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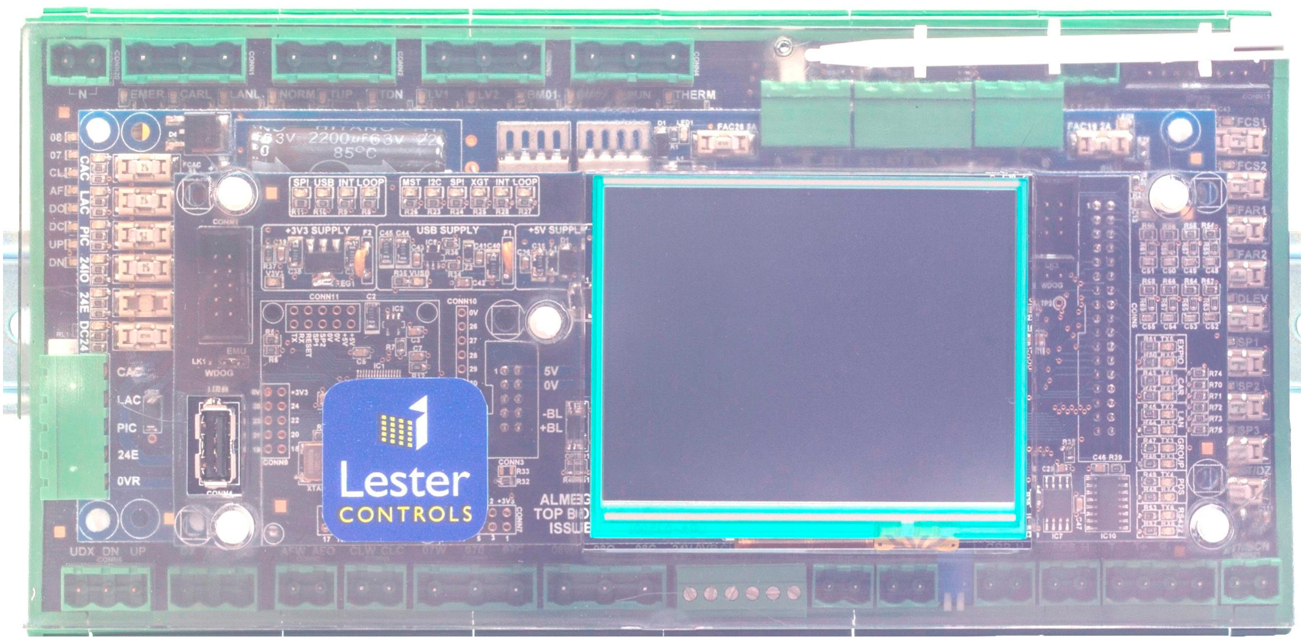

TECHNICAL MANUAL
FOR THE ALMEGA 2
MICROPROCESSOR SYSTEM
ISSUE: 1
Date: 15/09/2014

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1) Introduction

The ALMEGA 2 microprocessor has been designed as a successor to the ALMEGA. The product retains the proven technical ability of the ALMEGA, plus the addition of many new features / enhancements. Utilising the latest technology it has adopted TFT LCD technology with touch screen for a user friendly menu & programming interface. Also, a more powerful Dual Core micro processor has been chosen to handle the enhanced display and allow more processing for lift functions. USB technology has been implemented to provide a high speed serial interface to PC's / Laptops, but also to provide an expanded memory system using a USB memory drive. The USB "stick" can be used to store backup parameters and software versions, and also can be used for software updates.

The system consists of a Base IO module, and optional Expansion IO modules. The Base IO module contains the lift micro processor, USB micro processor, Wi-Fi module, Power supplies and "controller IO" connections. The expansion IO modules provide IO for the lift shaft and are enclosed in custom designed DIN rail mounting modules, thus the system is modular depending upon the number of floors and features. Expansion IO may also be mounted within the lift shaft. This does NOT use the same DIN RAIL modules but instead uses the IO associated with Lester Controls "pre-wired" Serial IO system. These provide functions for the landing IO as well as car IO.

Direct serial communication to selected Position Devices and motor drives (i.e. VVF) provides "Direct to Floor Control" for time and energy efficiency, better reliability, control, and a wealth of information can be accessed for diagnostics / monitoring purposes. The microprocessor will also connect directly to Lester Controls serial indicator and speech units, providing full programmability of up to 32 floors and many messages and features.

Windows application software is available to allow the user to change parameters and settings to suit the lift installation. All parameters, IO, serial speech / indicator are fully programmable. The software also provides the user with diagnostic tools for viewing detailed information regarding the status of the lift, motor drive and positioning system. The information is also available remotely via the Internet / Intranet connection with the Internet Monitoring, add on option.

2) Manual Supplements

There are a range of manual supplements available for specific information regarding the ALMEGA 2 lift control system. The information in these supplements provide additions for special / specific lift functions that would not normally required within the scope of this manual. Some supplements available are Internet connectivity, serial communications with an inverter drive, and Emergency supply operation etc. Contact Lester Controls for availability, or visit the web site to download those currently available.

3) List of Equipment

1) ALMEGA 2 Microprocessor system.

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

3) 1 USB 2.0 Communication Cable, Male to Male, Type A.

4) 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**, **CARL**, **LOCK** are illuminated on the mains input 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.

Note:
If you have any problems at this stage please refer to the fault finding section of this manual.

5) 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.

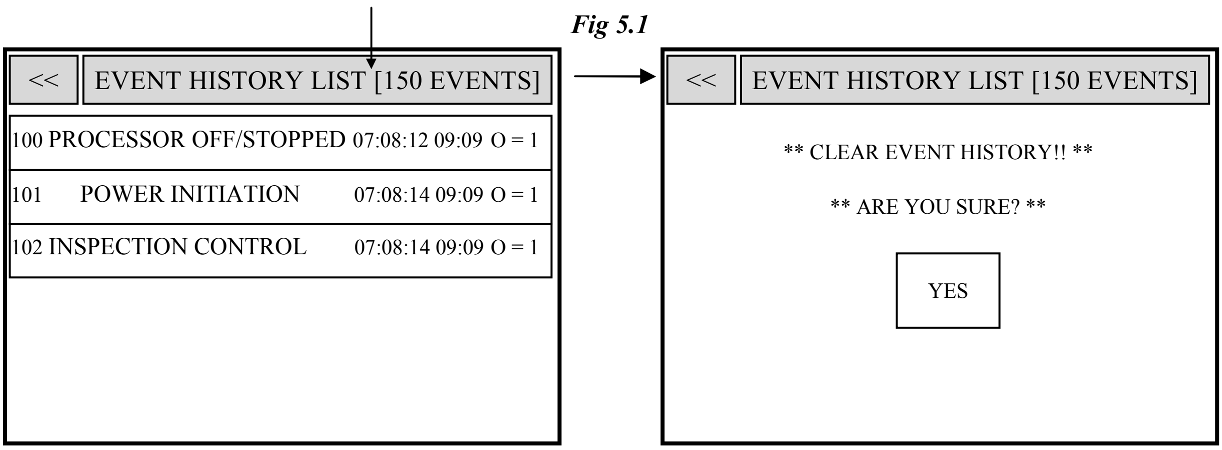
Installation state:
The lift installation is complete and is to be operated normally for the first time. The tape head, door operator, Emergency stop buttons, locks, safety circuit, shaft switches, proximity and levelling signals have been checked on TEST control as previously instructed and are operating 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 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**.

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 the EVENT HISTORY LIST button (as shown) invokes an "Are you sure" screen to clear/purge all events stored in the Event Logger. Press YES to confirm, or press << to cancel.

Fig 5.1



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.

5.1) Limits (Slowing/Stopping) and Buffer Tests

A set of dedicated buttons are available to assist in the testing of the slowing limits, stopping limits and lift buffers (i.e. buffer test). To make the buttons appear press and hold the shaft area of the screen for 5 Seconds. Once the buttons appear they need to be held under "constant pressure" to invoke the function. If the buttons are not pressed for a period of 20 minutes they will disappear and the normal lift viewer screen will be shown, otherwise the timer is reset when the screen is pressed. Also to clear the buttons, simply press MENU and press LIFT/GROUP VIEWER to re initialise the lift viewer.

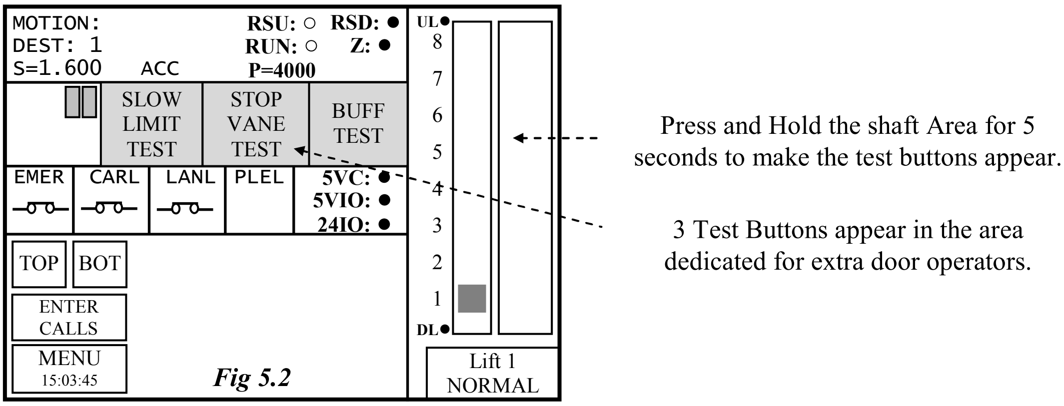


Fig 5.2

3) Testing of Slowing switches:

Press **TOP** button to register a top car call and, then press **SLOW LIMIT TEST** button under constant pressure to inhibit the STEP signal, thus forcing the lift to slowdown via the slowing limit. Press **BOT** to register a bottom car call and repeat the above process.

4) Testing of Terminal switches:

Press **TOP** button to register a top car call and then press **STOP VANE TEST** button under constant pressure to inhibit the stopping signals (e.g. STU and STD), thus forcing the lift to stop on the terminal limit. Press **BOT** to register a bottom car call and repeat the above process.

5) Testing of the Lift Buffers (Buffer Test):

Note this function is to be used only by responsible Lift Test Engineers!

Press **TOP** button to register a top car call and then press **BUFF TEST** button under constant pressure to inhibit the **slowing**, **slowing limits** and **stopping signals**, thus forcing the lift to crash stop onto the lift buffers on HIGH SPEED! Press **CPB** to register a bottom car call and repeat the above process.

Note:

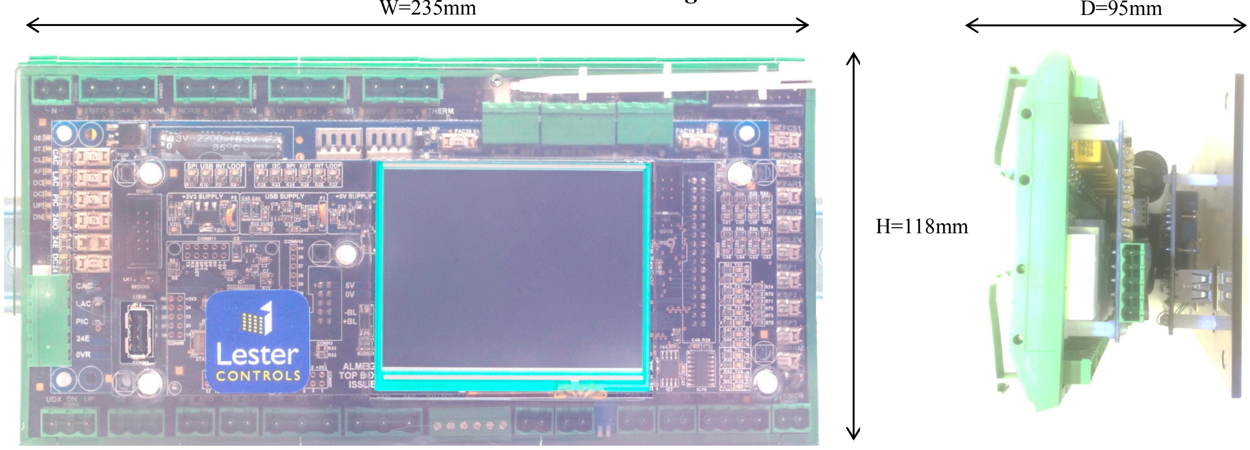
If you have any problems at this stage please refer to the fault finding section of this manual.

6) Hardware Section

6.1) Physical Dimensions

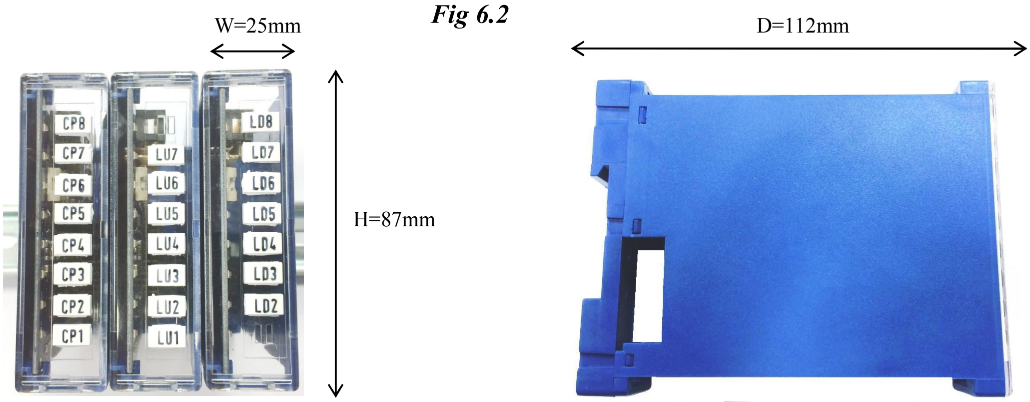
<u>Base Unit</u>

Fig 6.1



<u>IO Module(s)</u>

Fig 6.2



The base Unit and IO Modules are DIN rail mounting. Up to 30 modules can be added for extra IO. The modules clip into each other via a connection system at the base, thus no extra cables are required to add IO. The width spacing is 25mm, thus for 5 modules a space of 125mm is required, and for 10 modules 250mm is required.

6.1.1) Horizontal Fixing

The Base Unit and IO modules are typically mounted horizontally as shown below. The connection from the Base Unit to the IO modules is via a purpose made "screened" communications cable. The IO modules may be mounted next to the Base Unit or away from it on another a separate piece of DIN rail. The cable length can be adjusted to suit.

Fig 6.3

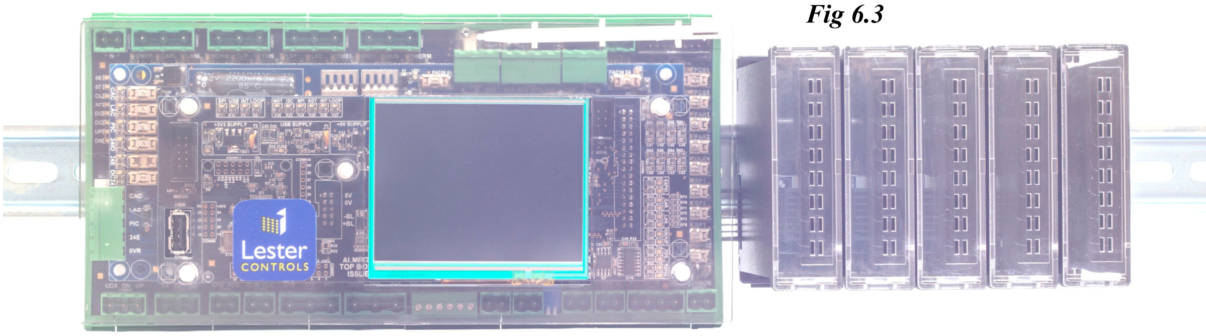


Fig 6.4

6.1.2) Vertical Fixing

The Base Unit and IO modules can be mounted vertically as shown aside. This is implemented typically where there are space restrictions within the control panel (i.e. MRL controllers). The LCD can be rotated from its horizontal position to vertical, thus the menu & user interface maintain the same resolution. The connection from the Base Unit to the IO modules is via a purpose made "screened" communications cable. The IO modules may be mounted next to the Base Unit or away from it on another a separate piece of DIN rail. The cable length can be adjusted to suit.

6.2) Base Unit Top Board

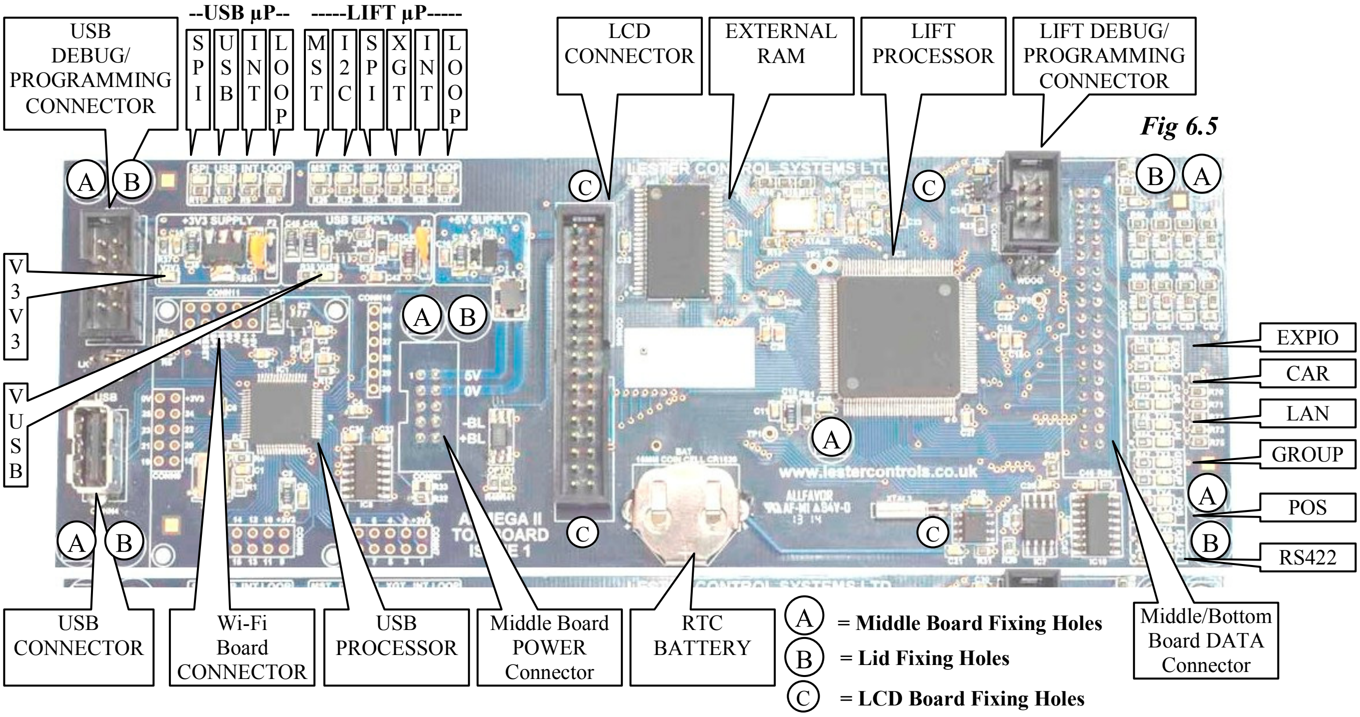


Fig 6.5

The Base Unit Top Board (shown above) contains the main Lift processor and also the USB processor. It also provides control and indication for the lift. The TFT LCD display combined with the touch screen provides the user with an easy to use menu interface for displaying lift/IO information, and changing parameters.

LED indication is provided for the **LIFT PROCESSOR** **system** functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	10 Times a second Approx
INT	Processor IO Interrupts	Every 20 Milliseconds
XGT	Processor 2^{nd} Core Busy	Illuminated when Processor Activity
SPI	Communications to the USB µP	Illuminated when Communications Activity
I2C	Communications to the RTC & Parameter Memory	Illuminated when Communications Activity
MSTR	MASTER	On all the time when LIFT=MASTER

LED indication is provided for the **LIFT PROCESSOR** **communications** functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
XPIO:TX/RX	Expansion IO CAN Transmit/Receive	Illuminated when Communications Activity
CAR:TX/RX	Lift Car CAN Transmit/Receive	Illuminated when Communications Activity
LAN:TX/RX	Landing /Shaft CAN Transmit/Receive	Illuminated when Communications Activity
GROUP:TX/RX	Group CAN Transmit/Receive	Illuminated when Communications Activity
POS:TX/RX	Position CAN Transmit/Receive	Illuminated when Communications Activity
RS422:TX/RX	RS422 Comms Transmit/Receive	Illuminated when Communications Activity

LED indication is provided for the **USB PROCESSOR** **system/power** functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	5 Times a second Approx
INT	Processor IO Interrupts	Every 20 Milliseconds
USB	Communications to the USB Port	Illuminated when USB Activity
SPI	Communications to the LIFT µP	Illuminated when Comms Activity
V3V3	3.3V Power Supply	Illuminated when Supply Present
VUSB	USB Power Supply	Illuminated when Supply Present

6.2.1) LCD Board

The Almega 2 incorporates TFT LCD technology with touch screen for a user friendly menu & programming interface. The display size is 3.5 inch with a dot matrix of 320 by 240 RGB pixels, and 256K colours. The backlight is 400mW white LED, and the viewing is 140 degrees.

A purpose made board has been developed to mount the display and provide connections/fixings to the Base Unit Top Board. The board increases the mechanical strength of the display and at the same time reduces the "wear & tear" that may be caused by movement of the display and hence movement of the sensitive connection cables.
The board can be rotated from its horizontal position to vertical, thus the menu & user interface maintain the same resolution.

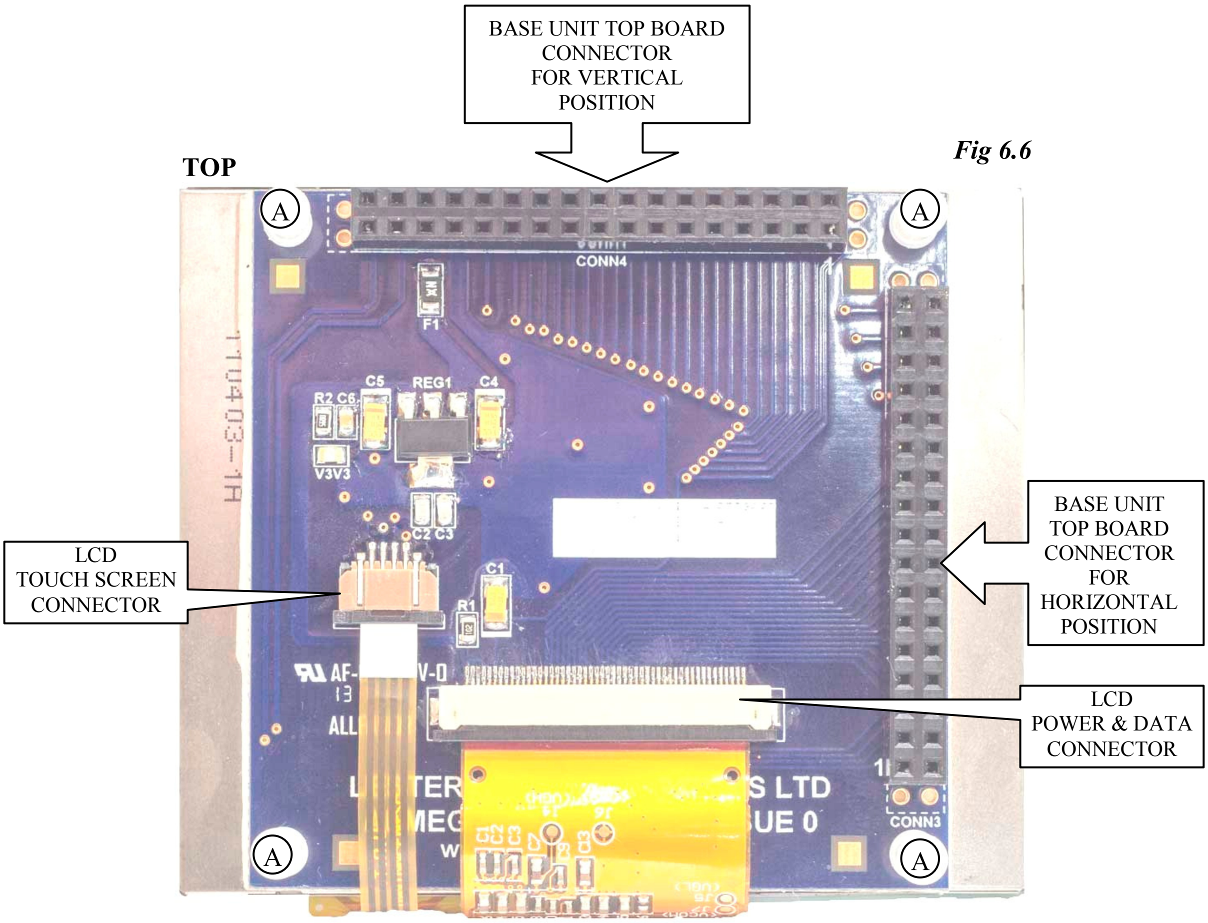
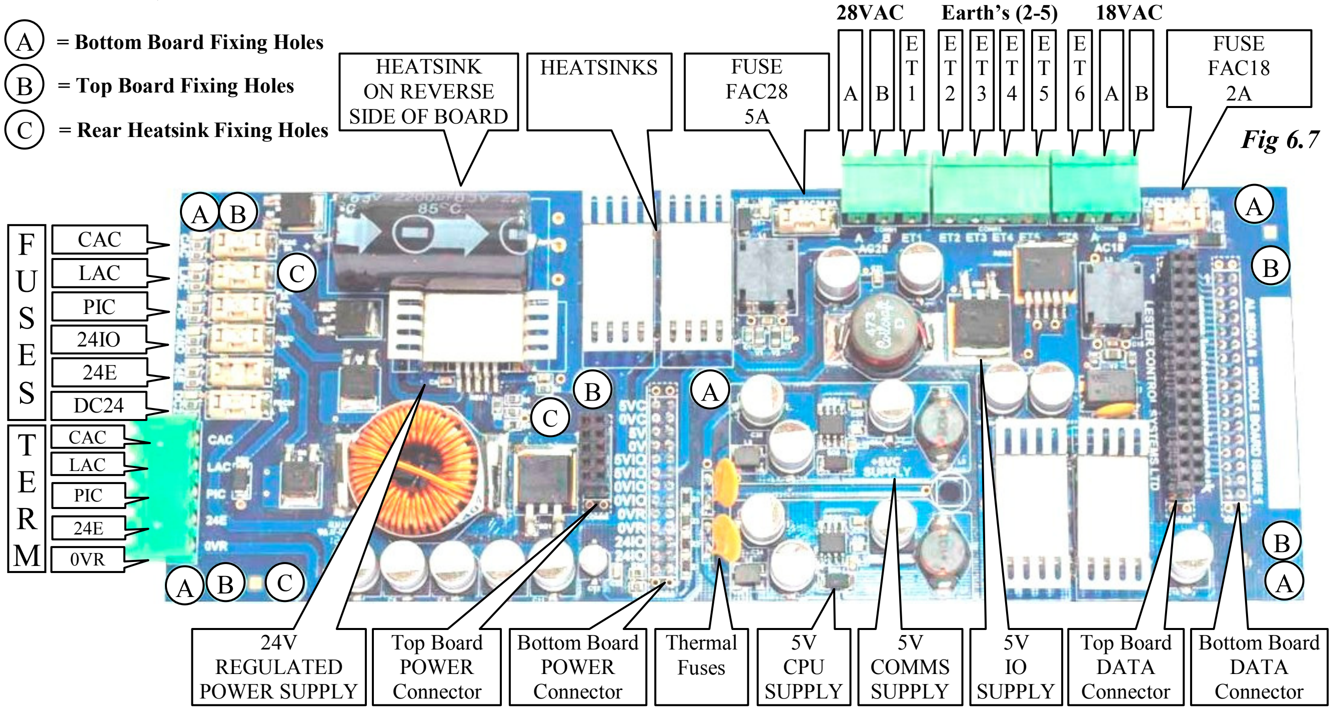


Fig 6.6

(A) = Base Unit Top Board Fixing Holes/Pillars

6.3) Base Unit Middle Board



The Base Unit Middle Board (shown above) contains the Lift power supplies. Separate 5V supplies have been implemented to provide isolation and modularity in the event of electrical noise and/or fault conditions. The 24V supplies are fully regulated. Quick Blow fuses protect the 24V supply outputs. Thermal / resettable fuses protect the 5V supply outputs.

AC Power Supply Inputs (LED indication is provided and illuminated when supply is healthy):

INPUT	FUNCTION	FUSE RATING	LED
AC18	18 VAC Incoming Supply	2A	AC18
AC28	28VAC Incoming Supply	5A	AC28

DC Power Supply Ratings:

SUPPLY	Functions	Derived From	Continuous	Peak
24V Regulated	24V Power Supplies	28V AC, CPU Transformer	**4A**	5A
5VIO Regulated	5V I/O Supply (Slot IO)	18V AC, CPU Transformer	3A	3A
5VC Regulated	5V Communications Supply	18V AC, CPU Transformer	1A	1A
5V Regulated	5V CPU Supply	18V AC, CPU Transformer	1A	1A

DC Power Supply Outputs (LED indication is provided and illuminated when the supply is healthy):

OUTPUT	FUNCTION	FUSE RATING	LED
DC24	24V DC Regulated Supply Feed	5A	DC24
CAC	24V DC Car Call Acceptance Supply	2A	CAC
LAC	24V DC Lan Call Acceptance Supply	2A	LAC
PIC	24V DC Position Indicator Supply	2A	PIC
24E	24V DC External Supply (Position Device)	2A	24E
24IO	24V DC Input / Output Supply (Slot IO)	2A	24IO

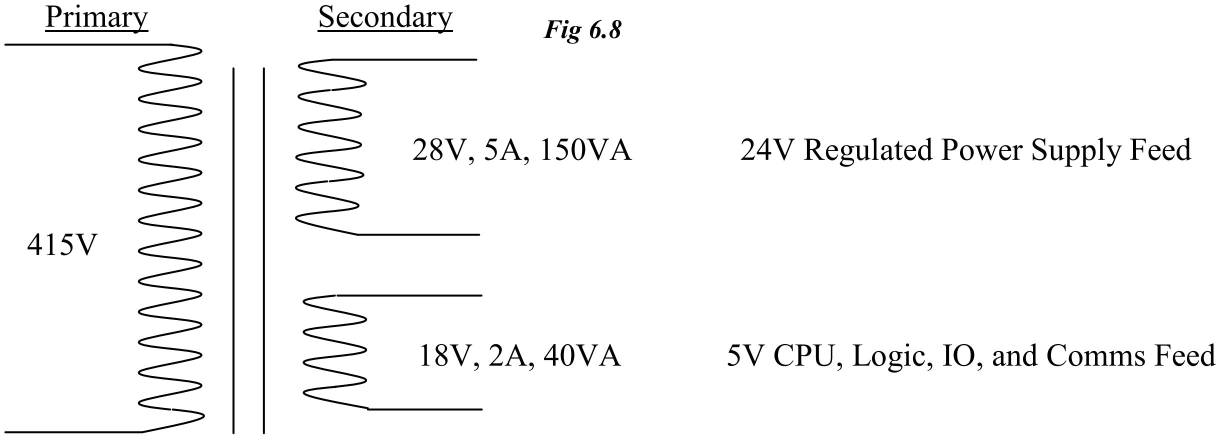
Earth Connections:

EARTH	FUNCTION	EARTH	FUNCTION
ET1	28V AC Filter Ground Reference	ET4	5V CPU Ground Reference
ET2	24V DC Ground Reference	ET5	5V I/O Supply Ground Reference
ET3	5V Communications Ground Reference	ET6	18V AC Filter Ground Reference

6.3.1) Power Supply External Transformer Inputs

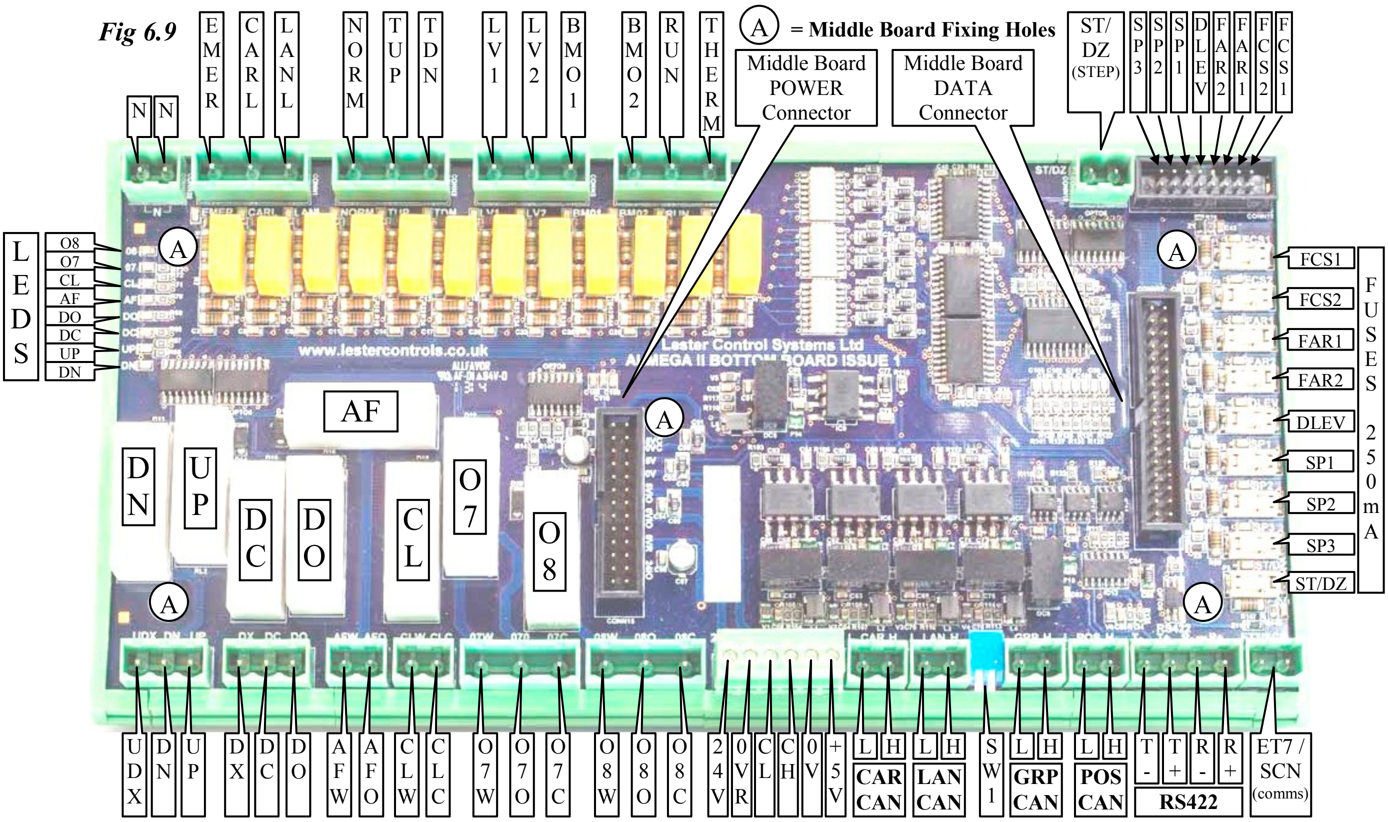
The Power Supply External transformer is derived from the 415V supply and provides outputs as below:

Fig 6.8



6.4) Base Unit Bottom Board

Fig 6.9



6.4.1) 110V AC Inputs (LED indication is provided and illuminated when input is asserted):

Terminal **N** = Neutral / Common return.

INPUT	FUNCTION
EMER	Emergency Stop Input (typically safety circuit immediately after the emergency stop(s))
CARL	Car Lock Input (typically safety circuit immediately after the Car Locks)
LANL	Landing Lock Input (typically end of safety circuit)
NORM	Normal Input (asserted when on Normal, from a contact of the TR relay)
TUP	Test Up Input
TDN	Test Down Input
LV1	Re-Levelling Vane 1 for Hydraulic Re-levelling
LV2	Re-Levelling Vane 2 (Re-level board feedback) for Hydraulic Re-levelling
BMO1	Brake Switch input 1for UMD brake monitoring (normally closed)
BMO2	Brake Switch input 2 for UMD brake monitoring (normally closed)
RUN	Run feedback input
THERM	Thermistor / Machine Room Temperature Exceeded Input

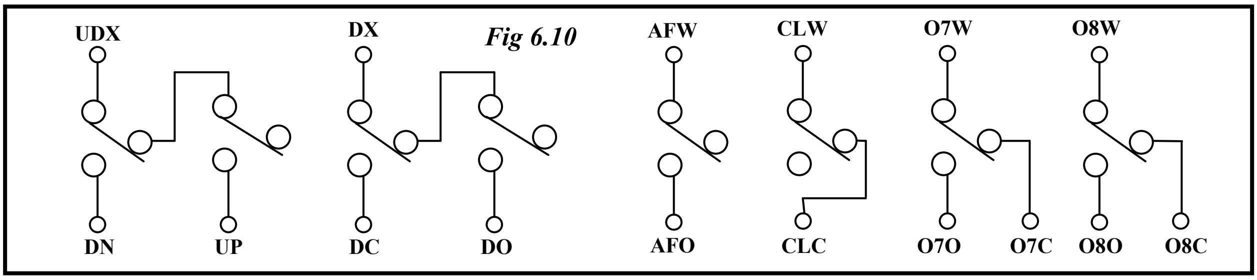
6.4.2) 24V DC Inputs (LED indication is provided and illuminated when input is asserted; also each input has an associated fuse of 250mA): Common return = **0V / Earth**.

INPUT	FUNCTION
FCS1	Fire Control Switch 1 input
FCS2	Fire Control Switch 2 input (secondary fire switch)
FAR1	Fire Alarm Recall 1input
FAR2	Fire Alarm Recall 2 input (secondary fire alarm)
DLEV	Drive Level Speed Reached input (ready to stop speed)
SP1	Spare input 1
SP2	Spare input 2
SP3	Spare input 3

6.4.3) Dedicated 24V DC Stepping & Door Zone Input (LED indication is provided and illuminated when input is asserted; also the input has an associated fuse of 250mA):

INPUT	FUNCTION
ST/DZ	Stepping and Door Zone input

6.4.4) Relay Outputs (LED indication is provided and illuminated when the output is asserted):



Output connections are shown above: UP / DN contacts are interlocked so that under a fault condition DN would take precedence. DO / DC contacts are interlocked so that under a fault condition DC would take precedence. All contacts are volt free, rated up to (5A@30Vd.c.) / (8A@250Va.c.); and may be used in safety critical circuits.

OUTPUT	FUNCTION
UDX	Up / Down Direction Pilot Relay Common
DN	Down Direction Pilot Relay Output
UP	Up Direction Pilot Relay Output
DX	Door Open / Close Pilot Relay Common
DC	Door Close Pilot Relay Output
DO	Door Open Pilot Relay Output
AFW	Alarm Filter Output Common (Wiper). Used in conjunction with Auto Dialler Alarm.
AFO	Alarm Filter Output (Normally Open). Used in conjunction with Auto Dialler Alarm.
CLW	Car Light Output Common (Wiper). Used for Car Light Energy Saving.
CLO	Car Light Output (Normally Closed). Used for Car Light Energy Saving.
O7W	Output 7 Common (Wiper). Spare Output
O7O	Output 7 Normally open. Spare Output
O7C	Output 7 Normally Closed. Spare Output
O8W	Output 8 Common (Wiper). Spare Output
O8O	Output 8 Normally open. Spare Output
O8C	Output 8 Normally Closed. Spare Output

6.4.1) Communications Interface

Serial IO Expansion CAN Port:
Connections are provided to interface to the Expansion IO modules. Typically shaft related IO is implemented on the expansion IO. Communication to the modules is implemented using CAN. Connection is made via a custom made screened cable.

CONNECTION TYPE	FUNCTION	VOLTAGE
24V	+24V power supply	24V
0VR	24V power supply 0V / return	0V
CL	CAN LOW Communications	0-5V
CH	CAN HIGH Communications	0-5V
0V	5V power supply 0V / return	0V
+5V	5V power supply	5V

CAR CAN Connections. Communications to the lift car (CAN devices) are connected at this connector: Connections are made using screened cable.

CONNECTION TYPE "CAR"	FUNCTION	VOLTAGE
CH	CAN HIGH Communications	0-5V
CL	CAN LOW Communications	0-5V

LAN CAN Connections. Communications to the landing / shaft (CAN devices) are connected at this connector: Connections are made using screened cable.

CONNECTION TYPE "LAN"	FUNCTION	VOLTAGE
CH	CAN HIGH Communications	0-5V
CL	CAN LOW Communications	0-5V

GROUP CAN Connections. CAN Communications between lifts are connected at this connector: Connections are made using screened cable.

CONNECTION TYPE "GRP"	FUNCTION	VOLTAGE
CH	CAN HIGH Communications	0-5V
CL	CAN LOW Communications	0-5V

Positioning System CAN Connections. Communications to a CAN positioning system are connected at this connector: Connections are made using screened cable.

CONNECTION TYPE "POS"	FUNCTION	VOLTAGE
CH	CAN HIGH Communications	0-5V
CL	CAN LOW Communications	0-5V

RS422 Connections. Typically Communications to an inverter drive via RS422 are connected at this connector: Connections are made using screened cable.

CONNECTION TYPE	Description	VOLTAGE
R+	Receive Channel Positive	±13V
R-	Receive Channel Negative	±13V
T+	Transmit Channel Positive	±13V
T-	Transmit Channel Negative	±13V

ET7 Earth / Screen Connections. This connection is to be connected to Earth, and used to terminate the screen(s) of the communication cables.

CONNECTION TYPE	Description	VOLTAGE
ET7 / SCN	Earth Terminal 7 and Communications Screen Connection	0V

6.5) Expansion IO Modules

The IO connections boards are housed in a custom made DIN rail module as shown. The main body of the module has been omitted to show how the IO boards locate and interconnect. Both Power and CAN communications are "bussed" through the connections to each board. A "screened" cable from the Base IO module plugs into the START connector as shown. From then on further IO modules can be added up to a maximum of **30**.

6.5.1) IO Connection Board

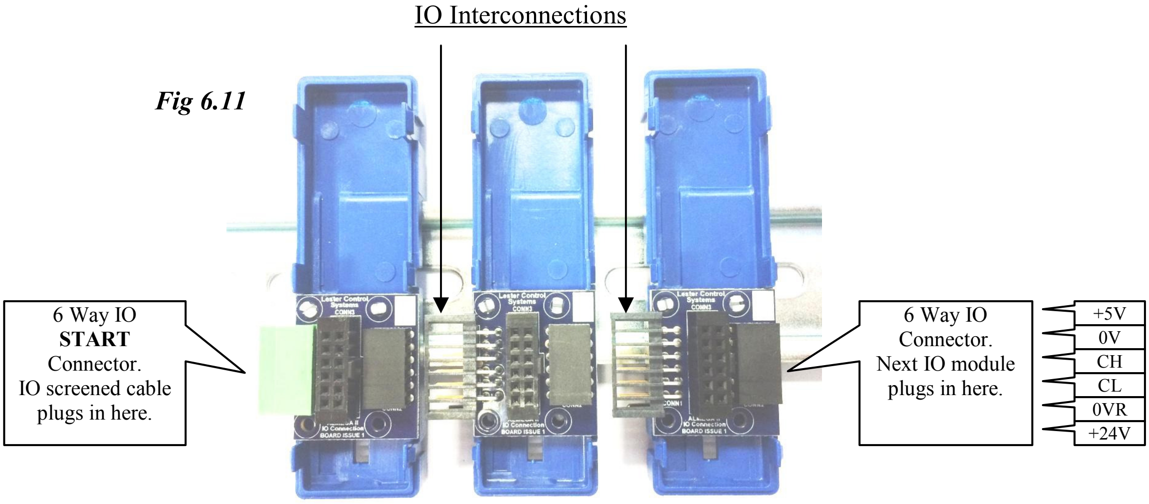


Fig 6.11

The picture below shows the modules interconnected. The IO boards such as "Mains Input Board" and "24V link Board" plug into the IO modules, and to the IO Board connectors as shown. The main body of the IO module guides the IO boards, and the lid secures the board in place.

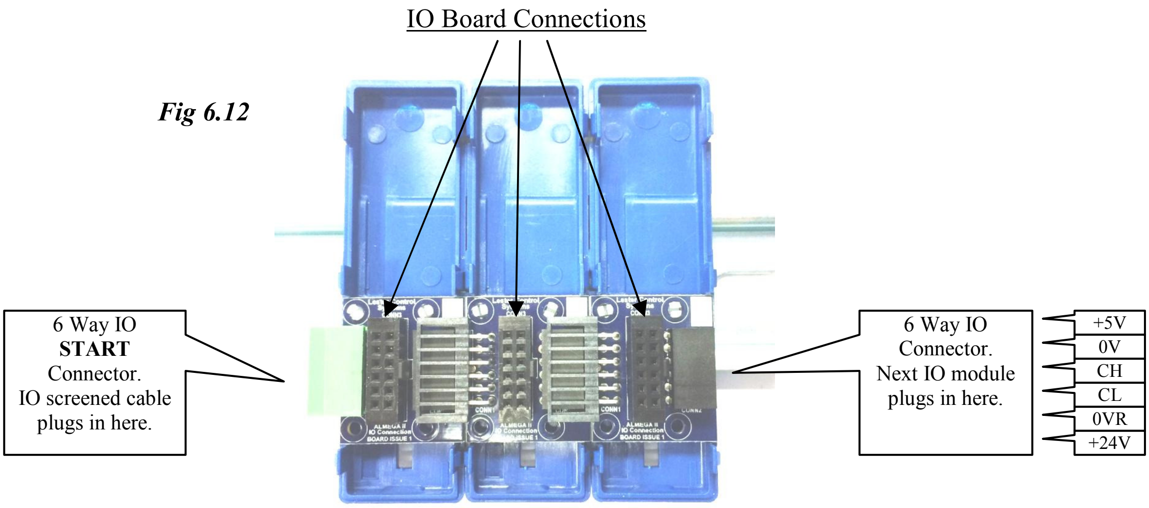


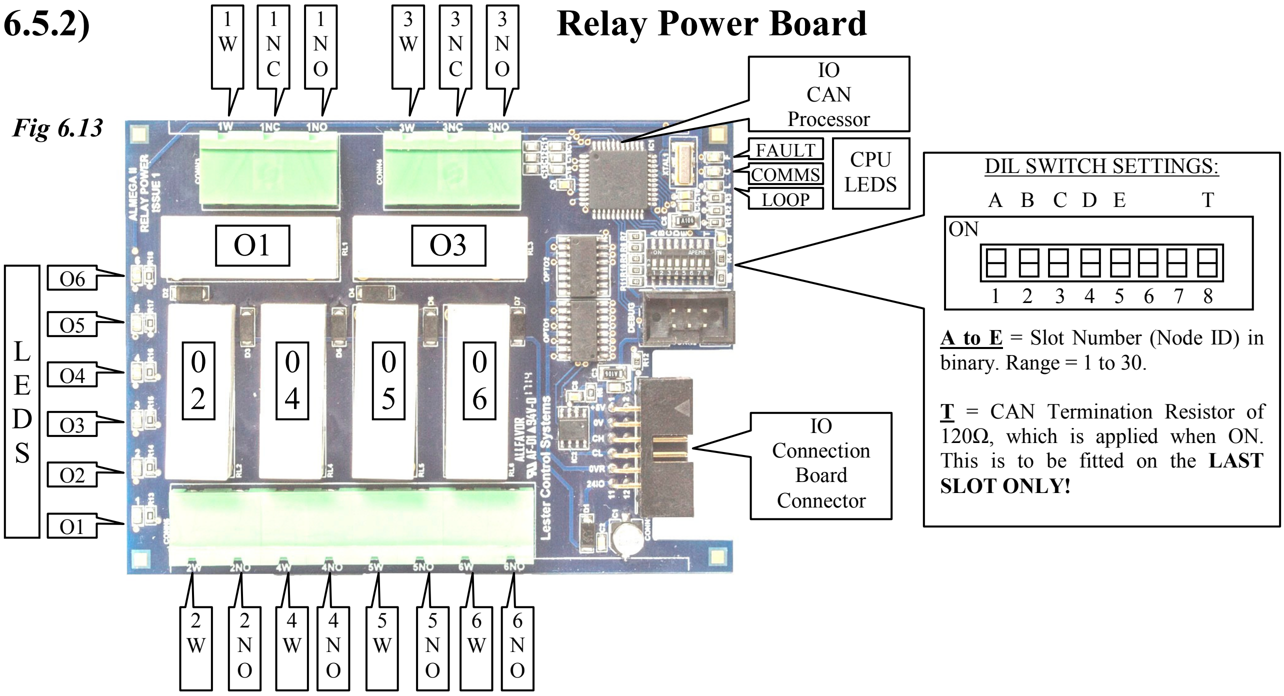
Fig 6.12

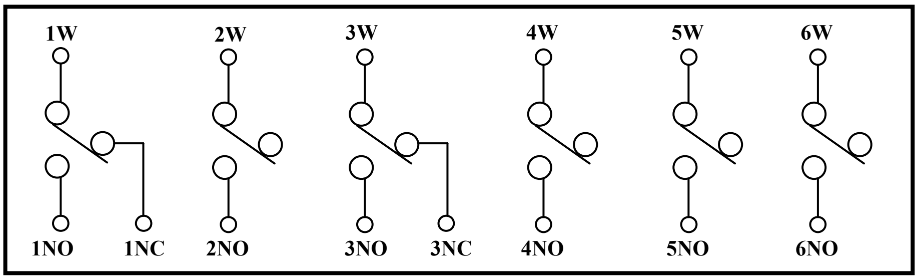
The specification for the IO board is as below:

Function	**Min**	**Norm**	**Max**
Current Range Per Connection (A)	-	-	2A
Output Update Time (ms)	20mS	20ms	20mS
Input Update Time (ms)	20mS	20ms	40mS
Power Supply Voltage Tolerance (5/24V, %)	-10%	0	+10%

6.5.2) Relay Power Board

Fig 6.13





The Relay Power Board may be used to provide extra programmable outputs as required (e.g. extra door operator outputs or Hall Lantern volt free outputs, etc.) Output connections are shown above: All contacts are volt free, rated up to (5A@30Vd.c.) / (8A@250Va.c.); and may be used in safety critical circuits.

Relay Outputs (LED indication is provided and illuminated when the output is asserted):

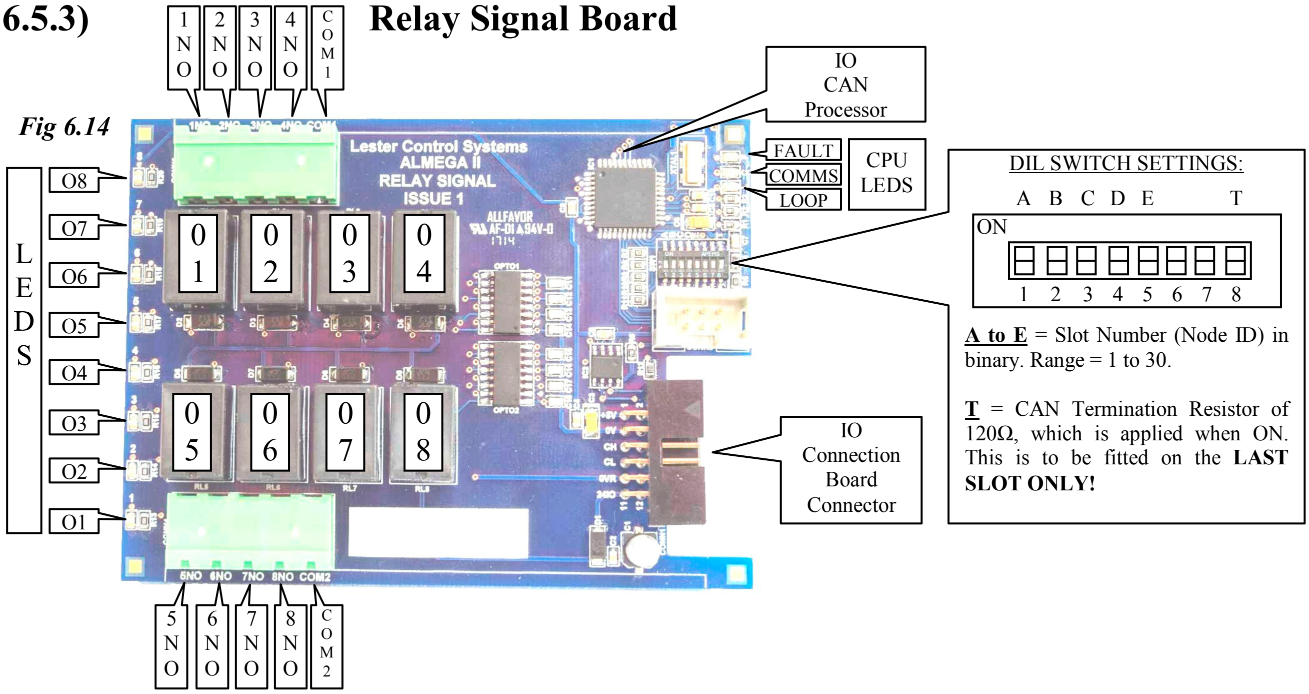
OUTPUT	**FUNCTION**
1W	Output 1 Common (Wiper)
1NO	Output 1 Normally open
1NC	Output 1 Normally Closed
2W	Output 2 Common (Wiper)
2NO	Output 2 Normally open
3W	Output 3 Common (Wiper)
3NO	Output 3 Normally open
3NC	Output 3 Normally Closed
4W	Output 4 Common (Wiper)
4NO	Output 4 Normally open
5W	Output 5 Common (Wiper)
5NO	Output 5 Normally open
6W	Output 6 Common (Wiper)
6NO	Output 7 Normally open

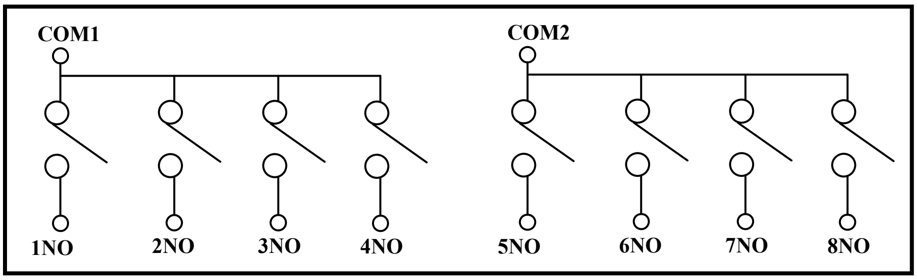
LED indication is provided for the **CAN PROCESSOR**, functions as below:

LED	**FUNCTION**	**FLASH SPEED / FUNCTION**
LOOP	Processor Program Loop	2 Times a second approx
COMMS	CAN Communication Activity	Once a second approx
FAULT	CAN Fault / Warning	On when Fault, flashes every 20ms when Warning.

6.5.3) Relay Signal Board

Fig 6.14





The Relay Signal Board may be used to provide extra programmable outputs as required (e.g. position / direction / status signals for an external indicator interface). The relays are designed to switch low voltage and low current.

Output connections are shown above: Contacts are volt free connected to 2 common terminals. The contacts are rated up to (3A@24Vd.c.) / (3A@120Va.c.), with a minimum switching capacity of 1mA@1VDC.

Relay Outputs (LED indication is provided and illuminated when the output is asserted):

OUTPUT	FUNCTION
COM1	Common Connection 1(Wiper of Relays 1-4)
1NO	Output 1 Normally open
2NO	Output 2 Normally open
3NO	Output 3 Normally open
4NO	Output 4 Normally open
COM2	Common Connection 2(Wiper of Relays 5-8)
5NO	Output 5 Normally open
6NO	Output 6 Normally open
7NO	Output 7 Normally open
8NO	Output 8 Normally open

LED indication is provided for the **CAN PROCESSOR**, functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	2 Times a second approx
COMMS	CAN Communication Activity	Once a second approx
FAULT	CAN Fault / Warning	On when Fault, flashes every 20ms when Warning.

6.5.4) Mains Inputs Board

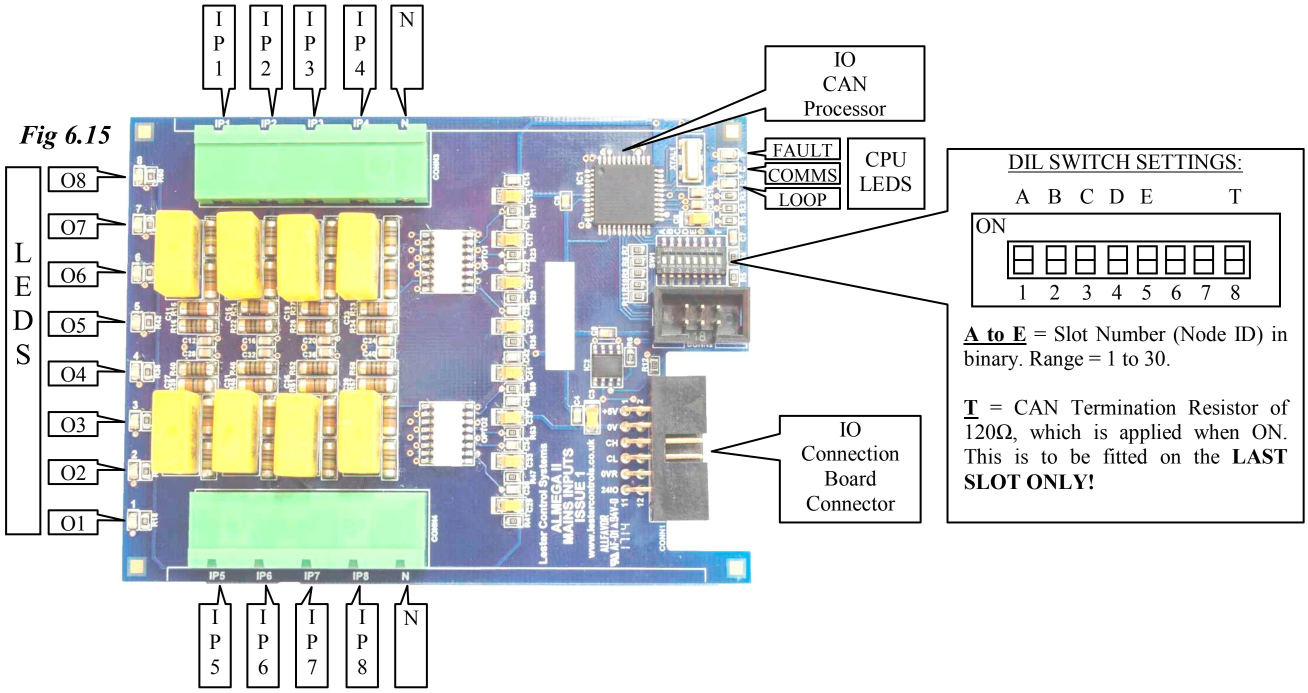


Fig 6.15

The Mains Input Board may be used to provide extra programmable inputs as required (e.g. slowing limits / door edge devices / load weighing signals etc). The inputs may be used in safety critical circuits.

110V AC Inputs (LED indication is provided and illuminated when input is asserted):
Terminal **N** = Neutral / Common return.

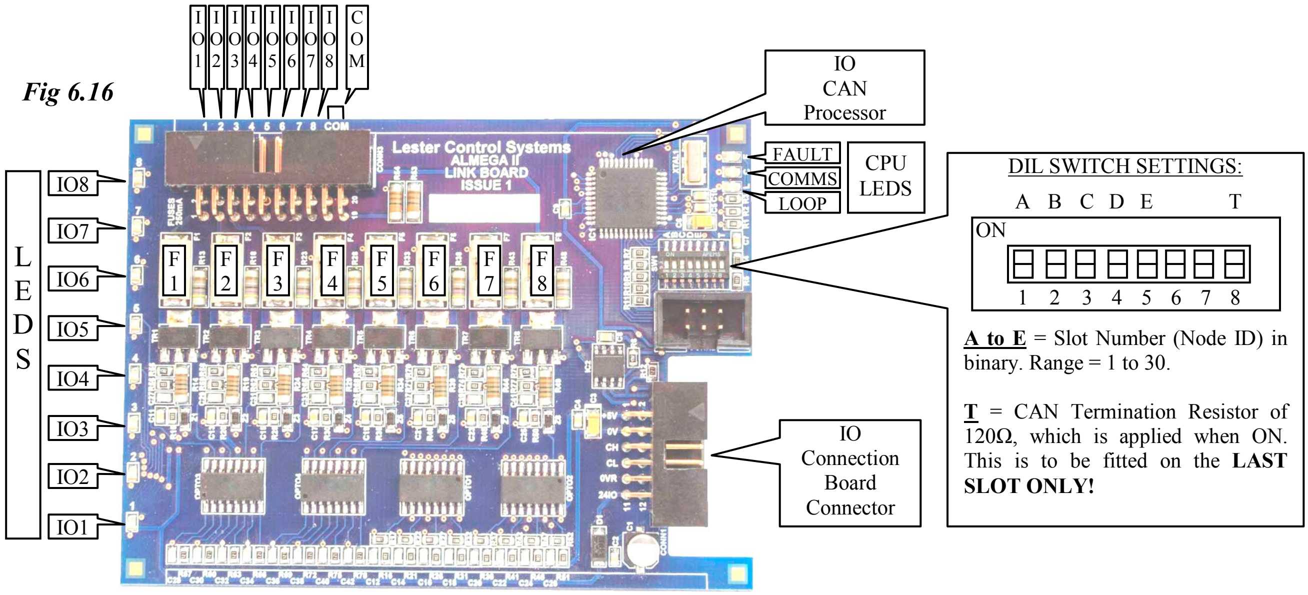
INPUT	FUNCTION
IP1	Input 1
IP2	Input 2
IP3	Input 3
IP4	Input 4
IP5	Input 5
IP6	Input 6
IP7	Input 7
IP8	Input 8

LED indication is provided for the **CAN PROCESSOR**, functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	2 Times a second approx
COMMS	CAN Communication Activity	Once a second approx
FAULT	CAN Fault / Warning	On when Fault, flashes every 20ms when Warning.

6.5.5) 24V Link Board

Fig 6.16



The 24V Link Board may be used to provide programmable inputs / outputs as required (e.g. car and landing calls, special service inputs, special function outputs etc). Each IO may only be configured as an input or output, **not both**!

LED indication is provided and illuminated when input or output is asserted; also each IO has an associated fuse of 250mA): Common return = **COM (which is typically wired to EARTH)**.

I/O	FUNCTION
IO1	Input / Output 1
IO2	Input / Output 2
IO3	Input / Output 3
IO4	Input / Output 4
IO5	Input / Output 5
IO6	Input / Output 6
IO7	Input / Output 7
IO8	Input / Output 8

LED indication is provided for the **CAN PROCESSOR**, functions as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LOOP	Processor Program Loop	2 Times a second approx
COMMS	CAN Communication Activity	Once a second approx
FAULT	CAN Fault / Warning	On when Fault, flashes every 20ms when Warning.

6.6) Input / Output Specifications

The input specification range for an 110V AC input is as below:

Input Function	Min	Norm	Max
Voltage Range @21°C (V-AC)	67V	110V	135V
Update / Scan Time (ms)	20mS	40ms	40mS
Time Response Input On (ms)	10ms	10ms	20ms
Time Response Input Off (ms)	20ms	20ms	28ms

The input specification range for a 24V input is as below:

Input Function	Min	Norm	Max
Voltage Range @21°C (V-DC)	15V	0V	28V
Update / Scan Time (ms)	20ms	20mS	40mS
Time Response Input On (ms)	3µs	3µs	5µs
Time Response Input Off (ms)	144µs	186µs	220µs

The input specification range for the ST/DZ input is as below:

Input Function	Min	Norm	Max
Voltage Range @21°C (V-DC)	15V	0V	28V
Update Time (ms)	1ms	1ms	1ms
Time Response Input On (ms)	3µs	3µs	5µs
Time Response Input Off (ms)	34µs	46µs	76µs

The output specification range for a Power Relay output is as below:

Output Function	Min	Norm	Max
Voltage Range @21°C (V-DC)	18V	24V	28V
Update / Scan Time (ms)	20ms	20ms	20ms

6.6) Power Supply Specifications

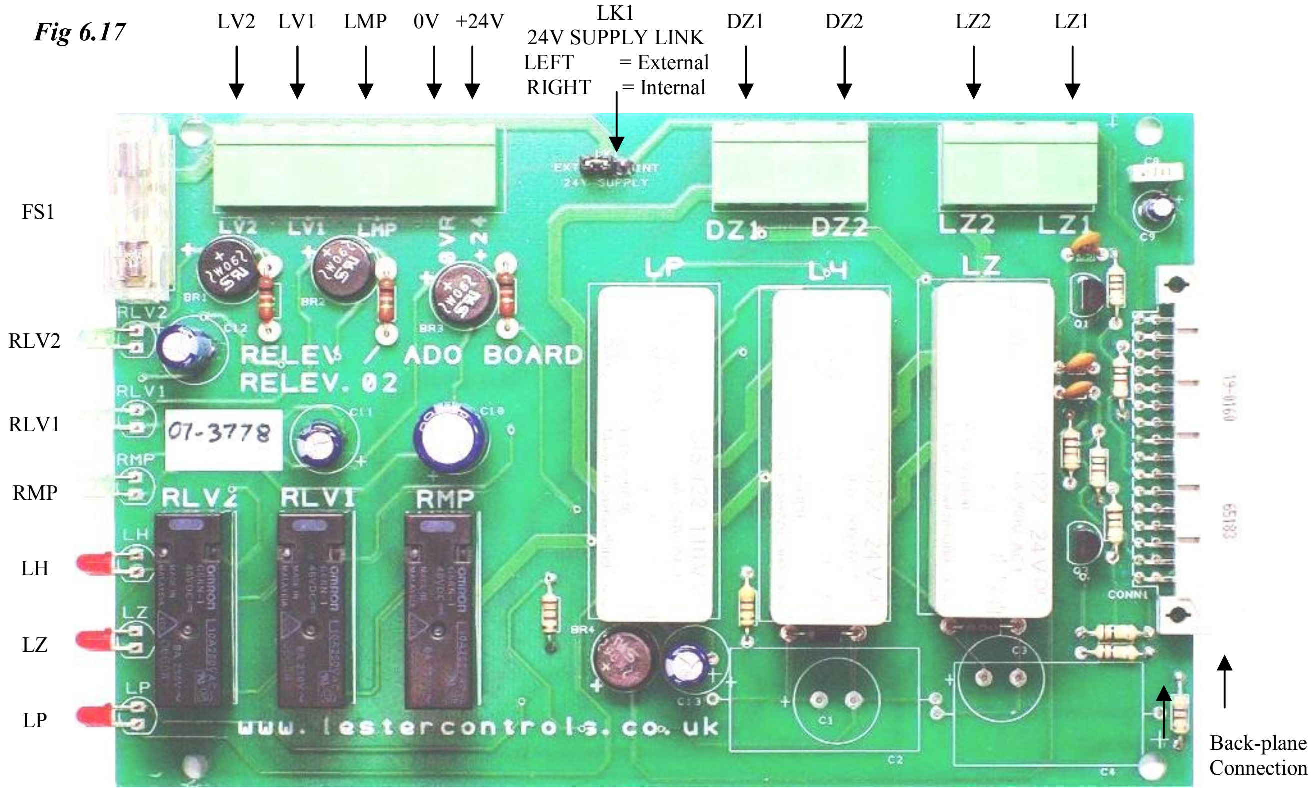
The specification range for Output Voltage against Load Current is as below:

Input Function	Min	Norm	Max
24V Regulated Power Supply	22V (@ 5A output)	24.8V (@ 0.5A output)	25.2V (open circuit)
5V CPU Power Supply	4.85V (@ 1A output)	5V (@ 0.1A output)	5V (open circuit)
5VC (Communications) Power Supply	4.85V (@ 1A output)	5V (@ 0.1A output)	5V (open circuit)
5VIO (Input / Output) Power Supply	4.61V (@ 3A output)	5V (@ 0.1A output)	5V (open circuit)

6.7) Re-Levelling and Advance Door Opening Board

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

Fig 6.17



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.

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

Inputs

LV1 = Re-level / ADO sensor 1 (1^{st} 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.

7) Fault Finding and Callouts

The microprocessor and circuitry can help the engineer in fault finding because it remembers each fault in turn, which floor it was at, how many times it has occurred and the date and time it happened. See **Event History** (or by pressing MENU key on the keypad) in the main menu for the events and their descriptions. See also **Lift Viewer** and **Input Output Viewer** for detailed information of the lifts' status.

Typical Checking procedure

1) Check the 3 phase incoming supply to the controller.
2) Check motor overloads/circuit breakers etc.
3) Check the various voltages at the Primary and Secondary of each transformer with respect to their terminals and not earth.
4) Check the LED indication associated with each fuse on the power supply (see Power Supply) and the voltage going into and out of each fuse in the control panel, making sure they match and visually inspect where possible for a blown fuse. Avoid switching off if possible to check fuses as this may clear the problem, but it may return at a later date causing another callout.
5) Input **EMER** = Safety Circuit should be on within the IO rack, if not check live feeds in order to terminals (**OTL - OSG - PSW - G1 - G2**), for a Hydraulic Lift, and (**OTL - OSG - G1 - G2**), for a Traction Lift.
6) Input **CARL** = Car Lock Circuit should be on within the IO rack, if not check live feeds in order to terminals **G2** and **G3**.
7) Input **LANL** = Landing Lock Circuit should be on within the IO rack, if not check live feeds in order to terminals **G3** and **G4**.
8) Check through the following functions, identifying correctly ON or OFF as required:
   a) **OSI** output, should be OFF
   b) **TEST** input, illuminated on Normal, OFF on TEST.
   c) **LW90** input**, LW110** input **& OLI** output, illuminated when the lift is 90% or 110% loaded.
   d) **THERM**, illuminated when the motor or machine room thermistor has tripped.
   e) **RET1, 2 or 3**, illuminated when on Emergency Recall/Shutdown 1, 2 or 3.
   f) **SHUTDOWN**, illuminated when on Shutdown Control.
   g) **SERV**, illuminated when on Service control.
   h) **FIRE**, illuminated when on Fire Control.
   i) **HYD OTL** input, illuminated when Hydraulic lift has over travelled.
   j) **PTT Control,** Prepare To Test within processor, and should be OFF.
   k) **SE, DOP** and **DE** are illuminated when the Safe edge, Door open Button and Door Detector Edge are activated respectively, which may prevent the doors from closing.
   l) The **Thermistor and Phase Sequence** LED'S on the phase failure and reversal relay (**PFRR**) must not be illuminated.

If all circuits appear to be O.K, there is a possibility of a coil burning out on a relay, contactor, the brake, ramp or a valve coil may have burnt out. If further help is required whilst fault finding, please make a note of the following before contacting Lester Control Systems.

i) LED's that are illuminated,
ii) A full report of the state of the contactors and relays etc.
iii) A full report of the lift fault.
iv) A full report from the fault logger.

7.1) Common Faults

Detailed below, is a list of common faults. To assist with fault finding see **Event History** in the main menu for the events and descriptions, see also **Lift Viewer** and **Input Output Viewer** for detailed information of the lifts' status.

A) Lift car out of step with the controller
i) Stepping input STEP/DZ must pulse once ON and once OFF between every floor.
ii) Check Tapehead unit/floor selection switches operate correctly.
iii) Check car/landing calls are being entered to the correct floors.

B) Doors remain open and will not close
i) Check safe edge, door open button and detector edge are not operated.
ii) Check door open limit has operated.
iii) Check the LCD display is not reporting Door Open Protection Timeout Fault.
iv) Check that the parameter "PARK OPEN" within **Door Setup** has not been set.
v) Check Terminal limits.
vi) Check Pre-Flite check has not failed, i.e. locks are short circuited, whilst on the door open limit.
vii) Note under Fire control, Service control, and 90% overload bypass the lift doors remain open typically and will only close by initiating a car call.

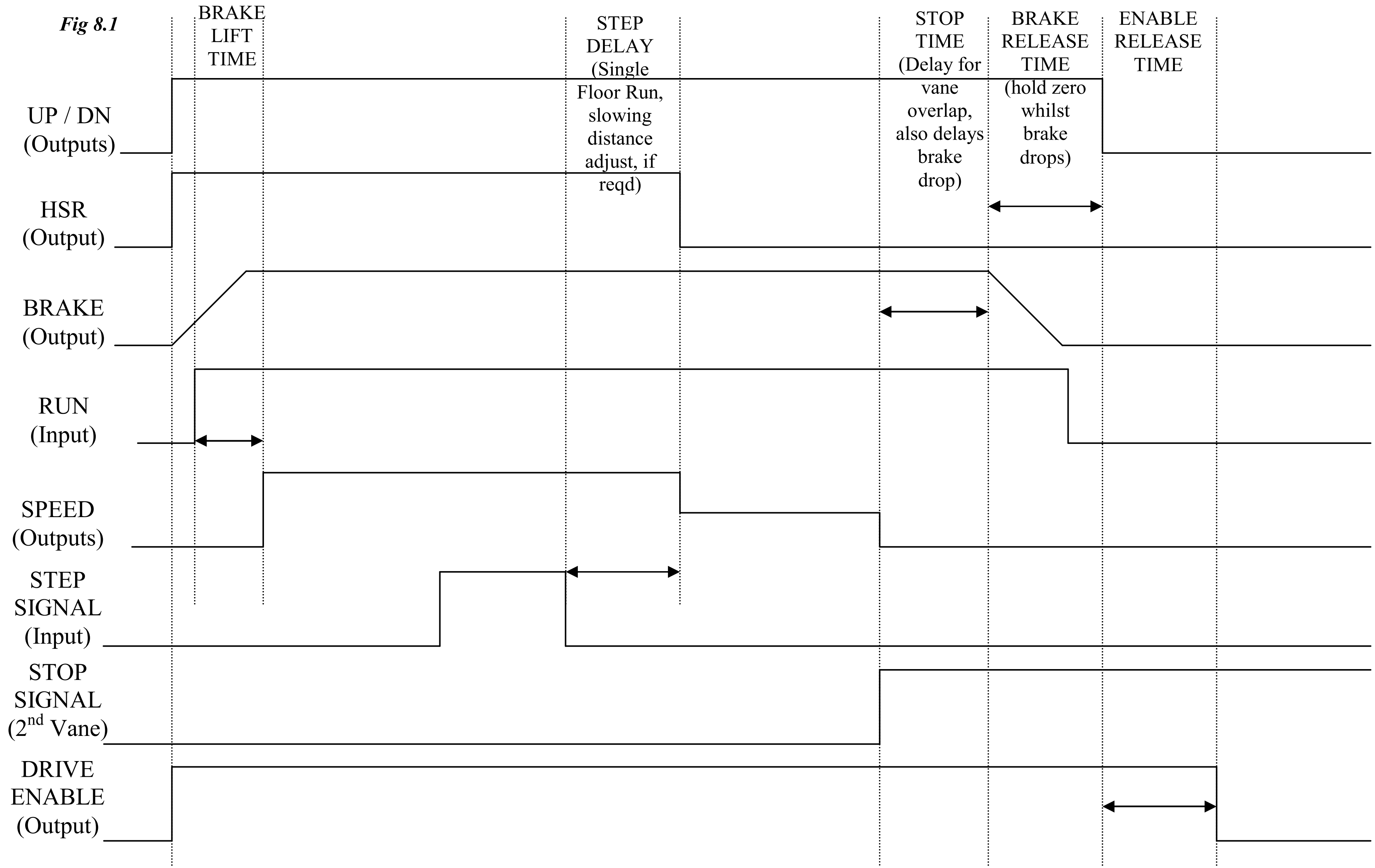
C) Doors closed and will not open
i) Check Stopping vanes STU and STD are not both on from start of a journey until the end of the journey (i.e. Stuck On).
ii) Check Stepping input STEP/DZ is not on from start of a journey until the end of the journey (i.e. Stuck On).
iii) Check lift is stopping on at least one Stopping vane when at floor level (STU or STD), however both are required for correct operation i.e. (STU and STD).
iv) Check that the parameter "DISABLE DOORS" within **Door Setup** has not been set.

D) Doors closed lift will not run
i) Check car and landing locks are made LED's **EMER** and **CARL and LOCK** on the CPU board.
ii) Check door limits.
iii) Check shaft Terminal limits.
iv) Check any drive fault conditions.
v) Check Phase Failure (PFRR) and Thermistors have not tripped.

E) Lift stops in travel
i) Car or Landing Lock "tipped".
ii) Journey timer operated.
iii) Run signal feedback fault i.e. input RUN.
iv) Slowing switch incorrectly set.
v) Lift slowed and stopped in mid travel, Tapehead/Proximity switch malfunctioning or set incorrectly.

8) Microprocessor Drive & Stopping Sequence

Fig 8.1



Above shows a typical Drive and Stopping Sequence, highlighting the main parameters for Speed, Stepping and stepping control that the ALMEGA 2 2 can provide.

9) Lift Special Services Operation

Prepare To Test:
The prepare to test feature is enabled through the Engineers Selection menu, or through Special Service2 parameter 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 **SERV** 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 buttons. 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 **FIRE** or **FIRE2** 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 is 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. Two inputs **FIRE** and **FIRE2** are provided to allow the lift to return to 2 different fire floors.

Fire Alarm Control:
The Fire Alarm Control feature is selected by asserting the **FAR1** or **FAR2** inputs. When selected, the fire alarm control feature renders the lift out of service and transfers all landing calls to the 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, the doors are parked closed (as default). Parameters found in **Fire Control Setup** provide options for door control and selecting the return floors etc. Two inputs **FAR1** and **FAR2** are provided to allow the lift to return to 2 different fire floors.

Evacuation Control:
The Evacuation Control feature is selected by asserting the **EVACUATION** input. When selected, the Evacuation control feature renders the lift out of service and transfers all landing calls to the 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 and the doors is assigned to the operator via constant pressure call buttons and the door open button. Evacuation control is intended to assist in the evacuation of persons in a building by providing information to an operator within the lift car of persons waiting on a landing. This information may be conveyed using an intercom system or from

persons pressing the landing call buttons. A user on the landing presses 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. Parameters found in **Fire Control Setup** provide options for enabling/disabling constant pressure door control, selecting the return floor, enabling the flashing of car calls when a landing button is pressed etc.

Load Weighing 110% Overloaded:
The 110% overload function becomes active when the lift is stationary (during travel has no effect) and the **LW110** 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 either moving or stationary and the **LW90** 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 stationary and the **THERM** input is asserted. The event Thermistor Tripped is generated, doors are parked open, and the lift is then marked out of service.

Priority Service Controls (1,2&3):
The Priority Service Control Features are selected by asserting the **PRIORITY SERVICE 1/2/3** inputs as required. 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 enabling/disabling constant pressure door control, enabling/disabling car calls etc.

Shutdown Control:
The Shutdown Control Features are selected by asserting the **SHUTDOWN** input as required. When selected, the lift is rendered out of service and transfers all landing calls to other members of the group (if any). The lift may be 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. Parameters found in **Special Service2 Setup** provide options for return controls (i.e. return floor), enabling/disabling constant pressure door control, enabling/disabling car calls etc.

Automatic Service:
Automatic Service Control is selected by asserting the **AUTOMATIC SERVICE** input as required. When selected, the lift is rendered out of service and transfers all landing calls to other members of the group (if any). Automatic service can be used for a variety of

applications e.g. lift floor to floor testing, and Automatic control that requires no human interaction of pressing call buttons. The lift will run continuously in an automatic fashion answering one single car call at a time. The lift can be configured to answer calls in the UP, DN, or both directions. The frequency of operations is measured in starts per hour (parameter settable). The number of starts per hour should not exceed the rated motor starts per hour. Parameters found in **Special Service1 Setup / Special Service Times** provide options for clearing calls upon operation of the switch; park open door control, enabling/disabling car calls, and landing call re-open etc.

Hospital Priority Service "Code Blue":

Hospital Priority Service "Code Blue" has been designed to work in a hospital environment allowing personnel a dedicated and custom priority service.

Code Blue Control is selected by asserting code blue inputs as required. An extra set of landing pushes are therefore required. Code Blue priority calls are entered at the landing entrances via a momentary action key-switch. Upon receipt of the call, the lift is rendered out of service and transfers all landing calls to other members of the group (if any), and makes an immediate return to the floor where the call was made. In the event the lift has to reverse its direction to the call, the lift will slow and stop at the next available landing before returning.

Upon arrival at the landing, the lift will remain on Code Blue control for a period of typically 15 seconds (parameter settable). This is to allow the user time to take control of the lift, otherwise after this time period the lift will return to normal operation, or answer the next Code Blue call (if any). Control is taken by putting the lift in the state of "Code Blue Held", this is achieved by asserting an input (i.e. Service Control or the "code blue hold" input (if configured)), or alternatively a call before the timeout times when "Code Blue Hold Bypass" parameter is set to YES. Once control is established the user may take the lift to its desired destination via the entering of car calls. Switching back to normal operation; requires the release of "code blue held", i.e. switching off the input or waiting for the timer to time out.

Code Blue control can be achieved by various methods, i.e. within a group of lifts whereby Code Blue calls are shared and dispatched to the nearest lift(s). Otherwise an isolated lift within the group may be configured for Code Blue control only (i.e. independent operation).

A Multiple calls option allows multiple code blue return calls to the same floor, e.g. if a lift has been called to a floor, another lift would **not** normally be allowed to be called to the same floor until the existing one has gone. However the multiple calls option allows another lift to be called whilst the existing one is still there. Note two or more lifts will not return at the same time to the same floor, only one. However two or more lifts may be returning to two or more different floors at the same time.

Parameters found in **Special Service2 Setup / Special Service Times** provide options for enabling/disabling constant pressure door control; park open door control, independent control, allowing multiple calls, and code blue hold / dwell times etc.

Code Blue, some General Points:

i) Lift(s) answer calls in the order of 1st come 1st served.
ii) If a call is not answered in the allotted time, the lift times out, the allocation is un-assigned, and another lift may take the call if available.
iii) Code Blue priority calls are answered upon a successful return.
iv) If no lifts are available, calls are cleared after a specified time period.

10) Lift Self Test Operation

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 until the system is returned to normal operation via passenger intervention. 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 as below:

General Parameters:

Parameter	Min	Max	Default
Self Test	NO	YES	YES
Number of Self Tests	1	10	5
Self Test Bottom Floor	Bottom Floor	(Top Floor-1)	Bottom Floor
Self Test Top Floor	(Bottom Floor+1)	Top Floor	Number of Floors

General Times:

Parameter	Min	Max	Default
Self Test Time	0s	600s	120s

11) Out Of Service Setup

The Out Of Service output **OSI** can be configured as required via the parameters found in the **Out Of Service Setup.** A list of failures and service modes can be selected / de-selected. Also by setting the parameter INVERT OSI INDICATOR (Lift in Service Indicator) in **General Parameters** the Out of Service Indicator is inverted and becomes a Lift in Service Indicator. A selection of parameters are shown below.

OSI Indicator:

Parameter	Min	Max	Default
Error in Position	NO	YES	YES
Journey Timer timed	NO	YES	YES
Hydraulic Overtravel	NO	YES	YES
Start Failure	NO	YES	YES
Re-Levelling Error	NO	YES	YES
Door Open Protection	NO	YES	YES
Door Close Protection	NO	YES	YES
Landing Lock Failure	NO	YES	YES
Car Lock Failure	NO	YES	YES
Lift Motion Failed	NO	YES	YES
Inspection Control	NO	YES	YES
Etc.	..	..	..

12) 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.

Reverse Car Call Dumping:
When the lift slows for its last call in the established direction of travel then reverse car call dumping is established. Reverse car call dumping causes the cancellation of reverse direction car calls if typically 3 or more car calls exist.

Forward Car Call Dumping:
If the lift has arrived at typically 3 or more destinations without breaking the detector edge/light ray, and there are typically 3 or more car calls still remaining, then these remaining calls will be cancelled (dumped).

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.

Detector Edge / Light Ray Override:
If the detector edge / light ray has been held for more than typically 20 seconds the event "**DETECTOR EDGE OVERIDE**" will be recorded and the lift doors will close regardless of the detector edge input. 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.

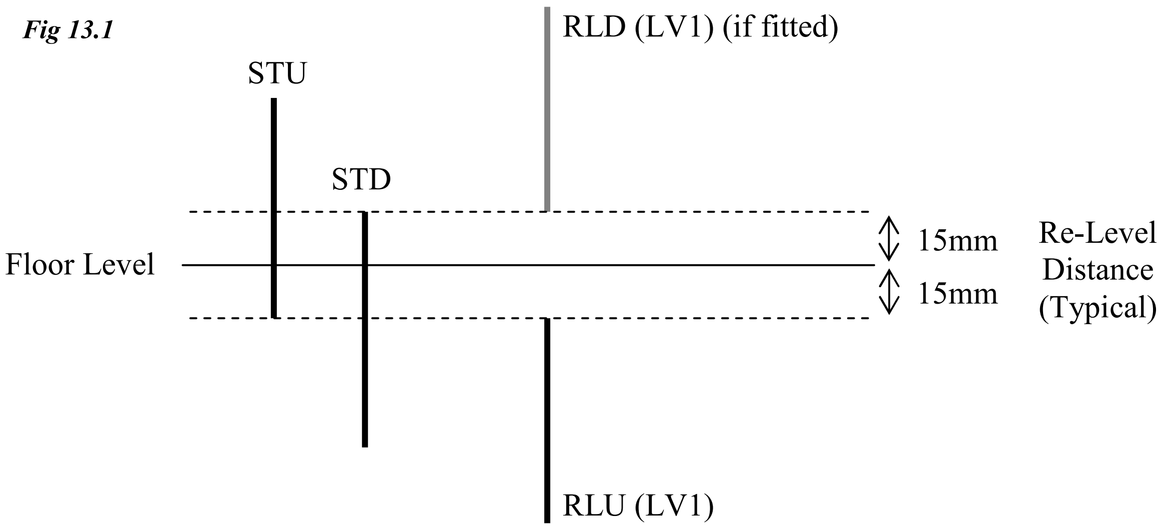
Landing Call Door Reversal Inhibit:
This feature is usually invoked on group systems whereby it is necessary to limit the number of door reversals when a landing call is pressed. This ensures the lift is not held at a floor unnecessarily thus increasing waiting times. The feature is invoked when the lift has calls in the system to a destination. The number of door reversals, are limited to between 1 and 10.

13) 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.

13.1) Re-Levelling Vane Layout Using Tape Head / Shaft Switches

Fig 13.1



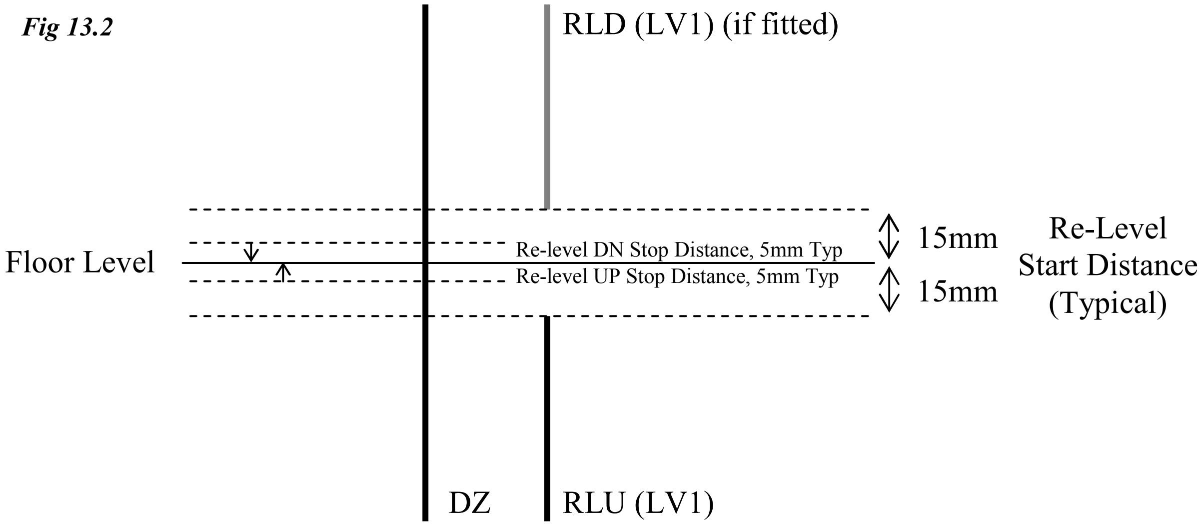
The Lift will re-level within the re-level distance (as shown). The distance may be varied to be smaller or larger (as required). However if it is too small instability / errors may occur, also if it is too large, the step between the lift car and landing entrance may be excessive before it re-levels. 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.

<u>Re-Level Up Sequence</u>

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 re-level board feedback contact has released.

13.2) Re-Levelling Vane Layout Using Positioning System

Fig 13.2



The Lift will re-level within the start 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.

<u>Re-Level Up Sequence</u>

1. Lift sinks onto RLU.
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 lift position and re-levelling starts to terminate when the Re-level Up stop distance is reached (typically 5mm).
7. The Re-level Up stop distance should be set according to the distance it takes the lift to stop during re-levelling (i.e. for the Hydraulic operation to ramp from re-level speed to zero speed).
8. If the lift overshoots floor level (>=5mm), the events below will be generated:
    1. RELEV RUN FAULT UP
    2. RLEV OVERSHOT FLR LEV

   These could be due to the Re-level Up stop distance which needs increasing or the RLU (LV1) vane which is set too near floor level (<15mm below floor level).
9. A delay off timer set by the parameter RELEV_UP_STOP_TIME also terminates re-levelling as a backup, set at 3000 Milliseconds typically.
10. The micro processor performs a final check to ensure the re-level board feedback contact has released.

13.3) 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)	Stopping point is reached.	Stopping point is reached.
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 and the vane overlap of 15mm. Taking into account distance for the lift to reach zero speed from level speed we may allow 10mm approx. Therefore we need a stop time for the remaining distance of 15-10mm = 5mm). Time to travel 5mm @ 0.06m/s = 5/60 = 83milliseconds.

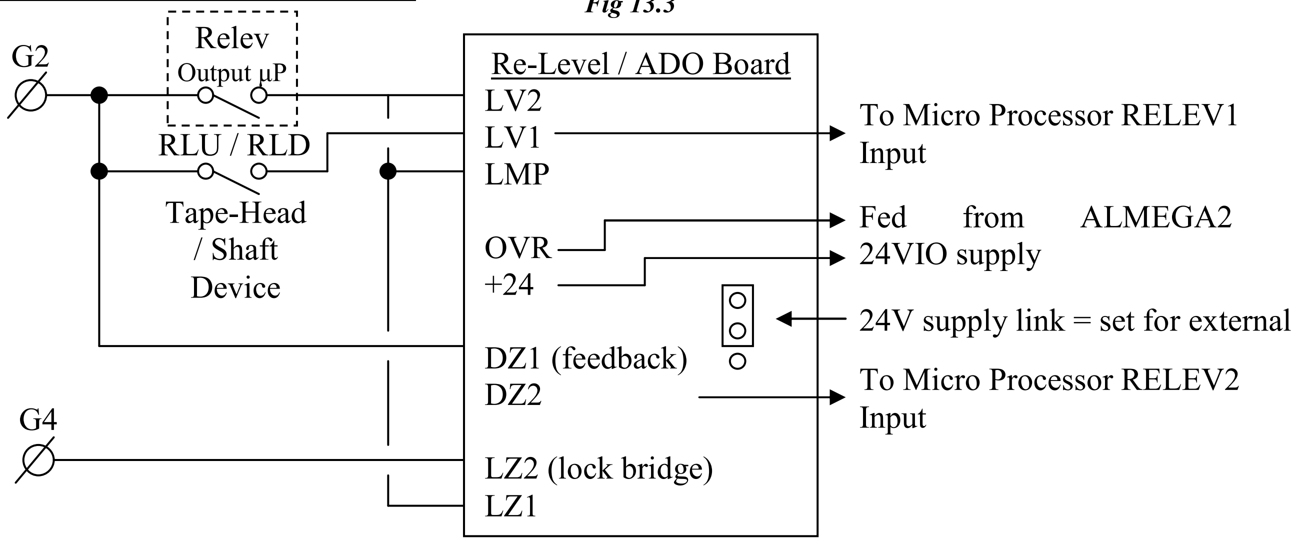
Therefore typical STOP TIME ≈ 100mS

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

Fig 13.3



13.4) 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.

13.5) 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.

<u>Re-level Yoyo Detection</u>

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.

13.6) Re-Level Parameters

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

Re-Level Parameters:

Parameter	Min	Max	Default	Description
RELEVEL REQUIRED	NO	YES	NO	Yes / No switch for re-levelling
MAX RELEV PERIOD	0	10	10	Max time allowed for re-levelling
RELEV YOYO COUNT	1	24	12	Number of Yoyo's within Yoyo period
RELEV YOYO PERIOD(s)	0	120	60	Period for detection of number of Yoyo's
RELEV UP STOP TIME(ms)	0	3000	0	Stop UP delay after re-levelling UP
RELEV DOWN STOP TIME(ms)	0	3000	0	Stop DN delay after re-levelling DN
RECOVERY TIMEOUT TIME(s)	0	180	60	Time allowed for recovery call to be completed
RELEV START TIME(ms)	0	3000	2000	Start delay before re-levelling

Positioning System Parameters:

Parameter	Min	Max	Default	Description
RE-LEV UP STOP DISTANCE(mm)	0	100	5	Up Stopping distance LEVEL to ZERO speed
RE-LEV DN STOP DISTANCE(mm)	0	100	5	Dn Stopping distance LEVEL to ZERO speed

13.7) 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.

Re-Level Events:

Parameter	Description
EMERGENCY STOP RELEVL	Emergency Stop whilst re-levelling.
RELEV_START_FAULT_UP	Start Fault in the UP direction. Check Re-level board feedback.
RELEV_START_FAULT_DN	Start Fault in the DN direction. Check Re-level board feedback.
RELEV_RUN_FAULT_UP	Run Fault in the UP direction. Check vane seq/timeout/overshoot/yoyo.
RELEV_RUN_FAULT_DN	Run Fault in the DN direction. Check vane seq/timeout/overshoot/yoyo.
RELEV_STOP_FAULT_UP	Stop Fault in the UP direction. Check Re-level board feedback/timeout.
RELEV_STOP_FAULT_DN	Stop Fault in the DN direction. Check Re-level board feedback/timeout.
RELEV_ERR	Re-level Error: warnings exceeded/stuck vanes/re-level board error.
RELEV_YOYO_ERR	Excessive yoyo's within yoyo period time (e.g. >=12 within a minute).
RELEV_HYDOTL_ERR	Lift over-travelled at the top floor.
RELEV_TIMED	Maximum re-level period exceeded (>=10s).
RELEV_STU_STD_LOST	STU/STD Stop Vanes lost when either primed or re-levelling.
RELEV_STU_LOST	STU Stop Vane lost when either primed or re-levelling.
RELEV_STD_LOST	STD Stop Vane lost when either primed or re-levelling.
RELEV_SUNK_DN_ERR	Sunk down and failed to re-level up. Typically vane(s) missing.
RELEV_PUMPED_UP_ERR	"Sprung" up and failed to re-level dn. Typically vane(s) missing.
RELEV_LOCK_BRIDGE	Lock circuit failed whilst re-levelling.
RELEV_BOARD_FEEDBACK	Re-level Board feedback contact failed (starting or stopping).
RELEV_RECOVERY_FAILED	Attempt to move to another floor failed.
RELEV_UNABLE_TO_RECOVER	Unable to move to another floor. Check LW10/Therm/Serv.
RELEV_OVERSHOT_FLOOR_LEV	Lift travelled past floor level. Chk re-level up/down stop distance/LV1.
RELEV_OUT_OF_RLEV_ZONE	Lift not within re-level zone (i.e. door zone, typically 150mm).

13.8) 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).

14) Advance Door Opening

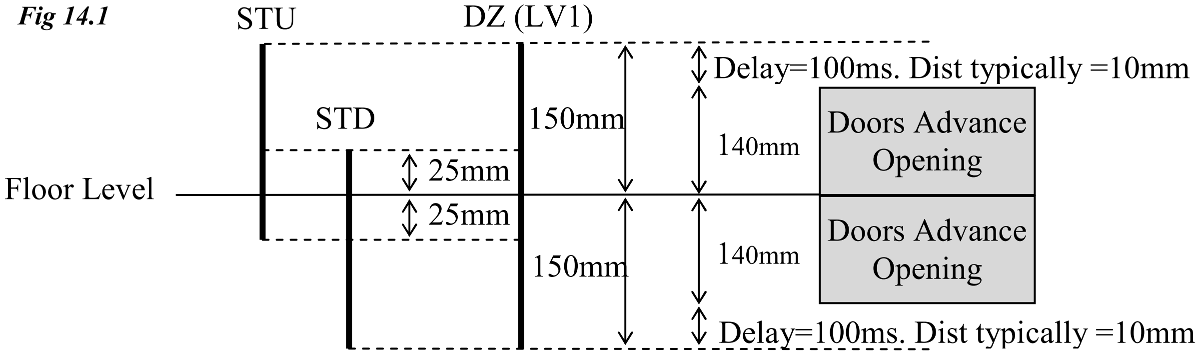
(See also Re-Levelling and Advance Door Opening Board (relev / ado board))

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) is used instead of a re-level output.

14.1) Advance Door Opening Vane Layout Using Tape Head / Shaft Switches

Fig 14.1



<u>Advance Open Sequence (UP direction)</u>

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.)

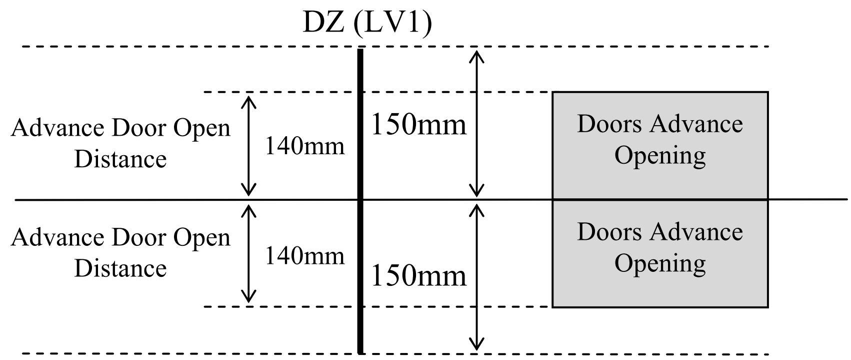
The sequence for DN is almost identical to UP, except the states of STU / STD are substituted.

The parameter "ADVANCE OPEN DELAY" (0-3000ms), found in DOOR TIMES, determines the amount of advance door opening, i.e.

a. Shorter delay = More advance door opening
b. Greater delay = Less advance door opening

14.2) Advance Door Opening Vane Layout Using Positioning System

Fig 14.2



<u>Advance Open Sequence (UP direction)</u>

1. Lift approaches floor level whilst decelerating.
2. Vane DZ (LV1) is energised, and at the same time the position is within the "Advance Door Open Distance" (found in the Positioning System Parameters).
    1. *Note if the LV1 vane is shorter than the "Advance Door Open Distance" or missing, no event will be reported (to inhibit nuisance reporting due to uneven distances above/below floor level). Instead the advance door opening operation will be inhibited.*
3. The micro processor starts the sequence by energising the advance open output.
4. The advance open output signals the re-lev / 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 energising the DOR pilot relay.
6. The DOR energises and the doors advance open.

The sequence for DN is identical to UP, except the direction is reversed.

The parameter "ADVANCE DOOR OPEN DISTANCE" (0-150mm), found in POSITION SYSTEM PARAMETERS, determines the amount of advance door opening, i.e.

a. More Distance = More advance door opening
b. Less Distance = Less advance door opening

Advance Open IO and Board Interface

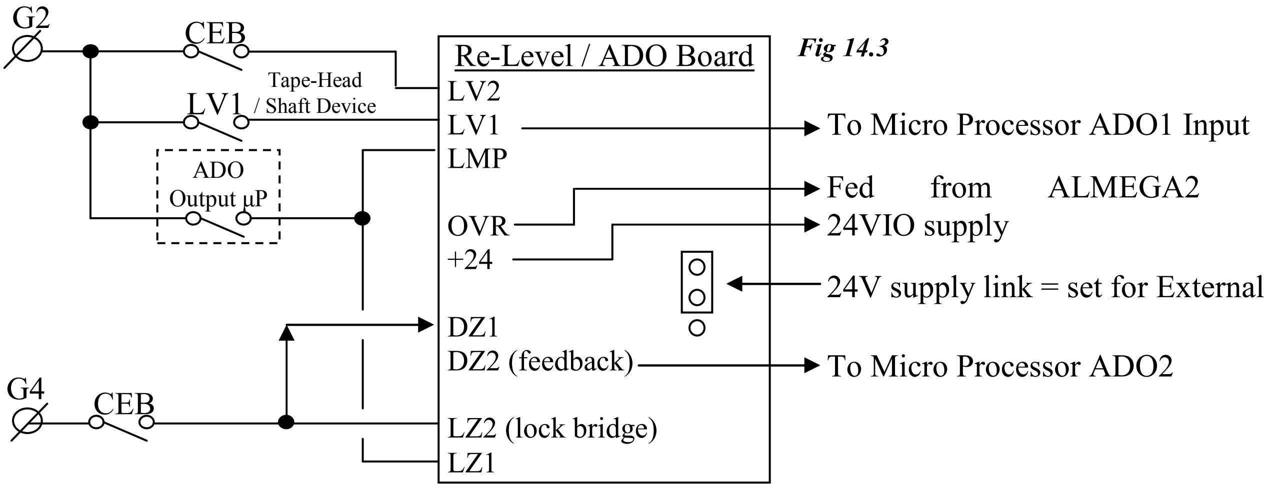


Fig 14.3

14.3) 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.

15) Despatcherless Group Control

The ALMEGA 2 processor has the capability and performance to provide a fast and efficient lift despatching service from Duplex up to many cars in a lift Group. This service is provided without an external despatcher.

The despatching service is based upon an “Estimated Time of Arrival” (ETA) algorithm, which calculates an estimated arrival time for each landing call. The calculations are based mainly upon lift speed, acceleration/deceleration times, door opening/closing times etc., and even down to the fine details such as car preference time and door dwell time.

The ETA’s are modelled within the microprocessor to allow the user to select the type of response required. Also parameters may be set to give an accurate representation of lift door timings; furthermore parameters may be set to measure accurately against times set, for Optimum performance. All these parameters can be found in the **ETA Setup**.

The Despatcherless system operates whereby one lift becomes the Master of the group. The decision of who is master is based upon the lowest lift number of the lifts that are connected. If two lifts have the same lift number an error will be recorded in the fault logger. Correct setting of the lift numbers i.e. parameter MY LIFT NUMBER in **System Details** will ensure trouble free operation. If the Master is removed from operation for any reason, then service continues since another lift will take over control, and this passing control would continue up to the last car remaining.

The Master receives information from each lift and calculates an estimated time of arrival for each lift to every call. The Master then allocates calls to each lift based upon the ETA’s. The calls are despatched and updated many times a second. Homing calls are also controlled by the Master, and lifts are despatched to the homing floors based upon the nearest, as and when required.

15.1) Group Algorithms

UP CALLS UP PEAK

When the number of up landing calls within the lift system is greater than the UP PEAK threshold (typically half the number of floors). The ALMEGA 2 detects an UP CALLS UP PEAK condition and reacts by strategically parking lifts within the Group, to give a faster response to the likelihood of further up calls. It achieves this by detecting the lowest up call and parking the available lifts from this floor upwards in anticipation.

DN CALLS DN PEAK

When the number of down landing calls within the lift system is greater than the DN PEAK threshold (typically half the number of floors). The ALMEGA 2 detects a DN CALLS DN PEAK condition and reacts by strategically parking lifts within the Group, to give a faster response to the likelihood of further down calls. It achieves this by detecting the highest down call and parking the available lifts from this floor downwards in anticipation.

BALANCED HEAVY TRAFFIC

When the number of down landing calls within the lift system is greater than the DN PEAK threshold, and the number of up landing calls within the lift system is greater than the UP PEAK threshold. The ALMEGA 2 detects a BALANCED HEAVY TRAFFIC condition, and reacts by strategically parking lifts within the Group, to give a faster response to the likelihood of further up and down calls. It achieves this by detecting the lowest up call and highest down call, and parks the available lifts from these floors upwards and downwards respectively in anticipation.

MAIN FLOOR UP PEAK

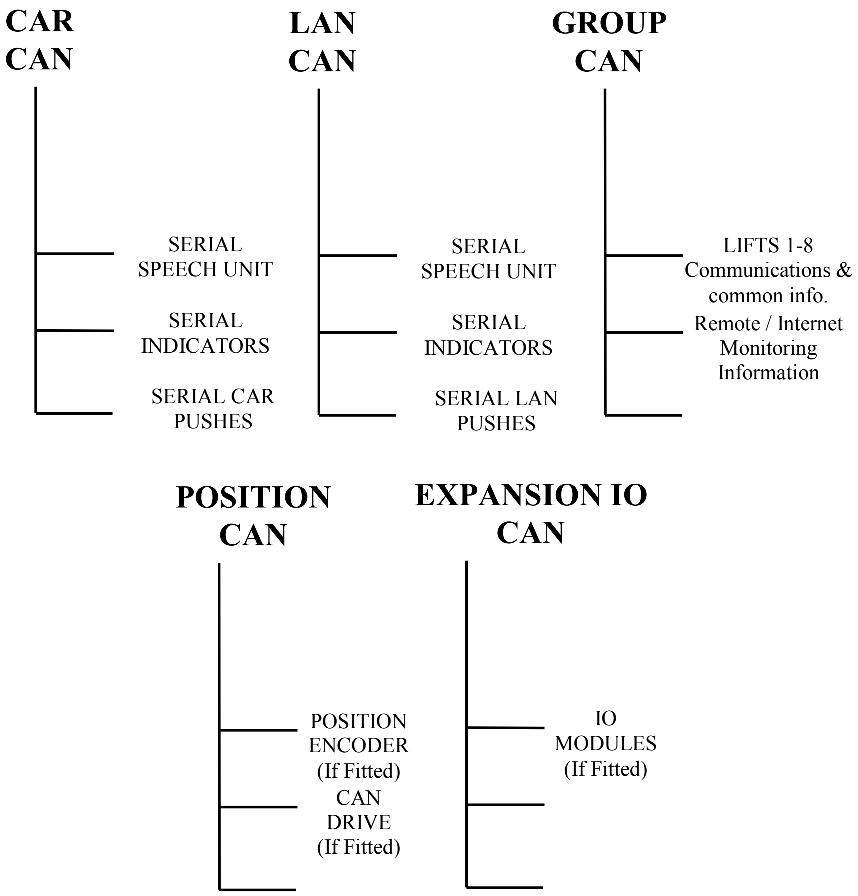
When the main flow of traffic is from the main floor up to various destinations, i.e. during the population of a building, the ALMEGA 2 detects a MAIN FLOOR UP PEAK condition. It reacts by strategically parking lifts within the Group to the main floor so that persons wishing to travel from the main floor have a significantly reduced waiting time. It achieves this by load sensing whilst the lifts are travelling from the main floor, and when a threshold is reached all available lifts park at the main floor.

16) Serial Communication Types

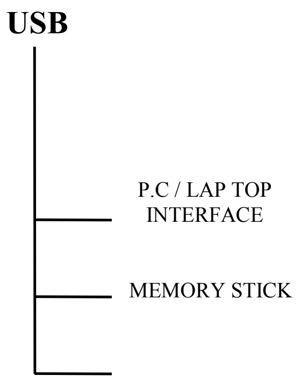
The ALMEGA 2 has been designed with many types of on board communications. These different types of communications allow a wide range of uses for interfacing to the processor. Typical uses, are detailed below:

CAN Communications (Controller Area Network)
The CAN communication ports provide an interface to a range of serial products including Lester Controls Serial Speech Unit and Indicators. Also communications between lifts, specific drives, and Position Encoder are carried out over the CAN bus. Below details the uses of the CAN buses for devices that may be fitted:

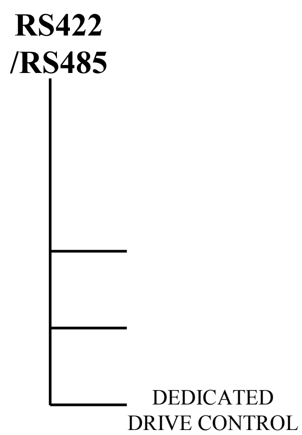
Fig 16.1



USB Communications



RS422 / RS485 Communications

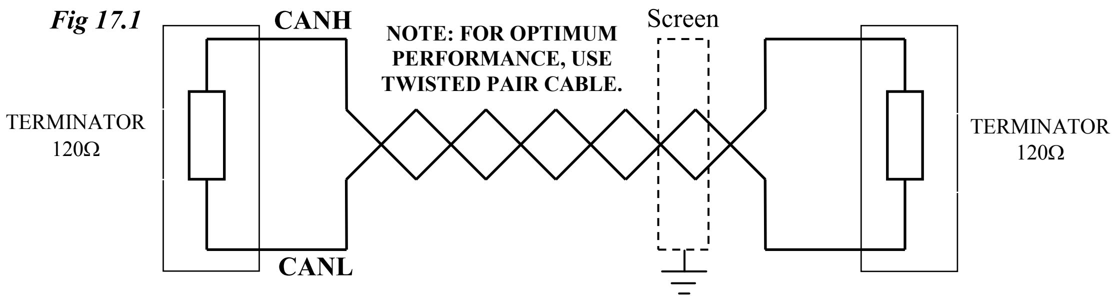


17) CAN Physical Layer Connections

Bus Connections
The CAN field bus consists of two wires named CAN HIGH (**CANH**) and CAN LOW (**CANL**). These two wires carry all the serial information, and must be wired correctly for proper operation of the CAN field bus. In the event of a wiring error however, they can withstand short circuits to either +24V supply or 0V supply.

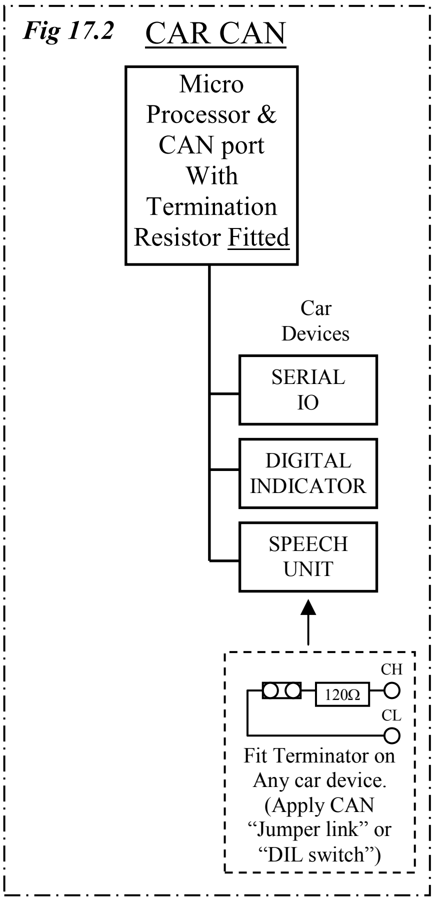
Importance of Bus Terminators
It is vital for correct operation that the **bus terminators** (settable via links) are connected to either end of the CAN field bus as shown below. These terminators are simply resistors of value 120Ω which are used to match the impedance of the cable.

Fig 17.1



17.1) CAR CAN Connections

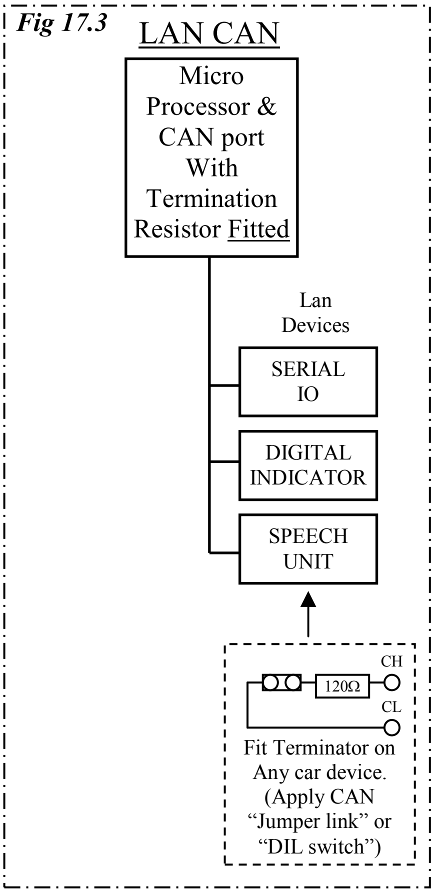
In order to terminate the CAN field-bus wiring properly, the terminating resistor must be applied at the correct point in the lift car as shown.



17.2) LAN CAN Connections

In order to terminate the CAN field-bus wiring properly, the terminating resistor must be applied at the correct point in the lift shaft as shown.

Fig 17.3

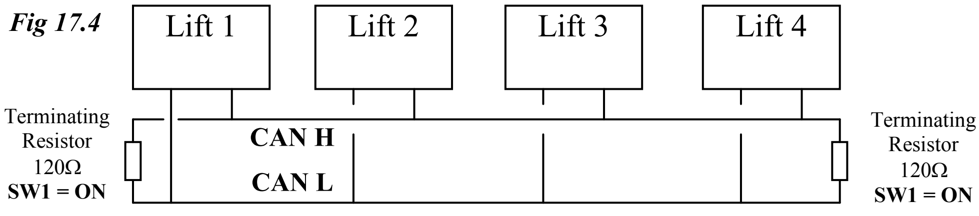


17.3) GROUP CAN Connections

Bus incorporating 4 Car Group

Below shows an example of a 4 car group, whereby field bus terminating resistors are fitted at Lift 1 and Lift 4, i.e. SW1 must be closed on the Base Unit Bottom Boards for Lift 1 and 4, but open on Lifts 2 and 3:

Fig 17.4



17.4) POSITION CAN Connections

In order to terminate the CAN field-bus wiring properly, the terminating resistor must be applied at the correct point on the position encoder as shown.

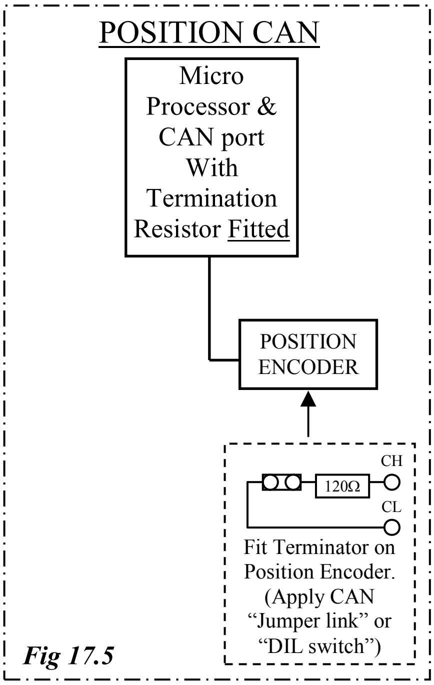


Fig 17.5

17.5) EXPANSION IO CAN Connections

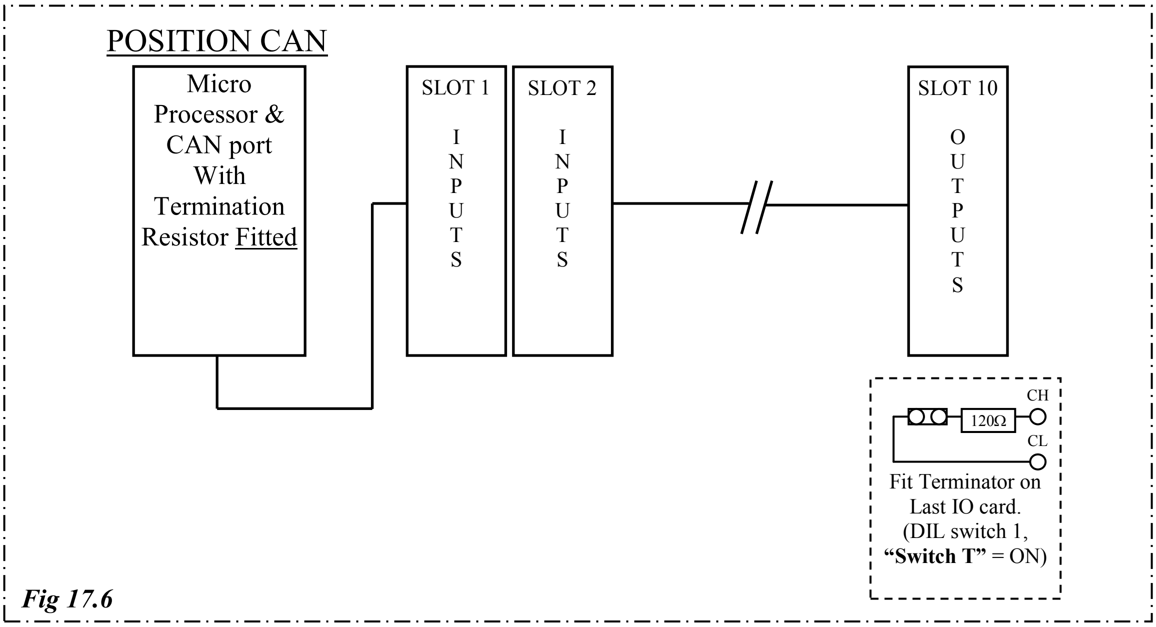


Fig 17.6

17.6) CAN field bus Fault Finding

The CAN field bus driver components that reside on each of the communication boards are very robust, as they can withstand short circuits to each other (CH to CL), and short circuits to either supply rail i.e. 0V & 24V. However they are not indestructible, and the fault finding procedure below, is intended for the rare case that one or more driver components may have got damaged, on one or more of the serial products.

Firstly, if there is a fault, the chance of anything working correctly on the bus is rare, and the majority of the time communication will cease. Within the Event History menu, an event such as below will indicate a CAN problem:

CAR CAN BUS OFF ERROR
(CAR CAN communications connection or short circuit error)

Within the ALMEGA 2 menu, the "CAN DIAGNOSTICS" screen provides information relating to the health of each CAN bus, **see menu & programming section**. This is particularly useful for fault finding!

Also LED indication on the CPU board can help, i.e. CAN LED's TX and RX should flash on frequently and mostly together. Either one of these flashing on its own, or staying ON will indicate a problem.

Identifying a fault on a TC3 Indicator / Speech unit can be relatively simple, as the LED indication on each of the boards will flash in a specific way to indicate a CAN bus fault. The "COMMS" LED, which is "RED" in colour will flash faster than normal (every 40milliseconds) to indicate a CAN bus fault. The LED should flash "ON" at a rate of once per second (if data is not changing i.e. position / doors etc.) if **normal** and once every 40milliseconds if there is a **fault**.

The following will establish whether or not a device is faulty:

1) Remove the power from that device.
2) Remove the CAN connections from that device (i.e. CH & CL).
3) Re-connect the power.
4) If the LED "C" is not flashing, that device is OK!
5) If the LED "C" is flashing "ON" once every 40milliseconds, that device is FAULTY!

This procedure should be repeated for all devices on the bus, until all faulty devices have been identified. Faulty devices cannot be repaired easily on site and should be returned to Lester Control Systems for repair.

18) RS422 / RS485 Connections

Similar to the CAN field bus, RS422 and RS485, also require **bus terminators** connected to either end of the field bus. These terminators are simply resistors of value 120Ω which are used to match the impedance of the cable.

The following shows connections for RS422/485 respectively (with BUS terminations):

Fig 18.1

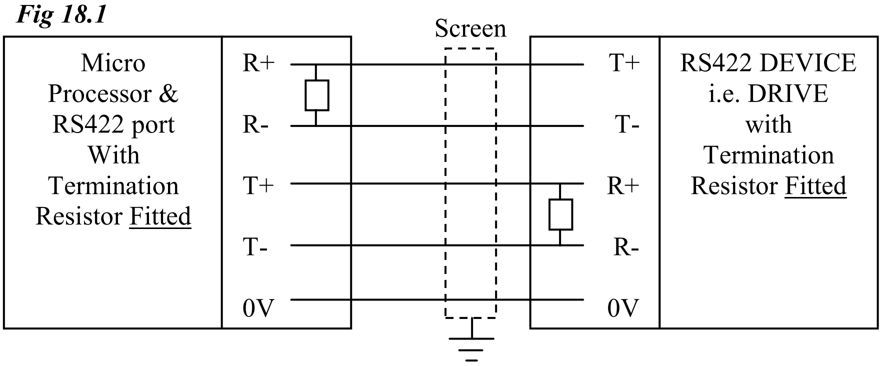
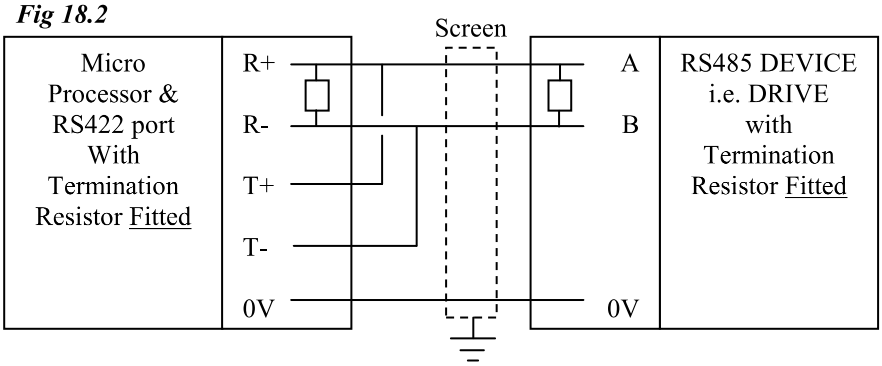


Fig 18.2



19) Serial Indicator and Speech Unit Controls Overview

The ALMEGA 2 has many features and controls applicable to the TC3 Indicator and Speech unit. These controls, settable via parameters, provide a user-friendly interface, and increase flexibility, making factory and site setup/modifications relatively simple. The ALMEGA 2 is able to interface directly to the TC3 products, without an interface unit.

Using a P.C, or laptop, is the most user friendly way for programming / setup, however this also can be achieved using the ALMEGA 2 menu system.

The Serial Indicator can be programmed for:

- i) Floor Position Text 2 to 16 characters.
- ii) Message Text 2 to 35 characters.
    - a. Messages are usually automatically selected according to specific conditions (i.e. INSPECTION CONTROL when on inspection and FIRE CONTROL when on FIRE etc).
    - b. There are also 6 user programmable messages which may be triggered from an external input or from an internal processor condition.
    - c. Messages are also prioritised to a specific order, but the priorities may be changed to suit.
- iii) There are a selection of enable controls for:
    - a. Character Colours.
    - b. Direction Arrow controls.
    - c. Hall Lantern Controls.
    - d. Gong Output Enable & Hush Times.
    - e. 2 Digit Controls.
    - f. Scroll Speed

The Serial Speech Unit can be programmed for:

- i) Position Phrases 1 to 5 phrases.
- ii) Door Phrases 1 to 5 phrases.
- iii) Direction Phrases 1 to 5 phrases.
- iv) Message Phrases 1 to 5 phrases.
    - a. Messages are usually automatically selected according to specific conditions (i.e. INSPECTION CONTROL when on inspection and FIRE CONTROL when on FIRE etc).
    - b. There are also 6 user programmable messages which may be triggered from an external input or from an internal processor condition.
    - c. Messages are also prioritised to a specific order, but the priorities may be changed to suit.
- v) There are a selection of enable controls for:
    - a. Mind the Doors annunciation.
    - b. Speech between Floors.
    - c. Speech trigger when stopped.
    - d. Direction repeated when closing.
    - e. Gong Output Enable & Hush Times.

See menu & programming section for more information.

20) List of Configurable Inputs

Below is a Typical list of configurable Inputs.

1. EMER
2. CARL
3. LANL
4. TEST_UP
5. TEST_DN
6. HYD_OTL
7. DRIVE_LEV_SPEED
8. RELEV_1
9. RELEV_2
10. ADO_1
11. ADO_2
12. IP12
13. IP13
14. IP14
15. IP15
16. IP16

17. SLU_HS
18. SLD_HS
19. SLU_MS3
20. SLD_MS3
21. SLU_MS2
22. SLD_MS2
23. SLU_MS1
24. SLD_MS1
25. IP25
26. IP26
27. IP27
28. IP28
29. IP29

30. STU
31. STD
32. STR
33. RSU
34. RSD
35. UMD_BRAKE1
36. UMD_BRAKE2
37. UMD_FAULT
38. UMD_SOL_MON
39. UMD_CANCEL_SOL_DLY_FBACK
40. IP40
41. IP41
42. IP42
43. IP43

44. DOL
45. DCL
46. DOC
47. DOP
48. SE
49. DLR
50. DCP
51. DOOR_HOLD
52. FRONT_DZ

53. REAR_DOL
54. REAR_DCL
55. REAR_DOC
56. REAR_DOP
57. REAR_SE
58. REAR_DLR
59. REAR_DCP
60. REAR_DOOR_HOLD
61. REAR_DZ
62. SIDE1_DOL
63. SIDE1_DCL
64. SIDE1_DOC
65. SIDE1_DOP
66. SIDE1_SE
67. SIDE1_DLR
68. SIDE1_DCP
69. SIDE1_DOOR_HOLD
70. SIDE1_DZ

71. SIDE2_DOL
72. SIDE2_DCL
73. SIDE2_DOC
74. SIDE2_DOP
75. SIDE2_SE
76. SIDE2_DLR
77. SIDE2_DCP
78. SIDE2_DOOR_HOLD
79. SIDE2_DZ

80. PLLEL_DOORS
81. DISABLE_DOORS
82. IP82
83. IP83
84. IP84
85. IP85
86. IP86

87. THERM
88. TEST_SWITCH
89. FIRE
90. FIRE2
91. FAR1
92. FAR2
93. SERV
94. PRI_SRV_1
95. PRI_SRV_2
96. PRI_SRV_3
97. SHUTDOWN
98. LW110
99. LW90
100. IP100
101. IP101
102. ALARM
103. ALARM_LATCH
104. ALARM_LATCH_RESET
105. CODE_BLUE_HOLD
106. FFIGHT_CAR_SW
107. AUTO_SRV
108. EMER_SUPPLY
109. NORM_SUPP
110. EVAC
111. JOURNEY_COUNTER_ENABLE
112. IP112
113. IP113
114. IP114
115. IP115
116. IP116
117. IP117

118. IP118
119. IP119
120. IP120
121. IP121

122. SPEECH_MSG1
123. SPEECH_MSG2
124. SPEECH_MSG3
125. SPEECH_MSG4
126. SPEECH_MSG5
127. SPEECH_MSG6
128. SPEECH_HUSH
129. IP129
130. IP130

131. IND_MSG1
132. IND_MSG2
133. IND_MSG3
134. IND_MSG4
135. IND_MSG5
136. IND_MSG6
137. IND_HUSH
138. IP138
139. IP139

140. TIME1_CALL_TABLE
141. TIME2_CALL_TABLE
142. TIME3_CALL_TABLE
143. TIME4_CALL_TABLE
144. TIME5_CALL_TABLE
145. IP145
146. IP146
147. IP147
148. IP148
149. IP149

150. FFIGHT_RESET_POSN_A
151. FFIGHT_RESET_POSN_B
152. FFIGHT_RESET_POSN_C
153. FFIGHT_RESET_POSN_D
154. FFIGHT_RESET_POSN_E
155. FFIGHT_RESET_POSN_F

156. A_HEALTHY
157. B_HEALTHY
158. C_HEALTHY
159. D_HEALTHY
160. E_HEALTHY
161. F_HEALTHY
162. G_HEALTHY
163. H_HEALTHY

164. PSLU_01
165. PSLU_02
166. PSLU_03
167. PSLU_04
168. PSLU_05
169. PSLU_06
170. PSLU_07
171. PSLU_08
172. PSLU_09
173. PSLU_10

174. PSLD_01
175. PSLD_02
176. PSLD_03
177. PSLD_04
178. PSLD_05
179. PSLD_06
180. PSLD_07
181. PSLD_08
182. PSLD_09
183. PSLD_10

184. PAWL_STU
185. PAWL_STD
186. PAWL_SOL1
187. PAWL_SOL2
188. PAWL_SOL3
189. PAWL_SOL4
190. PAWL_SOL5
191. PAWL_SOL6
192. PAWL_SOL7
193. PAWL_SOL8
194. PAWL_PLATF1
195. PAWL_PLATF2
196. PAWL_PLATF3
197. PAWL_PLATF4
198. PAWL_PLATF5
199. PAWL_PLATF6
200. PAWL_PLATF7
201. PAWL_PLATF8
202. IP202
203. IP203
204. IP204
205. IP205
206. IP206

207. MON_POINT_01
208. MON_POINT_02
209. MON_POINT_03
210. MON_POINT_04
211. MON_POINT_05
212. MON_POINT_06
213. MON_POINT_07
214. MON_POINT_08
215. MON_POINT_09
216. MON_POINT_10

Normal / Front Door Calls

Landing Up Calls
300 - 330   LU1 to LU31
Landing Dn Calls
331 - 361   LD2 to LD32
Car Calls
362 - 393   CP1 to CP32
Code Blue Calls
394 - 425   CB1 to CB32
Special Up Calls
426 - 456   SPLU1 to SPLU31
Special Dn Calls
457 - 487   SPLD2 to SPLD32

Rear Door Calls

Landing Up Calls Rear
488 - 518   LU1R to LU31R
Landing Dn Calls Rear
519 - 549   LD2R to LD32R
Car Calls Rear
550 - 581   CP1R to CP32R
Code Blue Calls Rear
582 - 613   CB1R to CB32R
Special Up Calls Rear
614 - 644   SPLU1R to SPLU31R
Special Dn Calls Rear
645 - 675   SPLD2R to SPLD32R

Side 1 Door Calls

Landing Up Calls Side 1
676 - 706   LU1S1 to LU3S1
Landing Dn Calls Side 1
707 - 737   LD2S1 to LD32S1
Car Calls Side 1
738 - 769   CP1S1 to CP32S1
Code Blue Calls Side 1
770 - 801   CB1S1 to CB32S1
Special Up Calls Side 1
802 - 832   SPLU1S1 to SPLU31S1
Special Dn Calls Side 1
833 - 863   SPLD2S1 to SPLD32S1

Side 2 Door Calls

Landing Up Calls Side 2
864 - 894   LU1S2 to LU3S2
Landing Dn Calls Side 2
895 - 925   LD2S2 to LD32S2
Car Calls Side 2
926 - 957   CP1S2 to CP32S2
Code Blue Calls Side 2
958 - 989   CB1S2 to CB32S2
Special Up Calls Side 2
990 - 1020   SPLU1S2 to SPLU31S2
Special Dn Calls Side 2
1021 - 1051   SPLD2S2 to SPLD32S2

21) List of Configurable Outputs

Below is a Typical list of configurable Outputs.

1. UPR
2. DNR
3. HSR
4. LSR
5. RELEV
6. RETIRING_RAMP
7. STAR
8. DELTA
9. BR_LIFT_REL
10. DRV_ENABLE
11. DRV_BIN_SPA
12. DRV_BIN_SPB
13. DRV_BIN_SPC
14. DRV_TOP_SP
15. QUICK_SLOW
16. STP_2NDVANE
17. LEARN_RUN
18. UMD_CANCEL_SOL_DLY
19. UMD_FAILURE
20. OP20
21. OP21
22. OP22
23. OP23
24. OP24

25. IU
26. ID
27. OP27
28. OP28
29. OP29

30. ADV_OPEN
31. FRONT_DOOR_OP
32. REAR_DOOR_OP
33. SIDE1_DOOR_OP
34. SIDE2_DOOR_OP

35. SE_HELD
36. DOP_HELD
37. DLR_HELD
38. DOP_SE_DE_HELD
39. DOP_ILLUMINATION
40. OP40
41. OP41
42. OP42
43. OP43
44. OP44

45. DOR
46. DCR
47. NUG
48. HLR
49. HLR_U
50. HLR_D
51. GONG
52. OP52
53. OP53
54. REAR_DOR
55. REAR_DCR
56. REAR_NUG
57. REAR_HLR
58. REAR_HLR_U
59. REAR_HLR_D
60. REAR_GONG
61. OP61
62. OP62

63. SIDE1_DOR
64. SIDE1_DCR
65. SIDE1_NUG
66. SIDE1_HLR
67. SIDE1_HLR_U
68. SIDE1_HLR_D
69. SIDE1_GONG
70. OP70
71. OP71

72. SIDE2_DOR
73. SIDE2_DCR
74. SIDE2_NUG
75. SIDE2_HLR
76. SIDE2_HLR_U
77. SIDE2_HLR_D
78. SIDE2_GONG
79. OP79
80. OP80

81. OSI
82. OLI
83. LW90_IND
84. OP84
85. OP85
86. FIRE_IND
87. FIRE_OR_FAR
88. FFIGHT_RESET
89. TEST_IND
90. SHUTDN
91. PREPARE_TO_TEST
92. THERMISTOR_TRIPPED
93. ESUP_O
94. ESUP_RETURNED
95. ESUP_RETURNED_DO
96. ESUP_SELECTED
97. PRI_SRV_1_IND
98. PRI_SRV_2_IND
99. PRI_SRV_3_IND
100. NORMAL_SERV
101. LIFT_IN_SERV
102. CODE_BLUE_IND
103. FIRE_WARNING
104. AUTO_SRV_IND
105. SERV_IND
106. EVAC_IND
107. FAR_1_IND
108. FAR_2_IND
109. FAR_IND
110. OP110
111. OP111
112. OP112
113. OP113

114. BIN_POS_A
115. BIN_POS_B
116. BIN_POS_C
117. BIN_POS_D
118. BIN_POS_E
119. BIN_POS_F

120. TIME1_CALL_TABLE_OUTPUT
121. TIME2_CALL_TABLE_OUTPUT
122. TIME3_CALL_TABLE_OUTPUT
123. TIME4_CALL_TABLE_OUTPUT
124. TIME5_CALL_TABLE_OUTPUT
125. OP125
126. OP126
127. OP127
128. OP128
129. OP129

130. STU_OP
131. STD_OP
132. WITHIN_FLEV
133. SPEECH_TRIGGER
134. JOURNEY_COUNT_EXCEEDED
135. ALLOC_REVS_EXCEEDED
136. ALARM_FILTER
137. CAR_LIGHT
138. POS_IND_ESAVE_OP
139. ALARM_LATCH_OP
140. POSITION_OP_ENABLE
141. POSN_DEV_PWR_OP

142. OP142
143. OP143
144. OP144
145. OP145
146. OP146
147. GATE_OP_WARN
148. LOCK_ALARM
149. LOCK_TIP_HI
150. LOCK_TIP_LO
151. START_FAIL
152. STUCK_BFLRS
153. DOOR_OP_PROT
154. DOOR_CL_PROT
155. GATE_LCK_FLT
156. MOTION_FAIL
157. EMER_STOP
158. UNABLE_TO_OPEN_DOOR
159. ERROR_IN_POSITION
160. DOUBLE_JOURNEY
161. HYDRAULIC_OVERTRAVEL
162. RELEVELLING_ERROR
163. LOST_24V
164. PRE_FLITE_CHECK_FAIL
165. IO_BOARDS_CHANGED
166. STUCK_CAR_BUTTON
167. STUCK_LAN_BUTTON
168. IO_CONFIG_ERROR
169. CARCAL_PRESSED
170. LANCAL_PRESSED
171. LIFT_IN_USE
172. AUTO_CAR_PREF

173. LIFT_FAIURE
174. LIFT_HEALTHY

175. CAN0_BUS_OFF
176. CAN1_BUS_OFF
177. CAN2_BUS_OFF
178. CAN3_BUS_OFF
179. CAN4_BUS_OFF

180. OP180
181. OP181
182. OP182
183. OP183
184. OP184

185. PAWL_UP
186. PAWL_DN
187. PAWL_DIR_CTRL
188. PAWL_SOL
189. PAWL_SPD
190. PAWL_FLT
191. PAWL_RECOVERY_RUN
192. PAWL_PLTFS_ENGAGED_OP

300. HLU1
301. HLU2
302. HLU3
303. HLU4
304. HLU5
305. HLU6
306. HLU7
307. HLU8
308. HLU9
309. HLU10
310. HLU11
311. HLU12
312. HLU13
313. HLU14
314. HLU15
315. HLU16
316. HLU17
317. HLU18
318. HLU19
319. HLU20
320. HLU21
321. HLU22
322. HLU23
323. HLU24
324. HLU25
325. HLU26
326. HLU27
327. HLU28
328. HLU29
329. HLU30
330. HLU31
331. HLD2
332. HLD3
333. HLD4
334. HLD5
335. HLD6
336. HLD7
337. HLD8
338. HLD9
339. HLD10
340. HLD11
341. HLD12
342. HLD13
343. HLD14
344. HLD15
345. HLD16
346. HLD17
347. HLD18
348. HLD19
349. HLD20
350. HLD21
351. HLD22
352. HLD23
353. HLD24
354. HLD25
355. HLD26
356. HLD27
357. HLD28
358. HLD29
359. HLD30
360. HLD31
361. HLD32
362. PI1
363. PI2
364. PI3
365. PI4
366. PI5
367. PI6
368. PI7
369. PI8
370. PI9
371. PI10
372. PI11
373. PI12
374. PI13
375. PI14
376. PI15
377. PI16
378. PI17
379. PI18
380. PI19
381. PI20
382. PI21
383. PI22
384. PI23
385. PI24
386. PI25
387. PI26
388. PI27
389. PI28
390. PI29
391. PI30
392. PI31
393. PI32