D4 Traffic Signal Controller
Feature Summary (Version 1.5L)

General Controller Features

- 16 phases
  - Three maximum times per phase with dynamic max operation
  - Minimum, maximum, soft recall modes
  - Early and delayed walk timing
  - Pedestrian clearance through yellow / red (configurable from end of red)
  - Conditional service during free and coordinated operation, with conditional service minimum and maximum green times
  - Manual control operation with selectable call, omit, sync, and protected pedestrian clearance phases
  - Per phase bike minimum green, red revert and advanced warning flasher
- 4 rings (single intersection or two independent intersections)
  - Each of the 4 rings can be assigned to one of the two ring-groups
- 16 timed overlaps
  - Vehicle and pedestrian movement for each overlap
  - Actuated pedestrian movements
  - Early and delayed walk timing
  - Pedestrian rest-in-walk across multiple phases
  - Per overlap preempt timing (vehicle and pedestrian)
- 8 flashing yellow arrow (FYA) / red arrow modules (separate from overlaps)
  - Start phase, opposing pedestrian movements, delay and skip red options
- 8 transit phases (for Bus or Light-Rail)
  - Two and three section signal head controls for light rail vehicles
  - Advanced warning signal control per transit phase (solid or flashing)
  - Recall or actuated operation
  - Normal or priority service
- 4 HAWK (High-intensity Activated crossWalk) modules
  - Various operational modes with flash delay and carryover
  - One or more can run independently via the second ring-group

Detector Features

- 64 vehicle detectors
  - Programmable call and extend phases
  - Delay and extend timing
  - Stop-bar disconnect mode with carryover (extend) timer
  - Detector cross-switching
  - No presence / max fail detector diagnostics (disabled by TOD)
• 16 queue detectors
  o Detects traffic backups
  o Capable of selecting alternate coordination patterns, maximum green timings or specified preempts
  o Advance green to clear vehicle movements prior to transit vehicle arrival
• 16 pedestrian detectors
  o Programmable calls for pedestrian and vehicle phases
  o Pedestrian cascade (sequential calling of two pedestrian movements)
• 8 transit detectors
  o Programmable calls for transit and vehicle phases
  o Delay and extend timing
  o Travel time delay
  o Alternate travel times by time-of-day (TOD)
  o Adaptive arrival time adjustment
• 32 remote transit detectors
  o Calls received by transit detectors at other intersections (via peer-to-peer Ethernet network)
  o Travel time delay
  o Alternate travel times by time-of-day (TOD)
  o Adaptive arrival time adjustment

Coordination Features

• 128 coordination patterns
  o Cycle time and three offsets per plan and ring group
  o Flexible global and/or per phase split expansion / shrinking for transition
  o Fixed / floating force-offs with a per phase float green parameter
  o Automatic permissive calculations
    ▪ Single-band or multi-band modes with permissive limit timer
    ▪ Three pedestrian permissive modes per pattern
  o Selectable reservice phases (fully actuated coordination)
  o Double service of phases (typically left-turns) without overlaps
  o Actuated coordinated phases can gap-out early and distribute unused time to movements with greater demand
  o Programmable recalls, omits and alternate base timing per pattern
  o Adaptive splits per timing pattern with global step and threshold values
• Multiple interconnect modes
  o Time based scheduler
  o Central system command (twisted pair or Ethernet connection)
  o 120 volt interconnect cable
• Master controller mode
  o Controller can operate as a twisted pair, Ethernet, or 120 volt cable master in the absence of a central management system

Preemption Features

• 10 prioritized preempts
  o Two track clearance states, dwell state, and exit state per preempt
• Per preempt gate-down confirmation input (variable track clearance)
• Permit or allow any phase / overlap for each preempt state
• Presence preempt input with optional fail-safe interlock input
• Per phase preempt timing (vehicle and pedestrian)
• Check-in / Check-out preempt detection option with override timer
• Exit to programmed phase, next phase (phase following the active phase when preempt commenced), same phase (if cut short) or in-sync
• Automatic yellow-trap protection for all preemption sequences

• 4 soft preempts
  • Step-by-step preempt (special preempt sequence)
  • 8 states per soft preempt sequence (timed or actuated)
  • Each state allows programmable calls, omits, holds and force-offs for each phase and overlap

• 8 emergency vehicle priority modules
  • Provides two-way communication between emergency / transit vehicles and the traffic signal to provide intelligent priority requests
  • Interface to GPS equipment that provides travel time away, Vehicle ID and left-turn requests with the goal of maintaining arterial two-way progression

Transit Priority Features

• Programmable transit priority options for each transit phase
• Operates based on arrival times using local intersection detection and remote “peer-to-peer” combined with estimated delay from upstream intersections
• Separate options for free or coordinated operation
  • Extend only (no phase abbreviation) or Early / Extend operation
  • Minimum phase green timing
  • Maximum extend limit
  • Optional vehicle / pedestrian phase omits
  • Ability to switch to an alternate sequence to better serve and early arriving transit vehicle (occurs only if needed and as a last resort)
• Adaptive arrival times to automatically compensate for varying station dwell times

Status / Diagnostic Features

• Detailed controller status displays through the 2070 LCD display
  • Phase, ring and overlap status
  • Transit phase / priority status
  • Coordination status
  • Preemption status
  • Vehicle and pedestrian detector status
  • Transit priority status
  • Cabinet / Field I/O status
  • System communication status
  • Web Interface / Telnet for remote status

• 6000 controller event log
  • Multiple classes of events can be individually enabled for logging
  • Logs can be retrieved / reset from a central connection (serial or Ethernet)
• 62.5 day detector volume / occupancy logs
  o Logging volume / occupancy for 16 system detectors (15-minute intervals)
• 600 MMU event log
  o Detailed MMU events, including reason for failure and status of all the field outputs at the time of failure

Cabinet Support

• NEMA TS-1, TS-2 Type 1 and Type 2, Caltrans 332/336, and ITS cabinet
• All controller input and output functions can be mapped to any physical cabinet input and output for each of the supported cabinet types
• Peer-to-Peer interconnect over Ethernet (select outputs or inputs from the source intersection to activate a function at the local intersection)
• 64 cabinet logic channels to accomplish custom controller I/O operation

Protocol Support

• Communications over serial port, twisted pair or Ethernet (fiber-optics)
• NMEA 0183 support for any compliant GPS device (date and time set)
• Caltrans AB3418E with messages for extended status and D4 functionality
• NTCIP with standard and proprietary objects implemented