International
Lift Equipment

Technical manual for the ILE Skycom microprocessor

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Note for Windows Application Software, refer to the Software Manual

1) INTRODUCTION

The SKYCOM micro processor has been designed based upon a rack system and using surface mount component technology to be small and compact so that a standard size box fits comfortably inside a control panel cabinet up to a maximum of 48 floors.

The rack system allows variable lift configurations to be implemented, which can be tailor made to suit the application and be cost effective according to the number of floors. Also each rack plug in board has on board identification (plug and play) which is used to provide information and help setup the board.

A large 128*64 dot Graphical LCD display has been used to provide the user with a simple and easy to use interface plus much more useful features such as a description for the events and trace events, Lift Viewer showing a graphical representation of the lifts' status/position/doors etc... and an Input viewer to show the status of each input and what it is configured for.

A keypad switch panel has been included to allow the user to change parameters and settings to suit the lift installation. The simple layout of the keypad and easy to use menu interface allows changing of parameters with very little effort. However passwords are required and maybe given upon request to change certain parameters.

LED indication is provided on each input/output of all plug in cards into the IO rack. The colour coding is GREEN for INPUT and RED for OUTPUT. Also the CPU has LED indication provided for the 10 Mains inputs, CPU status, Communications and Power Supplies.

The micro processor will connect directly to ILE serial indicator and speech units, providing full programmability of up to 48 floors and many messages and features. Separate messages are included for doors opening, doors closing, going up and going down, mind the doors and arrival gongs. The messages have priorities to differentiate between levels of importance i.e. "Lift Overloaded" would have a higher priority than "Lift On Fire Control". These priorities also eliminate the need for extra relays in the control panel. All these are fully re-programmable via the micro processor. Information is transmitted serially to the units using CAN (Controller Area Network) technology.

Windows application software is available to allow the user to change parameters and settings to suit the lift installation. The software will work on any IBM compatible P.C. or lap top (486, 33MHZ or higher) with windows version 95 or higher. The software has been designed to encourage and allow the user to change the lift installation setup as required and to reduce the need for special software. However if special software is required ILE will only be pleased to accommodate.

Other features include:-

- Direct serial communication to drives, also direct to floor control.
- Despatcherless Group systems.
- Adjustment of slowing distance / floor levels via software.
- Integral Shaft Encoder plug in board for high rise/high speed applications.
- Modem/Mobile Phone Interface.

2) List of Equipment

1) Skycom Micro Processor Box with plastic enclosure, power supply board, backplane board(s), IO cards and keypad interface.

2) Cable Terminators for devices with serial communication

3) Digital Indicators (if fitted)

4) Speech Synthesiser (if fitted)

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

6) 1 Serial Communication Cable (RS232 (none crossed Male/Female) link between processor & lap top).

3) Switching Onto Test Operation For The First Time

The Lift Viewer or Input Output Viewer from the main menu maybe 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 from terminals **OTL** to **CTS (**also **CF** to **TS** for hydraulic lifts**)**, **CTS** to **CDC** and from **CDC** to **LDC**.
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 **TS** and **TRS** open circuit.
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** and **TEST** are illuminated on the CPU board, or look on the LCD display (i.e. INPUT VIEWER).

The lift can now be driven by making the following temporary connections:-

To travel	UP	=	**TUD** to **TUP**
To travel	DOWN	=	**TUD** to **TDN**

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 **TOP**
OPEN	=	**DTF** and **TCL**

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.

4) Switching Onto Normal Operation For The First Time

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

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

The lift is switched onto NORMAL operation via the car top control, i.e. a connection should be made between terminals **TS** and **TRS**, also 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:-

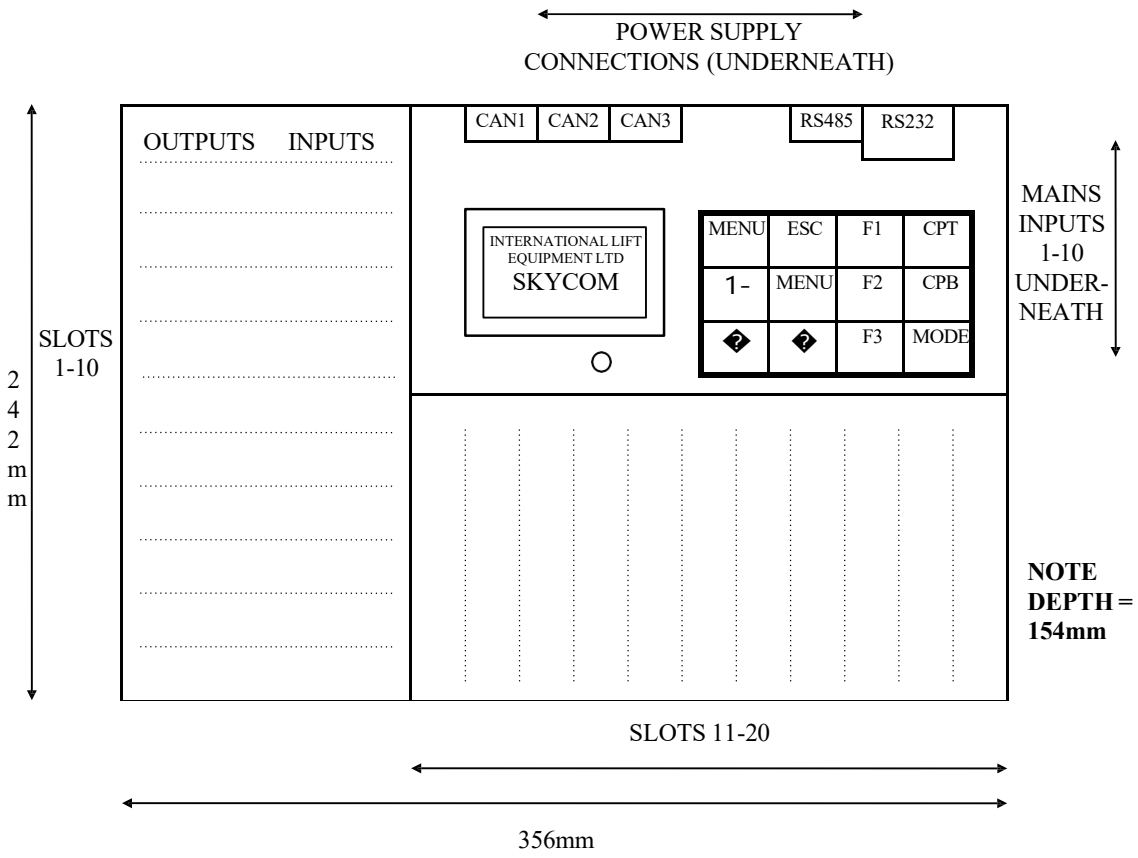
1) Purging of the Event Logger RAM:- By selecting pressing -+ and ENTER via the keypad the previous events stored in the Event Logger are completely cleared, whilst in the Menu **Event History**.

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

3) Testing of Terminal limit and Slowing switches :- Press **CPT** button to register a top car call and then press **MENU and F3** under constant pressure to inhibit signals MSU/MSD and PX thus forcing the lift to slow down via the slowing limit and stopping on the terminal limit. 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.

5) SKYCOM Micro Processor Box/Rack Drawing



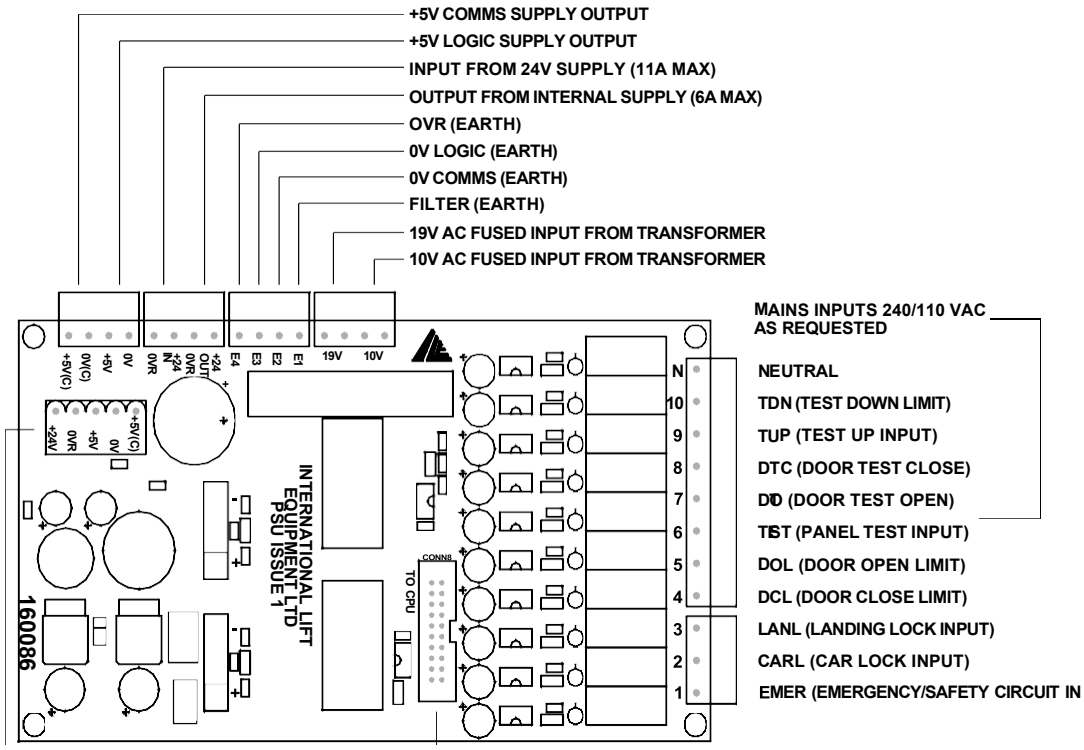
The SKYCOM lift controller is housed in a plastic Box as shown above. The main purpose of the box is to provide location and housing for the boards that are fixed within it, or will plug into the IO rack. The IO rack has grooved slots so that IO boards can slide in and out as required. Also the lids provide support for the IO boards since they also have grooved slots to support the IO cards from the top.

The CPU board is mounted behind the main lid with the LCD display and keypad. The CPU provides interface with the LCD display and keypad and communications for CAN (Controller Area Network)i.e. CAN1, CAN3 and CAN3. Also communications for RS232 and RS485 are provided.

The power supply board is mounted below the CPU board and has connections for 10 Mains inputs and connections for power from an external transformer or external power supply (if reqd).

Backplane/Motherboards are fixed within the sections for slots(1-10 / 11-20) as required and provide connection from the IO cards to the CPU board. Also power supplies for the IO cards are carried by the backplane/motherboards.

6) Power Supply and Fusing Techniques



The Power Supply board as shown above is located under the main processor CPU board and has 2 main purposes. The first is to provide low voltage power to the lift and micro processor circuits. The second is to provide Mains inputs for the lift functions, typically configured as shown above. However these inputs can be configured to any combination of possible inputs. The inputs are fully opto isolated and can be either 240V or 110V as requested, the isolated status of the inputs are then passed to the main CPU board via the ribbon connector.

The 24V D.C. supply is derived from the 19V A.C. supply and provides a maximum current output of 6A. If more current is required then an external 24V D.C. supply can be used up to a maximum of 11A. There are two 5V D.C. supplies (derived from the 10V A.C. supply) which are for logic and communications. The logic supply feeds the main micro processor and input output cards. The communication supply feeds all communication ports i.e. RS232, CAN ports etc..and usually contains more noise than the logic supply, therefore the two supplies should never be connected together. Note the terminals for 5V logic and 5V comms are provided but would not normally be connected i.e. for reference only.

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

Terminal connections are provided to transfer power from the power supply to the IO backplane i.e. 24V and 5V logic/comms supply.

6.1) General Fusing Techniques

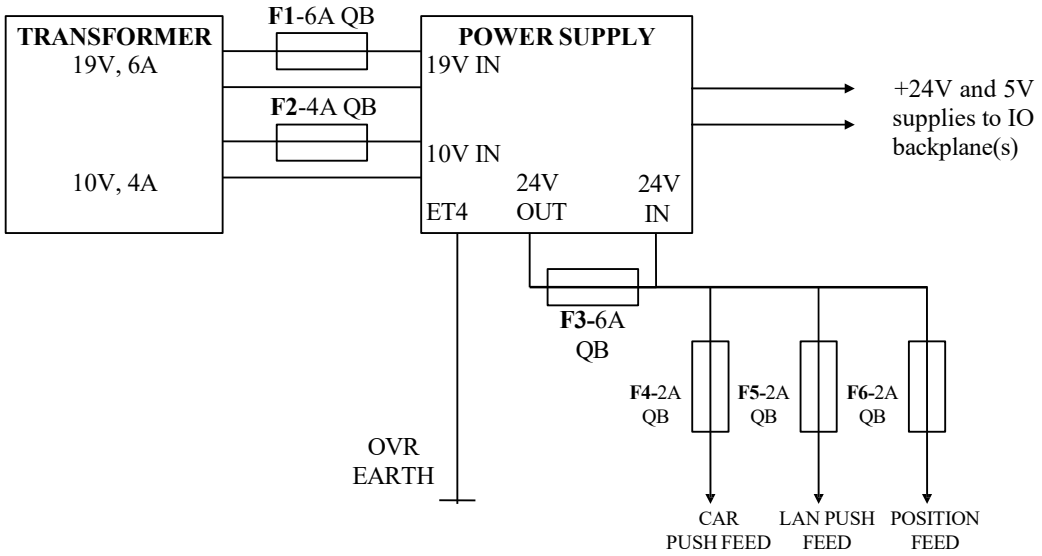
Notes

i) All Fuses are external to the PCB boards.

ii) Fuses should not exceed the maximum current ratings.

iii) The IO backplane +24V will be protected by fuse F3=6A.

iv) The IO backplane +5V supplies will be protected by electronic short circuit protection and F2=4A.



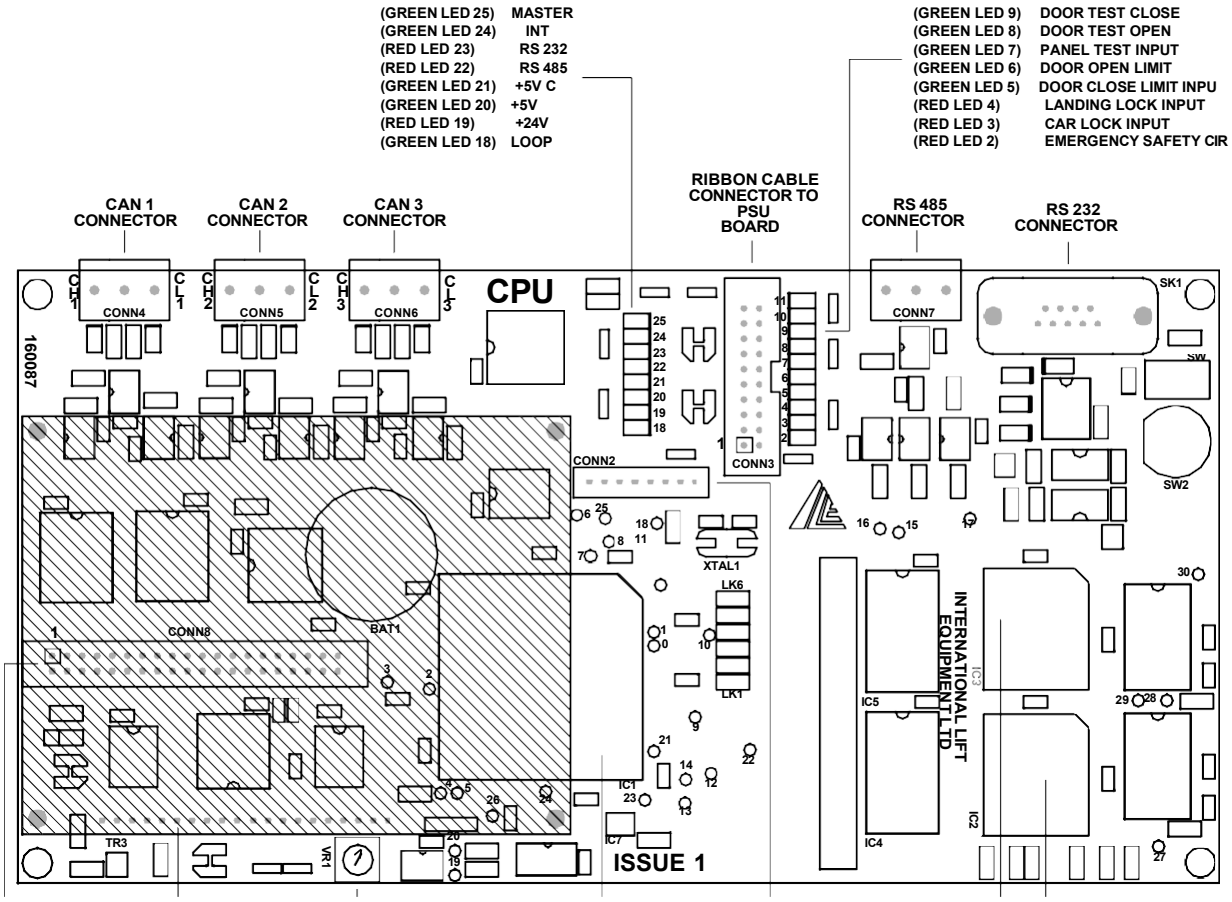
v) Car Push Feed
connects to car pushes and terminal COM of the relevant IO card, note also LK1 on the IO card will not be fitted if COM is wired.

vi) Lan Push Feed
connects to landing pushes and terminal COM of the relevant IO card, note also LK1 on the IO card will not be fitted if COM is wired.

vii) Position Feed
connects to terminal COM of the relevant IO card to supply fused feed to position outputs etc.., note also LK1 on the IO card will not be fitted if COM is wired.

viii) Fuses for Car and Lan push feed would not be required if the IO boards are type "linked" and are supplied with Over voltage and Mains protection, since inputs/outputs are separately fused.

7) CPU Processor Board



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

LED indication is provided for system functions i.e. Program Loop, +24Vand 5V supplies and Master light etc..(see above). LED is also provided for the mains inputs which are located on the power supply board underneath the CPU, i.e. EMER, LOCK, TEST INPUT etc.. (see above).

The program memory is located on the under side of the board for easier access when changing software(if reqd). The program memory must be removed carefully with a proper eprom removing tool (“hook”) or with a precision screwdriver if the proper tool is not available. Very little force is required to remove the memory devices or else damage to the memory sockets may occur. When inserting the new memory devices ensure that the ODD and EVEN devices (as marked) are inserted as shown. Also the slanted edges match the slanted edges of the sockets. Once correct, the device should be pushed firmly into the socket until it cannot go any further.

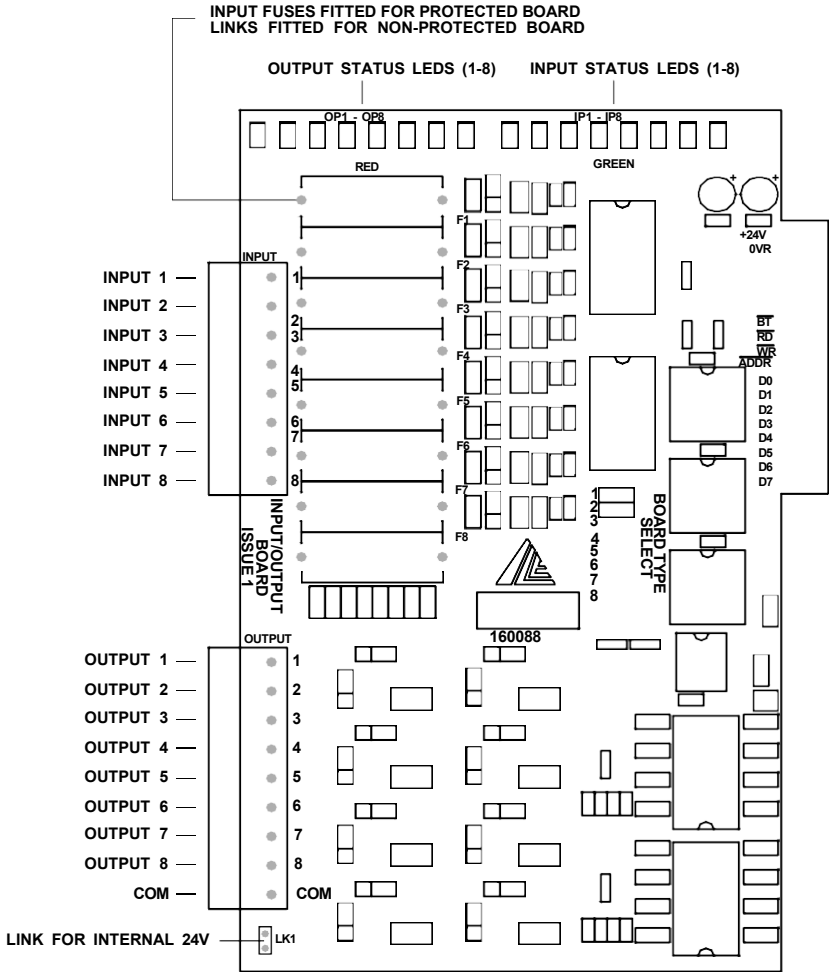
The LCD display contrast setting can be adjusted as required by changing the setting on the LCD contrast potentiometer. However this is factory set and generally would not be require adjustment.

Various connections are provided for serial communication to serial devices (see also Communications section of the manual). The RS232 connection (fitted as standard) provides communication to a P.C. or lap top computer. This in conjunction with the Windows software allows the user to view and change parameters as required. Also the RS232 connection may be used to connect to a Modem or hand held computer device i.e. Psion organiser etc..

CAN (Controller Area Network) connections are provided to enable communication to lift serial devices and other lifts. CAN 1 connection (fitted as standard) provides communication to per lift devices i.e. serial Indicators/Speech Unit etc.. CAN 2 (fitted on Duplex boards only) provides communication to other lifts i.e. Duplex, Triplex, Group etc... CAN 3 (fitted on Duplex boards only) provides communication to motor drives and shaft encoder.

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

8) IO LINK BOARD



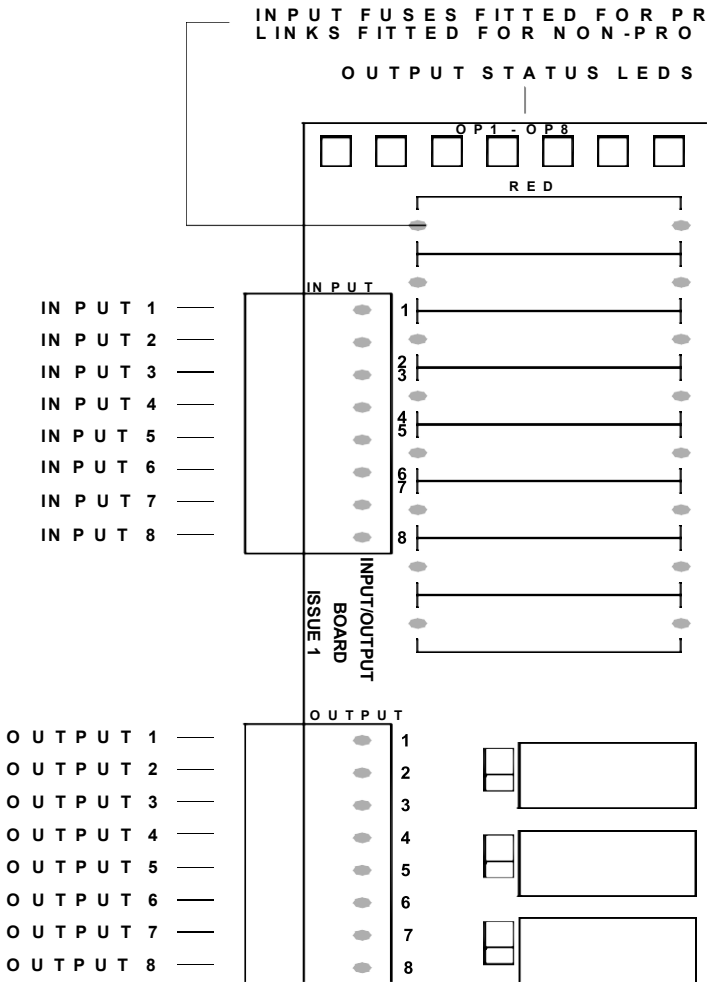
The Link board as shown above is so called since the input and output circuits are linked together. This has the advantage of reducing the wiring to the lift call pushes since the call acceptance output is provided by the processor and hence output circuit of the IO board. The outputs are achieved by **transistor switching.**

Input and output connections are shown above. LED indication for each input/output is provided at the top of the board, GREEN for Inputs and RED for outputs.

As standard the board is fitted **without** over voltage and mains input protection. If fitted, the inputs/outputs are protected against over voltage of typically greater than 30V and mains voltage up to 240V A.C. If an input/output is subjected to a high voltage then the relevant fuse will blow. This fuse is rated at 250mA quick blow and should be replaced with the same.

Link LK1 is required to link the common voltage of the board to the internal +24V supplied via the IO backplane. If an external supply is required i.e. if it is desirable to fuse the board separately, then LK1 should not be fitted and the terminal common should be wired with the common voltage.

9) IO NON-LINK BOARD



The Non Link board as shown above is so called since the input and output circuits are not linked together. This gives the option of configuring inputs and outputs independent of each other, i.e. input 1 may conferred as PX whereas output maybe configured as PI1 etc.. The outputs are achieved by **relay switching.** The relays contacts are normally open and are all common to the terminal **COM.** The contacts are rated up to (2A@28Vd.c.) and (2A@120Va.c.)

Input and output connections are shown above. LED indication for each input/output is provided at the top of the board, GREEN for Inputs and RED for outputs.

As standard the board is fitted **without** over voltage and mains input protection. If fitted, the inputs/outputs are protected against over voltage of typically greater than 30V and mains voltage up to 240V A.C. If an input/output is subjected to a high voltage then the relevant fuse will blow. This fuse is rated at 250mA quick blow and should be replaced with the same.

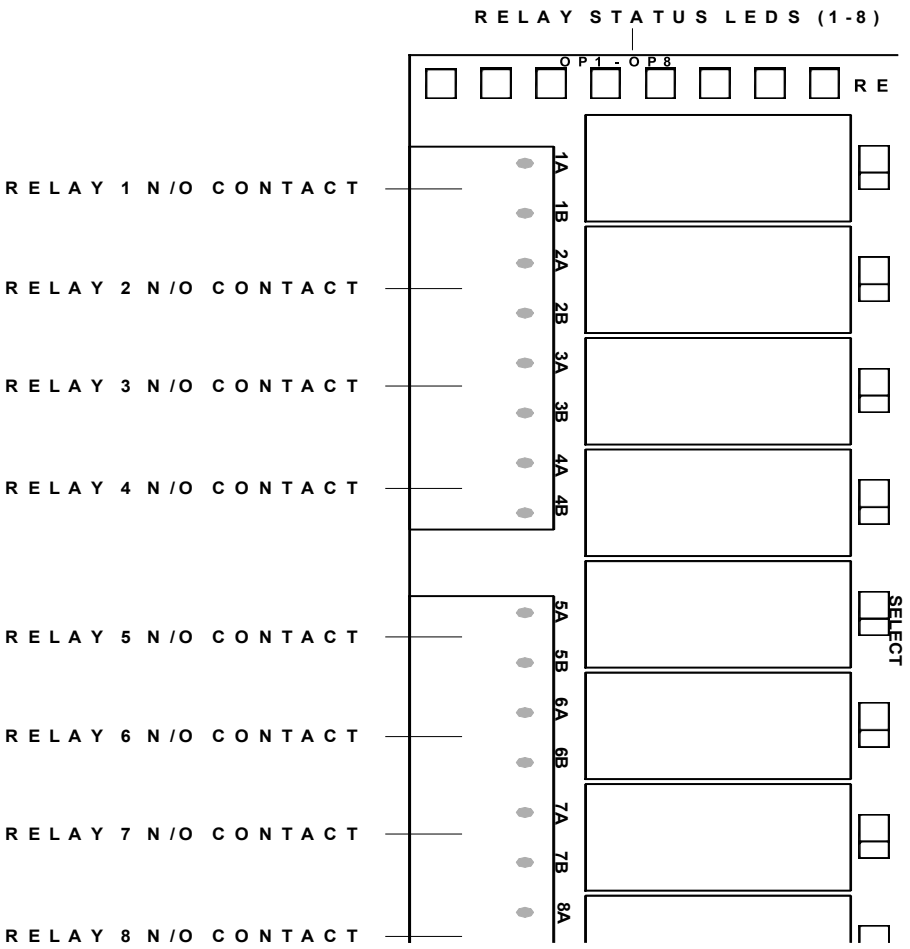
Link LK1 is required to link the common voltage of the board to the internal +24V supplied via the IO backplane. If an external supply is required i.e. if it is desirable to fuse the board separately, then LK1 should not be fitted and the terminal common should be wired with the common voltage.
There are 3 other links IP1, IP2 and IP3 which are included and are as follows:-

IP1 = when the link is on, links input 1 (opto-isolated side) to the processor to give a fast input used as PX. This input can then be used to provide accurate and predictable delays when changing from high speed to low speed for use with motor drives, in gaining accurate floor levels i.e. Direct to Floor Control.

IP2 = Spare should be left unconnected.

IP3 = Spare should be left unconnected.

10) RELAY OUTPUT BOARD

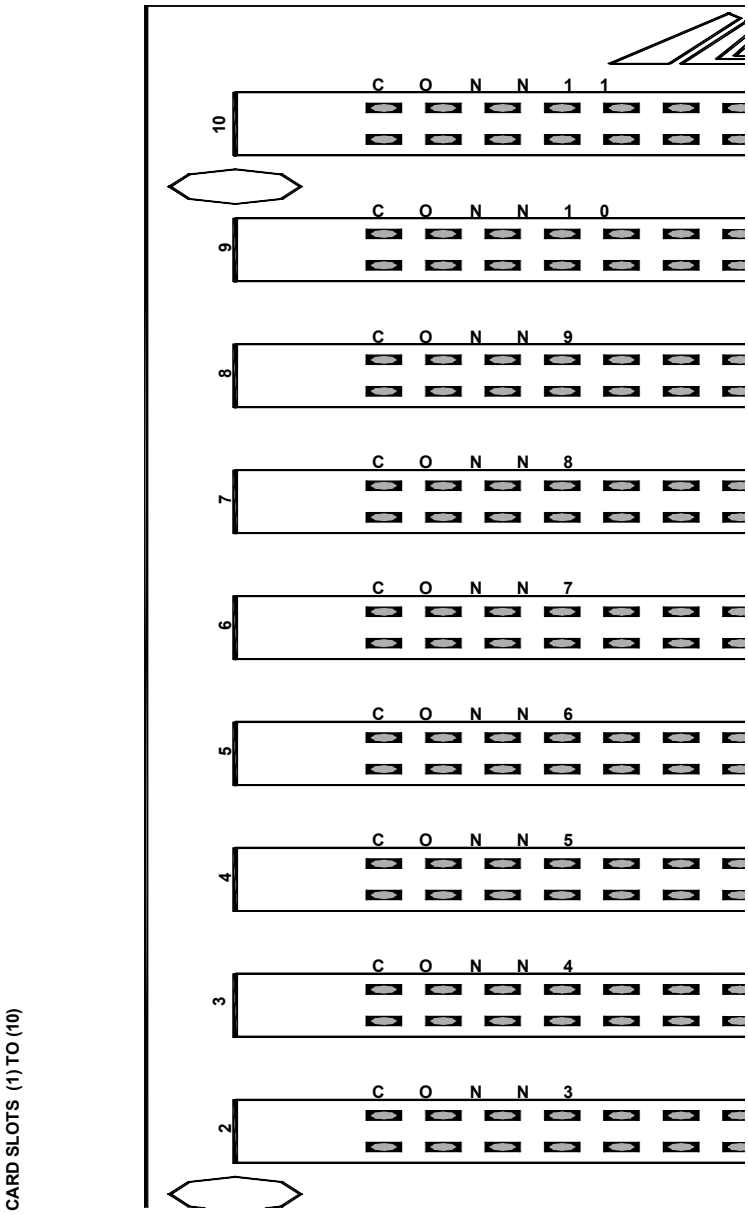


The Relay Output board provides 8 normally open volt free relay contacts that can be configured as required. The contacts are not common and must be wired to each side of the contact i.e. A and B. The contacts are rated up to (12A@28Vd.c.) and (12A@277Va.c.)

Output connections are shown above. LED indication for each output is provided at the top of the board i.e. RED for outputs.

LK1 = when the link is on, links output 1 (opto-isolated side) to the processor to give a fast output used as HSR. This output can then be used to provide accurate and predictable delays when changing from high speed to low speed for use with motor drives, in gaining accurate floor levels i.e. Direct to Floor Control.

11) Backplane Board



The Backplane board as shown above provides a connection between Input/Output devices and the micro processor, also it provides a connection from the power supply to the IO boards. The backplane is fixed within the box to provide a location for the IO cards to slot into. Generally only one backplane board will be fitted, but if more than 10 slots are required, a second board maybe fitted to expand up to 20 slots. The difference between a backplane board configured for slots 1-10 or 11-20 is identified by the address selector links, i.e. fitted 1-10 for slots 1-10 or 11-20 for slots 1-20.

12) Menu List Description

The menu list will be in the order typically as below. Each menu list item has a purpose to either view lift information or view and change lift parameters according to the password entered. Each section corresponds to a block of data that is relevant to each other i.e. all Door parameters are in Door Setup and all Door times are in Door Times etc.. All parameters are usually factory set from ILE before despatch. A brief description of all the menu items is shown below.

EVENT HISTORY
EVENT TRACE BUFFER
TRACE SETUP
ENTER CALLS
LIFT VIEWER
INPUT OUTPUT VIEWER
JOB DETAILS
SYSTEM DETAILS
MODIFIED PARAMETERS
GENERAL PARAMETERS
GENERAL TIMES
DOOR SETUP
DOOR TIMES
TRAVEL SETUP
HOMING SETUP
IO SETUP
OUT OF SERVICE SETUP
HYDRAULIC SETUP
ANTI NUISANCE SETUP
FIRE CONTROL SETUP
SPECIAL SERVICE SETUP
SPECIAL SERVICE TIMES
ETA PARAMETERS
EXTERNAL DEVICES
PX DELAYS SETUP
FLOOR SPEED SETUP
ENGINEER SETUP
GROUP SETUP
M.G. SEQUENTIAL START
ADVANCING SELECTOR
DATE TIME SETUP
GENERAL INFORMATION
PARAMETER CONTROL

EVENT HISTORY

All current event History can be viewed from within this menu. The data can be viewed in list format, or as detailed information with description, time and date etc..

EVENT TRACE BUFFER

All current Trace History can be viewed from within this menu. The data can be viewed in list format, or as detailed information with description, time and date etc.. Trace history is a log of certain events or information that is usually viewed for diagnostic purposes.

TRACE SETUP

This is the Trace history setup menu, whereby items can be selected for trace i.e. vane info or door info, or all if required. Once setup entering Trace History will display the information.

ENTER CALLS

The user can enter specific or patterned calls from within this menu with the option of repeating and viewing the calls with the Lift Viewer.

LIFT VIEWER

A graphical representation of the lift can be viewed showing lift position, status, door status, vane information, calls and much more.

INPUT OUTPUT VIEWER

A graphical representation of the inputs and outputs can be viewed from this menu, Also the information can be viewed as a whole or as usually preferred in detail of each IO slot.

JOB DETAILS

Job details such as Job Number and LCD default message etc, can be viewed and changed if required.

SYSTEM DETAILS

System details such as Number of floors, Drive type and Collective type etc, can be viewed and changed if required.

MODIFIED PARAMETERS

A list all relevant Parameters that have been modified can be viewed from within this menu. The data can be viewed in list format, or as detailed information showing the default value that the parameter has changed from.

GENERAL PARAMETERS

General parameters such as Delay, Pulse HLR etc, can be viewed and changed if required.

GENERAL TIMES

General times such as Self Test time and Dive time etc, can be viewed and changed if required.

DOOR SETUP

Door parameters can be viewed and changed as required such as Quick close, Park open and Nudging enabled etc.. These details are usually factory set from ILE before despatch.

DOOR TIMES

Door time parameters can be viewed and changed as required such as Door Dwell times and Nudging time etc..

TRAVEL SETUP

Travel parameters/times mostly associated with the drive control can be viewed and changed as required such as Brake Lift/Release times, Stop time and Journey time etc..

HOMING SETUP

Homing parameters/times such as Homing floors, Homing time and Homing ON/OFF can be viewed and changed as required.

IO SETUP

All Input/Output parameters such as Call inputs, Relay outputs and General inputs etc, can be viewed and changed as required.

OUT OF SERVICE SETUP

The Out Of Service Indicator can be configured to show out of service for a variety of conditions such as Landing Lock Failure, Car Lock Failure, Fire Control and Service Control etc.

HYDRAULIC SETUP

Hydraulic Lift parameters such as Hydraulic Homing Required, Hydraulic Homing Time and Relevel period etc, can be viewed and changed as required.

ANTI NUISANCE SETUP

Anti nuisance parameters such as Forward car call dumping, Reverse car call dumping and Door Open push held dumping etc, can be viewed and changed as required.

FIRE CONTROL SETUP

Fire control parameters such as Door Control, Fire return floor and Fire type etc, can be viewed and changed as required.

SPECIAL SERVICE SETUP

Control parameters referring to Service Control, Priority Service and Attendant Control etc, can be viewed and changed as required.

SPECIAL SERVICE TIMES

Parameters referring to Special Service Times i.e. door dwell times can be viewed and changed as required.

ETA PARAMETERS

When the system is set for Duplex, Triplex or Group, parameters can be viewed and changed as required to alter the Estimated Time of Arrival calculations e.g. Lift High Speed, Door timing and Motion timing etc..

EXTERNAL DEVICES

Selected parameters for devices such as ILE Indicators, Speech Unit and Shaft Encoder can be viewed and changed from this menu.

PX DELAYS SETUP

Proximity pulse delay (PX Delay) parameters for UP and DOWN direction and for various speeds can be viewed and changed as required.

FLOOR SPEED SETUP

Floor Speed parameters for UP and DOWN direction and for various multi floor runs can be viewed and changed as required.

ENGINEER SETUP

Special Engineering parameters such as Short Floors/Selective Doors can be viewed, but not usually changed on site.

GROUP SETUP

Group Despatcher parameters for use with a Group despatcher can be viewed and changed if required.

M.G. SEQUENTIAL START

Motor Generator sequential starting parameters for use with a Motor Generator Set can be viewed and changed if required.

ADVANCING SELECTOR

Advancing Selector parameters for use with a high speed lifts can be viewed and changed if required.

DATE TIME SETUP

The settings of time and date associated with the real time clock can be viewed and changed if required.

GENERAL INFORMATION

General information for the lift can be viewed here. E.g. Software Version, Number of Journeys Count , Number of Door Cycles etc..

PARAMETER CONTROL

Password Entry and the control of parameters are accessed here. A password is first required to enable the user to change parameters. Parameters can be stored and loaded as required, to be either Factory/User settings, First time Defaults or Current/Normal parameters.

13) Setup / Programming Via the Keypad Interface

Generally the lift parameters should be setup as specified at the ILE factory. However when required, programming of the lift controller is achieved by setting parameters from within the menu on the LCD display. The main menu is a list of menu items, which contain blocks of data associated with various parts of the lift program. These data blocks known as parameters can be changed to manipulate the lift program into performing a task in the desired way, e.g. changing door dwell times and homing times/homing floor etc..

Note the parameters are protected by the use of PASSWORDS which are required before a parameter may be changed. Different passwords are required to access different levels of parameters, however ILE will allow some parameters to be changed. Higher level passwords will only then be given at the discretion of ILE.

By the use of the keypad keys:- mainly -fl, ◆, ENTER, ESC, -+ and MENU, parameters can be viewed and easily changed as desired.

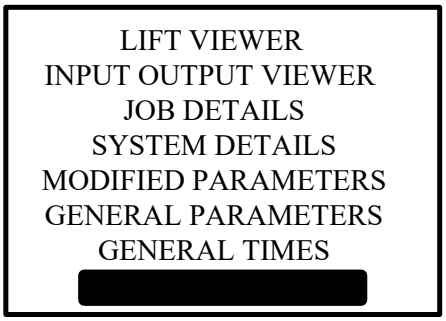
Parameters are selected by first moving the scroll bar over the menu item list and pressing ENTER. This will access the user into a further section which details the parameters in that menu item list. Again by moving the scroll bar over the required parameter and pressing ENTER, the details of that parameter are revealed. Changing the parameter is then achieved by using the -fl and ◆ arrows of the keypad to select a different value for that parameter. Pressing ENTER once again will store the new value of the parameter and a message will be displayed to indicate that the parameter has been updated successfully.

Parameters once changed are stored in non-volatile memory(i.e. not affected by power down)

There are three sets of parameters, which are:- **first time defaults**, **factory/user settings**, and **normal/current parameters**. These three sets are identical in every way apart from their values. First time defaults are typical job parameters that are loaded upon first time power up of the processor board. The factory set parameters are the ones set prior to despatch from the ILE factory(i.e. customer specific). The current parameters are ones that are currently available from the menu. When required, it is possible to load and save factory settings or load first time defaults into the lift program memory, via then Menu Parameter Control.

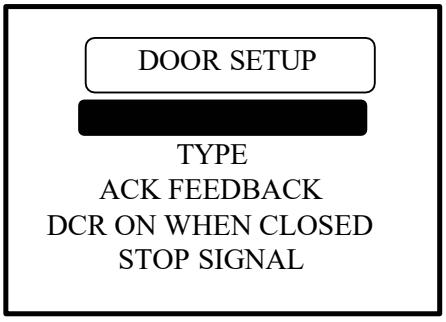
Example of Changing A Parameter

The example below shows how to change the door settings from doors that park closed to doors that park open. Before any parameters can be changed, the Engineer must "log on" by initiating the event **Engineer Present** to record his/her entry. This entry is achieved by pressing **MODE** and **ENTER** simultaneously on the keypad, hence **password level 1** will be set.

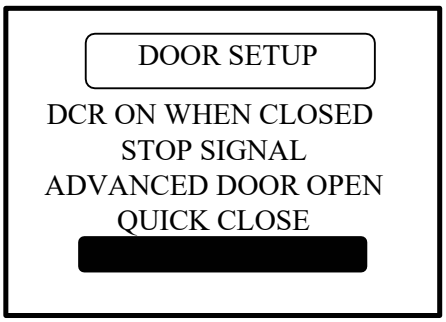


Move the menu scroll bar down to the Door Setup with the down arrow -J. on the keypad as shown. Note the inverting of the text indicates the scroll bar position. Once over the Door Setup as shown, press **ENTER** on the keypad to enter that menu.

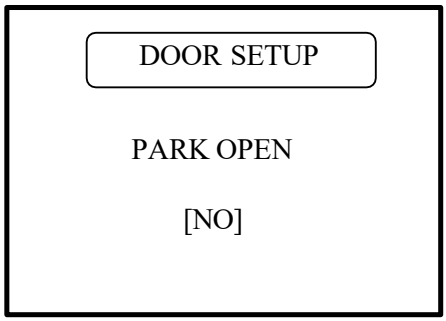
The Door Setup should reveal the following sub menu:-



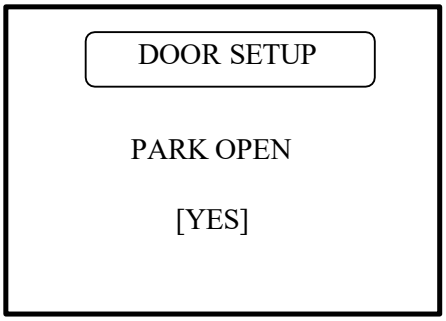
Move the scroll bar down in the same way to select the parameter Park Open as shown below:-



Press Enter to reveal the parameter and its value as shown:-



Change the parameter value by using the 1' or -J. arrows on the keypad. Note the value will alternate between **YES** and **NO.** Set the parameter for **YES** as below:-



Finally press Enter on the Keypad to change the parameter value and store it in memory. If the parameter has been accepted the message "**Parameters Updated**" will appear on the bottom of the LCD display for 1 second approximately and then disappear. However if there is an error for some reason the message "**Parameter Write Error**" will appear. ILE should be contacted if this message persists.

14) Password Entry, Parameter Control and Engineer Entry.

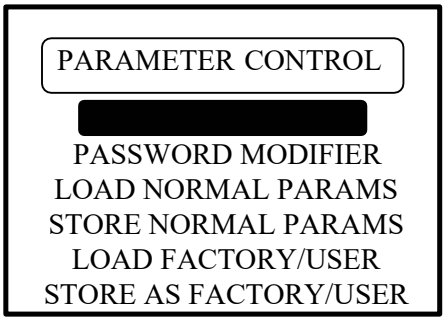
14.1) Engineer Entry

Before any parameters can be changed, the Engineer must "log on" by initiating the event **Engineer Present** to record his/her entry. This entry is achieved by pressing MODE and ENTER simultaneously on the keypad. This will then set **password level 1** and the Engineer will be able to change certain parameters e.g. door dwell times, homing times/floors etc. The Engineer present mode will allow **password level 1** for a time period of 24 hours or until **Engineer Leaving** is asserted from the keypad. This entry is achieved again by pressing MODE and ENTER simultaneously on the keypad.

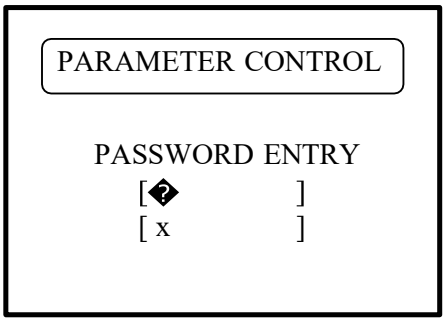
14.2) Password Entry

Higher level passwords are achieved by entering an actual password which can be obtained from ILE when required. Again the Engineer Present mode must be asserted to allow a password to be entered at all. The password is entered from the menu PARAMETER CONTROL in the main menu list.

The keypad keys (↑ and ↓) and Page up(**F1** + ↑) and Page Dn (**F1** + ↓) can be used to scroll through the menu PARAMETER CONTROL. Within Parameter Control will be typically the following:-



On pressing ENTER the Password entry will be displayed as follows:-



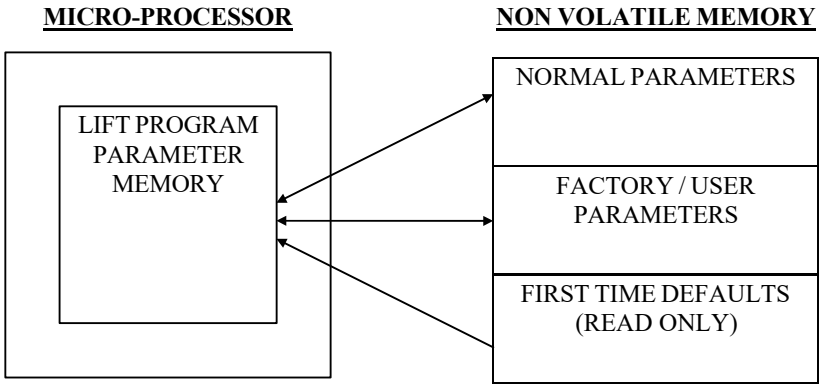
The keypad keys (↑ and ↓) will scroll through the list of possible characters for the password. Pressing -+ will move onto the next character and will loop back to the beginning once at the end. Pressing ENTER will submit the entry as displayed upon the screen. If it is the correct password, a message "**Password Level X OK**" will be displayed (where X is the level to be obtained). Otherwise a message "**Password Rejected**" will be displayed

14.3) Changing the Password

The password can be changed by selecting a different PASSWORD MODIFIER number. This can be achieved by selecting PASSWORD MODIFIER from the menu list. The number can be changed from 0 to 18 and has the effect of modifying the password in a pre-defined sequence. Once changed ILE will have to be contacted to obtain the new password. The main reason for changing the password is provide security for a new user who wishes to inhibit the use of any previously known passwords.

14.4) Parameter Control

There are three sets of parameters, which are:- **first time defaults**, **factory/user settings**, and **normal/current parameters**. These three sets are identical in every way apart from their values. First time defaults are typical job parameters that are loaded upon first time power up of the processor board. The factory set parameters are the ones set prior to despatch from the ILE factory (i.e. customer specific). The current parameters are ones that are currently available from the menu. When required, it is possible to load and save factory settings or load first time defaults into the lift program memory. The diagram below illustrates the process of parameter control:-



As can be seen parameters can be stored from the lift program parameter memory as Normal or Factory/User defaults. However Normal, Factory/User or First Time Defaults can be loaded into the lift program parameter memory as required.

15) Keypad Shortcut Keys

1)	Car call top	CPT
2)	Car call Bottom	CPB
3)	All car calls once	MODE + CPT
4)	All lan calls once	MODE + CPB
5)	All UP Lan calls once	MODE + F1
6)	All DN Lan calls once	MODE + F2
7)	Engineer Present / Leaving.	MODE + ENTER
8)	Service Visit	MODE + 1-
9)	Used with page UP/DN	F1
10)	Straight to Door Setup	F2
11)	Straight to Travel Setup	F3
12)	Straight to General Pars	-+ + F1
13)	Straight to System Details	-+ + F2
14)	Straight to Modified Parameters	-+ + CPT
15)	Straight to General Information	-+ + CPB
16)	Logger RAM Purge	-+ + 1-
17)	Page UP	F1 + 1-
18)	Page DN	F1 + -„
19)	Straight to password	MENU + 1-
20)	Straight To Prepare to Test	MENU + -+
21)	Straight To Enter Calls	MENU + -„
22)	Straight To IO setup	MENU + F2
23)	PX Override	MENU + F3
24)	Reset IO Board Detect Error	MENU + CPB
25)	Spare	MENU + ENTER

16) Lift Event and Fault Logging

The Skycom processor has full Event History Logging, providing many events for lift faults and occurrences. These events are stored in non-volatile memory(i.e. not affected by power down). A maximum of 50 events can be stored which includes the number of occurrences the event has occurred, time/date the last occurrence, the position at which it occurred and a full description of the event. Events are displayed as they happen as long a menu item is not selected(i.e. at the main menu). Otherwise they will be stored and then displayed shortly after coming out of the menu item, or by pressing the MENU button on the keypad.

A typical Fault event will be displayed as below:-

```
----------------------
   EMERGENCY STOP
Position=01      Occur=01
20:06:2000       17:50:23
----------------------
   The live voltage feed
   to input EMER was
   removed:- FAULT
```

Access to view the events can be gained by selecting **Event History** from the main menu. A complete list of all the events can be viewed from the start of the buffer to the end of the buffer, scrolling up and down by pressing the keypad direction arrows. Also by pressing enter over the event, the whole event can be viewed with all its other details and description. Scrolling up and down maybe continued whilst viewing the event in the detailed mode.

The events can be categorised as follows:-

i) Normal Events:-

POWER INITIATION	:- power has been restored to the lift
90% OVERLOAD	:- lift is 90% loaded
SELECTOR RESET TOP	:- lift has reset to the top floor
SELECTOR RESET BOTTOM	:- lift has reset to the bottom floor
TOP FLOOR SELF TEST	:- lift self test to the top floor
BOT FLOOR SELF TEST	:- lift self test to the bottom floor

ii) Power Supply Events:- e.g.

+24V SUPPLY LOW/LOST	:- main +24V is either less than 18V or lost.
+24V SUPPLY RESTORED	:- main +24V is now restored.
+5V COMMS SUPPLY LOST	:- +5V communication supply is lost.
+5V COMMS SUPPLY REST	:- +5V communication supply is restored.

iii) Processor Events:- **Contact ILE if any of these appear in the Fault Logger !!**

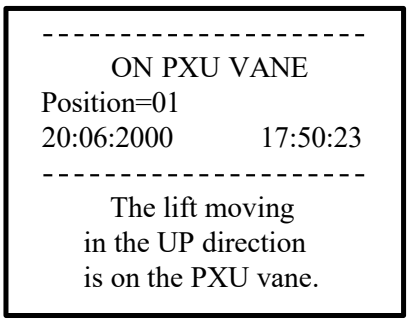
RAM FAILURE
CPU NMI TRAP ERROR
STACK OVERFLOW TRAP
STACK UNDERFLOW TRAP
CPU HARDWARE TRAP
CPU WATCHDOG TRIPPED
RTC READ ERROR
RTC WRITE ERROR
EEPROM WRITE ERROR
I2C CLOCK 0V TIMEOUT
I2C SDATA 0V TIMEOUT

iv) Communication Events:- e.g.

A LIFT COMMS LOST :- communications to A lift are lost.
A LIFT COMMS RESTORED :- communications to A lift are now restored.
ERROR: 2 LIFTS MASTER :- two lifts have same lift number and are Master.
ERROR IN CONTROL TYPE :- lift number is greater than control type.
ERROR: 2 LIFTS SAME :- two lifts have same lift number and are Master.
CAN 1 BUS OFF ERROR :- physical error on CAN1 bus lines CH1 or CL1.
CAN 2 BUS OFF ERROR :- physical error on CAN2 bus lines CH2 or CL2.
CAN 2 BUS OFF ERROR :- physical error on CAN3 bus lines CH3 or CL3.

17) Lift Trace Buffer Event Logging

The Skycom processor has a Trace Event History Logging feature, providing many extra events for lift diagnostics. These events are stored in volatile memory and will be erased after loss of power or processor re-boot. A maximum of 50 events can be stored which includes the time/date the last occurrence occurred, the position at which it occurred and a full description of the event. A typical event will be displayed as below:-



The trace buffer is setup by selecting **Trace Buffer Setup** from the main menu. Within this menu parameters can be enabled/disabled to select different trace viewing options as detailed below.
Access to view the events can be gained by selecting **Event Trace Buffer** from the main menu. A complete list of all the events can be viewed from the start of the buffer to the end of the buffer, scrolling up and down by pressing the keypad direction arrows. Also by pressing enter over the event, the whole event can be viewed with all its other details and description. Scrolling up and down maybe continued whilst viewing the event in the detailed mode.

Some typical Trace Buffer Setup options are:-

Door Task Event:- allows the trace of the door status i.e. Doors Opening, Doors Closing, Doors Opened etc...

Door Edge Devices:- allows the trace of the door edge devices i.e. DOP, SE, and DE.

Travel Task Event:- allows the trace of the lift travel status i.e. Starting, Slowing, Levelling etc..

Travel Vanes:- allows the trace of the lift vanes during travel i.e. ON PXU, OFF PXU, ON MSU, ON MSD etc...

Drive Info:- allows the trace of the information controlling the drive and information received from drives when connected serially.

18) LCD Default Message and Out Of Service Messages

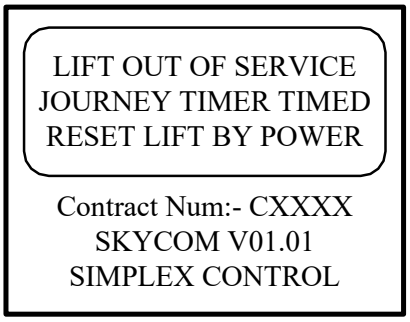
The Default Message on the LCD display provides the user with useful information without the need to search through various menus to find it. The default message can be configured to show the system details or the **Lift Viewer** can be selected (see Default Msg Select parameter, in **Job Details** from the main menu).

The message will not be displayed when within a menu item, however it will be displayed shortly after LCD and keypad activity has ceased. Priority is given to Events which will be displayed immediately and held for a short time period prior to the default message being re-displayed.

If the lift is out of service for any reason, the default message changes slightly to give details of the out of service condition. Also a suggestion is given to help rectify the out of service condition. If the lift is out of service for more than one reason, then the message displayed is prioritised by the processor.

The typical default message will be displayed as below:-

The typical out of service message will be displayed as below:-



19) Lift Viewer

The Lift Viewer has been designed to be a useful diagnostic tool for the Lift Engineer. Once selected from the main menu the lift status, position, doors, calls, vanes and other information can be viewed instantly from the Graphical representation of the lift, that the lift viewer provides. Below is a typical example of the lift viewer showing an 8 floor lift.

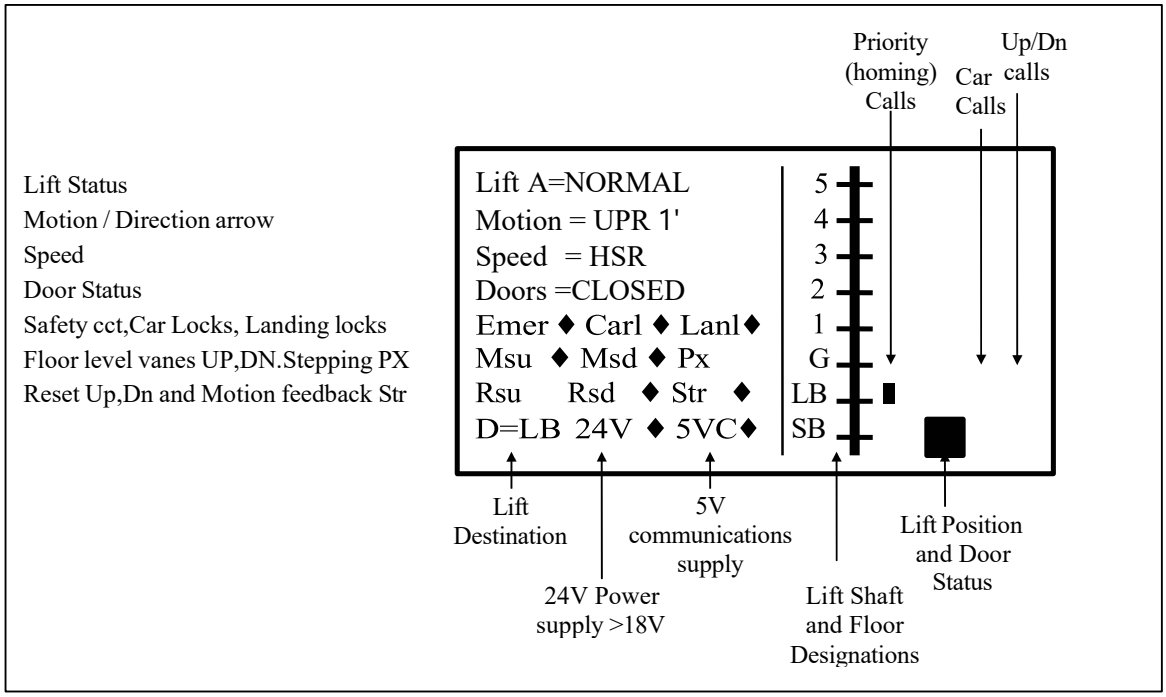
The lift is going in the **UP** direction to answer an up call, a car call and a Priority call(homing call) at the **LB** floor, from the **SB** floor. Indication **D** also shows that the Destination of the lift is to floor LB.

The doors are closed, the safety circuit, car locks and landing lock circuits are made(**Emer**, **Carl** and **Lanl** are on).

The lift is just setting off since it is still at floor level i.e. **Msu** and **Msd** vanes are on, also the lift is still on the bottom reset limit(**Rsd** is on).When the lift reaches a stepping proximity vane, Px will be on.

The processor has feedback from the direction relays or brake circuit since **Str** is on. The lift is targeting high speed i.e. speed = **HSR**.

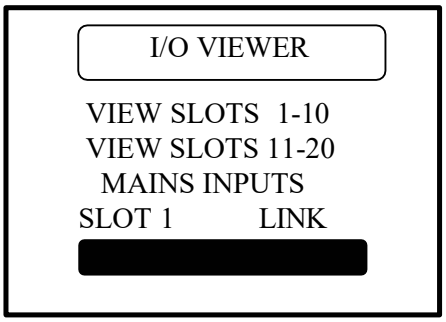
The Power supplies to the lift are present since **24V** and **5VC** are on. Also the lift is in NORMAL operation i.e. not on any special service i.e. Overloaded, Service or Fire etc..



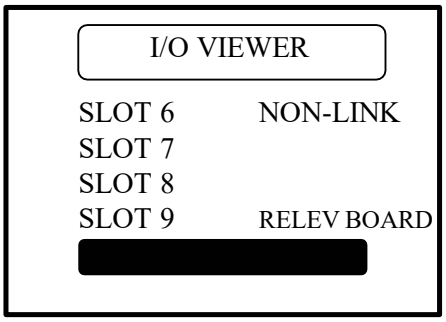
20) Input Output Viewer

The Input Output Viewer has been designed to be a useful diagnostic tool for the Lift Engineer. This viewer allows the user to view all inputs/outputs to the lift microprocessor. Inputs and outputs can be viewed all at once via a detailed graphical screen or as usually preferred via an enlarged screen showing one input/output slot at a time. The Inputs/ Outputs are viewed as they are set via the Input Output parameters. E.g. if Slot 1, Input 1= car call 1 then the input viewer will show CP1 as input1.

From the main Menu list select INPUT OUTPUT VIEWER and a display similar to the following will be shown:-



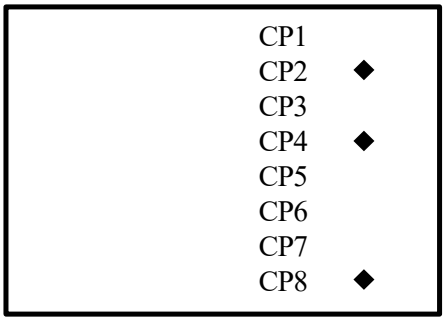
Also by scrolling down the remaining IO slots can be selected as shown:-



The Board Type is displayed next to the slot number i.e. LINK, NON-LINK, RELEV BOARD RELAY etc.. A blank indicates that no board is fitted or detected.

One the required slot has been selected a display will be shown as follows:-

SLOT 1 LINKED
Outputs Inputs

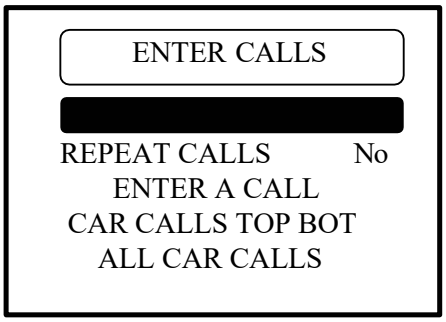


As can be seen the inputs are set for car calls on slot 1 and CP2, CP4 and CP8 are all ON.

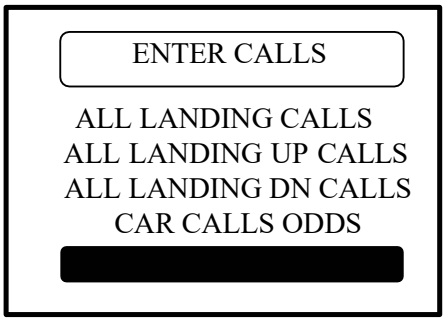
21) Enter Calls

The Enter calls menu has been designed to be a useful diagnostic tool for the Lift Engineer when testing and setting up the lift. This option allows the user to enter calls to their specific pattern or use the pre defined patterns such as all calls, Odds and Evens etc.. A repeat option has been included to allow the user to repeat the patterns, and an option to switch the lift viewer on once a call pattern has been selected has been included so that the calls can be viewed from the lift viewer. When the Repeat option is set to yes, calls will be repeated for a period of 30-60 minutes approx and then Enter Calls option will be terminated.

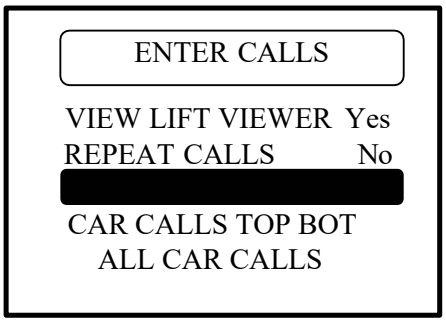
From the main Menu list select ENTER CALLS and a display similar to the following will be shown. As can be seen the lift viewer and repeat option is selected at this stage. By placing the scroll bar over the desired option and pressing ENTER the option can be selected or de-selected as required.



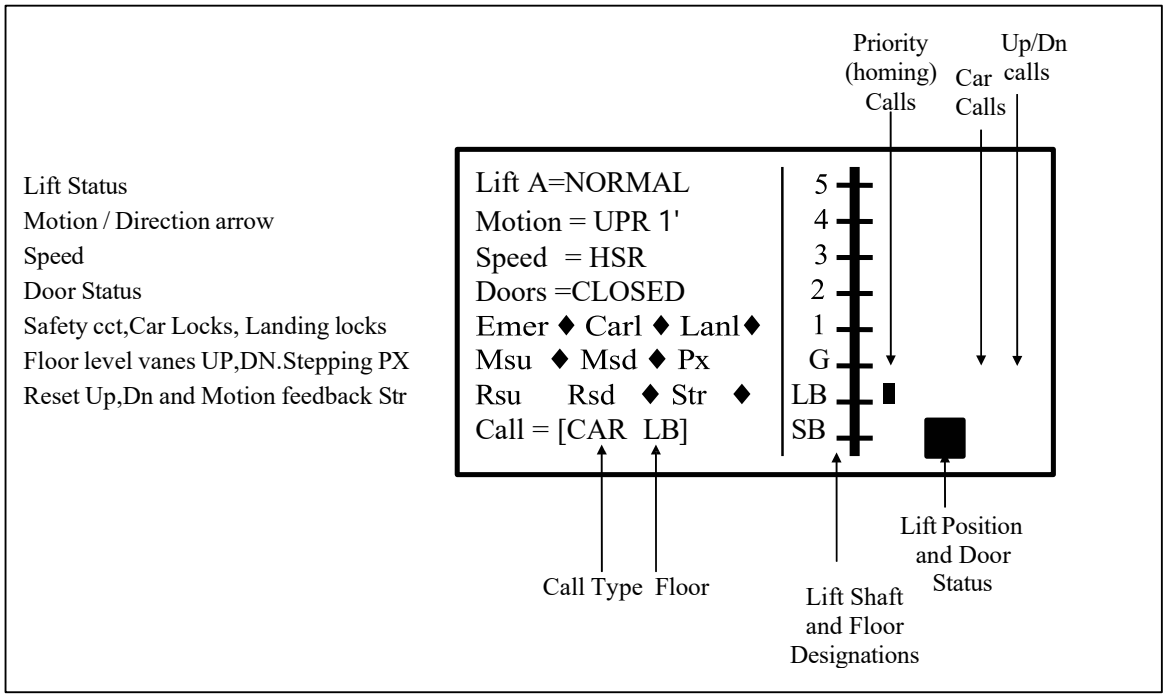
Also by scrolling down the remaining call options can be selected as shown:-
By pressing ENTER the even car calls will be entered. If the lift viewer option is set to Yes then the lift viewer will be shown to indicate the calls entered. If the Repeat Calls option is set to yes then the EVEN calls will be repeated until the timeout period has timed or enter calls is terminated.



To enter one or more specific calls as required, the menu option Enter a Call should be selected as shown below. Once selected, the lift viewer will be displayed automatically.



The Lift Viewer will be displayed as below with the bottom left hand side modified to allow the user to select Car, Up landing or Dn landing calls as required.

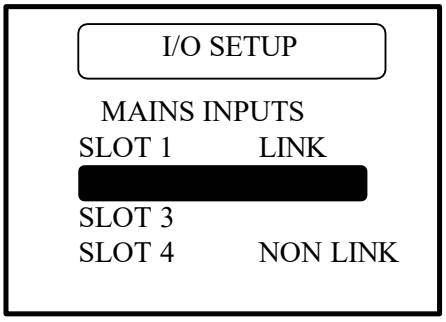


By pressing the right arrow ➔ on the keypad the call type is changed from CAR, UP or DN calls. By pressing the up and down arrow keys (1- or) the floor will change up/dn as required. Finally pressing Enter will enter the call. In the above example a Car call to LB would be entered.

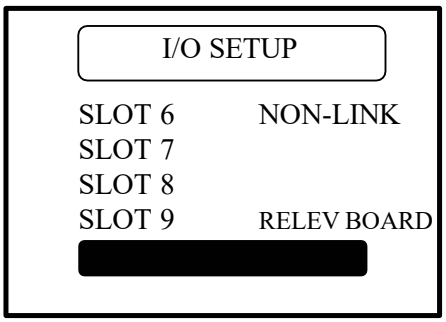
22) Input Output Setup

The Input Output Setup has been designed to allow configuration of Inputs and Outputs for Factory setup or on site for the Lift Engineer. First a slot should be selected to view the current configuration of the Inputs and Outputs, also displayed next to the slot is the board type. Inputs and Outputs maybe repeated as required. I.E. if it is required to have multiple UPR outputs, many outputs can be configured to UPR.

From the main Menu list select INPUT OUTPUT SETUP and a display similar to the following will be shown:-

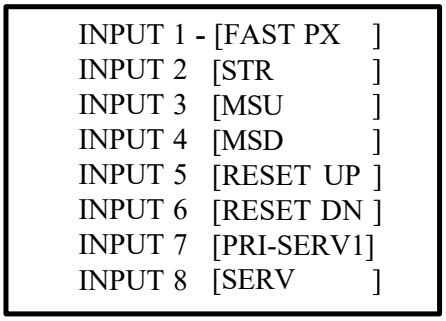


Also by scrolling down the remaining IO slots can be selected as shown:-



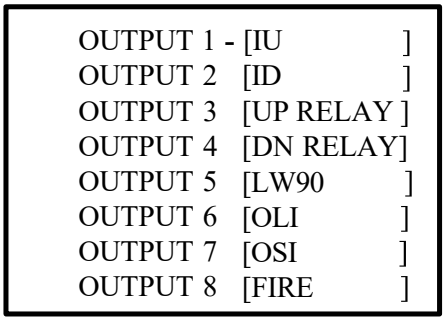
The Board Type is displayed next to the slot number i.e. LINK, NON-LINK, RELEV BOARD RELAY etc.. A blank indicates that no board is fitted or detected.

By pressing ENTER over a slot the following will be displayed:-



The pointer to the current parameter is shown by the dash "-" above. To move the pointer use the keypad keys MODE and -t. This will move the pointer upwards until it reaches the top where it reset to the bottom. With the pointer over the selected parameter scroll through the available parameters using the keys -tand -J until the desired input is found(Note see list of inputs section). By pressing ENTER then the parameter will be stored, also a message will be displayed for 1 second to acknowledge the entry.

By pressing ➔ whilst within the parameter screen will switch between Inputs and Outputs if the Board type is LINKED. I.E. the switch to Outputs has just been made from the previous screen.



Selecting and storing the parameter is the same as previously described.

23) Fault Finding and Callouts

If the lift system is not working correctly, the Service Engineer must find the fault. The Micro processor and circuitry helps 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/Trace Buffer** in the main menu for the events and descriptions. See also **Lift Viewer** and **Input Viewer** for detailed information of the lifts' status.

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 voltage going into and out of each fuse relevant to the power supply (see Power Supply) and 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) LED **EMER** = Safety Circuit should be lit on the CPU Board, if not check live feeds in order to terminals **CF, TS, OTL, RWS, OS and CTS.**

6) LED **CARL** = Lock Circuit Should be lit on the CPU Board, if not check live feeds in order to terminals **CTS** and **CDC**.

7) LED **LANL** = Lock Circuit Should be lit on the CPU Board, if not check live feeds in order to terminals **CDC** and **LDC**.

8) Check that the following functions are NOT switched on and the LED's are not illuminated:-

a) **OSI**,
b) **TEST**, illuminated on test.
c) **LW90, LW110 & OLI**, illuminated when the lift is 90% and 110% loaded.
d) **THERM**, illuminated when the motor thermistor / shaft temperature monitoring unit (if fitted) has tripped.
e) **RET**, illuminated when on Emergency Recall/Shutdown.
f) **SERV**, illuminated when on Service control.
g) **FIRE**, illuminated when on Fire Control.
h) **SE, DOP** and **DRL** are illuminated when the Safe edge, Door open Button and Door light Ray are activated respectively, which may prevent the doors from closing.
i) The **RED** led 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 ILE.
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.

24) Common Faults

A list of common faults are detailed below. To assist with fault finding see **Event History/Trace Buffer** 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) When car stops at floor level both MSU and MSD must be illuminated.
ii) Proximity input PX must pulse once ON and once OFF between every floor.
iii) Check Tapehead unit/floor selection switches operate correctly.
iv) 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 that the parameter "PARK OPEN" within **Door Setup** has not been set.
iv) Check Terminal limits.
v) Note under Fire control, Service control and overload bypass the lift doors remain open typically and will only close by initiating a car call.

C) *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 drive fault contact.

D) *Lift stops in travel*

i) Car or Landing Lock tipped.
ii) Journey timer operated.
iii) Slowing switch incorrectly set.
iv) Lift slowed and stopped in mid travel, Tapehead/Proximity switch malfunctioning or set incorrectly.

25) Micro Processor & Control Switchgear Sequencing / Interfacing

The micro processor situated on the CPU board is responsible for the co-ordination of all the inputs / outputs of the surrounding control circuitry via the I/O rack.
It is therefore important to be able to understand the basic and typical sequence of events surrounding the I/O rack interface in conjunction with the events generated on the fault logger display when fault finding.

SEQUENCE

Assuming the lift is at floor level with the doors closed and ready to accept a call.

1) A car/landing call is made.

2) The micro processor accepts this and produces a call accepted indicator, then energises the pilot relays UPR or DNR (depending upon direction) and HSR at the same time. These relays are situated on the relevant configured relay output board.

3) The pilot relays provide a current path to the controller return for the control relays/contactors (UP or DN and HSR).

4) The relay STR (start relay) is energised via the contacts of UP or DN. A contact of STR relay is then used to provide a feedback input to the micro processor at the input STR.

5) The micro processor acknowledges the start signal (STR) and energises the pilot relay LSR on the relevant configured relay output board. This then provides a current path to the control panel return for the LSR (low speed relay) in the control panel (if required).

26) Lift Service Modes

Prepare To Test:-

The prepare to test feature is enabled by pressing MENU + F3 on the keypad. This feature has the effect of preparing the lift for full test control by inhibiting any further landing calls and preventing the lift from homing to the main floor, thus prevents the pickup of further passengers. Any passenger still travelling within the lift will still be able to register car calls to their destination. Parameters found in **Special Service Setup** provide options 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 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 Service Setup** provide options for enabling/disabling constant pressure door control.

Fire Control:-

The Fire Control feature is selected by asserting the **FIRE** 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 Setup** provide options for enabling/disabling constant pressure door control and selecting fire floor etc..

Load Weighing 110% Overloaded:-

The 110% overload function becomes active when the lift is stationary and the **LW110** input is asserted. The event 110% overload is generated, doors are parked open, 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 from then on is that landing calls are bypassed therefore reducing the chance of another person entering the lift and fully overloading it. Instead car calls are dispensed with 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, the lift is then marked out of service.

Priority Service Controls (1,2&3):-

The Priority Service Control Features are selected by asserting the **ERET 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, enabling/disabling extended door dwell times etc...

27) Lift Self test and Out Of Service Setup

3.1) *Self Test Operation(Demand Request):-*

The self test feature automatically inserts terminal floor car calls (i.e. Top and Bottom or settable via parameters) 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 five 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. Parameters found in **General Parameters** provide options for Self Test.

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 LISI INDICATOR (Lift in Service Indicator) in **General Parameters** the Out of Service Indicator is inverted and becomes a Lift in Service Indicator.

28) 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** " event and " **STUCK UP LAN BUTTON** " event (UP and DOWN landing call buttons) will be recorded typically 10 seconds after the micro processor 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 micro processor 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 micro processor 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 micro processor will reinstate the call (if still stuck), typically 240 seconds from when originally detected.

29) Lift Relevelling Control

The Relevelling feature is included as standard within the Skycom control system on all hydraulic lifts and is an optional extra on traction lift systems.
The Skycom Control System continuously monitors the relevelling operation. If a failure occurs with the relevelling operation then the relevant fault is recorded and recovery action is initialised. All relevelling parameters are accessible from the menu **Hydraulic Setup**, but typical values are given below.

The relevelling sequence is automatically initiated via the Skycom control system and can perform relevelling in the up or down direction depending on loss of up or down levelling vanes. To prevent the lift from hydraulic oscillations, the relevelling sequence will not be initiated or re-initiated until the lift has been idle for the setting of the PAUSE TIME parameter(**Travel Setup**) i.e. typically 1 second. The Skycom Control System continuously monitors the relevelling operation. If a failure occurs with the relevelling operation then the relevant fault is recorded and recovery action is initialised. Failures associated with relevelling can be categorised as follows:-

a) Relevelling Time-out Timer:-

The Hydraulic time-out timer will time when the drive system fails to move the lift to floor level. This may be caused by failure of the lift hydraulic pump / valve unit or it's associated control circuit. These types of faults will cause the lift to remain in the levelling zone, but not reach floor level within a predictable time limit. This time to reach floor level is typically set to 20 seconds. If the lift exceeds this time it is removed from normal service, and relevelling operation is suspended. An attempt to return the lift to the bottom floor is then made, since the down operation could well be achievable i.e. (no pump motor operation is required). On arrival at the bottom floor the lift will remain out of service until the power is switched off.

b) Hydraulic Homing

The Skycom Control System will automatically home to the lowest floor level typically 12 minutes after the last lift movement. E.G. when the main homing floor is not the lowest floor level, the lift will home to the main homing floor after the standard homing time. However the control system will hydraulic home again to the lowest level after becoming idle for 12 mins.

c) Hydraulic Anti-Yo-Yo.

During normal relevelling operation excessive relevelling cycles can be detected and recovery action taken. Excessive relevelling cycles can be due to overheating hydraulic oil or faulty proximity switches all of which when left unattended can place the lift in a dangerous condition. The number of relevelling cycles are monitored over a period of minutes. If the number of relevelling cycles is deemed excessive by the Skycom programme, then the relevelling function is suspended and the lift is removed from service. Attempts will be made to return the lift to the bottom floor, where it will remain out of service.

d) Relevelling Sequence Check. (software).

Failure of the levelling vanes to operate causing the lift to stop by the release of both vanes. This type of operation can be caused by an intermittent malfunction, or by a faulty proximity switch. If the proximity switch operation is unreliable then the relevelling operation is potentially dangerous. The Skycom microprocessor monitors the relevelling, and keeps a record of occurrences when the lift stops out of level following a relevel operation. Each time the lift stops out of level a counter is incremented by sixteen. If the lift makes a successful relevelling operation to stop at floor level the counter is decremented by 1. If the counter reaches a count of 48 (caused by three consecutive relevelling errors, or frequent levelling errors), the lift is removed from service, and relevelling is suspended. Attempts will be made to return the lift to the bottom floor, where it will remain out of service.

e) Relevelling Sequence Check via Safety Proven Relays.

The Skycom microprocessor relevelling monitor programme checks the relevelling operation in a non-interlocked way that enhances the safety of the system.
However, the addition of a relevelling monitor board is used, to check the levelling vane operation during normal journeys, using relay interlocked methods. The relay control methods cannot achieve the same sophistication as the microprocessor in areas to establish the reliability. The microprocessor system cannot achieve the safety interlocking resulting from the relay monitor. It is the combination of both systems that are used to give the desired safety, reliability monitoring, and recovery procedures required.

30) Duplex, Triplex and Multi Car Group Applications

The Skycom 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 can be provided with or without an external despatcher, however an external despatcher will provide an enhanced service.

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, levelling speed, door opening/closing times etc.. but even down to the fine details such as car preference time and door dwell time. The accuracy of the ETA increases despatching efficiency/performance until the last landing call is answered, but at the same time provides the processor with a heavy burden of calculations, thus the need for an external despatcher for many floors and many lift cars.

The ETA’s are modelled within the micro processor to allow the user to select the type of response required. Also parameters maybe 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 menu **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.

30.1) Skycom Group Algorithms

1) 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 SKYCOM 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.

2) DN CALLS DN PEAK

When the number of dn landing calls within the lift system is greater than the DN PEAK threshold(typically half the number of floors). The SKYCOM 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 dn calls. It achieves this by detecting the highest dn call and parking the available lifts from this floor downwards in anticipation.

3) BALANCED HEAVY TRAFFIC

When the number of dn 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 SKYCOM 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 dn calls. It achieves this by detecting the lowest up call and highest dn call and parks the available lifts from these floors upwards and downwards respectively in anticipation.

4) MAIN FLOOR UP PEAK

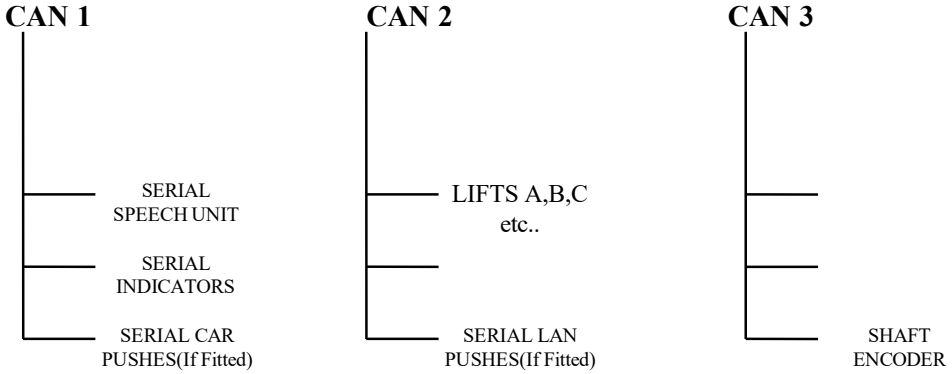
When the main flow of traffic is from the main floor up to various destinations, i.e. during the population of a building the SKYCOM detects a MAIN FLOOR UP PEAK condition. It reacts by strategically parking lifts within the Group to the main floor so that persons wishing to travel from the main floor 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.

31) Communications

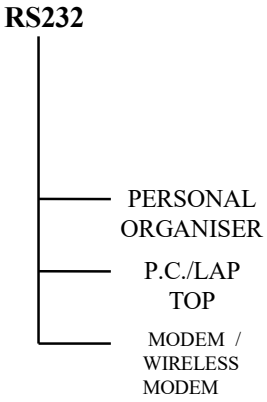
The Skycom has been designed with many types of on board communications. These different types of communications allow a wide range of uses fro interfacing to the processor. Details of typical uses for these are detailed below:-

31.1) CAN Communications (Controller Area Network)

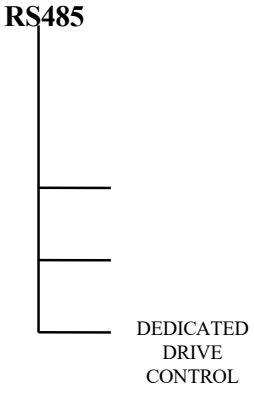
The CAN communication ports provide interface to a range of serial products including ILE Serial Speech Unit and Indicators. Also communications between lifts, specific drives, and ILE Shaft Encoder are carried out over the CAN bus. Below is detailed the uses of the CAN buses:-



31.2) RS232 Communications



31.3) RS485 Communications



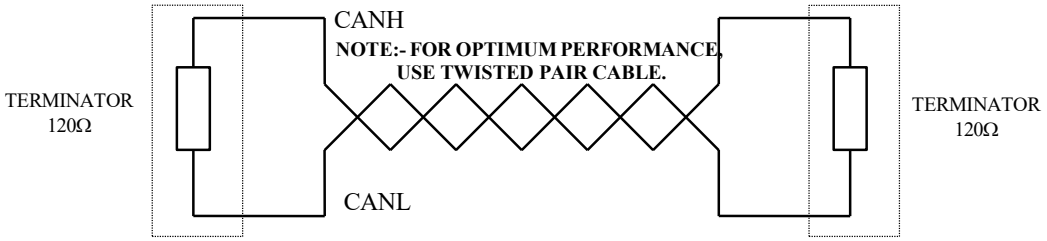
32) CAN 1 Fieldbus Connection Variations

32.1) Bus Connections

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

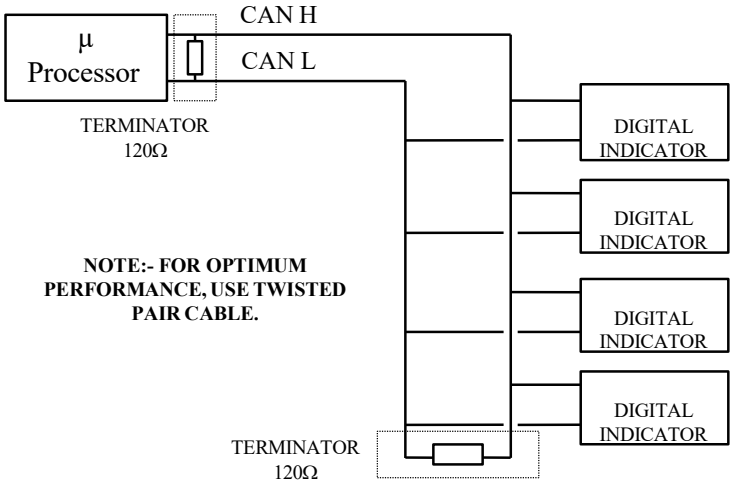
32.2) Importance of Bus Terminators.

It is vital for correct operation that the **bus terminators** provided are connected to either end of the CAN fieldbus as shown below. These terminators are simply resistors of value 120Ω which are used to match the impedance of the cable.



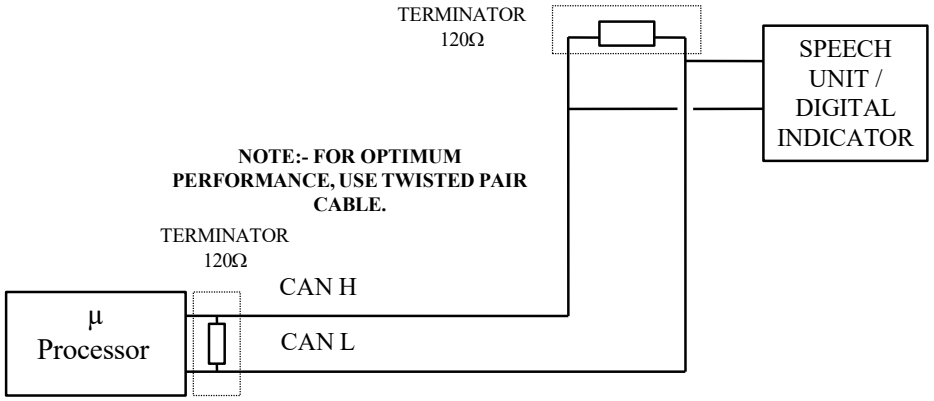
3.3) Bus incorporating Micro Processor & CAN1 landing devices only

When there are no devices in the lift car, the micro processor is positioned at the beginning of the bus, therefore one terminator must be placed at the control unit or as close as possible to it. The other terminator must be placed at the other end of the bus, or as close as possible to the last device as shown.



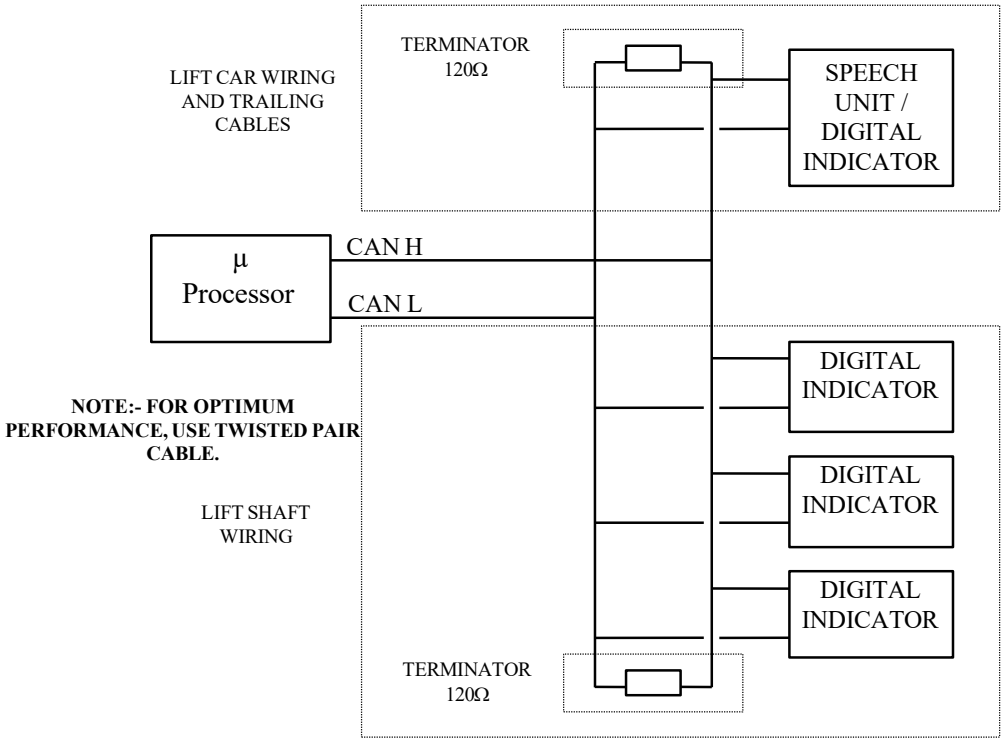
32.4) Bus incorporating Micro Processor & CAN 1 lift car device(s) only.

When there are no devices on the lift landing, the micro processor is positioned at the beginning of the bus, therefore one terminator must be placed at the control unit or as close as possible to it. The other terminator must be placed at the other end of the bus, or as close as possible to the last device as shown.



32.5) Bus incorporating Micro Processor, CAN 1 lift car & landing device(s).

When there are devices on the lift landings and in the lift car , the Micro Processor is positioned in the middle of the bus, therefore the terminators must be placed as close as possible to the last devices as shown below.



32.6) CAN fieldbus fault finding

The CAN fieldbus driver components that reside on each of the serial products 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.

To identify a fault on the bus is quite simple, as the LED indication on each of the boards will flash in a specific way to indicate a CAN bus fault. The “LOOP” light LED, which is “GREEN” in colour will flash faster than normal to indicate a CAN bus fault. The Led should flash “ON” at a rate of once per 2 seconds if **normal** and once per 0.2 second if there is a **fault**.

The “RED” LED “COMMS” may be flashing to indicate that it is trying to establish communications.

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 “LOOP” is flashing “ON” once per 2 seconds, that device is OK!
5) If the LED “LOOP” is flashing “ON” once per 0.2 seconds, 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 ILE for repair.

33) ILE SERIAL DIGITAL INDICATOR

33.1) Digital Indicator Features

The digital indicator has been designed to interface directly into the micro processor controller. Floors and messages are fully programmable, messages maybe configured as custom and connected directly to inputs/outputs, or the micro processor will prioritise and manage the displaying of messages automatically. These priorities also eliminate the need for extra relays in the control panel.

LED indication is provided to indicate processor running and communication with the micro processor.

The unit may have up to 48 floors, many messages and features, and 32 user defined characters. These user defined characters may be used where a special floor designation is required. Messages and floor positions may be typed as required. Direction arrows, Hall Lanterns and user defined characters may be custom made as required.

Connections:- **AC1 AC2**

These are the power supply connections and can be 12 to 24V a.c. or d.c. Also it does not matter which way the connections are made since they are non polarised.

Connections:- **CL CH**

These are the CAN communication connections, CL = CAN LOW and CH = CAN HIGH. It is important that these are wired correctly for successful communication, otherwise no information will be passed to the unit.

33.2) Relay output connections / operation.

Connections:-A B (RELAY)

These are volt-free connections to a normally open relay contact, which may be used to connect to an arrival gong or other external device. The relay contact works differently for indicators fitted in the car and landing.

The indicator in the lift car will operate the relay when the micro processor gives out a HLR signal(i.e. slowing for a landing call). Also when the passing chime parameter(General Parameters) is set the relay will operate when the lift is passing a floor.

The indicator on the landing will operate the relay when the micro processor gives out a HLR signal(i.e. slowing for a landing call), and the floor position setting matches the lift position. Therefore each indicator has to be set correctly for floor position for this to work correctly.

33.3) Digital Indicator floor position settings for car and landing

Lift Car Indicator setup

The digital indicator within the lift car should have the floor position DIL switches (TENS /UNITS) set to “00”.

Landing Indicator setup

If the operation of the relay is to be required for hall lantern / arrival gong output, the floor position DIL switches (TENS /UNITS) need to be set to the floor position the indicator is at, i.e. floor 5 = “05”.

Otherwise the operation of the relay can be inhibited by setting the floor position DIL switches to “61”.

33.4) Digital Indicator operation.

General
The digital indicator operates in conjunction with the micro processor. Floors/ messages are selected depending upon the information sent to it by the micro processor. The micro processor will store information set by the relevant parameters.

Direction Arrows
Direction arrows will scroll according to the direction of the lift. However with the “Frozen Arrows Enable” parameter set, the direction arrows will only scroll while the lift is in high speed. This has the advantage of showing that the lift is slowing in at a floor as well as indicating direction.

Hall Lanterns
Hall lanterns will only be displayed at the floor the lift is slowing into or at. The hall lantern is similar in appearance to a direction arrow except it is larger and overrides the position indication on the display. The floor position switches need to be set correctly for this operation see (5.5 Digital Indicator floor position settings for car and landing).

Test Operation (floor position switches set to 80)
This is a feature for testing the operation of the DIL switches. After selecting 80 via the floor position switches and after waiting a delay of 1 second approx., the display will indicate the DIL switch settings. Therefore the switches can be tested from 00 to 99.

Test Operation (floor position switches set to 91 - 97)
By selecting 91-97 via the floor position switches “MESSAGES 1-7” from within the indicator memory, will be scrolled on the indicator display.

Test Operation (floor position switches set to 98)
By selecting 98 via the floor position switches the “user defined characters” from within the indicator memory, will be displayed in turn on the indicator display.

Test Operation (floor position switches set to 99)
By selecting 99 via the floor position switches the “floor positions” from within the indicator memory, will be displayed in turn on the indicator display.

34) SPEECH SYNTHESISER

34.1) Speech Synthesiser Features

The speech synthesiser has been designed to interface directly into the micro processor controller. Floors and messages are fully programmable, messages maybe configured as custom and connected directly to inputs/outputs, or the micro processor will prioritise and manage the announcement of messages automatically. These priorities also eliminate the need for extra relays in the control panel.

A mono earpiece is supplied and socket fitted so that the speech can be heard, for test purposes, when the speaker is remote from the unit. A test speech link is fitted so that the speech memory can be tested independent of the micro processor.

LED indication is provided to indicate processor running and communication with the micro processor. Fitted as standard are 2 volume controls for Normal and Hush modes of operation.

The unit may have up to 48 floors, many messages, separate messages also for doors opening, doors closing, going up, going down and arrival gong.

Speech phrases are selected by linking together phrases, so that the users may create their own messages according to their preference. Up to 5 phrases may be linked together for any message annunciation and 3 for any floor annunciation.

Features have been included to enable the user to switch off speech in between floors, arrival gong, direction on closing and mind the doors(if desired).

A feature has been included to enable the user to select Hush volume between specific times of the 24 hour clock. This works in conjunction with the on board real time clock. Otherwise an input can be used for Hush.

Connections:- **AC1 AC2**

These are the power supply connections and can be 12 to 24V a.c. or d.c. Also it does not matter which way the connections are made since they are non polarised.

Connections:- **CL CH**

These are the CAN communication connections, CL = CAN LOW and CH = CAN HIGH. It is important that these are wired correctly for successful communication, otherwise no information will be passed to the unit.

Connections:- **SP1 SP2**

These are the speaker terminals and should be wired to a speaker of type 8Ω, 3W. However a 4Ω, 3W speaker may also be used.

Connection:- Mono Earpiece Socket

The Mono earpiece as supplied with the speech unit may be connected to this socket for test purposes. The audible volume at the earpiece is of a fixed level.

34.2) Speech Synthesiser operation.

The speech synthesiser operates in conjunction with the micro processor. Phrases are selected depending upon the information sent to it by the micro processor. The micro processor will store information according to the parameter settings.

The micro processor will send a set of phrase references (referring to speech unit memory) to make up a complete phrase. A complete phrase may consist of up to 5 phrase references.

Phrase references are sent from the control unit to the speech synthesiser to initiate a speech message. If a floor position phrase is to be said, the phrase will only be said once at the slowing point of the lift journey. If a main message is to be said, it will be repeated as long as the input for the message is still on. The number of repeats will be 5 at different interval times of 10, 15, 20, 25 & 30 seconds. If two or more messages inputs are on with the same priority, all messages will be repeated in sequence 5 times at the specified interval times.

Two way communication between the micro processor and speech unit provides feedback for uses such as the door closing sequence. e.g. the operation is as follows:-

i) the micro processor initiates a door closing sequence,
ii) the micro processor sends a message to the speech unit,
iii) a phrase such as “Please Mind the doors” is said,
iv) the speech unit then sends a message to the micro processor to say it has finished saying that message,
v) the micro processor sends a message to the speech unit.
vi) the speech unit says “Doors Closing”.

Depending upon the set-up of the parameters speech may or may not be inhibited during lift travel i.e. on high speed.

With regards to the volume control, only one can be selected at any one time i.e. Hush or Normal. Hush volume is usually required to select a different audible volume of speech at specific times during the day, i.e. quieter at night time.

L.E.D. indication is provided to inform the user of the following:-

i) LOOP:- this flashes every second, indicating that the main micro processor is running. (see also CAN fieldbus fault finding).
ii) COMMS:- this is illuminated when a message is being received or sent in conjunction with the micro processor.
iii) BUSY:- this is illuminated when a phrase is being processed by the speech processor.

Other Info

A position phrase is never said again until after another position has been announced.

34.3) Speech Synthesiser standard phrase list.

The list below is a selected list of phrases stored in the speech memory to create a standard version of the most common phrases used. However, there are many more phrases in the speech vocabulary, and International Lift Equipment will be only pleased to accommodate alternative phrases if required.

Version:- SRS16F3

1)	THIS LIFT IS OVERLOADED	65)	17
2)	THIS LIFT IS OVERLOADED PLEASE REDUCE THE LOAD	66)	18
3)	THIS LIFT IS OUT OF SERVICE	67)	19
4)	THIS LIFT IS UNDER FIRE CONTROL OPERATION	68)	20
5)	THIS LIFT IS UNDER EVACUATION CONTROL	69)	20X
6)	THIS LIFT IS UNDER PRIORITY SERVICE	70)	30
7)	THIS LIFT IS RETURNING	71)	30X
8)	TO	72)	40
9)	TO THE	73)	40X
10)	THIS LIFT IS RETURNING UNDER FIRE SERVICE	74)	50
11)	THIS LIFT IS RETURNING UNDER EVACUATION CONTROL	75)	50X
12)	THIS LIFT IS RETURNING UNDER PRIORITY SERVICE	76)	60
13)		77)	1ST
14)	THE ALARM HAS BEEN ACTIVATED	78)	2ND
15)	PLEASE BE CALM YOU ARE QUITE SAFE, HELP IS ON ITS WAY	79)	3RD
16)	PLEASE EXIT LIFT	80)	4TH
17)	**THIS LIFT IS UNDER SERVICE CONTROL *(SRS16F2)**	81)	5TH
18)		82)	6TH
19)		83)	7TH
20)	PLEASE MIND THE DOORS	84)	8TH
21)	FRONT DOORS ARE OPENING	85)	9TH
22)	FRONT DOORS ARE CLOSING	86)	
23)	REAR DOORS ARE OPENING	87)	A
24)	REAR DOORS ARE CLOSING	88)	B
25)	DOORS OPENING	89)	C
26)	DOORS CLOSING	90)	D
27)	STAND CLEAR DOORS CLOSING	91)	E
28)	STAND CLEAR OF THE DOORS	92)	F
29)	THIS LIFT IS GOING UP	93)	G
30)	THIS LIFT IS GOING DOWN	94)	H
31)	GOING UP	95)	I
32)	GOING DOWN	96)	J
33)		97)	K
34)		98)	L
35)		99)	M
36)		100)	N
37)		101)	O
38)		102)	P
39)	**LOWERX *(SRS16F3)**	103)	Q
40)	XFLOOR	104)	R
41)	FLOORX	105)	S
42)	XLEVEL	106)	T
43)	LEVELX	107)	U
44)	SUB BASEMENT	108)	V
45)	LOWER BASEMENT	109)	W
46)	BASEMENT	110)	X
47)	LOWER GROUND	111)	Y
48)	GROUND	112)	Z
49)	1	113)	
50)	2	114)	PODIUM
51)	3	115)	CAR PARK
52)	4	116)	MEZZANINE
53)	5	117)	KITCHEN
54)	6	118)	SERVICE
55)	7	119)	SHOP
56)	8	120)	FRONT ACCESS
57)	9	121)	REAR ACCESS
58)	10	122)	MINUS
59)	11	123)	BING (ARRIVAL GONG)
60)	12	124)	BONG “”
61)	13	125)	**BING/BONG “” *(**SRS16F2)
62)	14	126)	
63)	15	127)	
64)	16		

Note:’*’Denotes Phrases Added for Each Version

35) SKYCOM Serial Indicator / Speech Unit Message Priorities

When the serial Indicator and Speech Unit messages are controlled from the SKYCOM micro processor i.e. Message 7 (Processor Specific), the following message priorities are used:-

Priority	Message Function
1)	INSPECTION CONTROL
2)	LIFT 110% LOADED
3)	FIRE CONTROL
4)	EVACUATION CONTROL
5)	EMERGENCY SUPPLY
6)	SECURITY SERVICE
7)	PRIORITY SERVICE 1
8)	PRIORITY SERVICE 2
9)	PRIORITY SERVICE 3
10)	SERVICE CONTROL
11)	LIFT 90% LOADED
12)	CUSTOMISED OUT OF SERVICE
13)	ALARM ACTIVATED

Notes:-

1) The Customised Out of Service is the indication settable by the Out of Service Setup, i.e. configured for a number of different failures/service modes.

2) If message 7(processor specific) is not used the messages maybe customised and prioritised as required.

36) IO INPUT TYPES

NO_INPUT,
FAST_PX,
PXU,
PXD,
STR,
MSU,
MSD,
RSU,
RSD,
FRONT_DOP,
FRONT_SE,
FRONT_DLR,
FRONT_DCP,
REAR_DOP,
REAR_SE,
REAR_DLR,
REAR_DCP,
ERET1,
ERET2,
ERET3,
LW90,
LW110,
SERV,
FIRE,
SECU_SERV,
THERM,

EMER,
CARL,
LANL,
TEST_SWITCH,
TEST_OPEN,
TEST_CLOSE,
TEST_UP,
TEST_DN,
DOL,
DCL,
DOC,

ALARM,
EVACUATION,
EMER_SUPPLY,
SPEECH_MSG1,
SPEECH_MSG2,
SPEECH_MSG3,
SPEECH_MSG4,
SPEECH_MSG5,
SPEECH_MSG6,
SPEECH_HUSH,
IND_MSG1,
IND_MSG2,
IND_MSG3,
IND_MSG4,
IND_MSG5,
IND_MSG6

LU1 UP lan calls
LU2,
LU3,
LU4,
LU5,
LU6,
LU7,
LU8,
LU9,
LU10,
LU11,
LU12,
LU13,
LU14,
LU15,
LU16,
LU17,
LU18,
LU19,
LU20,
LU21,
LU22,
LU23,
LU24,
LU25,
LU26,
LU27,
LU28,
LU29,
LU30,
LU31,
LU32,
LU33,
LU34,
LU35,
LU36,
LU37,
LU38,
LU39,
LU40,
LU41,
LU42,
LU43,
LU44,
LU45,
LU46,
LU47,
LU48
LD1 DN lan calls
LD2,
LD3,
LD4,
LD5,
LD6,
LD7,
LD8,
LD9,
LD10,
LD11,
LD12,
LD13,

```
    LD14,
    LD15,
    LD16,
    LD17,
    LD18,
    LD19,
    LD20,
    LD21,
    LD22,
    LD23,
    LD24,
    LD25,
    LD26,
    LD27,
    LD28,
    LD29,
    LD30,
    LD31,
    LD32,
    LD33,
    LD34,
    LD35,
    LD36,
    LD37,
    LD38,
    LD39,
    LD40,
    LD41,
    LD42,
    LD43,
    LD44,
    LD45,
    LD46,
    LD47,
    LD48,
    CP1.    Car Calls
    CP2,
    CP3,
    CP4,
    CP5,
    CP6,
    CP7,
    CP8,
    CP9,
    CP10,
    CP11,
    CP12,
    CP13,
    CP14,
    CP15,
    CP16,
    CP17,
    CP18,
    CP19,
    CP20,
    CP21,
    CP22,
    CP23,
    CP24,
    CP25,
    CP26,
    CP27,
    CP28,
    CP29,
    CP30,
    CP31,
    CP32,
    CP33,
    CP34,
    CP35,
    CP36,
    CP37,
    CP38,
    CP39,
    CP40,
    CP41,
    CP42,
    CP43,
    CP44,
    CP45,
    CP46,
    CP47,
    CP48
    };
```

37) IO OUTPUT TYPES

NO_OUTPUT,
PI1,
PI2,
PI3,
PI4,
PI5,
PI6,
PI7,
PI8,
PI9,
PI10,

PI11,
PI12,
PI13,
PI14,
PI15,
PI16,
PI17,
PI18,
PI19,
PI20,

PI21,
PI22,
PI23,
PI24,
PI25,
PI26,
PI27,
PI28,
PI29,
PI30,

PI31,
PI32,
PI33,
PI34,
PI35,
PI36,
PI37,
PI38,
PI39,
PI40,

PI41,
PI42,
PI43,
PI44,
PI45,
PI46,
PI47,
PI48

IU,
ID,
HLR,

UPR,
DNR,
DCR,
DOR,
NUG,
HSR,
HS2,
LSR,
RELEV,
ADV_OPEN,
STAR,
DELTA,

STP_1STVANE,
STP_2NDVANE,
BR_LIFT_REL,
DRV_ENABLE,
QUICK_SLOW,

DRV_ZERO_SP,
DRV_TOP_SP,
DRV_MED_SP,
DRV_TST_LEV,

DRV_BIN_SP5,
DRV_BIN_SP6,
DRV_BIN_SP7,

OSI,
OLI,
FIRE_IND,
TEST_IND,
LW90_IND,

RAMP_CUT_OFF,
GATE_OP_WARN,
APB_BUSY,
LOCK_ALARM,
CHIME,

LOCK_TIP_HI,
LOCK_TIP_LO,
START_FAIL,
STUCK_BFLRS,
SE_HELD,
DOP_HELD,
DOOR_OP_PROT,
DOOR_CL_PROT,
GATE_LCK_FLT

HLU1, Hall lanterns UP
HLU2,
HLU3,
HLU4,
HLU5,
HLU6,
HLU7,
HLU8,
HLU9,
HLU10,
HLU11,
HLU12,

HLU13,
HLU14,
HLU15,
HLU16,
HLU17,
HLU18,
HLU19,
HLU20,
HLU21,
HLU22,
HLU23,
HLU24,
HLD1, Hall Lanterns DN
HLD2,
HLD3,
HLD4,
HLD5,
HLD6,
HLD7,
HLD8,
HLD9,
HLD10,
HLD11,
HLD12,
HLD13,
HLD14,
HLD15,
HLD16,
HLD17,
HLD18,
HLD19,
HLD20,
HLD21,
HLD22,
HLD23,
HLD24

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