



# **Chi-X Japan Market Data Feed Specification**

**Chi-X Japan Trading System**

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**Version 1.1-9**

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**FIGURES**

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## 1 Introduction

Chi-X Trading System (“CTS”) is a high performance, low latency trading system. The information processed by CTS is highly valuable to all the market players including participants, data vendors as well as investors. Therefore, a market data feed is one of the key services that is provided by CTS to disseminate such information.

This crucial market data service is called Chi-X Market Data Feed. Through this market data feed, the feed clients are able to receive orders and trade information in a real time fashion.

This document describes the technical aspect of this data feed including the connection protocol, message types and message structures etc.

### 1.1 Relevant documents

ITEM	TITLE	VERSION	DATE
1	CTS-L3-D-022 Chi-Tech Market Data Feed Specification	1.1	09-Oct-2009

Figure 1: Relevant Document(s)

### 1.2 Revision History

ITEM	REVISION HIGHLIGHT	DOCUMENT REFERENCE	CHANGE BY
1	Update to offset error in Login Accepted message	4.3	Patrick (version 1.1-3)
2	Update to description of Order Reference, Buy/Sell indicator and Contra Order Reference and updated the relevant use cases accordingly.	5.6, 6.7	Patrick (version 1.1-3)
3	Update to description of Order Reference in long form Order Execution Message	5.3	Eric (version 1.1-4)
4	Update to add support for Tick Direction in Order Execution message	5.3, 5.3.1, 6.1, 6.2, 6.6, 6.7, 6.8	Eric (version 1.1-5)
5	Remove “<space>” describe in Tick Direction Table	5.3.1	Eric (version 1.1-6)
6	Correct Sample in Trade Cancellation(Bust)	6.8	Eric (version 1.1-7)
7	Add Trading Status ‘A’ and ‘D’ to indicate Short Sell Price Check activate/deactivate for a symbol	5.8, 6.11, 6.12, 6.13	Eric (version 1.1-8)
8	Add the missed “display” field in “Add Order Message” in examples	6.4, 6.5	Eric (version 1.1-9)

Figure 2: Revision History

## 2 Data Types

This chapter described the available data types that are used in the Chi-X Market Data Feed.

### 2.1 Numeric

Numeric fields consist of digits which are ASCII coded. They are presented in right justification and are space-filled from the left. Data fields of numeric data type include Sequence, Order Reference, Trade Reference, number of Shares, etc.

### 2.2 Alphanumeric

Alphanumeric text fields consist of alphabetical letters or digits (or both). They are presented in left justification and are padded with spaces to the right. Data fields of alphanumeric data type include Stock (symbol).

### 2.3 Prices

Price data fields are presented in digits and decimal places are allowed.

Standard prices are presented in maximum six digits with four decimal places. Long form prices are presented in maximum 12 digits with 7 decimal places. Spaces are padded from the left in front of the digits and zeros are padded after the last decimal place to the right. Decimal points do not present in the price field. They are recognised by their positions in the price fields.

### 2.4 Timestamp

Timestamp data fields are presented in digits in milliseconds past midnight.

## 3 Session

### 3.1 Session Protocol

1. Chi-X MD Feed is built on a session layer on top of TCP/IP sockets. Sessions include sequenced and non-sequenced messages in which sequenced messages are the actual market data, while the non-sequenced messages are the session level interfaces that are not part of the market data feed.
2. Sequenced messages include buy and sell orders, order executions, order cancellation, etc.
3. Login, logout and heartbeat messages are the examples of non-sequenced messages.
4. Retrieving and recovering previous sequenced messages (actual market data feed) are possible.

### 3.2 Session Initialisation

1. Chi-X MD Feed Session is initialised when client establishes a TCP session and sends a login packet.
2. When server received the login packet, it responds with a login accepted packet and starts transferring sequenced data, or it rejects the login and terminates the session (if appropriate).
3. If login packet is not received within 30 seconds, server will also terminate the session.

### 3.3 Sequential Messaging

1. Each message is not literally assigned with a sequence number.
2. Since messages are transferred in sequence, the first message of a day can be considered assigned with the sequence number '1', and the succeeding sequenced messages are each assigned with the next sequence number. Hence, recovering a session is possible

### 3.4 Session Recovery

1. Recovering a session can be done by counting the number of sequenced messages which have already been received and providing the next expected sequence number of the message to be received when reconnecting to the server.
2. The new session will start from the next expected sequenced message.

## 4 Session Message

### 4.1 Debug Message (Inbound)

- Debug Messages are used for giving useful information to developers assisting them in application development and troubleshooting. They are used during development processes only.

Debug Message				
Name	Offset	Length	Value	Remarks
Message Type	0	1	“+”	Debug Message
Text	1	Variable	Alphanumeric	Free form text
Terminator	Text Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator

### 4.2 Login Request (Outbound)

- Login Request Message is sent to the server when client tries to establish connection to the server by sending login request packet. It also allows session recovery by providing the sequence number when sending the login request packet.
- Since data is sent in ASCII, it must be padded with spaces; for example, the field lengths of Username and Sequence are 6 and 10 alphanumeric characters respectively, if Username is “JOHN”, it should be sent as “JOHN\_ \_”, and if the expected sequence number is 1, it should be sent as “\_ \_ \_ \_ \_ \_ \_ \_ \_ \_1” (“\_” represents a space).

LOGIN REQUEST MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	“L”	Login Request Message
Username	1	6	Alphanumeric	Username
Password	7	10	Alphanumeric	Password
Session	17	10	Alphanumeric	Login requested session ID. Leave this field blank for initial login; and provide Session ID for subsequent logins.
Sequence	27	10	Numeric	The next expected sequence number of the feed from which to start. “1” indicates starting from the beginning of the day. “0” indicates the last message generated by the system bypassing recovery.
Terminator	37	1	ASCII 10, Hex 0x0A	Message Terminator

#### 4.3 Login Accepted (Inbound)

- Login Accepted Message is used for acknowledging a login request packet sent by client upon successful login.

LOGIN ACCEPTED MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"A"	Login Accepted Message
Session	1	10	Alphanumeric	The session ID currently logged into.
Sequence	11	10	Numeric	The next expected sequence number.
Comma	21	1	" , "	Separator
Messages Total	22	10	Numeric	The current total number of messages on the feed
Terminator	32	1	ASCII 10, Hex 0x0A	Message Terminator

#### 4.4 Login Rejected (Inbound)

- Login Rejected Message is used for acknowledging the failure of a login request packet sent by client.

LOGIN REJECTED MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"J"	Login Rejected Message
Reject Reason	1	1	"A" or "S"	Reason of the login rejection: "A" – Invalid username/password "S" – Invalid session ID
Terminator	2	1	ASCII 10, Hex 0x0A	Message Terminator

#### 4.5 Logout Request (Outbound)

- Logout Request Message is used for sending session termination request to the server. Session will be closed immediately when receiving logout request packet sent by client.

LOGOUT REQUEST MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"O"	Logout Request Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator



#### 4.6 Server Heartbeat Message (Inbound)

- If session is left idle for more than one second, server will send a heartbeat message.

SERVER HEARTBEAT MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"H"	Server Heartbeat Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

#### 4.7 Client Heartbeat Message (Outbound)

- Client Heartbeat Message is used for sending heartbeat messages to server from the client side on a regular interval. Since the server assumes the client is no longer active if it does not receive a heartbeat message from client for more than 15 seconds, the session will be terminated.

CLIENT HEARTBEAT MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"R"	Client Heartbeat Message
Terminator	1	1	ASCII 10, Hex 0x0A	Message Terminator

#### 4.8 Sequenced Data Message (Inbound)

- Sequenced Data Message is the message sent by the server which contains the actual market data. Since messages are transferred in sequence, the first sequenced data message of the current session can be considered assigned with the sequence number '1', and the succeeding sequenced messages are each assigned with the next sequence number. With the sequence number assigned to each message (implicitly), session recovery is possible.

SEQUENCED DATA MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Message Type	0	1	"S"	Sequenced Data Message
Data	1	Variable	Alphanumeric	Sequenced data. Contains all messages of actual market data feed. A message with zero length indicates the end of the session and no more messages are available.
Terminator	Data Length + 1	1	ASCII 10, Hex 0x0A	Message Terminator

## 5 Market Data Feed

Chi-X MD Feed service contains a series of messages informing clients of the orders added to and removed from CTS and the execution of trades in CTS. Data feed messages are included in Sequenced Data Message and are inbound messages to the client side.

Long form messages are used when the display length of the price or the size of an order or execution is longer than the standard message permits. Long form message is sent per order/execution basis.

### 5.1 System Event Message

- System Event Message is used for signalling an event which affects all systems of CTS.

SYSTEM EVENT MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"S"	System Event Message
Event Code	9	1	Alphanumeric	Please see System Event Codes below

#### 5.1.1 System Event Codes

SYSTEM EVENT CODE	DESCRIPTION	REMARKS
O	Start of Messages	This is the first message of the day
S	Start of Trading Session	This message indicates that CTS is open and accepting orders
E	End of System hours	This message indicates that CTS is closed and not accepting orders anymore. It is still possible to receive Broken Trade and Order Cancel messages after this.
C	End of Messages	This is the last message of the day

## 5.2 Add Order Message

- Add Order Message is used for acknowledging the acceptance of a visible order into the book in CTS. The message contains an Order Reference which is a unique key of the day assigned to the order by CTS.
- Add Order Message may be sent for accepting a revised order after the original order is cancelled. Please refer to *Section 5.5 Modification of Existing Orders* for detail.

ADD ORDER MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"A"	Add Order Message
Order Reference	9	9	Numeric	Unique order reference number of the day.
Buy/Sell Indicator	18	1	"B" or "S"	"B" = Buy Order "S" = Sell Order
Shares	19	6	Numeric	Total number of shares being added to the book. (The number of shares added to the book may be less than the actual number of shares entered because part of the order may trade before being posted to the book).
Stock	25	6	Alphanumeric	Stock symbol (which is right-padded with spaces).
Price	31	10	Price	The display price of the order.
Display	41	1	"Y"	"Y" = displayed in quote

LONG FORM ADD ORDER MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"a"	Long Form Add Order Message
Order Reference	9	9	Numeric	Unique order reference number of the day.
Buy/Sell Indicator	18	1	"B" or "S"	"B" = Buy Order "S" = Sell Order
Shares	19	10	Numeric	Total number of shares being added to the book. (The number of shares added to the book may be less than the actual number of shares entered because part of the order may trade before being posted to the book).
Stock	29	6	Alphanumeric	Stock symbol (which is right-padded with spaces).
Price	35	19	Price	The display price of the order.
Display	54	1	"Y"	"Y" = displayed in quote

### 5.3 Order Execution Message

- When an order on the book is executed, either in whole or in part, a Order Execution Message is sent.

ORDER EXECUTION MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"E"	Order Execution Message
Order Reference	9	9	Numeric	The reference key of the order which was executed.
Executed Shares	18	6	Numeric	The number of shares executed on the trade.
Trade Reference	24	9	Numeric	The unique trade reference number of the day.
Contra Order Reference	33	9	Numeric	The reference key of the contra-order that was executed.
Tick Direction	42	1	Alphanumeric	The tick direction. Please refer to the Tick Direction Table.

LONG FORM ORDER EXECUTION MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"e"	Long Form Order Execution Message
Order Reference	9	9	Numeric	The reference key of the order which was executed.
Executed Shares	18	10	Numeric	The number of shares executed on this trade
Trade Reference	28	9	Numeric	The unique trade reference number of the day.
Contra Order Reference	37	9	Numeric	The reference key of the contra-order that was executed.
Tick Direction	46	1	Alphanumeric	The tick direction. Please refer to the Tick Direction Table.

#### 5.3.1 Tick Direction Table

Tick Direction is available in Order Execution Message as supplementary information. It is determined by using the last trade price of the Chi-X Trading System.

TICK DIRECTION	DESCRIPTION
+	Trade price goes up
-	Trade price goes down.
0	Trade price no variation
U	Trade price no variation but higher than the previous different price.
D	Trade price no variation but lower than the previous different price.

### 5.4 Order Cancel Message

- When an order on the book is cancelled completely, the quantity of an order is cut down or the price of a pegged order is revised, Order Cancel Message is sent out.

ORDER CANCEL MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"X"	Order Cancel Message
Order Reference	9	9	Numeric	The reference number of the order which was cancelled. (Order Reference can be a reference of a previously sent Add Order Message.)
Cancelled Shares	18	6	Numeric	Number of shares cancelled.
LONG FORM ORDER CANCEL MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"x"	Long Form Order Cancel Message
Order Reference	9	9	Numeric	The reference number of the order which was cancelled. (Order References can be a reference of a previously sent Add Order Message.)
Cancelled Shares	18	10	Numeric	Number of shares cancelled.

## 5.5 Modification of Existing Orders

- Modification of Price

When there is a modification of price on an existing order, a Cancel Message (for full quantity and open order) for the existing order is sent out, followed by an Add Order Message which is assigned with the same Order Reference as the cancelled order.

- Reduction of quantity

When there is a reduction of quantity on an existing order, a Cancel Message for the existing order is sent out which acknowledges the reduction of the number of shares pending in the referenced open order currently. If the number of currently pending shares for an order reaches zero, the order will be removed from the book.

## 5.6 Trade Message

- When there is a trade realised against order quantity not visible on the book (partially hidden order), Trade Message is sent out. Trade Messages fill in the gaps of data feeds of orders that are executed with hidden order quantities.

*Note: Order Execution Messages and Trade Messages together provide a complete picture of all executions occurred in CTS. Trade Message does not affect the book and can be ignored for book-building.*

TRADE MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"P"	Trade Message
Order Reference	9	9	Numeric	The Order Reference will always be set to 0 (zero).
Buy/Sell Indicator	18	1	Alphanumeric	The Buy/Sell indicator will always be set to "B".
Shares	19	6	Numeric	Number of shares executed.
Stock	25	6	Alphanumeric	Stock symbol (right-padded with spaces)
Price	31	10	Price	Match price of the order
Trade Reference	41	9	Numeric	Trade reference number generated for the trade.
Contra Order Reference	50	9	Numeric	The Contra Order Reference will always be set to 0 (zero).

LONG FORM TRADE MESSAGE				
NAME	OFFSET	LENGTH	VALUE	REMARKS
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"p"	Long Form Trade Message
Order Reference	9	9	Numeric	The Order Reference will always be set to 0 (zero).
Buy/Sell Indicator	18	1	Alphanumeric	The Buy/Sell indicator will always be set to "B".
Shares	19	10	Numeric	Number of shares executed.
Stock	29	6	Alphanumeric	Stock symbol (right-padded with spaces).
Price	35	19	Price	Match price of the order
Trade Reference	54	9	Numeric	Trade reference number generated for the trade.
Contra Order Reference	63	9	Numeric	The Contra Order Reference will always be set to 0 (zero).

## 5.7 Broken Trade Message

- When an execution is broken in CTS, Broken Trade Message is sent out. If a trade is broken, it cannot be reverted.

*Note: Broken Trade Message only affects applications which build on a time-and-sales database or maintain cumulative volumes or high/low calculations. Broken Trade Message has no effect on the book and it can be ignored for book-building.*

Broken Trade Message				
Name	Offset	Length	Value	Remarks
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"B"	Broken Trade Message
Trade Reference	9	9	Numeric	The trade reference number of the execution that was broken. (The Trade Reference can be a previously sent Order Execution Message or Trade Message.)

## 5.8 Stock Status Message

This message indicates the current trading status of a stock. At the start of day, the feed will send out a stock status message with Trading Status set with 'T' – Trading or 'H' - Halted for each of the symbols trading on CTS. And then, the feed will send out stock status message with Trading Status set with 'A' or 'D' to indicate if Short Sell Price Check is activated or not for each of the symbols.

Subsequently, stock status messages will be sent when a stock is halted or is released for trading. Also, stock status messages will be sent when Short Sell Price check is activated for a stock.

Stock Status Message				
Name	Offset	Length	Value	Remarks
Time Stamp	0	8	Numeric	Time Stamp
Message Type	8	1	"H"	Stock Trading Action Message
Stock	9	6	Alphanumeric	Stock Symbol
Trading State	15	1	Alphanumeric	"H" = Halted, "T" = Trading, "A" = "Short Sell Price Check activate", "D" = "Short Sell Price Check deactivate"
Reserved	16	1	Alphanumeric	Reserved for future use

## 6 Sample Outputs

### 6.1 Order Added and Fully Traded

ACTION	CHI-X MD FEED MESSAGE
Sell of 100 RIM shares entered at 85.89. Order Reference 638 assigned.	38743037A 638S 100RIM 858900Y
Matching buy order entered and order traded with Reference "355".	38754246E 638 100 355 640-

*Note: There is no Add Order Message for the matching buy order since it does not display on the book.*

*Buyer needs to conjecture the execution price based on the limit of the original order since the Order Execution Message has no price indicated.*

### 6.2 Order Added, Fully Traded and Remaining Quantity of Matching Order is Placed on Book

ACTION	CHI-X MD FEED MESSAGE
Buy order of 111 RIM shares entered at 85.89. Order Reference "2" assigned.	46143332A 2B 111RIM 858900Y
Matching sell order entered for 112 shares of RIM. Order Execution Message is sent out with Order Reference "2" and Trade Reference "1".	46300560E 2 111 1 4-
Add the remaining share (1) of the sell order onto the book.	46300713A 4S 1RIM 858900Y

### 6.3 Pegged/Market Order Added to Book

ACTION	CHI-X MD FEED MESSAGE
Sell order of 100 RIM shares entered with a pegged order attribute. Order Reference "663" assigned. The display price is 85.89.	9323626A 663S 100RIM 858900Y
Each time when the price changes, an Order Cancel Message is sent out.	39329400X 663 100
An Add Order Message is sent after the Order Cancel Message. The Order Reference is the same. The display price changes to 85.88.	39329400A 663S 100RIM 858800Y

*Note: Same actions will be performed for CTS market orders.*



#### 6.4 Price Revision

ACTION	CHI-X MD FEED MESSAGE
Sell order of 1000 RIM shares entered. Order Reference "670" assigned. The display price is 85.88.	39465381A 670S 1000RIM 858800Y
Price is revised to 85.89. An Order Cancel Message is sent out.	39476527X 670 1000
An Add Order Message is sent after the Order Cancel Message. The Order Reference is the same. The display price changes to 85.89.	39476527A 670S 1000RIM 858900Y

#### 6.5 Reduction of Order Quantity

ACTION	CHI-X MD FEED MESSAGE
Sell order of 1000 RIM shares entered. Order Reference "671" assigned. The display price is 85.88.	39476527A 671S 1000RIM 858800Y
The order quantity is cut down by 100 shares. An Order Cancel Message is sent informing client about the change.	39483706X 671 100

*Note: Client should calculate the remaining amount of the original order which is still open since CTS currently does not support increase of total order quantity.*

#### 6.6 Order Revised and Executed

ACTION	CHI-X MD FEED MESSAGE
A visible sell order of 1666 RIM shares is placed on the book with the display price of 85.89.	38821658A 642S 1666RIM 858900Y
A visible buy order of 1066 RIM shares is placed on the book with the display price of 85.88.	38841745A 644B 1066RIM858800Y
The buy order is revised to the display price of 85.89. An Order Cancel Message is sent out.	38852664X 644 1066
The trade is executed. An Order Execution Message is sent out.	38852664E 642 1066 356 644+

#### 6.7 Trades On Partially Hidden Order (Iceberg)

ACTION	CHI-X MD FEED MESSAGE
A sell order of 10000 RIM shares is placed on the book with a visible quantity of 1000 shares. The display price is 85.89. An Add Order Message is sent out for the visible amount.	40792757A 2454S 1000RIM858900Y

A buy order of 500 shares is entered and crosses against the visible quantity of 1000 shares. 500 shares remain on the book.	40812453E	2454	500	1953	2455-
A buy order for 4000 shares is entered and crosses against the iceberg. An Order Execution Message for the visible trade of 500 shares is sent out.	40825082E	2454	500	1954	2456D
A Trade Message is sent out for the hidden quantity of 3500 shares.	40825082P 0	0B	3500RIM	858900	1954
The peak is refreshed onto the book. An Add Order Message is sent out for 1000 shares.	40825082A	2454S	1000RIM	858900Y	

### 6.8 Trade Cancellation (Bust)

ACTION	CHI-X MD FEED MESSAGE
A sell order of 111 RIM shares is placed on the book. The display price is 85.89. An Add Order Message is sent out for the visible amount.	42119703A 4716S 111RIM 858900Y
An Order Execution Message is sent out on receiving a matching order. The Trade Reference is "4152".	42124752E 4716 111 4152 4717+
When the trade is cancelled by CTS operators, a Broken Trade Message is sent .	42204572B 4152

### 6.9 Long Form Messages (Execution of Visible Order)

ACTION	CHI-X MD FEED MESSAGE
A buy order of 1,000,000 RBSI shares entered at 80,000,000p. Order Reference "109" is assigned.	36417412a 109B 1000000RBSI 8000000000Y
An Order Execution Message is sent out on receiving a matching order. The Trade Reference is "28".	36447020e 109 100000028 110U

### 6.10 Long Form Messages (Cancellation of Visible Order)

ACTION	CHI-X MD FEED MESSAGE
A buy order of 1,000,000 RBSI shares entered at 80,000,000p. Order Reference "111" is assigned.	36417412a 111B 1000000RBSI 8000000000Y
The order is cancelled by CTS and an Order Cancel Message is sent out.	36453536x 111 1000000

**6.11 Short Sell price check activated before trading hours**

ACTION	CHI-X MD FEED MESSAGE
Stock Status Message indicates symbol 9957 is tradable.	23412935H9957 TN
Stock Status Message indicates short sell price check activated for symbol 9957	27412896H9957 AN

**6.12 Short Sell price check deactivated before trading hours**

ACTION	CHI-X MD FEED MESSAGE
Stock Status Message indicates symbol 9957 is tradable.	23412935H9957 TN
Stock Status Message indicates short sell price check deactivated for symbol 9957	27412896H9957 DN

**6.13 Short Sell price check activated during trading hours**

ACTION	CHI-X MD FEED MESSAGE
Stock Status Message indicates short sell price check activated for symbol 2531	33403337H2531 AN