is typically used as a quick check for HC1 noise. When the car is traveling at full speed (automatic mode), the value displayed should be stable **(+/-300 microseconds**).

1.3.3 “READ HC2 WIDTH” MENU SELECTION

This menu selection allows the user to monitor the positive width of the HC2 signal. HC2 is used to determine car direction.

The width of HC2 is displayed in milliseconds and has an accuracy of **+/-150 microseconds**. This selection is typically used as a quick check for HC2 noise. When the car is traveling at full speed (automatic mode), the value displayed should be stable **(+/-300 microseconds).**

1.3.4 “READ HC OVERLAP” MENU SELECTION

The “Read HC Overlap” menu selection displays the time, in milliseconds, that HC1 (speed) is high until HC2 (direction) changes state. This is useful for dynamically adjusting the Hole Count debounce time.

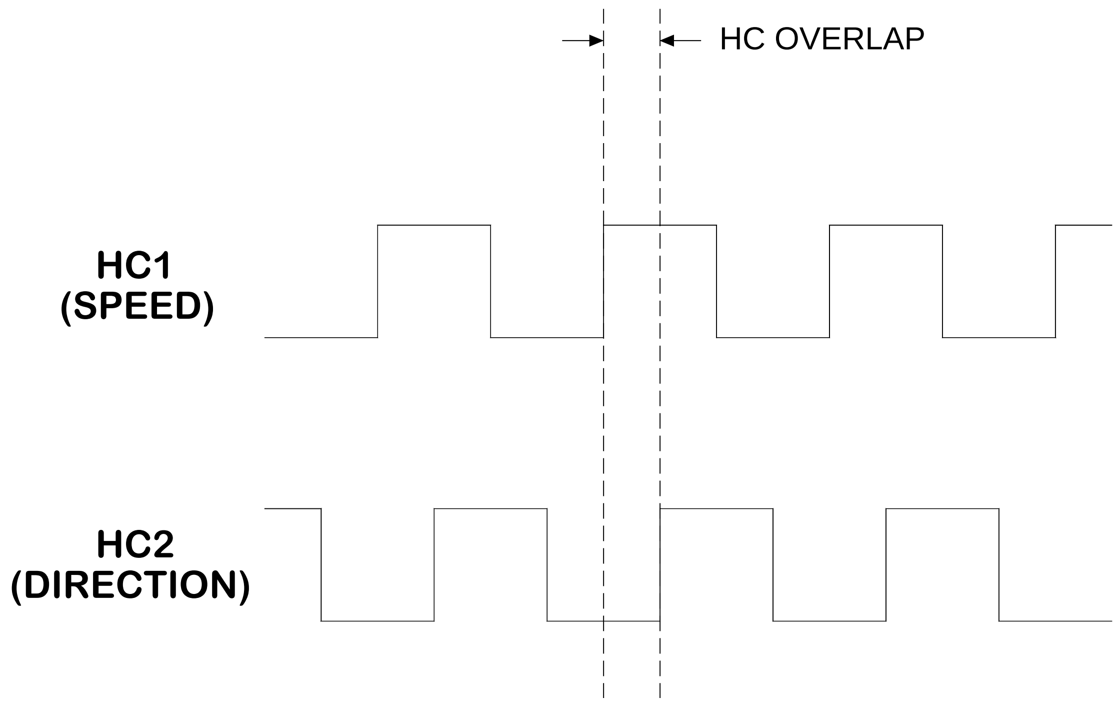

Figure 6 – Hole Count (HC) Overlap

1.3.5 "SET UL/DL DEB" MENU SELECTION

When UL (Up Level) and DL (Down Level) are both active, the car is either stopped at or passing a floor. The UL/DL debounce menu selection allows the user to program the time, from **0 to 19.125 milliseconds** in **75 microsecond** increments, that UL and DL must both be active.

UL and DL must remain active for the entire debounce cycle (phase 1) or the debounce counter is reset until both UL and DL are active again. Once UL and DL have successfully completed phase 1 of the debounce cycle, either UL or DL must also be inactive for the same debounce time (phase 2).

The car is considered to be at the floor when phase 1 of the UL/DL debounce cycle is complete. Phase 2 is used to debounce the time that the car is not at a floor (either UL or DL inactive) for noise suppression and to setup for the next floor transition (both UL and DL active).

The faster the car speed, the lower the UL/DL debounce time must be.

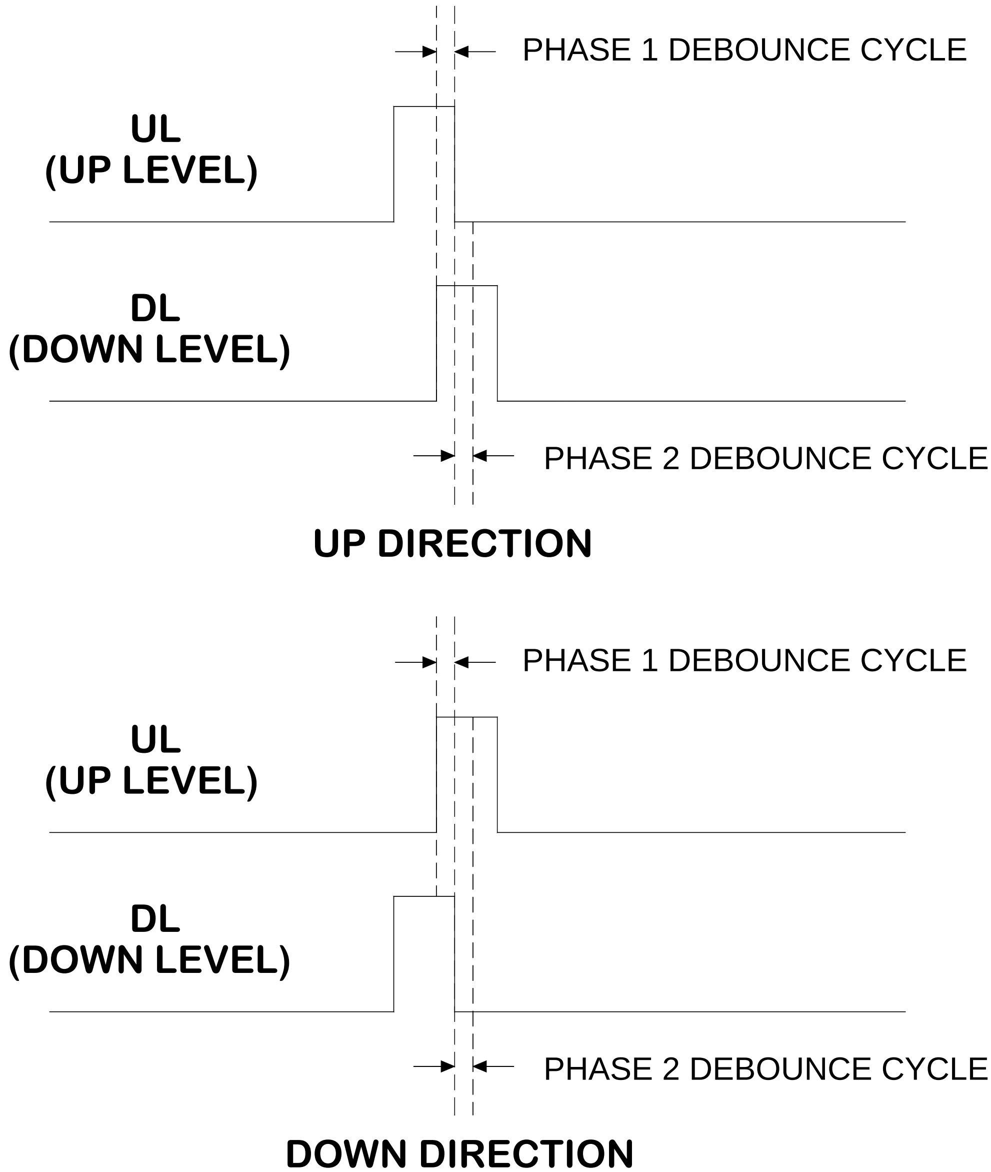

Figure 7 – UL/DL Debounce Cycle

1.3.6 "READ UL WIDTH" MENU SELECTION

This menu selection allows the user to monitor the active width of the UL signal. UL is used to determine when the car has hit the "Up Limit" for a given floor.

The width of UL is displayed in milliseconds and has an accuracy of **+/-200 microseconds**. This selection is typically used as a quick check for UL signal presence and noise levels.

1.3.7 "READ DL WIDTH" MENU SELECTION
This menu selection allows the user to monitor the active width of the DL signal. DL is used to determine when the car has hit the "Down Limit" for a given floor.

The width of DL is displayed in milliseconds and has an accuracy of **+/-200 microseconds**. This selection is typically used as a quick check for DL signal presence and noise levels.

1.3.8 "READ UL/DL OVER" MENU SELECTION
This menu selection allows the user to monitor the width of the UL and DL signal active overlap time. When both UL and DL are active, the car is either at or passing a floor.

The width of UL and DL being active is displayed in milliseconds and has an accuracy of **+/-200 microseconds**. This selection is typically used to verify magnet integrity for the entire shaft.

1.3.9 "SET UNC. MOTION" MENU SELECTION
This menu selection allows the user to set the distance (in **0.75" increments**) that the car must travel with no up or down command (uncontrolled motion) before a fault is logged.

This setting only applies after the car has come to a complete stop.

Valid selection range = 0.75" to 36".

1.3.10 "SET MIS DIR CNT" MENU SELECTION
This menu selection allows the user to set the maximum number of incorrect direction samples while the car is in motion. A "missed direction" occurs when HC2 has been averaged to a direction that is inconsistent with the current car direction.

The number of counts before a fault occurs is reset whenever the floor position changes.

Valid selection range = 0 to 99 counts.

1.3.11 "TIME TO UL/DL" MENU SELECTION

This menu selection allows the user to set the time (0 to 2.55 seconds in 10 millisecond increments) that can occur from when the car velocity has been calculated to be 0 until the car is actually level.

This is used to compensate for an extremely slow car velocity that cannot be gauged due to the 0.75" distance resolution provided by the holes in the tape.

This setting only applies when the car is in controlled motion..

If this value is set too low, the car may log an uncontrolled motion fault.

1.3.12 "FLOOR UPDATE" MENU SELECTION

This menu selection determines whether the floor position is read from the individual floor sensors or calculated using UL and DL when the car is in motion.

ON = Floor Position is Read from Sensors

OFF = Floor Position is Calculated from UL and DL

This option is always set to "OFF".

1.3.13 FACTORY DEFAULT SETUP VALUES

Factory Default Setup – Motion Control					
Foot/Min:	**HC Deb:**	**UL/DL Deb:**	**Unc Mot:**	**Set Mis:**	**Time UL/DL**
50	**12.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
75	**9.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
100	**6.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
150	**4.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
200	**3.525 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
250	**3.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
300	**2.000 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
350	**1.875 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
400	**1.725 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
450	**1.575 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
500	**1.500 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
550	**1.275 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
600	**1.125 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**
650	**0.975 msec**	**5.025 msec**	**6.00"**	**10 Cycles**	**0.20 msec**

2. LEARN SHAFTWAY

Having set all parameters, the Safety Board must now learn the positions of **Leveling Targets** and **Binary Position Targets.**

Place elevator on **Inspection** and **Level at the Bottom Floor**. (UL, DL & DZ must be energized) Run elevator to top floor. As the elevator travels up the shaft-way, the Safety Board is reading the position of leveling targets and binary position targets. If any of the binary position targets are not set properly an error will occur. If an error occurred, correct binary position targets and relearn shaft-way again.

3. TESTING PROCEDURE

We must now TEST the following critical scenarios:

(1) Uncontrolled Motion
(2) Over-Speed Trip Speed Check
(3) ETS Emergency Terminal Slowdown
(4) 150FPM Limit
(5) Start Permission & Force-Guided Relays Check
(6) Check Cab Door Contact (Gate Switch) & Hoistway Door Locks
(7) Car Door Open with or without Motion
(8) NTS Normal Terminal Slowdown
(9) Brake Monitoring

3.1 UNCONTROLLED MOTION

Place Car on Inspection. Manually push-in **BK1** & **BK2** contactors to energize the **Brake**. If the Car does not move, try turning the **Brake Disk** or **Drum** to create motion. After the Car moves, the **Rope Gripper** will apply. A **Manual Reset** is required.

A **Manual Reset** is accomplished via the LCD Display and Push Buttons on the Redundant Safety Board (RSB). Select menu item, **'Reset Faults'** and press **'Enter'** to reset faults. If there are no other faults outstanding, the RSB will reset and the elevator will be able to run.

To test elevator with **"Out of Door Zone",** place elevator on inspection operation, run elevator out of leveling and door zone, **disconnect wire DOL** (to simulate cab door is open). Now place elevator on normal operation. This fault will remove power from the brake, motor and hoist rope gripper. A reset is required to run the elevator again. Fault message on LCD display **"Out of Door Zone".**

3.2 OVER-SPEED TRIP SPEED CHECK

Over-speed the elevator to exceed the parameter set in **'Trip Speed'**. If this is not convenient, lower the 'Trip Speed' setting and run the elevator to demonstrate the fault condition. This fault will remove power from the brake, motor and hoist rope gripper. A reset is required to run the elevator again. Fault message on LCD display **"Over max Speed".**

3.3 ETS EMERGENCY TERMINAL SLOWDOWN

Lower the 'ETS … FPM' value to 1/3 of contract speed for example. Run elevator at high speed into the terminal landing to demonstrate the ETS fault. Run elevator to the opposite terminal to check for an ETS fault again. Reset **'ETS FPM'** to original value. Fault message on LCD display **"Over DSL Speed"** for the bottom limit and **"Over USL Speed"** for the top limit. This fault will remove power from the brake and motor.

3.4 150 FPM LIMIT

3.4.1 Inspection Speed Limit:

Lower the value in '150 fpm Limit' to some speed less than inspection high speed or increase the drive speed reference to be greater than the **'150 FPM Limit'** value. Run the elevator on inspection operation to exceed the **'150 fpm Limit'** value. This fault will remove power from the brake and motor and rope gripper. A reset is required to run the elevator again.

3.4.2 Leveling Speed Limit:

Lower the value in **'150fpm Limit'** to some speed less than **Leveling Speed**. Run the elevator on **Auto**. When elevator goes into **Leveling Speed**, the power will be removed from the **Motor**, **Brake** and **Rope Gripper**. A reset is required to run the elevator again.

3.5 START PERMISSION & FORCE-GUIDED RELAYS CHECK

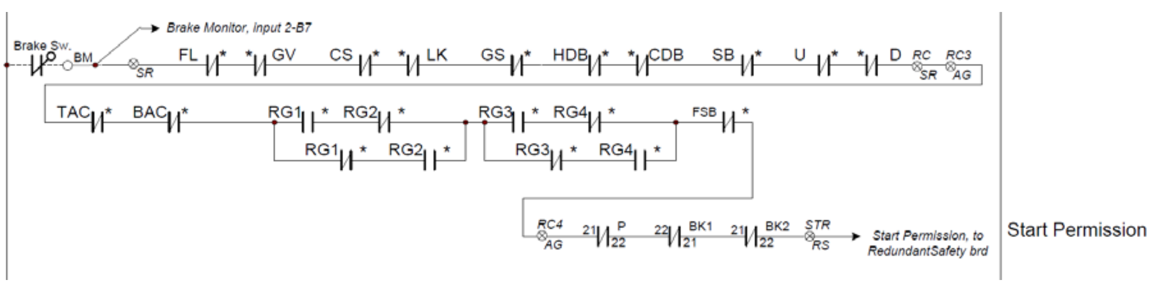

Fig. 8: Start Permission Circuit

Make a run on normal operation. As elevator is slowing down, hold open one the contacts in the **'Start Permission'** circuit, for e.g. one of the brake relays **'BK1'**. When the elevator stops, a test is made of the circuit. This test will result in a fault. Fault message on LCD display **"No Start Permiss".** Refer to **Fig. 8** for **Start Permission Circuit**. A reset is required to run the elevator again.

Every time the elevator stops, the **Redundant Safety Board** drops the **SB Safety Relay** (see **Fig. 9** for **Safety Strings**). Dropping the SB Safety Relay removes power from **FL, GV, CS, HP, CD, U** and **D Safety Relays**. **RG1/RG3** and **RG2/RG4** Safety Relays swap positions. Now the Redundant Safety Board checks for **'Start Permission'**. If this check is not satisfied, a fault occurs, **'No Start Permission'**.

3.6 CHECK HOISTWAY DOOR LOCKS

With the elevator on **Auto** and the **Car Door Open**, place a jumper across **Door Lock** circuit. A fault will show **'Door Locks Jumped'**. The door will remain open until the jumper is removed.

3.7 CAR DOOR OPEN WITH OR WITHOUT MOTION

With Car level at a floor and car open, do the following:

1. Place Car on Controller Inspection;
2. Remove the Close Relay or remove wire from Module 1, A2 to prevent doors from closing;
3. Remove field wires UL & DL;
4. Add temporary jumper to UL;
5. Place Car on Auto (Controller Inspection 'OFF');
6. As Car starts to move, remove temporary jumper from terminal UL;
7. Witness that when Car is out of the Leveling Zone, the Rope Gripper will apply;
8. Place on Controller Inspection, replace Close Relay or wire from Module 1, A2; replace field wires UL & DL. Reset 'Out of Zone' fault on Redundant Safety Board (RSB).

3.8 NTS NORMAL TERMINAL SLOWDOWN

For the NTS Normal Terminal Slowdown test, do the following:

1. Place Car several floors away from the Terminal Slowdown limit that is being tested;
2. Remove the 'Step High' wire from the upper right-hand side of the Redundant Safety Board (RSB);
3. Place a Car Call ahead of the Car;
4. Witness that the Car Position Indicator does not change after the elevator is running. Upon arriving at the Terminal Slowdown Limit, the Car should slow down as it would normally and the Car Position Indicator will indicate the correct floor;
5. Repeat test for the opposite terminal;
6. Replace the 'Step High' wire.

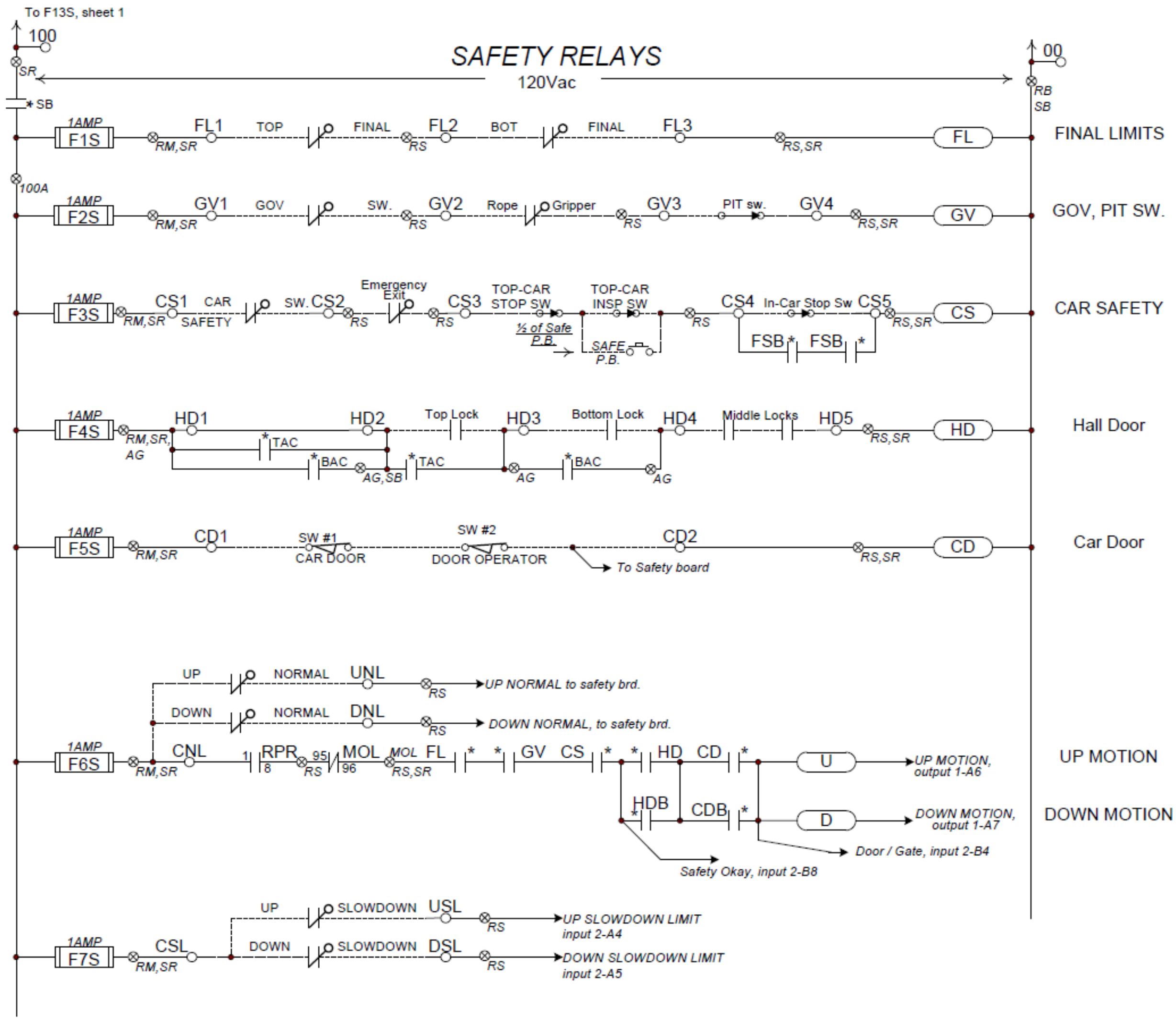

Fig. 9: Safety Strings

3.9 BRAKE MONITORING

The brake PICK (energized) or DROP (de-energized) will be monitored by a normally closed contact, which is activated by the action of the brake. When the brake is de-energized, the brake contact should close, indicating the brake is DROPPED.

3.9.1 Monitor Brake PICK:

Place a jumper across terminals ‘100’ and ‘BM’ (brake contact). Place the elevator on **Auto** and register a call several floors away. As the elevator starts to run (2 sec, approx), the call will cancel and the elevator will slowdown at the nearest floor with the doors open. The **PLC PI** (Position Indicator) position will flash on/off. The **Redundant Safety** board will show a fault “**Brake Pick Flt**”. The elevator will not run until the fault is reset. To reset this fault, toggle the inspection switch.

3.9.2 Monitor Brake DROP:

Run the elevator. While the elevator is running open the brake monitoring contact, so that when the elevator stops and the brake drops, the Redundant Safety board will indicate that the brake did not drop. The elevator will not restart until this fault is cleared. Refer to Start Permission 3.5 above.

4. SHAFTWAY EXAMPLE

The following example (**Fig. 10**: Shaftway Example) gives an idea of Floor Counts, ETS, Step-High settings.

Example:

Car Speed: 150fpm,
Slowdown: 36"
ETS fpm: 125fpm
ETS inches: 9" past S/D limit (27 inches from terminal floor)

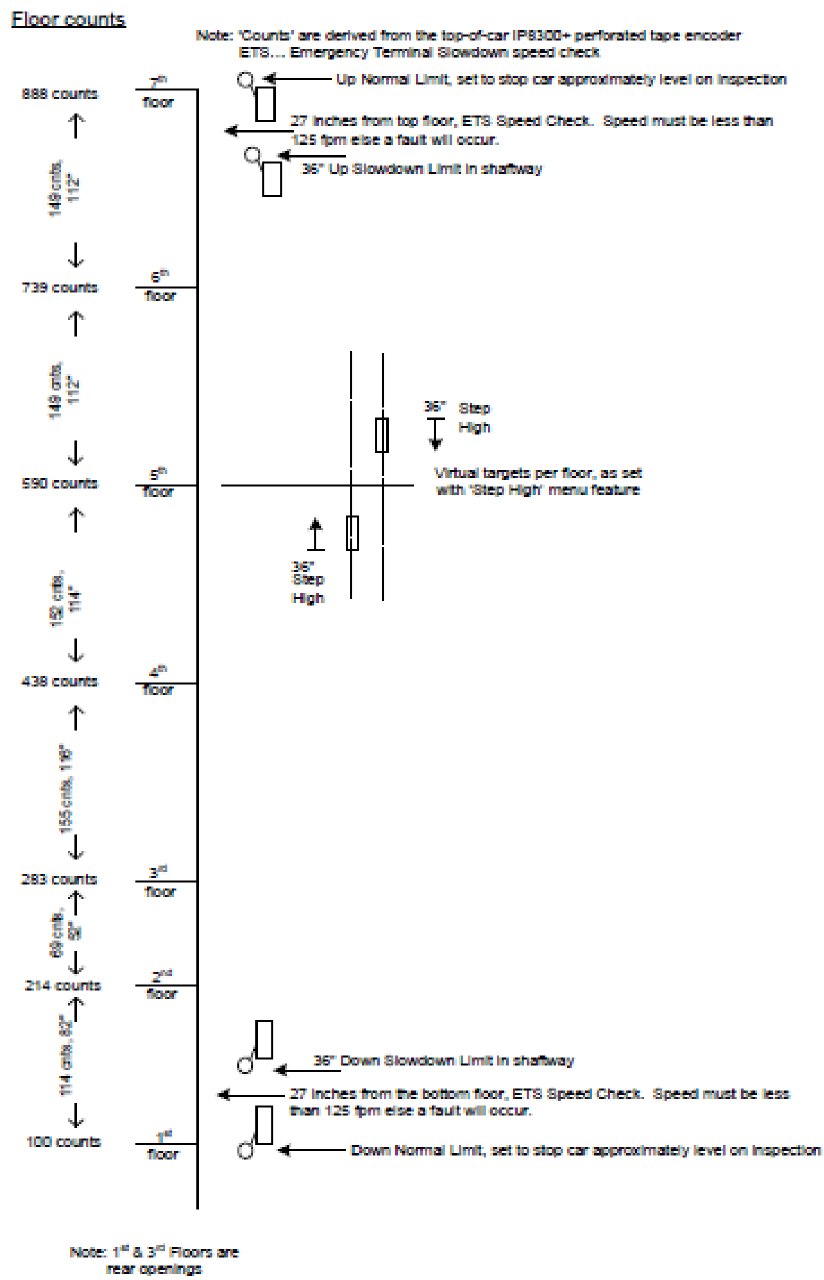

Fig. 10: SHAFTWAY EXAMPLE

5. REDUNDANT SAFETY BOARD - I/Os

Fig. 11 shows the critical I/Os and connections of the Redundant Safety Board.

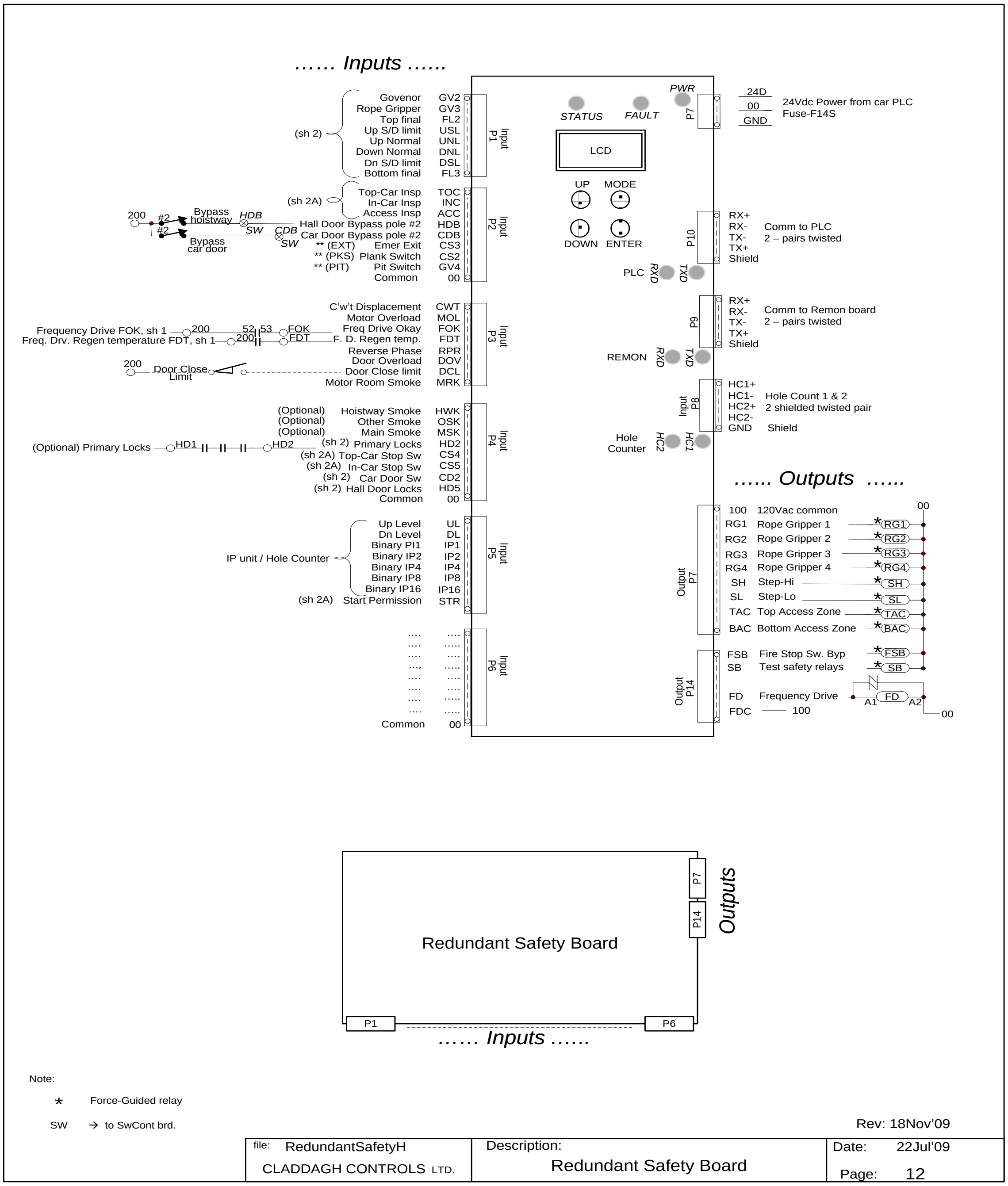

Fig. 11: THE REDUNDANT SAFETY BOARD – I/O CONNECTIONS

6. OTHER LCD SCREENS

The following additional LCD 'Texts' may be encountered while the Redundant Safety Board is running. These are not 'user-interactive' items.

//SUB MENUS
DIS_ACIN 21
DIS_ACOT 22
SHOW_FLT 23
SET_SDL1 25
SET_CNT1 26
SET_LFPM 27
SET_TRIP 28
SET_FLRS 29
SET_STHI 30
SET_STLO 31
CAR_MULT 32
VERS_NUM 33
FLR_CNTS 34
LRN_BEGN 35
LEARNING 36
LRN_DLUL 37
FLT_DIAG 38
TEST_ACO 39

//FAULT INDEX
NO_FAULT 0
LRN_SHFT 1
FL1_PRST 2
NOT_LVEL 3
FLR_ORDR 4
DL_NO_UL 5
DSL1_FLT 6
USL1_FLT 7
LRN_DOWN 8
LRN_DONE 9
UP_ON_DN 10
DN_ON_UP 11
UP_WO_UP 12
DN_WO_DN 13
OUT_ZONE 14
DOOR_FLT 15
FSB_FLTS 16
OVER_CHK 17
DSL1_VEL 18
USL1_VEL 19
OVER_VEL 20
TAPE_FLT 21
NO_START 22
OVER_20F 23
COMM_FLT 24
MAXFAULT 24 //the highest fault number

7. AMENDMENTS

DATE:	***Amendment #:***	***Page Affected:***	***Summary:***	***New Ver. #:***