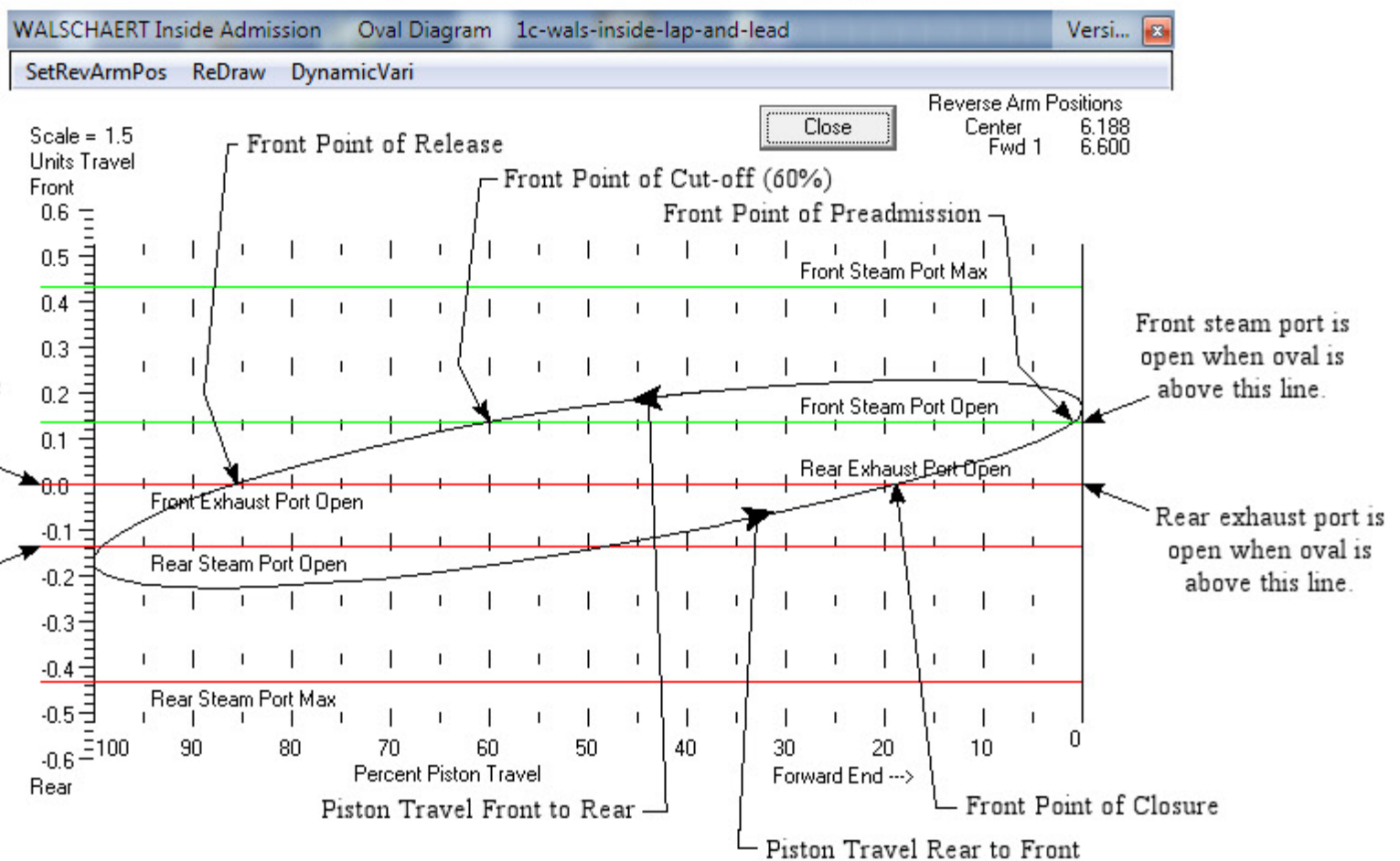


# EXPLANATION OF STEAM ENGINE VALVE ELLIPSE DIAGRAM

By J. G. Hook, December 8, 2013

Using oval diagram produced by C. J. Dockstader's  
"Steam Engine Valve Gear on the Computer" program.



0 percent piston travel = Piston on front dead center.  
100 percent piston travel = Piston on back dead center.

## PISTON TRAVEL EVENTS, LOCOMOTIVE

Moving from front dead center to rear dead center.  
Power stroke for front end of cylinder.  
Return stroke for rear end of cylinder.

Moving from rear dead center to front dead center.  
Power stroke for rear end of cylinder.  
Return stroke for front end of cylinder.

## VALVE EVENTS, ONE SIDE OF CYLINDER

Point of Preadmission, valve opens steam port to cylinder.  
Point of Cut-off, valve closes steam port to cylinder.  
Point of Release, valve opens exhaust port to cylinder.  
Point of Closure, valve closes exhaust port to cylinder.

## ASSOCIATED CYLINDER EVENTS, ONE SIDE OF CYLINDER

Preadmission, steam admitted to cylinder from steam chest.  
Begins at point of preadmission.  
Ends at piston on dead center before power stroke.  
Admission, steam admitted to cylinder from steam chest.  
Begins at piston on dead center before power stroke.  
Ends at point of cut-off.  
Expansion.  
Begins at point of cut-off.  
Ends at point of release.

Exhaust, steam released from cylinder to exhaust passages.  
Begins at point of release.  
Ends at point of closure.  
Compression.  
Begins at point of closure.  
Ends at point of preadmission.

## NOTES

Steam is admitted to the cylinder during both preadmission and admission cylinder events without interruption. Preadmission is used to define the valve and cylinder events that occur by design of a typical locomotive valve gear that causes steam to be admitted to the cylinder before the piston has reached dead center on its return stroke. If the design of the valve gear is such that steam is admitted to the cylinder at or after the piston has moved from dead center on its power stroke then the valve and cylinder events named preadmission are considered as not occurring and instead the valve event named Point of Admission where the valve opens the steam port to the cylinder begins the cylinder event named Admission.

The valve events and associated cylinder events described apply to both front and rear ends of the cylinder in a similar manner.

In locomotive engine practice the cylinder is generally defined as having a front and rear end based on what is considered the front of the locomotive. In stationary engine practice the cylinder is generally defined as having a head end and a crank end, the crank end being nearer the crank shaft of the engine.

## REFERENCES

Modern Locomotive Valves and Valve Gears, Chas. L. McShane, 1917 \*  
Steam Engine Indicators and Valve Gears, L. V. Ludy, 1918  
Locomotive Valves and Valve Gears, J. W. Harding, 1937  
Steam Engine Valve Gear on the Computer, C. J. Dockstader, 2010 \*

\* Part of LFLSRM recommended technical and historical reading list.

For further information see [www.lflsrm.org](http://www.lflsrm.org)