



L-1200

SINGLE CHANNEL LOOP DETECTOR FOR NEMA CABINETS

Singe channel, shelf mount loop detector with detect and loop fail indications provided via a high intensity red LED and an easy to read LCD screen.

FEATURES

- Back-lit LCD Screen
- Audible Detect Signal
- Push Button Programming
- Directional Logic Capability
- Built-in Diagnostic Capabilities

HIGHLIGHTS

- Upgrades or additions easily accomplished by changing socket mounted processor
- All programmed detector parameters stored in non-volatile memory
- Meets / exceeds NEMA Standards TS 1-1989



NEMA CABINET COMPATIBLE

Overview: The Model L-1200 is designed to meet or exceed NEMA Standards TS 1-1989. All detector settings and parameters are configured using a set of three push-buttons and the LCD screen. The L-1200 offers advanced features providing built-in diagnostic capabilities all of which are viewable by means of the LCD screen. These include: real-time loop frequency, loop inductance and $-\Delta L/L\%$, a bar-graph indication of relative inductance change (which ensures proper selection of sensitivity level), a record of accumulated loop failures, and a timer countdown of programmed timing functions.

Loop Frequency: The LCD screen displays the actual loop operating frequency which makes it easy to quickly identify and eliminate crosstalk in the most difficult to configure intersections. There are eight (8) selectable loop frequency settings (normally in the range of 20 to 100 kilohertz). The actual loop operating frequency is a function of the loop / lead-in network and the components of the loop oscillator circuit.

Sensitivity: A unique bar graph displayed on the LCD makes it easy to quickly set sensitivity at the ideal level for any loop / lead-in network situation. There are nine (9) selectable sensitivity levels, plus settings for Continuous-Call and Channel-Off. See "SENSITIVITY, - $\Delta L/L$, & RESPONSE TIME" table.

Continuous-Call: When set to the Continuous-Call state, the detector output is continuously in the Call state regardless of the presence or absence of vehicles over the loop. The loop oscillator is disabled when in the Continuous-Call state. This state is indicated by "CALL" flashing on the LCD. This option is selected from the Sensitivity menu in Program Mode and is useful for checking controller response and other troubleshooting activities.

Channel-Off: When set to the Channel-Off state, the detector output is continuously in the No-Call state regardless of the presence or absence of vehicles over the loop. The loop oscillator is disabled when in the



Channel-Off state. This state is indicated by "OFF" flashing on the LCD. This option is selected from the Sensitivity menu in Program Mode and is useful for checking controller response and other troubleshooting activities.

Call Delay: Call Delay is adjustable from 0 to 255 seconds in 1-second steps. Call Delay time begins when a vehicle enters the loop detection zone. The remaining Call Delay time is continuously displayed on the LCD. Whenever a Phase Green Input (call delay override) signal (pin J of the front panel mounted connector) is active (high state), the Call Delay function is aborted and the Call Delay time is forced to zero.

Call Extension: Call Extension is adjustable from 0 to 25.5 seconds in 0.1-second steps. Extension time begins when the last vehicle clears the loop detection zone. The remaining Extension time is continuously displayed on the LCD. Any vehicle entering the loop detection zone during the Extension time returns the detector to the Detect state, and later, when the last vehicle clears the loop detection zone, the full Extension time starts counting down again. NOTE: See Option 3, Call Extension Control for an alternate mode of operation for Call Extension.

Presence / Pulse: One of two mutually exclusive modes of operation can be selected in Program Mode:

- Presence Mode: Provides a minimum Call hold time of at least 4 minutes (regardless of vehicle size) and typically 1 to 3 hours for an automobile or truck.
- Pulse Mode: An output Pulse of 125 ±10 milliseconds duration is generated for each vehicle entering the loop detection zone. Each detected vehicle is instantly tuned out if it remains in the loop detection zone longer than 2 seconds. This enables detection of subsequent vehicles entering the loop detection zone. After each vehicle leaves the loop detection zone, the detector resumes full sensitivity within 0.5 seconds.

Max Presence Timer: The Max Presence timer is adjustable from 1 to 999 seconds in 1-second steps, plus OFF. The Max Presence function is used to limit presence time by automatically resetting the detector. If this function is enabled (on), the Max Presence timer begins counting down when a Call is initiated and the remaining time is continuously displayed on the LCD. If the loop becomes vacant before the Max Presence timer reaches zero, the Call is dropped and no automatic reset occurs. If the End-Of Green (EOG) function is not enabled (off) and the Call is still present when the Max Presence timer reaches zero, the detector is then automatically reset. If the EOG function is enabled (on) and the Call is still present when the Max Presence timer reaches zero, the detector enters a Wait state. The Wait state continues until the loop becomes vacant; or the Phase Green Input signal for the detector (pin J of the front panel mounted connector) transitions from green to not green with the Call still present. If the loop becomes vacant first, the Call is dropped and no automatic reset occurs. If the Phase Green Input transitions from green to not green while the detector is in a Wait state, the detector is automatically reset. The phase green signal on pin J is also called Call Delay Override.

End-Of-Green (EOG): The EOG function is used to synchronize a detector reset with the termination of the associated phase green. The EOG function is only available when the Max Presence function is set between 1 and 999

seconds. It is not available when the Max Presence function is OFF. When the EOG function is enabled (on), the detector will automatically reset at the time the phase green input signal (pin J of the front panel mounted connector) transitions from the ON state to the OFF state if the Max Presence Time has counted down to zero and is resting in the Wait state. The phase green signal on pin J is also called Call Delay Override. If an out of range loop failure condition exists and is identified (i.e. channel will not be reset at End-of Green and the channel will remain in the failed state).

Option 1, Loop Inductance Display: When this option is enabled (on), the LCD screen displays the total loop inductance (actual loop inductance plus actual lead-in inductance) in microhenries for loop inductance values in the range of 20 to 2500 microhenries. NOTE: This option is automatically disabled 15 minutes after activation or on loss of power.

Option 2, Loop Inductance -ΔL/L Display: When this option is enabled (on), the LCD screen displays the percentage of inductance change (-ΔL/L value) during the Call state. To facilitate viewing of the maximum change in the -ΔL/L value while traffic is in motion over the detection zone, the detector will hold the peak -ΔL/L value for a period of 2 seconds. NOTE: This option is automatically disabled 15 minutes after activation or on loss of power.

Option 3, Call Extension Control: When this option is enabled (on), the detector will extend calls for the programmed extension time only when the Phase Green Input signal (pin J of the front panel mounted connector) is active for the detector. When this option is off, the detector extends ALL calls for the programmed extension time. The signal on pin J is also called Call Delay Override.

Option 4, Noise Filter Disable: When Option 4 is enabled (on), internal noise filtering is disabled thus providing a faster response time. When this option is off, internal noise filtering is utilized. It is recommended that this option not be activated. The factory default setting of "Off" provides stable operation in high crosstalk environments. NOTE: Changing the setting of this feature will reset the detector. See "SENSITIVITY, -ΔL/L, & RESPONSE TIME" table.

Option 5, Phase Green Loop Compensation: When Option 5 is enabled (on), normal loop compensation is used until the Phase Green Input signal (pin J of the front panel mounted connector) becomes active. Once the Phase Green Input signal is active, concurrent with a call output, the detector desensitizes the loop by 0.05% (-ΔL/L) over a 15 second period. This desensitization "tunes out" small changes, such as adjacent lane pickup, therefore minimizing the chance of max timing an empty lane. A small motorcycle may also be tuned out following the start of Phase Green. This option is useful in minimizing the effects of false detection from adjacent lane pickup when the detector must be run with a high sensitivity setting to ensure detection of motorcycles. When Option 5 is not enabled (off), normal loop compensation is used.

Option 11, Audible Detect Signal: When this option is enabled (on), an audible signal will be activated whenever the detection zone is occupied. The audible signal indicates actual occupancy of the loop detection zone. Timing and disconnect functions have no effect on the audible signal. This feature allows a technician to watch the detection zone on the street and confirm correct detector operation without

having to look at the detector display as well. NOTE: This option is automatically disabled 15 minutes after activation or on loss of power.

Option 12.0, Detector Disconnect: The Detector Disconnect feature requires that the Phase Green Input for the detector be connected to the proper controller phase. When the Phase Green Input is not active (low), the detector shall operate normally. When the Phase Green Input is active (high), at the end of each detection, the extension timer will start to count down. If this timer reaches zero before the next detection, the detector will no longer output a Call until the phase green input is not active. Because the extension timer is used as a disconnect timer while in this mode, two different disconnect types are available:

- Option 12.1 OFF: Extension timing occurs and the extension timer also serves as the disconnect timer during phase green. This will cause the Call output to remain in the Call state until disconnect occurs. This may allow the user to use gap times appropriate for the advanced loops without considering the effects on the stop bar loops.
- Option 12.1 ON: Extension timing is disabled and the extension timer is used as the disconnect timer. This will cause the Call output to follow the occupancy of the loop detection zone until disconnect occurs.

The intent of this feature is for use in applications where a loop at the stop bar is not needed after any waiting queue in the associated traffic lane is moving during the green. Note: Refer to the Model L-1200 Series Operation Manual for complete installation and operation details.

Weight: 24 oz (680 gm)

Size: 4.70 inches (11.94 cm) high x 2.25 inches (5.72 cm) wide x 5.30 inches (13.46 cm) deep (excluding connector). Connector add .675 inch (1.71 cm) to depth measurement.

Operating Temperature: -40°F to +180°F (-40°C to +82°C)

Circuit Board: Printed circuit boards are 0.062 inch thick FR4 material with 2 oz. copper on both sides and plated through holes. Circuit boards and components are conformal coated with polyurethane.

Connector: MS 3102A-18-1P 10 pin male. See "PIN ASSIGNMENTS" table.

Loop Feeder Length: Up to 5000 feet (1500 m) maximum with proper feeder cable and

appropriate loops.

Power: 89 to 135 VAC, 50/60 Hz, 4 Watts maximum.

Loop Inductance Range: 20 to 2500 microhenries with a Q factor of 5 or greater.

Loop Input: Transformer isolated. The minimum capacitance added by the detector is 0.068 microfarads.

Lightning Protection: The detector can tolerate, without damage, a 10 microfarad capacitor charged to 2,000 volts being discharged directly into the loop input terminals, or a 10 microfarad capacitor charged to 2,000 volts being discharged between either loop terminal and earth ground.

Reset: Meets and/or exceeds NEMA TS 1 detector specifications. The detector can be reset by removing and reapplying power or by changing the setting of Option 4

(Noise Filter Disable). The detector can also be reset by pressing the FUNC button for 3 seconds or by changing the sensitivity or loop frequency. NOTE: Resetting the detector by pressing the FUNC button or changing the setting of Option 4 does not disable any selectable diagnostic functions. If any diagnostic option(s) (Option 1, Option 2, or Option 11) has (have) been activated, it (they) will remain activated following the detector reset or change of Option 4 setting. Resetting the detector by removing and reapplying power disables all selectable diagnostic features.

Phase Green Input: Also known as Call Delay Override. Meets and/or exceeds all NEMA TS 1 requirements. Application of a high state voltage (89 to 135 VAC) to pin J of the front panel mounted connector causes the delay timer to abort the delay timing function and also provides control for Phase Green Loop Compensation, Max Presence Timing (End-of-Green), Extension Timing, and Detector Disconnect, if the features are programmed.

Relay Ratings: The relay contacts are rated for 6 Amps maximum, 150 VDC maximum, and 180 Watts maximum switched power.

Display: The LCD back-lighting illuminates whenever any push-button is pressed. The back-lighting will extinguish 15 minutes after the last actuation of any push-button.

Detect Indicators: The detector has a super-high-intensity, red, light-emitting-diode (LED) to indicate a Call output, Delay Timing, Extension Timing, or failed loop.

Response Time: Meets or exceeds NEMA TS 1 response time specifications. See "SENSITIVITY, -ΔL/L, & RESPONSE TIME" table for actual response times.

Self-Tuning: The detector automatically tunes and is operational within 2 seconds after application of power or after being reset. Full sensitivity and hold time require 30 seconds of operation.

Environmental & Tracking: The detector is fully self-compensating for environmental changes and loop drift over the full temperature range and the entire loop inductance range.

Grounded Loop Operation: The loop isolation transformer allows operation with poor quality loops (which may include one short to ground at a single point).

Loop (Fail) Monitor: If the total inductance of the detector's loop input network goes out of the range specified for the detector, or rapidly changes by more than ±25%, the detector will immediately enter the Fail-Safe mode and display "LOOP FAIL" on the LCD screen. The type of loop failure will also be displayed as "L lo" (for -25% change or shorted loop conditions) or "L hi" (for +25% change or open loop conditions). This will continue as long as the loop fault exists. However, if the detector is reset, or power is momentarily lost, the detector will retune if the loop inductance is within the acceptable range. If any type of loop failure occurs in one (or more) loop(s) in a group of two or more loops wired in parallel, the detector will not respond with a fail-safe output following any type of reset. It is essential that multiple loops wired to the detector always be wired in series to ensure fail-safe operation under all circumstances. The Fail-Safe mode generates a continuous call in Presence Mode or in Pulse Mode. At the time of a loop failure, the LED will begin repeating a burst of three flashes each one second. The

LED will continue these bursts until the detector is manually reset or power is removed. If the loop "self heals", the "LOOP FAIL" message on the LCD will extinguish and the detector will resume operation in a normal manner; except the LED will continue the bursts thus providing an alert that a Loop Fail condition occurred. Each loop failure for the detector is counted and accumulated into the Loop Fail Memory. The total number of loop failures written into the Loop Fail Memory (since the last power interruption or manual reset) is viewed by stepping through the detector's functions in Program Mode to the "LOOP FAIL" message.

Full Restore To Factory Defaults: Pressing all three front panel switches simultaneously and continuously for 5 seconds resets the detector and restores all the factory default settings. The countdown of the 5-second period is displayed on the LCD screen. Releasing any of the switches before the countdown ends will abort the Full Restore operation. See "FACTORY DEFAULT SETTINGS" table.

Display Test: Pressing any two of the front panel switches simultaneously will display all possible symbols and messages on the LCD screen.

Sensitivity, $-\Delta L/L$, & Response Time: * Denotes Factory Default

Sensitivity	$-\Delta L/L$	Response Time	
		Noise Filter Enabled (Option 4 Off)	Noise Filter Disabled (Option 4 On)
1	0.64%	96 \pm 16 msec	12 \pm 2 msec
2	0.32%	96 \pm 16 msec	12 \pm 2 msec
3	0.16%	96 \pm 16 msec	12 \pm 2 msec
4	0.08%	96 \pm 16 msec	12 \pm 2 msec
5	0.04%	96 \pm 16 msec	12 \pm 2 msec
6*	0.02%	96 \pm 16 msec	15 \pm 3 msec
7	0.01%	96 \pm 16 msec	23 \pm 5 msec
8	0.005%	96 \pm 16 msec	38 \pm 8 msec
9	0.0025%	96 \pm 16 msec	68 \pm 14 msec

Factory Default Settings:

Function	Setting
Frequency	3
Sensitivity	6
Delay Time	0
Extension Time	0
Max Presence Time	OFF
Presence/Pulse Mode	Presence
End-of-Green (EOG)	OFF
Option 1 - Loop Inductance Display	OFF
Option 2 - Loop Inductance $-\Delta L/L$ Display	OFF
Option 3 - Call Extension Control	OFF
Option 4 - Noise Filter Disable	OFF
Option 4 - Noise Filter Disable	OFF
Option 5 - Phase Green Loop Compensation	OFF
Option 11 - Audible Detect Signal	OFF
Option 12.0 - Detector Disconnect	OFF
Option 12.1 - Detector Disconnect Type	OFF

Pin Assignments:

Pin	Function
A	Power, Neutral, 120 VAC
B	Output, Relay Common
C	Power, Line, 120 VAC
D	Loop Input
E	Loop Input
F	Output, Relay Normally Open
G	Output, Relay Normally Closed
H	Chassis Ground
I	No Connection
J	Phase Green Input

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