



# US Options Trade and Quote Minute Bar Guide

version 1.5 (Apr 2022)



**algoseek | the market data company**

We provide research market data for machine learning and quantitative trading



## CONTACT US

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

### **algoseek customer support**

✉ [support@algoseek.com](mailto:support@algoseek.com)

☎ (+1) 646 583 1832

### **algoseek sales**

✉ [sales@algoseek.com](mailto:sales@algoseek.com)

☎ (+1) 646 583 1832



## TABLE OF CONTENTS

INTRODUCTION	5
MINUTE BAR CALCULATIONS	5
DATA ORGANIZATION AND FILE FORMAT	7
APPENDIX A. FREQUENTLY ASKED QUESTIONS	12



## INTRODUCTION

algoseek's Trade and Quote (TAQ) Minute Bar 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 TAQ Minute Bar data files are organized into a single format feed where bars are ordered by time. The entire trading session includes market hours from 9:30:00 to 16:15:00 ET.

## MINUTE BAR CALCULATIONS

### What's Included

Quotes are calculated from the National Best Bid Offer (NBBO) using:

- Firm Quote Bid NB
- Firm Quote Ask NB
- Customer Trade Interest Bid NB
- Customer Trade Interest Ask NB

### What's Not Included

The bars do not include the following quote events:

- Open Interest
- Rotation Bid
- Rotation Ask
- Non Firm Quote

Please see the table below for the trade events that are excluded.

**Table 1: Excluded Trades**

Trade Condition	Description
A	Previously reported
B	Reported late and out of sequence



C	Transaction last reported and now canceled
F	Late report of opening and out of sequence
G	Transaction only one reported for day and is to be canceled
N	Transaction is at price agreed by floor personal
O	Cancel of stopped transaction
T	Benchmark trade

## Event-based Bars

Options activity varies from contracts with multiple events per millisecond (e.g. SPY in-the-money Options), to contracts without any bid or ask event during the market hours.

algoseek's options bars are event-based, which means a bar is only created when there was at least one event during the bar period. The three types of events (bid, ask and trade) don't always happen together during a bar period. For example, there could be three bids, but neither trades nor asks for a minute.

If there is only one bid, or ask, or trade, during the bar period, the event fields will have the same values. For example:

`OpenBidPrice = HighBidPrice = LowBidPrice = CloseBidPrice`

`OpenBidSize = HighBidSize = LowBidSize = CloseBidSize`

`OpenBidTime = HighBidTime = LowBidTime = CloseBidTime`

If there are no events, then there will not be any bars for a Call+Strike or Put+Strike option at all.

## Underlying Quote Event

Table 2 describes the logic for underlying security quotes.

**Table 2. Underlying Bid/Ask of the First and Last Event**

Field	Description
UnderOpenBidPrice	Underlying security NBBO bid price at millisecond time of first option bid, ask, or trade event.
UnderOpenAskPrice	Underlying security NBBO ask price at millisecond time of first option bid, ask, or trade event.
UnderCloseBidPrice	Underlying security NBBO bid price at millisecond time of last option bid, ask, or trade event.
UnderCloseAskPrice	Underlying security NBBO ask price at millisecond time of last option bid, ask, or trade event.



There can be one or more of these events in a bar. Each bar will show the underlying ticker's bid/ask price at the millisecond time of the first and last events for the bar. If there is only one event in the bar then this data will be the same.

The bid/ask price is the NBBO price of the underlying asset at the millisecond time of the event.

## 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 bars. Data is organized with one file per ticker per trading day per ticker and per option chain (ticker+expiration date). It means, for example, that trade and quote bars 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 compressed.

Table 3 below provides the name, base event, default value, a brief description, and data type for each data field (column) in the Options TAQ Minute Bar CSV file. Table column "Missing" indicates a default behavior in case the data field value is not present or cannot be calculated. The column value "Never" means that the data field value is always present.

**Table 3: CSV File Fields Schema**

Field	Base Event	Type (Format)	Missing	Description
Date	-	string (yyyymmdd)	Never	Trading date in yyyymmdd format
TimeBarStart	-	string (HH:MM)	Never	Start Time of the Bar. For minute bar format is HH:MM. For second bar format is HH:MM:SS.
Ticker	-	string	Never	Symbol name
CallPut	-	string	Never	Option type (Call or Put) displayed as "C" or "P"
Strike	-	decimal	Never	Fixed price for buying or selling an option contract
ExpirationDate	-	string (yyyymmdd)	Never	Expiration date of option contract in yyyymmdd format
OpenBidTime	Quote	string (timestamp)	Blank	Time of the first bid
OpenBidPrice	Quote	decimal	Blank	NBBO Price of the first bid



## US Options Trade and Quote Minute Bar Guide

OpenBidSize	Quote	integer	Blank	Open bid size
OpenAskTime	Quote	string (timestamp)	Blank	Time of the first ask
OpenAskPrice	Quote	decimal	Blank	NBBO price of the first ask
OpenAskSize	Quote	integer	Blank	Open ask size
OpenTradeTime	Trade	string (timestamp)	Blank	Time of the first trade
OpenTradePrice	Trade	decimal	Blank	Price of the first trade
OpenTradeSize	Trade	integer	Blank	Number of contracts of the first trade
HighBidTime	Quote	string (timestamp)	Blank	Time of highest NBBO bid price
HighBidPrice	Quote	decimal	Blank	The highest NBBO bid price
HighBidSize	Quote	integer	Blank	Size of the highest bid price
HighAskTime	Quote	string (timestamp)	Blank	Time of the highest NBBO ask price
HighAskPrice	Quote	decimal	Blank	The highest NBBO ask price
HighAskSize	Quote	integer	Blank	Size of the highest ask price
HighTradeTime	Trade	string (timestamp)	Blank	Time of the highest trade
HighTradePrice	Trade	decimal	Blank	Price of the highest trade
HighTradeSize	Trade	integer	Blank	Number of contracts of the highest trade
LowBidTime	Quote	string (timestamp)	Blank	Time of the lowest bid
LowBidPrice	Quote	decimal	Blank	The lowest NBBO bid price of bar
LowBidSize	Quote	integer	Blank	The lowest bid size
LowAskTime	Quote	string (timestamp)	Blank	Time of the lowest ask
LowAskPrice	Quote	decimal	Blank	The lowest NBBO ask price of bar
LowAskSize	Quote	integer	Blank	The lowest ask size
LowTradeTime	Trade	string (timestamp)	Blank	Time of the lowest trade
LowTradePrice	Trade	decimal	Blank	Price of the lowest trade
LowTradeSize	Trade	integer	Blank	The lowest trade's number of contracts
CloseBidTime	Quote	string	Blank	Time of the last bid



		(timestamp)		
CloseBidPrice	Quote	decimal	Blank	NBBO price of the last bid
CloseBidSize	Quote	integer	Blank	Size of the last bid
CloseAskTime	Quote	string (timestamp)	Blank	Time of the last ask
CloseAskPrice	Quote	decimal	Blank	NBBO price of the last ask
CloseAskSize	Quote	integer	Blank	Size of the last ask
CloseTradeTime	Trade	string (timestamp)	Blank	Time of the last trade
CloseTradePrice	Trade	decimal	Blank	Price of the last trade
CloseTradeSize	Trade	integer	Blank	Number of contracts of the last trade
UnderOpenBid Price	Under lying	decimal	Blank	Underlying ticker's NBBO bid price at millisecond time of the first option Bid, Ask, or Trade event.
UnderOpenAsk Price	Under lying	decimal	Blank	Underlying ticker's NBBO ask price at millisecond time of the first option Bid, Ask, or Trade event.
UnderCloseBid Price	Under lying	decimal	Blank	Underlying ticker's NBBO bid price at millisecond time of the last option Bid, Ask, or Trade event.
UnderCloseAsk Price	Under lying	decimal	Blank	Underlying ticker's NBBO ask price at millisecond time of the last option Bid, Ask, or Trade event.
MinSpread	Quote	decimal	Blank	Minimum bid-ask spread size. This may be 0 if the market was crossed during the bar. Note: This requires both a bid and an ask quote during the bar period.
MaxSpread	Quote	decimal	Blank	Maximum bid-ask spread in a bar. Note: This requires both a bid and an ask quote during the bar period.
CancelSize	Trade	integer	Blank	The total number of reported contracts canceled during this bar. The canceled trades may have occurred at any time since the open.
VolumeWeight Price	Trade	decimal	Blank	Trade Volume weighted average price.
NBBOQuote Count	Quote	integer	0	The number of bid and ask NBBO quotes during the bar period.
TradeAtBid	Quote Trade	integer	Blank	Sum of the number of contracts that occurred at or below the bid (a trade reported/printed late can be below current bid).





TradeAtBidMid	Quote Trade	integer	Blank	Sum of the number of contracts that occurred between the bid and the mid-point: (Trade Price > NBBO Bid) & (Trade Price < NBBO Mid)
TradeAtMid	Quote Trade	integer	Blank	Sum of the number of contracts that occurred at the mid. TradePrice = NBBO MidPoint
TradeAtMidAsk	Quote Trade	integer	Blank	Sum of the number of contracts that occurred between the mid and the ask: (Trade Price > NBBO Mid) & (Trade Price < NBBO Ask)
TradeAtAsk	Quote Trade	integer	Blank	Sum of the number of contracts that occurred at or above the ask.
TradeAtCrossOr Locked	Quote Trade	integer	Blank	Sum of the number of contracts during the bar period when national best bid/offer is locked or crossed. Locked is when bid = ask Crossed is when bid > ask
Volume	Trade	integer	0	Total number of contracts traded
TotalTrades	Trade	integer	0	Total number of trades
FinraVolume	Trade	integer	0	Number of contracts traded off the public exchanges and these are reported as FINRA

## Time Range

The data starts from the Open Interest publications by the exchanges at 9:30 to the last published information at 16:15 ET. Most options stop trading at 16 ET, while some indexes trade till 16:15 ET.

## Timestamp

Event timestamp is in milliseconds, ET. Field format is HH:MM:SS.mmm where

**HH:** Hour

**MM:** Minute

**SS:** Seconds

**mmm:** Milliseconds

For example, 09:31:01.723

## Bar Notes

**Time Bar Start Format:** One-second bar 13:03:01 is from time greater than 13:03:01 to 13:03:02. One-minute bar 11:04 is from time greater than 11:04 to less than 11:05.



**Empty Fields:** An empty field has no value and is shown as blank. For example, if there are no trades during the bar period, the field `OpenTradeTime` will be blank, but the field `"Volume"` measuring the total number of contracts traded in the bar will be `"0"`. Look at the `"Missing"` column above for each field to see if a field always has a value and if it will be zero or blank when there's no value.

**No Bid/Ask/Trade OHLC:** During a bar timeframe, there may not be a change in the NBBO or an actual trade. For example, there can be a bar with open/high/low/close bid/ask but no trade open/high/low/close.

**Single Event:** For bars with only one trade, one NBBO bid, or one NBBO ask the open/high/low/close price, size and time will be the same.

**VolumeWeightPrice:** a volume-weighted price is calculated as a sum of a dollar volume for all trades divided by the total number of shares traded

$$\frac{((\text{Trade1\_Shares} \times \text{Trade1\_Price}) + (\text{Trade2\_Shares} \times \text{Trade2\_Price}) + \dots)}{\text{TotalShares}}$$