DIAMOND INTERCHANGE EXAMPLES

The following are typical examples of configurations used for diamond interchange control. Once the equipment setup is selected, these examples can be used as a guide in setting up phasing.

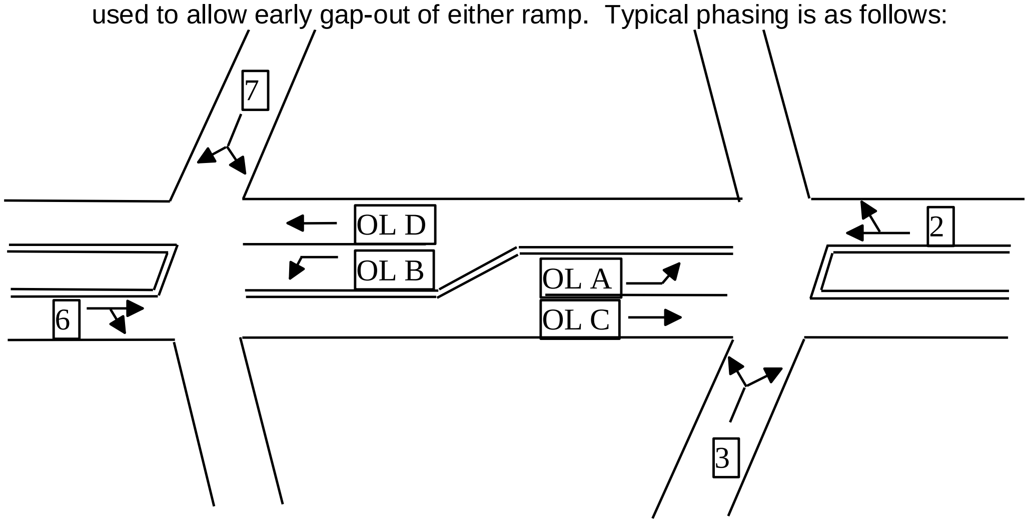
1. Fully Actuated Control With One Controller

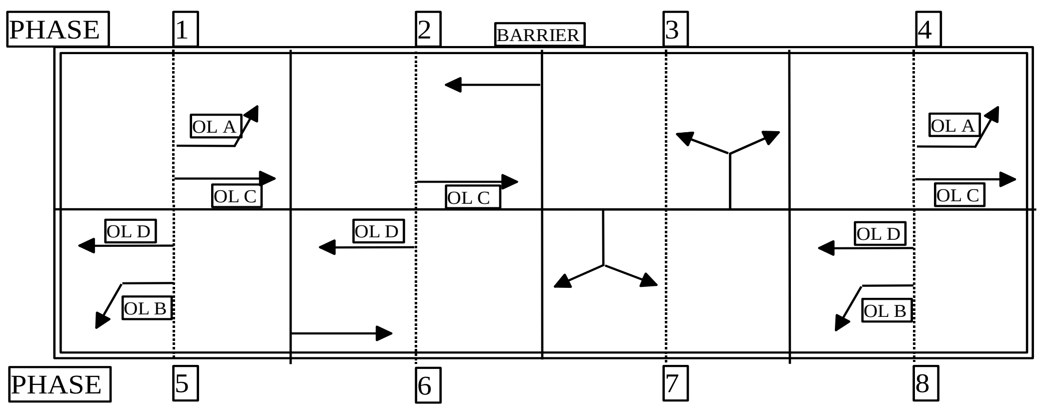
If full actuation is feasible, control can be set up from one actuated controller. This provides the ability to have variable cycle lengths and phase skipping and still maintain coordination between the intersections.

The following are three common phasing schemes that can be used for diamond interchange controllers. Most of the current NEMA controllers offer the ability to change the order of phases by time of day. This can be useful if directional traffic patterns change by time of day.

(A) <u>Standard Actuated Diamond Interchange Controller</u>

The standard diamond interchange controller uses simultaneous leading left turns for both internal lefts and brings the ramps up simultaneously. A logic circuit and "dummy" phases are used to allow early gap-out of either ramp. Typical phasing is as follows:





OL = Overlap
OL A = ∅ 1 + ∅ 4
OL B = ∅ 5 + ∅ 8
OL C = ∅ 1 + ∅ 2 + ∅ 4
OL D = ∅ 5 + ∅ 6 + ∅ 8

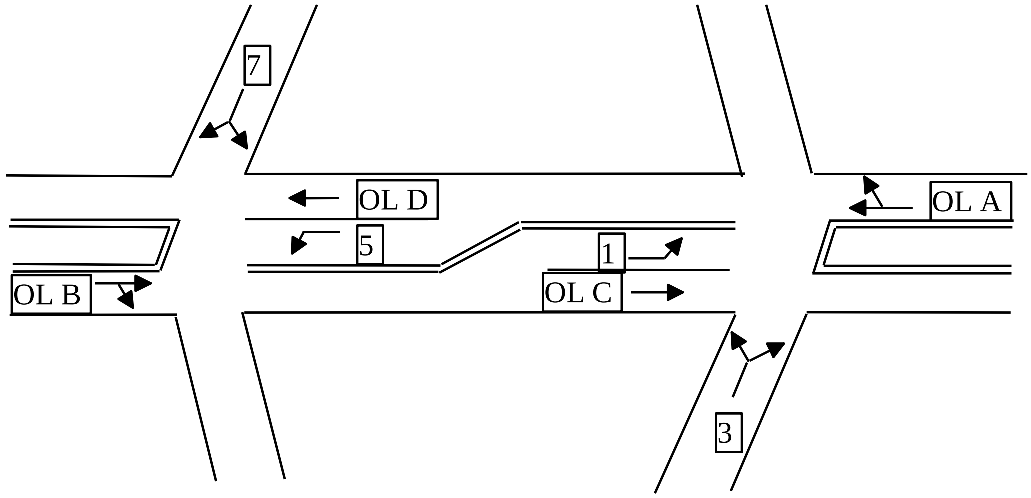
Logic Circuitry is provided so that Phase 3 gap-out calls phase 4 and Phase 7 gap-out calls Phase 8. Phases 4 and 8 are set for dual entry so that phases 3 or 7 can be skipped.

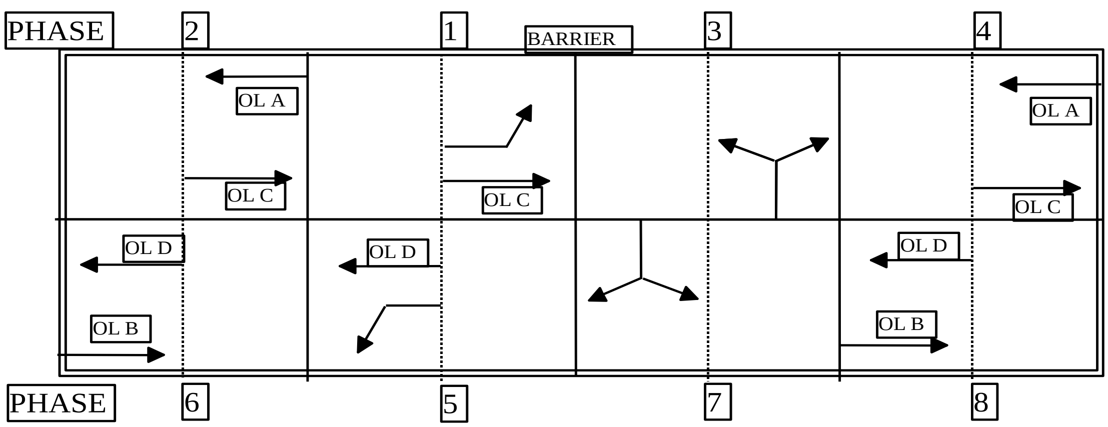
This setup is best where there is sufficient left turn storage between the ramps. In addition, there should be enough spacing between ramps to store the exiting ramp traffic after turning left. Where practical, this is the most efficient actuated diamond interchange operation.

The standard diamond controller setup can also be used with lead-lag internal lefts. This can be useful for directional peak periods to clear the storage area between ramps for a heavy ramp left turn or to provide improved progression for a heavy through movement. The controller can be returned to normal lead-lead internal left operation during off-peak periods.

(B) <u>Actuated Diamond Interchange Controller With Lag-Lag Internal Lefts</u>

This diamond interchange configuration uses lagging left turns for both internal lefts and brings the ramps up simultaneously. The logic circuit and "dummy" phases are still used to allow early gap-out of either ramp. Typical phasing is as follows:





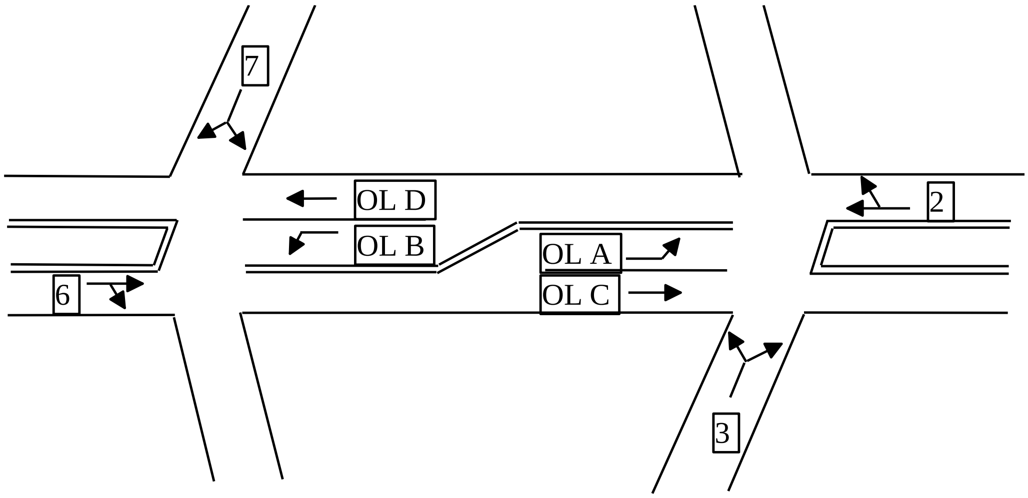
OL = Overlap
OL A = ∅ 1 + ∅ 4
OL B = ∅ 5 + ∅ 8
OL C = ∅ 1 + ∅ 2 + ∅ 4
OL D = ∅ 5 + ∅ 6 + ∅ 8

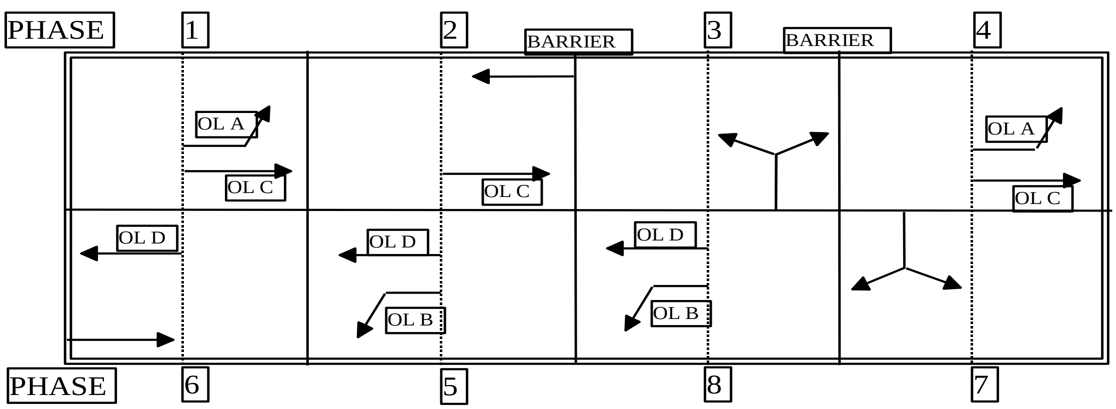
Logic Circuitry is provided so that Phase 3 gap-out calls phase 4 and Phase 7 gap-out calls Phase 8. Phases 4 and 8 are set for dual entry so that phases 3 or 7 can be skipped.

This setup will clear out the internal through and left turn movements before the ramps are serviced to make maximum use of the internal storage space. This setup also provides improved progression for the mainline through movements, however the lagging lefts may not make the most efficient use of mainline green time. In addition, early releases can occur for through movements if one ramp gaps out early or is skipped.

(C) <u>Actuated Diamond Interchange Controller With Lead-Lag Internal Lefts</u>

This diamond interchange configuration uses leading and lagging internal left turns. The ramps are split phased. Typical phasing is as follows:





OL = Overlap
OL A = ∅ 1 + ∅ 4
OL B = ∅ 5 + ∅ 8
OL C = ∅ 1 + ∅ 2 + ∅ 4
OL D = ∅ 5 + ∅ 6 + ∅ 8

This setup will clear out the phase 5 internal through and left turn movement (OL D + OLB) before the phase 3 ramp is serviced. This provides maximum use of internal storage for the phase 3 ramp left turn. This also provides positive progression for the phase 7 ramp left turn. This is useful if phase 7 ramp left turn and/or phase 5 left turn are very heavy. This setup also provides improved progression for the mainline through movements, however the lagging left may not make the most efficient use of mainline green time.

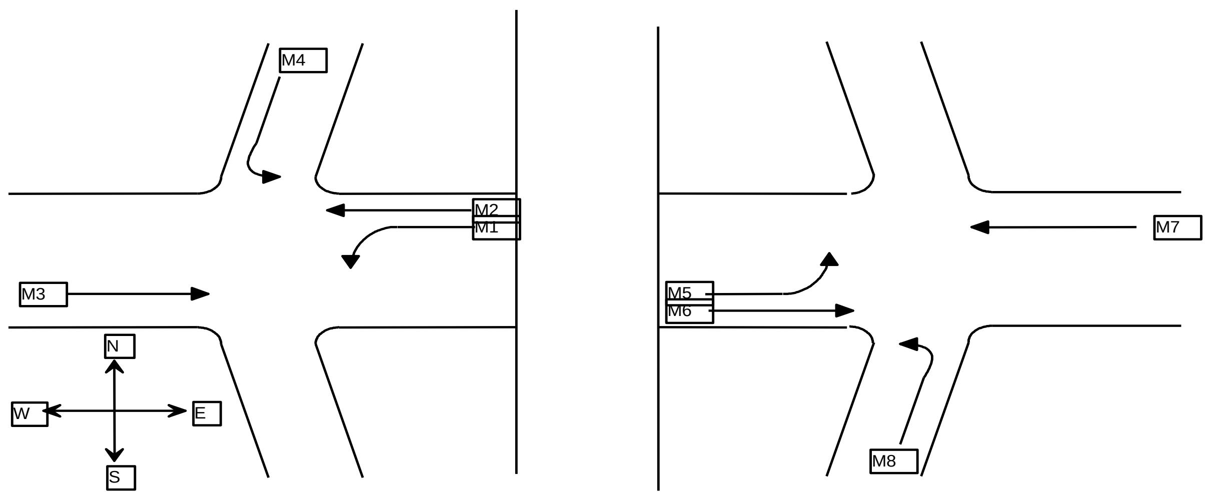
2. <u>Pre-Timed Control</u>

Pretimed control should be set up with two interconnected controllers. There are two general guidelines to follow in order to get the most efficient use of green time at a pre-timed controlled interchange:

1. The lead vehicle released at one end of the interchange from the through street should approach the signal at the opposite end of the interchange with the start of the green phase for that direction, along with a protected left turn indication onto the entrance ramp if provided.

2. All vehicles released from the off-ramp at one end of the interchange should be able to clear the signal at the opposite end.

This is illustrated by the following interchange setup:



At this interchange, the left turns onto the ramps are protected/permitted, with the protected lefts leading along with the first through movement at each end.

When the eastbound vehicles are released from the west end of the intersection (Movement 3) after the timing out of the westbound left turn direction (Movement 1), the lead vehicle should arrive at the east end signal at the start of the protected left turn and through direction (Movements 5 and 6). Any vehicle allowed to clear Movement 3 should be allowed to clear Movement 5 at the east end.

After Movements 2 and 3 have timed out, the southbound off-ramp (Movement 4) begins. As the lead car in this movement approaches the east end, Movement 5 times out, and Movement 7, the westbound thrus, begin. The last car able to clear Movement 4 should be able to clear Movement 6 at the opposite end.

It may be necessary to adjust the timings on these movements in order to accomplish these flows regardless of the volumes. For example, releasing Movement 3 too early will cause another stop for that movement at the east end. Time can be added to Movement 1 so Movement 3 can be released at the appropriate time in order to allow for uninterrupted flow to the opposite end.