TO: **All PBOT Members and Member Organizations**

FROM: **Market Operations**

DATE: **March 27, 2007**

SUBJECT: **PBOT Electronic Auction Algorithm**

On March 30, 2007 PBOT will implement a new PBOT XL electronic trading system functionality.

This new functionality, called the *electronic auction algorithm* has been developed to accept orders that cross the book and provides a methodology to deal with the rare situation in which virtually simultaneous multiple quotes and/or orders for a contract are submitted, modified or canceled when they cross or lock a market.

Background

The new electronic auction algorithm replaces the previous matching functionality that when an order or quote crossed the PBOT Best Bid or Offer (PBBO) or when two or more orders would simultaneously lock or cross a market were submitted, modified or canceled they would be rejected.

The New Algorithm

The new algorithm borrows from the methodology employed by the PBOT Opening Algorithm, which determines a market-clearing price, so that no lock or cross condition remains.

PBOT has revised the definition of the PBBO in its rules to reflect the functionality of the electronic auction algorithm: *The PBBO is the current <u>disseminated</u> highest bid and lowest offer in the Order Book and/or available by Quote excluding those Orders that at the time of receipt are matchable and are due execution as described in PBOT Rule E18*. The critical point in understanding this definition is that in certain rare circumstances an order may execute simultaneous to the PBBO being reconfigured. This may result in a situation where an order executes outside the PBBO. Whenever the electronic auction algorithm is engaged to handle simultaneous multiple events, the PBOT XL system will attach an (internally viewable only) *auction event sequence number* to the clearing trade so as to identify that the trade was executed using the new algorithm. This identifier may provide assistance to the PBOT Market Operations Desk in resolving the issue of transparency between the trade price and the PBBO at the time of execution. Inquiries may be directed to the PBOT Market Operations Desk: (888) 353-8114 or PMOD@phlx.com

Methodology:

An "electronic auction" occurs in PBOT XL when two or more Orders or Quotes for a PBOT contract are submitted, modified, or canceled virtually simultaneously so as to lock or cross a market.

During an "electronic auction", PBOT XL determines the price at which the most Contracts will trade based on all Orders on the Order Book and Quotes on PBOT XL, with each Order or Quote filled receiving its stated price or better.

In an electronic auction:

- Orders for Customers will receive priority over Orders for Members or Member Organizations and Market Maker Quotes; and among Customer Orders the first Customer Order in time at a price has priority over all other Customer Orders at the same price.

- Orders for Members and Member Organizations and Market Maker Quotes at the same price participate in proportion to the Order or Quote quantity relative to the total quantity of all Member and Member Organization Orders   and market maker Quotes at the same price.

*This example demonstrates how the electronic auction algorithm would handle **a cross of simultaneous Quotes and top of order book update:***

PBBO:

	Participant	Bid	Size	Offer	Size
	MM1 quote	.5	50	1.5	50
PBBO		**.5**	**50**	**1.5**	**50**

- The following quotes and orders are received simultaneously:
- Market Maker (MM2) quote (Bid 1.04 Size 20, Offer 1.2 Size 10)
- Market Maker (MM3) quote (Bid 1.05 Size 10, Offer 1.5 Size 10)
- Market Maker (MM4) quote (bid .8 Size 10, Offer .9 Size 10)
- Order to SELL 30 at limit price 1

- The auction algorithm finds the price where the most contracts can be traded:

	Participant	Bid	Size	Offer	Size
	MM1 quote	.5	50	1.5	50
	MM2 quote	1.04	20	1.2	10
	MM3 quote	1.05	10	1.5	10
	MM4 quote	.8	10	.9	10
	Sell top of book (cust order)			1	30

Most contracts would trade at a price of 1, leaving no locked or crossed market

- PBBO is generated as a locked market:

	Participant	Bid	Size	Offer	Size

PBBO		**1**	**30**	**1**	**40**

- Execution occurs at $1
- Market maker MM4 offer is executed for 10
- Market maker MM3 bid is executed for 10
- Market maker MM2 bid is executed for 20
- Top of sell order book is partially executed for 20

- PBBO after auction becomes:

	Participant	Bid	Size	Offer	Size
	MM1 quote	.5	50	1.5	50
	Sell top of book (cust order)			1	10
PBBO		**.5**	**50**	**1**	**10**

Note: In this example, the asynchronous receipt of an order between any of the sequences of events could alter the outcome of any given scenario.

References:

- PBOT Rule E18, Order and Quote Matching

- PBOT Rule E2(a), Definitions and Rules of Construction: PBOT Best Bid of Offer (PBBO)