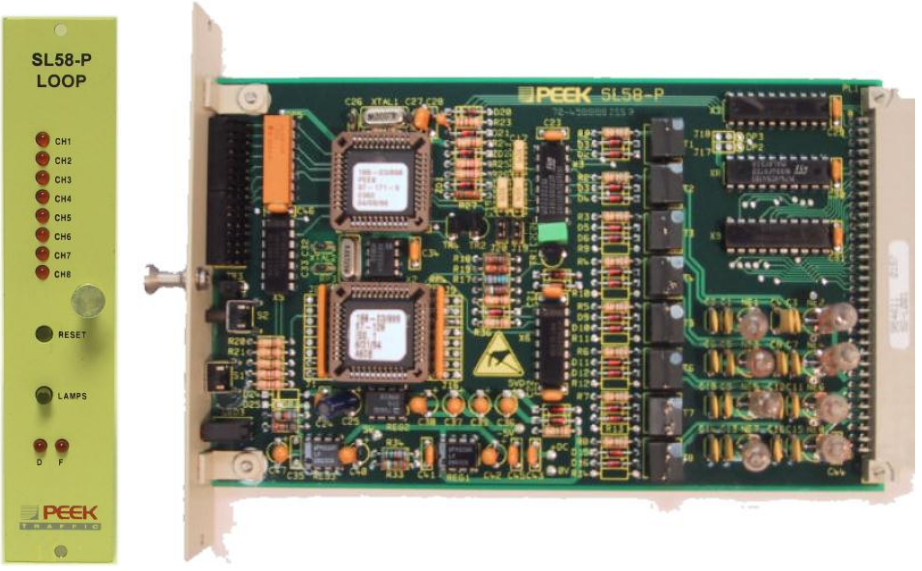
Operator Manual

SL58-P Loop Detector

for the Peek ADR Series Traffic Recorders



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Rev 1

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The information contained within this manual is intended to serve as a guide to users in the operation of the SL58-P Loop Detector. An effort has been made to insure the accuracy of the information contained in this manual. However, the information is supplied without warranty of any kind. Further, there is no warranty of the applicability of the information to all cases.

The SL58-P loop detector card has been designed and certified to operate within limits and a frequency range compliant with FCC and IC regulations.

Model : SL58-P

FCC ID : PMN-SL58P

IC : 10596A-SL58P

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The IC & FCC ID are labeled on the SL58-P. When the SL58-P is installed in an ADR unit, a screw driver may be used to open the ADR unit to view this label.

This unit must be installed and operated as specified in this manual. Any changes or modifications not expressly approved by Peek Traffic could void the user's authority to operate the equipment.

The user is cautioned to fully program and thoroughly test the controller for its intended application prior to placing it in operational service. Peek Traffic reserves the right to add, delete, and/or modify the material in this manual at any time.

Peek Traffic Corporation
2906 Corporate Way
Palmetto, FL 34221 U.S.A.

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ABOUT THIS MANUAL

This is the operator manual for Peek Traffic Corporation's SL58-P Loop Detector™.

This manual provides:

- General information regarding the installation of the SL58-P Loop Detector, power-up, and operation
- Guidelines for installing and connecting inductive road loops
- Instructions for operating the loop detection within FCC compliance limits
- Instructions for using the SL58-P LED indicators and buttons
- Instructions for making adjustments to Loop Detector loop frequencies, and other settings
- Glossary
- Index

ADDITIONAL GUIDANCE

For more guidance on the configuration and use of the Peek ADR Series traffic recorders, and related devices, refer to the following documents and contacts.

Documentation

These documents provide useful information concerning ADR Series traffic recorders.

Table 1 — Additional documentation available for ADR products

Document	Part Number
ADR-6000 Operating Manual	*99-273*
ADR-Plus Operating Manual	*99-133*

Technical Support

Use this information to contact the technical support staff of Peek Traffic Corporation, should you require additional help concerning IQ Connect devices.

Peek Traffic Corporation - Customer Service Center

2906 Corporate Way
Palmetto, FL 34221
toll free in the U.S.: 1 (800) 245-7660
tel: 1 (941) 845-1200
fax: 1 (941) 845-1504
email: tech.support@peektraffic.com

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Chapter 1 — Introduction

OVERVIEW

The SL58-P is a low-current, eight-channel inductive vehicle detector, designed primarily for use with the ADR Series traffic recorders, in traffic data monitoring applications. The loop detector monitors changes in the inductive level for each loop, indicating vehicle presence, as part of a traffic study array deployment strategy.

Features

- The detector energizes up to eight individual inductive loops (channels), and monitors changes in the inductive level for each loop, detecting vehicle presence.
- The detector uses channel scanning techniques which permit freedom from cross-channel interference from the eight channels within a detector.
- Automatic tuning upon power-up or reset allows detector operation in 2 seconds.
- Power up or reset clears any detect and fault outputs already set in the detector.
- Host device menus can be used to adjust sensitivity and hysteresis per individual channel. These adjustments can be made while the detector is working, although this causes the detector to reset.
- Detector channels can be switched on/off individually (via host device settings); normal operation of remaining channels in use is maintained. When a channel is switched off, its connected road loop is not energized.
- Failsafe on fault (open or short circuit loop). Automatic retune of a channel occurs if the loop inductance changes by a nominal + 18% of its initial start-up inductance.

Note For more information regarding ADR devices, and equipment usage in general, refer to the Operator Manual for the specific ADR device(s) in use (see Additional Guidance, p. iv).

DETECTOR INSTALLATION NOTES

The SL58-P Loop Detector is designed to be used with Peek Traffic ADR Series traffic recorders. Refer to “Additional Guidance,” p.iv, for more information on ADR Series traffic recorders and related products.

Always take the necessary safety precautions whenever servicing and operating electrical equipment.

Caution Be sure the power supply to any detector modules in a rack is switched off, or in the case of installation in a discreet ADR unit, the battery disconnected, before installing a detector into or removing a detector from a module rack or recorder unit slot.

Caution Observe all safety precautions when working with electrical circuitry within the unit. Also take care to prevent damage from electrostatic discharge, and avoid contact with circuit board traces and components. Failure to do so can result in personal injury or damage to equipment.

Chapter 2 — Using the Detector

Once installed and powered up, you can use the SL58-P loop detector to connect up to eight inductive road loops as part of your array. Typically, no adjustments to detector or settings, such as frequency level, or hysteresis, are needed for successful operation.

Adjustments can be made, if necessary, in detector frequency or hysteresis settings, if necessary to enhance detection accuracy or help overcome detection issues (see “Setting Operating Parameters via Host,” p. 5, or “Frequency Level Selection,” p. 6).

Basic Detector Operation

The SL58-P loop detector channels drive alternating current through the connected inductive loop, creating an electromagnetic field. The loop detector channel forms a tuned electrical circuit of which the loop wire is the inductive element.

If a conductive metallic mass passes through the electromagnetic field, eddy currents will be induced in the conductive material. Since the loop inductance is proportional to the magnetic flux, it results in a decrease in loop inductance. The detector channel electronics sense the change in inductance and then activate signal output.

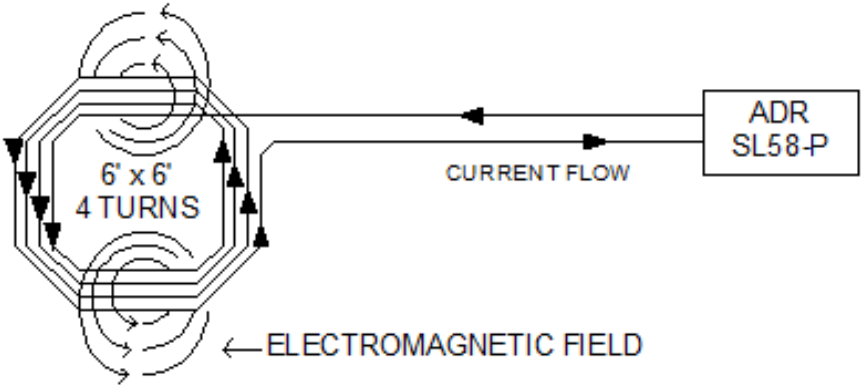
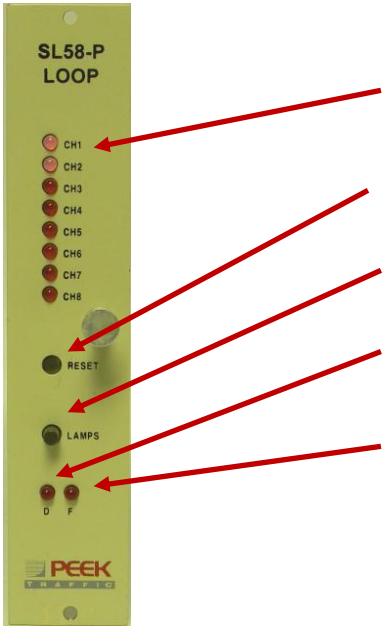


Figure 1 – *Typical loop and detector configuration*

LEDs and Buttons

When the SL58-P is running, LEDs on the unit signify certain status. The SL58-P has operator controls and indicators, in the form of LEDs and buttons:



Channel Status LEDs
The LED shows the current detect state for the respective inductive loop (channel)

Reset button
Push to reset the detector, and clear any faults

Lamps – LED activate button
Push to light the Channel LEDs

D – "Detect" LED
ON when any loop detects vehicle
(ON only when Lamps button is pushed)

F – "Fault" LED
Goes ON when a fault occurs, and stays on until fault is cleared
(ON only when Lamps button is pushed)

Figure 2 – LEDs and Buttons

Power-down and Power-up

The SL58-P loop detector has no individual on/off switch. To power up or power down the SL58-P loop detector:

- Power-down - Switch off or disconnect battery or power supply to the ADR system or host device, and thus also the SL58-P loop detector. Refer to the Operator Manual for the host device (see "Additional Guidance," p. iv).
- Power-up - Switch on or reconnect power supply to the ADR system or host device, and thus also the SL58-P loop detector. Refer to the Operator Manual for the host device (see "Additional Guidance," p. iv).

When you restart the SL58-P loop detector (or reset the unit while powered up), this action clears any detect and fault outputs that may be set in the detector.

Note The SL58-P performs “automatic tuning” upon power-up or reset; this allows detector to resume operation within two seconds of power-up or reset.

Reset

You may need to reset the SL58-P loop detector should there be any persistent faults that may not clear otherwise, or if you have changed settings and need to put them into full effect. You can reset the rack-mounted SL58-P units individually, but not the ADR-based, internally installed detector units.

To reset the SL58-P:

- Press the **Reset** button (see ***Figure 2*****,** p. 4).

Note If you change channel settings while the SL58-P is in operation, the detector stops operation and resets automatically; operation resumes after automatically retuning (two-second delay).

Setting Operating Parameters via Host

Most operational parameters for the SL58-P are settable via the configuration menu on the host device. For specific instructions on using a host device menu interface, refer to the Operator Manual for the host device (see “Additional Guidance,” p. iv).

Note If you change channel settings while the SL58-P is in operation, you will cause the detector to reset automatically; operation will resume after **automatic retuning** occurs (two-second delay).

Switching Channels Off/On

The SL58-P channels can be switched on/off individually, via host device settings. When a channel is switched off, normal operation of remaining channels in use is maintained. While a channel is switched off, its connected inductive loop is not energized.

Hysteresis and Sensitivity

The SL58-P with has a programmable “hysteresis” setting. Hysteresis is defined as a resistance to change; the use of this setting with SL58-P loop detectors is to curtail “drop out” and multiple vehicle counts on larger trucks.

Normally this is left at the factory default setting of 3 which is fine for almost all locations. A higher number is a greater resistance to change. If you observe that certain trucks are

being incorrectly detected as two smaller vehicles, you may want to set the sensitivity and hysteresis as follows:

1. First set the sensitivity on the subject loop(s) to a value of 7.
2. Observe traffic using the ADR device's PER VEHICLE MONITOR feature.
3. If trucks are being incorrectly detected as two cars, set the hysteresis to a setting of 4 and observe traffic again. If you still observe the trucks being detected as two vehicles, you may try a HYSTERESIS setting of 5.

Note If hysteresis is set too high, low slung vehicles (like luxury sedans) may be detected as being over 100 feet long, as the loop vehicle detection may tend to stay "on." If you observe this and find that reducing the hysteresis value to a lower setting is not acceptable, reducing the sensitivity by one setting (from 7 to 6) may achieve the desired result.

Frequency Level Selection

When using multiple SL58-P modules with loops in close proximity, it is possible that interference or cross talk between the SL58-P modules may occur. Typically, this is not an issue, due to the scanning nature of the detector.

If using a single loop detector, the frequency level setting does not matter, in terms of module crosstalk, although it may be of concern with respect to FCC compliant operation (see "FCC Compliant Operation," p.8).

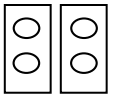
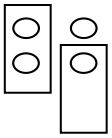
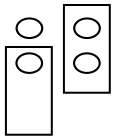
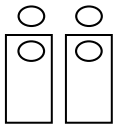
If needed, change settings on the different SL58-P modules to different respective frequency levels (low, medium low, medium high, or high). This helps to create frequency separation between modules, and avoid interference between modules.

Caution Be sure the power supply in a rack is switched off, or in the case of installation in a discreet ADR unit, the battery disconnected, before installing a detector into or removing a detector from a module rack or recorder slot.

Set the frequency level of the SL58-P using its onboard jumper pins, J19 and J20. To change the jumper pins (see **Figure 3**, p. 7).

1. Remove power from the host device, and thus the detector(s).
2. Remove module from slot to allow access to pins.
3. Refer to **Table 2** below to set module frequency levels as needed.
4. Replace module into slot.
5. When ready, restore power to the host device, and detector(s).

Table 2 – SL58-P Jumper Pin Settings for Detector Frequency Level

Low	Medium Low	Med. High	High
J20 J19	J20 J19	J20 J19	J20 J19
			

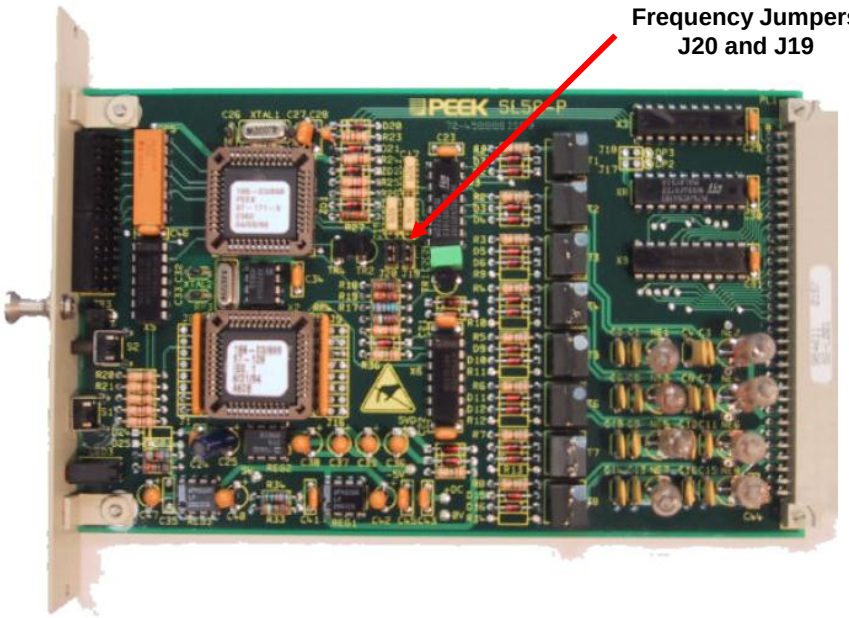


Figure 3 – Frequency Level Jumpers J20 and J19

Speed Measurement

When using two inductive loops to detect vehicle speeds:

- Make sure the respective channels for the two loops are set to the same sensitivity value sensitivity (in the range 0.1 to 1.0%; refer to the ADR Operator Manual for the host device)

Use adjacent channels for the two loops being used for speed detection.

Failsafe on Fault Conditions

The SL58-P channels maintain a fault status if there are device or loop failures.

Open or short circuit loop: In the case of open or short circuit loop, the channel goes into a fault condition. In rack-mounted versions of the, the respective channel LED will go into detect condition while the loop fault condition exists, and the fault output led will light (if enabled by pushing the LAMP button). The fault output will be held as long as the fault exists.

Loop Inductance variation: An automatic retune of a channel occurs if the loop inductance changes by a nominal +-18% of its initial start up inductance. In rack-mounted versions of the SL58-P, the respective channel LED will go into detect condition during the retune and give a fault output. The fault condition is held for one second after the fault condition has been cleared.

FCC Compliant Operation

The SL58-P inductive loop detector card has been designed and certified to operate within limits and a frequency range compliant with FCC and IC regulations. The frequency of operation is determined by both the frequency set jumpers (see “Frequency Level Selection,” p. 6) and the inductance of the connected loop. The physical dimensions of the loop, and number of turns of wire, affect the inductance of the loop.

Loops with inductance greater than 75uH are approved for use, under the following conditions:

- Loops with inductance of 75-100uH must use JP19,JP20 frequency setting 'Low Frequency'.
- Loops with inductance greater than 100uH may use any JP19,JP20 frequency setting.
- Optimal detection is achieved using loops with inductance in the range 100-250uH using 4 turns of wire.

The standard recommended loop is 6ft x 6ft with 4 turns of 12 or 14 AWG wire.

Table 3 (p. 9) shows FCC compliant loop antenna and frequency configurations.

Note Loops must be installed as specified in this manual. Any changes or modifications not expressly approved by Peek Traffic could void the user's authority to operate the equipment. See Chapter 3, Installing Loops for Data Collection.

Table 3 – Inductance in uH for loop dimensions

Width (feet)	Length (feet)	2 Turns	3 Turns	4 Turns	5 Turns
4	4	20	45	79	124
4	6	26	58	102	160
4	8	31	70	125	195
4	10	37	83	147	230
4	12	42	95	170	265
4	14	48	108	192	300
4	16	54	120	214	335
4	18	59	133	236	369
4	20	65	146	259	404
4	25	78	177	314	491
6	6	36	75	124	187
6	8	43	89	150	225
6	10	50	103	174	262
6	12	56	118	199	300
6	14	63	132	224	339
6	16	70	146	249	378
6	18	77	161	274	418
6	20	84	176	300	458
6	25	101	213	364	563
8	8	44	99	176	275

Use with any Frequency Setting of J19/J20 Jumpers
Use only with the Low Frequency Setting of J19/20 Jumpers
Invalid Loop Antenna

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Chapter 3 — Installing Loops for Data Collection

BASIC LOOP THEORY

The inductive loop as used for vehicle detection is comprised of two elements: the electronic detector module; and the wire which makes up the inductive loop coil in the road and its connecting lead in cable. The loop wire and its connecting lead in cable are the inductive elements of the detection system and possess a combination of resistance and capacitance (both inter-wire and wire to earth capacitance). The loop wire is wound to form a coil (usually 4 turns) where the magnetic field becomes more concentrated, creating the zone of detection. All conductors or wires carry an electrical current produce magnetic flux as long as the current is flowing through the wire. The effect of this flux is the electrical property called inductance, which is measured in henrys (h).

LOOP CONSTRUCTION

Quality loops, carefully installed as consistently matched equals, are recommended.

Loop Wire

Inductive loops, connecting lead in wire and cables typically use multi-stranded #12 or #14 AWG copper wire with low AC and DC resistance. The wire thickness is important, however, most critical is the quality, thickness and type of insulation covering the wire. Several types of insulation are available but only a Cross-Linked polyethylene (XHHW) should be used for vehicle detection loops. The insulation must withstand wear and abrasion from shifting streets as they expand and contract from high summer heat and winter cold as well as attacks from moisture, solvents and oils. Multi-stranded copper wire is recommended as better than solid wire because of its mechanical characteristics and is easier to correctly install without damage. Stranded wires withstand bending and stretching better than solid wire.

Recommended Loop Wire:

- XHHW (#14 or 12 SWG) Cross-Linked Polyethylene insulated, copper wire, multi-stranded.
- Rated 90°C in dry locations and 75°C in wet locations

Size of Loops

Loops for vehicle detection in traffic data applications are commonly 6‘ x 6’ (or 2m x 2m) dimension, with 4 complete wraps (turns) of wire around the sensing area. Although described as a square, the actual installation requires rounded corners to eliminate stress points at the corners. If two loops are used for speed measurement, exact pairs are required in a lane.

For loop sizes and inductance recommendations, see **Table 3** (p. 9).

Note For operation within permitted guidelines, install loops and equipment as specified. Any changes or modifications not expressly approved for use by Peek Traffic could void the user's authority to legally operate the equipment. For more information, consult with Peek Traffic Technical Support (see “Technical Support,” p. iv).

Loops smaller than 6’x 6’ may result in the early loss of detection for high body vehicles and should not be used if accurate truck traffic data is expected. Loops are usually installed as wide enough to span the path where detection is required, without being so wide as to detect vehicles in adjacent lanes or adjacent loops. Install loops three feet away from the nearest edge of lane line, if possible, and six feet away from any other loops. All loops should always be at least 4’ away from any moving metal objects, gates or doors. On narrow two lane roads with a loop in each lane it is better to keep the loops apart from each other than to make them smaller.

For large vehicle detection, such as trucks and tractor trailers or semis, use 6’ x 6’ loops or greater. With smaller loops the high ground clearance between axles can cause detection drop out problems, where each axle or group of axles will be seen as a separate detection on a small loop.

Height of Detection

The height of detection is the maximum height above the installed loop at which a reliable detection can be achieved. Normally, in the field test measurements will achieve a height of detection equal to one-half to two-thirds the length of the shortest side of a loop; that is, for example, a 6’ x 6’ loop would produce reliable detection to a height of 3’ to 4’ above the loop wires.

INSTALLING THE LOOP

Site Safety

This is not a safety manual nor is it a “how to” book for safely installing road tubes or other sensors in or on the roadway. This manual assumes that anyone using this guide for study site installation is a locally qualified technician and is thus qualified to safely set up and execute traffic counting studies on the study site, and is trained in addressing the public and personal safety factors that arise when working in such an environment.

Safety for the installer, and for the public, should be foremost in mind at all times, especially on site.

Warning Consult your local authority for the best safety practices and installation requirements in your area, before working on or near the roadway or any such study site. Failure to do so can result in injury or even death, or damage to equipment. Do not compromise safety.

Site Selection

A major factor in collecting usable data is the location. In selecting a location:

- Choose a location such that vehicles are traveling straight at a constant speed when passing over the installed loops.
- Avoid proximity to any area where a driver may have increased tendency to change lanes or speeds. Thus, avoid intersections, curves, hills and valleys, turning lanes and passing lanes.
- Also avoid bumps, cracks, loose gravel or dirt, bridges, or culverts.

Loop Wire Installation

With the loop wire, form a continuous run of wire from the detector electronics to the loop slot square, around the square 4 times (called 4 turns) and return back to the detector electronics.

Loops are normally wound into slots cut in the road surface. Two people should count the number of wire wraps (turns) around the sensing area of the loop as the wire goes into the slot. Slots are typically 1/4” to 5/16” (9.5 to 10 mm) wide by 1 ½” to 2” (50 to 75 mm) deep and completely backfilled with sealant grout that will totally encapsulate the wires in the slot. Thoroughly clean and dry the slot before placing the wire into the slot. The bottom of the slot should be smooth and at the same depth all the way around. Lay wire neatly in the slot in a vertical stack and apply sealant grout to fill the slot to level with the road surface. Do not allow voids or depressions in the hardened sealant which might allow sharp objects or moisture into the slot with the wire.

See “FCC Compliant Operation,” p. 8, for FCC compliant loop antenna and frequency configurations.

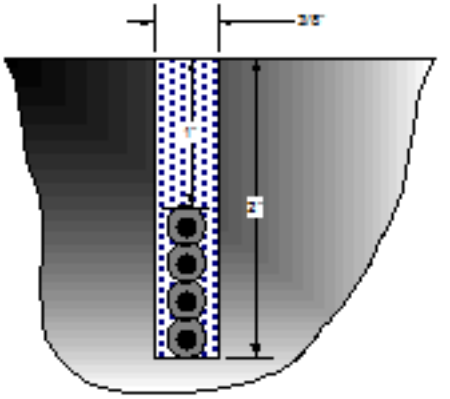

Figure 4 –*Loop wire installation*

Note The 300 meter maximum connecting lead in length makes the assumption that there is at least 2" (50 mm) separation between the loop and any reinforcing in the roadway and that the connecting lead in wire used has an inductance per meter not greater than 0.73 uh. A normal value for the total inductance of the loop and connecting lead in wire is approximately 200 uh. Any new installation measured at less than 100uh should be suspect and checked, and corrected.

For connecting lead in wire and loop tails, use at least 5 twists per foot (15 twists per meter). Loop tails can be untwisted over a short distance where the loop tails are taken across a lane to a connection point immediately at the roadside. The maximum length of the untwisted loop tails must not exceed 100 feet (30 meters). The purpose of the twisting is a self-canceling effect on the unwanted detection field which exists on the connecting wires from the sensing area (detection zone) back to the detector electronics. It is not advisable to have loop tails from different detectors in the same common slot. Not more than 50 feet (15 meters) of tails from any other loop should be laid in a common slot without twisting and shielding. It is not advisable to mix pairs from different detectors in a multi pair cable.

The loops and connecting lead in wire must have an insulation resistance to earth greater than 10 megohms measured at 500 volts and a series resistance of less than 10 ohms. New loops should test to better than 100 megohms measured at 500 volts and a series resistance of less than 5 ohms.

Splicing Loop Wires

Spliced loop wires can be subject to contamination, moisture penetration and thus early failure (see **Figure 5**). Commonly loops are installed at multi-lane sites using the

specified XHHW wire for the sensing area for the loop, with the loop tail (ends of the loop wire) going immediately to a curb side hand hole or pull box. In the pull box, high quality waterproof splices may connect to a special lead in or home run cable which is a twisted pair, foil shielded, with drain wire, and which is gel filled to prevent moisture entry. This is high quality cable specially made for detection loop connections. The weak point of the installation is the splice itself. Take care in this area to achieve a waterproof connection. There are two preferred methods of physically connecting the loop tails to the lead in cable – twist and solder, or crimp and solder. Both methods employ soldering of the connection. Soldering has proven to provide the lowest resistance, and is less susceptible to corrosive degradation.

Once the wires are spliced, seal the area of the connection. To protect against weather, moisture, abrasion, etc. any of the following are acceptable as long as the integrity of the waterproofing is maintained: Self-sealing heat shrinkable tubing (with the goop inside), special gel splice packs, pill bottles filled with sealant, or the original four layer coating of brush on liquid tape, wrapped with vinyl electrical tape, and then again coated with brush on liquid tape and finally wrapped again with a final protective coating of vinyl tape.

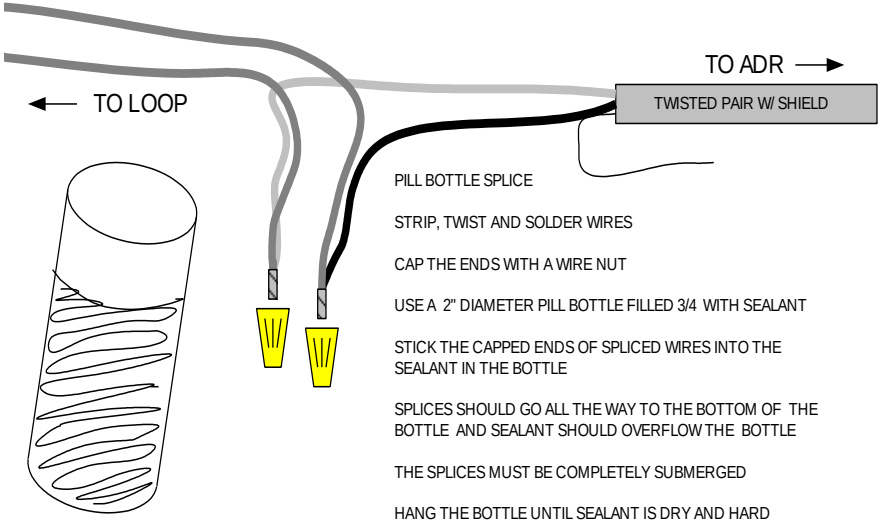

Figure 5 – *Wire Splicing Guidelines*

Using Harness 81-303

The standard PEEK part number 81-303 harness (normally referred to as an ADR loop and/or piezo harness) may be used for the loop connections between the ADR series recorders with the Amp connectors and the field sensors.

The harness comes with 9 wires as follows:		Connect to
Twisted pair #1	red	#1 (+).
	black (we will call this the red-black wire)	#1 (-) [shield].
Twisted pair #2	white	#2 (+).
	black (we will call this the white-black wire)	#2 (-) [shield].
Twisted pair #3	green	#3 (+).
	black (we will call this the green-black wire)	#3 (-) [shield].
Twisted pair #4	blue	#4 (+).
	black (we will call this the blue-black wire)	#4 (-) [shield].
Single wire	green with yellow tracer.	Earth (chassis) ground

NOTE: Do not connect the shields to the earth ground wire. If you are using shielded twisted pair loop lead-in cables, the shields should only be connected to earth ground in the cabinet, and not in the pull box or at the loop end. It is preferred to have the shields be left “floating” or isolated completely from earth.

Any unused sensor connection wires should be twisted together and isolated from earth ground. This helps prevent the possible electrical noise from being served as an unwanted input by the ADR.

Glossary

ADR— Automatic Data Recorder. A device that is installed next to a roadway and which is used to count traffic flows. The more advanced units can be called 'traffic classifiers' because they do more than just count vehicles, they can also separate them into classes and count vehicles in each class. ADR units can also record PVR (per vehicle record) data such as length and speed, depending on the types of sensors that are available in the roadway.

Air Switch – Pneumatic switch sensor used to sense the incoming air pressures change from a road-tube.

Armed – Is displayed on the ADR display when the unit has a completed program and is awaiting for the next full interval to begin recording

Array – Sensor, or group of sensors which work together to determine information about the vehicles passing over them. An array can span one or more lane, depending on array type, but are usually only one lane per array. Each array will assign a Flow number to any vehicles detected upon it. Some arrays, for example the single loop or single axle arrays, can only determine a single Flow. Others, such as the Tube-and-a-half or two tube classification arrays can determine more.

Axle Class – Axle Class is vehicle type classification based on the number and spacing of axles on a vehicle. The most common reference for this is published as Scheme "F".

Bins – As used when saying "the number of speed bins." A bin can be thought of as a container for information or data. Bins are established by defining their limits. An example of a bin definition is contained in the following statement: "All of the cars traveling at (or above) 30 miles per hour and less than 35 miles per hour are recorded in this bin". Studies are usually described by the number of bins utilized, i.e.: 15 classes x 4 lanes is a total of 60 bins.

Channel – Channel is similar in use to the word "lane" or "array" but is less specific and may have no physical reference. The data from one lane is normally collected via one array and is then often stored in one channel. A channel has the capability of either

separating the data from one array or lane (by “flow” direction) or can combine the data from a set of arrays into one total.

Channel Mapping – The Channel Mapping setting causes the count of vehicles to be stored in one or more “channels”. The Channel Mapping option has the following settings (Separated and Forward Only are not available for array types that cannot determine a vehicle’s direction):

Both – This causes the count of vehicles from each array to be stored in a channel. The count is incremented each time a vehicle passes the array, no matter in which direction it is traveling. Channel 1 is for array 1, Channel 2 for array 2, etc.

Separated (by direction) – Count of vehicles from each array is stored in two channels. Channel 1 contains the count of vehicles in the forward direction across array 1. Vehicles that are traveling in the reverse direction across array 1 are contained in Channel 2. Note that if more arrays are used, each subsequent array will have two channels associated with it. The forward direction is defined as those vehicles that are traveling from the lead sensor to the lag sensor.

Forward –The count is incremented each time a vehicle passes the array in the forward direction only. The forward direction is defined as those vehicles that are traveling from the lead sensor to the lag sensor. Vehicles traveling in the reverse direction are ignored. Each array will have only one channel associated with it.

Reverse –The count is incremented each time a vehicle passes the array in the reverse direction only. The reverse direction is defined as those vehicles that are traveling from the lag sensor to the lead sensor. Vehicles traveling in the forward direction are ignored. Each array will have only one channel associated with it.

User Defined – This enables you to specify the number of channels to create (the maximum, which is displayed on the screen, is dependent on the number of arrays and the array type). Once you have specified the number of channels, you can assign each array’s count of vehicles to a particular channel. The “+” forward direction is defined as vehicles traveling from the lead sensor to the lag sensor. The “-“ reverse direction is defined as vehicles traveling from the lag sensor to the lead sensor. Once the channel assignments have been specified, the number of bins in the heading of the record can be determined.

Class – In the ADR the word Class is used as a menu prompt for the classification of vehicles according to a preset vehicle classification scheme. The defining criteria of a scheme are called a ClassTree or Class table. The best known and most widely used scheme in the world today is referred to as Scheme “F” which uses the number, spacing and grouping of axles to assign each vehicle to one of thirteen definitions of vehicle type. Scheme “F” is the default scheme in the ADR as supplied, with the addition of a fourteenth “Other” type and a fifteenth category for “unclassified.” ADR operators can and are encouraged to determine the best scheme for local operations and install it in

the ADR (contact Technical Support for information). This is a very powerful feature of the ADR and operators can apply additional criteria such as length to fine tune their local scheme.

Classification – The dictionary defines the act of classification as the assignment of objects to groups as determined by criteria. The ADR can assign vehicles to groups (which are collected in "Bins" in a data file) based on a variety of criteria. The most commonly-used bin criteria are GAP, HEADWAY, CLASS, SPEED, VLENGTH (either wheelbase or chassis). In setting up the ADR, operators can set the limits of the criteria to be used, for example in classification by SPEED, operators can specify the number of "Speed Bins" and then can specify the limits of each of the bins as 0 to 20 mph and 20 to 30 mph and so on.

Continuous File – Is a binned or PVR file which has one header that includes all set-up information including the start date and time and will not include a end date time until a user ends the current recording session. This recording session could span several days, weeks or months depending on the amount of time users desire to allow the recorder to continue to recorder without stopping or ending the recording session.

Daily Files – Is a binned or PVR file which is one file with a file header for each day that includes all set-up information including the start and end date and time for each day. These files will have a maximum of 24 hours of data from midnight to midnight or until a user has stopped the ADR from recording data.

Debounce – Debounce value helps prevent "phantom" signals ("bounce") taken by tube sensors being counted as axles. It is a time delay set to ignore any pulse after an axle detection. If the ADR is undercounting, reduce the debounce time; if the ADR is over-counting, increase the debounce time.

DST – With the Daylight Saving Time adjustment, users have the option to allow the ADR to automatically adjust for the DST time change.

Factory Default Settings – These settings are the default settings as defined by the firmware which have been defined and set by Peek Traffic Corp. The default value settings may be different from one version firmware to another.

Flow – When any vehicle crosses any sensor array, it is assigned a "flow," indicating the vehicle passage. The assigned flow on single sensor arrays is a + (plus). Arrays with two sensors in the same lane assign either a (+) plus or a (-) minus to a vehicle passage as determined by the sequence of sensor activations. (i.e.: Travel from A to B is assigned (+) flow and travel from B to A is assigned (-) flow. This is commonly called direction of travel. The ADR also makes use of more complex sensor arrays, such as the four road tube array, which can also provide a lane assignment to a vehicle passage. When monitoring the four road tube array in the VEHICLE MONITOR you will see (*) and (-) assigned to vehicles in the near lane, and in the far lane vehicles will be assigned as (2+) or (2-). The ADR allows you to segregate (or combine) vehicles into separate data "channels" and "bins" by flow assignment in CHANNEL MAPPING.

Gap – Gap is the time (in milliseconds) between the trailing axle of a vehicle and the leading axle of the next vehicle going in the same direction. Gap studies using road tube sensors should use a count ratio setting of 2.00 (or some other means) to determine the end of a vehicle and to prevent inter-axle times (spacings) from being recorded as gap

times. One method is to combine studies as a matrix, such as classification by gap by lane (channel) using 2 or four road tubes.

GPS – Global Positioning System

Headway – Headway is the time (in milliseconds) between the front axle of one vehicle and the front axle of the next vehicle going in the same direction. This measurement is available when using piezo or tube axle sensors. Alternatively, it is the time between the front of one vehicle and the front of the next vehicle when using loop sensors.

Idle – The ADR is in a state that no given start time and date have been programmed

Lag Sensor – This indicates the second sensor typically activated in a two-sensor array, relative to a “forward” vehicle travel (in a “reverse” or opposite vehicle direction, the lag sensor is activated first).

Lane – The term "lane" is used to refer to a physical lane on the road, typically delineated from the rest of the road with a painted line or physical barrier.

LCD – Liquid Crystal Display, refers to the ADR Sabre’s screen which displays the menus for setup.

Lead Sensor – This indicates the first sensor typically activated in a two-sensor array, relative to a “forward” vehicle travel (in a “reverse” or opposite vehicle direction, the lag sensor is activated first).

Length – Length is the total wheelbase length when measured by piezo or tube sensors, or the overall length (chassis) when using loop sensors.

Marked Files – Are binned or PVR files that have previously been downloaded or marked as a read file and will be indicated as an open book when viewed by the ADR Commander

Memory – Is the available room used by ADR for storing Bin, PVR and Set-Up files in the ADR.

New Files – Are Binned or PVR files that have never been downloaded and marked as read file, these files are shown as closed book in the ADR Commander which indicates that the file has never been read before.

Old Files – Are Binned or PVR files that have previously been downloaded and will be indicated as an open book by the ADR Commander.

Per-Vehicle-Record (PVR) – Per-Vehicle-Records are individual records of each vehicle that passes over road tubes. Each record can include items such as (if the ADR is equipped and configured for) time of vehicle passing, lane, vehicle number in current interval, number of axles, class speed, gap, headway, axle spacings (first to second, second to third, etc).

Reset – Manual reset of the ADR CPU firmware which has been performed by a user.

Road tube (RT) – Is a pneumatic axle sensor that is used as part of portable traffic data collection system. Road tube is a simple rubber tube that can be used to send pressure pulses to any ADR unit that accepts road tube inputs, whenever a vehicle drives over. Suited to short-term studies because of its portability.

Serial Cable to Computer (Direct Connect Cable) – A cable that is used between the Serial Port of the ADR and a Computers Serial Port

Setup File – Are unique instructions that can be saved as a “setup file”, and the file can then be reloaded. Loading a “setup file” is faster and easier than custom making a new set of instructions.

Single – ‘Single’ is the term used to describe the weight on a single axle of a vehicle.

Site – The term “Site” is typically used to refer to the physical location of traffic data collection equipment. Some examples would be “Corner of Route 301 and Smith Road”, or “I75 Mile 14”. The “Site” and “STA” information can be used in combination to represent or designate a single piece of data collection equipment and the data which is collected from it. Under some circumstances, “Site” may not specify a single road or intersection. In such cases, data collected from each within the site is used to build a picture of the traffic flow through the site.

Speed – Speed is the scalar velocity of the vehicle as measured by the time required to travel a known distance from point A to point B. Point A and point B are typically two sensors of the same type in the same lane of travel. It is important that vehicles pass across a sensor array at a steady rate for accurate measurement and recording.

Station – A “Station” name is sometimes used to distinguish between pieces of data collection equipment at the same physical location (or “Site”). When setting up an ADR for operation at a location, you will be prompted to enter a Site and a Station identifier. You should feel free to set the Station field to contain any useful reference information desired in conjunction with the Site field .

Study – Each ADR has the ability to manage eight different data studies at one time each study will be saved in its own data file. Depending on the sensor arrays selected a user may have the following to surveys to select from (Speed, Lane, Class, Headway and Gap)

Tagged (Marked) Files – Are binned or PVR files that have been selected or sometimes referred to as (Marked) to either be collect, deleted or moved from the specific memory media

USB – Universal Serial Bus, a type of serial connection. The ADR Sabre has a slot for a USB jump drive (DEVICE), and a slot for connecting to a pc via a micro B USB cable plug (HOST).

Volume – Volume is the count of vehicles.

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