Trafficware
Engineered by Naztec

Naztec Version 50 Software

Training Unit 3
Basic Timing & Free Operation

NTCIP Objects & Naztec MIB's

- The Naztec Version 50 Software fully complies with NEMA Standard Publications TS 3.4 and TS 3.5 and the "Object Definitions" for NTCIP (National Transportation Communications For ITS Protocol). Even the naming used in the controller menus are very similar to the abbreviations used to define the NTCIP objects in the NEMA specifications.
- The NTCIP protocol allows manufacturers to extend the object database through MIB's (Management Information Blocks). MIB's allow manufacturers to extend the database while still maintaining compliance with the protocol.
- It is easy to distinguish between the mandatory NTCIP objects and Naztec MIB's by observing the controller menu. All Naztec specific MIB's are grouped in separate menus indicated as a "+" feature. For example, under controller menu MM->1->1->1, selection "2.Options" contains the NTCIP objects for phase options, while "3.Options+" contains Naztec specific MIB's that extend the NEMA specification.

Basic Actuated Control

- A Phase Time is associated with changes in a vehicle or pedestrian display
- A Phase Interval consist of a M*inimum Green* plus one vehicle *Gap Extension* (or passage time) followed by a *Yellow Clearance* time and an optional *All-Red* time
- Basic actuated control allows the minimum green to extend to a specified max time if sufficient vehicle actuations are present on a detector programmed to call this phase
- TS1 provided one vehicle input for eight phases. The Version 50 software allows each of the 64 detectors to call any of the 16 phases.
- Naztec extends NTCIP by allowing you to call multiple phases with the same detector using the detector source (or "src") feature.

Volume Density Control

- Volume density modifies *minimum green* and *passage times* based on additional parameters that extend basic actuated control
- Call detectors can increase the *min green* to a specified *max initial* during the yellow and red portion of a phase by adding an *added initial* time to the min green after each detection actuation.
  - The Version 50 software allows to increase the initial by the Sum of all the detectors calling the phase or by the Largest detector accumulation (see feature "Added Init Calc", MM->1->1->2).
  - *NOTE: be sure to program "Add. Init" under MM->5->2 or the call detector will not apply added initial time to the phase as intended*

- The initial *gap extension* is reduced to a specified *minimum gap* after Time B4 (Time Before Reduction) times out. The *initial gap* is reduced by a specified amount over the *Time To* reduce period.
  - The Version 50 software allows you to specify time-before-reduction and time-to-reduce in terms of vehicles as well as seconds.

How Can a Phase Be Called?

- On power-up, all enabled phases are serviced for one cycle
- As a track clearance and/or dwell phase during preemption
- By applying MCE and interval advance (police button)
- By an external *Hold* input if CNA1 or CNA2 is used
- If the phase is programmed for *Dual Entry* and a concurrent phase in another ring is called and serviced
- By a call detector programmed to call that phase
- By a call detector "sourced" by another detector programmed to call that phase
- By a switch detector when the call phase is yellow or red and the switch phase is green
- By a ped detector programmed to call that phase
- By a Min/Max, Ped, and Soft Recall applied to the phase during free operation (MM->1->1->2)
- By a Min/Max, Ped, MxPed, or Omit applied to the phase in the pattern split table during coordination
- By a vehicle or ped detector diagnostic when a detector fails

How Can a Phase be Terminated?

- By a power failure
- By a rail, emergency vehicle or low-priority preempt
- By applying MCE and interval advance (police button)
- By an external omit input to the controller for that phase
- By a gap-out condition of an extension detector programmed to extend the phase indefinitely
- By a gap-out condition of a queue detector programmed to extend the phase until a specified *queue limit* parameter times out
- By a max-out condition during free operation
- By a max-out condition during coordination (unless MAX_INH is specified as a mode under MM->2->1)
- By a force-off condition during coordination

Pedestrian Timing and Features

- Each phase has an associated *Walk* and *Ped Clearance* time used to satisfy pedestrian requirements in the MUTCD (Manual of Uniform Traffic Control Devices)
- Rest in Walk extends the walk during coordination so that the ped clearance ends at the force-off point (see MM->1->1->2)
- Pedestrian clearance normally ends before the vehicle yellow clearance begins. Since, the MUTCD allows vehicle clearance to be included with pedestrian clearance, and you can change the *"Walk Thru Yellow"* parameter for a phase using MM->1->1->4 to run ped clearance during the yellow and all red clearance of the phase
- If you do not want your police officers to have the ability to force out of a the pedestrian clearance, then enable the *"Auto Ped Clear"* feature under unit parameters (MM->1->2->1). This prevents ped clearance from being terminated by the interval advance input.

Dynamic Max Feature

- The Max1 and Max2 parameters can be used together to achieve a dynamic max feature using the MAX STEP to:
  - increase max time if a phase “maxes” out for 2 succeeding cycles
  - decrease max time if a phase “gaps” out for 2 succeeding cycles

- A separate parameter called DyMaxLim (Dynamic Max Limit), further extends the dynamic max feature.
  - If DyMaxLim is greater than Max1 and Max2, it is used as the larger max value
  - if DyMaxLim is less than Max1 and Max2, it is used as the lower limit for the dynamic max feature

Terminating a Phase

- If *"Disable Simultaneous Gap"* is set (MM->1->1->2), then once an extension detector is "gapped out", the phase will wait until the phase timing in the other ring "gaps out" or until a maximum or force-off is reached
- If *"Guaranteed Passage"* is set (MM->1->1->2), the phase is extended to insure that the initial *gap extension* is provided before the phase terminates (also referred to as *last car passage* in some controllers)
- If *"Skip Red-NoCall"* is set (MM->1->1->3), the phase skips the all red time specified if there is not a call on the phase during the yellow clearance interval (useful for stop bar detectors when all-red is not needed to clear the intersection after the yellow period has timed)
- If *"Red Rest"* is set (MM->1->1->3), the phase will terminate when it reaches the rest state with or without conflicting calls. The phase will not return to service until the specified red revert time has expired

Reservicing a Phase

- *"Red Revert"* (MM->1->1->1) is the minimum amount of red time before a phase can revert to back to green (this time reduces the risk of a rear end collision when two approaching vehicles are stopping for a red indication that reverts back to green).
  - Keep in mind, that if you want the controller to rest in red, you need to program "Red Rest" under MM->1->1>3
- *"Conditional Service"* (MM->1->1->2) gives an actuated phase the ability to "go back" to a previous phase before crossing the barrier.
- *"Reservice"* (MM->1->1->3) allows a phase to return if it leaves to conditionally service a phase before crossing the barrier.
  - During coordination, the controller insures that there is enough time in the split to service the min

Omit Yellow Phase

- This feature is typically used to omit the protected yellow left-turn arrow in a 5-section protected/ permitted left-turn display while the solid yellow (permitted) display is active
- The unit parameter, "Allow Skip Yellow" must be set for this feature to work (see MM->1->2->1)
- For example, assume the protected arrows in a 5-section left-turn display are driven by phase 1 and the permissive indications are driven by phase 6.
- Programming a value of "6" for phase 1 under MM->1->1->3, "Omit Yel" will result in the following sequence in the 5-section display:
  - ø1 (green arrow) + ø6 (solid green)
  - ø6 (solid yellow)
  - ø6 (solid red)

Ped Overlaps

- Ped Overlaps are used to allow a pedestrian interval to overlap two consecutive phases The walk and don't walk outputs are associated with the last of the two consecutive phases defined in the ped overlap.
- A "head start walk" indication can be accomplished using ped overlaps to give the pedestrian time to begin the crossing while all vehicles at the intersection are stopped. The following sequence is assumed using USER phase mode defined under unit parameters (MM->1->2->1):

  1 2 3 9 4

  5 6 7 10 8
- The ped overlap for ø9 is set to "4". This allows the walk signals to be driven using the outputs for phase 4, but allows the walk and ped clearance to "overlap" phases 9 and 4 in this sequence.

  Similarly, the ped overlap for ø10 is set to "8" to allow the walk indications for phase 8 to overlap the phase 10 and phase 8 interval
- We'll come back to this example when we discuss phase sequences.

Conflicting Phase Programming

- *"Conflicting Phases"* are programmed from the Main Menu under MM->1->1->3
- *"Conflicting Phases"* cannot time together in separate rings even though they are on the same side of the barrier based on concurrency definitions (we'll cover rings and barriers in the next section)
- One example is when ø1 and ø5 left-turn movements "overlap" in the middle of an intersection and it is necessary to insure that these phases never come up together. Just program "5" as a *"Conflicting Phase"* under ø1 or program "1" as a *"Conflicting Phase"* under ø5 (it is not necessary to program both ø1 and ø5 as *"Conflicting Phases")*
- Another example is when you want to run left-turns together at one time-of-day and split phase (left-turns separated) at other times of the day. Later on, in our discussion on coordination, we will see how to define *"Conflicting Phases"* by pattern so this type of operation can be achieved.