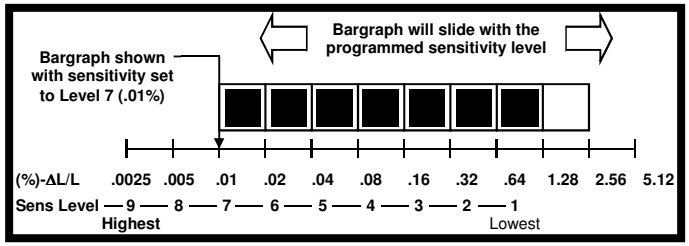
detector channel. **Simply entering the program mode without changing any parameter will not reset the channel.**

- Pressing and holding all four pushbuttons **simultaneously** and continuously for five (5) seconds resets both channels and also restores the default settings to both channels.
- The detector can be reset by removing and reapplying power.
- **Loop Fail History** is cleared by all reset procedures described above except changing frequency or sensitivity. Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons while viewing the Loop Fail History will also clear the Loop Fail History.

V. Sensitivity Setting:

Sensitivity is controlled by selecting a Sensitivity Level for each channel. The sensitivity settings of "1" through "9" represent thresholds from the least sensitive to the most sensitive. Setting the proper sensitivity level for the loop circuit provides stability to the system. If set too high, the detector may detect adjacent traffic. If set too low, the detector may not detect small vehicles (bicycles) or high bed vehicles.

The LCD includes an eight (8) segment bargraph that is a representation of the relative change of inductance as seen by the detector. This automatically takes into account loop size, loop inductance, number of loops, number of turns, loop geometry, lead-in length, etc. The bargraph is a sliding scale that is relative to the programmed Sensitivity Level. The first (left-most) bargraph segment represents the minimum inductance change necessary for the detector to output a call at the currently selected sensitivity



level. Larger inductance changes will indicate more segments. Each additional segment indicates that the next sensitivity level has also been met or exceeded. Therefore the bargraph indicates if the sensitivity is set too high or too low, easily facilitating the ideal setting of the sensitivity level.

The diagram below shows the bargraph with the channel set to Sensitivity Level 7: 0.01% -ΔL/L. The bargraph indicates that the vehicle in the loop zone has exceeded the minimum sensitivity level by an additional six Sensitivity Levels or 0.64% -ΔL/L. **The typical vehicle to be detected should cause six or seven segments of the bargraph to become filled.**

Each segment on the display is equal to one sensitivity level. If the typical standard size vehicle to be detected is not creating a six to seven segment display on the bar graph count how many segments are being displayed. Take the number of segments displayed and subtract that number from seven. The resultant number represents the number of sensitivity levels that must be increased.

Example: The detector channel sensitivity is programmed for four ("4"). The bargraph shows four (4) segments when detecting an average size automobile. Subtract four from seven, which is equal to three. The sensitivity should be increased by three levels. Since the initial setting was four ("4") and three additional levels are required to detect small vehicles the correct sensitivity setting should be seven ("7").

BICYCLE DETECTION will require setting the sensitivity to the higher levels (6, 7, 8 or 9). The bargraph can be used to assist in setting the proper sensitivity level. Adjust the sensitivity level for the channel until seven (7) segments of the bargraph are shaded when a standard automobile is present in the loop zone. Bring a bicycle down the center of the loop. If the bargraph shows more than two (2) segments, reduce the sensitivity level by the number of segments above two (2). If the bicycle down the center of the loop is not detected, increase the sensitivity until the bicycle causes the shading of at least one (1) segment of the bargraph. *Important: A bicycle will cause about 20 times more change when riding over the loop wires parallel to the direction of travel than riding in the center of the loop.*

Operating Instructions:

Model E, E/2 -1200-B

Firmware Version 36.00

FOUR CHANNEL BICYCLE DETECTOR

I. General Description:

The Model E, E/2-1200-B is designed to detect **all** vehicles with the added ability of differentiating bicycles from all other vehicles. This allows the traffic engineer to detect and provide safe passage time for bicycles without compromising the intersection's operating efficiency. The unique capability to identify bicycles from other vehicles allows the user to program initial time and extension time for **bicycles only**, thus providing a safe passage time through the intersection. When a bicycle is detected passing through the bicycle loop (a single 6' x 6' loop or smaller) the channel's output is latched in the call state. **The call output can only be latched during the absence of phase green.** The latched call is held until the detector's phase green input becomes active. At the time the phase green input becomes active the latch is reset, the call is held, and the initial time, which has been programmed in the detector, begins counting down to zero. If the loop is vacant when the initial time reaches zero the call is dropped. If additional bicycles are detected before the initial time reaches zero each subsequent bicycle extends the call by either the remaining amount of initial time or the extension time, whichever is greater. During phase green, after the initial time expires, all bicycle calls are extended by the amount of the programmed extension time. When the extension time is set to zero the extension time is equal to the initial time. If it is desired to have an extension time different from the initial time the detector's extension time can be programmed for any value ranging from 0.1 seconds to 25.5 seconds. When the extension time is set to any value other than zero the detector provides the initial time plus a separate extension time during phase green. **The detector's latched call, initial time, and extension time respond only to bicycles.** For all other vehicles the detector functions as a standard presence detector without timing.

The detector can also be set for **Bicycle Detect Only Mode**. In the Bicycle Detect Only Mode the detector does not output call signals for other vehicles passing over the bicycle detection loop.

The Model E, E/2-1200-B detector is compatible with NEMA Standards TS 2-1992.

II. Factory Default Settings:

Function	Channel 1	Channel 2	Channel 3	Channel 4
Loop Frequency: 8 Operating Frequencies	2	4	6	8
Sensitivity: Off - 1 to 9 - Call	7	7	7	7
CALL Delay Time: 0 - 255 seconds	0	0	0	0
CALL Extension Time: 0 - 25.5 seconds	0.0	0.0	0.0	0.0
Bicycle Initial Time: OFF, 1 - 999 seconds	OFF	OFF	OFF	OFF
Option 1: L (Loop Inductance)	OFF (all channels)			
Option 2: -ΔL/L (% Inductance Change)	OFF (all channels)			
Option 11: Audible Detect (Buzzer)	OFF	OFF	OFF	OFF
Option 15.0: Bicycle Detect Only	OFF	OFF	OFF	OFF
Option 15.1: Phase Green Input Disable	OFF	OFF	OFF	OFF

WARNING: If Option 15.1 is turned "ON" the channel will not latch the call. Initial time and extension time start counting down immediately when the bicycle leaves the loop area.

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III. How to View and Program Detector Functions:

- Enter the PROGRAM mode by momentarily pressing the FUNC pushbutton. Use the FUNC pushbutton to step through the functions described below.
- Press the CHAN pushbutton to select the channel. The channel that is in PROGRAM mode is indicated by a flashing numbered-loop symbol at the bottom of the LCD.
- To change a function's setting or to toggle a function ON or OFF, press the ▲ (UP) or ▼ (DOWN).
- To exit the PROGRAM mode and return to the NORMAL mode, press and hold the CHAN pushbutton continuously for one second.

LOOP FREQUENCY

Press the ▲ (UP) or ▼ (DOWN) pushbuttons to change the programmed loop frequency. The filled segment on the bargraph indicates the setting. The left-most segment represents setting 1 and the right-most segment represents setting 8. The LCD displays the actual operating frequency of the loop circuit. A separation of at least 5 KHz for adjacent loops, not connected to the same detector, is recommended. **NOTE:** Changing the frequency will reset the detector channel. Care should be taken to ensure that the detector channel is not reset while the detection zone is occupied.

SENSITIVITY

Press the ▲ (UP) or ▼ (DOWN) pushbuttons to change the programmed sensitivity. The lowest Sensitivity Level is "1" and the highest Sensitivity Level is "9". The channel can be configured to place a permanent call by selecting CALL (one setting above Sensitivity Level "9"). The channel can be disabled by selecting OFF (one setting below Sensitivity Level "1"). If CALL or OFF is selected, the LCD flashes the message ***CALL*** or ***OFF*** during NORMAL DISPLAY mode. See *Section V Sensitivity Setting* for instructions on how to use the bargraph to determine the proper sensitivity setting for the loop/lead-in network connected to the channel. **NOTE:** Changing the sensitivity will reset the detector channel. Care should be taken to ensure that the detector channel is not reset while the detection zone is occupied.

CALL DELAY TIME

Call Delay Time can be adjusted from 0 to 255 seconds by pressing the ▲ (UP) or ▼ (DOWN) pushbuttons. When the Call Delay Time is 0, pressing the DOWN pushbutton steps the value to 255 seconds. Holding either the ▲ (UP) or ▼ (DOWN) buttons will increase the speed of change. When the Call Delay Time is 255 seconds, pressing the UP pushbutton steps the value to 0. During the DELAY PERIOD, the channel's LED flashes at a four Hz rate with a 50% duty cycle and the LCD shows a countdown of the Call Delay Time. When the Phase Green Input is active the Call Delay Time is inhibited.

CALL EXTENSION TIME

Call Extension Time can be set from 0.0 to 25.5 seconds by pressing the ▲ (UP) or ▼ (DOWN) pushbuttons. When the Call Extension Time is 0.0, pressing the DOWN pushbutton steps the value to 25.5 seconds. When the Call Extension Time is 25.5 seconds, pressing the UP pushbutton steps the value to 0.0. Holding either the ▲ (UP) or ▼ (DOWN) buttons will increase the speed of change. During the EXTENSION PERIOD, the channel's LED flashes at a 16 Hz rate with a 50% duty cycle and the LCD shows a countdown of the Call Extension Time.

Call Extension Time provides extension time for only bicycles when Bicycle Initial Time is programmed. If a bicycle is detected while the Bicycle Initial Time is counting down the initial time, the Call Extension Time will replace the Bicycle Initial Time, if the Call Extension Time is greater than the Bicycle Detect Initial Time countdown. The Call Extension Time should be set for the time it takes a bicycle to safely cross the intersection.

BICYCLE DETECT INITIAL TIME

When in the program mode the Bicycle Detect Initial Time will flash between "bcL" and "OFF" or "bcL" and "XXX" (programmed time). The timer can be adjusted from OFF to 999 seconds by pressing the ▲ (UP) or ▼ (DOWN) pushbuttons. When the time is set to OFF, pressing the DOWN pushbutton steps the value to 999 seconds. Holding either the ▲ (UP) or ▼ (DOWN) buttons will increase the speed of change.

In normal operation "bc" is displayed on the LCD for each channel with Bicycle Detect Initial Time programmed. When a bicycle passes over the bicycle loop area, the bicycle detection latches the call output. If Option 15.1 is OFF, the Bicycle Detect Initial Time will start to countdown when the phase green input becomes activate. If Option 15.1 is ON, the Bicycle Detect Initial Time will start to countdown when the bicycle leaves the loop area. When the timer reaches zero and the loop is vacant the call is dropped. A bicycle passing through the loop area while the initial time is counting down will reset the extension time. If no Call Extension Time is programmed the Bicycle Detect Initial Time value is used for the extension time value. If Call Extension Time is programmed it will extend each bicycle detection by the extension time value.

The Call Extension Time should be set for the time it takes a bicycle to safely cross the intersection.

OPTION 1: LOOP INDUCTANCE

Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons toggles between ON and OFF. When Option 1 is OFF the LCD indicates three dashed lines (**- - -**) during the No Call state. When Option 1 is ON the LCD continuously indicates the Loop Inductance value in microhenries while in the NORMAL DISPLAY mode. Option 1 automatically turns OFF 15 minutes after the last actuation of any of the four front panel pushbutton switches. The display shows three digits if the inductance is between 15 µH and 999 µH. If the inductance is greater than 999 µH, the display alternately flashes between ***1*** or ***2*** and the lower three digits. The four digits represent inductance values from 1000 µH to 2500 µH. When a vehicle is detected the Detect LED and bargraph display indicate the call. The count down of the Delay, Extension, and Bicycle Detect Initial timers is **not** displayed when Option 1 is ON. **NOTE:** Turning this option ON for any channel turns it ON for all channels.

OPTION 2: INDUCTANCE CHANGE -ΔL/L

Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons toggles between ON and OFF. When Option 2 is OFF the LCD indicates a steady Call when a vehicle is detected. When Option 2 is ON the LCD indicates the -ΔL/L value when a vehicle is detected. The maximum -ΔL/L that occurs is displayed for two seconds unless a greater change occurs. **NOTE:** Turning this option ON for any channel turns it ON for all channels.

OPTION 11: AUDIBLE DETECT SIGNAL

Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons toggles between ON and OFF. When Option 11 is ON for a channel an audible signal is emitted any time that channel's detection zone is occupied. This option can only be turned ON for one channel at a time. The last channel to have Option 11 turned ON will be the only channel with Option 11 turned ON. Delay and Extension time have no effect on the audible signal. Option 11 will automatically turn off after 15 minutes.

OPTION 15.0: BICYCLE DETECT ONLY

Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons toggles Option 15.0 between ON and OFF. When Option 15.0 is turned ON, the channel will only provide output calls for bicycles. Larger vehicles will not activate a call output. When Option 15.0 is ON "bc0" is displayed on the LCD. If Option 15.0 is OFF, the channel will output a call for all vehicles detected.

OPTION 15.1: PHASE GREEN INPUT DISABLE

Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons toggles Option 15.1 between ON and OFF. When Option 15.1 is turned ON the channel will countdown the Bicycle Detect Initial Time immediately after the bicycle leaves the loop area. If Option 15.1 is OFF, the channel counts down the Bicycle Detect initial Time when the Phase Green Input becomes active.

LOOP FAIL

The number of loop failures logged in the loop fail register is displayed. Any time a channel enters the Fail Safe Mode due to a loop failure, the loop fail register is incremented by one count. Pressing either the ▲ (UP) or ▼ (DOWN) pushbuttons will clear the loop fail register. The number of loop fail counts is also reset to zero by any power down, when the harness is disconnected from the detector, or when the channel is reset. The loop fail register is not reset when the channel's sensitivity or frequency is changed.

After each detector channel is initialized and operating in a normal manner, the channel is continuously monitored for faulty loop conditions (e.g. broken wires, poor splices, bad solder connections, etc.). If the measured loop inductance value rapidly changes by more than ±25%, the channel is considered to have failed. The channel then enters the Fail Safe Mode, which generates a constant call output. When a channel is in Fail Safe Mode the Loop Fail message located at the bottom of the LCD will be illuminated. The LCD will display ***L lo*** for shorted or low loop inductance values, The LCD will display ***L hi*** for open or high loop inductance values. In addition, the corresponding channel's LED will begin to emit a flashing pattern (three flashes per second). If the loop self-heals the detector and LCD resume normal operation. The LED will continue to flash as a means of indicating a prior loop fail condition until the loop fail register is cleared.

FIRMWARE VERSION

The firmware version and revision for the detector is displayed. This is a view only parameter. The display alternates between the model letter and firmware version (example ***E36***) and the firmware revision number (example ***.00***).

IV. How to Reset the Detector:

- Momentarily press the CHAN pushbutton until the channel to be reset is selected. Press and hold the CHAN pushbutton continuously for three (3) seconds. After three seconds the channel is reset maintaining all previous settings.
- Changing the frequency or sensitivity setting will enter the new setting and reset the channel. Changing any of the other parameters will take effect immediately or on the next detection, but will not reset to