

Technical manual for the Skycom shaft encoder

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1)

Introduction

The ILE positioning device is a dedicated high performance system optimised to provide accurate, repeatable position and switching signals to lift control systems.

The position is determined using an overspeed governor mounted encoder, or motor tacho with correction magnets at each floor to allow continuous self-diagnostics.

Outputs are in the form of a “Virtual Tapehead system” and connect to the skycom processor using CAN serial communication. Extra outputs provided contribute to optimum performance by using solid-state devices to connect direct to drives. These outputs provide repeatable switching times of just a few microseconds.

Serial communications is also available for connection to lift controllers and drives.

When used with an external battery and charger, the unit can provide a position for fire fighting and hand winding using the ILE hand operation positional indicator.

Comment:

2)

Operation

Position Sensing

Position sensing is achieved by counting the pulses from an encoder, normally mounted on the overspeed governor, or motor. Direction is determined by comparing the A & B tacho channels.

Correction magnets

Magnets are mounted at each floor. They are used during the learning run to determine the number and position of floors. During normal operation they are used to continually monitor the lift position to compensate for external factors i.e. rope slip etc.

Modes

There are 2 modes of operation, **standby mode** and **normal mode**.

Normal mode provides the correct switching points for normal lift operation.

Standby mode is used if the positioning device has not been commissioned or if the exact position is not known, for example after power has been restored on a none battery backed system, where the lift has not yet moved to the reset floor. Standby mode provides a timed px signal when movement is detected, to allow running between terminal floors prior to and during learning run. Standby mode is also used to run to a reset floor and for movement on inspection control.

Reset after power up

The positioning device can be used both with and without battery backup. When operating without battery backup and the device is switched off during normal operation, it must be returned to the correction point magnet which is within the RSD zone. This is necessary because the lift may have been moved without power.

Battery operation

Battery operation is provided to allow the following:-

Fire fighting position to be sent to the lift controller in order to provide an accurate position in the event of power failure.

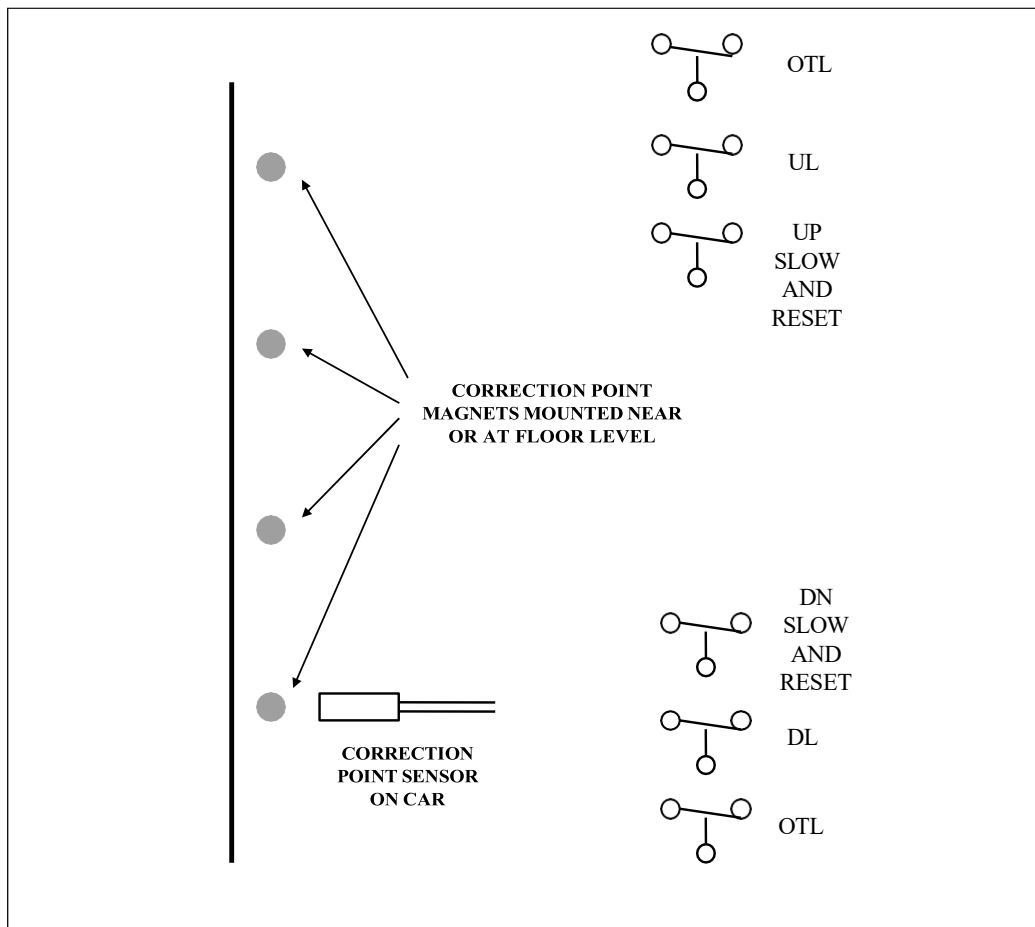
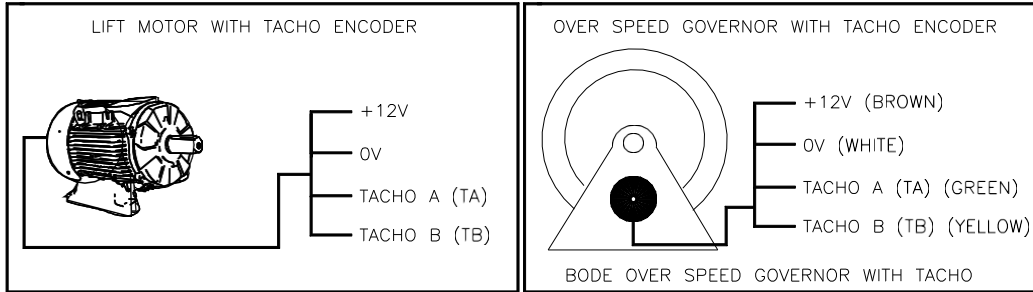
Outputs to allow a hand operation position indicator to display the position of the lift during handwinding / lowering operation.

3) Installation instructions

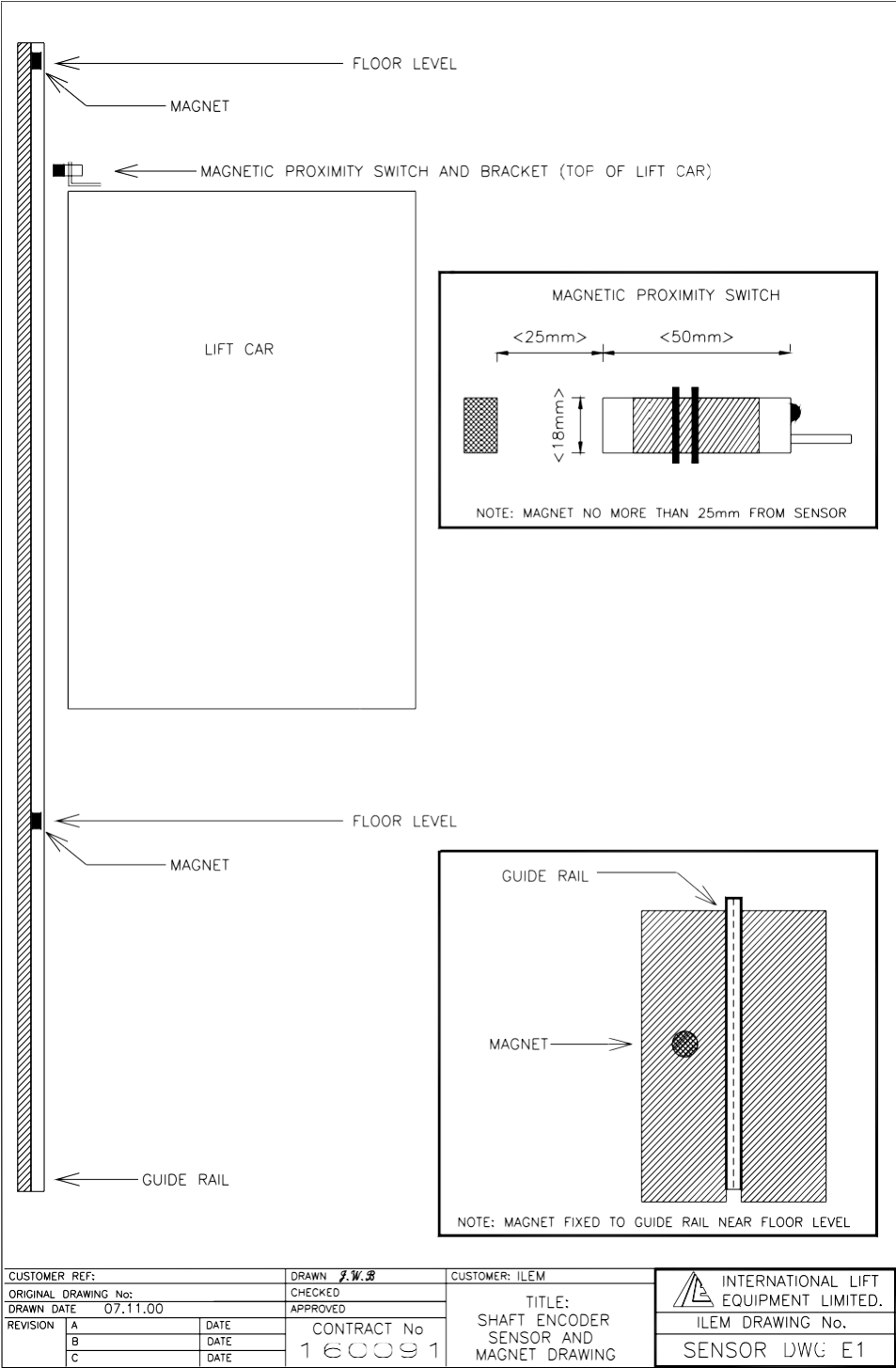
Tacho wires should be twisted pairs and if possible correction point wiring also.

Ensure that the lift can only pass one correction point whilst the bottom Reset (RSD) is on.

Correction point magnets should be mounted near or at floor level.

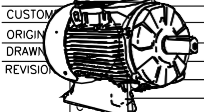
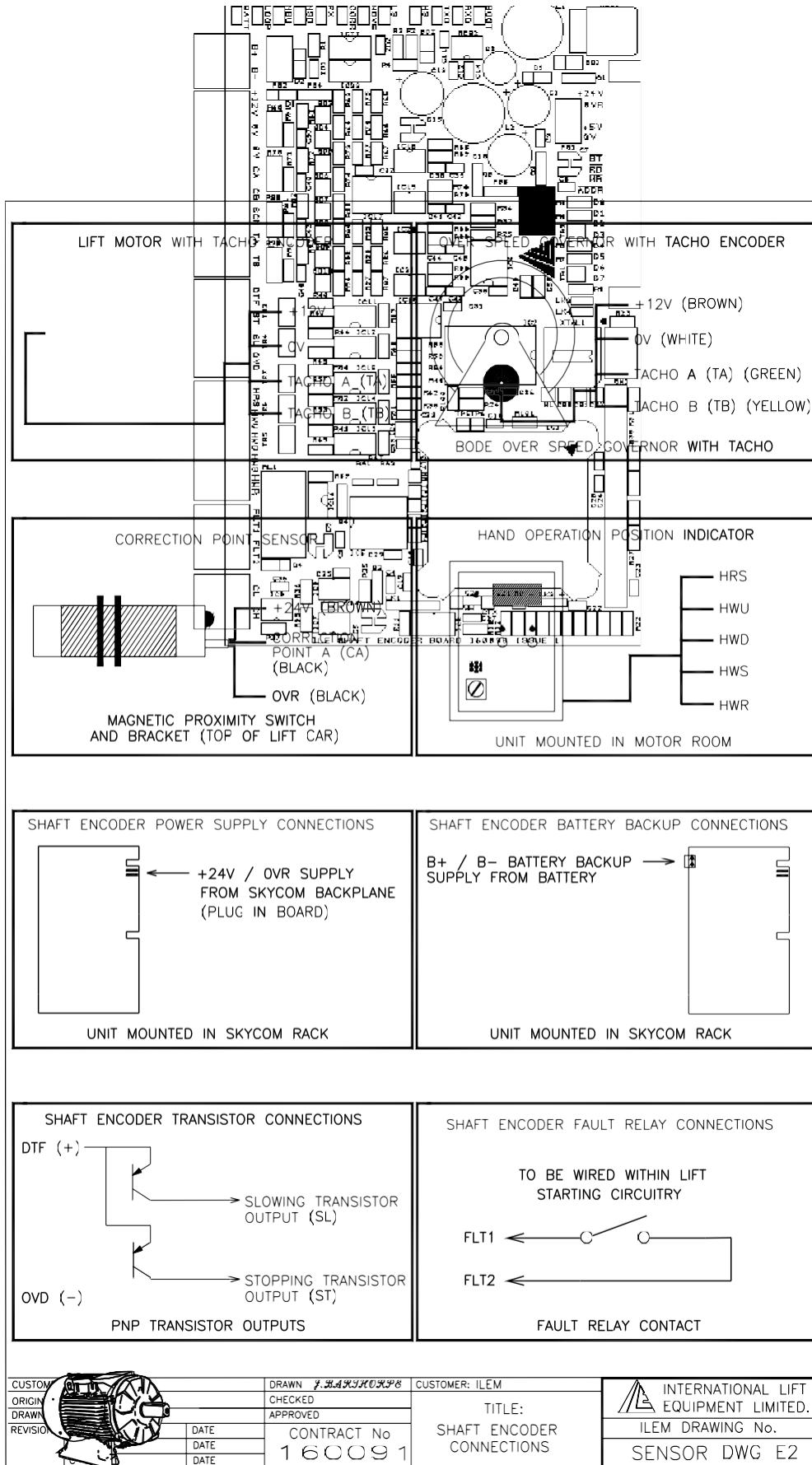


The correction point proximity switch should be mounted on the car with the distance from the magnets as shown below:



4)

Micro Processor Board Connections



CUSTOMER		DRAWN	F. BAKHOUK	CUSTOMER: ILEM
ORIGIN		CHECKED		TITLE:
DRAWN		APPROVED		SHAFT ENCODER CONNECTIONS
REVISION		DATE		CONTRACT No. 160091
		DATE		

CUSTOMER: ILEM
 TITLE:
 SHAFT ENCODER CONNECTIONS

INTERNATIONAL LIFT EQUIPMENT LIMITED.
 ILEM DRAWING No.
 SENSOR DWG E2

6)

LED Indication

BATT	Lights when battery supply present.
LOOP	Indicates CPU activity.
MSU	Lights when within the msu zone.
MSD	Lights when within the msd zone.
PX	Lights when within the px zone.
CORR	Lights when on a correction point.
MOVE	Lights when movement has been detected.
LS	Lights when the low speed/stop output is on.
HS	Lights when the high speed/slow output is on.
TXD	Lights to indicate CAN communication activity.
RXD	Lights to indicate CAN communication activity.
BOOT	Lights when processor is in boot-load.

7)

Set-up procedure

Learning mode

All movement during a learning run is to be at reduced speed.

Prior to commencing the learning run, the lift should be able to run between terminal floors at reduced speed, stopping on the terminal limits. The encoder will provide PX signals while moving to prevent journey timer timeout.

Lift to be positioned at the bottom floor on the down terminal(stopping limit) and whilst below the bottom floor correction point magnet. The RSD limit switch should also be activated.

While the lift is moving on the learning run the encoder will provide PX signals while moving, to prevent double journey.

Enter a top floor call, the lift will run to the top and stop on the terminal limit, just above the top floor correction point magnet and the RSU limit switch should also be activated.

Enter a bottom floor call, the lift will run to the bottom and stop on the terminal limit.

The encoder will present a map of floors to ensure a correct learning run has been carried out.

Setting stopping and slowing distances.

At a non-terminal floor (datum floor), and at reduced speed, adjust for correct floor level using the default stopping distance and floor level adjustment only.

At all other floors adjust the floor level, and (if needed) the stopping distances for that floor only to set each floors level.

At the datum floor increase the speed to contract speed and set all slowing distances to achieve the desired levelling distance.

At all other floors adjust the slowing distances for that floor only (if needed).

8)

Technical Data

Power Supply

24V dc (from skycom back plane)	120mA
12V Battery.	240mA

Tacho power supply

12 vdc / 12v dc battery operation.	50mA
------------------------------------	------

Inputs (main Board)

Tacho A+B (TA/TB).	10 to 30V D.C.
Correction point (CA/CB).	10 to 30V D.C.

Outputs (main Board)

Solid state PnP transistor outputs for drives.

Fault relay 6A @250 vac.

Interface to ILE Hand operation position indicator.

Communications Ports

CAN(Controller Area Network).

RS232 (for boot-load only)

Misc.

Maximum system speed	3.5 m/S
System levelling accuracy	±1mm
Max encoder P.R.F.(pulse repetition frequency)	40μS

9) Skycomwin Shaft Encoder Set-up

Incorporated within the skycomwin software, is the shaft encoder set-up utility. This software allows the user to set-up the skycom shaft encoder via the skycomwin software.

This utility allows the user to view and alter parameters for configuring and installing the skycom shaft encoder with relative ease.

The software gives a pictorial layout of the lift shaft, displaying floor levels, vanes, and correction points etc. (as shown below).

SkycomWin Shaft Encoder Setup (Current Job File=DEFAULT.DAT)

File Startup Comms Clear Setup Transfer Lift Viewer Events Modified Parameters Logs Help

Display Information in:
 Millimeters Pulses Pulses Absolute **Load Defaults**

General Shaft Information

Number of Floors Seen: 48
 Floor Vane Length: 150

Speeds:	LEV	MS1	MS2	MS3	HS
Px Length:	250	250	250	250	250
Px Slow Gap:	50	50	50	50	50

Initial Values for Learning Run Only

Initial Stopping Distance: 50

Speeds:	LEV	MS1	MS2	MS3	HS
Initial Slowing Distances:	1500	1500	1500	1500	1500

Change Values for All Floors

Up Stops: 0 Adjust Stop to Change Slowing Points
 Dn Stops: 0
 Up Slowing Points: 0 0 0 0 0
 Dn Slowing Points: 0 0 0 0 0

Learning Run Information

Mode:
 Index:

Measure Pulses Per Millimeter Information

Measured Pulses Per MM: 60
 Mode:

Pulses

Pulse Count in Millimeters:
 Nearest Position:

Shaft Layout at Floor = 1

Slow Dn Point on HS: 0
 Slow Dn Point on MS3: 0
 Slow Dn Point on MS2: 0
 Slow Dn Point on MS1: 0
 Slow Dn Point on LEV: 0

Up Off: 0 Dn On: 0 Stop Dn: 0
 -67108864 -67108864
 Correction Point
 67108864 67108864
 Up On: 0 Dn Off: 0 Stop Up: 0

Msu

Floor 1

Travel Distance: 0

Shaft

24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

D=

Start Learning Run **Start Measure PPM** **Show Pulses**

Enabling Can Communication:

To enable the skycomwin software to communicate with the shaft encoder, the engineer set-up parameter within skycomwin must be set to “Yes” as shown below:

Note: CAN connections CH3 and CL3 from the skycom have to be wired to CH and CL of the shaft encoder.

SkycomWin Parameter setup [Current Job File=DEFAULT.DAT]

File Startup Comms Clear Setup Transfer Lift Viewer Events Modified Parameters Logs Help

	Name	Current Value	Data Type	Min/Max	Default Value
SKYCOM VERSION					
JOB DETAILS	FIRE FIGHTING	No	Yes/No		No
SYSTEM DETAILS	SERCK MONITORING	No	Yes/No		No
DOOR SETUP	EMU MONITORING	No	Yes/No		No
DOOR TIMES					
GENERAL PARAMETERS	PSION	No	Yes/No		No
GENERAL TIMES	EMERGENCY SUPPLY	No	Yes/No		No
HOME SETUP	AUTO RELATED STEPPING	No	Yes/No		No
TRAVEL					
GROUP DESPATCHER	SELECTIVE DOORS	No	Yes/No		No
ENGINEER SETUP	SHORT FLOORS	No	Yes/No		No
MG SEQUENTIAL START	ADVANCING SELECTOR	No	Yes/No		No
ADVANCE SELECTOR	MG SEQUENTIAL START	No	Yes/No		No
HYDRAULIC SETUP	x SHAFT ENCODER SERIAL	Yes	Yes/No		No
ANTI NUISANCE SETUP	USE SHAFT ENCODER IFIO16	No	Yes/No		No
ETA SETUP					
OUT OF SERVICE IND					
FIRE SETUP					
SPECIAL SERVICE SETUP					
SPECIAL SERVICE TIME					
EVENT TRACE SETUP					
EMERGENCY SUPPLY					

Displaying Information:

Display Information in : **Millimeters** **Pulses** **Pulses Absolute**

Information from the over-speed / motor tacho encoder, can be displayed in one of the above formats. Once a display option is chosen, all other related information within the shaft encoder set-up utility is updated to show the values in the selected format.

Load defaults loads the pre-defined factory set values into the set-up utility.

General Shaft Information:

General Shaft Information					
Number of Floors Seen :	48				
Floor Vane Length :	150				
Speeds :	LEV	MS1	MS2	MS3	HS
Px Length :	250	250	250	250	250
Px Slow Gap :	50	50	50	50	50

General shaft information contains information on the number of floor levels, floor vane length, medium speed values, high-speed values, levelling speed values, and px values. The “PX Info” displays recommended minimum and maximum values for px slow gaps (speed m/s, time ms, and distance mm).

Note: factory defaults are shown.

Initial Values For Learning Run Only:

Initial Values for Learning Run Only					
Initial Stopping Distance :	50				
Speeds :	LEV	MS1	MS2	MS3	HS
Initial Slowing Distances :	1500	1500	1500	1500	1500

Change Values for All Floors

Initial values for learning run only, are used to set stopping distance / slowing distances for all floors.

Note: factory defaults are shown.

Change Values For All Floors:

Change Values for All Floors					
Up Stops :	0	<input checked="" type="checkbox"/>	Adjust Stop to Change Slowing Points		
Dn Stops :	0				
Up Slowing Points :	0	0	0	0	0
Dn Slowing Points :	0	0	0	0	0

Change values for all floors displays up / dn stops, up / dn slowing points. These values once changed will be automatically transferred to the shaft layout diagram. To change a value for example (+500) increases the existing value by (500) and (-500) decreases the existing value by (500).

By selecting the option below:

Adjust Stop to Change Slowing Points

All slowing points will be changed for all the 5 speeds, by the value entered for the up / dn stops. These values once changed will be automatically transferred to the shaft layout diagram.

Learning Run Information:

Learning Run Information	
Mode :	<input type="text"/>
Index :	<input type="text"/>

Learning run information displays the mode information, while a learning run is in progress. The following modes will be displayed while a learning run is carried out. These modes are displayed for faultfinding purposes.

- “None”
- “Not learned”
- “Start learning”
- “Waiting for bottom reset”
- “Arrived at bottom”
- “Run to top”
- “Arrived at top”
- “Run to bottom”
- “Returned to bottom”
- “Confirm points”
- “Get conformation”
- “Learning complete”
- “Store learned data”
- “Learning aborted”
- “Hide pulses”

Measure Pulses Per Millimetre Information:

Measure Pulses Per Millimeter Information	
Measured Pulses Per MM	<input type="text" value="60"/>
Mode :	<input type="text"/>

Measure pulses per mm information displays the pulses per mm and the mode information, while a learning run is in progress. The following modes will be displayed while a learning run is carried out. These modes are displayed for faultfinding purposes.

Note: factory defaults are shown.

“None”

“Find 1st magnet on”

“Find 1st magnet off”

“Find 2nd magnet on”

“Find 2nd magnet off”

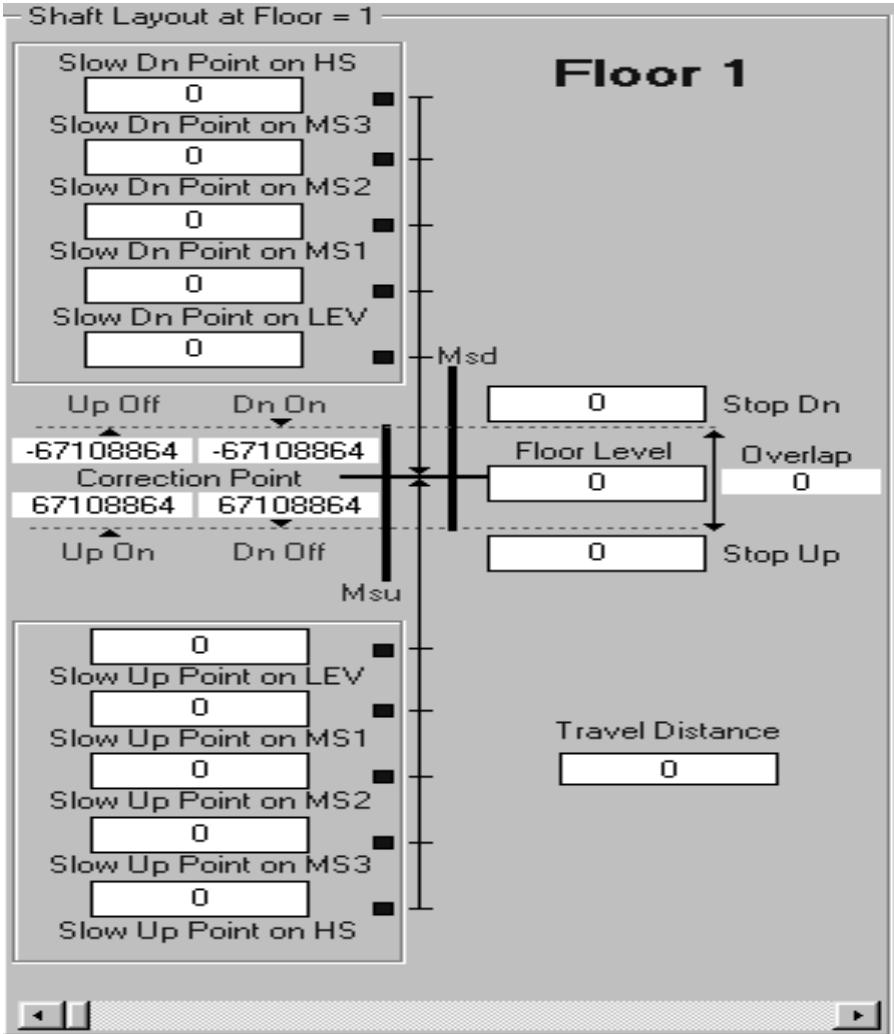
“Pulses to mm calculated and stored”

Pulses:

Pulses	
Pulse Count in Millimeters :	<input type="text"/>
Nearest Position :	<input type="text"/>

Pulses shows the pulse count in millimetres / pulses and pulses absolute. It also shows the “Nearest Position” in the corresponding format.

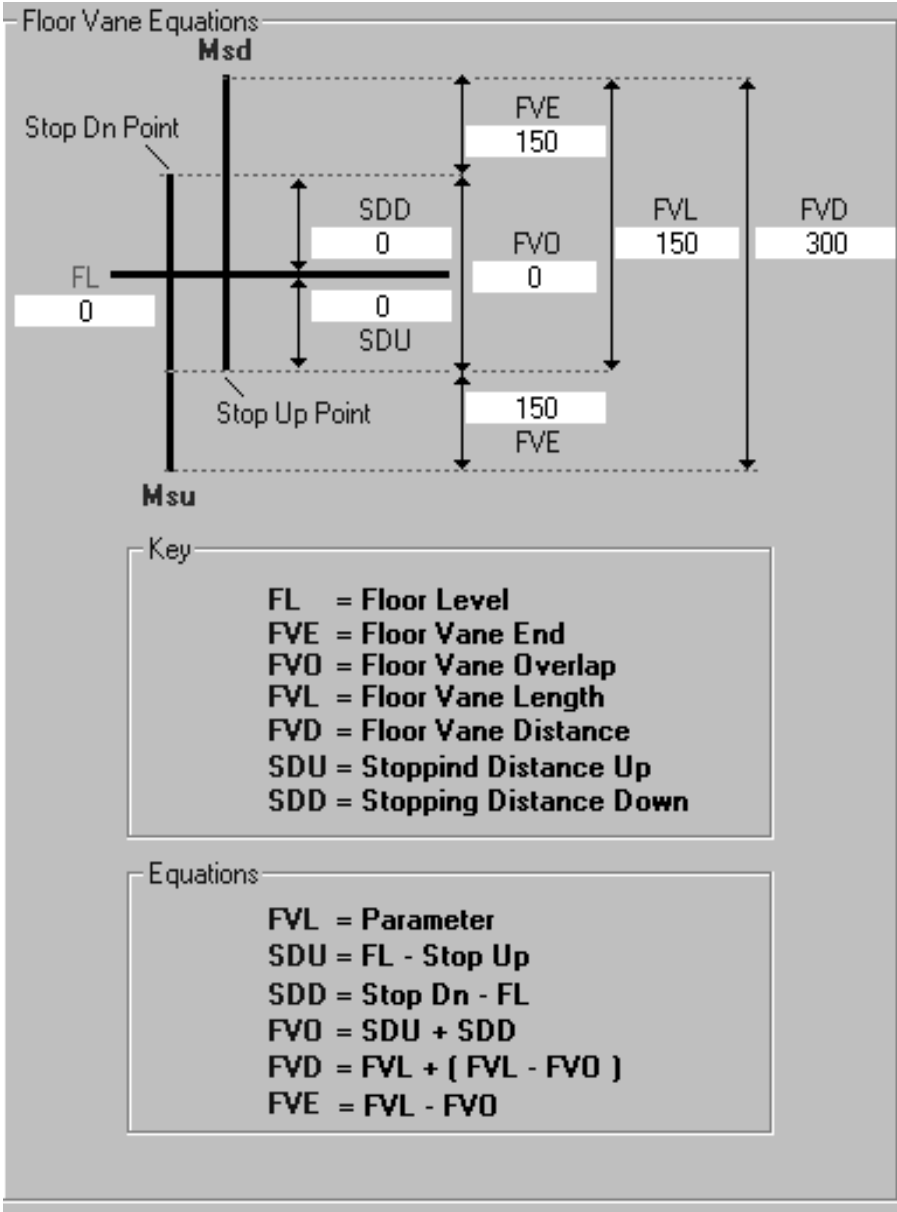
Shaft layout:



The shaft layout shows the layout for each floor level with all the corresponding settings. By using the scroll bar at the bottom, the layout for each floor can be viewed. Slow up / dn and stop up / dn points can also be changed.

Note: when set for use with “SHAFT ENCODER IFIO16” the slow up / dn point for LEV / HS are shown reversed on the shaft layout, due to software compatibility with the external positioning device.

Show Equations:

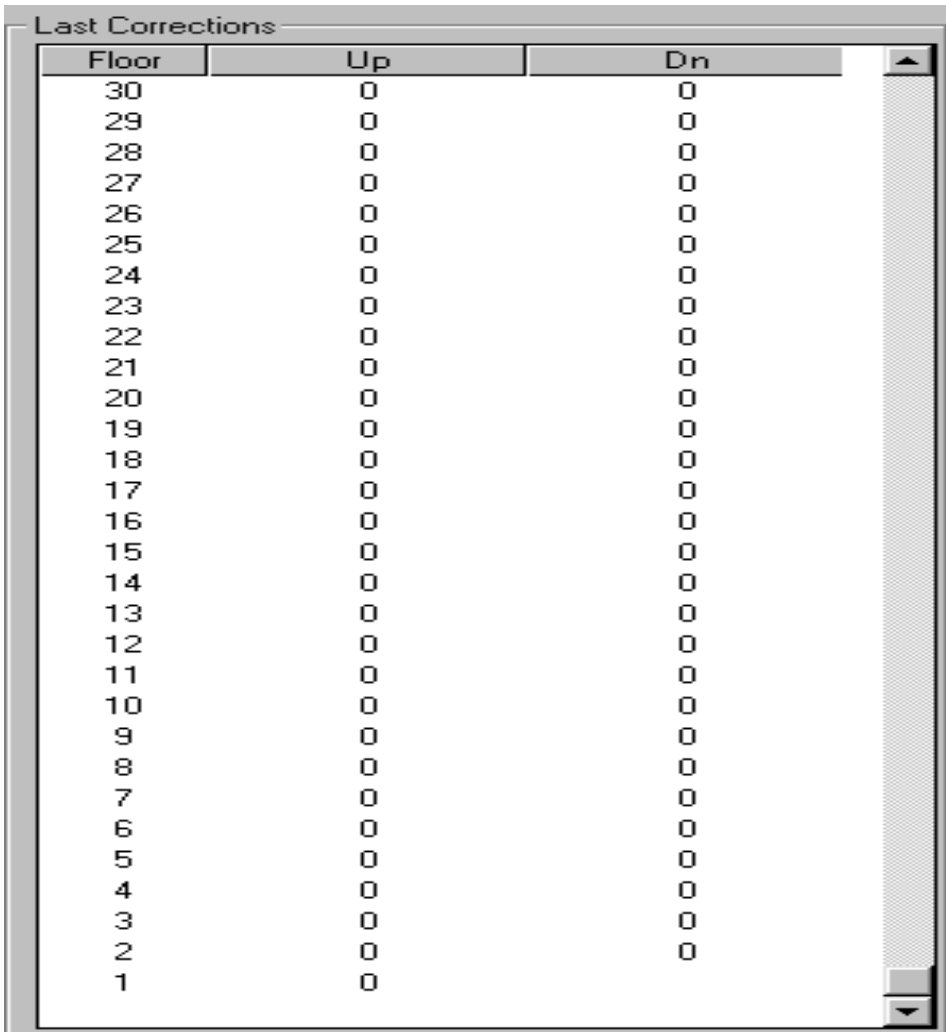


The Show Equations layout shows the equations and the results, which have been calculated by the software for that floor. The key explains the abbreviations used for the calculations.

To resume back to the main screen click “Hide Equations”.

Hide Equations

Show Last Corrections:



The screenshot shows a window titled "Last Corrections" containing a table with three columns: "Floor", "Up", and "Dn". The "Floor" column lists numbers from 30 down to 1. The "Up" and "Dn" columns both contain the number 0 for every floor. A vertical scrollbar is visible on the right side of the table.

Floor	Up	Dn
30	0	0
29	0	0
28	0	0
27	0	0
26	0	0
25	0	0
24	0	0
23	0	0
22	0	0
21	0	0
20	0	0
19	0	0
18	0	0
17	0	0
16	0	0
15	0	0
14	0	0
13	0	0
12	0	0
11	0	0
10	0	0
9	0	0
8	0	0
7	0	0
6	0	0
5	0	0
4	0	0
3	0	0
2	0	0
1	0	0

Show Last Corrections window displays the correction history for all of the floors in the up and down directions.

To resume back to the main screen click "Hide Last Corrections".



Show All Floor Data:

Display Information in : Millimeters Pulses Pulses Absolute

Flr	Flr Level	Px UP On	Px Up Off	Slow Up	Px Dn On	Px Dn Off	Slow Dn
1	67108864				67113165	67112915	67112865
2	67108864	67104563	67104813	67104863	67113165	67112915	67112865
3	67108864	67104563	67104813	67104863	67113165	67112915	67112865
4	67108864	67104563	67104813	67104863	67113165	67112915	67112865
5	67108864	67104563	67104813	67104863	67113165	67112915	67112865
6	67108864	67104563	67104813	67104863	67113165	67112915	67112865
7	67108864	67104563	67104813	67104863	67113165	67112915	67112865
8	67108864	67104563	67104813	67104863	67113165	67112915	67112865
9	67108864	67104563	67104813	67104863	67113165	67112915	67112865
10	67108864	67104563	67104813	67104863	67113165	67112915	67112865
11	67108864	67104563	67104813	67104863	67113165	67112915	67112865
12	67108864	67104563	67104813	67104863	67113165	67112915	67112865
13	67108864	67104563	67104813	67104863	67113165	67112915	67112865
14	67108864	67104563	67104813	67104863	67113165	67112915	67112865
15	67108864	67104563	67104813	67104863	67113165	67112915	67112865
16	67108864	67104563	67104813	67104863	67113165	67112915	67112865
17	67108864	67104563	67104813	67104863	67113165	67112915	67112865
18	67108864	67104563	67104813	67104863	67113165	67112915	67112865
19	67108864	67104563	67104813	67104863	67113165	67112915	67112865
20	67108864	67104563	67104813	67104863	67113165	67112915	67112865
21	67108864	67104563	67104813	67104863	67113165	67112915	67112865
22	67108864	67104563	67104813	67104863	67113165	67112915	67112865
23	67108864	67104563	67104813	67104863	67113165	67112915	67112865
24	67108864	67104563	67104813	67104863	67113165	67112915	67112865
25	67108864	67104563	67104813	67104863	67113165	67112915	67112865
26	67108864	67104563	67104813	67104863	67113165	67112915	67112865
27	67108864	67104563	67104813	67104863	67113165	67112915	67112865

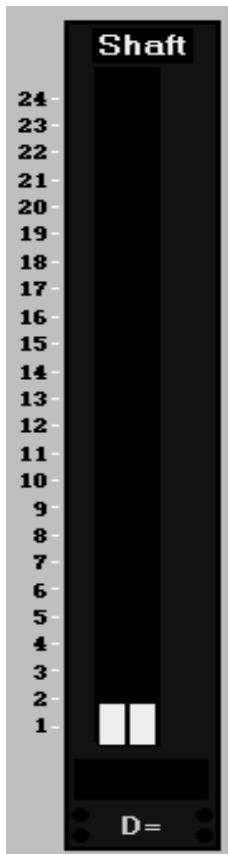
Show all floor data displays all the millimetre / pulse information (depending on selection) for floor level / px on / px off / slow up / slow dn etc. It also shows the values for all of the five speeds by clicking on the speed boxes as shown below.

Note: when set for use with “SHAFT ENCODER IFIO16” the two speeds LEV / HS are shown reversed, due to software compatibility with the external positioning device as shown below.

To resume back to the main screen click “Hide All Floor Data”

Shaft Display:

The shaft display only operates in show pulses mode. The shaft displays the numbers of floors depending on the number of floors, seen by the shaft encoder and a representation of the lift car position from the shaft encoder's nearest position. While the shaft encoder is running the lift car within the shaft display will move corresponding to the actual lift cars movement.



Start Learning Run:



To “Start Learning Run” click on the option above. The shaft encoder will now perform a learning run.



To abort the learning run click on the “Abort Learning Run” option above.

Start Measure PPM:



To “Start Measure PPM” click on the option above. The shaft encoder will now start to measure pulses per millimetre.



To abort the measure pulses per millimetre click on the “Abort Measure PPM” option.

Show pulses:



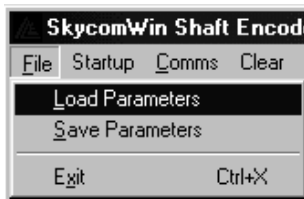
To view the Pulses from the encoder click on the “Show Pulses” option, while the encoder is running. A window also appears to show pulses are being received.



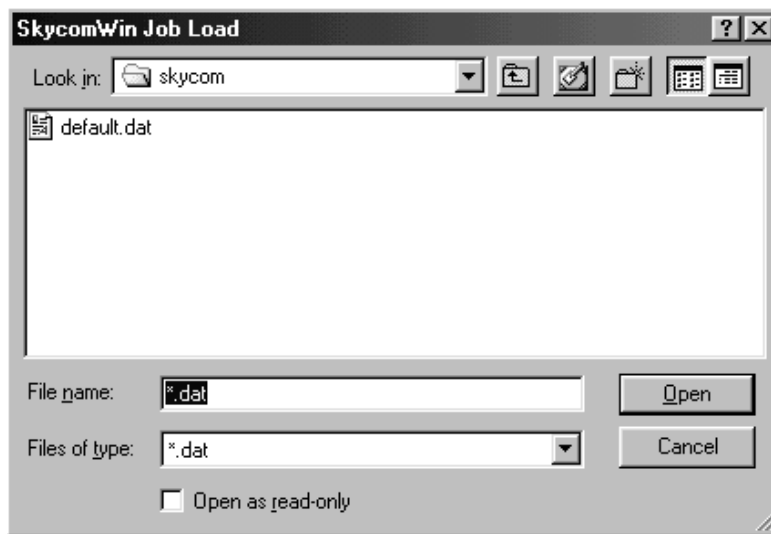
To hide the pulses window click on the “Hide Pulses” option.



Load Job Parameters:

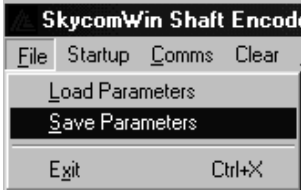


To load a file click on “File” then “Load Parameters”. The window shown below will appear, select the file name required and click “Open” or press “Return” on the keyboard.



The parameters of that particular file will now be loaded into skycomwin.

Save Job Parameters:



To Save a file click on “File” then “Save Parameters”. The window shown below will appear, enter a filename or select a file name required and click “Save” or press “Return” on the keyboard.



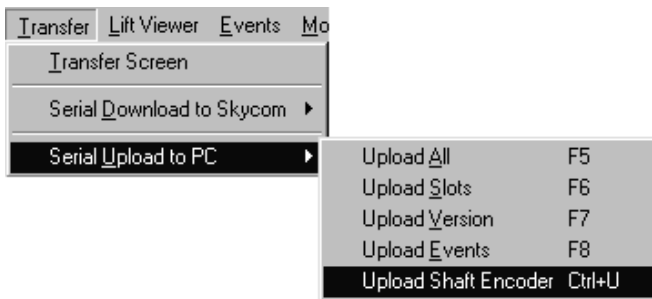
The parameters of that particular file will now be saved onto the PC disk drive.

Serial Download To Skycom:



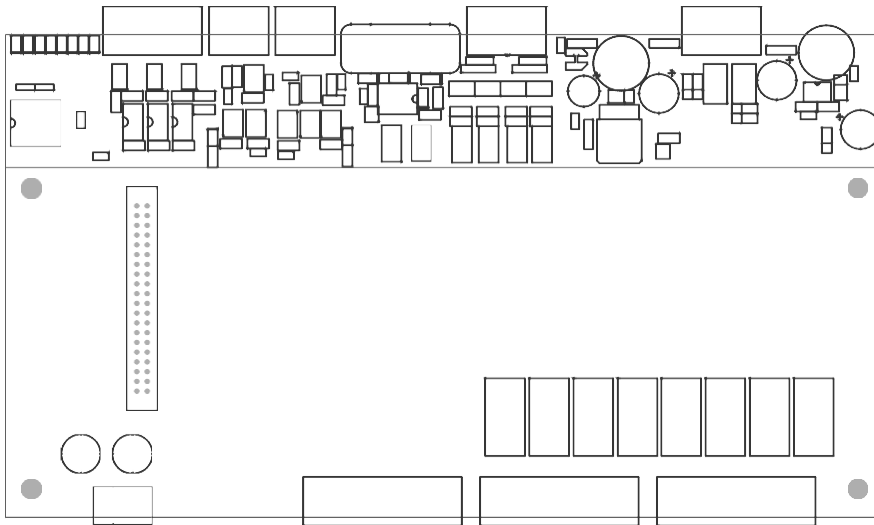
To download parameters to the shaft encoder from the pc, click on “Transfer” then “Download shaft Encoder ”. The parameters from the pc will now be downloaded to the shaft encoder. This can also be done by pressing “CTRL” + “D” on the keyboard simultaneously.

Serial Upload To PC:



To upload parameters from the shaft encoder to the pc, click on “Transfer” then “Upload shaft Encoder ”. The parameters from the shaft encoder will now be uploaded to the pc. This can also be done by pressing “CTRL” + “U” on the keyboard simultaneously.

10) Appendix A: Positioning Device Fitted With IFIO16 Board:

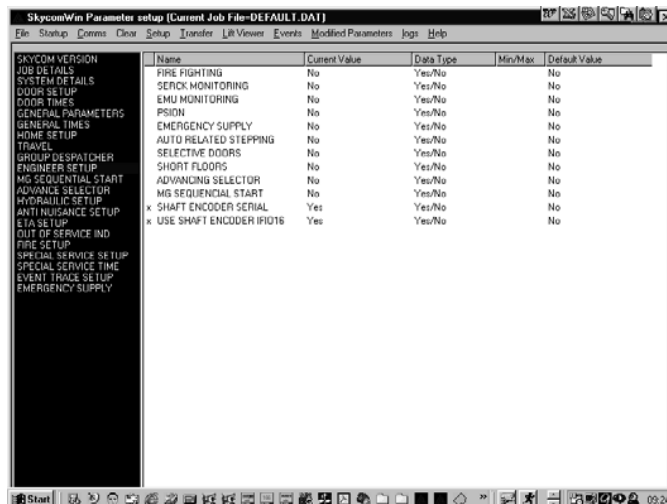


The above shows an earlier version of the shaftencoder i.e. “Positioning Device” that was external to the Skycom rack. The IOFIO16 board mounted on top of the main CPU board interfaces to the Skycom by outputs such as MSU, MSD, PX and inputs such as speed, direction, movement and resets.

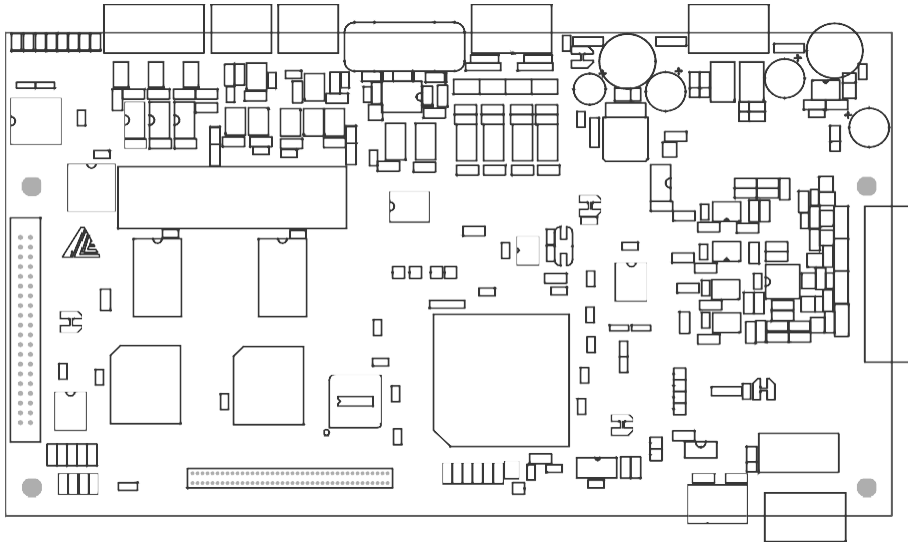
The relevant Skycom and Skycomwin software can be used with the above to provide Upload and Download facility and a graphical representation of the shaftencoder set-up.

Serial communication with the Skycom being used for parameters and information only and not any stepping signals.

To activate this simply set the Engineer parameters to “yes” as below:-
Note also CAN connections CH3 and CL3 from the Skycom have to be wired to CH and CL of the shaftencoder.



Position Device Fitted Without IFIO16 Board:



The above shows an earlier version of the shaftencoder i.e. “Positioning Device” that was external to the Skycom rack. The IOFIO16 board that is usually mounted on top of the main CPU board is now discarded since the control and stepping etc.. is now serially communicated between the Skycom and Shaftencoder.

The relevant Skycom and Skycomwin software can be used with the above to provide Upload and Download facility and a graphical representation of the shaftencoder set-up.

To activate this simply set the Engineer parameter to “yes” as below:-
 Note also CAN connections CH3 and CL3 from the Skycom have to be wired to CH and CL of the shaftencoder.

SkycomWin Parameter setup (Current Job File-DEFAULT.DAT)

	Name	Current Value	Data Type	Min/Max	Default Value
SKYCOM VERSION					
JOB DETAILS					
SYSTEM DETAILS					
DOOR SETUP					
DOOR TIMES					
GENERAL PARAMETERS					
GENERAL TIMES					
HOME SETUP					
TRAVEL					
GROUP DISPATCHER					
ENGINEER SETUP					
MG SEQUENTIAL START					
ADVANCE SELECTOR					
HYDRAULIC SETUP					
ANTI INUISANCE SETUP					
ETA SETUP					
OUT OF SERVICE IND					
FIRE SETUP					
SPECIAL SERVICE SETUP					
SPECIAL SERVICE TIME					
EVENT TRACE SETUP					
EMERGENCY SUPPLY					
	FIRE FIGHTING	No	Yes/No		No
	SERCK MONITORING	No	Yes/No		No
	EMU MONITORING	No	Yes/No		No
	PSION	No	Yes/No		No
	EMERGENCY SUPPLY	No	Yes/No		No
	AUTO RELATED STEPPING	No	Yes/No		No
	SELECTIVE DOORS	No	Yes/No		No
	SHORT FLOORS	No	Yes/No		No
	ADVANCING SELECTOR	No	Yes/No		No
	MG SEQUENTIAL START	No	Yes/No		No
	SHAFT ENCODER SERIAL	Yes	Yes/No		No
	USE SHAFT ENCODER IFIO16	No	Yes/No		No