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

**Phase II Final** 

**SPR 763** 

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

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#### **SPR 763**

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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.						
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VOLUME			VOLUME							
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NOTE: Volumes greater than 1000 L shall be shown in m <sup>2</sup> .										
oz lb	ounces pounds	<u>MASS</u> 28.35 0.454	grams kilograms	g kg	g kg	grams kilograms	0.035 2.205	ounces pounds	oz lb	
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<b>TEMPERATURE</b> (exact)				<b>TEMPERATURE</b> (exact)						
°F	Fahrenheit	(F- 32)/1.8	Celsius	°C	°C	Celsius	1.8C+3 2	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 ouput 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 3.9. 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  $\mu$ E. 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  $\mu$ E. The strain percentiles in Figure 3.24 for the rubblized base section are smaller with the 90<sup>th</sup> percentile strain around 5  $\mu$ E 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  $\mu$ E. 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 the 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 dates 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 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**

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	itudinal	Transverse	Longitudinal		
AS	SG 2	ASG 5	ASG 8		
Longi	itudinal	Transverse	Longitudinal		
AS	SG 3	ASG 6	ASG 9		
Longi	itudinal	Transverse	Longitudinal		

### 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



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

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## 3. Open Data tab in EXCEL workbook

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3	0.0002	0.00595092	8 0.006713867	0.007019043	-0.000444697	-0.000252077	0.000512266	1.403
4	0.0004	-0.00518798	8 -0.007171631	-0.006713867	-0.00044632	-0.000252121	0.000513055	1.372
5	0.0006	0.00610351	6 0.002441406	0.001373291	-0.000445004	-0.000251507	0.000513362	1.446
6	0.0008	-0.00167846	7 -0.004119873	-0.005187988	-0.00044496	-0.000252691	0.000513756	1.705
7	0.001	0.0086975	0.004730225	0.006561279	-0.000443908	-0.0002512	0.000515861	1.683
8	0.0012	0.00244140	6 0.004119873	0.0050354	-0.000444083	-0.000251551	0.00051494	1.508
9	0.0014	0.00228881	8 0.001373291	-0.002593994	-0.000444083	-0.000251989	0.00051266	1.451
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13	0.0022	-0.00976562	5 -0.007476807	-0.012054443	-0.000444346	-0.000250542	0.000513756	1.442
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15	0.0026	-0.00778198	2 -0.006408691	-0.008392334	-0.000444873	-0.000250805	0.000513406	1.596
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19	0.0034	0.00228881	8 0.004882813	0.00869751	-0.000444522	-0.000251332	0.000515773	1.26
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26	0.0048	0.00686645	5 0.001831055	-0.001373291	-0.000447284	-0.000252691	0.00051323	1.446
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29	0.0054	0.00259399	4 0.007019043	0.002288818	-0.000444566	-0.000251288	0.000514063	1.275
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35	0.0066	-0.00732421	-0.009307861	-0.009613037	-0.000443908	-0.000252866	0.000515072	1.639
50	0.0068	0.01266479	0.016174316	0.017547607	-0.000443338	-0.000252428	0.000514107	1.482

## 4. Add zeroes in columns N through Y

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

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9	0.0022888	Paste Special	-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
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19	0.0022885	Define Name	-0.000444522	-0.000251332	0.000515773	1.2628E-05	-0.000160261	-0.000145967	-1.70565E-05	-4.99857E-05	2.84129E-05	0	0	0	0 1	0 0	D
20	0.0019836	be and a second second	-0.000444346	-0.000250893	0.000513756	1.24964E-05	-0.000159867	-0.000146055	-1.68811E-05	-4.98103E-05	2.8676E-05	0	0	0	0	0 0	0
21	0.003967	NUMBER OF CONTRACTOR	-0.000445048	-0.000251638	0.000513055	1.34611E-05	-0.00016105	-0.000147239	-1.51711E-05	-5.18273E-05	2.78868E-05	0	0	0	0	0 0	0
22	0.003814697	0.002593994 0.000305176	-0.000444171	-0.000251332	0.000513537	1.42503E-05	-0.000159121	-0.000145792	-1.61796E-05	-5.2178E-05	2.92022E-05	0	0	0	0	0 0	0
23	-0.000305176	0.001220703 0.001831055	-0.000445574	-0.000251463	0.000513099	1.65742E-05	-0.000160305	-0.000146274	-1.77142E-05	-5.09503E-05	2.82814E-05	0	0	0	0	0 0	0
24	-0.000305176	0.001525879 0.006866455	-0.000444127	-0.000253042	0.000513932	1.84158E-05	-0.000159253	-0.00014566	-1.69688E-05	-5.2178E-05	2.91583E-05	0	0	0	0	0 0	0
25	0.005340576	0.005493164 0.005645752	-0.000445969	-0.000250586	0.000514589	1.55657E-05	-0.000160349	-0.000145485	-1.67057E-05	-5.15642E-05	2.90268E-05	0	0	0	0	0 0	0
26	0.006866455	0.001831055 -0.001373291	-0.000447284	-0.000252691	0.00051323	1.44695E-05	-0.000161094	-0.000145397	-1.6048E-05	-5.16957E-05	2.97283E-05	0	0	0	0	0 1	0
27	0.00579834	0.004577637 0.000915527	-0.000444916	-0.000252735	0.000514151	1.52149E-05	-0.000159735	-0.000145967	-1.59603E-05	-5.11696E-05	2.63521E-05	0	0	0	0	0 (	0
18	0.001525879	0.003662109 0.00289917	-0.000445399	-0.000252822	0.000514239	1.20141E-05	-0.000156929	-0.000145879	-1.63988E-05	-5.2485E-05	2.74483E-05	0	0	0	0	0 0	0
29	0.002593994	0.007019043 0.002288818	-0.000444566	-0.000251288	0.000514063	1.27595E-05	-0.00015877	-0.000145134	-1.62234E-05	-5.1915E-05	2.81937E-05	0	0	0	0	0 0	0
30	0.001525879	0.000610352 0.006713867	-0.000443294	-0.000251068	0.000513756	1.41626E-05	-0.000161489	-0.000146756	-1.71004E-05	-5.1915E-05	2.77114E-05	0	0	0	.0	0 0	0
31	0.014343262	0.013275146 0.014648438	-0.000445223	-0.000252822	0.000512309	1.31103E-05	-0.000160524	-0.000145222	-1.74511E-05	-5.13888E-05	2.83252E-05	0	0	0	0	0 0	0
32	-0.006103516	-0.007629395 -0.010681152	-0.000445048	-0.000253349	0.000513756	1.53026E-05	-0.000160656	-0.000145441	-1.40749E-05	-5.00734E-05	2.76675E-05	0	0	0	0	0 0	0
33	0.007324219	0.007171631 0.008544922	-0.000444697	-0.000251682	0.000512792	1.72758E-05	-0.000159867	-0.000145529	-1.52149E-05	-5.20903E-05	2.77552E-05	0	0	0	0	0 0	0
34	0.003204346	0.003204346 0.008392334	-0.000444873	-0.000251638	0.000513537	1.65304E-05	-0.00016048	-0.000147107	-1.74073E-05	-5 03365E-05	2.76237E-05	0	0	0	0	0 0	0
35	-0.007324219	-0.009307861 -0.009613037	-0.000443905	-0.000252866	0.000515072	1.63988E-05	-0.000160042	-0.000145967	-1.6618E-05	-5.13449E-05	2 \$1937E-05	0	0	0	0	0 0	0
36	0.012664795	0.016174316 0.017547607	-0.000443338	-0.000252428	0.000514107	1.48203E-05	-0.000161927	-0.000147458	-1.61357E-05	-5.1038E-05	2.73606E-05	0	0	0	0	0 0	0
	NEDEC	0011.34.00 13223834113000	Data	1									-				-
Res	de 197			S									Average	0.002511005	Count: 500000	Nomerical	Court

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

W1: Paste Ra	w Medford Data	Here 🗵	W60: setplotstyle(0	)			W1: Unti	tled Data	X
								1: Unspecified	
							1:	0.000000E+000	
	Series	· ·					2:	2.00000E-004	
	Dataset						3:	4.000000E-004	
	Copy	I					4:	6.000000E-004	
	Dacte		Paste to Window		1		5:	8.000000E-004	
	raste	-	Paste Link		1		6:	1.000000E-003	
-	Styles	•	Paste Link	<b>C</b> 1 1 1					
11/24 5000	Clear		Paste to Editor	Ctri+v		M			
W24: 5000	Clear	· ·				×			
	Magnify								
	Autoscale								
	Cursor								
	Zoom	F10							
	1 Clear Data								
		- F							

#### 7. Click PreProcess button to inspect data



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

		22
	Truck ID: 1.000000	
a		OK Cancel

#### 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\*

Medford Information	23
Truck ID: 1.000000	
LPSVoltage: 0.500000	
	OK Cancel

• 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 0.7 0.65 0.75 0.35 0.55 0.4 0.45 0.5 0.6 0.8 Σ Medford Information :C:\Users\mcv0005\Desktop\Oreg dow Help Truck ID: 2.000000 Medford I-5 Redmond US-97 Dever-Conner I-5 PreProcess LPSVoltage: 0.500000 ReadDatag Medford I-5 OK | Cancel

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

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



W57:	Output Data		x
	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		

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

- Click Preprocess button without loading another file
- Change Truck ID  $\rightarrow$  Click OK

OK	Cancel
	ОК

- 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



4	W57: Output Data		
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



## **15. Troubleshooting – Changing LPSVoltage**

- 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

Medford Information	
Truck ID: 1.0	
LPSVoltage: 0.1	
	OK Cancel

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

File Edit View Analysis Dawing Tools □ ■ ■ ■ ⊕ □ I H2 ■ ■ ₽ /9 W32: [label("ASG9-Cleaned Data")	O / C	Teachdea	
Raw Data Axle S		sensing Strips	Output Table
Long	SG 1 itudinal	ASG 4 Transverse	ASG 7 Longitudinal
A: Longi	SG 2 itudinal	ASG 5 Transverse	ASG 8 Longitudinal
Wite ASG1 Occured Data AS Long	SG 3 itudinal	ASG 6 Transverse	ASG 9 Longitudinal

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



 Redmond\_11080630102008

 Redmond\_11082430102008

 Redmond\_11090330102008

 Redmond\_11090330102008

 Redmond\_11095930102008

 Redmond\_1110430102008

 Redmond\_11122930102008

 Redmond\_1112230102008

 Redmond\_1112230102008

 Redmond\_1112230102008

 Redmond\_1112230102008

 Redmond\_11122730102008

 Redmond\_11125730102008

10/30/2008 2:10 PM	Text Document	233 KB
10/30/2008 2:10 PM	Text Document	232 KB
10/30/2008 2:10 PM	Text Document	233 KB
10/30/2008 2:10 PM	Text Document	233 KB
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10/20/2000 2:12 014	T (D)	222 1/0

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	N	7	<b>-</b>	$f_X$										
	A	В	C	D	E	F	G	H	I	J	K	L	M	
1	Station Na	me:Redmo	nd											
2	Sample Ra	ate:1000.0												
3	Comments	K.												
-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	-0.00214	0.00035	0 000438	0 00044	0 00017	0 000448	0 000169	0.00013	0 000464	0.000629	

## 2. Add zeroes in columns N through Y

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

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S Cot B ± G Copy Parte Cipboard C	Sort & Find & Filter * Select * iting	X Y
NS         -         Jack         L         M         N         O         P         Q         R         S         T         U         V           1         - <th>W</th> <th>X Y</th>	W	X Y
E         F         G         H         I         J         K         L         M         N         O         P         Q         R         S         T         U         V           1         -	W	X Y
2         3		
4         5         SG3         SG4         SG5         SG5         SG6         SG7         SG8         SG9         SG10         SG12           7         0.00035         0.000419         0.000147         0.000170         0.000170         0.000170         0.000170         0.000171         0.000170         0.000171		
6         volts         vol		
7         0.00035         0.000419         0.000167         0.000179         0.000179         0.000170         0.000171         0.000170         0.000171         0.0		
8         0.000349         0.000443         0.000147         0.00017         0.000128         0.000165         0	0 0	0 0
9         0.000352         0.000419         0.000171         0.000129         0.000159         0.000151         0 <td>0 0</td> <td>0 0</td>	0 0	0 0
10         0.000352         0.000438         0.000442         0.000169         0.00017         0.00018         0.000468         0.00063         0	0 0	0 0
11 0.000352 0.000439 0.000442 0.000168 0.000146 0.000128 0.000465 0.00063 0 0 0 0 0 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 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	0 0
14 0.00035 0.000438 0.00044 0.000168 0.000148 0.000172 0.000128 0.000466 0.00063 0 0 0 0 0 0 0 0 0 0	0 0	0 0
15 0.00035 0.000438 0.00044 0.00017 0.00048 0.000169 0.00013 0.000464 0.000629 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
10 0.00035 0.000437 0.000442 0.000148 0.000147 0.000129 0.000455 0.000829 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
17 0.00033 0.000438 0.000441 0.00117 0.000171 0.00013 0.000467 0.000259 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
	0 0	0 0
19 0.00035 0.000438 0.000441 0.000168 0.000146 0.000171 0.000129 0.000467 0.000651 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
220 0.000522 0.000437 0.000441 0.000147 0.00017 0.000179 0.000167 0.000628 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
21 0.000531 0.000438 0.000441 0.000147 0.000171 0.000129 0.000629 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
22 0.000511 0.000439 0.000441 0.000188 0.000449 0.00017 0.000129 0.000650 0.006529 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0	0 0
	0 0	0 0
	0 0	0 0

# 3. Copy cells A7 through Y2006

- Highlight all data
  - Exclude Header Rows 1-6
- Right-Click  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click

A	В	С	D	E	F	G	Н	I	J	K	L	M	N	0	P	Q	R	S	T	U	V
Station N	ame Redmo	nd																			
Sample R	ate:1000.0																				
Comment	s:																				
Time	axle 1	axle 2	axle 3	SG3	SG4	SG5	SG6	SG7	SGS	SG9	SG10	SG12									
secs	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts									
(	0.003052	0.00412	0.003815	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	
0.00	0.001068	0.000458	0.003662	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	
0.00	0.000153	0.001068	0.000153	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	
0.00	-0.00122	-0.00122	0.001373	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	
0.00-	-0.00015	0.002441	0.005798	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	
0.00	-0.00061	0.002747	0.003815	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	
0.00	0.000916	0	0.000763	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	
0.00	0.001373	-0.00015	-0.00061	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	
0.000	0.001831	0.000153	-0.00214	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	
0.00	0.001526	0.002747	0.002899	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	0.005798	0.007782	0.00412	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	
0.01	0.003815	0.003204	0.00412	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	
0.01	0.000458	-0.00137	0.003357	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	
0.01	0.002289	0.002441	0.003967	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	
0.01-	0.000763	0.004425	0.002136	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	
0.01	0.000458	0.000153	0.002899	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	
0.01	-0.00183	-0.00153	-0.0029	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	
0.01	-0.00015	0.002136	0.002747	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	
0.01	0.000458	0.002136	-0.00259	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	
0.019	0.002899	0.002289	0.000916	0.000349	0.000437	0.000441	0.000168	0.000448	0.00017	0.000129	0.000467	0.00063	0	0	0	0	0	0	0	0	
0.0	0.00351	0.00351	0.003357	0.000351	0.000437	0.00044	0.000168	0.000447	0.00017	0.000131	0.000466	0.000628	0	0	0	0	0	0	0	0	
0.02	0.006104	0.005188	0.00351	0.00035	0.000438	0.00044	0.000168	0.000446	0.000169	0.00013	0.000465	0.000628	0	0	0	0	0	0	0	0	
0.02	0.00351	0.004578	0.00473	0.000351	0.000438	0.000442	0.000167	0.000447	0.00017	0.000129	0.000466	0.00063	0	0	0	0	0	0	0	0	
0.02	0.002899	0.002136	0.003052	0.000351	0.000437	0.00044	0.000168	0.000446	0.000169	0.000129	0.000466	0.00063	0	0	0	0	0	0	0	0	
0.02	0.00061	0.00061	0.002289	0.000352	0.000439	0.000442	0.000168	0.000446	0.00017	0.000129	0.000466	0.000631	0	0	0	0	0	0	0	0	
0.02	0.000153	0.001526	0.001678	0.000351	0.000439	0.000441	0.000169	0.000447	0.00017	0.000128	0.000467	0.000628	0	0	0	0	0	0	0	0	
0.02	5 0.001068	0.003204	0.00412	0.000351	0.000438	0.000442	0.000169	0.000446	0.000169	0.000129	0.000467	0.00063	0	0	0	0	0	0	0	0	
H R	dmond 11	08063010	2008	E.C.						CALLOCK POINTS		0	4			10.					
#### 4. Paste raw data into W1: Paste Raw Data Here...

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

	Y	W60: setplotstyle(0)	W1: Untitled Data	
174	<u> </u>		1: Unspecified	2: No U
			1: 0.000000	0.003052
Series	•		2: 0.001000	0.001068
Dataset			3: 0.002000	0.000153
			4: 0.003000	-0.001221
Сору	• L		5: 0.004000	-0.000153
Paste	•	Paste to Window	6: 0.005000	-0.000610
Styles	•	Paste Link	7: 0.006000	0.000916
Styles		Paste to Editor Ctrl+V		
Clear	· • T			
Magnify				
Autoscale				
Cursor				
Zoom	F10			
1 Clear Data				
Properties				
	ta Series Dataset Copy Paste Styles Clear Magnify Autoscale Cursor Zoom 1 Clear Data	ta X Series + Dataset + Copy + Paste + Styles + Clear + Magnify Autoscale Cursor + Zoom F10 1 Clear Data	ta X V60: setplotstyle(0) Series Dataset Copy Paste Paste to Window Paste Link Paste to Editor Ctrl+V Clear Magnify Autoscale Cursor Zoom F10 1 Clear Data	ta     Series   Dataset   Copy     Paste   Paste   Paste   Paste Link   Paste to Editor   Ctear   Magnify   Autoscale   Cursor   Zoom   F10   1 Clear Data

#### 5. Click PreProcess button to inspect data



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

	23
Truck ID: 1.000000	
a1	OK Cancel

#### 6. Inspect W60

• Examples of what may be seen:



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

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



• Use cross-hair to drag over vehicle event

W60: setplotstyle(0)		<u>ک</u>
3 -		W60: X
2 -	. Λ Λ	[351, 1] X = 0.35 Unknown Y = 0.00100054 No Units (2.90647)
1-	$1 = V \cdot V \cdot V \cdot V \cdot V$	
-1 - ,		

### 8. Process vehicle event

• Click on Redmond US-97 button



Verify Truck ID and LPSVoltage\*

Redmond Information	X
Truck ID: 1.000000	
LPSVoltage: 0.500000	
	OK Cancel

• 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

	W60: setplotstyle(0)	-	×
CIICK UK		(9, 1) X = 0.008 Unknown Y = 4.2389	80-006 No Units (25 9353)
W60: setplotstyle(0)	* *		
	2 0,25 0,3		
		Redmond Information	X
i icip		Reamona Information	
Medford I-5 Redmond US-97 Dever-Conner I-5 PreP Redmond US-97	rocess ReadDataq	Truck ID: 2.000000 LPSVoltage: 0.500000	
			OK Cancel

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



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

- Click Preprocess button without loading another file
- Change Truck ID  $\rightarrow$  Click OK

	X
Truck ID: 3	
	OK Cancel

- Magnify other vehicle event
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage→Click OK



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



W57:	Output Data		x
	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:	3.000000	2.000000	
7:			

## 12. Copy W57 and store in EXCEL

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



## **13. Troubleshooting – Changing LPSVoltage**

- 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

Redmond Information	×
Truck ID: 3.0000	00
LPSVoltage: 0.5000	00
	OK Cancel

• 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

File Edit View Analysis Dearing Tools D D ■ ■ ■ ● D I I H2 ■ ■ P ● W32: [label("ASG9-Cleaned Data")	Processing Button	Season Reading	
Raw Data	Axle	Sensing Strips	Output Table
Long	SG 1 itudinal	ASG 4 Transverse	ASG 7 Longitudinal
AS Longi	SG 2 itudinal	ASG 5 Transverse	ASG 8 Longitudinal
With ASG3 Observed Data AS Longi	SG 3 itudinal	ASG 6 Transverse	ASG 9 Longitudinal

## 1. Open raw file in EXCEL

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			rk /		unionu_1	1551225	052000		1	.0/12/200	00.20 FI	vi iviici	OSOIL EXI	Cel Will	4	17 100	
				🖳 Re	dmond_1	1331925	092008		1	0/12/200	8 8:26 PN	A Mici	rosoft Exe	cel W	4	18 KB	
				🖳 Re	dmond_1	1333325	092008		1	0/12/200	8 8:27 PN	/ Mici	rosoft Exe	cel W	4	17 KB	
				🔊 Re	dmond_1	1334025	092008		1	0/12/200	8 8:28 PN	/ Mici	rosoft Exe	cel W	4	17 KB	
				🔊 Re	dmond 1	1334825	092008		1	0/12/200	8 8:30 PN	/ Mici	rosoft Exe	cel W	4	19 KB	
				🔊 Re	dmond 1	1335325	092008		1	0/12/200	8 8:31 PN	/ Mici	rosoft Exe	cel W	4	20 KB	
				🖾 Re	- dmond 1	1335925	092008		1	0/12/200	8 8:33 PM	A Mici	rosoft Exe	cel W	4	20 KB	
				X Re	dmond 1	1562225	092008		1	0/12/200	8 8.34 PM	A Mici	rosoft Ex	cel W	4	30 KB	
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## 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

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2	0.000403	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  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click

) (a) (b) -	Friends				Re	dmond_113	30425092008 -	Microsoft Exc	d				-	-	-	-	Incirition
Tate Hone Inset Page Layout	II · A A	- = =	everw v ■ i⊭ f Aig	ew De F Wi E Mei	veloper Ad up Text rige & Center - ria	General S - %	• *& 2 nber	Conditiona	f Format • as Table Styles	Cell Br	ert Del	ete Format	Σ AutoSu Fill * 2 Ocar =	sort & Filter	An Find & Select *		
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0.00 X Cut	58 0.000407	0.00031	0.000308	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
0.06 -a Copy	7 0.000408	0.000309	0.000308	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
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0.0X 123 6 - %	0.000406	0.000308	0.000308	0.000603	0.000609	0	0	0	0	0	0	0	0	0	0	0	0
0.00	0.000406	0.000309	0.000308	0.000603	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
7 0.00	0.000406	0.000307	0.000309	0.000601	0.000608	0	0	0	0	0	0	0	0	0	0	0	0
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0 0.00 Clear Contents	57 0.000408	0.000309	0.000308	0.000602	0.00061	0	0	0	0	0	0	0	σ	0	0	0	0
1 0.00 Filter	57 0.000408	0.000308	0.000309	0.000601	0.00051	0	0	0	0	0	0	0	0	0	0	0	0
2 0.00 Sort	57 0.000408	0.000309	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
3 0.00	57 0.000408	0.000309	0.000309	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
4 0.00 insert Cogment	58 0.000407	0.000309	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
5 0.00 T format Cells	06 0.000407	0.00031	0.000307	0.000603	0.000613	0	0	0	0	0	0	0	0	0	0	0	0
6 0.0X Pick From Drop-down List	59 0.000407	0.000309	0.000308	0.000604	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
7 0.00 Define Name	58 0.000406	0.000309	0.000309	0.000504	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
8 0.00 B Hyperlink	57 0.000407	0.000309	0.000307	0.000604	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
9 0.000403 0.000556 0.00083 0.0000	57 0.000407	0.000308	0.000307	0,000605	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
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1 0.000402 0.000557 0.000682 0.0000	59 0.000407	0.00031	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
2 0.000403 0.000557 0.000685 0.0000	58 0.000407	0.000308	0.000308	0.000604	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
3 0.000402 0.000557 0.000683 0.0000	57 0.000408	0.000308	0.00031	0.000603	0.000609	0	0	0	0	0	0	0	0	0	0	0	0
4 0.000402 0.000557 0.000682 0.0000	55 0.000407	0.00031	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
5 0.000402 0.000556 0.000684 0.0000	57 0.000406	0.000308	0.000309	0.000601	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
6 0.000401 0.000556 0.000682 0.0000	55 0.000407	0.000308	0.000306	0.000602	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
0.0004 0.000556 0.000682 0.0000	55 0.000407	0.000308	0.000308	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
8 0.000402 0.000556 0.000682 0.0000	58 0.000406	0.000308	0.000309	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
9 0.000403 0.000557 0.000683 0.0000	59 0.000407	0.000309	0.00031	0.000603	0.00061	0	0	0	0	0	0	0	0	0	0	0	0
0.000401 0.000556 0.000683 0.0000	57 0.000407	0.000309	0.000308	0.000603	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
1 0.000464 0.000555 0.000682 0.0000	59 0.000407	0.000311	0.000308	0.000603	0.000612	0	0	0	0	0	0	0	0	0	0	0	0
2 0.000403 0.000556 0.000682 0.000	06 0.000408	0.00031	0.000308	0.000603	0.000613	0	0	0	0	0	0	0	0	0	0	0	0
3 0.000403 0.000557 0.000682 0.0000	58 0.000409	0.000309	0.000309	0.000603	0.000611	0	0	0	0	0	0	0	0	0	0	0	0
Kedmond_11330425092008									114		111000	Surger Street	100710122				-

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

	Y	W60: setplotstyle(0)	W1: Untitled Data	
174	<u> </u>		1: Unspecified	2: No U
			1: 0.000000	0.003052
Series	•		2: 0.001000	0.001068
Dataset			3: 0.002000	0.000153
			4: 0.003000	-0.001221
Сору	• L		5: 0.004000	-0.000153
Paste	•	Paste to Window	6: 0.005000	-0.000610
Styles	•	Paste Link	7: 0.006000	0.000916
Styles		Paste to Editor Ctrl+V		
Clear	· • T			
Magnify				
Autoscale				
Cursor				
Zoom	F10			
1 Clear Data				
Properties				
	ta Series Dataset Copy Paste Styles Clear Magnify Autoscale Cursor Zoom 1 Clear Data	ta X Series + Dataset + Copy + Paste + Styles + Clear + Magnify Autoscale Cursor + Zoom F10 1 Clear Data	ta X V60: setplotstyle(0) Series Dataset Copy Paste Paste to Window Paste Link Paste to Editor Ctrl+V Clear Magnify Autoscale Cursor Zoom F10 1 Clear Data	ta     Series   Dataset   Copy     Paste   Paste   Paste   Paste Link   Paste to Editor   Ctear   Magnify   Autoscale   Cursor   Zoom   F10   1 Clear Data

#### 5. Click PreProcess button to inspect data



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

			23	Л
Truck ID: 1.0	00000			
a1		OK	Cancel	

#### 6. Inspect W60

• Examples of what may be seen:



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

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



• Use cross-hair to drag over vehicle event

W60: se	tplotstyle(0)			X
3 -				W60:
2 -		I. A	Δ	[351, 1] X = 0.35 Unknown Y = 0.00100054 No Units (2.90647)
1-		V		
-1 -	1			

### 8. Process vehicle event

• Click on Redmond Us-97 button

E	D 🖌	ADiS	2002	- [C:\F	Progra	m Files (x	86)\DSP20	02]:UI	NTITLED:C:\l	Jsers\mcv000	\Desktop\Oregon\Redmond\Phase 3\Red	ImondTemplate4.dwk
	File	Edit	View	An	alysis	Drawing	g Tools	Data	Window	Help		
	D	🖻 (		5 🗅	i	12 #	i 🕼 🔎	8	f*  🛛	Medford I-5	Redmond US-97 Dever-Conner I-5 PrePr	ocess ReadDataq
	W60: setplotstyle(0)										Redmond US-97	

Verify Truck ID and LPSVoltage\*

Redmond Info	rmation	×	J
Truck	ID: 1.000000		
		OK Cancel	

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:	W57: Output Data X										
	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

	W60: setplotstyle(0)		×
CIICK UK		(9, 1) X = 0.008 Unknown Y = 4.23	498e-006 No Units (25 9353)
W60 contractor/01			
nov sethorsiyeto			
	2 025 03		
			X-100
		Redmond Information	
Medford I-5 Redmond US-97 Dever-Conner I-5 PreP	rocess ReadDataq	Truck ID: 2.000000 LPSVoltage: 0.500000	OK Cancel

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



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

- Click Preprocess button without loading another file
- Change Truck ID  $\rightarrow$  Click OK

	X
Truck ID: 3	
	OK Cancel

- Magnify other vehicle event
- Click Medford I-5 button
- Verify Truck ID and LPSVoltage→Click OK



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



W57:	W57: Output Data										
	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:	3.000000	2.000000									
7:											

## 12. Copy W57 and store in EXCEL

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



## **13. Troubleshooting – Changing LPSVoltage**

- 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)

W60: MPP												×
2 - 1.5 - 1 - 0.5 - 0				A			·					
	1.85	1.9	1.95	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35	2.4

- After clicking the Redmond US-97 button to process, change LPSVoltage
- Click OK

Redmond Information	<b>X</b>
Truck ID: 3.000000	
LPSVoltage: 0.500000	
	OK Cancel

• 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

File Edit View Analysis Dawing Tools □ ■ ■ ■ ⊕ □ I H= ■ ■ ₽ /9 W32: [label("ASG9-Cleaned Data")	A C      A     Processing Button	Teachdea	
Raw Data	Axle	sensing Strips	Output Table
Long	SG 1 itudinal	ASG 4 Transverse	ASG 7 Longitudinal
A: Longi	SG 2 itudinal	ASG 5 Transverse	ASG 8 Longitudinal
Wite ASG1 Occured Data AS Long	SG 3 itudinal	ASG 6 Transverse	ASG 9 Longitudinal

## 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



# 2. Open raw .tdms file in EXCEL

				🕙 Re	dmond_1	1331225	092008		1	10/12/200	08 8:25 PI	M Mic	rosoft Ex	cel W	4	17 KB
0				📳 Re	dmond_1	1331925	092008		1	10/12/20	08 8:26 PI	M Mic	rosoft Ex	cel W	4	18 KB
				🔊 Re	dmond_1	1333325	092008		1	10/12/20	08 8:27 PI	M Mic	rosoft Ex	cel W	4	17 KB
				🔊 Re	dmond 1	1334025	092008		1	0/12/20	08 8:28 PI	M Mic	rosoft Ex	cel W	4	17 KB
					dmond 1	1224025	002000		1	0/12/20/	0 0.20 0	M Mie	resoft Ex	cel W		10 40
				e Re	amona_i	11554825	092008		1	10/12/200	06 6:50 PI		rosott Ex	cel w	4	19 KB
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				🔊 Re	dmond_1	1562225	092008		1	10/12/200	08 8:34 PI	M Mic	rosoft Ex	cel W	4	30 KB
				🔊 Re	dmond 1	1571125	092008		1	0/12/20	08 8:35 PI	M Mic	rosoft Ex	cel W	4	24 KB
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# 3. Open Data tab in EXCEL workbook

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X	[ <mark>]</mark> <sup> </sup>					Boo		A1	• (	f <sub>x</sub>	Time				
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	🛄 Copy 🕶			-	_		2	0	0.002746582	0.01663208	0.001220703	-0.000114923	-0.000162673	-8.98865E-05	-0.0001
Pa	B I U -	-   🗄 🕶   🆄	* <u>A</u> *   E =	(日) 伊日	E Merg	ge & Center 👻 💲	3	0.0002	0.001983643	0.016784668	-0.000915527	-0.000113652	-0.00016333	-9.09827E-05	-0.0001
	filebased a	P					4	0.0004	0.003051758	0.016784668	0.002746582	-0.000114529	-0.000164734	-9.15966E-05	-0.0001
_	Clipboard 14	Font	Gi .	Aligi	nment	- G	2	0.0006	0.003967285	0.015/10553	0.001068115	-0.000114529	-0.000165347	-9.27805E-05	-0.0001
	H5 🗸 (*	$f_x$					0	0.0008	0.001068115	0.012207031	-0.001525875	-0.000114923	-0.000163462	-9.05004E-05	-0.0001
	<u> </u>						0	0.001	-0.000152588	0.01575291	0.002740382	-0.000113730	-0.000162147	-9.03089E-05	-0.0001
_		_					0	0.0012	0.003051758	0.01663208	0.00213623	-0.000113913	-0.000162322	-8.98427E-05	-0.0001
- 4	d A	B	C	D	E	F	10	0.0014	0.004425049	0.017852783	0.001373291	-0.000114046	-0.00016355	-9.05881E-05	-0.0001
1	Root Name	Title	Author	Date/Time	Groups	Description	11	0.0018	0.000915527	0.010986328	-0.001220703	-0.000114309	-0.000164251	-9.02373E-05	-0.0001
2	RadmondOct00 10405222102000					1	12	0.002	-0.001373291	0.013580322	-0.000915527	-0.00011352	-0.000163199	-9.08512E-05	-0.000
2	RealibildOctos_10403222102009					1	13	0.0022	0.000305176	0.016937256	0.001983643	-0.000113827	-0.000162629	-8.93165E-05	-0.0001
3							14	0.0024	0.0050354	0.020294189	0.007019043	-0.000114485	-0.000162848	-9 18158E-05	-0.0001
-4	Group	Channels	Description	header			15	0.0026	0.000152588	0.015869141	-0.000152588	-0.000113915	-0.000163681	-9.19035E-05	-0.0001
				and a			16	0.0028	0.004272461	0.019073486	0.00289917	-0.000114748	-0.000162936	-9.15089E-05	-0.0001
				Station			17	0.003	0.002746582	0.014190674	-0.000610352	-0.00011466	-0.000166005	-9.18597E-05	-0.0001
				Name:Red			18	0.0032	-0.00289917	0.010375977	-0.001831055	-0.000114178	-0.000163155	-8.92288E-05	-0.0001
				mondOct09			19	0.0034	0.001678467	0.018157959	0.003509521	-0.000113783	-0.000164558	-9.03689E-05	-0.0001
				intenue etter				0036	0.002593994	0.01739502	0.001983643	-0.000112424	-0.000164164	-9.08073E-05	-0.0001
							21	0.0038	0.001068115	0.015411377	0	-0.000113783	-0.000165128	-9.19912E-05	-0.0001
				Sample			22	0.004	0.005493164	0.019989014	0.001525879	-0.000115274	-0.000165786	-9.23858E-05	-0.0001
				Rate:5000.0			23	0.0042	-0.003051758	0.01083374	-0.003509521	-0.00011466	-0.000164076	-9.06758E-05	-0.0001
							24	0.0044	-0.001220703	0.013580322	0.001831055	-0.000113739	-0.000163725	-9.09389E-05	-0.0001
							25	0.0046	0.005340576	0.020141602	0.00869751	-0.00011352	-0.00016333	-9.00619E-05	-0.0001
				Comments:			26	0.0048	0.000305176	0.015106201	0.004425049	-0.000115362	-0.000164207	-9.4052E-05	-0.0001
							27	0.005	0.004577637	0.016479492	0.001678467	-0.000116458	-0.000163374	-9.11581E-05	-0.0001
							28	0.0052	0.000915527	0.011291504	-0.000305176	5 -0.000115712	-0.000164076	-9.19474E-05	-0.0001
				TimeN			29	0.0054	-0.001983643	0.01449585	0.000915527	-0.000114572	-0.000163506	-8.95796E-05	-0.0001
				Imen			30	0.0056	0.004425049	0.013580322	0.001678467	-0.000112424	-0.000163111	-9.0895E-05	-0.0001
				DiagSs			31	0.0058	0.001983643	0.018768311	0.000457764	-0.000113126	-0.000163857	-9.13773E-05	-0.0001
				g03sg04			32	0.006	0.003356934	0.016937256	0.001220703	-0.000115362	-0.000163681	-9.07196E-05	-0.0001
				ca05ca0			33	0.0062	0.001525879	0.015563965		-0.000116151	-0.000163594	-9.05004E-05	-0.0001
				sgousgo			34	0.0064	-0.001678467	0.012512207	0.000610352	-0.000113476	-0.000163111	-9.09827E-05	-0.0001
				6sg07sg			35	0.0066	-0.000762939	0.013275146	(	-0.000113345	-0.000162629	-9.02812E-05	-0.0001
				08sg09s			36	0.0068	0.005187988	0.019073486	0.0050354	-0.000113696	-0.000162673	-9.05443E-05	-0.0001
				o10co12			37	0.007	0.001525879	0.010375977	-0.002288818	-0.000113432	-0.00016447	-9.11581E-05	-0.0001
				5			38	0.0072	0.003356934	0.016937256	0.001525879	-0.000114397	-0.000163506	-9.16843E-05	-0.0001
							39	0.0074	-0.001068115	0.012817383	-0.000915527	-0.000113301	-0.000163155	-9.16404E-05	-0.0001
				secsvolts			40	0.0076	0.000152588	0.014648438	0.001220703	-0.000113739	-0.000162673	-9.02812E-05	-0.0001
				voltsvol			41	0.0078	0.000915527	0.016479492	0.003509521	-0.000113038	-0.000163462	-9.08512E-05	-0.0001
м	( ) N RedmondOct00 1040533	2102000 (***	Data	CLIZ	17		42	0.007999999	0.003204346	0.018157959	0.003662109	-0.000113696	-0.000164032	-9.22981E-05	-0.0001
-		x105003 (10			Λ.		Rea	why P	01000009_104	J3222102009 (I	Data				

# 4. Add zeroes in columns N through Y

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

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A	B	C	D	E	F	G	H	I	1	K	L	M	N	0	P	Q	R	S	T	U	V	W	X	Y
1	N	Diag	8	sg03	sg04	sg05	sg06	sg07	sg08	sg09	sg10	sg12			_									
2	0.002746582	0.01663208	0.001220703	-0.000114923	-0.000162673	-8.98865E-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
3	0.001983643	0.016784668	-0.000915527	-0.000113652	-0.00016333	-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
4	0.003051758	0.016784668	0.002746582	-0.000114529	-0.000164734	-9.15966E-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
5	0.003967285	0.015716553	0.001068115	-0.000114529	-0.000165347	-9.27805E-05	-0.000140091	-4.08655E-05	-2.6966E-05	-7.226E-05	-2.50367E-05	-4.94157E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
6	0.001068115	0.012207031	-0.001525879	-0.000114923	-0.000163462	-9.05004E-05	-0.000137943	-3.9857E-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
7	-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
8	0.000610352	0.016784668	0.001678467	-0.000113915	-0.00016241	-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
9	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 \$3195E-05		0 0	0	0		0	0		0	0		
10	0.004425049	0.017852783	0.001373291	-0.000114046	-0.00016355	-9.05881E-05	-0.000139521	-4.03832E-05	-2 79744E-05	-7 29177E-05	-2 47736E-05	-4 \$6703E-05		0 0	0	0		0	0			0		
11	0.000015527	0.010086328	-0.001220203	-0.000114309	-0.000164251	-9.02121E-05	-0.000139434	-4 0007E-05	-2 73167E-05	-7 10177E-05	-2 50136E-05	4 99905E-06							0			0		
	0.000717722	0.010980328	0.0001220703	0.000114303	0.000104231	0.045132-03	0.000139434	4.033032.05	2.731072703	2,291712-00	2.591302-05	4.263037.07												
12	-0.001373291	0.013580322	-0.000915527	-0.00011352	-0.000163199	-9.08512E-05	-0.00013825	4.033932-05	+2.77114E-05	-7.283E-05	+2.05275E+05	-4.75303E-05							0			0		
13	0.000305176	0.010937256	0.001983643	-0.000113827	-0.000162629	-8.93105E-05	-0.000139171	-4.12103E-05	+2.79744E-05	-7.226E-05	-2.68344E-05	-4.8758E-05		0 0	0	0		0	0	0	0	0	0	0
14	0.0050354	0.020294189	0.007019043	-0.000114485	-0.000162848	-9.18158E-05	-0.000138951	-4.08055E-05	+2.7536E+05	+7.22102E+05	+2.75798E+05	-5.03803E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
15	0.000152588	0.015869141	-0.000152588	-0.000113915	-0.000163681	-9.19035E-05	-0.000138951	-4.05586E-05	+2.73606E+05	-7.4847E-05	-2.63083E-05	-4.73549E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
16	0.004272461	0.019073486	0.00289917	-0.000114748	-0.000162936	-9.15089E-05	-0.000140179	-4.12163E-05	-2.68344E-05	-7.19969E-05	-2.54752E-05	-4.73549E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
17	0.002746582	0.014190674	-0.000610352	-0.00011466	-0.000166005	-9.18597E-05	-0.000138469	-3.94185E-05	-2.75798E-05	-7.17777E-05	-2.66152E-05	-4.88018E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
18	-0.00289917	0.010375977	-0.001831055	-0.000114178	-0.000163155	-8.92288E-05	-0.000138338	-4.05586E-05	-2.74483E-05	-7.37508E-05	-2.64398E-05	-4.87141E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
19	0.001678467	0.018157959	0.003509521	-0.000113783	-0.000164558	-9.03689E-05	-0.000139171	-4.05586E-05	-2.64836E-05	-7.25669E-05	-2.60013E-05	-4.85826E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
20	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
21	0.001068115	0.015411377	0	-0.000113783	-0.000165128	-9.19912E-05	-0.000138995	-4.03832E-05	-2.7536E-05	-7.37947E-05	-2.45544E-05	-4.89772E-05		0 0	0 0	0	0	0	0	0	0	0	0	0
22	0.005493164	0.019989014	0.001525879	-0.000115274	-0.000165786	-9 23858E-05	-0.000137329	-3.98132E-05	-2.65275E-05	-7.29177E-05	-2.6396E-05	-4 91964E-05		0 0	0	0	0	0	0	0	0	0	0	0
23	-0.003051758	0.01083374	-0.003509521	-0.00011466	-0.000164076	-9.06758E-05	-0.000138688	-3 97693F-05	-2 70537E-05	-7 40130F-05	-2 65225E-05	-4 92403E-05		0 0		0		0	0			0		
28	-0.003051758	0.01083374	-0.003509521	-0.00011466	-0.000164076	-9.06758F-05	-0.000138688	_3 97693F_05	-2 20537E-05	-7 40130F-05	-2 65225E-05	-4 92403E-05		0 0		0	0	0	0	0	0	0		0

# 5. Copy data

- Highlight data
  - Exclude Header Row
- Right-Click  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click

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A,		в	C	D	E	F	6	H	1	1	K	L	M	N	0	P	Q	R	S	T	U	v	W	X
Time	0.07	003716183	Diag	0.001230000	5g03	5g04	sgos	1000110116	1045 PE DA	1 71 11 10 14	1.1.1.1000 A.	tg10	sg12										<u>^</u>	_
0.1	0002 0.0	002740342	0.010000000	0.000001552	-0.000111452	-0.00016333	-8.998032-03	-0.0001393940	4 104567-05	-2.77414E-05	-7 309315-05	-2.459628-05	4 93718F-05				0		110	0			0	
0.1	0004 0.0	003051758	0.016784668	0.00274658	-0.000114525	-0.000164734	-9.15966E-05	-0.000138557	-4 04209E-05	-2.62644E-03	-7.25669E-05	-2.56067E-05	-5.00734E-05	ő		0	0		1	0		0	ů.	
0.0	0006 0.0	003967285	0.015716553	0.00106811	-0.000114529	-0.000165347	-9.27805E-05	-0.000140091	-4 086552-05	-2.6966E-05	-7 226E-05	-2 50367E-05	-4.94157E-05	0	0	0	0		1.0	0	6	0	0	
0.0	0008 0.0	001068115	0.012207031	-0.00152587	-0.000114923	-0.000163462	-9.05004E-05	-0.000137943	-3.9657E-05	-2.67029E-05	-7.25231E-05	-2.67029E-05	-4.89334E-05	0	6	0	0	0		0	0	0	0	
0	1.001 -0.0	000152588	0.01373291	0.002746583	2 -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	1.0	0	0	0	0	
0.0	0012 0.0	000610352	0.016784668	0.00167846	-0.000113915	-0.00016241	-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	. 6	0	0	0	0	
0.1	0014 0.0	003051758	0.01663208	0.0021362	-0.000114793	-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	
0.1	0016 0.0	004425049	0.017852783	0.001373291	-0.000114046	-0.00016355	-9.05881E-05	-0.000139521	-4.03832E-05	-2.79744E-05	-7,29177E-05	-2.47736E-05	-4.86703E-05	0	0	0	0	0		0	0	0	0	
0.1	0018 0.0	000915527	0.010986328	-0.001220703	-0.000114305	-0.000164251	-9.02373E-05	-0.000139434	-4.0997E-05	-2.73167E-05	-7,29177E-05	-2.59136E-05	-4.88895E-05	0		0	0	0		0	0	0	0	
	1002 -0.0	001373291	0.013580322	-0.00091552	-0.00011353	-0.000183199	-9.08512E-02	-0.00013825	-4.03393E-05	-2.77114E-05	-7.283E-05	-2.652/3E-05	-4.75303E-05	0		8	0					0	0	
0.1	0022 0.0	0/1201000	0.01693/250	0.00199304	0.00011382	-0.000162629	-8.93165E-05	4.000139171	-4,121832-05	-2.79744E-05	-7,220E-00	-2.083442-05	-4.8758E-05	0		0	0	- 2	103	0	2		0	
0.	0024	0.0030324	0.015540141	0.00015108	0.000111448.	0.000162848	-9.101202-02	0.000118951	-4.08053E-05	2.7530E-05	7 48427 45	2.137982-03	+ 73549E-05	0	1	0	0		- 33					
0.0	0028 0.0	004773461	0.013003141	0.0075991	-0.000114745	-0.000167816	-9.19033E-05	-0.000138971	4 121618-05	-2 68344E-05	-7 199695-05	-2.690832-05	# 715496-05	0	1	0	0	, in the second					0	
0	003 0.0	002746582	0.014190674	-0 00065035	-0.00011466	-0.000166005	-9.18597E-05	-0.000138469	-3 94185E-05	-2.757988-05	-7.17777E-05	-2 66152E-05	-4.88018E-05	ō		ő	0			0	0	ö	ŏ	
0.1	0032 -0	00289917	0.010375977	-0.00183105	0.000114178	-0.000163155	-8.92288E-05	-0.000138338	-4.055BME-05	-2 74483E-05	-7.37508E-05	-2 643982-05	-4.87141E-05	0	0	0	0	0	1.0	0	0	0	0	
0.0	0034 0.0	001678467	0.018157959	0.00350952	-0.000113783	-0.000164558	-9.03689E-05	-0.000139171	-4.05586E-05	-2.64836E-05	-7.25669E-05	-2.60013E-05	-4.858.ME-05	0	0	0.	0	0		0	0	0	0	
0.9	0036 0.0	002593994	0.01739502	0.00198364	-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	
0.4	0038 0.0	001068115	0.015411377	howard	0.000113783	-0.000165128	-9.19912E-05	-0.000138995	-4.03832E-05	-2.7536E-05	-7.37947E-05	-2.45544E-05	-4.89772E-05	0	0	0	0	0		0	0	0	0	
0	0.004 0.0	005493164	0.019989014	0.00152587	0.000115274	-0.000165786	-9.23858E-05	-0.000137329	-3 98132E-05	-2.65275E-05	-7.29177E-05	-2.63962-05	-4.91964E-05	0	0	0	0	0		0	0	0	¢.	
0.0	0042 -0.0	003051758	0.01083374	-0.003509521	-0.00031468	-0.000164076	-9.06758E-05	-0.000138688	-3.97693E-05	-2.70537E-05	-7.40139E-05	-2.65275E-05	-4.92403E-05	0	•	0	0	0		0	0	0	0	
0.0	0044 -0.0	001220703	0.013580322	0.00183105	5 -0.000113739	-0.000163725	-9.09389E-05	-0.000138075	-4.09532E-05	-2.77991E-05	-7.25669E-05	-2.61767E-05	-4.84072E-05	0	.0	9	0			0	0	0	0	
0.1	0046 0.0	005340576	0.020141603	0.00569751	-0.00011353	-0.00016333	-9.006192-05	-0.000137636	-4.020782-05	-2.7536E-05	-7.20846E-05	-1.736062-05	-4.84949E-05	0	.0	0	0		8	0	0	0	0	
0.1	0048 0.0	000303176	0.015106201	0.004425049	-0.000115363	-0.000164207	-9.40128-05	-0.000139916	-4.0470902-05	-2.71414E-05	-7.25231E-05	-2.000132-05	-4.700182-05	0		0	0	- 3		0		0	0	
	1002 0.0	004277037	0.0104/9492	0.0010/840	-0.000138438	0.000163374	-9.112812-62	-0.000139083	-3.80793E-05	-2.0/40/E-00	-7.323106-03	-2.12129E-05	-4.915288-05		1.2				- 22					
	0052 0.0	000915527	0.011291304	0.0000001170	0.000113512	-0.000164076	-9.19474E-05	-0.000138088	-3.994472-05	1 17657E-05	-7,310852-05	-2.057138-05	-4.91904E-05			0	0		100		2		0	
	0056 07	004475049	0.013580322	D DOLATEAN	0.000112424	-0.0001631111	-0 0591F-04	-0.000119345	-1055867-05	-7 \$634E-05	-T 27867F-04	-2 52171E-05	-1 24864E-05	0		0	0	- A						
0.0	0058 0.0	001983643	0.018768311	0.00045776	-0.000113126	-0.000163857	-9.13773E-05	-0.000138905	-3.95939E-05	-2.7536E-05	-7.12077E-05	-2 59136E-05	-4 97226E-05	0	6	0	0		-	0		0	a	
0	006 0.0	003356934	0.016937256	0.00122070	-0.000115363	-0.000163681	-9.07196E-05	-0.000138732	-3.98132E-05	-2.89829E-05	-7.23916E-05	-2.65713E-05	-4.71356E-05	0	0	0	0	0	0	0	0	0	0	
0.1	0062 0.0	001525879	0.015563965		0.000116151	-0.000163594	-9.05004E-05	-0.000137768	-3.99\$\$6E-05	-2.79744E-05	-7.33685E-05	-2.55629E-05	-4.91526E-05	0	0	0	0	0		0	0	0	0	
0.9	0064 -0.0	001678467	0.012512207	0.000630353	-0.000113476	-0.000163111	-9.09827E-05	-0.000138381	-3.98132E-05	-2.92022E-05	-7.29616E-05	-2.64398E-05	-4.89772E-05	0	0	0	0	0		0	0	0	0	
0.0	0066 -0.0	000762939	0.013275146	(	-0.000113345	-0.000162629	-9.02812E-05	-0.000138162	-4.17863E-05	-1.76237E-05	-7.32246E-05	-2.51244E-05	-4.87141E-05	0	0	0	0	0		0	0	0	0	
0.1	0068 0.0	005187988	0.019073486	0.0050354	+ -0.000113696	-0.000162673	-9.05443E-05	-0.000140179	-4.00324E-05	-2.79744E-05	-7.05061E-05	-2.64398E-05	-4.8188E-05	0	0	0	0	0	6	0	0	0	0	
0	0.007 0.0	001525879	0.010375977	-0.002288811	-0.000113433	-0.00016447	-9.11581E-05	-0.000139258	-4.01639E-05	-2.6659E-05	-7.44962E-05	-2.58259E-05	-4.74864E-05	0	0	0	0	0	. 6	0	0	0	0	
0.1	0072 0.0	003356934	0.016937258	0.001525879	-0.000114397	-0.000183506	-9.16843E-05	-0.000139039	-4.05586E-05	-2.71414E-05	-7.3137E-05	-2.62644E-05	-4.8188E-05	0	0	0	0	0	0	0	0	0	0	
0.1	0074 -0.0	000068115	0.012817383	-0.00091552	7 -0.000113301	-0.000163155	-9.16404E-05	-0.000138732	-4.12163E-05	-2.74044E-05	-7.397E-05	-2.60013E-05	-4.8188E-05	0	- 0	0	0	0		0	0	0	Û	
0.1	0076 0.0	000152588	0.014648438	0.00122070	-0.000113739	-0.000162673	-9.02812E-05	-0.000137987	-4.06463E-05	-2.70098E-05	-7,41016E-05	-2.64836E-05	-4.87141E-05	0	.0	0	0	0	6	0	0	0	0	
0.1	0078 0.0	000915527	0.016479492	0.00350952	-0.000113038	-0.000163462	-9.08512E-05	-0.000138513	-4.08655E-05	-2.70237E-05	+7.10462E-05	-2.45105E-05	-4.88018E-05	0	.0	0	0	0		0	0	0	0	
IN DELTWO	7777 0.0	003204346	0.018137959	m.003662105	-0.000113696	+0.000104032	-7.22981E-05	-0.000138864	~3.92432E-05	-2.39373E-05	TUTOLE-05	-2.000132-05				0.	0			0	- U	0	0	

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

	Y	W60: setplotstyle(0)	W1: Untitled Data	
174	<u> </u>		1: Unspecified	2: No U
			1: 0.000000	0.003052
Series	•		2: 0.001000	0.001068
Dataset			3: 0.002000	0.000153
			4: 0.003000	-0.001221
Сору	• L		5: 0.004000	-0.000153
Paste	•	Paste to Window	6: 0.005000	-0.000610
Styles	•	Paste Link	7: 0.006000	0.000916
Styles		Paste to Editor Ctrl+V		
Clear	· • T			
Magnify				
Autoscale				
Cursor				
Zoom	F10			
1 Clear Data				
Properties				
	ta Series Dataset Copy Paste Styles Clear Magnify Autoscale Cursor Zoom 1 Clear Data	ta X Series + Dataset + Copy + Paste + Styles + Clear + Magnify Autoscale Cursor + Zoom F10 1 Clear Data	ta X V60: setplotstyle(0) Series Dataset Copy Paste Paste to Window Paste Link Paste to Editor Ctrl+V Clear Magnify Autoscale Cursor Zoom F10 1 Clear Data	ta     Series   Dataset   Copy     Paste   Paste   Paste   Paste Link   Paste to Editor   Ctear   Magnify   Autoscale   Cursor   Zoom   F10   1 Clear Data

#### 7. Click PreProcess button to inspect data



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

			23	Л
Truck ID: 1.0	00000			
a1		OK	Cancel	

#### 8. Inspect W60

x

• Examples of what may be seen: W60: RP Single Vehicle Event

0.4

0



1

1.4

1.6

1.8

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

• Right-Click in W60  $\rightarrow$  Select Magnify  $\rightarrow$  Left-Click

- Must be equal # of red & green LPS hits



• Use cross-hair to drag over vehicle event

W60: setplotstyle(0)		×
3 -		W60:
2 -	Α.Λ	[351, 1] X = 0.35 Unknown Y = 0.00100054 No Units (2.90647)
1-	V = V = V = V = V = V = V = V = V = V =	
-1 - ,		· · · · · ·

## **10. Process vehicle event**

• Click on Redmond US-97 button

ا 🔥	DADiSP	2002 -	[C:\Progra	am Files (x8	6)\DSP20	02]:UN	ITITLED:C:\U	Jsers\mcv0005	i\Desktop\Oregon\F	Redmond\Phase	3\Redmond	Template4.dwk
File	Edit	View	Analysis	Drawing	Tools	Data	Window	Help				
	🛩 🕻	16	🗟 i	≌ #	<b>M</b> 🖉	8	f*  📿	Medford I-5	Redmond US-97	ever-Conner I-5	PreProcess	ReadDataq
V	<b>V60</b> :	setplo	tstyle(0	))					Redmond US-97	]		

Verify Truck ID and LPSVoltage\*

Redmond Information	×
Truck ID: 1.000000 LPSVoltage: 0.500000	
	OK Cancel

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

V26.4553 Consed Data X	WD2 AGG4 Channel Data         WD2 AGG4 Channel Data           1         1         1           0         2         0         0         0           0         2         0         0         0         0           0         2         0         0         0         0         0	25 0. i i2 i4 i5 i5
W25.4562 Channel Data x	W2E AVGS Channel Data         W2E AVGS Channel Data           02         04         05         1         12         14         15         13           0         02         04         05         1         12         14         15         13	× ۵ i i i i i i i i i i i i i i i i i i i
WOE         ASG3         Common Name         X           3         -	W22 AGG Glowed Data         W22 AGG Glowed Data           04- 02- 04- 0- 0- 0- 0- 0- 0- 0- 0- 0- 0- 0- 0- 0-	× 

• Processed data output in tabular form in W57

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 × W60: 25 20 15 10 5 0.6 0.8 0.2 0.4 1.2 1.4 1.6 1.8 20 -15 -10 -5 -0.3 0.05 0.1 0.15 0.2 0.25 × Redmond Information Medford I-5 Redmond US-97 Dever-Conner I-5 PreProcess ReadDataq Truck ID: 2.000 Redmond US-97 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



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

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

- Click Preprocess button without loading another file
- Change Truck ID  $\rightarrow$  Click OK

	X
Truck ID: 3	
	0K Cancel

- 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



W57:	W57: Output Data									
	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:	3.000000	2.000000								
7:										

# 14. Copy W57 and store in EXCEL

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



# **15. Troubleshooting – Changing LPSVoltage**

- 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

Redmond Information	
Truck ID: 3.000000	
LPSVoltage: 0.500000	
	OK Cancel

• 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

Data Channel

Time

axle1 axle2 axle3

sg1 sg2 sg3 sg4 sg5 sg6 sg7 sg8 sg9 sg10 > sg12 sg11 Datatype U DT\_FLOAT

DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT DT\_FLOAT

•	No RB Gauges
•	TDMS File
•	Time and LPS listed
•	12 strain gauges listed
•	Gauges appear out of order
•	Dates

- 3/13/2009

C1-3

# 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



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

DOUBLE CLICK 🔰 🔁 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
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# 3. Open Data tab in EXCEL workbook

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	A	В	С	D	E			Α	В	С	D	E	F
1	Root Name	Title	Author	Date/Time	Groups							AB01	
2	DC08192009_09371619082009												
3							1 1	ime	axlel	axle2	axle3	sg3	AB02
4	Group	Channels	Description	header			2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station			3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
				Name:DC08192009			4	0.0004	-0.002441400	0.001220703	0.000457764	0.000612193	-0.0005
				Sample Rate:5000.0			5	0.0000	-0.000132388	0.003043732	0.001220703	0.00061007	-0.0005
				Comments:			2	0.0008	-0.001831055	0.001373291	0.002441400	0.000611402	-0.0005
							/ e	0.0012	0.001831033	-0.000913327	-0.001373291	0.000608005	-0.0005
				Timeaxle1axle2			0	0.0012	-0.00213623	-0.000457704	-0.002740382	0.000613026	-0.0005
				axle3AB01			10	0.0014	-0.0022598218	-0.001220703	-0.0011220703	0.00061193	-0.0005
							11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005
				sg3AB02AB03			12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.000
				AB04AB05AB06			13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005
				AB07AB08AB			14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005
				09ABI0ABIIA			15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005
				BIZ			16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005
				2PP04PP05PP			17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005
				06PP07PP00P			18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005
				B00			19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
				B09			20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005
				secsualtsvaltsval			21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
				tsvoltsvoltsvolts			22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				voltsvoltsvolts			23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005
		voltsvoltsvoltsvo			24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005		
		Itsvoltsvoltsvolts			25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005		
				voltsvoltsvolts			26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				voltsvoltsvoltsvo			27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				Itsvolts			28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data	2	5				29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6							30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data			CLICK			31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000
14 4	DC08192009_0937161	9082009 (roc	ot Data			1	4 4 3	DC01	3192009_09371	619082009 (roo	t Data 🏑 🤇	2/	

# 4. Arranging data in EXCEL

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

Immes Ht +  11 - Å Å Å													A					
B         I					Time	s N€ ≁	11 · A	A					Time	s Ne + 11	· A	Α	ş -	, %
M         N         O         P         O         R           isg9         sg12         sg11         # Cut         0.00035047         0.000430228         0.000165917         Cut         Cut         Cut         Compy         Cut					B	I ≣	<u>ð</u> - <u>A</u>	• []]					B	I =	🗞 - <u>A</u>	• 8	9 - 1	.00 00
sg9         sg10         sg12         sg11         ▲ Cut         g8         sg9         sg10         sg12         ▲ Cut           0.00059347         0.000430228         0.000165917         0.00035206         ↓ Cov         0.00053147         0.000430228         0.0001659         ↓ Cov         Paste Options:         0.00053142         0.000429428         0.00016600         0.00035206         ↓         Paste Options:         0.00053142         0.00016404         0.00016705         ↓ Paste Options:         0.00053141         0.00016605         0.00016605         0.00016705         ↓         Paste Options:         0.0005314137         0.00016705         ↓         Paste Options:         ↓         0.00059141         0.00016705         ↓         Paste Options:         ↓	M	N	0	Р		0	R		L	M	N	0		D		0		R
1       0.00039347       0.000430228       0.000165917       0.00035502       Copy         2       0.00058742       0.000429482       0.0001664       0.000352706       Paste Options:       0.0003872       0.00016644       0.00016644       0.00035248         0.00059141       0.000429526       0.00016644       0.000352487       0.000352487       0.000429482       0.00016644       0.00016644       0.000352487         0.000592813       0.000429745       0.000166356       0.000352487       0.000352487       0.000429745       0.000166356       0.000352487         0.000592813       0.000429745       0.000166356       0.000352487       0.00014292       0.00016637       Paste Special         0.000592813       0.000429745       0.000166356       0.000352487       0.00016635       0.0000352487       0.00016637       Paste Special       Insert         0.000592813       0.000429745       0.000166356       0.000352487       Cear Cogtents       Eormat Cells       Column Width       Eormat Cells	sg9	sg10	sg12	sgll	×	Cut			g8	sg9	sg10	sg12	ð	Cut				
1       0.00058742       0.00014644       0.00035270       Paste Options:       0.000342972       0.000429482       0.0001664       Paste Options:         1       0.000583035       0.000429526       0.000166444       0.000354021       Paste Options:       0.00034137       0.000429526       0.0001664       0.00016644         1       0.000592813       0.000430842       0.000166444       0.000351421       Paste Special       Insert Cut Cells       0.0001663         1       0.000592813       0.000429745       0.000166356       0.000351425       0.000351872       0.0001663       0.0001663       Delete	0.00059	47 0.000430228	0.000165917	0.00035503		⊆ору			0.00034192	0.00059347	0.000430228	0.0001659	•	⊆ору				
0.000600047       0.000429526       0.000166005       0.000353858         0.00059141       0.000429514       0.00016644       0.000354021         0.000592813       0.00043042       0.00016644       0.000353495         0.000592813       0.00043042       0.000166356       0.000353495         0.000592813       0.000430422       0.000166356       0.000351872         0.000592813       0.000429745       0.000166356       0.00035287156       0.000429745       0.00016637         0.000592833       0.000429263       0.000166356       0.000352965       Delete       Clear Cogtents       Dio0341832       0.000429745       0.00016637       Dio034284       0.0001637       Dio04299263       0.00016637       Dio034178       Dio0341822       0.000429235       0.00016637       Dio034284       Dio0342845       Dio0342845       Dio0342845       Dio0342845       Dio0342845       Dio04293551       Dio0429353       Dio0016374       Dio0429458       Dio016374       Dio0342845       Dio0429458       Dio016374       Dii041644	0.00058	42 0.000429482	0.0001664	0.00035270	e 🙉	Paste	Options:		).000342972	0.00058742	0.000429482	0.00016	2	Paste O	ptions:			
0.000583035       0.000429614       0.000166444       0.000354021         0.00059141       0.000430842       0.000166049       0.000352483         0.000592813       0.000430491       0.00016757       0.000353492         0.000587156       0.000430491       0.000166356       0.000352483         0.000587156       0.00043029745       0.000166356       0.000352485         0.000592833       0.000429745       0.000166356       0.000352485         0.000596233       0.000429395       0.000166356       0.000352495         0.000595031       0.000429395       0.00016657       0.000354192         0.000598331       0.000429395       0.00016657       0.000354192         0.000595331       0.000429395       0.00016657       0.000354192         0.000595931       0.000429745       0.00016657       0.000354192         0.000595931       0.000429748       0.00016591       0.000354192         0.0005959472       0.000165917       0.000354192       0.00016591         0.000595093       0.000429748       0.00016663       0.000353408         0.000595093       0.000429748       0.000166638       0.000353408         0.000595093       0.000429748       0.000166638       0.000353408	0.0006000	047 0.000429526	0.000166005	0.000353583	_	Â			0.00034284	0.000600047	0.000429526	0.0001660				- I.		
<ul> <li>             0.00059141             0.000430842             0.000160049             0.00035248             0.0003522             0.0003522             0.00016635             0.00035248             0.00035248             0.00035428             0.00035428             0.00035428             0.00035428             0.00035428             0.00035428             0.00035428             0.0003549             0.00035349             0.00035349             0.00035349             0.00035349             0.00035349             0.00035349             0.00035349             0.00035349             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534             0.0003534</li></ul>	0.0005830	035 0.000429614	0.000166444	0.00035402	1			-	).000341437	0.000583035	0.000429614	0.0001664		Paste Sr	pecial	ьĿ		
0.000592813       0.000430491       0.000167057       0.000353495         0.000592813       0.000429745       0.000166356       0.000351872       0.000341182       0.000350205       0.000430622       0.000166356       0.000352965         0.000596233       0.000429263       0.000166356       0.000352965       0.000166356       0.000352965       0.000166356       0.000166356       0.000352965         0.000596233       0.000429395       0.00016675       0.000353715       0.000353916       0.00016675       0.00016547       0.00016675       0.000353916         0.000598531       0.000429395       0.00016576       0.000353715       0.000353917       0.000353917       0.000354172       0.00016594       Unhide       Unhide       Unhide       Unhide       Unhide       Unhide       Unhide       Unhide       0.00016594       0.00016594       Uno0353208       0.00016594       0.00016594       0.00016594       Unhide       Unhide       Unhide       Unhide       Unhide       Unhide       0.00016594       0.000166663       0.000353299       0.0001659477       0.000166663       0.000353299       0.0001659477       0.000166663       0.00035332       0.0003541613       0.000166663       0.00035332       0.0003541613       0.000166663       0.00035332       0.000166663	0.00059	41 0.000430842	0.000166049	0.00035248		Paste	Special		).000341744	0.00059141	0.000430842	0.0001660		Incart C	ut Calle	_		
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0.000396233         0.000429263         0.00016636         0.000352965           0.000596233         0.000429263         0.00016636         0.00016536           0.000596233         0.000429263         0.00016636         0.00016547           0.000595531         0.000429745         0.0001657         0.000353715           0.000596731         0.000429745         0.00016596         0.000353715           0.0005957472         0.000165961         0.000353937           0.000596738         0.00016591         0.000353937           0.0005967472         0.00016591         0.000353937           0.000591629         0.00016591         0.000353408           0.000591629         0.00016663         0.000353408           0.000595093         0.000166631         0.000353408           0.000595093         0.000142948         0.000166630         0.000353671           0.000595093         0.000429648         0.000166638         0.000352399           0.000595093         0.000429658         0.000166628         0.000352399           0.0005995093         0.000429658         0.000166268         0.000353408           0.00059950947         0.000166631         0.000353276         0.000166631         0.00035332           0.000587463	0.000604	595 0.000430622	0.000166356	0.00035428	4	Clear (	Contents		0.00034192	0.000604695	0.000430622	0.0001663		Clear Co	ontents			
0.000595531       0.000429395       0.000165479       0.000354197         0.000595531       0.000429395       0.000165479       0.000354197         0.00059531       0.000429745       0.00016570       0.000353711         0.000595531       0.000429745       0.00016591       0.000353934         0.000595742       0.00016591       0.000353934       0.00016591       0.000353934         0.000595788       0.000429748       0.00016591       0.00035304       0.00035304         0.000595098       0.000429748       0.00016591       0.000353408       0.000353408       0.00016594         0.000591629       0.00042649       0.00016663       0.000353671       0.000353408       0.00016663       0.000353671         0.000595093       0.000429658       0.000166268       0.000355468       0.000353408       0.000166268       0.000353671         0.000595093       0.000429658       0.000166268       0.000353408       0.000353408       0.000353671         0.000595093       0.00042958       0.000166268       0.000353408       0.000353408       0.000353408         0.000599477       0.000430272       0.000166268       0.00035332       0.000343444       0.000599477       0.000166631       0.000353276         0.0000587463	0.000596	33 0.000429263	0.000166356	0.00035296					).000341832	0.000596233	0.000429263	0.0001663	1	<u>F</u> ormat	Cells			
Column Width         Diods 2573         Diods 2574         Diods 2577         Diods 25777         Diods 25777 <thd< th=""><th>0.000595</th><th>31 0.000429395</th><th>0.000165479</th><th>0.00035419</th><th></th><th>Forma</th><th>t Cells</th><th></th><th>0.000343454</th><th>0.000595531</th><th>0.000429395</th><th>0.0001654</th><th></th><th><u>C</u>olumn</th><th>Width</th><th>·</th><th></th><th></th></thd<>	0.000595	31 0.000429395	0.000165479	0.00035419		Forma	t Cells		0.000343454	0.000595531	0.000429395	0.0001654		<u>C</u> olumn	Width	·		
0.000594742       0.000429132       0.00016594       Unhide         0.000591629       0.000429138       0.00016504       0.000353408         0.000591629       0.000428649       0.00016504       0.000353671         0.00059083       0.000429658       0.000166268       0.000352399         0.00059097       0.000429748       0.000166268       0.000355468         0.00059084       0.000166268       0.000355468       0.000355468         0.00059084       0.000431148       0.000166312       0.00035332         0.00059084       0.00043011       0.000353276       0.000341141       0.00042971       0.00016663         0.000587463       0.00043011       0.000353934       0.000353934       0.00035312       0.00035312         0.00060251       0.000166312       0.000353934       0.000353128       0.000354126       0.000354328         0.00060251       0.000166634       0.000353934       0.000342402       0.000430535 </th <th>0.000589</th> <th>31 0.000429745</th> <th>0.00016675</th> <th>0.00035371</th> <th>2</th> <th>Colum</th> <th>n Width</th> <th>-</th> <th>0.000341788</th> <th>0.000589831</th> <th>0.000429745</th> <th>0.000166</th> <th></th> <th><u>H</u>ide</th> <th></th> <th>-</th> <th></th> <th></th>	0.000589	31 0.000429745	0.00016675	0.00035371	2	Colum	n Width	-	0.000341788	0.000589831	0.000429745	0.000166		<u>H</u> ide		-		
0.00059768       0.000129438       0.000165917       0.000342402       0.000332402       0.000163948       0.000165917       0.00035408         0.000589568       0.000427948       0.000165304       0.000353408       0.00016304       0.000353408         0.000591629       0.000427948       0.000165304       0.000353408       0.000165304       0.000353408         0.000591629       0.000427948       0.000166304       0.000353671       0.000342402       0.0001659509       0.000166268       0.000352399         0.000599933       0.000429658       0.000166268       0.000353408       0.000353408       0.000352399         0.000599477       0.000430272       0.000166388       0.00035332       0.000342446       0.000599477       0.000430272       0.000166638       0.00035332         0.000599484       0.000431148       0.000166631       0.000353276       0.000341481       0.00043071       0.000166631       0.000353324         0.000587463       0.00043071       0.000166634       0.000353324       0.000342402       0.00035335       0.000166631       0.000353324         0.000602371       0.00042957       0.000166636       0.000354328       0.000342402       0.00035835       0.000166634       0.000354416         0.000602371       0.000429576	0.000594	42 0.000429132	0.000165961	0.00035393	2	Hide		-	0.000342314	0.000594742	0.000429132	0.0001659		<u>U</u> nhide				
0.00050300       0.000125300       0.000125301       0.000125301       0.000125301         0.000600179       0.000427948       0.000165304       0.000353408       0.000343325       0.000428649       0.000166630       0.000353671         0.000591629       0.000428649       0.000166630       0.000353671       0.000342577       0.000429649       0.000166630       0.000353671         0.000591629       0.000428649       0.000166630       0.0003532399       0.000342577       0.000429658       0.000166638       0.000353468         0.000599477       0.000430272       0.000166638       0.000353426       0.0003534246       0.000430272       0.000166638       0.00035342         0.000599477       0.000430272       0.000166638       0.00035332       0.000343542       0.00059044       0.0001666312       0.000353276         0.000587463       0.00043071       0.000166631       0.000353934       0.000343148       0.00043071       0.000166663       0.000353328         0.000602371       0.00042957       0.000166636       0.000353324       0.0003432402       0.000166631       0.000354328         0.000602371       0.00042957       0.000166636       0.000354328       0.000342402       0.0005863       0.000430535       0.000166634       0.000354328       0.0003	0.000589	68 0.000429438	0.000165917	0.00035437		<u>U</u> nhid	e	-	2.000342402	0.000589508	0.000429438	0.0001659	Æ		400			
0.000591629         0.000428649         0.000166630         0.000353671           0.000591629         0.000428649         0.000166663         0.000353671           0.000591629         0.000428658         0.000166663         0.000353671           0.000590429         0.000428658         0.000166628         0.000353671           0.000590429         0.000428658         0.000166628         0.000352399           0.000590477         0.000429658         0.000166288         0.000353428           0.00059047         0.000429658         0.000166288         0.00035332           0.00059084         0.000430272         0.000166288         0.00035332           0.00059084         0.0004301148         0.000166288         0.000353276           0.000587463         0.00043071         0.000166631         0.000354328           0.00060237         0.00042957         0.000166636         0.000354328           0.000602311         0.000166636         0.000354328         0.0003542420         0.000153536           0.000602371         0.000166636         0.000354328         0.0003542402         0.000158663         0.000354416           0.000587463         0.000166634         0.000354416         0.000354416         0.000354416	0.000600	79 0.000427948	0.000165304	0.00035340					).000343525	0.000000179	0.000427948	0.0001655	62 0	000355	408			
0.00057622         0.00073625         0.00073642402         0.00073625         0.000736445         0.000736445         0.000736445           0.000602371         0.00076726         0.00073642402         0.000759825         0.000166631         0.000354126           0.000602371         0.00076726         0.000736445         0.000756465         0.000754416         0.000754416         0.000754416	0.000591/	0 000428649	0.000166663	0.00035367	1				) 000342577	0.000591029	0.000428049	0.0001662	60 0	000355	200			
0.000599477         0.000430272         0.000166338         0.000353454         0.00039084         0.000430272         0.000166338         0.000353454           0.00059084         0.000430272         0.000166338         0.000355468         0.000343542         0.000430171         0.000166312         0.00035332           0.00059084         0.000430272         0.000166288         0.000353426         0.00035332         0.000343144         0.000430171         0.0001666312         0.000353276           0.000587463         0.00043071         0.000166636         0.000353934         0.000343141         0.00043071         0.000166663         0.000354328           0.000602371         0.00046736         0.000166663         0.000354328         0.000342402         0.00043055         0.000166663         0.000354328           0.000602371         0.000429576         0.000166663         0.000354128         0.000342402         0.00043055         0.000166663         0.00035416	0.000595	0.000429658	0.000166268	0.00035239					) 000342446	0.000599477	0.000429098	0.0001668	38 0	000355	468			
0.00059747         0.00059272         0.00050048         0.00059748         0.00059748         0.00059748         0.000166268         0.000353276           0.00059084         0.000431148         0.000166268         0.000353276         0.000341613         0.0004029921         0.000166312         0.000353934           0.000587463         0.00043071         0.000166630         0.000353934         0.00034147         0.00042997         0.000166630         0.000354328           0.000602371         0.00042957         0.000166630         0.000354328         0.000342402         0.000358663         0.000354328           0.000602371         0.000166632         0.000354328         0.000342402         0.00058663         0.000354146	0.000599	177 0.000430272	0.000166838	0.00035546					) 000343542	0.00059084	0.000431148	0.0001662	68	0.00035	332			
0.0005004         0.0005302         0.0005302         0.0003532           0.0006005         0.000429921         0.000166312         0.00035326         0.000353934           0.000587463         0.00043071         0.00016663         0.000353934         0.00034147         0.00042957         0.000166663         0.000354328           0.000602371         0.00042957         0.000167364         0.000354328         0.000342402         0.00038863         0.000166663         0.000354328           0.000602371         0.000167364         0.000354328         0.000342402         0.00038863         0.000166663         0.000354364	0.00059	84 0.000431148	0.000166268	0.0003533	2				) 000341613	0.00060053	0.000429921	0.0001663	12 0	000353	276			
0.000587463 0.00042957 0.00016663 0.000352934 0.000354328 0.000342402 0.00058643 0.00043053 0.000166663 0.000354328 0.000342402 0.00058663 0.00043053 0.000166663 0.000354416 0.0003544260 0.000342402 0.00058683 0.00042957 0.000166644 0.000354426	0.00050	0.000429921	0.000166312	0.00035327	6				).000341481	0.000587463	0.00043071	0.0001666	63 0	.000353	934			
0.000602371 0.00042957 0.000167364 0.000354328 0.000342402 0.00035863 0.000430535 0.00016663 0.000354416 0.00035366 0.00042975 0.00016644 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.000353366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.00035366 0.000354416 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354420 0.000354416 0.000354402 0.000354416	0.000587	63 0.00043071	0.000166663	0.00035393	4				).000343147	0.000602371	0.00042957	0.0001673	64 0	.000354	328			
0.00052271 0.00012551 0.000156562 0.00025416 0.00025416 0.000353364	0.000507	71 0.00042957	0.000167364	0.00035432					).000342402	0.00058663	0.000430535	0.0001666	63 0	.000354	416			
	0.00058	563 0.000430535	0.0001666663	0.00035441	6				).000342402	0.000599828	0.000429745	0.0001664	44 0	.000353	364			

# 4. Arranging data in EXCEL cont..

• Insert columns of zeroes in columns Q through Y

L	М	N	0	Р	Q	R	S	Т	U	V	W	Х	Y	Ζ	AA	AB	E
sg8	sg9	sg10	sgll	sg12													F
6 0.00034192	0.00059347	0.000430228	0.00035503	0.000165917	0	0	0	0	0	0	0	0	0				1
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  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click


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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

		M				1: Unspecified	2: No Unit
iste Raw DeverCon	ner Data He	ere X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Carias					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Windo	w	· ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-0
Styles	•	Paste to Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-0
Clear	• • F	Paste to Editor	Curry		10:	1.800000E-003	-1.983643E-0
					11:	2.000000E-003	2.593994E-0
Magnify					12:	2.200000E-003	-1.525879E-0
Autoscale					13:	2.400000E-003	-9.155270E-0
racoscure							
Cursor							
Zoom	F10						
Properties	)).	60) × W27:	AB4-Cleaned Data				

W1: Untitled Data X

### 7. Click PreProcess button to inspect data



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

			23	Л
Truck ID: 1.0	00000			
a1		OK	Cancel	





- 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  $\rightarrow$  Select Magnify  $\rightarrow$  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\*

Dever Conner Information	X
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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:	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:	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



## 14. Troubleshooting – Changing LPSVoltage

- 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)

W60: MPP												X
2 -						1						
1.5 -												
1-				1								
0.5 -				h								
0				$\Delta \nabla$		$\sim$						
	1.95	10	1.05	2	2.05	2.1	2.15	22	2.25	22	2.25	24
	1.00	1.9	1.95	2	2.05	2.1	2.15	2.2	2.20	2.5	2.55	2.4

- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK

Dever Conner Information	23
Truck ID: 3.000000	
El Ovollago, joi rococo	OK Cancel

Event is processed successfully if all peaks are captured.

#### **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
⊴ <mark>rb4</mark>	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



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



5/6/2009 1:48 PM TDMS File 1,956 KB
5/6/2009 1:48 PM TDMS File 1,956 KB
5/6/2009 1:49 PM TDMS File 1,956 KB
5/6/2009 1:49 PM TDMS File 1,956 KB
5/6/2009 1:52 PM TDMS File 1,956 KB
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## 3. Open Data tab in EXCEL workbook

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	A	В	С	D	E			А	В	С	D	Е	F	
1	Root Name	Title	Author	Date/Time	Groups							AB01		
2	DC08192009_09371619082009													
3							1 <b>T</b>	ime	axlel	axle2	axle3	sg3	AB02	
4	Group	Channels	Description	header			2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005	
				Station			3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005	
				Name:DC08192009			4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005	
				Sample Rate:5000.0			5	0.0000	-0.000152588	0.005045752	0.001220703	0.000610878	-0.0005	
				Comments:			7	0.0008	-0.001831055	0.001373291	0.002441400	0.000611402	-0.0005	
							/ e	0.0012	0.001831033	-0.000913327	-0.001373291	0.000608005	-0.0005	
				Timeaxle1axle2			0	0.0012	-0.00010332	-0.000457704	-0.002740382	0.000613026	-0.0003	
				axle3AB01			10	0.0014	-0.00219029	-0.001220703	-0.0011220703	0.00061193	-0.0005	
							11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005	
				sg3AB02AB03			12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.000	
				AB04AB05AB06			13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005	
				AB07AB08AB			14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005	
				09ABI0ABIIA			15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005	
				B12 BB01BB03BB0			16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005	
				2PP04PP05PP			17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005	
				06PP07PP00P			18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005	
				B00			19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005	
				509			20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005	
				secsualtevalteval			21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005	
				tsvoltsvoltsvolts		1	22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005	
				voltsvoltsvolts			23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0009	
				voltsvoltsvoltsvo			24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005	
				Itsvoltsvoltsvolts			25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005	
				voltsvoltsvolts			26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000	
				voltsvoltsvoltsvo			27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005	
				Itsvolts			28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005	
5	Data	25	5				29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005	
6							30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005	
7	Data			CLICK			31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000	
14 4	DC08192009_0937161	9082009 (roc	ot Data			1	• • •	DC01	3192009_09371	619082009 (roo	t 📃 Data 🏒	2/		

# 4. Arranging data in EXCEL

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

		55)	ries,					Cells		Editi							
				Times	Ne - 11 - A A	· s - % ,	-				0	Р	Q	R	S	Т	U
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	Р	Q	3	2	S	Т	U	V	W		3.50777E-05	-1.31541E-07	0.000143731	0	4.56448E-05	7.77847E-05	-2.8062
1	1 21541E-07	rb1	rb3	8	Coge	2 206217-06	rb6	rb7	0 7770E-05	rb11	3.57792E-05	5.26165E-07	0.00014338	0	4.60833E-05	8.00209E-05	-1.0084
÷	5.26165E-07	0.000143731	4.608	÷.	Paste Options:	-1.00848E-06	5.13888E-05	3.2973E-05	9.88752E-05	-9.32	3.613E-05	1.75388E-07	0.000144783	0	4.51187E-05	7.88371E-05	-1.9292
1	1.75388E-07	0.000144783	4.511	1	3	-1.92927E-06	5.0468E-05	3.19207E-05	9.85683E-05	-9.25	3.55161E-05	4 38471E-07	0.000143599	0	4 54694E-05	7.78286E-05	-1.7977
÷	4.38471E-07	0.000143599	4.546		Paste Special	-1.79773E-06	4.93718E-05	3.23592E-05	9.69459E-05	-9.17	3.53408E-05	\$ 76942E-08	0.000144652	0	4 44171E-05	8 01525E-05	-3 2446
	\$.76942E-08	0.000144652	4.441	_	local	-3.24469E-06	4.97226E-05	3.25345E-05	9.72967E-05	-9.20	2 712955 05	1 21641E 07	0.000146207	0	4.28000E.05	0.01525E-05	2 6021
	1.31541E-07	0.000145397	4.385		Delete	-3.68316E-06	5.01611E-05	5 3.17453E-05	9.71652E-05	-9.19	3./1383E-03	1.31341E-07	0.000143397	0	4.38909E-03	8.07003E-03	-5.0851
÷	-1.1858/E-00	0.000144476	4,494		Clear Contents	-1.71004E-00	5.02488E-03 4.96349E-03	3.1/453E-05 3.10437E-05	9.78229E-05 9.73844E-05	-9.28	3.48584E-05	-1.1838/E-06	0.000144476	0	4.49433E-05	7.93032E-05	-1./100
÷	-1.09618E-06	0.000144213	4.432		farmal Calls	-2.63083E-06	4.8451E-05	3.08684E-05	9.71213E-05	-9.13	3.63931E-05	-6.13859E-07	0.000145616	0	4.51625E-05	7.98456E-05	-1.6661
÷	-1.31541E-06	0.000145397	4.555		Column Width	-2.01697E-06	5.10819E-0	3.15699E-05	9.74282E-05	-9.1	3.71385E-05	-1.09618E-06	0.000144213	0	4.43294E-05	7.96702E-05	-2.6308
÷	-1.14002E-06	0.000144915	4.476		Hide	-9.20789E-07	4.85826E-05	3.2973E-05	9.8086E-05	-9.1	3.67E-05	-1.31541E-06	0.000145397	0	4.55571E-05	7.86178E-05	-2.0169
1	-1.22772E-06	0.000144388	4.573		Unhide	-3.02545E-06	4.96349E-05	5 3.11314E-05	9.70336E-05	-9.18	3.48584E-05	-1.14002E-06	0.000144915	0	4.47679E-05	7.87494E-05	-9.2078
1	-1.27157E-06	0.000144608	4.635		2.244225.04	-3.11314E-06	4.88457E-05	3.13068E-05	9.78229E-05	-9.16	3.57792E-05	-1.22772E-06	0.000144388	0	4.57325E-05	7.90125E-05	-3.0254
÷	-7.89248E-07	0.000144739	4.404	80E-0 02E-0	7 87932E-05	-2.00081E-00	4.9898E-03 5.00734E-03	3.17453E-05 3.27099E-05	9.85083E-05 9.97083E-05	-9.14	3.54285E-05	-1.27157E-06	0.000144608	0	4.63902E-05	7.93632E-05	-3.1131
÷	-1.62234E-06	0.000143687	4.582	02E-0	5 7.79601E-05	-2.10466E-06	5.0468E-0	5 3.23153E-05	9.74282E-05	-9.0	3 63054E-05	-7 89248E-07	0.000144739	0	4 45486E-05	7 76532E-05	-2.0608
÷	-7.89248E-07	0.000144564	4.56	01E-0	5 7.96263E-05	-2.80621E-06	4.90649E-05	3.16576E-05	9.70775E-05	-9.11	3.60862E-05	-5 26165E-07	0.000145002	0	4 52502E-05	7 87032E-05	-3.2885
i.	-4.38471E-08	0.000144476	4.41	54E-0	5 7.98456E-05	-3.99009E-06	5.05995E-05	3.19207E-05	9.65951E-05	-9.26	2 71922E 05	1.62224E-06	0.000143697	0	4.523022-05	7.70601E.05	2 1046
1	-3.0693E-07	0.000144476	4.639	02E-0	5 7.99771E-05	-2.01697E-06	5.09503E-05	3.12191E-05	9.89629E-05	-9.29	3.71823E-03	-1.02234E-00	0.000143087	0	4.38202E-03	7.79001E-05	-2.1040
÷	2.19235E-07	0.000144301	4.082	8/E-0	0 7.9/14E-05	-1./9//SE-00	4.88895E-05	3.22/15E-05	9.09898E-05	-9.28	3.53408E-05	-7.89248E-07	0.000144504	0	4.5001E-05	7.90203E-05	-2.8002
÷	-3.94624E-07	0.000143283	4.498	71E-0	5 7.96263E-05	-2.76237E-06	5.02049E-05	3.36746E-05	9.71652E-05	-9.19	3.52531E-05	-4.38471E-08	0.000144476	0	4.4154E-05	7.98456E-05	-3.9900
1	-7.89248E-07	0.000144827	4.50	31E-0	5 7.93632E-05	-2.36774E-06	4.91526E-05	3.22715E-05	9.75159E-05	-9.20	3.51654E-05	-3.0693E-07	0.000144476	0	4.63902E-05	7.99771E-05	-2.0169
÷	-1.75388E-07	0.000144608	4.573	25E-0	5 7.86178E-05	-3.24469E-06	5.02049E-05	3.19207E-05	9.75159E-05	-9.02	3.54285E-05	2.19235E-07	0.000144301	0	4.68287E-05	7.9714E-05	-1.7977
i.	1.75388E-07	0.00014566	4,424	17E-0	5 7.91002E-05	-3.11314E-06	5.01172E-05	3.27976E-05	9.76475E-05	-9.1	3.58669E-05	-6.13859E-07	0.000145265	0	4.40663E-05	7.97579E-05	-2.9377
1	-1.31541E-07	0.000144871	4.595	18E-0	5 7.82232E-05	-3.63931E-06	5.00734E-05	3.20961E-05	9.82175E-05	-9.23	3.499E-05	-3.94624E-07	0.000144915	0	4.49871E-05	7.96263E-05	-2.7623
+	-7.01554E-07	0.000143687	4,402	25E-0	7.801/8E-05	-2.14851E-00	5.09942E-03	3.23592E-05	9.70030E-05	-9.25	3.59985E-05	-7.89248E-07	0.000144827	0	4.5031E-05	7.93632E-05	-2.3677
÷	0	0.000145792	4.525	02E-0	5 8.00648E-05	-1.97312E-06	5.07311E-05	3.13507E-05	9.71652E-05	-9.20	3 53408E-05	-1 75388E-07	0.000144608	0	4 57325E-05	7 86178E-05	-3 2446
1	-3.50777E-07	0.000146142	4.511	87E-0	5 7.89686E-05	-1.75388E-06	4.98103E-0	3.19207E-05	9.73844E-05	-9.1	3.613E-05	1.75388E-07	0.00014566	0	4 42417E-05	7.91002E-05	-3 1131
1	5.70012E-07	0.000144739	4.568	87E-0	5 7.99333E-05	-4.38471E-06	5.02488E-05	3.16138E-05	9.71213E-05	-9.16	3.55161E.05	1.31541E-07	0.000144971	0	4.50519E-05	7 922325-05	-3.6303
1	-5.70012E-07	0.000144082	4.555	71E-0	5 7.94071E-05	-2.76237E-06	5.08188E-0	3.17014E-05	9.93137E-05	-9.05	3.55101E-05	-1.51541E-07	0.0001448/1	0	4.39318E-03	7.82232E-05	-5.0393
1	0	0.000144783	4.608	33E-0	5 7.94948E-05	-2.3239E-06	5.01611E-05	3.20522E-05	9.63321E-05	-9.26	3.60423E-05	-7.01554E-07	0.000143687	0	4.40225E-05	7.80178E-05	-2.1485
1	-3.30///E-07	0.000143555	4.577	04E-0	3.00048E-05	-1.00019E-06	4.88895E-05	3.20222E-05	9.75159E-05	-9.1	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.

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							B	Z 🛎 🎰 - 🔬	· · · · · · · · · · · · · · · · · · ·	L .			rb3	rD4	105	rbo	rb7		rby	1011
Q	R	5	T	U	V.	W	X	Y	Z		143731		0 4.56448E-0	5 7.77847E-05	-2.80621E-06	5.02049E-05	3.22276E-05		0 9,7779E-0	-9.18597E-C
rb1		rb3	rb4	rb5	rbő	rb7	A 961	Cut	rb12		014338		0 4.60833E-0	5 8.00209E-05	-1.00848E-06	5.13888E-05	3.2973E-05		0 9.88752E-05	-9.32189E-0
7 0.000143731		0 4.56448E-0	5 7.77847E-0	-2.80621E-06	5.02049E-05	3.22276E-0	9 24	Copy	6 6.38852E-05		144783		0 4.51187E-0	5 7.88371E-05	-1.92927E-06	5.0468E-05	3.19207E-05		0 9.85683E-05	-9.25612E-0
7 0.00014338		0 4.60833E-0	5 8.00209E-0	5 -1.00848E-06	5.13888E-05	3.2973E-0	91 2	Paste Options:	15 6.34906E-05		143599		0 4.54694E-0	5 7.78286E-05	-1.79773E-06	4.93718E-05	3.23592E-05		0 9.69459E-05	-9.17281E-0
7 0.000144783		0 4.51187E-0	5 7.88371E-0	5 -1.92927E-06	5.0468E-05	3.19207E-0	91		6.38852E-05		144652		0 4.44171E-0	5 8.01525E-05	-3.24469E-06	4.97226E-05	3.25345E-05		0 9.72967E-05	-9.20789E-0
7 0.000143599		0 4.54694E-0	5 7.78286E-0	51.79773E-06	4.93718E-05	3.23592E-0	94	Parte Special	6 6.48937E-05		145397		0 4.38909E-0	5 8.07663E-05	-3.68316E-06	5.01611E-05	3.17453E-05		0 9.71652E-05	-9.19912E-0
8 0.000144652		0 4.44171E-0	5 8.01525E-0	5 -3.24469E-06	4.97226E-05	3.25345E-0	9		15 6.40168E-05		144476		0 4 49433E-0	5 7.93632E-0	-1.71004E-06	\$ 02488E-05	3.17453E-05		0 9.78229E-0	-9 28243E-0
7 0.000145397		0 4.38909E-0	5 8.07663E-0	5 -3.68316E-00	5.01611E-05	3.17453E-0	9	Inter	15 6.38852E-05		145616		0 4 \$1675E-0	5 2 98456F-0	1 65619E-06	4 963495-04	3 10437E-05		0 9 73844E-0	
5 0.000144476		0 4,49433E-0	5 7.93632E-0	5 -1.71004E-08	5.02488E-05	3.17453E-0	2	Daiets	6 6.42798E-05		14,0312		0 4.43204E 0	5 7 06702E 0	2 610815 06	4 84612 04	1 004841 05		0 0 71212E 0	0 111115E (
7 0.000145618		0 4.51625E-0	5 7.98456E-0	5 -1.66619E-00	4.96349E-05	3.10437E-0	9	Dear Cogtents	IS 6.43237E-05		144617		0 4.432346-0	2 7 941 70E -0.	2.030832-00	4.0431E-0,	3.0000942-03		0 9.712132-0.	-7.133352-4
5 0.000144213		0 4.43294E-0	5 7.90702E-0	5 -2.03083E-00	4.5451E-00	3.08884E-0	2 2	germat Celts	0 0.239442-03		145597		0 4.33571E-0	5 7.80178E-03	-2.0109/2-00	5.10819E-03	3.12099E-03		0 9.74282E-0;	-9.1403E-L
5 0.000145397		0 4,55571E-0	5 7.801/8E-0	5 -2.01097E-00	5.10819E-03	3.10099E-0		Column Width.	0 0.41483E-07		144915		0 4.47679E-0	5 7.87494E-03	-9.20789E-07	4.85820E-05	3.2973E-05		0 9.8080E-0	-9.1202E-0
5 0.000144915		0 4.470792-0	7.8/494E-U	2 -9_00189E-01	+.858.00E-402	3.19736-0		15:04			144388		0 4.57325E-0	5 7.90125E-05	-3.02545E-06	4.96349E-05	3.11314E-05		0 9.70336E-0	-9.18158E-C
5 0.000144585		0 4.573232-0	1014175-0	-3.02345E-00	4.90349E-03	3.11314E-0		Unhide	A JERTTE AS		144608		0 4.63902E-0	5 7.93632E-05	-3.11314E-06	4.88457E-05	3.13068E-05		0 9.78229E-05	-9.16404E-0
2 0.000144719		0 445486E-0	5 7 76512E-0	-1.04081E-04	4.004572-05	3.12453E-0	0 2142	18.05 .0 1471	17F.06 6 44557F.06		144739		0 4.45486E-0	5 7.76532E-05	-2.06081E-06	4.9898E-05	3.17453E-05		0 9.85683E-05	-9.14212E-0
2 0.000145002		0 4 \$2502E-0	5 7 87937E-0	1.788515.04	5 00714E-05	3.77099E-0	9.9708	1E.05 .9 2605	IE-05 & SANTE-05		145002		0 4.52502E-0	5 7.87932E-05	-3.28853E-06	5.00734E-05	3.27099E-05		0 9.97083E-05	-9.26051E-0
5 0.000143687		0 4 58202E-0	5 7 79601E-0	5 -2 10456E-00	5 0468E-05	3 23153E-0	9 7478	-9 085	HE-05 6 14467E-05		143687		0 4.58202E-0	5 7.79601E-05	-2.10466E-06	5.0468E-05	3.23153E-05		0 9.74282E-05	-9.0895E-0
7 0.000144564		0 4 5601E-0	5 7.96263E-0	-2 80621E-06	4 90649E-05	3.16576E-0	9 7077	SE-05 -9.1114	3E-05 6 31837E-05		144564		0 4.5601E-0	5 7.96263E-05	-2.80621E-06	4.90649E-05	3.16576E-05		0 9.70775E-0	-9.11143E-C
8 0.000144476		0 4.4154E-0	5 7.98456E-0	-3.99009E-06	5.05995E-05	3.19207E-0	9.6595	1E-05 -9 2648	NE-05 6 39729E-05		144476		0 4.4154E-0	5 7 98456E-0	-3.99009E-06	\$ 05995E-05	5 19207E-05		0 9.65951E-0	-9 26489E-0
7 0.000144476		0 4.63902E-0	5 7.99771E-0	5 -2.01697E-06	5.09503E-05	3.12191E-0	9.8962	9E-05 -9.2955	SE-05 6.31837E-05		144476		0 4 63907E-0	5 7 99771E-04	-2 01697E-06	5.09503E-05	3 121915-05		0 9 896795-0	-9 2000EL
7 0.000144301		0 4.68287E-0	5 7.9714E-0	5 -1.79773E-00	4.88895E-05	3.22715E-0	9.6989	SE-05 -9.2824	I3E-05 6.3666E-05		144201		0 1 40307E 0	107142 0	1 201212 04	A REPORT OF	2 2227162 06		D SOCOFT OF	0.303420 /
7 0.000145265		0 4.40663E-0	5 7.97579E-0	-2.93776E-00	5.09942E-05	3.22276E-0	9.8787	SE-05 -9.2425	7E-05 6.33152E-05		144901		0 4.08287E-0	2 7.9/14E-0	-1.197732-00	4.888932-03	3.227136-03		0 9.09898E-0.	-7.282436-4
7 0.000144915		0 4.49871E-0	5 7.96263E-0	5 -2.76237E-06	5.02049E-05	3.36746E-0	9.7165	ZE-05 -9.1991	12E-05 6.45868E-05		145205		0 4.40063E-0	5 7.97579E-03	-2.93770E-00	5.09942E-03	3.22276E-05		0 9.8/8/5E-0	-9.24297E-0
7 0.000144827		0 4.5031E-0	5 7.93632E-0	5 -2.36774E-06	4.91526E-05	3.22715E-0	9.7515	9E-05 -9.2035	1E-05 6.53322E-05		144915		0 4.49871E-0	5 7.96263E-01	-2.76237E-06	5.02049E-05	3.36746E-05		0 9.71652E-01	-9.19912E-0
7 0.000144608		0 4.57325E-0	5 7.86178E-0	5 -3.24469E-06	5.02049E-05	3.19207E-0	9.7515	9E-05 -9.0237	73E-05 6.2789E-05		144827		0 4.5031E-0	5 7.93632E-05	-2.36774E-06	4.91526E-05	3.22715E-05		0 9.75159E-0	-9.20351E-C
7 0.00014566		0 4.42417E-0	5 7.91002E-0	5 -3.11314E-00	5.01172E-05	3.27976E-0	9.7647	SE-05 -9.146	55E-05 6.24821E-05		144608		0 4.57325E-0	5 7.86178E-05	-3.24469E-06	5.02049E-05	3.19207E-05		0 9.75159E-0	-9.02373E-0
7 0.000144871		0 4.59518E-0	5 7.82232E-0	5 -3.63931E-06	5.00734E-05	3.20961E-0	9.8217	SE-05 -9.2385	SE-05 6.5376E-05		024566		0 4.42417E-0	5 7.91002E-05	-3.11314E-06	5.01172E-05	3.27976E-05		0 9.76475E-05	-9.1465E-C
7 0.000143687		0 4.40225E-0	5 7.86178E-0	5 -2.14851E-06	5.09942E-05	3.23592E-0	9.7603	6E-05 -9.2561	12E-05 6.52445E-05		144871		0 4.59518E-0	5 7.82232E-05	-3.63931E-06	5.00734E-05	3.20961E-05		0 9.82175E-05	-9.23858E-0
5 0.000144169		0 4.39786E-0	5 7.92317E-0	5 -4.64779E-08	4.98541E-05	3.32361E-0	9.6463	6E-05 -9.1903	35E-05 6.3666E-05		143687		0 4.40225E-0	5 7.86178E-05	-2.14851E-06	5.09942E-05	3.23592E-05		0 9.76036E-05	-9.25612E-C
0.000145792		0 4.52502E-0	5 3.00648E-0	5 -1.97312E-06	5.07311E-05	3.13507E-0	9,7165	2E-05 -9.2078	19E-05 6.44552E-05		144169		0 4 39786E-0	5 7.92317E-05	-4.64779E-06	4 98541E-05	3 32361E-05		0 9.64636E-0	-9.19035E-C
7 0.000146142		0 4.51187E-0	5 7.89686E-0	5 -1.75388E-00	4.98103E-05	3.19207E-0	9.7384	4E-05 -9.177	72E-05 6.35344E-05		145792		0 4 52502E-0	5 8 00648E-04	-1 97317E-06	5.07311E-04	3 13507E-05		0 9 71652E-04	-9 20789F-C
7 0.000144739		0 4.56887E-0	5 7.99333E-0	5 -4.38471E-00	5.02488E-05	3.16138E-0	9.7121	3E-05 -9.1684	IJE-05 6.46306E-05		146147		0 4 511875-0	5 7 90696E-04	1 753885.06	4 981035-04	3 10207E-05		0 0 72844E-04	0 1727E
7 0.000144082		0 4.55571E-0	5 7.94071E-0	5 -2.76237E-00	5.08188E-05	3.17014E-0	9.9313	7E-05 -9.0544	13E-05 6.32275E-05		140142		0 4.3110/E-0	5 7.67080E-0.	4 10 1712 00	4.98103E-0.	3.192072-05		0 9.735442-0.	0.169477 /
2 0.000144783		0 4.60833E-0	5 7.94948E-0	5 -2.3239E-06	5.01611E-05	3.20522E-0	9.6332	IE-05 -9.2605	51E-05 6.28767E-05		144739		0 4.3088/E-0	5 7.99333E-03	-4.384/1E-00	5.02488E-05	3.10138E-03		0 9./1213E-0	-9.10843E-0
7 0.000143555		0 4.57764E-0	5 3.00648E-0	5 -1.66619E-06	4.88895E-05	3.26222E-0	9,7515	9E-05 -9.146	55E-05 6.36221E-05		144082		0 4.55571E-0	5 7.94071E-05	-2.76237E-06	5.08188E-02	3.17014E-05		0 9.93137E-05	-9.05443E-0
7 0.000143687		0 4.48556E-0	5 7.88809E-0	5 +2.28005E-00	5.09942E-05	3.07368E-0	9,7515	9E-05 -9.1026	ME-05 6.38414E-05		144783		0 4.60833E-0	5 7.94948E-0	-2.3239E-06	5.01611E-05	3.20522E-05		0 9.63321E-0	-9.26051E-0
5 0.000144476		0 4.3\$909E-0	7.81932E-0	-1.27157E-00	4.99857E-05	3.04299E-0	9.7822	92-02 -9.2473	13E-03 0.49376E-05		143555		0 4.57764E-0	5 8.00648E-05	-1.66619E-06	4.88895E-05	3.26222E-05		0 9.75159E-05	-9.1465E-0
7 0.000144257		0 4.57325E-0	7.94071E-0	-2.71852E-00	4.99418E-05	3.29292E-0	9.7519	92-05 -9.1884	43E-00 0.48937E-03		143687		0 4.48556E-0	5 7.88809E-05	-2.28005E-06	\$.09942E-05	3.07368E-05		0 9.75159E-05	-9.10266E-0
2 0.000145704		0 4.19554E-0	7.8/232E-0	2 -2.71832E-00	4.90349E-03	3.10437E-0	9.7105	-9.140	0.30221E-03		144476		0. 4.38909E-0	5 7.87932E-05	-1.27157E-06	4.99857E-05	3.04299E-05		0 9.78229E-05	-9.24735E-C
/ 0/000143775		0-30002-0	7.910022-0	-2.023438-00	5.00293E-03	5.2403E-0	7 1135	-9.2473	0.49370E-93		140327		A + 2799427 A	-					A	A. 148.119 4

# 5. Copy data

- Highlight data in columns A through Y (rb9)
  Exclude Header Row
- Right-Click  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click



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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

		M				1: Unspecified	2: No Unit
iste Raw DeverCon	ner Data He	ere X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Caritan					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Windo	w	· · ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-0
Styles	•	Paste to Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-0
Clear	• • F	Paste to Editor	Curry		10:	1.800000E-003	-1.983643E-0
					11:	2.000000E-003	2.593994E-0
Magnify					12:	2.200000E-003	-1.525879E-0
Autoscale					13:	2.400000E-003	-9.155270E-0
racoscure							
Cursor	· ·						
Zoom	F10						
Properties	)).	60) × W27:	AB4-Cleaned Data				

W1: Untitled Data X

### 7. Click PreProcess button to inspect data



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

			23	η
Truck ID: 1.000	000			
a1		ОК	Cancel	

### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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\*

Dever Conner Information	23
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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 X				
	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:	W57: Output Data X				
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



## 14. Troubleshooting – Changing LPSVoltage

- 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

Dever Conner Information	23
Truck ID: 3.000000	
El Ovoltage, jel roopoo	OK Cancel

Event is processed successfully if all peaks are captured.

#### **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	
abus	DT_FLOAT
abu4	DT_FLOAT
abus	DI_FLOAT
abuo	DI_FLOAT
abu/	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



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

N				
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
	P	6/10/2000 1-41 DM	TOMC FIL-	1 070 1/0

## 3. Open Data tab in EXCEL workbook

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	A	В	С	D	E		A	В	С	D	E	F
1	Root Name	Title	Author	Date/Time	Groups						AB01	
2	DC08192009_09371619082009											
3						1	Time	axlel	axle2	axle3	sg3	AB02
4	Group	Channels	Description	header		2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station		3	0.0002	-0.002288818	-0.003814697	-0.005045752	0.000612807	-0.0005
				Name:DC08192009	>	4	0.0004	-0.002441400	0.001220703	0.000457764	0.00061203	-0.0005
				Sample Rate:5000.0	0	5	0.0008	-0.000132388	0.003043732	0.001220703	0.000610979	-0.0005
				Comments:		7	0.0008	-0.001831055	0.001373291	0.002441400	0.000611402	-0.0005
						2	0.0012	0.000610352	-0.000913327	-0.001373291	0.000608005	-0.0005
				Timeaxle1axle2			0.0012	-0.00213623	-0.003967285	-0.002740382	0.000613026	-0.0003
				axle3AB01		10	0.0014	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005
						11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612456	-0.0005
				sg3AB02AB03		12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.000
				AB04AB05AB06		13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005
				AB0/AB08AB		14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005
				09ABI0ABIIA		15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005
				D12		16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005
				2PP04PP05PP		17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005
				06PB07PB09P		18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005
				BOO		19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
				507		20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005
				secsvoltsvoltsvol		21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
				tsvoltsvoltsvolts		22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				voltsvoltsvolts		23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0009
				voltsvoltsvoltsvo		24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
				Itsvoltsvoltsvolts		25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005
				voltsvoltsvolts		26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				voltsvoltsvoltsvo		27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				Itsvolts		28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data	2	5			29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6						30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data	000000 (		CLICK		31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000
14 4	DC08192009_09371619	1082009 (ro	Data	CLICK	_	14 4	DC01	3192009_09371	619082009 (roo	t 📃 Data 🏑 🤶		

# 4. Arranging data in EXCEL

Insert column of zeroes between ab01 and ab03

	Cippoard	14	ront	14	A10	onmens			Past Contract of the
_	F1	• (	≏ ∫x	ab03			Time	es Ne - 11 - A	A \$ - %
							B	I 🗏 🌺 - 🤷	- 🗄 - 🐝
	A	В	С	D	E	F		<u> </u>	H
					ab01		<u>۸</u>	Cut	
	_						-0	⊆opy	_
1	Time	axie1	axle2	axle3	ab01	ab03	2	Paste Options:	00007 07
2	0.0000	0.003509521	0.001220703	0.00213623	-2.28443E-03	4.05580	1		938E-05
4	0.0002	-0.007593994	-0.001678467	-0.001323879	-2.26689E-05	4 09093	F	Paste Special	808E-05
5	0.0006	-0.000152588	-0.000915527	0.000457764	-2.28443E-05	4.32771	F	Insert	708E-05
6	0.0008	-0.000152588	0.001831055	0.00213623	-2.08274E-05	4.1567	E	Delete	)761E-05
7	0.001	0.002593994	0.002593994	-0.001678467	-2.26689E-05	3.96378	E	Clear Contents	462E-05
8	0.0012	0.001068115	0.000762939	0.001373291	-2.31951E-05	4.01639	E 🔗	Eormat Cells	531E-05
9	0.0014	0.000152588	-0.002593994	-0.001678467	-2.45544E-05	4.12163	E	<u>C</u> olumn Width	708E-05
10	0.0016	0.000457764	-0.000610352	0.000457764	-2.18359E-05	3.99009	2	Hide	039E-05
12	0.0018	0.002288818	0.000010352	0.007008115	-2.19235E-03	4.06024	F	Unhide	1831E-05
13	0.0022	0.003204346	0.002746582	0.002288818	-2.31513E-05	3.89801	E-05	0.000210291	7.19969E-05
14	0.0024	0.000457764	-0.004272461	-0.002288818	-2.4379E-05	3.94185	E-05	0.00020994	7.25231E-05
15	0.0026	-0.000152588	-0.001068115	-0.001983643	-2.30636E-05	3.95939	E-05	0.000208668	7.23039E-05
16	0.0028	0.001068115	0.001983643	0.001220703	-2.31513E-05	4.10847	E-05	0.000210948	7.20846E-05
17	0.003	0	-0.001068115	-0.000305176	-2.32828E-05	4.05586	E-05	0.000210071	7.29616E-05
18	0.0032	0.001678467	0.001831055	-0.000915527	-2.3239E-05	4.02516	E-05	0.000209458	7.18215E-05
20	0.0034	0.003814097	-0.001831055	0.003356934	-2.45351E-03	3.88485	E-05	0.000210041	7.06377E-05
21	0.0038	0.002746582	0.000305176	-0.000457764	-2.22743E-05	3.96816	E-05	0.000208756	7.09008E-05
22	0.004	-0.000762939	0.000152588	0.000762939	-2.39844E-05	4.20494	E-05	0.000210861	7.19969E-05
23	0.0042	0.000762939	0.001678467	0.001831055	-2.09589E-05	4.07778	E-05	0.000209414	7.09884E-05
24	0.0044	0.000762939	0.000457764	0.002593994	-2.02135E-05	3.99447	E-05	0.000210422	7.09008E-05
25	0.0046	0.004577637	0.000762939	0.000152588	-2.21428E-05	3.93308	E-05	0.000209238	7.22162E-05
26	0.0048	-0.000610352	0.001983643	0.00213623	-2.48613E-05	3.94624	E-05	0.000211299	7.06377E-05
27	0.005	-0.000457764	-0.001068115	-0.000152588	-2.2449/E-05	4.02955	E-05	0.000211431	7.14708E-05 7.16023E-05
20	0.0072	0.000002100	0.000000	0.001001000	2.2.70002.03	2.22141		0.000209420	

# 4. Arranging data in EXCEL cont..

#### • Move column ab12 between ab11 and rb01.

- Cut column R (ab12)  $\rightarrow$  Insert cut cells between ab11 and rb01

					Time	es Ne = 11 - 7	× × × ×	Χο 🔹 🎫						-				. 89
					B	I 🗏 🍐 - 🖌	- 🗄 - 🕍	-28 🕩							es ne v II v	A A	3 * %	, 🔤
N	0	Р	Q	R	L.	e	Т	U		М	N	0	Р	B	I 🗏 🖄 - 🔒	A -	± - * .0	.00 🝼 👘
					6	Cut								7				
		-101	-1.02		2	<u>Copy</u>		-107	-10					X	Cut			
00272685	2 58259E-05	5 63435E-05	3 20961E-05	0.00012706	-	Paste Options:	4655-0	FDU5	rou	-00	ab10	ab11	rb01		Copy			rb03
00272817	2.46421E-05	5.64312E-05	3.14822E-05	0.00012737			635E-0	-5.2178E-06	6	109	4010	a011	1001	-	Bacta Ontioner		107070	1003
00273167	2.59136E-05	5.74835E-05	3.34992E-05	0.00012886	5	Paste Special	458E-0	5 -4.34086E-06	5.	.000239405	0.000272085	2.58259E-05	0.03430E-		Paste Options.		0127009	-1.00848E
00273299	2.45544E-05	5.77466E-05	3.25345E-05	0.00012812		Insert	811E-0	5 -5.08626E-06	6.	0.00024037	0.000272817	2.46421E-05	5.64312E				0127376	-1.19264E-
00273737	2.44667E-05	5.65628E-05	3.11753E-05	0.00012807		Delete	865E-0	5 -4.99857E-06	6.	.000240457	0.000273167	2.59136E-05	5.74835E-		Paste Special	$\rightarrow$	)128867	-1.10933E-
00273036	2.45105E-05	5.6782E-05	3.27538E-05	0.00012728		Clear Contents	935E-0	5 -4.25317E-06	6.	.000240764	0.000273299	2.45544E-05	5.77466E-	_			)128121	-1.15756E-
00272948	2.51244E-05	5.55981E-05	3.26222E-05	0.00012812	7	Eormat Cells	357E-0	5 -4.95472E-06	6	.000241729	0.000273737	2.44667E-05	5.65628E-		Insert Cut Cells	5	)128077	-1.17949E-
00272817	2.52998E-05	5.70889E-05	3.39815E-05	0.00012882		⊆olumn Width.	485E-0	-5.08626E-06	6.	.000241203	0.000273036	2.45105E-05	5.6782E		Delete		127288	-1.10933E
00272041	2.52998E-05	5.61243E-05	3.19645E-05	0.00012825		Hide	973E-0	5 -5 87551E-06	6	000240238	0.000272948	2 51244E-05	5 55981E		Clear Contents		128121	-1.05671E
00271677	2.44667E-05	5.75274E-05	3.27099E-05	0.00012851		Unhide	604E-0	5 -5.04242E-06	6	000241230	0.000272917	2.512112-05	5 70990E	_			120022	1 11272E
00271107	2.45982E-05	5.76589E-05	3.28415E-05	0.00012693	7 -	1.15756E-05	5.34935E-0	5 -6.22629E-06	6.	.000241948	0.000272817	2.32998E-03	5.708892		Format Cells		120023	-1.11372E
00274395	2.52998E-05	5.61681E-05	3.26222E-05	0.0001274	2 -	-1.21895E-05	5.29673E-0	5 -4.5601E-06	5.	.000241817	0.000272041	2.4400/E-05	5.00000E		<u>C</u> olumn Width		)128297	-1.15318E-
00273124	2.51244E-05	5.59927E-05	3.33676E-05	0.00012768	- 3	-1.14002E-05	5.2485E-0	5 -4.73549E-06	6	.000241159	0.000272159	2.52998E-05	5.61243E		Hide		0012742	-1.11372E-
00272071	2.32828E-05	5.62997E-05	3.31046E-05	0.00012733	2 -	-1.16633E-05	5.52035E-0	5 -4.64779E-06	6.	.000241291	0.000271677	2.44667E-05	5.75274E		Unbide		)128516	-1.05671E
00272334	2.43351E-05	5.64751E-05	3.28415E-05	0.00012619	2 -	-1.11372E-05	5.30111E-0	5 -4.99857E-06	6.	.000242211	0.000271107	2.45982E-05	5.76589E-	0.0	3.201132-03	0.00	0126937	-1.15756E-
00272400	2.49928E-05	5.52912E-05 5.40942E-05	3.35809E-05 3.12045E-05	0.000127	2 -	1.24964E-05	5.22219E-03	-0.31398E-00	0.	.000241773	0.000274395	2.52998E-05	5.61681E-	-05	3.26222E-05	0.0	0012742	-1.21895E-
00272729	2.48613E-05	5.63435E-05	3.27976E-05	0.00012829	7 -	-1.18387E-05	5.20004E-0	5 -5.26165E-06	6	000241948	0.000273124	2 51244E-05	5 59927E	-05	3 33676E-05	0.00	0127683	-1 14002E
00272247	2.46421E-05	5.61243E-05	3.24907E-05	0.00012961	2 -	-1.20141E-05	5.29234E-0	5 -6.40168E-06	6	0.00024151	0.000272071	2 32828E 05	5 62007E	05	3 31046E 05	0.00	0127332	1 16633E
00271457	2.50367E-05	5.65189E-05	3.38061E-05	0.0001279	19	-1.1751E-05	5.33619E-0	5 -5.74397E-06	6.	0.00024151	0.000272071	2.328262-03	5.647512	05	3.30416E-05	0.00	0126102	1.1100332
.00027251	2.47298E-05	5.60366E-05	3.385E-05	0.00013053	3 -	-1.14879E-05	5.36688E-0	5 -4.82318E-06	6.	.000240501	0.000272334	2.45551E-05	5.04/51E	05	3.28415E-05	0.00	0120192	-1.113/2E
00273167	2.54752E-05	5.82728E-05	3.27976E-05	0.00012768	- 3	-1.11372E-05	5.32742E-0	5 -4.73549E-06	6.	.000240764	0.000272466	2.49928E-05	5.52912E-	-05	3.35869E-05	0.	0001272	-1.10495E-
00272422	2.34582E-05	5.71328E-05	3.30607E-05	0.00012702	- 15	-1.10495E-05	5.38442E-0	5 -5.48089E-06	6.	0.00024037	0.000272729	2.48613E-05	5.49843E	-05	3.13945E-05	0.0	0012742	-1.24964E-
00272729	2.38528E-05	5.67381E-05	3.32361E-05	0.00012882	3	-1.17072E-05	5.3055E-0	5 -5.91936E-06	6.	0.00024094	0.000273299	2.48613E-05	5.63435E	-05	3.27976E-05	0.00	0128297	-1.18387E-
000272224	2.48013E-05	5.0212E-05	3.20001E-05	0.00012803	-	-1.10033E-05	5.21342E-0	6 75245E-06	0.	.000240721	0.000272247	2.46421E-05	5.61243E	05	3.24907E-05	0.00	0129612	-1.20141E-
00273299	2.60452E-05	5.63435E-05	3.23153E-05	0.00012706	9	-1.10495E-05	5.2178E-0	-4.99857E-06	6	.000242387	0.000271457	2.50367E-05	5.65189E	-05	3.38061E-05	0.0	0012799	-1.1751E-
00272422	2.45544E-05	5.55981E-05	3.32799E-05	0.00012816	55	1.23649E-05	5.33619E-0	5 -5.9632E-06	6.	000241729	0.00027251	2 47298E-05	5.60366E	05	3 385E-05	0.00	0130533	-1 14879F
0.0002708	2.42036E-05	5.68697E-05	3.35869E-05	0.000127	2	-9.7779E-06	5.32742E-0	5 -5.74397E-06	6.	000242255	0.000272167	2 54752E 05	5 00700E	05	2 27076E 05	0.00	0127692	1 112725
00272378	2.50367E-05	5.70889E-05	3.34115E-05	0.00012877	9 -	-1.01725E-05	5.28796E-0	5 -6.7963E-06	6.	.000242255	0.0002/310/	2.34/32E-03	5.82728E	0.0	3.219/0E-03	0.00	0127083	-1.113/2E
0.0002708	2.51682E-05	5.66504E-05	3.35869E-05	0.00012671	8 -	-9.64636E-06	5.22219E-0	5 -6.40168E-06	6.	.000240984	0.000272422	2.34582E-05	5.71328E	-05	3.30607E-05	0.00	0127025	-1.10495E-

# 5. Copy data

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

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Time	Ó.	0.001309121	0.001220703	0.00211621	2 284418-03	1	4011842	25 0.000210594	BRID 7.040388.04	0.000110714	0.000141445	0.000212222	0.000239404	0.000272685	2 182108-01	0.000121049	1 614315 .01	1 200412-04	1 008485-00	1 204818-01	CWF	6.142082.05	0.000113073	.0 000127951	1 541142
	0.0002	0.000437764	0.000915527	-0.001525879	-2.280032-05	1	3.9944.7	-05 0.000210398	7.12515E-05	0.000110339	0.000143852	0.000274614	0.00024037	0.000272817	3.46421T-05	0.000127376	5.64J12E-05	3.148228-05	-1.192648-05	3.406358-05	-5.2178E-06	6.1166 T.05	0.000113608	.0.000127\$14	-3.19264E
	0.0004	-0.002597994	-0.001675467	-0.001220703	-2.266898.05	1	4.090932	-05 0.000211511	7.31808E-05	0.000305897	0.000143818	0.000273343	0.000240457	0.000273167	2.391348.05	0.000129567	5.748308-05	3.349928-05	-1.10937E-05	5.454582-05	-4.340862-06	5.97397E-05	8.0001125999	.0.000127157	-1.131248
	0.0006	-0.000152588	-0.000915537	0.000457764	-2.254438-05	1	4,527711	-05 0.000212000	7.14708E-05	0.000109093	0.000143073	0.000273255	0.000240764	0.000273299	2.435448.05	0.000128121	3.77466E-05	3.253458-05	-1.15756E-05	5.35811E-05	3.086262-06	6.011442-05	0.000113476	0.000126937	1.075642
	0.0008	-0.000152598	0.0001831055	0.00213623	-2.082748-05	1	4.1567	-05 0.090211734	1 7.10761E-05	0.000109682	0.000144476	0.000273234	0.000241729	0.000273737	2.446672.05	0.000129077	3.656282-05	3.117538-45	-1.179498-05	3.315652-05	4.995375.06	6.068442-05	0.000115099	.0.00012\$472	-1.179488
	0.001	0.002592994	0.002599994	-0.001678467	-2.266898-05		3.963763	-05 0.000210291	1.7.16462E-05	0.000109705	0.000143818	0.000273563	0.000241203	0.000273036	2.45105E-05	0.000127288	5.6T82E-05	3,275385,45	-1.10933E-05	5.349558-05	4.253178-06	6.07721E-05	0.000113783	.0.000127683	-1.254038
	0.0012	0.003068115	0.000762939	0.001373291	-2.319518-05	1	4,016398	45 0.000211296	0.7.19531E-05	0.000109355	0.000542854	0.000274483	0.000240238	0.000272948	2.51244E-05	0.000128121	5.55941E-05	1.362228-45	-1.05671E-05	5.283578-05	4.954728.06	者.2219年-05	0.000112775	.0.000126411	-1.087453
	0.0014	0.000152588	-0.002593994	-0.001678467	-2.455448.45		4,121638	45 6.0002093	7.14708E-02	0.000115451	0.000145636	0.000214353	0.000241948	0.000272817	2.52996E-05	0.000128829	3.70589E-05	3.39853E-45	-1.11372E-05	5.2485E-05	3.08636E-06	6.04311年-05	0.000112468	-0.000126718	-1.109138
	0.0016	0.000457764	-0.000610332	0.000437764	-2.18359E-03		3.990098	45 0.000212264	1 7.23039E-05	0.000109135	0.000144217	0.000214176	0.000241817	0.000272641	2,44667E-05	0.000129297	3.66066E-03	3.279768-45	-1.1531#E-05	3.375852-03	-4.5600E-06	6.142988-05	0.000113432	-0.00012856	-1.223333
	0.0018	-0.001675467	0.000610352	0.000068115	-2.19235E-05		3,990095	-05 0.000213439	P 7.06817E-02	0.000109969	0.000143862	0.000275184	0.000241139	0.000272159	2.52998E-05	0.00012742	5.6124RE-05	3,19645E-05	-1.11372E-05	5.23973E-05	-3.87351E-06	6.22629E-05	0.00011352	-6.000128121	-1.192643
	0.002	0.002288818	0.00213623	0.003441406	-2.22905E-05		A 06024E	03 0.000211363	1 7.13831E-02	0.000100582	0.000144082	0.000272725	0.000241291	0.000271877	2,44667E-05	0.000128316	\$.75214E-05	3.27099E-41	-1.05671E-05	5.26604E-03	-3.04242E-06	6.0552RE-05	0.0001111152	-0.00012742	-1.290340
	0.0022	0.003204346	0.002746592	0.002288818	-2.315138-05		3.898015	-03 0.000210293	1996/E-02	0.000308872	0.000143488	0.000272811	0.000342211	0.000271107	2,439828-03	0,000126937	3.76389E-05	3.284158-47	+1.13756E-05	5,3499552-03	-6.22829E-06	6.103528-05	0.000112117	-0.00012775	4.227728
	0.0024	0.000457764	-0.004272461	-0.002289818	-2.43/98-01	1 3	3.941838	40 0.0002099	202NE-00	0.000109399	0.000143181	9.0002(990)	0.000241119	0.000214395	2.329998-03	0.00012742	3.01601E-02	3.25(228-4)	-1_21893E-03	3.299738-03	4.30002-00	2.9/19/E-05	0.000112292	-0.000128899	-9.997348
	0.0028	-0.000152588	-0.001068113	-0.002933043	-2.508508-07		3.929398	-00 UD00208668	230398-02	0.000109.05	0.000144219	0.0002.10203	0.000241948	0.0000.731.24	2,31,2448-02	0.000127683	5.0992/8-40	3,539,98,407	-1 14002E-00	3.24838-03	4,133492-00	B.2219E-03	0.00011332	0.000128387	-1.223339
	0.0028	V.V.V.Vertig	0.001963943	0.001220103	2 3131300-01		4.5054.1	-03 -0.000210941	7.206408-02	0.000110058	0.000141869	0.000272814	0.00024171	0.000272071	2.328282-00	6.000124392	3.6299 (2.42)	1761112.04	-1.0003/E-07	1 301112 03	4 0001770 04	6.129828-02	0.000112073	0.00011032	0.01330
	0.0012	A GOLATERAT	.0.0018210/55	0.0000015577	3,15102,04		4.000900	43 6 00020041	1142112	0.000115451	0.0001/1914	0.000228083	0.000340344	0.0000773466	1 400192 04	0.0001777	5 4 YOU TE US	1 116402 / 4	1 10000 /4	3 311165 03	A 112002 (M	6.11990E-00	0.000111111	0.000172749	A 107900
	0.0014	0.001814697	0.004887913	0.001356014	2 413515.01		TOLOOTE	44 0.000010641	7141685.04	0.000109851	0.000147376	0.000774089	6-00674037	0.000272729	2 494135.05	0.00017143	5 408418 .05	1116212.04	1 349645-05	5 366048-03	1 141107.04	60114/5.05	0.000117906	.0.000178822	B 600313
	0.0016	0	-0.001831055	0 001356914	3 34497E-01		3 884810	01 0.000211034	7.06177E.04	0.000115561	0.000124078	0.000279245	0.00074094	0.000773299	2.496195.05	0.000178797	1.6141157.05	1,219168.04	1 18387E-05	\$ 304475-01	1.7614187.04	6 16495-01	0.000111389	.0.000123639	1 17910
	0.0018	0.007746587	0.000305116	0 000417764	3 222418-05		10010	AL 0.000308154	T CALORE JA	0.000109560	0.000144713	0.000214364	0.000740774	0.5002722#7	2 464717-05	0.000139413	SALLIE OF	1 349575.04	1 20141E-05	5 3971/5.01	A 201405.04	6183445.05	0.000111985	.0.000127439	1 10913
	0.004	-0.000142919	0.000132588	0.000747939	-7 19544F-01		1 314945	.01 0.00021084	7 199405-04	0.000110845	0.0001/3468	0.000773255	0.000247187	0.500275457	2 503475-05	0.00017799	SATING.05	1 180615-04	-11751E-05	1 114105-01	1 141015-04	6.077875.01	0.000112906	.0.000123025	-1 19387
	0.0042	0.000162930	0.001678467	0.001831055	-2.09589E-01		4.077785	05 0.00025945	7.09884E-01	0.000110188	0.000143248	0.000273781	0.000241729	0.00027251	2.472988-05	0.000130133	5 603668-05	3.3852.05	-1.145798-05	3 364835-01	4 823185-06	6173678-05	0.000111985	.0.000125378	-1.18387
	0.0044	0.000762939	0.000457764	0.002593994	-2.02135E-05	3	3.994475	-05 0.000210423	7.0900KE-03	0.000108597	0.00014508	0.000274703	0.000242255	0.000273167	2.54152E-05	0.000127683	5.82726E-05	3.27976E-05	-1 11372E-05	5.32742E-01	4.73549E-06	6.19998E-05	0.000112994	.0.00012742	-1.15756
	0.0045	0.004577657	0.000762939	0.000152588	-2.21428E-05	3	3.953088	-05 0.000209238	7.22162E-03	0.000109486	0.00014251	0.000214703	0.000240984	0.000272422	2.34582E-05	0.000127025	5.71328E-05	3 3060 12-05	-1 10495E-05	5.384422-05	-5.4808HE-06	6.07282E-05	0.000113257	-0.000127332	-1.12248
	0.0048	-0.000610352	0.001983643	0.00213623	-2.48613E-05	3	3.946548	-05 0.000211294	7.06377E-03	0.000109004	0.000142985	0.000275184	0.000240896	0.000272729	2.38528E-05	0.000126823	5.67381E-05	332361E-05	-1.17072E-05	5.3055E-05	-5.91936E-06	6.09913E-05	0.000115915	-0.000125384	-1.19264
9	0.005	-0.000457764	-0.001068115	-0.000152588	-2.34497E-05	1	4,029558	-05 0.000211431	7.14708E-03	0.00030896	0.000143599	0.000214871	0.000241115	0.00027229	2.48613E-05	0.000128034	5.6212E-05	3.26661E-05	-1 16633E-05	5.21342E-05	-6.09475E-06	6.15175E-05	0.000112862	-0.00012777	-1.54002
	0.0052	0.003662109	0.0050354	0.000831053	-2.21564E-05		3.937475	-05 0.000209458	7.16023E-05	0.000110319	0.000142459	0.00027422	0.000240723	0.000272354	2.58699E-05	0.000128209	3.62997E-05	3.20922E-05	-1.14002E-05	5,41073E-05	-6.75245E-06	6.16052E-05	0.000114397	-0.000128472	-1.17948
	0.0054	0.000762939	0.000913527	0.000678467	-2.170438-05		4.047095	-05 0.00021024	7.16023E-05	0.000109442	0.000142372	0.000214527	0.000241729	0.000273299	2.60452E-05	0.000127069	5,63435E-05	3.23153E-05	-1.10495E-05	5.2178E-05	-4.99837E-06	6.21313E-05	0.000134792	-0.00012554	-1.210185
9	0.0056	0.00213623	0.003509523	0.006855413	-2.301972-05		4.007625	-05 0.0002099-	7.0286KE-03	0.000109004	0.000144213	0.000212993	0.000239844	0.000273422	2.45544E-05	0.000128165	5.559812-05	1.32799E-05	-1.256498-05	3.336198-03	-3.9632E-06	6.068448-05	0.000111591	-0.000129253	-1.179409
	0.0058	0:000437764	0.00213623	-0.000610352	-2.2932E-05	1	3.854168	-03 -0.000210115	1 7.22162E-05	0.000109749	0.000144300	0.000274395	0.000241027	0.0002708	2.42036E-05	0.0001272	3,68697E-05	33580RE-05	-9,7779E-06	5.32142E-05	3,743972.06	6.05128E-05	0.000113679	-0.000129086	-1.297873
	0.006	0.000762939	0.001220703	-0.000457764	-2.253742-05		3.\$10318	-05 - 0.000209194	1 7.226E-45	0.000108872	0.000142132	0.000274307	0.000241291	0.000272578	2.50367E-05	0.000128779	5.70889E-05	3.341158-45	-1.01725E-05	3.287968-03	-8.7963E-06	6.04213E-05	0.000112249	-0.000127858	-1.135643
	0.0062	-0.000152588	0.000762939	-0.000325879	-2.183598-05	8	4.064631	-05 · 0.00021024	7.164622-03	0.000109048	0.000142303	0.000273211	0.000241466	0.0002705	2.516822-05	0.000126718	3.66304E-05	3.335698-05	-9.64636E-06	5.22219E-03	-8.40168X-06	6.046312-05	0.000113301	-0.000127025	-1.083025
	0.0064	0.004119873	0.003356934	0.00213623	2.253748-05		3.906782	-03 0.000210683	7.17777E-05	0.000109048	0.000142547	0.000274044	0.000241683	0.000272948	2.48175E-05	0.00012667#	3 643122-05	3,4428-05	-1.052338-05	5.397582-03	-8.401682-06	6.03439E-05	0.000114134	-0.000126323	-3.00433
	0.0066	0.003051758	0.003254346	0.003662309	-2.35028-05		3.941951	-05 0.00021051	7.059382-05	0.000109793	0.000144895	0.000275579	0.000240677	0.000272554	2.486132-05	0.00012777	3.54666E-05	3,2227682-05	-1.14441E-05	5.27481E-05	4,954128-06	8.0309E-05	0.000113257	-0,000127069	-1.069970
	0.0065	0.001373291	0.000068115	-0.001373291	-2.354596-05		3,92312	-05 0.000210725	7.180238-03	0.000109442	0.000144052	0.00027422	0.000041645	0.000272904	2.454212.407	0.000127483	3.000002.403	3.314542-07	-1.00941E-03	3.3844.22.403	4.999372.00	0.1549E-03	0.000113257	-0.00012583	-3.00413
	0.007	0.000032388	-0.000437704	0.0023/3292	2,424(48)(0)	3	a (020/88	40 0000211299	7.182158-42	0.000104911	0.00010000	0.000273233	0.000041904	0.000273835	2,967068-07	0.000122034	5,77900E-40	3,22/948,407	1100/012-00	3.406302-03	5.A37048-00	6.007028-02	0.000111203	0.00012-463	1.3 /0/23
	0.0012	0.007027040	0.000322879	0.000478467	2.378518-05		1.000000	45 £ 000210554	Thisse de	0.000104574	0.0001411943	0.000277094	0.000040332	0.000271908	2.017278-02	0.00012599	5.787828.405	1 1/15/17 04	1 1314/5 /0	1.301105.00	X 0400E 04	6173672.05	0.000113215	0.000123433	1.11114
	0.0076	0.003051258	-0.002441404	0.000005176	7 55078-05	C	1 1 000000	25 0.000711840	7 ADDELTE AM	0.000110510	0.000147764	0.0000773904	0.0000333044	0.000272904	T ASSAGE AN	0.000122136	5 577352.05	14136/1.05	1 31615.05	3 185817 04	1 011447.04	6 101575 05	0-000113643	0.000136718	1 14447
	0.0078	0.001304145	0.001063643	0.000476467	7 149878-05		1 1 001047	45 0.00021051	7 356405.05	0.000110407	0.000143305	0.000274	0.00074708	0.000272997	2 5080/02-05	0.000122902	5 767742.05	1 402102-05	-0.0071JE.04	1 212718-01	A THEFT A	6 343838.05	0.000111301	-0.000136367	117040
0.007	0000000	0.000305176	-0.001676467	-0.004119973	-2 2668005.05	C 2	411724	05 0.00021099	7.210162.05	0.000109311	0.000143155	0.000274044	0.000341197	0.000272027	2 51095-05	0.00017634	5.673815.05	3.415602.05	1 140075-05	3 354475.03	7 011547.06	6 142987.05	0-0001113301	.0 000129165	.1.17541
1	0.0082	0.000457764	0.000762930	0	2.38967E.05		4.090911	45 0.00021147	7.500545.05	0.000109662	0.000141116	0.000274174	0.000340589	0.000272554	2.529985-05	0.000128184	1 616515.05	1.402538.05	1 140075-05	5454585.05	4.735498.06	6.217526.05	0.000113169	.0 000126718	1.148795
1	0.0054	-0.000457764	0.001525879	0.0025939964	2 13097E-05	1	3.001328	-05 0.00021081	7 199666 .05	0.000109791	0.000143518	0.000273255	0.000340545	0.000272422	2.55398-05	0.000127962	5.58412E-05	3.446388.05	-1.20141E-03	5.287968-05	-5.873518-06	6.22198-05	0.000112512	-0.000129365	-1.122498
0.009	199999	0.002746582	0.002285518	0.002593994	-2.38095-01	1	3.976915	-05 0.0002096T	7.1698.44	0.000109355	0.000142108	0.000271984	0.000241941	0.000272422	2.5869982.45	0.000128114	5.5072E.05	3.394158.45	1.27595E-05	5,292348.05	4.138398.06	6.09036E-05	0.000113452	0.000127025	-1.13564
1	0.0088	-0.000305176	0.001678467	0.003340576	-2.29005E-05	1	3 924328	-05 0.000209894	7.04184E-0	0.000110232	0.000143434	0.00027423	0 000340984	0.00027251	2.481758-05	0.00012777	5.68697E-05	3.385E-05	-1 13364E-03	5.2265TE-03	8.97160E-06	6.156138-05	0.000112906	-0.000128472	-1.065485
	0.009	0.002258818	0.000675467	-0.000983643	-2.36774E-03		3.884952	45 0.00020994	7.09446E-0	0.000109837	0.000144125	0.000275143	0.000243573	0.000273474	2.45982E-05	0.000127244	2.59412E-05	3.420078-05	-1.02164E-03	5.344948-03	-8.48997E-06	6.04213E-05	0.000114134	-0.000129054	-1.074258
	0.0091.	AC12256000.0	0.0050354	.0.000305174	A HIGHE M	1	LANATE	A1 0.000000411	TIMTELM	0.000108873	0.000147517	0.000274658	0.000241554	0.000273466	1473948.05	4 (00119306	1 56175.05	1.119805.05	JI MARTE AS	1 101578.01		S REMOVE AS	0.000153815		1 10050
	D	ver conner_t	1264410062	09 (10 0) 600	lata 🦓										a second	I Contraction	Section of the	1000	in statut law				100 March 1994	and the second second	1000

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

	<b>D</b> · U	N N				1: Unspecified	2: No Unit
aste Raw DeverCo	nner Data He	ere X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Carilan					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Wind	ow	· · ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-00
Styles	•	Paste to Editor	c Ctrl+V		9:	1.600000E-003	-2.288818E-00
Clear	· · · · ·	Paste to Editor	Culty		10:	1.800000E-003	-1.983643E-00
					11:	2.000000E-003	2.593994E-00
Magnify					12:	2.200000E-003	-1.525879E-00
Autoscale					13:	2.400000E-003	-9.155270E-00
Autoscale							
Cursor							
Zoom	F10			-			
Properties	D.	60) × W27:	: AB4-Cleaned Data				

W1: Untitled Data X

#### 7. Click PreProcess button to inspect data



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

Truck ID: 1.000000	
	OK Cancel

#### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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

*	2 🗹	Medford I-5	Redmond US-97	Dever-Conner I-5	PreProcess	ReadDataq
_				Dever-Conner I-	5	

Verify Truck ID and LPSVoltage\*

Dever Conner Information	X
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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:	V57: Output Data X									
	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:	W57: Output Data X									
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



#### **14. Troubleshooting – Changing LPSVoltage**

- 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)

W60: MPP												×
2 - 1.5 - 1 - 0.5 - 0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	A			·					
	1.85	1.9	1.95	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35	2.4

- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK

Dever Conner Information	22
Truck ID: 3.000000	
	OK Cancel

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



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



Dever-Conner7-14-09_10373514072009	7/14/200
Dever-Conner7-14-09_10375814072009	7/14/200
Dever-Conner7-14-09_10420114072009	7/14/200
Dever-Conner7-14-09_10424114072009	7/14/200
Dever-Conner7-14-09_10430214072009	7/14/200
Dever-Conner7-14-09_10431014072009	7/14/200
Dever-Conner7-14-09_10433814072009	7/14/200
Dever-Conner7-14-09_10435014072009	7/14/200
Dever-Conner7-14-09_10435814072009	7/14/200
Dever-Conner7-14-09_10440614072009	7/14/200
Dever-Conner7-14-09_10443414072009	7/14/200
Dever-Conner7-14-09_10444114072009	7/14/200
Dever-Conner7-14-09_10445314072009	7/14/200
Dever-Conner7-14-09_10453214072009	7/14/200
Dever-Conner7-14-09_10455614072009	7/14/200
Dever-Conner7-14-09_10460514072009	7/14/200
Dever-Conner7-14-09_10461514072009	7/14/200
Dever-Conner7-14-09_10465414072009	7/14/200
Dever-Conner7-14-09_10470214072009	7/14/200
Dever-Conner7-14-09_10471414072009	7/14/200
Dever-Conner7-14-09_10473614072009	7/14/200

7/14/2009 12:37 PM	TDMS File	1,878 KB
7/14/2009 12:38 PM	TDMS File	1,878 KB
7/14/2009 12:42 PM	TDMS File	1,878 KB
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## 3. Open Data tab in EXCEL workbook

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1	Root Name	Title	Author	Date/Time	Groups							AB01	
2	DC08192009_09371619082009												
3							1 <b>T</b>	ime	axlel	axle2	axle3	sg3	AB02
4	Group	Channels	Description	header			2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station			3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
				Name:DC08192009			4	0.0004	-0.002441400	0.001220703	0.000457764	0.000612193	-0.0005
				Sample Rate:5000.0			6	0.0000	-0.000132388	0.003043732	0.001220703	0.000610878	-0.0005
				Comments:			7	0.000	0.001831055	-0.000915527	-0.001373291	0.000611497	-0.0005
							8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005
				Timeaxle1axle2		N	9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005
				axle3AB01			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
				AB04AB05AB06			12	0.002	0.002593994	0.000305176	-0.000457764	0.00061136	-0.000
				AB07AB08AB			13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005
				094B104B114			14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005
				B12			15	0.0026	-0.000762939	-0.001373291	-0.000762939	0.000612851	-0.0005
				RB01RB02RB0			16	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005
				3RB04RB05RB			17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005
				06RB07RB08R			18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005
				B09			19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
						1	20	0.0036	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005
				secsvoltsvoltsvol		1	21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
				tsvoltsvoltsvolts			22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				voltsvoltsvolts			23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005
				voltsvoltsvoltsvo			24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
				ltsvoltsvoltsvolts			25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005
				voltsvoltsvolts			26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				voltsvoltsvoltsvo			27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				Itsvolts			28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data	2:	5				29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6			4				50	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data	0082009 (100	Data	CLICK			1 4 4	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000011880	-0.000
	0000152005_0557101	1002009 (100	Je / Data			2		DCO	5192009_09371	013002003 (100		*/	

# 4. Arranging data in EXCEL

Insert column of zeroes between ab01 and ab03

	Cipocaro	1.4	ront	1.4	PLD	grimerit			The second se						
	F1	• (	° ∫⊀	ab03			Time	s Ne - 11 - A	x \$ - %		D	E	F	G	Н
							B	I = 💁 - 🛓	L = ⊞ = ‰ .	_		ab01			
4	A	В	С	D	E	F	X	Cut Cut	H						
					ab01		6	Copy				-b01		-1-02	-104
1	Time	axlel	axle2	axle3	ab01	ab03	8	Paste Options:			axies	4001		a003	ab04
2	0	0.003509521	0.001220703	0.00213623	-2.28443E-05	4.055868		(A)	938E-05	3	0.00213623	-2.28443E-05	0	4.05586E-05	0.0002105
3	0.0002	0.000457764	0.000915527	-0.001525879	-2.28005E-05	3.99447E		Paste Special	2515E-05	7	-0.001525879	-2.28005E-05	0	3.99447E-05	0.0002105
4	0.0004	-0.002593994	-0.001678467	-0.001220703	-2.26689E-05	4.090931		Incert	808E-05	7	0.001220703	2 26680E 05		4 00003E 05	0.0002115
5	0.0006	-0.000152588	-0.000915527	0.000457764	-2.28443E-05	4.327718		Delete	1708E-05	-	-0.001220703	-2.20089E-03		4.09093E-03	0.0002113
7	0.0008	0.002593994	0.002593994	-0.001678467	-2.062/4E-03	3.963781		Clear Contents	462E-05	7	0.000457764	-2.28443E-05	0	4.32771E-05	0.0002120
8	0.0012	0.001068115	0.000762939	0.001373291	-2.31951E-05	4.01639E	-	Format Cells	531E-05		0.00213623	-2.08274E-05	0	4.1567E-05	0.0002117
9	0.0014	0.000152588	-0.002593994	-0.001678467	-2.45544E-05	4.12163E	-	Column Width.	708E-05	4	-0.001678467	-2.26689E-05	0	3 96378E-05	0.0002102
10	0.0016	0.000457764	-0.000610352	0.000457764	-2.18359E-05	3.99009E		Hide	039E-05		0.001272201	2.21051E.05	, in the second s	4.01620E.05	0.000211
11	0.0018	-0.001678467	0.000610352	0.001068115	-2.19235E-05	3.99009E		Unhide	5815E-05	9	0.001373291	-2.31951E-05		4.01039E-03	0.000211.
12	0.002	0.002288818	0.00213623	0.002441406	-2.22305E-05	4.060248	05	0.000210201	7 10060E 05	4	-0.001678467	-2.45544E-05	0	4.12163E-05	0.00020
14	0.0022	0.000457764	-0.004272461	+0.002288818	-2.4379E-05	3.94185	2-05	0.000210291	7.25231E-05	2	0.000457764	-2.18359E-05	0	3.99009E-05	0.0002122
15	0.0026	-0.000152588	-0.001068115	-0.001983643	-2.30636E-05	3.95939E	-05	0.000208668	7.23039E-05	2	0.001068115	2 10235E-05		3 00000E 05	0.000212
16	0.0028	0.001068115	0.001983643	0.001220703	-2.31513E-05	4.108478	-05	0.000210948	7.20846E-05	2	0.001008115	-2.1923512-05		3.3300312-03	0.000212
17	0.003	0	-0.001068115	-0.000305176	-2.32828E-05	4.05586E	2-05	0.000210071	7.29616E-05	3	0.002441406	-2.22305E-05	0	4.06024E-05	0.0002115
18	0.0032	0.001678467	0.001831055	-0.000915527	-2.3239E-05	4.02516E	2-05	0.000209458	7.18215E-05	2	0.002288818	-2.31513E-05	0	3.89801E-05	0.0002102
19	0.0034	0.003814697	0.004882813	0.003356934	-2.45351E-05	3.91993E	2-05	0.000210641	7.14269E-05 7.06377E-05	1	-0.002288818	-2 4379E-05	0	3 94185E-05	0.000209
21	0.0038	0.002746582	0.000305176	-0.000457764	-2.22743E-05	3.96816E	-05	0.000208756	7.09008E-05		0.001002642	2.15772-05	, in the second s	2.050205.05	0.000200
22	0.004	-0.000762939	0.000152588	0.000762939	-2.39844E-05	4.204941	-05	0.000210861	7.19969E-05	2	-0.001983043	-2.30030E-03		3.93939E-03	0.0002080
23	0.0042	0.000762939	0.001678467	0.001831055	-2.09589E-05	4.07778	2-05	0.000209414	7.09884E-05	3	0.001220703	-2.31513E-05	0	4.10847E-05	0.0002109
24	0.0044	0.000762939	0.000457764	0.002593994	-2.02135E-05	3.99447E	2-05	0.000210422	7.09008E-05	5	-0.000305176	-2.32828E-05	0	4.05586E-05	0.0002100
25	0.0046	0.004577637	0.000762939	0.000152588	-2.21428E-05	3.93308E	2-05	0.000209238	7.22162E-05	5	0.000915527	2 3230E 05		4.02516E-05	0.000209
20	0.0048	-0.000010352	-0.001983043	-0.000152588	-2.46013E-03	4 02955E	-05	0.000211299	7.14708E-05	-	-0.000913327	-2.3239E-03		4.02310E-03	0.0002094
28	0.0052	0.003662109	0.0050354	0.001831055	-2.27566E-05	3.93747	-05	0.000209458	7.16023E-05	3	0.003356934	-2.43351E-05	0	3.91993E-05	0.0002106
44	0.007.	A AAAAAAAAA	A AAAAA 7733		A 170 100 07	1 0 1 7 1 9 1		A AAAAAAAA	3 1 CO337 AC	6	0.0000520014	0.04407E.05		2 004057 05	0.0000110

# 5. Copy data

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



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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

		M				1: Unspecified	2: No Unit
iste Raw DeverCon	ner Data He	ere X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Carias					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Windo	w	· · ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-0
Styles	•	Paste to Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-0
Clear	• • F	Paste to Editor	Curry		10:	1.800000E-003	-1.983643E-0
					11:	2.000000E-003	2.593994E-0
Magnify					12:	2.200000E-003	-1.525879E-0
Autoscale					13:	2.400000E-003	-9.155270E-0
racoscure							
Cursor							
Zoom	F10						
Properties	)).	60) × W27:	AB4-Cleaned Data				

W1: Untitled Data X

#### 7. Click PreProcess button to inspect data



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

			23	η
Truck ID: 1.000	000			
a1		OK	Cancel	

#### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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\*

Dever Conner Information	X
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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 X									
	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:	W57: Output Data X									
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



# 14. Troubleshooting – Changing LPSVoltage

- 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

Dever Conner Information	E Contraction of the second se
Truck ID: 3.000000	
- ,	OK Cancel

• Event is processed successfully if all peaks are captured.

#### **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	

# 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



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



A DC08192009\_09371619082009 8 DC08192009\_09373919082009 Rev DC08192009\_09374919082009 Rev DC08192009\_09380219082009 Representation 12/2009\_09385919082009 R DC08192009\_09393719082009 R DC08192009\_09400319082009 R DC08192009\_09403319082009 A DC08192009\_09410519082009 A DC08192009\_09411419082009 8 DC08192009\_09423919082009 Reference 2009\_09431319082009 R DC08192009\_09441419082009 R DC08192009\_09442119082009 8 DC08192009\_09442919082009 Ref DC08192009\_09451419082009 Rev DC08192009\_09462119082009 A DC08192009\_09462819082009 8 DC08192009\_09463619082009

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8/19/2009 11:46 AM	TDMS File	1,956 KB

# 3. Open Data tab in EXCEL workbook

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	A	В	С	D	E		A	В	С	D	E	F
1	Root Name	Title	Author	Date/Time	Groups						AB01	
2	DC08192009_09371619082009											
3						1	Time	axlel	axle2	axle3	sg3	AB02
-4	Group	Channels	Description	header		2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station		3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
				Name:DC08192009	>	4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005
				Sample Rate:5000.0	0	5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005
				Comments:		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
				Timeaxle1axle2		8	0.0012	0.000610352	-0.000457764	-0.002/46582	0.000608905	-0.0005
				axle3AB01		9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613020	-0.0005
						10	0.0010	-0.002288818	-0.001220703	-0.000152588	0.000612466	-0.0005
				sg3AB02AB03		11	0.0018	-0.001983043	0.001008115	0.001373291	0.0006112450	-0.0005
				AB04AB05AB06		12	0.002	0.002595994	0.000303176	-0.000457704	0.000610045	-0.000
				AB07AB08AB		13	0.0022	-0.001323879	-0.001220703	-0.001373291	0.000612806	0.0005
				09AB10AB11A		14	0.0024	-0.000913327	-0.001078407	-0.001008113	0.000612893	-0.0005
				B12		15	0.0020	-0.000702939	-0.001373291	-0.000702939	0.000612831	-0.0005
				RB01RB02RB0		10	0.0028	0.001220703	0.000132388	0.0010782939	0.000612632	-0.0005
				3RB04RB05RB		19	0.0032	0.001220703	-0.0002288818	0.000762939	0.000611185	-0.0005
				06RB07RB08R		19	0.0032	-0.001220703	-0.001831055	-0.002788818	0.000611053	-0.0005
				B09		20	0.0034	-0.003967285	-0.003356934	-0.001831055	0.00061193	-0.0005
						21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
				secsvoltsvoltsvol		22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				tsvoltsvoltsvolts		23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005
				voitsvoitsvoits		24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
				voitsvoitsvoitsvo		25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005
				restorestorestores		26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				voitsvoitsvoits		27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				tevolte		28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data		5	RSVORS		29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6	L' dia	4				30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data			CLICK		31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000
14 4	DC08192009_09371619	9082009 (ro	ot Data	CLICK		14 4	DC08	8192009_09371	619082009 (roc	it Data 🤇	2/	

# 4. Copy data

• Highlight data

- Exclude Header Row

• Right-Click  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click

1	4		В	С	D	E	F	G	Н	I	1	K	L	М	N	0	р
						AB01											
		Times Ne - 1	1 - A ,	\$ - % ,	<b>3</b>												
1 1	ime	BII	3 - A -	H - 14 - 1	1 3	sg3	AB02	AB03	AB04	AB05	AB06	AB07	AB08	AB09	AB10	AB11	AB12
2						0.000610878	-0.000926138	-5.37127E-05	0.000225681	-0.001429459	-4.03393E-06	0.000177274	0.000497182	0.000286058	0.000435489	0.000195909	-2.05204E-05
3	8	V Cut	03388818	0.003014607	-0.005645752	0.000612807	-0.000925656	-5.33181E-05	0.000226251	-0.001429459	-3.20084E-06	0.000178151	0.000498761	0.000287418	0.000436717	0.000197443	-2.01697E-05
4		e col		3	0.000457764	0.000612193	-0.000925919	-5.40196E-05	0.000225681	-0.001429459	-4.38471E-06	0.000178808	0.000498322	0.000288032	0.00043641	0.00019604	-1.93366E-05
5		- Sobh		2	0.001220703	0.00061307	-0.000926314	-5.52035E-05	0.000226119	-0.001429459	-4.12163E-06	0.000179291	0.000497796	0.000288514	0.000435182	0.000196479	-1.95558E-05
6		Paste C	Options:	1	0.002441406	0.000610878	-0.000924735	-5.5642E-05	0.000224629	-0.001429459	-3.37623E-06	0.000178502	0.000499594	0.000288777	0.000436673	0.000195427	-2.03889E-05
7		1	23 fi f	3 % - 7	-0.001373291	0.000611492	-0.000926226	-5.58612E-05	0.000225988	-0.001429459	-2.54313E-06	0.000178984	0.000498015	0.000288865	0.000436235	0.000195777	-2.01697E-05
8		Paste S	pecial	1.4	-0.002746582	0.000608905	-0.000925919	-5.4765E-05	0.0002259	-0.001429459	-3.90239E-06	0.000178414	0.000497621	0.000288032	0.000435139	0.000195953	-1.98189E-05
9				5	-0.001220703	0.000613026	-0.000924472	-5.35373E-05	0.000226996	-0.001429459	-4.82318E-06	0.000178326	0.000497971	0.000289215	0.000436542	0.000195777	-1.91612E-05
10		insert (	copied Cglis.	. 3	-0.000152588	0.00061193	-0.000924034	-5.43266E-05	0.000227347	-0.001429459	-4.16547E-06	0.000178063	0.000498585	0.000288865	0.000434656	0.00019455	-1.88543E-05
11		Delete.	•••	5	0.001373291	0.000612456	-0.000924209	-5.40635E-05	0.000227084	-0.001429459	-2.71852E-06	0.000178063	0.000497577	0.000288689	0.000436892	0.000195514	-1.9205E-05
12		Clear C	ontents	6	-0.000457764	0.00061136	-0.00092513	-5.45019E-05	0.000227172	-0.001429459	-4.42856E-06	0.000178765	0.000498147	0.000289785	0.00043527	0.000195997	-1.9205E-05
13		Filter		+ 3	-0.001373291	0.000610045	-0.000925261	-5.44581E-05	0.000225067	-0.001429459	-4.77933E-06	0.000179203	0.000498191	0.000288382	0.000435051	0.000195514	-1.92489E-05
14		Sort		. 17	-0.001068115	0.000612895	-0.000926796	-5.32742E-05	0.000225549	-0.001429459	-3.33238E-06	0.000177756	0.000498322	0.0002879	0.000435533	0.000194637	-1.9205E-05
15		-		1	-0.000762939	0.000612851	-0.000924648	-5.42389E-05	0.000226602	-0.001429459	-3.727E-06	0.000179378	0.000497621	0.000288207	0.000435182	0.00019626	-1.92489E-05
16		Insert o	Comment		0.001678467	0.000612544	-0.000924911	-5 42389E-05	0.000226295	-0.001429459	-3 59546E-06	0.000177361	0.000498761	0.000287637	0.000434832	0.000195295	-1.92489E-05
17		Termat	Cells	8	0.000762939	0.000612632	-0.000925919	-5 32304E-05	0.000226383	-0.001429459	-3.63931E-06	0.000178545	0.000498629	0.000288733	0.000435621	0.000194769	-1.89858E-05
18		Pick Fri	om Drop-dov	wn List 7	0.000762939	0.000611185	-0.000926796	-5.4195E-05	0.000225462	-0.001429459	-3 94674E-06	0.000177098	0.000497621	0.000287944	0.000436059	0.000195427	-1 95997E-05
19		Define	Name	5	-0.002288818	0.000611053	-0.000927454	-5 39319E-05	0.000226339	-0.001429459	-3 85854E-06	0.000177186	0.000496831	0.000288602	0.000436147	0.000194111	-2 04327E-05
20		A Honerdi	ink	4	-0.001831055	0.00061193	-0.000926358	-5 26165E-05	0.000226865	-0.001429459	-3 0693E-06	0.000179159	0.000496831	0.000288338	0.000435665	0.000196172	-2.00381E-05
21		0.0038 0.0	00457764	-0.000305176	0.001051055	0.000611623	-0.000925261	-5 35811E-05	0.000225725	-0.001429459	-4 12163E-06	0.000179422	0.000498059	0.000288909	0.000435621	0.000196084	-1 96873E-05
22		0.004 0.0	01068115	0.000610352	0.001831055	0.000611842	-0.000924121	-5 38442E-05	0.000226426	-0.001429459	-4 07778E-06	0.000179747	0.000497007	0.000288909	0.000435358	0.000195076	-1 9205E-05
23	3	0.0042 0.0	06103516	0.001983643	0.001525879	0.000612456	-0.000926489	-5 5072E-05	0.000225286	-0.001429459	-4 12163E-06	0.000179203	0.000498629	0.000288075	0.000434919	0.000193716	-1 99504E-05
24		0.0044 0	00213623	0.000152588	-0.001373291	0.000610571	-0.000926358	-5 4195E-05	0.000224497	-0.001429459	-3 02545E-06	0.000178151	0.000497928	0.000287944	0.000433692	0.000194374	-1 91173E-05
25	- 8	0.0046 -0.0	01983643	-0.004425049	-0.002441405	0.000611185	-0.000925174	-5 32304E-05	0.000226689	-0.001429459	-3.63931E-06	0.000178458	0.00049841	0.000288382	0.000434919	0.000194462	-1 78019E-05
26	1	0.0048 .0.0	01220203	0.000767939	0.000015527	0.000611623	0.00092684	5 35911E 05	0.000227172	0.001429459	4 64770E 06	0.000177274	0.000498191	0.000287856	0.00043584	0.000195427	1 OSSERE OS
27	5	0.005 .0	00213623	0.000305176	.0.000305176	0.000612369	0.000925086	-5 50281E-05	0.00022533	0.001429459	-3 68316E-06	0.000178545	0.000498454	0.000287812	0.000435796	0.000105558	1 9205E-05
20	-	0.0052 0.0	00015527	0.003503004	0.00303170	0.000612105	0.000925174	S 5510/E 05	0.000225333	0.001429459	5 3055E 06	0.000177591	0.000496413	0.000287812	0.000435073	0.000195358	1 01123E 05
20	8	0.0052 0.0	00310021	0.002393994	0.00289917	0.000611053	0.000925174	5.33104E-03	0.000225374	0.001429459	2 42007E 06	0.000177381	0.000490012	0.000287155	0.000433972	0.000190391	1.0512E-05
20	6	0.0054 0.0	03309321	0.001831055	-0.002093994	0.000011053	-0.000925050	-3.73082E-05	0.000225111	-0.001429459	-3.42007E-06	0.000178238	0.000497533	0.000287549	0.000434305	0.00019433	-1.9312E-05
30		0.0050 -0.0	01983043	-0.004272461	-0.003907285	0.00061136	-0.000925903	-3.4/05E-05	0.000225199	-0.001429459	-4.1034/E-00	0.000180809	0.000497095	0.000288602	0.000436147	0.000194593	-2.0109/E-05
31	-	0.0058 -0.0	02441406	-0.003509521	-0.000610352	0.000611886	-0.00092627	-5.39319E-05	0.000226426	-0.001429459	-3.90239E-06	0.000178238	0.000497971	0.000288645	0.000435051	0.000194944	-1.98627E-05
14 4 1	- Mai	DC081920	093716	13085003 (1000	Data 🥂	2/											*L

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

			M				1: Unspecified	2: No Units
aste Raw DeverCo	onner Data H	ere	×	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
			_			2:	2.000000E-004	-2.288818E-00
Series						3:	4.000000E-004	-2.441406E-00
Series						4:	6.000000E-004	-1.525880E-00
Dataset	'					5:	8.000000E-004	-1.831055E-00
Сору						6:	1.000000E-003	1.831055E-00
Paste	•	Paste to	Window	N	· · ·	7:	1.200000E-003	6.103520E-00
		Paste Li	nk			8:	1.400000E-003	-2.136230E-00
Styles	•	Dacte to	Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-00
Clear	• • • •	Paste to	Luitor	Cuity		10:	1.800000E-003	-1.983643E-00
						11:	2.000000E-003	2.593994E-00
Magnify	I					12:	2.200000E-003	-1.525879E-00
Autoscale	I					13:	2.400000E-003	-9.155270E-00
Adtostate	I							
Cursor								
Zoom	F10							
Properties	))	,60) ×	W27: A	AB4-Cleaned Data				

W1: Untitled Data X

#### 6. Click PreProcess button to inspect data



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

Truck ID: 1.000000	
	OK Cancel

#### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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

*	2 🗹	Medford I-5	Redmond US-97	Dever-Conner I-5	PreProcess	ReadDataq
_				Dever-Conner I-	5	

• Verify Truck ID and LPSVoltage\*

Dever Conner Information	<u> </u>
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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 X					
	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 X				
	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:	1.00000E+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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



# **13. Troubleshooting – Changing LPSVoltage**

- 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

Dever Conner Information	23
Truck ID: 3.000000	
LPSVoltage:  0.100000	
	OK Cancel

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



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

8 DC_10434422092009	9/22/2009 12:43 PM	TDMS File	1,956 KB
8 DC_10440922092009	9/22/2009 12:44 PM	TDMS File	1,956 KB
8 DC_10444122092009	9/22/2009 12:44 PM	TDMS File	1,956 KB
8 DC_10450922092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
8 DC_10452822092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
8 DC_10453622092009	9/22/2009 12:45 PM	TDMS File	1,956 KB
Ref DC_10461122092009	9/22/2009 12:46 PM	TDMS File	1,956 KB
8 DC_10470322092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
8 DC_10472122092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
8 DC_10473522092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
8 DC_10474622092009	9/22/2009 12:47 PM	TDMS File	1,956 KB
Ref DC_10481322092009	9/22/2009 12:48 PM	TDMS File	1,956 KE
Ref DC_10484122092009	9/22/2009 12:48 PM	TDMS File	1,956 KB
Ref DC_10490322092009	9/22/2009 12:49 PM	TDMS File	1,956 KB
8 DC_10491322092009	9/22/2009 12:49 PM	TDMS File	1,956 KE
Ref 10493222092009	9/22/2009 12:49 PM	TDMS File	1,956 KB
Rev 10501022092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
Reference 10501622092009	9/22/2009 12:50 PM	TDMS File	1,956 KE
Rev 10502822092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
Red DC_10503622092009	9/22/2009 12:50 PM	TDMS File	1,956 KB
8 DC_10510322092009	9/22/2009 12:51 PM	TDMS File	1,956 KB
EC 10511322092009	9/22/2009 12:51 PM	TDMS File	1 956 KB
## 3. Open Data tab in EXCEL workbook

<b>X</b>	🚽 H) = (H =   =						🖬 19 - (° -	Ŧ				
F	ile Home Insert Page L	ayout For	mulas Data	Review View	Developer	F	ile Home	Insert Pa	ge Layout Fe	ormulas Data	Review	View
100	💐 👗 Cut		- A* .* =		Tablean Test	1	💐 🔏 Cut	Timer M			- <b>-</b> ×	-
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	A1 - (*	f <sub>x</sub> ]	Root Name				A1	- (	⊂ fx	Time		
	А	В	С	D	E		A	В	С	D	E	F
1	Root Name	Title	Author	Date/Time	Groups						AB01	
2	DC08192009_09371619082009											
3						1	Time	axlel	axle2	axle3	sg3	AB02
4	Group	Channels	Description	header		2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station		3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
				Name:DC08192009		4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005
				Sample Rate:5000.0		5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005
				Comments:		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
				Timeaxle1axle2		8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005
				axle3AB01		9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613020	-0.0005
						10	0.0016	-0.002288818	-0.001220703	-0.000152588	0.00061193	-0.0005
				sg3AB02AB03		11	0.0018	-0.001983643	0.001068115	0.001373291	0.000612450	-0.0005
				AB04AB05AB06		12	0.002	0.002593994	0.000305176	-0.000457764	0.00061130	-0.000
				AB07AB08AB		13	0.0022	-0.001525879	-0.001220703	-0.001373291	0.000610045	-0.0005
				09AB10AB11A		14	0.0024	-0.000915527	-0.001678467	-0.001068115	0.000612895	-0.0005
				B12		15	0.0026	-0.000/62939	-0.001373291	-0.000/62939	0.000612851	-0.0005
				RB01RB02RB0		10	0.0028	-0.000915527	0.000152588	0.001678467	0.000612544	-0.0005
				3RB04RB05RB		17	0.003	0.001220703	0.002288818	0.000762939	0.000612632	-0.0005
				06RB07RB08R		18	0.0032	0.001220703	-0.000915527	0.000762939	0.000611185	-0.0005
				B09		19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
						20	0.0036	-0.003967285	-0.003350934	-0.001831055	0.00061195	-0.0005
				secsvoltsvoltsvol		21	0.0038	0.000457764	-0.000305176	0	0.000611623	-0.0005
				tsvoltsvoltsvolts		22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				voltsvoltsvolts		23	0.0042	0.006103516	0.001983643	0.001525879	0.000612450	-0.0005
				voltsvoltsvoltsvo		24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
				ltsvoltsvoltsvolts		25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005
				voltsvoltsvolts		26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				voltsvoltsvoltsvo		27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				Itsvolts		28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data	2	15			29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6						30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data	000000 (		CLICK		31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000
14 4	DC08192009_09371619	1082009 (ro	Data	CLICIN		14 4	DC08	3192009_09371	619082009 (roc	it 🗌 Data 🏑 🤇	1	

# 4. Arranging data in EXCEL

#### • Move column RB01 between AB11 and RB02.

− Cut column F (RB01)  $\rightarrow$  → Insert cut cells between AB11 and RB02

Forma	Painter (11)*	1.1			- (M -			Formal Formal	thing + as Table +	Research Control of Co		Styles						Cell	11.	U P	diting	
F1		- A	RB01		De	nes Mi + 11 )	× × 5 · 7	• 58							Tir	nes Ne - 1	1 - A	× × ·	% •	洒		
		6	D			789-2	1 · · · · · · · · · · · · · · · · · · ·	3.7	1	<i>x</i>					B	1 8	3 - A		3 3 1	r		
Time	North	Diag	South	AB01	RB01 A	Cut	4	AB05	AB06	AB07		M	N	0	1000	P	Q		ĸ	S	Т	
	0.000610353	-0.001678467	-0.001220703	0.000116414	0.001434	<u>⊆</u> eay	1436738	-0.001429415	-1.90096E-0	6 0.001436		AB09	AB10	AB11	RB y	Cut		AB1	2	RB04	RB05	F
0.000	2 -0.00671386	-0.000915527	0.000152588	0.00011633	0.001434	Paule Options:	1436738	-0.001429415	-7.5417E-0	6 0,001436		8 0.001436738	0.001436738	0.001436738	3. 0	Comi		0.00	1261306	0.001436738	0.00143673	3 1
0.000	4 0.000362935	0.000915527	0.003662109	0.000116414	0.001434	1.5	1436738	-0.001429415	-7.76094E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	31	FobA		0.00	1260823	0.001436738	0.001436735	8 1
0.000	6 0.002288811	0.003509521	0.005340576	0.000115844	0.005436	Teris (permi-	1436738	-0.001429415	-8.15556E-0	6 0.001436		9 0.001436739	0.001436739	0.001436739	1	Paste 0	Options:	0.00	1260922	0.001/126728	0.00142672	
0.000	0.00028991	0.001331055	0.000303176	0.000115180	0.001434	Intert	1436738	-0.001429415	-7.1+708E-0	6 0.001436		8 0.001430738	0.001430738	0.001430738		125		0.00	1200023	0.001430738	0.001430138	2
0.001	2 -0.001173791	-0.002441404	-0.000157588	0.00011573	0.00541	Quarte	1436718	-0.001429415	-7 14708E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3.	Const.		0.00	/1260911	0.001436738	0.001436738	5 5
0.001	4 -0.000762931	0.000457764	0.001525879	0.000116765	0.00143	Clear Cogtents	1436738	-0.001429415	-6.70861E-0	6 0.001436		\$ 0.001436738	0.001436738	0.001436738		Paste 3	pecial	0.00	1260472	0.001436738	0.001436738	\$ 0
0.001	5 0.000620353	0.002593994	0.001831055	0.000116677	0.001434	Pormat Cells	1436738	-0.001429415	-\$.41864E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3	Insert (	Cut Cells	0.00	1261086	0.001436738	0.00143673/	8 (
0.001	8 0.000762935	-0.000305176	0.001831055	0.000116546	0.001434	Column Wildth	1436738	-0.001429415	-9.07635E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3			0.00	1260385	0.001436738	0.00143673	2 1
0.00	2 0.002593994	0.003509521	0.000915527	0.000115143	0.001434	Hide	1436738	-0.001429415	-7.62939E-0	6 0.001436		0 0.001 126720	0.001436738	0.001426720	-	Delete		0.00	1260271	0.001126728	0.00143673	
0.003	2 -0.000915523	-0.002593994	-0.003356934	0.000115013	0.001438	Unhide	1436738	-0.001429415	-7.36631E-0	6 0.000436		5 0.001430738	0.001430738	0.001+30/38	3.	Clear C	ogtents	0.00	11722111	0.001430738	0.001430732	2 4
0.003	4 -0.000362935	-0.000630352	0.000305178	0.000114485	0.001436			-0.001429415	-8.72557E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738			er.	0.00	1260911	0.001436738	0.00143673	5 6
0.000	-0.001058111	0.001220103	0.001068115	0.000110553	0.00043673	0.001438738	0.001436738	-0.001429415	-9.3148/E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3.	Corman	Consul	0.00	1260122	0.001436738	0.001436738	5 1
0.00	0.001831000	0.001047190	0.000955527	0.000114103	0.00143673	0.001436718	0.001434719	0.001429415	2 6713/15 0	6 0.001436		\$ 0.001436738	0.001436738	0.001436738	34	Colum	n Width	- 0.00	1263279	0.001436738	0.00143673	2 6
0.003	2 0.003204346	0.001068115	-0.004577637	0.000114748	0.00143673	0.001436738	0.001436738	-0.001429415	-8.46249E-0	6 0.001434	-	8 0.001436718	0.001436738	0.001436738	3.	Hide		0.00	1262480	0.001436738	0.00143673	
0.003	4 -0.0028991	-0.005950928	-0.001983643	0.000115625	0.00143673	0.001436738	0.001436738	-0.001429415	-1.23477E-0	6 0.001434		8 0,001430738	0.001430738	0.001430738	2			0.00	11202403	0.001430738	0.001430738	1
0.003	5 -0.001220703	0.000650352	0.001525879	0.000115533	0.00143673	0.001436738	0.001436738	-0.001429415	-8.19941E-0	6 0.001436		\$ 0.001436738	0.001436738	0.001436738	3.1	Unhide	¢	0.00	1202358	0.001436738	0.001436733	5 6
0.003	8 0.004119873	0.003834697	0.00579834	0.000115274	0.00143673	8 0.001436738	0.001436738	-0.001429415	-8.98865E-0	6 0.001436	1	8 0.001436738	0.001436738	0.001436738	3.634	92E-05	0.00143	6738 0.00	1260955	0.001436738	0.001436738	\$ 0
0.00	4 0.001983643	0.00213623	0.000305176	0.000114793	0.00143673	8 0.001436738	0.001436738	-0.001429415	-7.84863E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3.691	93E-05	0.00143	6738 0.0	0126113	0.001436738	0.00143673	8 (
0.004	2 0.002746583	0.000650353	0.00213623	0.000115143	0.00143673	8 0.001436738	0.001436738	-0.001429415	-8.3748E-0	6.0.001436		8 0.001436738	0.001436738	0.001436738	3 694	31E-05	0.00143	6718 0.00	11260000	0.001436738	0.00143673	
0.004	4 -0.001831055	-0.000305176	0.000762939	0.000114704	0.00143673	8 0.001436738	0.001436738	-0.001429415	-7.58555E-0	6 0.001436		0 0.001430730	0.001400700	0.001430730	3.070	orn or	0.00142	10730 0.00	12000000	0.001430730	0.001430730	
0.004	5 -0.0021362	-0.001068115	0.000305176	0.000116414	0.00143673	0.001436738	0.001436738	-0.001429415	-3.06787E-0	6 0.001436		8 0.001430738	0.001436738	0.001430738	3.342	85E-05	0.00143	0738 0.00	11201203	0.001430738	0.001430732	5.0
0.004	6 0.000000333	0.001831033	0.00233623	0.000114544	0.00143073	0.001436758	0.001436738	-0.001429415	-8.33018E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3.564	77E-05	0.00143	6738 0.00	1260736	0.001436738	0.001436738	\$ 6
0.005	2 0.002441404	0.002288818	0.000305176	0.000115445	0.00143673	0 001436738	0.001436738	-0.001429415	_# 72557E-0	6.0.001436		8 0.001436738	0.001436738	0.001436738	3.691	93E-05	0.00143	6738 0.00	1262884	0.001436738	0.001436730	3 6
0.005	4 0.001831055	-0.001373291	-0.000915527	0.000115186	0.00143673	0.001436738	0.001436738	-0.001429415	-9.25174E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3 713	85E-05	0.00143	6738 0.00	1261086	0.001436738	0.00143673	2 (
0.005	5 0.000600350	-0.000305176	-0.000305176	0.000115888	0.00143673	8 0.001436738	0.001436738	-0.001429415	-8.68172E-0	6 0.001436		0 001476720	0.001436738	0.001426728	2 501	007 04	0.00142	6710 0.00	1341202	0.001/26728	0.00142672	
0.005	8 0.000610353	-0.000915527	0.000915527	0.000117203	0.00143673	8 0.001436738	0.001436738	-0.001429415	-7.93632E-0	6 0.001436		8 0.001430738	0.001430738	0.001430738	3.391	082-03	0.00145	0738 0.00	1201393	0.001430738	0.001430738	1
0.00	6 -0.000762939	0.001068115	0.000457764	0.000117598	0.00143673	8 0.001436738	0.001436738	-0.001429415	-8.15556E-0	6 0.001436		\$ 0.001436738	0.001436738	0.001436738	3.586	69E-05	0.00143	6738 0.00	1261744	0.001436738	0.001436738	\$ 0
0.006	2 0.00213623	-0.001220703	0.001373291	0.0001158	0.00143673	0.001436738	0.001436738	-0.001429415	-8.55018E-0	6 0.001436		\$ 0.001436738	0.001436738	0.001436738	3.428	84E-05	0.00143	6738 0.0	0126227	0.001436738	0.001436735	\$ C
0.008	4 -0.001220703	-0.000152588	-0.001068115	0.000115888	0.00143673	0.001436738	0.001436738	-0.001429415	-4.50634E-0	6 0.001436		8 0.001436738	0.001436738	0.001436738	3.595	46E-05	0.00143	6738 0.00	1261481	0.001436738	0.00143673	8 (
0.006	5 0.00091552	-0.000305176	-0.000457764	0.000115055	0.00143673	0.001436738	0.001436738	-0.001429415	-7.45401E-0	6 0.001436		0 0.001 436730	0.001436738	0.001216720	1 700	207 05	0.00142	6718 0.00	1361075	0.001436738	0.00142672	0 1
0.000	s -0.001525875	0.001831055	-0.002746582	0.000116585	0.00143673	0.001436738	0.001436738	-0.001429415	-7.23477E-0	0.001436		e 0.001430/38	0.001430738	0.001430/38	3./88	372-03	0.00145	0156 0.00	112018/3	0.001430/38	0.001430738	2 9
0.00	0.000305370	0.001983043	0.002288818	0.000/115888	0.001430/3	0.001436738	0.001436738	-0.001430415	-1.11/17/E-0	6.0.003436		8 0.001436738	0.001436738	0.001436738	3.463	92E-05	0.00143	6738 0.00	1262182	0.001436738	0.001436738	5 6

# 4. Arranging data in EXCEL cont..

Insert column of zeroes between AB01 and AB03

	Clipboard	G	Font	5	A	lignment		G.	Number			p	C	D	T	F	0
											A	D	C C	D	E		0
	F1		- <b>f</b> x	AB03		1	fimes I	Ne - 11 - A ,	∧*\$-%	1	Time	North	Diag	South	AB01		AB03
							BI	' 🗃 💁 - <u>A</u> -	🖽 - % 🖑	2	0	0.000610352	-0.001678467	-0.001220703	0.000116414	0	0.00143
	A A	В	С	D	E	F		G	Н	3	0.0002	-0.006713867	-0.000915527	0.000152588	0.00011637	0	0.00143
	Time	North	Diag	South	AB01	AB03	ð,	Cut	B05	-4	0.0004	0.000762939	0.000915527	0.003662109	0.000116414	0	0.00143
2		0 0.000610352	-0.001678467	-0.001220703	0.000116414	0.001	<u>ه</u>	Сору	).00142941	5	0.0006	0.002288818	0.003509521	0.005340576	0.000115844	0	0.0014
3	0.00	02 -0.006713867	-0.000915527	0.000152588	0.00011637	0.001	8, 1	Paste Options:	).00142941	6	0.0008	0.00289917	0.001831055	0.000305176	0.000115186	0	0.0014
4	0.00	04 0.000762939	0.000915527	0.003662109	0.000116414	0.001		3	).00142941	7	0.001	0.000610352	-0.000762939	-0.001983643	0.000115142	0	0.0014
5	0.00	06 0.002288818	0.003509521	0.005340576	0.000115844	0.001	1	Parte Special	).00142941	8	0.0012	-0.001373291	-0.002441406	-0.000152588	0.00011523	0	0.0014
6	0.00	08 0.00289917	0.001831055	0.000305176	0.000115186	0.001		and prentan	).00142941	9	0.0014	-0.000762939	0.000457764	0.001525879	0.000116765	0	0.0014
2	0.0	01 0.000610352	-0.000762939	-0.001983643	0.000115142	0.001		nsert	).00142941	10	0.0016	0.000610352	0.002593994	0.001831055	0.000116677	0	0.0014
8	0.00	12 -0.001373291	-0.002441406	-0.000152588	0.00011523	0.001	1	Delete	).00142941	11	0.0018	0.000762939	-0.000305176	0.001831055	0.000116546	0	0.0014
5	0.00	14 -0.000762939	0.000457764	0.001525879	0.000116765	0.001	1	Clear Contents	).001429	12	0.002	0.002593994	0.003509521	0.000915527	0.000115142	0	0.001
1	0.00	16 0.000610352	0.002593994	0.001831055	0.000116677	0.001	21	Format Cells	).00142941	13	0.0022	-0.000915527	-0.002593994	-0.003356934	0.000115011	0	0.001
1	1 0.00	18 0.000762939	-0.000305176	0.001831055	0.000116546	0.001		Column Width	).00142941	14	0.0024	-0.000762939	-0.000610352	0.000305176	0.000114485	0	0.001
1	2 0.0	02 0.002593994	0.003509521	0.000915527	0.000115142	0.001		Bide	0.00142941	15	0.0026	-0.001068115	0.001220703	0.001068115	0.000116151	0	0.001
1	3 0.00	22 -0.000915527	-0.002593994	-0.003356934	0.000115011	0.001	- 16	Unhide	0.00142941	16	0.0028	0.001831055	0.002593994	0.003051758	0.0001158	0	0.001
1	4 0.00	24 -0.000762939	-0.000610352	0.000305176	0.000114485	0.001			0.00142941	17	0.003	0.001831055	0.003967285	-0.000915527	0.000116107	ő	0.001
1	5 0.00	26 -0.001068115	0.001220703	0.001068115	0.000116151	0.0014	30731	8 0.001436738	-0.00142941	18	0.0032	0.003204346	0.001068115	-0.004577637	0.000114748	Ő	0.001
-10	0.00	28 0.001831055	0.002593994	0.003051758	0.0001158	0.0014	30/31	8 0.001436738	-0.00142941	19	0.0034	-0.00289917	-0.005950978	-0.001983643	0.000115625	ő	0.001
1	0.0	03 0.001831055	0.003967285	-0.000915527	0.00011610/	0.0014	30/31	8 0.001436738	-0.00142941	20	0.0036	-0.001220703	0.000610352	0.001525870	0.000115537	ő	0.001
-	s 0.00	32 0.003204340	0.001068115	-0.004577657	0.000114748	0.0014	30/31	0.001436738	-0.00142941	21	0.0030	0.004110873	0.003814697	0.001525875	0.000115274		0.001
2	0.00	34 -0.00289917	-0.003930928	-0.001983043	0.000115025	0.0014	26721	0.001436738	-0.00142941	22	0.0038	0.001983643	0.003814097	0.00375834	0.000114792	0	0.001
-2	0.00	38 0.004119873	0.003814697	0.001525879	0.000115337	0.0014	36731	0.001436738	-0.00142941	22	0.0042	0.001765045	0.000610352	0.0000000000000000000000000000000000000	0.000115142		0.001
2	2 0.00	04 0.001983643	0.00213623	0.000305176	0.000114792	0.0014	3673	0.001436738	-0.00142941	24	0.0042	0.002/40382	0.000010332	0.00213023	0.000113142		0.001
2	1 0.00	42 0.002746582	0.000510352	0.00213623	0.000115142	0.0014	3673	0.001436738	-0.00142941	24	0.0044	-0.001831033	-0.000303170	0.000702939	0.000114704		0.001
2	1 0.00	44 -0.001831055	-0.000305176	0.000762939	0.000114704	0.0014	3673	0.001436738	-0.00142941	25	0.0040	-0.00213023	-0.001008115	0.000303176	0.000116414	0	0.001
2	5 0.00	46 -0.00213623	-0.001068115	0.000305176	0.000116414	0.0014	3673	8 0.001436738	-0.00142941	20	0.0048	-0.000610352	0.001831055	0.00213623	0.000116984	0	0.001
2	5 0.00	48 -0.000610352	0.001831055	0.00213623	0.000116984	0.0014	3673	8 0.001436738	-0.00142941	27	0.005	0.003051758	0.002288818	0.00213623	0.000116546	0	0.0014
2	7 0.0	05 0.003051758	0.002288818	0.00213623	0.000116546	0.0014	3673	8 0.001436738	-0.00142941	28	0.0052	0.002441406	0.002288818	0.000305176	0.000115449	0	0.0014
2	8 0.00	52 0.002441406	0.002288818	0.000305176	0.000115449	0.0014	3673	8 0.001436738	-0.00142941	29	0.0054	0.001831055	-0.001373291	-0.000915527	0.000115186	0	0.0014
- 2	0.00	54 0.001831055	-0.001373291	-0.000915527	0.000115186	0.0014	3673	8 0.001436738	-0.00142941	: 30	0.0056	0.000610352	-0.000305176	-0.000305176	0.000115888	0	0.0014

# 4. Arranging data in EXCEL cont..

#### Move AB12 between AB11 and RB01

# − Cut column S (AB12) → Insert cut cells between AB11 and RB01

	Cells			Editing											<b>A A</b>		
			Times	Ne - 11 - A	A	\$ - %	, 🔤	^					B	I 🗏 👌	• <u>A</u> •	.00 00. ▼	1
			B	I = 👌 - A	-	.000	8 🦪	٢		N	0		T		0	R	S
0	P	0		т		TT	V	E		AB10	AB11	RB	ð	Cuţ		RB03	AB12
<u>v</u>	PP02	ADIO	x	Cut	-	205	PP06	-	6738	0.001436738	0.001436738	0.0	-	Copy		0.00143673	3 0.001261306
2	KB03	ABI2	8	cui		505	KB00		6738	0.001436738	0.001436738	0.0	2	Paste Opt	ions:	0.00143673	3 0.001260823
385E-05	0.001436738	0.0012		Copy		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0				0.00143673	3 0.001260823
615E-05	0.001436738	0.0012	2	Paste Options:		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0		Paste Spe	cial   >	0.00143673	\$ 0.001260911
108E-05	0.001436738	0.0012	2			001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0		Incart Cut	Calls	0.00143673	3 0.001260472
038E-05	0.001436738	0.0012				001436738	0.00143	6738	16738	0.001436738	0.001436738	0.0		Delete	CEIIS	0.00143673	\$ 0.001261086
499E-05	0.001436738	0.0012		Paste Special		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0		Delete		0.00143673	\$ 0.001260385
408E-05	0.001436738	0.0012	,	Insert		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0		Clear Con	tents	0.00143673	\$ 0.001259771
038E-05	0.001436738	0.0012	,	Delete		001436738	0.00143	6738	16738	0.001436738	0.001436738	0.0	2	Format Co	ells	0.00143673	3 0.001260911
408E-05	0.001436738	0.0012		Clear Contents		01436738	0.00143	6739	16738	0.001436738	0.001436738	0.0		<u>C</u> olumn V	Vidth	0.00143673	3 0.001260122
400L-05	0.001436738	0.0012		cicul co <u>n</u> tents		001426720	0.00143	6720	6738	0.001436738	0.001436738	0.0		<u>H</u> ide		0.00143673	3 0.001263279
550E-05	0.001430738	0.0012	1	Format Cells		001450758	0.00145	6738	6738	0.001436738	0.001436738	0.0		<u>U</u> nhide		0.00143673	3 0.001262489
009E-05	0.001436/38	0.0012	1	Column Width		001430/38	0.00143	6738	6738	0.001436738	0.001436738	0.0	0143	0130 3.	0030212-0	75 0.00143673	3 0.001262358
177E-05	0.001436738	0.0012	2	Hide		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0	0143	6738 3.	63492E-0	0.00143673	3 0.001260955
123E-05	0.001436738	0.0012	2	Ushida		001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0	0143	6738 3.	69193E-0	0.00143673	3 0.00126113
562E-05	0.001436738	0.0012		Onnide	_	001436738	0.00143	6738	6738	0.001436738	0.001436738	0.0	0143	6738 3.	59631E-0	05 0.00143673	\$ 0.001260999
492E-05	0.001436738	0.0012	26095	0.001436738	0.	001436738	0.00143	6738	10/38	0.001436738	0.001436/38	0.0	0143	6738 3.	54285E-0	0.00143673	0.001261569
193E-05	0.001436738	0.001	2611	0.001436738	0.	001436738	0.00143	6738	10/38	0.001436738	0.001436/38	0.0	0143	6738 3.	504//E-0	0.001436/3	0.001260736
631E-05	0.001436738	0.0012	26099	0.001436738	0	001436738	0.00143	6738	10/38	0.001436738	0.001430738	0.0	0143	6720 2	09193E-0	0.001430/3	0.001262884
285E-05	0.001436738	0.0012	26156	0.001436738	0	001436738	0.00143	6738	16730	0.001430738	0.001430738	0.0	0143	6720 2	/1383E-0	0.00143073	0.001261202
477E-05	0.001436738	0.0012	6073	0.001436738	0	001436738	0.00143	6739	10738	0.001436739	0.001436738	0.0	0143	6720 3	59660E (	0.00143073	0.001201393
102E 05	0.001430738	0.0012	6200	0.001430738	0.	001426720	0.00143	6720	16738	0.001436738	0.001436738	0.0	0143	6738 3	12884E-0	0.00143073	0.001201744
193E-05	0.001430738	0.0012	20288	0.001430738	0.	001430/38	0.00143	5610	6738	0.001436738	0.001436738	0.0	0143	6738 3	50546E-0	0.00143073	8 0.001261481
385E-05	0.001436738	0.0012	20108	0.001436738	0	001436738	0.00143	0/38	10/38	0.001430738	0.001430738	0.0	0143	0130 3.	37340E-0	0.001430734	0.001201401

# 5. Copy data

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

	1	EF		G	H	1	1	- K	L	M	N	0	P	Q	R	5	Т	U	- 19 <b>X</b> 2	W	X	Y	Z	2
	1 A	B01	AB03	3	AB04	AB05	AB06	AB07	AB08	AB09	AB10	AB11	AB12	RB01	RB02	RB03	RB04	RB05	RB06	RB07	RB08	RB09	RB10	8
	2 0	000116414	0 0.001	436738	0.001436738	-0.001429415	-8.90096E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261306	0.001436738	3.71385E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.34143E-05	0.001436738	6
	3	0.00011637	0 0.001	1436738	0.001436738	-0.001429415	-7.5417E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260823	0.001436738	3.62615E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.28443E-05	0.001436738	
	4 0	000116414	0 0.001	1436738	0.001436738	-0.001429415	-7.76094E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260823	0.001436738	3.59108E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31951E-05	0.001436738	
	5 0	000115844	0 0.001	1436738	0.001436738	-0.001429415	-8.15556E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3 56038E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20989E-05	0.001436738	
	6 0	000115186	0 0.001	436738	0.001436738	-0.001439415	-7,14708E-06	0,001436738	0.001436738	0.001436738	0.001436738	0.001436738	0,001260472	0.001436738	3.499E-05	0.001436738	0.001436738	0.001436738	0,001436738	0.001436738	0.001436738	-2.19674E-05	0.001436738	
	7 0	000115142	0 0.001	1436738	0.001436738	-0.001429415	-6.7963E-06	0.001436738	0.001436738	0.001436738	0.001436758	0.001436738	0.001261086	0.001436738	3.53408E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.19235E-05	0.001436738	
	8	0.00011523	0 0.001	1436738	0.001436738	-0.001429415	-7.14708E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260385	0.001436738	3.56038E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.13535E-05	0.001436738	
	9 0	000116765	0 0.001	436738	0.001436738	-0.001429415	-6 70\$61E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001259771	0.001436738	3.53408E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436735	0.001436738	-2.13974E-05	0.001436738	
	10 0	000116677	0 0.001	1436738	0.001436738	-0.001429415	-8.41864E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3.556E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738	
	11 0	000116546	0 0.003	436738	0.001436738	-0.001429415	-9.07635E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260122	0.001436738	3.58669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.05643E-05	0.001436738	
	12 0	000115142	0 0.001	1436738	0.001436738	-0.001429415	-7.62939E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001263279	0.001436738	3.62177E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.22305E-05	0.001436738	
5	13 0	000115011	0 0.001	436738	0.001436738	-0.001429415	-7.36631E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262489	0.001436738	3.66123E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738	
	14 0	000114485	0 0.001	1436738	0.001436738	-0.001429415	-8.72557E-08	0.001436738	0.001436738	0.001436738	0.001436733	0.001436738	0.001262358	0.001436738	3.66562E-05	0.001436733	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738	
	15 0	000116151	0 0.001	1436738	0.001436738	-0.001429415	-9.51482E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260955	0.001436738	3.63492E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31951E-05	0.001436738	
	16	0.0001158	0 0.001	1436738	0.001436738	-0.001429415	-7.84863E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.00126113	0.001436738	1.69193E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738	
	17 0	000116107	0 0.001	1436738	0.001436738	-0.001429415	-7.67324E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260999	0.002436738	3.69631E-05	0.001436738	0.001436738	0,001436738	0.002436738	0.001436738	0.001436738	-2.25813E-05	0.001436738	
	18 0	000114748	0 0.001	1436738	0.001436738	-0.001429415	-8.46249E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261569	0.001436738	3.54285E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.40721E-05	0.001436738	
	19 0	000115625	0 0.001	436738	0.001436738	-0.001429415	-7.23477E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260736	0.001436738	3.56477E-05	0.001436738	0.001436738	0.001436738	0.002436738	0.001436738	0.001436738	-2.24936E-05	0.001436738	
	20 0	.000115537	0 0.001	436738	0.001436738	-0.001429415	-3.19941E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436735	0.001262884	0.001436738	3.69193E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436735	0.001436738	-2.26689E-05	0.001436738	
	21 0	.000115274	0 0.001	1436738	0.001436738	-0.001429415	-8.98865E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261086	0.001436738	3.71385E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.44667E-05	0.001436738	
	22 0	000114792	0 0.003	1436738	0.001436738	-0.001429415	-7.84\$63E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261393	0.001436738	3.59108E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.36774E-05	0.001436738	
	23 0	000115142	0 0.001	1436738	0.001436738	-0.001429415	-8.3748E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261744	0.001436738	3.58669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.38528E-05	0.001436738	
	24 0	000114704	0 0.001	1436738	0.001436738	-0.001429415	-7.58555E-06	0.001436738	0.001436738	0.001456738	0.001436738	0.001436738	0.00126227	0.001436738	3.42884E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.30197E-05	0.001436738	
	B	000116414	0 0.000	1436738	0.001436738	-0.001429415	-8.06787E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261431	0.001436738	3.59546E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0,001436738	-2.31513E-05	0.001436738	
	26 0	000116984	0 0.000	1436738	0.001436738	-0.001429415	-8.55018E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261875	0.001436738	3,78839E-05	0.001436738	0.001436738	0.001436738	0.001436738	0,001436738	0.001436738	-2.24059E-05	0.001436738	
	27 0	000116546	0 0.001	1436738	0.001436738	-0.001429415	-7.19092E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262182	0.001436738	1.46392E-05	0.001438738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.34143E-05	0.001436738	
	28 0	000115449	0 0.001	436738	0.001436738	-0.001429415	-8.72557E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261481	0.001436738	3.57354E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.30197E-05	0.001436738	
	29 0	000115180	0 0.001	1436738	0.001436738	-0.001429415	-9.25174E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261349	0.001436738	3.604Z3E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	2.415978-05	0.001436738	
	30 0	000115888	0 0.001	436738	0.001436738	-0.001429415	-8.68172E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260955	0.002436738	3.58231E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31951E-05	0.001436738	
	21 0	.000117203	0 0.001	436738	0.001436738	-0.001429415	-7.93632E-06	0.001436738	0,001436738	0.001436738	0.001436735	0,001436735	0.001260385	0.001436738	3.52969E-05	0.001436738	0,001436738	0.001436738	0.001436738	0.001436735	0.001436738	-2.1792E-05	0.001436738	
	32 0	000117598	0 0.001	1436738	0.001436738	-0.001429415	-8.15556E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001280078	0.001436738	3.61739E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.27566E-05	0.001436738	
	33	0.0001158	0 0.003	436738	0.001436738	-0.001429415	-8.55018E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3.53846E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738	
	34 0	000115888	0 0.001	436738	0.001436738	-0.001429415	-8.50634E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261349	0.001436738	3 51654E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738	
12	12 0	000115055	0 0.003	496738	0.001436738	-0.001429415	-7.45401E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001281088	0.001436738	3.59108E-05	0.001436738	0.001436738	0.001436738	0.001436738	0,001436738	0.001436738	-2.20251E-05	0.001436738	
	30 0	000110389	0 0.001	430738	0.001436738	0.001429415	-1.13477E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001281088	0.001436738	3.38669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	Z.14851E-05	0.001436738	
	11 0	000115888	0 0.000	1430738	0.001436738	-0.001429415	-9.07635E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261437	0.001436738	3.494023E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20551E-05	0.001436738	
	38 0	000116414	0 0.001	1430738	0.001436738	-0.001429415	+7.23477E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.0012617	0.001436738	3.613E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20112E-05	0.001436738	
	23 0	000115888	0 0.001	1920738	0.001436738	-0.001429415	-7.93632E-06	0.001436738	0.001436738	0.001436738	0.001436738	0,001436738	0,001261042	0.002436738	3.34553E-05	0.001436738	0.001436738	0.001436738	0.002436738	0.001436738	0.001436738	-2.22305E-05	0.001435738	
	40 0	CKR0115970	0 0.001	436738	0.001436718	-0.001479415	-7.8450 \$700	0.001410718	0.001416718	0.001415718	0.001410718	0.001410718	0 001 201 788	0.001455751	1.309158-05	0.001416718	0.001410718	0.001435738	0.001456751	0.001410718	0.001416718		0.001436738	

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

						1: Unspecified	2: No Unit
iste Raw DeverCo	nner Data H	are X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Carias					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Windo	w	· · ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-00
Styles	•	Paste to Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-00
Clear	· • •	Paste to Editor	Cuity		10:	1.800000E-003	-1.983643E-00
	· ·				11:	2.000000E-003	2.593994E-00
Magnify					12:	2.200000E-003	-1.525879E-00
Autoscale					13:	2.400000E-003	-9.155270E-00
Autoscale							
Cursor							
Zoom	F10						
Properties	D.	.60) × W27:	AB4-Cleaned Data				

W1: Untitled Data X

#### 7. Click PreProcess button to inspect data



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

Truck ID: 1.000000	
	OK Cancel

#### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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

.*	2 🗹	Medford I-5	Redmond US-97	Dever-Conner I-5	PreProcess	ReadDataq
_				Dever-Conner I-	5	

• Verify Truck ID and LPSVoltage\*

Dever Conner Information	23
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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	X
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



### **14. Troubleshooting – Changing LPSVoltage**

- 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)

W60: MPP												X
2 - 1.5 - 1 - 0.5 - 0			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	A				1				
	1.85	1.9	1.95	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35	2.4

- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK

Dever Conner Information	23
Truck ID: 3.000000	
Li oronago, jorrococo	OK Cancel

• 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

		Time
•		n
		Diag
•	11 "AB" strain gauges listed	s AB01
		RB01
	– AB12 listed with RB	AB03
		AB04
	– AB02 missing	AB05
		ABUD
•	10 "RB" strain gauges listed	AB07 AB08
		AB09
	– RB01 listed with AB	AB10
		AB11
	– RB10 skipped	RB02
		RB03
	– Includes RB11	AB12
		RB04
٠	Dates	rb04
		RB05
		RDUU

- 10/28/2009

Channel	Datatype
Time	DT_FLOAT
n	DT_FLOAT
Diag	DT_FLOAT
s	DT_FLOAT
AB01	DT_FLOAT
7 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	
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



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

	_
DOUBLE CLIC	K

🔁 DC10-28-09_10532828102009
🔁 DC10-28-09_10533628102009
🔁 DC10-28-09_10534428102009
🔁 DC10-28-09_10540028102009
🔁 DC10-28-09_10541928102009
🔁 DC10-28-09_10543128102009
🔁 DC10-28-09_10543828102009
🔁 DC10-28-09_10544628102009
🔁 DC10-28-09_10550128102009
🔁 DC10-28-09_10550828102009
🔁 DC10-28-09_10551828102009
🔁 DC10-28-09_10552528102009
🔁 DC10-28-09_10553128102009
🔁 DC10-28-09_10555128102009
🔁 DC10-28-09_10564628102009
🔁 DC10-28-09_10571128102009
🔁 DC10-28-09_10572128102009
🔁 DC10-28-09_10572828102009
🔁 DC10-28-09_10574428102009
🔁 DC10-28-09_10575128102009
R DC10-28-09_10583128102009

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10/28/2009 12:53	TDMS File	1,956 KB
10/28/2009 12:53	TDMS File	1,956 KB
10/28/2009 12:54	TDMS File	1,956 KB
10/28/2009 12:54	TDMS File	1,956 KB
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10/28/2009 12:56	TDMS File	1,956 KB
10/28/2009 12:57	TDMS File	1,956 KB
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10/28/2009 12:57	TDMS File	1,956 KB
10/28/2009 12:57	TDMS File	1,956 KB
10/28/2009 12:57	TDMS File	1,956 KB
10/28/2009 12:58	TDMS File	1,956 KB

## 3. Open Data tab in EXCEL workbook

	III = 10 - €1 - 10					K   🖌	19 - (** -	- -				
F	ile Home Insert Page I	ayout Form	nulas Data	Review View	Developer	File	Home	Insert Pa	ge Layout Fo	rmulas Data	Review	View
ľ	Cut Times New I	Roman * 11	• A• A• =	= 😑 🗞 🖶	Wrap Text	Ĉ	K Cut	Times N	ew Roman 👻 11	т А* А* =	• = 😑 🕺	** 冒
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	A1 - (*	f <sub>x</sub> R	loot Name				A1	<b>•</b> (	≘ fx	Time		
	A	В	С	D	E		А	В	С	D	E	F
1	Root Name	Title	Author	Date/Time	Groups						AB01	
2	DC08192009_09371619082009											
3						1 <b>T</b>	ime	axlel	axle2	axle3	sg3	AB02
4	Group	Channels	Description	header		2	0	0.000305176	0.002288818	0.000762939	0.000610878	-0.0005
				Station		3	0.0002	-0.002288818	-0.003814697	-0.005645752	0.000612807	-0.0005
				Name:DC08192009		4	0.0004	-0.002441406	0.001220703	0.000457764	0.000612193	-0.0005
				Sample Rate:5000.0		5	0.0006	-0.000152588	0.005645752	0.001220703	0.00061307	-0.0005
				Comments:		0	0.0008	-0.001831055	0.0013/3291	0.002441406	0.000610878	-0.0005
						7	0.001	0.001831055	-0.000915527	-0.001373291	0.000611492	-0.0005
				Timeaxle1axle2		 8	0.0012	0.000610352	-0.000457764	-0.002746582	0.000608905	-0.0005
				axle3AB01		9	0.0014	-0.00213623	-0.003967285	-0.001220703	0.000613026	-0.0005
						10	0.0010	-0.002288818	-0.001220703	-0.000152588	0.000612456	-0.0005
				sg3AB02AB03		10	0.0018	-0.001983043	0.001008115	0.001373291	0.0006112450	-0.0005
				AB04AB05AB06		12	0.002	0.002595994	0.000303176	-0.000437704	0.000610045	-0.000
				AB07AB08AB		13	0.0022	-0.001323879	-0.001220703	-0.001373291	0.000612895	-0.0005
				09AB10AB11A		14	0.0024	-0.000913327	-0.001078407	-0.001008113	0.000612893	-0.0005
				B12		16	0.0020	-0.000702939	0.0001575291	0.001678467	0.000612531	-0.0005
				RB01RB02RB0		17	0.0020	0.001220703	0.000152588	0.000762939	0.000612632	-0.0005
				3RB04RB05RB		18	0.0032	0.001220703	-0.0002288818	0.000762939	0.000611185	-0.0005
				06RB07RB08R		19	0.0034	-0.001220703	-0.001831055	-0.002288818	0.000611053	-0.0005
				B09		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
				secsvoltsvoltsvol		22	0.004	0.001068115	0.000610352	0.001831055	0.000611842	-0.0005
				tsvoltsvoltsvolts		23	0.0042	0.006103516	0.001983643	0.001525879	0.000612456	-0.0005
				voitsvoitsvoits		24	0.0044	0.00213623	0.000152588	-0.001373291	0.000610571	-0.0005
				voltsvoltsvoltsvo		25	0.0046	-0.001983643	-0.004425049	-0.002441406	0.000611185	-0.0005
				nsvoitsvoitsvoits		26	0.0048	-0.001220703	-0.000762939	-0.000915527	0.000611623	-0.000
				vonsvonsvons		27	0.005	-0.00213623	0.000305176	-0.000305176	0.000612369	-0.0005
				tevolte		28	0.0052	0.000915527	0.002593994	0.00289917	0.000612105	-0.0005
5	Data	24		RSVORS		29	0.0054	0.003509521	0.001831055	-0.002593994	0.000611053	-0.0005
6	Data	2:	-			30	0.0056	-0.001983643	-0.004272461	-0.003967285	0.00061136	-0.0005
7	Data			CLICK		31	0.0058	-0.002441406	-0.003509521	-0.000610352	0.000611886	-0.000
14 4	DC08192009_0937161	9082009 (roc	ot / Data	CLICK			H DC0	3192009_09371	619082009 (roo	t Data 🤇	2/	

# 4. Arranging data in EXCEL

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

Upp	para.	19.1	1 OUT	.04	1.0	goneot		NUMBER	5		~			<i>D</i>			0	
[	F1		~ f.	RB01		2000/00/00 / C	Times Ne - 11 -	A & S .	• % •	1	Time		Diag		AB01		RB01	AB03
							B / # .	A	18 28 0	2	0	-0.00289917	0.003204346	0.001831055	0.000115449		0.000110807	-2 605
Carl .	Ă.	В	C	D	E	F	G	н	I	3	0.0002	-0.001068115	-0.000152588	0.000610352	0.000115712	-	0.000110232	-2.7057
							👗 Cut			4	0.0004	0.003814697	0.001831055	0.00213623	0.000116195		0.000109223	.2 8585
1 Time		n	Diag	\$	AB01	RB01	Copy		AB05	4	0.0005	0.004882813	0.005187988	0.002746582	0.000115537		0.000109311	-2 8500
2	0	-0.00289917	0.00320434	6 0.001831055	0.000115445	0.000110802	Paste Option	ns: 00118	8 0.0002	-	0.0000	0.000015527	0.000015527	0.001626970	0.000113937	_	0.000110011	2.6040
3	0.0002	-0.001068115	-0.00015258	8 0.000610352	0.000115712	0.000110232		01127	7 0.0002	7	0.0000	0.001220203	0.001373201	0.001525870	0.000115011		0.0001101	-2.91/
4	0.0004	0.003\$14697	0.001\$3105	5 0.00213623	0.000116195	0.000109223	Paste Specia	00864	4 0.0002		0.001	0.0001220703	0.001373291	0.001323879	0.000115011	_	0.000111764	3.766
5	0.0006	0.004882813	0.00518798	8 0.002746582	0.000115537	0.000109311	-	00074	4 0.0002		0.0012	-0.000132388	0.002288818	0.001373291	0.000115518		0.000111700	-2.7001
6	0.0008	0.000915527	-0.00091552	7 -0.001525875	0.000113827	0.000110012	prien	01697	7 0.000		0.0014	0.001983043	0.00289917	0.002593994	0.000115625		0.000109092	-2,810
1	0.001	0.001220703	0.00137329	1 0.001525875	0.000115011	0.0001101	TSelete	00776	5 0.0002	10	0.0016	0.003509521	0.003356934	0.006103516	0.000115976	_	0.000111065	-2.115
8	0.0012	-0.000152588	0.00228881	8 0.001373291	0.000115318	0.000111766	Clear Conten	113 01083	3 0.0002	11	0.0018	0.000305176	-0.001220703	-0.003509521	0.000116589		0.000108785	-2,8719
9	0.0014	0.001983043	0.0028991	1 0.002593994	0.000115025	0.000109092	Eormat Cells		0.0002	12	0.002	-0.000915527	0.001220703	-0.000610352	0.000115888		0.000110539	-2.907
10	0.0010	0.003309521	0.00333093	2 0.000103510	0.000115976	0.000111082	Golumn Wid	th_ 00774	6 0.0002	13	0.0022	0.001220703	0.000152588	0.000915527	0.000115581		0.00011124	-2.863
12	0.0028	-0.000915527	0.00122070	3 -0.000510351	0.000115885	0.000110535	Hide	02195	R 0.0002	14	0.0024	-0.001373291	-0.001831055	0.000610352	0.000117247		0.000111196	-2.683
13	0.0022	0.001220203	0.00015255	8 0.000915523	0.000115581	0.00011124	Unhide	00000	5 0.0002	15	0.0026	0.002441406	0.004730225	0.003051758	0.00011637		0.000108565	-2.806
14	0.0024	-0.001373793	-0.00183105	5 0.000510351	0.000117247	0.000111196	-2 68344E-05	0.000201653	3 0 0002	16	0.0028	0.001525879	0.00213623	0.001525879	0.000115449		0.000109399	-2.854
15	0.0026	0.002441406	0.00473022	5 0.003051758	0.00011637	0.000108565	-2 80621E-05	0.000200294	¥ 0.0002	17	0.003	0.004425049	0.000915527	0.001525879	0.000114222		0.000109881	-2.893
16	0.0028	0.001525875	0.0021362	3 0.001525879	0.000115449	0.000109399	-2.85445E-05	0.000199767	7 0.0002	18	0.0032	-0.000152588	0	-0.001525879	0.000115888		0.000109399	-2.788
17	0.003	0.004425045	0.00091552	7 0.001525879	0.000114222	0.000109881	-2.89391E-05	0.000201258	8 0.0002	19	0.0034	-0.001220703	-0.000610352	0.000457764	0.000116853		0.000111021	-2.893
18	0.0032	-0.000152588	· · · · · · · · · · · · · · · · · · ·	0 -0.001525879	0.000115888	0.000109399	-2.78868E-05	0.00020231	1 0.0002	20	0.0036	0.000915527	0.000915527	0.001983643	0.000116414		0.000110232	-2.871
19	0.0034	-0.001220703	-0.00061035	2 0.000457764	0.000116853	0.000111021	-2.89391E-05	0.000202223	3 0.0002	21	0.0038	0.003356934	0.003967285	0.003204346	0.000115274		0.000110802	-2.911
20	0.0036	0.000915527	0.00091552	7 0.001983643	0.000116414	0.000110232	-2.87198E-05	0.00020139	9 0.0002	22	0.004	0.007288818	0.001373291	0.001525879	0.000115011		0.000109793	.2 946
21	0.0038	0.003356934	0.00396728	5 0.003204346	0.000115274	0.000110802	-2.91145E-05	0.000202179	9.0.0002	22	0.0012	0.001678467	0.00213623	0.001525870	0.000115712		0.000110845	2 871
22	0.004	0.002288818	0.00137329	1 0.001525879	0.000115011	0.000109793	-2.94652E-05	0.000200776	5 0.0002	24	0.0011	0.001010407	0.000213022	0.0012022072	0.000116114		0.000110342	3.72
23	0.0042	-0.001678467	-0.0021362	3 -0.001525879	0.000115712	0.000110845	-2.87198E-05	0.000201828	8 0.0002	24	0.0044	0.003814097	0.003493104	0.003309321	0.000110414		0.000110431	-6.13
24	0.0044	0.003814691	0.00549316	4 0.003509521	0.000116414	0.000110451	-2.7536E-05	0.00020139	9 0.0002	20	0.0040	-0.000305170	0.000610352	0.001068115	0.000110414		0.000110451	-2.119
25	0.0046	-0.000305176	0.00061035	2 0.001068115	0.000116414	0.000110451	-2.77991E-05	0.000201477	7 0.0002	20	0.0048	0.003356934	0.004730225	0.0050354	0.000113827		0.000110012	-2.880
26	0.0048	0.003356934	0.00473022	5 0.0050354	0.000113821	0.000110012	-2.88075E-05	0.000200294	4 0.000	27	0.005	-0.000305176	0.001068115	-0.000457764	0.00011523		0.000110889	-2.876
27	0.005	-0,000305176	0.00106811	5 -0.000457764	0.00011523	0.000110889	-2.87637E-05	0.000200162	2 0.0002	28	0.0052	0.001220703	0.001373291	0.001220703	0.000115888		0.000110056	-2.832
28	0.0052	0.001220703	0.00137329	1 0.001220703	0.000115888	0.000110056	-2.83252E-05	0.000202574	4 0.0002	29	0.0054	-0.000915527	-0.000915527	-0.000152588	0.000115274		0.000110319	-2.740
29	0.0054	-0.000915523	-0.00091552	7 -0.000152588	0.000115274	0.000110319	-2.74044E-05	0.000201605	9 0.0002	30	0.0056	0.000305176	-0.000305176	0.003204346	0.000115844		0.000109004	-2.674
30	0.0056	0.000305176	-0.00030513	6 0.003204346	0.000115844	0.000109004	-2.67467E-05	0.000200337	7 0,0002	31	0.0058	0.002746582	0.003967285	0.003662109	0.0001158		0.000109749	-2.75
31	0.0058	0.002746582	0.00396728	5 0.003662105	0.0001158	0.000109749	-2.7536E-05	0.000201214	4 0.0002	32	0.006	0.003814697	0.004119873	0.001831055	0.000116019		0.000109486	-2.933
32	0.006	0.003814693	0.0041198	3 0.001831055	0.000116015	0.000109486	-2.93337E-05	0.000200951	1 0.0002	33	0.0062	0.001220703	0.001068115	0	0.00011523		0.000110012	-2.806
33	0.0062	0.001220703	0.00106811	2 0 00001//22	0.00011523	0.000110012	-2.80621E-05	0.000201784	4 0.0002	34	0.0064	0.000762939	-0.000305176	-0.000915527	0.000114836		0.000110012	-2.801
26	0.0004	0.000762955	-0.00030517	6 -0.00091552	0.000114830	0.000110012	-2.80183E-03	0.000201605	7 0.0002	35	0.0066	-0.000152588	-0.000305176	-0.001831055	0.00011751		0.000110363	-2.889
16	0.0000	-0.000152588	0.00030311	6 0.00228881052	0.00011751	0.000110303	-2.0095/E-03	0.00020109/	5 0.000	36	0.0068	0.001068115	0.002441406	0.002288818	0.00011466		0.000111021	-2.784
37	0.002	0.007288818	0.00244140	4 0.0050354	0.000115446	0.000109925	-2.76429E-05	0.000200293	1 0 0002	37	0.007	0.002288818	0.002593994	0.0050354	0.000115449		0.000109925	-2.744
3.8	0.0072	0.003812603	-0.00350047	1 0.0009100334	0.000112445	0.000109925	-2 79744F-05	0.000200294	0.0007	3.8	0.0072	0.003814697	-0.003509531	0.000915527	0.000115099		0.000109960	.2 797
30	0.0074	0.001525876	0.00091551	7 .0.00213623	0.000114961	0.000110495	-2 7536E-05	0.000200864	1 0 0007	20	0.0072	0.001535870	0.000015527	0.00212623	0.000114967		E 000110/05	2.75
14 4 5 51	DC10	28.00 105326	28102009 (ros	t Data		1				29	0.0074	0.001223879	0.000712227	-0.00213023	0.000114907		B+ 000110495	-2.73
Ready	3		Construction from		e					-	DCIC	105328	20102003 (1005	Coata 2 to	1000	Traff		
	-	-	-	-						1.00	147	53		The No	Shipping	1001	and the second se	

## 4. Arranging data in EXCEL cont..

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

Immes Ne - 11     A     A     S     S       B     I     Immes Ne - 11     A     A     S     S       B     I     Immes Ne - 11     A     A     S     S       B     I     Immes Ne - 11     A     A     S     S       B     I     Immes Ne - 11     A     A     S     S       B     I     Immes Ne - 11     A     A     S     S     T       B     I     Immes Ne - 11     A     A     S     T       B     I     Immes Ne - 11     A     A     S     T       B     I     Immes Ne - 11     A     A     S     T       B     I     Immes Ne - 11     I	_	Alig	nment	Fai		Number	G .					Time	es Ne - 11 -	A A	· s - %	, , 53
B     I					Time	es Né * 11 *	A A S	- 9	9			B	$r \equiv \Delta r$	Α.	□□ <b>- *</b> 29	.00 ~
E     F     G     H     I       AB01     RB01     Copy     A     Copy     A     Copy     A     Copy     A     Copy     Paste Options:     0.00011541     7.50662E-01     Paste Options:     0204503     0.000131541     7.50662E-01     Paste Options:     512E-05     1.96873E-0     1.92673E-0     0.000131585     7.57678E-00     Paste Options:     512E-05     2.2362E-05     1.92675E-0	_				B	I 🗏 🆑 -	A - 🖽 -	*.0 .00	8	D	0	-				*.0 V
AB01     Cut     0     AB11     RB02     Copy     rb04       55     0.000115449     0     0.000110020     Paste Options:     00118     (0020367     0.000131541     7.50662E-0;     Paste Options:     535E-05     1.96873E-0       20     0.000115712     0     0.000109223     0.000109231     0014     0.000131541     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.57678E-0;     7.5855E-0;     1.96873E-0;     9.81E-0;     2.2362E-0;     9.81E-0;     2.2362E-0;     9.81E-0;     2.2362E-0;     9.81E-0;     2.2362E-0;     9.81E-0;     2.2162E-0;     9.81E-0;     2.2162E-0;     9.81E-0;     2.1166E-0;     1.9775E-0;     2.11781E-0;     1.99504E-0;     1.99504E-0;     1.99504E-0;     1.99504E-0;     2.6166E-0;     1.99504E-0;     2.2005E-0;     2.200574E-0;		E	F	G		н	I		0	P	Q	X	Cut		5	I RB04
AB01     RB01     Copy     A     ColdHight     Copy     A     ColdHight     Paste Options:     335E-05     1.96873E-0       55     0.000115712     0     0.000110322     0.000110322     0.000110323     7.50662E-0     Paste Options:     512E-05     2.04327E-0       23     0.000116195     0     0.0001102223     0.000115537     0     0.000109211     Paste Special     003144     0.00013141     7.58555E-0     Paste Special	_				¥	Cu <u>t</u>			0	ABII	RB02		Copy			rb04
55   0.000115849   0   0.000110802   Paste Options:   00118   0020367   0.000131585   7.57678E-0;		AB01		RB01		Copy		A	A 0204503	0.000131541	7.50662E-0	<u></u>	Paste Option	is:	535E-05	1.96873E-0
52   0.000115712   0   0.000110232   0.000110232   0.000110232   0.000109223   0.000109223   0.000109223   0.000109223   0.000109223   0.000115537   0   0.000109213   0.000109211   0.000113827   0   0.000110102   Paste Special   00074   0203977   0.000131454   7.5893E-01   Insert Cut Cglis   119E-05   2.16166E-0     79   0.000115011   0   0.000110102   Paste Special   01697   0202793   0.000131541   7.58993E-01   Insert Cut Cglis   119E-05   2.16166E-0     91   0.000115011   0   0.000110102   Paste Special   01687   0204531   0.000131604   7.71709E-0   Clear Contents   81E-05   2.12305E-0   2.28005E-0   2.28005E-0   2.2005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.28005E-05   2.2005FE-05   2.2005FE-05   2.2005FE-05   2.2005FE-05   2.2005FE-05   2.00578.0   2.0177   0.000131629   7.67763E-05   2.02574E-05   1.9364E-05   2.20558E-0   2.00578.0   2.0177   0.000132594   7.57763E-05   2.02574E-05 <td>55</td> <td>0.000115449</td> <td></td> <td>0.000110802</td> <td>1</td> <td>Paste Options</td> <td>: 001</td> <td>18 (</td> <td>( 0020367</td> <td>0.000131585</td> <td>7.57678E-0</td> <td></td> <td>B</td> <td></td> <td>512E-05</td> <td>2.04327E-0</td>	55	0.000115449		0.000110802	1	Paste Options	: 001	18 (	( 0020367	0.000131585	7.57678E-0		B		512E-05	2.04327E-0
23   0.000116195   0   0.000109223   Paste Special   Past	52	0.000115712		0.000110232	2		0112	27 (	0203714	0.000132331	7.62062E-0				981E-05	2.2362E-0
82     0.000115537     0     0.00019311       79     0.000113827     0     0.000110012     Insert     00074     0203977     0.000131454     7.58116E-0:     Insert Cut Cells     19E-05     2.16166E-0       79     0.000115011     0     0.000110012     Insert     01697     0202793     0.000131103     7.58116E-0:     Insert Cut Cells     19E-05     2.16166E-0       91     0.000115011     0     0.000111766     Delete     00776     02024152     0.000131804     7.71709E-0:     7.63324E-0!     Clear Contents     81E-05     2.11781E-0       94     0.000115625     0     0.00011065     Delete     D1083     0203451     0.000131629     7.63763E-0!     Clear Contents     81E-05     2.13535E-0       20     0.000115589     0     0.00011124     Defease     D0776     0202573     0.00013259     7.6763E-0!     Column Width     Hide     D0588     0202574     0.00013259     7.5101E-0!     D17640E-0     2.02574E-05     1.99504E-05     2.24059E-0     2.2458E-05     2.04058E-05	23	0.000116195		0 0.000109223	5		0080	54 (	203144	0.000130796	7.58555E-0		Paste Special	▶	581E-05	1.9775E-0
79   0.000113827   0   0.000110012   Insert   01697   0202793   0.000131541   7.58993E-0:   Delete   566E-05   1.99504E-0     79   0.000115011   0   0.000110012   Delete   00776   0202793   0.000131804   7.58993E-0:   7.67324E-0:   7.71709E-0:   7.71709E-0:   7.71709E-0:   7.71709E-0:   7.67324E-0:   7.00030E-0:   2.28005E-0   2.206958E-0   2.006958E-0   2.006958E-0   2.00658E-0   2.00658E-0   2.00658E-0   2.00658E-0   2.02574E-0   1.9846E-05   2.00658E-0   2.02574E-0   1.98458E-05   1.99504E-0   2.2658E-0	82	0.000115537		0.000109311		Paste Special.		74 (	0203977	0.000131454	7.58116E-0		Insert Cut Ce	lls	419E-05	2.16166E-0
79   0.000115011   0   0.0001101   Delete   00776   (   0204152   0.00013103   7.67324E-01   Clear Contents   081E-05   2.11781E-0     91   0.000115015   0   0.000111766   0.000111766   0.000111065   0.000111065   0.000110057   0.000110057   0.000110057   0.000110057   0.000110539   0.000110539   0.0001110539   0.00011124   0.00011102   0.00011102   0.00011102   0.00011102   0.000110259   0.00011102   0.00011102   0.00011224   0.00011224   0.00011224   0.00013259   7.57032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.67032-0   7.571010-0   7	79	0.000113827		0.000110012	2	Insert	016	97	0202793	0.000131541	7.58993E-0		Delete		366E-05	1.99504E-0
91   0.0001115318   0   0.000111766   0.000111766   0.00011065   0.000109092   Image: constraint of the second	79	0.000115011		0 0.0001101		Delete	007	76 (	0204152	0.000131103	7.67324E-0		Clear Conter	its	081E-05	2.11781E-0
94   0.000115625   0   0.000109092   Enrmat Cells   20117   (   0204634   0.000131629   7.60309E-01   Column Width   05E-05   2.13535E-0   2.0117   (   0203889   0.000131629   7.67763E-01   2.0117   (   0203889   0.000133558   7.67763E-01   2.0117   (   0203889   0.000133558   7.67763E-01   2.25813E-01   2.25813E-01   2.25813E-01   2.26834E-05   2.0058E-01   2.2685E-05   2.0658E-05   2.26958E-0   2.01658E-05   2.02574E-05   2.02574E-05   2.02574E-05   2.02574E-05   1.93804E-05   2.24059E-05   2.24059	91	0.000115318		0 0.000111766	5	Clear Content	s 010	83 (	0203451	0.000131804	7.71709E-0	<b>P</b>	Format Cells.		965E-05	2.28005E-0
16   0.0001115976   0   0.000111065   2.000011065   0.00011065   0.000110658   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.0001110539   0.0001110539   0.000110539   0.000110539   0.0001110539   0.0001110539   0.0001110539   0.0001110539   0.0001110539   0.0001110539   0.0001110539   0.0001110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110539   0.000110559   0.000110539   0.000110559   0.0001010559   0.000201653   0.000201653   0.00011259   7.55408E-05   2.02574E-05   1.99804E-05   2.20598E-05   2.06958E-05   2.06958E-05 <th< td=""><td>94</td><td>0.000115625</td><td></td><td>0.000109092</td><td></td><td>Earmat Calls</td><td>201</td><td>17 (</td><td>0204634</td><td>0.000131629</td><td>7.60309E-0</td><td>_</td><td>– Column Wid</td><td>th</td><td>205E-05</td><td>2.13535E-0</td></th<>	94	0.000115625		0.000109092		Earmat Calls	201	17 (	0204634	0.000131629	7.60309E-0	_	– Column Wid	th	205E-05	2.13535E-0
21   0.000116589   0   0.000108785   Column Width   0776   0203801   0.000131629   7.52416E-01   Mide   SEE-05   2.06958E-05   2.06958E-05     52   0.000115581   0   0.000111247   0.000111196   -2.68344E-05   0.000201653   0203501   0.00013259   7.57246E-05   2.02574E-05   1.93804E-05   2.24059E-05     52   0.00011637   0   0.000108565   -2.80621E-05   0.000200294   0203714   0.000132194   7.55408E-05   1.98458E-05   1.99504E-05   2.12658E-05   2.06958E-05   2.06958E-05   2.06958E-05   2.06958E-05   2.06958E-05   2.06958E-05   0.000202574   0.000132199   7.55924E-05   1.98458E-05   1.99504E-05   2.12658E-05   2.00658E-05   2.00658E-05   2.00658E-05   2.00658E-05   2.00658E-05   2.00658E-05   1.99504E-05   1.99504E-05   1.99504E-05   1.99504E-05   2.12658E-05   2.00658E-05   2.00658E-05   2.00658E-05   1.99504E-05   1.99504E-05   1.99504E-05   2.00658E-05   2.00658E-05   2.00658E-05   2.00658E-05   1.99504E-05   1.99504E-05   1.99504E-05   2.00588E-05   2.00658E-05   2.00658E-	16	0.000115976		0.000111065		Format Cells	006	88 (	0203889	0.000133558	7.67763E-0		Hide		296E-05	2.25813E-0
52     0.000115888     0     0.000110539     Hide     0.2398     0.000132067     7.51101E-01     2.00001     775E-05     2.12658E-0       27     0.000115581     0     0.00011114     0.00995     0.00013259     7.51101E-01     2.02574E-05     2.22574E-05     2.24059E-0       52     0.000117247     0     0.000110856     -2.86344E-05     0.000201653     0.000132199     7.55408E-05     1.96435E-05     1.98058E-05     2.06958E-0       58     0.00011637     0     0.000108565     -2.80621E-05     0.000200294     0.000132199     7.55924E-05     1.99504E-05     1.99504E-05     2.06958E-0       79     0.000114222     0     0.000109389     -2.85445E-05     0.000201258     0.2020421     0.0001311015     7.57239E-05     1.99434E-05     2.06388E-05       79     0.000114222     0     0.000109389     -2.85445E-05     0.00020231     0204021     0.00013140     7.57239E-05     1.99434E-05     2.03889E-05     1.99434E-05     2.20378E-05     1.99512E-05     2.20378E-05     1.99512E-05     2.20378E-05     1.994243E-05	21	0.000116589		0.000108785	5	Column Width	007	76 (	0203801	0.000131629	7.52416E-0		Unbide		358E-05	2.06958E-0
27     0.000115581     0     0.00011124     Unhide     00995     0.000132594     7.67324E-05     2.02574E-05     1.93804E-05     2.24059E-0       52     0.000117247     0     0.000111196     -2.68344E-05     0.000201653     0.00201653     0.000132594     7.67324E-05     1.9435E-05     1.9635E-05     1.96058E-05     1.96058E-05     1.9635E-05     2.02574E-05     2.02574E-05     1.99504E-05     2.12658E-05     2.02658E-05     1.99504E-05     2.12658E-05     2.02658E-05     1.99504E-05     2.12658E-05     2.03858E-05     1.99504E-05     2.12658E-05     2.03858E-05     1.99504E-05     2.03858E-05     1.99504E-05     2.03858E-05     1.96673E-05     1.96673E-05     1.94243E-05     2.03858E-05     2.03858E-05     2.03858E-05     1.9205E-05     1.9512E-05     2.25374E-05     2.03737E-05     1.9205E-05     1.97312E-05     1.94243E-05     2.03737E-05     1.9205E-05     1.9205E-05     1.9205E-05     1.920	52	0.000115888		0 0 000110539		<u>H</u> ide	0239	98 (	0205073	0.000132067	7.51101E-05	-	Ounde		775E-05	2.12658E-0
52     0.000117247     0     0.000111196     -2.68344E-05     0.000201653     0.00013255     7.54608E-05     1.9643E-05     1.8065E-05     2.06958E-0       58     0.00011637     0     0.000108565     -2.80621E-05     0.000201653     0.00013259     7.55924E-05     1.89658E-05     1.96435E-05     2.06958E-0       79     0.000115449     0     0.000109399     -2.85445E-05     0.00019767     (     0202351     0.000131105     7.55924E-05     1.96435E-05     1.99504E-05     2.06958E-0       79     0.000115449     0     0.000109389     -2.85445E-05     0.00019767     (     0202451     0.000131105     7.55924E-05     1.96673E-05     1.9643E-05     2.06958E-0     2.03889E-0       79     0.000114222     0     0.000109381     -2.89391E-05     0.00020215     (     0204021     0.000131401     7.57239E-05     1.9512E-05     1.9512E-05     2.25374E-0       79     0.00011588     0     0.000109399     -2.78868E-05     0.00020221     0020481     0.000131804     7.52855E-05     1.97312E-05     1.9512E-05 <td>27</td> <td>0.000115581</td> <td></td> <td>0 00011124</td> <td></td> <td><u>U</u>nhide</td> <td>009</td> <td>95 (</td> <td>0204591</td> <td>0.000132594</td> <td>7.67324E-05</td> <td></td> <td>2.02574E-05</td> <td>1.93</td> <td>3804E-05</td> <td>2.24059E-0</td>	27	0.000115581		0 00011124		<u>U</u> nhide	009	95 (	0204591	0.000132594	7.67324E-05		2.02574E-05	1.93	3804E-05	2.24059E-0
0.00011637     0     0.000108565     -2.80621E-05     0.000200294     (     0203714     0.000132199     7.53924E-05     1.89858E-05     1.99504E-05     2.12658E-0       79     0.000115449     0     0.000109399     -2.85445E-05     0.00019767     (     0203451     0.000132194     7.50747E-05     1.9512E-05     1.93366E-05     2.06958E-0       79     0.000114222     0     0.000109881     -2.89391E-05     0.000200231     (     020481     0.00013141     7.57239E-05     1.9512E-05     1.9512E-05     2.23374E-05     2.23374E-05     2.23374E-05     2.23374E-05     1.9512E-05     2.23374E-05     2.23374E-05     2.23374E-05     1.9512E-05     2.9389E-05     2.23374E-05     2.23374E-05     1.9512E-05     2.23374E-05     <	52	0.000117247		0 0 000111196	-2	68344E-05 (	0 0002016	53 (	0202574	0.00013255	7.54608E-05		1.96435E-05	1.8	8065E-05	2.06958E-0
59     0.000115314     0.0012334     0.0012334     0.0012334     0.0012334     1.90172-05     1.9512E-05     1.93306E-05     2.0998E-0       79     0.000115449     0     0.000109881     -2.85445E-05     0.00019767     0202881     0.000131015     7.55047E-05     1.96873E-05     2.03889E-0     2.2334E-05     2.03868E-05     2.03868E-05     0.000113E-05     2.03868E-05     0.000202231     0.0020421     0.000131804     7.52855E-05     1.97312E-05     1.74511E-05     2.06081E-05       64     0.000116853     0     0.00011201     -2.89391E-05     0.00202223     <	58	0.00011637		0.000108565	-2	80621E-05	0002010	94 (	0203714	0.000132199	7.55924E-05		1.89858E-05	1.99	9504E-05	2.12658E-0
79     0.000114222     0     0.000109399     -2.89391E-05     0.000201258     0.000131015     7.55047E-05     1.96873E-05     1.94243E-05     2.03889E-0       79     0.000114222     0     0.000109381     -2.89391E-05     0.000201258     0204021     0.00013141     7.57239E-05     1.93804E-05     1.9512E-05     2.25374E-0       79     0.000115888     0     0.000109399     -2.78868E-05     0.00020221     0020481     0.000131804     7.52855E-05     1.97312E-05     1.74511E-05     2.07397E-0       64     0.000116853     0     0.00011021     -2.89391E-05     0.000202223     0204503     0.00132331     7.57678E-05     1.9205E-05     1.80212E-05     2.06081E-0	79	0.000115449		0 000109399	-2	85445E-05	0.0001997	57 (	0203451	0.000132374	7.60747E-0		1.9512E-05	1.9	3300E-05	2.06958E-0
79     0.000114222     0     0.00010381     2.03311-05     0.000201236     0     0204021     0.00013141     7.3739E-05     1.93804E-05     1.9312E-05     2.2334E-05       79     0.000115888     0     0.000109399     -2.78868E-05     0.00020231     0020481     0.000131804     7.52855E-05     1.97312E-05     1.74511E-05     2.07397E-0       64     0.000116853     0     0.00011021     -2.89391E-05     0.000202223     0204503     0.000132331     7.57678E-05     1.9205E-05     1.80212E-05     2.06081E-0	70	0.000113443		0.000109891		89391E-05	0.0001997	58 (	0202881	0.000131015	7.55047E-05		1.968/3E-05	1.94	4243E-05	2.03889E-0
64     0.000116853     0     0.00010202     2.780682-05     0.00202231     0     0.000131804     7.328352-05     1.973122-05     1.743112-05     2.073972-05       64     0.000116853     0     0.000101021     -2.89391E-05     0.000202231     0     0.000132331     7.57678E-05     1.9205E-05     1.80212E-05     2.06081E-0	79	0.000114222		0.000109381	-2	78868E-05	0.0002012.	21 (	0204021	0.00013141	7.57239E-05		1.93804E-05	1.5	4511E 05	2.253/4E-0
04 0.000110855 0 0.000111021 -2.87591E-05 0.000202225 ( 0204505 0.000152531 7.57678E-05 1.9205E-05 1.80212E-05 2.00081E-0	64	0.000115888		0.000109399		20201E 05	0.000202	22 (	0020481	0.000131804	7.52655E-05		1.97312E-05	1.74	+511E-05	2.0/39/E-0
42 0.000116414 0 0.000110020 0.000000120 / 0.0000132506 7.65132E.05 1.0775E.05 1.93710E.05 2.14412E.0	42	0.000116414		0.00011021		07100E 05	0.00020222	20 (	0204505	0.000132331	7.65132E-05		1.9203E-05	1.8	3710E-05	2.00081E-0

## 4. Arranging data in EXCEL cont..

#### Move AB12 between AB11 and RB01

# - Cut column S (AB12) $\rightarrow$ Insert cut cells between AB11 and RB01

1

	Cells			Editing									· · · ·	
			Times	Ne - 11 - A	A <sup>*</sup> \$ - %	, 🔹 🗸	^				B	I 🗏 🌺 - 🗛 - 1	1 👬 👸 📲	·
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0	P	6	-		11	V		AB10	AB11	RB	ð	Cuţ	RB03	AB12
V.	R	4.010	V.	Cut	105	DDOC	▲ 1673	8 0.00143673	8 0.001436738	0.0	-	⊆opy	0.001436738	0.001261306
2	KB03	AB12	8	cui	505	KB00	673	8 0.00143673	8 0.001436738	0.0		Paste Options:	0.001436738	0.001260823
385E-05	0.001436738	0.0012	-	Сору	001436738	0.001436/38	673	8 0.00143673	8 0.001436738	0.0			0.001436738	0.001260823
615E-05	0.001436738	0.0012	<b>2</b>	Paste Options:	001436738	0.001436738	673	8 0.00143673	8 0.001436738	0.0		Paste Special   >	0.001436738	0.001260911
108E-05	0.001436738	0.0012			001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0		Incert Cut Cells	0.001436738	0.001260472
038E-05	0.001436738	0.0012			001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0		Delete	0.001436738	0.001261086
499E-05	0.001436738	0.0012		Paste Special	001436738	0.001436738	673	8 0.00143673	8 0.001436738	0.0		Delete	0.001436738	0.001260385
408E-05	0.001436738	0.0012		Insert	001436738	0.001436738	673	8 0.00143673	8 0.001436738	0.0		Clear Contents	0.001436738	0.001259771
038E-05	0.001436738	0.0012		Delete	001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0	<b>7</b>	Format Cells	0.001436738	0.001260911
408E-05	0.001436738	0.0012		Clear Contents	001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0		Column Width	0.001436738	0.001260122
556E 05	0.001436738	0.0012		cicul co <u>n</u> terito	001426728	0.001436738	1673	8 0.00143673	8 0.001436738	0.0		<u>H</u> ide	0.001436738	0.001263279
550E-05	0.001430738	0.0012	<u></u>	Format Cells	001450758	0.001430738	1673	8 0.00143673	8 0.001436738	0.0		Unhide	0.001436738	0.001262489
009E-05	0.001436738	0.0012		<u>C</u> olumn Width	001430738	0.001436738	673	8 0.00143673	8 0.001436738	0.0	CPTO	0738 3.00302E=0.	0.001436738	0.001262358
177E-05	0.001436738	0.0012		Hide	001436738	0.001436738	673	8 0.00143673	8 0.001436738	0.0	0143	6738 3.63492E-05	0.001436738	0.001260955
123E-05	0.001436738	0.0012		Unbida	001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0	0143	6738 3.69193E-05	0.001436738	0.00126113
562E-05	0.001436738	0.0012		Onnide	001436738	0.001436738	1673	8 0.00143673	8 0.001436738	0.0	0143	6738 3.69631E-05	0.001436738	0.001260999
492E-05	0.001436738	0.0012	60955	0.001436738	0.001436738	0.001436738	1073	8 0.00143673	8 0.001436738	0.0	0143	6738 3.54285E-05	0.001436738	0.001261569
193E-05	0.001436738	0.001	26113	0.001436738	0.001436738	0.001436738	1073	8 0.00143673	8 0.001436/38	0.0	0143	0/38 3.504//E-05	0.001436738	0.001260736
631E-05	0.001436738	0.0012	60999	0.001436738	0.001436738	0.001436738	1073	8 0.00143673	8 0.001436738	0.0	0143	0738 3.09193E-03	0.001430738	0.001262884
285E-05	0.001436738	0.0012	61569	0.001436738	0.001436738	0.001436738	1073	8 0.00143673	8 0.001430738	0.0	0143	0738 3.71385E-03	0.001430738	0.001261080
477E-05	0.001436738	0.0012	60736	0.001436738	0.001436738	0.001436738	1673	0.00143073	0.001430738	0.0	0143	6728 3.59108E-03	0.001430738	0.001261744
102E 05	0.001430738	0.0012	62004	0.001430738	0.001436738	0.001430730	1673	0 00143073	0.001430738	0.0	0143	6738 3.42884E-05	0.001430738	0.001201744
193E-05	0.001436738	0.0012	02884	0.001436738	0.001436/38	0.001436738	1673	0.00143073	0.001430/38	0.0	0143	6720 2 50546E 05	0.001430738	0.001261491
385E-05	0.001436738	0.0012	61086	0.001436738	0.001436738	0.001436738	10/3	0.00143073	0.001430/38	0.0	0143	5.39340E-03	0.001430/38	0.001201481

# 5. Copy data

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

		E	Ŧ	G	Н	1	1		10	M	N	0	P	Q	R	5	Т	U	- V	W	X	Y	Z
	1 AB	01		AB03	AB04	AB05	AB06	AB07	AB08	AB09	AB10	AB11	AB12	RB01	RB02	RB03	RB04	RB05	RB06	RB07	RB08	RB09	RB10
	2 0.0	00116414		0 0.001436	38 0.00143673	-0.001429415	-8.90096E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261306	0.001436738	3.71385E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.34143E-05	0.001436738
	3 0	00011637		0 0.001436	38 0.00143673	-0.001429415	-7.5417E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260823	0.001436738	3.62615E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.28443E-05	0.001436738
	4 0.0	00116414		0 0.001436	38 0.00143673	-0.001429415	-7.76094E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260823	0.001436738	3.59108E-05	0.001436738	0.001436738	0.001436738	0.001436758	0.001436738	0.001436738	-2.31951E-05	0.001436738
	5 0.0	00115844		0 0.001435	38 0.00143673	-0.001429415	-8.15556E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3 56038E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20989E-05	0.001436738
	6 0.0	00115186		0 0.001436	38 0.00143673	-0.001429415	-7,14708E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260472	0.001436738	3.499E-05	0.001436738	0.001436738	0.001436738	0,002436738	0.001436738	0.001436738	-2.19674E-05	0.001436738
	7 0.0	00115142		0 0.001436	38 0.00143673	-0.001429415	-6.7963E-06	0.001436738	0.001436738	0.001436738	0.001436758	0.001436738	0.001261086	0.001436738	3.53408E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.19235E-05	0.001436738
	8 0	00011523		0 0.001436	38 0.00143673	-0.001429415	-7.14708E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260385	0.001436738	3.56038E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.13535E-05	0.001436738
	9 0.0	00116765		0 0.001436	38 0.00143673	-0.001429415	-6 70861E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001259771	0.001436738	3.53408E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.13974E-05	0.001436738
	10 0.0	00116677		0 0.001436	38 0.00143673	-0.001429415	-8.41864E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3.556E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738
	11 0.0	00116546		0 0.001435	38 0.00143673	-0.001429415	-9.07635E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260122	0.001436738	3.58669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.05643E-05	0.001436738
	12 0.0	00115142		0 0.001436	38 0.00143673	-0.001429415	-7.62939E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001263279	0.001436738	3.62177E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.22305E-05	0.001436738
	13 0.0	00115011		0 0.001436	38 0.00143673	-0.001429415	-7.36631E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262489	0.001436738	3.66123E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738
	4 0.0	00114485		0 0.001436	38 0.00143673	-0.001429415	-8.72557E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262358	0.001436738	3.66562E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738
	15 0.0	00116151		0 0.001436	38 0.00143673	-0.001429415	-9.51482E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260955	0.001436738	3.63492E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31951E-05	0.001436738
	16	0.0001158		0 0.001436	38 0.00143673	-0.001429415	-7.84863E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.00126113	0.001436738	1.69193E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.2362E-05	0.001436738
	17 0.0	00116107		0 0.001436	38 0.00143673	0.001429415	-7.67324E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260999	0.002436738	3.69631E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738
	18 0.0	00114748		0 0.001436	38 0.00143673	-0.001429415	-8.46249E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261569	0.001436738	3.54285E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.40721E-05	0.001436738
	19 0.0	00115625		0 0.001436	38 0.00143673	-0.001429415	-7.23477E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260736	0.001436738	3.56477E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.24936E-05	0.001436738
	20 0.0	00115537		0 0.001435	38 0.00143673	-0.001429415	-3.19941E-08	0.001436738	0.001436738	0.001436738	0.001436738	0.001436735	0.001262834	0.001436738	3.69193E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436735	0.001436738	-2.26689E-05	0.001436738
	21 0.0	00115274		0 0.001436	38 0.00143673	-0.001429415	-8.98865E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261086	0.001436738	3.71385E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.44667E-05	0.001436738
	22 0.0	00114792		0 0.001435	38 0.00143673	-0.001429415	-7.84863E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261393	0.001436738	3.59108E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.36774E-05	0.001436738
	21 0.0	00115142		0 0.001436	38 0.00143673	-0.001429415	-\$ 3748E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261744	0.001436738	3 58669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2 38528E-05	0.001436738
	14 0.0	00114704		0 0.001435	38 0.00143673	-0.001429415	-7.58555E-06	0.001436738	0.001436738	0.001456738	0.001436738	0.001436738	0.00126227	0.001436738	3.42884E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.30197E-05	0.001436738
	3 0.0	00116414		0 0.001436	38 0.00143673	-0.001429415	-8.06787E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261431	0.001436738	3.59546E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31513E-05	0.001436738
	26 0.6	00116954		0 0.001436	38 0.00143673	-0.001429415	-8.55018E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261875	0.001436738	3.78839E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.24059E-05	0.001436738
	27 0.0	00116546		0 0.001435	38 0.00143673	-0.001429415	-7.19092E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001262182	0.001436738	3.46392E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.34143E-05	0.001436738
	28 0.0	00115449		0 0.001436	38 0.00143673	-0.001429415	-8.72557E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261481	0.001436738	3.57354E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.30197E-05	0.001436738
	19 0.0	00115186		0 0.001436	38 0.00143673	-0.001429415	-9.25174E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261349	0.001436738	3.60423E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.41597E-05	0.001436738
	50 0.0	00115888		0 0.001436	38 0.00143673	-0.001429415	-8.68172E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260955	0.001436738	3.58231E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.31951E-05	0.001436738
1	1 0.0	00117203		0 0.001436	38 0.00143673	-0.001429415	-7.93632E-06	0.001436738	0.001436738	0.001436738	0.001436735	0.001436735	0.001260385	0.001436738	3.52969E-05	0.001436738	0.001436735	0.001436738	0.001436738	0.001436738	0.001436738	-2.1792E-05	0.001436738
	32 0.0	00117598		0 0.001436	38 0.00143673	-0.001429415	-8.15556E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260078	0.001436738	3.61739E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.27566E-05	0.001436738
	33	0.0001158		0 0.001435	38 0.00143673	-0.001429415	-8.55018E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001260911	0.001436738	3.53846E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.25813E-05	0.001436738
. 7	14 0.0	00115888		0 0.001436	38 0.00143673	-0.001429415	-8.50634E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261349	0.001436738	3 51654E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2 25813E-05	0.001436738
10	15 0.0	00115055		0 0.001436	38 0.00143673	-0.001429415	-7.45401E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261086	0.001436738	3 59108E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.26251E-05	0.001436738
	10 0.0	00116589		0 0.001436	38 0.00143673	-0.001429415	-7.23477E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261086	0.001436738	3.58669E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.14851E-05	0.001436738
	37 0.0	00115888		0 0.001436	38 0.00143673	-0.001429415	-9.07635E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261437	0.001436738	3.49023E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20551E-05	0.001436738
	18 0.0	00116414		0 0.001435	38 0.00143673	-0.001429415	-7.23477E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.0012617	0.001436738	3.613E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.20112E-05	0.001436738
	19 0.0	00115888		0 0.001436	38 0.00143673	-0.001429415	-7.93632E-06	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001261042	0.001436738	3.34553E-05	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	0.001436738	-2.22305E-05	0.001436738
	10 0.0	00115976		0.0.001435	18 0.00143671	-0.001479415	TRABALE-OF	0.001436738	0.001436738	0.001415738	0.001416718	0.001436718	0.001261288	0.001436738	1 54015E-05	0.001416718	0.001436718	0.001434738	0.001434758	0.001416718	0.001436738	-2 20328-04	0.001436738

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

		M				1: Unspecified	2: No Unit
iste Raw DeverCon	ner Data He	ere X	W60: setplotstyle(0)		1:	0.000000E+000	3.051760E-00
					2:	2.000000E-004	-2.288818E-00
Carias					3:	4.000000E-004	-2.441406E-00
Series					4:	6.000000E-004	-1.525880E-00
Dataset	'				5:	8.000000E-004	-1.831055E-00
Сору					6:	1.000000E-003	1.831055E-00
Paste	•	Paste to Windo	w	· ·	7:	1.200000E-003	6.103520E-00
		Paste Link			8:	1.400000E-003	-2.136230E-0
Styles	•	Paste to Editor	Ctrl+V		9:	1.600000E-003	-2.288818E-0
Clear	• • F	Paste to Editor	Curry		10:	1.800000E-003	-1.983643E-0
					11:	2.000000E-003	2.593994E-0
Magnify					12:	2.200000E-003	-1.525879E-0
Autoscale					13:	2.400000E-003	-9.155270E-0
racoscure							
Cursor							
Zoom	F10						
Properties	)).	60) × W27:	AB4-Cleaned Data				

W1: Untitled Data X

#### 7. Click PreProcess button to inspect data



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

			23	η
Truck ID: 1.000	000			
a1		ОК	Cancel	

#### 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  $\rightarrow$  Select Magnify  $\rightarrow$  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\*

Dever Conner Information	X
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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 X				
	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	x
	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  $\rightarrow$  Select Copy  $\rightarrow$  Select Copy from Window  $\rightarrow$  Right-Click
- Paste into EXCEL file and save



# 14. Troubleshooting – Changing LPSVoltage

- 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)

W60: MPP												x
2 -						1						
1.5 -												
1-				A								
0.5 -				A	$\langle   \rangle$		~ ~					
0											1	
	1.85	1.9	1.95	2	2.05	2.1	2.15	2.2	2.25	2.3	2.35	2.4

- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK

Dever Conner Information	23
Truck ID: 3.000000	
El Ovollago, joi rococo	OK Cancel

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           secs         volts         volts         volts         volts         volts           0.000000         -0.014801         -0.015106         0.015106           0.002000         -0.104250         0.014351           0.003000         -0.046387         -0.043182           0.004000         0.016937         0.012360           0.005000         0.015106         0.014191           0.005000         0.014496         0.013428	ab 3 ab 4 ab 5 ab volts volts volts volts volts -0.016785 0.000544 -0.109711 0.000478 0.044861 0.000523 -0.050049 0.000513 0.014191 0.000545 0.015411 0.000545	6         ab 7         ab 8         ab 9         ab 10           lts         volts         volts	ab 11 ab 12 volts volts 0.000308 0.000644 0.000268 0.000636 0.000297 0.000646 0.000286 0.000645 0.000318 0.000654 0.000317 0.000653 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



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

er Conner 🔻 Phase 3 - Processing 👻 DC_2008_12_0	)4 ▼ Strain Data ▼ DC	<ul> <li>Batch #123</li> </ul>			
hare with 👻 Print Burn New folder					
Name 🔺	Date modified	Туре	Size		
Name ^	Date modified 12/4/2008 1:24 PM 12/4/2008 1:24 PM	Type Total Descenses Open Print Create PDF and Bitma Edit Convert to Adobe PDF Combine files in Acrol Move to Dropbox Open with Scan with Sophos Ant Share with Scan with Malwarebyt Restore previous version	Size	Creator	Microsoft Excel Microsoft Visual Studio 2005 Tools for Applications Notepad WordPad Choose default program
<ul> <li>DC_11154404122008</li> <li>DC_11155704122008</li> <li>DC_1116160122008</li> <li>DC_11163704122008</li> <li>DC_11171004122008</li> <li>DC_11180504122008</li> <li>DC_11182404122008</li> <li>DC_11183304122008</li> <li>DC_11184204122008</li> </ul>	12/4/2008 1:24 PN 12/4/2008 1:24 PM 12/4/2008 1:24 PM	Send to Cut Copy Create shortcut Delete Rename Properties Text Document Text Document Text Document	571 KB 570 KB 571 KB	•	

# 3. Arranging data in EXCEL cont..

# • Insert columns of zeroes in columns Q through Y

X) L	19-0	(i)y												DC_111133	04322008 - 1	Microsoft Exc	el								
File	Kon Kon	ne anse	rt Page Times New	Layout Roman - 1	Formulas	Data I	eview V	We De	ap Text	Add-Ins General	Atrobat		R.	No	rmal	Bad		Good	Neu	tral	Calcub	ation	3.	<b>*</b>	Σ AutoSu
Paste	Copy		B / U		- A		-	E HAN	rae & Center			22 6	onditional Fi	ormat In	eck Cell	Explan	atoini_	Input	Link	ed Cell	Note	1	Insert	Delete Form	at Fill -
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4																									
5 T	ine	axle 1	axle 2	axle 3	SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8	SG9	SG10	SG11	SG12									
6 5	tCS	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	_								
7	0	-0.00214	-0.00061	0.00427	2 0.000318	0.000357	0.000264	0.000096	5 0.000279	0.000207	0.000247	0.0003	319 0.00028.	3 0.00031	1 0.00143	7 0.000512		0 0	0	(	1 0	0	1	1 0	0
8	0.001	0.000305	-0.00061	0.00320	4 0.000319	0.000356	0.000262	0.000096	5 0.000278	0.000207	0.000249	0.000	032 0.00028	3 0.00031	2 0.00143	7 0.000513		0 0	0		0	0	- 23	0	0
9	0.002	0.000916	-0.00214	-0.0004	5 0.000318	0.000357	0.000262	0.000096	0.000279	0.000209	0.000247	0.0003	319 0.00028.	3 0.0003	1 0.00143	7 0.000512		0 0	0		0	0		0	0
10	0.003	0.000918	0.001831	0.00045	0.000318	0.000356	0.000262	0.000095	0.00028	0.000208	0.000248	0.000	0.00028	5 0.00031	1 0.00143	0.000512		0 0			0	0	- 8	0	0
	0.004	0.001008	0.001078	0.0003	0.000318	0.000355	0.000282	0.000095	0.00028	0.000208	0.000249	0.0003	0.00028	2 0.0003	0.00143	7 0.000511		0 0					1		0
	0.005	0.001073	0.001221	0.00076	0.000317	0.000350	0.00028	0.000096	0.000278	0.000208	0.000249	0.000	0.00028	0.0003	0.00143	0.000512		0 0					- 3		3
4	0.007	0.00051	0.002285	0.00335	0.000319	0.000353	0.000262	0.000094	0.000279	0.000208	0.00023	0.0003	319 0.00028	4 0.00031	1 0.00143	7 0.000511		0 0			a c				0
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6	0.009	0.002285	0.000153	0.00213	5 0.000318	0.000356	0.000262	0.000096	6 0.00028	0.000207	0.000247	0.000	032 0.00028	5 0.0003	0.00143	7 0.000512		0 0			5 0	0			0
7	0.01	-0.00031	0.001984	0.00320	0.000319	0.000357	0.000262	0.000097	0.000279	0.000208	0.000249	0.000	032 0.00028-	4 0.00031	0.00143	7 0.000512		0 0	0		5 0	0		. 0	0
8	0.011	-0.00168	0.000305	0.00106	8 0.000318	0.000357	0.000262	0.000096	5 0.000279	0.00021	0.000248	0.000	032 0.00028	4 0.00031	0.00143	7 0.000513		0 0	. 0		j (	0	1	) 0	0
9	0.012	-0.00168	0.000153	0.00152	5 0.000319	0.000356	0.000263	0.000095	0.00028	0.000206	0.000248	0.0003	318 0.00028-	4 0.00031	0.00143	7 0.000512		0 0	0		j 0	0		) 0	0
20	0.013	0.001221	-0.00255		0.000318	0.000356	0.000262	0.000096	5 0.00028	0.000208	0.000248	0.0003	319 0.00028.	3 0.00031	0.00143	7 0.000512		0 0	0		) 0	0		) 0	0
1	0.014	0.001373	0.001221	+0.0003	0.000317	0.000355	0.000261	0.000095	0.000279	0.000207	0.00025	0.000	0.00028	4 0.00031	0.001433	7 0.000511		0 0	0	(	) 0	0		) 0	0
2	0.015	0.003815	0.001831	0.00091	5 0.000316	0.000354	0.000261	0.000096	5 0.000279	0.00021	0.000249	0.0003	321 0.00028	3 0.00031	2 0.00143	7 0.000512		0 0	0	(	1 0	0		) 0	0
23	0.016	0.003052	0.001984	-0.0004	5 0.000319	0.000355	0.000261	0.000093	0.000279	0.000208	0.000248	0.0003	319 0.00028-	4 0.00031	1 0.00143	7 0.000512		0 0	0	0	) 0	0	1	1 0	0
4	0.017	0.002899	0.003357	0.00091	5 0.000319	0.000356	0.000261	0.000094	0.00028	0.000209	0.000248	0.0003	319 0.00028	4 0.0003	1 0.00143	7 0.000512		0 0	0	(	0	0		0	0
5	0.018	0.003357	0.002743	0.00366	2 0.000318	0.000354	0.000261	0.000094	0.000278	0.000208	0.000249	0.0003	319 0.00028:	5 0.00031	1 0.00143	7 0.000513		0 0	0		0	0		0	0
0	0.019	0.002747	0.00412	0.00579	5 0.000318	0.000356	0.000262	0.000094	0,000278	0.000209	0.000249	0.000	0.00028	2 0.00031	2 0.00143	7 0.000512		0 0	9		0	0	- 8	0	9
1	0.02	0.001063	0.001831	0.00427	0.00032	0.000356	0.000262	0.000091	0.000279	0.000207	0.000249	0.0003	0.00028	+ 0.00031	0.00143	0.000513		0 0	0		0	0	23	0	
0	0.021	0.000151	-0.001078	0.00320	0.00032	0.000357	0.000261	0.000096	0.000279	0.000209	0.000249	0.000	32 0.00028-	4 0.00031	0.00143	7 0.000511		0 0				0	-	0	0
0	0.022	-0.000133	0.00061	0.00244	1 0.000318	0.000356	0.000263	0.000095	0.00028	0.000208	0.000248	0.000	132 0.00028	3 0.00031	0.00143	7 0.000511		0 0							0
1	0.024	.0.00214	0.0000	-0.0004	6 0 000119	0.000356	0.000263	0.000093	0.000281	0.000207	0.000247	0.0003	121 0.00028	4 0.00031	0.00143	7 0.000511		0 0	i i				- 8	i i	0
2	0.025	0.000304	0.000151	-0.0004	5 0.000318	0.000355	0.000262	0.000096	0.000281	0.00021	0.00025	0.0003	319 0.00028	4 0.00031	2 0.00143	7 0.000513		0 0	ő		3 0	0	2		0
13	0.026	0.001373	0.001831	0.00213	5 0.000318	0.000356	0.000262	0.00009	0.000278	0.000208	0.000248	0.0003	319 0.00028	4 0.00031	2 0.00143	7 0.000513		0 0	0		5 0	0	3		0
14	0.027	0.002289	-0.00046	0.00228	0.000319	0.000356	0.000261	0.00009	0.000279	0.000208	0.000249	0.0003	319 0.00028.	3 0.00031	1 0.00143	7 0.000512		0 0	0		3 0	0		0	0
35	0.028	0.005183	0.003357	0.00274	0.000318	0.000356	0.00026	0.000094	0.000279	0.000207	0.000248	0.000	032 0.00028	3 0.00031	0.00143	7 0.000512		0 0	0	0	3 0	0	3	5 0	0
6	0.029	0.002289	0.00412	0.00366	0.000319	0.000356	0.000261	0.000096	0.000279	0.000208	0.000249	0.000	032 0.00028:	5 0.00031	2 0.00143	7 0.000512		0 0	0	(	1 0	0	20	0	0
17	0.03	0.002594	0.002441	0.00427	0.000318	0.000356	0.000261	0.000096	0.00028	0.000208	0.000249	0.000	032 0.00028	3 0.00031	2 0.00143	7 0.000512		0 0	0		1 0	0		) 0	0
18	0.031	0.002899	0.002743	0.00366	0.000318	0.000356	0.000262	0.000094	0.000278	0.00021	0.000248	0.0003	321 0.00028:	5 0.00031	0.00143	7 0.000512		0 0	0	(	) 0	0	20	) 0	0

# 4. Copy data

- Highlight data in columns A through Y (RB09)
   Exclude Header Rows
- Right-Click  $\rightarrow$  Select Copy  $\rightarrow$  Left-Click

A	B	C	D	E	F	G	Н	1	1	K	L	M	N	0	P	Q	R	S	Т	U	V	W	X	Y	Z
Station 1	Name DC																								
Sample	Rate:1000.0																								
Comme	ats:																								
Time	axle 1	axle 2	axle 3	SG1	SG2	SG3	SG4	SG5	\$G6	SG7	SG8	SG9	SG10	SG11	SG12										
secs	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts	volts										
-	0 -0.00214	-0.00061	0.004272	0.000318	0.000357	0.000264	0.000096	0.000279	0.000207	0.000247	0.000319	0.000283	0.000311	0.001437	0.000512	0	0	0	0	0	2	) (	) (	)	0
0.0	0.000305	-0.00061	0.003204	0.000319	0.000356	0.000262	0.000096	0.000278	0.000207	0.000245	0.00032	0.000283	0.000312	0.001437	0.000513	0	0	0	0	0				8	8
0.0	12 0.000916	-0.00214	-0.00044	0.000318	0.000357	0.000262	0.000096	0.000279	0.000209	0.000247	0.000319	0.000283	0.00031	0.001437	0.000512	0	0	0	0	0	8 - 9				0
0.0	13 0.000916	0.001831	0.000458	0.000318	0.000356	0.000262	0.000095	0.00028	0.000208	0.000248	0.00037	0.000285	0.000311	0.001437	0.000512	0	0	0				1			
0.0	4 0.001068	0.001675	-0.00031	0.000318	0.000355	0.000261	0.000095	0.00028	0.000208	0.000745	0.000318	0.000282	0.00031	0.001437	0.000511	0	0	ő							
0.0	5 0.001678	0.001221	0.00076	0.000317	0.000356	0.00026	0.000095	0.000228	0.000208	0.000745	0.00032	0.000285	0.00031	0.001437	0.000512	0	0	0						2	
0.0	6 0.00351	0.002285	0.00151	0.000317	0.000355	0.000262	0.000095	0.000279	0.000708	0.00025	0.000319	0.000282	0.000311	0.001417	0.00051	0		ő	0					1	
0.0	0 00063	0.002786	0.002351	0.000319	0.000357	0.000267	0.0000055	0.000220	0.000709	0.000245	0.000319	0.000284	0.000311	0.001417	0.000511	0		0							
0.0	0.00000	0.001231	0.002285	0.000319	0.000356	0.000262	0.000095	0.000279	0.000209	0.000345	0.000319	0.000284	0.00031	0.001437	0.000511										
0.0	0.007285	0.000151	0.002134	0.000318	0.000354	0.000261	0.000095	0.00028	0.000207	0.000247	0.00037	0.000285	0.00031	0.001417	0.000512	0		0							1
	0.00011	0.00108	0.00130	0.0000310	0.000353	0.000263	0.000000	0.000220	0.000207	0.000010	0.000000	0.000284	0.000111	0.001417	0.0000012							1 3			1
	0.00031	0.001984	0.003204	0.000319	0.000357	0.000202	0.000097	0.000219	0.000208	0.000245	0.00032	0.000284	0.000311	0.001437	0.000512	0								3	1
0.0	0.00168	0.000303	0.001008	0.000310	0.000357	0.000202	0.000090	0.000279	0.00021	0.000246	0.000318	0.000284	0.000311	0.001437	0.000513			0					1		
0.0	12 -0.00102	0.000155	0,001520	0.000319	0.000330	0.000203	0.000095	0.00028	0.000200	0.000248	0.000318	0.000284	0.000311	0.001437	0.000512			0			÷ .			3	
0.0	13 0.001221	-0.00255		0.000318	0.000350	0.000282	0.000096	0.00028	0.000208	0.000248	0.000319	0.000285	0.000311	0.001437	0.000512	0		0	0	0					1
0.0	14 0.001373	0.001221	-0.00031	0.000317	0.000355	0.000261	0.000095	0.000279	0.000207	0.00025	0.00032	0.000284	0.000311	0.001437	0.000511	0		0	0	0			3		
0.0	0.003813	0.001831	0.000910	0.000310	0.000324	0.000261	0.000090	0.000279	0.00021	0.000249	0.000321	0.000283	0.000312	0.001437	0.000512	0	0	0	0					3	
0.0	10 0.003052	0.001984	-0.00040	0.000319	0.000355	0.000261	0.000093	0.000279	0.000208	0.000248	0.000319	0.000284	0.000311	0.001437	0.000512	0	0	0			2			6	
0.0	0.002895	0.00335	0.000916	0.000319	0.000356	0.000261	0.000094	0.00028	0.000209	0.000243	0.000319	0.000284	0.00031	0.001437	0.000512	0		0	0	0	8 8				
0.0	18 0.003357	0.00274	0.00306.	0.000318	0.000354	0.000261	0.000094	0.000278	0.000208	0.000245	0.000319	0.000285	0.000311	0.001437	0.000513	0	0	0	0						1
0.0	19 0.002747	0.00412	0.005798	0.000318	0.000356	0.000262	0.000094	0.000278	0.000209	0.000245	0.00032	0.000282	0.000312	0.001437	0.000512	0	0	0	0	0					0
0.0	02 0.001068	0.001\$31	0.004272	0.00032	0.000356	0.000262	0.000097	0.000279	0.000207	0.000249	0.000319	0.000284	0.000311	0.001437	0.000513	0	0	0	0	0	8 - B	8		8	0
0.0	a (	0.001678	0.003204	0.00032	0.000357	0.000261	0.000096	0.000279	0.000209	0.000245	0.00032	0.000284	0.000311	0.001437	0.000511	0	0	0	0	0					2
0.0	22 0.000153	-0.00122	0.002441	0.000318	0.000356	0.000263	0.000095	0.00028	0.000208	0.000248	0.00032	0.000284	0.000312	0.001437	0.000511	0	0	0	0	0	( I				0
0.0	23 -0.00214	0.00061	0.001984	0.000319	0.000356	0.000263	0.000095	0.000278	0.000209	0.00025	0.00032	0.000283	0.000311	0.001437	0.000512	0	0	0	0	0		2	2		0
0.0	24 -0.00214		-0.00046	5 0.000319	0.000356	0.000263	0.000097	0.000281	0.000207	0.000247	0.000321	0.000284	0.000312	0.001437	0.000511	0	0	0	0	0	9. J				0
0.0	25 0.000305	0.000153	-0.00046	6 0.000318	0.000355	0.000262	0.000096	0.000281	0.00021	0.00025	0.000319	0.000284	0.000312	0.001437	0.000513	0	0	0	0	0	( I				0
0.0	26 0.001373	0.001831	0.002136	0.000318	0.000356	0.000262	0.000095	0.000278	0.000208	0.000248	0.000319	0.000284	0.000312	0.001437	0.000513	0	0	0	0	0					9
0.0	27 0.002285	-0.00046	0.002289	0.000319	0.000356	0.000261	0.000095	0.000279	0.000208	0.000245	0.000319	0.000283	0.000311	0.001437	0.000512	0	0	0	0	0					0
0.0	28 0.005188	0.003357	0.002747	0.000318	0.000356	0.00026	0.000094	0.000279	0.000207	0.000248	0.00032	0.000283	0.000311	0.001437	0.000512	0	0	0	0	0					0
0.0	0.002289	0.00413	0.003662	0.000319	0.000356	0.000261	0.000096	0.000279	0.000208	0.000249	0.00032	0.000285	0.000312	0.001437	0.000512	0	0	0	0	0	6 (		2		0
0.0	03 0.002594	0.002441	0.004272	0.000318	0.000356	0.000261	0.000096	0.00028	0.000208	0.000249	0.00032	0.000283	0.000312	0.001437	0.000512	0	0	0	0	0	5				0
0.0	0.002895	0.00274	0.003662	0.000318	0.000356	0.000262	0.000094	0.000278	0.00021	0.000248	0.000321	0.000285	0.000311	0.001437	0.000512	0	0	0	0	0	1	) (			0
0.0	32 -0.00061	-0.00131	0.003052	0.000318	0.000355	0.000264	0.000096	0.00028	0.000208	0.000248	0.000319	0.000283	0.000313	0.001437	0.000512	0	0	0	0	0	6 1	) (	) (		0
0.0	-0.0032	0.001221	0.002594	0.000318	0.000357	0.000263	0.000096	0.000279	0.000209	0.000248	0.000318	0.000284	0.000311	0.001437	0.000511	0	0	0	0	0	1	) (	3	10 I	0
0.0	14 -0.00076	0.000305	5 0	0.000318	0.000357	0.000262	0.000097	0.000279	0.000207	0.000247	0.00032	0.000283	0.000312	0.001437	0.000512	0	0	0	0	0	1	) (	) (	)	0
0.0	15 0.001084			0.000318	0.000357	0.000267	0.000095	0.00028	0.00021	0.000248	0.000319	0.000285	0.000317	0.001437	0.000512	0	0	0	-0			1 1		1	0

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

- Right-Click  $\rightarrow$  Select Paste  $\rightarrow$  Left-Click
- Copied data will fill box

	<b>D</b> . U			1: Unspecified	2: No Units
Paste Raw DeverCo	nner Data Here X	W60: setplotstyle(0)	1:	0.000000E+000	3.051760E-004
			2:	2.000000E-004	-2.288818E-003
Carias			3:	4.000000E-004	-2.441406E-003
Series			4:	6.000000E-004	-1.525880E-004
Dataset	'		5:	8.000000E-004	-1.831055E-003
Сору	•		6:	1.000000E-003	1.831055E-003
Paste	Paste to Wine	dow	7:	1.200000E-003	6.103520E-004
	Paste Link		8:	1.400000E-003	-2.136230E-00
Styles	Paste to Edit	or CtrluV	9:	1.600000E-003	-2.288818E-00
Clear			10:	1.800000E-003	-1.983643E-00
cicai			11:	2.000000E-003	2.593994E-00
Magnify			12:	2.200000E-003	-1.525879E-00
Autoscala			13:	2.400000E-003	-9.155270E-00
Autoscale					
Cursor	•				
7	F10	1			
200m	FIU				
Properties	)).60) × W2	7: AB4-Cleaned Data			

W1: Untitled Data

#### 6. Click PreProcess button to inspect data



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

			 23	ן
Truck	D: 1.000000			
at		0	Cancel	





- 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  $\rightarrow$  Select Magnify  $\rightarrow$  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\*

Dever Conner Information	X
Truck ID: 1.000000	
LPSVoltage: 0.120000	
	OK 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:	W57: Output Data X								
	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

W57:	Output Data	×
	1: TruckID	2: Axle
1:	1.00000E+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
<b>9</b> :	2.000000E+000	4.000000E+000
10:	2.000000E+000	5.000000E+000

# 12. Copy W57 and store in EXCEL

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



# **13. Troubleshooting – Changing LPSVoltage**

- 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)

W60: MPP												x
2 -						1						
1.5 -												
1-				1								
0.5 -				h								
0				$\Delta \nabla$		$\sim$						
	1.95	10	1.05	2	2.05	2.1	2.15	22	2.25	22	2.25	24
	1.00	1.9	1.95	2	2.05	2.1	2.15	2.2	2.20	2.5	2.35	2.4

- After clicking the Dever-Conner I-5 button to process, change LPSVoltage to 0.1
- Click OK

Dever Conner Information	E Contraction of the second se
Truck ID: 3.000000	
- ,	OK Cancel

• 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

Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like? C Show Worksheets	
C Show Named Banges ade count	
Sample data for worksheet "Sheet". Get External Data - Excel Spreadsheet	<u>? ×</u>
1 Truck ID Akle Speed, mph Dffset, in Dist From prev, in Akle Type ASG1 Baseline ASG1 T       2 P.00     1.00 β6.02       0.00     0.00       1.10     0.08       0.56	
3         2         00         2         00         5         9         0         12         4         0         0         0         0         0         7         4         0	
S 0.00         D.00         P.30         D.07         D.55           6 1.00         2.00         H9.21         D.00         1.04.79         D.00         D.03         D.66         Do you want to save these import steps? This will allow you to quickly repeat the operation without using the warm	L
1.00         1.00         1.00         0.00         0.00         0.03         0.03         0.03           B         5.00         5.00         5.79         0.00         5.19         2.00         0.72         0.97         □ Sage mont steps           B         5.00         5.00         5.19         2.00         0.72         0.56         □	
105.00 2.00 86.02 0.00 208.54 2.00 0.72 0.89 115.00 4.00 86.02 0.00 859.57 2.00 0.72 1.54	
128.00         8.00         8.26         0.00         124.03         1.00         0.72         1.73           137.00         2.00         40.82         p.00         p.88.79         p.00         p.08         p.77	
Cancel < Brick Bext > Enich	

glose

# 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

Get External Data - Excel Spreadsheet

? | X |

- Select "Append" to "Processed"
- Click "OK"

Signed Specify the source data and source by creating a lack to be source data in the current database.   Specify the source data and not be reflected in the database. Specify the source data and to the source data annot be database. Specify the source data annot be		Select the source and destination of the data
Compiled without Two Axle Vehicles	File Home Create External Data Database Tools   Saved Linked Tuble Excel Arcss ooo Saved   Imports Manage Database More Exports   Import & Link All Access Objects Import data from or link to data in a Microsoft Excel file.   Saved Processed Press F1 for more help.   Truck ID Queries \$   Queries \$   Compiled Compiled   Compiled without Two Axle Vehicles	Specify the source of the data.  Ele name: C:Users'InecCODS'Documents/  Specify how and where you want to store the data in the current database.  I may not where you want to store the data in the current database.  (I may not be source data into a new table in the current database.  (I may not be one of the data. Access will create it. If the specified table already exists, Access might overwrite its contents will not be reflected in the database.  (I the specified table exists, Access will add the records to the table. If the table does not exist, Access will create it. Changes made the second case will more the database.  (I the specified table exists, Access will add the records to the table. If the table does not exist, Access will create it. Changes made the second case will not be reflected in the database.  (I the data source by creating a linked table.  Access will create a table that will maintain a link to the source data in Excel. Changes made the second case will be reflected in the linked table. However, the source data and the database.  (I the linked table. However, the source data cannot be changed from within Access.  (I cancel

# 2. Complete new data upload

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

Import S	Spreadsheet Wi	zard								23	
Your spre	eadsheet file con	tains mo	ore than or	ne worksheet o	r range. Which worksheet or r	ange would you like?					
€ Sho € Sho	w <u>W</u> orksheets w Named <u>B</u> ange	s	Sheet1 compiled axle count	t							
											Get External Data - Excel Spreadsheet
Sample data	a for worksheet	Sheet1'.									
1 True	k ID Axle	Speed	, mph	Offset, i	n Dist From prev,	in Axle Type	ASG1	Baseline	ASG1 T	1	Save Import Steps
2 2.00	1.00	36.02		0.00	0.00	1.10	0.08		0.56		
3 2.00	2.00	36.99		0.00	112.44	1.00	0.08		0.74		
4 3.00	2.00	43.06		0.00	133.14	1.00	0.07		0.72		Finished importing file 'C:'Users'(mcv0005/Dropbax)/Currently Working/Redmond Outputs_xisx' to table 'Processed'.
5 3.00	1.00	43.40		0.00	0.00	1.10	0.07		0.55		
6 1.00	2.00	49.21		0.00	104.79	1.00	0.03		0.66		Do you want to save these import steps? This will allow you to quiddy repeat the operation without using the wizard.
7 4.00	1.00	49.21		0.00	0.00	1.10	0.03		0.54		
8 5.00	3.00	35.79		0.00	51,19	2.00	0.72		0.97		Sage import steps
95.00	1.00	35.79		0.00	0.00	1.10	0.72		0.56		
105.00	2.00	36.02		0.00	208.54	2.00	0.72		0.89		
115.00	4.00	36.02		0.00	359.57	0.00	0.72		1.54		
125.00	5.00	36.26		0.00	124.03	0.00	0.72		1.73		
127.00	2 00	40 82		0.00	158 70	0.00	0.08		6 77		
147.00	1.00	40.82		0.00	0.00	1.10	0.08		0.55	1.1	
14/100	µ.00	10.02		0.00	0.00	p.10	p.08		0.00	Ľ.	
<u> </u>									,	<u> </u>	
					Cancel	< Back	Next >		Enish		
											,

#### 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

Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like? C Show Worksheets	
C Show Named Banges ade count	
Sample data for worksheet "Sheet". Get External Data - Excel Spreadsheet	<u>? ×</u>
1 Truck ID Akle Speed, mph Dffset, in Dist From prev, in Akle Type ASG1 Baseline ASG1 T       2 P.00     1.00 β6.02       0.00     0.00       1.10     0.08       0.56	
3         2         00         2         00         5         9         0         12         4         0         0         0         0         0         7         4         0	
S 0.00         D.00         P.30         D.07         D.55           6 1.00         2.00         H9.21         D.00         1.04.79         D.00         D.03         D.66         Do you want to save these import steps? This will allow you to quickly repeat the operation without using the warm	L
1.00         1.00         1.00         0.00         0.00         0.03         0.03         0.03           B         5.00         5.00         5.79         0.00         5.19         2.00         0.72         0.97         □ Sage mont steps           B         5.00         5.00         5.19         2.00         0.72         0.56         □	
105.00 2.00 86.02 0.00 208.54 2.00 0.72 0.89 115.00 4.00 86.02 0.00 859.57 2.00 0.72 1.54	
128.00         8.00         8.26         0.00         124.03         1.00         0.72         1.73           137.00         2.00         40.82         p.00         p.88.79         p.00         p.08         p.77	
Cancel < Brick Bext > Enich	

Qose

# 3. Review Data

• All queries will automatically update after appending new data.

- Simply double click any query to see new data