



SPECIALIZED QUOTE FEED INTERFACE

MESSAGING MANUAL

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1 PURPOSE AND SCOPE

The purpose of this document is to provide details of the message format and protocol of the firm 's connection to the SQF Interface. The intended audience of this document is a firms' Production Support and Development/R&D personnel. The firm must represent PHLX Specialists and Market makers that are members of PHLX to be eligible to use this interface.

Following is the list of companion documents that give additional information related to the interface.

- ❖ **PHLX-XL TCP/IP Communication Manual:** The intended audience of this document is a firm's Communications personnel. The objective is to help them understand the physical and transport level details of the firm's connection to all the TCP/IP PHLX-XL Interfaces.
- ❖ **PHLX-XL SQF Business Manual:** The purpose of this document is to provide details of the supported business functionality to firms that wish to connect to the PHLX-XL Quoting system using the Specialized Quote Feed interface. The intended audience of this document is the marketing and product development personnel at the firm who wish to understand the details of the SQF Business functionality.
- ❖ **PHLX-XL SOF Messaging Manual:** The intended audience of this document is a firm's Production Support and Development/R&D personnel. The objective is to help them understand the message format & protocol details of the firm's connection to the PHLX-XL SOF Interface. Using this interface, the firms can receive Order and Book information in real time from PHLX-XL.
- ❖ **PHLX-XL RMP Messaging Manual:** The intended audience of this document is a firm's Production Support and Development/R&D personnel. The objective is to help them understand the message format & protocol details of the firm's connection to the PHLX-XL RMP Interface. Using this interface, the firms can receive real time updates of all the trades done by the representing Specialists and Market Makers at PHLX.

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2 FIRM, PARTICIPANT & SYMBOL SETUP

The Line to TCP/IP connection mapping table maintains the map of the TCP/IP connection information to a Logical line identifier. Each firm must make known to PHLX-XL the identity of the IP address assigned to PHLX-XL on their network. PHLX will assign port numbers to the firm for that IP address to establish connections with PHLX-XL. Based on each firm's IP address and port numbers, PHLX-XL assigns unique line identifiers to each IP address and port number combination.

LineID	IPAddress	Port #
L1	192.9.169.5	6000
L2	192.9.170.6	6004
...

Line Id to Firm Mnemonic mapping table maintains the map of Line Identifier to a Firm Mnemonic. Each logical line identifier maps to one firm mnemonic. PHLX-XL assigns a unique firm mnemonic to each Firm. One or more lined id can map to a firm mnemonic. All TCP/IP connections or logical line identifiers for the Firm should map to the same firm mnemonic. The map is maintained and configured by PHLX Help Desk.

Line Id	Firm Mnemonic
L1	TMH
L2	TMH
L3	SIG
L4	SIG
...

The Firm Mnemonic to the Participant mapping table maintains a map of all the participants that map to the Firm. The Firm should identify all the Market Makers and Specialists that are quoting through the Firm. Each participant maps to one firm mnemonic. The participant id is the PHLX badge number for Market Makers and badge number or SPLST for Specialists. The map is maintained and configured by PHLX Help Desk.

Firm	Participant
TMH	436A
TMH	123B
TMH	775A
SIG	664C
SIG	987D
...	...

The participant to Symbol mapping table maintains a map of eligible underlying symbols for a given participant. The Firm should notify the PHLX Help desk when a symbol is assigned or unassigned to a Market Maker or Specialist. The map is maintained and configured by PHLX Help Desk.

Participant	Symbol
436A	ATT
436A	IBM
436A	C
987D	HD
664C	QQQ
...	...

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All messages received on the TCP/IP connections are validated with the above tables. Messages received from the firm are rejected in the following scenarios:

1. If the firm mnemonic received with the message is not valid for the TCP/IP session or logical line identifier.
2. If the participant in the message is not valid for a given firm mnemonic
3. If participant id in the message is not eligible for the symbol in the message.

The firm should specify line ids on which they can receive notifications from PHLX-XL. These line ids are configured as control line ids and can be used exclusively to receive notifications from PHLX-XL.

NOTE: As of version 5.0 of this specification, option symbology no longer allows use of the 5-character OPRA symbol, but instead requires use of individual components that define an option series. Section 4.2 Symbology summarizes the new options symbology format required for use in version 5.0.

3 PROTOCOL

3.1 CONNECTION

Firm is responsible for initiating a connection to PHLX-XL on the assigned IP address and port number. PHLX-XL system acts a server for all the connections. Firms should initiate one or more connections to PHLX-XL on the assigned port number(s). All firm connections into the PHLX-XL are routed through the firewall for authorization. If authorized, a TCP/IP session is established between the firm and the PHLX-XL system.

Application requests and notifications are exchanged between the PHLX-XL and the firm once the session is established.

PHLX operations will notify the firm if it detects a session disconnect during the trading day. Sessions will be automatically disconnected by the PHLX-XL system at the end of trading day.

The following are recommendations to minimize down time:

1. Support multiple physical communication lines to PHLX-XL. Example: Dual T1 or T1 and a dial backup.
2. Support multiple TCP/IP connections on each of the communication lines.
3. Development of automatic failover mechanism such that in case of failure, data is automatically transferred through one of the other active connections.
4. Development of connection retry logic such that in case of failure, connection is retried every periodic interval.

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3.2 REQUESTS FROM FIRM

All requests from the Firm except Option Query are responded with one response. Option Query request can be responded with one or more responses. Responses are sent on the line on which the request was received. If the response cannot be sent due to disconnect on the line it is discarded and PHLX operations is notified of the same.

For quote messages, there can be only one outstanding message pending response per participant on a given line. If a quote message is received from the same participant on the same line while there is a previous quote message pending response it is rejected. Multiple quote messages can be sent for different participants on the same line at the same time.

All other requests from the firm (with the exception of Complex Order Book Sweeps introduced in version 4.4) are handled asynchronously and up to 10 such requests can be outstanding for a participant on a given line. Complex Order Book Sweeps are not limited – see section 5.7

If the line gets disconnected before the reply is received for a request message, a new request message should be sent after reconnection.

3.3 NOTIFICATIONS TO THE FIRM

The firm should specify all line ids on which they will be ready to receive notifications from PHLX-XL. These line ids are configured as control line ids.

The PHLX-XL system sends notifications to the firm on all specified control lines. If all the lines are disconnected the notification will be discarded.

PHLX-XL does not expect any responses for the notifications sent to the firm.

3.4 HEARTBEATS

When the PHLX-XL system detects that no data has been received on a particular firm line for a period of time a Heartbeat message will be sent on that line to ensure connectivity. If no data (quotes, purges heartbeat response, etc...) is received for a period of time after the Heartbeat message was sent, the PHLX-XL system would assume that particular firm line is dead.

When the PHLX-XL system determines that "ALL" the lines for a firm are dead, the PHLX-XL system will purge all the quotes for all participants for that firm.

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3.5 DETECTION OF LOSS OF COMMUNICATION BY PHLX-XL

If all the lines for a given firm get disconnected, PHLX-XL system will purge all the quotes for all participants that send quotes from that firm.

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4 MESSAGE FORMATS

4.1 GENERAL

All messages are an ASCII stream of characters.. An ETX character delimits all messages. This character should be used to segregate messages when they are received as a stream on characters on a TCP/IP connection.

All price fields are represented in decimal format and are a multiple of the MPV (Minimum Price Variation) for that option (i.e.: a quote of 3.05 by 3.56 will be rejected as an invalid quote for those options trading with an MPV of .05)

All request messages from the firm must have the following header fields:

1. Firm identifier that uniquely identifies the firm sending the message
2. Message Type that uniquely identifies the request
3. Message Identifier that uniquely identifies the message to the firm. This is not used by the PHLX-XL system and is echoed back in the response. The firm should use this field to map the response received from PHLX-XL to the corresponding request.
4. Specialist & Market Maker Identifier

All requests from the firm are validated against the Firm, Participant and Symbol tables. If the relationship between the Firm, Participant and the Symbol does not match the configured tables, the message is rejected.

4.2 SYMBOLOGY

Beginning with version 5.0 of this specification, Options are identified by explicit series elements and not by the 5-character OPRA symbol (carefully review each message in section 5 for the change in symbology for each message). The new symbology is essentially described as follows:

- An Option is identified logically by:
 - Security Symbol (formerly Root) – 5-characters in length and alphanumeric
 - Type (Call/Put)
 - Expiration Year, Month and Day
 - Strike (actual strike value)
- The term “security symbol” replaces the term “root”. The security symbol will, in most cases, have a value that is the same as the underlying symbol (e.g., DELL instead of DLQ). However, corporate actions still lead to the need for more than one security symbol in a class, and such additional security symbols would be formatted as follows:
 - Corporate actions will result in a security symbol having a digit added to the end of the symbol (e.g., DELL1, DELL2, etc) or in the case of a 5-character underlying symbol the last character of the security symbol replaced by a digit (as a hypothetical example, a

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security symbol such as ABCDE that had a corporate action occur could result in the symbol ABCD1)

- In the case of a 5-character underlying where the first 4 characters are the same as the first four characters of another class, the security symbol will be given a value that is unique. For example if ABCDE and ABCD are distinct classes, a corporate action on ABCDE could not use ABCD1 but would instead be listed with some other unique symbol.
- Other corporate actions may occur to require a “bastardized” security symbol that also differs from the underlying stock symbol (for example due to a merger or spinoff). A unique security symbol will be defined as needed for those cases which may not reflect the underlying symbol of the underlying stock(s).
- Expiration month is explicit and separate from the designation of CALL/PUT, except for quote requests where for efficiency reasons the OPRA month code will continue to be used (A-L = JAN to DEC Calls, M-X = JAN to DEC Puts)
- The expiration day-of-the-month is explicit ('01'...'31').
- The expiration year is explicit – either two-digit for quote request messages or four-digit for other messages. This eliminates the need for a specific LEAP symbol
- The strike code is eliminated, replaced by the explicit strike price (NNNNN.NNNN). This eliminates the need for a specific WRAP symbol
- The option type is, except for quote request messages, now contained in a four-character field with either 'CALL' or 'PUT '. For quote requests, the option type is encoded in the month code for efficiency.

Note 1: The symbology initiative involves two phases:

Phase I is the elimination of the use of the OPRA Symbol and the use of the explicit symbology fields as designated above (expiration year, month, day, strike, call/put). This phase has an industry deadline where all participants (firms, exchanges, OCC, OPRA, etc) must stop dependence on the OPRA Symbol and be using only these explicit symbology fields. Throughout this phase the existing 1-3 character values for Root (and Underlying in the case of the Option Series Query) will continue to be used and the message formats in the SQF specification accommodate this by allowing the root value to be put in the new Security Symbol field. During this period LEAPS and WRAPS will continue to use their current symbols until their associated class is consolidate to use the underlying symbol.

Phase II is a consolidation period when the industry will, in a coordinated manner, migrate to use of the true underlying symbol as the security symbol instead of using the 1-3 character value used today as the root. For example, options of DELL would be designated with a security

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symbol of DELL instead of DLQ, DLY, DLZ, etc. This phase will be conducted in several events where various classes will be converted overnight and begin trading the next business day under the new symbol value. On the date of consolidation for a class, any existing roots that represent corporate actions on a class will also be converted as described earlier.

Note 2: The use of explicit symbology reduces the need for separate security symbols, particularly since there is now no need for separate security symbols to accommodate LEAPS and WRAPS since expiration year and strike value are explicit under the new symbology. However corporate actions effectively result in additional security symbols (eg., DELL, DELL1, DELL2, or possibly symbols other than the actual underlying)

Note 3: In the case where a "bastardized" Security Symbol exists there may be a bastardized underlying symbol as well (due to the same reasons that such bastardized underlying symbol is created today, such as when the corporate action involves cash and stock, or in a split that is other than 2-for-1, etc).

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5 CORE MESSAGES FOR SPECIALISTS AND MARKET MAKERS

5.1 HEARTBEAT

5.1.1 Description

The heartbeat message will only be sent by PHLX-XL, when no messages have been received or sent on a logical connection for a specified interval. The interval is controlled by PHLX-XL and is set to 5 seconds.

If the PHLX-XL system does not receive any response from firm on all its lines, it will purge all quotes for all the participants mapping to the firm id.

The heartbeat messages are an ASCII stream of characters. The record size of each message is 15 bytes and will have the following format.

Upon receipt of a heartbeat message, the firm should immediately echo the message back to PHLX-XL.

5.1.2 Heartbeat message format

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
Msg_type	3	100	Heartbeat message identifier
Msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
End_msg_ind	1	Hex character 03	ETX

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5.2 QUOTE

5.2.1 Description

The Firm can send a quote request with a block of quotes for a given participant. The quotes can be for any series that the participant is eligible to quote. The Quote request is replied back with a response that contains a list of quote numbers and corresponding rejection codes for all the invalid quotes in the request. If all quotes are valid the list is empty, indicating that all quotes have been stored for processing. In the event that a quote for the same series is received prior to the previous quote being processed the stale quote will be discarded and the most recent quote will be considered for PBBO participation.

All quotes received prior to X minutes before the start of trading day will be treated as local. These quotes will not be included in the Opening Process and will not be disseminated to OPRA. All quotes received within X minutes before the start of trading day will be included in the opening process. After the start of trading day, each option series will attempt to open following the PHLX-XL rapid opening rules

The PHLX-XL system calculates PHLX Best Bid Offer (PBBO) using the latest quotes from all the participants and Book. The highest price for the bid and lowest price for ask is disseminated as the PHLX quote. Aggregate size of all the participants and the Book at the best bid and offer price is disseminated as corresponding bid and ask size.

If the bid (offer) received from a participant locks or crosses the offer (bid), the trade between the participants and Book at the offer (bid) price for the locked or crossed size will be put in a pending state for a period of time. A trade will be triggered after every lock/cross time period until there are no matching entities due to a change in participant quotes or Book.

Only one quote request can be outstanding per participant on one line.

5.2.2 Quote Validation

All quotes are validated for the following:

- Valid Option Series
- Bid price less than ask
- Valid quote condition
- Quote price represented in a valid decimal format, which is a multiple of the MPV for the option
- Quote size is greater than or equal to minimum allowed size

5.2.3 Quote Conditions

The following are the list of valid quote conditions for the Specialist:

- Regular
- Rotation

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- Trading Halt

Market maker can only send regular quote condition.

5.2.4 Quote Re-Entry

PHLX-XL system will not refresh the quote after a system generated Automatic Purge Notification message (the result of a Rapid Fire, or Single Symbol Size Exhaust) until it receives the subsequent quote from the participant with the re-entry indicator flag set to "Y". Each quote received without the re-entry indicator equal to "Y" following the Automatic Purge Notification will be rejected.

The purpose of this feature is to ensure the proper sequencing of the quote stream in cases where there are automatic system generated purges (i.e. Rapid Fire, Single Symbol Size Exhaust).

This mechanism will protect the participant in the cases where the participant re-quoted before receiving the purge notification.

When a participant re-quotes after an Automatic Purge Notification, the participant must set the re-entry indicator flag to "Y" in order for quotes to be accepted. This informs the PHLX-XL system that the participant is aware of the purge and wants to re-join the market. The absence of the re-entry indicator after an Automatic Purge Notification will result in the quote being rejected ("08" Need Re-entry Indicator).

The re-entry indicator of "Y" should be only sent once after the firm receives a notification. Upon the receipt of an ACK for this quote, the firm must revert back to sending the "N" indicator to ensure proper behavior of the system. If a subsequent quote(s) is sent with the re-entry indicator of "Y", the quote will be accepted, but a warning in the quote response will be indicated (Warning - Unexpected Re-entry Indicator = 51).

NOTE: The protection only applies to series the participant quoted prior to the protection being invoked.

5.2.5 Quote Warning Indicators

The purpose of this feature is to inform the quote streamer of non-proper quoting practices.

All quote messages that result in a warning response will be accepted by the system and processed.

Submitted quotes will result in a warning in the following circumstances:

Re-entry indicator set to "Y" when not in an exhausted state
(Warning - Unexpected Re-Entry Indicator)

Quote Unchanged
(Warning - Quote Unchanged)

5.2.6 Quoting Capacity

PHLX-XL system allows of dynamic sharing of the quoting capacity between the participants. As long as there is spare capacity available, the PHLX-XL system will not throttle any quotes received from the firm.

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When the maximum capacity is reached, the capacity will be shared equally between each unique combination of participant and symbol.

Since quotes cannot be sent for the same participant on the same line while there is a response pending, to improve throughput, firms should have multiple connections with the PHLX-XL system and try to fill in the quote blocks as complete as possible.

Rollout of the symbols will be planned to match with the increase in available capacity for the system to avoid throttling any quotes.

The firm should be aware that sending quotes for the same options series nearly simultaneously in multiple blocks for the same participant on multiple connections could result in a loss of FIFO since PHLX-XL cannot guarantee the messages will be read in the order in which they were sent from the Firm.

5.2.7 Quote Format

5.2.7.1 Quote Request Message Format (v5.0) (Firm → PHLX-XL)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id][msg_type][msg_id] [badge_number][badge_suffix]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	031	Quote Request Message identifier
msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
Badge_number	5	00000 to 99999 SPLST	Badge #, right justified, padded with zeroes Specialist can use 'SPLST' instead of badge #
Badge_suffix	1	Alphabet or blank	Badge suffix for Market Maker. Blank for specialist

Data:

[num_quotes][quote_1][quote_2][quote_3][...][quote_n]

where:

num_quotes

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Field	Len	Value	Description
num_quotes	2	00 to 99	Number of quotes

quote_n :

[security_symbol][month_code][day][year][strike_price][quote_condition][reentry_flag][bid_price][bid_size][ask_price][ask_size]

Field	Len	Value	Description
security_symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
month_code	1	A..L: Jan-Dec Calls M..X : Jan-Dec Puts	Standard Expiration Month Code
day	2	01, 02, ... 31	Expiration day-of-month – right justified zero filled
year	2	00, 01, ... 99	Expiration year – right justified zero filled
strike_price	10	wwwww.dddd	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled .= decimal point dddd = decimal format , zero filled i.e.: 00075.0000
Quote_condition	1	[R, T]	Regular Quote = ' Only specialist can send the following conditions: Rotation Quote = 'R' Trading Halt = 'T'
Quote_reenty_flag	1	[Y,N]	Flag for handling of a re-entry after purge notifications: 'N' – Normal quote; 'Y' – quote will be used to re-enter market after a purge notification
bid_price	10	wwwww.dddd	The exercise price of the option. The format of this field is: wwwww = whole dollars, zero filled .= decimal point dddd = decimal format , zero filled i.e.: 00060.9000
bid_size	5	00000 to 99999	Bid Quote Size - zero filled
ask_price	10	wwwww.dddd	The exercise price of the option. The format of this field is: wwwww = whole dollars, zero filled .= decimal point dddd = decimal format , zero filled i.e.: 00060.9000
ask_size	5	00000 to 99999	ASK Quote Size - zero filled

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end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.2.7.2 Quote Reply Message Format (v5.0) (PHLX-XL □ FIRM)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id][msg_type][msg_id][badge_number][badge_suffix][msg_status]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	131	Quotes Reply Message Process identifier
msg_id	7	0000000 to 9999999	Original Request message Sequence # identifier
badge_number	5	00000 to 99999 SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or SPLST for specialist
badge_suffix	1	Alphabet or blank	Badge suffix for market maker. Blank for specialist
msg_status	2	Numeric	Valid Block = 00 Invalid Firm = 01 Invalid MSG Type = 02 Previous Block Being Processed = 03 Invalid Block = 04 System Unavailable = 05 Invalid participant = 12

Data:

[num_of_naks][nak_1][nak_2][...][nak_n]

where:

num_of_naks

Field	Len	Value	Description
num_of_naks	2	00 to 99	Number of invalid quotes

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nak_n: **Not sent when num_of_naks=00.**

Field	Len	Value	Description
quote_no	2	01 to 99	Quote number in the request message
response_code	2	Numeric	Rejects Invalid Symbol = 01 Bid GE Ask = 02 Bad Spread = 03 Quote undelivered = 04 Bad Price = 05 Invalid quote condition = 06 Invalid quote size = 07 Need Re-entry Indicator = 08 Invalid Re-entry Indicator = 09 Warning Unexpected Re-Entry Indicator = 51 Quote Unchanged = 52

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.3 QUOTE PURGE

5.3.1 Description

The specialist and market maker have the ability to purge their quotes, subject to PHLX rules, for a given root or option series.

5.3.2 Purge Message Formats

5.3.2.1 Purge Quote Request Message Format (v5.0) (Firm → PHLX-XL)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number] [badge_suffix]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
Msg_type	3	032	Purge Quote Request Message type
Msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
badge_number	5	00000 to 99999 SPLST	Badge #, right justified, padded with zeroes; Specialist can use 'SPLST' instead of badge #
badge_suffix	1	Alphabets or blank	Badge suffix for market maker Blank for specialist

Data:

[security symbol][year][month][day][type][strike_price]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9 *	Security Symbol - left justified, padded with spaces * = all security symbols (left justified, space padded) If * then all other symbology fields <u>must be</u> * also
year	4	YYYY	Expiration year – 4-digit year

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		*	* = all years (left-justified, space-padded)
month	3	JAN, ..., DEC *	Expiration month – standard abbreviations * = all months (left-justified, space-padded)
day	2	00, 01, ..., 31 *	Expiration day – right justified zero filled * = all days (left-justified, space-padded)
type	4	CALL, PUT *	Type of option * = both (left-justified, space-padded)
strike_price	10	wwwww.dddd *	The exercise price of the option. The format of this field is: wwwww = whole dollars, zero filled .= decimal point dddd = decimal format, zero filled i.e.: 00075.0000 * = all strikes (left-justified, space-padded)

end_msg_ind:

End_msg_ind	1	Hex character 03	ETX
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5.3.2.2 Purge Quote Reply Message Format (v5.0) (PHLX-XL → Firm)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number] [badge_suffix] [msg_status]

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where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	132	Purge Quote Reply message type
msg_id	7	0000000 to 9999999	Original Request message sequence # identifier
badge_number	5	00000 to 99999 SPLST	Badge # for market maker; Badge # or SPLST for specialist
badge_suffix	1	Alphabets or blank	Badge suffix for market maker Blank for specialist
msg_status	2	Numeric	Successful = 00 Invalid Firm Id = 01 Invalid MSG Type = 02 Previous Block Being Processed = 03 Invalid Block = 04 System Unavailable = 05 Invalid symbol = 06 Invalid participant = 12

Data:

[security symbol][year][month][day][type][strike_price]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9 *	Security Symbol - left justified, padded with spaces * = all security symbols (left justified, space padded) If * then all other symbology fields <u>must</u> be * also
year	4	YYYY *	Expiration year – 4-digit year * = all years (left-justified, space-padded)
month	3	JAN, ..., DEC *	Expiration month – standard abbreviations * = all months (left-justified, space-padded)

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day	2	00, 01, ..., 31 *	Expiration day – right justified zero filled * = all days (left-justified, space-padded)
type	4	CALL, PUT *	Type of option * = both (left-justified, space-padded)
strike_price	10	wwwww.dddd *	The exercise price of the option. The format of this field is: wwwww = whole dollars, zero filled .= decimal point dddd = decimal format, zero filled i.e.: 00075.0000 * = all strikes (left-justified, space-padded)

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.4 Book SWEEP

5.4.1 Description

Opening Sweep, Auction Sweep, Market Sweep and PIXL Sweep

The Book Sweep message will exhibit varying behaviors depending on the context of the system. For example, a book sweep received by XL prior to, or during, market opening will behave like an Opening Sweep. A book sweep received by XL during an auction will behave like an Auction Sweep. And a book sweep received by XL outside of the opening or an auction will behave like a Market Sweep. A PIXL sweep is determined by new side types – Buy Pixl and Sell Pixl. Descriptions of each sweep type are included below.

Opening Sweep Behavior of a Book Sweep

The Opening Sweep (Book Sweep during Opening) allows quoters to participate in the market at multiple prices during the opening process. An Opening Sweep can execute against any marketable interest trading at the opening... including both orders and quotes. An Opening Sweep may trade at multiple price levels. The sweep response to an Opening Sweep will include the execution price and the number of contracts traded. Once opening is completed, the unexecuted balance of an Opening Sweep will be rejected prior to any post-opening trades. Quoters must have a valid resting quote in the system in order to be able to submit an Opening Sweep. If the quoter's resting quote is purged or widened such that it is no longer a legal quote, the quoter's resting sweeps will be purged as well.

The Specialist and Market Maker can specify the number of contracts at the defined price.

The quoter can enter multiple Opening Sweep requests at various price points to layer the opening.

The quoters can cancel an Opening Sweep request by entering a sweep at the original price with a volume of zero.

The quoters can replace an Opening Sweep request by entering a sweep at the original price with the changed volume.

Opening Imbalance messages are sent via the SQF feed.

The quoter can receive the Order and Book information in real time using the Specialized Order Feed Interface. Price details on all executions resulting from Market Sweeps will be available via the Risk Management Feed Interface.

Auction Sweep Behavior of a Book Sweep

The Auction Sweep (Book Sweep during an Auction) allows quoters to participate in the market at multiple prices during an auction process. An auction process will be commenced when an order is

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received in an option that is subject to a Market Exhaust... i.e. there are no participants in the market ("no man standing"), or the result of a Quote Exhaust upon the expiration of the Quote Exhaust timer.

An Auction Sweep can execute against any marketable interest trading in the auction including both orders and quotes. The sweep response to an Auction Sweep will include the execution price and the number of contracts traded. Once the auction is completed, the unexecuted balance of an Auction Sweep will be rejected prior to a subsequent trade. Quoters must have a valid resting quote in the system in order to be able to submit an Auction Sweep.

The Specialist and Market Maker can specify the number of contracts at the defined price.

The quoter can enter multiple Auction Sweep requests at various price points to layer prices in the auction.

The quoters can cancel an Auction Sweep request by entering a sweep at the original price with a volume of zero.

The quoters can replace an Auction Sweep request by entering a sweep at the original price with the changed volume.

Auction notification messages are sent via the SQF feed.

The quoter can receive the Order and Book information in real time using the Specialized Order Feed Interface. Price details on all executions resulting from Market Sweeps will be available via the Risk Management Feed Interface.

Market Sweep Behavior of a Book Sweep

A Market Sweep (Book Sweep outside of Opening or an Auction) can execute against any marketable interest including both orders and quotes. A Market Sweep can hit multiple price levels of orders, but only one quote level. The sweep response to a Market Sweep will include a volume weighted average execution price and the number of contracts traded. Since Market Sweeps are handled as an IOC, the unexecuted balance of a Market Sweep will be rejected prior to a subsequent trade.

A Market Sweep is done on the top of the market on the side on which the request is sent. The price at the top of the market on the side the Sweep is requested has to be at or better than the Sweep price i.e. If Buy (Sell) side of the market is being swept, the top of market price has to be at or greater (less) than the Sweep price.

The Specialist and Market Maker can specify the number of contracts at the defined price.

The quoter can receive the Order and Book information in real time using the Specialized Order Feed Interface. Price details on all executions resulting from Market Sweeps will be available via the Risk Management Feed Interface.

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Pixl Sweep Behavior of a Book Sweep

Pixl Sweeps are used to respond to PIXL auction notifications published via TOPO+. PIXL Sweeps can only participate in a PIXL auction. To participate in a PIXL auction, the *Side* field in a book sweep request must be designated as PIXL Buy ('P') or PIXL Sell ('Q'). If no PIXL auction is going on when a PIXL sweep is received, it will be cancelled immediately. All rules pertaining to an auction sweep are applicable to PIXL sweep. E.g. a firm can layer PIXL Sweeps in a PIXL Auction as well as cancel and cancel replace PIXL sweeps.

5.4.2 Book Sweep Message Formats

5.4.2.1 Book Sweep Request Message Format (v5.0.1) (Firm → PHLX-XL)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number][badge_suffix]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
Msg_type	3	030	Market Sweep Message type
Msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
Badge_number	5	Alphanumeric 00000 to 99999 or SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for Specialist
Badge_suffix	1	Alphabet or blank	Specialist should send blank in this field while Market maker should send their suffix.

Data:

[security symbol][year][month][day][type][strike_price][side][price][size]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
year	4	YYYY	Expiration year – 4-digit year
month	3	JAN, ..., DEC	Expiration month – standard abbreviations
day	2	00, 01, ..., 31	Expiration day – right justified zero filled
type	4	CALL, PUT	Type of option

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strike_price	10	wwwww.dddd	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled i.e.: 00075.0000
Side	1	[BS]	'B' = Buy market side 'S' = Sell market side 'P' = PIXL Buy market side 'Q' = PIXL Sell market side
Price	10	wwwww.dddd	The price for the sweep. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled
Size	5	00000 to 99999	Maximum Sweep Size - zero filled

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.4.2.2 Book Sweep Reply Message Format (v5.0.1) (PHLX-XL → Firm)

The positive acknowledgements are sent only after the transaction takes place.

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number] [badge_suffix] [msg_status]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	130	Book Sweep Reply message type
msg_id	7	0000000 to 9999999	Original Request message sequence # identifier
badge_number	5	Alphanumeric 00000 to 99999 or SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for Specialist
badge_suffix	1	Alphabets or blank	Specialist should send blank in this field while Market maker should send their suffix.
msg_status	2	Numeric	Successful = 00 Invalid Firm Id = 01 Invalid MSG Type = 02 Previous Block Being Processed = 03 Invalid Block = 04 System Unavailable = 05 Invalid symbol = 06 Invalid participant = 12 Bad price = 13 Bad size = 14 Bad side = 15 NBBO is crossed = 16 Prior sweep request pending = 17 No eligible order or market = 18 Book status not eligible for sweep = 19 Not open for trading = 20 No volume allocated = 21

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Data:

[security symbol][year][month][day][type][strike_price][trade_price] [trade_vol]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
year	4	YYYY	Expiration year – 4-digit year
month	3	JAN, ..., DEC	Expiration month – standard abbreviations
day	2	00, 01, ..., 31	Expiration day – right justified zero filled
type	4	CALL, PUT	Type of option
strike_price	10	wwwww.dddd	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled i.e.: 00075.0000
trade_price	10	wwwww.dddd	The volume weighted average price at which sweep is executed. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled In the response to an unsuccessful request, this field will be all zeroes with no decimal point.
trade_vol	5	00000 to 99999	Volume allocated for the request. Will have zeroes for unsuccessful requests.

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.5 NOTIFICATIONS

5.5.1 Automatic Purge Notification

5.5.1.1 Description

The purpose of the Automatic Purge Notification is to alert the participant when their quote(s) is purged due to Rapid Fire or Single Symbol Size Exhaust.

When re-quoting after a purge, the participant must set the re-entry indicator to “Y” in order to re-enter the market. *Please see the Quote Re-entry Section for more details. Note: system related purges do not require the use of the re-entry flag.*

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5.5.1.1.1 Rapid Fire

For each participant, PHLX-XL counts the percentage of disseminated size executed for each of the series for the Underlying in the Sampling interval. If the aggregate percentage for one or more series for the underlying exceeds the configured percentage for the participant and Underlying, Risk protection (Rapid Fire) processing is activated and the participant quotes for all the series of the Underlying are purged.

The PHLX Help Desk upon request by the participant configures the percentage & sampling interval for a given Underlying. If the participant does not specify any configuration, default configuration is used for the participant.

A notification message is sent to the participant for each security symbol for that underlying. The other fields that comprise the symbology in the message will be wild (populated with *). The reason code will be "A", denoting a purge by rapid fire.

The notification message will be sent on all of the designated and connected control line ids of the firm that the participant is using to connect to the PHLX-XL system.

5.5.1.1.2 Single Symbol Size Exhaust

The single symbol size exhaust for a participant happens when all of the quote size gets consumed in a trade. In this case, the PHLX-XL system will automatically purge the corresponding quote for the given option series.

A single symbol size exhaust notification message is sent to the participant for the option series. The other fields that comprise the symbology in the message are not wild. The reason code will be B, denoting single symbol size exhaust.

The notification message will be sent on all of the designated and connected control line ids of the firm that the participant is using to connect to the PHLX-XL system.

5.5.1.1.3 Opening Purge Notification

Under XL, quotes being used for the opening must be of legal width. Quotes that are not of legal width will be purged and will not participate in the opening. Quotes that are purged under these circumstances will include a notification to the quoter that the quote has been purged. The reason code in the notification will be B.

Legal width is defined by PHLX rule and includes the provision that for an in the money option a quote can be the wider of 1) the legal width as defined in a table with a multiplier or 2) the width of the NBBO of the underlying. For an out of the money option the quote can be as wide as the legal width defined in a table with a multiplier. There is no max spread check for options that expire that expire more than 9 months out.

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5.5.1.1.4 System Purge Notification

In versions 5.0 and earlier of the SQF specification, additional circumstances will initiate a purge of a quoter's quotes. For example, purges initiated for system reasons... such as purges due to internal system relates issues, etc... will result in purge notifications being sent to the quoters. The reason code in the notification will be B.

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5.5.1.2 MESSAGE FORMAT

5.5.1.2.1 Purge Notification Message Format (v5.0.1) (PHLX-XL → Firm)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id][msg_type][msg_id][badge_number][badge_suffix]

where:

Field	Len	Value	Description
Firm_id	4	PHLX-XL assigned code	Unique firm identifier
Msg_type	3	236	Automatic Purge Notification
Msg_id	7	0000000 to 9999999	Unique sequence #
badge_number	5	00000 to 99999 SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for specialist
badge_suffix	1	Alphabet or blank	Blank for specialist and suffix for market maker.

Data:

[security symbol][year][month][day][type][strike price][reason][timestamp]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
year	4	YYYY *	Expiration year – 4-digit year * = all years (left-justified, space-padded) * specified only if Reason code is 'A'
month	3	JAN, ..., DEC *	Expiration month – standard abbreviations * = all months (left-justified, space-padded) * specified only if Reason code is 'A'

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day	2	00, 01, ..., 31 *	Expiration day – right justified zero filled * = all days (left-justified, space-padded) * specified only if Reason code is 'A'
type	4	CALL, PUT *	Type of option * = both (left-justified, space-padded) * specified only if Reason code is 'A'
strike_price	10	wwwww.dddd *	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled i.e.: 00075.0000 * = all strikes (left-justified, space-padded) * specified only if Reason code is 'A'
reason	1	[ABCD]	A = Rapid Fire Size Exhaust B = Single Symbol Size Exhaust/Other
event_timestamp	6	HHMMSS	Timestamp

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.5.2 RAPID OPENING NOTIFICATION

5.5.2.1 Description

The Rapid Opening Notification message is used for multiple circumstances. It will continue to be used for Rapid Opening. However, it will also be used to notify firms that an intraday auction has been started for an order in an option subject to a Market Exhaust (no valid quotes in the market). In the case of an auction due to a Market Exhaust situation, the notification message will have a reason code of 'A' – Imbalance (See the 'Book Sweep' section of this document for details on responding to an Auction notification).

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The PHLX-XL Rapid Opening system attempts to automatically open all options series. In the case where the opening process is unable to open the market for that series, a notification message will be generated that will include the reason along with the imbalance price and size information. This notification will be disseminated to all the participants that are eligible to trade a given symbol.

The notification message will be sent on all of the designated and connected control lines for the firm, which that participant is using to connect to the PHLX-XL system.

Following are the three scenarios in which the Opening notification will be disseminated.

- Imbalance

Imbalance occurs during opening when a quote or order at a better price than the estimated Opening price cannot be completely satisfied. The imbalance is the total PHLX imbalance based on the participant imbalance at PHLX. Note: Part of the imbalance can be filled by routing away.

When the reason is Imbalance, the data fields will have the following values:

- Estimated Opening Price – Price with the smallest imbalance
- Estimated Opening Size – The total number of contracts that must trade at that price
- Imbalance Size – Remaining number of contracts that need to be filled
- Imbalance Side – Indicate the side that the imbalance size is representing
- Reason – (A=Imbalance)

- Can't Determine Opening Price

Can't Determine Opening Price occurs' during opening when there are multiple prices and the Opening process is unable to determine the Opening price automatically based on the rules.

When the reason is Can't Determine Opening Price, the data fields will have the following values:

- Estimated Opening Price – will be 0
- Estimated Opening Size – will be 0
- Imbalance Size – will be 0
- Imbalance Side – will be BLANK
- Reason – (C=Cannot determine Opening Price)

As noted earlier, the following is the scenario in which the Market Exhaust Auction notification will be disseminated.

- Imbalance

Used to notify firms that an auction has been started for an order in an option subject to a Market Exhaust (no valid quotes in the market)

- Imbalance Size – Remaining number of contracts that need to be filled
- Imbalance Side – Indicate the side that the imbalance size is representing
- Price: null
- Reason – (A=Imbalance)

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5.5.2.2 Message Format (v5.0) (PHLX-XL → Firm)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number] [badge_suffix]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	235	Rapid Opening Notification identifier
msg_id	7	0000000 to 9999999	Unique sequence number
badge_number	5	00000 to 99999; SPLST;	Badge # for market maker, right justified, padded with zeroes; Badge # or SPLST for specialist;
badge_suffix	1	Alphabets or blank	Blank for specialist; suffix for market maker;

Data:

[security_symbol][year][month][day][type][strike_price][estimated_opening_price][estimated_opening_size][imbalance_size][imbalance_side][reason]

where:

Field	Len	Value	Description
security symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
year	4	YYYY	Expiration year – 4-digit year
month	3	JAN, ..., DEC	Expiration month – standard abbreviations
day	2	00, 01, ..., 31	Expiration day – right justified zero filled
type	4	CALL, PUT	Type of option
strike_price	10	wwwww.dddd	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled i.e.: 00075.0000
Estimated_opening_price	10	wwwww.dddd	Estimated Opening Price The format of this field is: wwwww = whole dollars, zero filled

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			. = decimal point dddd = decimal format , zero filled i.e.: 00060.1000
Estimated_opening_size	5	00000 - 99999	Estimated Opening Size
Imbalance_size	5	00000 - 99999	Imbalance Size
Imbalance_side	1	[BA or blank]	Imbalance Side B = Bid - A = Ask
Reason	1	[ABC]	A - Imbalance B - Opening Price Range Violation C - Cannot Determine Opening Price

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.6 OPTION SERIES QUERY

5.6.1 Description

The Firm has the ability to query all option series that are active on the PHLX-XL system.

The Firm can query for a specified underlying or security symbol (as of version 5.0 query for an explicit series is no longer supported). PHLX-XL system responds with a reply that contains a list of the option series definitions (OPRA Symbol is no longer provided as of version 5.0 since OPRA symbol is no longer a concept under the new industry symbology). Due to limitations on the message size, more than one transmission may be required to satisfy the request and the more to follow indicator will be used to indicate multiple messages.

Wildcards are not supported for underlying or security symbol specification.

5.6.2 Option Series Message Format

5.6.2.1 Option Series Request Message Format (v5.0) (Firm → PHLX-XL)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge_number][badge_suffix]

where:

Field	Len	Value	Description
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firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	036	Option Series Message type
msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
badge_number	5	00000 to 99999 SPLST	Badge #, right justified, padded with zeroes Specialist can use 'SPLST' instead of badge #
badge_suffix	1	Alphabet or blank	Badge suffix for market maker Blank for specialist

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Data:

[symbol]

where:

symbol:

Field	Len	Value	Description
underlying or security symbol	5	A..Z,0..9	Underlying or Security Symbol - left justified, padded with spaces
underlying or Security Symbol indicator	1	UR (R is used for Security Symbol)	U = Underlying symbol R = Security symbol

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.6.2.2 Option Series Reply Message Format (v5.0) (PHLX-XL → Firm)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id][msg_type][msg_id][badge_number][badge_suffix][msg_status]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	136	Option Series Reply message type
msg_id	7	0000000 to 9999999	Original Request message sequence # identifier
badge_number	5	00000 to 99999 SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for Specialist
badge_suffix	1	Alphabet or blank	Badge suffix for market maker Blank for specialist
msg_status	2	Numeric	Successful = 00 Invalid Firm Id = 01 Invalid MSG Type = 02 Previous Block Being Processed = 03 Invalid Block = 04 System Unavailable = 05 Invalid symbol = 06 Invalid table entries = 07 Invalid participant = 12

Data :

[symbol][nbr_records][security_symbol_list_1] [...] [security _symbol_list_n] [end_msg_ind]

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where:

symbol:

Field	Len	Value	Description
underlying or security symbol	5	A..Z,0..9	Underlying or Security Symbol - left justified, padded with spaces
underlying or security symbol indicator	1	UR (R is used for Security Symbol)	U = Underlying symbol R = Security symbol

nbr_records: **Not sent when msg_status is unsuccessful.**

nbr_records	2	0 to 99	numbers of records
More to follow indicator	1	Y/N	Y - indicates more series to follow N - indicates all series are transmitted

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security_symbol_list_n : **Not sent when msg_status is unsuccessful.**

Field	Len	Value	Description
security symbol	5	A..Z,0..9	Security Symbol - left justified, padded with spaces
Year	4	YYYY	Expiration year – 4-digit year
month	3	JAN, ..., DEC	Expiration month – standard abbreviations
day	2	00, 01, ..., 31	Expiration day – right justified zero filled
put_call	4	CALL, PUT	Type of option
Strike	10	wwwww.dddd	Explicit strike price. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled i.e.: 00075.0000

end_msg_ind:

end_msg_ind	1	Hex character 03	ETX
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5.7 COMPLEX ORDER BOOK SWEEP

5.7.1 Description

The Complex Book (C Book) Sweep is a means for the Specialist and Market maker to participate in the COLA (Complex Order Live Auction) for a given complex order Strategy, or to sweep the complex order book if no COLA is in progress for that strategy when the C Book Sweep is received. COLA is an auction that provides an opportunity for price improvement for an incoming order. COLA provides a brief period in which C Book Sweep requests (as well as other complex orders sent in response to the COLA notification) may be submitted for inclusion in the auction to improve the COLA-initiating order price. The PHLX-XL exchange rules should be consulted for details of trading complex orders.

Complex Order and COLA Information

The Firm can receive the COLA notification in real time using the Specialized Order Feed Interface (SOF). This information can be used by the Firm to become aware that a new COLA has been initiated (reference the PHLX-XL Specialized Order Feed technical specification for details)

The COLA notification due to a new incoming complex order will identify the strategy and indicate the volume available due to the initiating complex order, but will not provide information on side (buy/sell) or price. The participant can provide C Book Sweep requests for both buy and sell. C Book Sweeps that are opposite the side of the COLA initiating order will be considered for COLA and the others will be ineffectual (both will receive appropriate responses at the end of the COLA as indicated in the Specialized Quote Feed Messaging Manual). If any C Book Sweeps are received after the COLA has completed, they will both be evaluated against the complex order book and responses sent to each after this evaluation against the book.

Sweep Request Attributes

The sweep request must specify the side to sweep, number of contracts to sweep and the sweep price. If the volume specified in the request exceeds the volume available to be traded, the sweep will only trade up to the available volume. The sweep may trade at multiple price points, but never at a price worse than the specified sweep price (again, reference PHLX-XL Complex Order rules for details).

The price and debit/credit indicator in the request is the limit price of the sender's C Book Sweep

For Strategies with a stock component, a Sweep value of 'T' (buy book side - short) represents a sweep order on the buy side with a sell short stock order. Similarly, a Sweep value of 'Y' (sell book side - short) represents a sweep order on the sell side with a sell short stock order. If a sweep request is sent with a sell short indicator and the tied to stock strategy leg is not for short positioning, the sweep will be accepted by the PHLX system as a normal buy or sell sweep.

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Multiple Sweep Requests

A participant may specify multiple C Book Sweep requests for a given strategy and side, as long as each request is at a different price than all other requests. Each request will be considered during the COLA; if a COLA is not in progress the requests will sweep the complex order book in the order each request was received.

If a participant submits multiple C Book Sweep requests for a given strategy with the same price and side, the more recent request will effectively replace the preceding request if and only if the preceding C Book Sweep request happened to be waiting for the COLA time period to expire at the moment the more recent request is received. A C Book Sweep with a size of zero effectively cancels a prior C Book Sweep for a strategy at a given price and side. In either case, a response will be sent for the former sweep request with the identity of the latter sweep request (see Sweep Responses below for the information that will be supplied in the response).

Sweep Responses

A sweep response will be returned to the Firm in the following three cases:

- When a sweep request is received, it will receive an immediate NAK response in the following circumstances:
 - The sweep request fails parsing or validation rules
 - The strategy is not eligible to trade at the present time (e.g., the strategy is not open yet due to the individual leg series having not yet completed opening)
- After successful parsing and validation, a sweep response will be sent to each sweep request:
 - At the end of the COLA if a COLA is in progress
 - At the end of sweeping the complex order book if no COLA was in progress
- If a sweep request is received while COLA is in progress that effectively replaces a prior sweep request, a sweep response will be sent immediately for the sweep request that is being replaced (see Multiple Sweep Requests and Revisions earlier). The new sweep request will receive its response as follows:
 - Immediately if the new sweep request specifies volume of zero (the response code would indicate SUCCESS)
 - If the new sweep volume is not zero, then response will be sent at the end of the COLA

Sweep requests that receive a NAK response message will indicate the reason for rejecting the request. The Firm should use this response to correct the failure indicated and resubmit a new sweep request.

Sweep requests that are accepted will receive a response that includes the following:

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- Unfilled Volume: The total volume that was left unfilled at completion of processing, after all trades on the sweep have occurred. Essentially: Sweep Request Volume less Volume Traded.
- Replaced By: The message ID of the sweep request that effectively replaced this sweep request (this will be blank if a sweep was not replaced)

Risk Management Feed

Individual trades will be reported via the existing Risk Management Feed (reference the PHLX-XL Risk Management Feed technical specification for details)

5.7.2 Message Formats

5.7.2.1 Complex Order Book Sweep Request Message Format (Firm → PHLX-XL)

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge#][suffix]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
Msg_type	3	022	Complex Order Book sweep Message type
Msg_id	7	0000000 to 9999999	Sequence number identifier for ACK/NAK
Badge_number	5	Alphanumeric 00000 to 99999 or SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for Specialist
Badge_suffix	1	Alphabet or blank	Specialist should send blank in this field while Market maker should send their suffix.

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Data:

[underlying][strategy][side][price][debit/credit indicator][size]

Field	Len	Value	Description
Underlying	5	A..Z,0-9	Underlying Symbol - left justified, padded with spaces (alphanumeric – related to upcoming change in options symbology)
Strategy	6	A..Z,0..9	Valid Complex Order Strategy identifier as disseminated by SOF feed.
Side	1	[BTXSYZ]	'B' = Buy book side 'T' = Buy book side (short) 'S' = Sell book side 'Y' = Sell book side (short)
Price	10	wwwww.dddd	The price for the sweep. The format of this field is: wwwww = whole dollars, zero filled . = decimal point dddd = decimal format , zero filled
Debit/Credit Indicator	1	[DC]	Indicates whether the specified sweep price is debit or credit (Even is implied by price of 0.0 and Debit/Credit value is ignored – it may be filled with a space in the case when price is 0.0)
Size	5	00000 to 99999	Maximum Sweep Size - zero filled

end_msg_ind:

Field	Len	Value	Description
end_msg_ind	1	Hex character 03	ETX

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5.7.2.2 Complex Order Book Sweep Reply Message Format (PHLX-XL →Firm)

A CO Book Sweep Reply message is sent to the Firm as described in Sweep Responses of section 5.7.1. Positive acknowledgement should not be treated as an indicator of execution(s) taking place. RMP feed should be used to observe execution events and to realize price and size of executions on the sweep request.

Message Format:

[Header][Data][end_msg_id]

The format of each of these message components is described below:

Header:

[firm_id] [msg_type] [msg_id] [badge#] [suffix] [msg_status]

where:

Field	Len	Value	Description
firm_id	4	PHLX-XL assigned code	Unique firm identifier
msg_type	3	122	Book sweep Reply message type
msg_id	7	0000000 to 9999999	Original Request message sequence # identifier
badge_number	5	Alphanumeric 00000 to 99999 or SPLST	Badge # for market maker, right justified, padded with zeroes; Badge # or "SPLST" for Specialist
badge_suffix	1	Alphabets or blank	Specialist should send blank in this field while Market maker should send their suffix.
msg_status	2	Numeric	Successful = 00 Invalid firm id = 01 Invalid msg type = 02 Invalid block = 04 System unavailable = 05 Invalid underlying = 06 Invalid participant = 12 Bad price = 13 Bad size = 14 Bad side = 15 Invalid Instrument = 22 Instrument Not Trading = 23 Sweep Replaced = 24

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			<p>Market State prevents trade = 25 (code 25 represents various conditions with the following subset provided as examples:</p> <ul style="list-style-type: none"> • Price outside CPBBO • PBBO locked • System not trading • Can't trade thru CNBBO bid • Etc...) <p>CO Sweep Not Used = 26 (code 26 is the response to a sweep that was on the same side as the COLA-initiating order and therefore not considered in the COLA)</p>
--	--	--	---

Data:

[underlying][strategy][side][unfilled volume][replaced by]

Field	Len	Value	Description
Underlying	5	A..Z,0-9	Underlying Symbol - left justified, padded with spaces (alphanumeric – related to upcoming change in options symbology)
Strategy	6	A..Z,0..9	Valid Complex Order Strategy identifier as disseminated by SOF feed.
Side	1	[BS]	'B' = Buy book side 'T' = Buy book side (short) 'S' = Sell book side 'Y' = Sell book side (short)
Unfilled Volume	5	00000 to 99999	Volume that was left unfilled after the trades (if any) on the sweep request. When message status returned is not 00 this field contains the original size of the request
Replaced By	7	0000000 to 9999999	<u>Msg_id</u> of the CO Sweep request that replaced the one being acknowledged. This field is only populated when the returned

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			message status is Sweep Replaced. It is filled with spaces in all other cases.
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end_msg_ind:

Field	Len	Value	Description
end_msg_ind	1	Hex character 03	ETX

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6 SUPPLEMENTARY MESSAGES FOR SPECIALISTS ONLY

All previous supplementary messages for Specialist Only have been deprecated and are no longer supported

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7 VERSION CONTENTS

7.1 VERSION 1.0

Initial Version release with quote msg_type 001 and quote response msg_type 101.

7.2 VERSION 1.1

Changes to support decimalization. New quote msg_type 002 and quote response msg_type 102.

7.3 VERSION 2.0

Changes to support quotes with size and enhanced SQF functionality.

Updated section 1.0 Overview for the NBBO step feature for Auto-execution, engage/disengage automatic execution, market center control, fast market control and a query for option series.

Update section 5.1 Description and section 5.4 to include new quote conditions. In section 5.5 added new quote msg_type 001 to support 5 character sizes and addition quote conditions.

Added section 6.0 – NBBO STEP-UP PARAMETERS.

Added section 7.0 – AUTOMATIC EXECUTION AND STEP-UP ENGAGEMENT/DISENGAGEMENT.

Added section 8.0 – MARKET CENTERS.

Added section 9.0 – FAST MARKET MESSAGE FORMAT.

Added section 10.0 – OPTION SERIES QUERY.

Added section 11.0 – HEARTBEAT MESSAGE FORMAT.

Created APPENDIX A.

7.4 VERSION 3.0

Changes to support quote source.

Updated section 5.1 Description to include quote source.

Changed section 5.0 for a new quote request msg_type 008, which includes bid_source and ask_source, and for a new quote reply msg_type 108 with an invalid quote source (08) error added.

Created APPENDIX B.

7.5 VERSION 3.1

Took out future use for Broker Dealer quote source in section 5.0 and 5.5.

Took out fractional spread values for Step-Up default table, section 6.1

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7.6 VERSION 3.2

Added BOX.

Created APPENDIX C.

7.7 VERSION 3.3

Added section 12.0 – BOOK SWEEP REQUEST

Removed old quote formats (from version 1.0 and 2.0)

7.8 VERSION 4.0

First Version that supports Phi-XL. This version is NOT backward compatible to version 3.3 so firms have to make changes to move to this version.

Changed the format and renumbered the document.

Added badge number and badge suffix to firm header.

Added interface for ROT quotes and purge quotes.

Added notification for cross quote and risk protection.

Changed Automatic execution to set automatic execution only and not step-up

Removed message for step-up parameters

7.9 VERSION 4.1

This version is completely backward compatible to version 4.0. All the new messages are OPTIONAL and the firm has to make NO changes if doesn't need the new functionality provided in this release.

Updated the description for QUOTE message to include additional details on processing & meaning of acknowledgements.

Added interface for Market For Execution Sweep. This interface is NOT required for Phi-XL. It will be used by Specialists to manually allocate BOOK Sweeps for Non-Streaming Symbols

In this version Specialists can use for identification either "SPLST" or their Badge Number.

Added the following notifications

- Fast market (non-firm),

- Automatic execution engagement/disengagement,

- Market center control

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7.10 VERSION 4.2

This version is completely backward compatible to version 4.1. The new notification is OPTIONAL and the firm has to make NO changes if doesn't need the new functionality provided in this release.

Added the following notifications

Rapid Opening

Eliminated the Mark for Execution Sweep Request as it does not apply to non PHLX-XL symbols.

7.11 VERSION 4.2.1

Added a note to the end of section 2.Firm, Participant & Symbol Setup

NOTE: The symbols that will be accepted are the OPRA Options Symbol. Currently, Options symbol roots are 1 to 3 characters long, therefore the 4 & 5 character Stock Symbol Underlying has a corresponding 1 to 3 character Options Symbol.

Added a comment to Quote Reply Message Format

nak_n: **Not sent when num_of_naks=00.**

Added a comment to Option Series Query Reply Message

nbr_records: **Not sent when msg_status is unsuccessful.**

root_symbol_list_n: **Not sent when msg_status is unsuccessful.**

7.12 VERSION 4.2.2

Removed Non-Firm Notification messages and Automatic Execution Engagement/Disengagement Notification messages

7.13 VERSION 4.3

Added a Universal "Automatic Purge Notification" Message and Quote Re-Entry protocol.

Added new reject message to the Quote Reply Message.

When quote is unable to be delivered to the PHLX-XL engine

Response_code - **04 = Quote undelivered**

When quote received after a automatic purge is missing the re-entry indicator

Response_code - **08= Need Re-entry Indicator**

Removed the Market Centers Request Message and Market Centers Notification messages.

Remove the following language

The Firm can also send a quote request with an empty block or no quotes for a given participant.

The request is validated for Firm and participant in the message and appropriate response is sent

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back to the firm. This can be used by the Firm as a Heartbeat to check the connection with PHLX-XL system at any time and check the configuration of the Firm and participant on the system.

7.14 VERSION 4.4

Requires compliance with version 4.3 in order to step up to version 4.4

–

Added section 5.7 – COMPLEX ORDER BOOK SWEEP.

- New Specialist/Market Maker request to sweep the complex order book or participate in Complex Order Live Auction (COLA)

7.15 VERSION 5.0

This is the first version that supports the new options industry symbology. **This version is NOT backward compatible to earlier versions and firms MUST make changes to move to this version.**

Requires compliance with the changes that have occurred as part of all prior versions through 4.4 in order to step up to version 5.0.

The following sections have been added, modified or removed to describe the difference between version 4.4 and 5.0 of the SQF specification. All messages under version 5.0 have new message ID's with the exception of the Complex Book Sweep message which is unchanged (reference each message format).

Section 2 – Firm, Participant & Symbol Setup

- Noted that OPRA symbols are obsolete in version 5.0 and symbology is defined by individual series components

Section 4.2 – Symbology

- New section summarizing the high level aspects of symbology as it relates to SQF

Section 5.2 – Quote

- Removed description in 5.2.1 regarding cross notifications (cross notifications have been removed)
- Modified the format of quote request and reply messages to use explicit symbology rather than OPRA codes

Section 5.3 – Quote Purge

- Modified the format of purge request and reply messages to use explicit symbology rather than OPRA codes

Section 5.4 – Book Sweep

- Modified the format of book sweep request and reply messages to use explicit symbology rather than OPRA codes

Section 5.5 – Notifications

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Section 5.5.1 – Cross Notification

- o Removed cross notifications

Section 5.5.1 – Automatic Purge Notification (formerly section 5.5.2)

- o Modified the format of automatic purge notification to use explicit symbology rather than OPRA codes

Section 5.5.2 – Rapid Opening Notification (formerly section 5.5.3)

- o Modified the format of rapid opening notification to use explicit symbology rather than OPRA codes

Section 5.6 – Option Series Query

- Restricted the option series query request to support only underlying symbol or security symbol – specification of Year, Month, Day, Call/Put and Strike is no longer supported
- Removed OPRA Symbol from the reply message (OPRA Symbol is obsolete in the new symbology)

Section 6 – Supplementary Messages For Specialists Only

- Removed all support for Automatic Execution Engagement/Disengagement and Non-Firm Control

7.16 VERSION 5.0.1

Section 5.4 – Book Sweep

- Added descriptions for Opening Sweep, Auction Sweep and Market Sweep and sweep responses.
- The Market Sweep response will be a volume weighted average.

Section 5.5 Notifications

- Added descriptions for Opening Purge Notifications and System Purge Notifications
- Added description for the Market Exhaust Auction Notification

Minor edits to remove references distinguishing XL from XL II.

7.17 VERSION 5.0.12

Section 5.7.1 – Complex Order Book Sweep - Description

- Added description for new values of “side” field in Complex Sweep Requests and Responses

Section 5.7.2.1 Complex Order Book Sweep Request Message Format

- Added two new values for “side” field in Complex Order Book Sweep Reply Message

Section 5.7.2.2 Complex Order Book Sweep Response Message Format

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- Added two new values for “side” field in Complex Order Book Sweep Reply Message

7.18 VERSION 5.0.13

Section 5.7.1 – Complex Order Book Sweep - Description

- Added further description for new values of “side” field in Complex Sweep Requests and Responses. Added explanation of the side field values

Section 5.7.2.1 Complex Order Book Sweep Request Message Format

- Added more values to side field for short positioning on complex sweep request

Section 5.4.1 PIXL sweep description

- Added description of PIXL sweep

Section 5.4.2.1 PIXL Sweep Request Message Format

- Added more values to side field for PIXL sweep request

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