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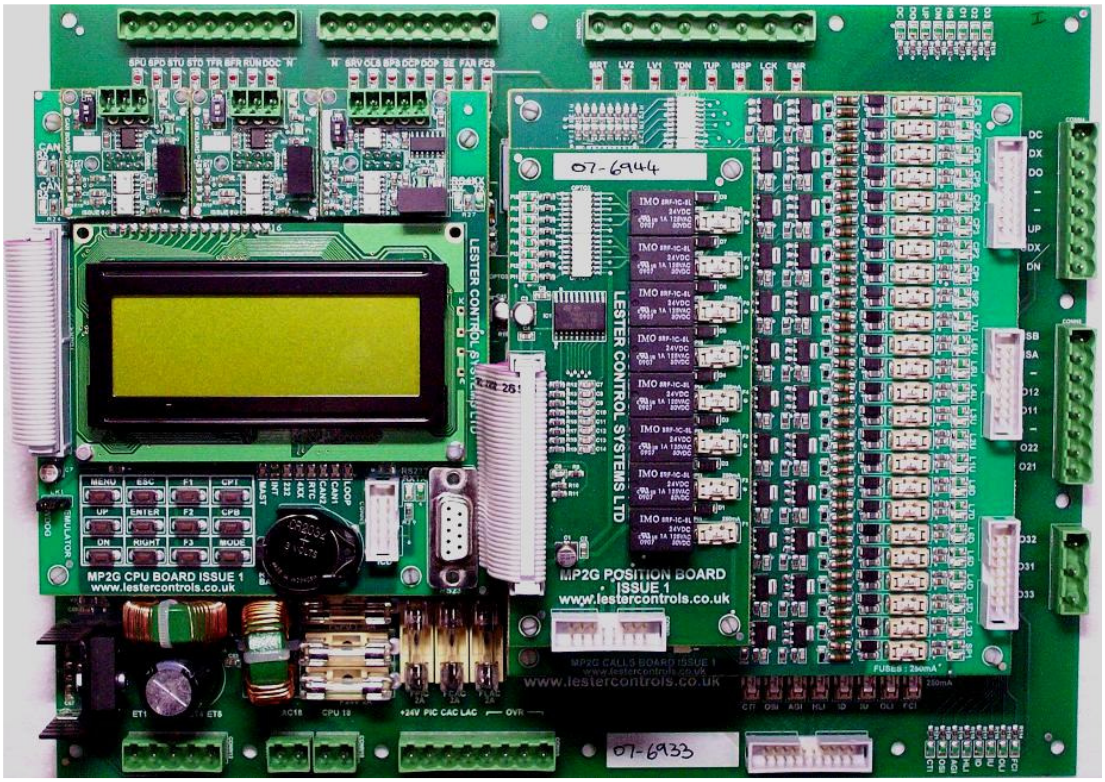

TECHNICAL MANUAL
FOR THE MP2G
MICROPROCESSOR SYSTEM
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Introduction

The MP2G microprocessor has been designed using surface mount component technology to be small and compact. The main processor is one of the latest technologies that incorporates program and data memory, as well as many features and peripherals. The board layout is based upon a fixed system layout of up to 8 floors full collective, which fits comfortably inside a typical control panel cabinet.

A 20 character by 4 line LCD display has been used to display information and data adequately. It also provides the user with a simple and easy to use menu interface with selections for Lift Viewer (which shows a representation of the lifts' status/position/doors etc), and an Input/Output viewer to show the status of each input/output.

A push button switch panel (keypad) has been included to allow the user to change parameters and settings to suit the lift installation. The simple layout of the push buttons and easy to use menu interface allows changing of parameters with very little effort. Passwords entry is not required.

LED indication is provided on each input/output of all boards. The general colour coding is RED for Input and GREEN for Output. Also the CPU has LED indication for CPU status and Communications.

The microprocessor will connect directly to the TC3 serial indicator and speech units, providing full programmability of up to 8 floors and many messages and features. Separate messages are included for doors opening, doors closing, going up and going down, mind the doors and arrival gongs. The messages have fixed priorities to differentiate between levels of importance i.e. "Lift Overloaded" would have a higher priority than "Lift on Fire Control". These priorities also eliminate the need for extra relays in the control panel. Information is transmitted serially to the units using CAN (Controller Area Network) technology.

Windows application software is available to allow the user to change parameters and settings to suit the lift installation. The software will work on any IBM compatible P.C. or laptop (250MHz or higher) with windows version XP or higher. The software has been designed to encourage and allow the user to change the lift installation set-up as required, and to reduce the need for special software. However special software may be issued upon request.
Other features include:
Direct serial communication to drives.
Internet Monitoring.

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Manual Supplements

There are a range of manual supplements available for specific information regarding the MP2G lift control system. The information in these supplements are additions for special / specific lift functions that would not normally be required within the scope of this manual. Some supplements available are Internet connectivity, serial communications with an inverter drive etc. Contact Lester Controls for availability, or visit the web site to download those currently available.

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List of Equipment

1) MP2G Microprocessor system.

2) Digital Indicators (if fitted)

3) Speech Synthesiser (if fitted)

4) Lap top / P.C. for programming the processor (if desired)

5) 1 Serial Communication Cable (RS232 (non-crossed Male/Female) link between processor & laptop).

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Switching Onto Test Operation for The First Time

The Lift Viewer or Input Output Viewer from the main menu may be used at this stage to aid with testing.

Installation state:
The Motor, Thermistors, Fan and Brake etc. have been connected to the Control Panel.
The safety and lock circuit are in a state where the door contacts, emergency stops etc., are making contact providing continuity through terminals:
(**OTL - OSG - PSW - G1 - G2 - G3 - G4**), for a Hydraulic Lift, and
(**OTL - OSG - G1 - G2 - G3 - G4**), for a Traction Lift.
The wiring has been checked and all cables are connected correctly.
The fuses are in their correct places and of the correct size and type.
The lift is switched to **TEST** via the Car Top Control or manually by leaving the connection between **TTS** and **TS** open circuit, also continuity is made from terminals **TTS** and **TS1**.
Check there are no obstructions in the lift shaft.
Provisionally set the lift and door motor overloads.
Check that the car and landing doors are closed fully (if fitted at this stage).

The lift can now be switched on:
Check the incoming three-phase sequence is correct (PFRR relay is energised)
Check the LED's **EMER**, **LOCK** are illuminated on the main io board, or look on the LCD display (i.e. INPUT VIEWER), or check the LCD display default screen.

Making the following temporary connections can now drive the lift:
To travel UP = **TF** to **TU**
To travel DOWN = **TF** to **TD**

The following checks should be made before continuing with moving the lift:
1) Check that the Emergency stop buttons, Locks and Safety circuit (if applicable) will stop the lift instantaneously shortly after the lift motor starts to rotate.

2) Run the lift and check that the direction of rotation is correct.

3) Run the lift and check that the brake and ramp voltages are correct

4) Check the door operation (if fitted) by using the car top control buttons to make contact between terminals:

CLOSE = **DTF** and **DC**
OPEN = **DTF** and **DO**

5) Check selector stepping and levelling switches are in place and are functional.

6) After Test operation move the lift to the lowest level possible, park with doors closed and switch off the control system.

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Switching Onto Normal Operation for The First Time

The Lift Viewer or Input Output Viewer from the main menu may be used at this stage to aid with testing.

Installation state:
The lift installation is complete and is to be operated normally for the first time. The tape head, door operator, Emergency stop buttons, locks, safety circuit, shaft switches, proximity and levelling signals have been checked on TEST control as previously instructed and are operating correctly. The pulsing and levelling signals are in the correct sequence as on the shaft and vane layout drawing. The lift is at the lowest floor level with the reset signal energised.

The lift is switched onto NORMAL operation via the car top control, i.e. a connection should be made between terminals **TTS** and **TS**, and open circuit from terminals **TTS** and **TS1**.
The lift should not be on any other form of independent service, i.e. Fire or Service control.
Ensure no shaft obstructions exist. The lift can now be switched on, and the following suggested test procedures maybe carried out:

1) Purging of the Event Logger:
Whilst in the menu **Event History**, pressing RIGHT and UP on the keypad, clears/purges all events stored in the Event Logger.

2) Testing the pulsing and levelling signals (STU/STD & STEP):
This can be achieved by placing calls to each floor in turn, in both the UP and DOWN direction, ensuring correct selector stepping and stopping sequence. Correct any problems with the vanes before proceeding to the next stage. Once correct, run the lift to the terminal floors in both directions to check vane operation.

3) Testing of Slowing switches:
Press **CPT** button to register a top car call and, then press **MODE and MENU** under constant pressure to inhibit the signal STEP, thus forcing the lift to slowdown via the slowing limit. Press **CPB** to register a bottom car call and repeat the above process.

4) Testing of Terminal switches:
Press **CPT** button to register a top car call and then press **MODE and ESC** under constant pressure to inhibit the signals STU and STD, thus forcing the lift to stop on the terminal limit. Press **CPB** to register a bottom car call and repeat the above process.

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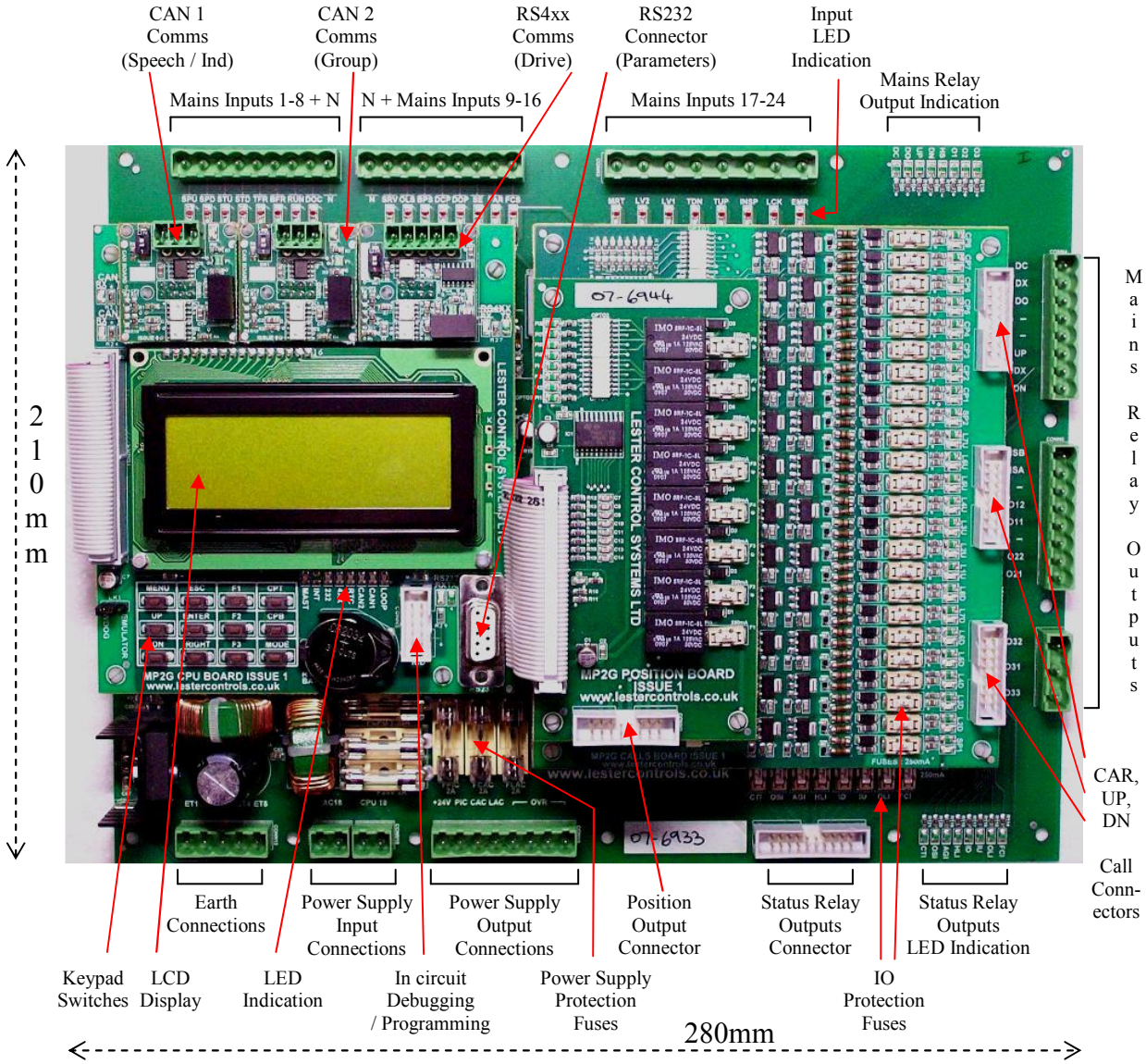
MP2G Microprocessor Board Arrangement



The MP2G lift controller is designed in a modular form as shown above. The main modules consist of boards; Central Processing Unit (CPU), Main inputs / outputs (Main IO), Calls (Up, Down and Car Calls), Position (Position Outputs), and Communications (CAN, RS4xx (422/485)). The modular approach suits a fixed input / output system of up to 8 floors as well as promoting space saving, and some flexibility.

Selected modules can be added / removed as required, such as Position Board, CAN boards (CAN1 / CAN2), and RS4xx Board. These modules and their uses are described in further sections of this manual. The Main IO board provides the foundation for the modules, providing connection for power, also signals that are passed from the CPU to the IO and vice versa. These connections are achieved via the Ribbon Connectors (as shown). “Snap together” fixing pillars are utilised to firmly hold the boards in place.

Low voltage IO (typically +24V) is protected up to 110VAC via circuit and fusing techniques (replaceable fuses as shown). Power supplies are also protected against over current for CPU and +24V outputs, via fuses (as shown). LED indication is provided for CPU, input / output status (as shown). The LCD together with the menu system provides programmability and adequate debugging facilities.

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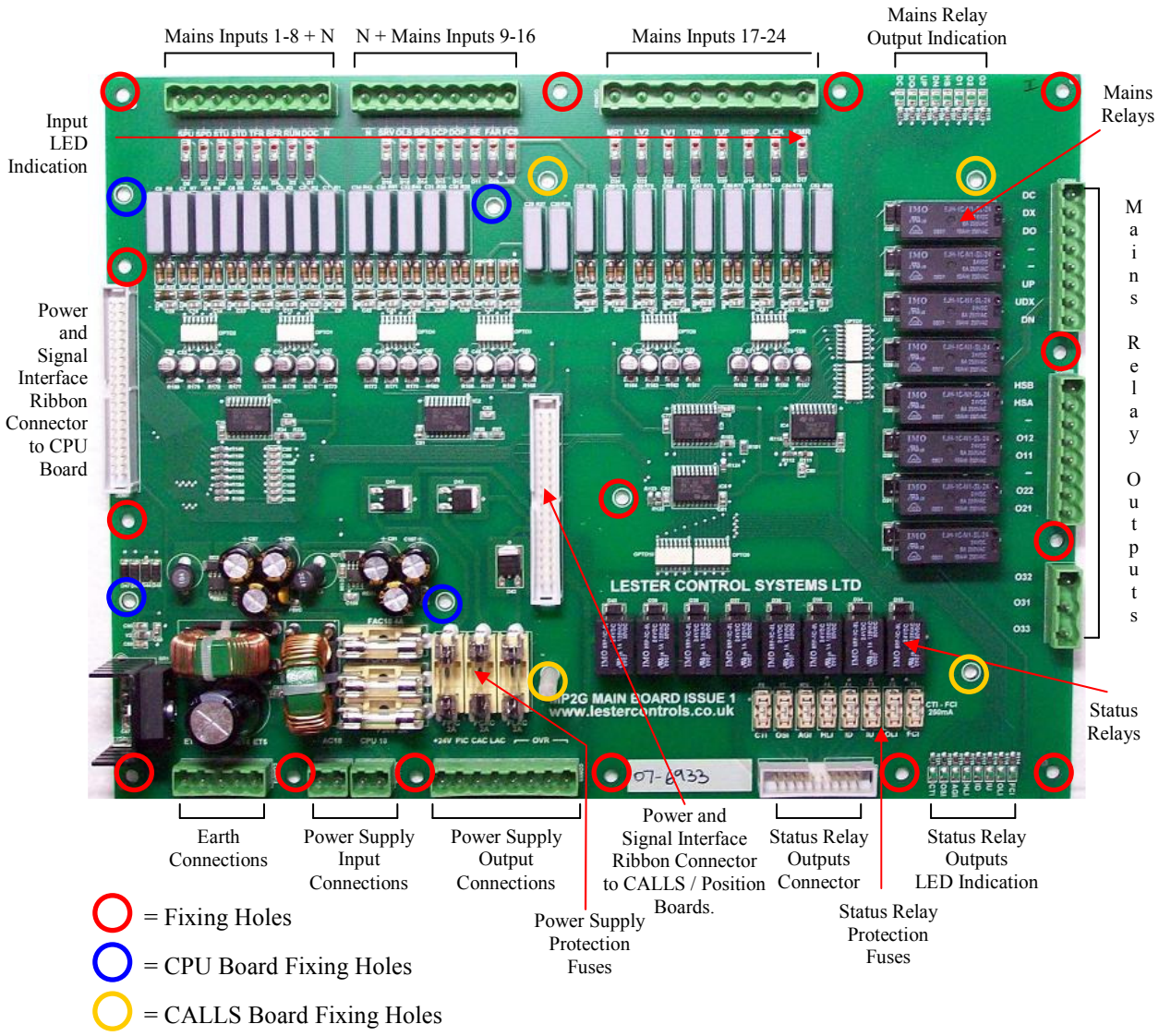
Main IO Board



The Main IO board incorporates inputs, outputs and the Power Supply.
The inputs consist of 24 inputs rated at 110V AC. Red LED indication is located next to each input to show that it is asserted.
The outputs consist of two types of Relay outputs:

i) Mains relays (volt-free) which provide switching for motor contactors and door contactors etc.

ii) Status relays (voltage-common) which provide outputs for direction, Inspection, Fire etc.

Green LED indication is located at a visible point near the edge of the board to show the output(s) asserted.

The Ribbon connectors provide an interface for power and signals to the CPU, CALLS, and Position boards. Fixing holes for the Main IO board are distributed around the edge of the board, and one near the middle (as shown). Fixing holes for the CPU board are towards the left hand side (as shown). Fixing holes for the CALLS board are towards the right hand side (as shown).

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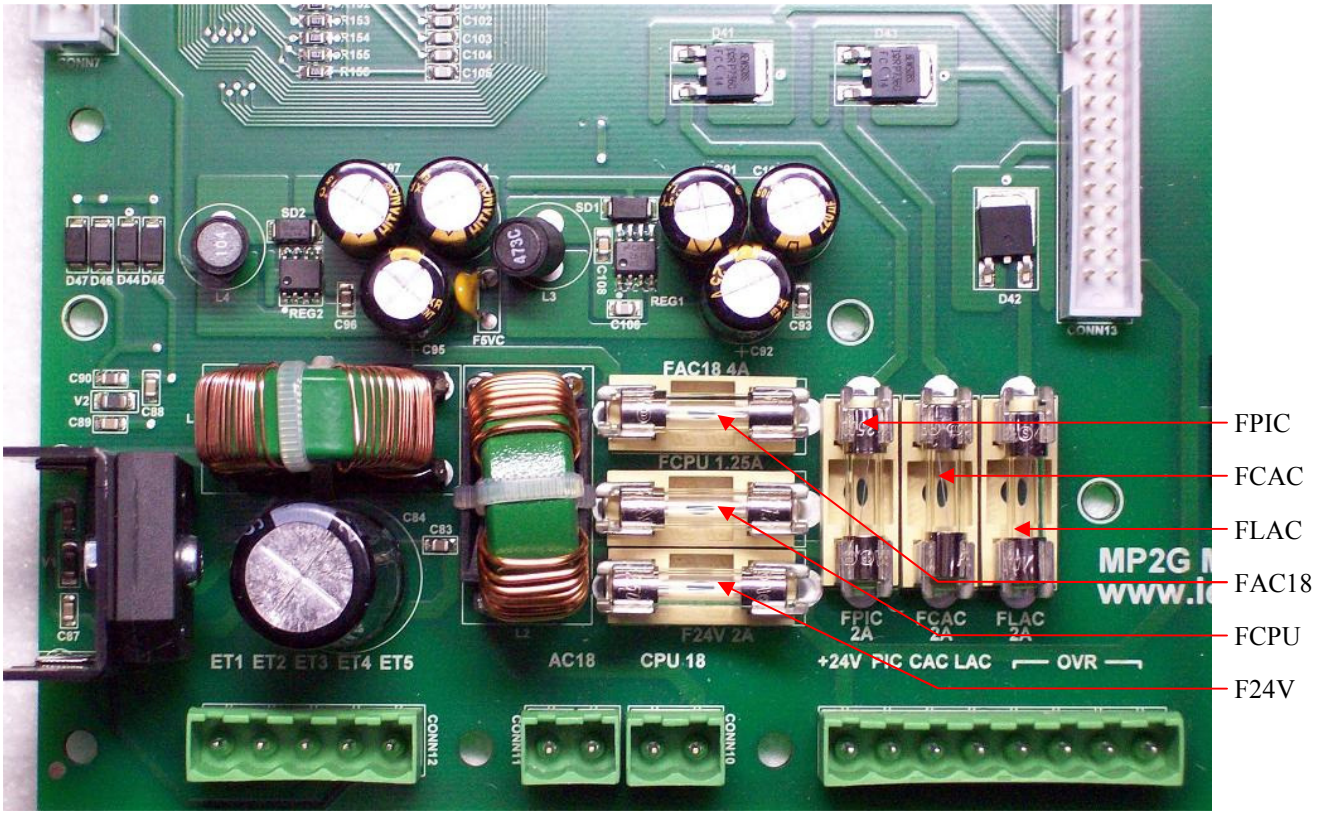
Power Supply



E E E E E A A C C + P C L 0 0 0 0
T T T T T C C P P 2 I A A V V V V
1 2 3 4 5 1 1 U U 4 C C C R R R R
8 8 1 1 V
8 8

The Power Supplies are located on the Main IO board. The Connections are:

Connection Type	Description	Voltage
ET1	Earth Connection: CPU 18 Filter.	NA
ET2	Earth Connection: 5V Communications Filter.	NA
ET3	Earth Connection: 5V CPU and logic Filter.	NA
ET4	Earth Connection: AC18 Filter.	NA
ET5	Earth Connection: 24V Un-Regulated Filter.	NA
AC18, AC18	AC Power Input for 24V DC Un-regulated supplies	18VAC
CPU18, CPU18	AC Power Input for CPU and Comms regulated supplies	18VAC
+24V	24V Unreg DC Output for specific control use only!	18-28V DC
PIC	Position Indicator 24V Unregulated DC Output	18-28V DC
CAC	Car Acceptance 24V Unregulated DC Output	18-28V DC
LAC	Landing Acceptance 24V Unregulated DC Output	18-28V DC
0VR → 0VR	0V Return For 24V Unregulated DC Output	NA

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Power Supply Outputs

The Power Supply as shown previous provides power supplies as detailed below:

Supply Type	Derived From	Norm Rating	Max Rating
24V Un-Regulated	AC18 input.	5A	6A
5V CPU & Logic	CPU18 input.	1A	1A
5V Communications	CPU18 input.	0.5A	0.5A

The 24V Un-Regulated supply is intended to feed external equipment with a wide supply tolerance range, i.e. Call accepted indicators, Position Indicators / Units etc. It also is used to supply the 24V IO circuits. It is considered a "Dirty" supply (i.e. may contain noise and voltage spikes).

The 5V CPU and logic supply feeds the main microprocessor and input / output circuits. It is considered a "Clean" supply (noise and voltage spikes kept to a minimum due to isolation techniques).

The 5V communication supply feeds all communication ports i.e. RS232, CAN ports etc. It is considered a "Dirty" supply (i.e. may contain noise and voltage spikes).

Separate Earth connections are provided to ensure the lowest path of resistance to Earth. The function of each Earth connection is detailed previous.

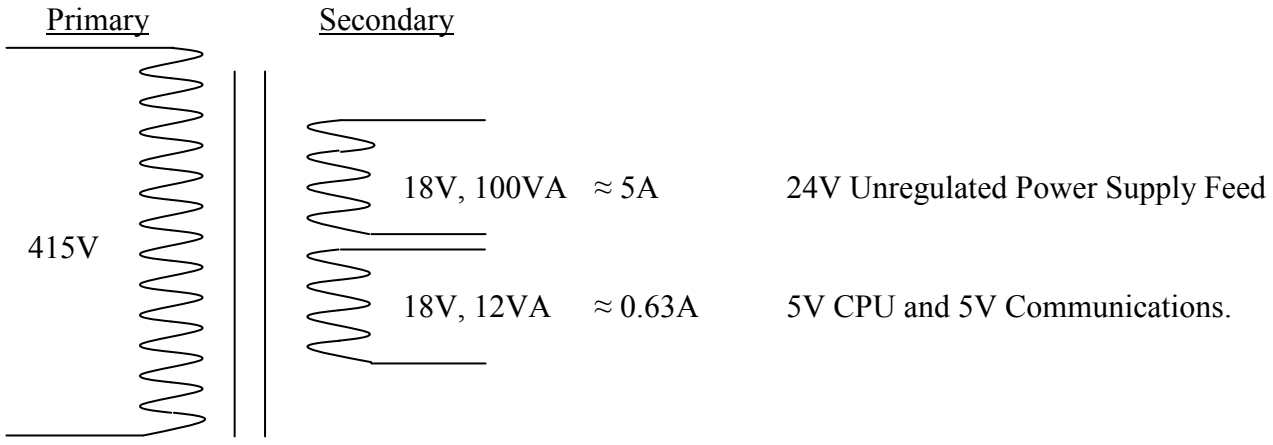
Power Supply Fuses

The Power Supply has on board fusing that protects the circuits as detailed below.

Fuse Type	Supply Voltage	Protects	Norm Rating
FPIC	24V Unregulated Output	Positions / Speech units	Q-blow 2A
FCAC	24V Unregulated Output	Car Call Acceptance	Q-blow 2A
FLAC	24V Unregulated Output	Lan Call Acceptance	Q-blow 2A
FAC18	18V AC Input	Unregulated 24VDC Outputs	Q-blow 5A
FCPU	18V AC Input	CPU and Comms Supplies	Q-blow 0.63A
F24V	24V Unregulated Output	Specific Controls Only!	Q-blow 2A

Power External Transformer

The Power Supply External transformer is derived from the 415V supply and provides outputs as below:



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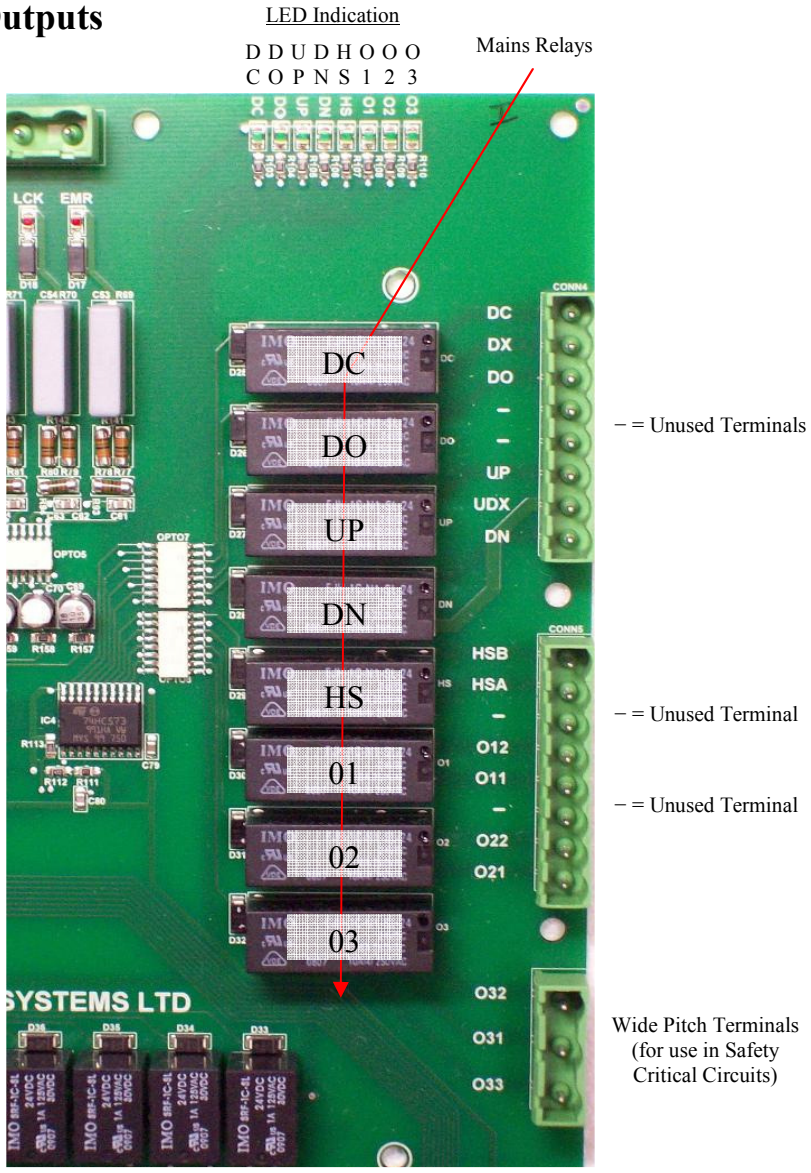
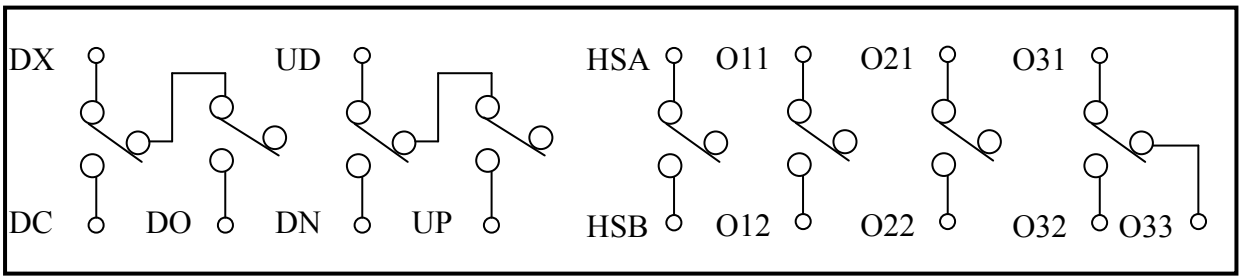
Mains Relay Outputs





Output connections are shown above. DO / DC contacts are interlocked so that under a fault condition DC would take precedence. UP / DN contacts are interlocked so that under a fault condition DN would take precedence. HSA / HSB to be used generally as a High speed output. O1, O2, and O3 are programmable as required. All contacts are volt free, rated up to (5A@30Vd.c.) and (8A@250Va.c.). Relay Output O3 (O31, O32 and O33) utilises wide pitch terminals that may be used in safety critical circuits.

LED indication for each output is provided at the edge of the board as shown i.e. GREEN for outputs.

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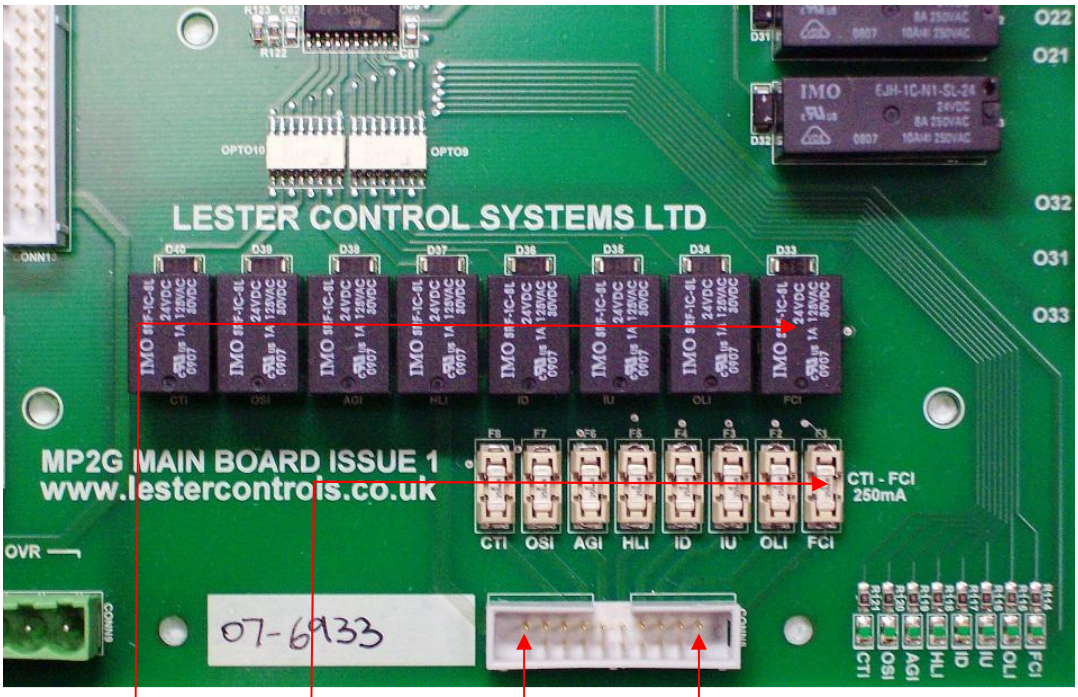
Status Relay Outputs



Status Relay Output contacts are voltage common, and rated up to (3A@24Vd.c/110VAC). The outputs are via normally open contacts of each relay, which are accessed via the 20 way ribbon connector as shown. Replaceable fuses (as shown) protect the outputs and cabling (rated at 250mA). LED indication for each output is provided at the edge of the board as shown i.e. GREEN for outputs.

The normal output functions are as below (however since they are re-programmable they may differ):

Output	Function
FCI	Fire Control Indicator
OLI	Overload Indicator
IU	Committed Up Direction
ID	Committed Down Direction
HLI	Hall Lantern Indication (Hall Lantern Output)
AGI	Arrival Gong Indication (Arrival Gong Output)
OSI	Out of Service Indicator
CTI	Car top Inspection (Inspection Output)

The 20 way Ribbon Connector has pin assignments which relate to outputs as below:

Output	Function
1,2	FCI
3,4	OLI
5,6	IU
7,8	ID
9.10	HLI
11,12	AGI
13,14	OSI
15,16	CTI
17,18,19,20	Relay Common for all status outputs

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Mains Inputs

Mains Inputs 1-8 + N

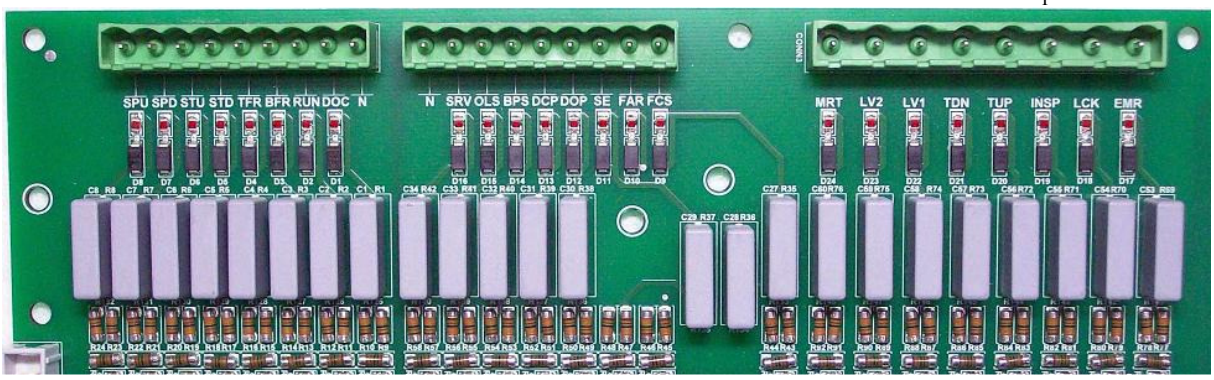
S S S S T B R D
P P T T F F U O
U D U D R R N C N

N+ Mains Inputs 9-16

S O B D D S F F
R L P C O E A C
N V S S P P R S

Mains Inputs 17-24

M L L T T I L E
R V V D U N C M
T 2 1 N P S K R
P



Mains inputs and connections are shown above. From left to right the inputs are also identified as 1-24. The inputs are rated at 110VAC, 50Hz.

The input specification range is as below:

Input Function	**Min**	**Norm**	**Max**
Voltage Range @21°C (V-AC)	70	110	135
Time Response Input On (ms), *note (11@0°C)*	6 (@21°C)	6 (@21°C)	65 (@70°C)
Time Response Input Off (ms)	20 (@0°C)	23 (@21°C)	24 (@70°C)

The normal input functions are as below (however since they are re-programmable they may differ):

Input	**Function**
SPU	Stepping Input UP
SPD	Stepping Input DN
STU	Stopping Input UP
STD	Stopping Input DN
TFR	Top Floor Reset and UP slowing Limit
BFR	Bottom Floor Reset and DN slowing Limit
RUN	Run feedback input
DOC	Door open / close acknowledge input
N	110VAC Neutral Return
N	110VAC Neutral Return
SRV	Service Control
OLS	Lift Overloaded Input (typically 110%)
BPS	Lift Loaded to Bypass (landing calls) level Input (typically 90%)
DCP	Door Close Push Input
DOP	Door Open Push Input
SE	Safe Edge / Door edge Input
FAR	Fire Alarm Recall Input
FCS	Fire Control Switch Input
MRT	Machine Room Temperature Exceeded Input
LV2	Levelling Vane 2 (for Hydraulic and advance door opening)
LV1	Levelling Vane 1 (for Hydraulic and advance door opening)
TDN	Test Down Input
TUP	Test Up Input
INSP	Inspection Input (asserted when on Normal)
LCK	Lock Input (typically end of safety circuit)
EMR	Emergency Stop Input (typically safety circuit immediately after the emergency stop(s))

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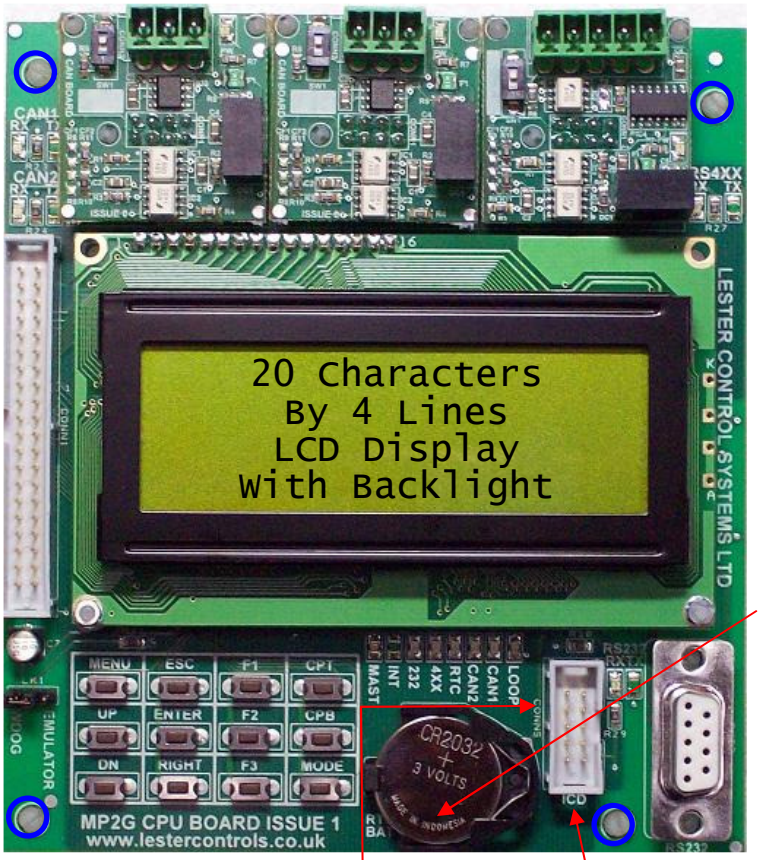
CPU Board



The main CPU Processor board (shown above) provides control and an interface to the lift system. The LCD combined with the keypad provides the user with an easy to use menu interface for displaying lift and IO information, and changing parameters etc.

LED indication is provided for system functions i.e. Program Loop, Communications and Master light etc. The table below gives the appropriate functions:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	5 Times a second Approx
CAN1	CAN1 Communications	Upon Message Activity (TX/RX)
CAN2	CAN2 Communications	Upon Message Activity (TX/RX)
RTC	Real Time Clock Activity	Once a second
4XX	RS422/485 Communications	Upon Message Activity (TX/RX)
232	RS232 Communications	Upon Message Activity (TX/RX)
INT	Processor IO Interrupts	Every 20 Milliseconds
MAST	MASTER	On all the time when LIFT=MASTER

LED indication is also provided for the specific communications CAN1, CAN2, RS232 and RS4XX. The RX LED will flash when a message is being received, and the TX LED will flash when a message is being transmitted.

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The program memory is located inside the processor itself. Program software upgrades can only be achieved using an in circuit programmer. The process of re-programming is restricted to Lester Controls personnel only.

Parameter changes can be made via the keypad and LCD menu interface. Parameters are stored in non-volatile memory within the processor. Prior to system software upgrade **parameters must be saved to a PC** to avoid losing all parameters, since the programming process restores them to default settings.

For normal operation the Watchdog / Emulator link should always be set to WDOG.

Various connections are provided for serial communication to serial devices (see also Communications section of the manual). The RS232 connection (fitted as standard) provides communication to a P.C. or lap top computer. This in conjunction with the Windows software allows the user to view, change and save parameters as required.

CAN (Controller Area Network) connections are provided to enable communication to lift serial devices and other lifts. CAN 1 connection provides communication to per lift devices i.e. serial Indicators/Speech Unit etc. CAN 2 (fitted on Group Systems only) provides communication to other lifts i.e. Duplex.

The RS485/RS422 connection is mainly used as a dedicated motor drive serial communication port.

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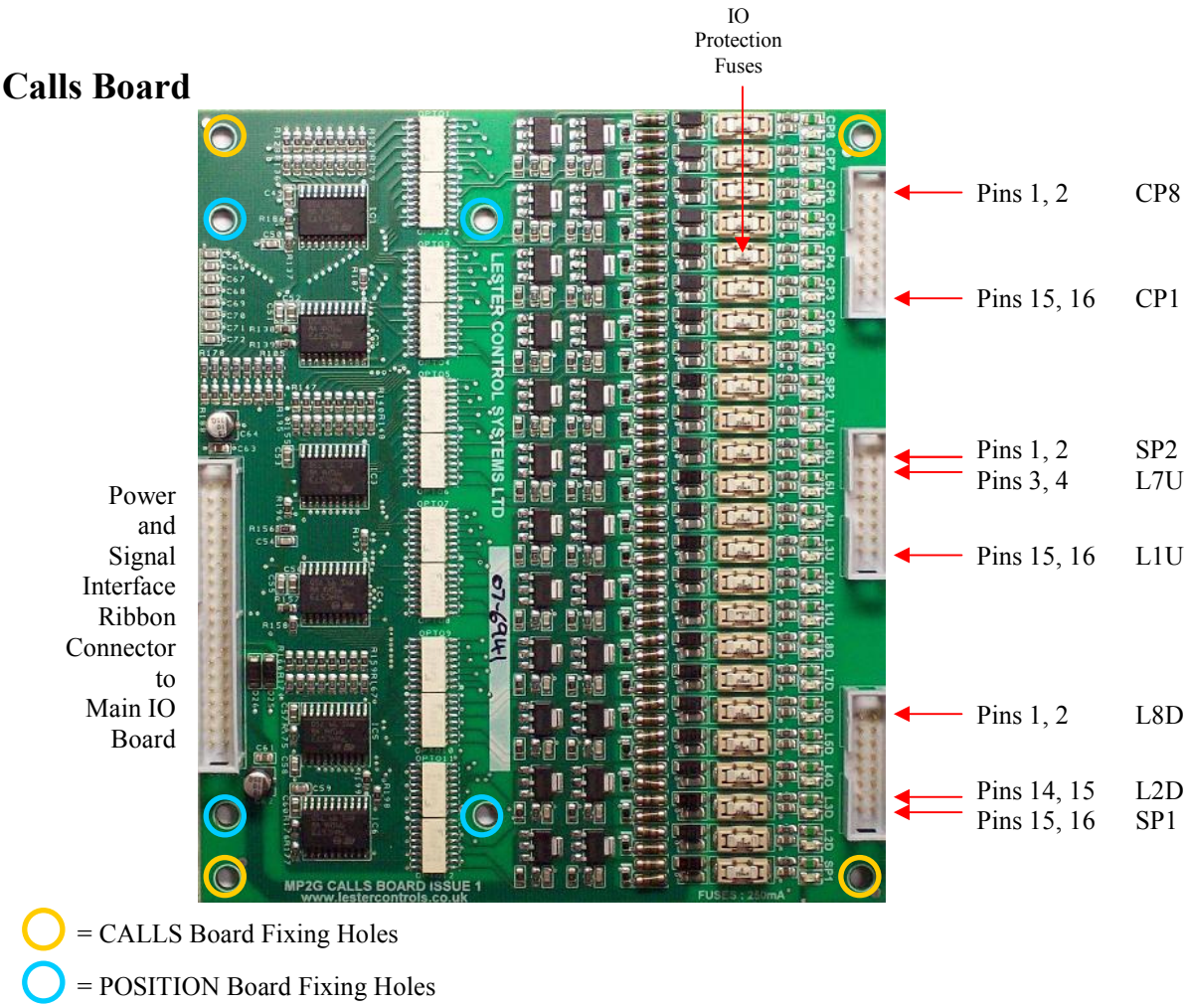
Calls Board



Call inputs and connections are shown above. Connections to these inputs are via the 3-16 way ribbon cable connectors. Each input has 2 pins associated with it, i.e. “doubled up”.

The inputs are rated at 24VDC, negatively switched, drawing a current of typically 13mA when asserted to 0V. The outputs for call acceptance are linked to the inputs i.e. a 3 wire system. When a call is registered the output transistor maintains the current flow to illuminate the call acceptance indication. This is fuse protected up to 250mA per output.

As standard the board is fitted with over-voltage and mains input protection. The inputs/outputs are protected against over-voltage of typically greater than 30V and mains voltage up to 110V A.C. If an input/output is subjected to a high voltage then the relevant fuse will blow. This fuse is rated at 250mA quick blow and should be replaced with the same.

The input specification range for registering a call is as below:

Input Function	Norm	Min	Max (no call)
Voltage Range @21°C (V-DC)	0	12	28

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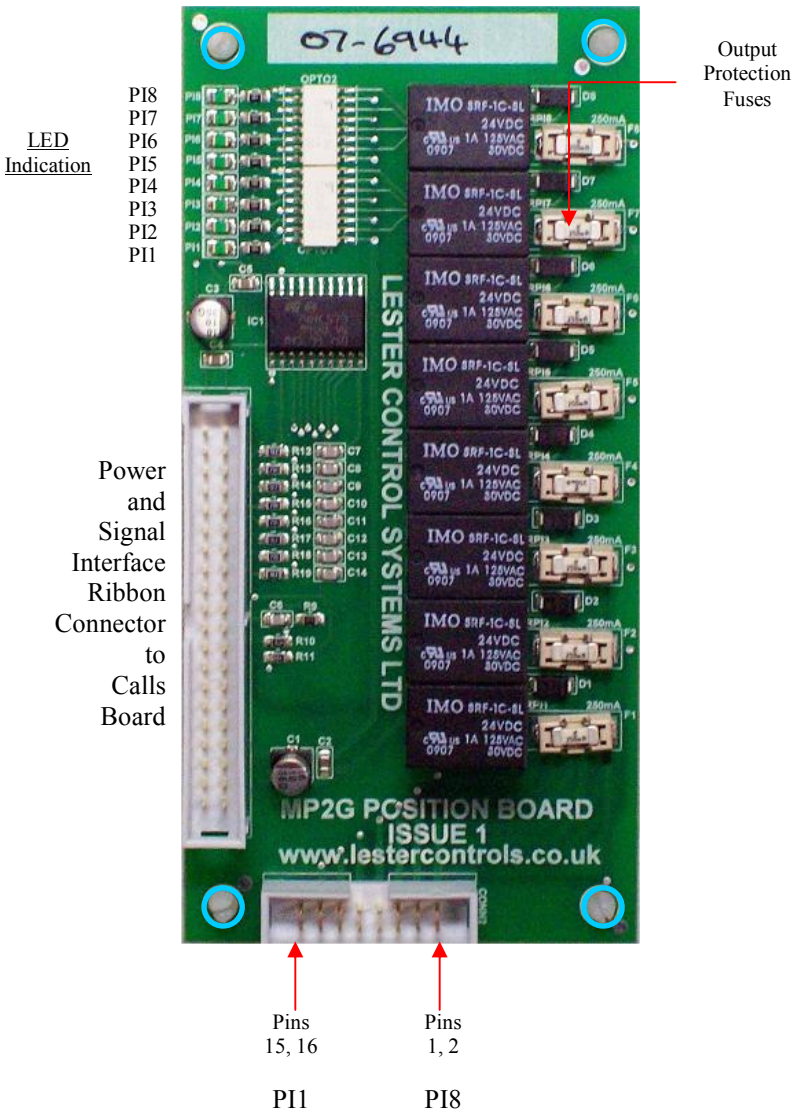
24V Position Board

= POSITION Board Fixing Holes



Position Relay Output contacts are voltage common, and rated up to (3A@24VDC).
The outputs are via normally open contacts of each relay, which are accessed via the 16 way ribbon connector as shown.

Generally the common feed to the relays is permanently connected to the 24V Position Indicator Feed (PIF) on the Main IO board. *If a different voltage common is required, the terminal PIF may be wired to an external voltage common (i.e. 0V or a 12V feed). At the same time the* ***Fuse FPIC (Main IO board) must be removed*** *to isolate the new common from the on board power supply. Also since the function of PIF has been altered, consideration for other devices using PIF has to be taken into account.*

Replaceable fuses (as shown) protect the outputs and cabling (rated at 250mA). LED indication for each output is provided at the edge of the board as shown i.e. GREEN for outputs.

The normal output functions are PI1 – PI8 as shown (however since they are re-programmable they may differ):

The 16 way Ribbon Connector has pin assignments which relate to outputs as shown:

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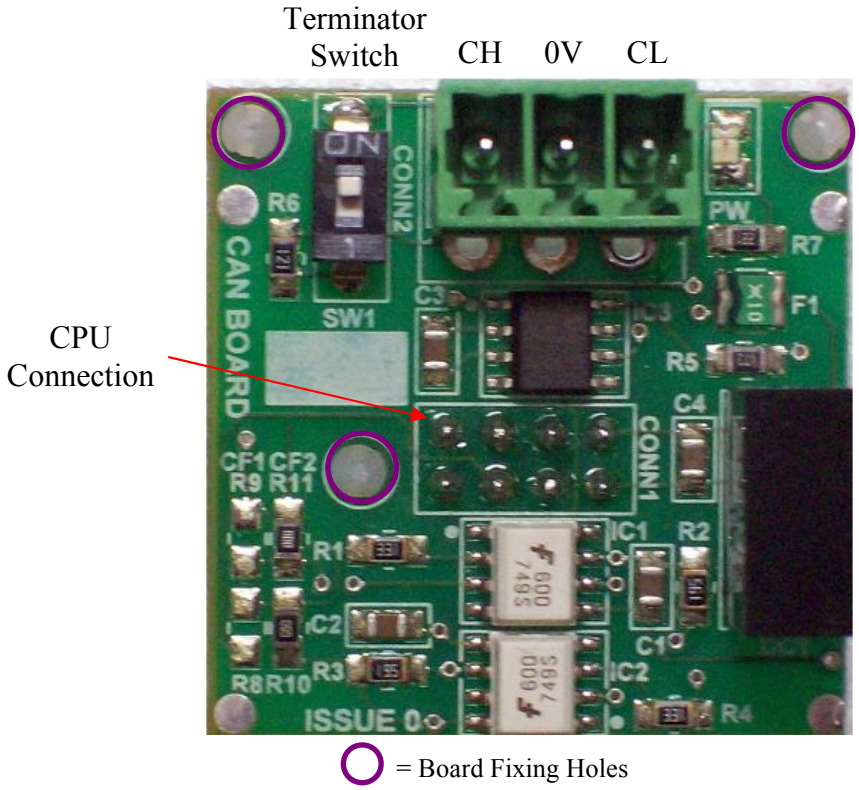
CAN Communications Board



Each CAN (Controller Area Network) Board is mounted on the front of the CPU board and provides communications to lift serial devices and other lifts. Connection to the CPU is via the pin connector as shown. Also snap in fixings (in the fixing holes), ensure the board is firmly fixed.

External Connections to the 3 way terminal block are detailed below:

Connection Type	Description	Voltage
CH	CAN HIGH Communications	0-5V
0V	Isolated Communications 0V Return, i.e. cable screen	NA
CL	CAN LOW Communications	0-5V

CAN1 provides communication to per lift devices i.e. serial Indicators/Speech Unit etc.
CAN2 provides communication to other lifts i.e. 2 Car Group (Duplex) etc.

The Terminator Switch, when set to ON, inserts a resistor of value 120Ω across the CH and CL terminals (see sections “Communication Wiring Terminators and Their Importance” and “CAN1 (Speech / Indicators) Communication Wiring Terminator Variations” for further information).

LED indication for TX (transmit) RX (receive), CAN1, and CAN2 activity is provided on the CPU (see CPU Board).

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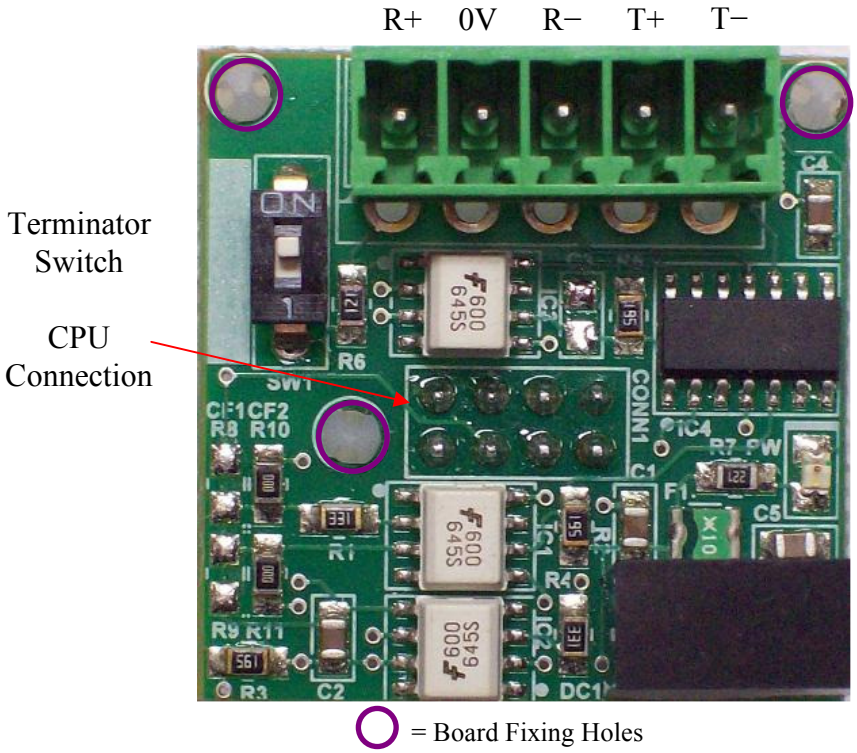
RS4XX Communications Board



The RS4XX Board (RS422/RS485) is mounted on the front of the CPU board and is mainly used as a dedicated motor drive serial communication port. Connection to the CPU is via the pin connector as shown. Snap in fixings (in the fixing holes) ensure the board is firmly fixed.

External Connections to the 5 way terminal block are detailed below:

Connection Type	Description	Voltage
R+	Receive Channel Positive	±13V
0V	Isolated Communications 0V Return, i.e. cable screen	NA
R-	Receive Channel Negative	±13V
T+	Transmit Channel Positive	±13V
T-	Transmit Channel Negative	±13V

The Terminator Switch, when set to ON, inserts a resistor of value 120Ω across the R+ and R- terminals (see sections "Communication Wiring Terminators and Their Importance" and "RS4XX (Drive) Communication Wiring Terminators" for further information).

LED indication for TX (transmit), RX (receive) and RS4XX activity is provided on the CPU (see CPU Board).

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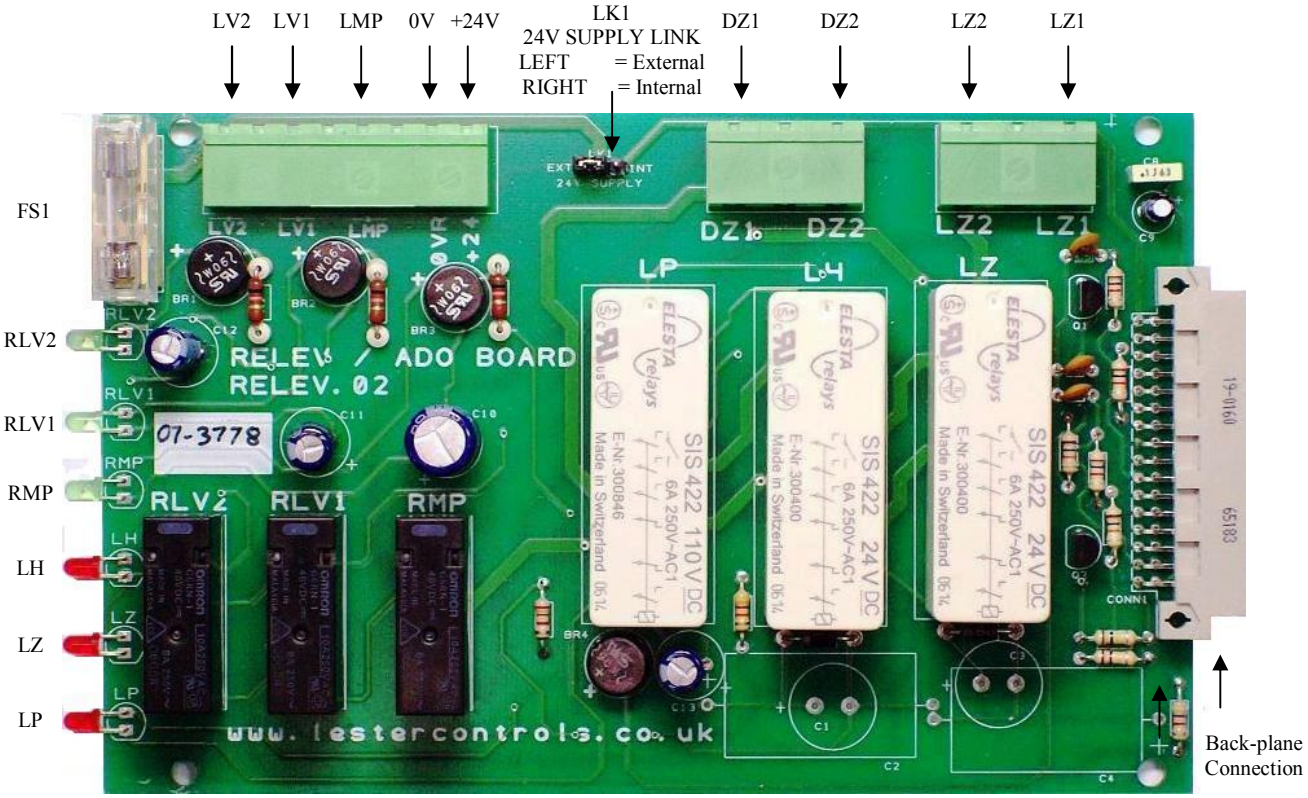
Re-Levelling and Advance Door Opening Board

(See also Re-Levelling, and Advance Door Open Control)



The Re-levelling and Advance Door Opening Board is a safety critical board that checks for correct vane information (also stuck vanes) and ensures that safety circuits (car / landing lock circuits) are only bridged, when the conditions are correct. The safety critical board in conjunction with the physical shaft vane information (re-level proximity vanes), is designed to conform to BS/EN81 standards. The Board may be used in conjunction with the Almega rack system, or another system such as MP2G i.e. "Stand alone".

LK1 = supply source i.e. "internal = from backplane", or "external = terminals"

Inputs

LV1 = Re-level / ADO sensor 1 (1st sensor - tape-head / proximity switch-110VAC)
LV2 = Re-level / ADO signal 2 (from micro processor re-level / ado output-110VAC)
LMP = Re-level / ADO pilot input from micro processor (110VAVC).
0VR = Supply Return for +24V supply (stand alone mode only)
+24V = +24V D.C supply (60mA max) (stand alone mode only)

Outputs

LZ1-LZ2 = Level Zone: n/o Contact (6A@250VAC) for bridging lock safety circuit.
DZ1-DZ2 = Door Zone: n/o Contact (6A@250VAC) to be wired into a processor input for feedback or in Series with Door Open Contactor circuit.

LED Indication

RLV1-2/RMP = Indication for relay coils RLV1, RLV2, and RMP respectively.
LH/LZ/LP = Indication for relay coils LP, LZ, and LP respectively.
Note when locks are bridged LED's RLV2, RLV1, RMP, LH and LZ should all be lit.

Protection FS1= Fuse protection for +24V supply input (internal or external, 250mA Q-blow)
The Back-plane Connection provides both Power and Board Identification.

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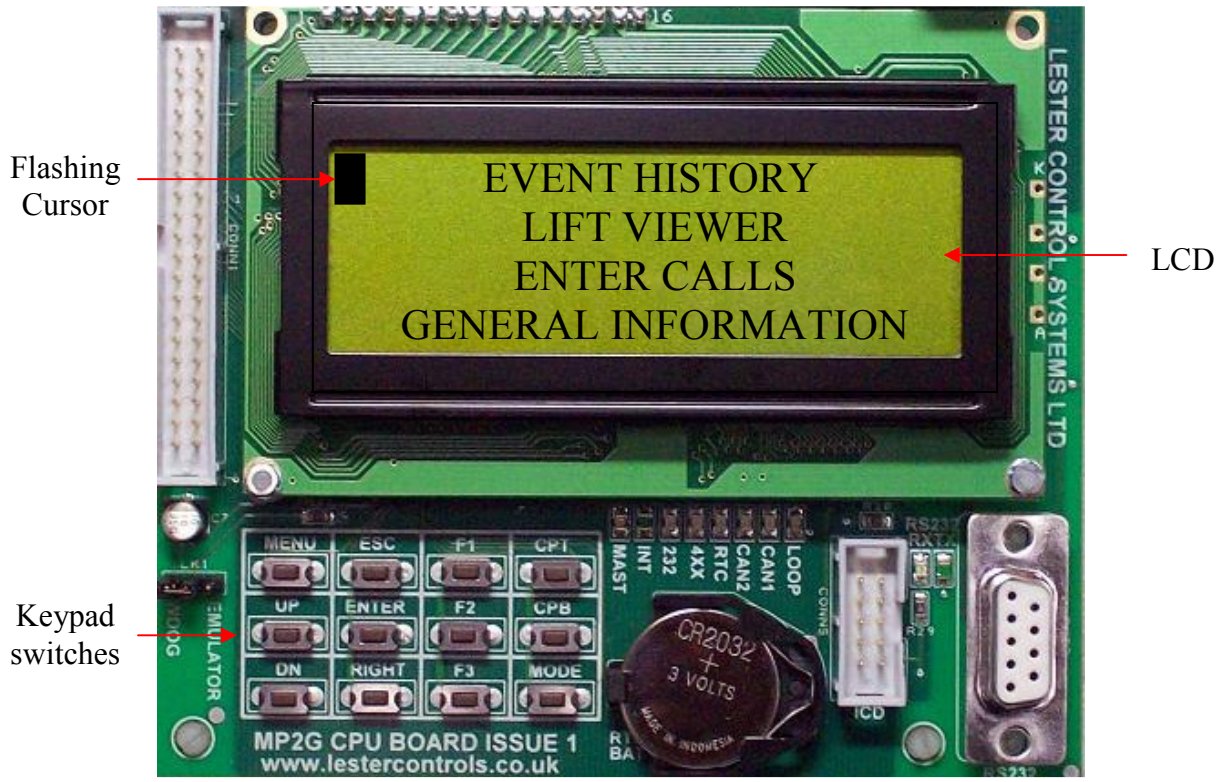
Menu / Keypad Interface



The MP2G utilises a simple menu interface for the interrogation of faults, obtaining general information, and the changing of selected parameters. By pressing the keypad switches input data is passed to the menu, whilst at the same time output data is via the LCD. The flashing cursor at the left hand side of the LCD indicates the position of the menu selector, and by pressing ENTER the menu item will be selected. The menu structure has a depth of 3 layers as shown below. The 1st layer has the list of Menu items, the 2nd layer has the menu selected options (options for Door Setup), and the 3rd layer displays the selected option (selected option = Advance Door Open parameter). Pressing **ENTER** increases the menu layer, whilst pressing **ESC** decreases the menu layer ("to go back").

Menu List (1st layer)		*Menu Selected Options (2nd Layer)*		*Selected Option (3rd Layer)*
DOOR SETUP	ENTER →	* DOOR SETUP *	ENTER →	* DOOR SETUP *
DOOR TIMES		ADVANCE DOOR OPEN		ADVANCE DOOR OPEN
HOMING SETUP		PARK OPEN		[NO]
TRAVEL SETUP		DISABLE DOORS		Enter to Update

Once the three layer approach is understood, navigation through the Menu becomes easier. A starting point is to always press MENU. After that a combination of using the UP / DN keys and ENTER are required to navigate through the 3 layers of the Menu. For the previous example the following keys were pressed.

1)	Press MENU	(Menu list,	layer 1)
2)	Press DN 8 times to DOOR SETUP		
3)	Press ENTER	(Menu Selected Options,	layer 2)
4)	Press DN once to ADVANCE DOOR OPEN		
5)	Press ENTER	(Selected Parameter,	layer 3)
6)	And now to change, Press UP / DN to toggle between YES/ NO		
7)	Press ENTER to confirm and wait for message		
	a. "Parameter Updated" to appear at the bottom of the screen.		
8)	Press ESC to go back at anytime.		

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Menu Map

Menu List (1st layer)	*Menu Selected Options (2nd Layer)*	*Selected Option (3rd Layer)*
EVENT HISTORY	Event History (list view)	Event History (detailed view)
LIFT VIEWER	----------	Lift Viewer Screen
ENTER CALLS	REPEAT CALLS	----------
	CANCEL REPEAT CALLS	----------
	CAR TOP BOT 15S, 60M	Initiate then to Lift Viewer Screen
	CAR TOP BOT 30S, 60M	Initiate then to Lift Viewer Screen
	CAR TOP BOT 60S, 60M	Initiate then to Lift Viewer Screen
	ALL CAR CALLS	Initiate then to Lift Viewer Screen
	ALL LANDING CALLS	Initiate then to Lift Viewer Screen
	ALL LANDING UP CALLS	Initiate then to Lift Viewer Screen
	ALL LANDING DN CALLS	Initiate then to Lift Viewer Screen
GENERAL INFORMATION	----------	Job Number : Mxxxx
		Software Version : Vxx.xx
		Door Cycles : xxxx
		Journey Count : xxxx
IO VIEWER	LINK CAR	View Car Call Inputs
	LINK UP	View Up Landing Call Inputs
	LINK DN	View Up Landing Call Inputs
	MAINS 1-8	View Mains Inputs 1-8
	MAINS 9-16	View Mains Inputs 9-16
	MAINS17-24	View Mains Inputs 17-24
	RELAY MAINS	View Mains Relay Outputs
	RELAY STATUS	View Status Relay Outputs
	RELAY POS	View Position Relay Outputs
TIME DATE	Time / Date Viewer	Time / Date Setup
EXTERNAL DEVICES	SPEECH POSITIONS	Change Speech Positions
	INDICATOR POSITIONS	Change Indicator Positions
SYSTEM DETAILS	MY LIFT NUMBER	View/Change (Min=1, Max=2)
DOOR SETUP	ADVANCE DOOR OPEN	View/Change (YES/NO)
	PARK OPEN	View/Change (YES/NO)
	DISABLE DOORS	View/Change (YES/NO)
DOOR TIMES	MODIFY ALL DWELLS	View/Change (Min=-60, Max=+60S)
	CAR LAN DWELL TIME	View/Change (Min=-0, Max=60S)
	LAN DWELL	View/Change (Min=-0, Max=60S)
	CAR DWELL	View/Change (Min=-0, Max=60S)
	DOP DWELL	View/Change (Min=-0, Max=60S)
	SE DWELL	View/Change (Min=-0, Max=60S)
	DOOR HOLD DWELL	View/Change (Min=-0, Max=1200S)
	LOCK TIME	View/Change (Min=-0, Max=10S)
	CAR PREFERENCE TIME	View/Change (Min=-0, Max=30S)
	ADVANCE OPEN DELAY	View/Change (Min=-0, Max=300mS)
HOMING SETUP	HOMING ON	View/Change (YES/NO)
	HOMING TIME	View/Change (Min=-0, Max=1200S)
	HOMING FLOOR PREF1	View/Change (Min=-0, Max=num floors)
	HOMING FLOOR PREF2	View/Change (Min=-0, Max=num floors)
	MASTER HOMING ENABLE	View/Change (YES/NO)
TRAVEL SETUP	JOURNEY TIME	View/Change (Min=-0, Max=120S)
	LOW SPEED PROT TIME	View/Change (Min=-0, Max=120S)
	STOP TIME	View/Change (Min=-0, Max=3000mS)
	BRAKE RELEASE TIME	View/Change (Min=-0, Max=3000mS)
	ENABL RELEASE TIME	View/Change (Min=-0, Max=3000mS)
	DRIVE CONTRACT SPEED	View/Change (Min=-0, Max=8M/S)
	DRIVE HIGH SPEED	View/Change (Min=-0, Max=Contract Speed)
	DRIVE MEDIUM SPEED 1	View/Change (Min=-0, Max=Contract Speed)
	DRIVE LEVEL SPEED	View/Change (Min=-0, Max=Contract Speed)
	DRIVE TEST SPEED	View/Change (Min=-0, Max=0.5M/S)
	DRV SRL COMMS LOST	View/Change (Min=-0, Max=1.54M/S)
	ST0P ON RUN RELEASE	View/Change (YES/NO)
	DRV COMMS LOST PROT	View/Change (Min=-0, Max=1200S)
	BRAKE DROP TIME	View/Change (Min=-0, Max=3000mS)
FIRE SETUP	FIRE FLOOR	View/Change (Min=-1, num floors)
	BACKUP FIRE FLOOR	View/Change (Min=-1, num floors)
SPECIAL SERVICE 1	ERET1 RETURN FLOOR	View/Change (Min=-1, num floors)
SPECIAL SERVICE 2	PREPARE TO TEST CTRL	View/Change (YES/NO)
DELAYS / SPEEDS	DELAYS	Select/View/Change

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New Event Notification

A text message "pop up" has been utilised to inform the user that a new Event has been recorded, without the user having to interrogate the Event History. This "pop up" displays the message * New Event Logged * on the top line of the LCD display for a period of 400mS. The message will appear whatever the menu state, and is never inhibited.

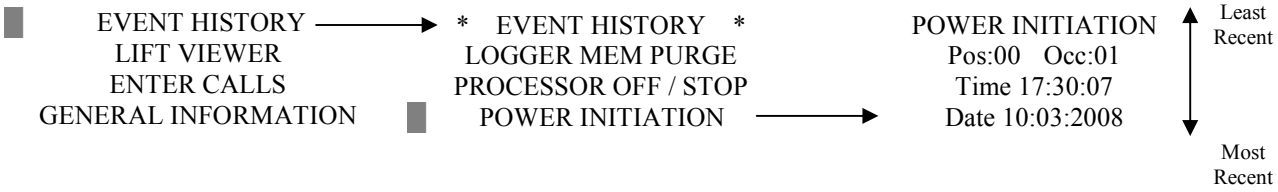
Menu Interrogation / Programming

Only a selected number of parameters have been included in the menu system. The full set of parameters can only be accessed using the Windows application software. Interrogation and Programming of the selected parameters is described in the following.

Menu List (1st layer)	*Menu Selected Options (2nd Layer)*	*Selected Option (3rd Layer)*

Event History

The Event Logger can store up to 100 events. The events are ordered in a list format from least recent at the top to most recent at the bottom. The events are stored in non-volatile memory (not affected by power loss) for a period of at least ten years.



1) Press Menu
2) Press ENTER
3) View EVENT history in a list form.
4) Press ENTER to view Event Information
   a. Pos = Position (00 = No position, or Position Lost)
   b. Occ = Occurrence
   c. Time = Time of Event (24 Hours)
   d. Date = Day: Month: Year
5) Press RIGHT and UP keys, and hold together to completely clear (purge) the Event History. Note this can only be done when in EVENT HISTORY (layer 2 and above).
6) Whilst in the 2nd layer and above press UP and DN keys to scroll through the events (most recent to the bottom, least recent to the top).
7) Press ESC to go back at anytime.

Contact Lester Controls if any of the following events appear in the Event Logger:

```
"I2C BUSY TIMEOUT-RTC"
"OSCILLATOR TRAP ERR "
" ADDRESS TRAP ERROR "
"  STACK TRAP ERROR  "
"  MATHS TRAP ERROR  "
" DEFAULT TRAP ERROR "
"EEPROM WRITE TIMEOUT"
"EEPROM ERASE TIMEOUT"
"FLASH WRITE TIMEOUT "
"FLASH ERASE TIMEOUT "
" IO DATA BUS ERROR  "
```

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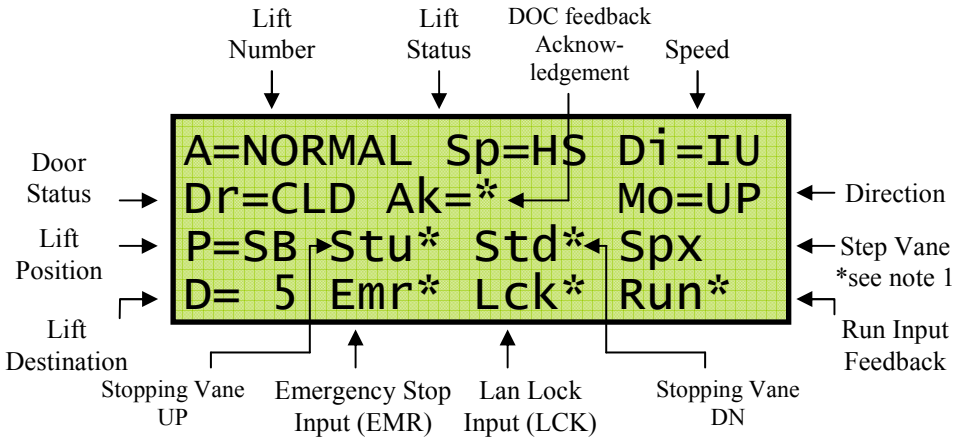
Lift Viewer

Press F1 to ENTER Lift Viewer. The lift Viewer provides selected information for viewing the lift and various controller / shaft signals.

Below shows Lift A (lift number=1) on NORMAL, travelling UP on HIGH SPEED, the doors are closed, and the door acknowledge signal (AK) is on (i.e. DCR energised on run). The actual position (P) of the lift is SB, and its destination (D) is to floor 5. The lift is passing floor level since stopping vanes STU and STD are on. The Run Input feedback (RUN) is on, and both emergency stop (EMR) / landing lock (LAN) signals are present.



*Note 1: The Step Vane indication will briefly show * when passing a stepping vane. SPU input only in the up direction, and SPD input only in the down direction.

A facility to enter calls is also incorporated within the Lift Viewer. Press MODE and RIGHT keys to toggle between Viewer and Enter calls. The bottom line of the screen will change showing typically **D= 5 Call=[UP SB]**. Pressing ENTER key will enter an UP call to floor SB. Press RIGHT key to select call type (UP, DN, or CAR). Press UP / DN keys to select the call position.

Menu List (1st layer)	*Menu Selected Options (2nd Layer)*	*Selected Option (3rd Layer)*
ENTER CALLS		
EVENT HISTORY LIFT VIEWER ENTER CALLS GENERAL INFORMATION	* ENTER CALLS * REPEAT CALLS NO CANCEL REPEAT CALLS CAR TOP BOT 15S, 60M	Option Selected Lift Viewer displayed

1) Press MENU
2) Press DN 2 times to ENTER CALLS
3) Press ENTER
4) Press DN 3 times to CAR TOP BOT 15S, 60M
    a. (car calls cycle from top to bottom and vice versa every 15 seconds, for 60 Minutes)
5) Press ENTER to select option and display lift viewer.
6) View Calls being entered.
7) REPEAT CALLS is used in conjunction with the Car / Landing call options, and causes the option to repeat for a period of 60 seconds.
    a. E.g. ALL CAR CALLS with REPEAT CALLS = YES, means all car calls will continuously be entered (repeated) for 60 minutes.
8) Press ESC to go back at anytime.

GENERAL INFORMATION

General information contains information such as Job number, Software Version, Door cycles and Journey count. Also the user may reset the Door Cycles and Journey count.

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IO Viewer

Press F2 to ENTER IO Viewer (Input / Output Viewer to the 2nd layer). Select the desired option and press ENTER.

LIFT VIEWER
ENTER CALLS
GENERAL INFORMATION
IO VIEWER

→ * IO VIEWER *
LINK CAR
LINK UP
LINK DN
≈ etc.
RELAY MAINS
RELAY STATUS
RELAY POS

→ Option Selected, View Inputs Or Outputs

Inputs for LINK CAR are selected as below. Car calls 1 and 3 are asserted.

```
*     IO VIEWER      *

LINK CAR          INPUT
  [8 7 6 5 4 3*2 1*]
```

Outputs for RELAY MAINS are selected as below. Relays UP (3) and HS (5) are energised

```
*     IO VIEWER      *

RELAY MAINS     OUTPUT
 [1 2 3*4 5* 6 7 8 ]
```

Menu List (1st layer) | *Menu Selected Options (2nd Layer)* | *Selected Option (3rd Layer)*

Time / Date

ENTER CALLS
GENERAL INFORMATION
IO VIEWER
TIME DATE

→ Time Date Viewer
11:35:50
WED: 12:03:2008
Press Enter to Setup

→ Set Time / Date
[11:35:50]
[WED: 12:03:2008]
Enter to Update

1) Press MENU
2) Press DN 5 times to TIME DATE
3) Press ENTER to View Time
4) Press ENTER again (if desired) to Setup Time Date.
    a. The Flashing cursor indicates the field to be changed.
    b. Press RIGHT to move onto next field.
    c. Press ENTER to complete when all info is set.

Press ESC to go back at anytime.

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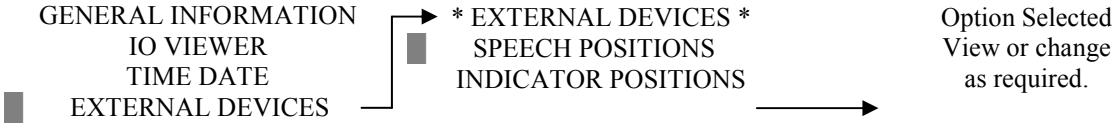
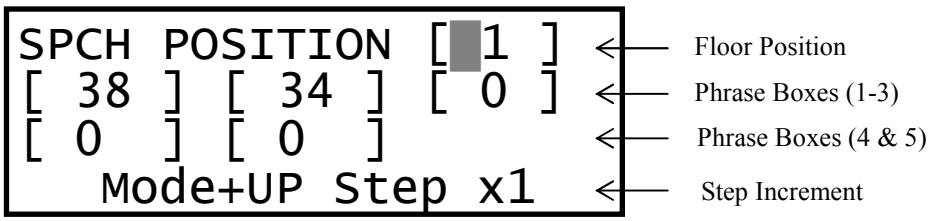
External Devices

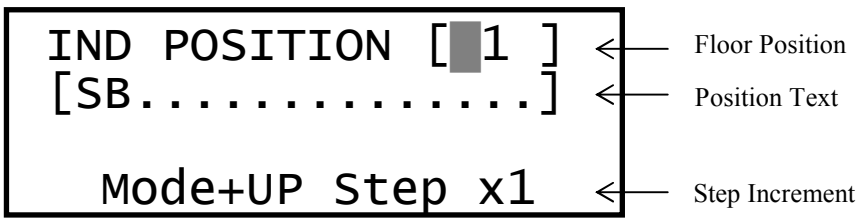


1) Press MENU
2) Press DN 6 times to EXTERNAL DEVICES
3) Press ENTER on selected option.
4) Press ESC to go back at anytime.

Speech Positions are selected as below. Press RIGHT to move the cursor between floor position and phrase boxes. Press the UP / DN keys to alter the information within the boxes. Alter each position (as required) to select the desired phrase combination (see section "TC3 Speech unit Standard Phrase List" for reference of numbers to phrases). By selecting MODE and UP (hold MODE and then press UP), the step increment of the numbers may be altered to vary the speed at which the numbers are selected. Press ENTER to update ("Parameter Updated" should briefly appear at the bottom of the screen).



Indicator Positions are selected as below. Press RIGHT to move the cursor from floor position box to the position text box. Also press RIGHT to move to the next character in the position text box. Press the UP / DN keys to select the desired character. Alter the text for each position (as required). By selecting MODE and UP (hold MODE and then press UP), the step increment of the characters may be altered to vary the speed at which the characters are selected. Most floor positions comprise of 2 characters, however when there is only one, precede the 2nd character with a space, e.g. "SB" as below would become " B" (space then B). Press ENTER to update ("Parameter Updated" should briefly appear at the bottom of the screen).



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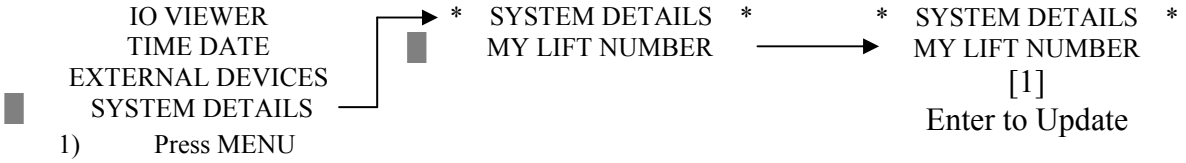
Menu List (1st layer) *Menu Selected Options (2nd Layer)* *Selected Option (3rd Layer)*

SYSTEM DETAILS



1) Press MENU
2) Press DN 7 times to SYSTEM DETAILS
3) Press ENTER
4) To change, Press UP / DN to toggle between Lift Number (1=Lift A, 2=Lift B etc).
5) Press ESC to go back at anytime.

DOOR SETUP

This menu item contains door parameters such as Park Open and Disable Doors etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

DOOR TIMES

This menu item contains door time parameters such as door dwell times, and Lock Time etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

HOMING SETUP

This menu item contains parameters associated with homing operation such as homing floors (pref1 / 2) and Homing time etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

TRAVEL SETUP

This menu item contains parameters associated with lift movement operation such as journey timer, lift speeds and control sequence timers etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed. Also by pressing F3 the menu goes straight to travel setup.

FIRE SETUP

This menu item contains parameters associated with fire control operation such as Fire floor, and control of doors during Fire etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

SPECIAL SERVICE SETUP 1

This menu item contains parameters associated with special services such as Eret 1 return floor (usually Fire Alarm Recall), and control of doors during Fire Alarm Recall etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

SPECIAL SERVICE SETUP 2

This menu item contains parameters associated with further special services such as Prepare to Test Control and Service Control etc. Following a similar procedure as with System Details (above) the parameters may be viewed / changed.

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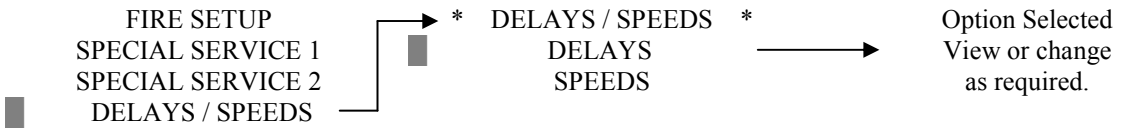
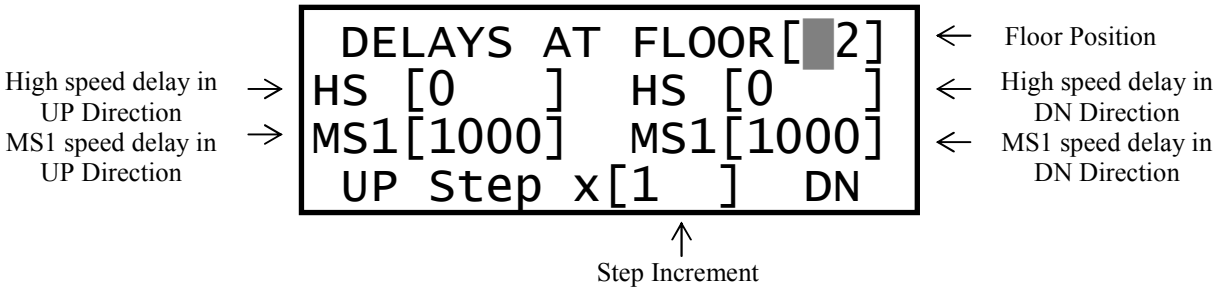
DELAYS / SPEEDS



1) Press MENU
2) Press DN 15 times to DELAYS / SPEEDS
3) Press ENTER on selected option.
4) Press ESC to go back at anytime.

Speed Delays are selected as below. Press RIGHT to move the cursor between floor position and delay boxes. Press the UP / DN keys to alter the delays (in ms) within the boxes. By selecting MODE and UP (hold MODE and then press UP), the step increment of the numbers may be altered to vary the speed at which the numbers are selected. Press ENTER to update ("Parameter Updated" should briefly appear at the bottom of the screen).

Delays correspond to floor position when approaching that floor. The delay is inserted on the trailing edge of the stepping signal (i.e. after coming off SPU on MS1 (medium speed 1), slowdown to level speed is delayed until after 1000mS). Typically for a job with a High Speed of 1.6m/s, a single floor run speed (MS1) will be selected to run at 1m/s, with a Step delay of 1000ms. The combination of a single floor run speed and a delay, permits the lift to generate a single floor run profile.



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Key Switch Operation and Short Cut Keys

1)	Car call top	CPT
2)	Car call Bottom	CPB
3)	All Car calls once	MODE + CPT
4)	All Lan calls once	MODE + CPB
5)	All UP Lan calls once	MODE + F1
6)	All DN Lan calls once	MODE + F2
7)	Engineer Present / Leaving.	MODE + ENTER
8)	Service Visit (when in main menu)	MODE + UP
9)	STEP Override	MODE + MENU
10)	Stopping Vane Override	MODE + ESC
11)	Straight to Lift Viewer	F1
12)	Straight to IO Viewer	F2
13)	Straight to Travel Set-up	F3
14)	Straight to Time Setup	RIGHT + CPT
15)	Straight to General Information	RIGHT + CPB
16)	Logger RAM Purge (when in Event History)	RIGHT + UP
17)	Straight To Prepare to Test	MENU + RIGHT
18)	Switch to Enter Calls when in Lift Viewer	MODE + RIGHT

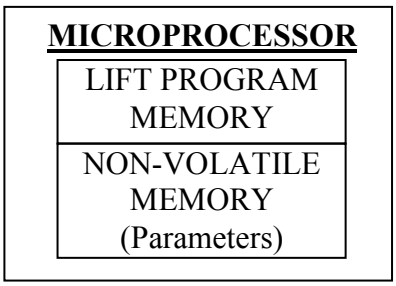
Other Special Operations

MODE + UP, has other uses, i.e. it is used to alter the step increment of numbers when changing selected parameters.

RIGHT, is used as a pointer selector in DATE TIME SETUP, and other text set-up screens.

Parameter Control

There is one set of parameters stored in the non-volatile memory of the micro processor. The parameters are set prior to despatch from Lester Control Systems, according to the customers' specification. All parameters are changeable using the Windows application software, however only selected parameters are changeable from the menu. Prior to system software upgrade **parameters must be saved to a PC** to avoid losing all parameters, since the programming process restores them to default settings.



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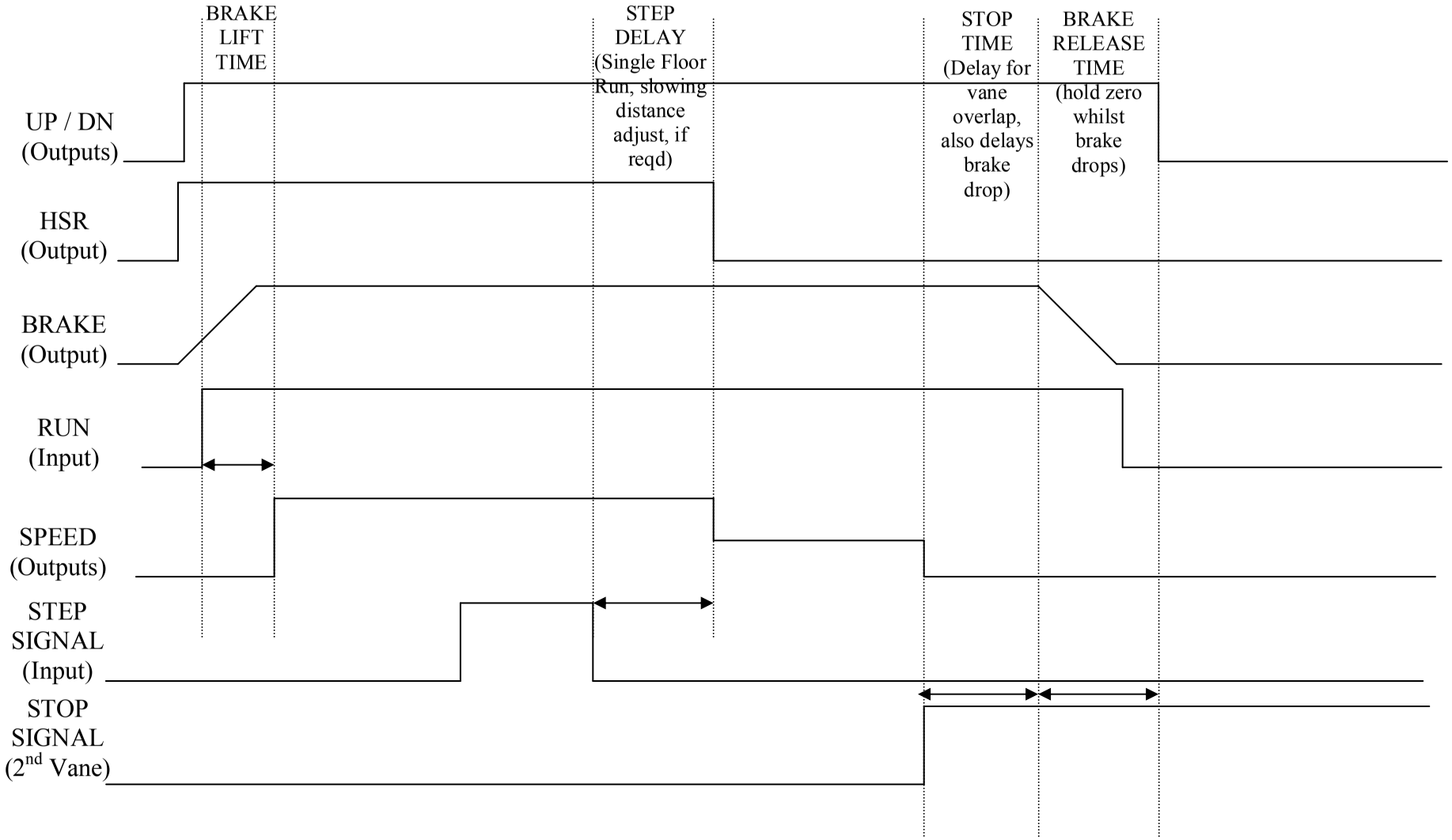
Microprocessor Drive & Stopping Sequence



Above illustrates the signalling for a typical lift journey (Drive and Stopping Sequence). Selected timer parameters highlight controls for starting, slowing and stopping.

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Lift Special Services Operation

Prepare To Test:
The "prepare to test" feature is enabled by pressing MENU + RIGHT on the keypad, through the Engineers Selection menu, or through Special Service2 Setup. This feature has the effect of preparing the lift for full test control by inhibiting any further landing calls, preventing the lift from homing to the main floor, and picking up any further passengers. Any passengers remaining in the lift will still be able to register car calls to their destination. Options are given for disabling the doors and low speed timer whilst on Prepare to Test.

Service Control:
The Service Control Feature is selected by asserting the **SRV** input. When selected, the service control feature renders the lift out of service and transfers all landing calls to other members of the group (if any). The control of the lift is then from the car only, and it is assumed that an attendant would operate the lift in a manual fashion as the car call buttons now become constant pressure whilst the doors are closing. The advantage of such control is for the loading and unloading of goods whereby the attendant has full control of the lift e.g. a porter in a Hotel. Parameters found in **Special Service2 Setup** provide options for enabling/disabling constant pressure door control.

Fire Control:
The Fire Control feature is selected by asserting the **FCS** input. When selected, the fire control feature renders the lift out of service and transfers all landing calls to the other members of the group (if any). There are many different types of Fire control but generally the lift is interrupted from its normal direction of travel to its destination (any car calls being immediately cancelled) and called automatically to a specific floor as a matter of urgency for a fireman. Once the lift has reached this floor, full control of the lift and the doors are assigned to the fireman via constant pressure call buttons and the door open button. Parameters found in **Fire Control Setup** provide options for enabling/disabling constant pressure door control and selecting fire floor etc.

Load Weighing 110% Overloaded:
The 110% overload function becomes active when the lift is stationary (during travel has no effect) and the **OLS** input is asserted. The event 110% overload is generated, doors are parked open, and the lift is then marked out of service.

Load Weighing 90% Overload/Bypass:
The 90% overload function is active when the lift is stationary and the **BPS** input is asserted. The operation of the lift changes such that landing calls are bypassed, therefore reducing the chance of another person entering the lift and fully overloading it. Instead car calls are only answered, so that passengers will leave the lift car thus reducing the weight and relieving the 90% overload condition. Once this is achieved landing calls are resumed and the lift is ready to pick up passengers once again as normal.

Thermistor Tripped:
The Thermistor Tripped function becomes active when the lift is either moving or stationary and the **MRT** input is asserted. Whilst moving car calls are cancelled, landing calls are transferred to other members of the group (if any), and the lift slows and stops at the next available floor. The event Thermistor Tripped is generated, doors are parked open, and the lift is marked out of service.

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Fire Alarm Recall (ERET1):

The Fire Alarm Recall Control Features are selected by asserting the **FAR** input (Fire alarm recall). When selected, the lift is rendered out of service and transfers all landing calls to other members of the group (if any). The lift is interrupted from its normal direction of travel to its destination (any car calls being immediately cancelled) and called automatically to a specific floor as a matter of urgency. Once the lift has reached this floor, full control of the lift is assigned to the user. Parameters found in **Special Service Setup** provide options for door control, and enabling/disabling car calls etc.

Evacuation Control:

Evacuation control is implemented as an extension of Fire control. The basic operation assists in the evacuation of a building, by providing information to an operator within the lift car of persons waiting on a landing. The information is transferred by users on the landing pressing a landing call button, which in turn flashes the car call acceptance illumination within the car. The operator within the lift car may then pick up passengers and take them to an evacuation point (floor), in an orderly fashion as described by the buildings evacuation procedure. Knowledge of passengers waiting is indicated by the flashing car call acceptance illumination. The operator enters a car call to pick up passengers from the destination. The car call illumination then stays on permanently to indicate the car call has been accepted, it will completely extinguish when the call is answered.

Since the car call operation and car call illumination have separate functionality, it is preferred that the car calls are wired using a 4 wire system. The landing calls however, may be wired using a 3 wire system. An output may be configured to drive a buzzer signal, to indicate when a landing call is pressed (see list of configurable outputs).

Self Test Operation (Demand Request):

The self test feature automatically inserts terminal floor car calls (i.e. Top and Bottom or settable via parameters) typically 120 seconds after lift inactivity following a fault condition, e.g. door open/close protection time, lock failure, failure to start etc. This cycle will be repeated every 120 seconds up to a maximum of ten attempts (parameter settable) or until the lift is back in service. After the last attempt, self test will be inhibited and the lift may only be tested again by the insertion of a car call (human interaction). Events will be generated indicating a self test to Top or Bottom, and whether or not the self test Passed or Failed. Parameters found in **General Parameters and General Times** provide options for Self Test.

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Lift Anti-Nuisance Control

Anti-Nuisance features have been included to enhance the operation of the system and help reduce waiting times. All features are configurable by the parameters in the **Anti Nuisance Setup** but typical values are given below. Also the features described below are all disabled during any not-normal service operations, i.e. Fire and Service control.

Door Open Push Held Car Call Dumping:

The remaining car calls will be cancelled and the event "**OPEN PUSH HELD**" will be recorded when the door open push has been held constantly for more than typically 20 seconds.

Safe Edge Held Car Call Dumping:

The remaining car calls will be cancelled and the event "**SAFE EDGE HELD**" will be recorded when the safe edge has been held constantly for more than typically 20 seconds. However this is not active when the door nudging control is enabled.

Stuck Hall Push Detection:

The " **STUCK UP LAN BUTTON** ", and " **STUCK DN LAN BUTTON** " events (UP and DOWN landing call buttons) will be recorded typically 10 seconds after the microprocessor has attempted and failed to cancel the respective hall call. The respective stuck hall call is now ignored but will be eligible for operation after the stuck condition has been removed. However, to provide lift service to the floor with the stuck hall push or pushes, the microprocessor will reinstate the call (if still stuck), typically 240 seconds from when originally detected.

Stuck Car Push Detection:

The " **STUCK CAR BUTTON** " event will be recorded typically 10 seconds after the microprocessor has attempted and failed to cancel a car call. The stuck car call is now ignored but will be eligible for operation after the stuck condition has been removed. However, to provide lift service to the floor with the stuck car call push, the microprocessor will reinstate the call (if still stuck), typically 240 seconds from when originally detected.

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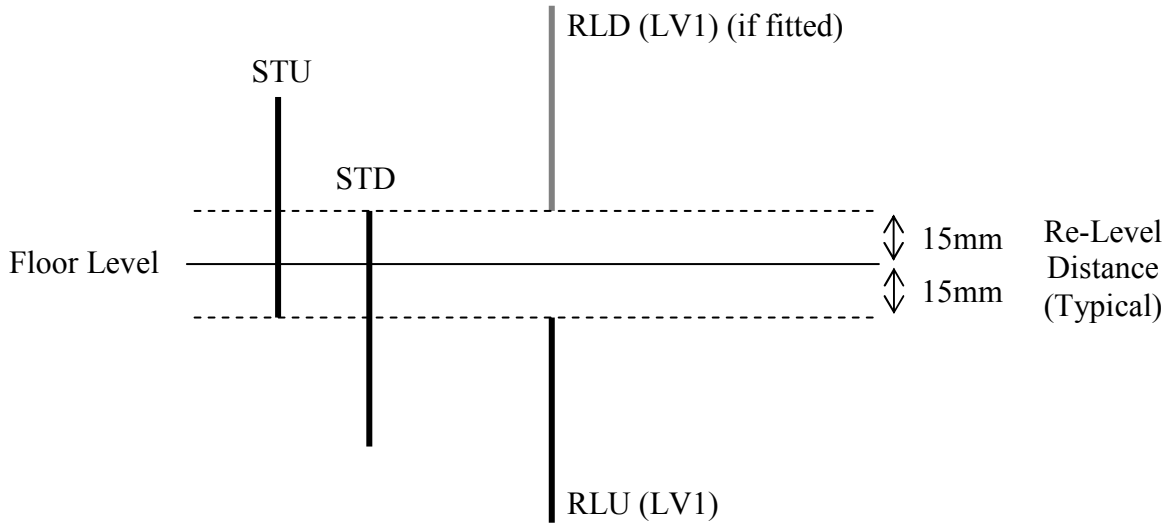
Lift Re-Levelling

(See also Re-Levelling and Advance Door Opening Board)

Lift re-levelling control is achieved using the combination of software, and a safety critical Re-Levelling / Advance Door Opening Board. The software provides functionality by analysing vane information, producing outputs to re-level, checking for stuck vanes, reporting and acting upon error conditions etc, whereas the safety critical board, checks for correct vane information (also stuck vanes) and ensures that safety circuits (car / landing lock circuits) are only bridged, when the conditions are correct. The safety critical board in conjunction with the physical shaft vane information (re-level proximity vanes), is designed to conform to BS/EN81 standards.

Re-Levelling Vane Layout



The Lift will re-level within the re-level distance (as shown). The distance may be varied to be smaller or larger (as required). However if it is too small instability / errors may occur, also if it is too large, the step between the lift car and landing entrance may be excessive before it re-levels. Overlap between re-level vanes and stopping vanes at the re-level point is not necessary since it requires both LV1 to energise and STU to release, to start re-levelling in the up direction for example. The order of the vanes is not important, however for predictable operation, setting both vanes the same distance is recommended.

Re-Level Up Sequence

1. Lift sinks onto RLU, and at (or about) the same time comes off the trailing edge of STU.
2. The micro processor initiates the start sequence by energising the re-level output.
3. The re-level output signals the re-level board to bridge the lock circuit.
4. The micro processor monitors the lock circuit and a feedback contact from the re-level board before energising the UP relay and other associated controls.
5. Re-levelling Up now commences.
6. The micro processor monitors the vane information and re-levelling starts to terminate upon release of RLU. (If a fault occurs, re-levelling may be terminated for various other conditions.)
7. A delay off timer set by parameter RELEV_UP_STOP_TIME determines the re-level distance and ultimately the floor level after re-levelling.
8. The micro processor performs a final check to ensure the feedback contact has released.

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Hydraulic Normal Stopping Sequence

The stopping sequence during normal operation has an effect on the re-levelling setup regarding vane setup, vane overlap, and ultimately re-levelling distance. Related parameters set within the factory will suit most installations, but an appreciation of this could be regarded as necessary. The UP stopping sequence is divided into 2 stages, and applies to Hydraulic systems which:

1. Release the valves firstly then the pump.
2. Release the pump first, then the valves.

Stopping Sequence (valves 1st, pump 2nd)		Stopping Sequence (pump 1st, valves 2nd)
i)	Stop vanes STU and STD both operate.	Stop vanes STU and STD both operate.
ii)	Stop timer, starts timing	Stop timer starts timing.
iii)	Stop timer timed?	Stop timer timed?
iv)	**Release Valve (UP pilot relay).**	**Release Pump (UP pilot relay).**
v)	Enable release timer, starts timing.	Enable release timer, starts timing.
vi)	Enable timer timed?	Enable timer timed?
vii)	**Release Motor (Enable pilot relay).**	**Release Valve (Enable pilot relay).**

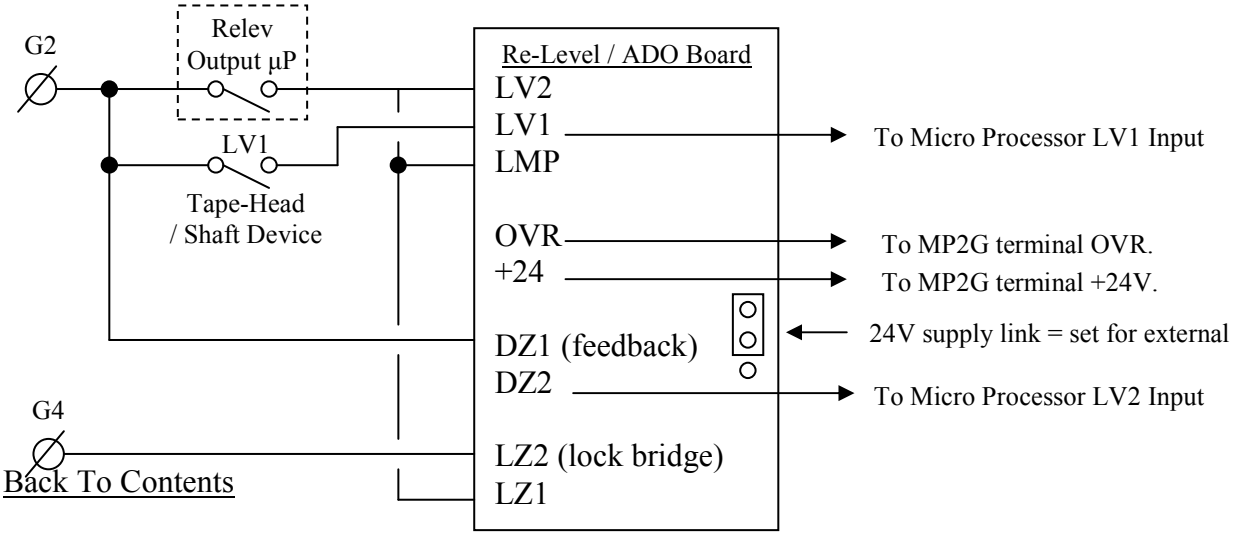
The pressure within the hydraulic system is applied by the motor in the UP, and is released at the appropriate time in accordance with the valve release sequence. In the DOWN the pressure is applied constantly by the weight of the lift, and the release of the valve determines stopping.

Parameters STOP TIME and ENABLE RELEASE TIME can be found in TRAVEL SETUP from the menu. They are settable in milliseconds (0-3000).

A typical setting for STOP TIME is derived from the levelling speed of the lift:
Level Speed = 0.06m/s = 60mm/s, Therefore to stop within 15mm, a time of (15/60) = **250mS** is required. Taking into account distance for the lift to reach zero speed from level, we may allow 10mm approx. This gives an approximate time of 10/60 = 166mS.
Therefore typical STOP TIME = (250-166) ≈ 100mS

A typical setting for ENABLE RELEASE TIME that allows pump run on after the valve has released is 500mS. This has the effect of keeping maintaining a constant pressure when the valve closes, and thus should provide a predictable, and softer stop.
Typical ENABLE RELEASE TIME = 500mS

Re-Level IO and Board Interface



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Re-Level Warnings

A Re-level Warning is given for the following conditions:

1. Wrong vane sequence (i.e. wrong vane sequence release)
2. Re-level timeout.
    a. Maximum re-level time exceeded.
3. Re-level Lock Bridge faults (check for locks bridged when re-levelling).
    a. Locks not bridged before re-levelling
    b. Lock Bridge removed whilst re-levelling. (If floor level is not reached, re-level timeout will be generated 1st, otherwise lock bridge warning).
4. Re-level board feedback fault.
    a. Feedback contact not made up before re-levelling.
    b. Feedback contact not released after re-levelling.
5. Emergency stop whilst re-levelling (re-levelling terminates, event generated).
6. Re-levelling Pump up / Sunk down control.
    a. If lift sunk down off Stopping vanes STU / STD, and not re-levelled UP.
    b. If pumped /moved up past Stopping vanes STU / STD, and not re-levelled DN.

After a warning, re-levelling is inhibited for 5 seconds, to allow for last run to terminate (i.e. contactors and backup timer to de-energise). After 5 seconds, a recovery call is made to another floor, in an attempt to eliminate conditions specific to the floor that caused the warning i.e. faulty vanes / tight guides etc. The recovery call preference, is to send the lift down a floor, however if this is not possible it will go UP. If the fault is not floor specific, further warnings will be reported until a warning limit is reached. After this warning limit is reached re-level failure is initiated.

The warning level is incremented **(typically by 10)** every time a warning is generated. Otherwise if re-level was successful, the warning level is decremented **(typically by 2)**. The warning level maximum typically set at 30 would allow 3 successive re-level warnings before failure.

Re-Level Failures

A Re-level failure occurs for the following conditions.

1. Stuck vane / signal
    a. Either LV1 vane, or LV2 signal.
    b. or BOTH.
2. Error warning level exceeds warning limit.
3. Sunk down and unable to recover.
    a. The lift has sunk down and a warning is generated. Normally the lift will attempt a recovery call. However if the lift cannot recover due to conditions such as excessive overload, locks open when constant pressure close doors etc, a re-level failure is generated.
4. Re-level Yoyo Error.
    a. Excessive re-level operations (see yoyo operation)

Under failure any run is terminated, calls are cleared, and an attempt to return the lift to the lowest floor is made. Whereby it stays out of service, until the processor is reset (i.e. power removed / restored).

An exception to this condition is Fire Control whereby the condition is suspended to allow the fireman full control of the lift. After fire operation is complete, the lift will then return and hence stay out of service.

Re-level Yoyo Detection

Re-levelling operations can be monitored, and a fault trigger can be programmed when an excessive amount have been reached. The term yoyo, relates to the "yoyo toy" whereby the motion is a continuous UP / DN. Excessive re-levelling cycles can be due to overheating hydraulic oil or faulty proximity switches etc. Faults such as this (if ignored) may place the lift in a dangerous condition. Programming is achieved by setting the number of yoyo's allowed within a given time period. Typically this is set at 12 within a 60 minute period. A re-count is made for every minute. If the number of yoyos exceeds these settings, re-levelling is terminated, and the lift is returned to the bottom as described in the re-level failure sequence.

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Re-Level Parameters

Re-levelling parameters are found in Hydraulic setup (not specific to Hydraulic, but generally), and allow typical programming as below:

RELEVEL REQUIRED	Yes / No switch for re-levelling
MAX RELEV PERIOD	Max time allowed for re-levelling
RELEV YOYO COUNT	Number of Yoyo's within Yoyo period
RELEV YOYO PERIOD	Period for detection of number of Yoyo's
RELEV UP STOP TIME	Stop UP delay after re-levelling UP.
RELEV DOWN STOP TIME	Stop DN delay after re-levelling DN.
RECOVERY TIMEOUT TIME	Time allowed for recovery call to be completed
RELEV START TIME	Start delay before re-levelling.

Re-Level Event Recording

Below is a list of events that will appear in the fault logger if any errors occur with the re-levelling system. Errors will be reported by one or more events during the sequence state, i.e. during Re-level Start, Run, or Stop. The fault may occur for various reasons i.e. Timed (timeout), STU / STD lost, Board Feedback, or Lock Bridge etc. Checking the logger and event sequence will provide useful information in establishing the reason for the fault.

EMERGENCY STOP RELEVL

RELEV_START_FAULT_UP
RELEV_START_FAULT_DN

RELEV_RUN_FAULT_UP
RELEV_RUN_FAULT_DN

RELEV_STOP_FAULT_UP
RELEV_STOP_FAULT_DN

RELEV_ERR
RELEV_YOYO_ERR
RELEV_HYDOTL_ERR

RELEV_TIMED

RELEV_STU_STD_LOST
RELEV_STU_LOST
RELEV_STD_LOST

RELEV_SUNK_DN_ERR
RELEV_PUMPED_UP_ERR

RELEV_LOCK_BRIDGE
RELEV_BOARD_FEEDBACK

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Specific Hydraulic Operations

Hydraulic Homing

Hydraulic homing is a requirement of BS/EN81, relating to "Electrical Anti-Creep (EN81-2-1998:14.2.1.5)" which states that "the car shall be dispatched automatically to the lowest landing, within 15 minutes of the last normal journey".

Therefore, if the lift is idle and not at the bottom floor, the Hydraulic Homing timer will start to expire (typically 10 minutes). When the timer expires, a homing call to the bottom floor is made. If the normal homing floor is programmed to any other floor than the bottom, the lift will first return to the homing floor as programmed, and then Hydraulic home to the bottom after 10 minutes.

Hydraulic Over-travel Detection

Over-travel detection is a requirement of BS/EN81, relating to "Method of operation of final limit switch (EN81-2-1998:10.5.3)" which states that "After the operation of the final limit switch, car movement in response to car / landing calls shall no longer be possible, even in the case of the car leaving the actuation zone by creeping. The return to service of the lift shall not occur automatically (10.5.3.2)".

An input to the microprocessor is specifically reserved for Hydraulic over-travel detection.

Following this condition, and identical to re-level failure, any run is terminated, calls are cleared, and an attempt to return the lift to the lowest floor is made. Whereby it stays out of service, until the processor is reset (i.e. power removed / restored).

An exception to this condition is Fire Control whereby the condition is suspended to allow the fireman full control of the lift. After fire operation is complete, the lift will then return and hence stay out of service.

Thermistor Operation when Hydraulic

When the motor / machine room thermistors have tripped, the lift cannot move in the upwards direction, therefore an attempt to return the lift to the lowest floor is made. Re-levelling is inhibited at this point. The lift stays out of service until the thermistors have reset.

Journey Timer Operation

Journey timer operation is slightly different for Hydraulic lifts, whereby an attempt to bring the lift to the bottom is made before placing the lift out of service. This applies to when the lift was travelling in the UP direction, and not the DN.

If the lift journey timer times in the UP direction, the run is terminated and a journey timer event is reported. An attempt to return the lift to the lowest floor is made. If journey timer times during this run, lift movement is disabled and it stays out of service, until the processor is reset (i.e. power removed / restored).

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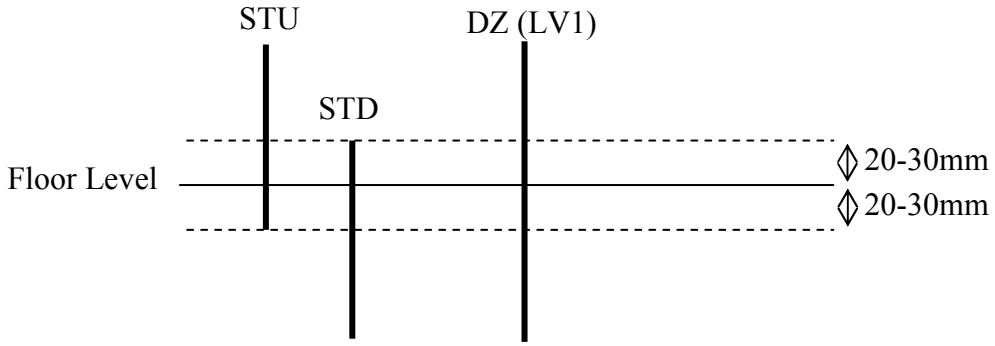
Advance Door Opening (without Re-levelling)

(See also Re-Levelling and Advance Door Opening Board (relev / ado board))

Similar to re-levelling, Advance Door Open control is achieved using the combination of software and a safety critical Re-Levelling / Advance Door Opening Board.

The main differences are below:

1. The vane layout is different (as shown below) whereby the Door Zone is a continuous vane, instead of 2 separate vanes (RLU / RLD).
2. For a traction lift, The STOP TIME is generally greater; hence the vane overlapping distance.
3. An Advance Door Open Output (from the μP) may be used instead of a re-level output (however the Re-level output also energises when advance opening.)



Advance Open Sequence (UP direction)

1. Lift approaches floor level on levelling speed.
2. Vane DZ (LV1) is energised, and at the same time STD. (**Note seeing STD before DZ will generate errors, however the processor allows a tolerance of 10mm approx)**
3. The micro processor starts the sequence by energising the advance open output.
4. The advance open output signals the relev / ado board to bridge the circuit between LZ2 and LZ1 on the re-level / ado board.
5. The micro processor monitors the lock bridge circuit via a feedback contact from the re-level board before starting the ADVANCE OPEN DELAY TIMER.
6. When the ADVANCE OPEN DELAY TIMER times, DOR energises and the doors advance open.
7. The micro processor monitors the vane information and advance opening terminates upon seeing both stop vanes STU / STD. (If a fault occurs, advance opening may be terminated for various other conditions.)

The sequence for DN is almost identical to UP, except the states of STU / STD are substituted.

The parameter "ADVANCE OPEN DELAY" (0-3000ms), found in DOOR TIMES, determines the amount of advance door opening, i.e. the shorter the delay, the more the doors will have opened before stopped, and the greater the delay less the doors will have opened.

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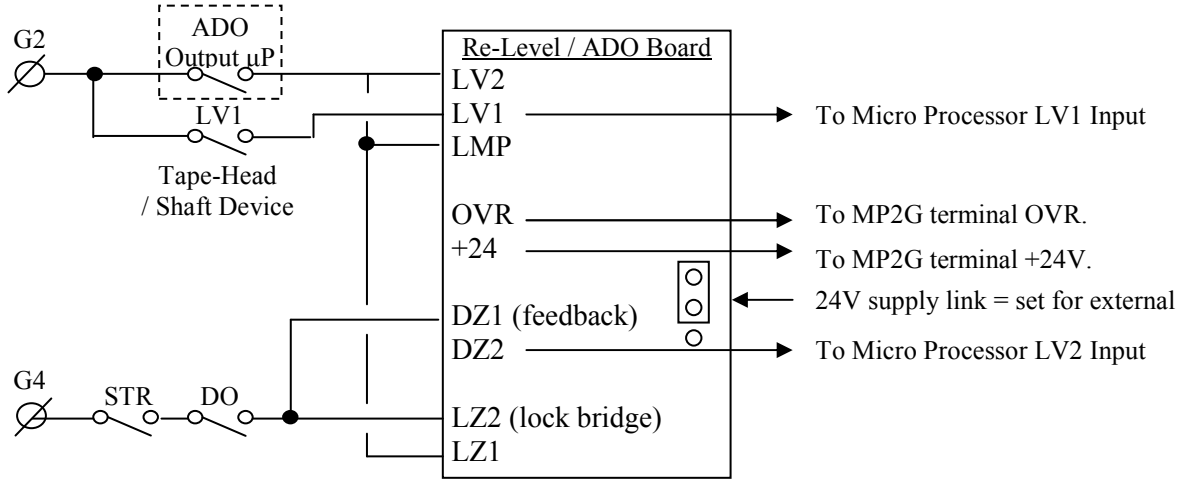
Advance Open IO and Board Interface



Conditions Affecting Advance Door Opening

1. If the door zone vane (DZ) to processor input LV1 has not energised when seen a stopping vane. The event "RELEV/ADO VANE1 MISSN" will be generated.
2. If the DZ feedback to processor input LV2 has not energised when the relev / ado board has been signalled to bridge the circuit between LZ2 and LZ1. The event "ADO LOCK BRIDGE FAIL" will be generated.
3. Any stuck vanes / signals will inhibit advance opening. Events in the logger such as below may be generated:
   a. "RELEV/ADO VANE1 STUCK"
   b. "RELEV/ADO VANE2 STUCK"
   c. " STU AND STD STUCK "
   d. "   STU STUCK   "
   e. "   STD STUCK   "
4. The wrong stopping vane sequence will inhibit advance opening. Events in the logger such as below may be generated:
   a. " STOP VANE FAULT UP "
   b. " STOP VANE FAULT DN "
5. Other conditions which will inhibit advance door opening are:
   a. When not set for advance door open (DOOR PAR, advance door open = NO)
   b. When not normal service i.e. Fire / Fire Alarm Recall.
   c. When constant pressure open i.e. Service Control.
   d. When doors are disabled.
   e. When Open on switches are disabled:
      i. Open on Init
      ii. Open on Reset
      iii. Open on Homing etc.
   f. When on High Speed.
   g. When not arrived at destination.

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Serial Communication Types

The MP2G has been designed with many types of on board communications. These different types of communications have specific functions for interfacing to the processor. Information from the various communications can be accessed remotely over a network / Internet link, if the Internet option is fitted. Typical uses are detailed below:

CAN Communications (Controller Area Network)
The CAN communication ports provide interface to a range of serial products including Lester Controls Serial Speech Unit and Indicators. Also communications between lifts (Group Communications) are carried out over the CAN bus.

RS232 Communications
The RS232 communications port is used to transfer parameters and other information from a PC / Lap top to the MP2G and vice versa.

RS4XX Communications
RS4XX refers to RS422 or RS485 since the hardware supports both. The communication port is dedicated for lift drive communications such as to an Inverter drive. Serial communication reduces the amount of signalling between the lift controller and drive, and therefore reduces wiring and at the same time increases reliability. Information such as control, parameters, speed, and diagnostic information may be accessed from the drive.

Serial Communication Types and their uses:

CAN BUS	Function
CAN1	Communications to Lester's serial Speech / Indicator Products
CAN2	Communications between lifts i.e. Duplex etc. (also monitoring via Internet)
RS232	Communication to Lap Top / PC for parameters transfer and Interrogation. (also via Internet)
RS4XX	R422 or RS485 Dedicated Drive Communications (also monitoring via Internet)

Communications Interface to a Network / Internet system
As an optional extra, some of the above communications are accessed via a remote Network / Internet system for Remote Monitoring / Controls. Group communications (CAN2) is accessed for lift monitoring such as position and status etc. The RS232 communication provides an interface to the parameters and the RS4XX communications. E.g. lift parameters and drive information are passed through the RS232 port.

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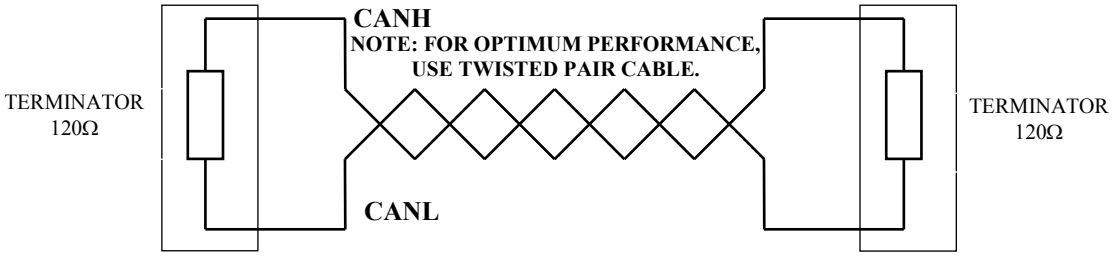
Communication Wiring Terminators and Their Importance

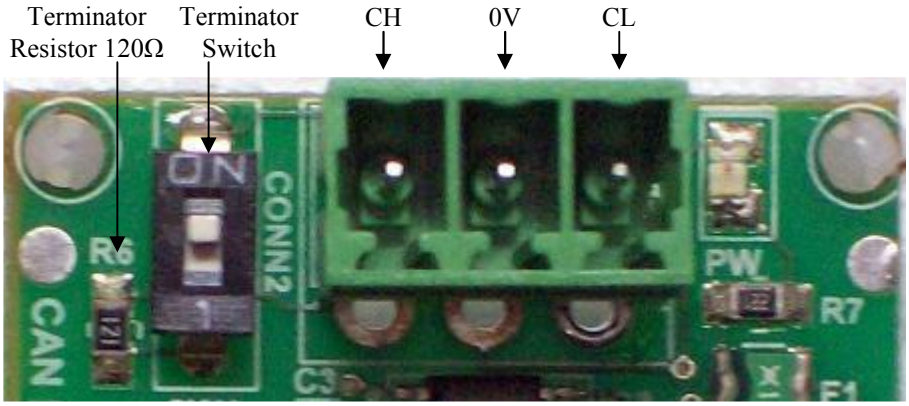
In general, any serial communication field-bus (cable / wiring) **must** be terminated correctly for reliable operation. If not, the result is that messages transmitted on the cable reflect and cause many collisions and errors. The longer the cable, the more critical the terminators are. It is therefore typical that most problems are associated with serial the Speech Unit and Indicators. Typical symptoms are:

1. Speech Unit / Indicator not responding at all.
2. Speech Unit / Indicator lagging behind the lift (i.e. position is updated much later than expected).
3. Speech Unit repeats (announces floors twice).
4. Logger reports "CAN1 BUS OFF ERROR".
5. Logger reports "SPCH UNIT COMS LOST".

These terminators are simply resistors of value 120Ω which are used to match the impedance of the cable (as shown in the CAN example below). With the MP2G system the terminators are fitted on the communications CAN1, CAN2, and RS4XX. For RS232 however terminators are not required.



The resistors are fitted on the boards CAN1 / RS4XX, but are also fitted on the speech / indicator boards. The resistor is placed across the relevant connections when the switch is "ON" (see picture below) or the link is fitted (CAN jumper link).



Wiring Terminators Simple Check

A reliable way to check if terminators are fitted correctly is to measure the resistance. E.G for CAN1, this can be achieved by firstly removing power from the controller and indicators / speech unit. Then using a test meter selected for resistance (Ω) (set to 2K approximately), measure across CH and CL (usually terminals PIH and PIL). The value should read approximately **60Ω if correct**, 120Ω if only one terminator is fitted, 40 Ω if 3 terminators are fitted, and open circuit if no terminators are fitted. Repeat setting and checking of terminators until correct.

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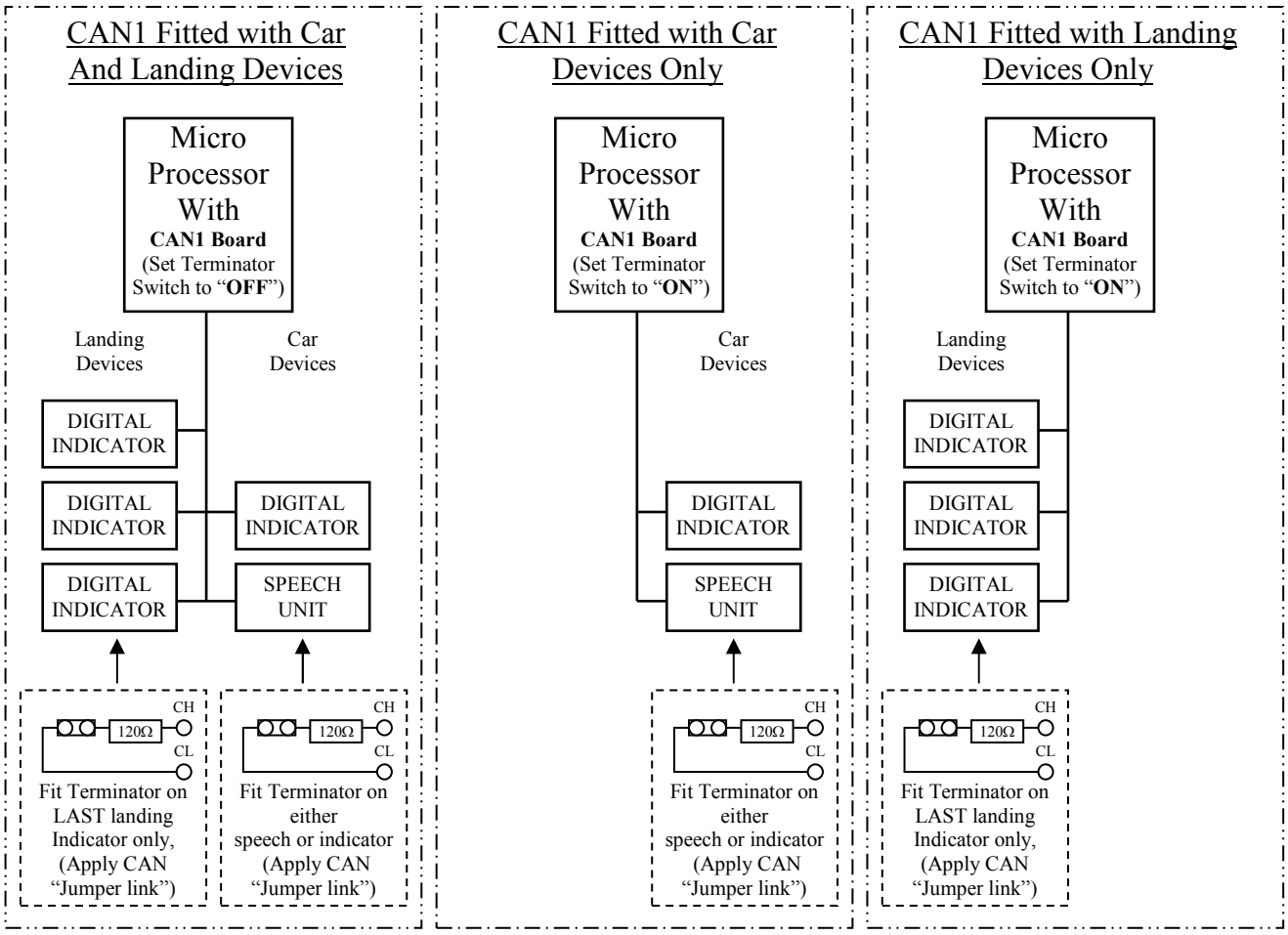
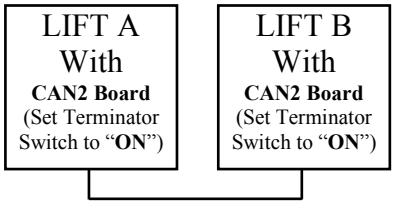
CAN1 (Speech / Indicators) Communication Wiring Terminator Variations

In order to terminate the CAN field-bus wiring properly, the terminating resistors must be applied at the correct points in the shaft, controller, or lift car as shown.



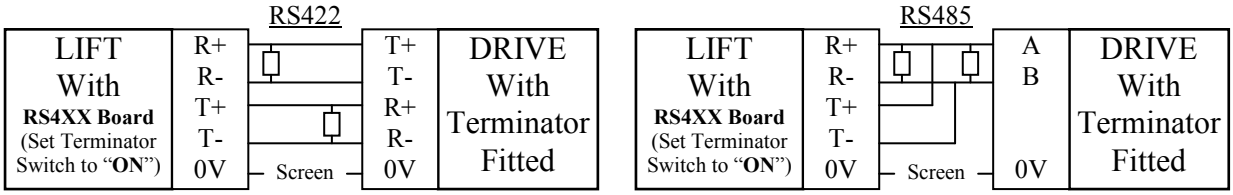
CAN2 (Group) Communication Wiring Terminators

Shown below is a Duplex pair of lifts. In order to terminate the CAN field-bus wiring properly, the terminating resistors must be inserted on the CAN2 board on each lift.



RS4XX (Drive) Communication Wiring Terminators

Termination for RS422 and RS485 is shown below. Since RS422 has both transmission and receive channels, the termination is the fitted on the receive end of both.



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List of Configurable Inputs

Below is a typical list of configurable Inputs.

EMER
IP2
LANL
TEST_UP
TEST_DN
HYD_OTL
DRIVE_LEV_SPEED
RELEV_1
RELEV_2,
RELEV_LK_SHORT
IP11
IP12
IP13
IP14

IP15
IP16
DOC
IP18
IP19
IP20
IP21
IP22
IP23
IP24
DISABLE_DOORS

SLU_HS
SLD_HS
IP28
IP29
IP30
IP31
SLU_MS1
SLD_MS1
IP34
IP35
IP36
IP37
IP38

FAST_SPU
FAST_SPD
MSU,
MSD
STR
RSU
RSD
IP46
IP47
IP48
IP49

DOP
SE
DLR
DCP
DOOR_HOLD
IP55
IP56
IP57
IP58
IP59
IP60
IP61
IP62
IP63
IP64
IP65
IP66
IP67
IP68
IP69
IP70
IP71

THERM
TEST_SWITCH
FIRE
SERV
ERET1
IP77
IP78
IP79
LW110
LW90
ALARM
IP83
IP84
IP85
IP86
IP87
IP88
IP89
IP90

IP91
IP92
IP93
IP94
IP95
IP96
SPEECH_HUSH
IP98
IP99
IP100
IP101
IP102

IP103
IP104
IP105
IP106
IP107
IP108
IND_HUSH
IP110
IP111
IP112
IP113

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LU6
LU7
IP239

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List of Configurable Outputs

Below is a Typical list of configurable Outputs.

UPR
DNR
HSR
LSR
RELEV
RETIRING_RAMP
OP7
OP8
OP9
OP10
OP11

IU
ID
HLR
OP15
GONG
OP17
OP18
OP19
OP20

DOR
DCR
NUG
ADV_OPEN
OP25
OP26
OP27
OP28
OP29
OP30
OP31
OP32

BR_LIFT_REL
DRV_ENABLE
DRV_BASEBLOCK
DRV_BIN_SPA
DRV_BIN_SPB
DRV_BIN_SPC
DRV_TOP_SP
QUICK_SLOW
OP41
OP42
OP43
OP44
OP45
OP46

OSI
OLI
OP49
FIRE_IND
OP51
TEST_IND
OP53
OP54
OP55
OP56
OP57
OP58
OP59
OP60
OP61
OP62
OP63

OP64
OP65
OP66
DOP_SE_DE_HELD
DOP_ILLUMINATION
OP69
OP70
OP71
OP72
OP73

GATE_OP_WARN
OP75
OP76
OP77
START_FAIL
OP79
DOOR_OP_PROT
DOOR_CL_PROT
LAN_LOCK_FAIL
MOTION_FAIL
OP84
OP85
OP86
DOUBLE_JOURNEY
HYDRAULIC_OVERTRAVEL
RELEVELLING_ERROR
OP90
OP91
OP92
OP93
OP94
OP95
CARCAL PRESSED
LANCAL PRESSED
OP98
OP99

CAN1_BUS_OFF
CAN2_BUS_OFF
OP102
OP103
OP104
WITHIN_FLEV
OP106
OP107

OP108
OP109
SPEECH_TRIGGER
BIN_POS_A
BIN_POS_B
BIN_POS_C
BIN_POS_D
OP115
OP116

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PI1
PI2
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PI7
PI8

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TC3 Speech unit Standard Phrase List

1. THIS LIFT IS
2. THIS LIFT IS UNDER
3. THIS LIFT IS RETURNING
4. THIS LIFT IS RETURNING UNDER
5. TO
6. TO THE
7.
8. OUT OF SERVICE
9. OVERLOADED
10. FIRE CONTROL OPERATION
11. EVACUATION CONTROL
12. PRIORITY CONTROL
13. SERVICE CONTROL
14. EXPRESS SERVICE
15.
16.
17. LIFT ALARM HAS BEEN ACTIVATED
18. MAIN EXIT
19.
20.
21.
22.
23. DOORS OPENING
24. DOORS CLOSING
25. PLEASE STAND CLEAR
26. OF THE DOORS
27. PLEASE MIND THE DOORS
28.
29.
30. GOING UP
31. GOING DOWN
32.
33.
34. XFLOOR
35. FLOORX
36. XLEVEL
37. LEVELX
38. SUB BASEMENT
39. LOWER BASEMENT
40. BASEMENT
41. LOWER GROUND
42. GROUND
43. UPPERX
44. LOWERX
45. MINUS
46. 0
47. 1
48. 2
49. 3
50. 4
51. 5
52. 6
53. 7
54. 8
55. 9
56. 10
57. 11
58. 12
59. 13
60. 14
61. 15
62. 16
63. 17
64. 18
65. 19
66. 20
67. 20X
68. 30
69. 30X
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105.
106.
107.
108. CAR PARK
109.
110.
111.
112.
113. LOBBY
114. MEZZANINE
115. PENTHOUSE
116.
117. RECEPTION
118.
119.
120.
121.
122.
123.
124.
125.
126. BING (WESTMINSTER)
127. BONG (WESTMINTSER)

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