algoseek
THE MARKET DATA COMPANY

US Options TTOB Guide

version 1.1 (Jan 2024)

CONTACT US

We are here to help you do great things with our market data. For questions, feedback, and other concerns, you may reach our team of experts using the following contact information:

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INTRODUCTION

algoseek's Trade And Top Of Book Quote (TTOB) dataset for US Options on Equity, ETF, ETN, and ADRs is based on the top-of-book quotes (bids and asks) and all trades from the Options Pricing Authority (OPRA) feed, which includes the consolidated last sale and quotation information from the 16 option exchanges that the Securities and Exchange Commission has approved.

All Trade TTOB data files are organized into a single format feed where trade events are ordered by the time. The entire trading session includes market hours from 9:30:00 to 16:15:00 ET.

OPRA DATA FEED

OPRA is a securities information processor that disseminates, on a current and continuous basis, information about transactions that occurred on the options markets.

Each trade that is executed on an options exchange, as well as each price change quoted on an options exchange, is reported to OPRA. Also, OPRA calculates and identifies the National Best Bid and Best Offer (NBBO – highest bid and lowest offer). OPRA consolidates this information and disseminates it via computer-to-computer linkages to the financial community in the U.S. and abroad.

DATA ORGANIZATION AND FILE FORMAT

algoseek provides Options market data in plain-text CSV files. Data files have fixed headers on top and rows of data corresponding to individual events. Data is organized with one file per option contract per trading day. For example, all trade events for all the AAPL call and put options for every strike on the expiration date March 3, 2020, for trading date February 27, 2020, are consolidated in one file. Due to the large dataset size, each CSV file is gzip-compressed, so the uncompressed data is on average 7 times larger than the compressed.

Table 1 (below) provides the name, description, and data type for each data field (column) in Options Trade Only data file.

Table 1: CSV File Fields Schema

Field	Type (Format)	Description
Date	string (yyyymmdd)	Trading date in yyyymmdd format (optional)
Timestamp	string (HHMMSSmmm)	Event timestamp in milliseconds

		Excel Note: Excel displays incorrect timestamps unless the Timestamp column is imported as text.
Ticker	string	Symbol name
CallPut	string	Option type (Call or Put) displayed as “C” or “P”
StrikePrice	decimal	Fixed price for buying or selling an option contract
ExpirationDate	string (yyyymmdd)	Expiration date of option contract in yyyymmdd format
EventType	string	Byte code. See “EventType” section for details
Side	string	B (Buy) or S (Sell) side of the book. Empty field for trade events
Action	string	EventType and Side as text. See “Action” section for details
Price	decimal	Option contract pricing
Quantity	integer	Underlying asset quantity
Exchange	string	Exchange code. See “Exchanges” section for details
Conditions	string	Single letter for trade or quote condition
LastNBBOBidTime	string (HHMMSSmmm)	Time of the last option NBBO bid
LastNBBOBidExchange	string	Last option NBBO bid exchange code
LastNBBOBidPrice	decimal	Price of the last option NBBO bid
LastNBBOBidSize	integer	Size of the last option NBBO bid
LastNBBOBidCondition	string	Last option NBBO bid condition
LastNBBOAskTime	string (HHMMSSmmm)	Time of the last option NBBO ask
LastNBBOAskExchange	string	Last option NBBO ask exchange code
LastNBBOAskPrice	decimal	Price of the last option NBBO ask
LastNBBOAskSize	integer	Size of the last option NBBO ask
LastNBBOAskCondition	string	Last option NBBO ask condition
ListQuoteExchange	string	List of exchanges for LastBid* and LastAsk* columns separated by a semicolon “;”
ListLastBidTime	string	List of last bid times for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastBidPrice	string	List of last bid prices for each exchange in the

		ListQuoteExchange column separated by a semicolon “;”
ListLastBidSize	string	List of last bid sizes for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastAskTime	string	List of last ask times for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastAskPrice	string	List of last ask prices for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastAskSize	string	List of last ask sizes for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastQuoteCondition	string	List of last quote conditions for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastBidCondition	string	List of last bid conditions for each exchange in the ListQuoteExchange column separated by a semicolon “;”
ListLastAskCondition	string	List of last ask conditions for each exchange in the ListQuoteExchange column separated by a semicolon “;”
UnderSymbol	string	Underlying symbol name
UnderBidTime	string (HHMMSSmmmuuunnn)	The bid time of the underlying security
UnderBidPrice	decimal	The bid price of the underlying security
UnderBidSize	integer	The bid size of the underlying security
UnderBidConditions	string	The bid conditions of the underlying security
UnderBidExchange	string	The bid exchange of the underlying security
UnderAskTime	string (HHMMSSmmmuuunnn)	The ask time of the underlying security
UnderAskPrice	decimal	The ask price of the underlying security
UnderAskSize	integer	The ask size of the underlying security
UnderAskConditions	string	The ask conditions of the underlying security

UnderAskExchange	string	The ask exchange of the underlying security
UnderLastTradeTime	string (HHMMSSmmmuuunnn)	The time of the last trade for the underlying security (nanosecond resolution) before the current trade. Empty if no trade price is available
UnderLastTradePrice	decimal	The last trade price for the underlying security before the current trade. Empty if no trade price is available
UnderLastTradeSize	decimal	The size of the last trade for the underlying security before the current trade. Empty if no trade price is available
UnderLastTradeConditions	string	The conditions of the last trade for the underlying security before the current trade. Empty if no trade price is available
UnderLastTradeExchange	string	The exchange of the last trade for the underlying security before the current trade. Empty if no trade price is available
UnderTotalTradeSize	integer	The total trade size of the last trade for the underlying security before the current trade. Empty if no trade price is available
UnderTotalTradeCount	integer	The total trade count of the last trade for the underlying security before the current trade. Empty if no trade price is available

Timestamp

Event timestamp is in milliseconds, EST. Field format: HHMMSS.mmm where

HH: Hour

MM: Minute

SS: Seconds

mmm: Milliseconds

For example, 093101723 corresponds to 09:31:01.723

Exchanges

The table below shows the list of exchange codes and matching exchange names.

Table 2: Exchange Codes

Exchange Code	Exchange Name
AM	AMEX

AR	ARCA
BA	BATS
BY	BATS_Y
BO	BOSTON
C2	C2
CB	CBOE
CS	CSE
EA	EDGA
EX	EDGX
FI	FINRA
IE	IEX
IS	ISE
IG	ISE_GEMINI
IM	ISE_MERCURY
LT	LTSE
MI	MIAX
MP	MIAX_PEARL
ME	MIAX_EMERALD
MS	MIAX_SAPPHIRE
MX	MEMX
NA	NASDAQ
NB	NASDAQ_BX
NP	NASDAQ_PSX
NS	NSE
NY	NYSE
OP	OPRA
SI	SIAC
TH	THOMSON
UN	UNKNOWN

Action

Table 3 lists the action codes and matching EventType. It is possible for multiple action codes to occur. For example, TI NB: Trade Interest NBBO.

Table 3: Action Codes

Action	EventType
H	Halted
HB	Heartbeat
I	Indicative Value
IN	Invalid
NB	NBBO
OI	OpenInterest
R	Rotation
T	Trade
TI	TradeInterest
UQ	UnderlyingValueQuote
US	UnderlyingValueSale

Conditions

Conditions are displayed as a single character to represent a normal trade or quote. Table 4 lists **Category a** (Equity and Index Last Sale) messages and their descriptions.

Table 4. Trade Message Types

Code	Type	Value	Description
Space Filled	Regular		Indicates that the transaction was a regular sale and was made without stated conditions.
A	CANC		Transaction previously reported (other than as the last or opening report for the particular option contract) is now to be canceled.
B	OSEQ		Transaction is being reported late and is out of sequence. (i.e., later transactions have been reported for the particular option contract)
C	CNCL		Transaction is the last reported for the particular option contract and is now canceled.
D	LATE		Transaction is being reported late, but is in the correct sequence. (i.e., no later transactions have been reported for the particular option contract)

E	CNCO		Transaction was the first one (opening) reported this day for the particular option contract. Although later transactions have been reported, this transaction is now to be canceled.
F	OPEN		Transaction is a late report of the opening trade and is out of sequence. (i.e., other transactions have been reported for the particular option contract)
G	CNOL		Transaction was the only one reported this day for the particular option contract and is now to be canceled.
H	OPNL		Transaction is a late report of the opening trade, but is in the correct sequence. (i.e., no other transactions have been reported for the particular option contract)
I	AUTO		Transaction was executed electronically. Prefix appears solely for information; process as a regular transaction.
J	REOP		Transaction is a reopening of an option contract in which trading has been previously halted. Prefix appears solely for information; process as a regular transaction.
S	ISOI		Transaction was the execution of an order identified as an Intermarket Sweep Order. Process like normal transaction.
a	SLAN	Single Leg Auction Non-ISO	Transaction was the execution of an electronic order which was stopped at a price and traded in a two-sided auction mechanism that goes through an exposure period. Such auction mechanisms include and are not limited to price improvement, facilitation, or solicitation mechanism.
b	SLAI	Single Leg Auction ISO	Transaction was the execution of an Intermarket Sweep electronic order which was stopped at a price and traded in a two-sided auction mechanism that goes through an exposure period. Such auction mechanisms include and are not limited to price improvement facilitation or solicitation mechanisms marked as ISO.
c	SLCN	Single Leg Cross Non-ISO	Transaction was the execution of an electronic order which was stopped at a price and traded in a two-sided crossing mechanism that does not go through an exposure period. Such crossing mechanisms include and are not limited to Customer to Customer Cross and QCC with a single option leg.
d	SCLI	Single Leg Cross ISO	Transaction was the execution of an Intermarket Sweep electronic order which was stopped at a price and traded in a two-sided crossing mechanism that does not go through an exposure period. Such crossing mechanisms include and are not limited to Customer to Customer Cross.
e	SLFT	Single Leg Floor Trade	Transaction represents a non-electronic trade executed on a trading floor. Execution of paired and unpaired auctions and cross orders on an exchange floor are also included in this

			category.
f	MLET	Multi-Leg Auto-Electronic Trade	Transaction represents an electronic execution of a multi-leg order traded in a complex order book.
g	MLAT	Multi-Leg Auction	Transaction was the execution of an electronic multi-leg order which was “stopped” at a price and traded in a two-sided auction mechanism that goes through an exposure period in a complex order book. Such auction mechanisms include and are not limited to price improvement, facilitation or solicitation mechanism.
h	MLCT	Multi-Leg Cross	Transaction was the execution of an electronic multi-leg order which was stopped at a price and traded in a two-sided crossing mechanism that does not go through an exposure period. Such crossing mechanisms include and are not limited to customer to customer cross and QCC with two or more options legs.
i	MLFT	Multi-Leg Floor Trade	Transaction represents a non-electronic multi-leg order trade executed against other multi-leg order(s) on a trading floor. Execution of paired and unpaired auctions and cross orders on an exchange floor are also included in this category.
j	MESL	Multi-Leg Auto-Electronic Trade against Single Leg(s)	Transaction represents an electronic execution of a multi-leg order traded against single-leg orders/quotes.
k	TLAT	Stock Options Auction	Transaction was the execution of an electronic multi-leg stock/options order which was stopped at a price and traded in a two-sided auction mechanism that goes through an exposure period in a complex order book. Such auction mechanisms include and are not limited to price improvement, facilitation or solicitation mechanism.
l	MASL	Multi-Leg Auction against Single Leg(s)	Transaction was the execution of an electronic multi-leg order which was stopped at a price and traded in a two-sided auction mechanism that goes through an exposure period and trades against single-leg orders/ quotes. Such auction mechanisms include and are not limited to price improvement, facilitation or solicitation mechanism.
m	MFSL	Multi-Leg Floor Trade against Single Leg(s)	Transaction represents a non-electronic multi-leg order trade executed on a trading floor against single-leg orders/quotes. Execution of paired and unpaired auctions on an exchange floor is also included in this category.
n	TLET	Stock Options Auto-Electronic Trade	Transaction represents an electronic execution of a multi-leg stock/options order traded in a complex order book.
o	TLCT	Stock Options Cross	Transaction was the execution of an electronic multi-leg stock/options order which was “stopped” at a price and traded in a two-sided crossing mechanism that does not go through

			an exposure period. Such crossing mechanisms include and are not limited to customer to customer cross.
p	TLFT	Stock Options Floor Trade	Transaction represents a non-electronic multi-leg order stock/options trade executed on a trading floor in a Complex order book. Execution of paired and unpaired auctions and cross orders on an exchange floor are also included in this category.
q	TESL	Stock Options Auto-Electronic Trade against Single Leg(s)	Transaction represents an electronic execution of a multi-leg stock/options order traded against single leg orders/quotes.
r	TASL	Stock Options Auction against Single Leg(s)	Transaction was the execution of an electronic multi-leg stock/options order which was stopped at a price and traded in a two-sided auction mechanism that goes through an exposure period and trades against single-leg orders/quotes. Such auction mechanisms include and are not limited to price improvement, facilitation, or solicitation mechanism.
s	TFSL	Stock Options Floor Trade against Single Leg(s)	Transaction represents a non-electronic multi-leg stock/options order trade executed on a trading floor against single-leg orders/quotes. Execution of paired and unpaired auctions on an exchange floor is also included in this category.
t	CBMO	Multi-Leg Floor Trade of Proprietary Products	Transaction represents the execution of a proprietary product non-electronic multi-leg order with at least 3 legs. The trade price may be outside the current NBBO.
u	MCTP	Multilateral Compression Trade of Proprietary Products	Transaction represents an execution in a proprietary product done as part of a multilateral compression. Trades are executed outside of regular trading hours at prices derived from end of day markets. Trades do not update Open, High, Low, and Closing Prices.
v	EXHT	Extended Hours Trade	Transaction represents a trade that was executed outside of regular market hours. Trades do not update Open, High, Low, and Closing Prices.

Quote Conditions

The Message Type character for the following categories is Space

Category C (Administrative)

Category f (Equity and Index End of Day Summary)

Category d (Open Interest)

For other categories, refer to Table 5.

Table 5: Quote Message Types

Code	Value	Description
Category H (Control)		
A	Start of test cycle	transmitted to signal the start of the transmission of a Test Cycle
B	End of test cycle	transmitted to signal the end of the transmission of a Test Cycle message
C	Start of day	signals the start of normal data recipient processing of messages received over a line
D	Good morning	transmitted by a Participant to signal the beginning of transaction processing by that Participant
E	Start of summary	transmitted by a Participant to signal the beginning of transmission of one or more End of Day Summary messages by that Participant
F	End of summary	transmitted by a Participant to signal the end of transmission of one or more End of Day Summary messages by that Participant
G	Early market close	transmitted by a Participant to signal that the Participant originating the message is closing prior to normal market close time
H	End of transaction reporting	transmitted by a Participant to signify that the Participant has terminated reporting of transactions
I	Good night	transmitted by a Participant to advise all data recipients that there are no further messages of any type transmitted for the day by that Participant
J	End of day	signals the end of transmission of original data over the lines
K	Reset block sequence number	transmitted when the block sequence number requires resetting
L	Start of open interest	signals the beginning of transmission of a series of one or more Open Interest messages
M	End of open interest	signals the end of transmission of a series of one or more Open Interest messages
N	Line integrity	Generated automatically at intervals of approximately one minute to verify continued integrity of multicast transmission
P	Disaster recovery data center	disseminated from the Disaster Recovery site to signify that OPRA has switched processing from the Primary Data Center to the Disaster Recovery Center

Category k (Long Equity and Index Quote) and Category q (Short Equity and Index Quote)		
Space	Regular trading	
F	Non-firm quote	
I	Indicative value	
R	Rotation	
T	Trading halted	
A	Eligible for automatic execution	
B	Bid contains customer trading interest	
O	Offer contains customer trading interest	
C	Both bid and offer contain customer trading interest	
X	Offer side of quote not firm; bid side firm	
Y	Bid side of quote not firm; offer side firm	
Category Y (Underlying Value)		
Space	Index based on last sale	
I	Index based on bid and offer	

APPENDIX A. EVENT TYPE CODES

Event types are represented by a one-byte (8 bits) mask. The “EventType” column has the event as a byte, and the corresponding text is in the Action column. The bit position 0 corresponds to the rightmost bit and 7 is the leftmost bit. Tables 6 and 7 summarize Event Type codes and their descriptions.

Note: Most clients do not need to concern themselves with the “EventType” field, as it is translated into text in the Action column.

Table 6: EventType Flags

Bit Position	Description
0-3	Message type (integer 3-bit value). See Message Type Table
4	Set if the previous trade/quote canceled
5	Option type: 1 for call, 0 for put
6	Indicates NBBO
7	Indicates buy or sell side. Buy size if et and sell side otherwise

Table 7: Message Type (Bits 0-3)

Value	Message	Value	Message
0	Heartbeat (not in use)	6	Rotation
1	Trade	7	Halted
2	OpenInterest	8	NoQuote
3	TradeInterest	9	SessionEnd (not in use)
4	FirmQuote	10	UnderlyingValueSell
5	NonFirmQuote	11	UnderlyingValueQuote