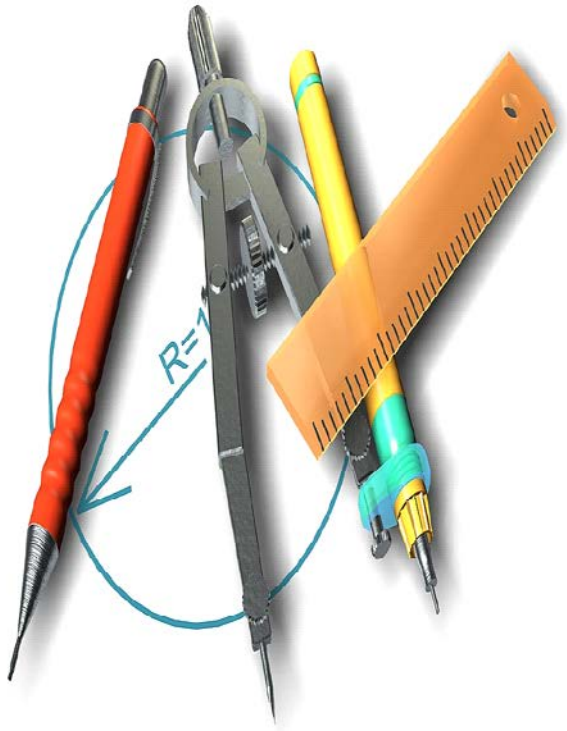
Alignment Seminar Student Workbook



Training Supplement
Technician Reference Guide

HUNTER Engineering Company

Camber Worksheet

1. What is the definition of positive camber?

2. What is the definition of negative camber?

3. Why is camber considered a direct tire wear angle?

4. What would excessive positive camber wear look like on a tire?

5. What is the definition of “cross camber”?

6. How much cross camber does it take to cause a vehicle to drift or pull?

7. Which way would a vehicle pull if the left front camber was 0.00° and the right front camber was 1.00°?

Caster Worksheet

1. What is the definition of positive caster?

2. What is the definition of negative caster?

3. Why is caster considered a non-direct tire wear angle?

4. Why do the front wheels have to be steered to measure caster?

5. What is the definition of “cross caster”?

6. How much cross caster does it take to cause a vehicle to drift or pull?

7. Which way would a vehicle pull if the left front caster was 2.00° and the right front caster was 3.00°?

Toe and Related Geometry Worksheet

1. What is the definition of positive and negative total toe?

2. Why is total toe considered a direct tire wear angle?

3. What is the definition of “individual toe”?

4. Which toe angles directly affect thrust angle?

5. Why do front tires typically wear equally when front total toe is incorrect?

6. What is the definition of geometric centerline?

7. What is the definition of “thrus tline”?

8. What is the definition of “thrust angle”?

9. What is meant by designating thrust angle as being positive or negative?

Alignment Procedure Worksheet

1. Why should sensors be mounted using the same method on the same axle of the vehicle?

2. When would a 4-wheel thrust alignment procedure be preferred?

3. When would a total 4-wheel alignment procedure be preferred?

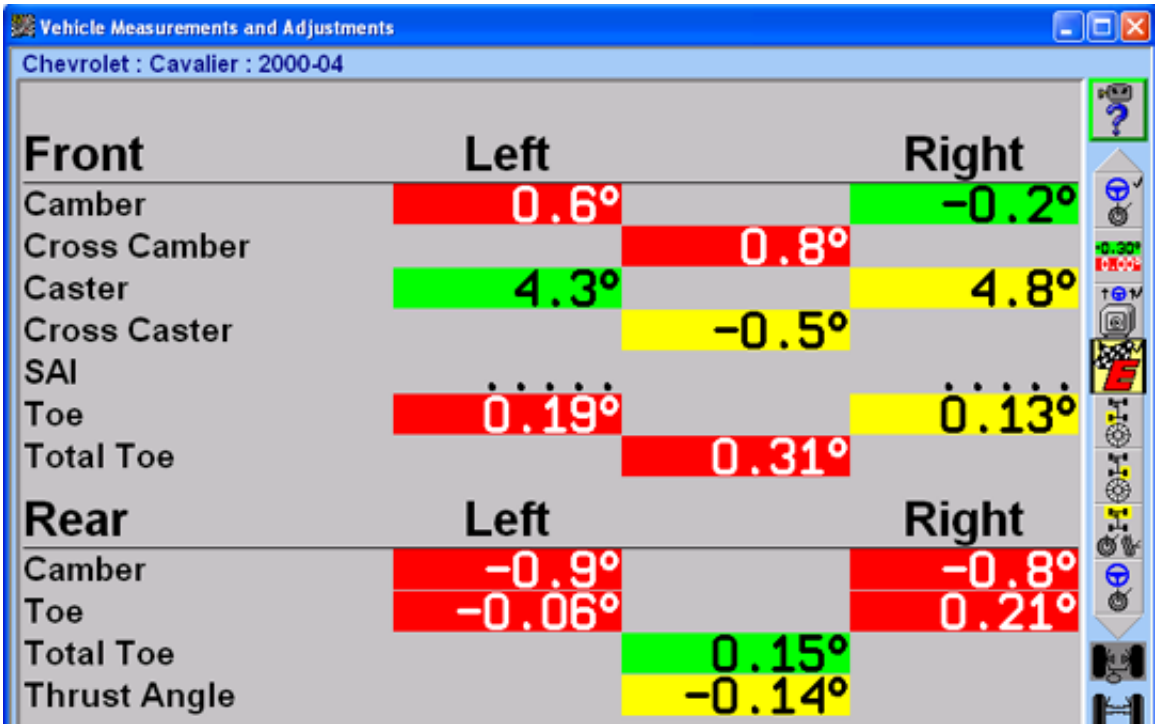
4. Which angles are not adjusted during a 4-wheel thrustline alignment?

5. Why are the rear wheels of a vehicle adjusted before the front wheels?

6. Why would an alignment procedure require all four sensors to be mounted and compensated when only the front wheels are adjustable?

7. What is the correct order of alignment angle adjustment when performing a Total 4-Wheel alignment procedure?

Alignment Display Interpretation #1



Complete the following worksheet based on the above measurements

1. Place an “x” next to any angle contributing to premature tire wear.

___ a) left rear camber	___ b) right rear camber	___ c) thrust angle
___ d) left rear toe	___ e) right rear toe	___ f) rear total toe
___ g) Left front camber	___ h) right front camber	
___ i) Left front caster	___ j) right front caster	
___ k) left front toe	___ l) right front toe	___ m) front total toe

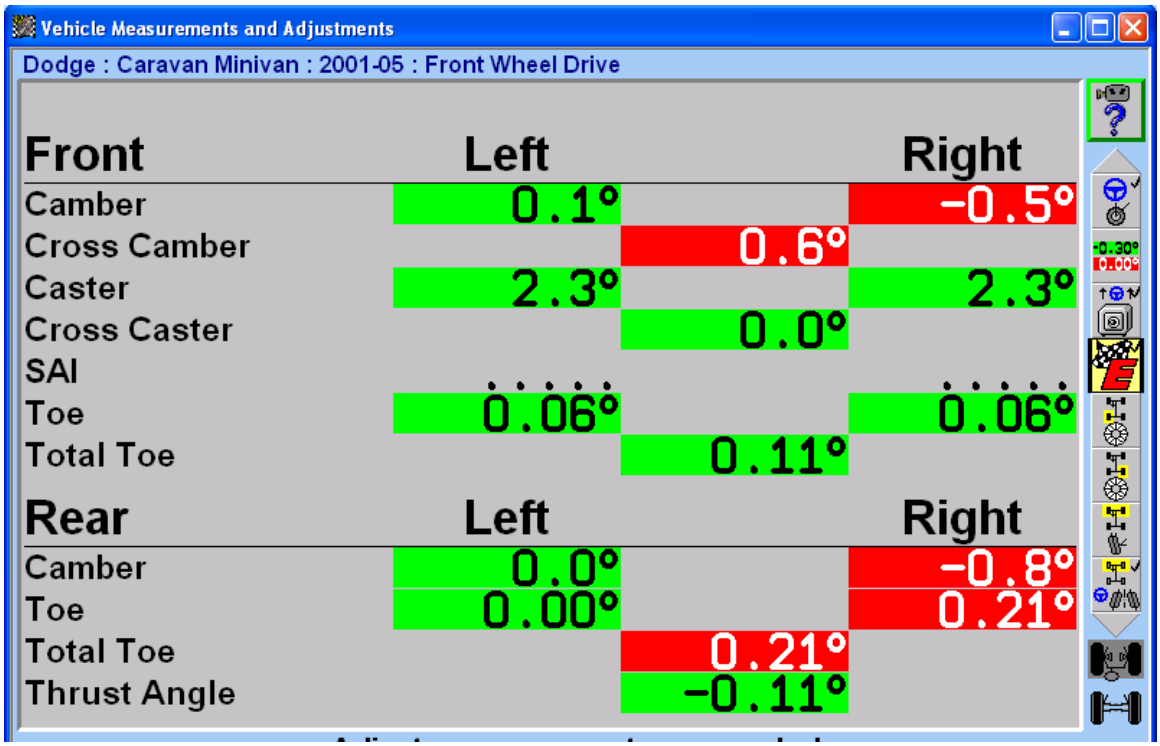
2. Place an “x” next to the driving condition, which might be present.

___ a) pull left	___ b) pull right	___ c) wander
___ d) drift left	___ e) drift right	___ f) dog track

3. The steering wheel is currently level. What will the steering wheel position look like when traveling a straight path?

___ a) off-center left	___ b) off-center right	___ c) level

Alignment Display Interpretation #2



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___ d) left rear toe	___ e) right rear toe	___ f) rear total toe
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___ i) Left front caster	___ j) right front caster	
___ k) left front toe	___ l) right front toe	___ m) front total toe

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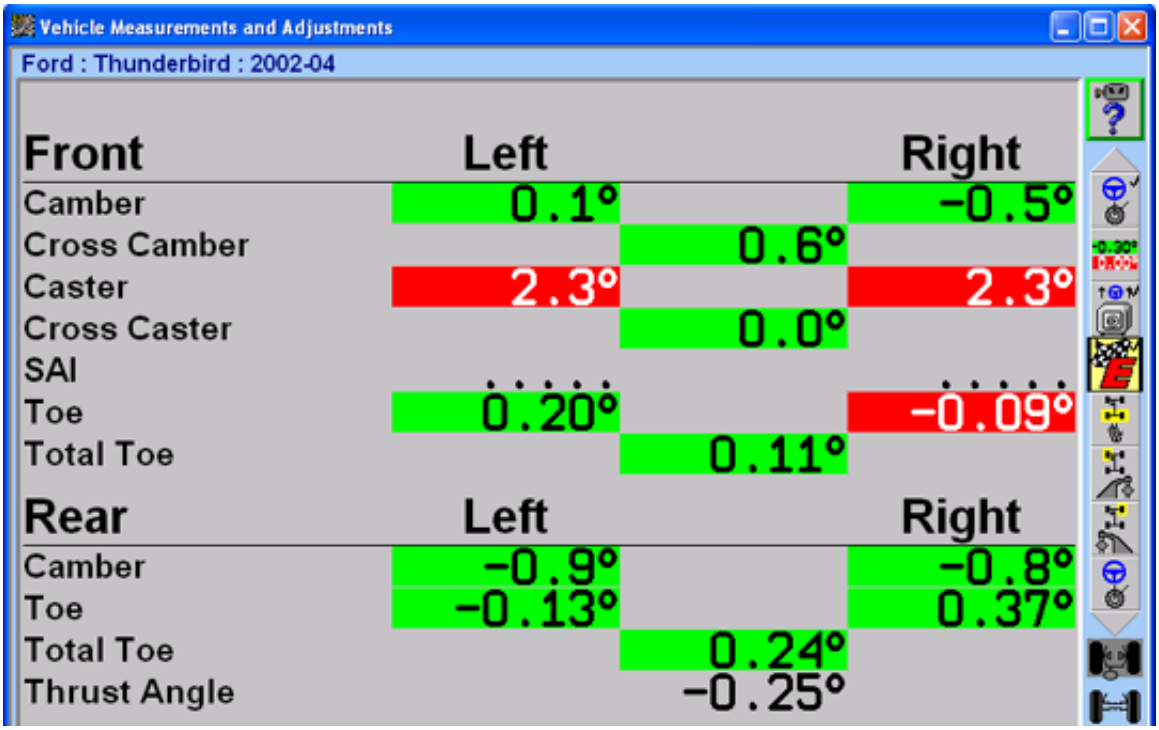
Alignment Display Interpretation #3



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___ a) left rear camber	___ b) right rear camber	___ c) thrust angle
___ d) left rear toe	___ e) right rear toe	___ f) rear total toe
___ g) Left front camber	___ h) right front camber	
___ i) Left front caster	___ j) right front caster	
___ k) left front toe	___ l) right front toe	___ m) front total toe

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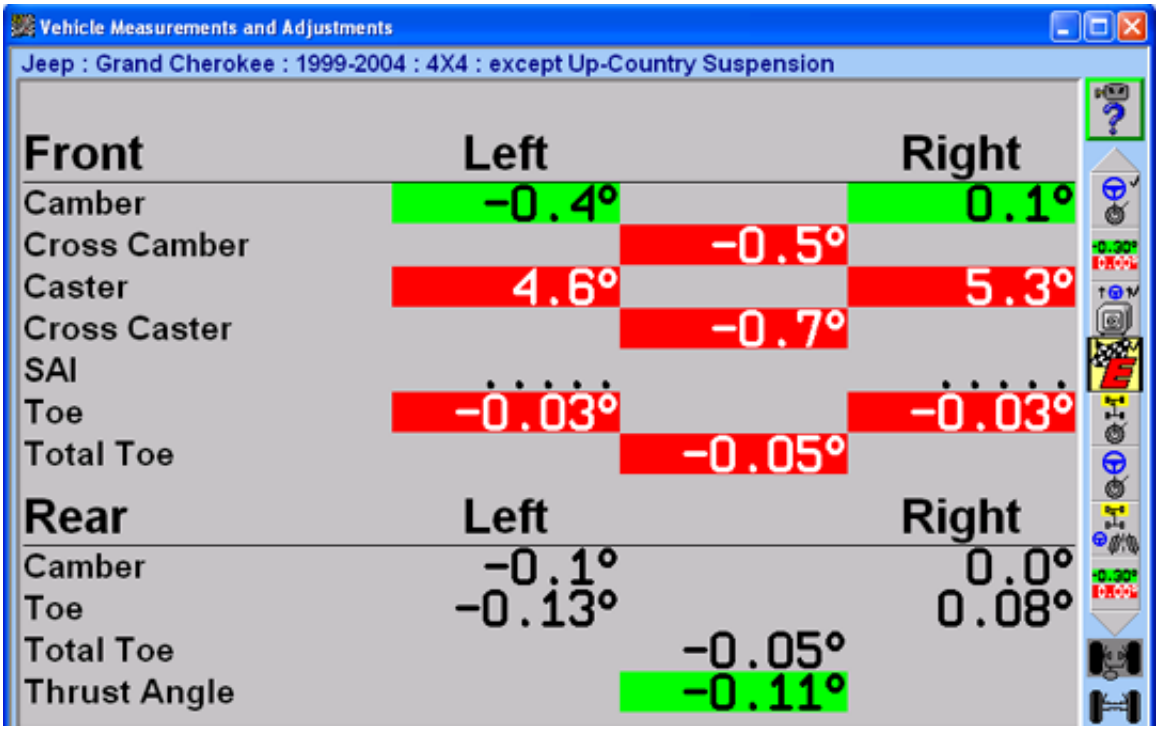
___ a) off-center left	___ b) off-center right	___ c) level

Alignment Display Interpretation #4



Complete the following worksheet based on the above measurements

1. Place an “x” next to any angle contributing to premature tire wear.

___ a) left rear camber	___ b) right rear camber	___ c) thrust angle
___ d) left rear toe	___ e) right rear toe	___ f) rear total toe
___ g) Left front camber	___ h) right front camber	
___ i) Left front caster	___ j) right front caster	
___ k) left front toe	___ l) right front toe	___ m) front total toe

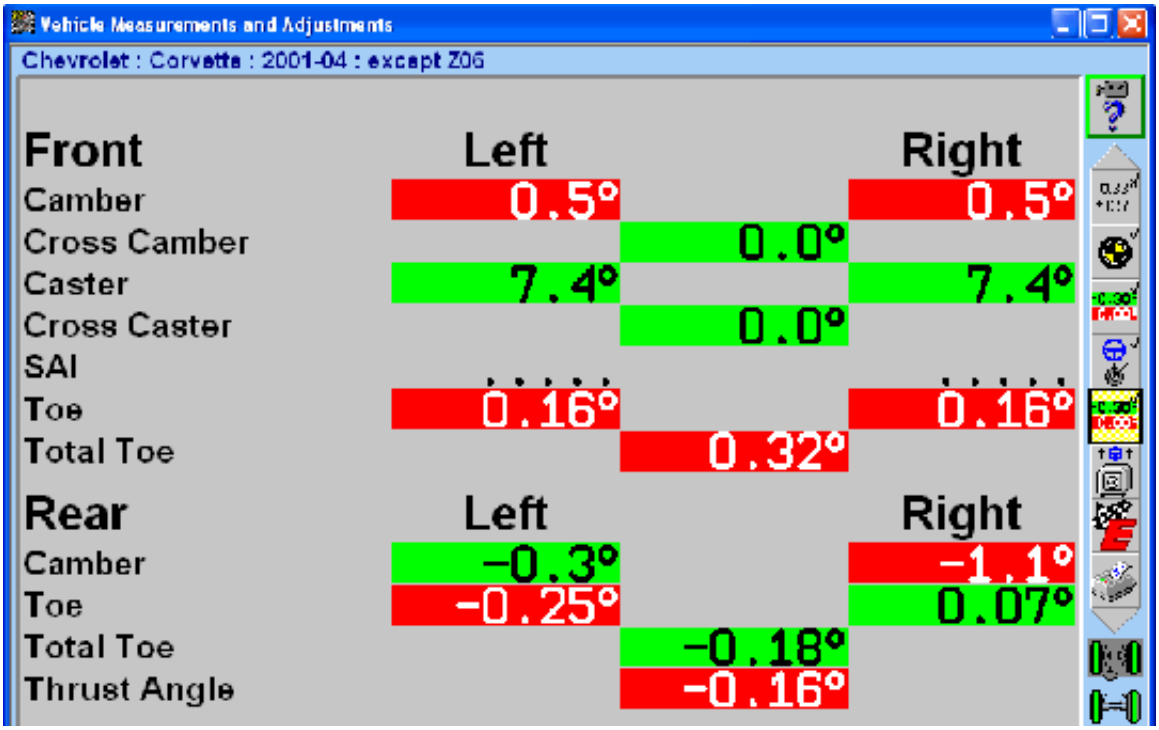
2. Place an “x” next to the driving condition, which might be present.

___ a) pull left	___ b) pull right	___ c) wander
___ d) drift left	___ e) drift right	___ f) dog track

3. The steering wheel is currently level. What will the steering wheel position look like when traveling a straight path?

___ a) off-center left	___ b) off-center right	___ c) level

Alignment Display Interpretation #5



Complete the following worksheet based on the above measurements

1. Place an "x" next to any angle contributing to premature tire wear.

___ a) left rear camber	___ b) right rear camber	___ c) thrust angle
___ d) left rear toe	___ e) right rear toe	___ f) rear total toe
___ g) Left front camber	___ h) right front camber	
___ i) Left front caster	___ j) right front caster	
___ k) left front toe	___ l) right front toe	___ m) front total toe

2. Place an "x" next to the driving condition, which might be present.

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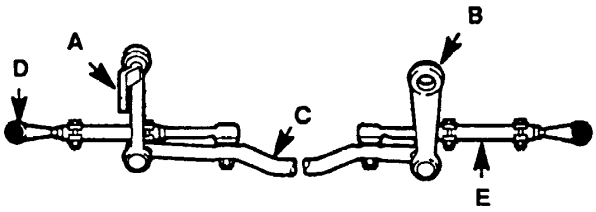
___ d) drift left	___ e) drift right	___ f) dog track

3. The steering wheel is currently level. What will the steering wheel position look like when traveling a straight path?

___ a) off-center left ___ b) off-center right ___ c) level

Homework #1

1. Identify the following steering linkage design and components:



a. _____

b. _____

c. _____

d. _____

e. _____

Steering Linkage design _____

2. List four **suspension** designs you will work on frequently. (course book)

a. _____

b. _____

c. _____

d. _____

3. Indicate by numbering 1-6 a proper four-wheel alignment procedure:

_____ adjust front camber

_____ vehicle inspection

_____ adjust front caster

_____ adjust front toe

_____ adjust rear camber

_____ adjust rear toe

4. Indicate “Direct” or “Indirect” for each angle as relates to tire wear.

_____ a) Front camber

_____ b) Front caster

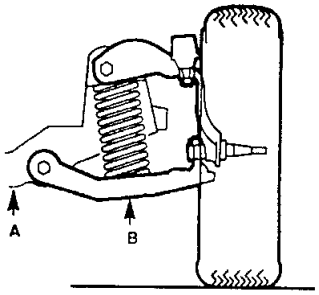
_____ c) Front toe

_____ e) Rear camber

_____ f) Rear toe

_____ g) Thrust angle

5. When checking for ball joint wear on a SLA (Short Long Arm) suspension, where should the jack be positioned? Look at your spec book for help!

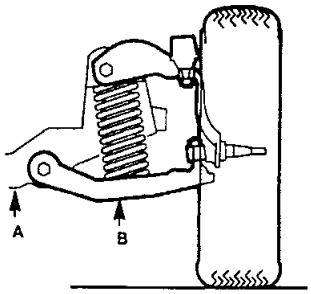


Standard ball joint design?

_____a) Point A

_____a) Point B

_____c) Neither A or B



Wear indicator ball joint?

_____a) Point A

_____a) Point B

_____c) Neither A or B

6. Do the sensors have to be compensated before measurements are displayed?
_____ a) Yes
_____ b) No

7. Indicate if the following angles could be the cause for a vehicle to pull. Y or N

_____ a) Front camber

_____ b) Front caster

_____ c) front toe

_____ e) Rear camber

_____ f) Rear toe

_____ g) Thrust angle

8. Why do alignment angles change as front springs sag?

9. Which of the four steering systems only offers a total toe adjustment?

10. What is meant by the term “Dry Park” inspection?

Homework #2

1. List three reasons for a vehicle to pull, which are not related to camber or caster.
    a. _____
    b. _____
    c. _____

2. List four common wheel alignment adjustment methods
    a. _____
    b. _____
    c. _____
    d. _____

3. Why is camber considered a direct tire wear angle?

4. List three methods a slotted upper control arm can be adjusted.
    a. _____
    b. _____
    c. _____

5. Does a thrust condition exist if a vehicle has -0.45° toe-out on the left rear wheel and +0.50° toe-in on the right rear wheel? Draw a picture if needed

6. Using your vehicle specification book, give the specifications for a 2006 Ford Taurus. What front and rear adjustment methods are used?

	Preferred specification	tolerance
Front caster		
Front camber		
Front toe		
Rear camber		
Rear total toe		
Rear Thrust Angle		

Adjustable angles:

7. What do the terms “inboard” and “outboard” mean when referring to a shimmed control arm?

8. How do you access the front shim program and what preliminary steps must be taken to insure accuracy?

9. Camber and caster are excessively positive and the adjustment is moving a slotted upper control arm. Which end of the control arm is adjusted first and why?

10. Why is it preferred to measure caster by steering the wheels using the vehicle's steering wheel instead of manually steering the tires?