Customer Portal

User Guide 5.4

Table of Contents

Executive Summary 5
Introduction 5
Purpose 5
Accessing the Portal 5
Login 5
Password 5
Timeout 5
Navigating the Portal 6
Menu 6
Reports and Features 6
Title 6
Filters 7
Class List Management (Symbol Lists) 7
Group By 8
Symbol List Groups 8
Public Data (605) 9
Multiple Tabs 9
Report Functions 10
Favorites 12
Scheduled Reports 12
Pagination 13
Column Headers 13
Sorting 13
Audit Features 14
Drilldown Capabilities 14
Market Data Table 14
Market Table Chart 15
Dashboard 16
Graphical Views 16
Route View 16
Entry View 16
Exchange View 16
Asset Classes 16
Options 16

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Equities 17
Equities Reports 18
Missed Fills 18
Details 19
Summary 20
Equities Execution Efficiency 20
Eligible Orders and Volume 20
Execution Efficiency Defined 20
Enhanced E/Q 20
Limit Performance 21
Equity TCA "Not Held" Reports 21
TCA Parent and Child 21
TCA Trade 22
Options Reports 22
Details 22
Summary 22
Options Execution Efficiency 22
Eligible Orders and Volume 22
Execution Efficiency Defined 22
Complex Options Reports 23
Trade Surveillance Reporting 24
Equities/Options: Marking the Close 24
Audit Trail 24
Equities/Options: Trade Through 25
Equities/Options: Layering 25
Equities/Options: Spoofing 25
Equities/Options: Reg SHO 25
Cross Product (Equities and Options): Data Manipulation 25
Exceptions 26
Changing Parameters and Running Back Tests 26
Viewing Test Results 26
Parameter History 26
World View Reports 27
Compliance Reports 27
Rule 605 Report 27

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Rule 606(a) Report 28
606a Analysis 28
Manually Editing 29
Entering Disclosure Information 29
606a Audit 30
Rule 606(b)(3) Report 30
606b3 Analysis 31
606B3 Audit 31
Appendix 32
Appendix A: Market Quote Condition Codes 32
Appendix B: Market Trade Condition Codes 35
Appendix C: Report Filters for Equites and Options 39
Appendix D: Equities Details Columns (Parent Orders) 40
Appendix E: Equities Details Columns (Child Orders) 41
Appendix F: Equities Details Columns (Trades) 42
Appendix G: Equity Summary Columns 43
Appendix H: Limit Performance Columns (Summary) 44
Appendix I: Limit Performance Filters 45
Appendix J: Equity TCA Report Columns (Summary) 46
Appendix K: Equity TCA Report Columns (Details) 48
Appendix L: Option Details Columns (Parent Orders) 50
Appendix M: Option Summary Columns 51
Appendix N: Execution Efficiency Columns (Summary) 53
Appendix O: Missed Fills Report Filters 53
Appendix P: Trade Suveillance Exceptions Columns 54

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Executive Summary

Introduction

The S3 Portal is a web-based customer portal which allows our customers to view trade data. For more information on S3's Reporting Suite, please visit http://s3.com/.

Purpose

The purpose of this document is to provide you with a guide to use the S3 Customer Portal.

Accessing the Portal

Visit our customer portal homepage at: *https://s3.s3.com*. For login assistance please contact *help@s3.com*.

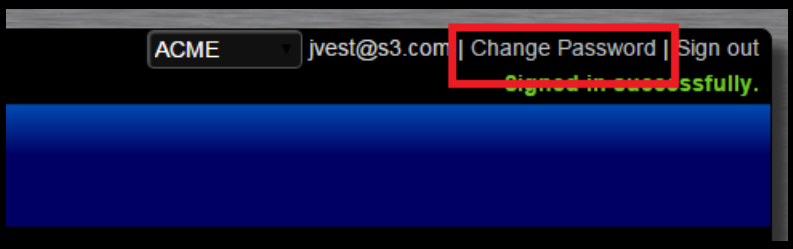
Login

Your login is typically your email address.

Password

Initially you will receive a temporary password. The first time you log in, you will be asked to change your password. Passwords will expire after 90 days at which point you will have to change your password.

You can also change your password at any time by clicking the 'Change Password' link in the upper right hand corner of the portal.



Timeout

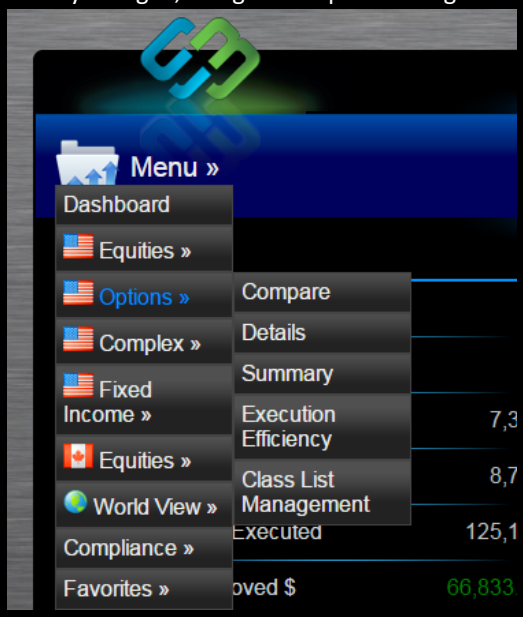
Unless configured otherwise, the portal will automatically timeout after 30 minutes of inactivity. At this point you will need to re-login.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Navigating the Portal

Menu

Once you log in, navigate the portal using the menu located on the left side of the portal page.

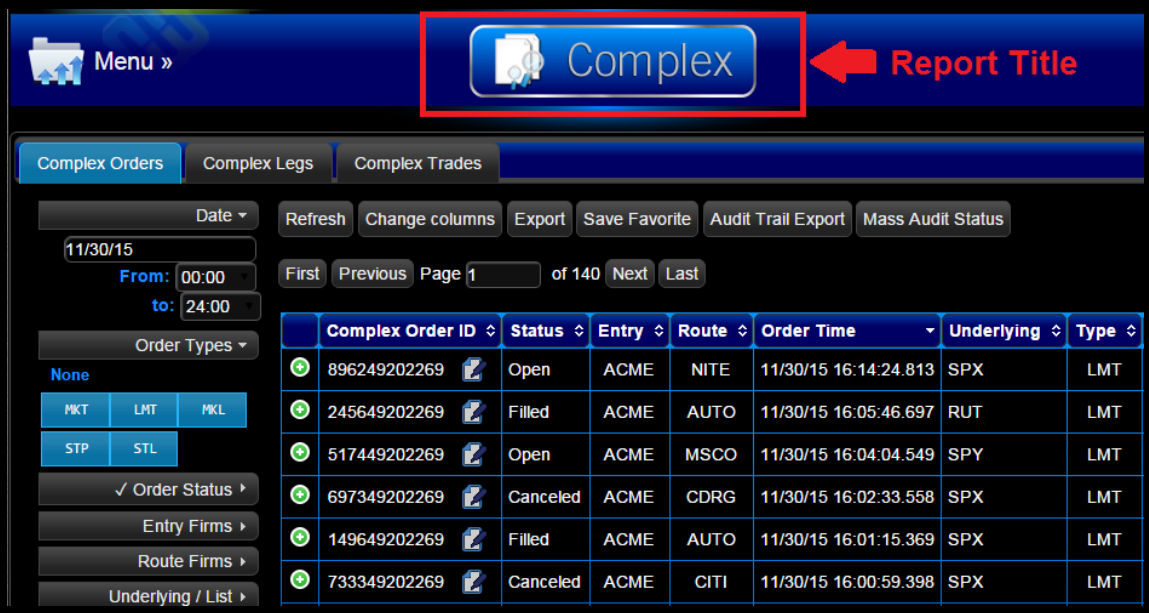


Reports and Features

The S3 Portal is primarily used for reporting. You can navigate to these reports using the menu or drilling into details from the dashboard. Your list of reports might include Equities, Options, Complex Options, World View, Compliance, and other custom reports. In general, reports will have these types of features:

Title

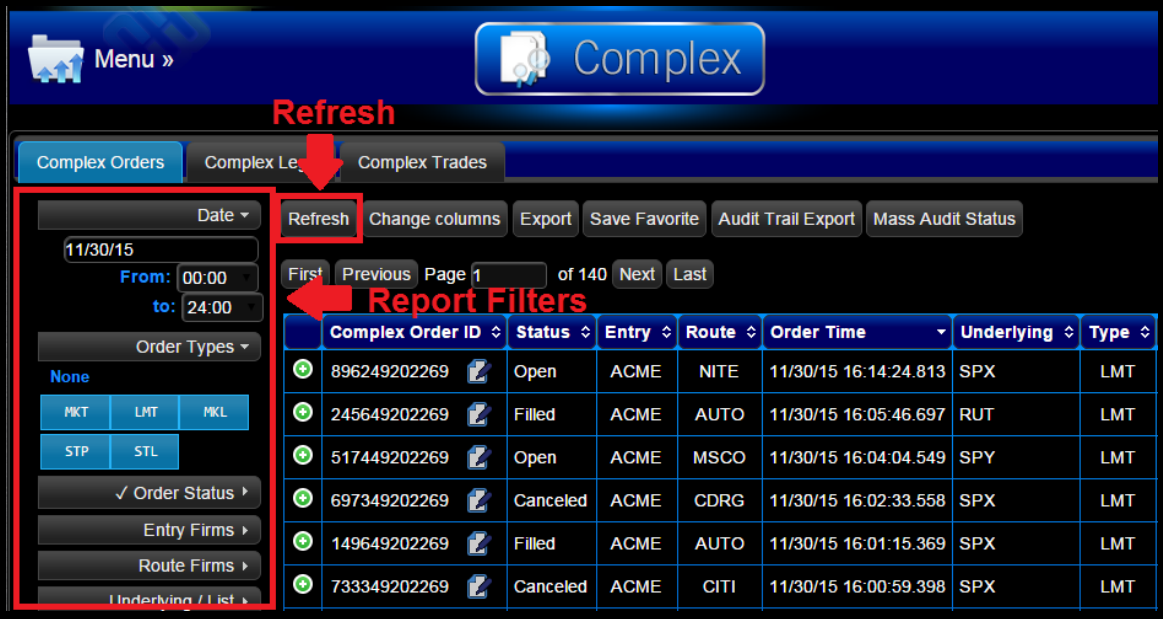
At the top of each report should be a title to let you know which report you are currently viewing.



Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Filters

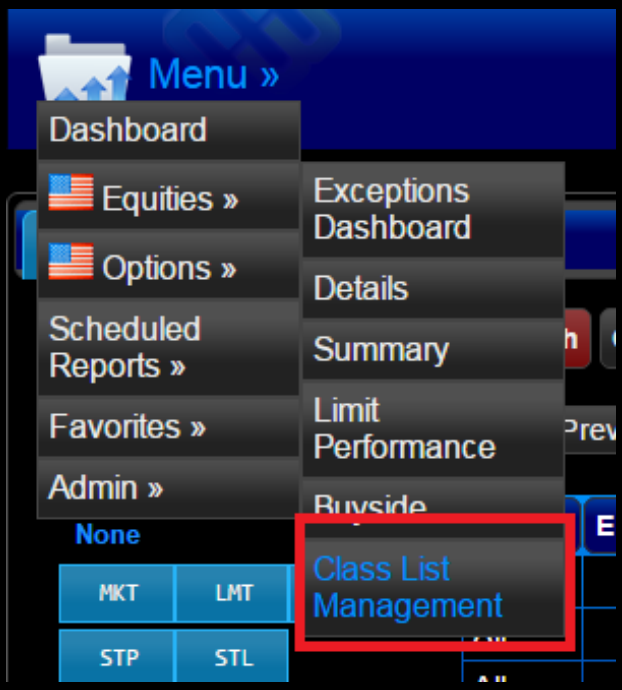
On the left side of each report will be a list of filters. Click on a filter to expand the filter options. A checkmark next to a filter indicates that filter is currently in use. After selecting your filters, you must click the 'Refresh' button to apply. While many filters may be found on multiple reports, each report in the portal has a unique list of filters. For a full list of report filters and definitions, see the appendix.



Tip: Use an asterisk '' in the text box* *to select all from the multi-select pop-up windows. Then click the selection icon to edit your selections.*

Class List Management (Symbol Lists)

Option and Equity Reports can be filtered by custom symbol lists, which you can create using the Class List Management tool. Once you have created and named your custom list, you will find that list name in the filter dropdown. You can focus in even further by combining multiple filters in one search. A nice feature of these defined lists is that the list will change as you change your dates based what the symbol list was as of that particular date or date range.



Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Group By

At the summary level of the Equites and Options reports, you have the ability to group the data by month, day, entry firm, route firm, symbol, order type, and order size.

Symbol List Groups

For the Equities Summary Report, you can choose to group by one or more symbol lists and compare to your overall summary data. Click on 'Symbol List Groups,' then click the 'Add' link. You can give your group a label, select a group from the dropdown, and optionally join with another group list. Click the 'Remove' link to remove your group or click the 'Add' link to add and view additional groups at the same time. Custom symbol lists can be created using the '[Class List Management]' feature.

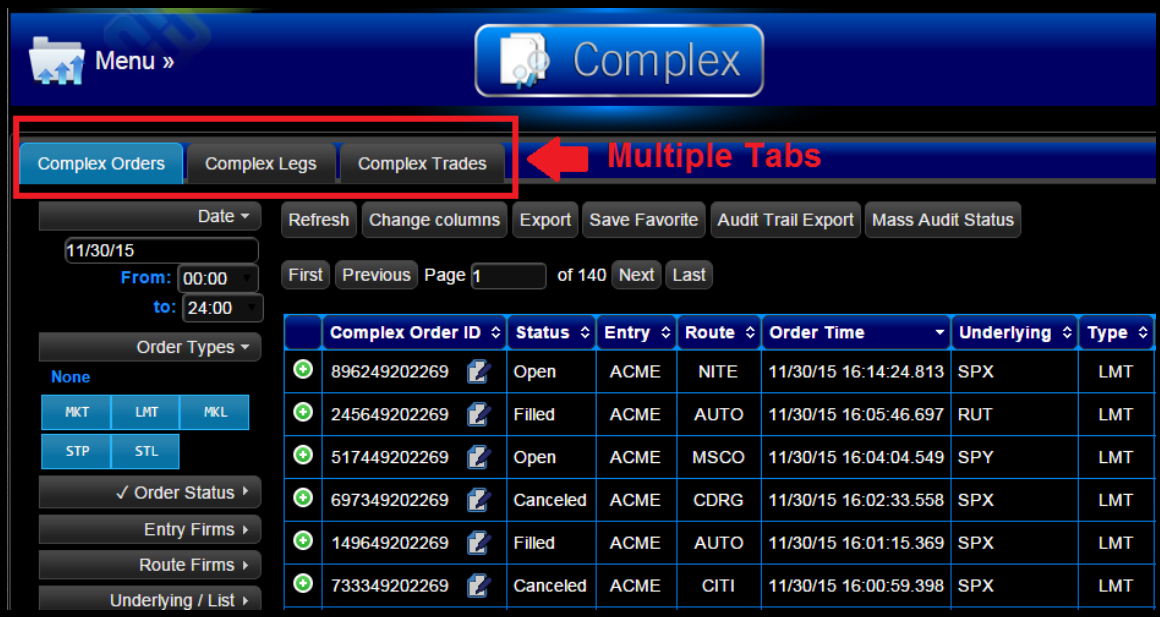
Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Public Data (605)

For the Equities Summary Report, you can choose to include the public 605 data. Select the date range for months you want to see the public data. Click the 'Firms' icon to choose which public data firms you want to view. Select 'Show' and click the report 'Refresh' button. The public data will be highlighted in blue on the screen giving you the ability to quickly compare your data to the public data.

Multiple Tabs

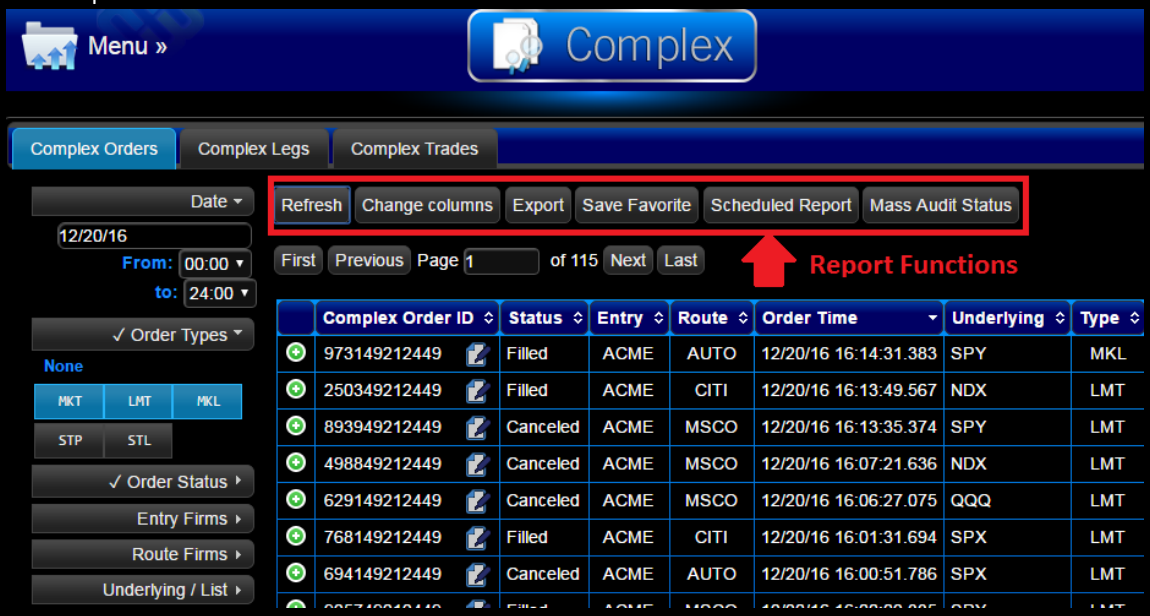
Some reporting screens will contain more than one report. You can switch between reports using these tabs.



Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Report Functions

Most reports come with a default set of functions.



- Refresh – Clicking refresh will update the report using the latest data available and filters selected. When changing filters, the refresh button will turn red as a reminder that you must click refresh to update the report.

  Note: You can Export or Save Favorite using the new filters selected without clicking refresh. This saves you the time of waiting for the data to refresh if you are sure of your filters.

- Change columns – Use this function to hide and unhide columns. Note that many columns are hidden by default. Also, you cannot currently change the column order.
- Export – Clicking 'Export' will send you an email with a link so that you can download the current report in an Excel format.
- Save Favorite – Save Favorite allows you to save a report as a favorite so that you can save your filters and quickly access your standard reports anytime you are in the portal. Click here to see more information on how to access or edit favorites.

  Note: Once a favorite is created, you cannot edit filters or columns. You can only update the type, personal or company. You can however save over a previously saved favorite.

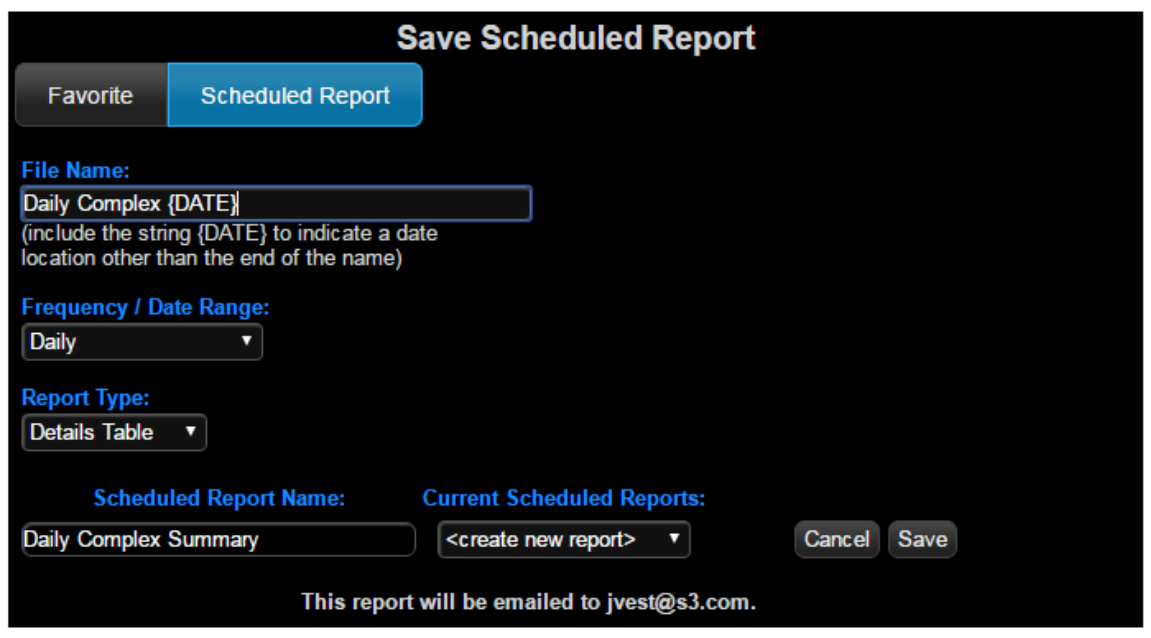
  - **Visibility** - When you create the favorite you have the option to save it as a personal favorite, or you can choose to allow everyone in your company to access this report.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- **Date Range** – Depending on the type of report, 'Date Range' gives you the flexibility of saving your report for a specific day, month, quarter, date range, or most recent day.
  - As Entered – Your report will use the current/same date filter each time the report is run. Unless that data changes, the report results for this saved report should not change.
  - Most Recent Day – Your report will use the most recent trading day's data.
  - Month to Date – Your report will use the current month's to-date trading data.
  - Previous Month – Your report will run against the previous month's trading data.
- **Favorite Name** - You must supply a name for your report.
- **Current Favorites** – You can save as a "new favorite" or you can save over a previously saved favorite.

Note: Favorites and Scheduled Reports are completely independent of one another. Saving or updating a scheduled report does NOT update a favorite and vice versa.

- Scheduled Report – When saving a report as a favorite, you have the option to schedule the report. Scheduled reports will be emailed to you as an excel document based on the set frequency of the report. To read more about scheduled reports, click here.

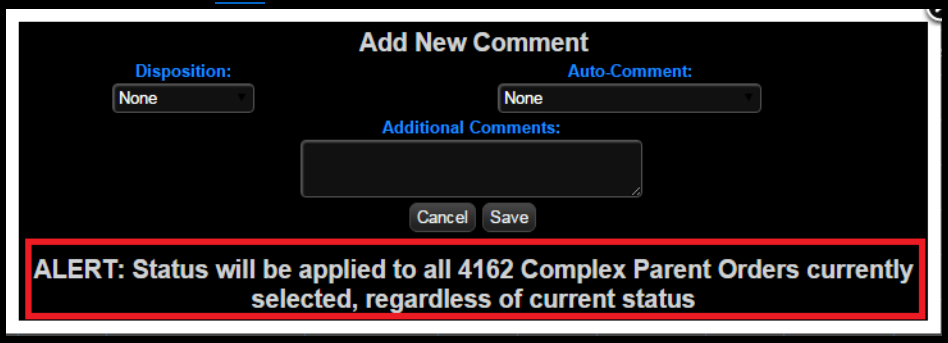


  - **File Name** – Since a scheduled report is a file that is either an email attachment or downloaded, you must supply a name for the file.
  - **Frequency / Date Range** – Choose how often you wish to receive and the date range for the report. Scheduled Reports are generated after the end of day processing is complete for the previous day's data.
  - **Report Type** – Select the type of report you wish to receive, Details or Audit Trail.
    - Details Table – Exact Details of the report in an Excel File Format
    - Audit Trail (pdf) – Audit Details in pdf format. For more information on audit trails click here.

- Mass Audit Status – If your report has audit features, clicking 'Mass Audit Status' allows you to enter an audit comment on all orders in your current report at one time. For more information

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

on audit trails click here.



Favorites

Any report can be saved as a 'Favorite.' To access Favorite Reports, mouse over 'Favorites' listed menu items. When you mouse over 'Favorites you will have four sub-menu items: Personal, Company, Public, and Manage Favorites.

When you mouse over 'Personal,' 'Company,' or 'Public,' saved favorites of each type will be seen out to the right. When you click on a report name, the report will be executed immediately and you will be taken to that report.

To manage your favorites, click on 'Manage Favorites.' Once on the 'Favorites' screen, click any report name in the 'Current Favorites' box on the right. Once a report is selected, you can change the name, update the visibility type, or delete the report.

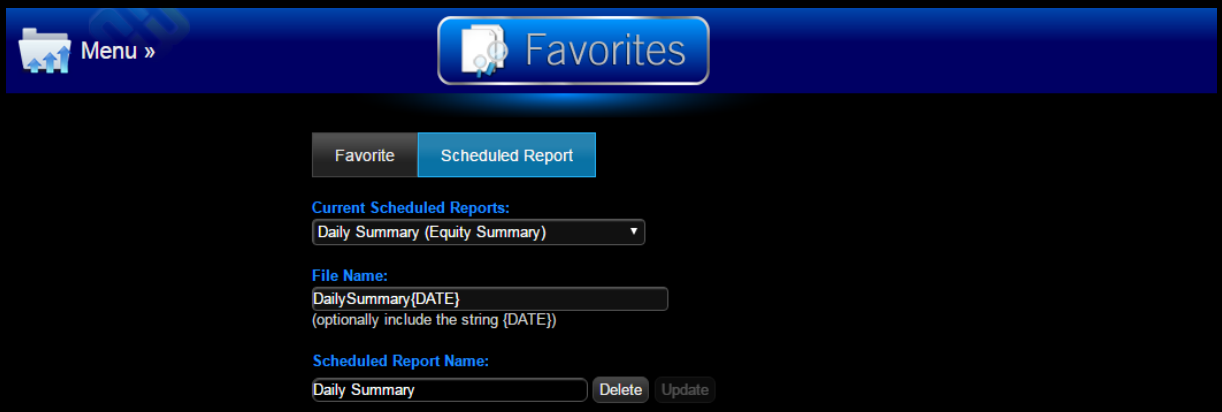
Note: While all favorites you have access to will be listed, you can only edit your personal favorites.

Scheduled Reports

You can run, view, or manage your scheduled reports under Menu->Scheduled Reports. Here you will see a list of all your current scheduled reports broken out by frequency. Click "Manage Scheduled Reports" to Delete or Update a Report.

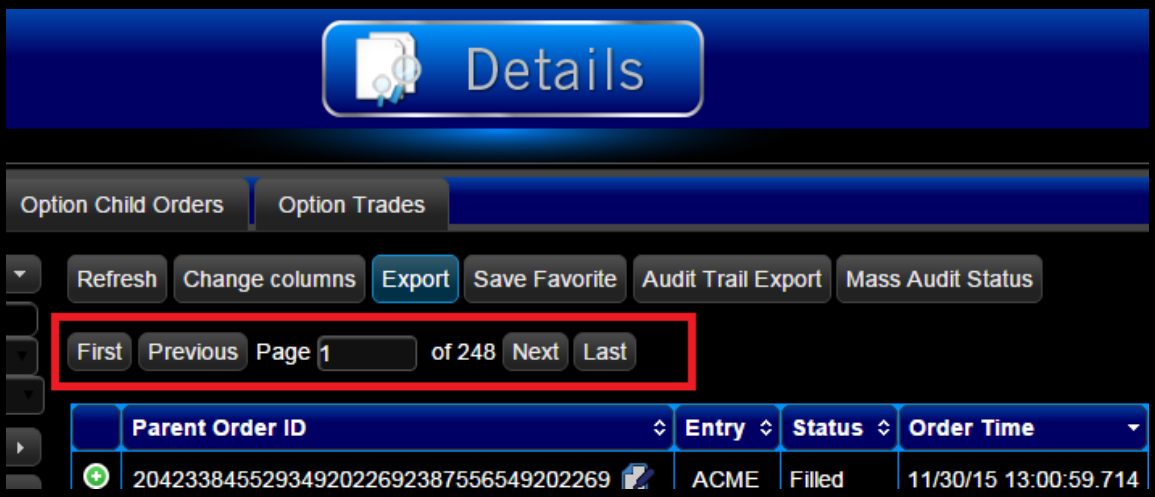
Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

NOTE: You must have an existing saved scheduled report before you can see this menu item.



Pagination

By default, a report will only display the first 25 line items. The top and bottom of each report has pagination functionality which allows you to quickly change your view to see other pages in the report. Clicking 'First' or 'Last' will take you to the first or last page of the report respectively while clicking 'Previous' or 'Next' moves the report one page at a time. You can also just type in the page number you wish to jump to.



Column Headers

You can get more detailed information on many column headers by just mousing over the header name.

Sorting

Click any column header to sort on a column ascending, denoted by a down arrow on the right side of the column header. Click the column header again to sort descending, denoted by an up arrow. By default, many reports are sorted by 'Order Time' descending.

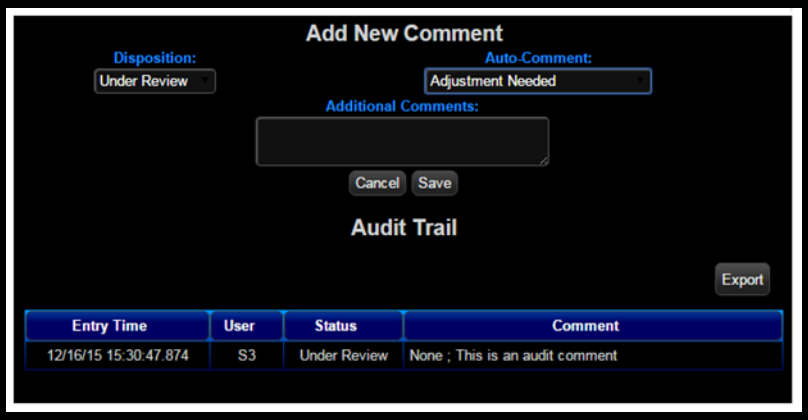
Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Tip: Hold the 'Shift' key to sort by a second column and not lose your original sort.

Status	Entry	Route	Order Time	Underlying	Type	Legs	Limit $	Net
Open	ACME	AUTO	12/15/15 11:39:11.778	AA	LMT	2	0.00	
Filled	ACME	AUTO	12/15/15 12:16:23.461	AAL	LMT	2	-0.12	C
Filled	ACME	AUTO	12/15/15 15:32:49.678	AAL	MKL	2	1.80	D
Filled	ACME	AUTO	12/15/15 12:09:25.133	AAL	MKT	2		D

Audit Features

Many of your 'Details' reports will have audit features. Look for the icon to view the audit trail or leave a comment on any single line item. Use the 'Mass Audit Status' function to add an audit comment to all line items at one time. Click 'Export' on the right, under 'Audit Trail' to export the audit trail to a PDF document. You can export your ALL audit comments for a report by clicking the 'Audit Trail Export' button at the top of the report.



Drilldown Capabilities

Some reports allow you to drill down further into line item details. Click the icon to expand an order to see child orders and trade detail. Click the icon to collapse back.

Parent Order ID	Entry	Status	Order Time	Side	Size	Symbol	Type	Limit $	Variance $	TIF
205259038274349202420702347 4	ACME	Filled	12/15/15 13:00:59.463	S	200	FCEL	MKT		2.00	DAY
225259038485468585825613276	ACME	Filled	12/15/15 13:00:59.274	B	100	XIV	MKT		0.40	DAY

Child Order ID	Status	Route	Route Time	Size	Type	Route Speed	Variance $
225259038485468585825613276	F	CITI	12/15/15 13:00:59.318	100	MKT	0.044	0.40

Part	Exchange	Trade Time	Trade Size	Price $	Target Quote	Variance $	Variance %	Trade Speed
1	NYSE	12/15/15 13:00:59.466	100	25.4860	25.48 x 25.49	0.40	0.02	0.192

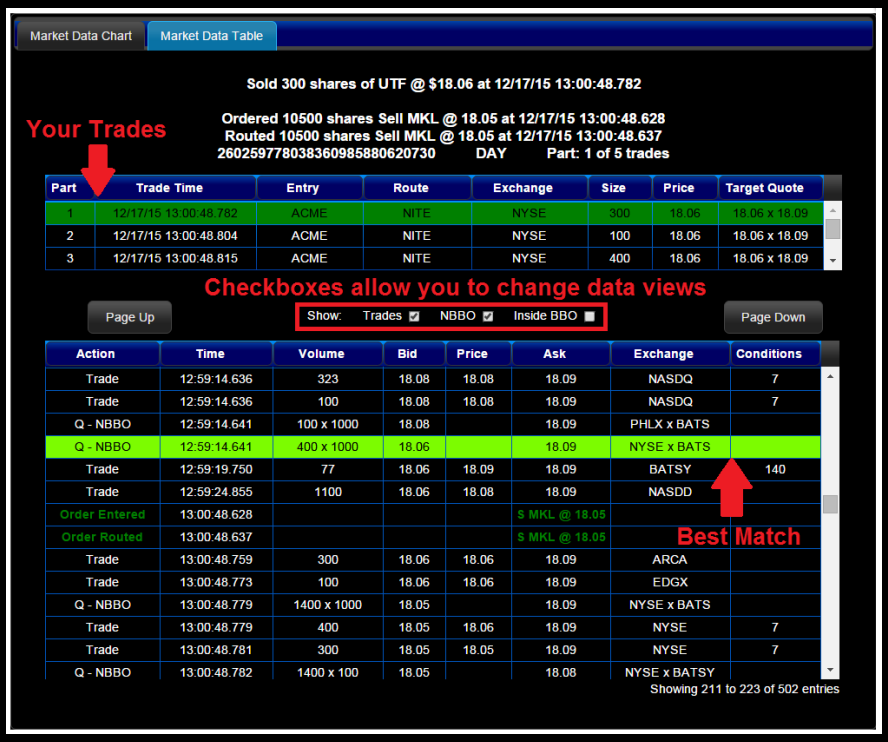
225259038259268584609571648	ACME	Filled	12/15/15 13:00:58.528	B	12	FOGO	MKT		0.03	DAY

Market Data Table

When viewing trade detail, look for icon to drill into the 'Market Data Table'. Here you can see your trades versus the market. Click on your trade to see the best match within the market data. Depending

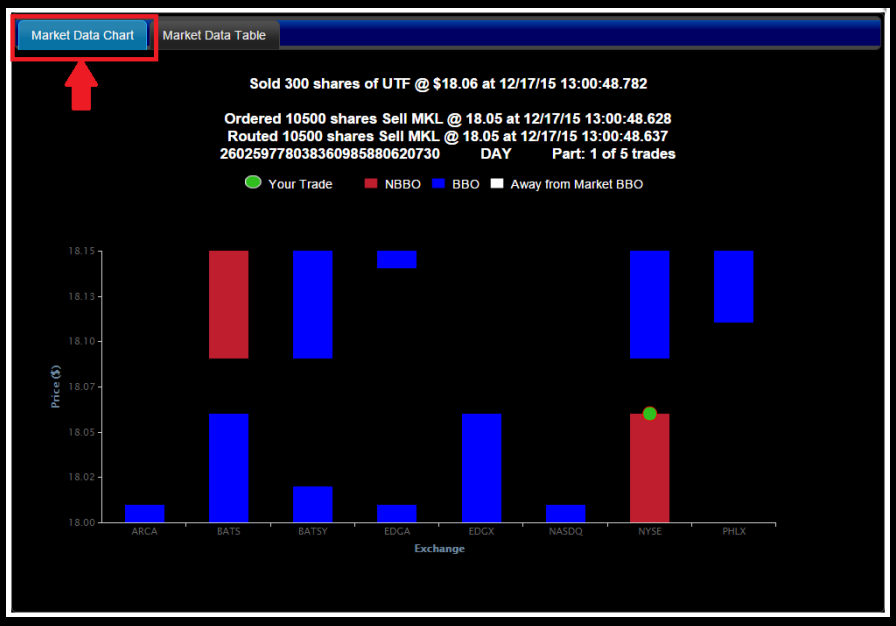
Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

on the trade type and data, it will often find your exact trade in the market data. Select 'Trades,' 'NBBO,' or 'Inside BBO' to change your view of the market data. See Appendix for Condition Codes.



Market Table Chart

When viewing the 'Market Data Table,' you can click on the 'Market Data Chart' tab to see your trade versus the market data in a graphical view.



Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Dashboard

The Dashboard is the first screen you will see when you log into the portal as well as the first item in the Menu list. It provides a quick overview of your assets. The left side of the screen lists your asset classes and the right side gives you a graphical view of each class.

Graphical Views

The right side of the dashboard shows a graphical overview of the previous day's orders of the corresponding asset class shown immediately to the left. You can quickly see more detail of your orders by clicking on the graph.

Route View

By default, you will see the route view. Route view shows you where orders are routing through. Here you can see where orders are being routed and quickly see which routed orders were executed. Drag your cursor over any section of the pie chart to see exact totals. Click on the pie chart to see further detail.

Entry View

Entry view shows you where you are receiving order flow. Here you can quickly see what order flow was executed. Drag your cursor over any section of the pie chart to see exact totals. Click on the pie chart to see further detail.

Exchange View

Exchange view is a graph that shows you a breakdown of which exchange executed your orders. This view is only available for equities and non-complex options. Complex options do not have an exchange view due to the fact a single order might execute on more than one exchange. Drag your cursor over any section of the pie chart to see exact totals. Click on the pie chart to see further detail.

Asset Classes

The left side of the dashboard shows a summary of your asset classes for the previous business day. Each asset class shows the date of the orders followed by the orders summary for the corresponding date.

Options

A financial derivative that represents a contract sold by one party (option writer) to another party (option holder). The contract offers the buyer the right, but not the obligation, to buy (call) or sell (put) a security or other financial asset at an agreed-upon price (the strike price) over a certain period of time or on a specific date (exercise date). Complex Options (options with multiple legs) will be listed as a separate asset class. Complex options do not have an exchange view due to the fact a single order might execute on more than one exchange.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Parent Orders Placed - Total number of parent option orders placed on a given day. Click on the total to see more detail.
- Child Orders Placed – Total number of child option orders placed on a given day. Click on the total to see more detail.
- Contacts Executed – Total number of option contracts executed on a given day. Click on the total to see more detail.
- Price Improved $ - Daily total dollar improvement of contracts that executed at a better price than the bid/ask (expected) price at the time the order was placed. Click on the total to see more detail.
- Slippage $ - Daily total dollar setback of contracts that executed at a price worse than the bid/ask (expected) price at the time the order was placed. Click on the total to see more detail.

Equities

Equities or stocks signify ownership in a corporation and represent a claim on part of the corporation's assets and earnings. Equities (or stocks) are one of the principal asset classes. Equities are orders that originated in the US. Orders that originate outside the US will be listed under a different asset class like "Canadian Equities."

- Parent Orders Placed - Total number of parent orders placed on a given date. Click on the total to see more detail.
- Child Orders Placed – Total number of child orders placed on a given date. Click on the total to see more detail.
- Shares Executed – Total number of actual shares executed on a given date. Click on the total to see more detail.
- Price Improved $ - Daily total dollar improvement of shares that executed at a better price than the bid/ask (expected) price at the time the order was placed. Click on the total to see more detail.
- Slippage $ - Daily total dollar setback of shares that executed at a price worse than the bid/ask (expected) price at the time the order was placed. Click on the total to see more detail.

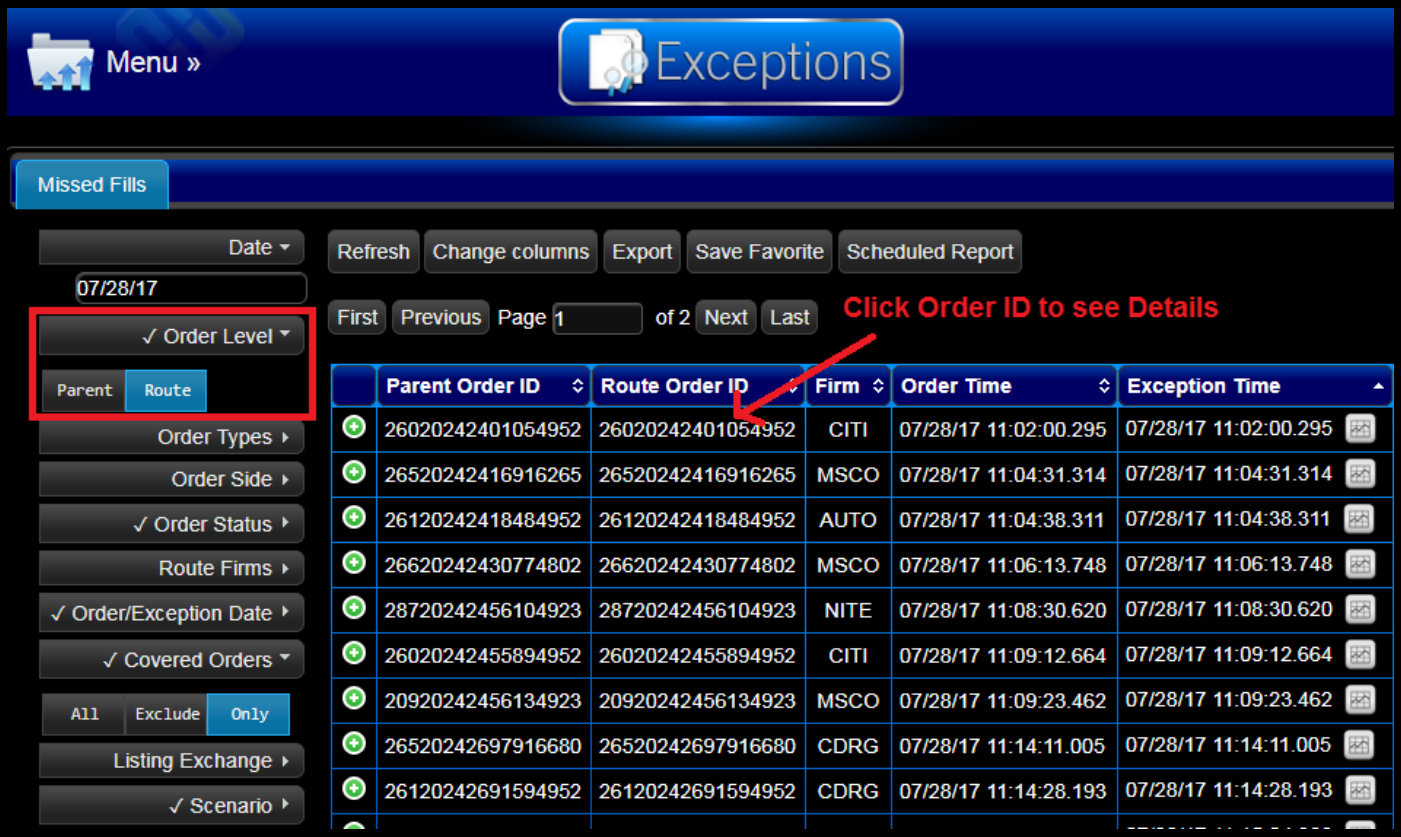
Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Equities Reports

If your company subscribes to S3's Equities Reporting features, then in the menu dropdown items you will see 'Equities.' Hovering over 'Equities' in the Menu, you may see many clickable submenu items: Exceptions Dashboard, Details, Summary, Limit Performance, and Buyside (VWAP). See Asset Classes for more information on equities.

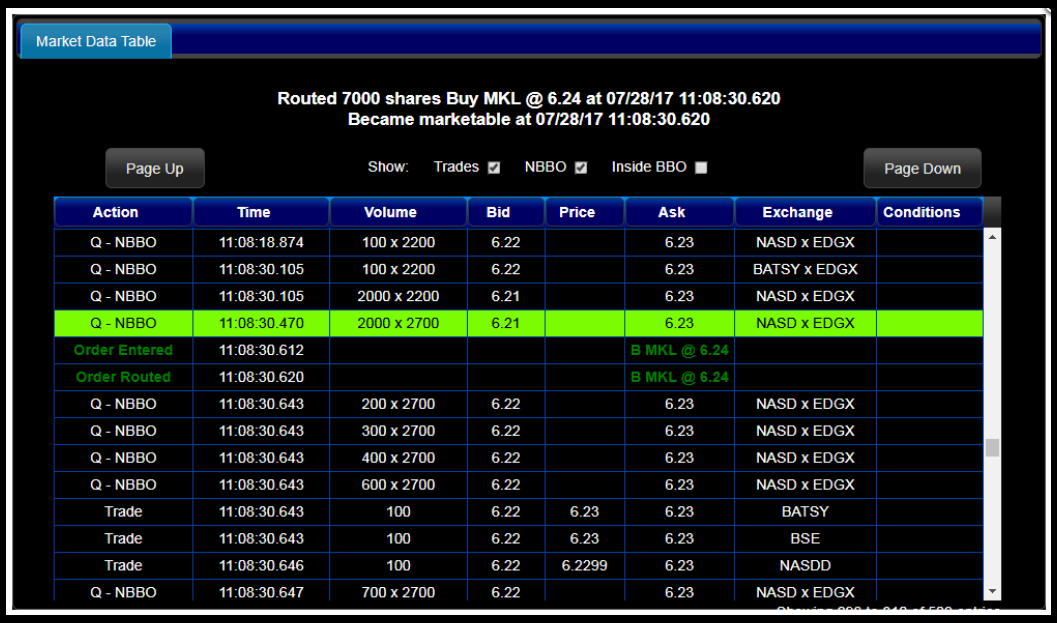
Missed Fills

'Missed Fills' is a daily exceptions report that shows which orders were marketable during a specified date range but were not filled. With this report, you can quickly see whether an order was a buy or sell, order type, size, and price compared to the market quote and volume (highlighted in red on the report) at the time of the exception. Note that 'Not Held,' 'Short Sell,' and other orders with special handling are excluded from this report. Also, you can review 'Missed Fills' from either the parent order or route order level using the 'Order Level' filter. For more information on the 'Missed Fills' filters, click here.



To see more details about the order, you can click the order ID (Parent or Route) which will take you to the order details report for that order. Click on the market data icon next to 'Exception Time' to drill into market data details at the time of the exception.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.



Details

The Equities Details Report gives you a detailed view of your equity orders for a selected date range. By default, the report shows details from the most recent day of trading data collected. There are three tabs on this report: Equity Parent Orders, Equity Child Orders, and Equity Trades. Equity Parent Orders is a detailed view of your "New Orders." See Appendix for Equity Parent Order Columns and definitions. Equity Child Orders is typically a detailed view of your "Route Orders." See Appendix for Equity Child Order Columns and definitions. If an order has a child order or trade associated, then you can expand the order details to see the order tree. Equity Trades is a detailed view of your trades. See Appendix for Equity Trades Columns. See Appendix for Equity Trades Columns and definitions.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Summary

The Equities Summary Report gives you a summarized view of your equity orders for a selected date range. There are two tabs on this report: Equity Parent Summary and Equity Child Summary. Equity Parent Summary is a summarization of your "New Orders." Equity Child Summary is normally a summarization of your "Route Orders." See Appendix for Equity Summary Columns and definitions.

Equities Execution Efficiency

The Equities Execution Efficiency Report lets you compare equity orders to the full market breadth available. The report compares the volume of executions at or better than the prevailing NBBO against the full market volume available at the NBBO. This allows you to identify orders that provided enhanced liquidity – orders that achieved a better volume than the available market; diminished liquidity – orders that failed to fully execute despite sufficient posted liquidity; and execution efficiency – an overall picture of how well executions performed relative to available liquidity. There are two tabs on this report: Summary and Detail. The summary report is a summarization of your equity's execution efficiency, while the detail report is a detailed report of all orders eligible for the report. See Appendix for Execution Efficiency Report Columns and Definitions.

Eligible Orders and Volume

- Orders must be marketable
- Orders executed must execute while Order is Marketable
- Orders executed must execute "At or Better" than the NBBO

Note: Orders executed while order is non-marketable or worse than the NBBO are not considered for this report.

Execution Efficiency Defined: Total Eligible Shares Executed "At or Better" than the Target Quote, divided by the Lesser of the # of Shares Ordered or the Market Volume

Example 1: You had 200 Shares that Executed "At or Better" than the Target Quote. Market Volume was 100 and Order Volume was 200. Execution Efficiency would be 200/100 (market volume) = 2. (Volume Executed was 2 times more than Market Volume)

Example 2: You had 200 Shares that Executed "At or Better" than the Target Quote. Market Volume was 300 and Order Volume was 200. Execution Efficiency would be 200/200 (order volume) = 1 (Exactly 100% of Contracts of the Eligible Orders executed when there was sufficient volume)

Example 3: You had 200 Shares that Executed "At or Better" than the Target Quote. Market Volume was 300 and Order Volume was 400. Execution Efficiency would be 200/300 (market volume) = .667 (Only 67% of the Contracts of Eligible orders actually executed)

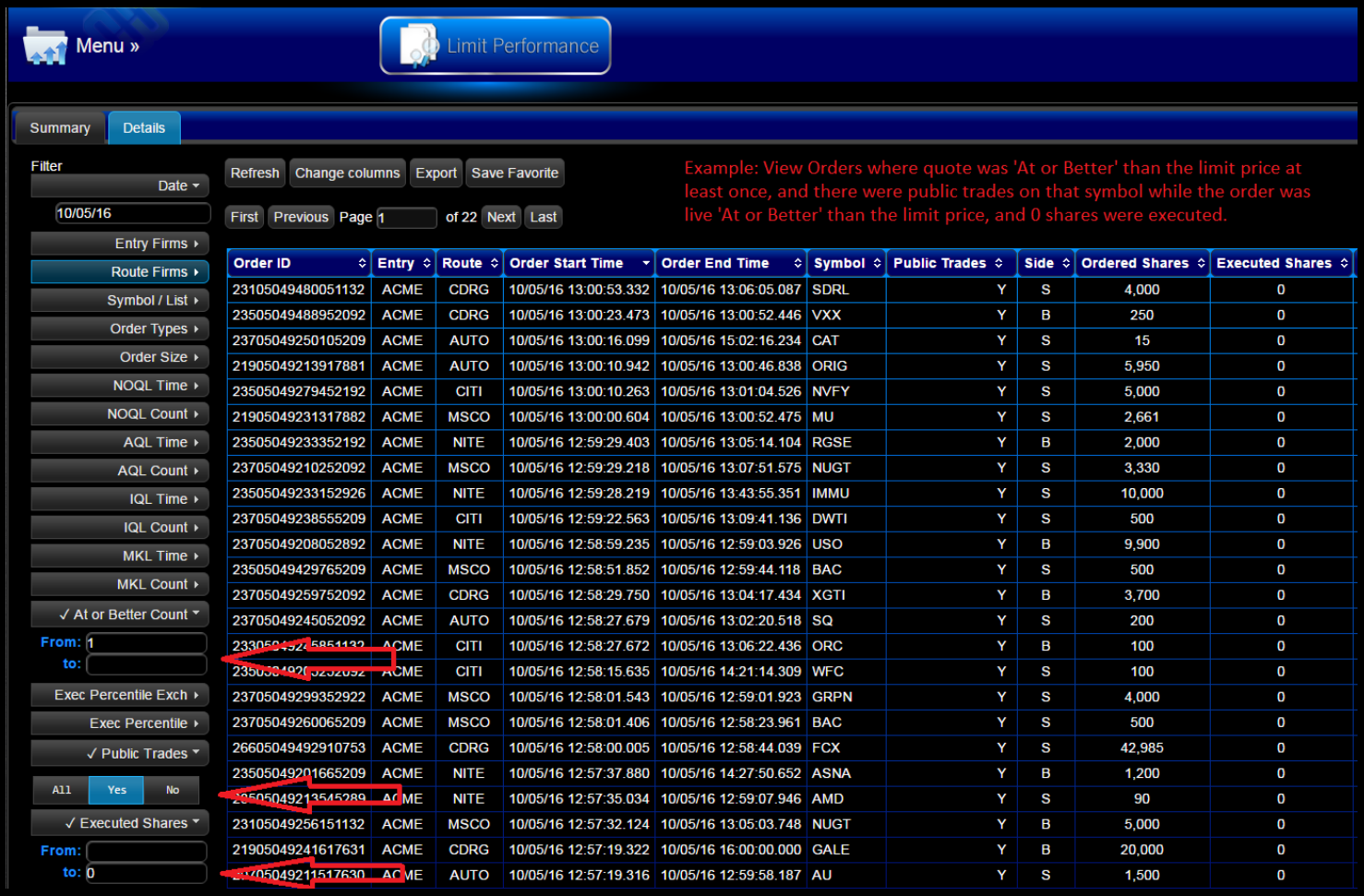
Example 4: You had 200 Shares that Executed "At or Better" than the Target Quote. Market Volume was 500 and Order Volume was 400. Execution Efficiency would be 200/400 (order volume) = .500 (Only 50% of Contracts of Eligible Orders executed)

Enhanced E/Q

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Limit Performance

The Limit Performance report allows you to review the performance of your non-marketable limit orders against the market and public trades. This report includes all route non-marketable limit orders excluding Short Sells as well OTC and PINK listed symbols. See Appendix for Limit Performance Columns and definitions.



Order ID	Entry	Route	Order Start Time	Order End Time	Symbol	Public Trades	Side	Ordered Shares	Executed Shares
23105049480051132	ACME	CDRG	10/05/16 13:00:53.332	10/05/16 13:06:05.087	SDRL	Y	S	4,000	0
23505049488952092	ACME	CDRG	10/05/16 13:00:23.473	10/05/16 13:00:52.446	VXX	Y	B	250	0
23705049250105209	ACME	AUTO	10/05/16 13:00:16.099	10/05/16 15:02:16.234	CAT	Y	S	15	0
21905049213917881	ACME	AUTO	10/05/16 13:00:10.942	10/05/16 13:00:46.838	ORIG	Y	S	5,950	0
23505049279452192	ACME	CITI	10/05/16 13:00:10.263	10/05/16 13:01:04.526	NVFY	Y	S	5,000	0
21905049231317882	ACME	MSCO	10/05/16 13:00:00.604	10/05/16 13:00:52.475	MU	Y	S	2,661	0
23505049233352192	ACME	NITE	10/05/16 12:59:29.403	10/05/16 13:05:14.104	RGSE	Y	B	2,000	0
23705049210252092	ACME	MSCO	10/05/16 12:59:29.218	10/05/16 13:07:51.575	NUGT	Y	S	3,330	0
23505049233152926	ACME	NITE	10/05/16 12:59:28.219	10/05/16 13:43:55.351	IMMU	Y	S	10,000	0
23705049238555209	ACME	CITI	10/05/16 12:59:22.563	10/05/16 13:09:41.136	DWTI	Y	S	500	0
23705049208052892	ACME	NITE	10/05/16 12:58:59.235	10/05/16 12:59:03.926	USO	Y	B	9,900	0
23505049429765209	ACME	MSCO	10/05/16 12:58:51.852	10/05/16 12:59:44.118	BAC	Y	S	500	0
23705049259752092	ACME	CDRG	10/05/16 12:58:29.750	10/05/16 13:04:17.434	XGTI	Y	B	3,700	0
23705049245052092	ACME	AUTO	10/05/16 12:58:27.679	10/05/16 13:02:20.518	SQ	Y	S	200	0
[illegible]	ACME	CITI	10/05/16 12:58:27.672	10/05/16 13:06:22.436	ORC	Y	B	100	0
[illegible]	ACME	CITI	10/05/16 12:58:15.635	10/05/16 14:21:14.309	WFC	Y	S	100	0
23705049299352922	ACME	MSCO	10/05/16 12:58:01.543	10/05/16 12:59:01.923	GRPN	Y	S	4,000	0
23705049260065209	ACME	MSCO	10/05/16 12:58:01.406	10/05/16 12:58:23.961	BAC	Y	S	500	0
26605049492910753	ACME	CDRG	10/05/16 12:58:00.005	10/05/16 12:58:44.039	FCX	Y	S	42,985	0
23505049201665209	ACME	NITE	10/05/16 12:57:37.880	10/05/16 14:27:50.652	ASNA	Y	B	1,200	0
[illegible]	ACME	NITE	10/05/16 12:57:35.034	10/05/16 12:59:07.946	AMD	Y	S	90	0
23105049256151132	ACME	MSCO	10/05/16 12:57:32.124	10/05/16 13:05:03.748	NUGT	Y	B	5,000	0
21905049241617631	ACME	CDRG	10/05/16 12:57:19.322	10/05/16 16:00:00.000	GALE	Y	B	20,000	0
[illegible]	ACME	AUTO	10/05/16 12:57:19.316	10/05/16 12:59:58.187	AU	Y	S	1,500	0

Equity TCA "Not Held" Reports

The TCA reports are "Not Held" order analyses that allow you to compare historical transactions against several metrics and enhanced algorithms. Not Held Execution analysis reporting allows you to easily analyze larger orders that execute over a longer period time, such as orders being executed via algorithmic trading systems. By comparing these orders to many different metrics, algorithms, traders, and venues you can rest assured you are making the best decisions for even the largest orders.

TCA Parent and Child

Unlike traditional TCA tools, which primarily compare the performance of a trade against the performance of other trades and similar business, S3's TCA tools take the analysis a step further by comparing against what could have been. Each individual execution is graded against the national best bid or offer to determine how well each transaction performed.

S3's TCA suite compares each parent and child order to a variety of different benchmarks, including:

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

• Arrival Time (also known as implementation shortfall) and Price

• Volume Weighted Average Price (VWAP) is measured not only during the trading time, but also during allowed order time, before and after the trade, and during the full day.

• Time Weighted Average Midpoint (TWAM) tracks the market as a whole and determines how your executions compared to what was quoting in the market.

See Appendix for a complete list of TCA Report Columns and definitions.

TCA Trade

S3 evaluates every single execution for a comprehensive determination of transaction cost and execution quality with additional metrics including forward and "backward looking" reversion statistics (±1 and ±5 seconds), liquidity charge, and timing consequence and presents this information via graphical and table-based reporting analysis.

Options Reports

S3 also provides companies with Options Reporting. Options reports include Details and Summary. For more information on Options, see Asset Classes.

Details

The Options Details Report gives you a detailed view of your options' orders. Here you will see a complete list of all orders or trades for a selected date range. There are generally three tabs on this report: Option Parent Orders, Option Child Orders, and Option Trades. Option Parent Orders is a list of your "New Orders." Option Child Orders is a list of your "Route Orders." And Option Trades is a full list of each individual trade. See Appendix for Options Orders Details Columns and definitions.

Summary

The Options Summary Report gives you a summarized view of your option orders for a selected date range. There are two tabs on this report: Option Parent Summary and Option Child Summary. Option Parent Summary is a summarization of your "New Orders." Equity Child Summary is normally a summarization of your "Route Orders." See Appendix for Options Summary Columns and definitions.

Options Execution Efficiency

The Options Execution Efficiency Report lets you compare option orders to the full market breadth available. The report compares the volume of executions at or better than the prevailing NBBO against the full market volume available at the NBBO. This allows you to identify orders that provided enhanced liquidity – orders that achieved a better volume than the available market; diminished liquidity – orders that failed to fully execute despite sufficient posted liquidity; and execution efficiency – an overall picture of how well executions performed relative to available liquidity. There are two tabs on this report: Summary and Detail. The summary report is a summarization of your options execution efficiency while the detail report is a detailed report of all contracts orders eligible for the report. See Appendix for Execution Efficiency Report Columns and Definitions.

Eligible Orders and Volume

- Orders must be marketable
- Contracts executed must execute while Order is Marketable
- Contracts executed must execute "At or Better" than the NBBO

Note: Contracts executed while order is non-marketable or worse than the NBBO are not considered for this report.

Execution Efficiency Defined: Total Eligible Contracts Executed "At or Better" than the Target Quote, divided by the Lesser of the # of Contracts Ordered or the Market Volume

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Example 1: You had 200 Contracts that Executed “At or Better” than the Target Quote. Market Volume was 100 and Order Volume was 200. Execution Efficiency would be 200/100 (market volume) = 2. (Volume Executed was 2 times more than Market Volume)

Example 2: You had 200 Contracts that Executed “At or Better” than the Target Quote. Market Volume was 300 and Order Volume was 200. Execution Efficiency would be 200/200 (order volume) = 1 (Exactly 100% of Contracts of the Eligible Orders executed when there was sufficient volume)

Example 3: You had 200 Contracts that Executed “At or Better” than the Target Quote. Market Volume was 300 and Order Volume was 400. Execution Efficiency would be 200/300 (market volume) = .667 (Only 67% of the Contracts of Eligible orders actually executed)

Example 4: You had 200 Contracts that Executed “At or Better” than the Target Quote. Market Volume was 500 and Order Volume was 400. Execution Efficiency would be 200/400 (order volume) = .500 (Only 50% of Contracts of Eligible Orders executed)

Complex Options Reports

In cases where complex option data can be provided, S3 provides reports on complex options detail. For more information on S3’s Complex Options reporting solution please visit http://s3.com/complex-options/.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Trade Surveillance Reporting

S3's **Trade Surveillance Suite (TSS)** allows clients to monitor trading for a variety of restricted behaviors across multiple asset classes, including Market Manipulation and other Trade-based regulatory reporting.

The TSS currently monitors for the following:

Equities/Options: Marking the Close

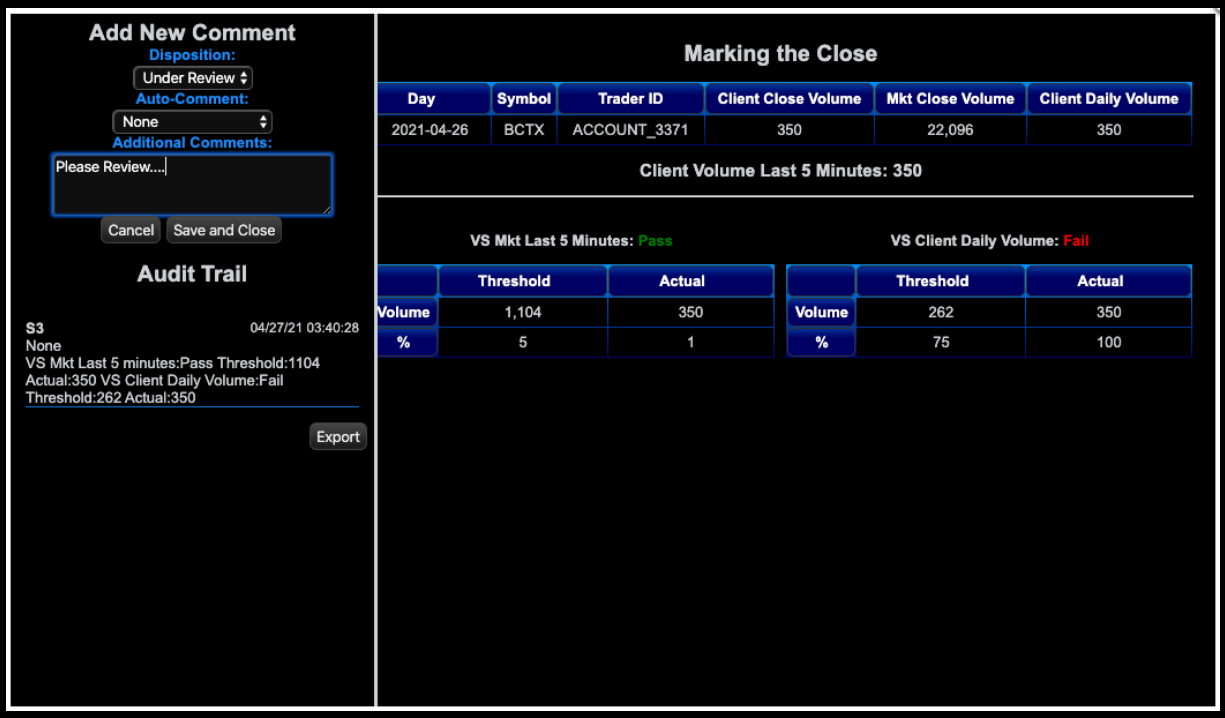
Marking the Close

- Client volume in close period is more than x% of market volume in the same period.
- Client volume in close period is more than x% of the total client volume for the day.

Audit Trail

For more detail about each exception, look for the paper and pen icon to open the Audit Trail. Here..

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.



Equities/Options: Trade Through

- Trade Through - Scan all NBBO quotes within a set number of seconds before and after the trade. If there is no quote at the trade price generate an exception.

Equities/Options: Layering

- Layering - Layering exception will look for orders placed off the NBBO that are within a set number of ticks of the NBBO. The goal is to look for the appearance of interest on one side of the market when there is no intention to trade on that side of the market.

Equities/Options: Spoofing

- Spoofing - Spoofing occurs when a layer event has been triggered and there is a trade on the opposite side of the market within a set number of seconds

Equities/Options: Reg SHO

- Reg SHO - Check all symbols in REG SHO state (list curated from listing exchange). If a short sell trades at less than or equal to the NBBO bid price, generate an exception.

Cross Product (Equities and Options): Data Manipulation

- Equity-Options manipulation (“Mini-manipulation”)

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Exceptions

The TSS Exceptions Report gives you a summary of all trade exceptions for a given date range. From here you can quickly see your Exception Types as well as the number of Resolved and Unresolved Exceptions. See Appendix for Trade Surveillance Exceptions Columns and definitions.

Changing Parameters and Running Back Tests

Viewing Test Results

Parameter History

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

World View Reports

World View report gives users a summarized world view of equities at the parent or child order level. This report allows you to group by such things as currency, country, and origin.

Compliance Reports

Along with Equity and Options Reporting, S3 provides many customers with their 605 and 606 compliance reporting.

Rule 605 Report

Under Rule 605, market centers that trade National Market System securities are required to make available to the public monthly electronic reports that include uniform statistical measures of execution quality. S3's Rule 605 Report gives you a way to view, filter, and drill into your Public 605 Data.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

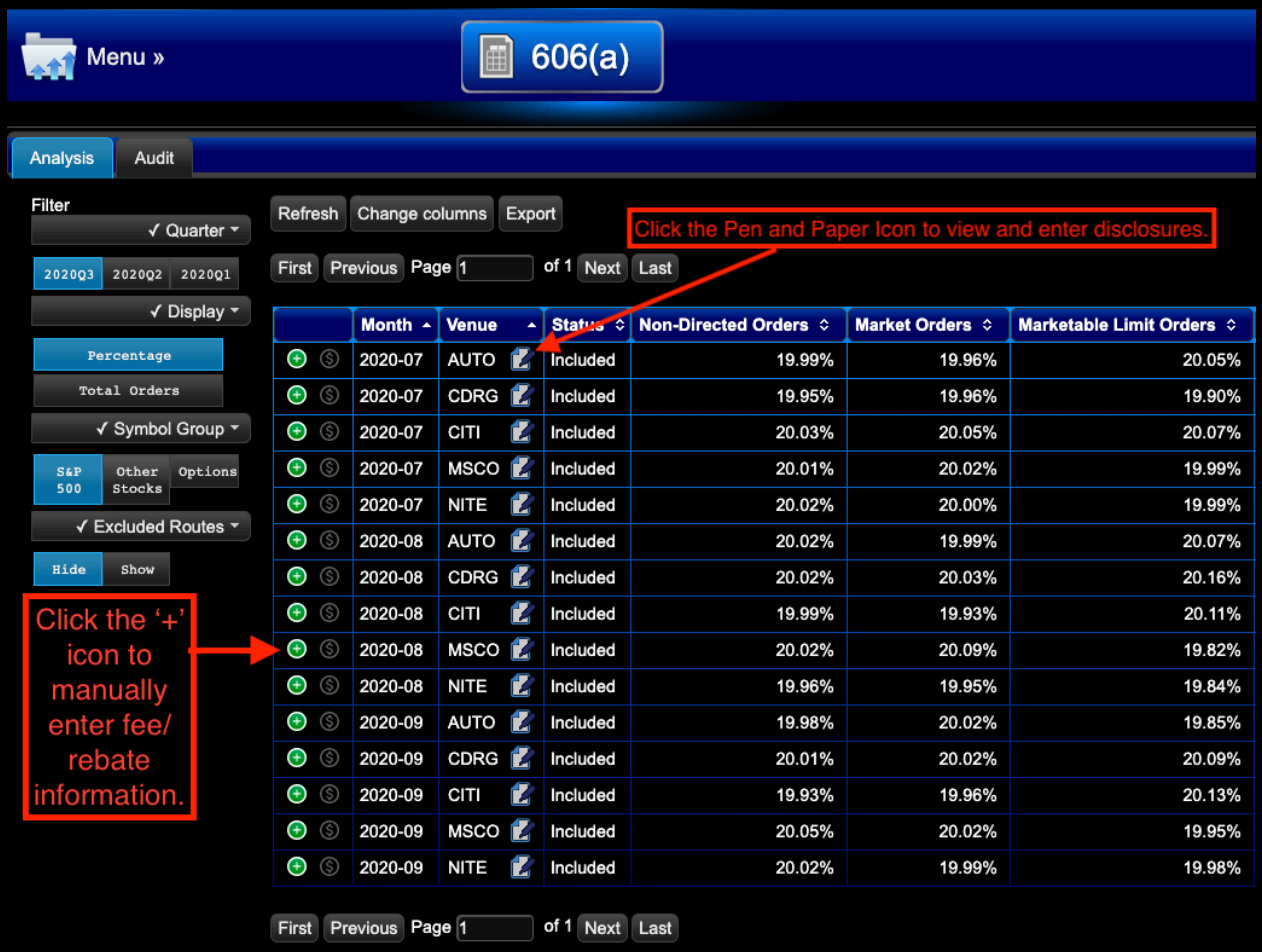
Rule 606(a) Report

Under Rule 606a of SEC Regulation NMS, broker-dealers that route customer orders in options or "Held" equity securities are required to make publicly available quarterly reports that, among other things, identify the venues to which customer orders are routed for execution along with any associated net fees or rebates. S3's Rule 606a Report gives you a way to view, filter, and drill into your Public 606 Data. The Portal has two tabs: 606 Analysis and 606 Audit. The 606 Analysis gives you a quarterly view while the 606 Audit gives you your 606 Order Details for a selected Date Range.

606a Analysis

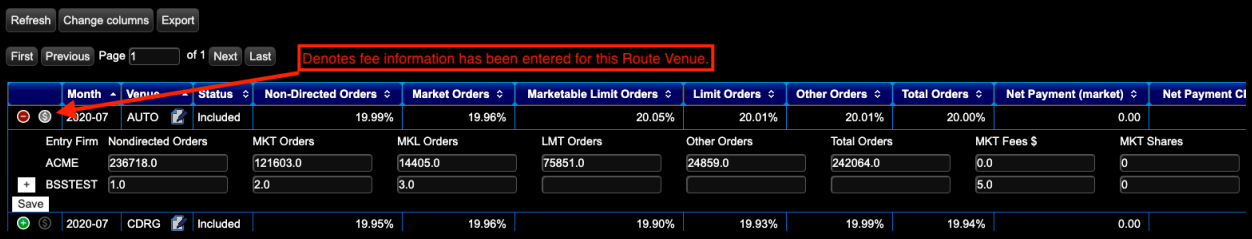
The 606a Analysis Tab has many features. Along the left side of the page you can filter by Date (Quarter) or Symbol Group. You can also choose to view your 606a orders as a percentage of routes or total routed orders. If you have routes that have been excluded from your public 606a because of the 90% rule, they will also be excluded from the default view. You can see any excluded routes using the 'Excluded Routes' filter.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.



Manually Editing

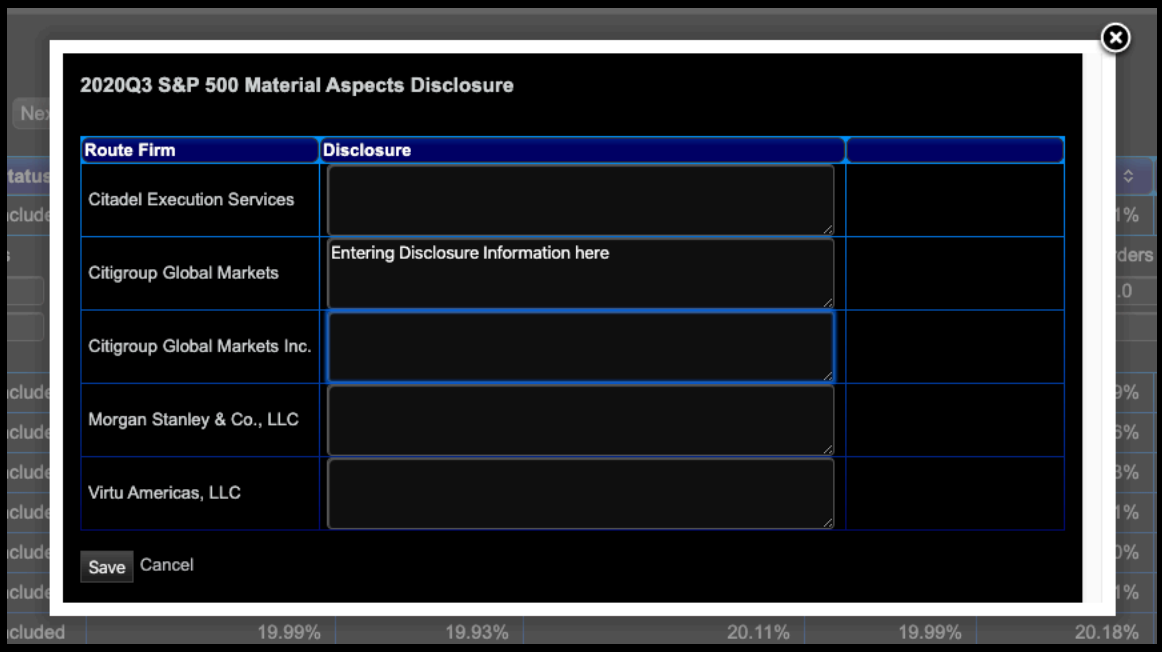
Clicking the green '+' icon on any row allows you to manually enter or edit Order Counts, Fees, and Shares for the selected Route Venue.



Entering Disclosure Information

Clicking any Paper & Pen Icon next to a Route Venue allows you to enter your disclosure information for any and all Route Venues.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.



606A AUDIT

The 606(a) Audit tab allows you to view the details and verify the orders in your 606(a) report. When using the same Date and Security Type filters, you can see exactly which orders make up your 606(a) report. The filters on this report also allow you to view 'Excluded Orders' or search for specific order IDs.

Entry	Order ID	Parent order	Status	Symbol	Route	Side	Directed Order	Order Size	Target Quote	Value
ACME	223091-0442927	223091-0442926	All	GE	CITI	Sell	No	338164	6.25 x 6.26	2,113,525.00
ACME	223091-1026931	223091-1026930	All	MU	MSCO	Buy	No	300654	48.16 x 48.17	14,482,503.18
ACME	223091-1026929	223091-1026928	All	MU	CITI	Buy	No	300654	48.37 x 48.38	14,545,640.52
ACME	223091-1026927	223091-1026926	All	MU	AUTO	Buy	No	300654	48.47 x 48.48	14,575,705.92
ACME	223091-1424597	223091-1424596	All	F	MSCO	Sell	No	215000	6.63 x 6.64	1,425,450.00
ACME	223091-0445987	223091-0445986	All	F	MSCO	Buy	No	200000	6.66 x 6.67	1,334,000.00
ACME	223091-1412286	223091-1412285	All	F	AUTO	Sell	No	165000	6.63 x 6.64	1,093,950.00
ACME	223091-0464286	223091-0464285	All	F	MSCO	Sell	No	125000	6.65 x 6.66	831,250.00
ACME	223091-0424230	223091-0424229	All	F	CDRG	Buy	No	125000	6.67 x 6.68	835,000.00
ACME	223091-1453393	223091-1453392	All	GE	AUTO	Buy	No	65000	6.21 x 6.22	404,300.00
ACME	223091-0457897	223091-0457896	All	T	CITI	Buy	No	52613	28.50 x 28.51	1,499,996.63
ACME	223091-0458123	223091-0458122	All	GE	NITE	Buy	No	50000	6.24 x 6.25	312,500.00
ACME	223091-1338003	223091-1338002	All	UAL	MSCO	Short Sale	No	50000	35.69 x 35.70	1,784,500.00
ACME	223091-1475832	223091-1475831	All	UAL	CDRG	Short Sale	No	50000	35.44 x 35.45	1,772,000.00
ACME	223091-1419059	223091-1419058	All	F	CDRG	Buy	No	50000	6.63 x 6.64	332,000.00
ACME	223091-0521500	223091-0521499	All	AAL	CDRG	Buy	No	48000	12.56 x 12.57	603,360.00
ACME	223091-0527454	223091-0527453	All	COTY	CITI	Sell	No	47000	2.72 x 2.73	127,840.00
ACME	223091-1423756	223091-1423755	All	COTY	NITE	Buy	No	47000	2.72 x 2.73	128,310.00

RULE 606(B)(3) REPORT

Under Rule 606 of SEC Regulation NMS, Rule 606(b)(3) requires a broker-dealer, upon request of its customer, to provide specific disclosures related to the routing and execution of the customer's NMS stock orders submitted on

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

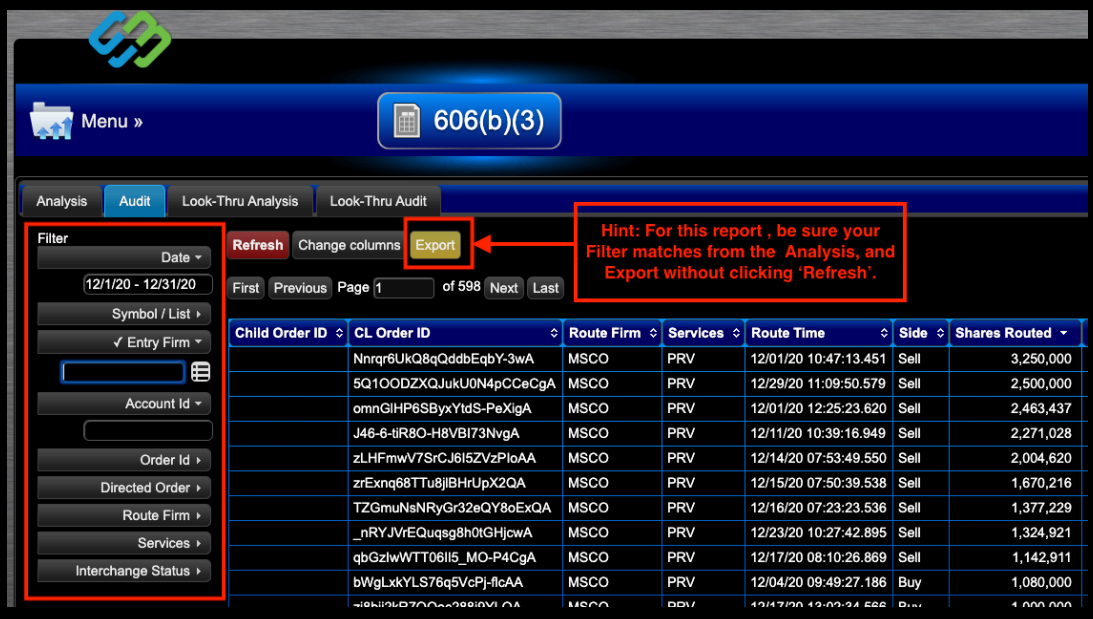
a not held basis for the prior six months along with any associated net fees or rebates. S3's Rule 606b3 Reporting gives users the ability to quickly view and export requested 606b3 reports in the required PDF and XML formats. The Portal has four tabs: Analysis, Audit, Look-Through Analysis, and Look-Through Audit.

606b3 Analysis

The 606b3 Analysis Report gives you the ability to filter by Account and Date then export the required 606b3 PDF and XML reports. Choose the date range for which the client has requested, then filter by Account or Order ID. You can enterer multiple Account or Order IDs by using a comma delimiter.

606B3 Audit

The 606(b)(3) Audit tab allows you to view the order details and verify the orders in your 606 report. When using the same filter set from your Analysis, you can see exactly which orders make up your 606 report. The filters on this report also allow you to search and verify specific order IDs.



Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Appendix

Appendix A: Market Quote Condition Codes

1	Regular
2	Depth On Offer
3	Depth On Bid
4	Closing
5	News Dissemination
6	Fast Trading
7	Trading Range
8	Depth On Bid Offer
9	Order Influx
10	Due To Related
11	News Pending
12	Market Maker Closed
13	Additional Info
14	NonFirm
15	Opening Quote
16	Additional Info Due To Related
17	Resume
18	View Of Common
19	Volume Alert
20	Order Imbalance
21	Equipment Changeover
22	No Open No Resume
23	Crossed
24	Locked
25	Automatic Execution
26	Automatic Execution ETH
27	Regular ETH
28	Fast Market
29	Fast Market ETH
30	Inactive
31	Inactive ETH
32	Rotation
33	Rotation ETH
34	Halt
35	Halt ETH

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

36	Due To News Dissemination
37	Due To News Pending
38	Trading Resumption
39	Out Of Sequence
40	Bid Specialist
41	Offer Specialist
42	Bid Offer Specialist
43	End Of Day SAM
44	Forbidden SAM
45	Frozen SAM
46	PreOpening SAM
47	Opening SAM
48	Open SAM
49	Surveillance SAM
50	Suspended SAM
51	Reserved SAM
52	No Active MarketMaker
53	Restricted
54	Manual Ask Automatic Bid
55	Manual Bid Automatic Ask
56	Manual Bid Manual Ask
57	Slow On Offer
58	Slow On Bid
59	Slow On Bid And Offer
60	Slow Due To Set Slow List On Bid And Offer
61	Slow Due To LRPorGapOnOffer
62	Slow Due To LRP or Gap On Bid
63	Slow Due To LRP or Gap On Bid And Offer
64	One Side Automated
65	Board Lot
66	Odd Lot
67	Manual Bid Manual Ask Non Firm
68	Blank
69	Cabinet
70	Differential
71	Exchange For Physical
72	Exchange For Physical Cross
73	Hit

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

74	Implied
75	Large Order
76	Small Order
77	Nominal Notional
78	Option Excercise
79	Percentages
80	Auto Quotes
81	Indicative
82	Exchange For Swaps
83	Take
84	Exchange For Options
85	Nomial Cabinet
86	Changing Transaction
87	Firm BBO Price
88	Indicative Best Bid or Offer
89	Only Market Orders On Book
90	One Of Both Sides Of Book Empty
91	One Size Firm Other Side Market
92	Firm Quote is Closed
93	Unsolicited
94	Offer Not Firm Bid Firm
95	Bid Not Firm Offer Firm
96	Level 1 Breached
97	Level 2 Breached
98	Level 3 Breached

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

Appendix B: Market Trade Condition Codes

0	Undefined
1	Regular
2	Cash Market
3	Average Price
4	Cash Clearing
5	Next Day Market
6	Automatic Execution
7	Inter Market Sweep
8	Opening Detail
9	Intraday Detail
10	Cap Election
11	Rule 127
12	Rule 155
13	Sold Last
14	Next Day Clearing
15	Late Open
16	Seller
17	FormT
18	Out Of Sequence
19	Cancel
20	Volume Only
21	Direct Plus
22	Acquisition
23	Bunched
24	Distribution
25	BunchedSale
26	Split Trade
27	Cancel Stopped
28	Cancel ETH
29	Cancel Stopped ETH
30	Out Of Sequence ETH
31	Cancel Last ETH
32	Sold Last Sale ETH
33	Cancel Last
34	Sold Last Sale

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

35	Cancel Open
36	Cancel Open ETH
37	Opened Sale
38	Opened Sale ETH
39	Cancel Only
40	Cancel Only ETH
41	Late Open ETH
42	Auto Execution ETH
43	Reopen
44	Reopen ETH
45	Adjusted
46	Adjusted ETH
47	Spread
48	Spread ETH
49	Straddle
50	Straddle ETH
51	Stopped
52	Stopped ETH
53	Regular ETH
54	Combo
55	Combo ETH
56	Official Closing Price
57	Prior Reference Price
58	Stopped Sold Last
59	Stopped Out Of Sequence
60	Official Opening Price
61	Crossed
62	Fast Market
63	Sold Out of Sequence Extended Hours
64	Opening Range
65	Closing Range
66	Bid Ask Price
67	Yellow Flag Regular Trade
68	Market Center Opening Trade
69	Market Center Closing Trade
70	Market Center ReOpening Trade
71	Derivatively Priced
72	Price Variation

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

73	Cross Trade
74	Block Trade
75	Stock Option Trade
76	Stopped Intermarket
77	Benchmark Trade
78	Trade Through Exempt
79	Blank
80	Cabinet
81	Differential
82	Exchange for Physcial
83	Exchange for Physcial Cross
84	Hit
85	Implied
86	Large Order
87	Small Order
88	Nominal Notional
89	Option Excercise
90	Percentage
91	Auto Quotes
92	Indicative
93	Exchange for Swaps
94	Take
95	Exchange for Options
96	Nominal Cabinet
97	Changing Transaction
98	Single Leg
99	Single Leg ETH
100	Delayed Sale
101	Delayed Delivery
102	Contigent Trade
103	Non Board Lot
104	Mandatory Cash
105	VWAP Trade
106	Inactive Board
107	Inactive Issuer
108	Capital Pool
109	Special Terms Trading
110	Non Voting Shares

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

111	Basis Trade
112	Accrued Interest Stock
113	MOC Trade
114	Restricted
115	Special Trading Session
116	US Dollar
117	Subordinate Shares
118	Bypass Trade
119	Late Correction
120	Not to Mark
121	Reserved
122	Contra Trade
123	Uncrossing Trade
124	Previous Day Contra Trade
125	Ordinary Trade Delayed Publication
126	Negotiated Trade Immediate Publication
127	Negotiated Trade Delayed Publication
128	OTC Trade Immediate Publication
129	OTC Trade Delayed Publication
130	Inter Fund Cross Delayed Publication
131	OTC Trade Late Correction
132	SI Trade Immediate Publication
133	SI Trade Delayed Publication
134	SI Trade Late Correction
135	Exempt 611
136	Ordinary Trade Immediate Publication
137	Opening Settlement
138	Trade Condition Max
139	Dark Pool
140	Odd Lot Trade
141	Corrected Consolidated Close
142	Internal Cross
143	ByPass Cross
144	Cash Clearing Next Day
145	Derivatives Contigent Clearing
146	Non Net Clearing
147	UnrelatedToMarketPrice
148	MarketMakerSettlement

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

149	SipContingentTrade
150	SipQualifiedContingentTrade
151	NationalCrossTrade
152	Auction Non ISO
153	Auction ISO
154	Cross Non ISO
155	Cross ISO
156	Floor Trade
157	Complex Auto Trade
158	Complex Auction
159	Complex Cross
160	Complex Floor Trade
161	Complex Auto Trade
162	Stock Options Auction
163	Complex Auction v Single Leg
164	Complex Floor v Single Leg
165	Stock Options Auto Trade
166	Stock Options Cross
167	Stock Options Floor
168	Stock Options Auto Trade v Single Leg
169	Stock Options Auction v Single Leg
170	Stock Options Floor v Single Leg
171	Complex Floor Prop Product

Appendix C: Report Filters for Equites and Options

- Date – Found on most reports, the 'Date' filter allows you to filter by a specific date or date range.
- Entry Firm – Allows you to filter on from where your orders are being received.
- Symbol / List – Allows you to filter by a specific symbol or symbol list. You can create your own symbol list under 'Class List Management'.
- Order Type – Allows you to filter by whether the order is marked as a Market, Limit, Marketable Limit, Stop, or Stop Limit order. Market and Marketable Limit orders are considered 'Marketable Orders'.
- Order Size – Allows you to filter by the order size. For equities, the filter is based on number of shares. For options, it is based on the number of contracts.
- Notional (Order) – Allows you to filter by the notional value of the order. Notional Value is determined by the executed order size multiplied by the average execution price.
- Oversized Orders – Allows you to filter by orders that may have outsized the market. Oversized orders are those that are at least 10x the aggregated BBO volume at the NBBO price point (depending if it's a buy or sell) at the time of order placement.
- AON – Allows you to filter by orders tagged as "All or None". "All or None" is a client instruction to execute the full order or else don't execute the order at all.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Not Held – Allows you to filter by orders tagged as “Held” or “Not Held”. A “Held” order is a market **order** that requires prompt execution for an immediate fill. Most retail order flow is considered “Held” order flow. A “Not Held” order, provides traders with both time and price discretion to try and get a better fill. Most institutional order flow is typically “Not Held” order flow.
- Modifiers / Conditions – Allows you to filter by orders tagged with special handling conditions or orders that were placed while the market locked, crossed, or halted. See Market Data Table for more information.
- Covered Orders – Allows you to filter by orders tagged by S3 as 605 eligible.
- Listing Exchange – Allows you to filter by orders for symbols listed on a specific stock exchange.

Appendix D: Equities Details Columns (Parent Orders)

- Parent Order ID – Order ID of the Parent Order or “New Order”
- Entry – Entry Firm
- Status – Last reported status of the Order
- Order Time – Time when the Parent Order was placed
- Side – (B)uy or (S)ell
- Size – Order Volume of Parent Order
- Symbol – Equity Symbol being traded
- Type – Order Type
    - MKT – Market
    - LMT – Limit
    - MKL – Marketable Limit
    - STP – Stop
    - STL – Stop Limit
- Limit $ - Limit Price of the Order
- Stop $ - Stop Price of Order
- Notional $ (Order) – Notional Dollar Value of “Filled” Order
- Variance $ - Total variance of executed trades of the Parent Order in dollars between trade price and quote match price (using client defined time of execution match mode)
- EFQ – Effective Spread divided by Quoted Spread
- TIF – Time in Force of the Order
    - DAY – Day Order
    - FOK – Fill or Kill
    - GTC – Good til Cancelled
    - GTD – Good til Date
    - IOC – Immediate or Cancel
- Expiration Time – Parent Order Expiration Time
- Firm Trader ID – Trader ID assigned to the Parent Order
- Order Account ID – Account ID of Parent Order
- DO – Direct Order
- DNR – Do Not Reduce
- AON – All or None
- NH – Not Held
- FAO – Fill at Open
- FAC – Fill at Close
- Manual – Manual Order

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Pre Market – Orders allowed to trade before Open
- Post Market – Orders allowed to trade after Close
- Audit Status – S3 Portal Audit Status
    - None
    - Resolved
    - Under Review
- 605 Order Type – Rule 605 Order Type at Time Order was Received
    - MKL – Marketable Limit
    - MKT – Market
    - NQL – Near or Outside the Quote
    - AQL – At the Quote
    - IQL – Inside the Quote

Appendix E: Equities Details Columns (Child Orders)

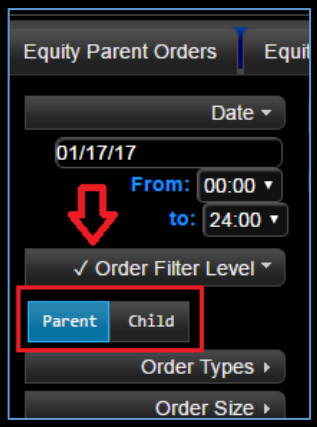
- Parent Order ID - Order ID of the Parent Order or "New Order"
- Child Order ID – Order ID of the Child or "Route Order"
- Entry – Entry Firm
- Route – Route Firm
- Status – Last reported status of the Order
- Route Time – Time when the Child Order was routed
- Side – (B)uy or (S)ell
- Size – Order Volume of Child Order
- Symbol – Equity Symbol being traded
- Type – Order Type
    - MKT – Market
    - LMT – Limit
    - MKL – Marketable Limit
    - STP – Stop
    - STL – Stop Limit
- Limit $ - Limit Price of the Childe Order
- Stop $ - Stop Price of the Child Order
- Notional $ (Order) – Notional Dollar Value of "Filled" Order
- Variance $ - Total variance of executed trades of the Child Order in dollars between trade price and quote match price (using client defined time of execution match mode)
- EFQ – Effective Spread divided by Quoted Spread
- Route Speed – Time is seconds from Parent Order Time to time the order was routed.
- TIF – Time in Force of the Child Order
    - DAY – Day Order
    - FOK – Fill or Kill
    - GTC – Good til Cancelled
    - GTD – Good til Date
    - IOC – Immediate or Cancel
- Expiration Time – Route Order Expiration Time
- Firm Trader ID – Trader ID assigned to the Route Order
- Order Account ID – Account ID of Parent Order

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- DO – Direct Order
- DNR – Do Not Reduce
- AON – All or None
- NH – Not Held
- FAO – Fill at Open
- FAC – Fill at Close
- Manual – Manual Order
- Pre Market – Orders allowed to trade before Open
- Post Market – Orders allowed to trade after Close
- Audit Status – S3 Portal Audit Status
    - None
    - Resolved
    - Under Review

Appendix F: Equities Details Columns (Trades)

- Parent Order ID – ID of Parent Order
- Child Order ID – ID of Route Order
- Part – Trade Part
- Entry – Parent Order Entry Firm
- Route – Route Order Firm
- Exchange – Exchange where Trade occurred
- Status – Order Status (Parent or Route, depending on “Order Filter Level”)
- Trade Time – Time of Trade Execution
- Side – (B)uy or (S)ell
- Order Size – Order Size (Parent or Route, depending on “Order Filter Level”)
- Trade Size – Size of Trade Execution
- Symbol – Order Symbol
- Type – Order Type (Parent or Route, depending on “Order Filter Level”)
- Limit $ - Limit Price (Parent or Route, depending on “Order Filter Level”)
- Stop $ - Stop Price (Parent or Route, depending on “Order Filter Level”)
- TIF – Time in Force (Parent or Route, depending on “Order Filter Level”)



- Price $ - Execution Price
- Notional $ (Order) – Total Value of Executed Order (Parent or Route, depending on “Order Filter Level”)
- Notional $ (Trade)- Total Value of Shares Executed for the given Trade
- Trade Speed – Time in Seconds from when the Order was received or routed (Depending on “Order Filter Level”) to Trade Execution Time
- Target Quote – Quote in which Trade Price is compared to. Execution Match Type is Client Defined
    - TBM – Time Became Marketable
    - TOP – Time of Placement
    - TEX – Time of Execution
- Target Size – Market Volume at Time of Target Quote Match
- Variance $ - In Dollars, Difference Between Executed Shares*Price and Executed Shares*Target Quote for the given Trade
- Variance % - Percent of Variance per Share as defined as "Variance per Share / Action Price"
- EFQ – Effective Spread / Quoted Spread
- Action Party Type – Action Party Type

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Trader ID – ID after Trader Assigned to Order
- Order Account ID – Account ID on Order
- DO – Directed Order
- DNR – Do Not Reduce
- AON – All or None
- NH – Not Held
- FAO – Fill at Open
- FAC – Fill at Close
- Audit Status - S3 Portal Audit Status
    - None
    - Resolved
    - Under Review

Appendix G: Equity Summary Columns

- Date – Order Date
- Entry – Entry Firm
- Route – Route Firm (Child Summary Only)
- Symbol – Equity Symbol on the Order
- Type – Order Type
    - MKT – Market
    - LMT – Limit
    - MKL – Marketable Limit
    - STP – Stop
    - STL – Stop Limit
- Order Size – Size of Order
- Orders Placed – Total Number of Orders Placed, Excluding Manual and Rejected Orders
- Orders Filled – Total Number of Orders Filled having at least One Filled Order
- Shares Placed – Total Number of Shares Placed Excluding Orders with Manual or Rejected Status
- Trades – Total Number of Executed Trades
- Shares Executed – Total Number of Shares Executed, Excluding Orders with a Status or Manual or Rejected
- Notional $ (Trade) - Total Value of Shares Executed
- Speed - Share Weighted Average Number of Seconds from when the Order became Marketable (TBM1) to the Trade Time in Milliseconds
- Effective Spread – Share Weighted Average Spread Calculated by Taking the Difference between the Actual Trade Price and the Midpoint of the Ask and Bid Price and Multiplied by Two. Ask and Bid Price is Determined Using Client Defined Time of Execution Match
- Quoted Spread – Share Weighted Average Difference between Ask and Bid Price Using Client Defined Time of Execution Match
- Realized Spread – Spread Calculated by Taking Difference of Execution Price and Midpoint of the Quoted Price Five Minutes after Execution and Multiplied by Two.
- EFQ – Effective Spread Divided by the Quoted Spread
- At or Better % - Total Percentage of Shares that Executed at or better than the NBBO
- Price Improved % - Total Percentage of Shares that Executed

Note: NBBO Quote Will Vary Depending on Client Defined Time of Execution Match

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- better than the NBBO
- Price Improved $ - Total Dollar Amount of Price Improvement Only Counting Shares that Executed Better than the NBBO
- Price Improvement Per Share – Total Dollar Amount of Price Improvement Divided by Number of Shares Executed Better than the NBBO
- Slippage % - Total Percentage of Shares that Executed Worse than the NBBO
- Slippage $ - Total Dollar Amount of Slippage Only Counting Shares that Executed Worse than the NBBO
- Variance $ - Total Net Variance, Includes Price Improved $ and Slippage $
- Avg Variance $ - Average Net Variance, Includes Price Improved $ and Slippage $
- Avg Shares Placed – Average shares per order. Total shares divided by total orders
- Pct Shares Executed – Percent of total shares placed that executed
- PI Shares – Total number of shares with price improvement
- Slippage Shares – Total number of shares with slippage
- At or Better Shares – Total number of shares that executed at or better than NBBO

Appendix H: Limit Performance Columns (Summary)

- Date – Route Order Date
- Entry – Entry Firm
- Route – Route Firm
- Symbol – Order Symbol
- Order Type – Order Type at the Time of ***Parent Order*** was received
  - MKL – Marketable Limit
  - MKT – Market
  - NQL – Near the Quote (within 10 cents)
  - AQL – At the Quote
  - IQL – Inside the Quote
  - LMT – Away from the Quote (More than 10 cents away)
- Order Size – Size of Routed Order
- Public Trades – 'Y' or 'N' Flag that indicates if there were any public shares trade for the symbol on the order 'At or Better' than the Route Order Limit Price after Time of Route while the order was live.
- Public Exchange Trades - Were there any public shares traded at exchanges (excluding TRF) at or better than the order's limit price while the order was live.
- Orders – Total Number of Route Orders
- Ordered Shares – Total Number of Ordered Shares
- Shares – Total Number of Shares Executed
- Nql Time – Average Number of Milliseconds the Route Orders were 'Near or Outside the Quote'
- Nql Count – Average Number of times the Route Orders were 'Near or Outside the Quote'
- Aql Time – Average Number of Milliseconds the Route Orders were 'At the Quote'
- Aql Count – Average Number of times the Route Orders were 'At the Quote'
- Iql Time – Average Number of Milliseconds the Route Orders were 'Inside the Quote'
- Iql Count – Average Number of times the Route Orders were 'Inside the Quote'
- Mkl Time – Average Number of Milliseconds the Route Orders were Marketable
- Mkl Count – Average Number of times the Route Orders were Marketable
- Fill Rate – Executed Shares divided by Ordered Shares

Note: Filter should be left blank to indicate no limit. Example: From: 100, To: blank indicates 100 to infinity.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Execution Percentile Exchanges Only - Average Execution Percentile where Execution Percentile equals Routed Shares Executed / (Routed Shares Executed + Shares Executed 'At or Better' than the Limit Price across all Exchanges excluding TRF (Trade Reporting Facility) while the order was live)
- Execution Percentile - Average Execution Percentile where Execution Percentile equals Routed Shares Executed / (Routed Shares Executed + Shares Executed 'At or Better' than the Limit Price cross all Exchanges while the order was live)
- TIF – Time in Force
- Status – Order Status
    - O – Open
    - F – Filled
    - P – Partial Fill
    - C – Canceled
    - RJ – Rejected
    - X – Expired
    - CR – Cancel Replace
    - M - Manual

Appendix I: Limit Performance Filters

- Date – Date of Routed Orders. Filter is defaulted to most recent day of data
- Entry Firms – Allows you to filter your report down to one or many entry firms
- Route Firms – Allows you to filter your report down to one or many route firms
- Order Types – Order Type at the Time the ***Parent Order*** was received.
    - MKL – Marketable Limit Order
    - MKT – Market Order
    - NQL – Near the Quote (within 10 cents)
    - AQL – At the Quote
    - IQL – Inside the Quote
    - LMT – Away from the Quote (more than 10 cents away)
- Order Size – Size of Route Order
- NOQL Time – Time in Milliseconds a Routed Limit Order was 'Near or Outside' the Quote while the order was live
- NOQL Count – Number of Times a Routed Limit Order was 'Near or Outside' the Quote while the order was live
- AQL Time – Time in Milliseconds a Routed Limit Order was 'At the Quote' while the order was live
- AQL Count – Number of Times a Routed Limit Order was 'At the Quote' while the order was live
- IQL Time – Time in Milliseconds a Routed Limit Order was 'Inside the Quote' while the order was live
- IQL Count – Number of Times a Routed Limit Order was 'Inside the Quote' while the order was live
- MKL Time – Time in Milliseconds a Routed Limit Order was Marketable while the order was live
- MKL Count – Number of Times a Routed Limit Order was Marketable while the order was live
- At or Better Count – Number of Times a Routed Limit Order was 'At or Better' ('At the Quote', 'Inside the Quote', or Marketable) while the order was live
- Exec Percentile Exch – Allows you to filter on Orders with Average Percent Range where Execution Percentile equals Routed Shares Executed / (Routed Shares Executed + Shares Executed 'At or Better' than the Limit Price across all Exchanges excluding TRF (Trade Reporting Facility) while the order was live)

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Exec Percentile – Allows you to filter on Orders with Average Percent Range where Execution Percentile equals Routed Shares Executed / (Routed Shares Executed + Shares Executed 'At or Better' than the Limit Price cross all Exchanges while the order was live)
- Public Trades – Allows you to filter on Routed Limit Orders where the symbol on the order was publicly traded 'At or Better' than the limit price on the order while the order was live
- Public Exchange Trades – Allows you to filter on Routed Limit Orders where the symbol traded on public exchange (excluding 'TRF') 'At or Better' than the order limit price while the order was live
- Time in Force – Time in force of the routed order
    - DAY – Day order
    - FOK – Fill or Kill
    - GTC – Good til Cancel
    - GTD – Good til Date
    - IOC – Immediate or Cancel
- Not Held Orders – Allows you to filter on or out 'Not Held' orders.
- Order Status – Allows you to filter on current status of the order.
    - O – Open
    - F – Filled
    - P – Partial Fill
    - C – Canceled
    - RJ – Rejected
    - X – Expired
    - CR – Cancel Replace
    - M - Manual
- Executed Shares – Allows you to filter Orders by Number of Shares Executed
- P Shares Exec Exch – Allows you to filter on Number of Orders Executed across all Exchanges excluding TRF (Trade Reporting Facility) where Public Shares traded for the order symbol 'At or Better' than the Order Limit Price while the order was live
- P Shares Exec – Allows you to filter on Number of Orders Executed across all Exchanges where Public Shares traded for the order symbol 'At or Better' than the Order Limit Price while the order was live

Appendix J: Equity TCA Report Columns (Summary)

- Date – Order Date when using 'Group by Month' or 'Group by Day'
- Symbol – Order Symbol
- Side - Buy(B), Sell(S) or Short Sell(SS)
- Entry - Entry Firm
- Order Type – Order Type (MKT, LMT, Etc…)
- Parent / Child Algo ID – Algorithm ID
- Parent / Child Firm Trader ID – ID of Trader
- % of ADV – Percent of Average Daily Volume
- Arrival Spread (BP) – Spread at the Arrival Time in Basis Points
- Participation Rate – Order Percentage of Total Market Volume
- Fill Rate – Percent of Orders Filled
- Order Count – Number of Parent Orders Placed
- Volume – Sum of Ordered Shares
- Filled volume – Sum of Ordered Shares Filled
- Order duration – Length of Time Order was Open in Milliseconds

Note: One Basis Point is equal to 1/100th of 1%, or 0.01% (0.0001), and is used to denote the percentage change in a financial instrument.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Open Variance – Average Price Difference between Open Price and Execution Price
- Var vs Open (BP) - Average Difference between the Execution Price and the Open Price in Basis Points
- Open Total Variance – Total Filled Volume Multiplied by Open Variance Price
- Previous Close Variance – Average Price Difference between Previous Close Price and Execution Price
- Var vs Prev Close (BP) - Average Difference between the Execution Price and the Previous Close Price in Basis Points
- Previous Close Total Variance – Total Filled Volume Multiplied by Previous Close Variance Price
- Var vs Arrival Price $ - Average Difference between the Execution Price and Arrival (Midpoint) Price
- Var vs Arrival Price (BP) - Average Difference between the Execution Price and Arrival (Midpoint) Price in Basis Points
- Var vs Arrival Price Total $ - Total Filled Volume Multiplied by Arrival (Midpoint) Variance Price
- Var vs Live TWAM $ - Average Difference between the Time Weighted Average Midpoint and the Execution Price
- Var vs Live TWAM (BP) - Average Difference between the Time Weighted Average Midpoint and the Execution Price in Basis Points

Note: Live Time is the time from when an order is allowed to execute to the order expiration time.

- Var vs Live TWAM Total $ - Total Filled Volume Multiplied by TWAM Variance Price
- Var vs All Day VWAP $ - Average Difference between the Execution Price and the Day's Volume Weighted Average Price
- Var vs All Day VWAP (BP) - Average Difference between the Execution Price and the Day's Volume Weighted Average Price in Basis Points
- Var vs All Day VWAP Total $ - Total Filled Volume Multiplied by All Day VWAP Variance
- Var vs Prior To Order VWAP $ - Average Difference between the Execution Price and the VWAP for the Time between the Open and When the Order Could First Start Executing
- Var vs Prior To Order VWAP (BP) – Average Difference between the Execution Price and the Volume Weighted Average Price for the Time between the Open and When the Order Could First Start Executing in Basis Points
- Var vs Prior To Order VWAP Total $ - Total Filled Volume Multiplied by Prior To Order VWAP Variance Price
- Var vs VWAP $ - Average Difference between the Execution Price and the VWAP for the Allowed Period of Execution (Live Time)
- Var vs VWAP (BP) - Average Difference between the Execution Price and the VWAP for the Allowed Period of Execution (Live Time) in Basis Points
- Var vs VWAP Total $ - Total Filled Volume Multiplied by VWAP Variance Price
- Var vs Avg Tape Trade $ - Average Difference between the Execution Price and the Unweighted Average Tape Trade Price for the Allowed Period of Execution (Live Time)
- Var vs Avg Tape Trade (BP) - Average Difference between the Execution Price and the Unweighted Average Tape Trade Price for the Allowed Period of Execution (Live Time) in Basis Points
- Var vs Avg Tape Trade Total $ - Total Filled Volume Multiplied by Average Tape Trade Variance Price
- Var vs Executed Time VWAP $ - Average Difference between Execution Price and VWAP at the Time of Execution
- Var vs Executed Time VWAP (BP) - Average Difference between Execution Price and VWAP at the Time of Execution in Basis Points
- Var vs Executed Time VWAP Total $ - Total Filled Volume Multiplied by Executed Time VWAP Variance Price
- Var vs Rest Of Day VWAP $ - Average Difference between the Execution Price and the VWAP for the Time from Execution to the Close Price

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Var vs Rest Of Day VWAP (BP) - Average Difference between the Execution Price and the VWAP for the Time from Execution to the Close Price in Basis Points
- Var vs Rest Of Day VWAP Total $ - Total Filled Volume Multiplied by Rest of Day VWAP Variance Price
- Var vs Take $ - Average Difference between each Execution Price and the Quoted Price to Take Liquidity at the Time of Execution
- Var vs Take (BP) - Average Difference between each Execution Price and the Quoted Price to Take Liquidity at the Time of Execution in Basis Points
- Var vs Take Total $ - Total Filled Volume Multiplied by Take Variance Price

Appendix K: Equity TCA Report Columns (Details)

- Chart – Detailed Chart of Executions for a Given Order (Details only)
- Symbol – Order Symbol
- Side - Buy(B), Sell(S) or Short Sell(SS)
- Volume – Sum of ordered shares (Details only)
- Filled volume – Sum of ordered shares filled
- Order Time – Date and Time of Order Placement (Details only)
- Order Type – Order Type (MKT, LMT, Etc…)
- TIF – Time In Force (Details only)
- Parent / Child Order ID – Order ID (Details only)
- CL Order ID – Unique identifier as assigned by institution (Details only)
- Status –(C)anceled, (F)illed, or e(X)pired (Details only)
- Route Firm – Route firm (Details only)
- Limit $ - Order Limit Price (Details only)
- Stop $ - Order Stop Price (Details only)
- Order Account ID – (Details only)
- Close Datetime – Time Order Closed (Details only)
- Parent / Child Algo ID – ID of Algorithm
- SIC Code – Standard Industrial Classification (Details only)
- Avg Price – volume-weighted avg execution price (Details only)
- Low / High Price – lowest / highest fill price for parent order (Details only)
- First / Last Price – fill price for the first / last execution of the parent order (Details only)
- First Executed Variance – diff between execution price and fill price of the first executed parent order (Details only)
- Last Executed Variance – diff between execution price and fill price of the last executed parent order (Details only)
- ADV – Average Daily Volume (Details only)
- % of ADV – Percent of Average Daily Volume
- Order Duration – length of time order was open in milliseconds
- Previous Close Price – close price of previous day (Details only)
- Previous Close Variance – avg diff between execution price and previous day's close price
- Var vs. Previous Close (BP) – avg diff between execution price and previous day's close price in basis points
- Previous Close Total Variance – total filled volume multiplied by previous close variance price
- Open Price – open price

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Open Variance – diff between execution price and open price
- Var vs. Open (BP) – avg diff between avg execution price and the open price in basis points
- Open Total Variance – total filled volume multiplied by open variance price
- Arrival Price – midpoint at the time of eligibility (Details only)
- Var vs. Arrival Price $ - avg difference between avg execution price and arrival midpoint
- Var vs. Arrival Price (BP) – avg difference between avg execution price and arrival midpoint in basis points
- Var vs. Arrival Price Total $ - total difference between avg execution price and arrival price in dollars
- Arrival Quote – quote at the arrival time (Details only)
- Arrival Spread – spread at the arrival time
- Arrival Spread (BP) – Spread at the arrival time in basis points
- Live TWAM – Time Weighted Average Price
- Var vs Live TWAM $ - Average Difference between the Time Weighted Average price midpoint and the execution price
- Var vs Live TWAM (BP) - Average Difference between the Time Weighted Average Midpoint and the Execution Price in Basis Points
- Var vs Live TWAM Total $ - Total Filled Volume Multiplied by TWAM Variance Price
- Var vs All Day VWAP $ - Average Difference between the Execution Price and the Day's Volume Weighted Average Price
- Var vs All Day VWAP (BP) - Average Difference between the Execution Price and the Day's Volume Weighted Average Price in Basis Points
- Var vs All Day VWAP Total $ - Total Filled Volume Multiplied by All Day VWAP Variance
- Var vs Prior To Order VWAP $ - Average Difference between the Execution Price and the VWAP for the Time between the Open and When the Order Could First Start Executing
- Var vs Prior To Order VWAP (BP) – Average Difference between the Execution Price and the Volume Weighted Average Price for the Time between the Open and When the Order Could First Start Executing in Basis Points
- Var vs Prior To Order VWAP Total $ - Total Filled Volume Multiplied by Prior To Order VWAP Variance Price
- Var vs VWAP $ - Average Difference between the Execution Price and the VWAP for the Allowed Period of Execution (Live Time)
- Var vs VWAP (BP) - Average Difference between the Execution Price and the VWAP for the Allowed Period of Execution (Live Time) in Basis Points
- Var vs VWAP Total $ - Total Filled Volume Multiplied by VWAP Variance Price
- Average Tape Trade – Unweighted average tape trade price
- Var vs Avg Tape Trade $ - Average Difference between the Execution Price and the Unweighted Average Tape Trade Price for the Allowed Period of Execution (Live Time)
- Var vs Avg Tape Trade (BP) - Average Difference between the Execution Price and the Unweighted Average Tape Trade Price for the Allowed Period of Execution (Live Time) in Basis Points
- Var vs Avg Tape Trade Total $ - Total Filled Volume Multiplied by Average Tape Trade Variance Price
- Var vs Executed Time VWAP $ - Average Difference between Execution Price and VWAP at the Time of Execution
- Var vs Executed Time VWAP (BP) - Average Difference between Execution Price and VWAP at the Time of Execution in Basis Points
- Var vs Executed Time VWAP Total $ - Total Filled Volume Multiplied by Executed Time VWAP Variance Price

Note: Live Time is the time from when an order is allowed to execute to the order expiration time.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Var vs Rest Of Day VWAP $ - Average Difference between the Execution Price and the VWAP for the Time from Execution to the Close Price
- Var vs Rest Of Day VWAP (BP) - Average Difference between the Execution Price and the VWAP for the Time from Execution to the Close Price in Basis Points
- Var vs Rest Of Day VWAP Total $ - Total Filled Volume Multiplied by Rest of Day VWAP Variance Price
- Var vs Take $ - Average Difference between each Execution Price and the Quoted Price to Take Liquidity at the Time of Execution
- Var vs Take (BP) - Average Difference between each Execution Price and the Quoted Price to Take Liquidity at the Time of Execution in Basis Points
- Var vs Take Total $ - Total Filled Volume Multiplied by Take Variance Price
- Participation Rate – Order Percentage of Total Market Volume
- Fill Rate – Percent of Orders Filled
- Expected Cost per Share – Expected cost per share
- Expected Cost per Share (BP) – Expected cost per share in Basis Points
- Average Expected Cost – Expected cost of the order
- Var vs Expected Cost $ - Variance of expected cost versus actual order cost
- Var vs Expected Cost (BP) – Variance of expected cost versus actual order cost in basis points

Appendix L: Option Details Columns (Parent Orders)

- Parent Order ID – Order ID of the New Order
- Entry – Entry Firm
- Status – Order Status
- Order Time – Time of New Order
- Side – Buy or Sell Side
- Size – Order Size or Volume
- Symbol – Listing Symbol
- Type – Order Type (MKT, LMT, etc…)
- Limit $ - Limit Price if Limit Order
- Stop $ - Stop Price if Stop Order
- Variance $ - Price Difference between Trade Price and NBBO Multiplied by Order Size
- EFQ – Effective Spread divided by Quoted Spread
- TIF – Time in Force
- Expiration Time – Order Expiration Time if Applicable
- Firm Trader ID – Firm Trader ID if Applicable
- Order Account ID – Order Account ID if Applicable
- DO – Directed Order (Special Handling Instruction)
- ND – Non-Directed (Special Handling Instruction)
- DNR – Do Not Reduce (Special Handling Instruction)
- AON – All or None (Special Handling Instruction)
- NH – Not Held (Special Handling Instruction)
- FAO – Fill at Open (Special Handling Instruction)
- FAC – Fill at Close (Special Handling Instruction)
- Manual – Manual (Special Handling Instruction)
- Pre Market – Pre Market Order (Special Handling Instruction)

Note: NBBO Quote Will Vary Depending on Client Defined Time of Execution Match

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Post Market – Post Market Order (Special Handling Instruction)
- Audit Status – Audit Status within S3 Portal
- Spread Size – Group of Quoted Spread Size
    - $.01
    - $.02
    - $.03
    - $.04
    - $.05
    - $.06-$.10
    - $.11-$.15
    - >$.15
    - Locked
    - Crossed
    - Halted
- Entry Type – Order Type at time of placement or entry
- Midpoint Group – Group in which trade price is categorized
    - Near – For Buys: trade price is in lower 1/3 of spread or less. For Sells: trade price is in upper 1/3 of spread or greater
    - Far – For Buys: trade price is in upper 1/3 of spread or greater. For Sells: trade is in lower 1/3 of spread or less
    - Middle – Trade price in middle 1/3 of quoted spread
    - N/A – No Quoted Spread available

Appendix M: Option Summary Columns

- Date – Order Date
- Entry – Entry Firm
- Route – Route Firm (Child Summary Only)
- Symbol – Option Symbol on the Order
- Type – Order Type
    - MKT – Market
    - LMT – Limit
    - MKL – Marketable Limit
    - STP – Stop
    - STL – Stop Limit
- Order Size – Size of Order by bucket size
    - 1-10
    - 11-25
    - 26-50
    - 51-100
    - 101-500
    - 500+
- Spread Size – Group/Bucket of quoted spread
    - $.01
    - $.02
    - $.03

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- $.04
- $.05
- $.06-$.10
- $.11-$.15
- >$.15
- Locked
- Crossed
- No Quote

- Midpoint Group - – Group in which trade price is categorized
  - Near – For Buys: trade price is in lower 1/3 of spread or less. For Sells: trade price is in upper 1/3 of spread or greater
  - Far – For Buys: trade price is in upper 1/3 of spread or greater. For Sells: trade is in lower 1/3 of spread or less
  - Middle – Trade price in middle 1/3 of quoted spread
  - N/A – No Quoted Spread available
- Entry Type – Order Type at time of Entry
  - AQL – At the quote
  - IQL – Inside the quote
  - MKL – Marketable limit
  - MKT – Market
  - NOQL – Near or Outside the quote
  - STL – Stop Limit
  - STP – Stop
- NH – Indicator for 'Not Held' orders. '1' = 'Not Held'
- Orders Placed – Total Number of Orders Placed, Excluding Manual and Rejected Orders
- Orders Filled – Total Number of Orders Filled having at least One Filled Order
- Contracts Placed – Total Number of Contracts Placed Excluding Orders with Manual or Rejected Status
- Trades – Total Number of Executed Trades
- Contracts Executed – Total Number of Contracts Executed, Excluding Orders with a Status or Manual or Rejected
- Notional $ - Total Value of Contracts Executed
- Speed - Weighted Average Number of Seconds from when the Order became Marketable (TBM1) to the Trade Time in Milliseconds
- Effective Spread – Contract Weighted Average Spread Calculated by Taking the Difference between the Actual Trade Price and the Midpoint of the Ask and Bid Price and Multiplied by Two. Ask and Bid Price is Determined Using Client Defined Time of Execution Match
- Quoted Spread –Contract Weighted Average Difference between Ask and Bid Price Using Client Defined Time of Execution Match
- EFQ – Effective Spread Divided by the Quoted Spread
- At or Better % - Total Percentage of Contracts that Executed at or better than the NBBO
- Price Improved % - Total Percentage of Contract that Executed better than the NBBO
- Price Improved $ - Total Dollar Amount of Price Improvement Only Counting Contracts that Executed Better than the NBBO
- Price Improvement Per Contract – Total Dollar Amount of Price Improvement Divided by Number of Contracts Executed Better than the NBBO
- Slippage % - Total Percentage of Contracts that Executed Worse than the NBBO

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Slippage $ - Total Dollar Amount of Slippage Only Counting Contracts that Executed Worse than the NBBO
- Variance $ - Total Net Variance, Includes Price Improved $ and Slippage $
- Avg Variance $ - Average Net Variance, Includes Price Improved $ and Slippage $
- Avg Contracts Placed – Average Contracts per order. Total contracts divided by total orders
- Pct Contracts Executed – Percent of total contracts placed that executed
- PI Contracts – Total number of contracts with price improvement
- Slippage Contracts – Total number of contracts with slippage
- Distance From Midpoint – Difference between midpoint of target quote and trade price.
    - For Sells – Trade Price minus Midpoint
    - For Buys – Midpoint minus Trade Price

Appendix N: Execution Efficiency Columns (Summary)

- Date – Month or Day of Order when using "Group By"
- Entry – Entry Firm
- Route – Route Firm
- Orders Placed – Sum of Total Orders Placed for a given Date or Date Range that had Eligible Contracts/Shares
- Contracts/Shares Placed – Sum of Total Contracts/Shares Placed on Orders with Eligible Contracts for a given Date or Date Range
- Eligible Contracts/Shares Executed – Contracts/Shares that executed "At or Better" than the Target Quote when the order was initially marketable.
- Symbol – Symbol on the Order
- Type – Order Type
    - MKT – Market
    - LMT – LMT
    - MKL – Marketable Limit
    - STP – Stop
    - STL – Stop Limit
- Liquidity Enhanced: Number of Contracts/Shares on Eligible Orders that Executed greater than Market Volume
- Liquidity Diminished: Number of Contracts/Shares on Eligible Orders that did NOT execute when sufficient Market Volume available
- Execution Efficiency: Total Eligible Contracts/Shares Executed "At or Better" than the Target Quote, Divided by the Lesser of the # of Contracts/Shares Ordered or the Market Volume
- Mkt Availability – Signifies if sufficient liquidity in the market at time of order placement
    - Y – Yes, there was sufficient liquidity
    - N – No, there was not sufficient liquidity
    - N/A = Could not determine liquidity

Appendix O: Missed Fills Report Filters

- Date – Date of 'Missed Fill'
- Order Level – Order Level of exception (Parent or Route)
- Order Type
    - MKT – Market
    - LMT – Limit
    - MKL – Marketable Limit

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- STP – Stop
- STL – Stop Limit

- Order Side – Buy or Sell
- Order Status
  - O – Open
  - F – Filled
  - P – Partial Fill
  - C – Canceled
  - RJ – Rejected
  - X – Expired
  - CR – Cancel Replace
  - M – Manual
- Entry Firm – Firm which parent order was received from or into
- Order/Exception Date
  - All – Exception Date not a factor
  - Same – Exception Date was same day as order date
  - Different – Exception Date was different than order date
- Covered Orders – Exclude or Include 605 covered orders
- Listing Exchange – Exchange with security is primarily listed
- Scenario
  - All – Order Level not a factor
  - Order Level – Only show exceptions for order level specified
  - Both – Only show exceptions for misses that missed at both the parent and route order levels

Appendix P: Trade Suveillance Exceptions Columns

- Date – Date of the Exception
- Exception Type – Type of Exception Reported
  - Spoofing - Spoofing occurs when a layer event has been triggered and there is a trade on the opposite side of the market within a set number of seconds
  - Layering - Layering exception will look for orders placed off the NBBO that are within a set number of ticks of the NBBO. The goal is to look for the appearance of interest on one side of the market when there is no intention to trade on that side of the market.
  - Marking the Close
    - Client volume in close period is more than x% of market volume in the same period.
    - Client volume in close period is more than x% of the total client volume for the day.
  - Trade Through - Scan all NBBO quotes within a set number of seconds before and after the trade. If there is no quote at the trade price generate an exception.
  - Reg SHO - Check all symbols in REG SHO state (list curated from listing exchange). If a short sell trades at less than or equal to the NBBO bid price, generate an exception.
  - Equity-Options manipulation (“Mini-manipulation”)
  - Wash Sales/Trades - Buying or Selling of a position among related accounts where the net position size does not change even with a lot of trading activity.
    - Example: Account A has a ‘500 share’ position in AAPL. Account B is controlled by the same household as Account A. Account A sells 500 shares of AAPL and at the same time Account B buys 500 shares of AAPL at an extremely similar price. This report allows you to configure how close the prices need to be to trigger a Wash Sales exception.

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.

- Blocking – A Blocking exception is generated when a large order of a set size is entered on the opposite side of the market off the NBBO and when an execution on the other side of the market occurs, the large order is removed.
- Limit Price Violations (Rule 612)
  - Verify that all limit orders placed conform to the minimum price increment rules (no sub penny increments in stocks above 1.00).
  - Verify all sub penny increments orders are below 1.00.
- Erroneous Order Quantity – Exception occurs when order quantity is an order of magnitude above a normal order
- Erroneous Order Price – Exception occurs when the price of an order is an order of magnitude higher or lower than expected. (Example $100 limit price on a $10 stock).
- Duplicative Orders - Orders that are coming in at a high frequency from a specific trader that appear to be exact duplicates. For these exceptions we look for a set number of orders from the same trader with the same instructions and price over a short period of time.
- Manipulating the Underlying - Buying or selling the underlying security in an effort to improve the price of a preexisting option position. These exceptions look for aggressive buying and selling of the underlying security and the initiation or exiting of the related option position. It also checks to see if the underlying position is exited when there is little net impact to that position in relation to the option transaction.
- High Trade Activity - Buying and selling a large amount of a security with no net position carried over. Exceptions are generated in instances where a lot of trading activity is occurring with little economic incentive. For exception to occur, there must be a high % of daily average volume for that security and the total volume of security is some percent significantly higher than the average daily volume.
- 1% Market Maker – In cataloging and classifying all order flow, exception occurs when the entity involved does not follow the 1% market maker rule and publicly disseminates quotes for a given security.

- Security Type
  - Equities
  - Options
  - Futures
- Order Account ID – Client Account ID of the Order with the Exception. Only visible when you 'Group By' Order Account ID.
- Symbol – Symbol of the traded security. Only visible when you 'Group By' Symbol.
- Household ID – Client Household ID of the Order with the Exception. Only visible when you 'Group By' Household ID.
- #Exceptions – Total number of exceptions for listed Exceptions Type
- Resolved – Total number of exceptions that have been marked 'Resolved'
- Unresolved – Total number of exceptions that have NOT been marked 'Resolved'

Confidential – Not to be copied, distributed, or reproduced
without prior written approval from S3 Matching Technologies.