



London
STOCK EXCHANGE

Order Book Simulator v2.0

OPERATIONS GUIDE





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1 Scope and Purpose

The scope of this document is to provide:

- Installation instructions for the London Stock Exchange Order Book Simulator (OBS) and Workstation.
- Instructions on how to start and stop the Exchange Order Book Simulator and Workstation.
- Description of the Exchange Order Book Simulator Native API.
- Description of the OBS Workstation and Native Interface Configuration Console, and instructions upon their usage



2 Introduction

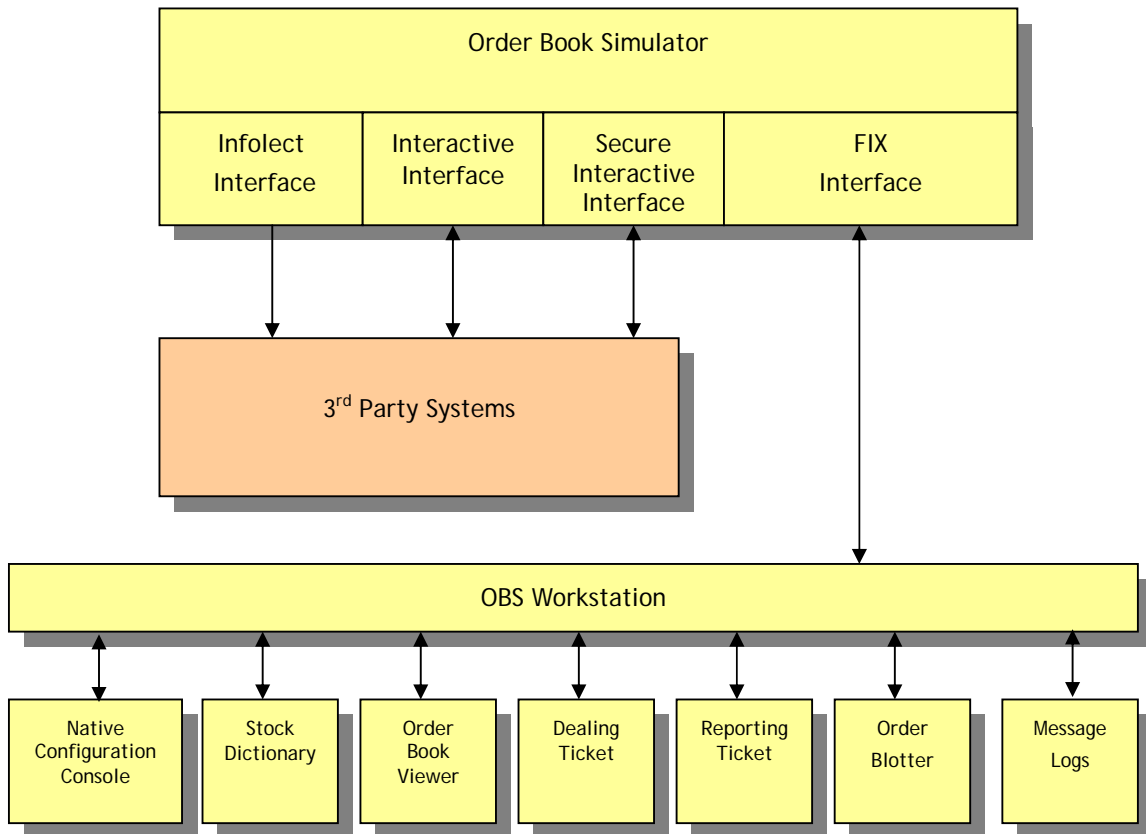
The Order Book Simulator and Workstation provide a simulation of the Exchange's Infolect and Trading Service. The workstation provides a monitoring tool, plus a simple market data viewing terminal, and trading facility to use on the simulated markets.

The simulator is configured to provide the following services:

- Infolect data via UDP multicast
- Two USAPs for access to the interactive service (message retrieval and own order download services)
- Two USAPs for access to the secure interactive trading service upon the simulator)

Additionally to the simulated market, the simulator can playback provided script files, which can either be used to populate the order book upon the simulator, or to provide Infolect messages which are not sent by the simulated markets. This script playback facility is controlled from the 'Native Interface Configuration' console within the workstation

The architecture of the Order Book Simulator and Workstation is as follows:





2.1 Details

Third party systems, as developed by users of the Simulator, will connect to the simulator using the simulated Infolect, Interactive and Secure Interactive interfaces. These interfaces are collectively referred to within the simulator as the Native Interface. These interfaces can then be tested against for adherence to the specifications provided by the London Stock Exchange. See the Native Interface section for further information.

The Order Book Simulator is provided as two applications:

- Simulator Engine

This is the simulator engine, which must be started first. It provides the interfaces to the simulated markets for both the provided workstation, and the clients application which would be using the native interface.

- Workstation

The workstation connects locally to the simulator using the FIX interface, and provides the following components:

- Native Interface Configuration Console
- Stock Finder
- Order Book Viewer
- Trading Ticket
- Reporting Ticket
- Order/Trade Blotter
- Multicast Message Log
- Interactive Message Log
- Secure Interactive Message Log



3 Installation

3.1 Prerequisites

The OBS supports the following versions of Microsoft Windows:

- Windows 2000 Professional
- Windows 2000 Advanced Server
- Windows XP Home
- Windows XP Professional
- Windows Vista

Microsoft Windows 98 is not supported.

Additionally, the simulator requires TCP/IP to be present upon the computer.

3.2 Instructions

The OBS Simulator and Workstation install from a single installation process.

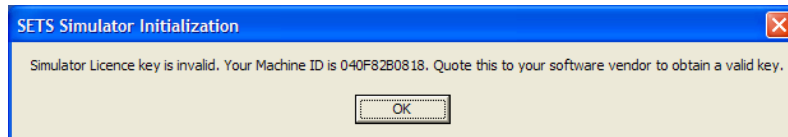
1. From the supplied installation media or compressed file, run the Install.exe program.
2. Follow the on screen directions.
3. After clicking the “Finish” button you will find 2 new shortcuts on your desktop:
4. “Order Book Workstation”, the client
5. “Order Book Simulator”, the OBS engine.



3.3 Licence Key

Once you have installed the Order Book Simulator, you will need to obtain a licence key in order to successfully run the software. To obtain a valid key you will need to provide the identifying code for the machine where the software has been installed. To do this, follow the steps below.

1. Double click on the Order Book Simulator icon that has been installed onto the desktop. A dialog box should appear that looks like this



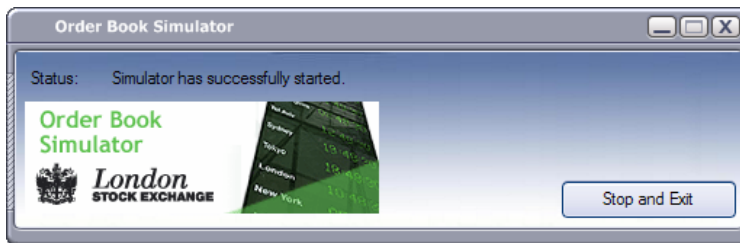
2. Email the Machine ID code displayed in the dialog box to obs@londonstockexchange.com.
3. You will receive a response email with a valid licence key. This key needs to be added to the configuration file for the Order Book Simulator.
 - a. Go to the directory where the Order Book Simulator was installed - the default is: `C:\Program Files\London Stock Exchange\Order Book Simulator\OrderBookSimulator`
 - b. Open the `enablements.cfg` file as a text file
 - c. In the general section there is a setting called `LicenceKey`
 - d. copy the licence key value from the email and paste it next to the setting as follows:
`LicenceKey=AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA`
4. The Order Book Simulator is now ready for use.

4 Starting and Stopping the OBS

The simulator is delivered as two parts, the OBS Engine and an Administration/Trading client workstation.

4.1 Starting the OBS Simulator Engine

- The OBS Engine runs as a background service and should be run before using the OBS Workstation client (unless running performance tests).
- Double click on the “Order Book Simulator” icon on your desktop.
- After successful initialisation, the following status is displayed:



Each time the simulator engine is started, the MSN's for each Infolect broadcast group are reset.

- You are now ready to start the workstation. The workstation must also be running for successful operation of the simulator.

4.2 Starting the OBS Workstation

- The OBS runs as a GUI application and includes the administration and trading client.
- Ensure you are running the Simulator engine, by following the instructions listed in Section 4.1.
- The OBS Workstation is configured by default to connect to the simulator which is running on the same machine.
- Double click on the “Order Book Workstation” icon on your desktop to start the Administration/Trading client.
- It may take a few seconds for the workstation to initialise itself. Please be patient whilst it loads all standing data from the simulator components.



- The OBS Workstation resets the internal order books of the simulator engine upon start-up. For this reason, it is best to leave the OBS Workstation running for the entire testing session using the simulator.
- Once successfully started, the workstation will display the following application window on the screen:



- See the section: Using the OBS Workstation for further instructions.

4.3 Stopping the OBS Workstation and Simulator

To stop the OBS Workstation, either click on the close box in the top right hand corner of the application window or select File on the top menu bar and the select Exit.

To stop the simulator engine, either click the 'Stop and Exit' button or on the close box in the top right hand corner of the small status window that the engine displays.



5 Using the OBS Workstation

The OBS Workstation is controlled via the application window, which looks like the following:



This command bar provides the following options:

- **OBS Stock Finder**
This is the stock dictionary which lists and controls all instruments available upon the simulator.
- **OBS Order Tracker**
This is the blotter which displays details of all orders and trades upon the simulator.
- **OBS Depth Screen**
This is the Level 2 Market Data depth screen for a selected instrument.
- **OBS Trade Report**
This is the dealing ticket for entering off-book trade reports.
- **Native Interface Configuration**
This is the key administration console for controlling and monitoring the simulator.
- **Multicast Log**
Records and displays the Multicast data generated by the OBS workstation or external



application.

- Interactive Log

Records and displays the Interactive data generated by the OBS workstation or external application.

- Secure Interactive Log

Records and displays the Secure Interactive data generated by the OBS workstation or external application.

- Help

This brings up a browser window, linking to the simulators help pages.

5.1 Workstation screens in detail

5.1.1 Stock Finder

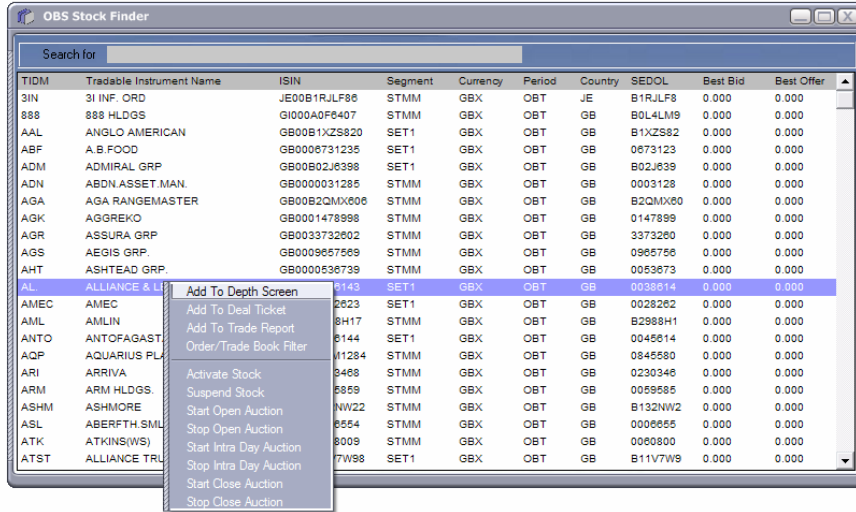
TIDM	Tradable Instrument Name	ISIN	Segment	Currency	Period	Country	SEDOL	Best Bid	Best Offer
3IN	3I INF. ORD	JE00B1RJLF86	STMM	GBX	OBT	JE	B1RJLF8	0.000	0.000
888	888 HLDGS	GI000A0F6407	STMM	GBX	OBT	GB	B0L4LM9	0.000	0.000
AAL	ANGLO AMERICAN	GB00B1XZS820	SET1	GBX	OBT	GB	B1XZS82	0.000	0.000
ABF	A.B.FOOD	GB0006731235	SET1	GBX	OBT	GB	0673123	0.000	0.000
ADM	ADMIRAL GRP	GB00B02J6398	SET1	GBX	OBT	GB	B02J639	0.000	0.000
ADN	ABDN.ASSET.MAN.	GB0000031285	STMM	GBX	OBT	GB	0003128	0.000	0.000
AGA	AGA RANGEMASTER	GB00B2QMX006	STMM	GBX	OBT	GB	B2QMX00	0.000	0.000
AGK	AGGREKO	GB0001478998	STMM	GBX	OBT	GB	0147899	0.000	0.000
AGR	ASSURA GRP	GB0033732602	STMM	GBX	OBT	GB	3373260	0.000	0.000
AGS	AEGIS GRP.	GB0009657569	STMM	GBX	OBT	GB	0965756	0.000	0.000
AHT	ASHTHEAD GRP.	GB0000536739	STMM	GBX	OBT	GB	0053673	0.000	0.000
AL	ALLIANCE & LEIC	GB0000386143	SET1	GBX	OBT	GB	0038614	0.000	0.000
AMEC	AMEC	GB0000282623	SET1	GBX	OBT	GB	0028262	0.000	0.000
AML	AMLIN	GB00B2988H17	STMM	GBX	OBT	GB	B2988H1	0.000	0.000
ANTO	ANTOFAGASTA	GB0000456144	SET1	GBX	OBT	GB	0045614	0.000	0.000
AQP	AQUARIUS PLAT.	BMG0440M1284	STMM	GBX	OBT	GB	0845580	0.000	0.000
ARI	ARRIVA	GB0002303468	STMM	GBX	OBT	GB	0230346	0.000	0.000
ARM	ARM HLDGS.	GB0000595859	STMM	GBX	OBT	GB	0059585	0.000	0.000
ASHM	ASHMORE	GB00B132NW22	STMM	GBX	OBT	GB	B132NW2	0.000	0.000
ASL	ABERFTH.SMLL.CO	GB0000066554	STMM	GBX	OBT	GB	0006655	0.000	0.000
ATK	ATKINS(W.S)	GB0000608009	STMM	GBX	OBT	GB	0060800	0.000	0.000
ATST	ALLIANCE TRUST	GB00B11V7W98	SET1	GBX	OBT	GB	B11V7W9	0.000	0.000

The stock finder screen is the stock dictionary component for the simulator. It displays the following information for the instruments:

- Tradable Instrument Display Mnemonic (TIDM)
- Tradable Instrument Name
- Tradable Instrument Code (ISIN)
- Market Segment
- Country of Register
- Currency Code
- SEDOL
- Best Bid Price
- Best Offer Price



Additionally, it displays the current period for the instrument.



By selecting an instrument, and right-clicking, the following options are made available:

- Add to Depth Screen
This option brings up a depth view window for the selected stock. See the Depth screen display option for further details.
- Add to Deal Ticket
This option brings up a dealing ticket for the selected stock. See the dealing ticket option for further details.
- Add to Trade Report
This option brings up a trade reporting ticket for entering off-book trades for the selected stock. See the trade reporting ticket option for further details.
- Order/Trade book Filter
This option filters the display on the order/trade book for the selected stock.
- Activate Stock
This option changes the status of the stock to active, which in turn means that the stock is now in OBT or MP10 for its period, and is available for automatic execution.
- Suspend Stock
This option changes to status of the stock to suspended, which in turn means that the



stock is now in SUSP for its period, and neither placement nor execution are permitted.

- **Start Auction**

This option pops up a dialog box asking for the time period desired for the auction in minutes. A check box is provided to throw the stock into an auction indefinitely. An auction can be finished using the stop auction function. Whilst in an auction, the period is set to AESP for the selected stock.

- **Stop Auction**

This option returns a stock which is currently in an auction, with it's period set to AESP, to OBT/MP10. The stock will first uncross and then return to automated execution and placement.



5.1.2 Depth Screen

The Depth screen is used for viewing both Level 1 Touch Price and Level 2 Order book depth information for the selected stock.

ALLIANCE & LEIC					
TIDM	AL	ISIN	GB0000386143	News	
Currency	GBX	SEDOL	0038614	Period	OBT
Country	GB	Market	London	EMS	0
Segment	SET1	Sector	FS10	NMS	0
Last Trade		Close		Curr Price	
350.00	AT 600	Open (15/10)	351.00	350.00	+350.00
351.00	AT 1,000	Trade Hi	351.00	Curr Hi	351.00 +351.00
		Trade Lo	350.00	Curr Lo	350.00 +350.00
		Base	351.00	SETS Vol	0
				Total Vol	0
Buy Vol 6,200			Sell Vol 8,400		
1	4,200	350.00	351.00	6,000	1
1	4,200	350.00	351.00	6,000	1
1	2,000	349.00	352.00	1,500	1
			353.00	900	1

Buttons: Open Deal Ticket, Find

The screen displays the following information, from top left to right:

- Instrument Name
- Tradable Instrument Display Mnemonic (TIDM)
- Instrument Code (ISIN)
- Announcement Indicator (News)
- Currency
- SEDOL
- Period
- Country of Register
- Market
- Crest/Residual Indicator
- Segment
- Market Sector
- Normal Market Size (NMS) – for informative purpose only*
- Last 5 trades
- Closing Price and Date – for informative purpose only*
- Current Price and net change on day
- Opening Price and Date – for informative purpose only*



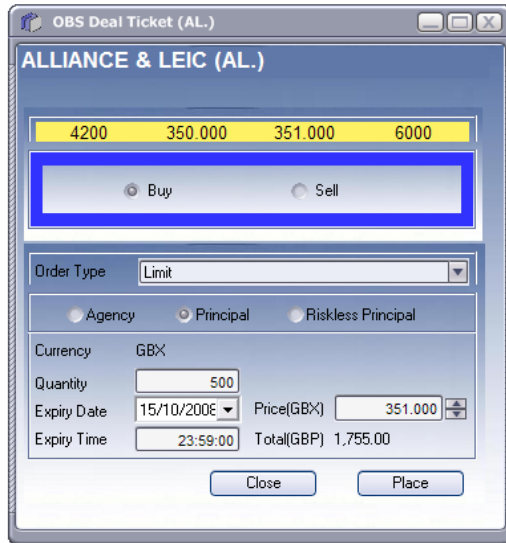
- Trade High for current simulator session
- Current High for current simulator session
- Trade Low for current simulator session
- Current Low Price for current simulator session
- Volume Weighted Average Price – for informative purpose only*
- SETS Volume for current simulator session
- Base Price for informative purpose only*
- Cumulative Vol for current simulator session
- Bid Volume
- Ask Volume
- Touch line (Best Bid/Ask)
- Order Book Depth

*These fields are displayed from the provided simulator data, and are reset each time the simulator is reset. They will not update as part of the trading or script playback cycle of the simulator.

Double clicking upon the depth will display a dealing ticket for the displayed stock.



5.1.3 Deal Ticket



The deal ticket provides the ability to enter and modify orders upon the simulator. The following options are supported:

- Side
 - Buy
 - Sell

- Order Type
 - At Best
 - Limit
 - Fill or Kill
 - Execute and Eliminate
 - Market
 - Iceberg
 - Committed Principal
 - At the Open
 - Good till Crossing
 - At the Close
 - Good for Auction

- Dealing Capacity
 - Agency
 - Principal
 - Riskless Principal



- Currency
For informative purposes, this displays the currency of the selected instrument.
- Quantity
Enter the quantity you wish to place
- Peak Size
For iceberg orders, enter the peak size
- Expiry Date
For limit orders, enter the expiry date. Technically, irrelevant, as the simulator will not hold orders overnight.
- Price
Enter the price for this order, if not an unpriced aggressive or market order.
- Expiry Time
Enter the expiry time for this order, if not aggressive.
- Total consideration
For informative purposes, this displays the total amount in the displayed currency that this order is for.

Clicking place and agreeing to the displayed confirmation box will place this order upon the simulator.



5.1.4 OBS Order Tracker

The OBS Order Tracker displays Orders placed:

1. Using the OBS workstation.
2. Entered through the native interface.

Orders can be:

1. Expanded to show fill executions
2. Modified.
3. Deleted.

Client	Order	TIDM	Participant	BIC code	Type	Price	Size	Size filled	Size left	Expire Time	Status	Order Date	Order Time
TTS	30S0000009	AL	LSETESTGB		SELL	GBX 353.00	900	0	900	00:00:00	WORKING	15.10.2008	20:44:41
TTS	30S0000007	AL	LSETESTGB		SELL	GBX 352.00	1,500	0	1,500	00:00:00	WORKING	15.10.2008	20:44:08
TTS	30S0000005	AL	LSETESTGB		SELL	GBX 351.00	7,000	1,000	6,000	00:00:00	PARTIAL FILL	15.10.2008	20:43:14
TTS	3XS0000003	AL	LSETESTGB		BUY	GBX 349.00	2,000	0	2,000	00:00:00	WORKING	15.10.2008	20:42:28
TTS	3XS0000001	AL	LSETESTGB		BUY	GBX 350.00	4,800	600	4,200	00:00:00	PARTIAL FILL	15.10.2008	20:41:23

Client	Order	TIDM	Participant	BIC code	Type	Price	Size	Size filled	Size left	Avg Price	Status	Last Update
TTS	30S0000000D	AL	LSETESTGB		SELL	GBX 350.00	600	600	0	GBX 350.00	FILLED	15.10.2008 : 20:51:58
TTS	3XS0000000B	AL	LSETESTGB		BUY	GBX 351.00	1,000	1,000	0	GBX 351.00	FILLED	15.10.2008 : 20:51:02
TTS	30S0000005	AL	LSETESTGB		SELL	GBX 351.00	7,000	1,000	6,000	GBX 351.00	PARTIAL FILL	15.10.2008 : 20:43:14
TTS	3XS0000001	AL	LSETESTGB		BUY	GBX 350.00	4,800	600	4,200	GBX 350.00	PARTIAL FILL	15.10.2008 : 20:41:23

Order Book Simulator

Exchange:

Book:

Status:

TIDM:

Account:

All states:

Client:

Specify:

5.1.4.1 Order/Trade Books

The **Order Book** is displayed in the top window and shows all open orders.

The **Trade Book** is displayed in the lower window and shows all orders that have proceeded beyond an acknowledged state.

Detail fields in the books identify the order and show it's current status.

Filters in the bottom panel allow the book displays to be narrowed or broadened according to selected criteria.



5.1.4.2 Sorting the display.

The display in each book can be sorted into ascending (+) or descending (-) order. Clicking a column heading will flip-flop the sort order based on the selected column values.

Order	TIDM +
3OS000000D	AL.
3XS000000B	AL.
3OS0000005	AL.
3XS0000001	AL.
6XS0000015	TSCO
6OS0000013	TSCO
6OS0000011	TSCO
6XS000000F	TSCO

Ascending (+)

Order	TIDM -
6XS000000F	TSCO
6OS0000011	TSCO
6OS0000013	TSCO
6XS0000015	TSCO
3XS0000001	AL.
3OS0000005	AL.
3XS000000B	AL.
3OS000000D	AL.

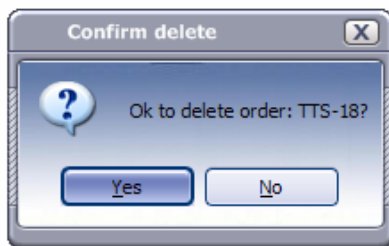
Descending (-)

5.1.4.3 Delete an order

An open order can be deleted by clicking the right mouse button over it in one of the display windows.

Order	TIDM -	Participant	BIC code	Type	Price	Size	Size filled	Size left	Avg Price
6XS000000F	TSCO	LSETESTGB		BUY	GBX 400.00	650	650	0	GBX 400.00
6OS0000011	TSCO	LSETESTGB		BUY	405.00	1,000	1,000	0	GBX 405.00
6OS0000013	TSCO	LSETESTGB		BUY	405.00	1,000	1,000	0	GBX 405.00
6XS0000015	TSCO	LSETESTGB		BUY	350.00	4,800	600	4,200	GBX 350.00
3XS0000001	AL.	LSETESTGB		BUY	351.00	7,000	1,000	6,000	GBX 351.00
3OS0000005	AL.	LSETESTGB		BUY	GBX 351.00	1,000	1,000	0	GBX 351.00
3XS000000B	AL.	LSETESTGB		BUY	GBX 351.00	1,000	1,000	0	GBX 351.00
3OS000000D	AL.	LSETESTGB		SELL	GBX 350.00	600	600	0	GBX 350.00

Selecting 'delete' from the options menu causes a confirmation box to be presented.



Choosing 'Yes' in the confirmation box sends a delete request for the order. Choosing 'No' cancels the delete action.



5.1.4.4 Modify an order

An open order can be modified by clicking the right mouse button over it in one of the display windows.

Order	TIDM	Participant	BIC code	Type	Price	Size	Size filled	Size left +	Expire Time
3OS0000009	AL	LSETESTGB		SELL	GBX 353.00	900	0	900	00:00:00
3OS0000007	AL	LSETESTGB		SELL	GBX 352.00	1,500	0	1,500	00:00:00
3XS0000003	AL	LSETESTGB		BUY	GBX 349.00	2,000	0	2,000	00:00:00
3XS0000001	AL	LSETESTGB		BUY	GBX 350.00	4,800	600	4,200	00:00:00
3OS0000005	AL	LSETESTGB		SELL	GBX 351.00	7,000	1,000	6,000	00:00:00

Choosing 'modify' from the options menu will display the 'modify' dealing ticket.

5.1.4.5 Viewing Order executions.

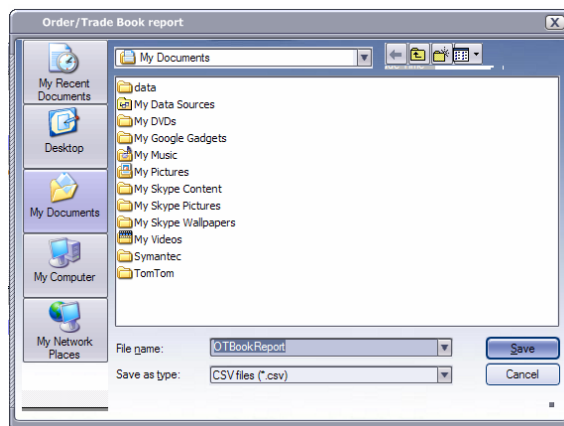
Executions (shapes) can be viewed by double clicking an order line. This will extend the display to show the execution details

Order	TIDM	Participant	BIC code	Type	Price	Size	Size filled	Size left +	Expire Time	Status
3OS0000009	AL	LSETESTGB		SELL	GBX 353.00	900	0	900	00:00:00	WORKING
3OS0000007	AL	LSETESTGB		SELL	GBX 352.00	1,500	0	1,500	00:00:00	WORKING
3XS0000003	AL	LSETESTGB		BUY	GBX 349.00	2,000	0	2,000	00:00:00	WORKING
3XS0000001	AL	LSETESTGB		BUY	GBX 350.00	4,800	600	4,200	00:00:00	PARTIAL FILL
Trade Book										
Trade Code	Counterparty	Type	Price	Size	Trade Date	Trade Time				
3SIM000002		BUY	GBX 350.00	600	15.10.2008	00:00:00				
Order Book										
3OS0000005	AL	LSETESTGB		SELL	GBX 351.00	7,000	1,000	6,000	00:00:00	PARTIAL FILL

Double clicking the order line again will contract the display back to its original state.

5.1.4.6 Creating a report.

Clicking the create report button allows a report of orders and executions to be saved to file. The report is based on the current display in the Order and Trade Books and is saved as a comma separated file (csv).





5.1.5 Trade Reporting Ticket

The following is a screen-shot of the off-book trade reporting entry screen, which represents the ability to submit off-book trade reports for instruments.

OBS Trade Report (TSCO)

TESCO

Bought Sold

TIDM ISIN
Find Currency

Quantity Price
Converted Price

Dealing Capacity

Trade Type

Counterparty

Time Date

Settlement T+ 20/10/2008

Client ref

Conditions

- CB - Special cum Bonus
- CC - Special cum Coupon
- CD - Special cum Dividend
- CP - Special cum Capital Repayments
- CR - Special cum Rights
- CS - Cash Settlement
- GD - Guaranteed Delivery
- SP - Special Price
- TR - European Equity Market Securities
- XB - Special ex Bonus
- XC - Special ex Coupon
- XD - Special ex Dividend
- XP - Special ex Capital Repayments
- XR - Special ex Rights

Place Clear Close

- Provide the ability to submit off-book trade reports
- Submitted off-book trade reports are disseminated upon market data channels through the native interface, and visible as trade information upon the OBS Workstation



5.1.6 Native Interface Configuration Console

The Native Interface Configuration console allows the user to change the Simulator Environment settings (e.g Activate USAP, Suspend USAP, etc).

5.1.6.1 Native Interface Configuration Window

The Native Interface Configuration window (shown below) allows the user to:

- View, Pause/Resume, and Recover Infolect Service Channels.
- Playback Scripts either manually or at a fixed set of speeds.
- View, Activate/Suspend, Log on/off Interactive and Secure USAPs.
- View a USAPs Participants and Connections.
- Generate KEKs for Secure USAPs.
- Edit USAP IDs and Participant Mnemonics.

The screenshot shows the 'Native Interface Configuration' window with the following sections:

- Infolect:** A table listing service channels with columns for Service Channel, Name, MSN, UDP, Idle Poll, No. Requests, and State. All channels are in a 'Running' state.
- Status:** A text area showing 'Received Script Msg'.
- Interactive and Secure USAPs:** A table with columns for USAP, Sent MRN, Rcvd MRN, Keep Alives, Status, State, KEK, MAC Fails, Unsol Pend, and Type. It includes buttons for 'Activate', 'Suspend', 'Log on', 'Log off', and 'Generate KEK'.
- Participants:** A table with columns for Participant Mnemonic and Participant Code, listing LSE1 (LSEGB01) and LSE2 (LSEGB02).
- Connections:** A table with a column for Client IP.

5.1.6.2 General Information

- USAP details are loaded from the simulator's configuration. Any simulator configuration updates will take affect immediately.

Note: There will always be exactly 2 USAPs in the simulators configuration.



5.1.6.3 Infolect Section

- This section displays status information for each Service Channel (SC) and Performance Channel (PC) present within the simulator. It lists the following information for each SC:
 - Identifier
The SC/PC identifier, e.g. "S03"
 - Service Name
The name of the service represented by the SC, e.g. "Level 2" etc.
 - MSN
The Current Message Sequence Number (MSN) for this broadcast group
 - UDP
The multicast address and port for this SC
 - Idle Poll
The number of idle polls transmitted upon the SC
 - No Requests
The number of interactive message retrieval requests which have been submitted in respect to this SC
 - State
The state of UDP multicast delivery upon this SC. Either "RUNNING" or "PAUSED".
- The "Playback Options" button is used to playback script files (see Section 6.3 below).
- The "Pause" button can be used to pause UDP output to the selected SC or PC on the "Infolect" grid; this is used to simulate packet loss and message re-requesting. UDP output can be resumed (on the selected SC or PC) by pressing the "Resume" button. This does not stop script playback, it suppresses the network transfer of the packet
- The "Cancel" button is used for cancelling script playback.
- The "Next" button controls the manual playback of scripts.
- The Native Interface Configuration console can only play one script file at a time. During script playing you can view the playback status and messages received, in the Status and Received text boxes.
- Some scripts are configured to automatically suppress the UDP multicast and provoke interactive rerequest. This is indicated in the script by a value of 'S' and 'T' in the Resend Indicator field within the message header in the script. These values are replaced with the valid Infolect values of 'N' and 'Y' respectively when the message is processed by the script player. This provides an additional, more conformance-like mechanism for suppression of UDP messages in addition to the developer-friendly suppression mechanism via the pause option.



5.1.6.4 USAPs Display area

- For each USAP configured for the system, both interactive and secure interactive, the following details are displayed in the USAPs grid:
- USAP
The identifier of the USAP. Suffixed with “010” for an interactive USAP, “020” for a secure interactive USAP.
- Sent MRN
The last Message Reference Number sent on outgoing messages by the simulator.
- Recvd MRN
The last Message Reference Number received from incoming messages by the simulator.
- Keep Alives
The total number of keep alives dispatched to all connections for this USAP.
- Status
The status of the USAP, either active or suspended. Suspended USAPs cannot logon.
- State
The logon state for the USAP, either “Logged on” or “Logged off”
- KEK
The KEK for the USAP
- MAC Checks
The number of messages with failed MAC checks for this USAP.
- Unsolicited
The number of outstanding unacknowledged unsolicited messages pending delivery/redelivery.
- Type
Indicates whether this is a “S”ecure or an “I”nteractive USAP.
- Selecting an item from the “Interactive and Secure USAPs” grid will populate the “Participants” and “Connections” grids with the relevant information. The user can then “Activate”, “Suspend”, “Logon”, “Logoff” or “Generate KEK” for the specified USAP. Double-Clicking a USAP or Participant will allow you to edit the USAP ID and Participant Mnemonic respectively.
Note: Connection information is read-only.
- Pressing the “Activate” or “Suspend” button will Activate/Suspend the selected USAP.
Note: When a USAP has been Suspended, any 3rd Party Client attempts to log-on will receive an E1471A message via TCP/IP.
- Pressing the “Logon” or “Logoff” button will Logon/Logoff the selected USAP.
Note: The “Interactive and Secure USAPs” grid’s “State” column will display the USAP’s current connection state (e.g Logged off). Any 3rd Party Client



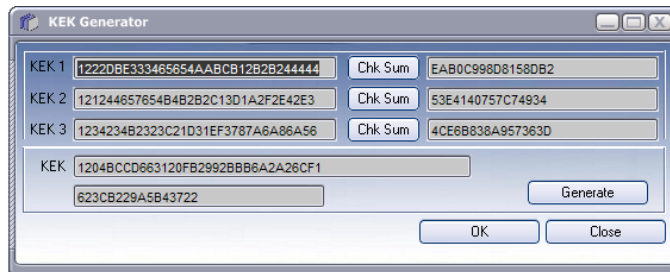
attempting to logon to a USAP that they are already logged on to will receive an E146A 'USAP already logged on' message.

- An "Interactive and Secure" statistics message will be sent from the Native Interface to the Admin Console. The current MRNs will be included as part of the statistics and will be used to update the "Interactive and Secure USAPs" grid's "Sent MRN" and "Rcvd MRN" columns for the associated USAP. Likewise, an "Infolect" statistics message will be sent from the Native Interface to the console. This will be used to update the "Infolect" grid's "MSN" column.
- Pressing the "Generate KEK" button will open the "KEK Generator" window.
Note: This button is only available when you click on a Secure USAP row.

5.1.7 KEK Generator Window

The KEK Generator window (shown below) allows the user to:

- Generate a Checksum for an individual KEK.
- Generate a single KEK from the combination of three KEKs.
- Generate a single Checksum from the combination of three KEKs.



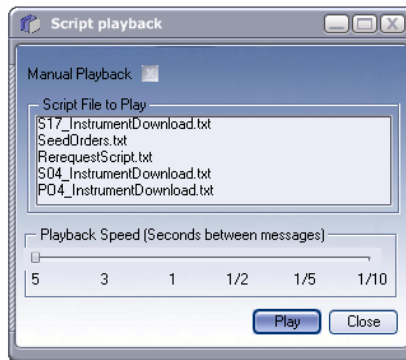
- This window will allow the User to enter the 3 Keys obtained from the LSE, and generate a Check Sum (by pressing the "Chk Sum" button) for each. The User can then press the "Generate" button to generate the USAP's KEK. Pressing the "OK" button will close the window and update the enablements.cfg file and the USAP information in the "Interactive and Secure USAPs" grid. Pressing the "Close" button will close the window and leave the USAP's details unchanged.



5.1.8 Script Player Window

The Script Player window (shown below) allows the user to:

- Set a playback speed.
- Select a single script file to playback.
- Select the manual playback option.

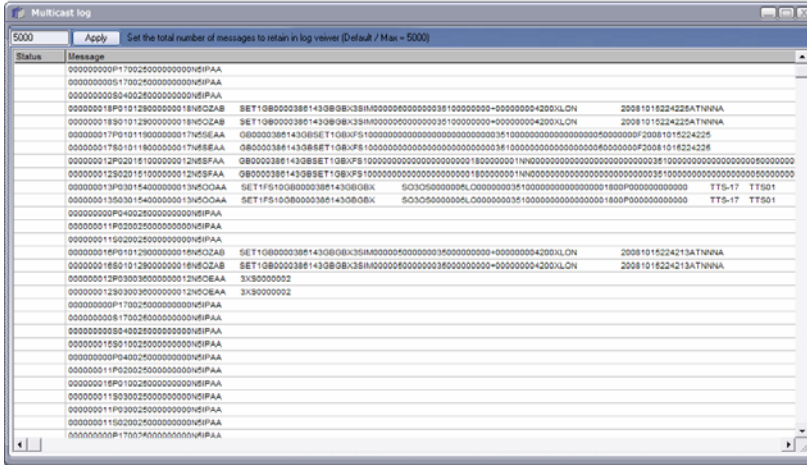


- The “Manual Playback” option can be ticked if you want to manually request the next message. With the option, clicking Next on the main admin console screen dispatches the next message in the script sequence.
- The Script file playback speed can be selected by clicking the “Playback Options” button on the console. The speed range will be from 1 every 5 seconds to 10 a second. Intervals are 5 secs, 3 secs, 1 sec, ½ secs, 1/5 secs and 1/10 secs.
- These scripts can be used to automate the sending of messages. A file list will be provided on the Native Interface Configuration Console (as part of the installation), while the physical files are stored on the Server. The user will select a Script Description and its associated filename will be sent to the Server for playback.
- The “Play” button starts the Playback or requests the first message if “Manual Playback” is ticked. The Script Player window will then close and playback can be viewed/controlled from the console (See Section 6.1). From the main console screen, the cancel button can be used to cancel script playback at any time.
- The Script file playback also supports order entry messages over the infrastructure. This will send a 5E0 message into the simulator to load the “Order/Trade Book” with Orders, Committed Principle Orders, etc.



5.1.9 Multicast Log

The Multicast Log window (shown next) allows the user to review all Multicast messages. The number of messages available is defaulted to 5000 (the maximum permitted), however this value can be reduced by entering the desired number and then selecting 'Apply'.



5.1.10 Interactive Log

The Interactive Log window allows the user to review all Interactive messages. The number of messages available is defaulted to 5000 (the maximum permitted), however this value can be reduced by entering the desired number and then selecting 'Apply'.

5.1.11 Secure Interactive Log

The Secure Interactive Log window allows the user to review all Secure Interactive messages. The The number of messages available is defaulted to 5000 (the maximum permitted), however this value can be reduced by entering the desired number and then selecting 'Apply'.



6 Native Interface Details

This release of the OBS supports a session level capable version of the Native interface, specifically the UDP multicast for Infolect Broadcast Data and TCP/IP connections for interactive 010 and secure interactive 020 USAPs.

In addition, it supports order entry and matching onto a simulated order book, and script playback via the script playback option of the administration console.

The Native interface is configured via the simulator, and can be updated via the Native Interface Configuration console.

The Native interface is best described by the service definition (TIS101) provided by the London Stock Exchange - available on the web site: <http://www.londonstockexchange.com/en-gb/products/membershiptrading/techlib/techspecs.htm>

In summary, however, it provides the following:

- A reproduction information (Infolect) service via UDP multicast, which is attached to a script player and a simulated market which is interactive and provides order matching.
- A reproduction message retrieval and own order download service (interactive) via TCP/IP.
- A reproduction secure interactive trading environment, supporting order placement/modification/cancellation and execution via TCP/IP. The security checks are provided, as are the unsolicited message handling.

6.1 Features enabled within the Native Interface

- Reading of configuration for details on which SCs and PCs to create, and what interface (NIC) / ports to listen on for SII and Interactive connections.
- Can be configured to disseminate messages and new message types onto different SCs or PCs without code changes required.
- Infolect UDP Multicast creation – establishment of SC or PC:

The Native interface binds its multicasting sockets onto the same port locally as it uses to multicast. This means that a 3rd party connecting system cannot reside upon the machine upon which the simulator is running.

- Idle poll broadcast on all established SCs and PCs– set to send after 60 seconds of no traffic
- Allows for Interactive and Secure interactive connections on specified ports (from any TCP/IP address).



- Supports USAP identification on interactive/SII connections
- Support disconnection, if not identified after 5 seconds after connecting to SII/interactive.
- Supports keep alives on interactive/SII connections, send after 60 seconds of no activity, or in response to client request.
- Supports logon to secure interactive, with keys generated and returned
- Supports user identification messages
- Supports logon to interactive
- Support logoff from secure interactive
- Supports logoff from interactive interface
- Supports MAC checking of all relevant messages within the secure interactive interface.
- Supports caching of unsolicited messages and redelivery until successful acknowledgement from the client.
- Supports script playback of Infolect messages
- Supports script playback of enter order messages to populate simulated order books
- Supports order entry/modification/cancellation onto a simulated order book
- Supports order matching/execution generation upon simulated order books
- Supports auction for simulated order books
- Supports generation and dissemination of all relevant Infolect information from simulated order book.
- Supports Own Order download service
- Supports Interactive Message retrieval service for retrieving missed Infolect messages
- The accompanying workstation client can be used to monitor and compliment all activity upon the simulator.
- Supports the relevant session and application error codes, which is a subset of the full system functionality, specifically supported are those listed in the following section.



6.2 Performance Testing

The Order Book Simulator can be used to optimise performance when testing the placement of orders through the Secure Interactive connection.

There is a setting in the configuration file that “turns off” the internal matching engine and simply automatically responds to any order message that it is sent. This feature supports both message versions (AD and AE).

To turn this feature on:

- Navigate to the directory where the Order Book Simulator has been installed (the default is C:\Program Files\London Stock Exchange\Order Book Simulator\OrderBookSimulator)
- Open the enablements.cfg file as a text file. In the general section at the top of the file you will find an entry, `autorespond=0`
- When this is set to zero, this feature is turned off and when the setting is set to one it is turned on.



6.3 Session Level Error Codes supported

6.3.1 E023E 'INVALID MESSAGE DISCARDED'

This advisory code is used when a message fails validation and when a message is entered when the local market it relates to is closed.

6.3.2 E146A 'USAP ALREADY LOGGED ON'

Sent when the USAP is already logged on, either with an existing connection, or via the Management console.

6.3.3 E147A 'USAP IS NOT AUTHORISED TO LOGON'

Sent when the USAP has been suspended via the Management Console

6.3.4 E173E 'NON NUMERIC VALUES IN INPUT DATE'

This is sent when a participant enters a message containing a nonnumeric date.

6.3.5 E175E 'INPUT DATE INVALID'

This is sent when a participant enters a message containing an incorrect date, for example, the date field does not contain the current date.

6.3.6 E176E 'INPUT TIME INVALID'

This is sent when a participant enters a message containing an incorrect time, for example, the time field does not contain the current time.

A window of 3 minutes either side of the current time has been permitted. This can be changed upon request.

6.3.7 E214E 'INVALID MESSAGE TYPE OR MESSAGE VERSION IDENTIFIER'

The simulator does not recognise the message type, or the version of the message.

6.3.8 E215A 'INVALID INTERCHANGE TYPE'

A message contains an invalid Interchange Type. The Interchange Type should be set according to the type of message sent. Refer to Section 3 of the Data Formations documentation supplied by the LSE for further information.



6.4 Application Advisory codes Supported

The following application advisory codes are supported:

- Q002I - PERIOD AUTHORISATION FAILED
- Q006I - ORDER NOT FOUND
- Q019I – RE-REQUEST SATISFIED INTERACTIVELY
- Q107I - PARTICIPANT NOT FOUND IN SEGMENT
- Q112I - INST/SEG/CURR COMBINATION INVALID
- Q113I - MANDATORY FIELDS NOT SPECIFIED
- Q137I - FIELD MUST BE BLANK
- Q138I - ORDER SIZE FIELD INVALID
- Q189I - TRADE DATE/TIME INVALID
- Q197I - INVALID TRADE TYPE INDICATOR
- Q203I - SIZE MUST BE GREATER THAN ZERO
- Q219I - NO TRADE REPORT EXISTS FOR TRADE CODE
- Q220I - TRADE REPORT CANNOT BE PRE-RELEASED
- Q222I - CANNOT PRE-RELEASE AUTOMATIC TRADE
- Q228I – NO MATCHING HAS OCCURRED
- Q244I - TRADE REPORT CANNOT BE CANCELLED
- Q247I - BARGAIN CONDITION INVALID
- Q250I - BUY PARTICIPANT EQUALS SELL PARTICIPANT
- Q306I - DEALING CAPACITY MUST BE PRINCIPAL
- Q326I - DEALING CAPACITY INVALID
- Q327I - CLIENT REF MUST BE ENTERED
- Q328I - CLIENT REF SELL MUST BE ENTERED
- Q405I - POTENTIAL BREACH OF PRICE MONITORING TOLERANCE
- Q418I - CONTRA TRADE REQUEST SUBMITTED
- Q419I - CONTRA TRADE ACCEPTANCE SUBMITTED
- Q449I - DELETION ONLY AS BELOW MIN ORDER SIZE
- Q450I - RELATIVE SIZE CHANGE FIELD INVALID



6.5 Internal Configuration

The configuration file, enablements.cfg, which is responsible for the configuration of the entire simulator component, is based in format like an old Windows-style ini file, in that settings are in the following format:

```
entry=value
```

Settings are grouped into sections in the following format:

```
[section heading]  
entry=value
```

Repeating entries have an single heading entry indicating how many repeating entries there are, e.g.

```
instances=2
```

Each repeating entry is suffixed with its instances, e.g.

```
instances=2  
entry1=value  
entry2=value
```

Additionally, there can be repeating entries within repeating entries, each level within the suffix delimited with a '-':

```
instances=2  
subinstances1=2  
entry1-1=value  
entry1-2=value  
subinstances2=3  
entry2-1=value  
entry2-2=value  
entry2-3=value
```

6.5.1 Location

This file is located in the simulator install directory, typically c:\Program Files\Information and Trading Systems Ltd\ODM Simulator\ODMEngine. It should not need to be touched, unless different enablements and SCs are required, or any network changes are needed.

6.5.2 Service Channels (SCs) and Performance Channels (PCs)

The SCs and PCs are defined in the broadcast section:



```
[broadcast]
```

```
instances=22
```

The instances entry describes how many SCs are defined

```
; 1
```

This is a comment indicating the first SC definition

```
groupname1=B44
```

Entry containing SC identifier.

```
longname1=B44 Order Book Prices/Details
```

Entry containing long name and details of SC

```
address1=239.88.1.44
```

Entry of multicast group address upon which SC publishes

```
interface1=INADDR_ANY
```

Entry of local interface address upon which to bind. INADDR_ANY is TCP/IP speak for don't care. You can specify a local TCP/IP address which is bound to a specific NIC within the machine, if the machine is multi-homed.

```
port1=58344
```

Entry of port upon which to multicast upon.

```
local_port1=58344
```

Entry of port upon which to bind to, to allow the simulator to exist on a machine which is hosting a 3rd party system.

```
msg1-1=500
```

Repeating entry of messages disseminated upon this SC. Used for both script playback and simulator dissemination.

6.5.3 Secure and Interactive sections

SII has section heading [secure]. Interactive interface has section heading [interactive].

```
[secure]
```

```
instances=1
```



The instances entry in the secure and interactive sections can have a value of 0 or 1 only, to state whether or not the simulator should bother to create these interfaces.

```
address=INADDR_ANY
```

The local interface address to which the listening socket should bind. INADDR_ANY is TCP/IP speak for don't care. You can specify a local TCP/IP address which is bound to a specific NIC within the machine, if the machine is multi-homed.

```
port=51800
```

The local port no to which the listening socket should bind upon to listen for connections.

```
usaps=2
```

The number of usaps defined for the simulator. Always 2.

```
usap1=LSE020
```

The definition of the USAP User Code. Repeating entry for each USAP defined

```
kek1=6E3C02C1D7C81CD5C18307BD9307E640
```

The KEK, which can be generated within the management console. Repeating entry for each USAP defined. Ignored for interactive usaps.

```
suspended1=1
```

Participant suspension status. Used in the generation of an E147A. Set in the management console. Repeating entry for each USAP defined

```
participants1=2
```

The number of participants defined for this USAP. Repeating entry for each USAP defined.

```
memberid1-1=LSEGB01
```

The BIC code of a participant for this USAP. Repeating entry for each participant of a repeating entry for each USAP defined.

```
mnemonic1-1=LSE1
```

The participant mnemonic of a participant for this USAP. Repeating entry for each participant of a repeating entry for each USAP defined.

```
tradergroup1-1=LSEGB01
```



Tokyo	18
London	10
New York	0
Johannesburg	

The Trader Group ID for this USAP. Repeating entry for each participant of a repeating entry for each USAP defined.



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