Tech Note 1116 – Transit Priority Programming and Engineering Considerations

Controller Programming Considerations

The controller receives an osculating input on an emergency preempt input pin, which allows the controller to identify as a LowPriority Input on logic inputs 311, 312, 313, 314.

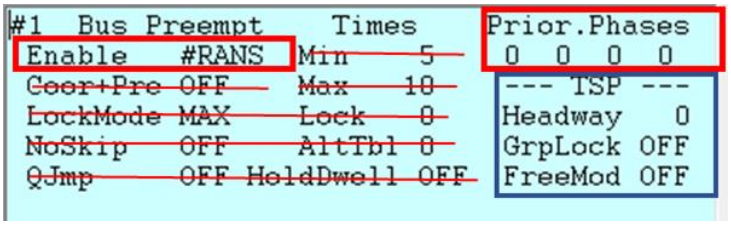
```
    Inputs
Fcn Description Stat
310 LowPriPre 1 ---- -#1 Bus Preempt    Request 1
311 LowPriPre 2 ----  #2 Bus Preempt    Request 2
312 LowPriPre 3 ----  #3 Bus Preempt    Request 3
313 LowPriPre 4 ----  #4 Bus Preempt    Request 4
314 LoPreInh  1 ----
315 LoPreInh  2 ---- +
```

Each Low Priority Preempt input activates the Bus Priority Preempts defined in MM>3>4>#. For each Preempt the user needs to defined the following

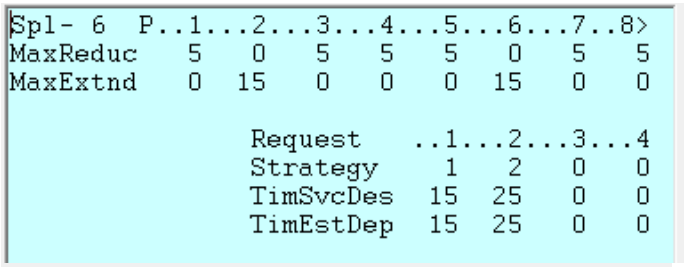
- **Enable** = **TRANS**. MUST BE ENABLED FOR TSP
- **Prior. Phases** = 0,0,0,0. SET TO 0 FOR TSP
- **Coord + Pre, Lock Mode, NoSkip, QJmp, Min/Max, AltTbl** – No effect on TSP
-

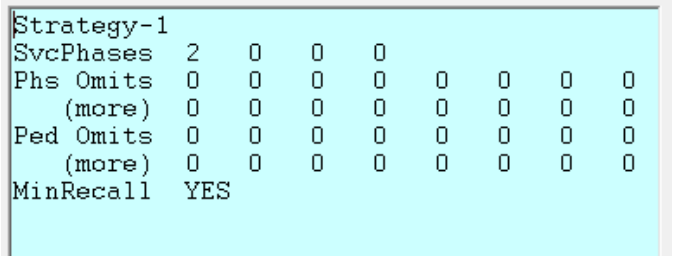
```
#1  Bus Preempt     Times     Prior.Phases
 Enable    #RANS  Min     5     0  0  0  0
 Coor+Pre  OFF    Max    10     --- TSP ---
 LockMode  MAX    Lock    0     Headway   0
 NoSkip    OFF    AltTbl  0     GrpLock  OFF
 QJmp      OFF  HoldDwell  OFF   FreeMod  OFF
```

- **Headway** (min) = Defines how often this preempt call can be serviced.
- **GrpLock (ON/OFF)** = Set if Headway > 0.
- **FreeMod (ON/OFF)** = Set to ON if running TSP during 'Free.' A free pattern will need to be programmed.



Next the user must determine and program the timing response (if any) by the controller. The Request determines the **Strategy** and **Time Service Desired (TSD), Time Estimated Departure (TED**).





When a TSP call is received, the controller looks at the Split Transit Priority settings in the active pattern defined in MM>2>7>#>3. The Request (which ties back to the Low Priority Preempt) determines the **Strategy** and **Time Service Desired (TSD), Time Estimated Departure (TED**). Strategy setting references the Strategy Table (MM>2>9>5), which lists the Service Phase as well as Phases that can be omitted to time the Service Phase. The TSD and TED settings allows the controller to calculate the time the bus is expected at the intersection.

The **Max Reduce** setting allow the user to define the reduction to the max times (if any) is to be applied for an early return. The controller will either reduce the phase's max green time by the Max Reduce, or not at all.

The **Max Extend** setting allows the user to define the maximum extension to the service phase to hold the green.

Controller Software Decision Considerations

When the controller receives a LowPriority Preempt that is designated as type Transit, the controller identifies the service phase from the Strategy table and calculates the bus arrival time. Based on the service phase and arrival time, the controller identifies the response assuming all phases time are on Max Recall. The controller may:

- **Do Nothing** – No adjustment is made. The bus is expected to arrive when Service Phase is green.
- **Reduce/Early Return/Early Green** – Bus arrival before the Service phase. Phases prior to the Service are REDUCED to provide an early green.
- **Extension** – Bus arrival after the Service phase, but within the MaxExtend window. The Service phase is held until the TED is 0 or the amount of permissive Shortway is reached. It is expected for the controller to be back in sync within 1 cycle.

Controller Timing Response

If the controller decides to reduce for early green, the active max times for each phase are reduced by the specified amount. The user will see phase max out prior to its calculated force off in MM>2>8>2, even if Max Inhibit is programmed for that phase or pattern.

If the controller decides to extend, the controller will 'hold' the service phase in a similar manner to 'Stop-in-walk.'

Engineering Considerations

For a reduction to be applied, there must be available time in the split to be reduced. The controller will always time Min Green, Yellow, Red as well as Walk / Ped Clr if a ped call.

If the controller is going to reduce the phase it will reduce it for the programmed amount, even if that will activate the early green prior to the bus arrival.

The controller calculates the 'effective' maximum extension time from the percent Shortway and cycle length. Therefore, the Max Extend <= (Cycle * Shortway)

Summary

Transit Signal Priority (TSP) is a controller module that requires some extra programming and engineering considerations as discussed in this Tech Note.