

Glossary of Controller Terms**Application Note****1000A**

The abbreviations used are defined as follows:

AC - Alternating Current
BIU - Bus Interface Unit
CA - Controller Assembly
CU - Controller Unit
EPROM - Erasable Programmable Read Only Memory
FEPRM - Flash Programmable Read Only Memory
ITS - Intelligent Transportation Systems
MMU - Malfunction Management Unit
NEMA - National Electrical Manufacturers Association
PROM - Programmable Read Only Memory
RAM - Random Access Memory
ROM - Read Only Memory
SDLC - Synchronous Data Link Control
TF - Terminals and Facilities

AUXILIARY EQUIPMENT - Separate devices used to add supplementary features to a controller assembly.

BARRIER - A barrier (compatibility line) is a reference point in the preferred sequence of a multi-ring CU at which all rings are interlocked. Barriers assure there will be no concurrent selection and timing of conflicting phases for traffic movements in different rings. All rings cross the barrier simultaneously to select and time phases on the other side.

BIU - A module used to interface the controller with the field terminals and detector loops in a TS2 cabinet.

CABINET - An outdoor enclosure for housing the controller unit and associated equipment.

CALL - A registration of a demand for right-of-way by traffic (vehicles or pedestrians) to a controller unit.

Serviceable Conflicting call:

1. Occurs on a conflicting phase not having the right-of-way at the time the call is placed.
2. Occurs on a conflicting phase, which is capable of responding to a call.

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3. When occurring on a conflicting phase operating in an occupancy mode, remains present until given its right-of-way.

CHECK - An output from a controller unit that indicates the existence of unanswered call(s).

CONNECTOR - A device enabling outgoing and incoming electrical circuits to be connected and disconnected without the necessity of installing and removing individual wires leading from the control unit.

1. Not Used Connections - The "Not Used" connector pin termination=s are used exclusively to prevent interchangeability with units already in use not in conformance to this publication. These connector pins are not to be internally connected.
2. Reserved Connections - The "Reserved" connector pin termination are used exclusively for future assignment by NEMA of additional specific input/output functions. The control unit does not recognize any "reserved" input as valid nor shall it provide a valid output on a "Reserved" output.
3. Spare Connections - The "Spare" connector pin termination are exclusively for manufacturer specific applications. A controller Assembly wired to utilize one of these connections may not be compatible with all manufacturer's control units.

CONTROLLER ASSEMBLY - A complete electrical device mounted in a cabinet for controlling the operation of a traffic control signal.

1. Flasher Controller Assembly - A complete electrical device for flashing a traffic signal or beacon.
2. Full-Traffic-Actuated Controller Assembly - A type of traffic-actuated controller assembly in which means are provided for traffic actuation on all approaches to the intersection.
3. Isolated Controller Assembly - A controller assembly for operating traffic signals not under master supervision.
4. Master Controller Assembly - A controller assembly for supervising a system of secondary controller assemblies.
5. Master-Secondary Controller Assembly - A controller assembly operating traffic signals and providing supervision of other secondary controller assemblies.
6. Occupancy Controller Assembly (Lane-Occupancy Controller or Demand Controller, and Presence Controller) - A traffic-actuated controller which responds to the presence of vehicles within an extended zone of detection.

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7. **Pedestrian-Actuated Controller Assembly** - A controller assembly in which intervals, such as pedestrian WALK and clearance intervals, can be added to or included in the controller cycle by the actuation of a pedestrian detector.
8. **Pretimed Controller Assembly** - A controller assembly for the operation of traffic signals with predetermined:
 - a. Fixed cycle length(s).
 - b. Fixed interval duration(s).
 - c. Interval sequence(s).
9. **Secondary Controller Assembly (slave)** - A controller assembly which operates traffic signals under the supervision of a master controller assembly.
10. **Semi-Traffic Actuated Controller Assembly** - A type of traffic-actuated controller assembly in which means are provided for traffic actuation on one or more but not all approaches to the intersection.
11. **Traffic-Actuated Controller Assembly** - A controller assembly for supervising the operation of traffic control signals in accordance with the varying demands of traffic as registered with the controller by detectors.

CONTROLLER UNIT - A controller unit is that portion of a controller assembly that is devoted to the selection and timing of signal displays.

1. **Digital Controller Unit** - A controller unit wherein timing is based upon a defined frequency source such as a 60-hertz alternating current source.
2. **Multi-ring Controller Unit** - A multi-ring CU contains two or more interlocked rings which are arranged to time in a preferred sequence and to allow concurrent timing of all rings, subject to the restraint on BARRIER.
3. **Single-Ring Controller Unit** - A single-ring CU contains two or more sequentially timed and individually selected conflicting phases so arranged as to occur in a established order.

CONCENTRATION - The largest of Scaled Occupancy or Scaled Volume expressed in percent.

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COORDINATION - The control of controller units in a manner to provide a relationship between specific green indications at adjacent intersections in accordance with a time schedule to permit continuous operation of groups of vehicles along the street at a planned speed.

COORDINATOR - A device, program or routine which provides coordination.

CYCLE - The total time to complete one sequence of signalization around an intersection. In an actuated CU, a complete cycle is dependent on the presence of calls on all phases. In a pretimed CU unit it is a complete sequence of signal indications.

CYCLE LENGTH - The time period in seconds required for one complete cycle.

DENSITY - A measure of the concentration of vehicles, stated as the number of vehicles per mile per lane.

DETECTION -

1. **Advisory Detection** - The detection of vehicles on one or more intersection approaches solely for the purpose of modifying the phase sequence and/or length for other approaches to the intersection.
2. **Passage Detection** - The ability of a vehicle detector to detect the passage of a vehicle moving through the zone of detection and to ignore the presence of a vehicle stopped within the zone of detection.
3. **Presence Detection** - The ability of a vehicle detector to sense that a vehicle, whether moving or stopped, has appeared in its zone of detection.
4. **Zone of Detection** - The area or zone that a vehicle detector can detect a vehicle.

DETECTOR - A device for indicating the presence or passage of vehicles or pedestrians.

1. **Bi-directional Detector** - A detector that is capable of being actuated by vehicles proceeding in either of two directions and of indicating in which of the directions the vehicles were moving.
2. **Calling Detector** - A registration of a demand during red interval for right-of-way by traffic (vehicles or pedestrians) to a controller unit.

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3. Classification Detector - A detector that has the capability of differentiating among types of vehicles.
4. Directional Detector - A detector that is capable of being actuated only by vehicles proceeding in one specified direction.
5. Extension Detector - A detector that is arranged to register an actuation at the controller unit only during the green interval for that approach so as to extend the green time of the actuating vehicles.
6. Infrared Detector - A detector that senses radiation in the infrared spectrum.
7. Light-Sensitive Detector - A detector that utilizes a light-sensitive device for sensing the passage of an object interrupting a beam of light directed at the sensor.
8. Loop Detector - A detector that senses a change in inductance of its inductive loop sensor by the passage or presence of a vehicle near the sensor.
9. Magnetic Detector - A detector that senses changes in the earth's magnetic field caused by the movement of a vehicle near its sensor.
10. Magnetometer Detector - A detector that measures the difference in the level of the earth's magnetic forces caused by the passage or presence of a vehicle near its sensor.
11. Nondirectional Detector - A detector that is capable of being actuated by vehicles proceeding in any direction.
12. Pedestrian Detector - A detector that is responsive to operation by or the presence of a pedestrian.
13. Pneumatic Detector - A pressure-sensitive detector that uses a pneumatic tube as a sensor.
14. Pressure-Sensitive Detector - A detector that is capable of sensing the pressure of a vehicle passing over the surface of its sensor.
15. Radar Detector - A detector that is capable of sensing the passage of a vehicle through its field of emitted microwave energy.

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16. System Detector - Any type of vehicle detector used to obtain representative traffic flow information.
17. Side-Fire Detector - A vehicle detector with its sensor located to one side of the roadway.
18. Sound-Sensitive Vehicle Detector - A detector that responds to sound waves generated by the passage of a vehicle near the surface of the sensor.
19. Ultrasonic Detector - A detector that is capable of sensing the passage or presence of a vehicle through its field of emitted ultrasonic energy.
20. Video Detection - A detector that responds to the Video image or changes in the Video image of a vehicle.

DETECTOR MODE - A term used to describe the operation of a detector channel output when a presence detection occurs.

1. Pulse Mode - Detector produces a short output pulse when detection occurs.
2. Controlled Output - The ability of a detector to produce a pulse that has a predetermined duration regardless of the length of time a vehicle is in the zone of detection.
3. Continuous-Presence Mode - Detector output continues if any vehicle (first or last remaining) remains in the zone of detection.
4. Limited-Presence Mode - Detector output continues for a limited period of time if vehicles remain in zone of detection.

DEVICE -

1. Electromechanical Device - A device which is characterized by electrical circuits utilizing relays, step switches, motors, etc.
2. Electronic Device - A device which is characterized by electrical circuits utilizing vacuum tubes, resistors, capacitors, inductors and which may include electromechanical and solid state devices.

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3. **Solid State Device** - A device which is characterized by electrical circuits, the active components of which are semi-conductors, to the exclusion of electromechanical devices or tubes.

DIAL - The cycle timing reference or coordination input activating same. Dial is also frequently used to describe the cycle.

DWELL - The interval portion of a phase when present timing requirements have been completed.

ENTRY -

1. **Dual Entry** - Dual entry is a mode of operation (in a multi-ring CU) in which one phase in each ring must be in service. If a call does not exist in a ring when it crosses the barrier, a phase is selected in that ring to be activated by the CU in a predetermined manner.
2. **Single Entry** - Single entry mode of operation (in multi-ring CU) in which a phase in one ring can be selected and timed alone if there is no demand for service in a nonconflicting phase on parallel ring(s).

EXTENSION UNIT - The timing interval during the extensible portion which is resettable by each detector actuation. The green interval of the phase may terminate on expiration of the unit extension time.

FLASHER - A device used to open and close signal circuits at a repetitive rate.

FORCE OFF - A command to force the termination of the Green extension in actuated mode or Walk Hold in the nonactuated mode of the active phase. Termination is subject to presence of a serviceable conflicting call.

GAP REDUCTION - A feature whereby the "unit extension" or allowed time spacing between successive vehicle actuation=s on the phase displaying the green in the extensible portion of the interval is reduced.

HOLD - A command that retains the existing Green interval.

INTERCONNECT - A means of remotely controlling some or all of the functions of a traffic signal.

INTERVAL - The part or parts of the signal cycle during which signal indications do not change.

1. **Minimum Green Interval** - The shortest green time of a phase. If a time setting control is designated as "minimum green," the green time shall be not less than that setting.

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3. **Pedestrian Clearance Interval** - The first clearance interval for the pedestrian signal following the pedestrian WALK indication.
4. **Red Clearance Interval** - A clearance interval which may follow the yellow change interval during which both the terminating phase and the next phase display Red signal indications.
5. **Sequence, Interval** - The order of appearance of signal indications during successive intervals of a cycle.
6. **Yellow Change Interval** - The first interval following the green interval in which the signal indication for that phase is yellow.

MANUAL -

1. **Manual Operation** - The operation of a controller assembly by means of a hand- operated device(s). A push-button is an example of such a device.
2. **Manual Push-button** - An auxiliary device for hand operation of a controller assembly.

MAXIMUM GREEN - The maximum green time with a serviceable opposing actuation, which may start during the initial portion.

MEMORY -

1. **Detector Memory** - The retention of a call for future utilization by the controller assembly.
2. **EPROM** - Read-Only, non-volatile, semiconductor memory that is erasable (via ultra-violet light) and reprogrammable.
3. **FEPRM** - Read-Only, non-volatile, semiconductor memory that is electrical erasable reprogrammable.
4. **Nonlocking Memory** - A mode of actuated-controller-unit operation which does not require detector memory.
5. **Non-Volatile Memory** - Read/Write memory that is capable of data retention during periods when AC power is not applied for a minimum period of 30 days.

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6. **PROM** - Read-Only, non-volatile, semiconductor memory that allows a program to reside permanently in a piece of hardware.
7. **RAM** - Semiconductor Read/Write volatile memory. Data is lost if power is turned off.
8. **ROM** - Read-Only, non-volatile, semiconductor memory manufactured with data content, permanently stored.
9. **Volatile Memory** - Read/Write memory that loses data when power is removed.

MMU - A device used to detect and respond to improper and conflicting signals and improper operating voltages in a traffic control system.

MODULAR DESIGN - A device concept such that functions are sectioned into units which can be readily exchanged with similar units.

NTCIP - National Transportation Communication for ITS Protocol.

OCCUPANCY -

1. **Actual** - The percent of time that vehicles passing a point occupy the roadway during a period in time. Typically expressed in Percent of occupied per Hour or Vehicles per Hour per Lane.
2. **Scaled** - The percentage that the Actual Occupancy when compared to a stated maximum. The stated maximum is considered to be 100% use of the roadway.

OFFSET - Offset is the time relationship, expressed in seconds or percent of cycle length, determined by the difference between a defined point in the coordinated green and a system reference point.

OMIT PHASE (Special Skip, Force Skip) - A command that causes omission of a selected phase.

OVERLAP - A Green indication that allows traffic movement during the green intervals of and clearance intervals between two or more phases.

PASSAGE TIME - The time allowed for a vehicle to travel at a selected speed from the detector to the stop line.

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PATTERN - A unique set of coordination parameters (cycle, value, split values, offset value, and sequence).

PHASE -

1. Traffic Phase - Those green, change and clearance intervals in a cycle assigned to any independent movement(s) of traffic.
2. Conflicting Phases - Conflicting phases are two or more traffic phases which will cause interfering traffic movements if operated concurrently.
3. Nonconflicting Phase - Nonconflicting phases are two or more traffic phases which will not cause interfering traffic movements if operated concurrently.
4. Pedestrian Phase - A traffic phase allocated to pedestrian traffic which may provide a right-of-way pedestrian indication either concurrently with one or more vehicular phases, or to the exclusion of all vehicular phases.
5. Phase Sequence - A predetermined order in which the phases of a cycle occur.
6. Parent Phase - A traffic phase with which a subordinate phase is associated.
7. Vehicular Phase - A vehicular phase is a phase which is allocated to vehicular traffic movement as timed by the controller unit.

PORTION -

1. Extensible Portion - That portion of the green interval of an actuated phase following the initial portion which may be extended, for example, by traffic actuation.
2. Initial Portion - The first timed portion of the green interval in an actuated controller unit:
 - a. Fixed Initial Portion: A preset initial portion that does not change.
 - b. Computed Initial Portion: An initial portion which is traffic adjusted.
 - c. Maximum Initial Portion: The limit of the computed initial portion.

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- d. Minimum Initial Portion: (See "Fixed Initial Portion.")
- e. Added Initial Portion: An increment of time added to the minimum initial portion in response to vehicle actuation.

3. Interval Portion - A discrete subdivision of an interval during which the signals do not charge.

PREEMPTION - The transfer of the normal control of signals to a special signal control mode for the purpose of servicing railroad crossings, emergency vehicle passage, mass transit vehicle passage, and other special tasks, the control of which require terminating normal traffic control to provide the priority needs of the special task.

PREEMPTOR, TRAFFIC CONTROLLER - A device or program/routine which provides preemption.

PREFERRED SEQUENCE - Normal order of phase selection within a ring with calls on all phases.

PROGRESSION - The act of various controller units providing specific green indications in accordance with a time schedule to permit continuous operation of groups of vehicles along the street at a planned speed.

RED INDICATION, MINIMUM (Red Revert) - Provision within the controller unit to assure a minimum Red signal indication in a phase following the Yellow change interval of that phase.

REST - The interval portion of a phase when present timing requirements have been completed.

RING - A ring consists of two or more sequentially timed and individually selected conflicting phases so arranged as to occur in an established order.

SCLC - A protocol for transfer of data between the controller, MMU and BIUs in a TS2 cabinet.

SIGNAL - A device which is electrically operated by a controller assembly and which communicates a prescribed action (or actions) to traffic.

SPEED - The speed of vehicles passing a point in the roadway during a period in time. Typically expressed in Average Miles per Hour or Average Miles per Hour per Lane.

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SPLIT - The segment of the cycle length allocated to each phase or interval that may occur (expressed in percent or seconds). In an actuated controller unit, split is the time in the cycle allocated to a phase. In a pretimed controller unit, split is the time allocated to an interval.

SUPPRESSORS -

1. Suppressor, Radio Interference - A device inserted in the power line in the controller assembly (cabinet) that reduces the radio interference.
2. Suppressor, Transient - A device which serves to reduce transient over-voltages.

SWITCH -

1. Auto/Manual Switch - A device which, when operated, discontinues normal signal operation and permits manual operation.
2. Flash Control Switch - A device which, when operated, discontinues normal signal operation and causes the flashing of any predetermined combination of signal indications.
3. Power Line Switch (Disconnect Switch) - A manual switch for disconnecting power to the controller assembly and traffic control signals.
4. Recall Switch - A manual switch which causes the automatic return of the right-of-way to its associated phase.
5. Signal Load Switch - A device used to switch power to the signal lamps.
6. Signal Shut-Down Switch - A manual switch to discontinue the operation of traffic control signals without affecting the power supply to other components in the controller cabinet.

TERMINALS, FIELD - Devices for connecting wires entering the controller assembly.

TIME BASE CONTROL - A means for the automatic selection of modes of operation of traffic signals in a manner prescribed by a predetermined time schedule.

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TIME BASE CONTROL - A means for the automatic selection of modes of operation of traffic signals in a manner prescribed by a predetermined time schedule.

TIMING -

1. Analog Timing - Pertaining to a method of timing that measures continuous variables, such as voltage or current.
2. Concurrent Timing - A mode of controller unit operation whereby a traffic phase can be selected and timed simultaneously and independently with another traffic phase.
3. Digital Timing - Pertaining to a method of timing that operates by counting discrete units.
4. Timing Plan - The Split times for all segments (Phase/Interval) of the coordination cycle.

VOLUME -

1. Actual - The count of vehicles passing a point in the roadway during a period in time. Typically expressed in Vehicles per Hour or Vehicles per Hour per Lane.
2. Scaled - The percentage that the Actual Volume is when compared to a stated maximum. The stated maximum is considered to be 100% use of the roadway.

YIELD - A command which permits termination of the green interval.

