

**MECHANISTIC DESIGN DATA FROM  
ODOT INSTRUMENTED PAVEMENT  
SITES- PHASE II REPORT**

**Phase II Final**

**SPR 763**



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INSTRUMENTED PAVEMENT SITES- PHASE II REPORT**

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**SPR 763**

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16. Abstract <p>This investigation examined data obtained from three previously-instrumented pavement test sites in Oregon. Data processing algorithms and templates were developed for each test site that facilitated full processing of all the data to build databases representing each site. Investigation of site data found that most of the collected data could be successfully processed and observed trends in the data were as expected (e.g., seasonal changes affected pavement response). The location that compared rubblized base to aggregate base clearly demonstrated the effect of the rubblized base through a 50% reduction in strain at the bottom of the asphalt layer. Further investigations of the data may be warranted and user's guides provided in this report will enable those investigations to proceed by ODOT staff.</p>			
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## SI\* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS					APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol	Symbol	When You Know	Multiply By	To Find	Symbol
<b><u>LENGTH</u></b>					<b><u>LENGTH</u></b>				
in	inches	25.4	millimeters	mm	mm	millimeters	0.039	inches	in
ft	feet	0.305	meters	m	m	meters	3.28	feet	ft
yd	yards	0.914	meters	m	m	meters	1.09	yards	yd
mi	miles	1.61	kilometers	km	km	kilometers	0.621	miles	mi
<b><u>AREA</u></b>					<b><u>AREA</u></b>				
in <sup>2</sup>	square inches	645.2	millimeters squared	mm <sup>2</sup>	mm <sup>2</sup>	millimeters squared	0.0016	square inches	in <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	meters squared	m <sup>2</sup>	m <sup>2</sup>	meters squared	10.764	square feet	ft <sup>2</sup>
yd <sup>2</sup>	square yards	0.836	meters squared	m <sup>2</sup>	m <sup>2</sup>	meters squared	1.196	square yards	yd <sup>2</sup>
ac	acres	0.405	hectares	ha	ha	hectares	2.47	acres	ac
mi <sup>2</sup>	square miles	2.59	kilometers squared	km <sup>2</sup>	km <sup>2</sup>	kilometers squared	0.386	square miles	mi <sup>2</sup>
<b><u>VOLUME</u></b>					<b><u>VOLUME</u></b>				
fl oz	fluid ounces	29.57	milliliters	ml	ml	milliliters	0.034	fluid ounces	fl oz
gal	gallons	3.785	liters	L	L	liters	0.264	gallons	gal
ft <sup>3</sup>	cubic feet	0.028	meters cubed	m <sup>3</sup>	m <sup>3</sup>	meters cubed	35.315	cubic feet	ft <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	meters cubed	m <sup>3</sup>	m <sup>3</sup>	meters cubed	1.308	cubic yards	yd <sup>3</sup>
NOTE: Volumes greater than 1000 L shall be shown in m <sup>3</sup> .									
<b><u>MASS</u></b>					<b><u>MASS</u></b>				
oz	ounces	28.35	grams	g	g	grams	0.035	ounces	oz
lb	pounds	0.454	kilograms	kg	kg	kilograms	2.205	pounds	lb
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	megagrams	1.102	short tons (2000 lb)	T
<b><u>TEMPERATURE (exact)</u></b>					<b><u>TEMPERATURE (exact)</u></b>				
°F	Fahrenheit	(F-32)/1.8	Celsius	°C	°C	Celsius	1.8C+32	Fahrenheit	°F

\*SI is the symbol for the International System of Measurement



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## 1.0 INTRODUCTION

As documented previously (*Timm and Vrtis 2015*) the Oregon DOT (ODOT) instrumented three pavement sites between 2004 and 2008 to support efforts toward implementing mechanistic-empirical (M-E) pavement design. These three sites are known as the Dever-Conner, Medford and Redmond test sites, respectively. The Dever-Conner and Medford sites are both located on I-5 while the Redmond site is on US 97 as depicted in Figure 1.1.

The purpose of the test sites was to support stepwise validation of the new M-E design approach under development by AASHTO. Specifically, ODOT was interested in measuring tensile strain at the bottom of asphalt concrete (AC) layers as a predictor for bottom-up fatigue cracking (*Scholz 2010*). These measurements were to provide validation of predictions made by computer programs using layered elastic theory.

Though data were collected as part of an earlier research project (*Scholz 2010*), limited data reduction and analysis was conducted and much of the response measurement data were considered to be in raw format. Therefore, there was a need to evaluate the usefulness of the data and assess whether it can be useful for M-E design. There was also a need to develop user-friendly tools for ODOT to continue collecting and analyzing data to support M-E design.

Given these needs, a research contract was awarded to the National Center for Asphalt Technology (NCAT) in 2014 with these main objectives:

1. Process existing data sets and evaluate their usefulness toward implementation of M-E design.
2. Develop user-friendly processing schemes to facilitate future data processing and analysis.

To achieve these objectives, the work was divided into two major phases. Phase I (Preliminary Evaluation) was meant to catalogue and assess the current state of the data, establish rudimentary processing schemes and execute some measured versus predicted strain response comparisons. The results of Phase I were intended to provide ODOT with sufficient information to make a decision whether to continue with Phase II (Full Evaluation). Phase II was to include full data processing and database development followed by technology transfer of the developed products.

In May, 2015, a Phase I project meeting was held at ODOT to present the Phase I report (*Timm and Vrtis 2015*) and discuss continuing with Phase II. At that time, it was decided to begin Phase II of the research which included the following objectives:

1. Document data processing schemes and database development.
2. Characterize in situ pavement responses from each test site.



3. Compare pavement response measurements from each test site.
4. Develop user's guides for the processing templates and accessing the database.

To accomplish these objectives, the data processing scheme developed initially for Phase I was further refined and enhanced to allow for processing of all data from each test site. All the data were then processed and three databases were created to represent each test site. The databases were used to characterize pavement responses from each site and enabled comparisons between them. Finally, user's guides were developed that will enable future data processing and additional investigations using the processing template and database, respectively.



Figure 1.1: ODOT Instrumented Pavement Test Sites (*Google Earth 2015*).

## 2.0 DATA PROCESSING AND DATABASE DEVELOPMENT

Signal processing templates were created for each site with the software, DADiSP. Figures 2.1, 2.2, and 2.3 show each test site's template which include a window to paste raw data into, a data preview screen, windows containing each processed signal and a summary output table. The Medford and Redmond templates are identical since the sensor configuration was the same between the two sites. The Dever-Conner template has more processed signal windows since it had more gauges.

Within each template, the preview window allows the data processor to assess whether the file is sufficiently clean to proceed with processing, or subdivide the file into separate vehicle events. The processed signal windows enable a visual check of the data and captured peak values. The summary output table contains the following:

- A user-specified vehicle identification number
- Axle number on each vehicle
- Speed of each axle on each vehicle
- Spacing between axles on each vehicle
- Axle classification (single, tandem, tridem, etc.)
- Baseline and peak values from each sensor for each axle event
- Amplitude readings from each sensor (peak minus baseline)
- Maximum longitudinal strain for each axle event
- Minimum longitudinal strain for each axle event
- Maximum transverse strain for each axle event
- Minimum transverse strain for each axle event

Section 4 and the appendices of this report provides detailed guidance for using the templates and further details regarding the processing algorithms has been previously documented (*Timm and Vrtis, 2015*).

The development of site-specific databases, using data generated from the DADiSP templates, was an important part of Phase II. The databases, created in Microsoft<sup>®</sup> Access allowed for immediate analysis of the data from each site, in addition to long-term archival of the data for future analyses, as needed. Further guidance in using the databases is also provided in Section 3 and the appendices.

The databases contain all of the summary output data generated by the DADiSP templates for all of the files generated at each test site. They are simply named:

- Medford.accdb
- Redmond.accdb
- DeverConner.accdb

A number of queries and pivot charts were also generated within the databases to provide the data presented in the next section of this report. While they are specific to this investigation, they may be adapted for future analyses. Additional queries may also be created within the databases to answer future research questions.



Figure 2.1.1: Medford Processing Template.

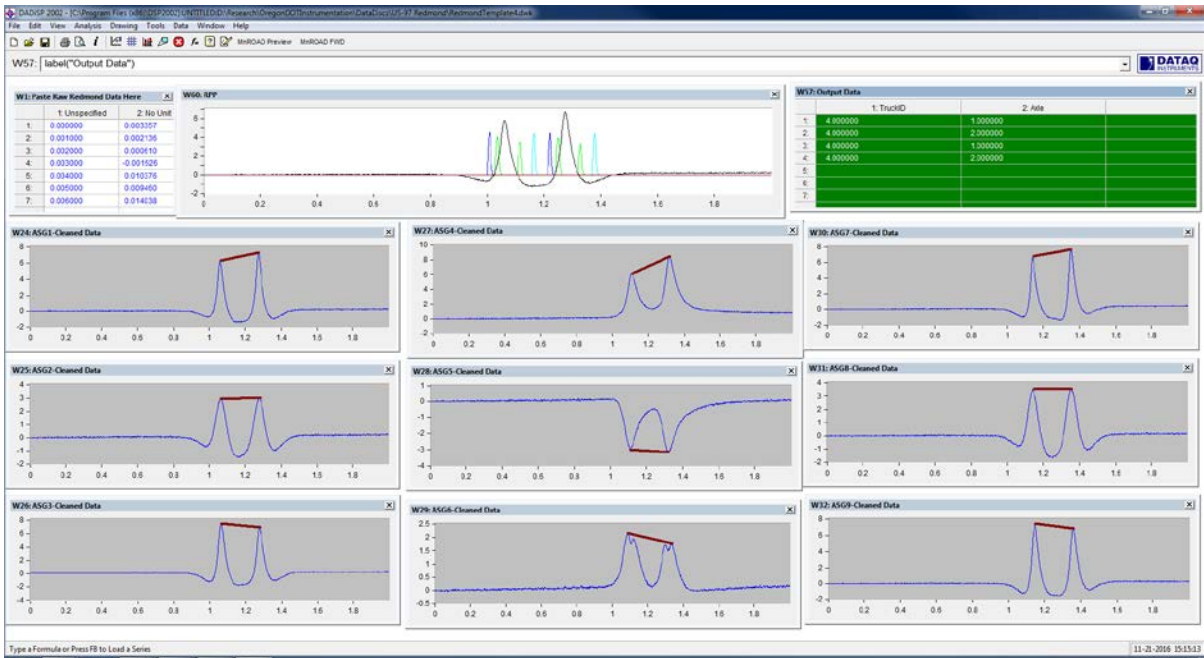


Figure 2.2: Redmond Processing Template.

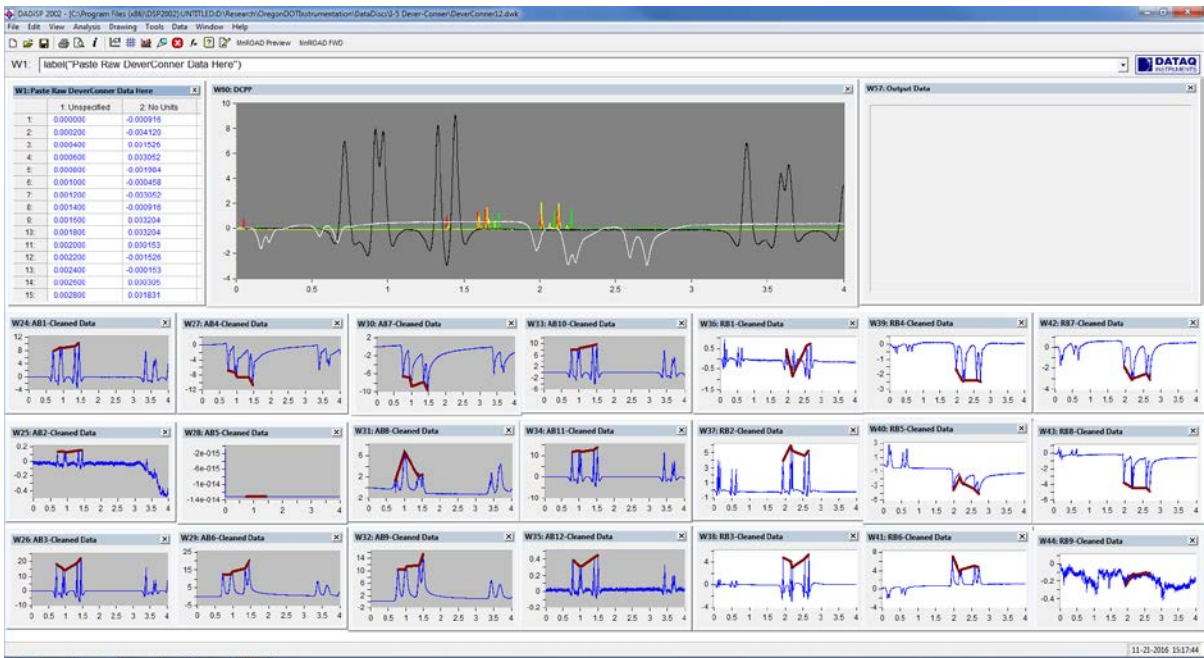


Figure 2.3: Dever-Conner Processing Template.

## **3.0 DATA ANALYSIS AND DISCUSSION**

The following sub-sections will provide a general description of each of the instrumented pavement sites and the available data that was recorded. The results from the processed data are presented, discussed, and compared to expected trends found in the literature and theoretical simulations. Lastly, the results from the three sites are compared and general conclusions drawn.

### **3.1 MEDFORD**

#### **3.1.1 Site Description and Scope of Data**

The instrumented pavement section on I-5 in Medford was constructed in August 2009. Axle sensing strips and nine asphalt strain gauges were installed on I-5. As shown in Figure 3.1, six strain gauges were oriented in the longitudinal direction and three gauges oriented in the transverse direction. This instrumentation array was centered on the outside wheelpath of the right lane in the southbound direction of I-5.

Data at this site were only collected on the afternoon of November 24, 2009 from around 3:30 to 5:30 pm. A total of 724 files were collected with some of the files containing multiple vehicle events. Each vehicle event was processed individually creating a total of 972 vehicle events with 2,475 individually axle hits.

Figure 3.2 shows the distribution of axles per vehicle. The vast majority of vehicle events were from two axle vehicles which are likely lightly loaded passenger vehicles. Five axle trucks were the next most common vehicle type but still only comprised 13% of the vehicles captured. The axle type distribution is shown in Figure 3.3. Steer and single axles each comprised 40% of the total and tandem axles comprised 20%. There were only three tridem axles (one set) out of the 2,475 axles recorded which registered as 0% in Figure 3.3.

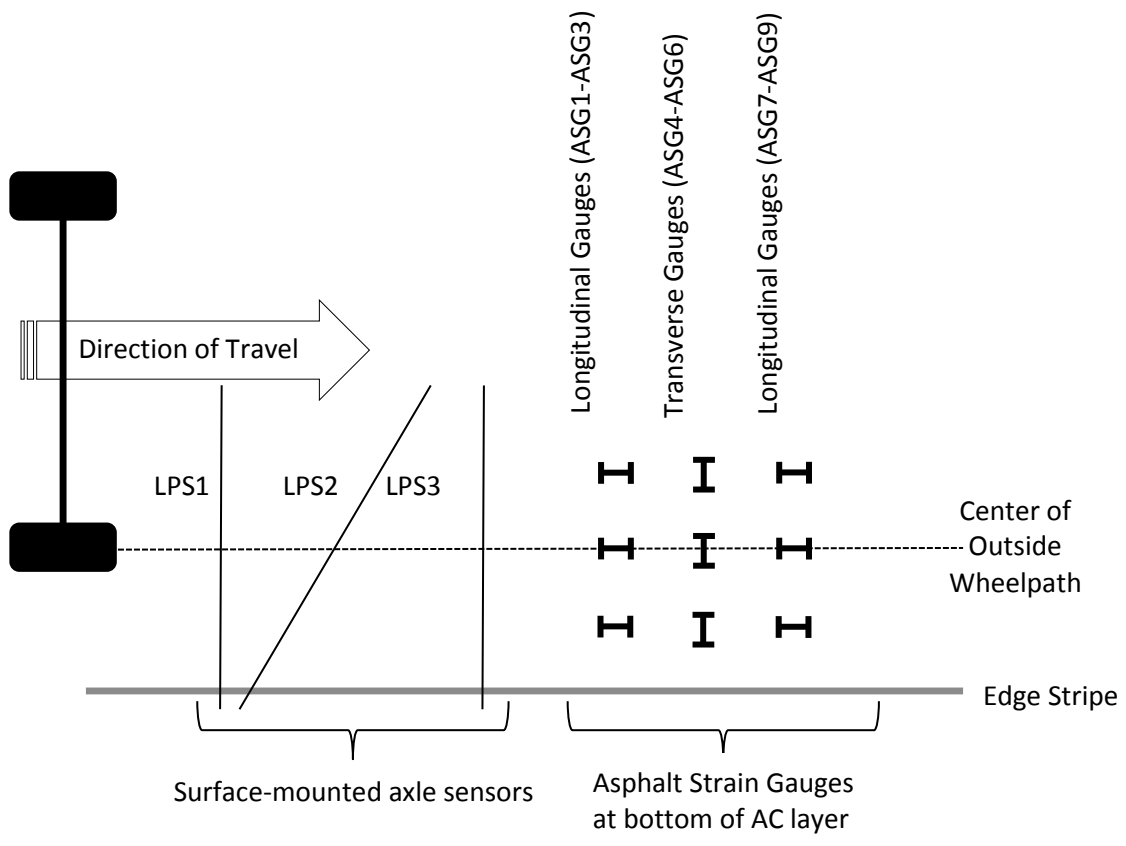


Figure 3.1: Medford and Redmond Instrumentation Layout (Timm and Vrtis 2015).

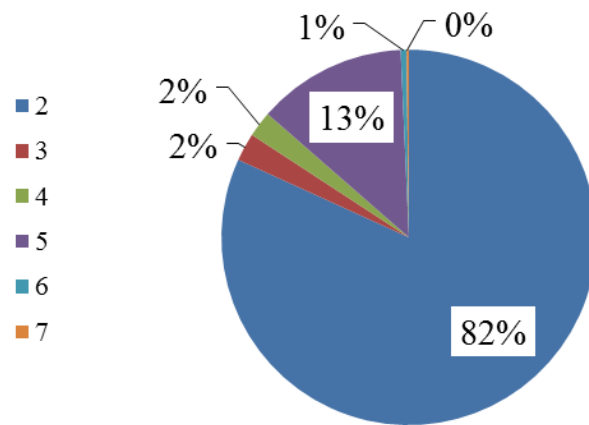


Figure 3.2: Medford Distribution of Axles per Vehicle.

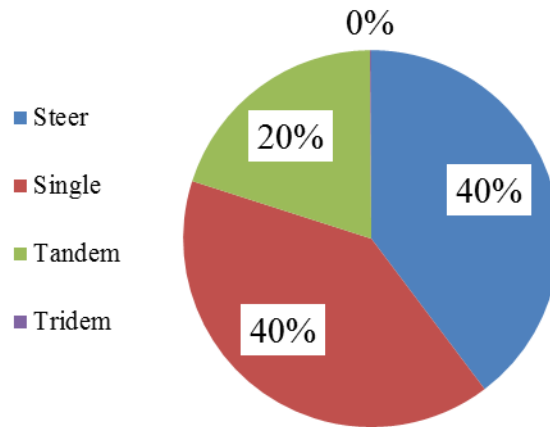


Figure 3.3: Medford Axle Type Distribution.

### 3.1.2 Results and Discussion

The cumulative percentile of microstrain ( $\mu\epsilon$ ) by axle type is shown for longitudinal and transverse gauges in Figure 3.4. In the legend of Figure 3.4, “1.1” represents a steer axle. “1”, “2”, and “3” represent single, tandem, and tridem axles, respectively. When subsequent axles were within 54 inches of one another they were grouped together and classified as either tandem, tridem, or quad (quad axles were found only in the Redmond and Dever-Conner datasets) based on the number of axles that were closely spaced. “Max L” represents maximum longitudinal strain induced on the gauge array by each axle and “Max T” represents maximum transverse strain from each axle. The 50<sup>th</sup> percentile longitudinal microstrain for tandem axles (ASG Max L -2) is around 11  $\mu\epsilon$ . The highest strain percentiles were induced by the tandem axles which are not influenced by passenger vehicles. After removing the two axle vehicles and recalculating the percentiles, the strain percentiles for the steer and single axles are increased, as shown in Figure 3.5. The lateral offset of each vehicle event was not calculated due to predominantly erratic responses on the diagonal sensing strip which would have significantly reduced the number of quality vehicle events that could be processed.

In both Figures 3.4 and 3.5 the longitudinal strains were greater than the transverse strains for all axle types except the tridem. The ratio of each axle event’s corresponding transverse strain divided by longitudinal strain was calculated and the average for each axle type is shown in Figure 3.6. For all axle types except tridem, there is a lower strain induced in the transverse direction than the longitudinal direction. Previous research at the NCAT Test Track found similar results in which the transverse strain response was found to be 2/3 of the longitudinal strain response (*Timm and Priest 2008*). This relationship is important to verify for pavement design because transverse cracks are likely to develop first, as result of a result of the higher strain measured in the longitudinal direction.

The relationship between transverse and longitudinal strain responses from tridem axles was further investigated using theoretical simulations. The pavement structure was modeled in the



linear-elastic analysis program WESLEA and the strain responses from tandem, tridem, and quad axles were simulated under a load of 20,000 lbs. per axle (5,000 per tire). The same strain profiles were observed at axle loads of 15,000 and 10,000 lbs. but the magnitude of strain was reduced. WESLEA default material properties were used as inputs. The moduli were 500,000, 20,000, and 12,000 psi for the asphalt concrete, granular base, and subgrade, respectively. Poisson's ratio was 0.35 for the asphalt concrete, 0.4 for the granular base, and 0.45 for the subgrade. In the tandem axle simulations in Figure 3.7, the peak longitudinal strain is greater than the peak transverse strain under both axle events. However, in the simulations for the tridem axle, shown in Figure 3.8, the peak transverse strain under the middle axle is greater than the peak longitudinal strain, thus explaining the tridem axle ratio shown in Figure 3.6. The same phenomenon was observed for the middle axles of a quad axle, shown in Figure 3.9. Quad axles were not found in the Medford dataset but were in the Redmond and Dever-Conner datasets, discussed later in this report.

The relationship between speed and longitudinal microstrain is presented in Figure 3.10. It can be seen that there is not a distinguishable trend between speed and strain and there is a large cluster of data points that are under 5  $\mu\epsilon$ . After removing the two axle vehicles from the dataset (Figure 3.11), the larger cluster under 5  $\mu\epsilon$  is removed but there is still not a distinguishable trend between speed and strain. It is important to verify that there is not trend between speed and strain because lower speeds and heavy vehicles may induce more distress on the pavement due to the viscoelastic nature of asphalt concrete. The lack of a clearly-defined trend indicates that the range of measured strain values largely resulted from variation in load magnitude and axle placement relative to the gauges.

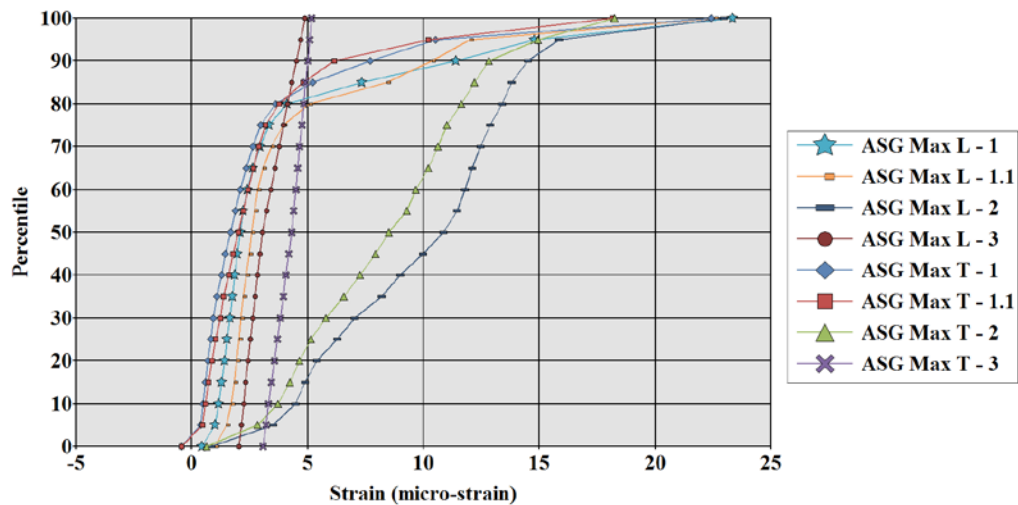


Figure 3.4: Medford Strain Percentiles by Axle Type – All Vehicles.



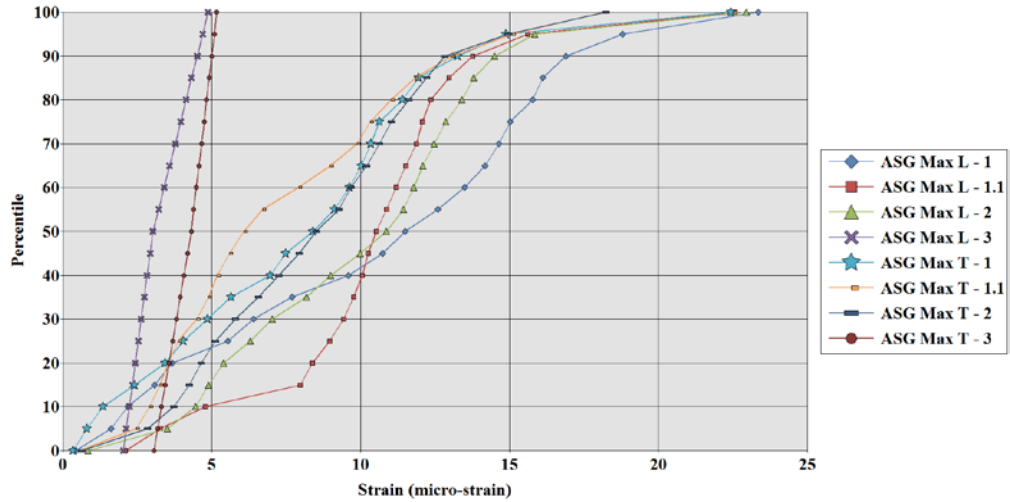


Figure 3.5: Medford Strain Percentiles by Axle Type-Excluding Two Axle Vehicles.

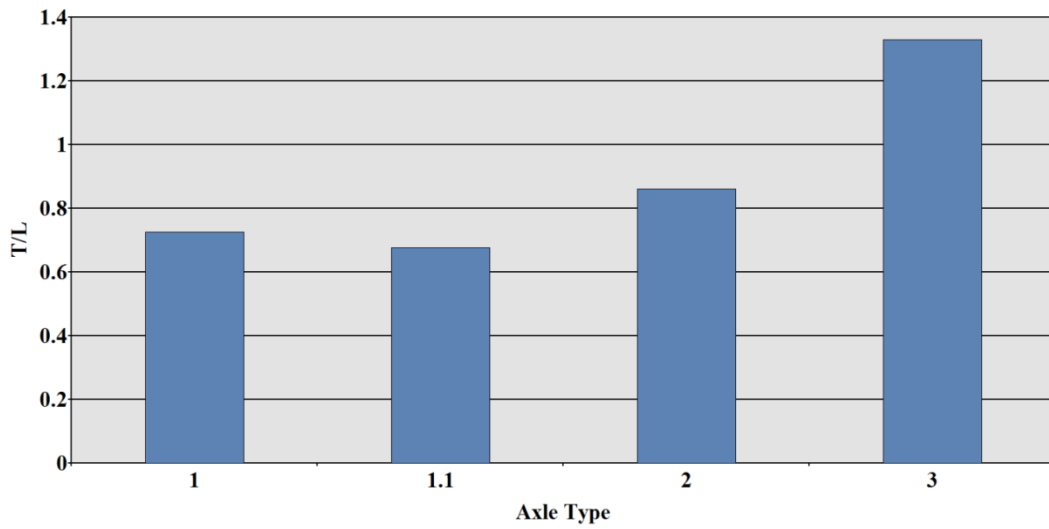


Figure 3.6: Medford Longitudinal and Transverse Strain Comparison.

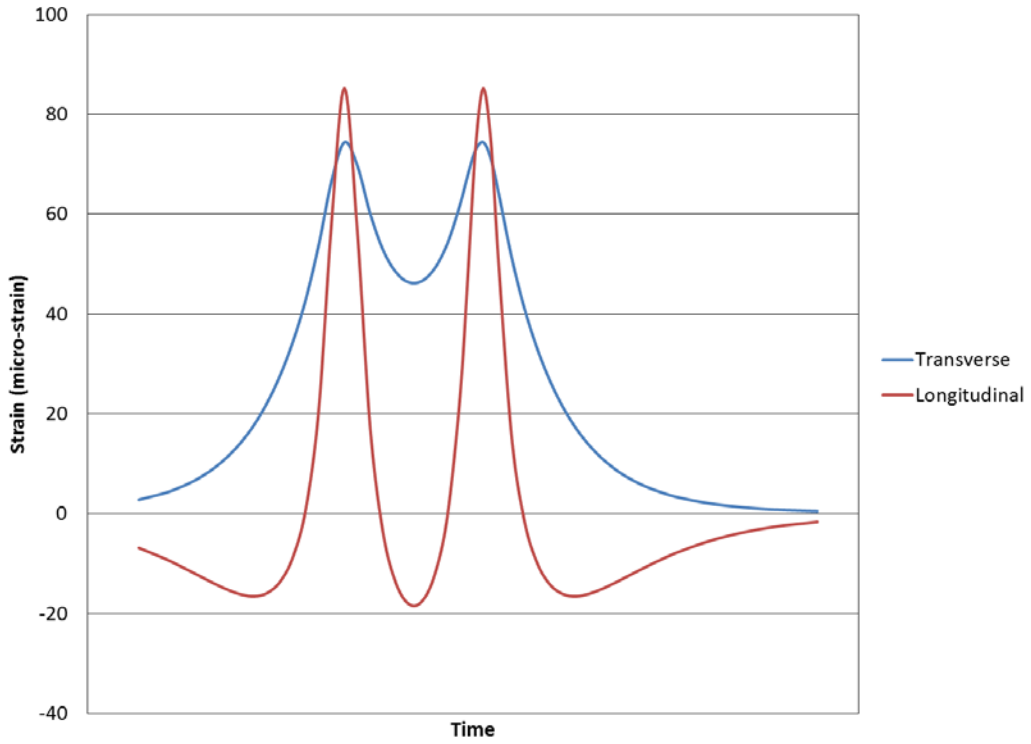


Figure 3.7: Theoretical Strain Response from Tandem Axle.

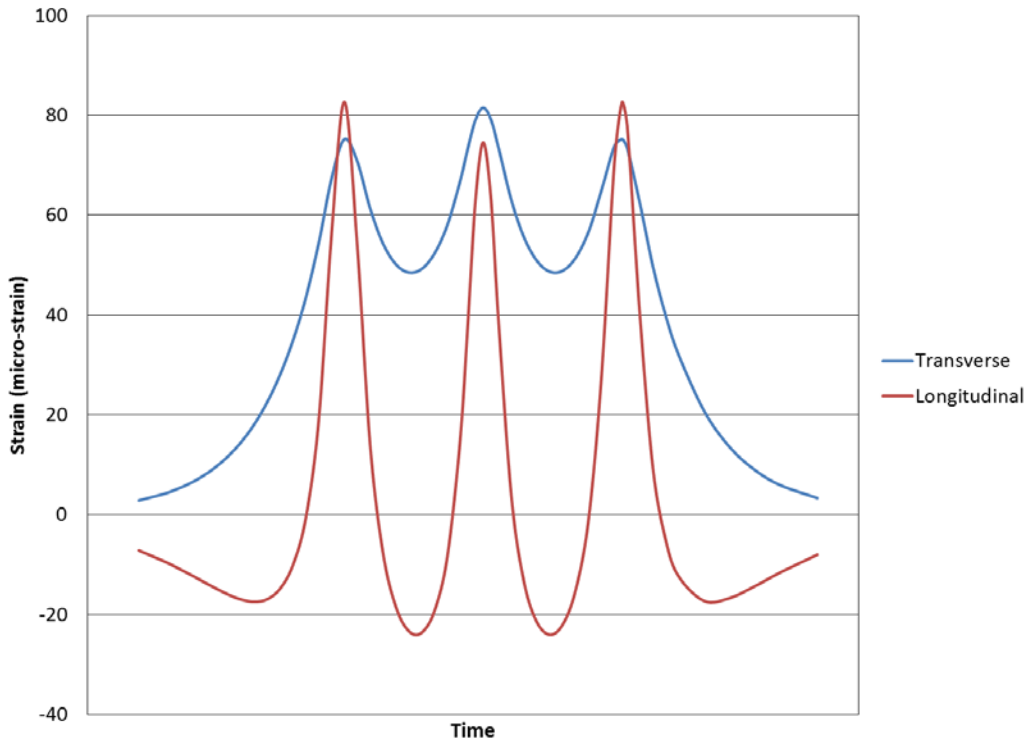


Figure 3.8: Theoretical Strain Response from Tridem Axle.

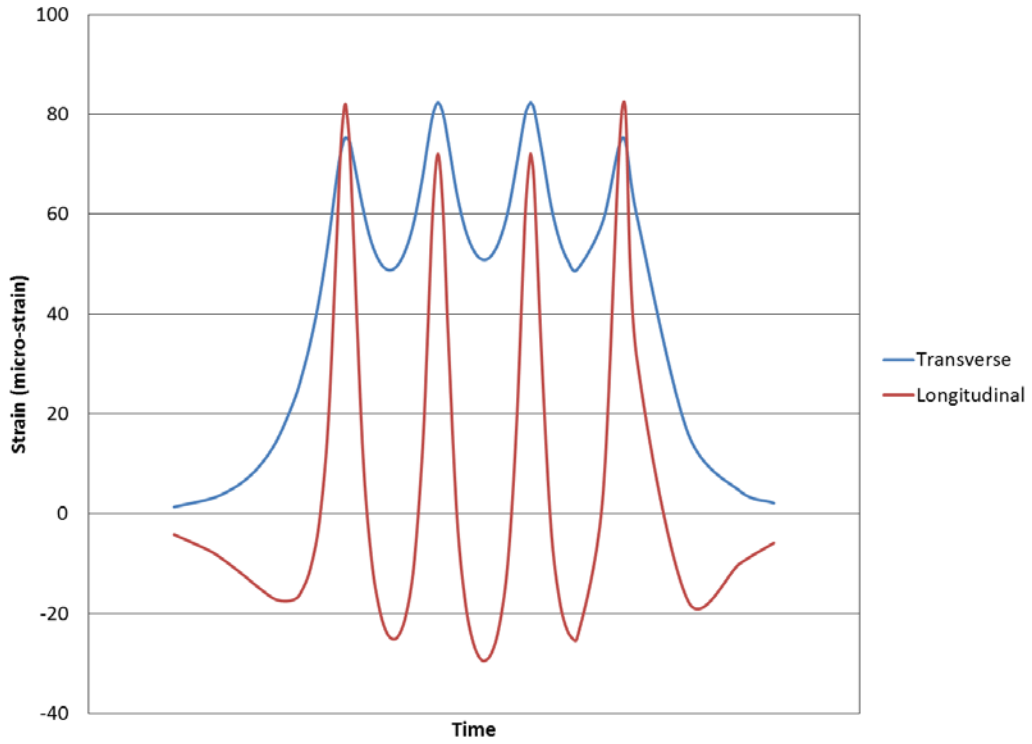


Figure 3.9: Theoretical Strain Response from Quad Axle.

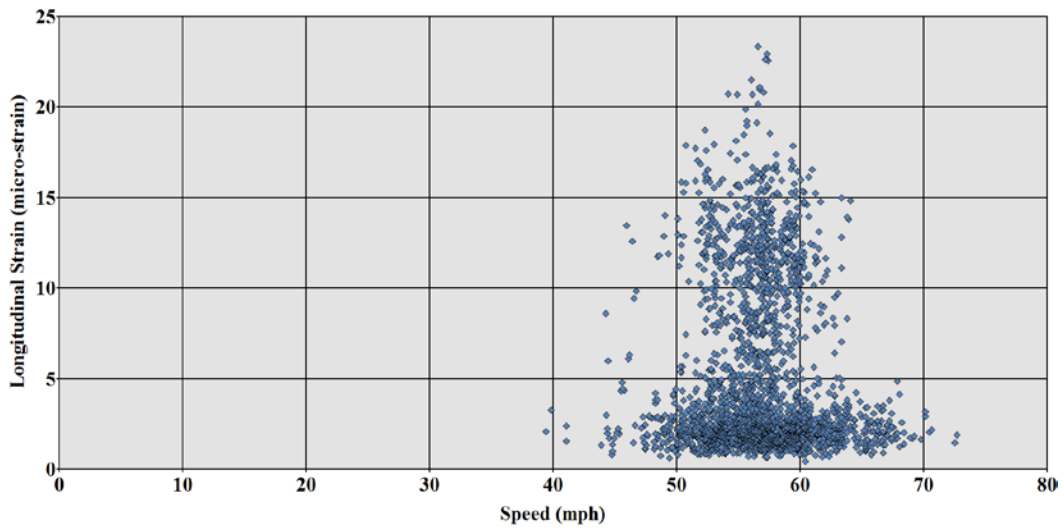


Figure 3.10: Medford Longitudinal Strain and Speed including all Vehicles.

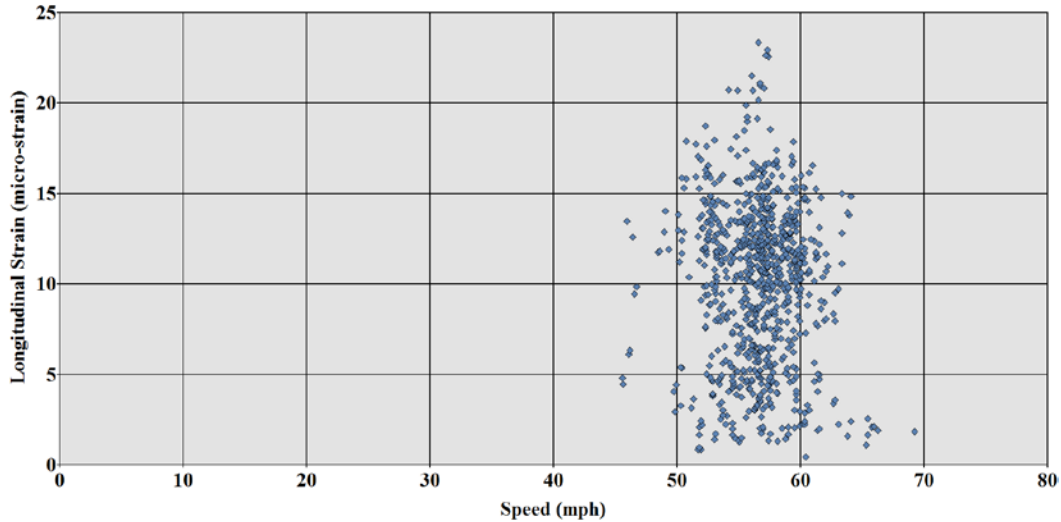


Figure 3.11: Medford Longitudinal Strain and Speed Excluding Two Axle Vehicles.

## 3.2 REDMOND

### 3.2.1 Site Description and Scope of Data

The instrumented pavement section on US 97 in Redmond was constructed in June 2008. Instrumentation included axle sensing strips and nine asphalt strain gauges, with the same layout shown previously for the Medford section (Figure 3.1). Data were collected on 11 dates from October 2008 through November 2009. A total of 2,989 files were collected which comprised 2,630 individual vehicle events that were processed. The discrepancy between the number of files that were collected and the number of vehicles events that were able to be processed is mainly due to a large number of files from September 29, 2009 being collected over 0.4 seconds instead of 4 seconds. Other files that were not able to be processed from this site included only electronic noise, low voltage readings on the axle sensing strips, or partial vehicles being captured. From those vehicle events there were a total of 7,884 axles for which the corresponding longitudinal and transverse strain was recorded.

Figure 3.12 shows the distribution of the number of axles per vehicle. The majority of the vehicles collected were two axle vehicles and there 20% five axle vehicles. The axle type distribution is shown in Figure 3.13. Approximately one third of the axle group types were steer, single or tandem axles, respectively. The remainder of the axles were tridem and quad axles.

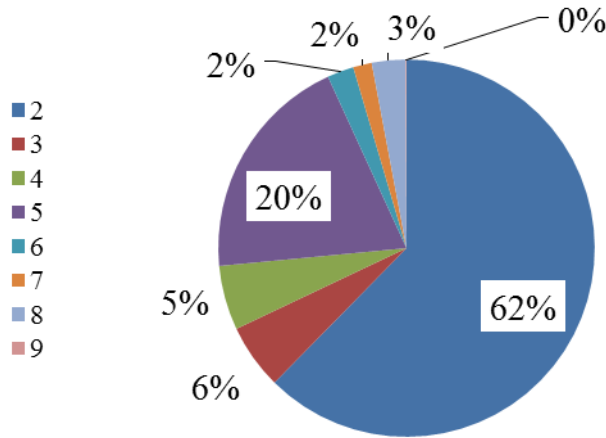


Figure 3.12: Redmond Distribution of Axles per Vehicle.

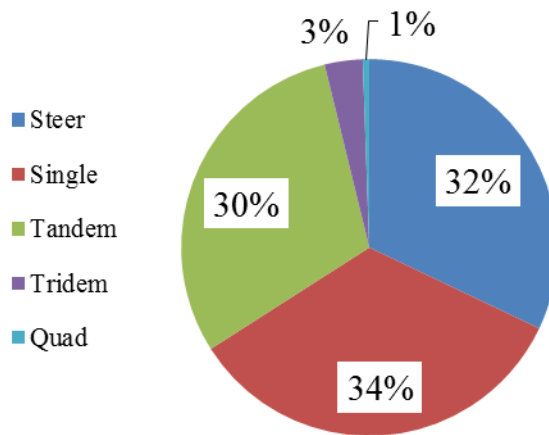


Figure 3.13: Redmond Axle Type Distribution.

### 3.2.2 Results and Discussion

The percentiles of longitudinal and transverse strain by axle type are presented in Figure 3.14. The legend is the same as used for the Medford plots in which “Max T” and “Max L” represent the maximum strain induced by an axle event measured by the transverse and longitudinal gauges, respectively. As described earlier, “1.1” represents a steer axle and “1”, “2”, “3”, and “4” are single, tandem, tridem and quad axles, respectively. It can be seen that the lowest strain percentiles are in the transverse direction from steer and single axles with the 90<sup>th</sup> percentile less than 20  $\mu\epsilon$ . As done for the Medford site, the percentiles were recalculated without two axle vehicles and are shown in Figure 3.15. The most noticeable change from Figure 3.14 to Figure 3.15 is the increase in strain percentiles from the single and tandem axles as expected from presumably heavier vehicles.

The same trend between longitudinal and transverse strain observed in Medford was apparent in the responses measured at Redmond. Figure 3.16 shows the average of the ratio of the transverse strain divided by the longitudinal strain from each axle event. The tridem axle was the only axle type that did not have a reduction in transverse and longitudinal microstrain. As discussed for the Medford site, linear-elastic analysis showed that the transverse strain is greater than the longitudinal strain for the middle axles of tridem and quad axle sets.

The longitudinal strain versus speed is presented in Figures 3.17 and 3.18 for all vehicles and after removing two axle vehicles, respectively. In both cases, there is no distinguishable trend between strain and speed which again means the strain variation is not influenced primarily by vehicle speed.

The 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile longitudinal strain values for tandem axles on each date are presented in Figure 3.19. It can be seen that there is a seasonal trend in the strain responses due to the temperature sensitivity of the asphalt concrete. The lowest strain responses were observed during the winter months and the highest strain response was recorded in August. It is also noteworthy that there is no reduction in strain values over time as evident by similar strain responses taken in November 2008 and in November 2009. This observation indicates that there was no damage to the pavement structure over that time period.

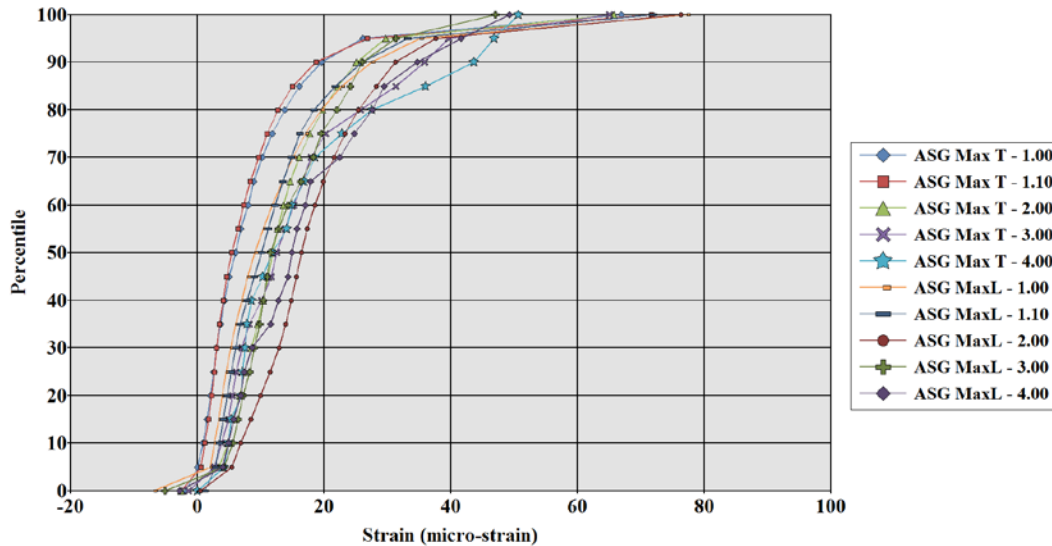


Figure 3.14: Redmond Strain Percentiles by Axle Type.

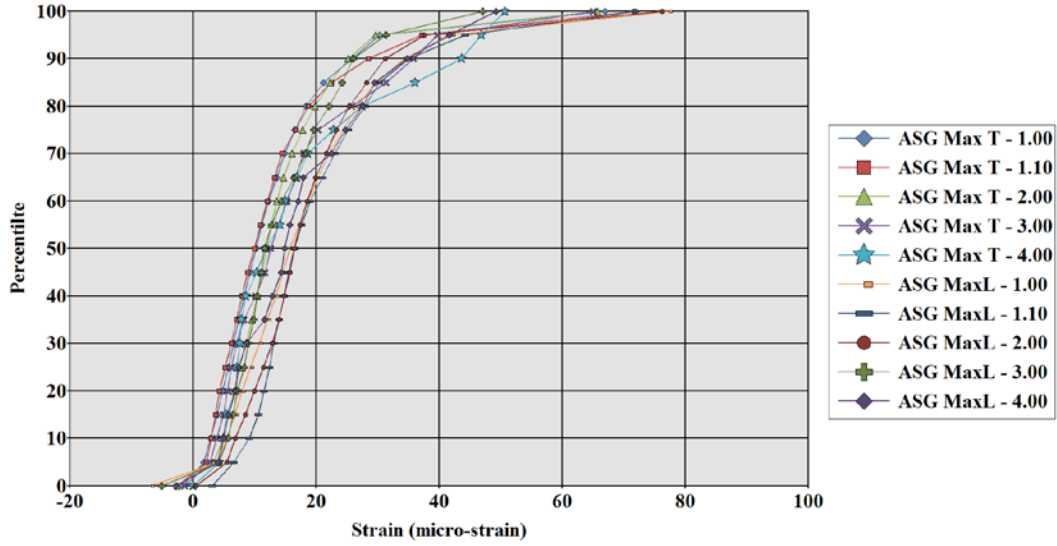


Figure 3.15: Redmond Strain Percentiles by Axle Type Excluding Two Axle Vehicles.

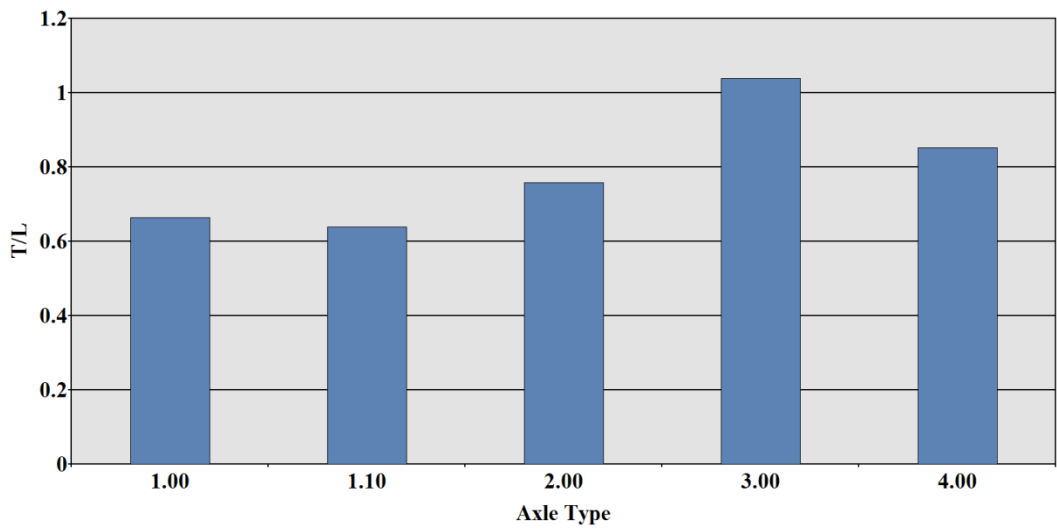


Figure 3.16: Redmond Longitudinal and Transverse Strain Comparison.

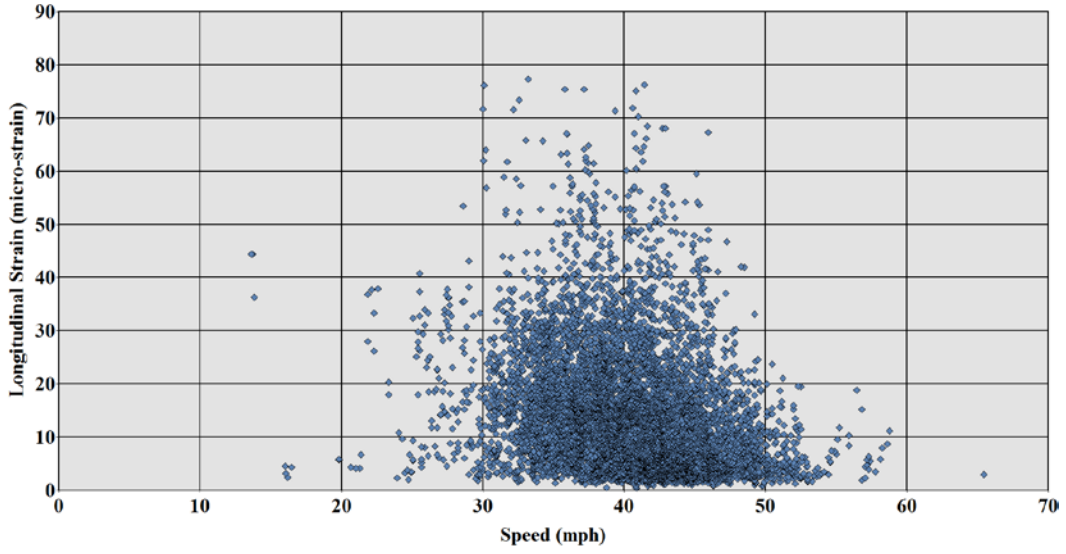


Figure 3.17: Redmond Longitudinal Strain and Speed including all Vehicles.

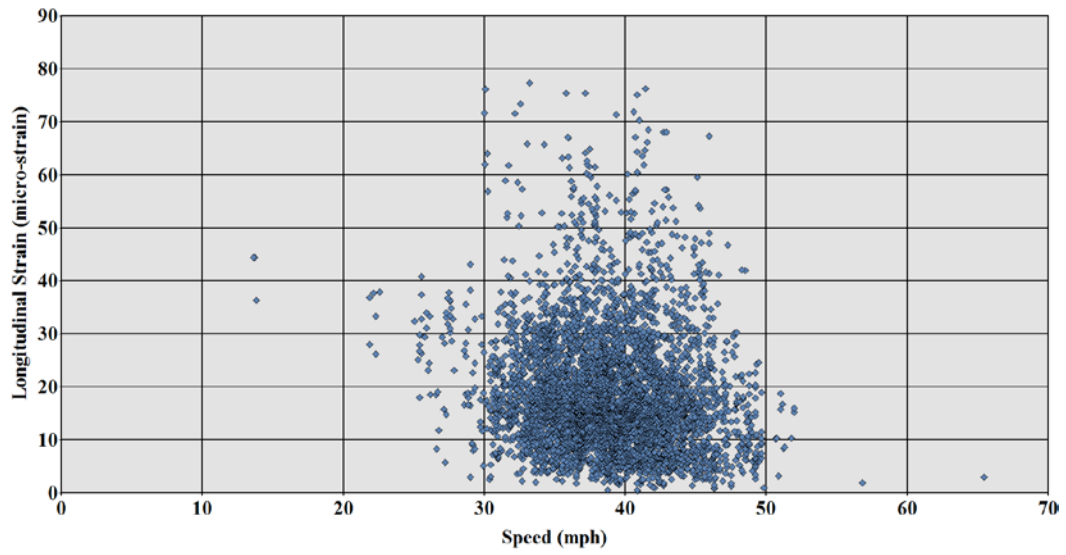


Figure 3.18: Redmond Longitudinal Strain and Speed Excluding Two Axle Vehicles.



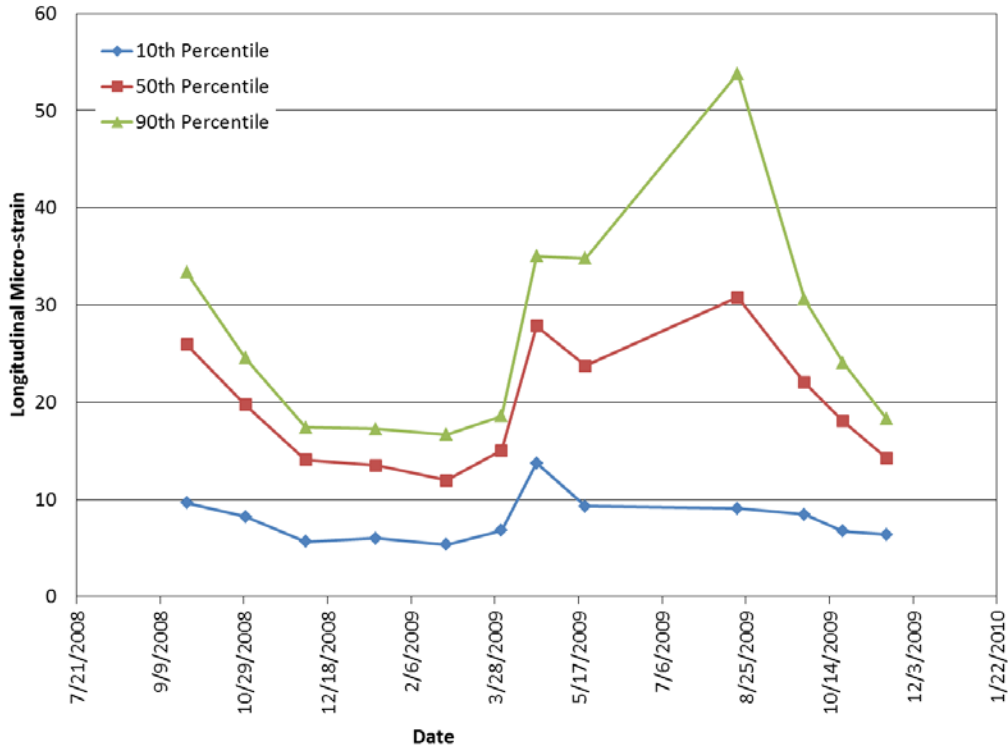


Figure 3.19: Redmond Longitudinal Strain by Date

### 3.3 DEVER-CONNER

#### 3.3.1 Site Description and Scope of Data

The Dever-Conner instrumented pavement sections on I-5 were constructed during the summer of 2007. Data were collected on twelve dates between October 2008 and November 2009. The Dever-Conner site had two strain gauge arrays of 12 gauges each with six gauges oriented in the longitudinal direction and six in the transverse direction, as shown in Figure 3.20. The first strain gauge array was placed over an aggregate base and the following gauge array was placed over a rubblized Portland cement concrete base. Axle sensing strips were placed between the strain gauge arrays. It should be noted that there were five dates in which there was no data collected from the gauge array over the rubblized concrete base.

A total of 3,605 files were collected and 3,380 individual vehicle events were processed. Some of the files collected were not able to be processed due to electronic noise, low voltage responses on the axle sensing strips, and partial vehicles being captured. Data collected at the Dever-Conner site included a significantly higher percentage of vehicles with more than two axles, as shown in Figure 3.21. The majority of the vehicle events (56%) were five axle vehicles and only 16% were from two axle vehicles. Figure 3.22 shows that the increase in vehicles with more than two axles is also apparent in the axle type classification. The majority of axles were classified as tandem; steer and single axles represented 21 and 19% of the total axle types, respectively.

Although there were 495 and 352 axles classified as tridem and quad, these events only accounted for 3 and 2% of the total axle events, respectively.

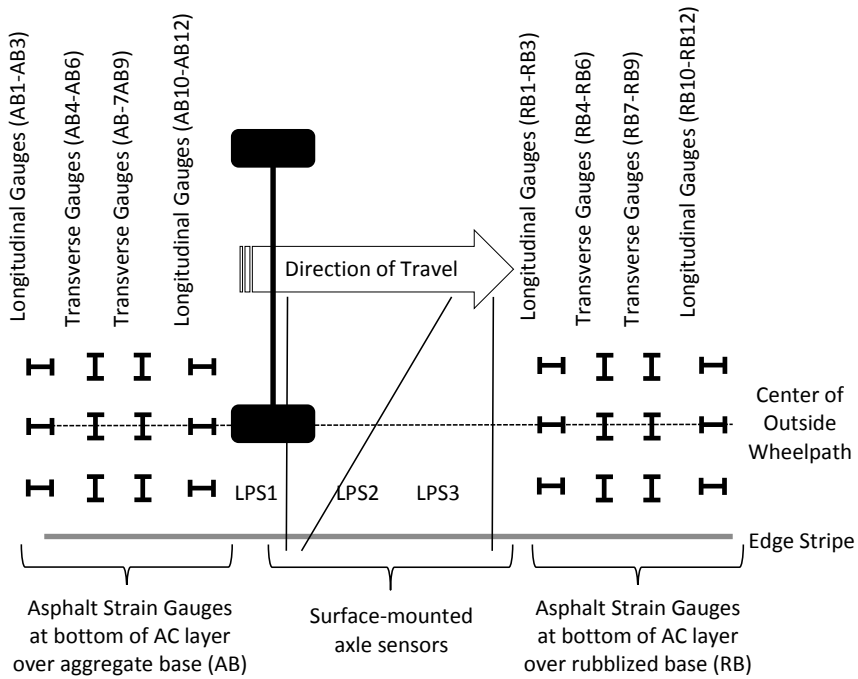


Figure 3.20: Dever-Conner Instrumentation Layout.

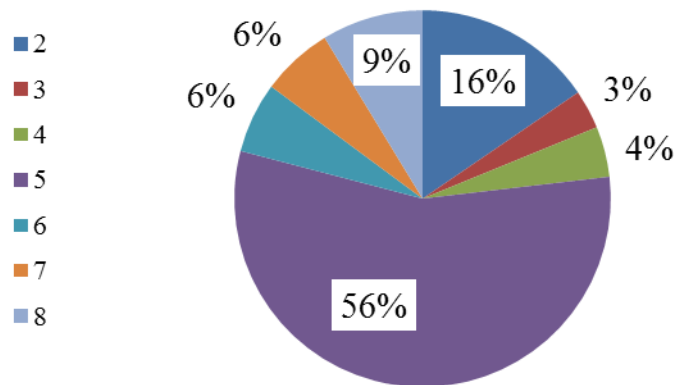


Figure 3.21: Dever-Conner Distribution of Axles per Vehicle.

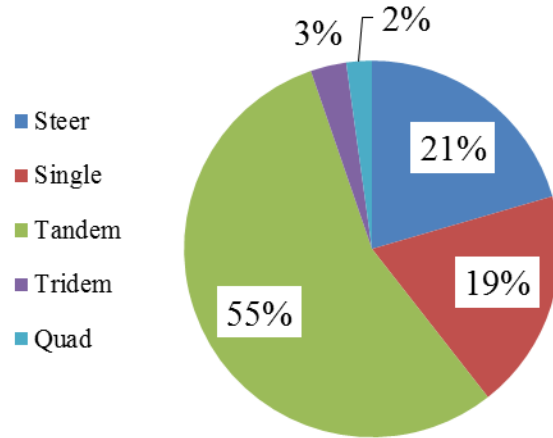


Figure 3.22: Dever-Conner Axle Type Distribution.

### 3.3.2 Results and Discussion

The strain percentiles for the aggregate and rubblized base layers are presented in Figures 3.23 and 3.24, respectively. The legend is the same as used previously in the percentile plots for the Redmond and Medford sites. In Figure 3.23, the highest strain percentiles are in the longitudinal direction for steer, single, and tandem with the 90<sup>th</sup> percentile strain just under 20  $\mu\epsilon$ . The strain percentiles in Figure 3.24 for the rubblized base section are smaller with the 90<sup>th</sup> percentile strain around 5  $\mu\epsilon$  for all gauge orientations and axle types. In the rubblized base responses, there is no distinguishable separation between percentiles for gauge orientation or axle type.

Figure 3.25 shows a comparison of longitudinal and transverse gauges for both base types. For the aggregate base, the ratios of transverse over longitudinal strain are similar to those observed in the Medford and Redmond sites with values 0.70, 0.60, and 0.82 for steer, single, and tandem axles, respectively. The rubblized base did not show this trend and all ratios were greater than one, indicating that the measured transverse strain was greater than the measured longitudinal strain. Although this trend for the rubblized base section was unexpected, it is likely due to the very low strain responses measured and is exacerbated on tridem and quad axles by the phenomenon of higher transverse strains from the middle axles, presented previously in Figures 3.6, 3.7, and 3.8. A previous NCAT Test Track investigation (*Willis and Timm 2009*) found that strain gauge repeatability was within 12  $\mu\epsilon$ . Thus, it could be that the extremely low strain values from the rubblized section are within the measurement precision of the gauge itself.

It can be seen in Figure 3.26 that there is no distinguishable trend between the speed of the vehicle and the longitudinal strain. Two axle vehicles were included in this plot (excluded in some of the Redmond and Medford plots) because they only comprised 15% of the total vehicles processed and therefore do not overshadow the other vehicles.

Figure 3.27 shows the 90<sup>th</sup> percentile longitudinal and transverse strain values for the aggregate and rubblized base. The seasonal trend of strain over the annual temperature cycle can be seen in Figure 3.27 with higher strains occurring in the summer months when the asphalt concrete

modulus is reduced. The trend is apparent for both base types even with less data available and lower magnitudes in the rubblized base. Again, it must be noted that data were not collected from the rubblized base gauges on the first five collection dates.

A direct comparison of the strain measured over the aggregate base and rubblized base is summarized in Figure 3.28. For each axle event, a paired comparison was made in which the greatest strain measured over the aggregate base was compared to the corresponding greatest strain measured over the rubblized base. The ratio of strain over the rubblized base divided by strain over the aggregate base was calculated for each axle event and the average for each axle type is presented in Figure 3.28. It can be seen that for all orientations and axle types that the strain over the rubblized base was less than 50% of the strain over the aggregate base. The transverse strain ratios were higher than the longitudinal strain ratios for all axle types. The rubblized base significantly reduced the strain induced at the bottom of the asphalt contact which improves the pavements resistant to traditional, bottom-up fatigue cracking.

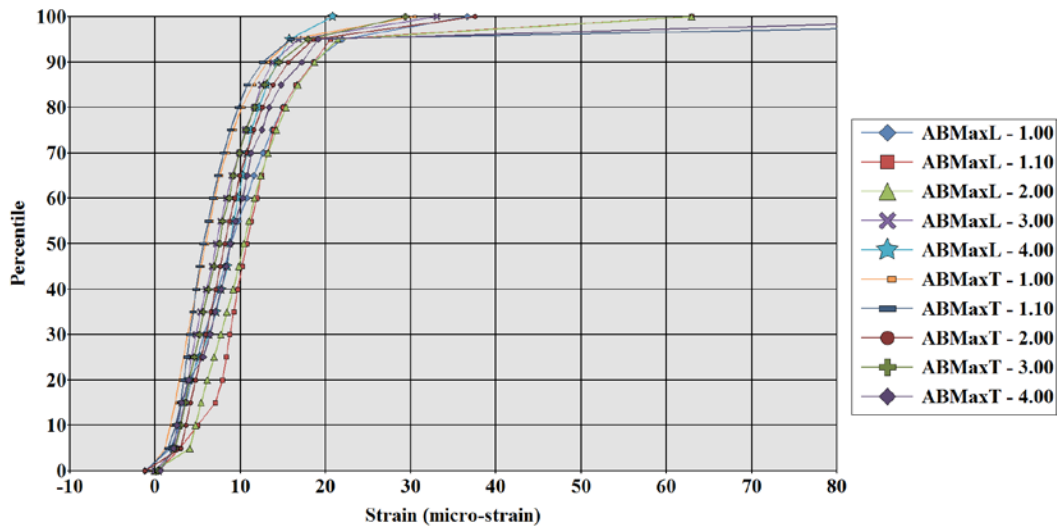


Figure 3.23: Dever-Conner Strain Percentiles by Axle Type over Aggregate Base.

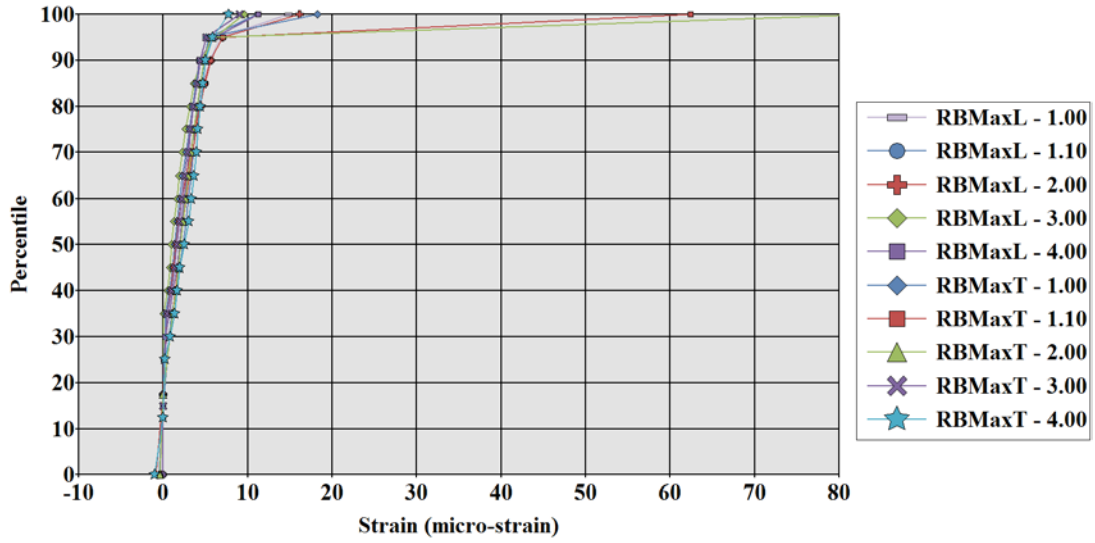


Figure 3.24: Dever-Conner Strain Percentiles by Axle Type over Rubblized Base.

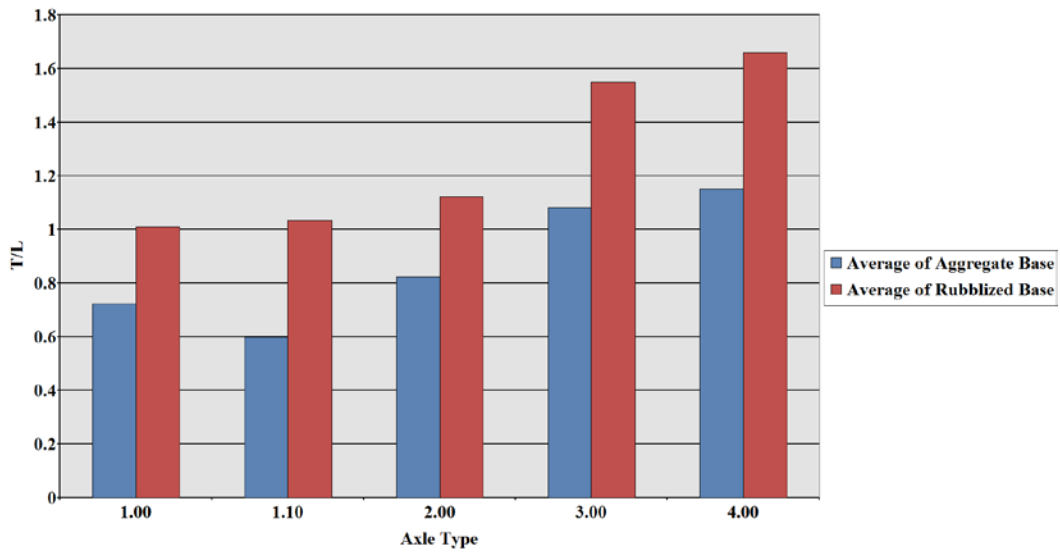


Figure 3.25: Dever-Conner Longitudinal and Transverse Strain Comparison.

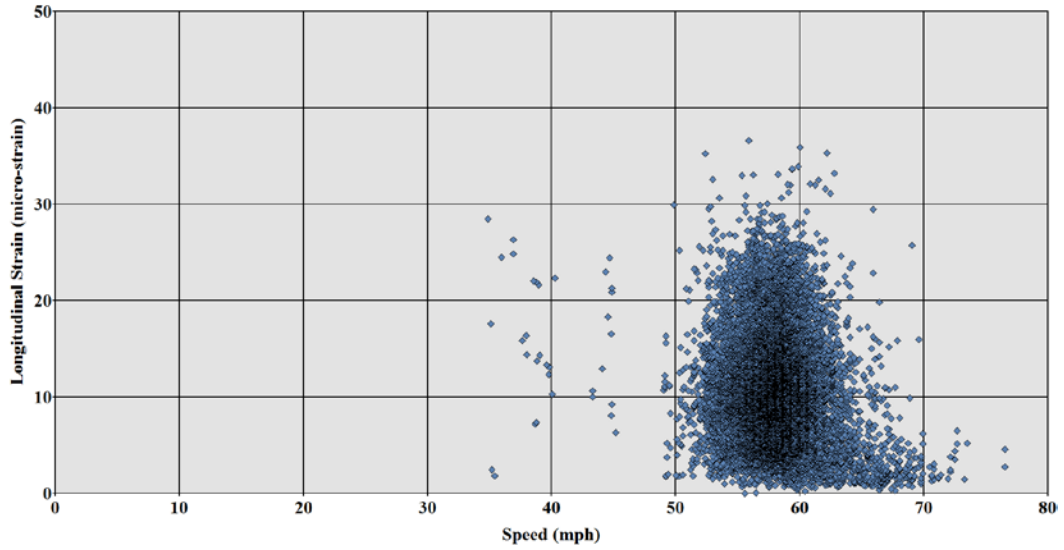


Figure 3.26: Dever-Conner Longitudinal Strain and Speed including all Vehicles

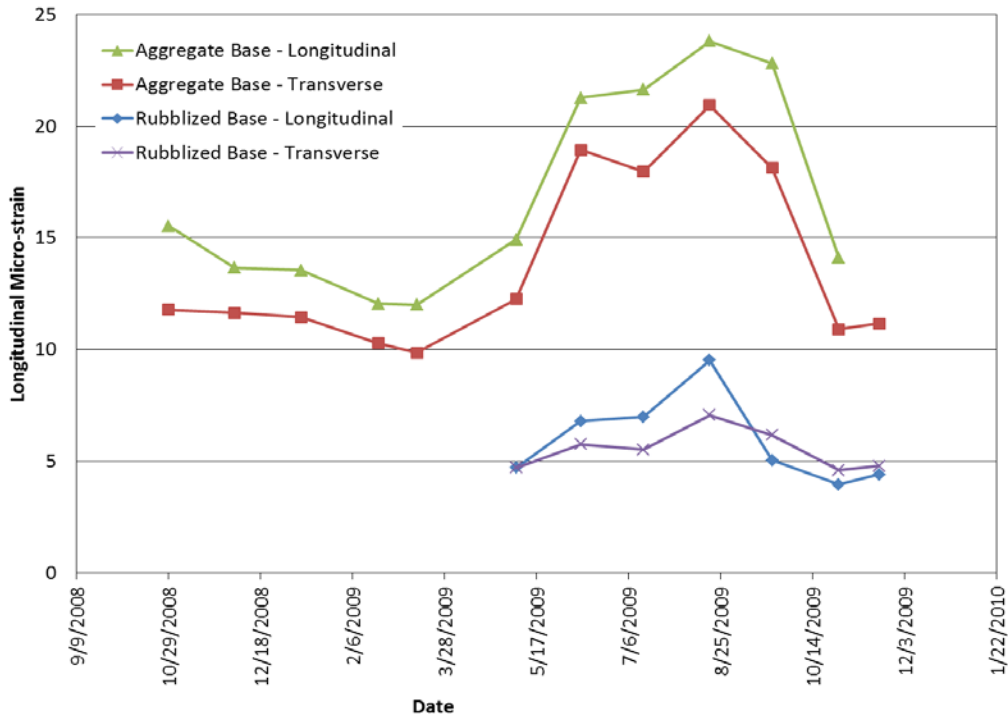


Figure 3.27: Dever-Conner 90<sup>th</sup> Percentile Strain from Five Axle Vehicles over Time

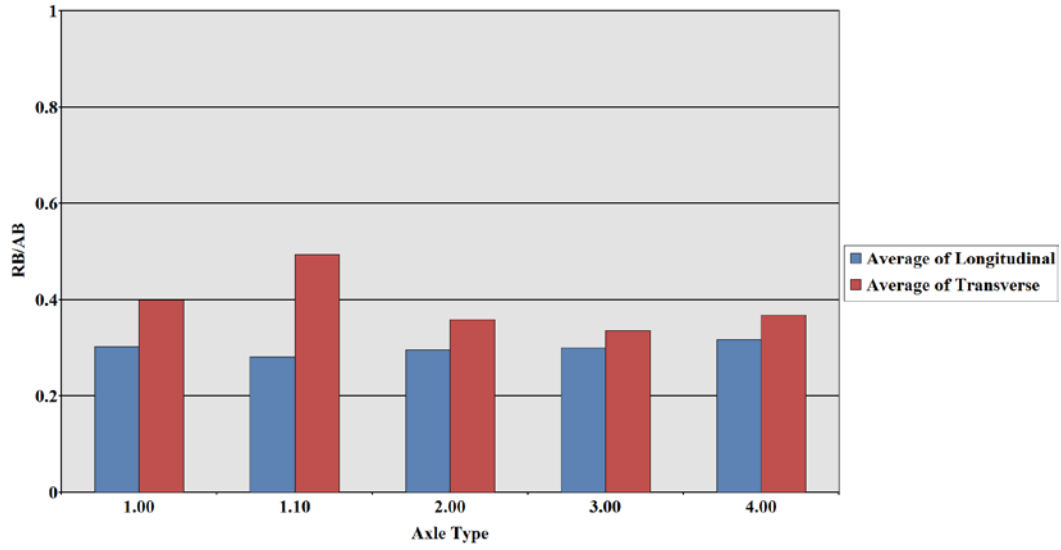


Figure 3.28: Dever-Conner Strain Comparison from Aggregate to Rubblized Base

### 3.4 COMPARISON BETWEEN TEST SITES

The strain induced on a pavement by a passing vehicle is a function of vehicle weight, environmental conditions, and the pavement layers. Therefore, direct comparison between sites is difficult. To mitigate the impact of environmental conditions, testing dates in November 2009 were chosen for further comparison (Medford was only collected in November 2009). The average strain value from each site recorded in November 2009 is presented in Figure 3.29. The error bars show the standard deviation. Similar strain values were recorded at Redmond and Dever-Conner Aggregate Base. The Dever-Conner Rubblized Base was significantly lower than all other sites. This highlights the effect of the rubblized base at reducing strain levels. The Medford, Redmond, and Dever-Conner Aggregate Base sites had similar cross sections, as shown in Figure 3.30. It was expected that the similar cross sections would result in similar strain responses. However, the Medford strains were slightly lower which was likely due to the large amount of two axle vehicles presented in Figure 3.2.

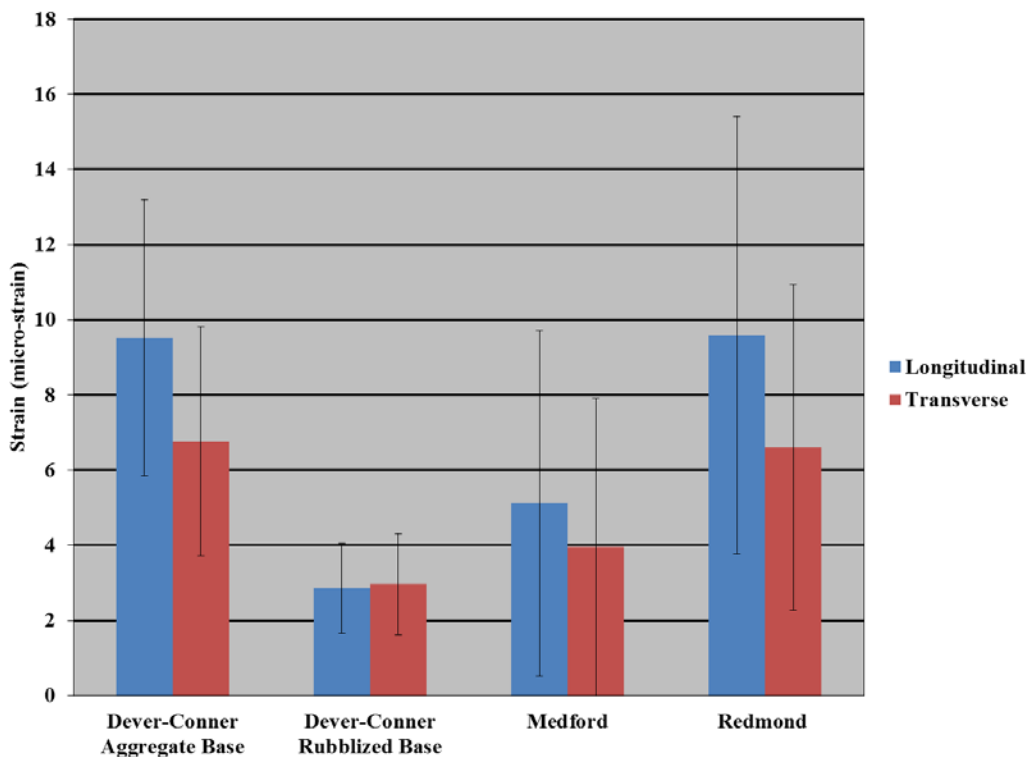


Figure 3.29: Comparison of Average Strain Recorded in November 2009



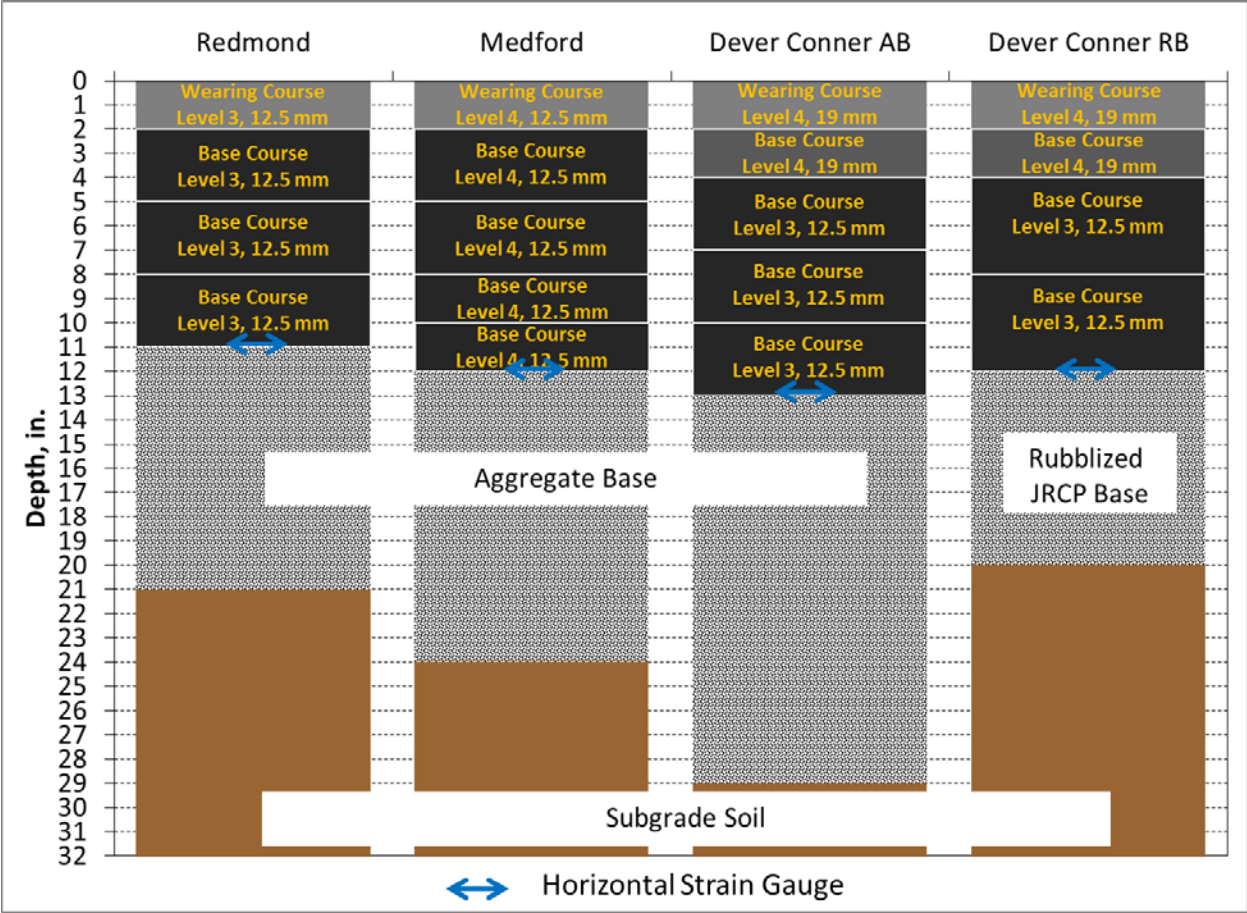


Figure 3.30: Pavement Cross Sections.

## **4.0 TECHNOLOGY TRANSFER**

The last objective of Phase II was to provide user's guides on working with the DADiSP templates and Access databases that will enable future analyses as needed by ODOT. These guides have been developed as stand-alone appendices. Appendices A, B and C contain detailed instructions for using the DADiSP templates for each test site while Appendices D, E and F contain guidance on using the Access databases. Note the large number of sub-appendices correspond to the many file formats encountered in the raw data archives.

## 5.0 SUMMARY

The objectives of Phase II of this project included documenting the data processing schemes and database development from each site, characterizing the in situ pavement responses from each site, comparing the pavement responses between the sites and providing user's guides for using the processing templates. Based on the work presented herein, the following conclusions and recommendations are made:

- Most of the collected data could be processed from each test site and assembled into site-specific databases. Instances where the data could not be processed usually resulted from erroneous data files and improper sampling durations.
- Analysis of the data followed expected trends where the transverse strain was generally lower than longitudinal strain. The exceptions, based on axle type, were demonstrated to follow layered elastic theory.
- Seasonal trends were clearly evident in the data sets that had multiple dates. These trends may be used for future M-E analysis and simulation of the sections.
- The rubblized base layer had a significant impact on measured strain values at the Dever-Conner site. Paired measurements showed over a 50% reduction in strain response.
- Further analysis of the data may be accomplished using the assembled databases and user's guides provided in the appendix of this report.

## 6.0 REFERENCES

Scholz, T.V. *Instrumentation for Mechanistic Design Implementation*. Final Report. OTREC-RR-10-02. Oregon Transportation Research and Education Consortium (OTREC), 2010.

Timm, D.H., and M.C. Vrtis. *Mechanistic Design Data from ODOT Instrumented Pavement Sites-Phase I Report*. Draft Report. National Center for Asphalt Technology, Auburn University, 2015.

Timm, D.H., and A.L. Priest. *Flexible Pavement Fatigue Cracking and Measured Strain Response at the NCAT Test Track*. Proceedings of the 87th Annual Transportation Research Board, Washington, D.C., 2008.

Willis, J.R., and D.H. Timm. *Repeatability of Asphalt Strain Gauges*. NCAT Report 09-07, National Center for Asphalt Technology, Auburn University, 2009.

## **APPENDIX A – MEDFORD DATA PROCESSING**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Medford

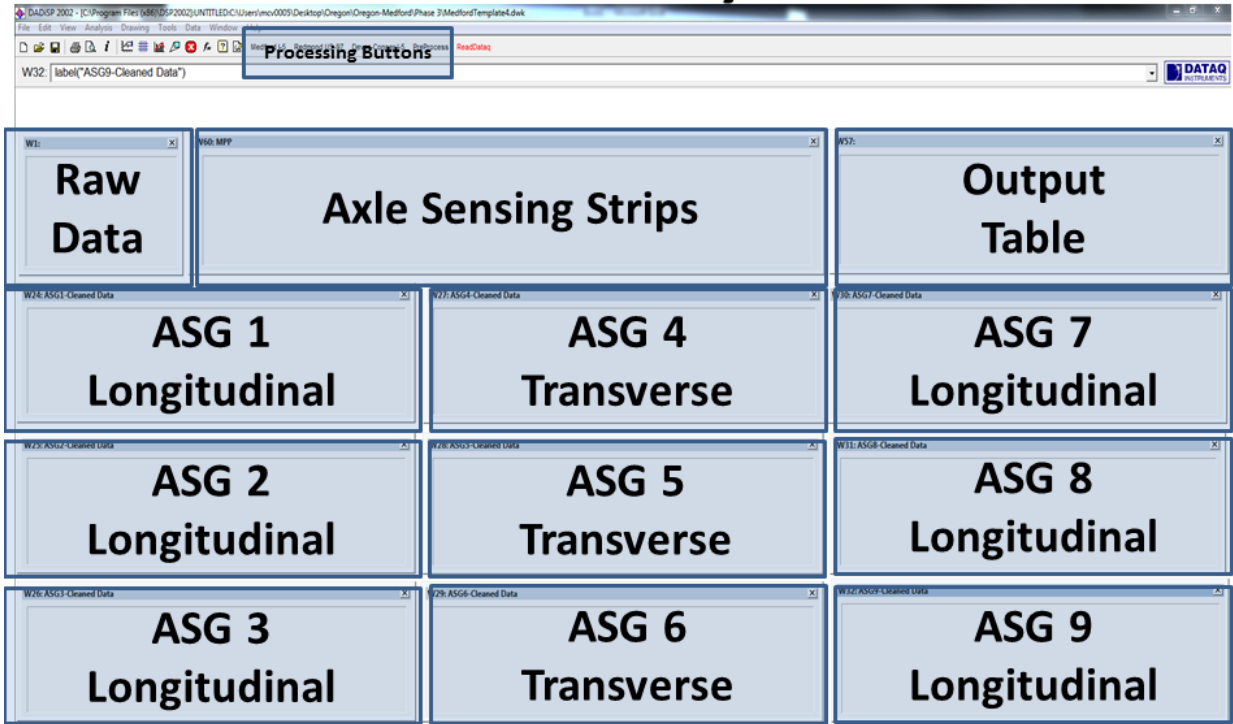
# DADiSP Processing Steps

1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Add zeroes in columns N through Y
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Processing files with multiple vehicle events
14. Copy W57 and store in EXCEL
15. Troubleshooting – Changing LPSVoltage



# MedfordTemplate4.dwk

## General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

**NATIONAL INSTRUMENTS**

United States ▼ MY ACCOUNT  
Log in

INNOVATIONS SHOP SUPPORT **COMMUNITY**

Home > Example Programs > TDM Excel Add-In for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the TDM Excel Add-In COM-API to automate loading of TDM and TDMS files into Excel.

**Bookmark & Share**  
 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
[Requirements](#)

**CLICK** →

## 2. Open raw \*.tdms file in EXCEL



MEDFORD11-24-09_13273824112009	11/24/2009 3:27 PM	TDMS File	1,017 KB
MEDFORD11-24-09_13275324112009	11/24/2009 3:27 PM	TDMS File	1,017 KB
MEDFORD11-24-09_13280324112009	11/24/2009 3:28 PM	TDMS File	1,017 KB
MEDFORD11-24-09_13281024112009	11/24/2009 3:28 PM	TDMS File	1,017 KB
MEDFORD11-24-09_13281724112009	11/24/2009 3:28 PM	TDMS File	1,017 KB
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MEDFORD11-24-09_13305224112009	11/24/2009 3:30 PM	TDMS File	1,017 KB
MEDFORD11-24-09_13310124112009	11/24/2009 3:31 PM	TDMS File	1,017 KB

# 3. Open Data tab in EXCEL workbook

Root Name	Title	Author	Date/Time	Groups	Description	
MEDFORD11-24-09_13273824112009				1		
<b>Group</b>	<b>Channels</b>	<b>Description</b>	<i>header</i>			
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			<i>Sample Rate:5000.0</i>			
			<i>Comments:</i>			
			<i>TimeND</i>			
			<i>LAG</i>			
			<i>DIAGSs</i>			
			<i>g1sg2sg3</i>			
			<i>sg4sg5</i>			
			<i>sg6sg7sg</i>			
			<i>8sg9</i>			
			<i>secsvolts</i>			
			<i>voltsvolts</i>			
			<i>voltsvolts</i>			
			<i>voltsvolts</i>			
			<i>volts</i>			
			<i>volts</i>			
<b>Data</b>		13				
<b>Data</b>						
<b>Channel</b>	<b>Datatype</b>	<b>Unit</b>	<b>Length</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Descrip</b>
<b>Time</b>	DT_FLOAT		20000			
<b>N</b>	DT_FLOAT		20000			
<b>DIAG</b>						



Time	N	DIAG	S	sg1	sg2	sg3	sg4
0	-0.008239746	-0.006103516	-0.00869751	-0.000443864	-0.000251989	0.000512353	1.38995
0.0002	0.005950928	0.006713867	0.007019043	-0.000446697	-0.000252077	0.000512266	1.40311
0.0004	-0.005187988	-0.007171631	-0.006713867	-0.000446632	-0.000252121	0.000513055	1.37241
0.0006	0.006103516	0.002441406	0.001373291	-0.000445004	-0.000251507	0.000513362	1.44695
0.0008	-0.001678467	-0.004119873	-0.005187988	-0.000444996	-0.000252691	0.000513756	1.70565
0.001	0.00869751	0.004730225	0.006561279	-0.000443908	-0.0002512	0.000515861	1.68373
0.0012	0.002441406	0.004119873	0.0050354	-0.000444083	-0.000251551	0.000514944	1.50834
0.0014	0.002288818	0.001373291	-0.002593994	-0.000444083	-0.000251989	0.00051266	1.45134
0.0016	0.000152588	-0.000610352	-0.002593994	-0.000445566	-0.000252559	0.0005138	1.22333
0.0018	-0.001678467	-0.001678467	-0.000915527	-0.000444785	-0.000252077	0.000513493	1.21456
0.002	0.006408691	0.006408691	0.007476807	-0.000445574	-0.000251902	0.000514896	1.42065
0.0022	-0.009765625	-0.007476807	-0.012054443	-0.000444346	-0.000250542	0.000513756	1.44257
0.0024	0.014190674	0.017089844	0.018768311	-0.000444873	-0.000252866	0.000513888	1.36364
0.0026	-0.007781982	-0.006408691	-0.008392334	-0.000444873	-0.000250805	0.000513406	1.59603
0.0028	0.007781982	0.010986328	0.009918213	-0.000446451	-0.000252998	0.000512616	1.65304
0.003	0.002593994	0.000915527	-0.001373291	-0.000444873	-0.000253085	0.0005138	1.68811
0.0032	-0.00213623	0.000915527	-0.000457764	-0.00044404	-0.00025177	0.000514151	1.59165
0.0034	0.002288818	0.004882813	0.00869751	-0.000445522	-0.000251332	0.000515733	1.2628
0.0036	0.001983643	0.002441406	0.004730225	-0.000444346	-0.000250893	0.000513756	1.24964
0.0038	0.003967285	0.007019043	0.004730225	-0.000445048	-0.000251638	0.000513055	1.34611
0.004	0.003814697	0.002593994	0.000305176	-0.000444711	-0.000251332	0.000513537	1.42503
0.0042	-0.000305176	0.001220703	0.001831055	-0.000445574	-0.000251463	0.000513099	1.65742
0.0044	-0.000305176	0.001525879	0.006866455	-0.000444127	-0.000253042	0.000513932	1.84158
0.0046	0.005340576	0.005493164	0.005645752	-0.000445969	-0.000250586	0.000514589	1.55657
0.0048	0.006866455	0.001831055	-0.001373291	-0.000447284	-0.000252691	0.00051323	1.44695
0.005	0.00579834	0.004577637	0.000915527	-0.000444916	-0.000252735	0.000514151	1.52149
0.0052	0.001525879	0.003662109	0.00289917	-0.000445399	-0.000252822	0.000514239	1.20141
0.0054	0.002593994	0.007019043	0.002288818	-0.000445566	-0.000251288	0.000514063	1.27595
0.0056	0.001525879	0.000610352	0.006713867	-0.000443294	-0.000251068	0.000513756	1.41626
0.0058	0.014343262	0.013275146	0.014648438	-0.000445223	-0.000252822	0.000512309	1.31103
0.006	-0.006103516	-0.007629395	-0.010681152	-0.000445048	-0.000253349	0.000513756	1.53026
0.0062	0.007324219	0.007171631	0.008544922	-0.000444697	-0.000251682	0.000512792	1.72758
0.0064	0.003204346	0.003204346	0.008392334	-0.000444873	-0.000251638	0.000513537	1.65304
0.0066	-0.007324219	-0.009307861	-0.009613037	-0.000443908	-0.000252866	0.000515072	1.63988
0.0068	0.012664795	0.016174316	0.017547607	-0.000443338	-0.000252428	0.000514107	1.48203

CLICK

## 4. Add zeroes in columns N through Y

- Enter zeroes into columns N through Y
- Copy zeroes through all rows containing data

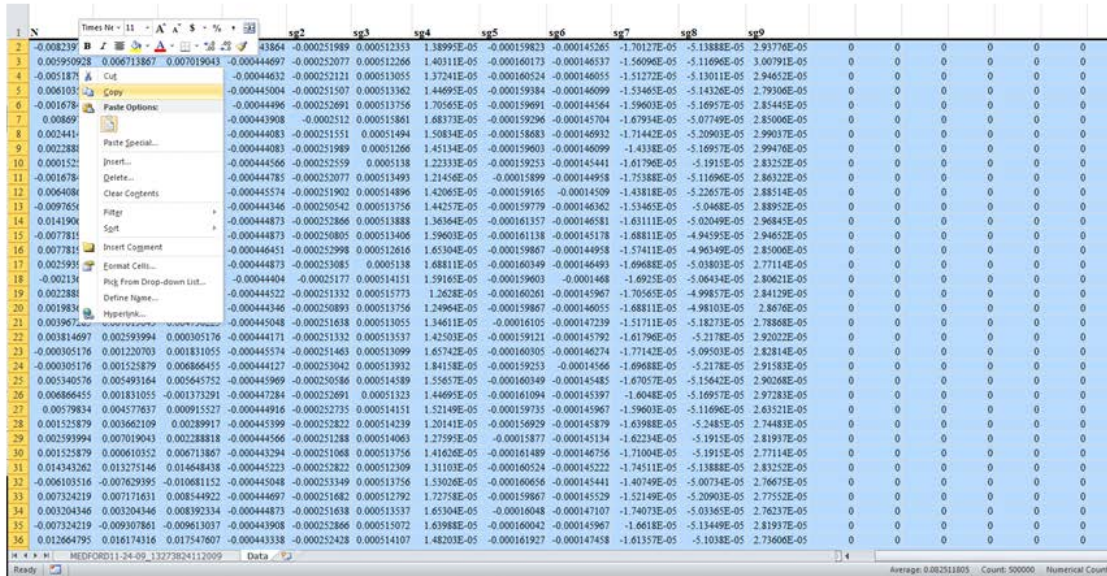
The screenshot shows a Microsoft Excel spreadsheet with the following structure:

- Row 1:** Column B contains "DIAG".
- Row 2:** Column B contains "N", column C contains "DIAG", column D contains "S", and columns E through M contain labels "sg1" through "sg9".
- Columns N through Y:** All cells in these columns contain the value "0".
- Rows 2 through 14:** Each row contains numerical values in columns B through M, and "0" in columns N through Y.

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	N	DIAG	S	sg1	sg2	sg3	sg4	sg5	sg6	sg7	sg8	sg9												
2	-0.008239746	-0.006103516	-0.00869751	-0.000443864	-0.000251989	0.000512353	1.38995E-05	-0.000159823	-0.000145265	-1.70127E-05	-5.13888E-05	2.93776E-05	0	0	0	0	0	0	0	0	0	0	0	
3	0.005950928	0.006713867	0.007019043	-0.000444697	-0.000252077	0.000512266	1.40311E-05	-0.000160173	-0.000146537	-1.56096E-05	-5.11696E-05	3.00791E-05	0	0	0	0	0	0	0	0	0	0	0	
4	-0.005187988	-0.007171631	-0.006713867	-0.00044632	-0.000252121	0.000513055	1.37241E-05	-0.000160524	-0.000146055	-1.51272E-05	-5.13011E-05	2.94652E-05	0	0	0	0	0	0	0	0	0	0	0	
5	0.006103516	0.002441406	0.001373291	-0.000445004	-0.000251507	0.000513362	1.44695E-05	-0.000159384	-0.000146099	-1.53465E-05	-5.14326E-05	2.79306E-05	0	0	0	0	0	0	0	0	0	0	0	
6	-0.001678467	-0.004119873	-0.005187988	-0.00044496	-0.000252691	0.000513756	1.70565E-05	-0.000159691	-0.000144564	-1.59603E-05	-5.16957E-05	2.85445E-05	0	0	0	0	0	0	0	0	0	0	0	
7	0.00869751	0.004730225	0.006561279	-0.000443908	-0.0002512	0.000515861	1.68373E-05	-0.000159296	-0.000145704	-1.67934E-05	-5.07749E-05	2.85006E-05	0	0	0	0	0	0	0	0	0	0	0	
8	0.002441406	0.004119873	0.0050354	-0.000444083	-0.000251551	0.00051494	1.50834E-05	-0.000158683	-0.000146932	-1.71442E-05	-5.20903E-05	2.99037E-05	0	0	0	0	0	0	0	0	0	0	0	
9	0.002288818	0.001373291	-0.002593994	-0.000444083	-0.000251989	0.00051266	1.45134E-05	-0.000159603	-0.000146099	-1.4338E-05	-5.16957E-05	2.99476E-05	0	0	0	0	0	0	0	0	0	0	0	
10	0.000152588	-0.000610352	-0.002593994	-0.000444566	-0.000252559	0.0005138	1.22333E-05	-0.000159253	-0.000145441	-1.61796E-05	-5.1915E-05	2.83252E-05	0	0	0	0	0	0	0	0	0	0	0	
11	-0.001678467	-0.001678467	-0.000915527	-0.000444785	-0.000252077	0.000513493	1.21456E-05	-0.000159899	-0.000144958	-1.75388E-05	-5.11696E-05	2.86322E-05	0	0	0	0	0	0	0	0	0	0	0	
12	0.006408991	0.006408991	0.007476807	-0.00044574	-0.000251902	0.000514896	1.42065E-05	-0.000159165	-0.00014509	-1.43818E-05	-5.22857E-05	2.88514E-05	0	0	0	0	0	0	0	0	0	0	0	
13	-0.009765625	-0.007476807	-0.012054443	-0.000444346	-0.000250542	0.000513756	1.44257E-05	-0.000159779	-0.000146362	-1.53465E-05	-5.0446E-05	2.88932E-05	0	0	0	0	0	0	0	0	0	0	0	
14	0.01490674	0.017089844	0.018768311	-0.000444873	-0.000252866	0.000513888	1.36564E-05	-0.000161357	-0.000146581	-1.63111E-05	-5.02049E-05	2.96845E-05	0	0	0	0	0	0	0	0	0	0	0	

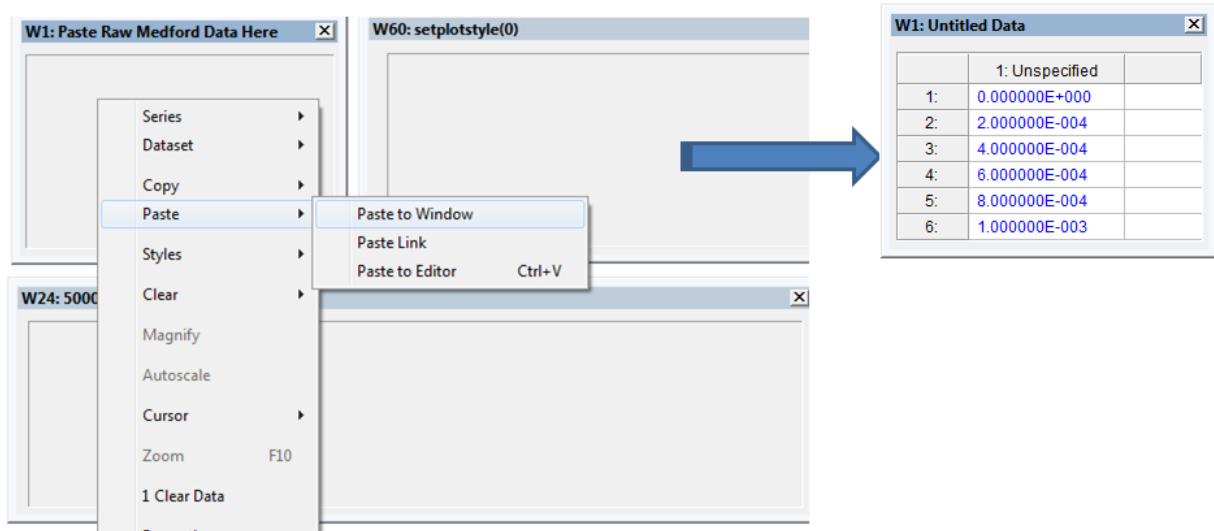
# 5. Copy data

- Highlight A2 through all row containing data
  - Exclude Header Row
- Right-Click → Select Copy → Left-Click



## 6. Paste raw data into W1: Paste Raw Data Here...

- Right-Click → Select Paste → Left-Click
- Copied data will fill box

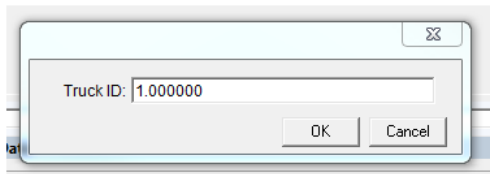




## 7. Click PreProcess button to inspect data



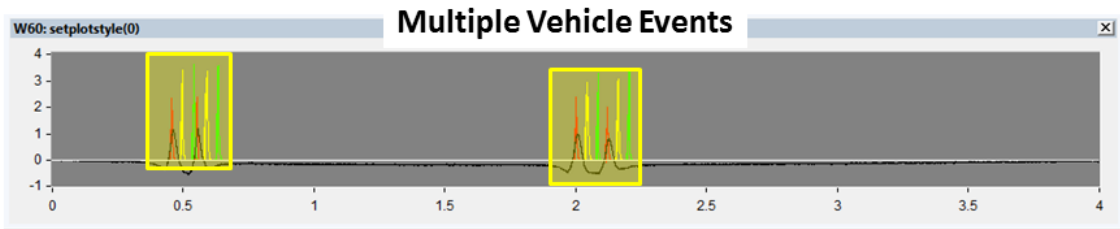
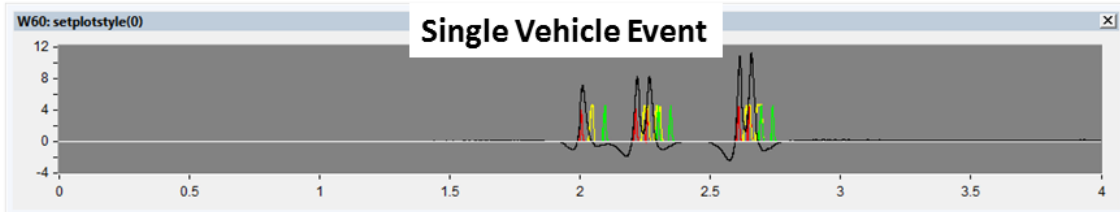
- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK





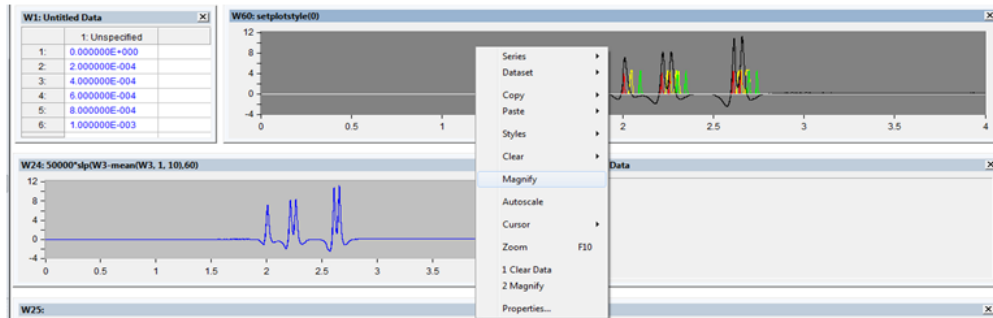
## 8. Inspect W60

- Examples of what may be seen:

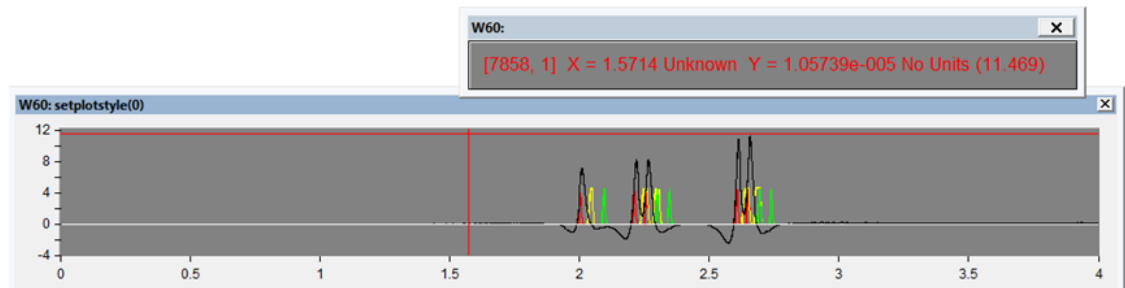


## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits

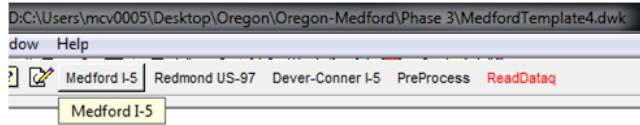


- Use cross-hair to drag over vehicle event

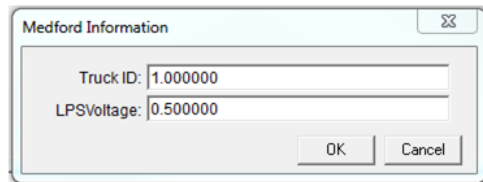


## 10. Process vehicle event

- Click on Medford I-5 button



- Verify Truck ID and LPSVoltage\*

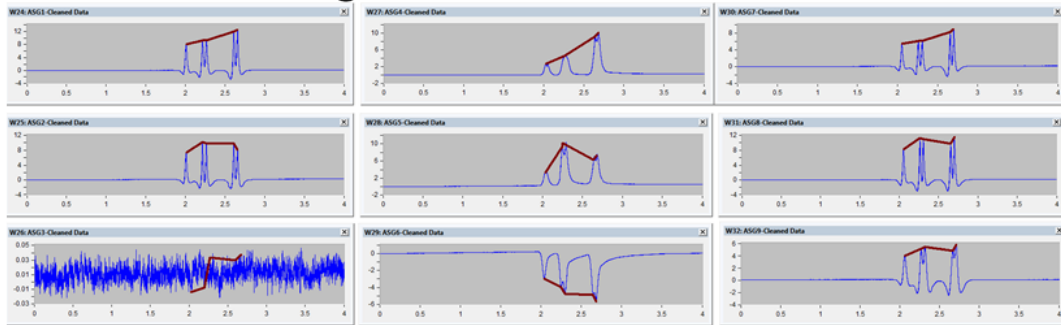


- Click OK

\*Default LPSVoltage of 0.5 will work in most all cases. When to change LPSVoltage discussed in step 15

## 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs
  - If peaks are not captured, see Step 15 for troubleshooting

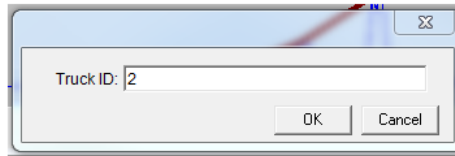


- Processed data output in tabular form in W57

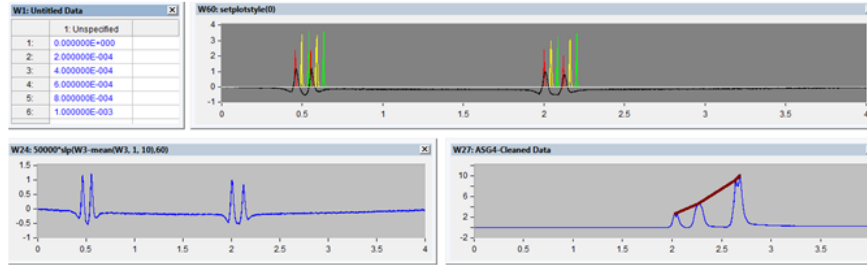
W57: Output Data			
	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	1.000000	3.000000	
4:	1.000000	4.000000	
5:	1.000000	5.000000	
6:			

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7

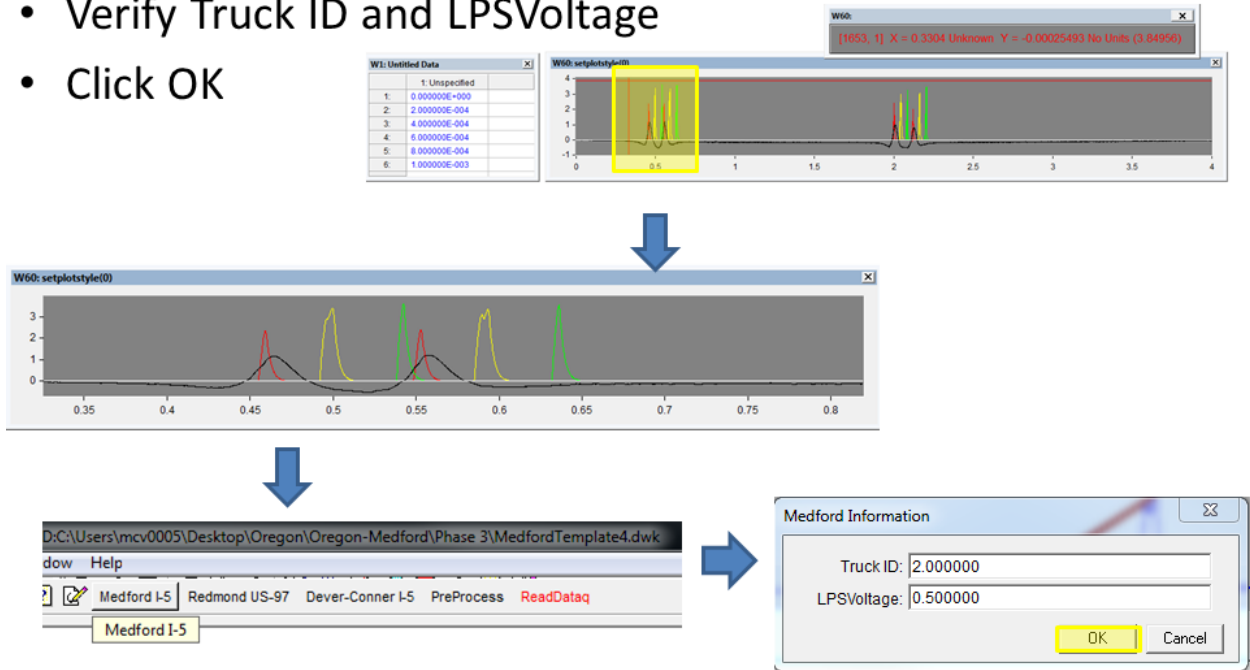


- Next file will be loaded into W60 and W24



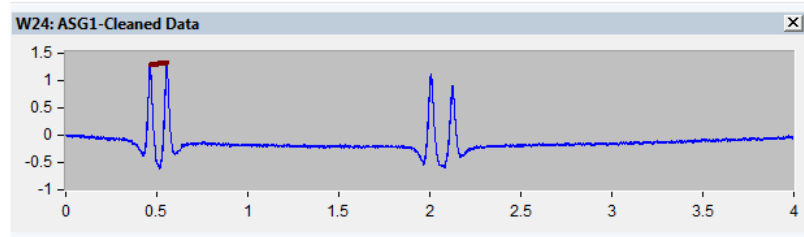
### 13. Processing files with multiple vehicle events

- Magnify vehicle event to be processed (shown in Step 9)
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage
- Click OK



### 13. Files with multiple vehicle events cont..

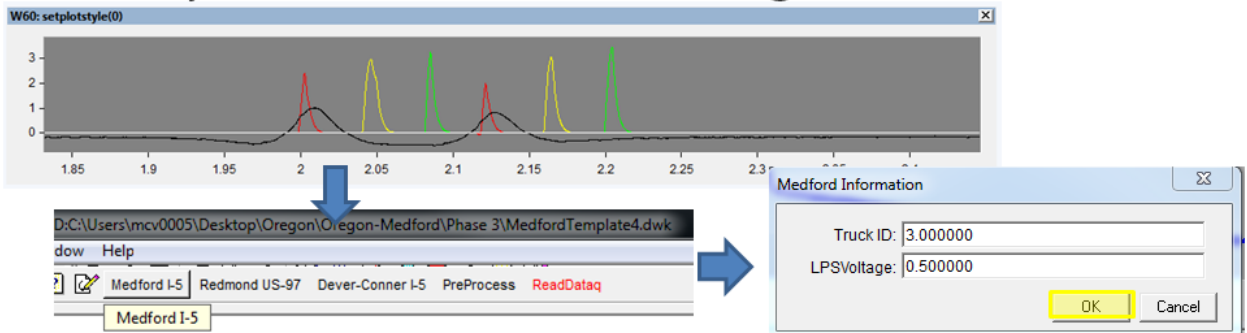
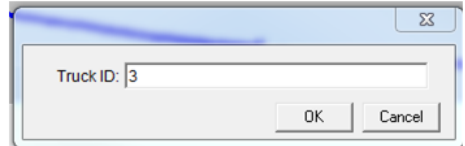
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	1.000000	3.000000	
4:	1.000000	4.000000	
5:	1.000000	5.000000	
6:	2.000000	1.000000	

### 13. Files with multiple vehicle events cont..

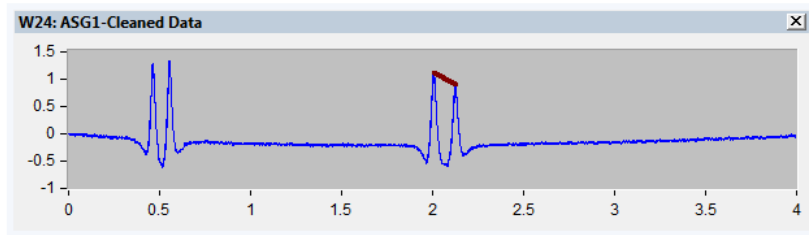
- Click Preprocess button without loading another file
- Change Truck ID → Click OK
- Magnify other vehicle event
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage → Click OK





### 13. Files with multiple vehicle events cont..

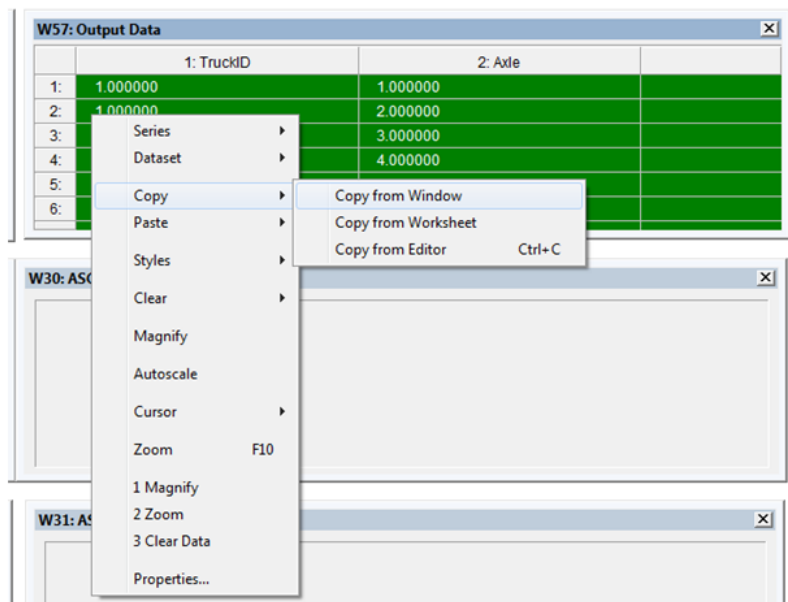
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	3
1:	1.000000	1.000000	62.064906
2:	1.000000	2.000000	62.205007
3:	1.000000	3.000000	62.064906
4:	1.000000	4.000000	62.064906
5:	1.000000	5.000000	61.510755
6:	2.000000	1.000000	66.562363
7:	2.000000	2.000000	66.401972
8:	3.000000	1.000000	66.723531
9:	3.000000	2.000000	68.209946

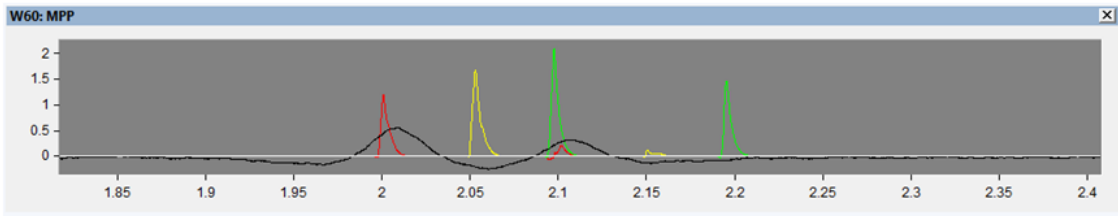
## 14. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

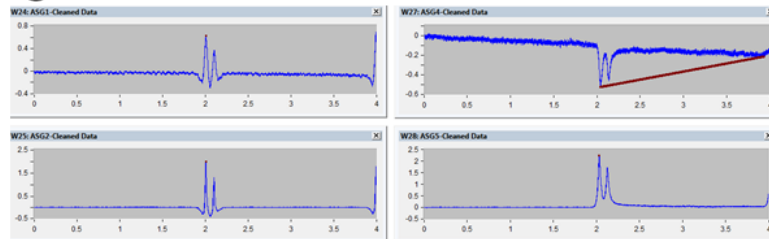


# 15. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



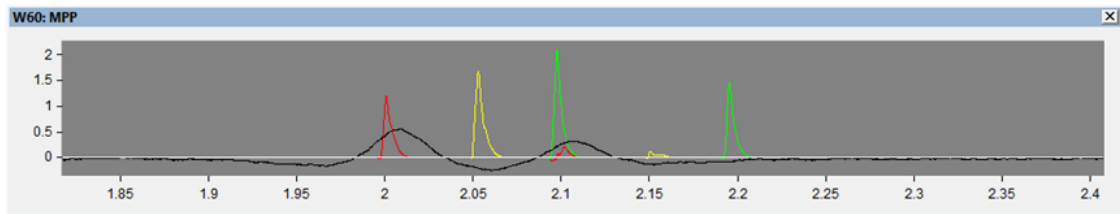
- The peaks will not be properly captured when processing\*



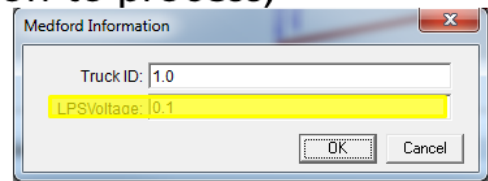
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 15. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Medrod I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.



**APPENDIX B1 – REDMOND DATA PROCESSING**

**10/30/2008; 12/5/2008; 1/16/2009; 2/27/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Redmond

10/30/2008; 12/5/2008; 1/16/2009;  
2/27/2009

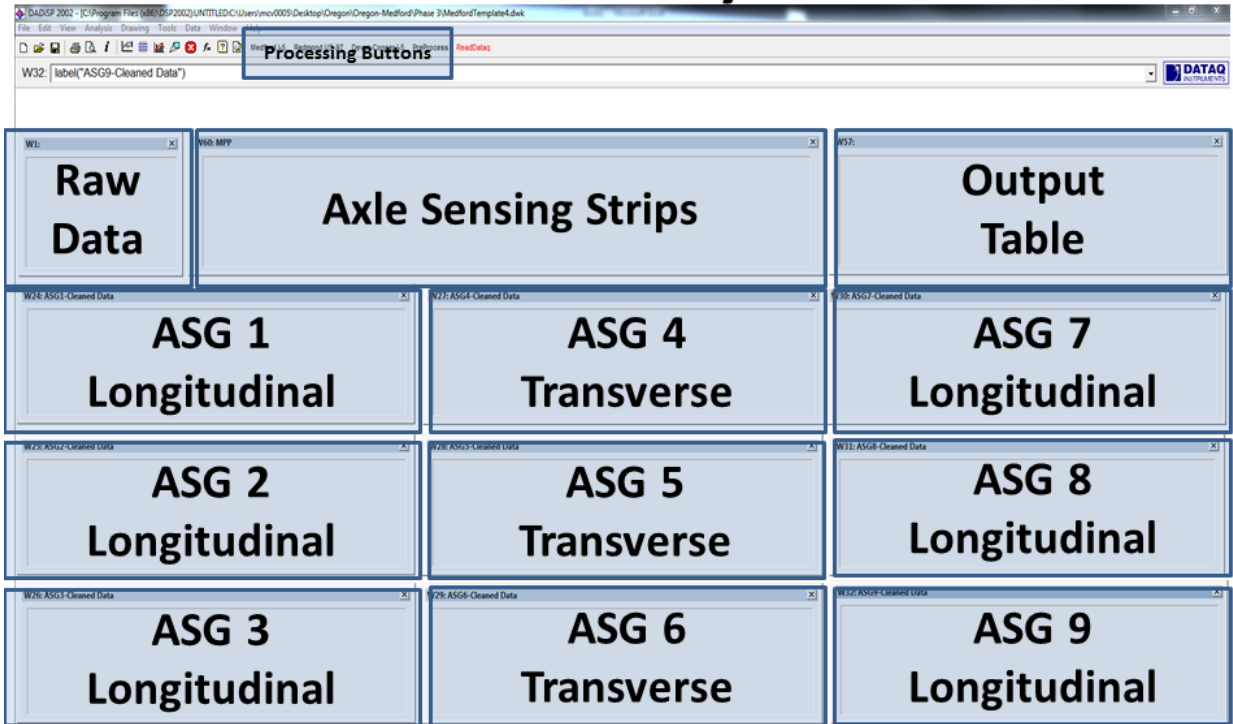
# DADiSP Processing Steps

1. Open raw \*.txt file in EXCEL
2. Add zeroes in columns N through Y
3. Copy data
4. Paste raw data into W1: Paste Raw Data Here...
5. Click PreProcess button to inspect data
6. Inspect W60
7. Zoom in on vehicle event to be processed
8. Process vehicle event
9. Visual inspection of processed output
10. Repeat procedure for next .tdms file
11. Processing files with multiple vehicle events
12. Copy W57 and store in EXCEL
13. Troubleshooting

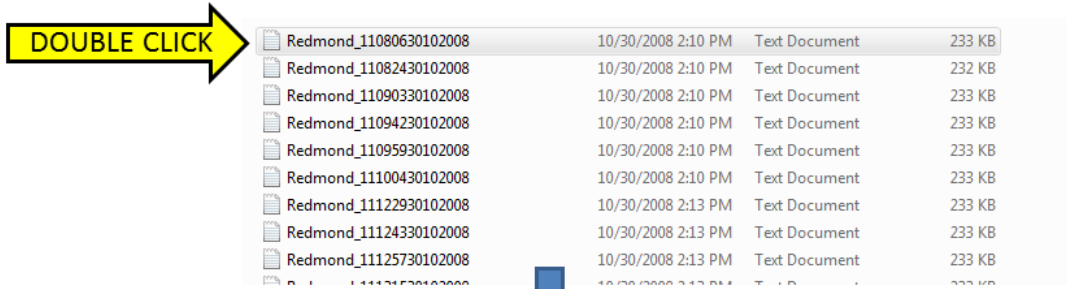


# RedmondTemplate4.dwk

## General Layout



# 1. Open raw \*.txt file in EXCEL



Redmond\_11080630102008 - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Station Name:Redmond												
2	Sample Rate:1000.0												
3	Comments:												
4													
5	Time	axle 1	axle 2	axle 3	SG3	SG4	SG5	SG6	SG7	SG8	SG9	SG10	SG12
6	secs	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts
7	0	0.003052	0.00412	0.003815	0.00035	0.000439	0.000441	0.000167	0.000445	0.000171	0.000129	0.000467	0.00063
8	0.001	0.001068	0.000458	0.003662	0.000349	0.000439	0.000442	0.000167	0.000446	0.00017	0.000128	0.000465	0.000631
9	0.002	0.000153	0.001068	0.000153	0.000352	0.000439	0.000441	0.00017	0.000447	0.000169	0.000129	0.000465	0.000631
10	0.003	-0.00122	-0.00122	0.001373	0.000352	0.000438	0.000442	0.000169	0.000447	0.00017	0.00013	0.000468	0.00063
11	0.004	-0.00015	0.002441	0.005798	0.000352	0.000439	0.000442	0.000168	0.000446	0.000169	0.000128	0.000465	0.00063
12	0.005	-0.00061	0.002747	0.003815	0.000351	0.000439	0.000441	0.000169	0.000448	0.000171	0.000129	0.000464	0.00063
13	0.006	0.000916	0	0.000763	0.000349	0.000438	0.000441	0.000169	0.000448	0.000171	0.000129	0.000465	0.000631
14	0.007	0.001373	-0.00015	-0.00061	0.00035	0.000438	0.00044	0.000168	0.000448	0.000172	0.000128	0.000466	0.00063
15	0.008	0.001831	0.000153	-0.00714	0.00035	0.000438	0.00044	0.00017	0.000448	0.000169	0.00013	0.000464	0.000679

## 2. Add zeroes in columns N through Y

- Enter zeroes into columns N through Y
- Copy zeroes through all rows containing data

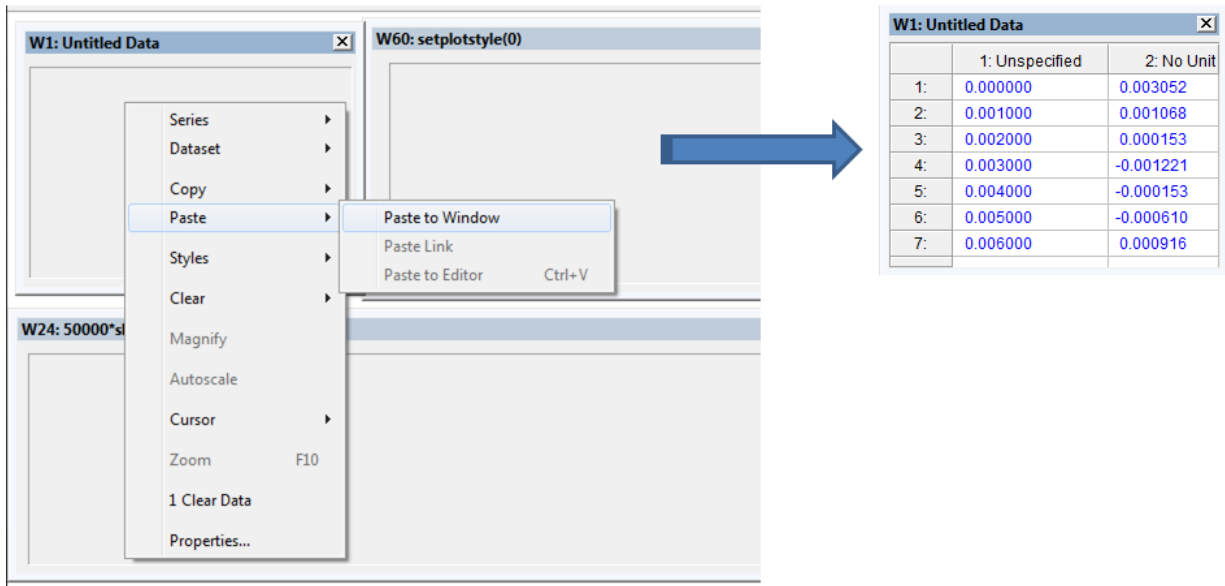
The screenshot shows a Microsoft Excel spreadsheet with the following data:

	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
1																						
2																						
3																						
4																						
5	SG3	SG4	SG5	SG6	SG7	SG8	SG9	SG10	SG12													
6	volts	volts	volts	volts	volts	volts	volts	volts	volts													
7	0.00035	0.000439	0.000441	0.000167	0.000445	0.000171	0.000129	0.000467	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
8	0.000349	0.000439	0.000442	0.000167	0.000446	0.00017	0.000128	0.000465	0.000631	0	0	0	0	0	0	0	0	0	0	0	0	
9	0.000352	0.000439	0.000441	0.00017	0.000447	0.000169	0.000129	0.000465	0.000631	0	0	0	0	0	0	0	0	0	0	0	0	
10	0.000352	0.000438	0.000442	0.000169	0.000447	0.00017	0.00013	0.000468	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
11	0.000352	0.000439	0.000442	0.000168	0.000446	0.000169	0.000128	0.000465	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
12	0.000351	0.000439	0.000441	0.000169	0.000448	0.000171	0.000129	0.000464	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
13	0.000349	0.000438	0.000441	0.000169	0.000448	0.000171	0.000129	0.000465	0.000631	0	0	0	0	0	0	0	0	0	0	0	0	
14	0.00035	0.000438	0.00044	0.000168	0.000448	0.000172	0.000128	0.000466	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
15	0.00035	0.000438	0.00044	0.00017	0.000448	0.000169	0.00013	0.000464	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
16	0.00035	0.000437	0.000442	0.000168	0.000447	0.000171	0.000129	0.000465	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
17	0.00035	0.000438	0.000441	0.000168	0.000447	0.000171	0.00013	0.000467	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
18	0.00035	0.000438	0.00044	0.000168	0.000447	0.000171	0.00013	0.000466	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
19	0.00035	0.000438	0.000441	0.000168	0.000446	0.000171	0.000129	0.000467	0.000631	0	0	0	0	0	0	0	0	0	0	0	0	
20	0.000352	0.000437	0.000441	0.000167	0.000446	0.00017	0.000129	0.000467	0.000628	0	0	0	0	0	0	0	0	0	0	0	0	
21	0.000351	0.000438	0.000441	0.000167	0.000447	0.000171	0.000129	0.000466	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
22	0.000351	0.000439	0.000441	0.000168	0.000449	0.00017	0.000129	0.000465	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
23	0.00035	0.000438	0.000441	0.000169	0.000448	0.000169	0.00013	0.000466	0.00063	0	0	0	0	0	0	0	0	0	0	0	0	
24	0.000351	0.000439	0.000441	0.000167	0.000447	0.00017	0.000128	0.000466	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	
25	0.000349	0.000438	0.00044	0.000168	0.000448	0.000171	0.000129	0.000466	0.000629	0	0	0	0	0	0	0	0	0	0	0	0	

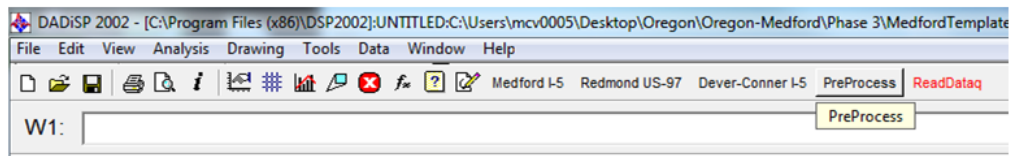


## 4. Paste raw data into W1: Paste Raw Data Here...

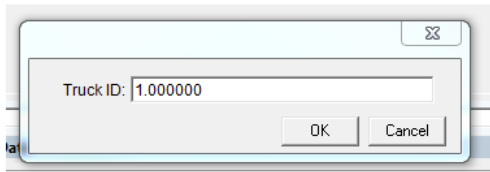
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



## 5. Click PreProcess button to inspect data

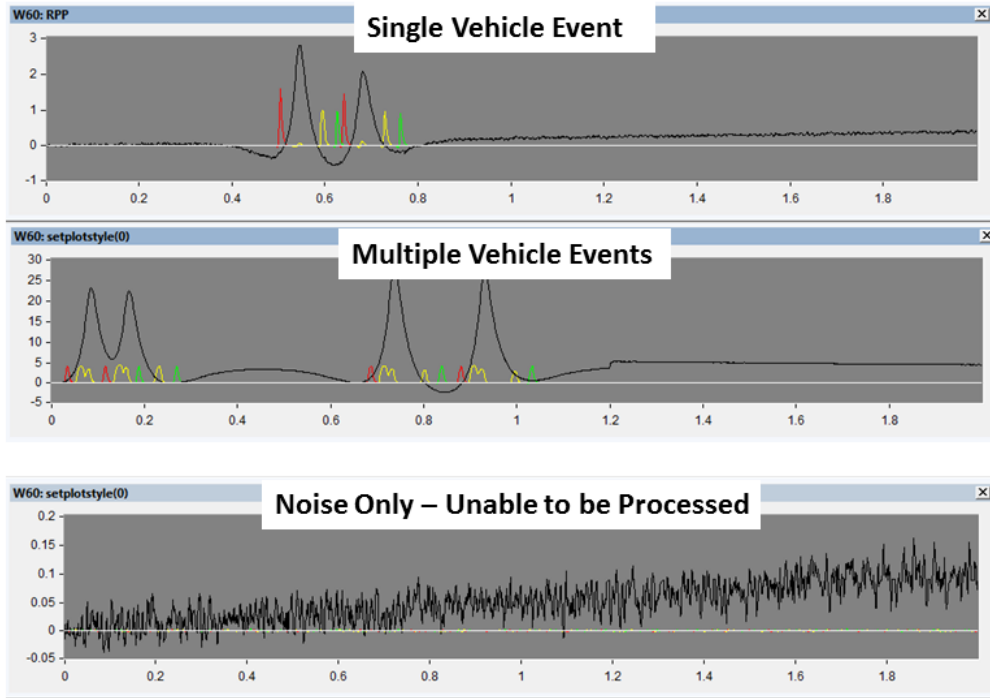


- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



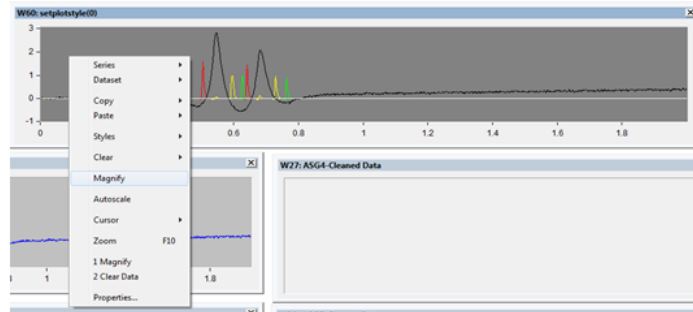
## 6. Inspect W60

- Examples of what may be seen:

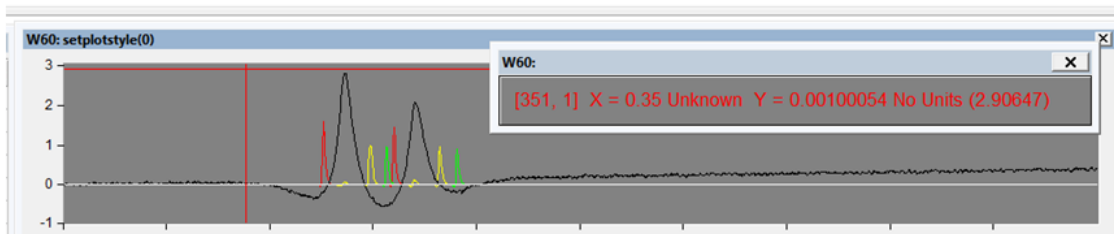


## 7. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



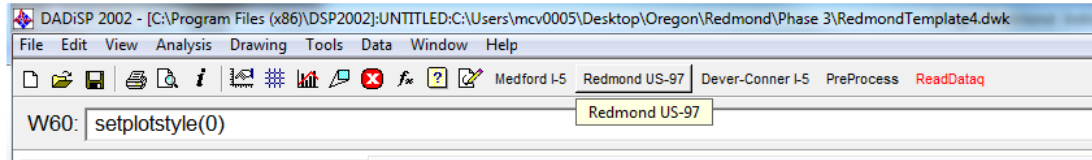
- Use cross-hair to drag over vehicle event



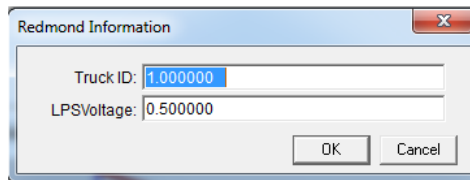


## 8. Process vehicle event

- Click on Redmond US-97 button



- Verify Truck ID and LPSVoltage\*

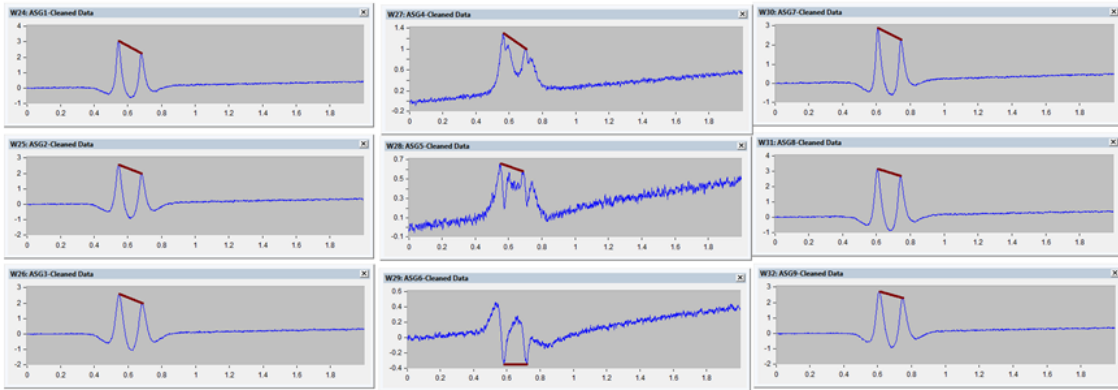


- Click OK

\*Default LPSVoltage of 0.5 will work in most all cases. When to change LPSVoltage discussed in step 15

## 9. Visual inspection of processed output

- Ensure peaks are captured on ASGs

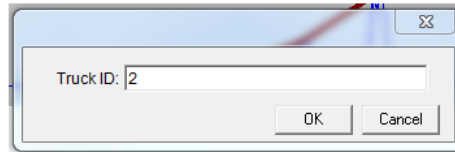


- Processed data output in tabular form in W57

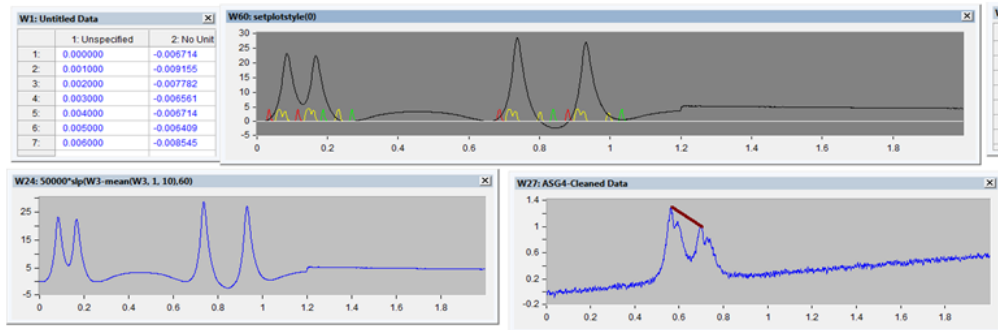
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000	1.000000
2:	1.000000	2.000000
3:		
4:		
5:		
6:		
7:		

## 10. Repeat procedure for next .txt file

- Repeat Step 2 through 4
- Change Truck ID in Step 5

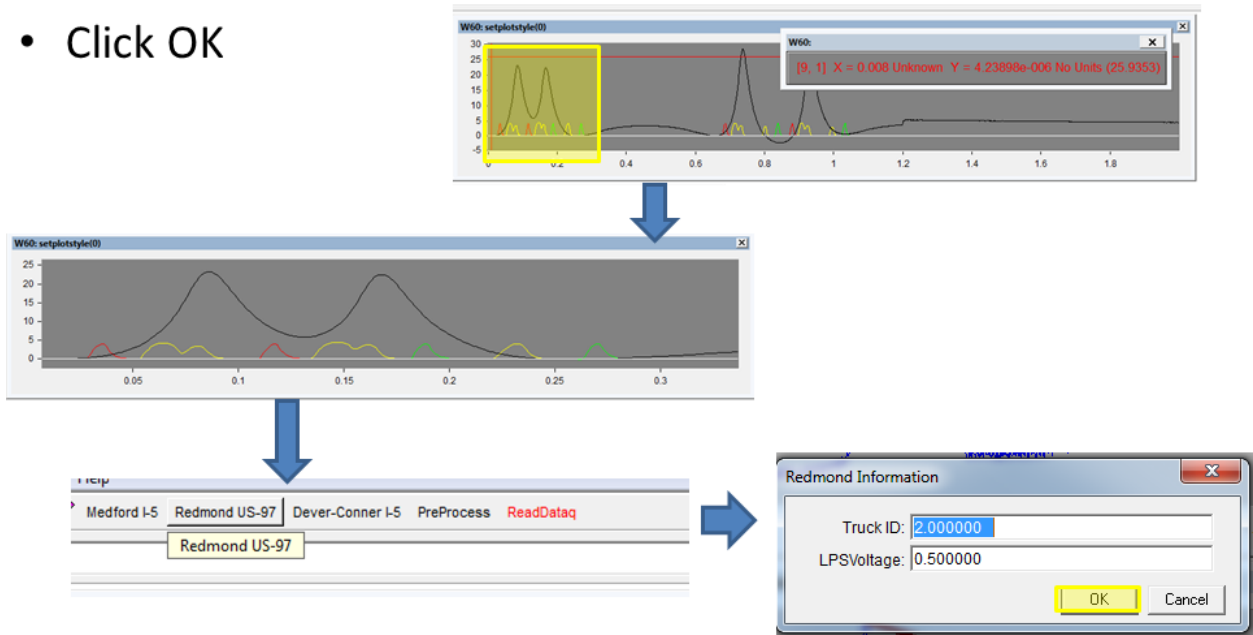


- Next file will be loaded into W60 and W24



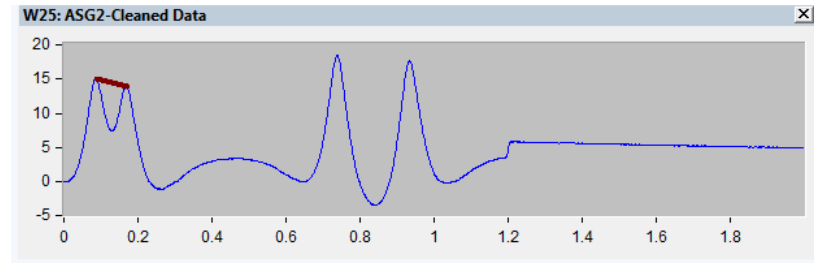
## 11. Processing files with multiple vehicle events

- Magnify vehicle event to be processed (shown in step 9)
- Click Redmond US-97 button
- Verify Truck ID and LPSVoltage
- Click OK



## 11. Files with multiple vehicle events cont..

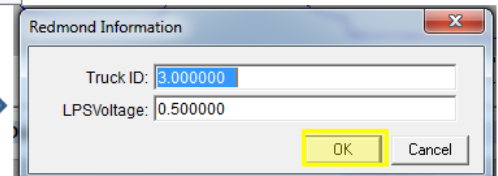
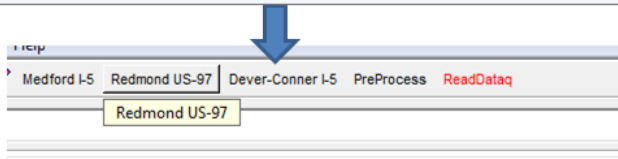
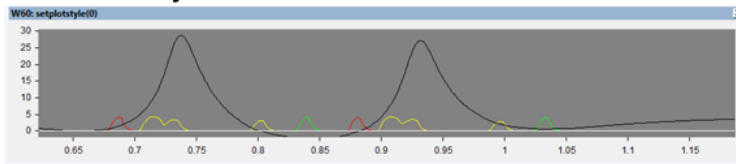
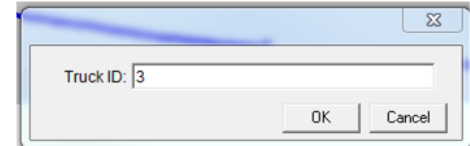
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:			
6:			
7:			

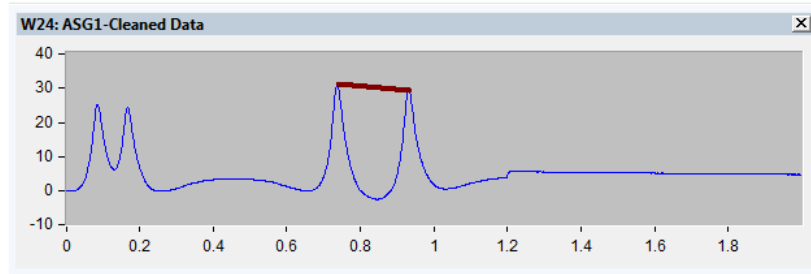
## 11. Files with multiple vehicle events cont..

- Click Preprocess button without loading another file
- Change Truck ID → Click OK
- Magnify other vehicle event
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage → Click OK



## 11. Files with multiple vehicle events cont..

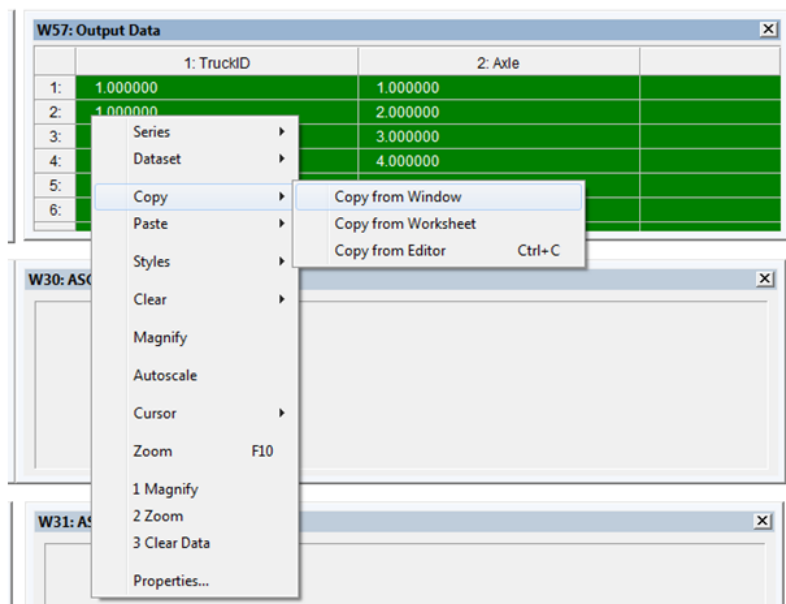
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:	3.000000	1.000000	
6:	3.000000	2.000000	
7:			

## 12. Copy W57 and store in EXCEL

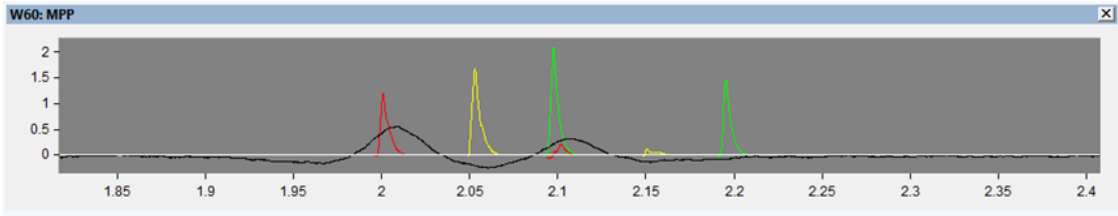
- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save



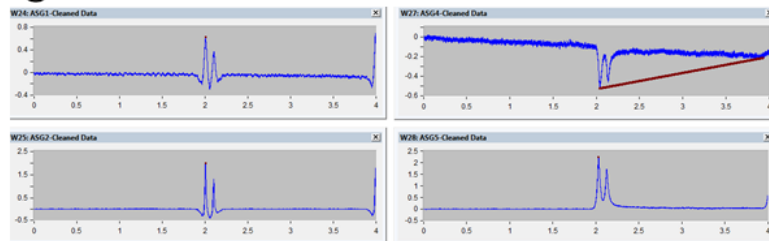


# 13. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



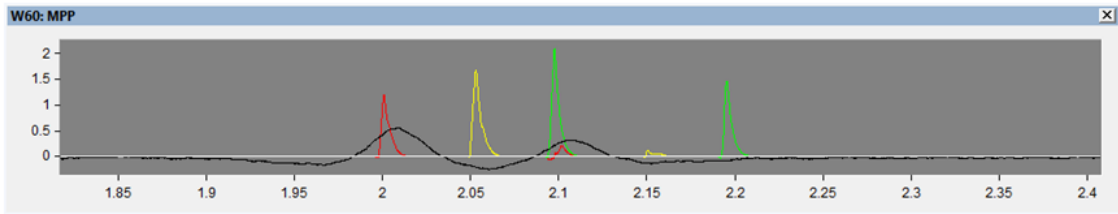
- The peaks will not be properly captured when processing\*



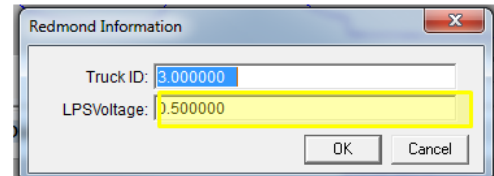
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 13. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Redmond US-97 button to process, change LPSVoltage
- Click OK
- Event is processed successfully if all peaks are captured.



**APPENDIX B2 – REDMOND DATA PROCESSING**

**9/25/2008**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

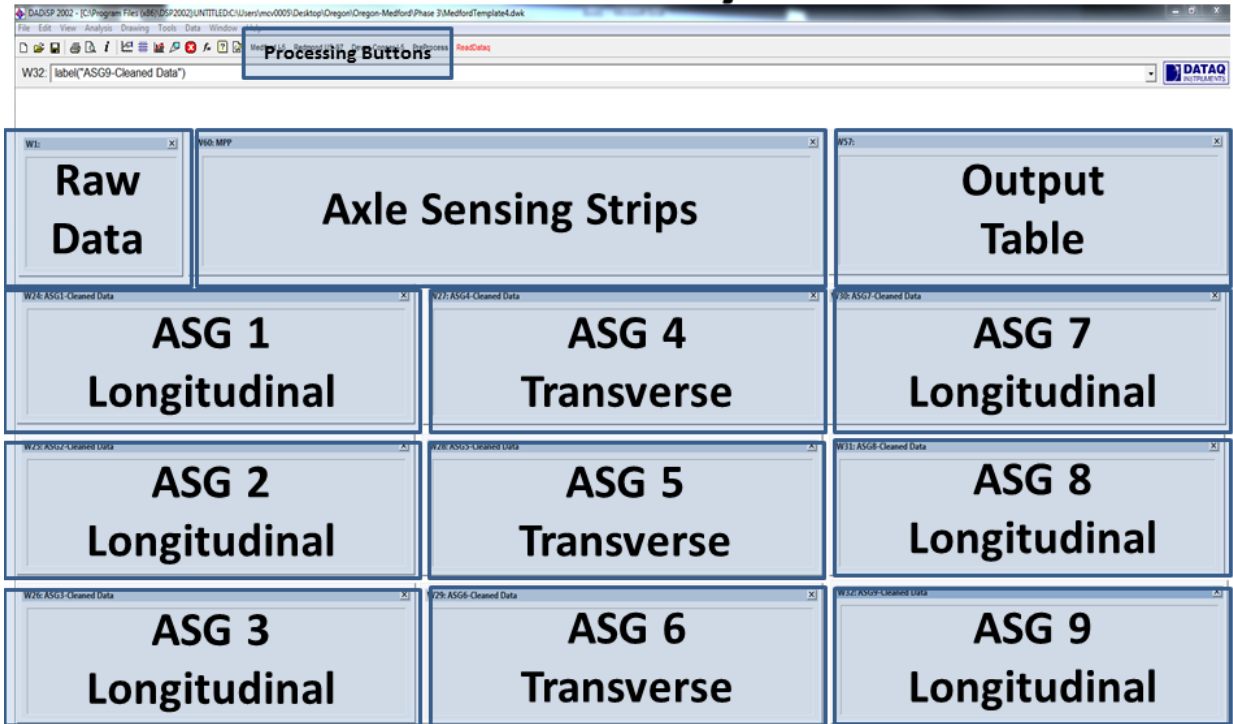
Redmond  
9/25/2008

# DADiSP Processing Steps

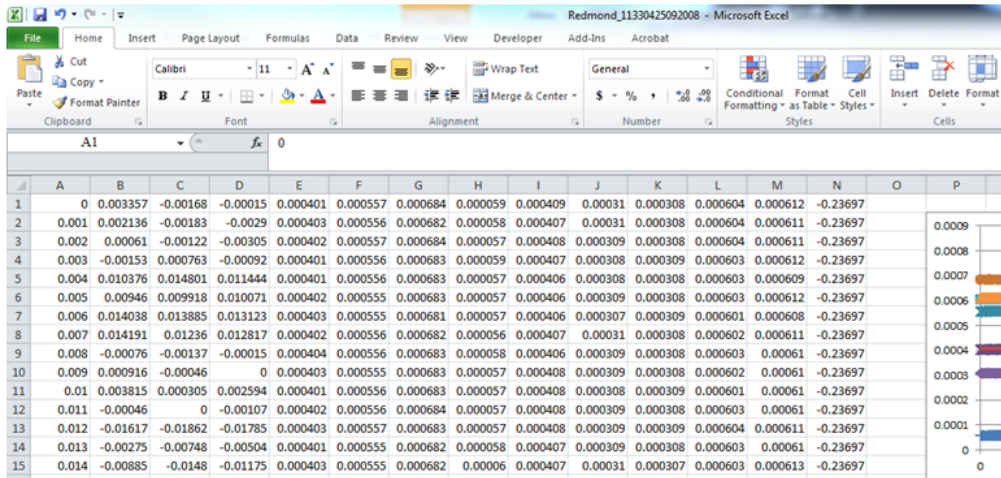
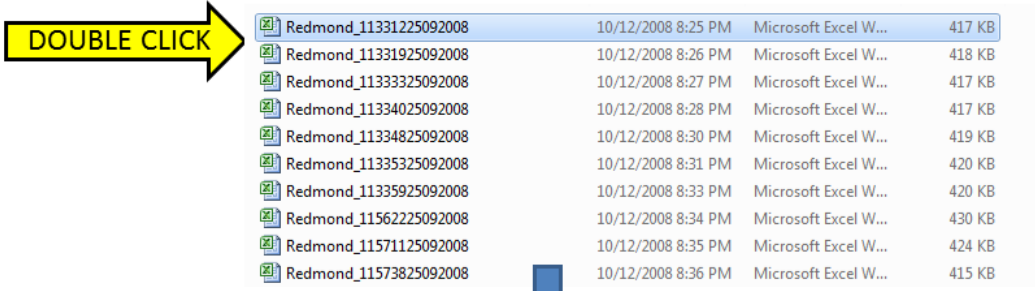
1. Open raw file in EXCEL
2. Add zeroes in columns N through Y
3. Copy data
4. Paste raw data into W1: Paste Raw Data Here...
5. Click PreProcess button to inspect data
6. Inspect W60
7. Zoom in on vehicle event to be processed
8. Process vehicle event
9. Visual inspection of processed output
10. Repeat procedure for next .tdms file
11. Processing files with multiple vehicle events
12. Copy W57 and store in EXCEL
13. Troubleshooting

# RedmondTemplate4.dwk

## General Layout



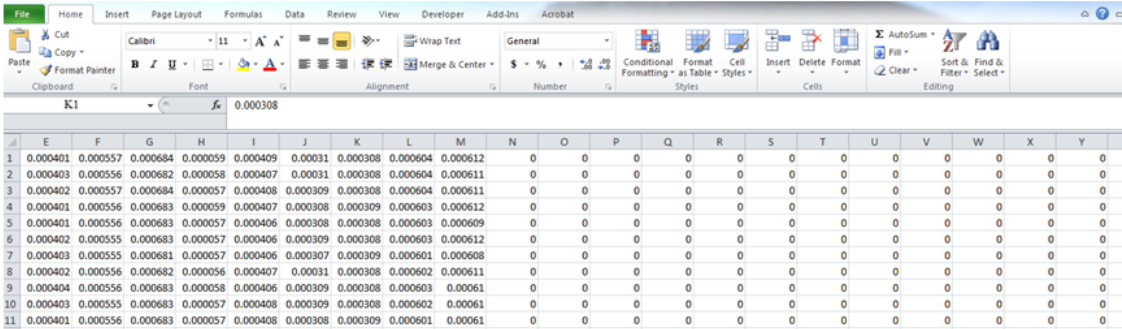
# 1. Open raw file in EXCEL





## 2. Add zeroes in columns N through Y

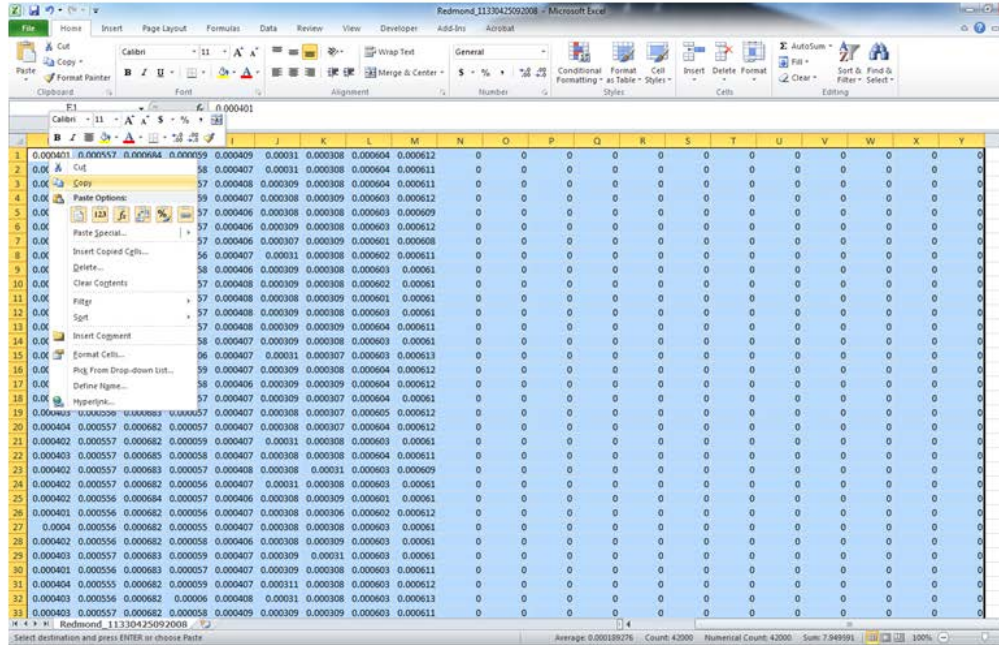
- Enter zeroes into columns N through Y (overwrite column N data)
- Copy zeroes through all rows containing data



	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	0.000401	0.000557	0.000684	0.000059	0.000409	0.00031	0.000308	0.000604	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
2	0.000402	0.000556	0.000682	0.000058	0.000407	0.00031	0.000308	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
3	0.000402	0.000557	0.000684	0.000057	0.000408	0.000309	0.000308	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
4	0.000401	0.000556	0.000683	0.000059	0.000407	0.000308	0.000309	0.000603	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
5	0.000401	0.000556	0.000683	0.000057	0.000406	0.000308	0.000308	0.000603	0.000609	0	0	0	0	0	0	0	0	0	0	0	0
6	0.000402	0.000555	0.000683	0.000057	0.000406	0.000309	0.000308	0.000603	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
7	0.000403	0.000555	0.000681	0.000057	0.000406	0.000307	0.000309	0.000601	0.000608	0	0	0	0	0	0	0	0	0	0	0	0
8	0.000402	0.000556	0.000682	0.000056	0.000407	0.00031	0.000308	0.000602	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
9	0.000404	0.000556	0.000683	0.000058	0.000406	0.000309	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
10	0.000403	0.000555	0.000683	0.000057	0.000408	0.000309	0.000308	0.000602	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
11	0.000401	0.000556	0.000683	0.000057	0.000408	0.000308	0.000309	0.000601	0.00061	0	0	0	0	0	0	0	0	0	0	0	0

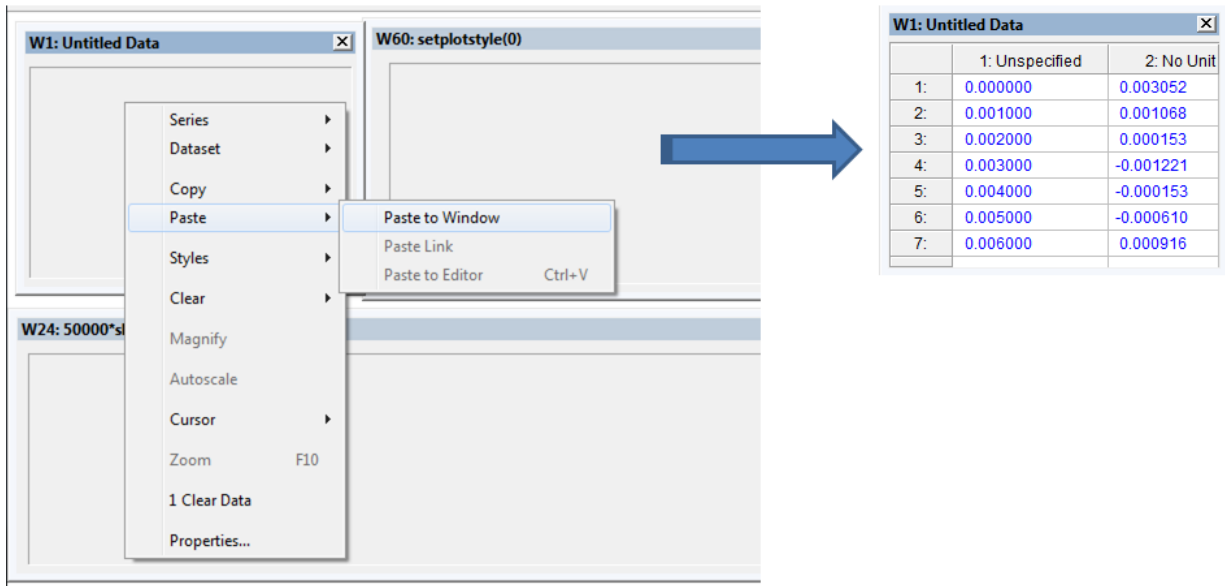
# 3. Copy data

- Highlight all data
- Right-Click → Select Copy → Left-Click

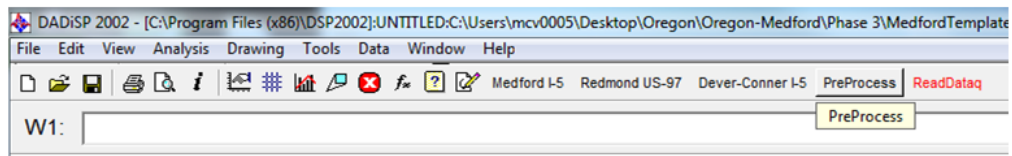


## 4. Paste raw data into W1: Paste Raw Data Here...

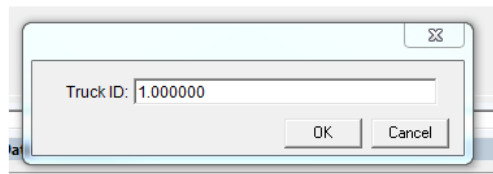
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



## 5. Click PreProcess button to inspect data

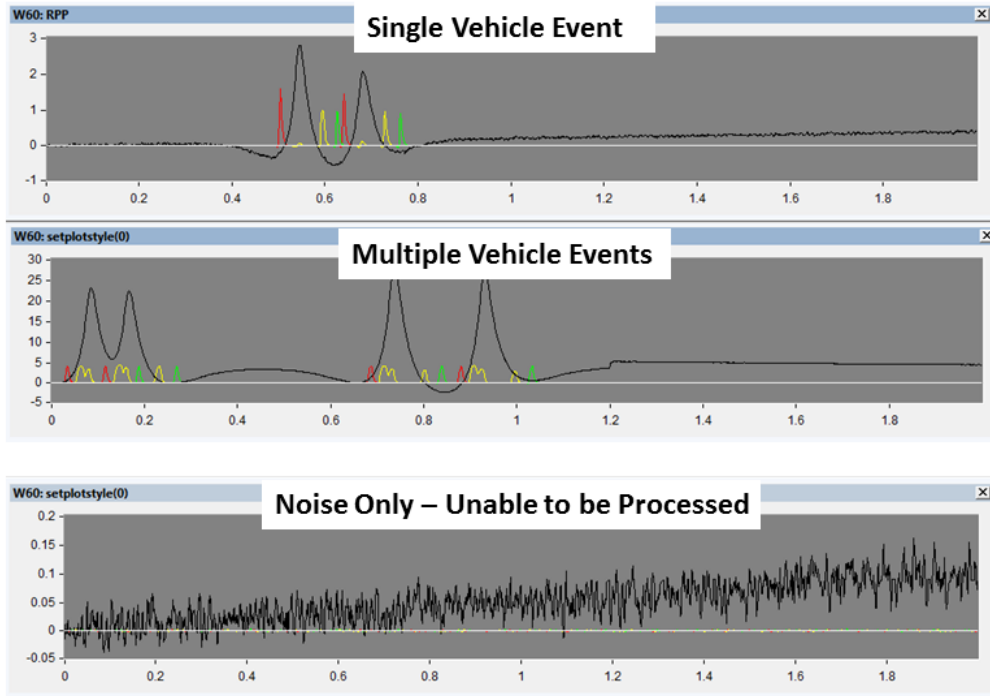


- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



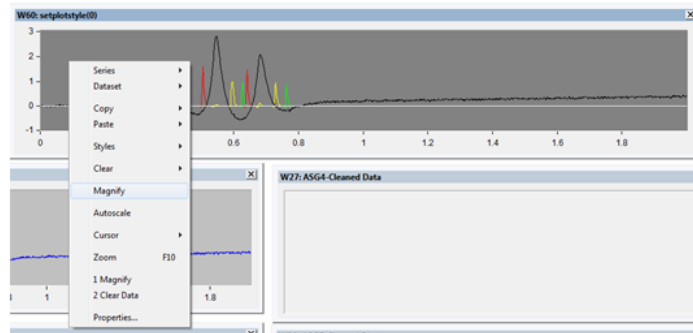
## 6. Inspect W60

- Examples of what may be seen:

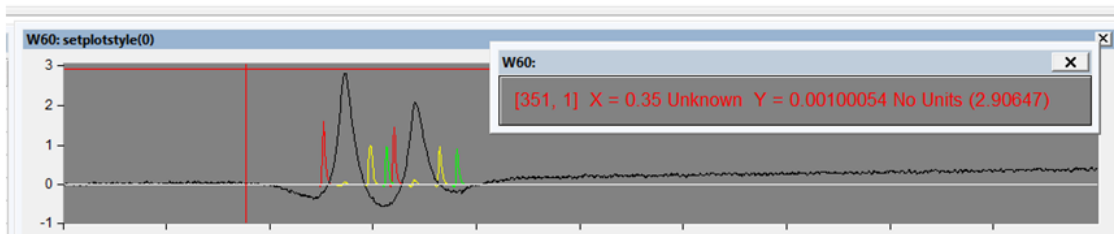


## 7. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits

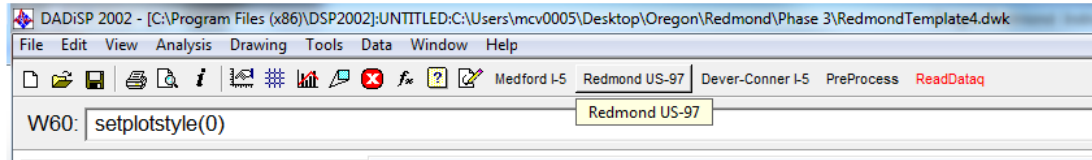


- Use cross-hair to drag over vehicle event

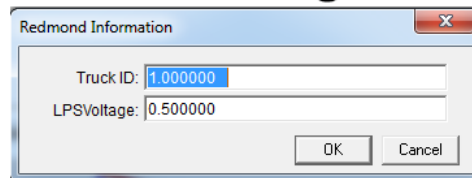


## 8. Process vehicle event

- Click on Redmond Us-97 button



- Verify Truck ID and LPSVoltage\*

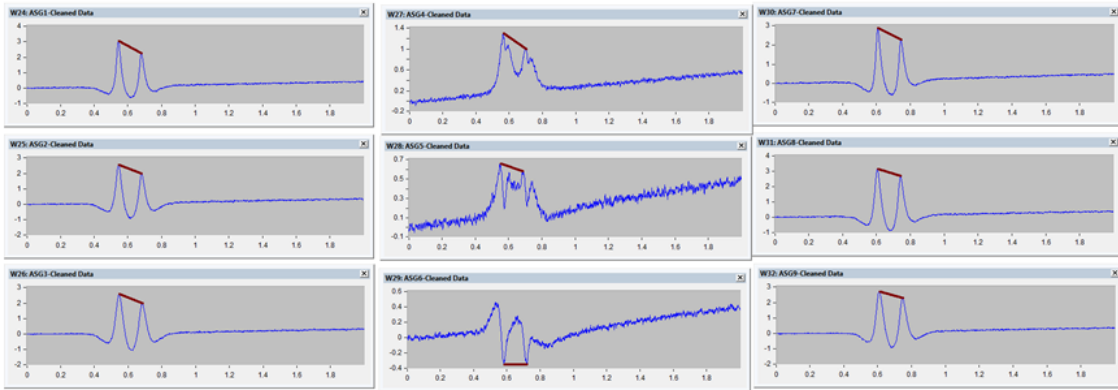


- Click OK

\*Default LPSVoltage of 0.5 will work in most all cases. When to change LPSVoltage discussed in step 15

## 9. Visual inspection of processed output

- Ensure peaks are captured on ASGs



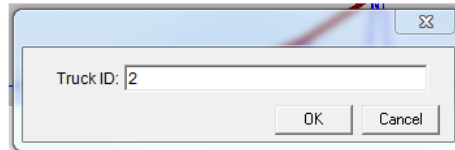
- Processed data output in tabular form in W57

W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000	1.000000
2:	1.000000	2.000000
3:		
4:		
5:		
6:		
7:		

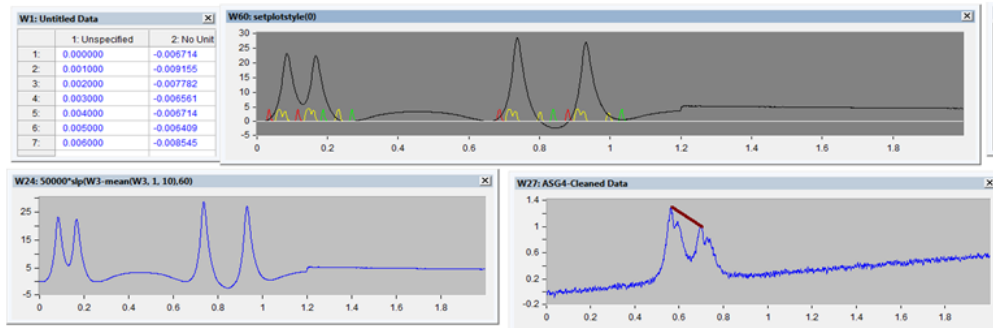


## 10. Repeat procedure for next .txt file

- Repeat Step 2 through 4
- Change Truck ID in Step 5

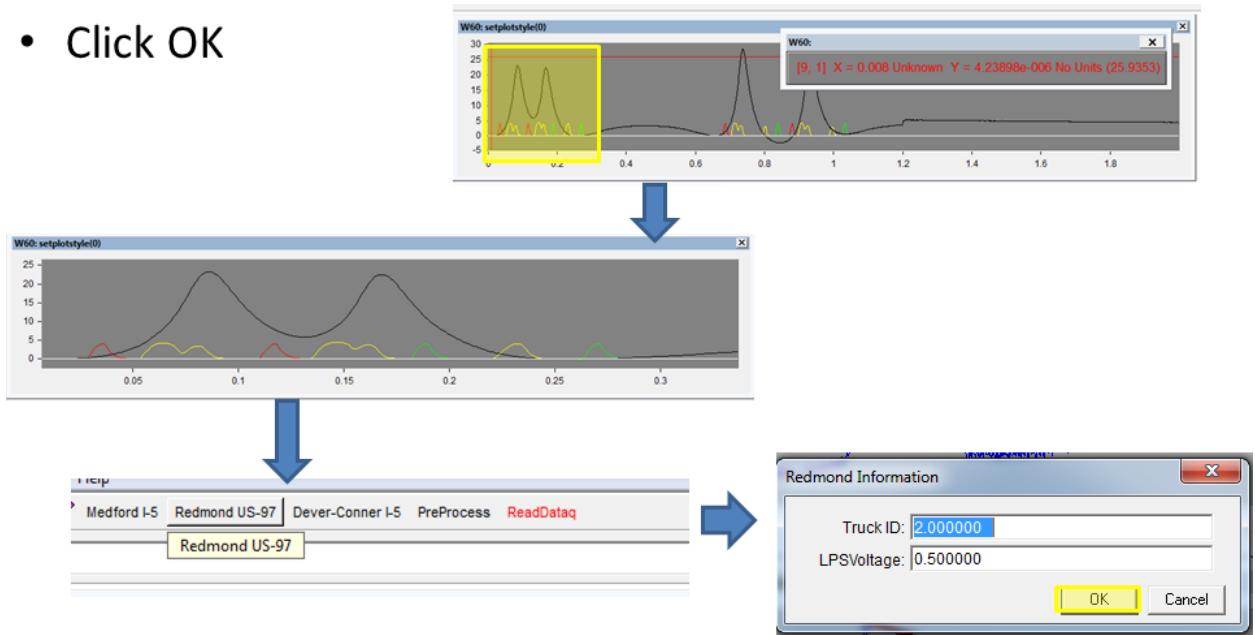


- Next file will be loaded into W60 and W24



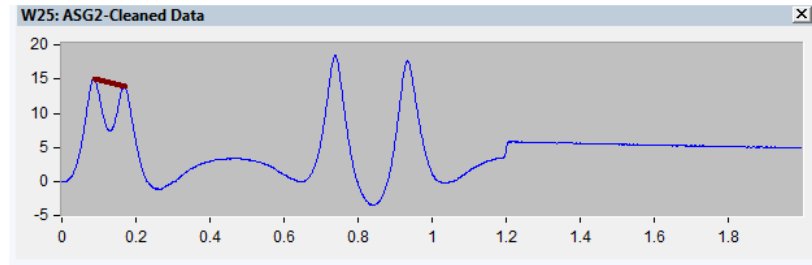
## 11. Processing files with multiple vehicle events

- Magnify vehicle event to be processed (shown in step 9)
- Click Redmond US-97 button
- Verify Truck ID and LPSVoltage
- Click OK



## 11. Files with multiple vehicle events cont..

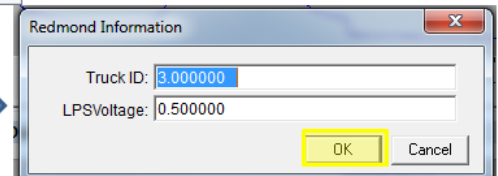
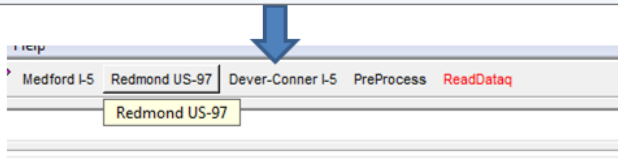
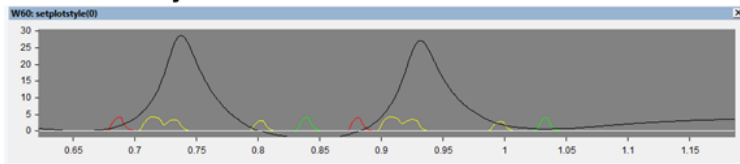
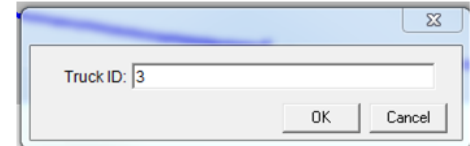
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:			
6:			
7:			

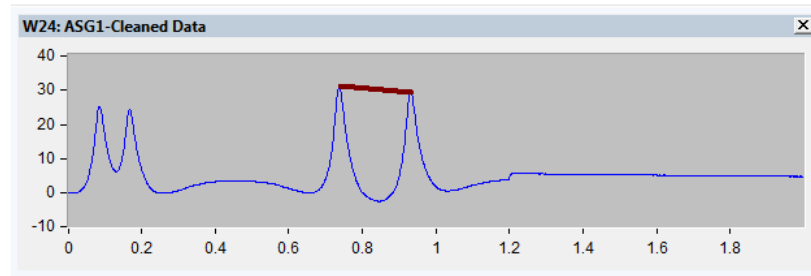
## 11. Files with multiple vehicle events cont..

- Click Preprocess button without loading another file
- Change Truck ID → Click OK
- Magnify other vehicle event
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage → Click OK



## 11. Files with multiple vehicle events cont..

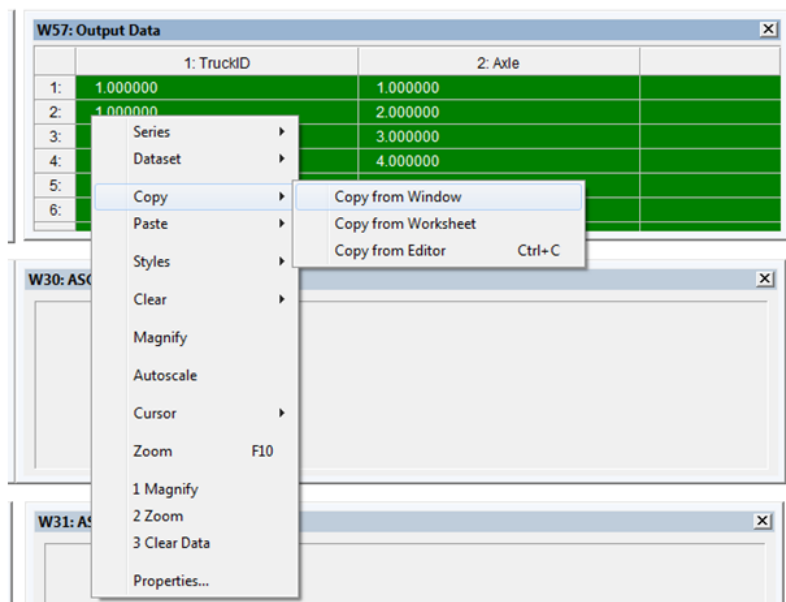
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:	3.000000	1.000000	
6:	3.000000	2.000000	
7:			

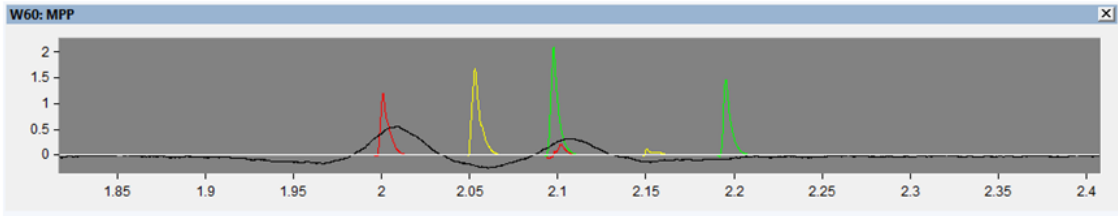
## 12. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

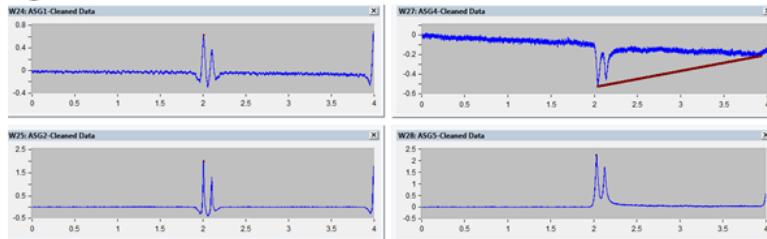


# 13. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



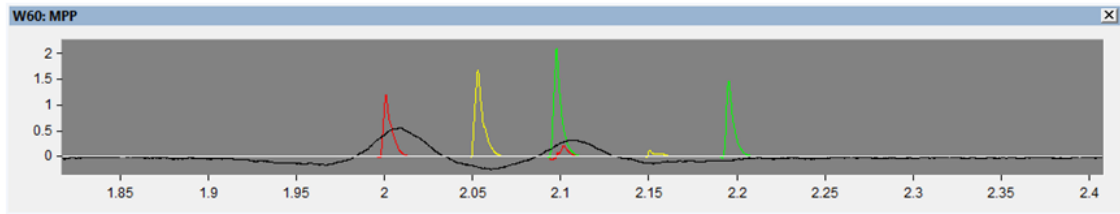
- The peaks will not be properly captured when processing\*



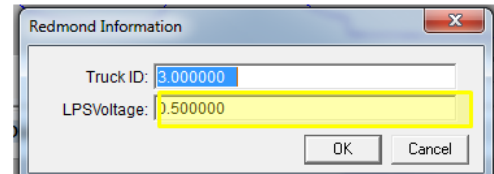
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 13. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Redmond US-97 button to process, change LPSVoltage
- Click OK
- Event is processed successfully if all peaks are captured.





**APPENDIX B3 – REDMOND DATA PROCESSING**

**1/22/2009; 4/1/2009; 5/21/2009; 5/22/2009; 8/20/2009; 9/29/2009; 11/17/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Redmond

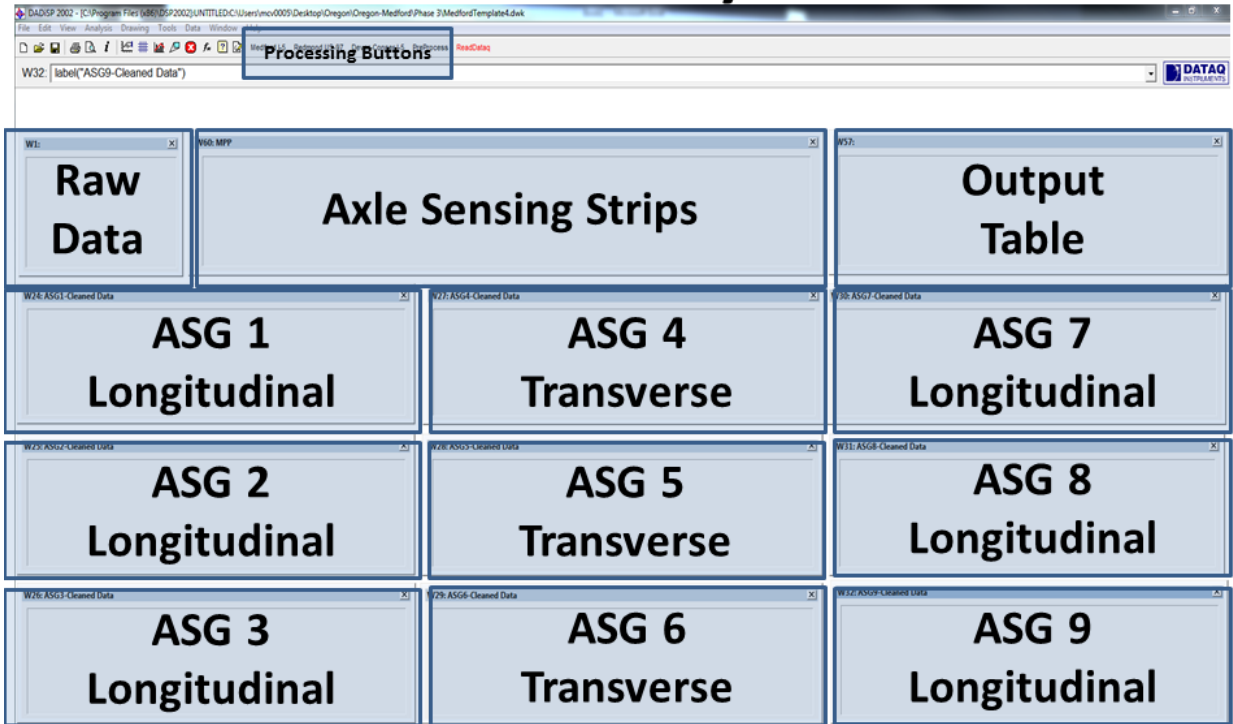
1/22/2009; 4/1/2009; 5/21/2009;  
5/22/2009; 8/20/2009; 9/29/2009;  
11/17/2009

# DADiSP Processing Steps

1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Add zeroes in columns N through Y
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Processing files with multiple vehicle events
14. Copy W57 and store in EXCEL
15. Troubleshooting

# RedmondTemplate4.dwk

## General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:

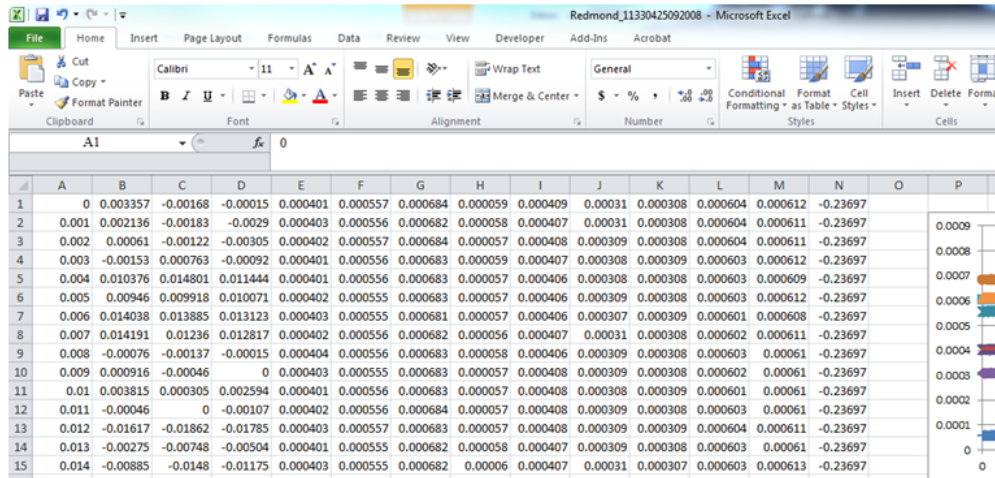
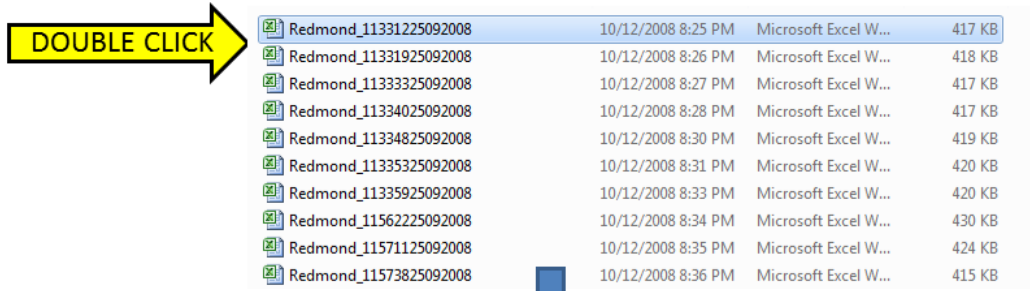
- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.

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**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▸ Requirements

**CLICK** →

## 2. Open raw .tdms file in EXCEL



# 3. Open Data tab in EXCEL workbook

The screenshot displays an Excel spreadsheet with the following data structure:

Root Name	Title	Author	Date/Time	Groups	Description
RedmondOct09_10405222102009				1	
Group	Channels	Description	header		
			Station Name: RedmondOct09		
			Sample Rate: 5000.0		
			Comments:		
			TimeN		
			DiagSs		
			g03sg04		
			sg05sg0		
			6sg07sg		
			08sg09s		
			g10sg12		
			secsvolts		
			voltsvol		

The bottom status bar shows the active tab is 'Data', indicated by a yellow arrow and the word 'CLICK'.



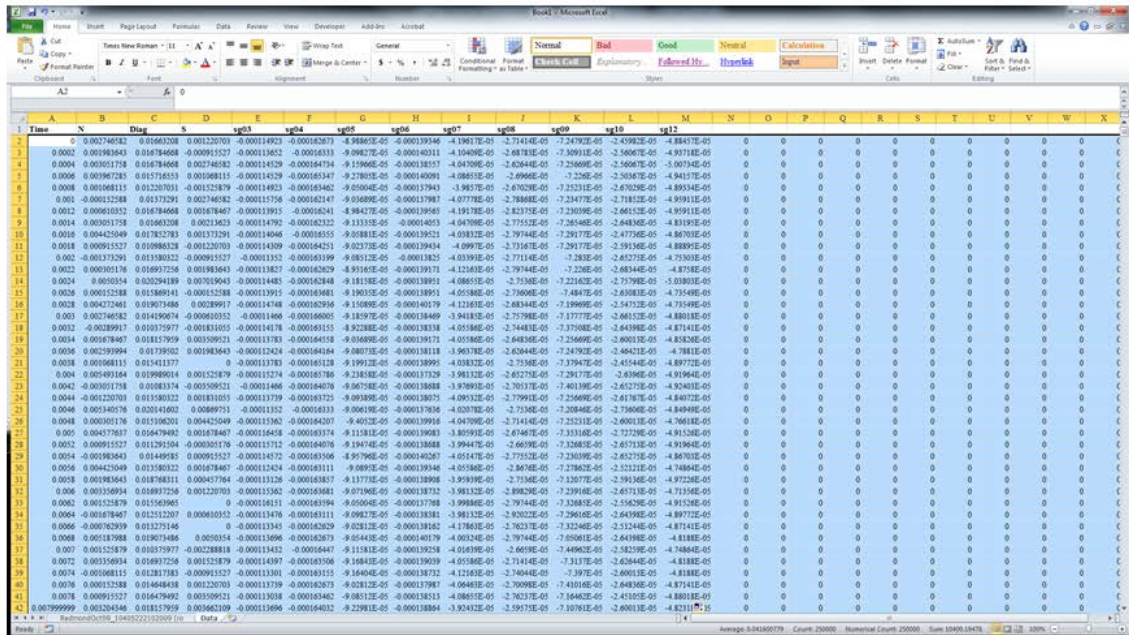
# 4. Add zeroes in columns N through Y

- Enter zeroes into columns N through Y
- Copy zeroes through all rows containing data

J	N	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y		
1	0.002746582	0.01663208	0.001220703	-0.000114923	-0.000162673	-8.58865E-05	-0.000139346	-4.19617E-05	-2.71414E-05	-7.24792E-05	-2.45982E-05	-4.88457E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0.001983643	0.016784668	-0.000915527	-0.000113652	-0.000163333	-9.09827E-05	-0.000140311	-4.10409E-05	-2.68783E-05	-7.30931E-05	-2.56067E-05	-4.93718E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0.003051758	0.016784668	0.002746582	-0.000114529	-0.000164734	-9.15968E-05	-0.000138557	-4.04709E-05	-2.62644E-05	-7.25669E-05	-2.56067E-05	-5.00734E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.003967285	0.015718553	0.001068115	-0.000114529	-0.000165347	-9.27805E-05	-0.000140091	-4.08655E-05	-2.4966E-05	-7.226E-05	-2.50167E-05	-4.94157E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0.001068115	0.012207031	-0.001525879	-0.000114923	-0.000163462	-9.05004E-05	-0.000137943	-3.9837E-05	-2.67029E-05	-7.25231E-05	-2.67029E-05	-4.89334E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	-0.000152588	0.01373291	0.002746582	-0.000115756	-0.000162147	-9.03689E-05	-0.000137987	-4.07778E-05	-2.78868E-05	-7.23477E-05	-2.71852E-05	-4.95911E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0.000610352	0.016784668	0.001678467	-0.000113915	-0.000162421	-8.98427E-05	-0.000139565	-4.19178E-05	-2.82375E-05	-7.23039E-05	-2.66152E-05	-4.95911E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0.003051758	0.01663208	0.00213623	-0.000114792	-0.000162322	-9.13335E-05	-0.00014053	-4.04709E-05	-2.77552E-05	-7.26546E-05	-2.64836E-05	-4.83195E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0.004425049	0.01782783	0.001373291	-0.000114046	-0.00016355	-9.05881E-05	-0.000139521	-4.03832E-05	-2.7974E-05	-7.29177E-05	-2.47758E-05	-4.86703E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0.000915527	0.010966328	-0.001220703	-0.000114509	-0.000164251	-9.02373E-05	-0.000139434	-4.0997E-05	-2.71617E-05	-7.29177E-05	-2.59136E-05	-4.88891E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-0.0011373291	0.013580322	-0.000915527	-0.000113552	-0.000163199	-9.08512E-05	-0.00013825	-4.01393E-05	-2.7714E-05	-7.283E-05	-2.65275E-05	-4.75303E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0.000305176	0.016937256	0.001983643	-0.000113827	-0.000162629	-8.93165E-05	-0.000139171	-4.12163E-05	-2.7974E-05	-7.226E-05	-2.68344E-05	-4.8758E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0.0050354	0.020294189	0.007019043	-0.000114485	-0.000162848	-9.18158E-05	-0.000138951	-4.08655E-05	-2.7536E-05	-7.22162E-05	-2.75798E-05	-5.03803E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0.000152588	0.015899141	-0.000152588	-0.000113915	-0.000163681	-9.19035E-05	-0.000138951	-4.05586E-05	-2.7360E-05	-7.4847E-05	-2.63083E-05	-4.73549E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0.004272461	0.019073486	0.00289917	-0.000114748	-0.000162956	-9.15089E-05	-0.000140179	-4.12163E-05	-2.68344E-05	-7.19669E-05	-2.54752E-05	-4.73549E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0.002746582	0.014190674	-0.000610352	-0.000114666	-0.000166005	-9.18397E-05	-0.000138469	-3.94183E-05	-2.7579E-05	-7.17777E-05	-2.66152E-05	-4.88018E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	-0.00289917	0.010317977	-0.001831055	-0.000114178	-0.000163155	-8.9228E-05	-0.000138338	-4.05586E-05	-2.74483E-05	-7.3708E-05	-2.64398E-05	-4.87141E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0.001678467	0.01817959	0.001509521	-0.000113783	-0.000164558	-9.03689E-05	-0.000139171	-4.05586E-05	-2.64836E-05	-7.25669E-05	-2.60013E-05	-4.8582E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0.002593994	0.01739502	0.001983643	-0.000112424	-0.000164164	-9.08073E-05	-0.000138118	-3.96378E-05	-2.62644E-05	-7.24792E-05	-2.46421E-05	-4.7881E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0.001068115	0.015411377	0	-0.000113783	-0.000165128	-9.19912E-05	-0.000138995	-4.03832E-05	-2.7536E-05	-7.37947E-05	-2.45344E-05	-4.89772E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0.005493164	0.01999014	0.001525879	-0.000115274	-0.000165786	-9.2385E-05	-0.000137329	-3.98132E-05	-2.65275E-05	-7.29177E-05	-2.6396E-05	-4.91984E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	-0.001061358	0.016781332	-0.001061358	-0.000112666	-0.000164076	-8.96749E-05	-0.000138488	-3.97603E-05	-2.70517E-05	-7.24110E-05	-2.63739E-05	-4.90203E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

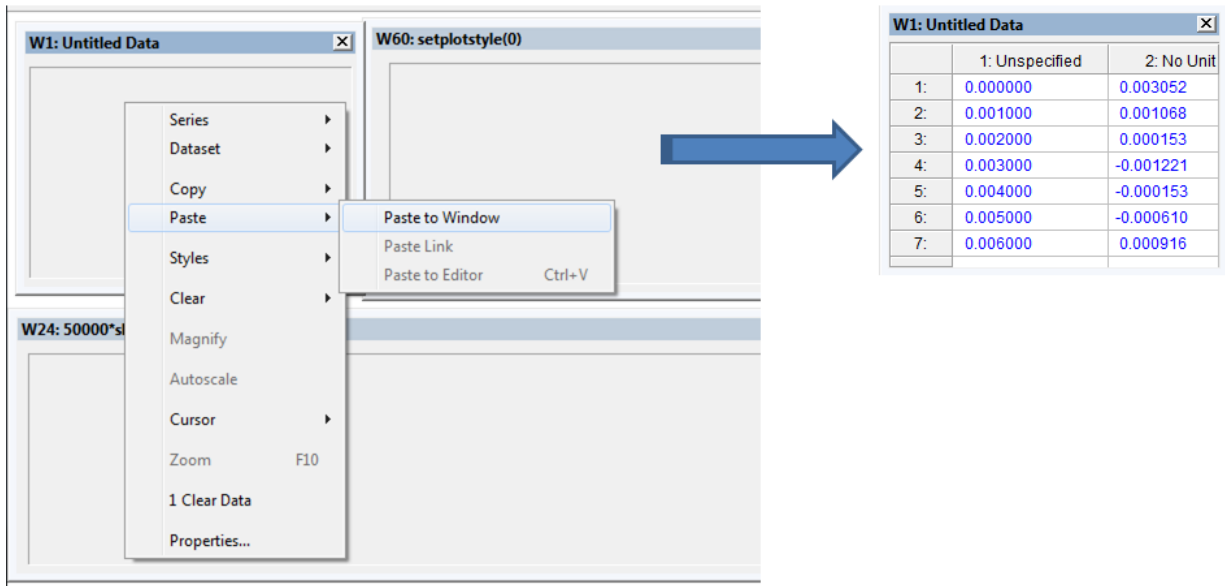
# 5. Copy data

- Highlight data
  - Exclude Header Row
- Right-Click → Select Copy → Left-Click

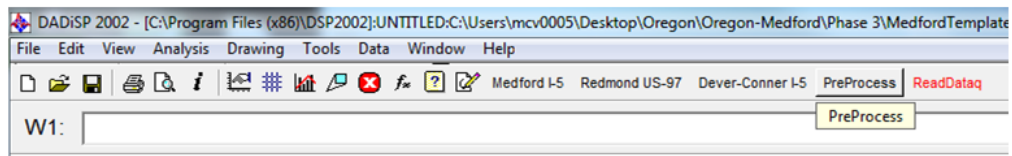


## 6. Paste raw data into W1: Paste Raw Data Here...

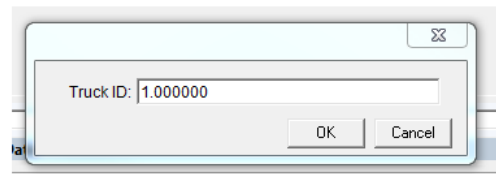
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



## 7. Click PreProcess button to inspect data

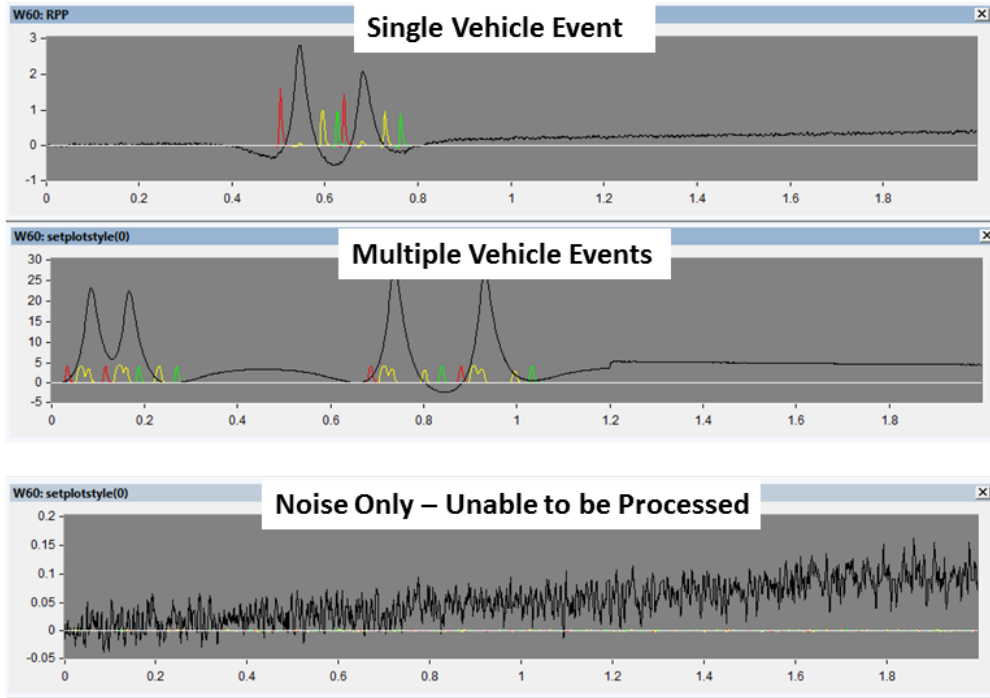


- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



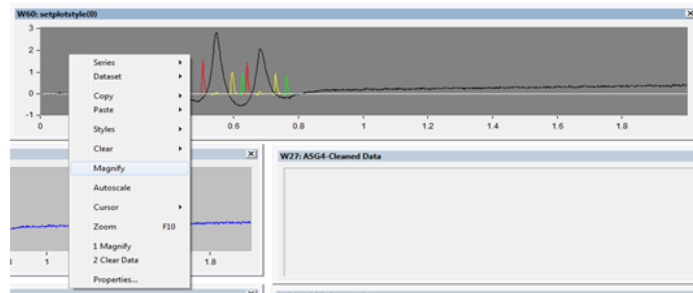
## 8. Inspect W60

- Examples of what may be seen:

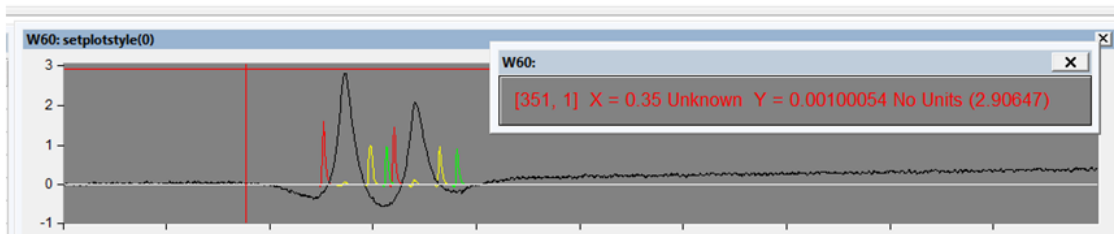


## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits

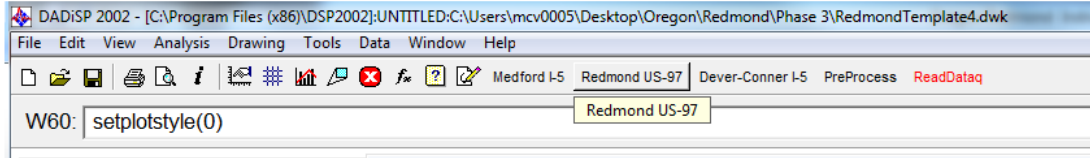


- Use cross-hair to drag over vehicle event

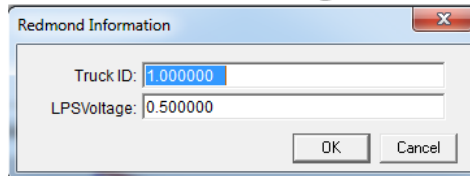


## 10. Process vehicle event

- Click on Redmond US-97 button



- Verify Truck ID and LPSVoltage\*

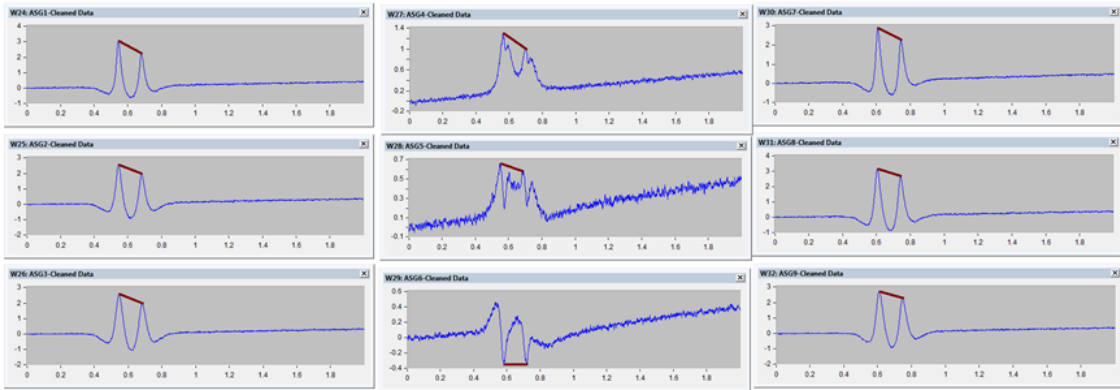


- Click OK

\*Default LPSVoltage of 0.5 will work in most all cases. When to change LPSVoltage discussed in step 15

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs



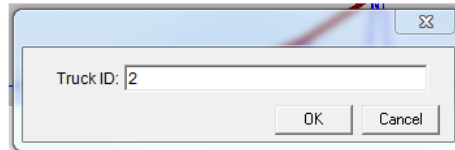
- Processed data output in tabular form in W57

W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000	1.000000
2:	1.000000	2.000000
3:		
4:		
5:		
6:		
7:		

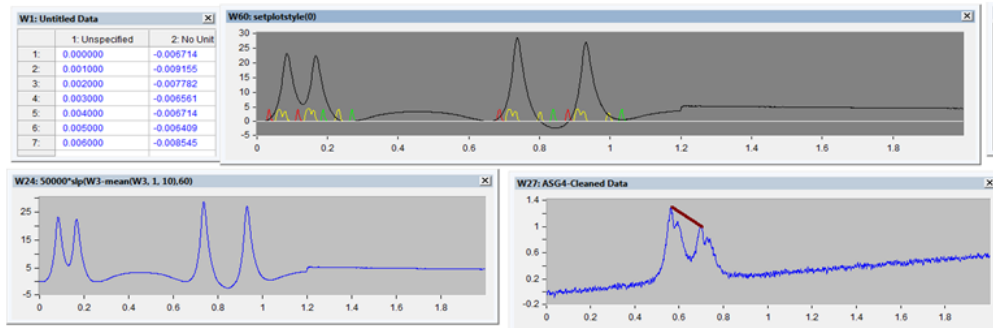


## 12. Repeat procedure for next .txt file

- Repeat Step 2 through 4
- Change Truck ID in Step 5

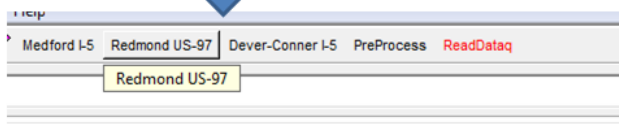
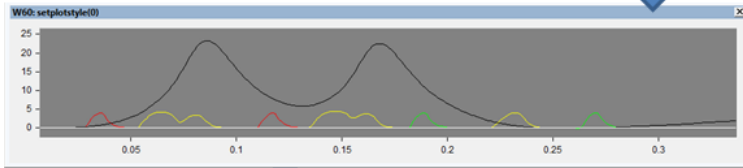
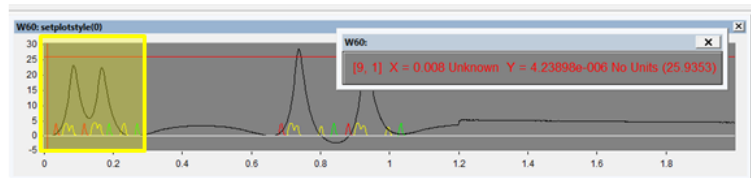


- Next file will be loaded into W60 and W24



### 13. Processing files with multiple vehicle events

- Magnify vehicle event to be processed (shown in step 9)
- Click Redmond US-97 button
- Verify Truck ID and LPSVoltage
- Click OK

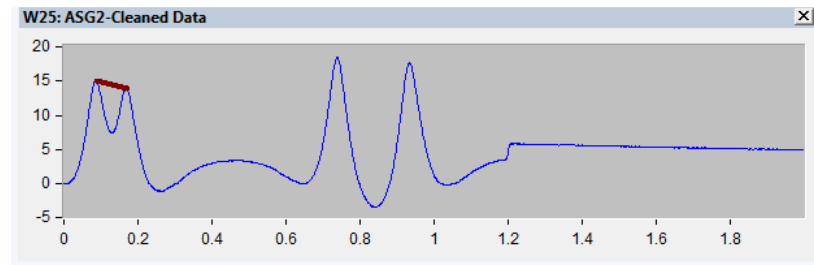


Truck ID: 2.000000  
LPSVoltage: 0.500000

OK Cancel

### 13. Files with multiple vehicle events cont..

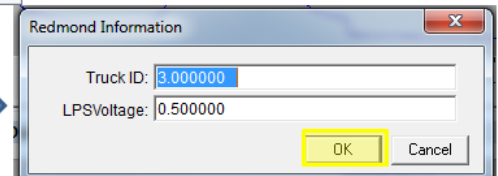
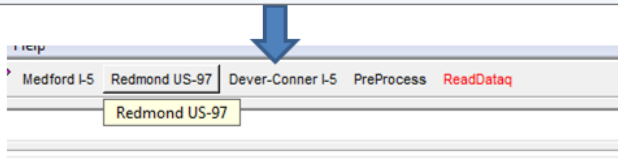
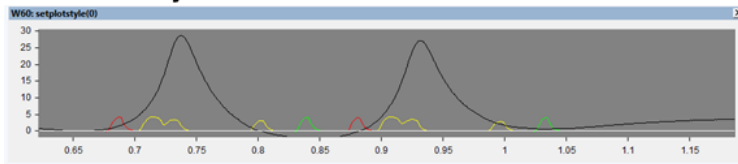
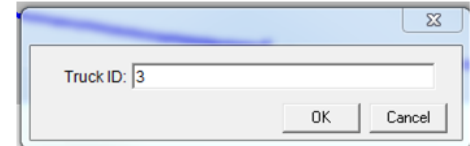
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:			
6:			
7:			

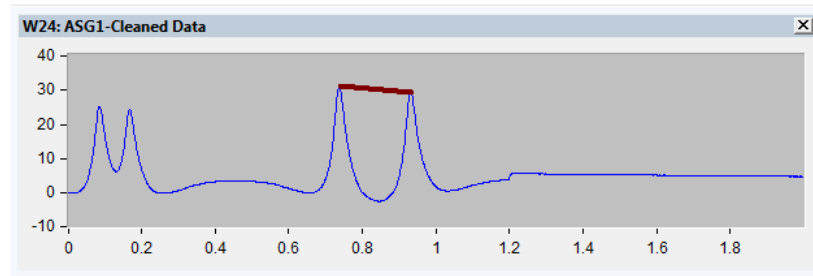
### 13. Files with multiple vehicle events cont..

- Click Preprocess button without loading another file
- Change Truck ID → Click OK
- Magnify other vehicle event
- Click Redmond US- 97 button
- Verify Truck ID and LPSVoltage → Click OK



### 13. Files with multiple vehicle events cont..

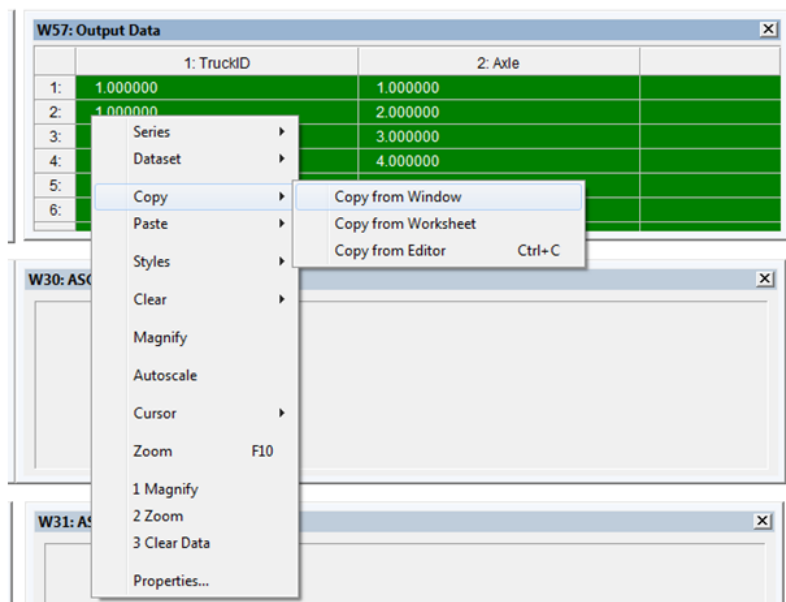
- Vehicle event shown in W60 will be processed and added to table in W57



	1: TruckID	2: Axle	
1:	1.000000	1.000000	
2:	1.000000	2.000000	
3:	2.000000	1.000000	
4:	2.000000	2.000000	
5:	3.000000	1.000000	
6:	3.000000	2.000000	
7:			

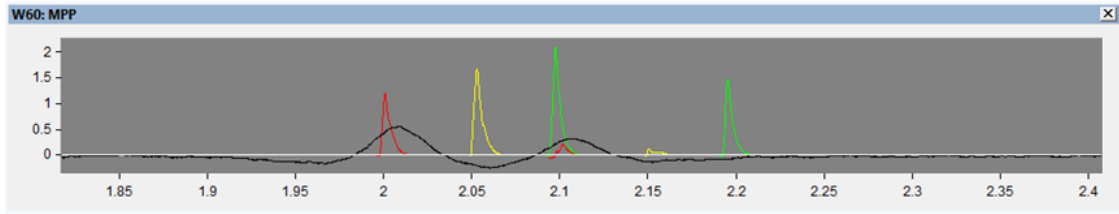
## 14. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

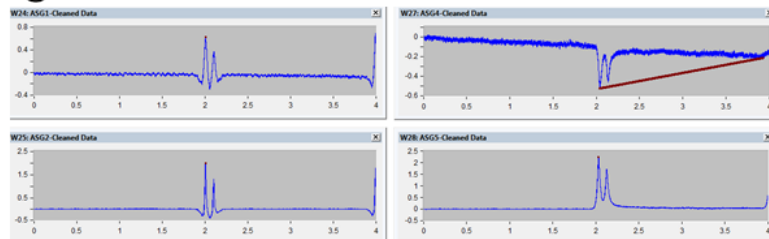


## 15. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



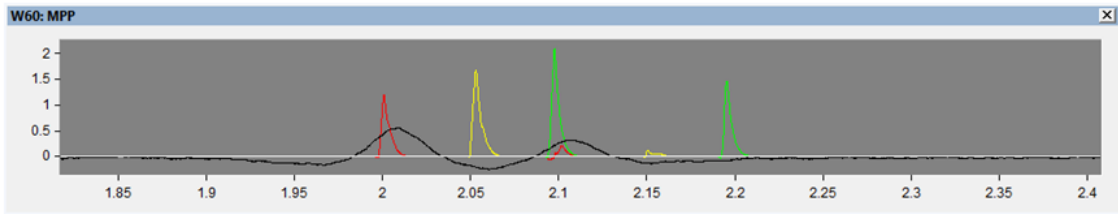
- The peaks will not be properly captured when processing\*



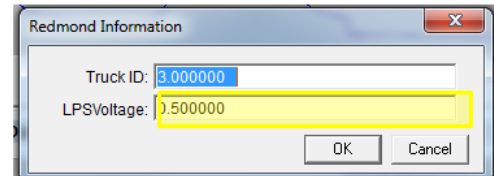
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 15. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Redmond US-97 button to process, change LPSVoltage
- Click OK
- Event is processed successfully if all peaks are captured.





**APPENDIX C1 – DEVER-CONNER DATA PROCESSING**

**3/13/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

3/13/2009

# DADiSP Processing Steps

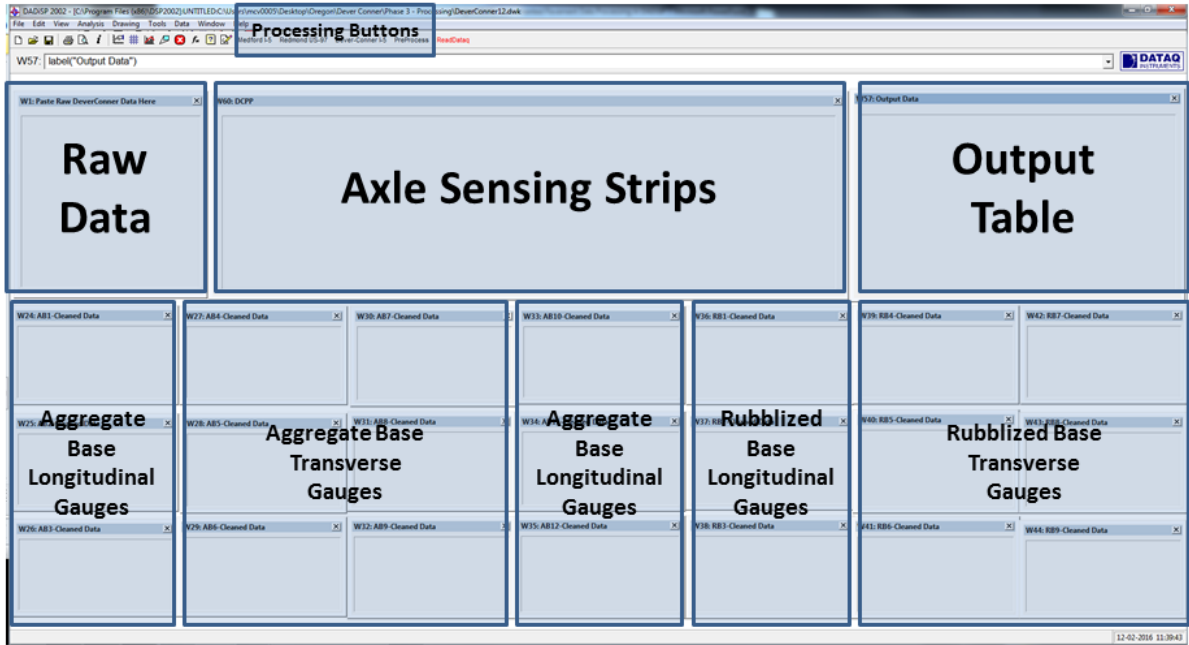
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- **No RB Gauges**
- TDMS File
- Time and LPS listed
- 12 strain gauges listed
- Gauges appear out of order
- Dates
  - 3/13/2009

Channel	Datatype
Time	DT_FLOAT
axle1	DT_FLOAT
axle2	DT_FLOAT
axle3	DT_FLOAT
sg1	DT_FLOAT
sg2	DT_FLOAT
sg3	DT_FLOAT
sg4	DT_FLOAT
sg5	DT_FLOAT
sg6	DT_FLOAT
sg7	DT_FLOAT
sg8	DT_FLOAT
sg9	DT_FLOAT
sg10	DT_FLOAT
sg12	DT_FLOAT
sg11	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.

**Bookmark & Share**  
 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▸ Requirements

**CLICK** →

## 2. Open raw \*.tdms file in EXCEL



DC_11343513032009	3/13/2009 1:34 PM	TDMS File	1,252 KB
DC_11344313032009	3/13/2009 1:34 PM	TDMS File	1,252 KB
DC_11350713032009	3/13/2009 1:35 PM	TDMS File	1,252 KB
DC_11355213032009	3/13/2009 1:35 PM	TDMS File	1,252 KB
DC_11361913032009	3/13/2009 1:36 PM	TDMS File	1,252 KB
DC_11363513032009	3/13/2009 1:36 PM	TDMS File	1,252 KB
DC_11364513032009	3/13/2009 1:36 PM	TDMS File	1,252 KB
DC_11371413032009	3/13/2009 1:37 PM	TDMS File	1,252 KB
DC_11380513032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11381013032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11381913032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11383013032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11384313032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11384913032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11385513032009	3/13/2009 1:38 PM	TDMS File	1,252 KB
DC_11391413032009	3/13/2009 1:39 PM	TDMS File	1,252 KB
DC_11392413032009	3/13/2009 1:39 PM	TDMS File	1,252 KB
DC_11394713032009	3/13/2009 1:39 PM	TDMS File	1,252 KB
DC_11401413032009	3/13/2009 1:40 PM	TDMS File	1,252 KB
DC_11402213032009	3/13/2009 1:40 PM	TDMS File	1,252 KB
DC_11403113032009	3/13/2009 1:40 PM	TDMS File	1,252 KB



# 3. Open Data tab in EXCEL workbook

	A	B	C	D	E
1	Root Name	Title	Author	Date/Time	Groups
2	DC08192009_09371619082009				
3					
4	Group	Channels	Description	header	
			Station		
			Name:DC08192009		
			Sample Rate:5000.0		
			Comments:		
			Timeaxle1axle2		
			axle3AB01		
			sg3AB02AB03		
			AB04AB05AB06		
			AB07AB08AB		
			09AB10AB11A		
			B12		
			RB01RB02RB0		
			3RB04RB05RB		
			06RB07RB08R		
			B09		
			secsvoltsvoltsvol		
			tsvoltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvoltsvo		
			ltsvoltsvoltsvolts		
			voltsvoltsvoltsvo		
			ltsvolts		
5	Data		25		
6					
7	Data				



	A	B	C	D	E	F
1	Time	axle1	axle2	axle3	sg3	AB01
2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005
5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005
6	0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005
7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005
8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005
9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005
10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005
11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005
12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005
13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005
14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005
15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005
16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005
17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005
18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005
19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005
21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005
24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
25	0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005
26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005
27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005

CLICK

## 4. Arranging data in EXCEL

- Move column sg11 between sg10 and sg12.
  - Cut column P (sg11) → Insert cut cells between sg10 and sg12

The image displays two screenshots of an Excel spreadsheet illustrating the process of moving a column. The left screenshot shows a spreadsheet with columns M, N, O, P, Q, and R. Column P is highlighted in blue, and the 'Cut' menu is open over it. The right screenshot shows the same spreadsheet after the column has been moved. Column P is now between columns N and O. The 'Insert Cut Cells' option is highlighted in the 'Cut' menu. A blue arrow points from the first screenshot to the second, indicating the transition.

M	N	O	P	Q	R
sg9	sg10	sg12	sg11		
0.00059347	0.000430228	0.000165917	0.00035503		
0.00058742	0.000429482	0.0001664	0.00035270		
0.000600047	0.000429526	0.000166005	0.00035358		
0.000583035	0.000429614	0.000166444	0.000354021		
0.00059141	0.000430842	0.000166049	0.00035248		
0.000592813	0.000430491	0.000167057	0.00035349		
0.000587156	0.000429745	0.000166356	0.00035187		
0.000604695	0.000430622	0.000166356	0.00035428		
0.000596233	0.000429263	0.000166356	0.00035296		
0.000595531	0.000429395	0.000165479	0.00035419		
0.000589831	0.000429745	0.00016675	0.00035371		
0.000594742	0.000429132	0.000165961	0.00035393		
0.000589568	0.000429438	0.000165917	0.00035437		
0.000600179	0.000427948	0.000165304	0.000353408		
0.000591629	0.000428649	0.000166663	0.000353671		
0.000595093	0.000429658	0.000166268	0.000352399		
0.000599477	0.000430272	0.000166838	0.000355468		
0.00059084	0.000431148	0.000166268	0.00035332		
0.00060053	0.000429921	0.000166312	0.000353276		
0.000587463	0.00043071	0.000166663	0.000353934		
0.000602371	0.00042957	0.000167364	0.000354328		
0.00058663	0.000430535	0.000166663	0.000354416		

## 4. Arranging data in EXCEL cont..

- Insert columns of zeroes in columns Q through Y

	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB
	sg8	sg9	sg10	sg11	sg12												
6	0.00034192	0.00059347	0.000430228	0.00035503	0.000165917	0	0	0	0	0	0	0	0	0			
3	0.000342972	0.00058742	0.000429482	0.000352706	0.0001664	0	0	0	0	0	0	0	0	0			
6	0.00034284	0.000600047	0.000429526	0.000353583	0.000166005	0	0	0	0	0	0	0	0	0			
5	0.000341437	0.000583035	0.000429614	0.000354021	0.000166444	0	0	0	0	0	0	0	0	0			
3	0.000341744	0.00059141	0.000430842	0.000352487	0.000166049	0	0	0	0	0	0	0	0	0			
1	0.000342183	0.000592813	0.000430491	0.000353495	0.000167057	0	0	0	0	0	0	0	0	0			
5	0.000341525	0.000587156	0.000429745	0.000351873	0.000166356	0	0	0	0	0	0	0	0	0			
7	0.00034192	0.000604695	0.000430622	0.000354285	0.000166356	0	0	0	0	0	0	0	0	0			
7	0.000341832	0.000596233	0.000429263	0.000352969	0.000166356	0	0	0	0	0	0	0	0	0			
6	0.000343454	0.000595531	0.000429395	0.000354197	0.000165479	0	0	0	0	0	0	0	0	0			
6	0.000341788	0.000589831	0.000429745	0.000353715	0.00016675	0	0	0	0	0	0	0	0	0			
1	0.000342314	0.000594742	0.000429132	0.000353934	0.000165961	0	0	0	0	0	0	0	0	0			
3	0.000342402	0.000589568	0.000429438	0.000354372	0.000165917	0	0	0	0	0	0	0	0	0			
9	0.000343323	0.000600179	0.000427948	0.000353408	0.000165304	0	0	0	0	0	0	0	0	0			
3	0.000342577	0.000591629	0.000428649	0.000353671	0.000166663	0	0	0	0	0	0	0	0	0			
7	0.000340955	0.000595093	0.000429658	0.000352399	0.000166268	0	0	0	0	0	0	0	0	0			
3	0.000342446	0.000599477	0.000430272	0.000355468	0.000166838	0	0	0	0	0	0	0	0	0			
9	0.000343542	0.00059084	0.000431148	0.00035332	0.000166268	0	0	0	0	0	0	0	0	0			
3	0.000341613	0.00060053	0.000429921	0.000353276	0.000166312	0	0	0	0	0	0	0	0	0			
6	0.000341481	0.000587463	0.00043071	0.000353934	0.000166663	0	0	0	0	0	0	0	0	0			
2	0.000343147	0.000602371	0.00042957	0.000354328	0.000167364	0	0	0	0	0	0	0	0	0			
9	0.000342402	0.00058663	0.000430535	0.000354416	0.000166663	0	0	0	0	0	0	0	0	0			
4	0.000342402	0.000599828	0.000429745	0.000353364	0.000166444	0	0	0	0	0	0	0	0	0			
9	0.00034227	0.000595093	0.000430272	0.000353188	0.000165128	0	0	0	0	0	0	0	0	0			
9	0.000343323	0.000594479	0.000429526	0.000353057	0.00016618	0	0	0	0	0	0	0	0	0			
3	0.000341788	0.00059768	0.000429877	0.000354328	0.000166005	0	0	0	0	0	0	0	0	0			
1	0.000343279	0.000595531	0.000429745	0.000353627	0.000167364	0	0	0	0	0	0	0	0	0			
2	0.000344463	0.000600749	0.000429745	0.000352969	0.000166224	0	0	0	0	0	0	0	0	0			
2	0.000342095	0.000597767	0.000430491	0.000354021	0.000165874	0	0	0	0	0	0	0	0	0			
4	0.000340736	0.000595838	0.000430184	0.000353188	0.0001664	0	0	0	0	0	0	0	0	0			
2	0.000341087	0.000594479	0.000431675	0.000354285	0.000166049	0	0	0	0	0	0	0	0	0			
3	0.000343279	0.000600442	0.000432113	0.000352969	0.000165874	0	0	0	0	0	0	0	0	0			

# 5. Copy data

- Highlight data in columns A through Y (RB09) – Exclude Header Row
- Right-Click → Select Copy → Left-Click

The image shows a screenshot of an Excel spreadsheet. The columns are labeled A through Y, and the rows are numbered 1 through 48. The data in columns A through Y consists of numerical values, while columns Z through AA contain zeros. The spreadsheet interface includes a status bar at the bottom with the following information: 'Ready', '11:53:35.20207 [Print]', 'Data', 'Avg: 0.0021261, Count: 50000, Numerical Count: 50000, Sum: 4640.6372, 90%'.

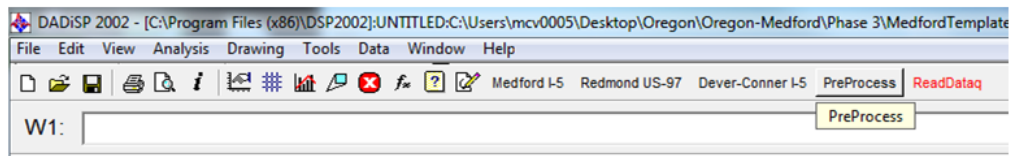
## 6. Paste raw data into W1: Paste Raw Data Here...

- Right-Click → Select Paste → Left-Click
- Copied data will fill box

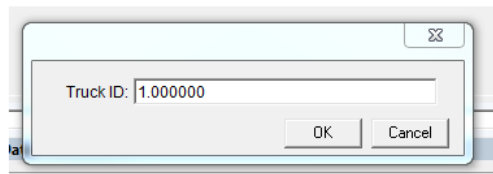
The screenshot illustrates the process of pasting data into a specific window. A context menu is shown over the window 'W1: Paste Raw DeverConner Data Here'. The 'Paste' option is selected, and a sub-menu is open with 'Paste to Window' highlighted. A blue arrow points from this sub-menu to a separate window titled 'W1: Untitled Data' which contains a table of numerical data.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

## 7. Click PreProcess button to inspect data

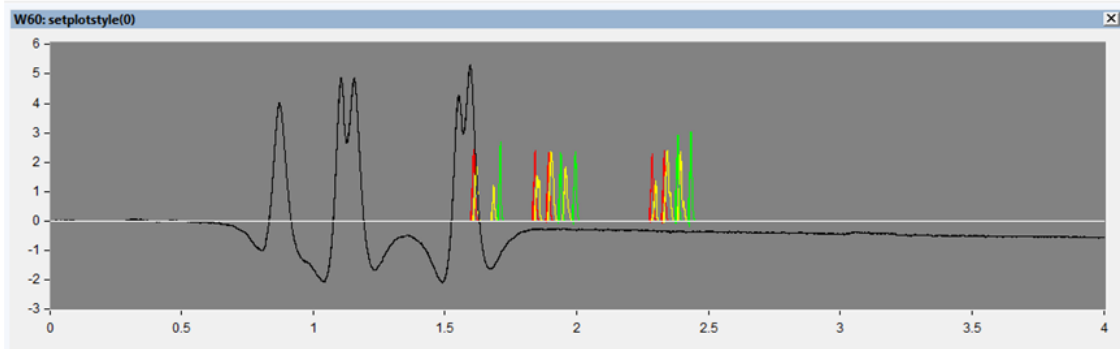


- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK





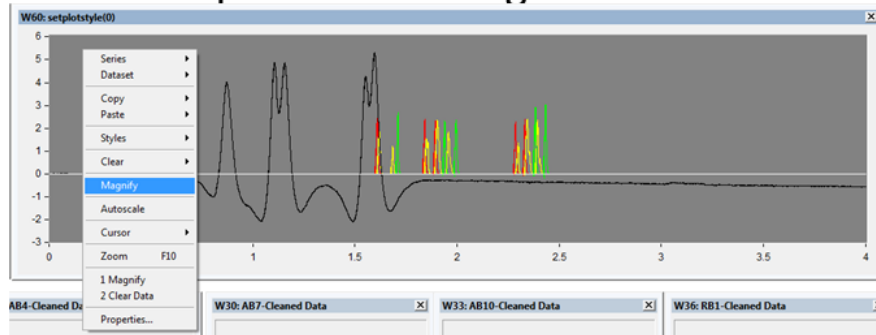
## 8. Inspect W60



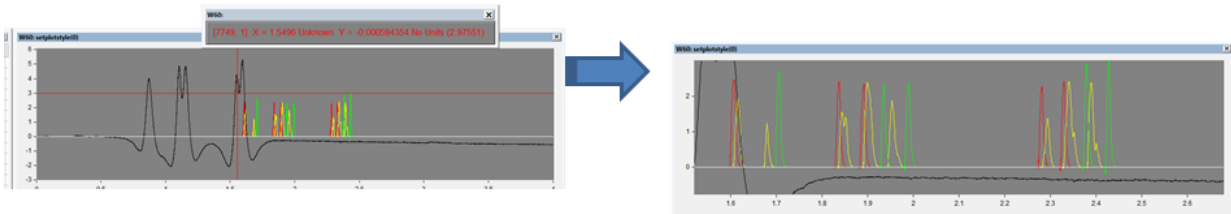
- Red lines are 1<sup>st</sup> axle sensing strip (LPS)
- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG

## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



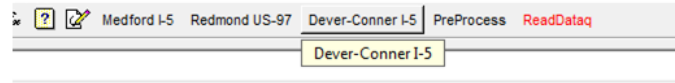
- Use cross-hair to drag over vehicle event



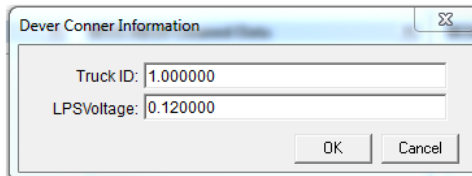


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

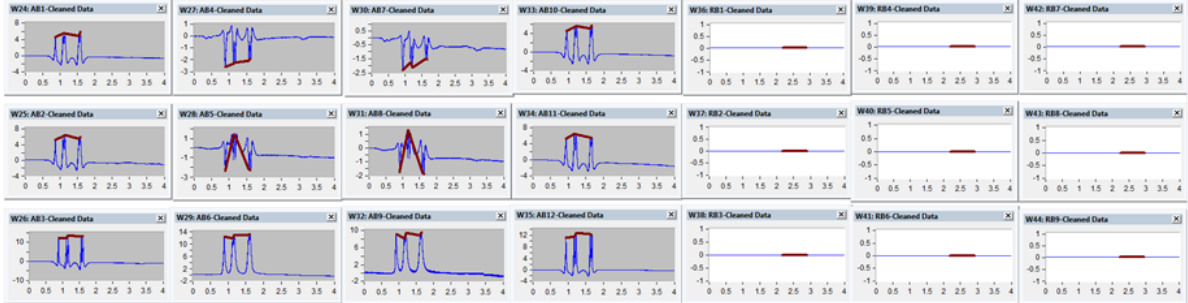
A screenshot of a dialog box titled 'Dever Conner Information'. The dialog box has a title bar with a close button. Inside the dialog, there are two text input fields. The first field is labeled 'Truck ID:' and contains the value '1.000000'. The second field is labeled 'LPSVoltage:' and contains the value '0.120000'. At the bottom right of the dialog, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in final step

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs
  - Note: only AB gauges had data to be processed

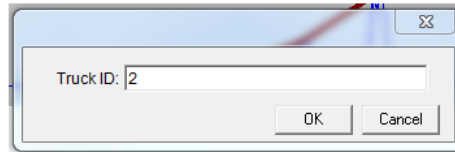


- Processed data output in tabular form in W57

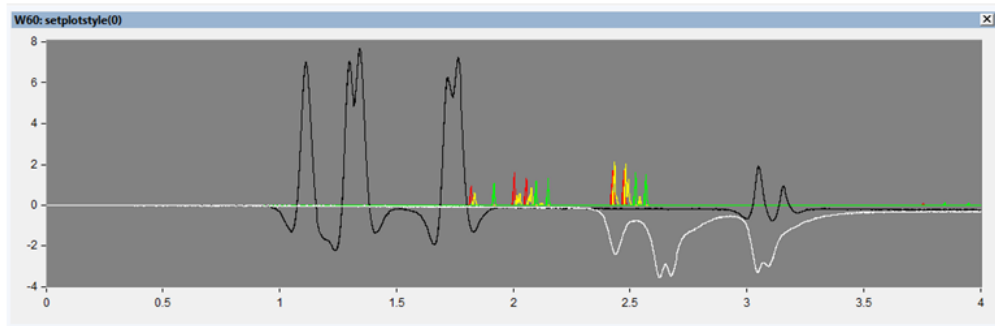
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 5
- Change Truck ID in Step 6



- Next file will be loaded into W60 and W24



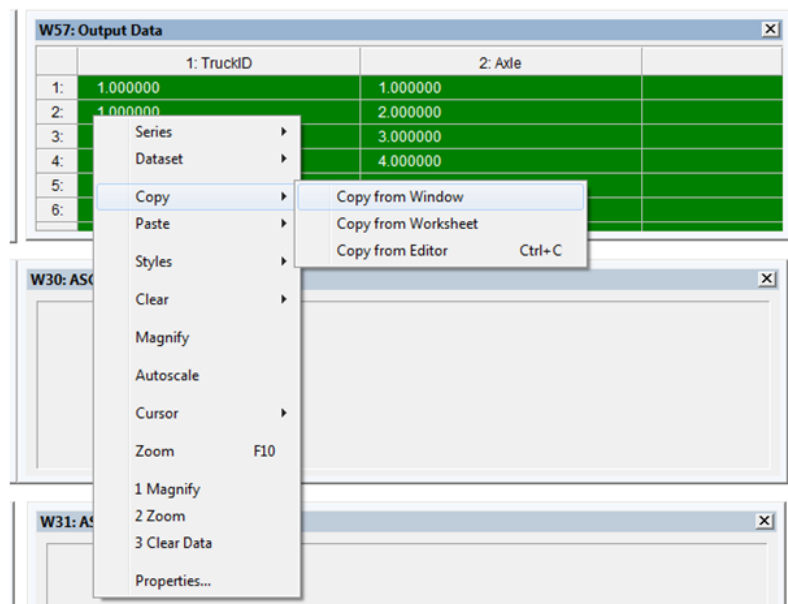
## 12. Repeat procedure for next .txt file cont...

- Repeat Step 7 through 11
- Output data will be added to table in W57

W57: Output Data			
	1: TruckID	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

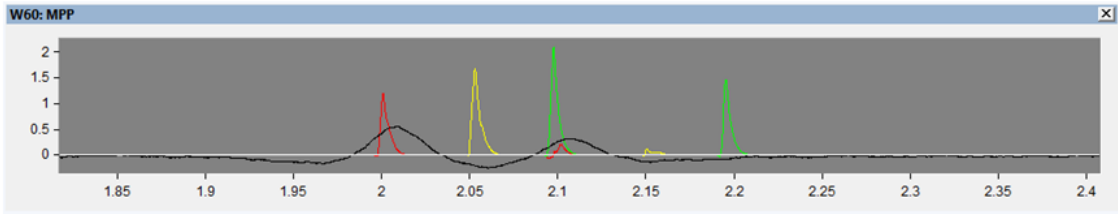
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

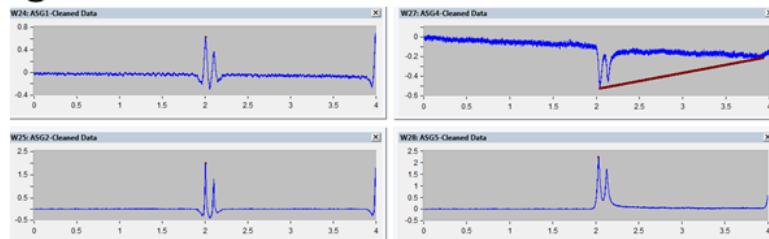


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



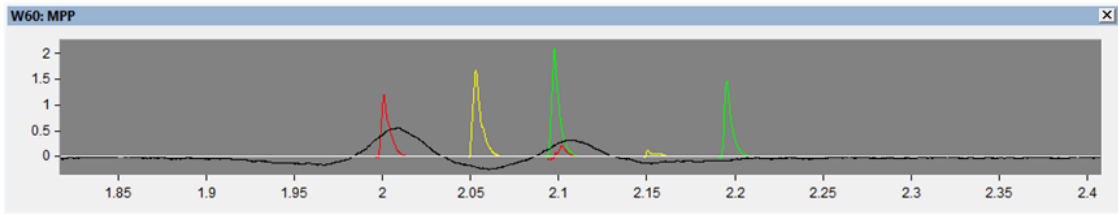
- The peaks will not be properly captured when processing\*



\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.

Truck ID:	3.000000
LPSVoltage:	0.100000

**APPENDIX C2 – DEVER-CONNER DATA PROCESSING**

**5/6/2009**





# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

5/6/2009

# DADiSP Processing Steps

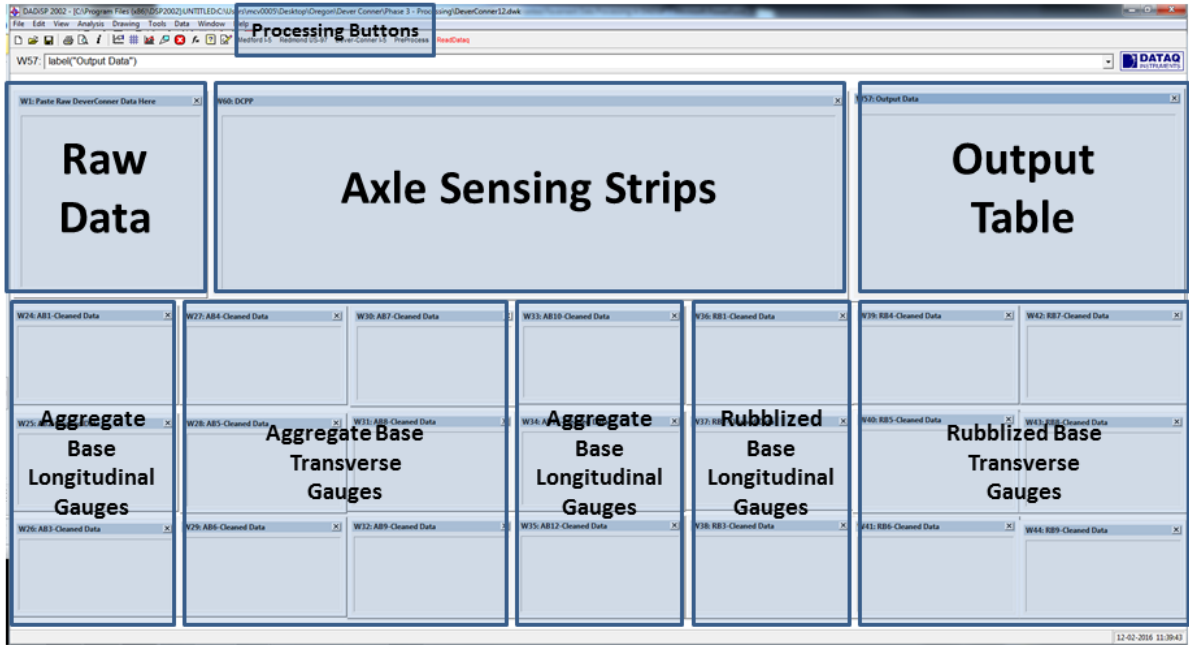
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- TDMS File
- 12 “ab” strain gauges listed
- 9 “rb” strain gauges listed
  - Numbering skips
- Dates
  - 5/6/2009

Channel	Datatype
Time	DT_FLOAT
axle1	DT_FLOAT
axle2	DT_FLOAT
axle3	DT_FLOAT
ab1	DT_FLOAT
ab2	DT_FLOAT
ab3	DT_FLOAT
ab4	DT_FLOAT
ab5	DT_FLOAT
ab6	DT_FLOAT
ab7	DT_FLOAT
ab8	DT_FLOAT
ab9	DT_FLOAT
ab10	DT_FLOAT
ab11	DT_FLOAT
ab12	DT_FLOAT
rb1	DT_FLOAT
rb3	DT_FLOAT
rb4	DT_FLOAT
rb5	DT_FLOAT
rb6	DT_FLOAT
rb7	DT_FLOAT
rb9	DT_FLOAT
rb11	DT_FLOAT
rb12	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.

























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**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▸ Requirements

**CLICK**

## 2. Open raw \*.tdms file in EXCEL

**DOUBLE CLICK** 

 DC_11483906052009	5/6/2009 1:48 PM	TDMS File	1,956 KB
 DC_11484806052009	5/6/2009 1:48 PM	TDMS File	1,956 KB
 DC_11491706052009	5/6/2009 1:49 PM	TDMS File	1,956 KB
 DC_11493106052009	5/6/2009 1:49 PM	TDMS File	1,956 KB
 DC_11523406052009	5/6/2009 1:52 PM	TDMS File	1,956 KB
 DC_11525106052009	5/6/2009 1:52 PM	TDMS File	1,956 KB
 DC_11530406052009	5/6/2009 1:53 PM	TDMS File	1,956 KB
 DC_11531906052009	5/6/2009 1:53 PM	TDMS File	1,956 KB
 DC_11532606052009	5/6/2009 1:53 PM	TDMS File	1,956 KB
 DC_11535606052009	5/6/2009 1:53 PM	TDMS File	1,956 KB
 DC_11540506052009	5/6/2009 1:54 PM	TDMS File	1,956 KB
 DC_11553706052009	5/6/2009 1:55 PM	TDMS File	1,956 KB
 DC_11554506052009	5/6/2009 1:55 PM	TDMS File	1,956 KB
 DC_11555906052009	5/6/2009 1:56 PM	TDMS File	1,956 KB
 DC_11562006052009	5/6/2009 1:56 PM	TDMS File	1,956 KB
 DC_11565806052009	5/6/2009 1:57 PM	TDMS File	1,956 KB
 DC_11571506052009	5/6/2009 1:57 PM	TDMS File	1,956 KB
 DC_11573106052009	5/6/2009 1:57 PM	TDMS File	1,956 KB
 DC_11575706052009	5/6/2009 1:57 PM	TDMS File	1,956 KB
 DC_11582506052009	5/6/2009 1:58 PM	TDMS File	1,956 KB
 DC_11584306052009	5/6/2009 1:58 PM	TDMS File	1,956 KB
 DC_11585006052009	5/6/2009 1:58 PM	TDMS File	1,956 KB
 DC_11590506052009	5/6/2009 1:59 PM	TDMS File	1,956 KB
 DC_11594306052009	5/6/2009 1:59 PM	TDMS File	1,956 KB

# 3. Open Data tab in EXCEL workbook

1	Root Name	Title	Author	Date/Time	Groups
2	DC08192009_09371619082009				
3					
4	Group	Channels	Description	header	
			Station		
			Name:DC08192009		
			Sample Rate:5000.0		
			Comments:		
			Timeaxle1axle2		
			axle3AB01		
			sg3AB02AB03		
			AB04AB05AB06		
			AB07AB08AB		
			09AB10AB11A		
			B12		
			RB01RB02RB0		
			3RB04RB05RB		
			06RB07RB08R		
			B09		
			secsvoltsvoltsvol		
			tsvoltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvoltsvo		
			ltsvoltsvoltsvolts		
			voltsvoltsvoltsvo		
			ltsvolts		
5	Data		25		
6					
7	Data				



1	Time	axle1	axle2	axle3	sg3	AB01	AB02
2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	
6	0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	
7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	
8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	
9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	
10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	
11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	
13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	
24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
25	0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	
26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	
27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	





# 4. Arranging data in EXCEL

- Insert a blank column between RB1 and RB3. Populate it with zeroes.

ab12	P	Q	R	S	T	U	V	W	rb1
-1.31541E-07	0.000143731	4.561E-05	-2.80621E-06	5.02049E-05	3.22276E-05	9.7779E-05	-9.18		
5.26165E-07	0.00014338	4.608E-05	-1.00848E-06	5.13888E-05	3.2973E-05	9.88752E-05	-9.32		
1.75388E-07	0.000144783	4.511E-05	-1.92927E-06	5.0468E-05	3.19207E-05	9.85683E-05	-9.25		
4.38471E-07	0.000143599	4.546E-05	-1.79773E-06	4.93718E-05	3.23592E-05	9.69495E-05	-9.17		
8.76942E-08	0.000144652	4.441E-05	-3.24469E-06	4.97226E-05	3.25345E-05	9.72967E-05	-9.20		
1.31541E-07	0.000145397	4.385E-05	-3.68316E-06	5.01611E-05	3.17453E-05	9.71652E-05	-9.19		
-1.18387E-06	0.000144476	4.494E-05	-1.71004E-06	5.02488E-05	3.17453E-05	9.7829E-05	-9.28		
-6.13859E-07	0.000145616	4.516E-05	-1.66619E-06	4.96349E-05	3.10437E-05	9.73844E-05	-9.30		
-1.09618E-06	0.000144213	4.433E-05	-2.63083E-06	4.8451E-05	3.08684E-05	9.71213E-05	-9.13		
-1.31541E-06	0.000145397	4.555E-05	-2.01697E-06	5.10819E-05	3.15699E-05	9.74282E-05	-9.1		
-1.14002E-06	0.000144915	4.476E-05	-9.20789E-07	4.85826E-05	3.2973E-05	9.8086E-05	-9.1		
-1.22772E-06	0.00014338	4.571E-05	-3.02545E-06	4.96349E-05	3.11314E-05	9.7033E-05	-9.18		
-1.27157E-06	0.000144608	4.635E-05	-1.11314E-06	4.88457E-05	3.13068E-05	9.78239E-05	-9.16		
-7.89248E-07	0.000144739	4.54846E-05	-7.76532E-06	-2.06081E-06	4.9598E-05	3.17453E-05	9.85683E-05	-9.14	
-5.26165E-07	0.000145002	4.52502E-05	-7.87932E-06	-3.28853E-06	5.00744E-05	3.27099E-05	9.70785E-05	-9.26	
-1.62234E-06	0.000143483	4.58022E-05	-7.79601E-06	-2.10466E-06	5.0468E-05	3.23153E-05	9.74282E-05	-9.0	
-7.89248E-07	0.000144564	4.5601E-05	-7.96263E-06	-2.80621E-06	4.90649E-05	3.16576E-05	9.70775E-05	-9.11	
-4.38471E-08	0.000144476	4.4154E-05	-7.98456E-06	-3.99009E-06	5.05995E-05	3.19207E-05	9.65951E-05	-9.26	
-3.0693E-07	0.000144476	4.63902E-05	-7.99771E-06	-2.01697E-06	5.09503E-05	3.12191E-05	9.89695E-05	-9.29	
2.19235E-07	0.000144301	4.68287E-05	-7.9714E-06	-1.79773E-06	4.88895E-05	3.22715E-05	9.69898E-05	-9.28	
-6.13859E-07	0.000145265	4.40663E-05	-7.97579E-06	-2.93776E-06	5.09942E-05	3.22776E-05	9.87875E-05	-9.24	
-3.94624E-07	0.000144915	4.49871E-05	-7.96263E-06	-2.76237E-06	5.02049E-05	3.36746E-05	9.71652E-05	-9.19	
-7.89248E-07	0.000144827	4.5031E-05	-7.93632E-06	-2.36774E-06	4.91526E-05	3.22715E-05	9.75159E-05	-9.20	
-1.75388E-07	0.000144608	4.57325E-05	-7.86178E-06	-3.24469E-06	5.02049E-05	3.19207E-05	9.75159E-05	-9.02	
1.75388E-07	0.00014566	4.42417E-05	-7.91002E-06	-3.11314E-06	5.01172E-05	3.27976E-05	9.76475E-05	-9.1	
-1.31541E-07	0.000144871	4.59518E-05	-7.82232E-06	-3.63931E-06	5.00734E-05	3.20961E-05	9.82175E-05	-9.23	
-7.01554E-07	0.000143683	4.40225E-05	-7.86178E-06	-2.14851E-06	5.09942E-05	3.23592E-05	9.76046E-05	-9.25	
-1.92927E-06	0.000144169	4.39786E-05	-7.92317E-06	-4.64779E-06	4.98541E-05	3.32391E-05	9.6463E-05	-9.19	
0	0.000145792	4.52502E-05	-8.00648E-06	-1.97312E-06	5.07311E-05	3.13507E-05	9.71652E-05	-9.20	
-3.50777E-07	0.000146142	4.51187E-05	-7.89686E-06	-1.75388E-06	4.98103E-05	3.19207E-05	9.73844E-05	-9.1	
5.70012E-07	0.000144739	4.56887E-05	-7.99333E-06	-4.38471E-06	5.02488E-05	3.16118E-05	9.71213E-05	-9.16	
-5.70012E-07	0.000144082	4.55571E-05	-7.94071E-06	-2.76237E-06	5.08188E-05	3.17014E-05	9.93137E-05	-9.05	
0	0.000144783	4.60833E-05	-7.94948E-06	-2.3239E-06	5.01611E-05	3.20522E-05	9.63321E-05	-9.26	
-3.50777E-07	0.000143555	4.57764E-05	-8.00648E-06	-1.66619E-06	4.88895E-05	3.26222E-05	9.75159E-05	-9.1	

	O	P	Q	R	S	T	U
rb11	ab12	rb1	rb3	rb4	rb5		
	3.50777E-05	-1.31541E-07	0.000143731	0	4.56448E-05	7.77847E-05	-2.8062
	3.57792E-05	5.26165E-07	0.00014338	0	4.60833E-05	8.00209E-05	-1.0084
	3.613E-05	1.75388E-07	0.000144783	0	4.51187E-05	7.88371E-05	-1.9292
	3.55161E-05	4.38471E-07	0.000143599	0	4.54694E-05	7.78286E-05	-1.7977
	3.53408E-05	8.76942E-08	0.000144652	0	4.44171E-05	8.01525E-05	-3.2446
	3.71385E-05	1.31541E-07	0.000145397	0	4.38909E-05	8.07663E-05	-3.6831
	3.48584E-05	-1.18387E-06	0.000144476	0	4.49433E-05	7.93632E-05	-1.7100
	3.63931E-05	-6.13859E-07	0.000145616	0	4.51625E-05	7.98456E-05	-1.6661
	3.71385E-05	-1.09618E-06	0.000144213	0	4.43294E-05	7.96702E-05	-2.6308
	3.67E-05	-1.31541E-06	0.000145397	0	4.55571E-05	7.86178E-05	-2.0169
	3.48584E-05	-1.14002E-06	0.000144915	0	4.47679E-05	7.87494E-05	-9.2078
	3.57792E-05	-1.22772E-06	0.000144388	0	4.57325E-05	7.90125E-05	-3.0254
	3.54285E-05	-1.27157E-06	0.000144608	0	4.63902E-05	7.93632E-05	-3.1131
	3.63054E-05	-7.89248E-07	0.000144739	0	4.45486E-05	7.76532E-05	-2.0608
	3.60862E-05	-5.26165E-07	0.000145002	0	4.52502E-05	7.87932E-05	-3.2885
	3.71823E-05	-1.62234E-06	0.000143683	0	4.58202E-05	7.79601E-05	-2.1046
	3.53408E-05	-7.89248E-07	0.000144564	0	4.5601E-05	7.96263E-05	-2.8062
	3.52531E-05	-4.38471E-08	0.000144476	0	4.4154E-05	7.98456E-05	-3.9900
	3.51654E-05	-3.0693E-07	0.000144476	0	4.63902E-05	7.99771E-05	-2.0169
	3.54285E-05	2.19235E-07	0.000144301	0	4.68287E-05	7.9714E-05	-1.7977
	3.58669E-05	-6.13859E-07	0.000145265	0	4.40663E-05	7.97579E-05	-2.9377
	3.499E-05	-3.94624E-07	0.000144915	0	4.49871E-05	7.96263E-05	-2.7623
	3.59985E-05	-7.89248E-07	0.000144827	0	4.5031E-05	7.93632E-05	-2.3677
	3.53408E-05	-1.75388E-07	0.000144608	0	4.57325E-05	7.86178E-05	-3.2446
	3.613E-05	1.75388E-07	0.00014566	0	4.42417E-05	7.91002E-05	-3.1131
	3.55161E-05	-1.31541E-07	0.000144871	0	4.59518E-05	7.82232E-05	-3.6393
	3.60423E-05	-7.01554E-07	0.000143683	0	4.40225E-05	7.86178E-05	-2.1485
	3.67E-05	-1.92927E-06	0.000144169	0	4.39786E-05	7.92317E-05	-4.6477

# 4. Arranging data in EXCEL cont.

- Insert a blank column between RB7 and RB9. Populate it with zeroes.

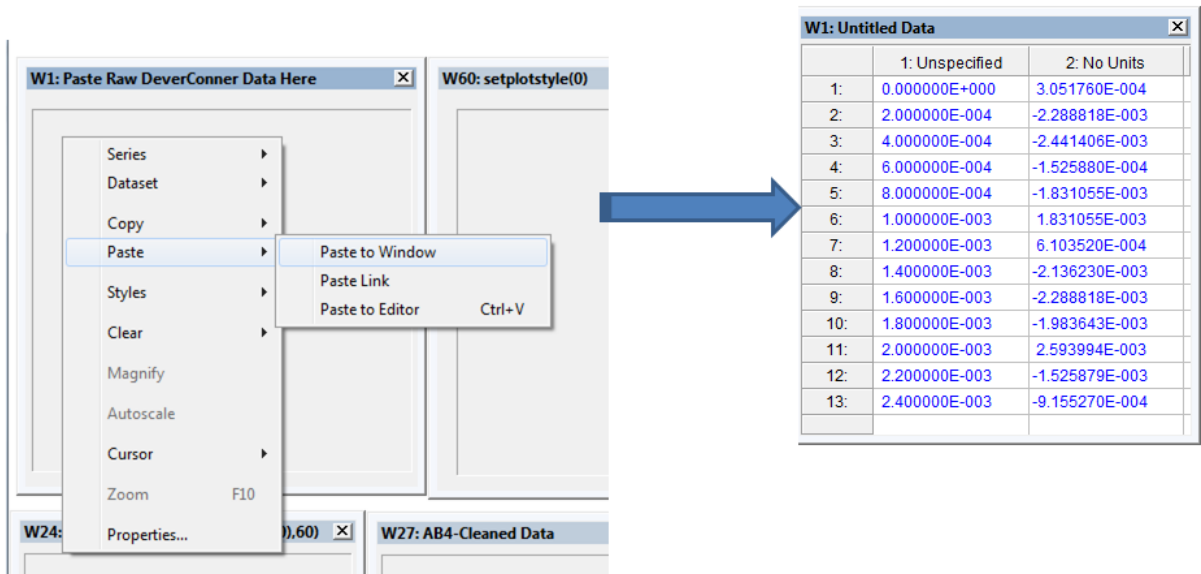
Q	R	S	T	U	V	W	X	Y	Z
rb1	rb3	rb4	rb5	rb6	rb7	rb8	rb9	rb10	rb11
0.000043731	0.456448E-05	7.77847E-05	-2.80021E-06	5.02049E-05	3.22276E-05	0	0	0	0
0.000043338	0.460833E-05	8.00209E-05	-1.00844E-06	5.13888E-05	3.29732E-05	0	0	0	0
0.000044738	0.451187E-05	7.88371E-05	-1.92927E-06	5.04685E-05	3.19207E-05	0	0	0	0
0.000044399	0.454694E-05	7.78280E-05	-1.79773E-06	4.93718E-05	3.23392E-05	0	0	0	0
0.000044632	0.444717E-05	8.01232E-05	-3.24495E-06	4.97220E-05	3.25345E-05	0	0	0	0
0.000043397	0.439096E-05	8.07663E-05	-3.68336E-06	5.01612E-05	3.17453E-05	0	0	0	0
0.000044476	0.449433E-05	7.93632E-05	-1.71004E-06	5.02488E-05	3.17653E-05	0	0	0	0
0.000045616	0.451625E-05	7.98456E-05	-1.66619E-06	4.96349E-05	3.10437E-05	0	0	0	0
0.000044213	0.43294E-05	7.96702E-05	-2.61081E-06	4.84313E-05	3.06848E-05	0	0	0	0
0.000043397	0.455717E-05	7.86173E-05	-2.03697E-06	5.10819E-05	3.15696E-05	0	0	0	0
0.000044955	0.447697E-05	7.87484E-05	-2.20789E-06	4.83280E-05	3.29732E-05	0	0	0	0
0.000044588	0.457325E-05	7.90125E-05	-3.02345E-06	4.96349E-05	3.11314E-05	0	0	0	0
0.000044608	0.463920E-05	7.93632E-05	-3.11314E-06	4.88437E-05	3.13068E-05	0	0	0	0
0.000044739	0.444486E-05	7.76512E-05	-2.06081E-06	4.89898E-05	3.17433E-05	0	0	0	0
0.000045002	0.452502E-05	7.87932E-05	-3.28833E-06	5.00734E-05	3.27999E-05	0	0	0	0
0.000043687	0.458202E-05	7.79601E-05	-2.10466E-06	5.04685E-05	3.23153E-05	0	0	0	0
0.000045464	0.45145E-05	7.96363E-05	-2.80021E-06	4.90649E-05	3.16576E-05	0	0	0	0
0.000044476	0.44154E-05	7.98456E-05	-3.99099E-06	5.05993E-05	3.19207E-05	0	0	0	0
0.000044476	0.463902E-05	7.99771E-05	-2.03697E-06	5.09933E-05	3.12191E-05	0	0	0	0
0.000044301	0.468237E-05	7.9714E-05	-1.79773E-06	4.88801E-05	3.22715E-05	0	0	0	0
0.000045265	0.440663E-05	7.97579E-05	-2.97778E-06	5.09942E-05	3.22760E-05	0	0	0	0
0.000044915	0.449871E-05	7.96363E-05	-2.76237E-06	5.02049E-05	3.16746E-05	0	0	0	0
0.000044827	0.450316E-05	7.93632E-05	-2.80746E-06	4.91528E-05	3.22715E-05	0	0	0	0
0.000044608	0.457325E-05	7.86173E-05	-3.24495E-06	5.02049E-05	3.19027E-05	0	0	0	0
0.000045464	0.442417E-05	7.91002E-05	-3.11314E-06	5.01172E-05	3.27965E-05	0	0	0	0
0.000044871	0.459218E-05	7.82232E-05	-3.63911E-06	5.00744E-05	3.20961E-05	0	0	0	0
0.000043687	0.440225E-05	7.86173E-05	-2.14851E-06	5.09942E-05	3.23922E-05	0	0	0	0
0.000044169	0.439786E-05	7.92317E-05	-1.64779E-06	4.98411E-05	3.23816E-05	0	0	0	0
0.000043792	0.452502E-05	8.00648E-05	-1.97312E-06	5.07311E-05	3.13507E-05	0	0	0	0
0.000046142	0.451187E-05	7.89868E-05	-1.71388E-06	4.96103E-05	3.19027E-05	0	0	0	0
0.000044739	0.456887E-05	7.99333E-05	-3.84712E-06	5.02488E-05	3.16138E-05	0	0	0	0
0.000044682	0.455717E-05	7.94071E-05	-2.76237E-06	5.08188E-05	3.17014E-05	0	0	0	0
0.000044783	0.460833E-05	7.94948E-05	-2.3396E-06	5.01612E-05	3.20522E-05	0	0	0	0
0.000043355	0.457325E-05	8.00648E-05	-1.66619E-06	4.88801E-05	3.20222E-05	0	0	0	0
0.000043687	0.448556E-05	7.88899E-05	-2.28051E-06	5.09942E-05	3.07368E-05	0	0	0	0
0.000044476	0.439896E-05	7.87932E-05	-1.27157E-06	4.99837E-05	3.04299E-05	0	0	0	0
0.000044237	0.457325E-05	7.94071E-05	-2.71852E-06	4.99418E-05	3.29292E-05	0	0	0	0
0.000045704	0.45294E-05	7.82232E-05	-2.71852E-06	4.96349E-05	3.10437E-05	0	0	0	0
0.000043775	0.448556E-05	7.91002E-05	-3.02345E-06	5.00291E-05	3.24032E-05	0	0	0	0

Q	R	S	T	U	V	W	X	Y	Z
	rb3	rb4	rb5	rb6	rb7		rb9	rb11	
143731	0.456448E-05	7.77847E-05	-2.80021E-06	5.02049E-05	3.22276E-05	0	0	0	0
043538	0.460833E-05	8.00209E-05	-1.00844E-06	5.13888E-05	3.29732E-05	0	0	0	0
144783	0.451187E-05	7.88371E-05	-1.92927E-06	5.04685E-05	3.19207E-05	0	0	0	0
143599	0.454694E-05	7.78280E-05	-1.79773E-06	4.93718E-05	3.23392E-05	0	0	0	0
144652	0.444717E-05	8.01232E-05	-3.24495E-06	4.97220E-05	3.25345E-05	0	0	0	0
145397	0.439096E-05	8.07663E-05	-3.68336E-06	5.01612E-05	3.17453E-05	0	0	0	0
144476	0.449433E-05	7.93632E-05	-1.71004E-06	5.02488E-05	3.17453E-05	0	0	0	0
145616	0.451625E-05	7.98456E-05	-1.66619E-06	4.96349E-05	3.10437E-05	0	0	0	0
144213	0.43294E-05	7.96702E-05	-2.61081E-06	4.84313E-05	3.06848E-05	0	0	0	0
145397	0.455717E-05	7.86173E-05	-2.03697E-06	5.10819E-05	3.15696E-05	0	0	0	0
144915	0.447697E-05	7.87484E-05	-2.20789E-06	4.83280E-05	3.29732E-05	0	0	0	0
144388	0.447697E-05	7.87484E-05	-2.20789E-06	4.83280E-05	3.29732E-05	0	0	0	0
144608	0.463920E-05	7.93632E-05	-3.11314E-06	4.88437E-05	3.13068E-05	0	0	0	0
144739	0.444486E-05	7.76512E-05	-2.06081E-06	4.89898E-05	3.17433E-05	0	0	0	0
145002	0.452502E-05	7.87932E-05	-3.28833E-06	5.00734E-05	3.27999E-05	0	0	0	0
143687	0.458202E-05	7.79601E-05	-2.10466E-06	5.04685E-05	3.23153E-05	0	0	0	0
144564	0.45011E-05	7.96263E-05	-2.80021E-06	4.90649E-05	3.16576E-05	0	0	0	0
144476	0.44154E-05	7.98456E-05	-3.99099E-06	5.05993E-05	3.19207E-05	0	0	0	0
144476	0.463902E-05	7.99771E-05	-2.03697E-06	5.09933E-05	3.12191E-05	0	0	0	0
144501	0.468237E-05	7.9714E-05	-1.79773E-06	4.88899E-05	3.22715E-05	0	0	0	0
144565	0.440663E-05	7.97579E-05	-2.97778E-06	5.09942E-05	3.22760E-05	0	0	0	0
144915	0.449871E-05	7.96363E-05	-2.76237E-06	5.02049E-05	3.16746E-05	0	0	0	0
144827	0.450316E-05	7.93632E-05	-2.80746E-06	4.91528E-05	3.22715E-05	0	0	0	0
144608	0.457325E-05	7.86173E-05	-3.24495E-06	5.02049E-05	3.19027E-05	0	0	0	0
04566	0.442417E-05	7.91002E-05	-3.11314E-06	5.01172E-05	3.27965E-05	0	0	0	0
144871	0.459218E-05	7.82232E-05	-3.63911E-06	5.00744E-05	3.20961E-05	0	0	0	0
143687	0.440225E-05	7.86173E-05	-2.14851E-06	5.09942E-05	3.23922E-05	0	0	0	0
144169	0.439786E-05	7.92317E-05	-1.64779E-06	4.98411E-05	3.23816E-05	0	0	0	0
145792	0.452502E-05	8.00648E-05	-1.97312E-06	5.07311E-05	3.13507E-05	0	0	0	0
144783	0.451187E-05	7.89868E-05	-1.71388E-06	4.96103E-05	3.19027E-05	0	0	0	0
145792	0.456887E-05	7.99333E-05	-3.84712E-06	5.02488E-05	3.16138E-05	0	0	0	0
144783	0.455717E-05	7.94071E-05	-2.76237E-06	5.08188E-05	3.17014E-05	0	0	0	0
143555	0.457325E-05	8.00648E-05	-1.66619E-06	4.88801E-05	3.20522E-05	0	0	0	0
143687	0.448556E-05	7.88899E-05	-2.28051E-06	5.09942E-05	3.07368E-05	0	0	0	0
144476	0.439896E-05	7.87932E-05	-1.27157E-06	4.99837E-05	3.04299E-05	0	0	0	0



## 6. Paste raw data into W1: Paste Raw Data Here...

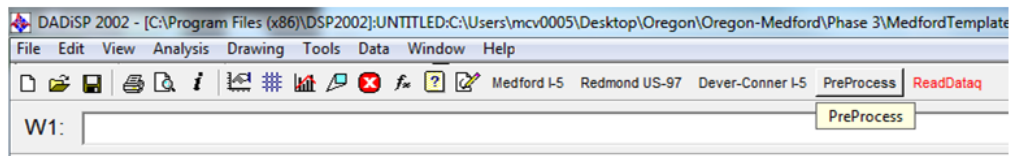
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



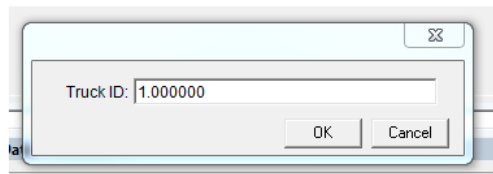
The screenshot illustrates the process of pasting data into a specific window. On the left, a context menu is open over a window titled "W1: Paste Raw DeverConner Data Here". The "Paste" option is selected, and a sub-menu is visible with "Paste to Window" highlighted. A blue arrow points from this sub-menu to a separate window titled "W1: Untitled Data" which contains a table of numerical data.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

## 7. Click PreProcess button to inspect data

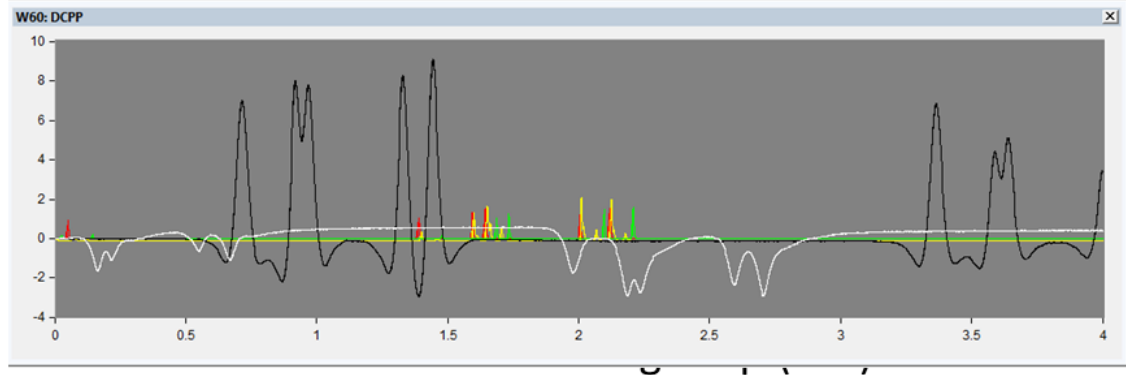


- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK





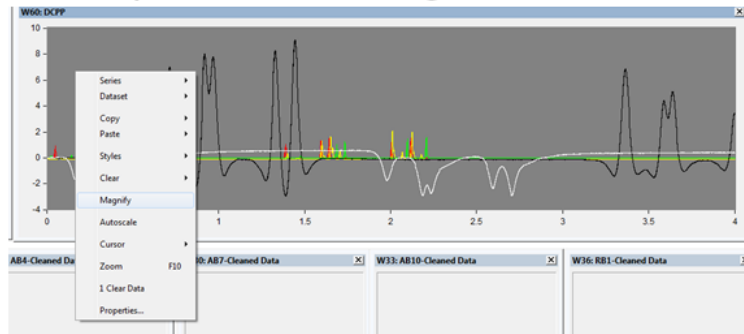
## 8. Inspect W60



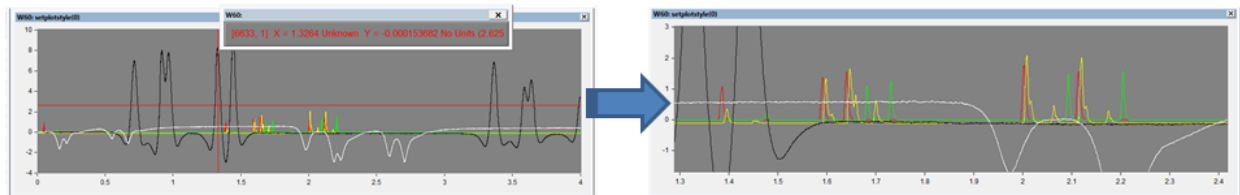
- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



- Use cross-hair to drag over vehicle event

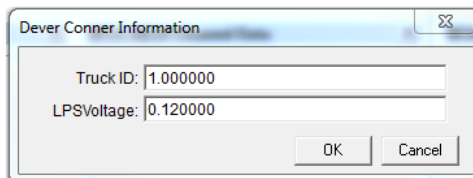


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*



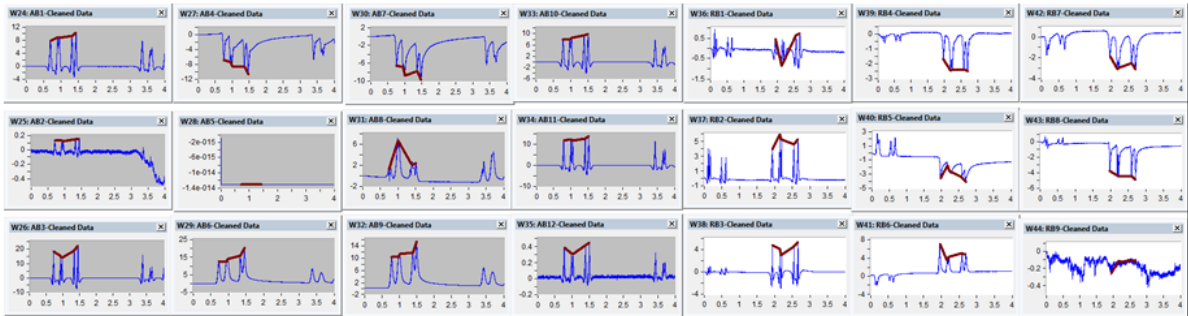
- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in step 14



# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs

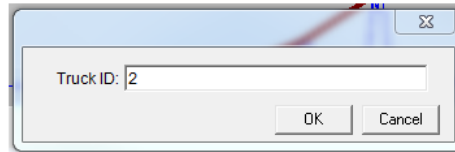


- Processed data output in tabular form in W57

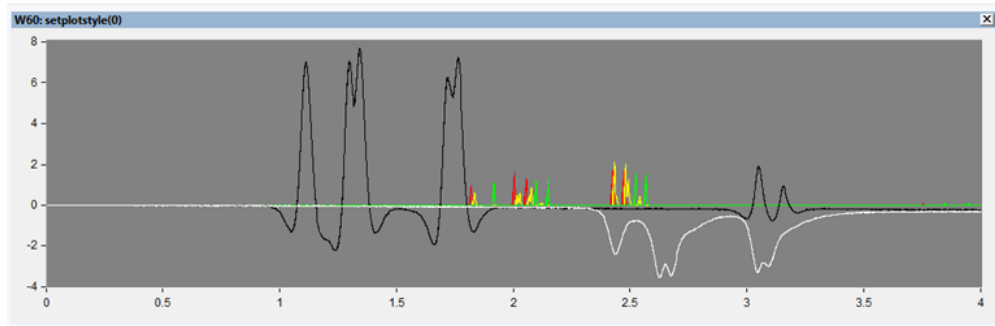
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7



- Next file will be loaded into W60 and W24



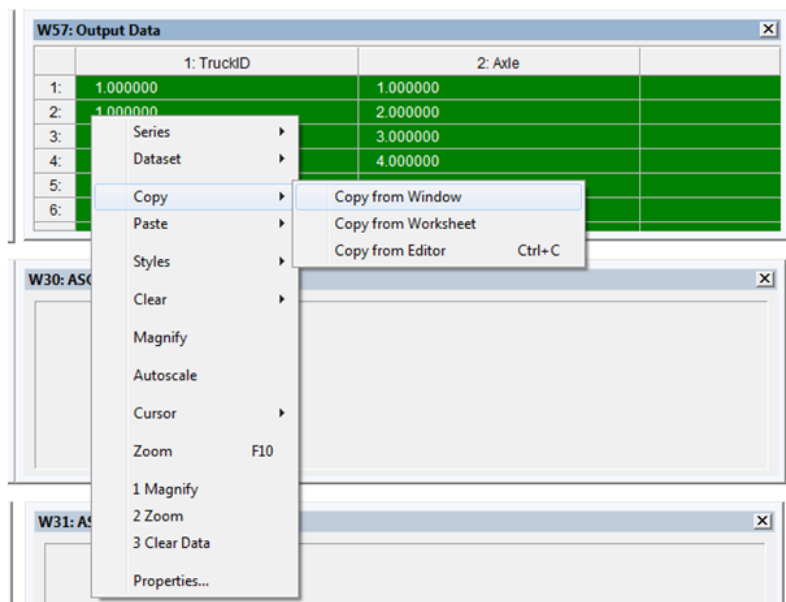
## 12. Repeat procedure for next .txt file cont...

- Repeat Step 8 through 11
- Output data will be added to table in W57

W57: Output Data			
	1: TruckID	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

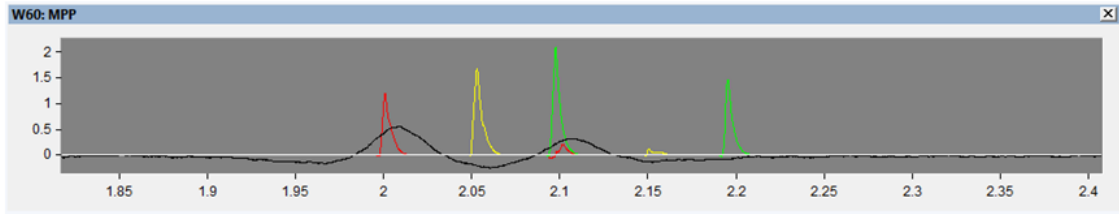
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

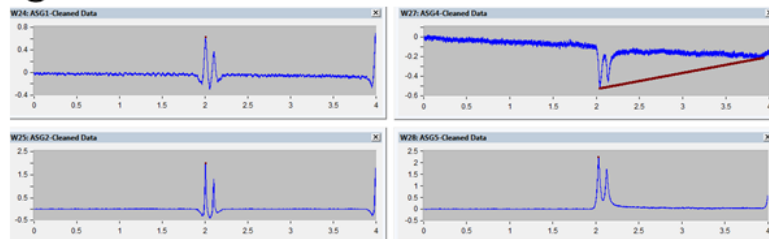


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



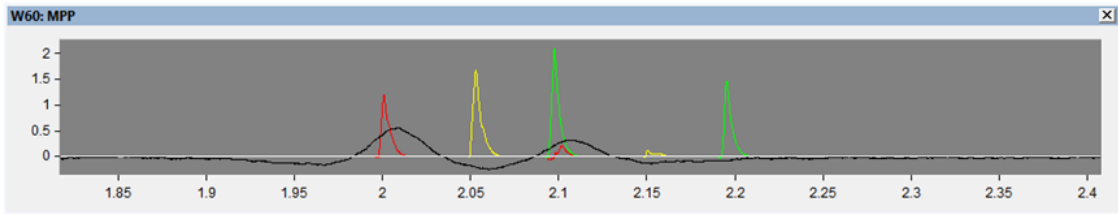
- The peaks will not be properly captured when processing\*



\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.

Truck ID:	3.000000
LPSVoltage:	0.100000

**APPENDIX C3 – DEVER-CONNER DATA PROCESSING**

**6/10/2009**





# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

6/10/2009

# DADiSP Processing Steps

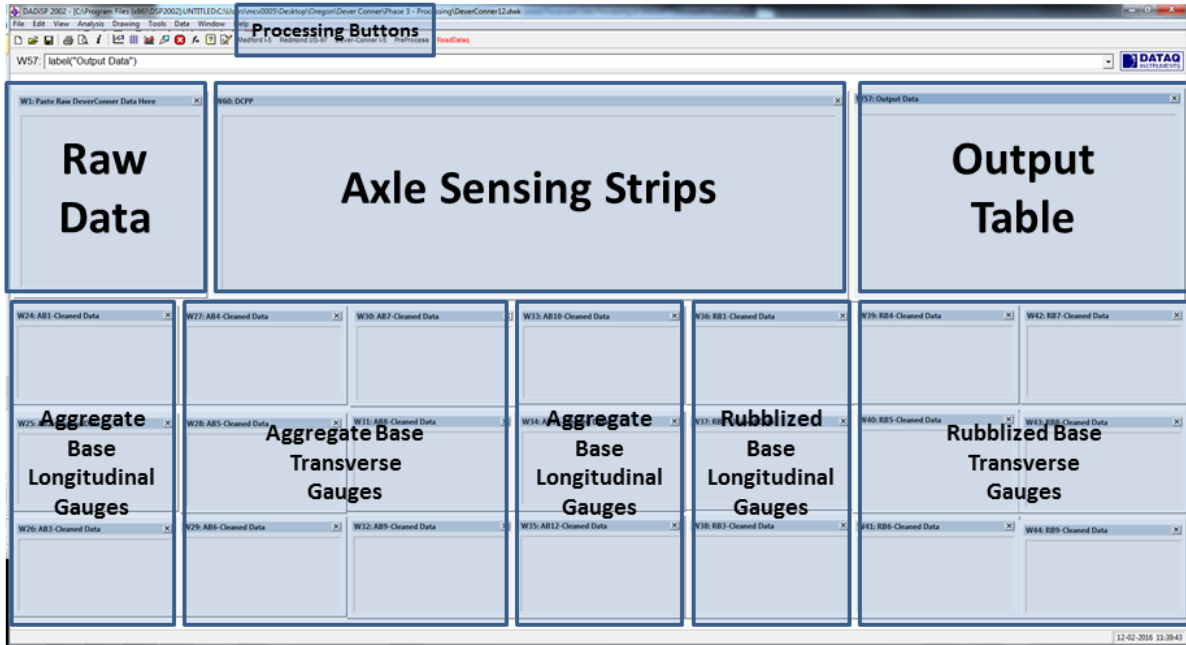
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- TDMS File
- 11 “ab” strain gauges listed
  - Missing ab02
  - ab12 listed with rb gauges
- 9 “rb” strain gauges listed
- Dates
  - 6/10/2009

Channel	Datatype
Time	DT_FLOAT
axle1	DT_FLOAT
axle2	DT_FLOAT
axle3	DT_FLOAT
ab01	
ab01	DT_FLOAT
ab03	DT_FLOAT
ab04	DT_FLOAT
ab05	DT_FLOAT
ab06	DT_FLOAT
ab07	DT_FLOAT
ab08	DT_FLOAT
ab09	DT_FLOAT
ab10	DT_FLOAT
ab11	DT_FLOAT
rb01	DT_FLOAT
rb02	DT_FLOAT
ab12	DT_FLOAT
rb03	DT_FLOAT
rb04	DT_FLOAT
rb05	DT_FLOAT
rb06	DT_FLOAT
rb07	DT_FLOAT
rb08	DT_FLOAT
rb09	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use "Open with>>Excel importer" or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.




















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**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
[Requirements](#)

**CLICK** →

## 2. Open raw \*.tdms file in EXCEL

**DOUBLE CLICK** 

 Dever Conner_11264410062009	6/10/2009 1:26 PM	TDMS File	1,878 KB
 Dever Conner_11270310062009	6/10/2009 1:27 PM	TDMS File	1,878 KB
 Dever Conner_11274510062009	6/10/2009 1:27 PM	TDMS File	1,878 KB
 Dever Conner_11284110062009	6/10/2009 1:28 PM	TDMS File	1,878 KB
 Dever Conner_11302410062009	6/10/2009 1:30 PM	TDMS File	1,878 KB
 Dever Conner_11304110062009	6/10/2009 1:30 PM	TDMS File	1,878 KB
 Dever Conner_11331410062009	6/10/2009 1:33 PM	TDMS File	1,878 KB
 Dever Conner_11342010062009	6/10/2009 1:34 PM	TDMS File	1,878 KB
 Dever Conner_11351110062009	6/10/2009 1:35 PM	TDMS File	1,878 KB
 Dever Conner_11355710062009	6/10/2009 1:35 PM	TDMS File	1,878 KB
 Dever Conner_11363710062009	6/10/2009 1:36 PM	TDMS File	1,878 KB
 Dever Conner_11384910062009	6/10/2009 1:38 PM	TDMS File	1,878 KB
 Dever Conner_11385610062009	6/10/2009 1:38 PM	TDMS File	1,878 KB
 Dever Conner_11401210062009	6/10/2009 1:40 PM	TDMS File	1,878 KB
 Dever Conner_11402010062009	6/10/2009 1:40 PM	TDMS File	1,878 KB
 Dever Conner_11403210062009	6/10/2009 1:40 PM	TDMS File	1,878 KB
 Dever Conner_11405610062009	6/10/2009 1:40 PM	TDMS File	1,878 KB
 Dever Conner_11412710062009	6/10/2009 1:41 PM	TDMS File	1,878 KB
 Dever Conner_11412710062009	6/10/2009 1:41 PM	TDMS File	1,878 KB

### 3. Open Data tab in EXCEL workbook

Root Name	Title	Author	Date/Time	Groups
DC08192009_09371619082009				
<b>Group</b>	<b>Channels</b>	<b>Description</b>	<i>header</i>	
			Station Name:DC08192009 Sample Rate:5000.0 Comments:	
			Timeaxle1axle2 axle3AB01	
			sg3AB02AB03 AB04AB05AB06 AB07AB08AB 09AB10AB11A B12 RB01RB02RB0 3RB04RB05RB 06RB07RB08R B09  secsvoltsvoltsvol tsvoltsvoltsvolts voltsvoltsvolts voltsvoltsvoltsvo ltsvoltsvoltsvolts voltsvoltsvoltsvo ltsvolts	
Data		25		
<b>Data</b>				

Time	axle1	axle2	axle3	sg3	AB01	AB02
0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	-0.0005
0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	-0.0005
0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	-0.0005
0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	-0.0005
0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	-0.0005
0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	-0.0005
0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	-0.0005
0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	-0.0005
0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	-0.0005
0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	-0.0005
0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	-0.0005
0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	-0.0005
0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	-0.0005
0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	-0.0005
0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	-0.0005
0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	-0.0005
0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	-0.0005
0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	-0.0005
0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	-0.0005
0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	-0.0005
0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	-0.0005
0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	-0.0005
0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	-0.0005
0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	-0.0005
0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	-0.0005
0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	-0.0005
0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	-0.0005
0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	-0.0005
0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	-0.0005
0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	-0.0005

# 4. Arranging data in EXCEL

- Insert column of zeroes between ab01 and ab03

Time	axle1	axle2	axle3	ab01	ab03
0	0.003509521	0.001220703	0.00213623	-2.28443E-05	4.05586E-05
0.0002	0.000457764	0.000915527	-0.001525879	-2.28005E-05	3.99447E-05
0.0004	-0.002593994	-0.001678467	-0.001220703	-2.26689E-05	4.09093E-05
0.0006	-0.000152588	-0.000915527	0.000457764	-2.28443E-05	4.32771E-05
0.0008	-0.000152588	0.001831055	0.00213623	-2.08274E-05	4.1567E-05
0.001	0.002593994	0.002593994	-0.001678467	-2.26689E-05	3.96378E-05
0.0012	0.001068115	0.000762939	0.001373291	-2.31951E-05	4.01639E-05
0.0014	0.000152588	-0.002593994	-0.001678467	-2.45544E-05	4.12163E-05
0.0016	0.000457764	-0.000610352	0.000457764	-2.18359E-05	3.99009E-05
0.0018	-0.001678467	0.000610352	0.001068115	-2.19235E-05	3.99009E-05
0.002	0.00288818	0.00213623	0.002441406	-2.22305E-05	4.06024E-05
0.0022	0.003204346	0.002746582	0.002288818	-2.31513E-05	3.89801E-05
0.0024	0.000457764	-0.004272461	-0.002288818	-2.4379E-05	3.94185E-05
0.0026	-0.000152588	-0.001068115	-0.001983643	-2.30636E-05	3.95939E-05
0.0028	0.001068115	0.001983643	0.001220703	-2.31513E-05	4.10847E-05
0.003	0	-0.001068115	-0.000305176	-2.32828E-05	4.05586E-05
0.0032	0.001678467	0.001831055	-0.000915527	-2.3239E-05	4.02516E-05
0.0034	0.003814697	0.004882813	0.00356994	-2.43351E-05	3.91993E-05
0.0036	0	-0.001831055	0.00356994	-2.24497E-05	3.88485E-05
0.0038	-0.002746582	0.000305176	-0.000457764	-2.22743E-05	3.96816E-05
0.004	-0.000762939	0.000152588	0.000762939	-2.39844E-05	4.20494E-05
0.0042	0.000762939	0.001678467	0.001831055	-2.09589E-05	4.07778E-05
0.0044	0.000762939	0.000457764	0.002593994	-2.02135E-05	3.99447E-05
0.0046	0.004577637	0.000762939	0.000152588	-2.21428E-05	3.93308E-05
0.0048	-0.000610352	-0.001983643	0.00213623	-2.48613E-05	3.94624E-05
0.005	-0.000457764	-0.001068115	-0.000152588	-2.24497E-05	4.02955E-05
0.0052	0.003662109	0.0050354	0.001831055	-2.27566E-05	3.93747E-05

	D	E	F	G	H
		ab01			
	axle3	ab01		ab03	ab04
3	0.00213623	-2.28443E-05	0	4.05586E-05	0.000210598
7	-0.001525879	-2.28005E-05	0	3.99447E-05	0.000210598
7	-0.001220703	-2.26689E-05	0	4.09093E-05	0.000211518
7	0.000457764	-2.28443E-05	0	4.32771E-05	0.000212001
	0.00213623	-2.08274E-05	0	4.1567E-05	0.000211738
4	-0.001678467	-2.26689E-05	0	3.96378E-05	0.000210291
9	0.001373291	-2.31951E-05	0	4.01639E-05	0.000211299
4	-0.001678467	-2.45544E-05	0	4.12163E-05	0.00020937
2	0.000457764	-2.18359E-05	0	3.99009E-05	0.000212264
2	0.001068115	-2.19235E-05	0	3.99009E-05	0.000212439
3	0.002441406	-2.22305E-05	0	4.06024E-05	0.000211562
2	0.002288818	-2.31513E-05	0	3.89801E-05	0.000210291
1	-0.002288818	-2.4379E-05	0	3.94185E-05	0.00020994
5	-0.001983643	-2.30636E-05	0	3.95939E-05	0.000208668
3	0.001220703	-2.31513E-05	0	4.10847E-05	0.000210948
5	-0.000305176	-2.32828E-05	0	4.05586E-05	0.000210071
5	-0.000915527	-2.3239E-05	0	4.02516E-05	0.000209458
3	0.003356934	-2.43351E-05	0	3.91993E-05	0.000210641



# 4. Arranging data in EXCEL cont..

- Move column ab12 between ab11 and rb01.
  - Cut column R (ab12) → Insert cut cells between ab11 and rb01

	N	O	P	Q	R	T	U
0	ab11	rb01	rb02	ab12		rb05	rb0
00272685	2.58259E-05	5.63435E-05	3.20961E-05	0.00012706	465E-05	-5.26165E-06	6.
00272817	2.46421E-05	5.64312E-05	3.14822E-05	0.00012737	635E-05	-5.2178E-06	6.
00273167	2.59136E-05	5.74835E-05	3.34992E-05	0.00012886	458E-05	-4.34086E-06	5.
00273299	2.45544E-05	5.77466E-05	3.25345E-05	0.00012812	811E-05	-5.08026E-06	6.
00273737	2.44667E-05	5.65628E-05	3.11753E-05	0.00012807	865E-05	-4.99857E-06	6.
00273036	2.45105E-05	5.6782E-05	3.27538E-05	0.00012728	935E-05	-4.25317E-06	6.
00272948	2.51244E-05	5.55981E-05	3.26222E-05	0.00012812	357E-05	-4.95472E-06	6.
00272817	2.52998E-05	5.70889E-05	3.39815E-05	0.00012882	485E-05	-5.08026E-06	6.
00272641	2.44667E-05	5.66066E-05	3.27976E-05	0.00012829	565E-05	-4.5601E-06	6.
00272159	2.52998E-05	5.61243E-05	3.19645E-05	0.0001274	973E-05	-5.87551E-06	6.
00271677	2.44667E-05	5.75274E-05	3.27099E-05	0.00012851	604E-05	-5.04242E-06	6.
00271107	2.45982E-05	5.76589E-05	3.28415E-05	0.000126937	-1.15756E-05	5.34935E-05	-6.22639E-06
00274395	2.52998E-05	5.61681E-05	3.26222E-05	0.00012742	-1.2189E-05	5.29673E-05	-4.5601E-06
00273124	2.51244E-05	5.59927E-05	3.33676E-05	0.000127683	-1.14002E-05	5.2483E-05	-4.73549E-06
00272071	2.32828E-05	5.62997E-05	3.31046E-05	0.000127332	-1.16633E-05	5.52035E-05	-4.64779E-06
00272334	2.43351E-05	5.64751E-05	3.28415E-05	0.000126192	-1.11372E-05	5.30111E-05	-4.99857E-06
00272466	2.49928E-05	5.52912E-05	3.35869E-05	0.0001272	-1.10495E-05	5.22219E-05	-6.31398E-06
00272729	2.48613E-05	5.49843E-05	3.13945E-05	0.00012742	-1.24964E-05	5.26004E-05	-5.58858E-06
00273299	2.48613E-05	5.63435E-05	3.27976E-05	0.000128297	-1.18387E-05	5.20465E-05	-5.26165E-06
00272247	2.46421E-05	5.61243E-05	3.24907E-05	0.000129612	-1.20141E-05	5.29234E-05	-6.40168E-06
00271457	2.50367E-05	5.65189E-05	3.38061E-05	0.00012799	-1.1751E-05	5.33619E-05	-5.74397E-06
00027251	2.47298E-05	5.60366E-05	3.385E-05	0.000130533	-1.14879E-05	5.36688E-05	-4.82318E-06
00273167	2.54752E-05	5.82728E-05	3.27976E-05	0.000127683	-1.11372E-05	5.32742E-05	-4.73549E-06
00272422	2.34582E-05	5.71328E-05	3.30607E-05	0.000127025	-1.10495E-05	5.38442E-05	-5.48089E-06
00272729	2.38528E-05	5.67381E-05	3.32661E-05	0.000128823	-1.17072E-05	5.3055E-05	-5.91936E-06
00027234	2.48613E-05	5.6212E-05	3.2661E-05	0.000128034	-1.16633E-05	5.21342E-05	-6.09475E-06
00272334	2.58698E-05	5.62997E-05	3.20522E-05	0.000128209	-1.14002E-05	5.41073E-05	-6.75245E-06
00273299	2.60452E-05	5.63435E-05	3.23153E-05	0.000127069	-1.10495E-05	5.2178E-05	-4.99857E-06
00272422	2.45544E-05	5.55981E-05	3.32799E-05	0.000128165	-1.23649E-05	5.33619E-05	-5.9632E-06
3.0002708	2.42036E-05	5.68697E-05	3.35869E-05	0.0001272	-9.7779E-06	5.32742E-05	-5.74397E-06
00272378	2.50367E-05	5.70889E-05	3.34115E-05	0.000128779	-1.01725E-05	5.28796E-05	-6.7963E-06
3.0002708	2.51682E-05	5.66504E-05	3.35869E-05	0.000126718	-9.64636E-06	5.22219E-05	-6.40168E-06

	M	N	O	P		
r09	ab10	ab11	rb01			rb03
.000239405	0.000272685	2.58259E-05	5.63435E-05			0.0127069
0.00024037	0.000272817	2.46421E-05	5.64312E-05			0.0127376
.000240457	0.000273167	2.59136E-05	5.74835E-05			0.0128867
.000240764	0.000273299	2.45544E-05	5.77466E-05			0.0128121
.000241729	0.000273737	2.44667E-05	5.65628E-05			0.0128077
.000241203	0.000273036	2.45105E-05	5.6782E-05			0.0127288
.000240238	0.000272948	2.51244E-05	5.55981E-05			0.0128121
.000241948	0.000272817	2.52998E-05	5.70889E-05			0.0128823
.000241817	0.000272641	2.44667E-05	5.66066E-05			0.0128297
.000241159	0.000272159	2.52998E-05	5.61243E-05			0.012742
.000241291	0.000271677	2.44667E-05	5.75274E-05			0.0128516
.000242211	0.000271107	2.45982E-05	5.76589E-05			0.0126937
.000241773	0.000274395	2.52998E-05	5.61681E-05			0.012742
.000241948	0.000273124	2.51244E-05	5.59927E-05			0.000127683
0.00024151	0.000272071	2.32828E-05	5.62997E-05			0.000127332
.000240501	0.000272334	2.43351E-05	5.64751E-05			0.000126192
.000240764	0.000272466	2.49928E-05	5.52912E-05			0.0001272
0.00024037	0.000272729	2.48613E-05	5.49843E-05			0.00012742
0.00024094	0.000273299	2.48613E-05	5.63435E-05			0.000128297
.000240721	0.000272247	2.46421E-05	5.61243E-05			0.000129612
.000242387	0.000271457	2.50367E-05	5.65189E-05			0.00012799
.000241729	0.00027251	2.47298E-05	5.60366E-05			0.000130533
.000242255	0.000273167	2.54752E-05	5.82728E-05			0.000127683
.000240984	0.000272422	2.34582E-05	5.71328E-05			0.000127025

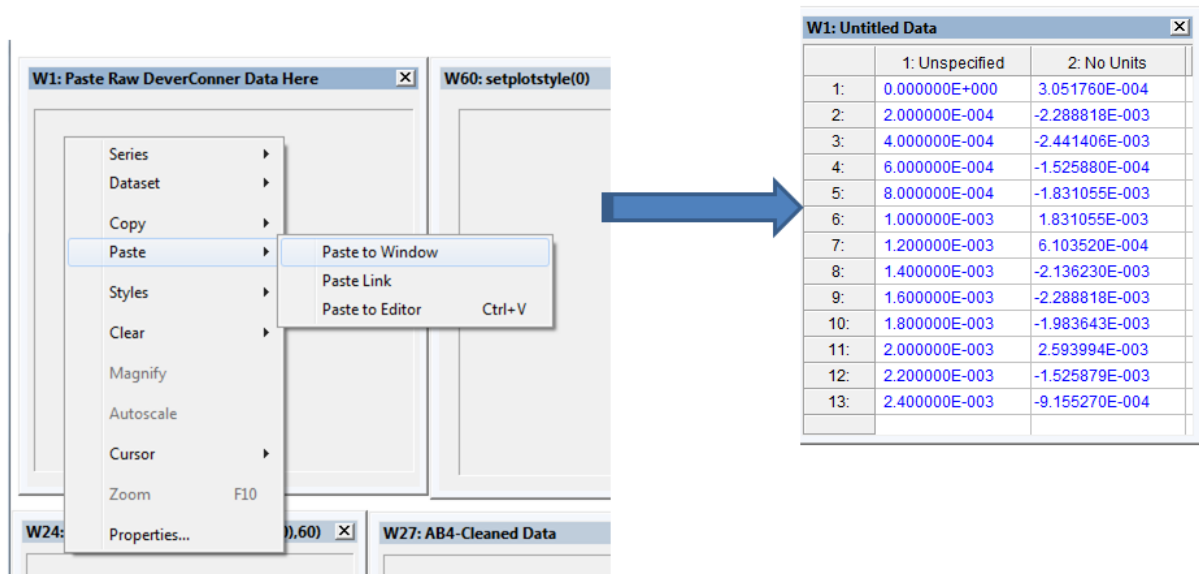
# 5. Copy data

- Highlight data in columns A through Y (RB09) – Exclude Header Row
- Right-Click → Select Copy → Left-Click

The screenshot displays an Excel spreadsheet with columns labeled A through X and rows numbered 1 through 1000. The data is organized into columns, with the first column (A) containing row numbers and subsequent columns (B through X) containing numerical values. The values are presented in scientific notation, such as 0.00012345, 0.00012345, and 0.00012345. The spreadsheet is titled 'Data' and the status bar at the bottom indicates 'Average: 0.00000017, Count: 50000, Numerical Count: 50000, Sum: 41243.337'.

## 6. Paste raw data into W1: Paste Raw Data Here...

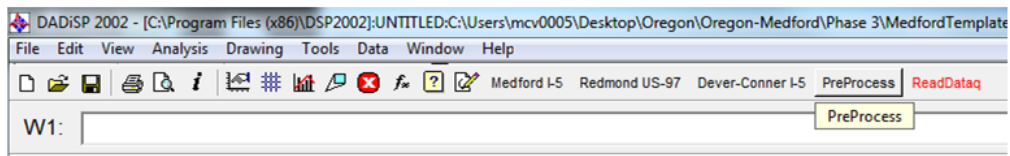
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



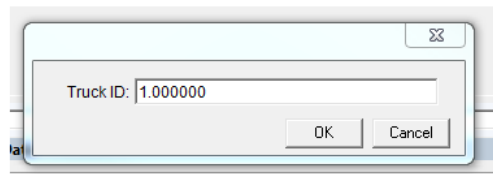
The screenshot illustrates the process of pasting data into a window. On the left, a context menu is open over a window titled 'W1: Paste Raw DeverConner Data Here'. The 'Paste' option is selected, and a sub-menu is visible with 'Paste to Window' as the primary choice. A blue arrow points from this sub-menu to a separate window on the right titled 'W1: Untitled Data'. This window contains a table with 13 rows and 2 columns of numerical data in scientific notation.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

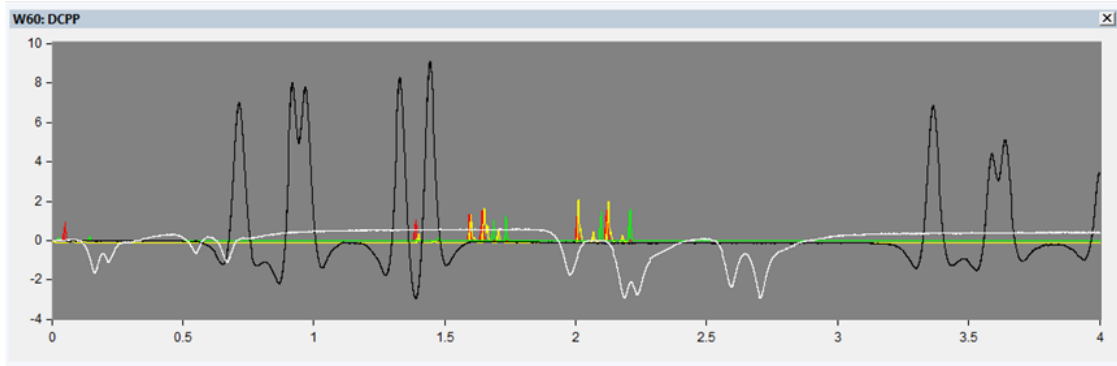
## 7. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



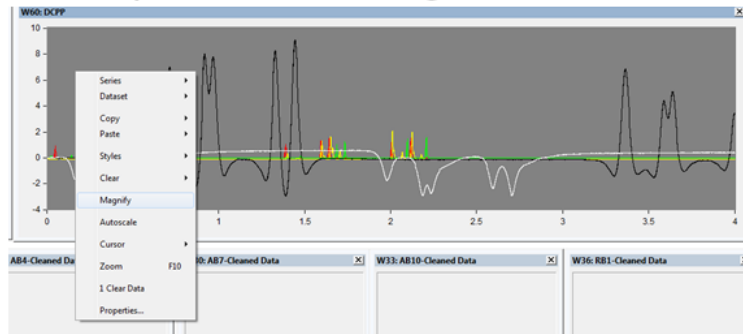
## 8. Inspect W60



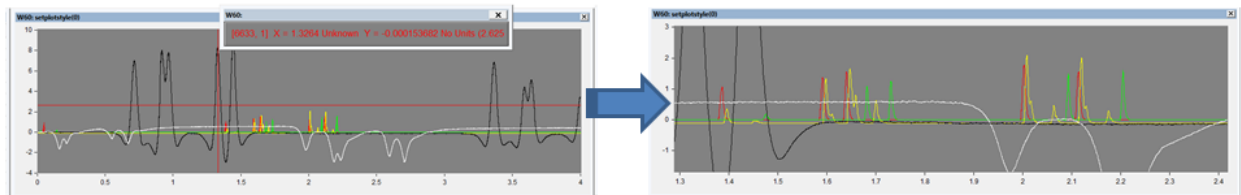
- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



- Use cross-hair to drag over vehicle event

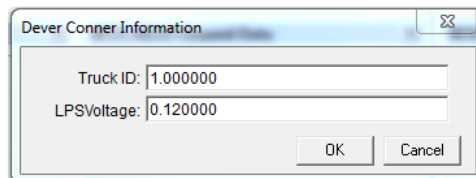


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

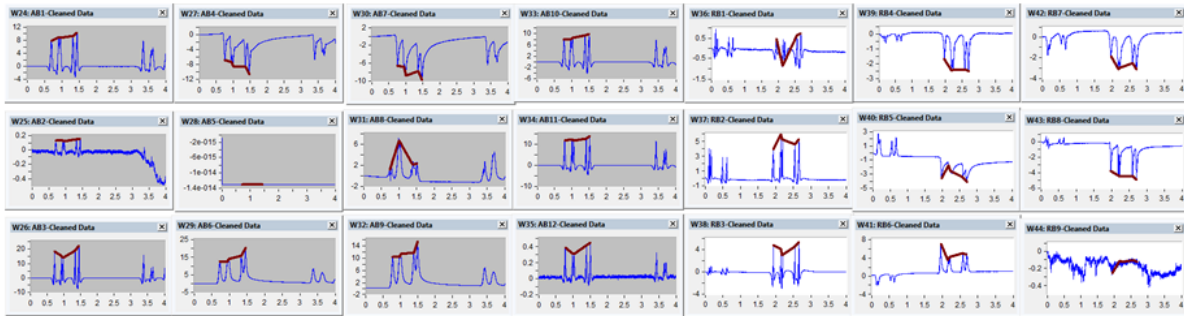
A screenshot of a dialog box titled 'Dever Conner Information'. The dialog box has a title bar with a close button. It contains two text input fields: 'Truck ID:' with the value '1.000000' and 'LPSVoltage:' with the value '0.120000'. At the bottom right of the dialog box, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in Step 14

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs



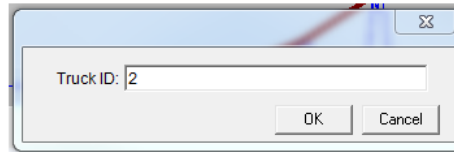
- Processed data output in tabular form in W57

W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

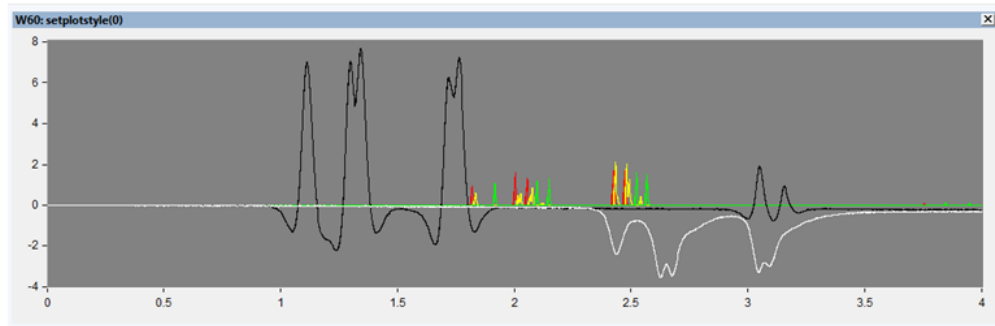


## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7



- Next file will be loaded into W60 and W24



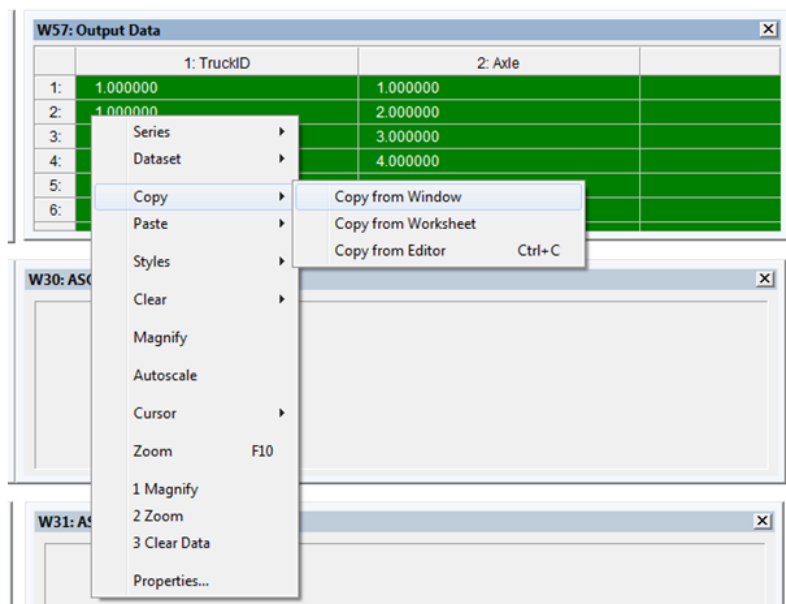
## 12. Repeat procedure for next .txt file cont...

- Repeat Step 8 through 11
- Output data will be added to table in W57

W57: Output Data			
	1: TruckD	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

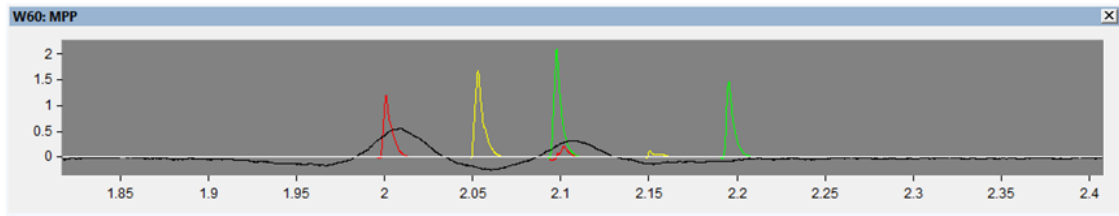
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

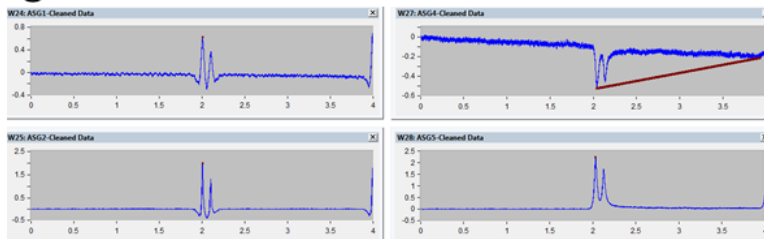


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



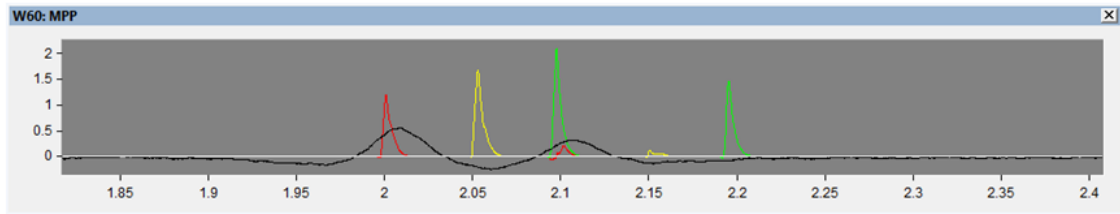
- The peaks will not be properly captured when processing\*



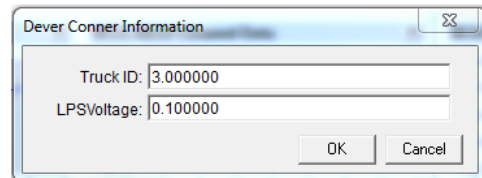
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.



**APPENDIX C4 – DEVER-CONNER DATA PROCESSING**

**7/14/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

7/14/2009



# DADiSP Processing Steps

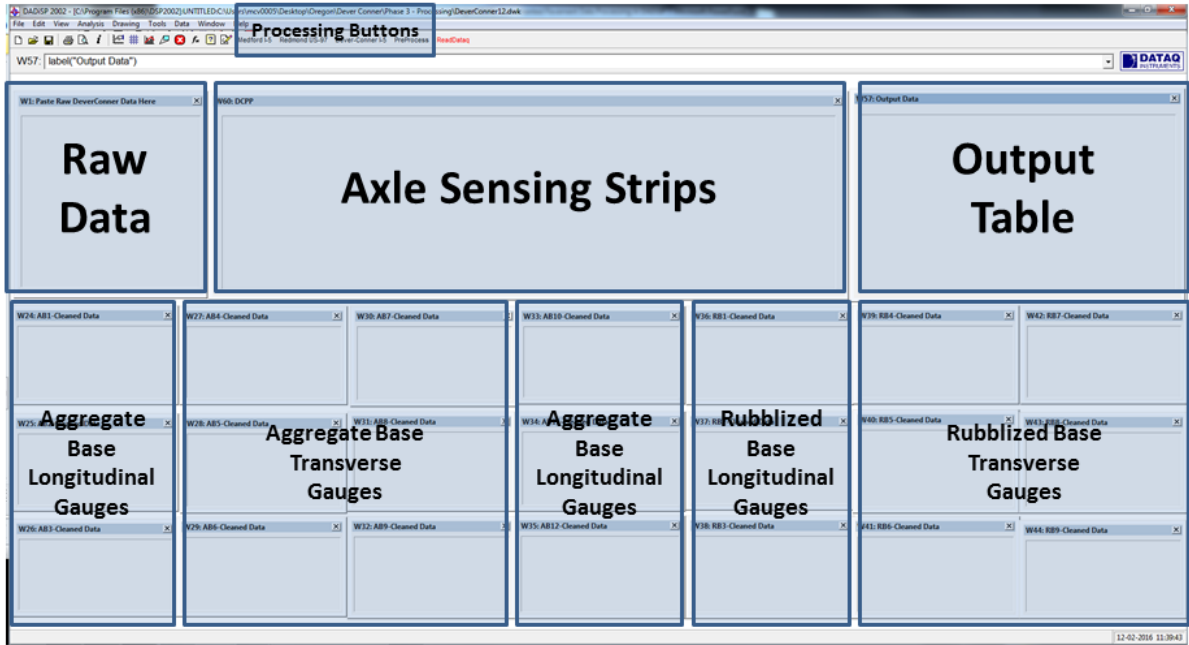
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- TDMS File
- 11 “ab” strain gauges listed
  - Missing ab02
- 9 “rb” strain gauges listed
- Dates
  - 7/14/2009

Channel	Datatype
Time	DT_FLOAT
axle1	DT_FLOAT
axle2	DT_FLOAT
axle3	DT_FLOAT
ab01	
ab	
ab3	DT_FLOAT
ab03	DT_FLOAT
ab04	DT_FLOAT
ab05	DT_FLOAT
ab06	DT_FLOAT
ab07	DT_FLOAT
ab08	DT_FLOAT
ab09	DT_FLOAT
ab10	DT_FLOAT
ab11	DT_FLOAT
ab12	DT_FLOAT
rb01	DT_FLOAT
rb02	DT_FLOAT
rb03	DT_FLOAT
rb04	DT_FLOAT
rb05	DT_FLOAT
rb06	DT_FLOAT
rb07	DT_FLOAT
rb08	DT_FLOAT
rb09	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

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Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:

- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.






















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Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
[Requirements](#)

**CLICK** →

## 2. Open raw \*.tdms file in EXCEL



 Dever-Conner7-14-09_10373514072009	7/14/2009 12:37 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10375814072009	7/14/2009 12:38 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10420114072009	7/14/2009 12:42 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10424114072009	7/14/2009 12:42 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10430214072009	7/14/2009 12:43 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10431014072009	7/14/2009 12:43 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10433814072009	7/14/2009 12:43 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10435014072009	7/14/2009 12:43 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10435814072009	7/14/2009 12:44 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10440614072009	7/14/2009 12:44 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10443414072009	7/14/2009 12:44 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10444114072009	7/14/2009 12:44 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10445314072009	7/14/2009 12:44 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10453214072009	7/14/2009 12:45 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10455614072009	7/14/2009 12:45 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10460514072009	7/14/2009 12:46 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10461514072009	7/14/2009 12:46 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10465414072009	7/14/2009 12:46 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10470214072009	7/14/2009 12:47 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10471414072009	7/14/2009 12:47 PM	TDMS File	1,878 KB
 Dever-Conner7-14-09_10473614072009	7/14/2009 12:47 PM	TDMS File	1,878 KB

### 3. Open Data tab in EXCEL workbook

	A	B	C	D	E
1	Root Name	Title	Author	Date/Time	Groups
2	DC08192009_09371619082009				
3					
4	Group	Channels	Description	header	
			Station		
			Name:DC08192009		
			Sample Rate:5000.0		
			Comments:		
			Timeaxle1axle2		
			axle3AB01		
			sg3AB02AB03		
			AB04AB05AB06		
			AB07AB08AB		
			09AB10AB11A		
			B12		
			RB01RB02RB0		
			3RB04RB05RB		
			06RB07RB08R		
			B09		
			secsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
			voltsvoltsvolts		
5	Data		25		
6					
7	Data				



	A	B	C	D	E	F	
1	Time	axle1	axle2	axle3	sg3	AB01	AB02
2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	
6	0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	
7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	
8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	
9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	
10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	
11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	
13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	
24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
25	0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	
26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	
27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	

CLICK

# 4. Arranging data in EXCEL

- Insert column of zeroes between ab01 and ab03

Time	axle1	axle2	axle3	ab01	ab03
0	0.003599521	0.001220703	0.00213623	-2.28443E-05	4.05586E-05
0.0002	0.000457764	0.000915527	-0.001525879	-2.28005E-05	3.99447E-05
0.0004	-0.002593994	-0.001678467	-0.001220703	-2.26689E-05	4.09093E-05
0.0006	-0.000152588	-0.000915527	0.000457764	-2.28443E-05	4.32771E-05
0.0008	-0.000152588	0.001831055	0.00213623	-2.08274E-05	4.1567E-05
0.001	0.002593994	0.000762939	-0.001678467	-2.26689E-05	3.96378E-05
0.0012	0.001068115	0.000762939	0.001373291	-2.31951E-05	4.01639E-05
0.0014	0.000152588	-0.002593994	-0.001678467	-2.45544E-05	4.12163E-05
0.0016	0.000457764	-0.000610352	0.000457764	-2.18359E-05	3.99009E-05
0.0018	-0.001678467	0.000610352	0.001068115	-2.19235E-05	3.99009E-05
0.002	0.00288818	0.00213623	0.002441406	-2.22305E-05	4.06024E-05
0.0022	0.003204346	0.002746582	0.002288818	-2.31513E-05	3.89801E-05
0.0024	0.000457764	-0.004272461	-0.002288818	-2.4379E-05	3.94185E-05
0.0026	-0.000152588	-0.001068115	-0.001983643	-2.30636E-05	3.95939E-05
0.0028	0.001068115	0.001983643	0.001220703	-2.31513E-05	4.10847E-05
0.003	0	-0.001068115	-0.000305176	-2.32828E-05	4.05586E-05
0.0032	0.001678467	0.001831055	-0.000915527	-2.3239E-05	4.02516E-05
0.0034	0.003814697	0.004882813	0.00356994	-2.43515E-05	3.91993E-05
0.0036	0	-0.001831055	0.00356994	-2.24497E-05	3.88485E-05
0.0038	-0.002746582	0.000305176	-0.000457764	-2.22743E-05	3.96816E-05
0.004	-0.000762939	0.000152588	0.000762939	-2.39844E-05	4.20494E-05
0.0042	0.000762939	0.001678467	0.001831055	-2.09589E-05	4.07778E-05
0.0044	0.000762939	0.000457764	0.002593994	-2.02135E-05	3.99447E-05
0.0046	0.004577637	0.000762939	0.000152588	-2.21428E-05	3.93308E-05
0.0048	-0.000610352	-0.001983643	0.00213623	-2.48613E-05	3.94624E-05
0.005	-0.000457764	-0.001068115	-0.000152588	-2.24497E-05	4.02955E-05
0.0052	0.003662109	0.00050354	0.001831055	-2.27566E-05	3.93747E-05

	D	E	F	G	H
		ab01			
	axle3	ab01		ab03	ab04
3	0.00213623	-2.28443E-05	0	4.05586E-05	0.000210598
7	-0.001525879	-2.28005E-05	0	3.99447E-05	0.000210598
7	-0.001220703	-2.26689E-05	0	4.09093E-05	0.000211518
7	0.000457764	-2.28443E-05	0	4.32771E-05	0.000212001
7	0.00213623	-2.08274E-05	0	4.1567E-05	0.000211738
7	-0.001678467	-2.26689E-05	0	3.96378E-05	0.000210291
9	0.001373291	-2.31951E-05	0	4.01639E-05	0.000211299
4	-0.001678467	-2.45544E-05	0	4.12163E-05	0.00020937
2	0.000457764	-2.18359E-05	0	3.99009E-05	0.000212264
2	0.001068115	-2.19235E-05	0	3.99009E-05	0.000212439
3	0.002441406	-2.22305E-05	0	4.06024E-05	0.000211562
2	0.002288818	-2.31513E-05	0	3.89801E-05	0.000210291
3	0.001220703	-2.31513E-05	0	4.10847E-05	0.000210948
1	-0.002288818	-2.4379E-05	0	3.94185E-05	0.00020994
5	-0.001983643	-2.30636E-05	0	3.95939E-05	0.000208668
3	0.001220703	-2.31513E-05	0	4.10847E-05	0.000210948
5	-0.000305176	-2.32828E-05	0	4.05586E-05	0.000210071
5	-0.000915527	-2.3239E-05	0	4.02516E-05	0.000209458
3	0.003356934	-2.43515E-05	0	3.91993E-05	0.000210641



# 5. Copy data

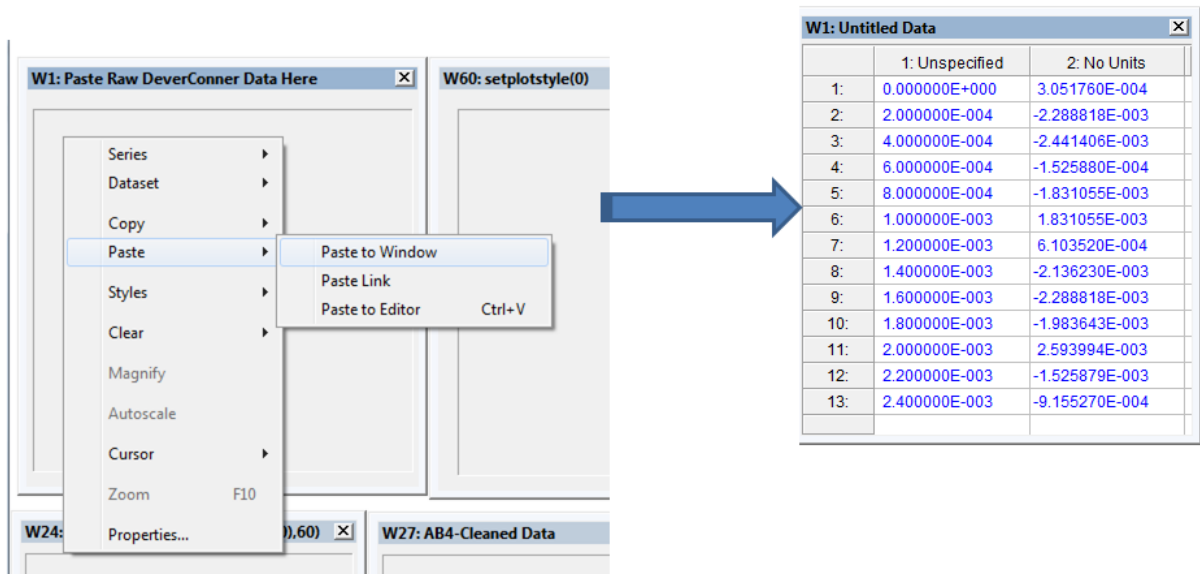
- Highlight data in columns A through Y (RB09) — Exclude Header Row
- Right-Click → Select Copy → Left-Click

The image shows a screenshot of an Excel spreadsheet with columns A through Y highlighted. The data consists of numerical values in scientific notation, such as 0.450148E+05, 0.0001109E+05, etc. The spreadsheet is titled 'data1' and has a status bar at the bottom showing summary statistics: Average: 0.00000071, Count: 50000, Numerical Count: 50000, Sum: 4124.537.



## 6. Paste raw data into W1: Paste Raw Data Here...

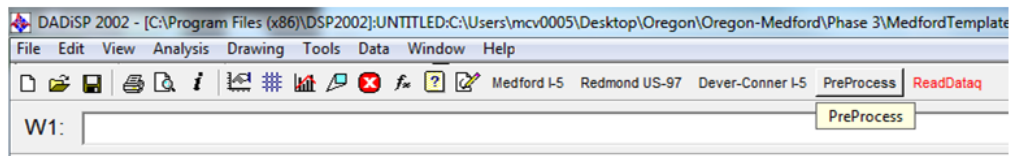
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



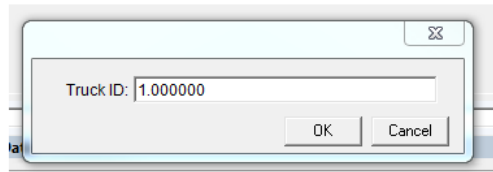
The screenshot illustrates the process of pasting data into a window. On the left, a window titled "W1: Paste Raw DeverConner Data Here" has a context menu open. The "Paste" option is selected, and a sub-menu is displayed with "Paste to Window" highlighted. A blue arrow points from this sub-menu to a separate window titled "W1: Untitled Data" on the right. This window contains a table with the following data:

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

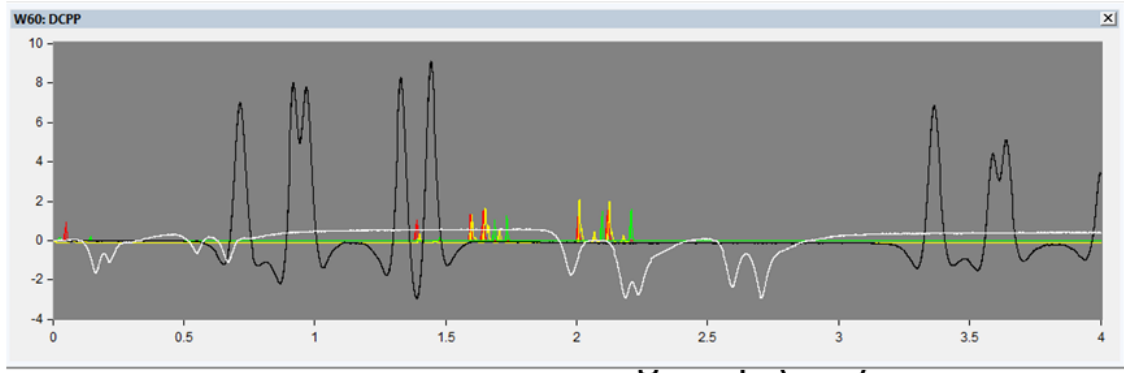
## 7. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



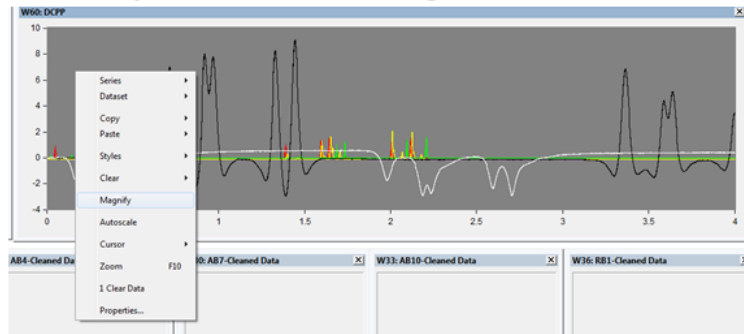
## 8. Inspect W60



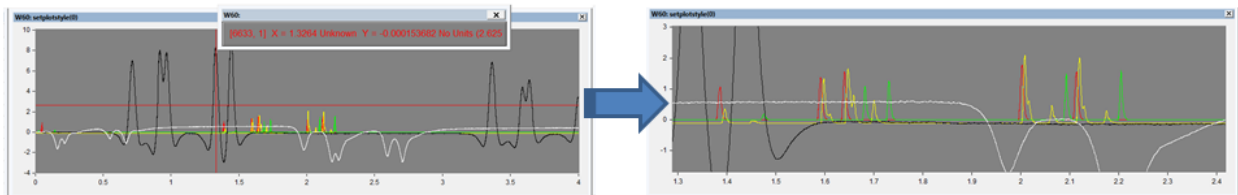
- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



- Use cross-hair to drag over vehicle event

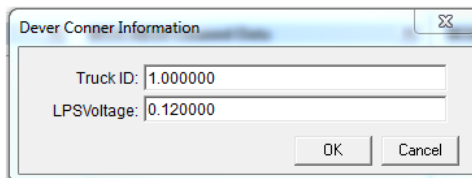


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

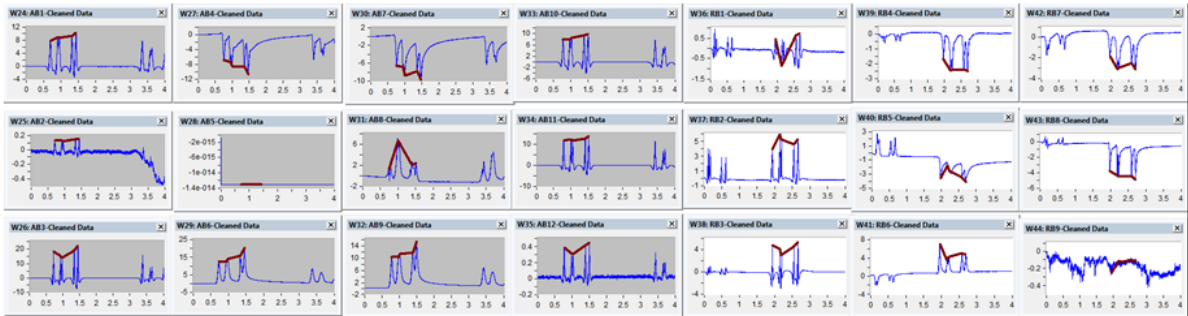
A screenshot of a dialog box titled 'Dever Conner Information'. The dialog box has a title bar with a close button. Inside the dialog, there are two text input fields. The first field is labeled 'Truck ID:' and contains the value '1.000000'. The second field is labeled 'LPSVoltage:' and contains the value '0.120000'. At the bottom right of the dialog, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in Step 14

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs

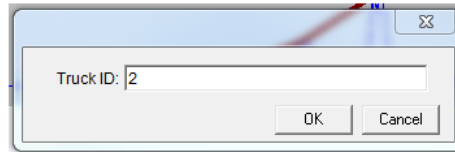


- Processed data output in tabular form in W57

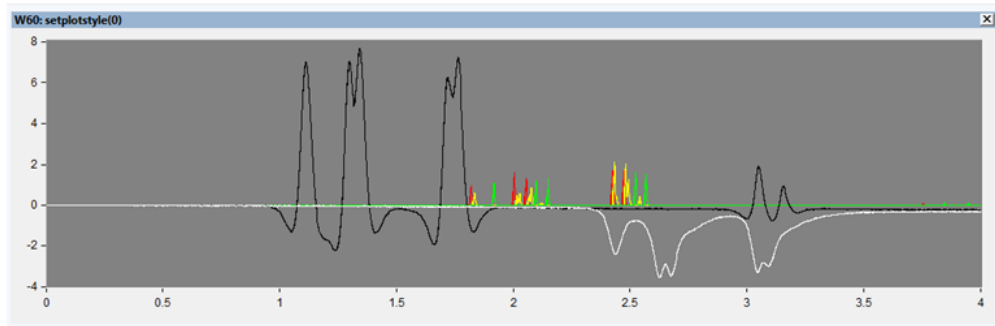
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7



- Next file will be loaded into W60 and W24



## 12. Repeat procedure for next .txt file cont...

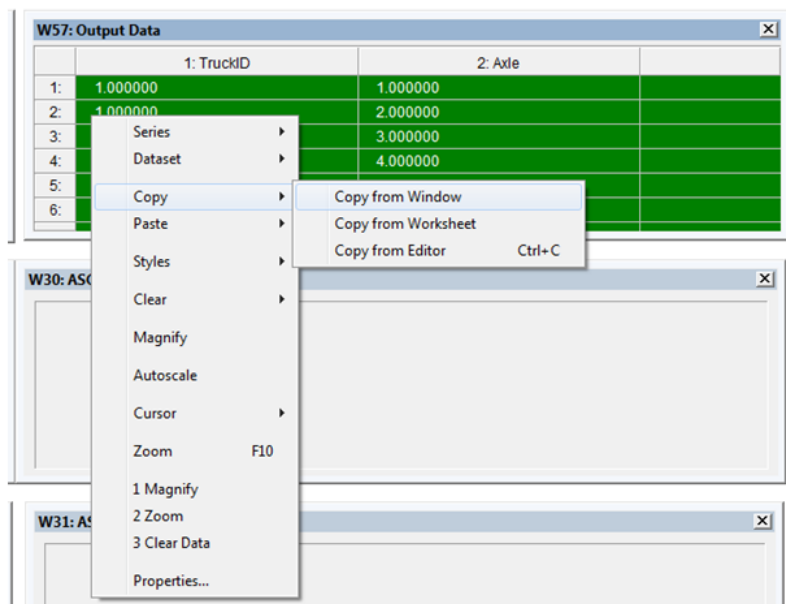
- Repeat Step 8 through 11
- Output data will be added to table in W57

	1: TruckID	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	



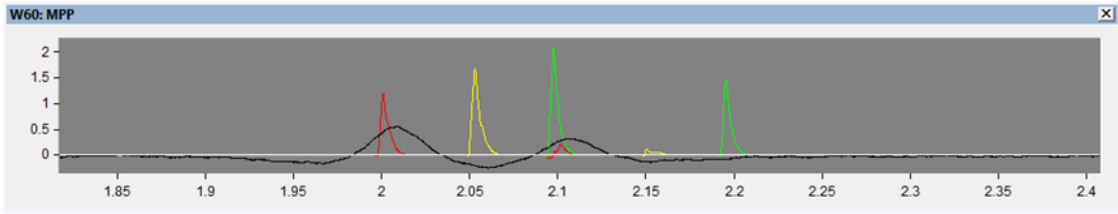
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

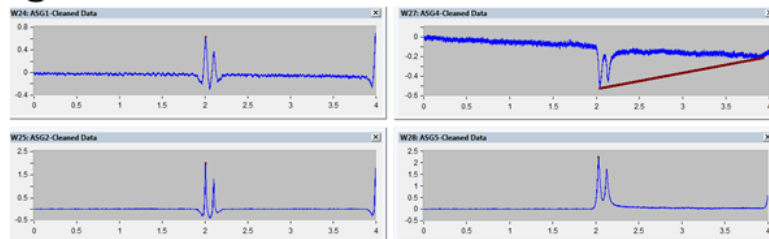


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



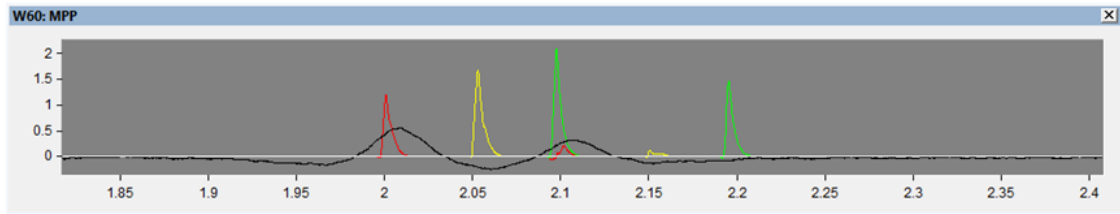
- The peaks will not be properly captured when processing\*



\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.

Truck ID:	3.000000
LPSVoltage:	0.100000

**APPENDIX C5 – DEVER-CONNER DATA PROCESSING**

**8/19/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

8/19/2009

# DADiSP Processing Steps

1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Copy data
5. Paste raw data into W1: Paste Raw Data Here...
6. Click PreProcess button to inspect data
7. Inspect W60
8. Zoom in on vehicle event to be processed
9. Process vehicle event
10. Visual inspection of processed output
11. Repeat procedure for next .tdms file
12. Copy W57 and store in EXCEL
13. Troubleshooting – Changing LPSVoltage

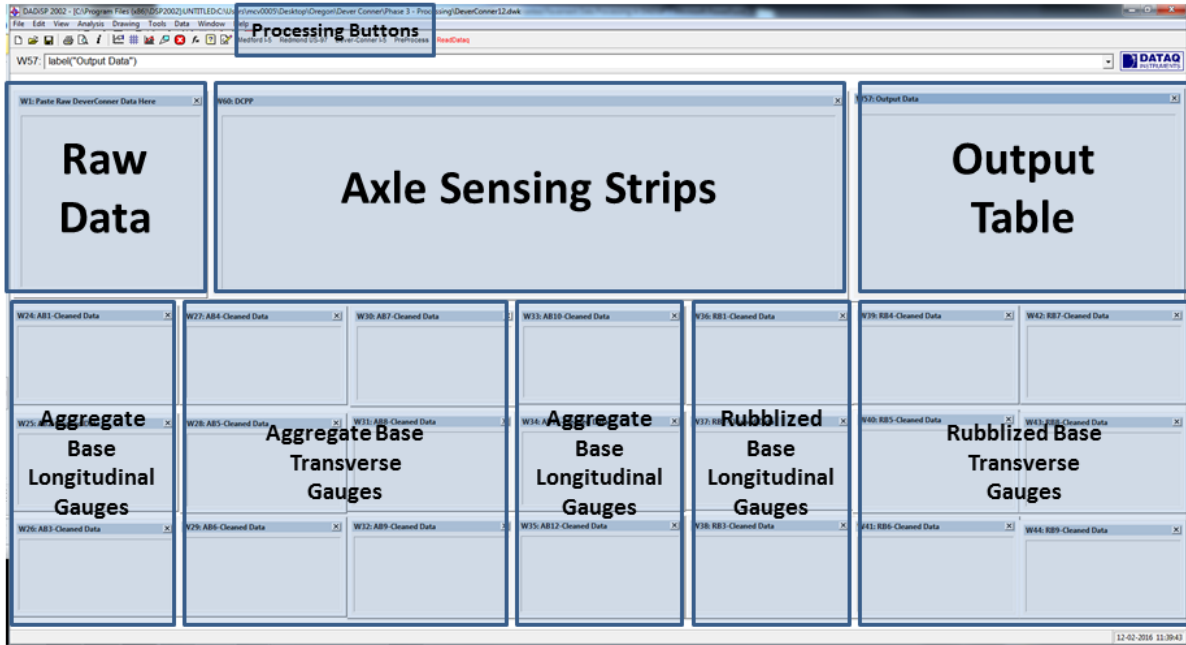
# File Format

- TDMS File
- 12 “ab” strain gauges listed
- 9 “rb” strain gauges listed
- Dates
  - 8/19/2009

Channel	Datatype
Time	DT_FLOAT
axle1	DT_FLOAT
axle2	DT_FLOAT
axle3	DT_FLOAT
AB01	
sg3	DT_FLOAT
AB02	DT_FLOAT
AB03	DT_FLOAT
AB04	DT_FLOAT
AB05	DT_FLOAT
AB06	DT_FLOAT
AB07	DT_FLOAT
AB08	DT_FLOAT
AB09	DT_FLOAT
AB10	DT_FLOAT
AB11	DT_FLOAT
AB12	DT_FLOAT
RB01	DT_FLOAT
RB02	DT_FLOAT
RB03	DT_FLOAT
RB04	DT_FLOAT
RB05	DT_FLOAT
RB06	DT_FLOAT
RB07	DT_FLOAT
RB08	DT_FLOAT
RB09	
	DT_FLOAT



# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

The screenshot shows the National Instruments website interface. At the top left is the NI logo. To the right, there is a language selector set to 'United States' and a 'MY ACCOUNT' button with a 'Log in' link. Below the logo is a navigation menu with 'INNOVATIONS', 'SHOP', 'SUPPORT', and 'COMMUNITY'. The main content area displays the title 'TDM Excel Add-In for Microsoft Excel Download' and its publish date. A 'Supported Features' section lists three bullet points. On the right side, there are two sections: 'Bookmark & Share' with social media icons, and 'Downloads' which lists an attachment 'NITDMEXCEL\_15-0-0.exe'. A yellow arrow with the word 'CLICK' points to this attachment link.

United States MY ACCOUNT  
Log in

INNOVATIONS SHOP SUPPORT COMMUNITY

Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.























**Bookmark & Share**  
 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▸ Requirements

**CLICK**

## 2. Open raw \*.tdms file in EXCEL



 DC08192009_09371619082009	8/19/2009 11:37 AM	TDMS File	1,956 KB
 DC08192009_09373919082009	8/19/2009 11:37 AM	TDMS File	1,956 KB
 DC08192009_09374919082009	8/19/2009 11:37 AM	TDMS File	1,956 KB
 DC08192009_09380219082009	8/19/2009 11:38 AM	TDMS File	1,956 KB
 DC08192009_09385919082009	8/19/2009 11:39 AM	TDMS File	1,956 KB
 DC08192009_09393719082009	8/19/2009 11:39 AM	TDMS File	1,956 KB
 DC08192009_09400319082009	8/19/2009 11:40 AM	TDMS File	1,956 KB
 DC08192009_09403319082009	8/19/2009 11:40 AM	TDMS File	1,956 KB
 DC08192009_09410519082009	8/19/2009 11:41 AM	TDMS File	1,956 KB
 DC08192009_09411419082009	8/19/2009 11:41 AM	TDMS File	1,956 KB
 DC08192009_09420819082009	8/19/2009 11:42 AM	TDMS File	1,956 KB
 DC08192009_09423919082009	8/19/2009 11:42 AM	TDMS File	1,956 KB
 DC08192009_09431319082009	8/19/2009 11:43 AM	TDMS File	1,956 KB
 DC08192009_09433819082009	8/19/2009 11:43 AM	TDMS File	1,956 KB
 DC08192009_09441419082009	8/19/2009 11:44 AM	TDMS File	1,956 KB
 DC08192009_09442119082009	8/19/2009 11:44 AM	TDMS File	1,956 KB
 DC08192009_09442919082009	8/19/2009 11:44 AM	TDMS File	1,956 KB
 DC08192009_09450319082009	8/19/2009 11:45 AM	TDMS File	1,956 KB
 DC08192009_09451419082009	8/19/2009 11:45 AM	TDMS File	1,956 KB
 DC08192009_09462119082009	8/19/2009 11:46 AM	TDMS File	1,956 KB
 DC08192009_09462819082009	8/19/2009 11:46 AM	TDMS File	1,956 KB
 DC08192009_09463619082009	8/19/2009 11:46 AM	TDMS File	1,956 KB

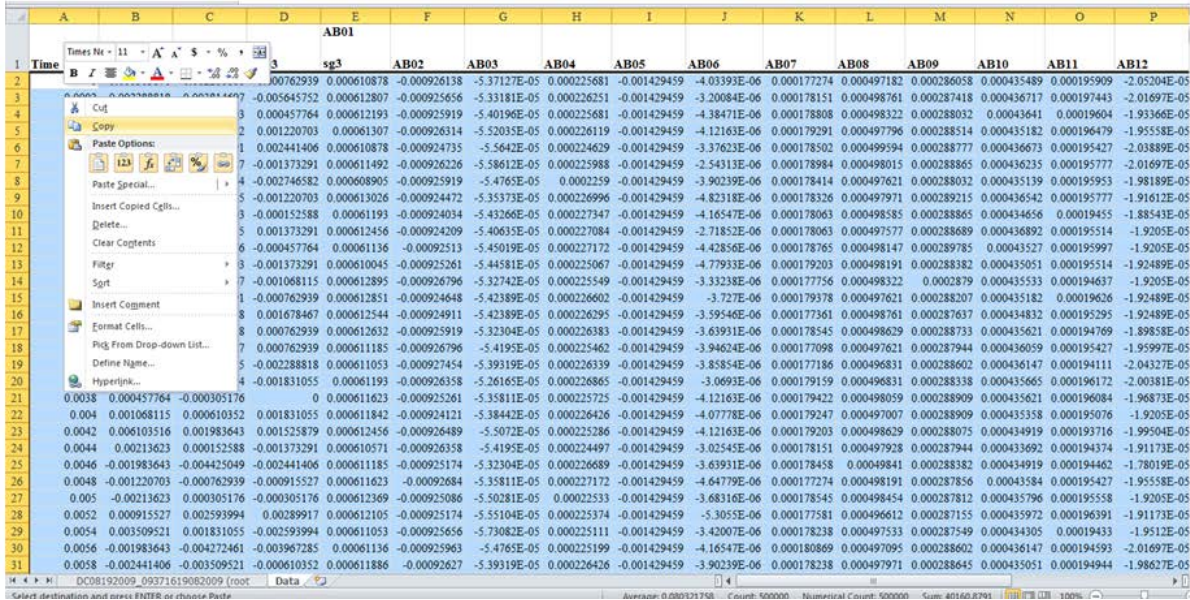
### 3. Open Data tab in EXCEL workbook

1	Root Name	Title	Author	Date/Time	Groups
2	DC08192009_09371619082009				
3					
4	Group	Channels	Description	header	
				Station	
				Name:DC08192009	
				Sample Rate:5000.0	
				Comments:	
				Timeaxle1axle2	
				axle3AB01	
				sg3AB02AB03	
				AB04AB05AB06	
				AB07AB08AB	
				09AB10AB11A	
				B12	
				RB01RB02RB0	
				3RB04RB05RB	
				06RB07RB08R	
				B09	
				secsvoltsvoltsvol	
				tsvoltsvoltsvolts	
				voltsvoltsvolts	
				voltsvoltsvoltsvo	
				ltsvoltsvoltsvolts	
				voltsvoltsvoltsvo	
				ltsvolts	
5	Data		25		
6					
7	Data				

1	Time	axle1	axle2	axle3	sg3	AB01	AB02
2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	
6	0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	
7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	
8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	
9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	
10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	
11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	
13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	
24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
25	0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	
26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	
27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	

# 4. Copy data

- Highlight data
  - Exclude Header Row
- Right-Click → Select Copy → Left-Click



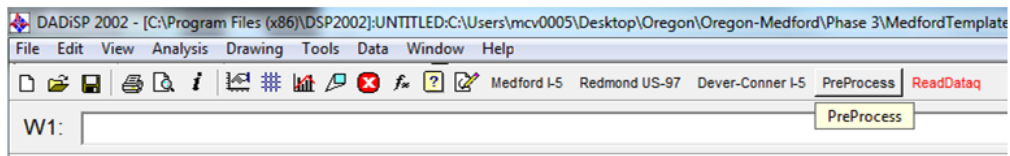
## 5. Paste raw data into W1: Paste Raw Data Here...

- Right-Click → Select Paste → Left-Click
- Copied data will fill box

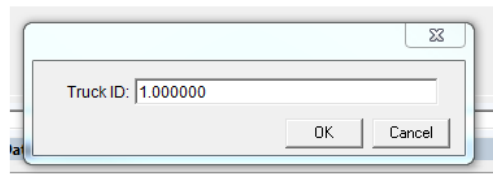
The screenshot illustrates the process of pasting data into a specific window. A context menu is shown over the window 'W1: Paste Raw DeverConner Data Here'. The 'Paste' option is selected, and a sub-menu is visible with 'Paste to Window' highlighted. An arrow points from this sub-menu to a separate window titled 'W1: Untitled Data' which contains a table of numerical data.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

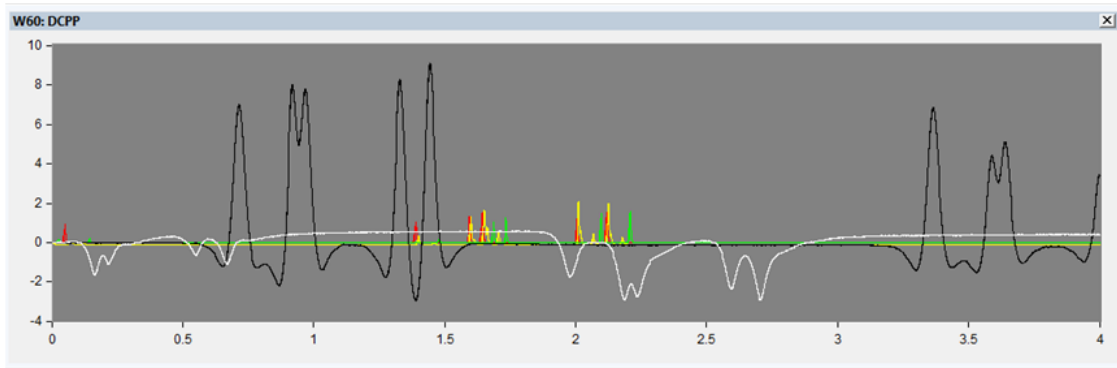
## 6. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



## 7. Inspect W60

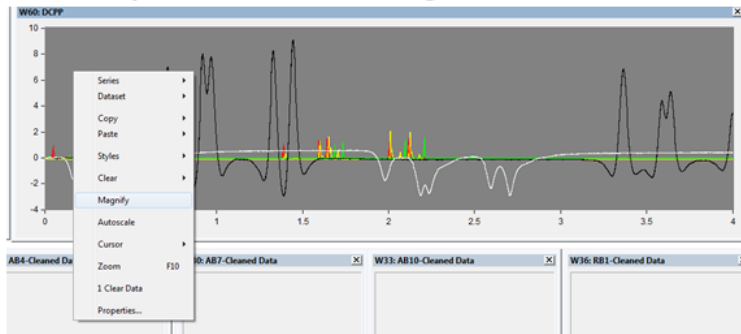


- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

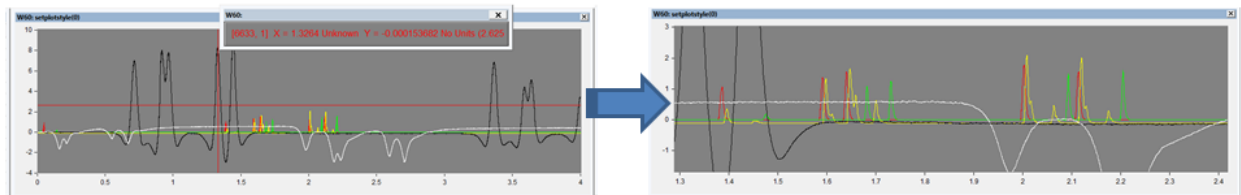


## 8. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



- Use cross-hair to drag over vehicle event

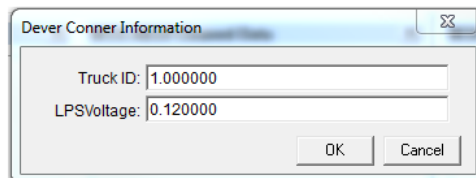


## 9. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

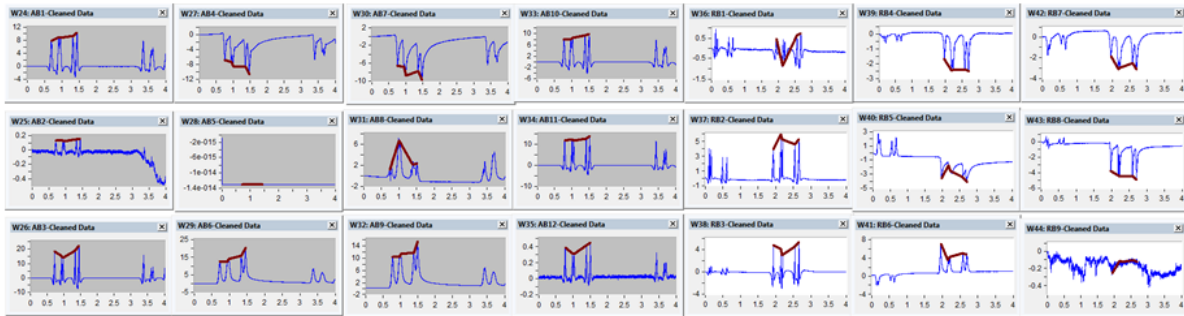
A screenshot of a dialog box titled 'Dever Conner Information'. It has a standard Windows-style title bar with a close button. The dialog contains two text input fields. The first field is labeled 'Truck ID:' and contains the value '1.000000'. The second field is labeled 'LPSVoltage:' and contains the value '0.120000'. At the bottom right of the dialog, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in Step 13

# 10. Visual inspection of processed output

- Ensure peaks are captured on ASGs

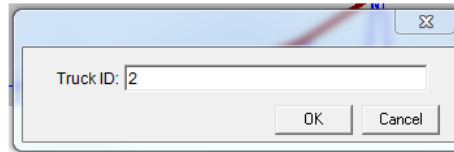


- Processed data output in tabular form in W57

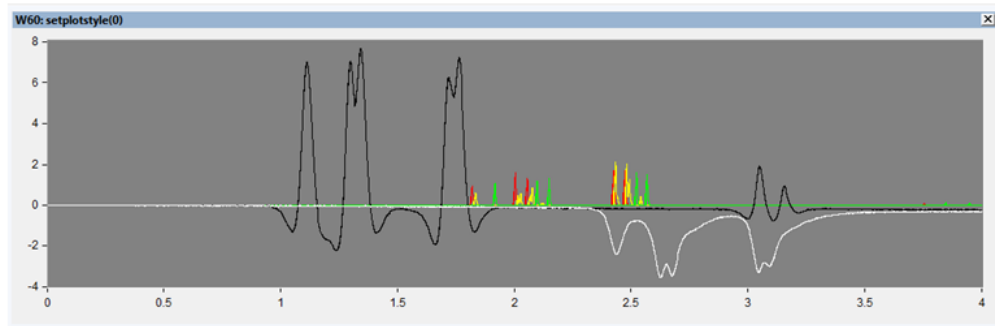
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 11. Repeat procedure for next .tdms file

- Repeat Step 2 through 5
- Change Truck ID in Step 6



- Next file will be loaded into W60 and W24



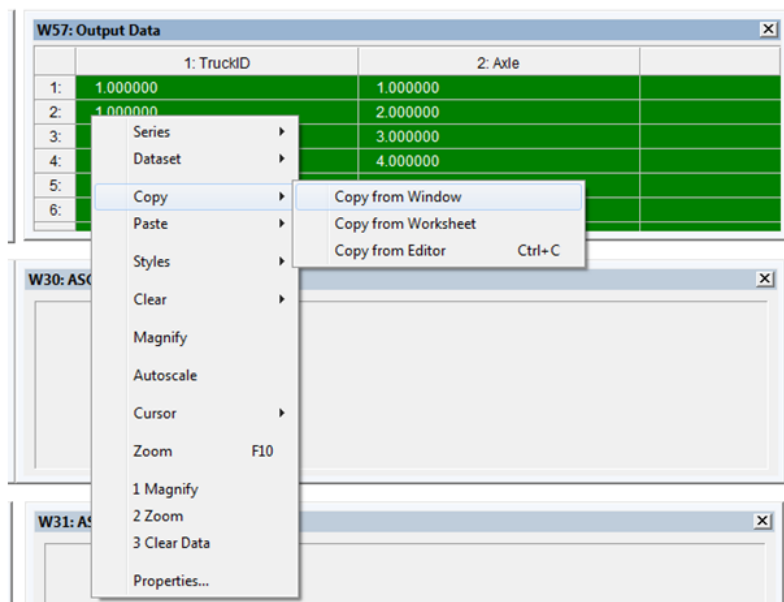
## 11. Repeat procedure for next .txt file cont...

- Repeat Step 7 through 10
- Output data will be added to table in W57

W57: Output Data			
	1: TruckD	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

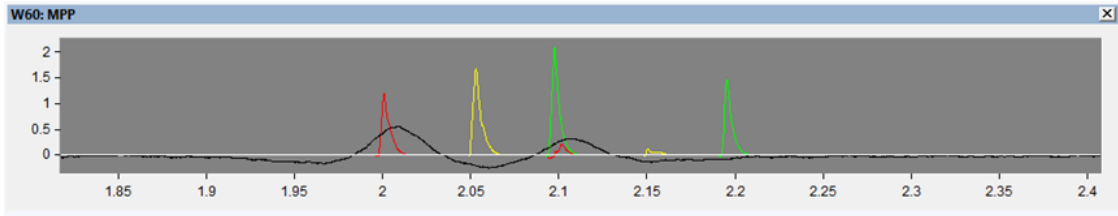
## 12. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

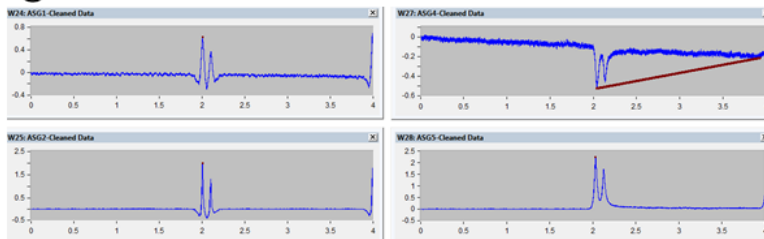


# 13. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



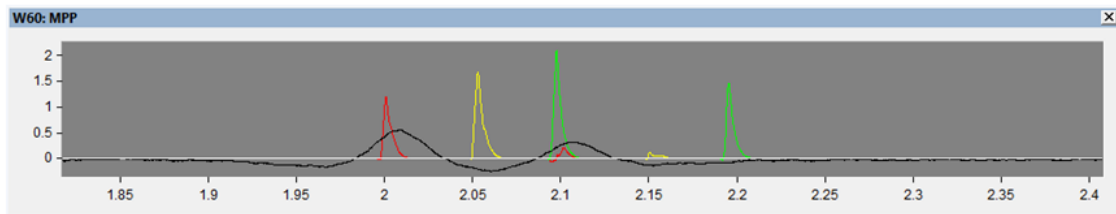
- The peaks will not be properly captured when processing\*



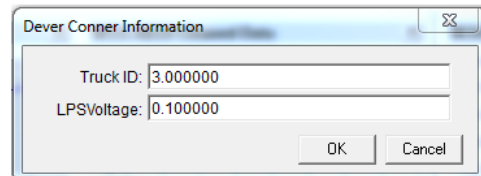
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

### 13. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.





**APPENDIX C6 – DEVER-CONNER DATA PROCESSING**

**9/22/2009 & 11/19/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

9/22/2009; 11/19/2009

# DADiSP Processing Steps

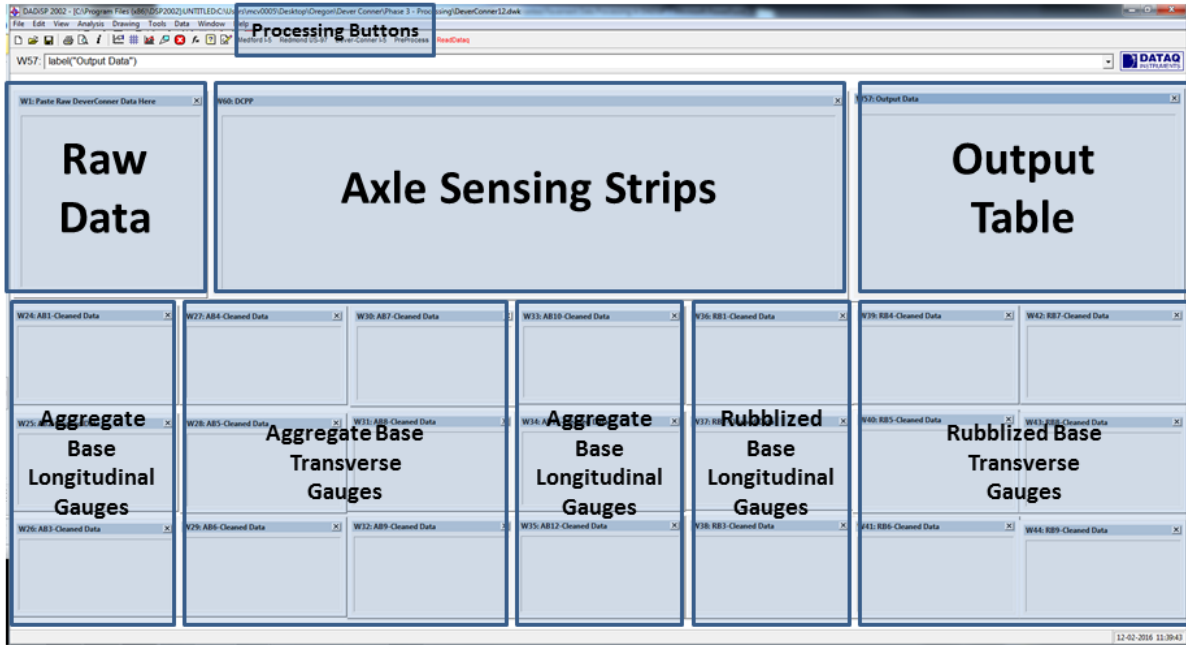
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- TDMS File
- 11 “AB” strain gauges listed
  - AB12 listed with RB
  - AB02 missing
- 10 “RB” strain gauges listed
  - RB01 listed with AB
- Dates
  - 9/22/2009
  - 11/19/2009

Channel	Datatype
Time	DT_FLOAT
North	DT_FLOAT
Diag	DT_FLOAT
South	DT_FLOAT
AB01	DT_FLOAT
RB01	DT_FLOAT
AB03	DT_FLOAT
AB04	DT_FLOAT
AB05	DT_FLOAT
AB06	DT_FLOAT
AB07	DT_FLOAT
AB08	DT_FLOAT
AB09	DT_FLOAT
AB10	DT_FLOAT
AB11	DT_FLOAT
RB02	DT_FLOAT
RB03	DT_FLOAT
AB12	DT_FLOAT
RB04	DT_FLOAT
RB05	DT_FLOAT
RB06	DT_FLOAT
RB07	DT_FLOAT
RB08	DT_FLOAT
RB09	DT_FLOAT
RB10	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:

- Interactively loads TDM and TDMS files in Excel
- Use "Open with>>Excel importer" or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.























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 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▶ Requirements

**CLICK**

## 2. Open raw \*.tdms file in EXCEL



 DC_10434422092009	9/22/2009 12:43 PM	TDMS File	1,956 KB
 DC_10440922092009	9/22/2009 12:44 PM	TDMS File	1,956 KB
 DC_10444122092009	9/22/2009 12:44 PM	TDMS File	1,956 KB
 DC_10450922092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
 DC_10452822092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
 DC_10453622092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
 DC_10461122092009	9/22/2009 12:46 PM	TDMS File	1,956 KB
 DC_10470322092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
 DC_10472122092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
 DC_10473522092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
 DC_10474622092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
 DC_10481322092009	9/22/2009 12:48 PM	TDMS File	1,956 KB
 DC_10484122092009	9/22/2009 12:48 PM	TDMS File	1,956 KB
 DC_10490322092009	9/22/2009 12:49 PM	TDMS File	1,956 KB
 DC_10491322092009	9/22/2009 12:49 PM	TDMS File	1,956 KB
 DC_10493222092009	9/22/2009 12:49 PM	TDMS File	1,956 KB
 DC_10501022092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
 DC_10501622092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
 DC_10502822092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
 DC_10503622092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
 DC_10510322092009	9/22/2009 12:51 PM	TDMS File	1,956 KB
 DC_10511322092009	9/22/2009 12:51 PM	TDMS File	1,956 KB



### 3. Open Data tab in EXCEL workbook

1	Root Name	Title	Author	Date/Time	Groups
2	DC08192009_09371619082009				
3					
4	Group	Channels	Description	header	
				Station	
				Name:DC08192009	
				Sample Rate:5000.0	
				Comments:	
				Timeaxle1axle2	
				axle3AB01	
				sg3AB02AB03	
				AB04AB05AB06	
				AB07AB08AB	
				09AB10AB11A	
				B12	
				RB01RB02RB0	
				3RB04RB05RB	
				06RB07RB08R	
				B09	
				secsvoltsvoltsvol	
				tsvoltsvoltsvolts	
				voltsvoltsvolts	
				voltsvoltsvoltsvo	
				ltsvoltsvoltsvolts	
				voltsvoltsvolts	
				voltsvoltsvoltsvo	
				ltsvolts	
5	Data		25		
6					
7	Data				

1	Time	axle1	axle2	axle3	sg3	AB01	AB02
2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	
6	0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	
7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	
8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	
9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	
10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	
11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	
13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	
24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
25	0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	
26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	
27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	

# 4. Arranging data in EXCEL

- Move column RB01 between AB11 and RB02.  
– Cut column F (RB01) → → Insert cut cells between AB11 and RB02

	A	B	C	D	E	F	G	H	I	J	K
1		North	Diag	South	AB01	RB01	Col	AB05	AB06	AB07	
2	0	0.00602032	-0.001678467	-0.001220703	0.000116413	0.00436738	Copy	1436738	-0.001429415	-8.90906E-06	0.001436738
3	0.0002	-0.006713667	-0.000915227	0.000112588	0.000116313	0.00436738	Paste Options	1436738	-0.001429415	-7.5417E-06	0.001436738
4	0.0004	0.000762939	0.000915227	0.003662109	0.000116413	0.00436738	Paste Special...	1436738	-0.001429415	-7.30904E-06	0.001436738
5	0.0006	0.002288818	0.003662109	0.003662109	0.000115844	0.00436738	Insert	1436738	-0.001429415	-8.11556E-06	0.001436738
6	0.0008	0.00289917	0.003662109	0.000015176	0.000111388	0.00436738	Delete	1436738	-0.001429415	-7.14708E-06	0.001436738
7	0.001	0.000601032	-0.000762939	-0.001981643	0.000115142	0.00436738	Clear Contents	1436738	-0.001429415	-6.7963E-06	0.001436738
8	0.0012	-0.001373291	-0.002443406	-0.000123288	0.000113122	0.00436738	Format Cells...	1436738	-0.001429415	-7.14708E-06	0.001436738
9	0.0014	-0.000762939	0.000437764	0.001514789	0.000116746	0.00436738	Column Width...	1436738	-0.001429415	-6.7963E-06	0.001436738
10	0.0016	0.000601032	0.002293994	0.001214055	0.000116673	0.00436738	Hide	1436738	-0.001429415	-8.11556E-06	0.001436738
11	0.0018	0.000762939	-0.000305176	0.001811055	0.000116544	0.00436738	Unhide	1436738	-0.001429415	-8.2257E-06	0.001436738
12	0.002	-0.001373291	-0.002443406	-0.000123288	0.000113122	0.00436738		1436738	-0.001429415	-9.31482E-06	0.001436738
13	0.0022	-0.000915227	-0.002293994	-0.003369844	0.000115031	0.00436738		1436738	-0.001429415	-7.62939E-06	0.001436738
14	0.0024	-0.000762939	-0.000601032	0.000391176	0.000114448	0.00436738		1436738	-0.001429415	-7.47324E-06	0.001436738
15	0.0026	-0.001088115	0.001220703	0.0001088115	0.000116515	0.00436738		1436738	-0.001429415	-8.46249E-06	0.001436738
16	0.0028	0.001813055	0.002293994	0.000311736	0.000111588	0.00436738		1436738	-0.001429415	-7.84863E-06	0.001436738
17	0.003	0.001813055	0.003662109	-0.000915227	0.000110103	0.00436738		1436738	-0.001429415	-7.47324E-06	0.001436738
18	0.0032	0.001304346	0.001088115	-0.00457637	0.000114748	0.00436738		1436738	-0.001429415	-8.46249E-06	0.001436738
19	0.0034	-0.00289917	-0.003662109	-0.001981643	0.000115623	0.00436738		1436738	-0.001429415	-7.23477E-06	0.001436738
20	0.0036	0.001220703	0.000601032	0.001514789	0.000115137	0.00436738		1436738	-0.001429415	-8.11556E-06	0.001436738
21	0.0038	0.004119873	0.003662109	0.003662109	0.000115271	0.00436738		1436738	-0.001429415	-9.31482E-06	0.001436738
22	0.004	0.001983643	0.00213623	0.000015176	0.000114792	0.00436738		1436738	-0.001429415	-7.84863E-06	0.001436738
23	0.0042	0.001746882	0.000601032	0.00213623	0.000115144	0.00436738		1436738	-0.001429415	-8.11556E-06	0.001436738
24	0.0044	-0.001813055	-0.000305176	0.000762939	0.000114792	0.00436738		1436738	-0.001429415	-7.5151E-06	0.001436738
25	0.0046	-0.00213623	-0.001088115	0.000015176	0.000116413	0.00436738		1436738	-0.001429415	-6.66787E-06	0.001436738
26	0.0048	-0.000601032	0.001813055	0.00213623	0.000116984	0.00436738		1436738	-0.001429415	-8.11556E-06	0.001436738
27	0.005	0.003051738	0.002288818	0.00213623	0.000116544	0.00436738		1436738	-0.001429415	-7.14708E-06	0.001436738
28	0.0052	0.002443406	0.002288818	0.000015176	0.000114448	0.00436738		1436738	-0.001429415	-8.2257E-06	0.001436738
29	0.0054	0.001813055	-0.001373291	-0.000915227	0.000111388	0.00436738		1436738	-0.001429415	-9.25174E-06	0.001436738
30	0.0056	-0.000601032	-0.000305176	-0.000915227	0.000115888	0.00436738		1436738	-0.001429415	-8.46249E-06	0.001436738
31	0.0058	0.000601032	-0.000915227	0.000915227	0.000117209	0.00436738		1436738	-0.001429415	-7.95623E-06	0.001436738
32	0.006	0.000762939	0.001088115	0.000437764	0.000117398	0.00436738		1436738	-0.001429415	-8.11556E-06	0.001436738
33	0.0062	-0.00213623	-0.001220703	0.001373291	0.000115137	0.00436738		1436738	-0.001429415	-8.11556E-06	0.001436738
34	0.0064	-0.001220703	-0.000123288	-0.001088115	0.000115888	0.00436738		1436738	-0.001429415	-8.30643E-06	0.001436738
35	0.0066	0.000915227	-0.000305176	-0.000437764	0.000115031	0.00436738		1436738	-0.001429415	-7.4101E-06	0.001436738
36	0.0068	-0.000123288	-0.001813055	-0.002746882	0.000116544	0.00436738		1436738	-0.001429415	-7.23477E-06	0.001436738
37	0.007	0.000305176	0.001983643	0.002288818	0.000115888	0.00436738		1436738	-0.001429415	-9.0783E-06	0.001436738
38	0.0072	0.000015176	0.001746882	0.000015176	0.000116413	0.00436738		1436738	-0.001429415	-7.47324E-06	0.001436738

	M	N	O	P	Q	R	S	T
	AB09	AB10	AB11	RB01	RB02	RB03	RB04	RB05
8	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
9	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
10	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
11	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
12	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
13	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
14	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
15	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
16	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
17	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
18	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
19	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
20	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
21	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
22	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
23	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
24	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
25	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
26	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
27	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
28	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
29	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
30	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
31	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
32	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
33	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
34	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
35	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
36	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
37	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738
38	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738

# 4. Arranging data in EXCEL cont..

- Insert column of zeroes between AB01 and AB03

	A	B	C	D	E	F	G	H
1	Time	North	Diag	South	AB01	AB03		B05
2	0	0.000610352	-0.001678467	-0.001220703	0.000116414	0.000116414		0.000116414
3	0.0002	-0.006713867	-0.000915527	0.000152588	0.00011637	0.00011637		0.00011637
4	0.0004	0.000762939	0.000915527	0.003662109	0.000116414	0.000116414		0.000116414
5	0.0006	0.002288818	0.003509521	0.005340576	0.000115844	0.000115844		0.000115844
6	0.0008	0.00289917	0.001831055	0.000305176	0.000115186	0.000115186		0.000115186
7	0.001	0.000610352	-0.000762939	-0.001983643	0.000115142	0.000115142		0.000115142
8	0.0012	-0.001373291	-0.002441406	-0.000152588	0.00011523	0.00011523		0.00011523
9	0.0014	-0.000762939	0.000457764	0.001525879	0.000116765	0.000116765		0.000116765
10	0.0016	0.000610352	0.002593994	0.001831055	0.000116677	0.000116677		0.000116677
11	0.0018	0.000762939	-0.000305176	0.001831055	0.000116546	0.000116546		0.000116546
12	0.002	0.000610352	0.002593994	0.003509521	0.00011542	0.00011542		0.00011542
13	0.0022	-0.000915527	-0.002593994	-0.00356934	0.000115011	0.000115011		0.000115011
14	0.0024	-0.000762939	-0.000610352	0.000305176	0.000114485	0.000114485		0.000114485
15	0.0026	-0.001068115	0.001220703	0.001068115	0.000116151	0.000116151		0.000116151
16	0.0028	0.001831055	0.002593994	0.003051758	0.0001158	0.0001158		0.0001158
17	0.003	0.001831055	0.003967285	-0.000915527	0.000116107	0.000116107		0.000116107
18	0.0032	0.003204346	0.001068115	-0.004577637	0.000114748	0.000114748		0.000114748
19	0.0034	-0.00289917	-0.005950928	-0.001983643	0.000115625	0.000115625		0.000115625
20	0.0036	-0.001220703	0.000610352	0.001525879	0.000115537	0.000115537		0.000115537
21	0.0038	0.004119873	0.003814697	0.00579834	0.000115274	0.000115274		0.000115274
22	0.004	0.001983643	0.00213623	0.001831055	0.000114792	0.000114792		0.000114792
23	0.0042	0.002746582	0.000610352	0.00213623	0.000115142	0.000115142		0.000115142
24	0.0044	-0.001831055	-0.000305176	0.000762939	0.000114704	0.000114704		0.000114704
25	0.0046	-0.00213623	0.0001068115	0.000305176	0.000116414	0.000116414		0.000116414
26	0.0048	-0.000610352	0.001831055	0.00213623	0.000116984	0.000116984		0.000116984
27	0.005	0.003051758	0.002288818	0.00213623	0.000116546	0.000116546		0.000116546
28	0.0052	0.002441406	0.002288818	0.002288818	0.000115449	0.000115449		0.000115449
29	0.0054	0.001831055	-0.001373291	-0.000915527	0.000115186	0.000115186		0.000115186
30	0.0056	0.000610352	-0.000305176	-0.000305176	0.000115888	0.000115888		0.000115888
31	0.0058	0.000610352	-0.000915527	-0.000915527	0.000117201	0.000117201		0.000117201

## 4. Arranging data in EXCEL cont..

- Move AB12 between AB11 and RB01
  - Cut column S (AB12) → Insert cut cells between AB11 and RB01

The image displays two screenshots of an Excel spreadsheet illustrating the process of moving a column. The left screenshot shows the 'Cut' menu open over column S (AB12). The right screenshot shows the 'Insert Cut Cells' option selected, with a blue arrow pointing to the new position between columns AB11 and RB01.

	R	S	T	U	V
2	RB03	AB12		RB05	RB06
385E-05	0.001436738	0.0012		0.001436738	0.001436738
615E-05	0.001436738	0.0012		0.001436738	0.001436738
108E-05	0.001436738	0.0012		0.001436738	0.001436738
038E-05	0.001436738	0.0012		0.001436738	0.001436738
499E-05	0.001436738	0.0012		0.001436738	0.001436738
408E-05	0.001436738	0.0012		0.001436738	0.001436738
038E-05	0.001436738	0.0012		0.001436738	0.001436738
408E-05	0.001436738	0.0012		0.001436738	0.001436738
556E-05	0.001436738	0.0012		0.001436738	0.001436738
669E-05	0.001436738	0.0012		0.001436738	0.001436738
177E-05	0.001436738	0.0012		0.001436738	0.001436738
123E-05	0.001436738	0.0012		0.001436738	0.001436738
562E-05	0.001436738	0.0012		0.001436738	0.001436738
492E-05	0.001436738	0.001260955	0.001436738	0.001436738	0.001436738
193E-05	0.001436738	0.00126113	0.001436738	0.001436738	0.001436738
631E-05	0.001436738	0.001260999	0.001436738	0.001436738	0.001436738
285E-05	0.001436738	0.001261569	0.001436738	0.001436738	0.001436738
477E-05	0.001436738	0.001260736	0.001436738	0.001436738	0.001436738
193E-05	0.001436738	0.001262884	0.001436738	0.001436738	0.001436738
385E-05	0.001436738	0.001261086	0.001436738	0.001436738	0.001436738

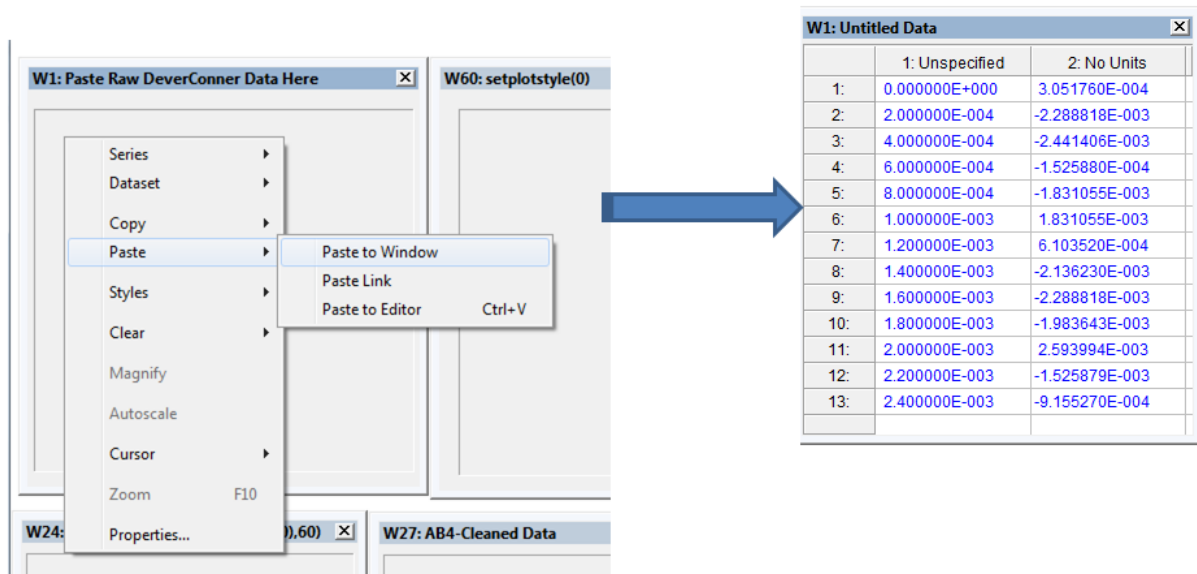
	N	O	P	Q	R	S
16738	0.001436738	0.001436738	0.001436738	0.001436738	RB03	AB12
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261306
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260823
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260472
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261086
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260385
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001259771
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260122
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001263279
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262489
16738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262358
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.63492E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.69193E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.69631E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.54285E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.56477E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.69193E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.71385E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.59108E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.58669E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.42884E-05	0.001436738
16738	0.001436738	0.001436738	0.001436738	0.001436738	3.59546E-05	0.001436738





## 6. Paste raw data into W1: Paste Raw Data Here...

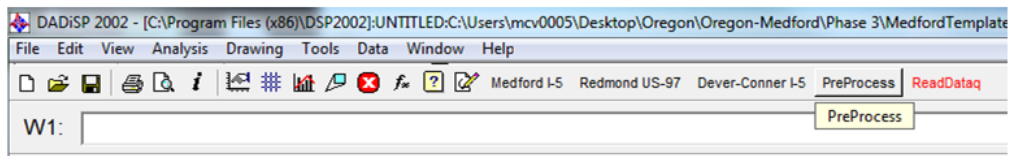
- Right-Click → Select Paste → Left-Click
- Copied data will fill box



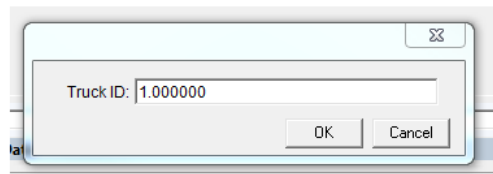
The screenshot illustrates the process of pasting data into a specific window. On the left, a context menu is open over a window titled "W1: Paste Raw DeverConner Data Here". The "Paste" option is selected, and a sub-menu is visible with "Paste to Window" highlighted. A blue arrow points from the "Paste to Window" option to a separate window titled "W1: Untitled Data" which contains a table of numerical data.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

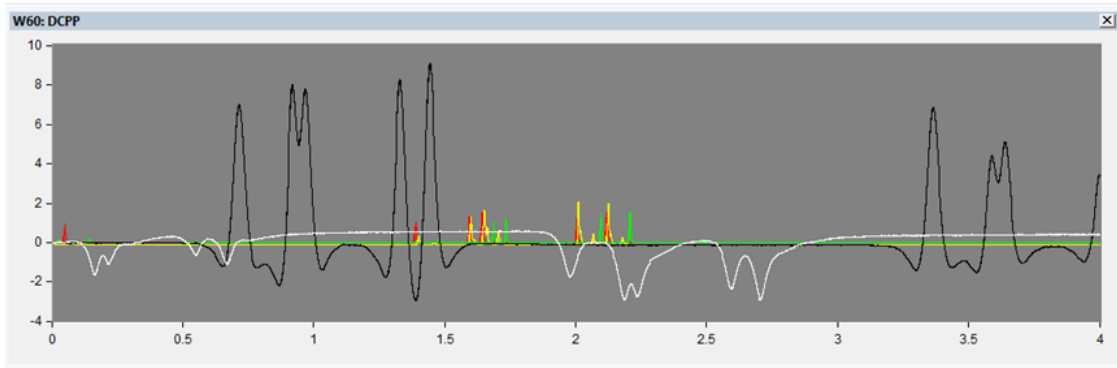
## 7. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



## 8. Inspect W60

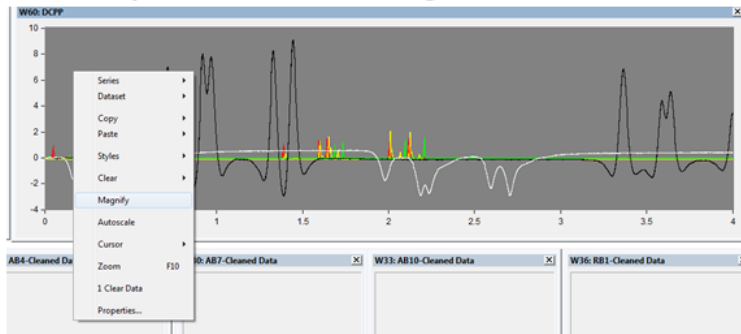


- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

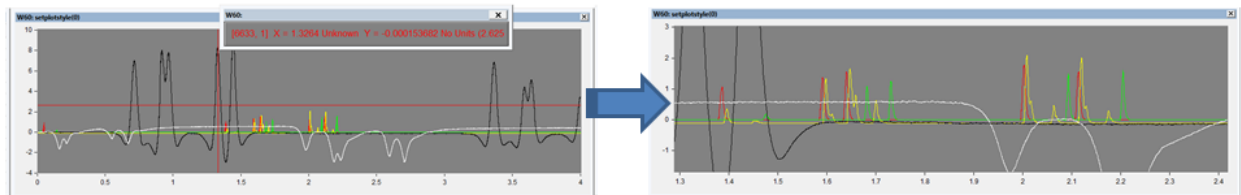


## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits

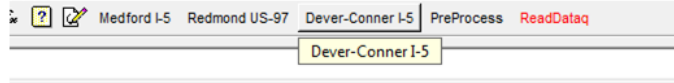


- Use cross-hair to drag over vehicle event

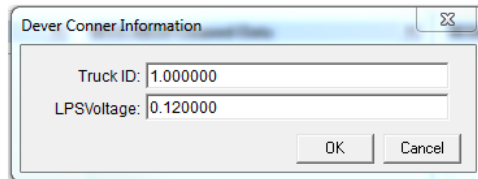


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

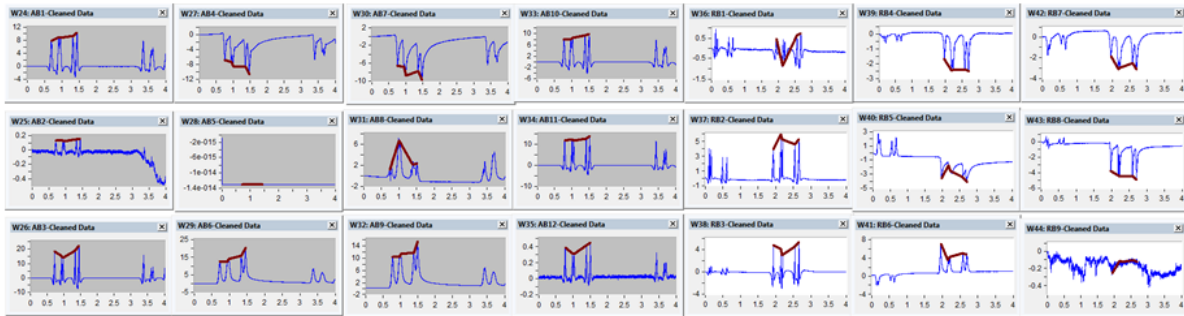
A screenshot of a dialog box titled 'Dever Conner Information'. It has a standard Windows-style title bar with a close button. The dialog contains two input fields: 'Truck ID:' with the value '1.000000' and 'LPSVoltage:' with the value '0.120000'. At the bottom right, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in Step 14

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs

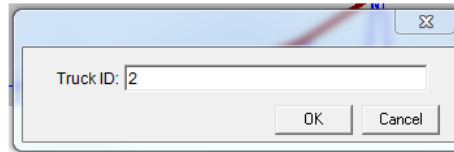


- Processed data output in tabular form in W57

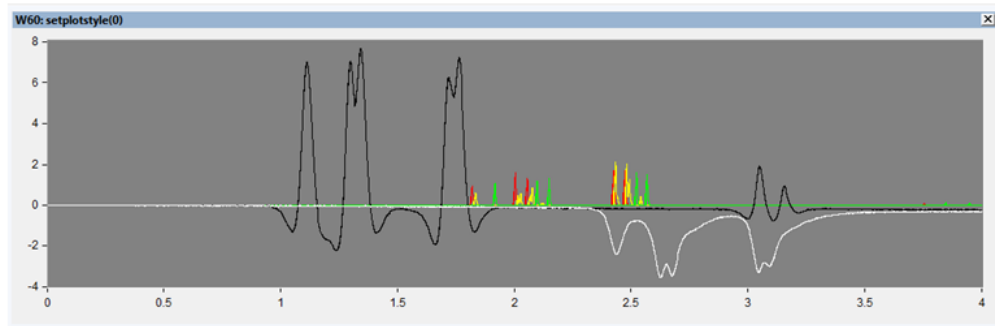
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7



- Next file will be loaded into W60 and W24



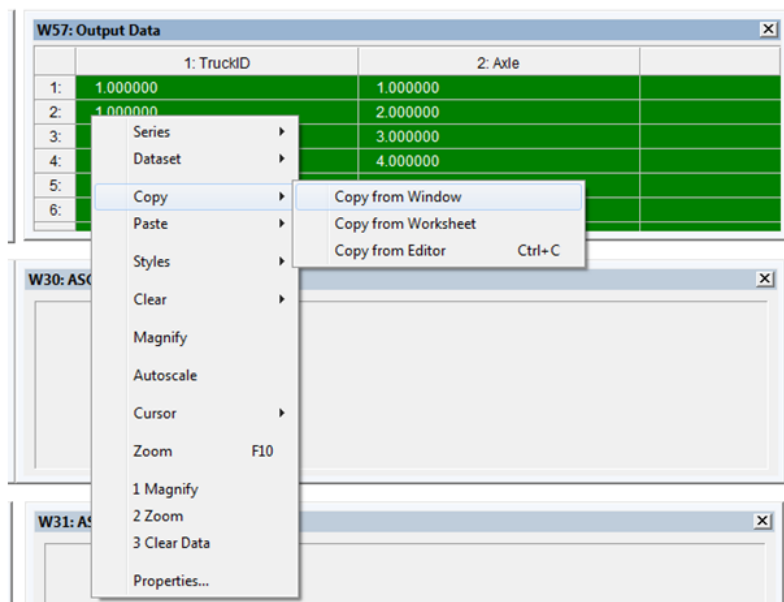
## 12. Repeat procedure for next .txt file cont...

- Repeat Step 8 through 11
- Output data will be added to table in W57

W57: Output Data			
	1: TruckD	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

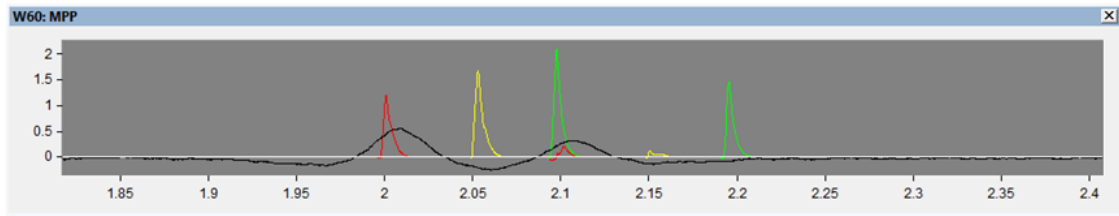
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

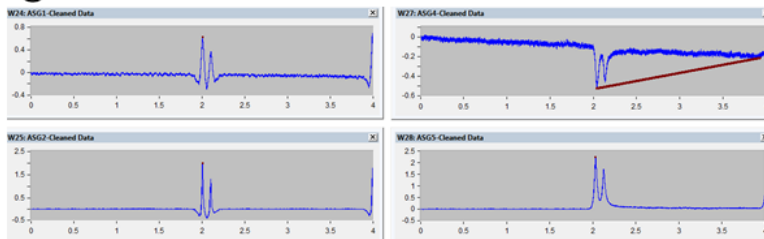


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



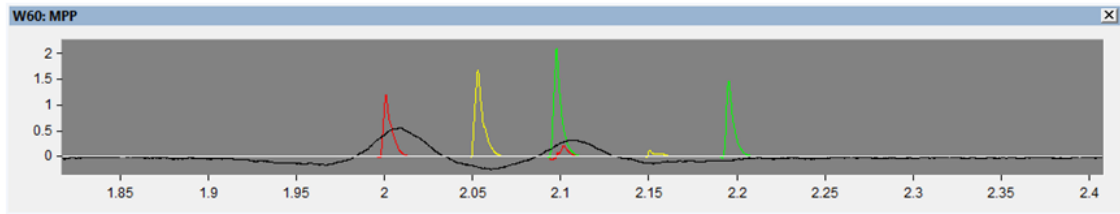
- The peaks will not be properly captured when processing\*



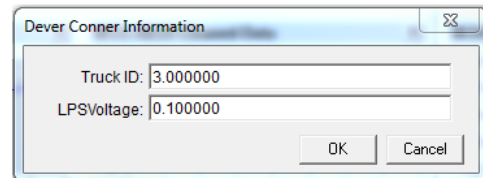
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.





**APPENDIX C7 – DEVER-CONNER DATA PROCESSING**

**10/28/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

10/28/2009

# DADiSP Processing Steps

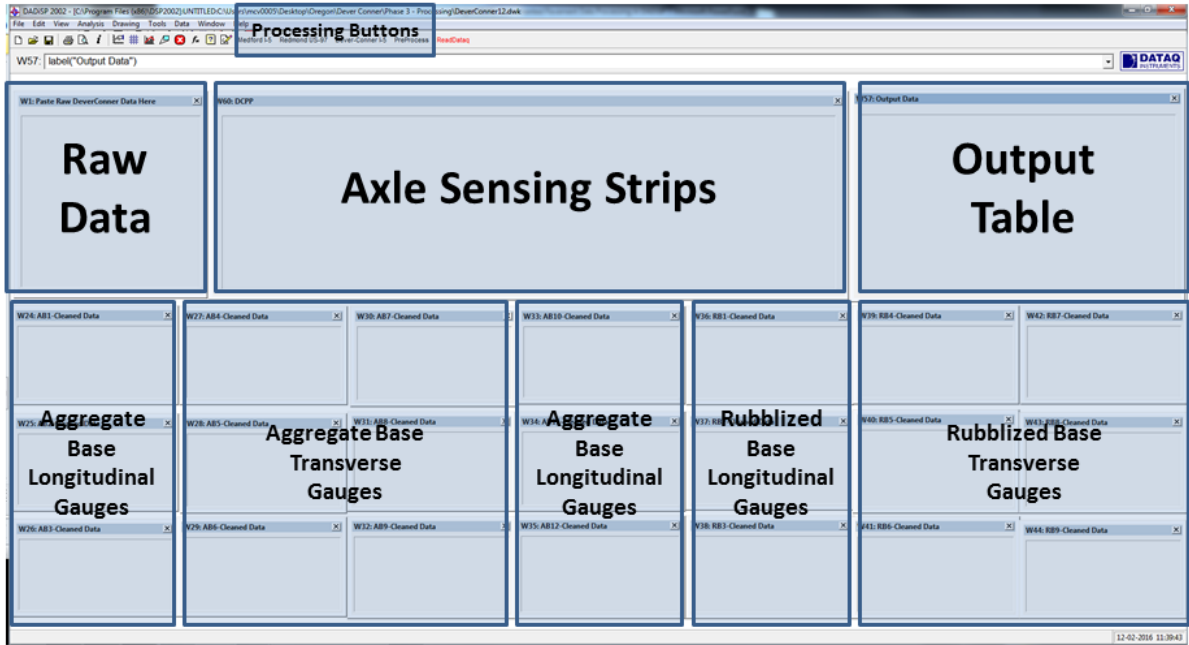
1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.tdms file in EXCEL
3. Open data tab in EXCEL workbook
4. Arranging data in EXCEL
5. Copy data
6. Paste raw data into W1: Paste Raw Data Here...
7. Click PreProcess button to inspect data
8. Inspect W60
9. Zoom in on vehicle event to be processed
10. Process vehicle event
11. Visual inspection of processed output
12. Repeat procedure for next .tdms file
13. Copy W57 and store in EXCEL
14. Troubleshooting – Changing LPSVoltage

# File Format

- TDMS File
- 11 “AB” strain gauges listed
  - AB12 listed with RB
  - AB02 missing
- 10 “RB” strain gauges listed
  - RB01 listed with AB
  - RB10 skipped
  - Includes RB11
- Dates
  - 10/28/2009

Channel	Datatype
Time	DT_FLOAT
n	DT_FLOAT
Diag	DT_FLOAT
s	DT_FLOAT
AB01	DT_FLOAT
RB01	DT_FLOAT
AB03	DT_FLOAT
AB04	DT_FLOAT
AB05	DT_FLOAT
AB06	DT_FLOAT
AB07	DT_FLOAT
AB08	DT_FLOAT
AB09	DT_FLOAT
AB10	DT_FLOAT
AB11	DT_FLOAT
RB02	DT_FLOAT
RB03	DT_FLOAT
AB12	DT_FLOAT
RB04	DT_FLOAT
rb04	DT_FLOAT
RB05	DT_FLOAT
RB06	DT_FLOAT
RB07	DT_FLOAT
RB08	DT_FLOAT
RB09	DT_FLOAT
RB11	DT_FLOAT

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:


- Interactively loads TDM and TDMS files in Excel
- Use "Open with>>Excel Importer" or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.

**Bookmark & Share**  
 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
[Requirements](#)

**CLICK** →

## 2. Open raw \*.tdms file in EXCEL



DC10-28-09_10532828102009	10/28/2009 12:53 ...	TDMS File	1,956 KB
DC10-28-09_10533628102009	10/28/2009 12:53 ...	TDMS File	1,956 KB
DC10-28-09_10534428102009	10/28/2009 12:53 ...	TDMS File	1,956 KB
DC10-28-09_10540028102009	10/28/2009 12:54 ...	TDMS File	1,956 KB
DC10-28-09_10541928102009	10/28/2009 12:54 ...	TDMS File	1,956 KB
DC10-28-09_10543128102009	10/28/2009 12:54 ...	TDMS File	1,956 KB
DC10-28-09_10543828102009	10/28/2009 12:54 ...	TDMS File	1,956 KB
DC10-28-09_10544628102009	10/28/2009 12:54 ...	TDMS File	1,956 KB
DC10-28-09_10550128102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10550828102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10551828102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10552528102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10553128102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10555128102009	10/28/2009 12:55 ...	TDMS File	1,956 KB
DC10-28-09_10564628102009	10/28/2009 12:56 ...	TDMS File	1,956 KB
DC10-28-09_10571128102009	10/28/2009 12:57 ...	TDMS File	1,956 KB
DC10-28-09_10572128102009	10/28/2009 12:57 ...	TDMS File	1,956 KB
DC10-28-09_10572828102009	10/28/2009 12:57 ...	TDMS File	1,956 KB
DC10-28-09_10574428102009	10/28/2009 12:57 ...	TDMS File	1,956 KB
DC10-28-09_10575128102009	10/28/2009 12:57 ...	TDMS File	1,956 KB
DC10-28-09_10583128102009	10/28/2009 12:58 ...	TDMS File	1,956 KB



# 3. Open Data tab in EXCEL workbook

Root Name	Title	Author	Date/Time	Groups
DC08192009_09371619082009				
<b>Group</b>	<b>Channels</b>	<b>Description</b>	<i>header</i>	
		Station Name:DC08192009 Sample Rate:5000.0 Comments:	Timeaxle1axle2 axle3AB01	
		sg3AB02AB03 AB04AB05AB06 AB07AB08AB 09AB10AB11A B12 RB01RB02RB0 3RB04RB05RB 06RB07RB08R B09		
		secsvoltsvoltsvol tsvoltsvoltsvolts voltsvoltsvolts voltsvoltsvoltsvo ltsvoltsvoltsvolts voltsvoltsvoltsvo ltsvolts		
Data		25		
Data				



Time	axle1	axle2	axle3	sg3	AB01	AB02
0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005	
0.0008	-0.001831055	0.001373291	0.002441406	0.000610878	-0.0005	
0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005	
0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005	
0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005	
0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005	
0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.0005	
0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005	
0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
0.0046	-0.001983643	-0.00425049	-0.002441406	0.000611185	-0.0005	
0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.0005	
0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.0005	

# 4. Arranging data in EXCEL

- Insert column between AB01 and RB01.
- Fill column (F) with zeroes



## 4. Arranging data in EXCEL cont..

- Move column RB01 between AB11 and RB02
  - Cut column G (RB01) → Insert cut cells between AB11 and RB02

The image displays two screenshots of an Excel spreadsheet illustrating the process of moving a column.

**Left Screenshot:** Shows columns E, F, G, H, and I. Column G (labeled RB01) is selected. A context menu is open over column G, with the 'Insert Cut Cells' option highlighted. A blue arrow points from this option towards the right screenshot.

	E	F	G	H	I
	AB01		RB01		
55	0.000115449	0	0.000110802	00118	
52	0.000115712	0	0.000110232	01127	
23	0.000116195	0	0.000109223	00864	
82	0.000115537	0	0.000109311	00074	
79	0.000113827	0	0.000110012	01697	
79	0.000115011	0	0.0001101	00776	
91	0.000115318	0	0.000111766	01083	
94	0.000115625	0	0.000109092	20117	
16	0.000115976	0	0.000111065	00688	
21	0.000116589	0	0.000108785	00776	
52	0.000115888	0	0.000110539	02398	
27	0.000115581	0	0.00011124	00995	
52	0.000117247	0	0.000111196	-2.68344E-05	0.000201653
58	0.00011637	0	0.000108565	-2.80621E-05	0.000200294
79	0.000115449	0	0.000109399	-2.85445E-05	0.000199767
79	0.000114222	0	0.000109881	-2.89391E-05	0.000201258
79	0.000115888	0	0.000109399	-2.78868E-05	0.00020231
64	0.000116853	0	0.000111021	-2.89391E-05	0.000202223
43	0.000116414	0	0.000110232	-2.87198E-05	0.00020139

**Right Screenshot:** Shows columns O, P, Q, R, S, and T. Column P (labeled AB11) and column Q (labeled RB02) are visible. Column R (labeled RB04) is now the original column G. The context menu is open over column R, with 'Insert Cut Cells' highlighted. A blue arrow points from the 'Insert Cut Cells' option in the left screenshot to this option in the right screenshot.

	O	P	Q	R	S	T
		AB11	RB02	RB04	rb04	
0	0204503	0.000131541	7.50662E-05	335E-05	1.96873E-0	
	0020367	0.000131585	7.57678E-05	512E-05	2.04327E-0	
	0203714	0.000132331	7.62062E-05	81E-05	2.2362E-0	
	003144	0.000130796	7.58555E-05	81E-05	1.9775E-0	
	0203977	0.000131454	7.58116E-05	419E-05	2.16166E-0	
	0202793	0.000131541	7.58993E-05	66E-05	1.99504E-0	
	0204152	0.000131103	7.67324E-05	81E-05	2.11781E-0	
	0203451	0.000131804	7.71709E-05	65E-05	2.28005E-0	
	0204634	0.000131629	7.60309E-05	05E-05	2.13535E-0	
	0203889	0.000133558	7.67763E-05	296E-05	2.25813E-0	
	0203801	0.000131629	7.52416E-05	58E-05	2.06958E-0	
	0205073	0.000132067	7.51101E-05	775E-05	2.12658E-0	
	0204591	0.000132594	7.67324E-05	2.02574E-05	1.93804E-05	2.24059E-0
	0202574	0.00013255	7.54608E-05	1.96435E-05	1.8065E-05	2.06958E-0
	0203714	0.000132199	7.55924E-05	1.89858E-05	1.99504E-05	2.12658E-0
	0203451	0.000132374	7.60747E-05	1.9512E-05	1.93366E-05	2.06958E-0
	0202881	0.000131015	7.55047E-05	1.96873E-05	1.94243E-05	2.03889E-0
	0204021	0.00013141	7.57239E-05	1.93804E-05	1.9512E-05	2.25374E-0
	0020481	0.000131804	7.52855E-05	1.97312E-05	1.74511E-05	2.07397E-0
	0204503	0.000132331	7.57678E-05	1.9205E-05	1.80212E-05	2.06081E-0
	0204152	0.000132506	7.65132E-05	1.9775E-05	1.83719E-05	2.14412E-0

## 4. Arranging data in EXCEL cont..

- Move AB12 between AB11 and RB01
  - Cut column S (AB12) → Insert cut cells between AB11 and RB01

The image shows two screenshots of an Excel spreadsheet illustrating the process of moving a column.

**Left Screenshot:** The spreadsheet shows columns R, S, T, U, and V. Column S is selected, and the 'Cut' menu is open. The menu options include Cut, Copy, Paste Options, Paste Special..., Insert, Delete, Clear Contents, Format Cells..., Column Width..., Hide, and Unhide.

**Right Screenshot:** The spreadsheet shows columns N, O, P, Q, R, and S. Column S is selected, and the 'Insert Cut Cells' option is highlighted in the 'Paste Options' menu. A blue arrow points from the 'Cut' menu in the left screenshot to the 'Insert Cut Cells' option in the right screenshot.

The resulting spreadsheet (right) shows the data from column S (AB12) moved between columns AB11 and RB01. The columns are labeled AB10, AB11, RB01, RB03, and AB12. The data in column S is now positioned between AB11 and RB01.



# 5. Copy data

- Highlight data in columns A through Y (RB09)
  - Exclude Header Row
- Right-Click → Select Copy → Left-Click

	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z						
1	AB01	AB03	AB04	AB05	AB06	AB07	AB08	AB09	AB10	AB11	AB12	RB01	RB02	RB03	RB04	RB05	RB06	RB07	RB08	RB09	RB10							
2	0.00016414	0	0.00436738	0.00436738	-0.001429415	-8.90908E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.002101306	0.00436738	3.71385E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.34143E-05	0.00436738					
3	0.00016417	0	0.00436738	0.00436738	-0.001429415	-7.5417E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200223	0.00436738	3.6261E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.28441E-05	0.00436738				
4	0.00016414	0	0.00436738	0.00436738	-0.001429415	-7.70094E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200223	0.00436738	3.59108E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.31951E-05	0.00436738				
5	0.000151884	0	0.00436738	0.00436738	-0.001429415	-8.15556E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200911	0.00436738	3.56038E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.29699E-05	0.00436738				
6	0.000151186	0	0.00436738	0.00436738	-0.001429415	-7.14708E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001201672	0.00436738	3.4995E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.19474E-05	0.00436738			
7	0.000151142	0	0.00436738	0.00436738	-0.001429415	-6.7905E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001201086	0.00436738	3.53408E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.19235E-05	0.00436738			
8	0.000151523	0	0.00436738	0.00436738	-0.001429415	-7.14708E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200385	0.00436738	3.56038E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.13355E-05	0.00436738			
9	0.000161605	0	0.00436738	0.00436738	-0.001429415	-6.70861E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001219771	0.00436738	3.53408E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.11974E-05	0.00436738			
10	0.000166677	0	0.00436738	0.00436738	-0.001429415	-4.81864E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200911	0.00436738	3.556E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.2362E-05	0.00436738			
11	0.000165644	0	0.00436738	0.00436738	-0.001429415	-9.07653E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001201022	0.00436738	3.58669E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.0541E-05	0.00436738		
12	0.000151142	0	0.00436738	0.00436738	-0.001429415	-7.6239E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001202729	0.00436738	3.62117E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.22305E-05	0.00436738		
13	0.000151011	0	0.00436738	0.00436738	-0.001429415	-7.36631E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001202489	0.00436738	3.68122E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.2162E-05	0.00436738		
14	0.000144885	0	0.00436738	0.00436738	-0.001429415	-8.7257E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001202328	0.00436738	3.66562E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.23811E-05	0.00436738		
15	0.000161511	0	0.00436738	0.00436738	-0.001429415	-9.51482E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001200955	0.00436738	3.63492E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.31971E-05	0.00436738	
16	0.000151158	0	0.00436738	0.00436738	-0.001429415	-7.8486E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00126113	0.00436738	3.69193E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.1626E-05	0.00436738	
17	0.000161607	0	0.00436738	0.00436738	-0.001429415	-7.6732E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001260999	0.00436738	3.69631E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.2581E-05	0.00436738	
18	0.000147478	0	0.00436738	0.00436738	-0.001429415	-8.4624E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001201599	0.00436738	3.54283E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.46721E-05	0.00436738	
19	0.000151625	0	0.00436738	0.00436738	-0.001429415	-7.2347E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001260736	0.00436738	3.56477E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.29466E-05	0.00436738	
20	0.000151537	0	0.00436738	0.00436738	-0.001429415	-8.19941E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001262884	0.00436738	3.69193E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.2688E-05	0.00436738	
21	0.000151274	0	0.00436738	0.00436738	-0.001429415	-8.9888E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261086	0.00436738	3.71185E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.2466E-05	0.00436738	
22	0.000147492	0	0.00436738	0.00436738	-0.001429415	-7.8486E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261393	0.00436738	3.59108E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.36774E-05	0.00436738	
23	0.000151142	0	0.00436738	0.00436738	-0.001429415	-8.3746E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261744	0.00436738	3.58669E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.3872E-05	0.00436738	
24	0.000147494	0	0.00436738	0.00436738	-0.001429415	-7.8555E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00126227	0.00436738	3.42844E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.30197E-05	0.00436738	
25	0.000161414	0	0.00436738	0.00436738	-0.001429415	-8.0078E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261481	0.00436738	3.59546E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.3151E-05	0.00436738
26	0.000168984	0	0.00436738	0.00436738	-0.001429415	-8.5501E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261875	0.00436738	3.7889E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.24659E-05	0.00436738
27	0.000165646	0	0.00436738	0.00436738	-0.001429415	-7.1909E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001262182	0.00436738	3.40392E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.3414E-05	0.00436738
28	0.000151449	0	0.00436738	0.00436738	-0.001429415	-8.7257E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261841	0.00436738	3.57554E-05	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	-2.30197E-05	0.00436738
29	0.000151186	0	0.00436738	0.00436738	-0.001429415	-9.25174E-06	0.00436738	0.00436738	0.00436738	0.00436738	0.00436738	0.001261349	0.00436738	3.60423E-05	0.00436738	0.00436738	0.004											

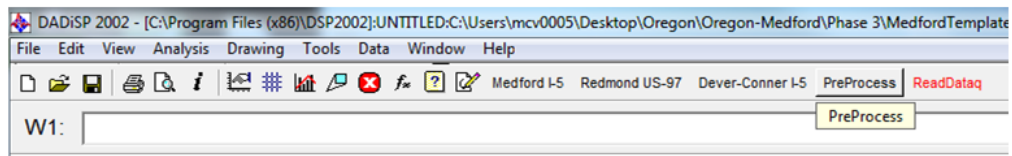
## 6. Paste raw data into W1: Paste Raw Data Here...

- Right-Click → Select Paste → Left-Click
- Copied data will fill box

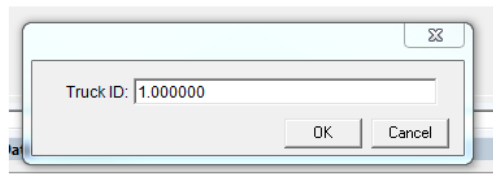
The screenshot shows a software interface with a window titled "W1: Paste Raw DeverConner Data Here". A context menu is open over this window, with the "Paste" option selected. A sub-menu is open, showing "Paste to Window" as the active option. A blue arrow points from this sub-menu to a separate window titled "W1: Untitled Data". This window contains a table with the following data:

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

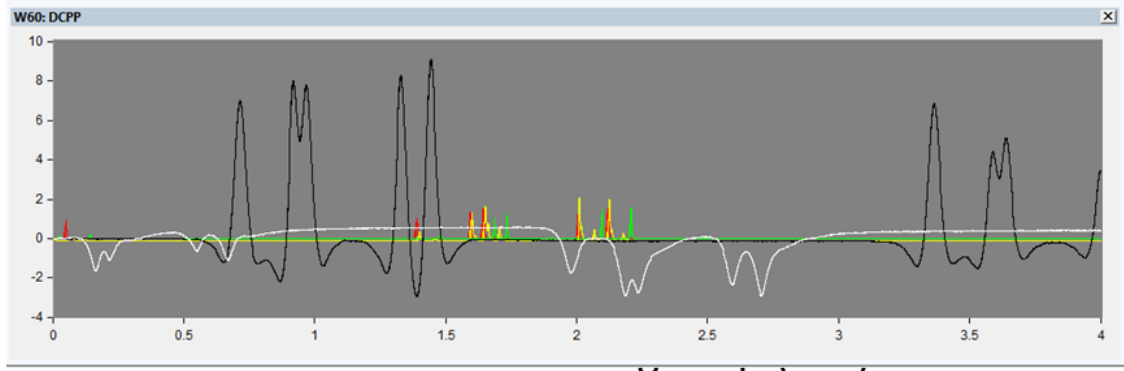
## 7. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



## 8. Inspect W60

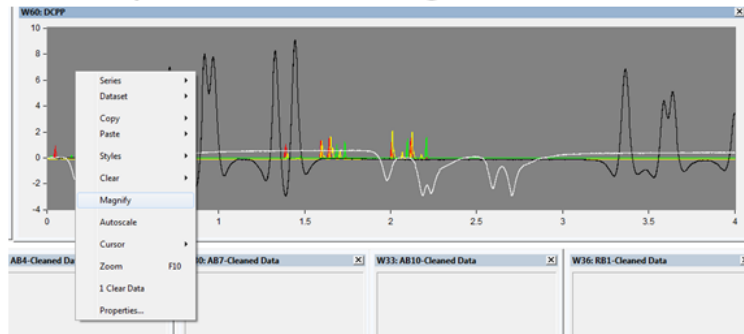


- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG
- White line is rubblized base transverse ASG

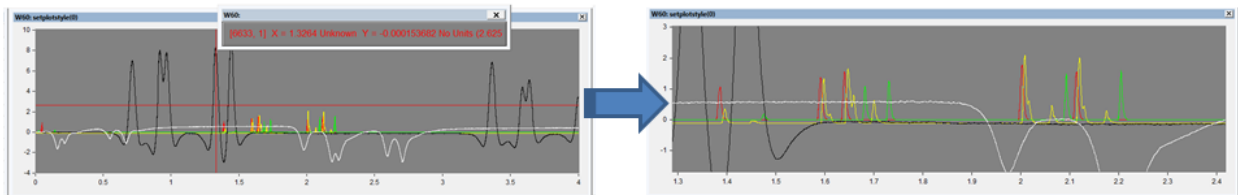


## 9. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits



- Use cross-hair to drag over vehicle event

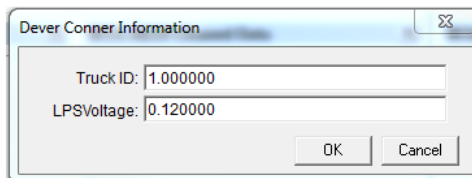


## 10. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

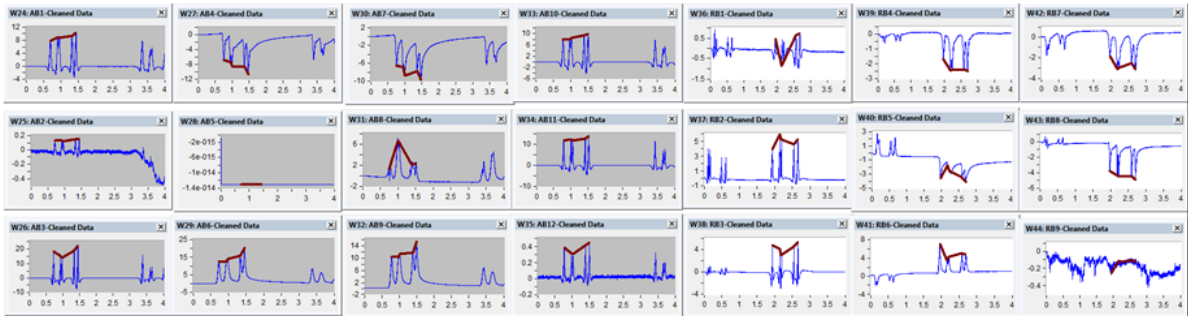


- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in Step 14

# 11. Visual inspection of processed output

- Ensure peaks are captured on ASGs

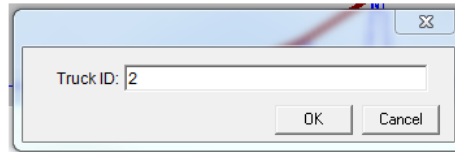


- Processed data output in tabular form in W57

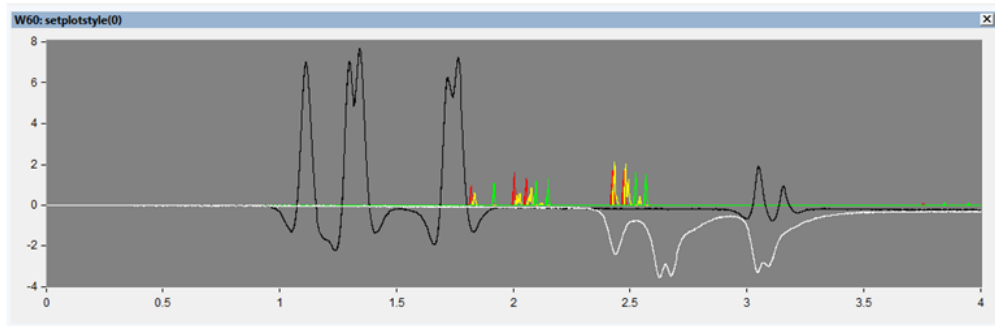
W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

## 12. Repeat procedure for next .tdms file

- Repeat Step 2 through 6
- Change Truck ID in Step 7



- Next file will be loaded into W60 and W24



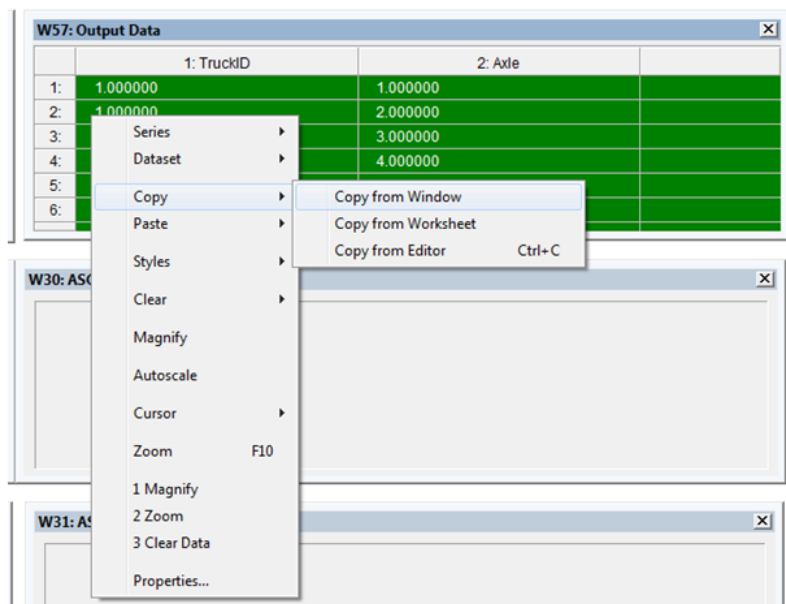
## 12. Repeat procedure for next .txt file cont...

- Repeat Step 8 through 11
- Output data will be added to table in W57

W57: Output Data			
	1: TruckID	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

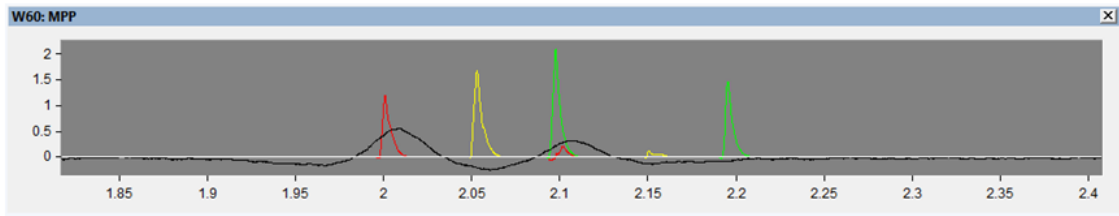
## 13. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

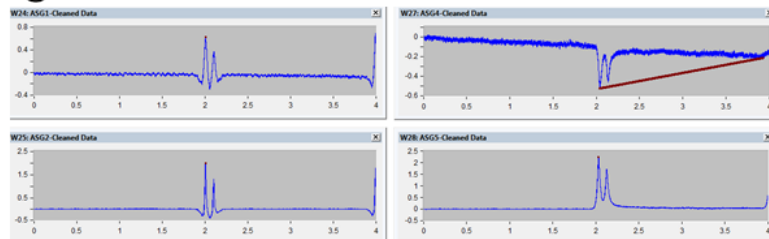


## 14. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



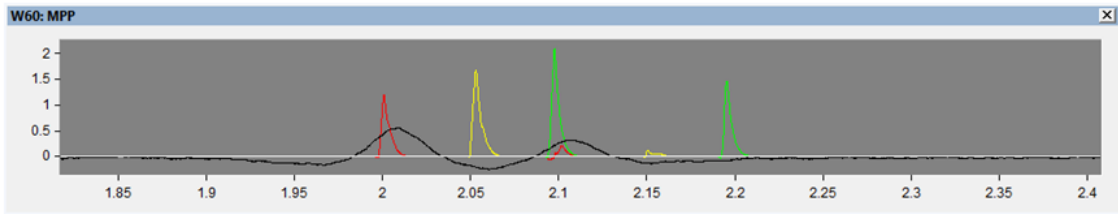
- The peaks will not be properly captured when processing\*



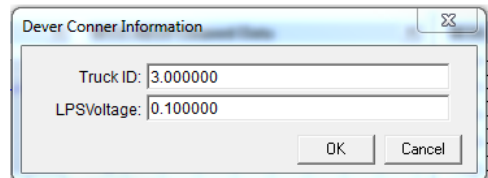
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

## 14. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.





**APPENDIX C8 – DEVER-CONNER DATA PROCESSING**

**10/29/2009; 12/4/2008; 1/9/2009; 2/20/2009**



# **Oregon Instrumented Pavement Data Processing in DADiSP**

Dever-Conner

10/29/2008; 12/4/2008; 1/9/2009;  
2/20/2009

# DADiSP Processing Steps

1. Download TDMS add-in for Microsoft EXCEL
2. Open raw \*.txt file in EXCEL
3. Arranging data in EXCEL
4. Copy data
5. Paste raw data into W1: Paste Raw Data Here...
6. Click PreProcess button to inspect data
7. Inspect W60
8. Zoom in on vehicle event to be processed
9. Process vehicle event
10. Visual inspection of processed output
11. Repeat procedure for next .tdms file
12. Copy W57 and store in EXCEL
13. Troubleshooting – Changing LPSVoltage

# File Format

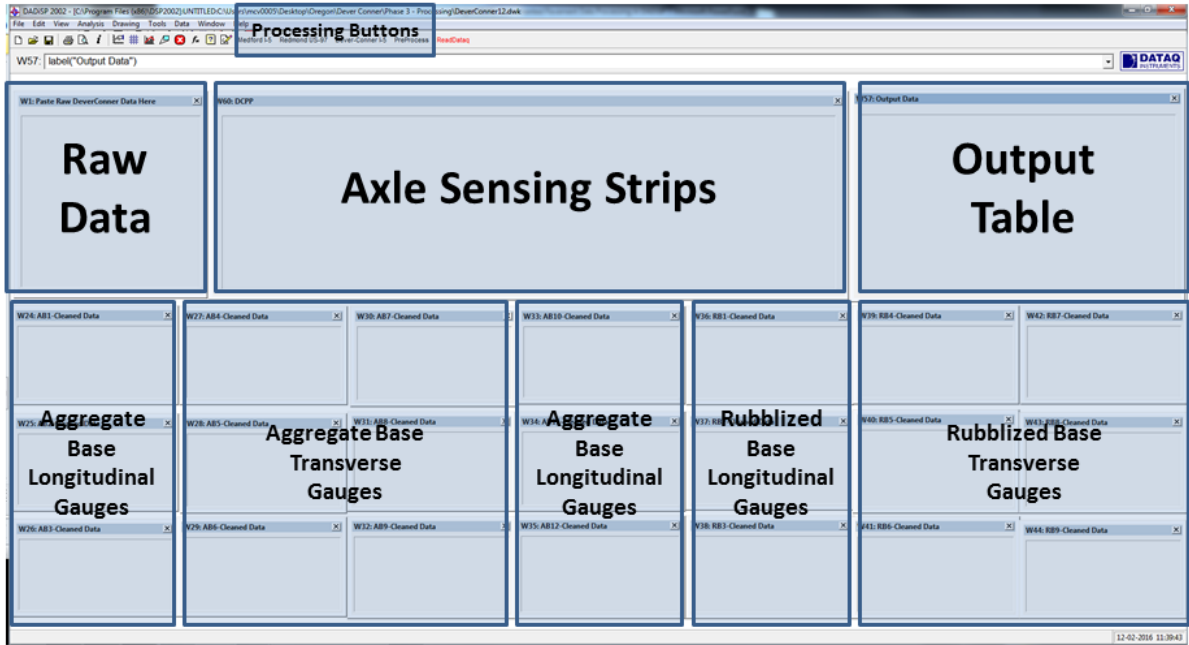
```

DC_10222729102008 - Notepad
File Edit Format View Help
Station Name:DC
Sample Rate:1000.0
Comments:
Time axle 1 axle 2 axle 3 ab 1 ab 2 ab 3 ab 4 ab 5 ab 6 ab 7 ab 8 ab 9 ab 10 ab 11 ab 12
secs volts volts volts volts volts volts volts volts volts volts volts volts volts volts
0.000000 -0.014801 -0.015106 -0.016785 0.000544 0.000455 0.000372 0.000308 0.000644
0.001000 -0.102539 -0.104980 -0.109711 0.000478 0.000462 0.000289 0.000268 0.000636
0.002000 0.044250 0.041351 0.044861 0.000523 0.000459 0.000314 0.000297 0.000646
0.003000 -0.046387 -0.043182 -0.050049 0.000513 0.000461 0.000292 0.000286 0.000645
0.004000 0.016937 0.012360 0.014191 0.000540 0.000461 0.000290 0.000318 0.000654
0.005000 0.015106 0.014191 0.014343 0.000545 0.000466 0.000278 0.000317 0.000653
0.006000 0.014406 0.013478 0.015411 0.000565 0.000468 0.000295 0.000330 0.000656

```

- Text File
- Header information with sampling rate
- Time given
- LPS included
- 12 ASGs
- Dates
  - 10/29/2008 (strain gauges labeled ab1-ab12); 12/4/2008 (strain gauges labeled SG1-SG12);
  - 1/9/2009 (strain gauges labeled SG1-SG12);
  - 2/20/2009 (strain gauges labeled SG1-SG12)

# DeverConner12.dwk General Layout



# 1. Download TDMS add-in for Microsoft EXCEL

- Allows file extension .tdms to be opened in EXCEL
- Free download from National Instruments
- <http://www.ni.com/example/27944/en/>
- Run executable (.exe) file to install

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Home > Example Programs > TDM Excel Add-in for Microsoft Excel Download

### TDM Excel Add-In for Microsoft Excel Download

Publish Date: Aug 17, 2016 | 54 Ratings | 4.02 out of 5 | Print | 36 Customer Reviews | [Submit your review](#)

Using the FREE TDM Excel Add-in for Microsoft Excel, you can load and work with TDM and TDMS files in Excel.

Supported Features:

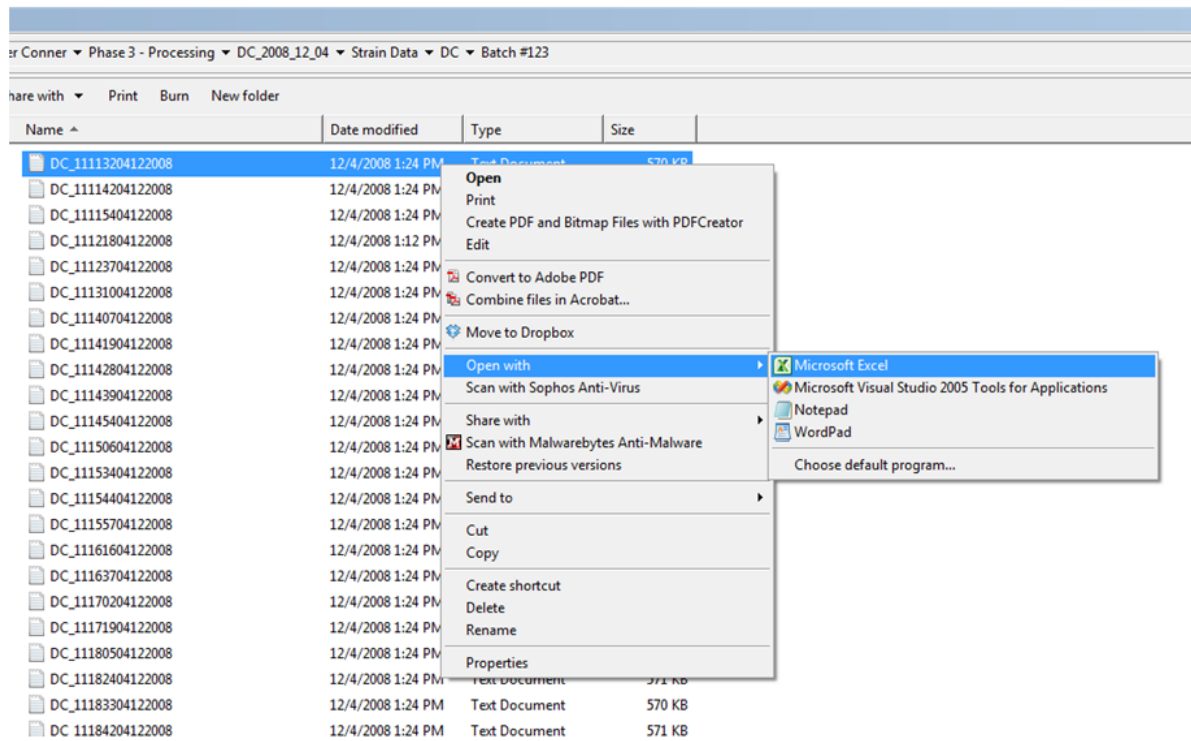
- Interactively loads TDM and TDMS files in Excel
- Use 'Open with>>Excel Importer' or double-click from Windows Explorer to open a TDM/TDMS file in Excel
- Use VBA and the [TDM Excel Add-in COM-API](#) to automate loading of TDM and TDMS files into Excel.

**Bookmark & Share**  
 Share

**Downloads**  
Attachments:  
[NITDMEXCEL\\_15-0-0.exe](#)  
▶ Requirements

**CLICK**

## 2. Open raw \*.txt file in EXCEL





# 3. Arranging data in EXCEL cont..

- Insert columns of zeroes in columns Q through Y

The screenshot shows a Microsoft Excel spreadsheet with the following structure:

- Columns:** A through Y. Columns Q through Y are highlighted in yellow.
- Row 1:** Station Name DC
- Row 2:** Sample Rate 1000.0
- Row 3:** Comments
- Row 4:** (Empty)
- Row 5:** Headers for columns A through P: Time, axde 1, axde 2, axde 3, SG1, SG2, SG3, SG4, SG5, SG6, SG7, SG8, SG9, SG10, SG11, SG12.
- Row 6:** Units for columns A through P: secs, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts, volts.
- Rows 7-38:** Data rows containing numerical values for each column. Columns Q through Y contain zeros.



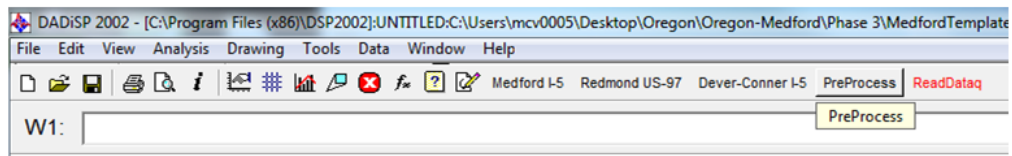
## 5. Paste raw data into W1: Paste Raw Data Here...

- Right-Click → Select Paste → Left-Click
- Copied data will fill box

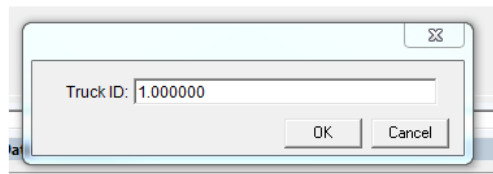
The image shows a software interface with a context menu open over a window titled 'W1: Paste Raw DeverConner Data Here'. The menu includes options like 'Series', 'Dataset', 'Copy', 'Paste', 'Styles', 'Clear', 'Magnify', 'Autoscale', 'Cursor', 'Zoom', and 'Properties...'. The 'Paste' option is selected, and a sub-menu is visible with 'Paste to Window', 'Paste Link', and 'Paste to Editor (Ctrl+V)'. A blue arrow points from this sub-menu to a separate window titled 'W1: Untitled Data', which contains a table of data.

	1: Unspecified	2: No Units
1:	0.000000E+000	3.051760E-004
2:	2.000000E-004	-2.288818E-003
3:	4.000000E-004	-2.441406E-003
4:	6.000000E-004	-1.525880E-004
5:	8.000000E-004	-1.831055E-003
6:	1.000000E-003	1.831055E-003
7:	1.200000E-003	6.103520E-004
8:	1.400000E-003	-2.136230E-003
9:	1.600000E-003	-2.288818E-003
10:	1.800000E-003	-1.983643E-003
11:	2.000000E-003	2.593994E-003
12:	2.200000E-003	-1.525879E-003
13:	2.400000E-003	-9.155270E-004

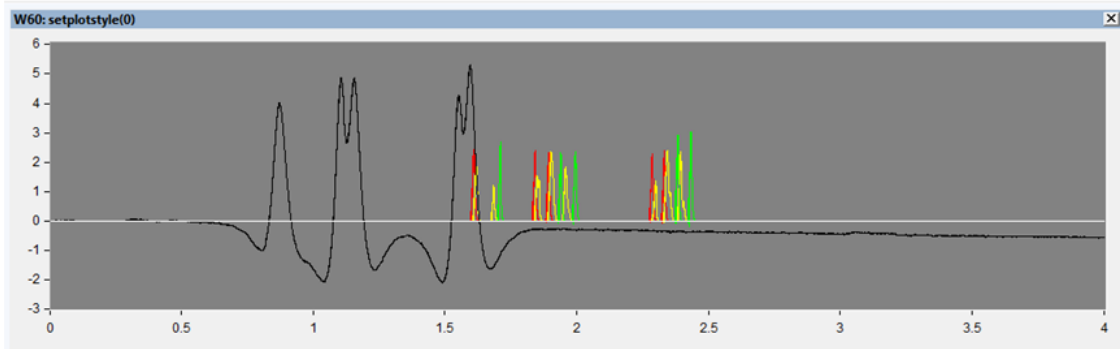
## 6. Click PreProcess button to inspect data



- Enter Truck ID (numerical identifier for each vehicle event)
- Click OK



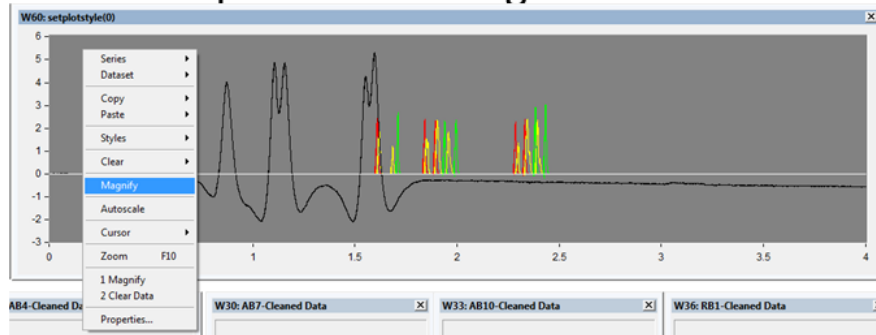
## 7. Inspect W60



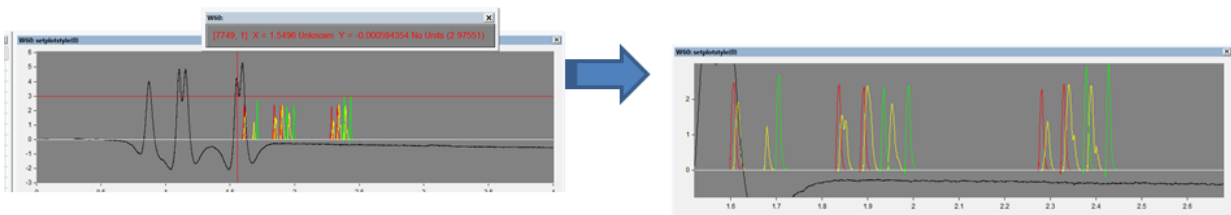
- Red lines are 1<sup>st</sup> axle sensing strip (LPS)
- Green lines are 2<sup>nd</sup> axle sensing strip (LPS)
- Black line is aggregate base longitudinal ASG

## 8. Zoom in on vehicle event to be processed

- Right-Click in W60 → Select Magnify → Left-Click
  - Must be equal # of red & green LPS hits

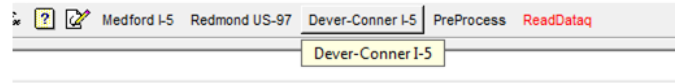


- Use cross-hair to drag over vehicle event

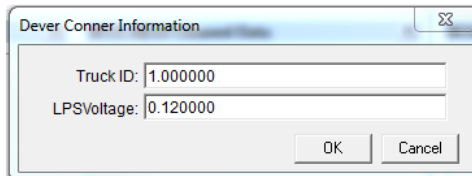


## 9. Process vehicle event

- Click on Dever-Conner I-5 button



- Verify Truck ID and LPSVoltage\*

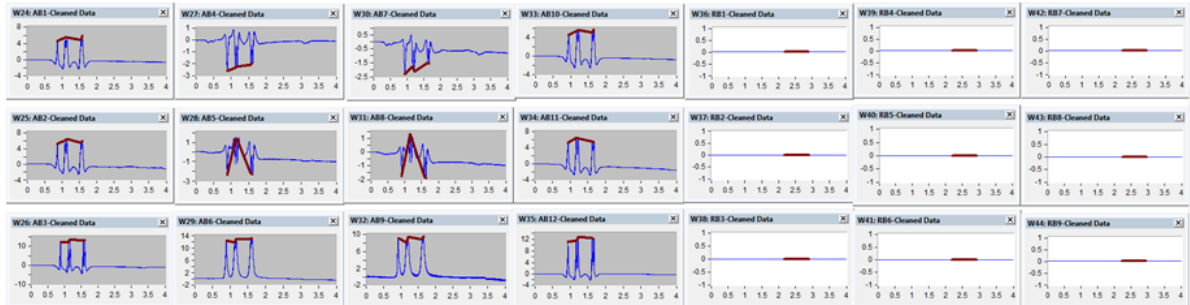
A screenshot of a dialog box titled 'Dever Conner Information'. The dialog box has a title bar with a close button. It contains two text input fields: 'Truck ID:' with the value '1.000000' and 'LPSVoltage:' with the value '0.120000'. At the bottom right of the dialog box, there are two buttons: 'OK' and 'Cancel'.

- Click OK

\*Default LPSVoltage of 0.12 will work in most all cases. When to change LPSVoltage discussed in final step

## 10. Visual inspection of processed output

- Ensure peaks are captured on ASGs
  - Note: only AB gauges had data to be processed



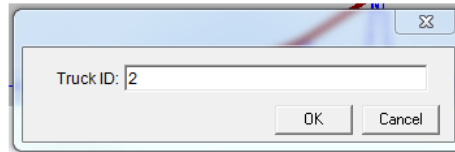
- Processed data output in tabular form in W57

W57: Output Data		
	1: TruckID	2: Axle
1:	1.000000E+000	1.000000E+000
2:	1.000000E+000	2.000000E+000
3:	1.000000E+000	3.000000E+000
4:	1.000000E+000	4.000000E+000
5:	1.000000E+000	5.000000E+000
6:		

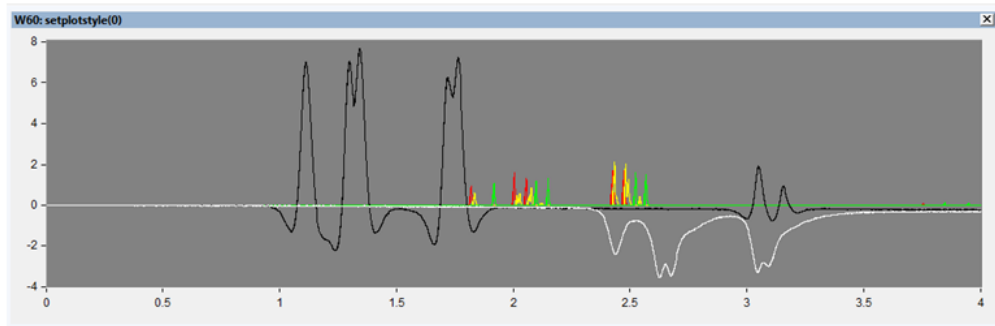


## 11. Repeat procedure for next .tdms file

- Repeat Step 2 through 5
- Change Truck ID in Step 6



- Next file will be loaded into W60 and W24



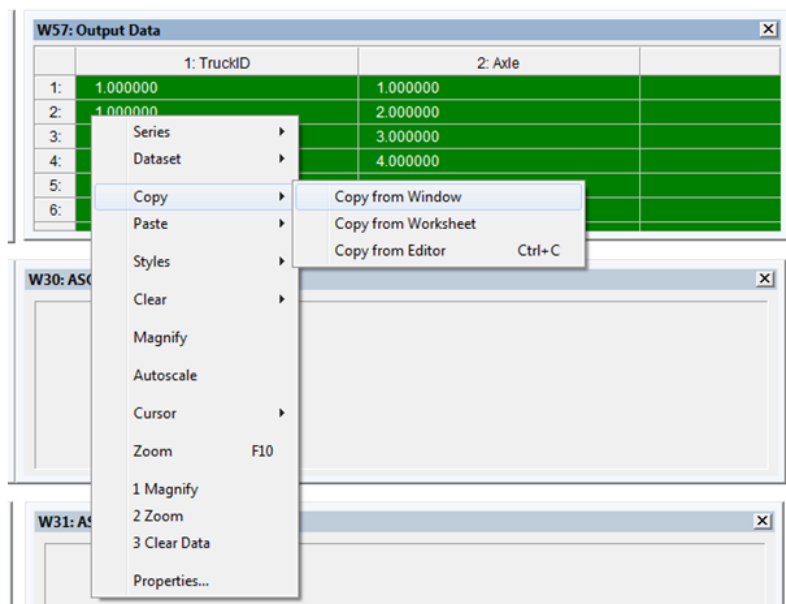
## 11. Repeat procedure for next .txt file cont...

- Repeat Step 6 through 10
- Output data will be added to table in W57

	1: TruckID	2: Axle	
1:	1.000000E+000	1.000000E+000	
2:	1.000000E+000	2.000000E+000	
3:	1.000000E+000	3.000000E+000	
4:	1.000000E+000	4.000000E+000	
5:	1.000000E+000	5.000000E+000	
6:	2.000000E+000	1.000000E+000	
7:	2.000000E+000	2.000000E+000	
8:	2.000000E+000	3.000000E+000	
9:	2.000000E+000	4.000000E+000	
10:	2.000000E+000	5.000000E+000	

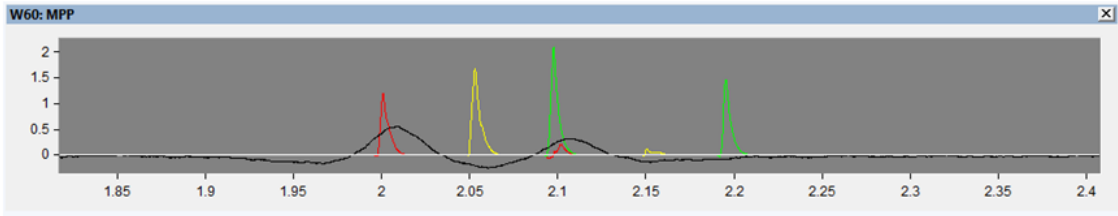
## 12. Copy W57 and store in EXCEL

- Left-Click in W57 → Select Copy → Select Copy from Window → Right-Click
- Paste into EXCEL file and save

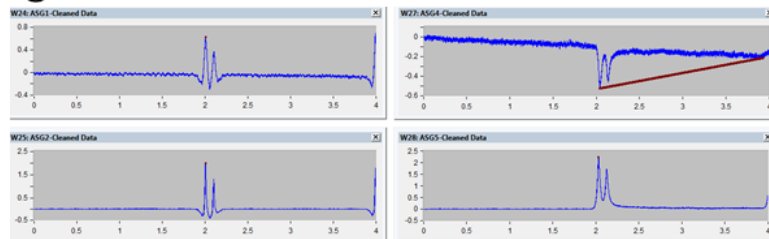


# 13. Troubleshooting – Changing LPS Voltage

- For events with Low LPS hits such as:
  - Notice low response in red on second axle



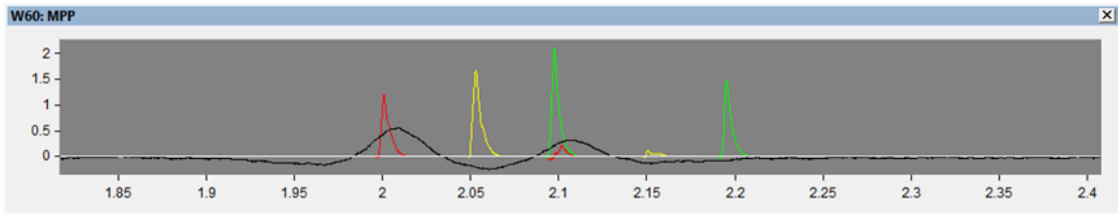
- The peaks will not be properly captured when processing\*



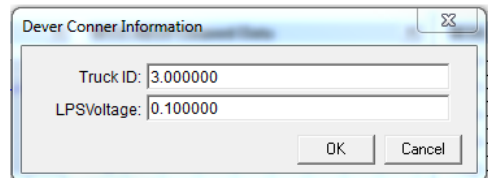
\*This will add erroneous data to table in W57 that needs to be deleted after exporting to EXCEL

### 13. Troubleshooting – Changing LPSVoltage cont...

- To correct this, the LPSVoltage can be lowered to a value that is below the lowest response in red and green (0.1 in this case)



- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK
- Event is processed successfully if all peaks are captured.



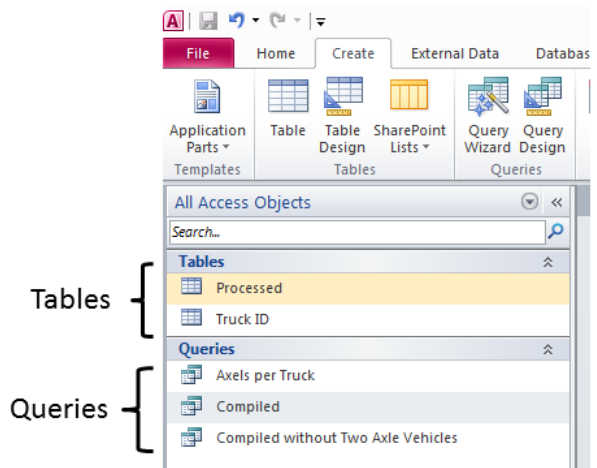
## **APPENDIX D – MEDFORD DATABASE USER GUIDE**



Medford  
Microsoft Access Database



# Access Database



# Database Tables

- Processed
  - Stores processed data output from DADiSP template
- Truck ID
  - Stores date information

## Queries

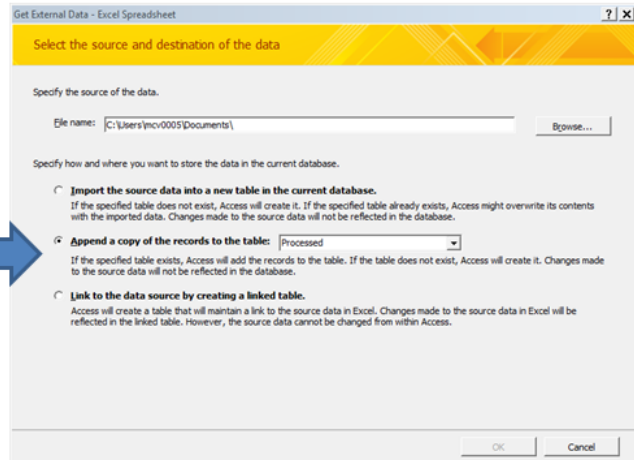
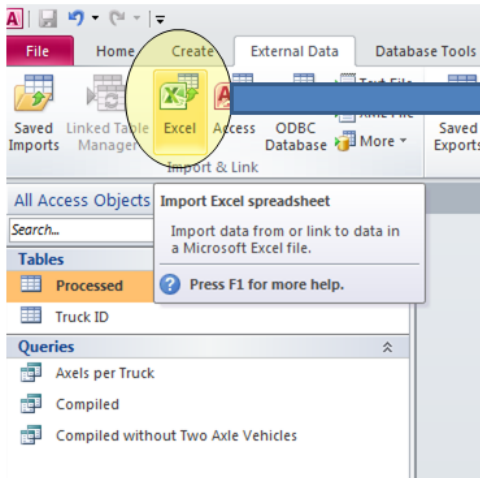
- Axles per Truck
  - Counts number of axles per vehicle
- Compiled
  - Pulls critical processed data
  - Shows Truck ID, Speed, Axle Type, ASG Max L, and ASG Max T
- Compiled without Two Axle Vehicles
  - Pulls critical processed data from vehicles with more than two axles
  - Shows Truck ID, Speed, Axle Type, ASG Max L, ASG Max T, and CountofTruckID (# of axles per vehicle)

# Uploading New Data

- All queries will automatically update as new data files are added to database
  - Need to append new data to
    - Processed
    - Truck ID
- Three-step process
  1. Initiate new data upload
  2. Complete new data upload
  3. Review data

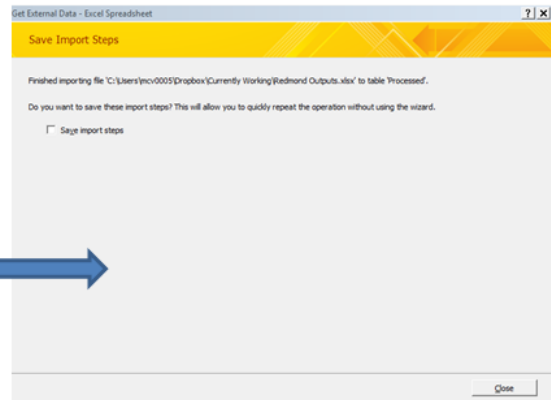
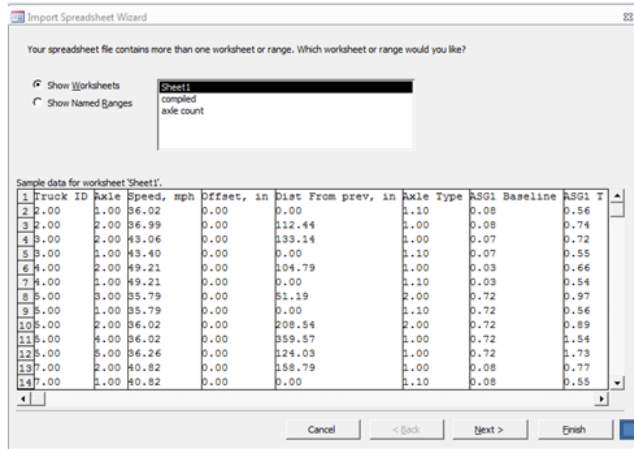
# 1. Initiate new data upload

- Click on “Excel into Access” icon in “External Data” tab
- In “Get External Data” dialog box, choose file with Browse button
- Select “Append” to “Processed”
- Click “OK”



## 2. Complete new data upload

- Make sure “Sheet1” is selected
- Click “Finish”
- Click “Close” on final dialog box



### 3. Review Data

- All queries will automatically update after appending new data.
  - Simply double click any query to see new data

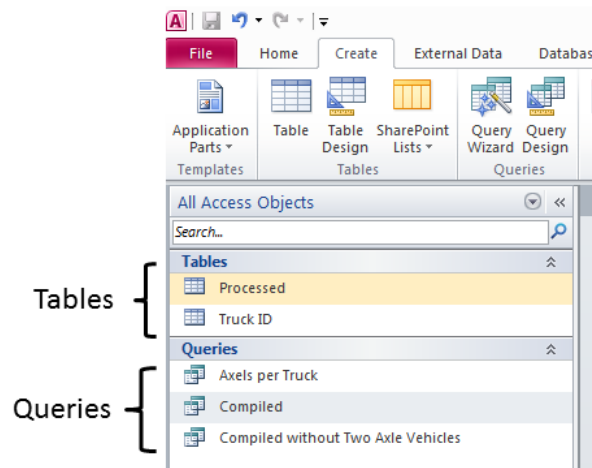
## **APPENDIX E – REDMOND DATABASE USER GUIDE**





Redmond  
Microsoft Access Database

# Access Database



# Database Tables

- Processed
  - Stores processed data output from DADiSP template
- Truck ID
  - Stores date information

## Queries

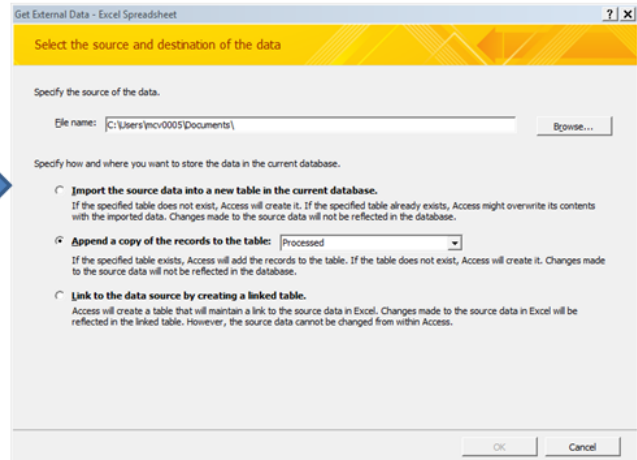
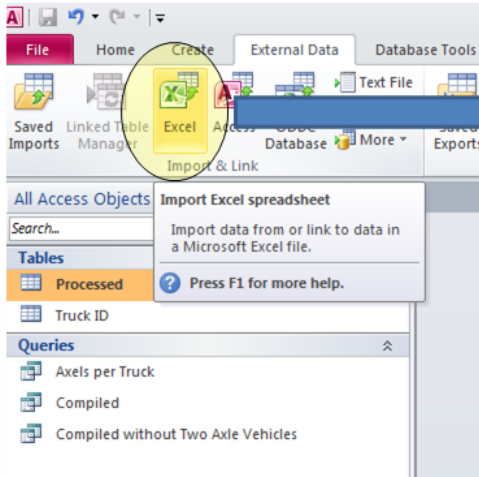
- Axles per Truck
  - Counts number of Axles per Vehicle
- Compiled
  - Combines date with processed data
  - Shows Truck ID, Date, Speed, Axle Type, ASG Max L, and ASG Max T
- Compiled without Two Axle Vehicles
  - Combines date with processed data for vehicles with more than two axles
  - Shows Truck ID, Date, Speed, Axle Type, ASG Max L, ASG Max T, and CountofTruckID (# of axles per vehicle)

# Uploading New Data

- All queries will automatically update as new data files are added to database
  - Need to append new data to
    - Processed
    - Truck ID
- Three-step process
  1. Initiate new data upload
  2. Complete new data upload
  3. Review data

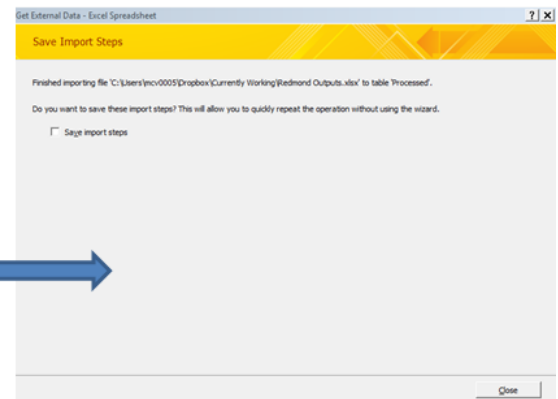
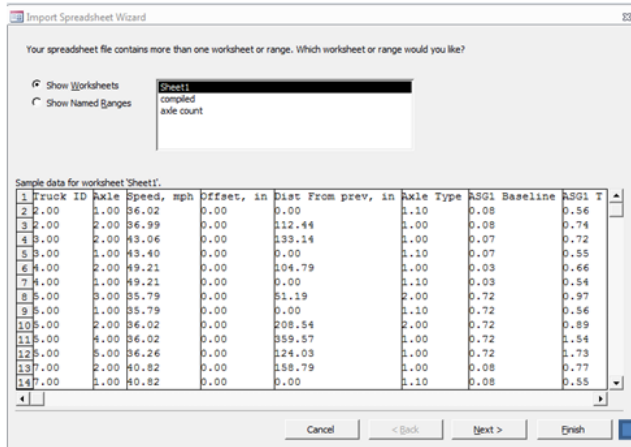
# 1. Initiate new data upload

- Click on “Excel into Access” icon in “External Data” tab
- In “Get External Data” dialog box, choose file with Browse button
- Select “Append” to “Processed”
- Click “OK”



## 2. Complete new data upload

- Make sure “Sheet1” is selected
- Click “Finish”
- Click “Close” on final dialog box





### 3. Review Data

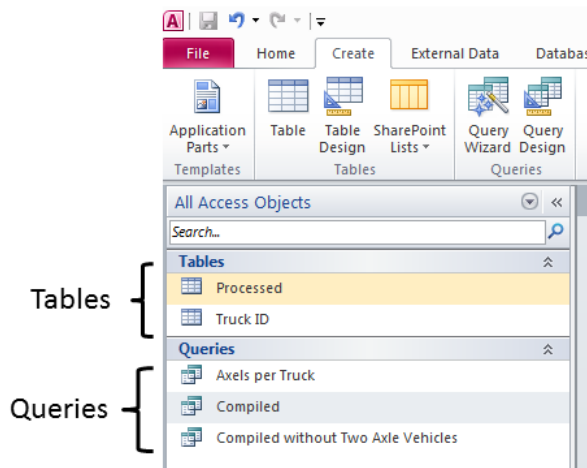
- All queries will automatically update after appending new data.
  - Simply double click any query to see new data

## **APPENDIX F –DEVER-CONNER DATABASE USER GUIDE**



Dever-Conner  
Microsoft Access Database

# Access Database



# Database Tables

- Processed
  - Stores processed data output from DADiSP template
- Truck ID
  - Stores date information

# Queries

- Axles per Truck
  - Counts number of Axles per Vehicle
- Compiled
  - Combines date with processed data
  - Shows Truck ID, Date, Speed, Axle Type, AB Max L, AB Max T, RB Max L, RB Max T and CountofTruckID (# of axles per vehicle)
- Compiled without Two Axle Vehicles
  - Combines date with processed data for vehicles with more than two axles
  - Shows Truck ID, Date, Speed, Axle Type, AB Max L, AB Max T, RB Max L, RB Max T and CountofTruckID (# of axles per vehicle)

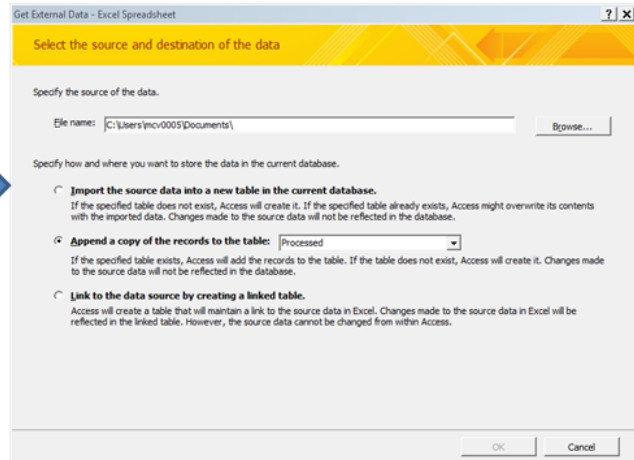
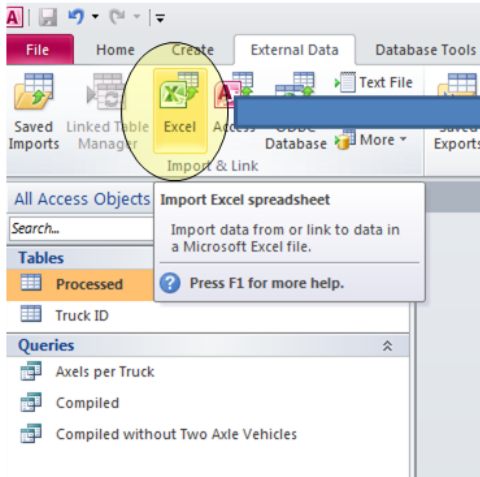
# Uploading New Data

- All queries will automatically update as new data files are added to database
  - Need to append new data to
    - Processed
    - Truck ID
- Three-step process
  1. Initiate new data upload
  2. Complete new data upload
  3. Review data



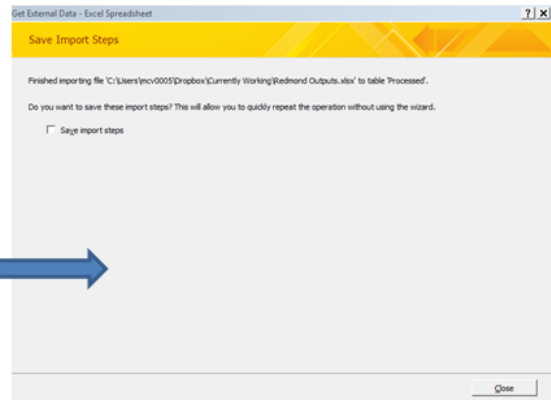
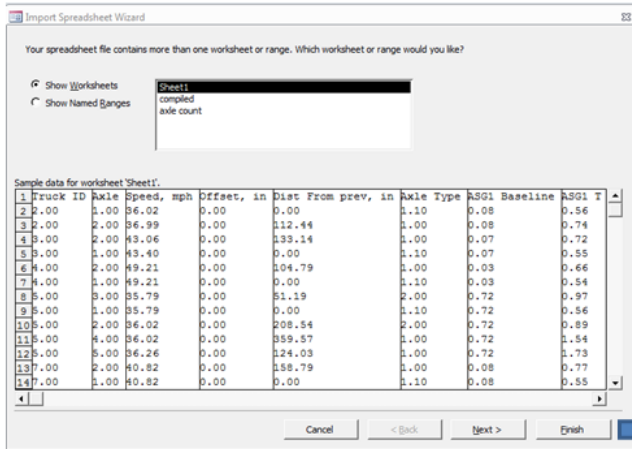
# 1. Initiate new data upload

- Click on “Excel into Access” icon in “External Data” tab
- In “Get External Data” dialog box, choose file with Browse button
- Select “Append” to “Processed”
- Click “OK”



## 2. Complete new data upload

- Make sure “Sheet1” is selected
- Click “Finish”
- Click “Close” on final dialog box



### 3. Review Data

- All queries will automatically update after appending new data.
  - Simply double click any query to see new data