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TECHNICAL MANUAL
FOR THE ALMEGA
MICROPROCESSOR SYSTEM
"INTERNET SUPPLEMENT"

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1)   Introduction

The Internet system has been designed to be a complete solution for lift monitoring, whether on site (i.e. building management), or from a remote location. It utilises the Internet to make use of the latest technology, but also to make use of the Internet protocols, which allow multi user connections, i.e. many persons are able to connect to one lift site, all at the same time. Also utilising the internet for telephone connections, takes advantage of low cost telephone calls. The same monitoring can be achieved using a telephone connection without internet, however it is limited to a one to one connection (i.e. one user), also call charges are priced at local / national rates (as applicable).

In the event of Internet failure the system can also revert back to using normal telephone connections i.e. one to one standard telephone calls. All the monitoring / programming features available remain unaffected.

The system has features to allow monitoring, system interrogation, and programming.

Monitoring can be of the lifts themselves (i.e. position, status, and calls etc), of the inverter drive connected to the lift (status, events, faults, alarms, and speed profile etc), or of the lift IO system (safety circuit, locks, floor level, and limits etc).

System Interrogation involves transferring information such as the lift setup (number of floors, door setup, and homing floors etc). Also the transfer of the Event History with time / date stamp to diagnose problems that have occurred (even before going to site). This has the advantage of arming the user with as much information as possible before going to site. For instance a faulty motor encoder could be easily diagnosed by analysing the drive and lift event history. The Engineer would then take to site a new encoder, which he would replace and rectify the fault. The Internet Board (IP Board) itself pays special attention to fault logging, since connection problems and the complexity of the Internet, requires detailed logging to trace connection / setup problems.

System programming can also be achieved remotely, as / when required. This feature is password protected to safeguard against nuisance / accidental system overwriting or corruption. However changing system parameters, adding to or removing from the system, and setting up the drive and speed profiles is achievable. System software upgrade is also available, however restricted to Lester Controls personnel only. This can be used to upgrade the system for the addition of new features, but also allows the changing of system software that may not meet the customer's satisfaction. The software upgrade is carried out under controlled conditions with the associated lift being out of action. The upgrade has also been carefully designed to ensure that the corruption of transferred software shall not affect the upgrade. The existing software is always retained, and not overwritten, despite the upgrade.

The Internet Board microprocessor has been designed using surface mount component technology to be small and compact as possible. The hardware will fit into an Almega rack as standard, but may be mounted externally to suit other Lester Control Systems controllers.

The Windows application software is necessary for Internet / remote connectivity. Standard windows Internet browser programs will not suffice. The software will work on any IBM compatible P.C. or laptop (250MHz or higher) with windows version XP.

2)   List of Equipment

1)   Internet Board *(options as below).*
   a. PSTN Modem Option
         i.   Telephone cable RJ11 to Telephone connector.
         ii. Telephone single to double adapter.
         iii. Telephone extension cable (if required).
   b. GSM Modem Option
         i.   Ariel.
   c. Ethernet (Network / Broadband option)
         i.   Network cable to be installed by others.

2)   RS232 to RS485 converter *(from lift to Internet Board).*

3)   Local or Remote Lap top / P.C. *(for monitoring programming).*

4)   1 Serial Communication Cable *(RS232 (non-crossed Male/Female) link between processor & laptop).*

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3) Internet System Block Diagram / Overview

Lift Site and Equipment

Group CAN
Communications

Lift A | Lift B | Lift C | Lift D

Conv | Conv | Conv | Conv

RS232 to RS485
Converters

Per lift, RS485, Communications

INTERNET BOARD (IP BOARD)
With Internet TCP / IP Stack

MODEM,
Or,
Mobile (GSM) option

RS485

CAN

RS232

ETHERNET

Ariel
(if fitted)

Motor Room
Serial Connection
(Parameters etc.)

Local Building
Management System
(Lift Monitoring etc.)

PSTN
TELEPHONE
LINE

Internet and Telephony

Dialup
Internet

Broadband
Internet

Internet Service Provider
(ISP)

**Lester Controls
Management Centre**

Broadband
Internet

Lester Controls Management Centre
(Server)

Ariel
(if fitted)

PSTN
TELEPHONE
LINE

MODEM,
Or,
Mobile (GSM) option

**Connecting Customer Clients**

CLIENT 1 | CLIENT 2 | CLIENT 3

4)   Power Supply Requirements and Fusing

The Supply to the IP Board is rated at 24V, 1A (max), and 12V, 1.6A (max).
It has an on board thermal fuse rated at 1.6A, which trips at 3.2A approx.
The IP should be fused with a 1A fuse when powered at +24V and a 2A fuse when powered at +12V.

When connected to a group of lifts, the IP board should be powered whilst any one lift has power, or by a separate un-interruptible power supply.

Powering from each lift is achieved as below (example 4 car group):

Lift A   Lift B   Lift C   Lift D

0V   +V   0V   +V   0V   +V   0V   +V

Fuses:
1A@24V,
2A@12V.

+24V

0V

5) IP Board

Serial Configuration Links

LK9 CAN Bus Terminator

CAN LEDS TX/RX

CAN connection to Lift Group Comms

RS485 connection (to each lift)

Alarm / Backup Supply Inputs (AL- = common)

LK-RS485 RS485 Bus Terminator

RS232 Connection (IP Board and Lift(s))

Fixing Hole

Fixing Hole

CH 0V CL | A B | ALS Al- +BS

Modem Socket Connection

TX
DTR
RX
DCD

BT
I2
SP
5C
IN
SU
UA
ET
LP
BS
AL

EVEN   ODD

Fixing Hole

Back-plane connection

Fixing Hole

+24 0V | SPK MIC OVC

SPKR ON/OFF Link

Processor IC

Ethernet Socket Connection

PSTN RJ11 Telephone Connection

Program Memory EVEN ODD

Modem Piezo Sounder

Power Supply Connections

External Speaker and Microphone Connections (Modem)

Speaker Volume Control

The IP Board (shown above) provides the connection interface to the lift(s). It can achieve communication between a remote user and the lifts via Modem, Dialup Internet and Broadband Internet, hence IP means (Internet Protocol Board). The IP board may be situated within the IO rack of one of the "Almega" controllers, or fitted as a separate unit within the control panel using the fixing holes as shown.

Communication to each lift is achieved via RS485. Group CAN information from the lift(s) is passed to this board for lift-viewer monitoring / call information etc. RS232 connection is required for on site communication to the IP board and to each lift through the IP board. The Alarm input is monitored to allow an on site Auto Dialler preference in using the telephone line.

Two external "plug in" boards (Ethernet and Modem) are used in conjunction with the IP board to provide options for Broadband (Ethernet) or Dialup (Modem) Internet. Modem dialup indication is provided by the means of a piezo sounder, however also an external speaker (volume adjustable via the potentiometer as shown) may be used where the level of background noise supersedes the piezo output level. Also microphone and Speaker connections provide expansion for the possibility of an integrated Auto Dialler system.

The program memory must be removed carefully with a proper EPROM removing tool ("hook / double hook types"). Very little force is required to remove the memory devices or else damage to the memory sockets may occur.

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

LED	FUNCTION	FLASH SPEED / FUNCTION
TX	Modem TX	Upon Message Transmit Activity
DTR	Modem Data Transmit Ready	Lit when Modem is ready to Communicate
RX	Modem RX	Upon Message Receive Activity
DCD	Modem Data Carrier Detect	Extinguished when Modem is transferring data
BT	µProcessor Boot Mode	OFF = Normal operation, ON = Boot.
I2	µP I2C, RTC Clock or Parameters	Once a second for RTC, or Parameter operation
SP	Spare Function	
5C	5V Communications Healthy	On whilst Communication Supply is Healthy
IN	Processor IO Interrupts	Every 20 Milliseconds
SU	Software Uart Activity	On when info transfer to IP board or lifts
UA	Uart Activity	On when info transfer from IP board to Modem
ET	Ethernet Activity	On when Ethernet Messages sent / received
LP	Processor Program Loop	Between 5 and 10 Times a second Approx
BS	Backup Supply Input Indication	Lit if input Backup Supply is asserted
AL	Alarm Input Indication	Lit if input Alarm is asserted
CAN	CAN Communication LEDS TX/RX	Upon Message Activity (TX/RX)

Connections to the IP achieved using the plug and socket terminals as shown. Connection details are:

CONNECTION TYPE	DESCRIPTION	VOLTAGE
CH	CAN HIGH Communications	0-5V
0V	Communications 0V Return, i.e. cable screen	NA
CL	CAN LOW Communications	0-5V
A	RS485 Communications Channel A (non-inverting)	$\pm$13V
B	RS485 Communications Channel B (inverting)	$\pm$13V
ALS	Alarm Button Pressed Detection input	+12V
AL-	ALS / +BS Return / Common	0V
+BS	Backup Supply Detection (if required)	+12V
BACKPLANE	Almega IO Rack Slot location / Board Id	0-5V
SPK	External Speaker Output 8Ω min, 325mW (max)	0-5V
MIC	Electret Microphone Input	mV
OVC	Common Feed Return for Spkr / Mic, also Communications	0V
+24V	Supply to IP Board (24V: 1A (max), 12V: 1.6A (max))	12-24V D.C.
0V	Supply Return	0V
RJ11	PSTN Telephone RJ11 Connector	STD Telephone
RS232-D-Type	Local RS232 Communications to IP Board and Lifts(s)	$\pm$13V

5.1) IP Board Ethernet Option
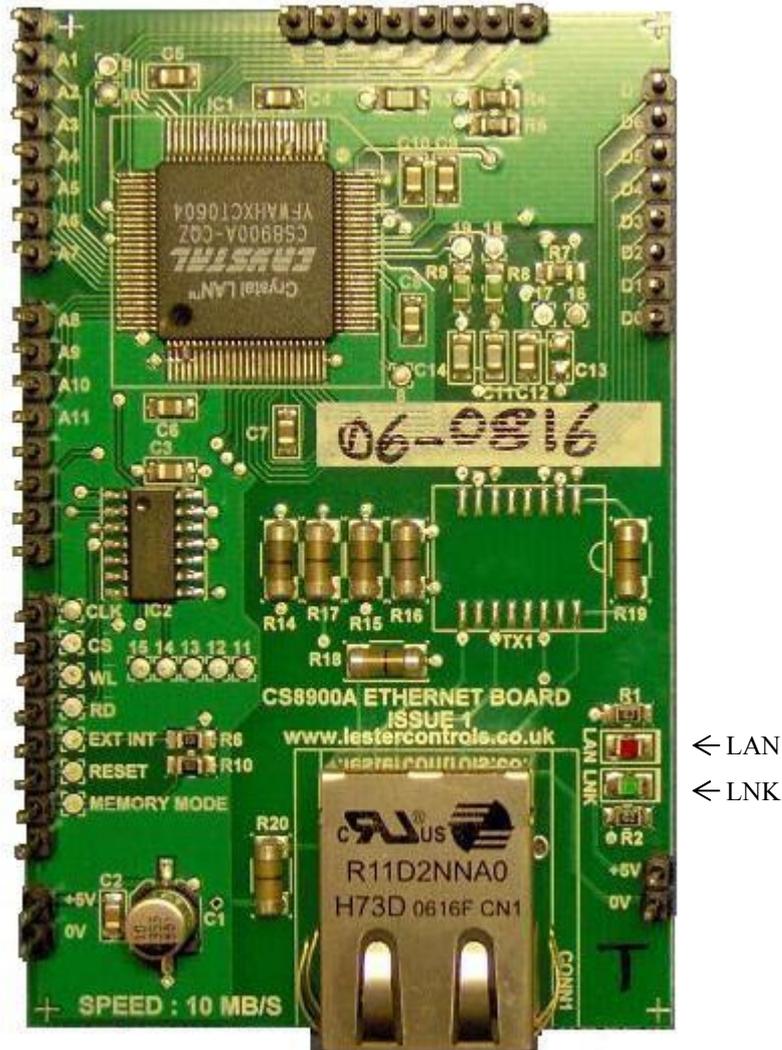
RJ45 Ethernet Connector

The Ethernet option allows the lift to connect via Broadband Internet. Broadband has the advantage that the data transfer is quicker, and the connection time is greatly reduced since there is no dialup sequence. The Ethernet also allows a local network connection that can be used for local Monitoring, or connection to a building management system. Users can connect directly to the IP board and hence lifts, without the need to go through the Lester Controls Management Centre.

The Ethernet Board plugs into the IP board with the pins a shown. Connection to a network is via the RJ45 Ethernet connector.

LED indication is provided as below:

LED	FUNCTION	FLASH SPEED / FUNCTION
LAN	Ethernet Local Area Network Activity	Lit upon message Transmit / Receive Activity
LNK	Ethernet Link Healthy	Lit when Ethernet link is Healthy (with / without RJ45 cable connected)

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5.2) IP Board PSTN Modem Option

The PSTN (Public Switched Telephone Network) modem option allows the lift to connect via a standard telephone socket, either using dialup internet, or a dialup 1-1 operation.

Dialup internet connects to the Lester Controls Management Centre, and has the advantage of using local rate Internet charges as well as allowing more than one user, to view the information of the lift, all at the same time.

The 1-1 dialup connection has the advantage of a direct / private connection, and could be considered more reliable since it does not rely on the Internet. However it has the disadvantage of more expensive local / national telephone calls, as well as being limited in its functionality. The 1-1 connection would be more suitable to an Auto dialler application.

There are many modem modules in this family range, which have different speeds and functionality, but all universally fit within the same space, and associated connections.

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5.3) IP Board GSM Modem Option

The GSM (Global System for Mobile Communications) modem option allows the lift to connect via a wire free connection, either using dialup internet, or a dialup 1-1 operation.

Similar to the PSTN modem, the dialup internet connects to the Lester Controls Management Centre, and has the advantage of using local rate Internet charges (however mobile phone charges apply) as well as allowing more than one user, to view the information of the lift, all at the same time.

Again, similar to the PSTN modem, the 1-1 dialup connection has the advantage of a direct / private connection, and could be considered more reliable since it does not rely on the Internet. However it has the disadvantage of more expensive local / national telephone calls, as well as being limited in its functionality. The 1-1 connection would be more suitable to an Auto dialler application.

The main difference between the GSM modem option and the PSTN, is the functionality. The GSM modem is able to send / receive SMS messages (text messages). This allows the user to access the site directly and obtain information as / when required, without going through any dialup / PC interface, i.e. direct from a mobile phone. Using a set of commands the user can obtain information as required. Also the site could be setup to inform the user, say when a fault has happened.   Back To Contents

5.4) IP Board with Ethernet and PSTN Modem
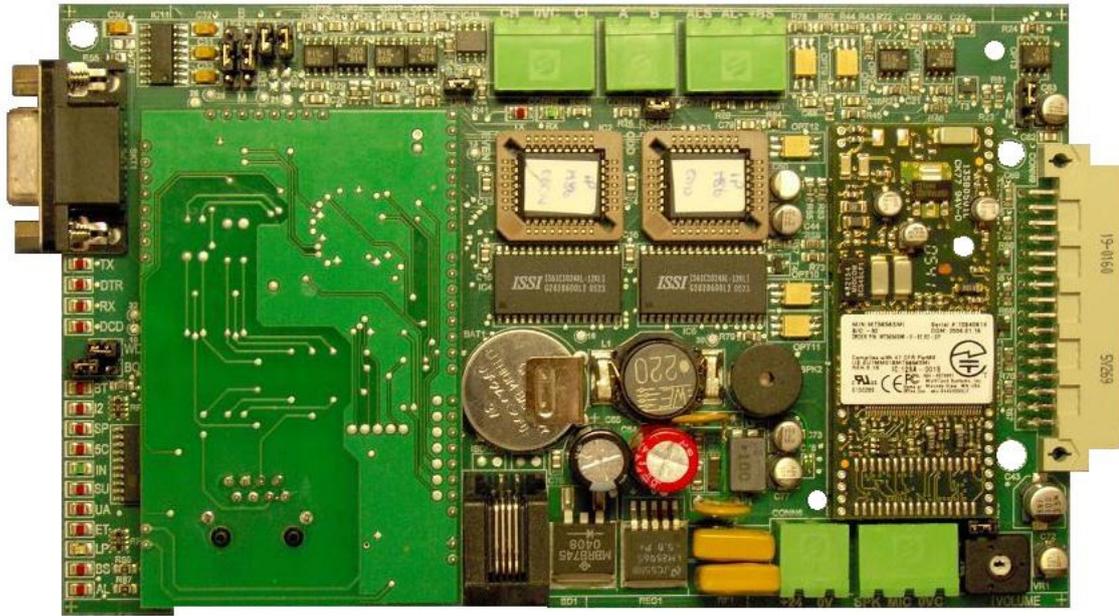
5.5) IP Board with Ethernet and GSM Modem
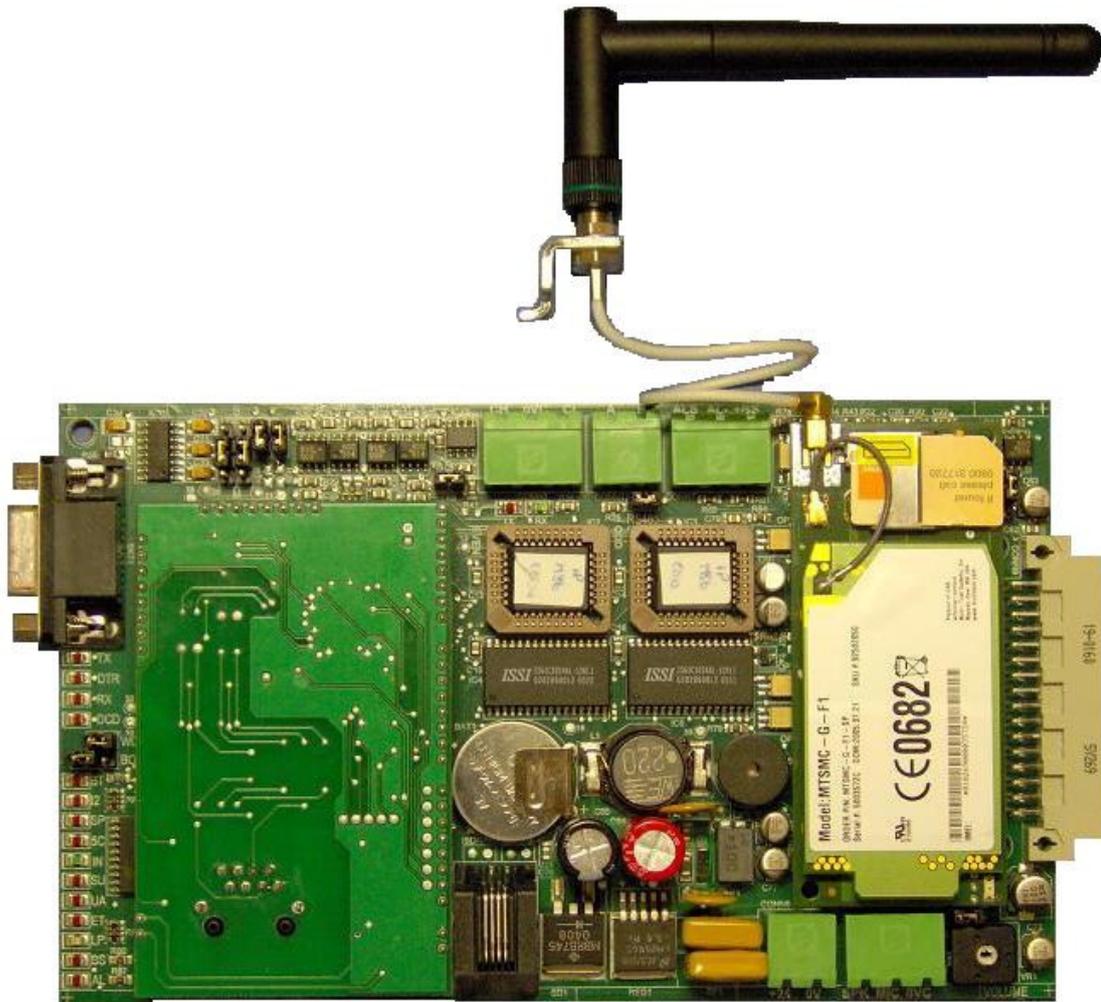
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6) RS232 to RS485 Converter
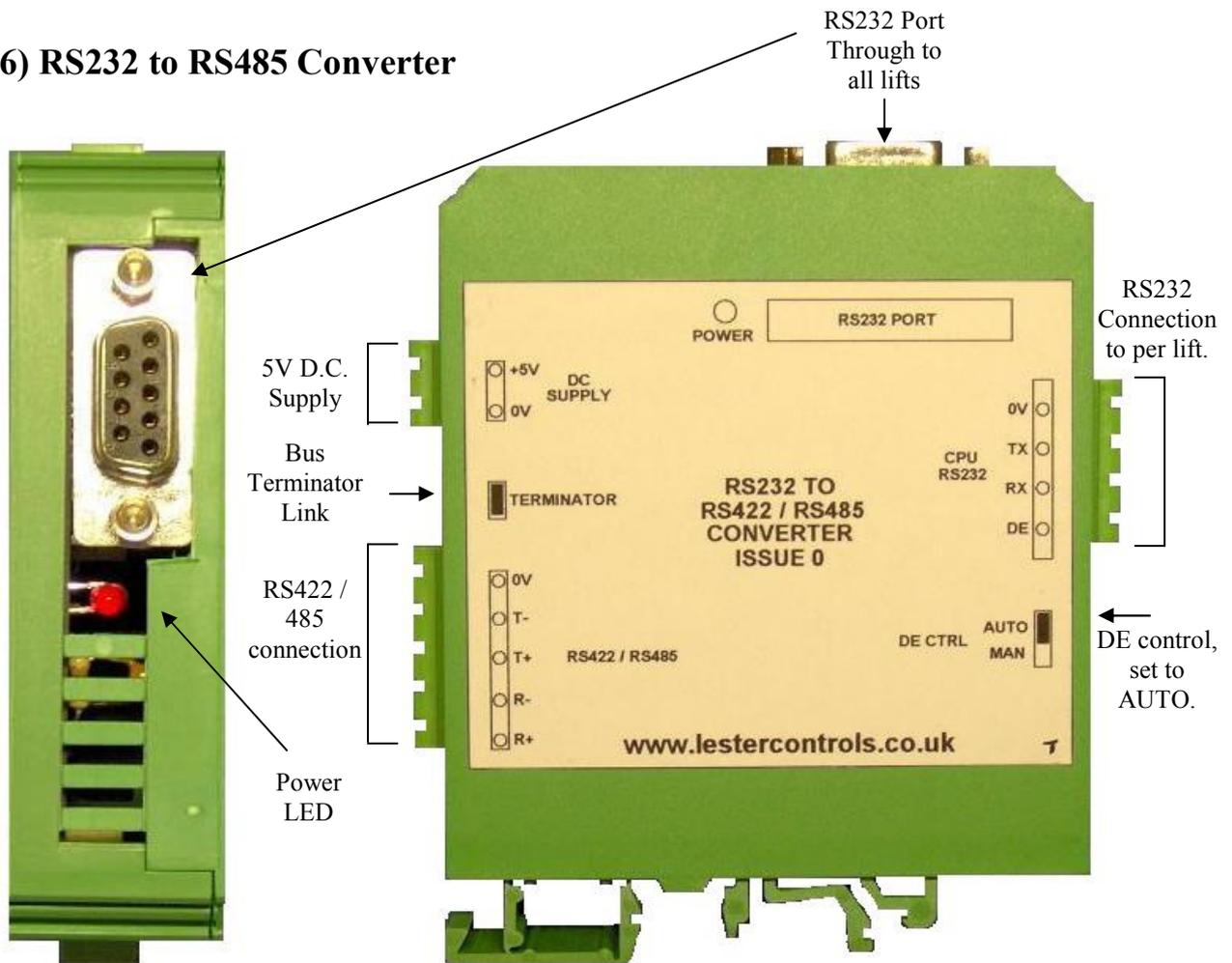
Connections to the converter achieved using the plug and socket terminals as shown. Connection details are:

Connection Type	Description	Voltage
+5V	D.C Supply (5V: 100mA-max)	0-5V
0V	Supply Return	0V
R+	RS422 Receiver Input (non-inverting)	±13V
R-	RS422 Receiver Input (inverting)	±13V
T+	RS422 Driver Output (non-inverting)	±13V
T-	RS422 Driver Output (inverting)	±13V
0V	RS232 0V Return	0V
TX	RS232 Transmit	±13V
RX	RS232 Receive	±13V
DE	RS232 Driver Enable	±13V

The converter is fitted to each to lift to allow an RS485 multi-drop serial bus connection between all lifts. This bus is derived from connecting together the RS422 polarised connections. Most lift information is transferred through this interface, other info such as group information is transferred through the CAN interface.

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7) Common Faults

7.1)   Connection Problems

From time to time the user may experience connection problems. Due to the nature of the Internet and its associated equipment, connection problems would be the most probable type of nuisance / failure. Below is a list of possible causes:

i)   Dialup Problems
- a.   Telephone Line busy.
- b.   Telephone number of site changed, or incorrect.
- c.   Incorrect, or corrupt Internet Service Provider (ISP) username / password
- d.   Modem Failure (IP board, or Server).
- e.   Line Rental Expired.
- f.   Lester Controls Management Centre malfunction.

ii)   Broadband / Network Problems.
- a.   Internet Server / temporarily unavailable / malfunction.
- b.   Local Area Network Fault.
- c.   Incorrect IP address setting.
- d.   Incorrect Gateway setting.
- e.   Incorrect Port number setting.
- f.   Ethernet Board Failure (IP Board).

iii)   Common Problems (to dialup and broadband)
- a.   Internet Server Malfunction.
- b.   Alarm push held on.
- c.   Lift switched OFF.
- d.   Lift communication fault.
- e.   Lift Controller Faulty.

7.2) Monitoring Problems

i)   Lift-viewer Not Responding.
- a.   Check Can On/ Off button (PC software) is Green, and says **Can On.**
- b.   Check lift(s) not switched off, or showing (CF=Communications Failure).
- c.   Check Group communications cables plugged in.
- d.   Check Group terminator links are set correctly.
- e.   Check Group Communications wiring GH / GL.

ii)   Lift Information Transfer Problems (e.g. Parameters / Drive Viewer / IO Viewer / Events etc.)
- a.   Check lift(s) not switched off.
- b.   Check Monitoring buttons are on, either Green, or flashing.
- c.   Check RS485 communications cables plugged in.
- d.   Check RS485 terminator links are set correctly.
- e.   Check RS485 wiring 485A / 485B.
- f.   Check RS232- RS485 converter failure.
- g.   Check RS232 Uart Baudrate (57600 typical).

iii)   Lift Busy Message.
The lift busy message will appear under certain conditions, when a user attempts to access information currently being accessed by another user, e.g. when one user is say uploading Event History, and another also tries at the same time.

8) Serial Communication Types

8.1) RS232

The IP board is fitted with an RS232 port, access to which is through the RS232 D-type connector, on the front of the board. Engineers on site can connect to this port (via a lap-top / P.C.) to access information directly from all the lifts. The information is passed to each lift via the RS485 bus. Connection to each individual lift via its RS232 connector is also permitted (in the event of RS485 malfunction).

8.2) CAN

The IP board CAN connection is wired into the lift Group Communications (GH / GL).
From this information mainly "lift-viewer" information is sent back to the user. Also the user is able to transfer information to the lifts such a car / landing calls.

Bus incorporating 4 Car Group and IP board

Below shows an example of a 4 car group, whereby field bus **terminating resistors** are fitted at Lift A and Lift D, i.e. LK1 must be closed on CAN 2 communication boards for Lift A and D, but open on Lifts B and C, also open on the IP Board (LK9):
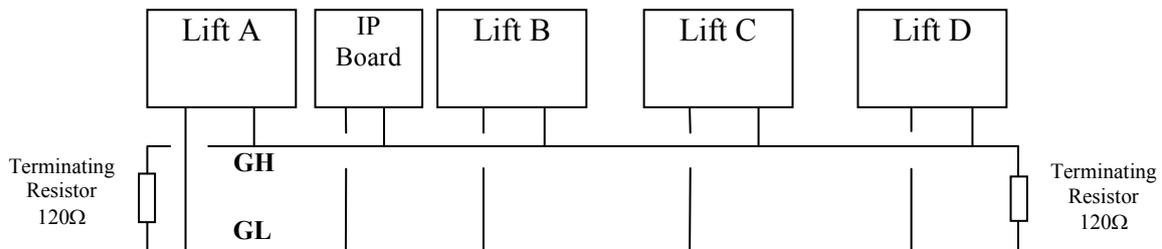
Bus incorporating Simplex and IP board

Below shows an example of a simplex, whereby field bus **terminating resistors** are fitted at Lift A and the IP board, i.e. LK1 must be closed on CAN 2 communication board for Lift A and on the IP Board (LK9):

8.3) RS485

Similar to the CAN field bus, the RS485 bus, also requires bus **terminator resistors** connected to either end of the field bus. These terminators are simply resistors of value 120Ω which are used to match the impedance of the cable. It is important that these are correct on the RS485 bus, if not, errors could occur frequently in the form of transfer timeouts.

Bus incorporating 4 Car Group and IP board
Below shows an example of a 4 car group, whereby field bus **terminating resistors** are fitted at Lift A and Lift D (TERM link fitted on RS232-RS485 converter):
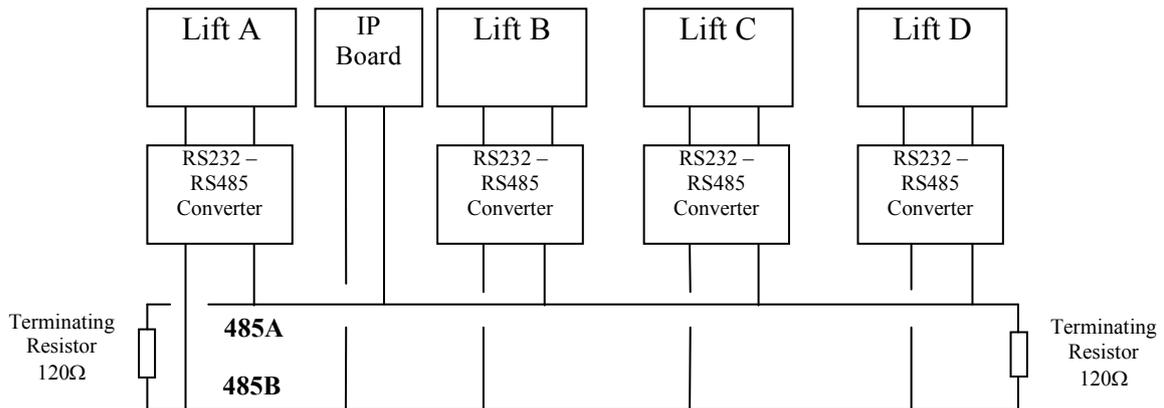
Bus incorporating Simplex and IP board
Below shows an example of a simplex, whereby field bus **terminating resistors** are fitted at Lift A (TERM link fitted on RS232-RS485 converter), and on the IP Board (RS485 link fitted):

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9) AlmegaWin PC Software

The associated software that comes with the Internet system is required to be able to connect to the lift sites. Rather than using a standard Internet browser application, specific software was chosen for increased security (i.e. not just anybody can connect), and it enables the users to use a common software package whether on site, or from a remote station. The software allows interrogation, setup, monitoring, programming, and even software upgrade from a remote location. Protection against accidental programming (i.e. corrupting parameters / software) is achieved via the use of password protection. To gain access to programming features would require contacting Lester Controls to gain a "daily password" (valid for that day only), and technical assistance to guide one through the programming process.

Connection to the lift sites can be either direct i.e. from Modem to Modem, or from IP address to IP address (Ethernet), or via the Lester Controls Server / Management Centre. This can be configured accordingly. Most of the time, except for monitoring on site, the connection will be via the Lester Controls Management Centre. The Software establishes a connection to the Lester Controls Management Centre, which in turn establishes a connection to the lift site. More than one user can then connect to the lift site, via the Management Centre.

9.1) Customer Database Login.

It is necessary for each customer to log onto the customer database to obtain the associated contracts for that company. Each customer has their own database, in which is contained their associated contracts / sites, also each customer will have their own Username and Password. Much information is contained within it, so that customers may reference sites / contracts quickly and easily. Once the database has been accessed, information is transferred to the connecting PC, and a copy of the information is stored locally. Therefore it is only necessary to connect to the database for the 1st time, or when information has been added, removed, or updated. An option will be given to update / overwrite current information.

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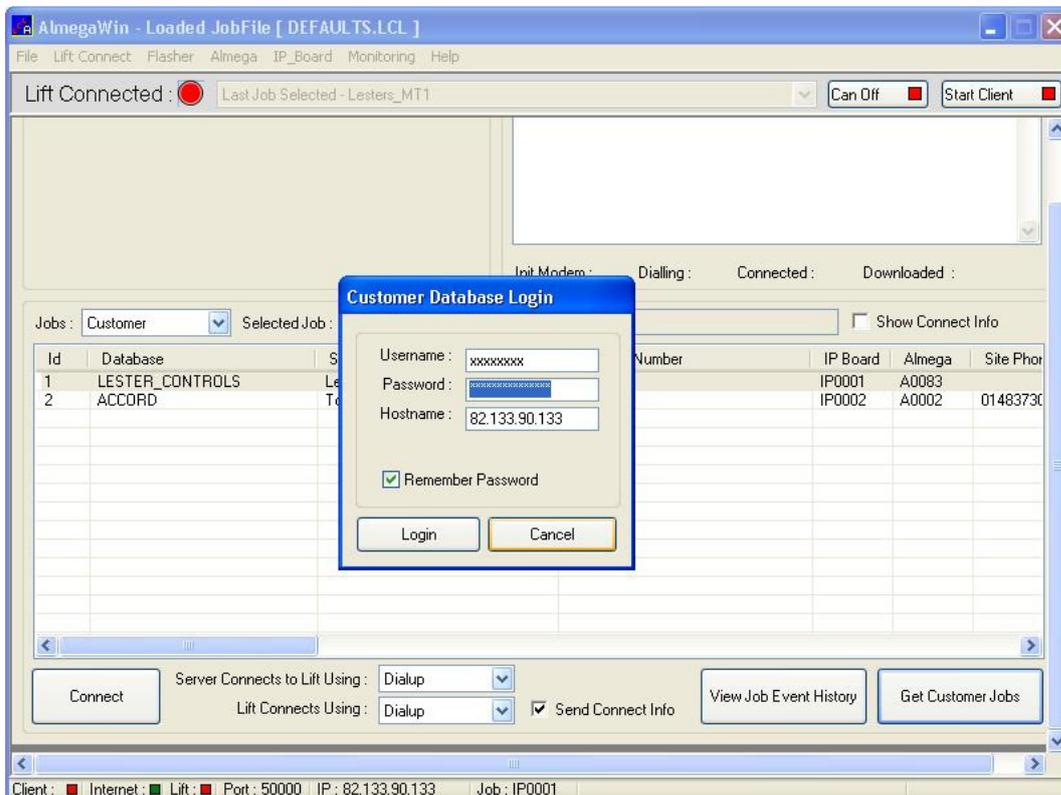
9.2) Connect Screen

The connect screen below would normally show a list of lift sites / contracts for that customer. To connect to that site requires highlighting the job as shown, and clicking the connect button.
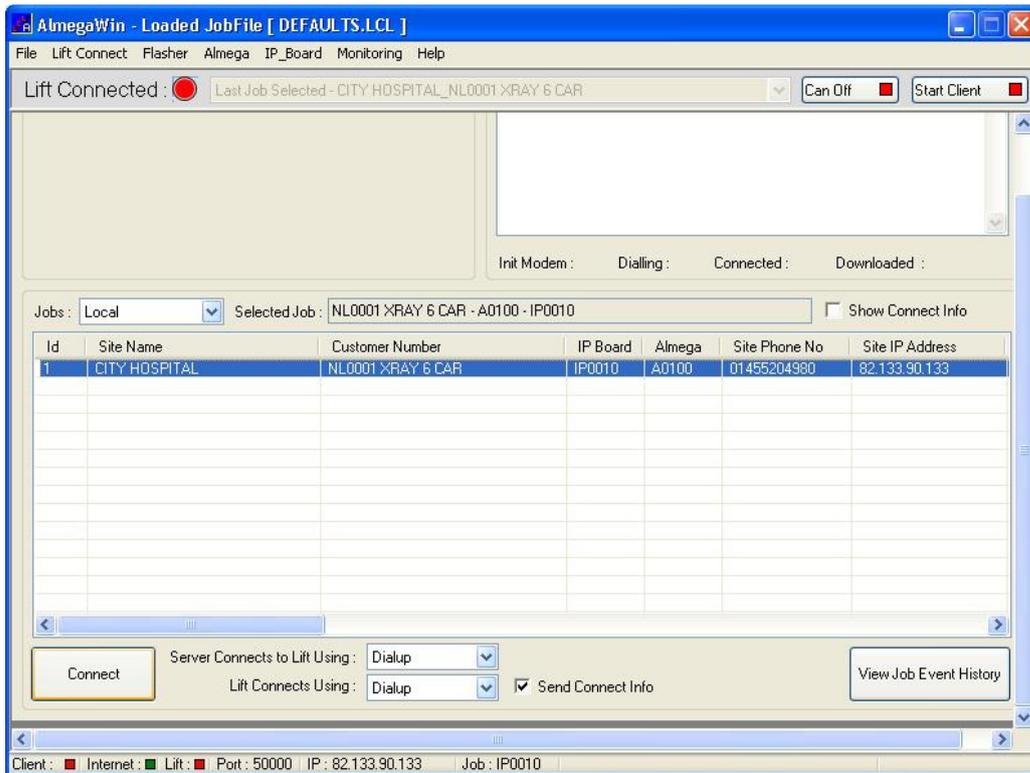
Whilst the connection process is in progress, a screen as below appears. The connection will either connect, or timeout. If it times out the Lift Connected indication (top left) will remain red in colour, otherwise it will turn green.
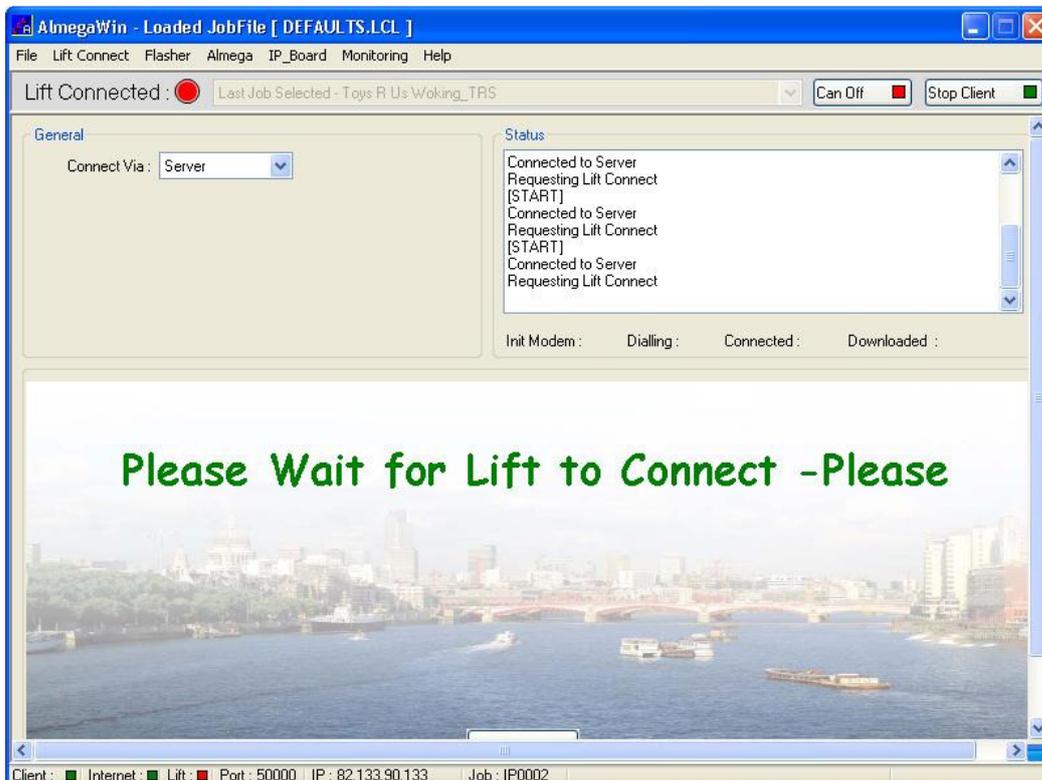
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When the connection is established typical options for monitoring, interrogation and transfer can be selected as follows:

9.3) Events Upload

Events can be uploaded from any lift within the system, or from the IP board, for example from lift A

- Select Almega->Event History.
- Place mouse over white area, then click right button on mouse.
- Select Upload Event History.
- Select Lift 1, the transfer will then begin.
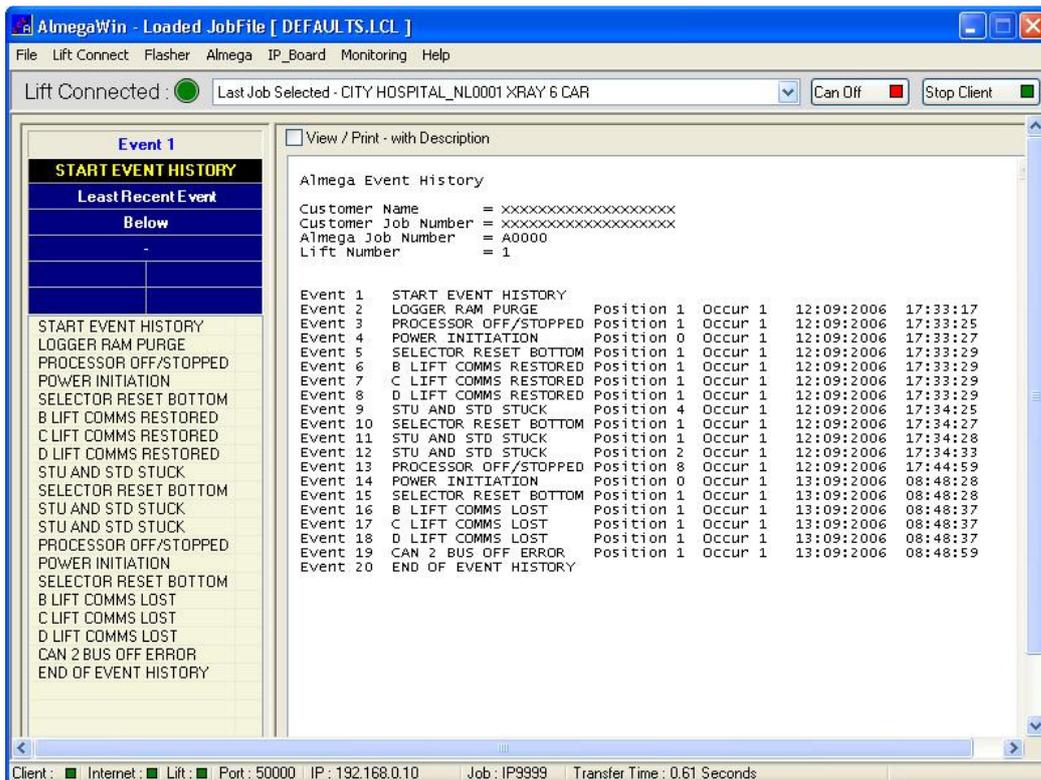
9.4) Lift-viewer Monitoring

Lifts can be monitored on the screen, showing their position, status, and calls etc. Car / landing calls can also be entered.

- Select Monitoring-> Almega->Lift Viewer.
- Click the button Can Off, to change it from red to green, information now starts to transfer.
- Transfer of information is shown above the lift shaft.
- Status of lift is shown at bottom of each shaft.
- Landing call riser is shown on the left hand side, to enter calls simply click each button.
- Call allocations are shown as per each lift shaft.
- Car calls are entered via the drop down box, above each lift shaft.

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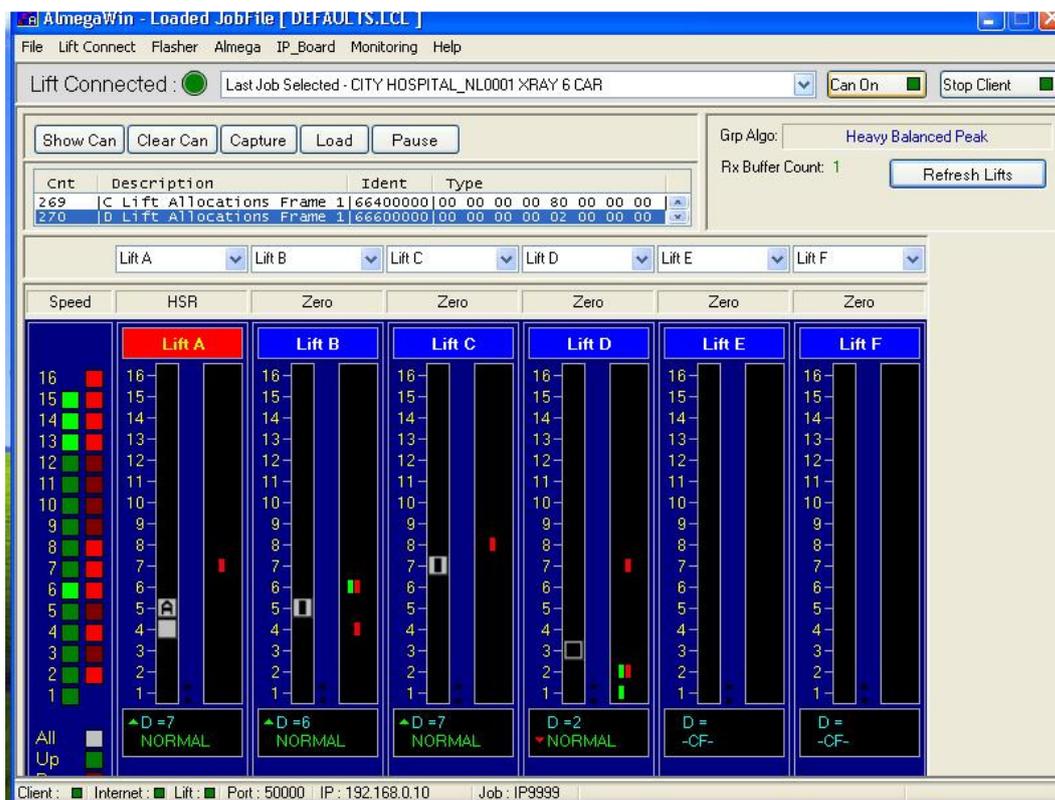
9.5) IO Viewer Monitoring

Since the lifts are remote from the user, it can be very useful to ascertain which inputs/ outputs are on / off. For instance is the lock circuit complete? Are there any calls in the system? What is the state of the door limits etc? Diagnosis can be made remotely, as well as assistance can be given to an engineer on site, fault finding etc.

- Select Monitoring-> Almega->IO Viewer.
- Select which lift, by clicking one of the buttons (i.e. 1-6).
- Click the button Start Monitoring, to start the transfer of information.
- Information is transferred / repeated at regular intervals.
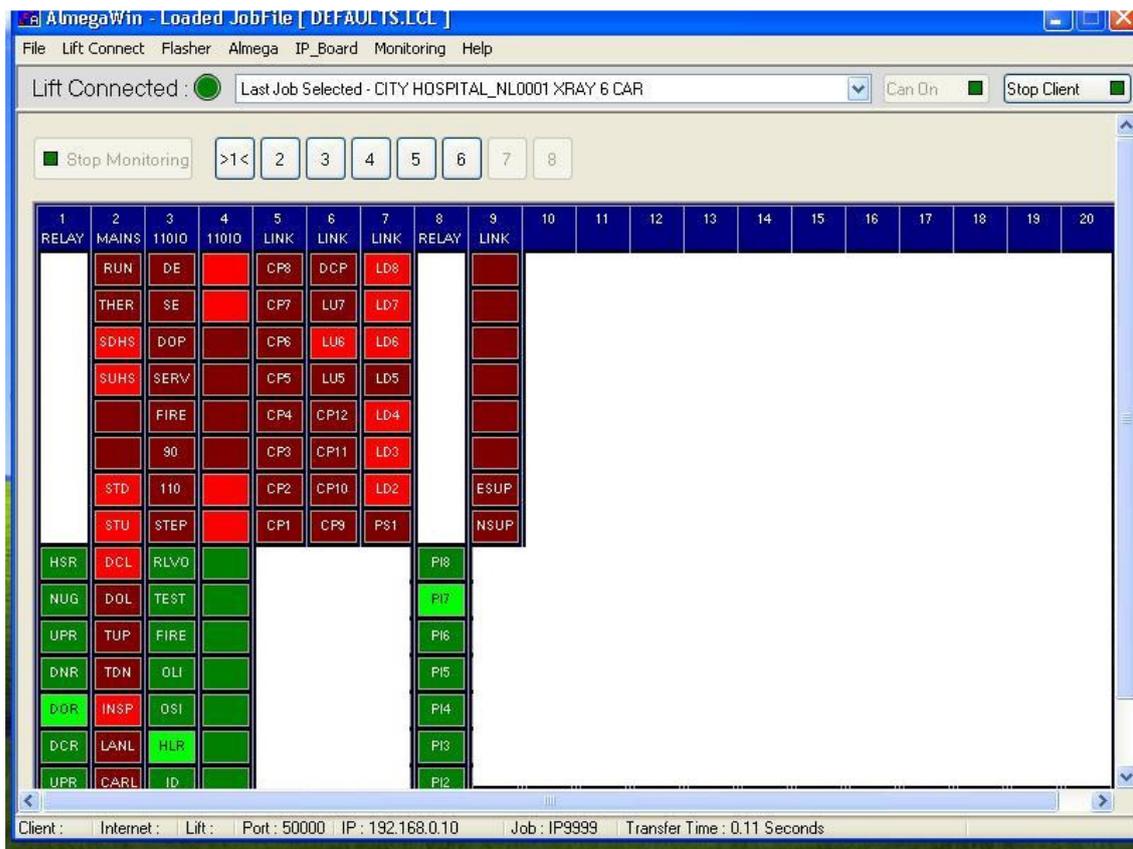
9.6)   Drive Viewer Monitoring

Since the lifts are remote from the user, it can be very useful to ascertain the state of the Inverter drive. If the lift is connected to the drive via serial communications, diagnosis can be made remotely, as well as assistance can be given to an engineer on site, fault finding etc.

- Select Monitoring-> Almega->Magnetek HPV600-900, Drive Viewer.
- Select which lift, by clicking one of the buttons (i.e. 1-6).
- Click the button Start Monitoring, to start the transfer of information.
- Information is transferred / repeated at regular intervals.
- Click on Monitor Profile to monitor profile information in addition to all other info. (Note this increases transfer time slightly).
- Drive Profile(s) can be viewed, compared, stored etc.
- Drive status, direction, events, alarms, communications information can be viewed by selecting any of the screens, from the tab controls.
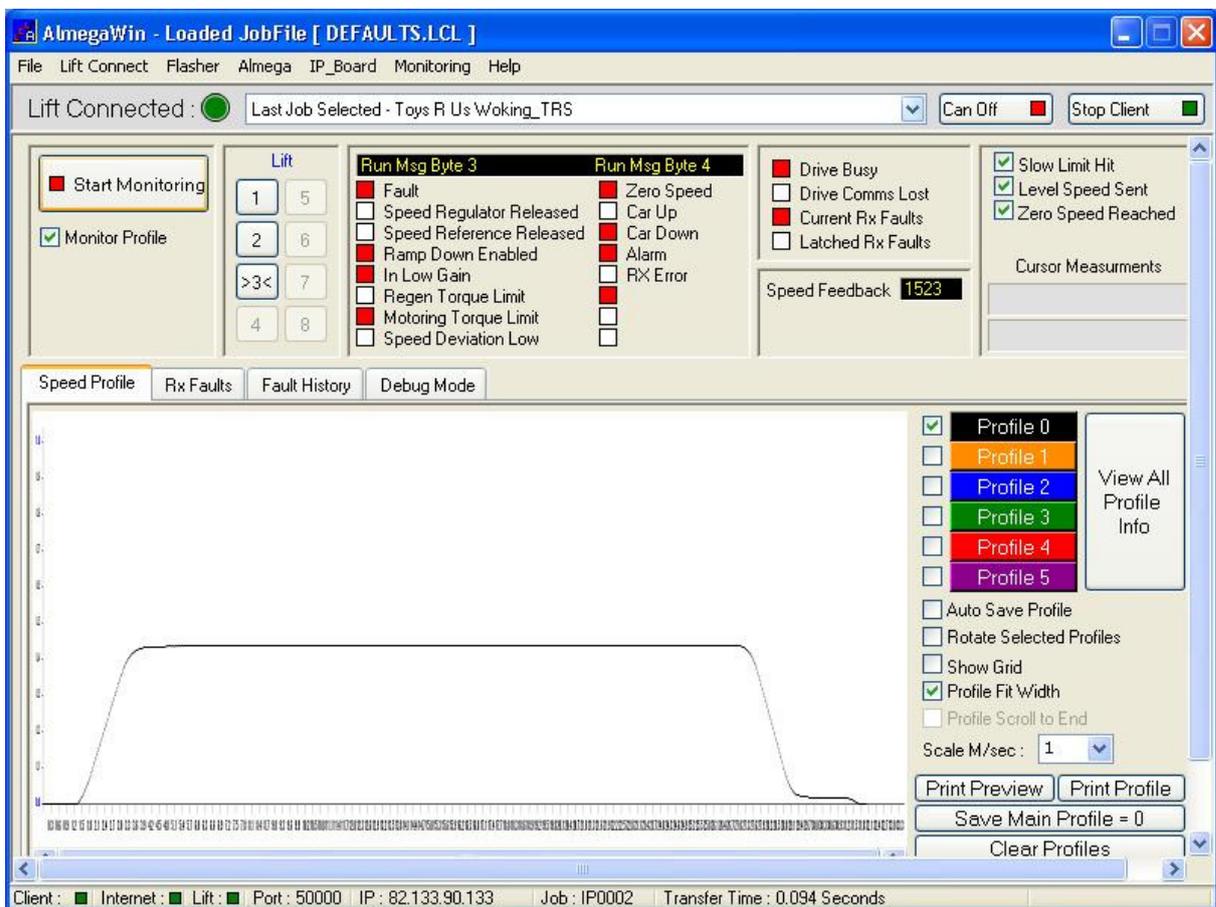
9.7)   Parameter Transfer

Since the lifts are remote from the user, it can be very useful to obtain, and re-configure the system where necessary. For instance how many floors is it set for? Is it selective doors? Is the homing switched on? Outputs need to be added for extra position / hall lanterns etc. Diagnosis can be made remotely, as well as assistance can be given to an engineer on site, fault finding etc.

- Select Almega-> Upload to PC->Upload All, or
- Select Almega-> Parameters->and press CTRL and U key together
- Select lift to Upload parameters from.
- When Upload has finished select from the menu on the left hand side for parameter sets, i.e. SYSTEM DETAILS, DOOR SETUP etc.
- Select Almega-> IO Config to view the IO configuration.
- Select Almega-> Indicator to view the indicator configuration etc.
- If the user wishes to re-programme any of the parameters, a daily password must be obtained from Lester Control Systems.
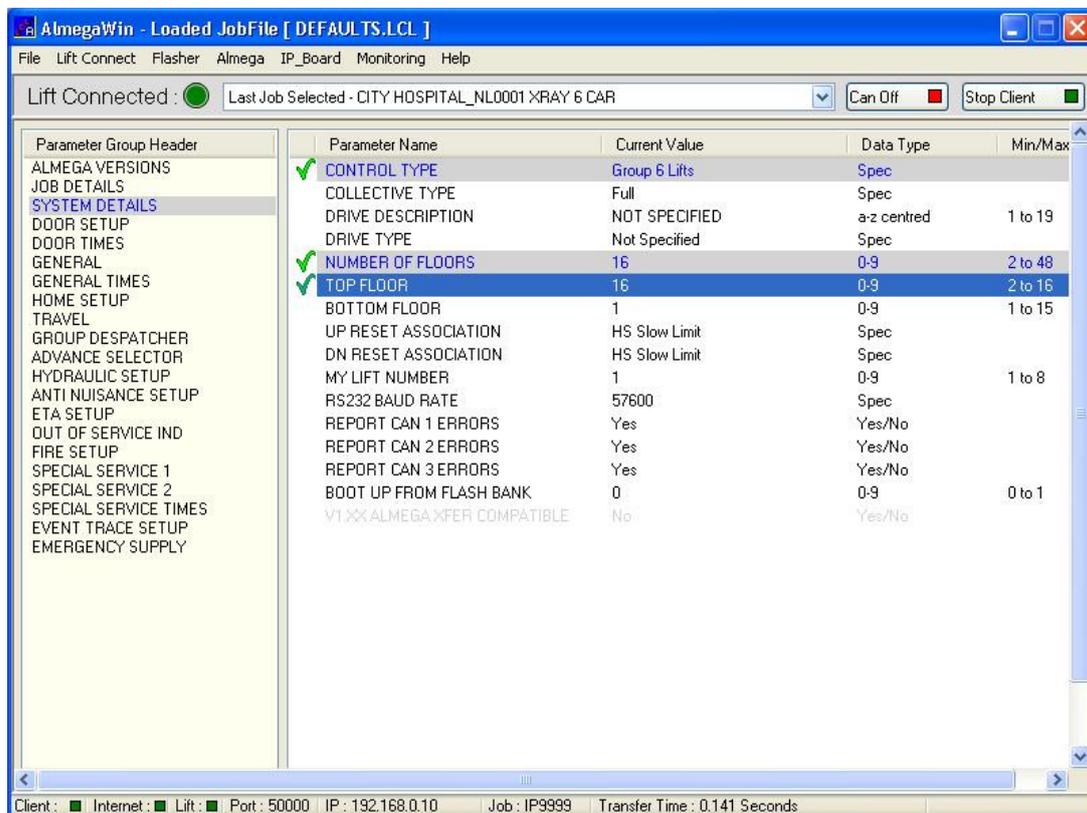
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9.8) Software Security

Since the lifts are remote from the user, programming the system has to be secure and treated with care. Password protection prevents (to a reasonable level) the misuse, or accidental overwriting of system parameters. However there will be occasions whereby the user wishes to add / change the system configuration. This can be achieved by entering a daily password into the software to enable re-programming. Passwords are to be obtained from Lester Control Systems, and are valid for one day only.

- Select File-> Properties
- Select Security screen form the Security tab.
- Type in the Daily Download Password obtained from Lester Controls.
- Press Enter to check validation, and unlock the software for download.

Another password is required to enable remote calls via the software. This again is a security precaution to prevent the misuse / nuisance of the lift system, from continuous call entering. The password once entered unlocks the software indefinitely. The software tool as default only allows monitoring, until the user wishes to interact with the lift system.

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