FRONT END ALIGNMENT

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DESCRIPTION AND OPERATION

FRONT END ALIGNMENT

Wheel alignment is the process of adjusting the position of the front suspension and wheels in order to attain proper vehicle handling characteristics and the least steering effort with a minimal amount of tire wear.

Wheel and tire balance has an important effect on steering and tire wear. If wheels and tires are out of balance, "shimmy" or "tramp" may develop causing tires to wear unevenly and give the erroneous impression that the wheels are not in proper alignment. For this reason, the wheel and tire assemblies should be known to be in proper balance before assuming that the front suspension is out of alignment.

With the type of front suspension used, the toe-in adjustment is usually more important than caster and camber as far as tire wear is concerned.

In the majority of cases, services consisting of inflating tires to specified pressure and interchanging tires at recommended intervals, balancing all wheels and tires, adjusting steering gear and setting toe-in correctly will provide more improvement in car handling and tire wear than will front end alignment adjustments.

The correct use of accurate front end alignment equipment is essential to determine whether front suspension parts have been damaged, and to obtain correct alignment settings after new parts have been installed.

MAINTENANCE AND ADJUSTMENTS

FRONT END ALIGNMENT

Inspection Before Checking Front Wheel Alignment

Before making any adjustment affecting caster, camber, toe-in, theoretical king pin inclination, or steering geometry, the following checks and inspections should be made to insure correctness of alignment equipment readings and alignment adjustments.

1. Front tires should have approximately the same wear and all tires must be inflated to specified pressus.

2. Check front wheel bearings for looseness and adjust if necessary.

3. Check for run-out of wheels and tires.

4. Check wheels and tires for balance and correct if out-ofbalance.

5. Check for looseness at ball joints, tie rod ends, and steering relay rods; if found excessive, it must be corrected before alignment readings will have any value.

6. Check trim height; if out of limits, correct with shims or replace spring. Consideration must be given the undercoating, dirt, etc. Vehicle should be at curb or free height when an alignment operation is performed. (All excess equipment, such as tool boxes, fishing or golfing equipment should be removed from the vehicle.) The vehicle should have a full tank of fuel.

Good judgment should be exercised before replacing a spring when car trim height is only slightly out of limits. Spring replacement under conditions of excessive weight as mentioned above will accomplish little and must be accompanied by shimming to obtain satisfactory results. Front and rear shims are available through the Parts Department.

7. It is advisable to check the condition and accuracy of any equipment being used to check front end alignment and to make certain that instructions of the manufacturer are thoroughly understood and followed.

Checking Caster and Camber Settings

Caster is the forward or rearward tilt of the steering knuckle pivot centerline from true vertical as viewed from the side of the vehicle. If the top of the steering knuckle pivot centerline is tilted forward of true vertical, it is called "negative caster." If the top of the steering knuckle pivot centerline is tilted rearward of true vertical, it is called "positive caster."

Camber is the inward or outward tilt of the top of a wheel from true vertical as viewed from the front of the vehicle. If the top of a wheel is tilted outward from true vertical, it has "positive camber." If the top of a wheel is tilted inward from true vertical, it has "negative camber."

Since caster and camber settings are both adjusted in the same locations, both of these settings must be checked before changing shims or cam position.

3D-2 1975 BUICK SERVICE MANUALY. Team Buicease Caster Only - (More positive) Remove an

Regardless of equipment used to check caster and camber, the car must be on level surface both transversely and fore and aft.

When alignment equipment is used which bears against the tire or wheel rim to obtain readings, it is very essential that the tires or wheels be checked for lateral run-out.

Caster and camber readings must be taken at points on the wheels which have no run-out or which lie in the same plane. Caster and camber should be within the service limits shown. Note that the caster angles at both front wheels need not be exactly the same but must be within l degree of each other. Likewise, the camber angle on the left must be within specifications of the right. If caster and camber are not within the specified limits, adjust in the following manner.

H Series Caster and Camber Adjustment

Caster and camber adjustments are made by rotating, or changing the position of the cam bolts. The front cam adjusts the camber setting and the rear cam adjusts the caster setting. The lower control arm is designed so that the camber setting should be made first. In other words: adjust camber, then caster, then toe-in.

The front cam tends to move the control arm in or out with respect to the vehicle. This movement will change camber.

The rear cam tends to move the control arm fore or aft with respect to the vehicle. This movement will change caster.

Camber Adjustment

Camber angle is adjusted by loosening the front lower control arm pivot nut and rotating the cam until proper setting is reached. This eccentric cam action will move the lower control arm in or out thereby varying the camber. Hold the cam bolt head while tightening the nut.

Caster Adjustment

Caster angle is adjusted by loosening the rear lower control arm pivot nut and rotating the cam until proper setting is reached. This eccentric cam action will tend to move the lower control arm fore or aft thereby varying the caster.

Hold the cam bolt head while tightening the nut. Recheck camber after setting caster.

X-A-B-C-E Series Caster and Camber Adjustment

On A Series the alignment shims are installed from the bottom. Count shims before loosening to aid installation.

For caster and camber adjustment purposes, use the following guide:

1. To increase camber only - (More positive) Remove and equal amount of shims from front and rear bolts.

2. To decrease camber only - (Less positive) add an equal amount of shims to front and rear bolts.

3. To increase easter only - (More positive) Remove an amount of shims from front bolt and add an equal amount of shims at rear bolt.

4. To decrease caster only - (Less positive) Add an amount of shims at the front bolt and remove an equal amount of shims from the rear bolt.

5. To increase caster and camber at the same time - remove an amount of shims *at front bolt only*.

6. To decrease caster and camber at the same time - add an amount of shims *at front bolt only.*

The following guide lines will help you select and correctly shim with minimum effort. Shim thickness limit for any one stack is .750 of an inch.

Shims are available in .030", .060", and .120" thickness.

By adding a pack of shims .090" thick at both sides, camber will be decreased by approximately 1/2 degree.

By adding a .030" shim on one bolt and removing a .030" shim from the other, caster will change approximately 3/8 degree.

To help you determine the shim thickness change required to return caster and camber to design dimension, dimension change charts have been developed to enable you to do quicker and more accurate work. See Figures 3D-3, 3D-4, 3D-5 and 3D-6. The chart indicates the change required at (F) front and (R) rear shim position in order to return the initial reading to factory specifications. For example: Assume the initial readings for one B Series wheel were, camber plus $1/2^{\circ}$ left side and 0° right side. Caster minus 1/4 degrees. Figure 3D-6 indicates that a subtraction of 0.18 shim thickness to the (F) front shim position and addition of plus .009 shim thickness to the (R) shim position would be required to adjust this wheel to factory specifications.

Torque control arm shaft nuts to specifications.

Torque wrench adapter J-22668 may be used if reading is calibrated for its use.

It is imperative that this torque specification be closely adhered to.

Checking Theoretical Kingpin (Steering Axis) Inclination

When checking theoretical king pin inclination, car must be on a level surface both transversely and fore and aft, must have trim heights within limits, and must be at curb load.

Set camber and caster to the desired specifications as shown. Measure king pin or steering axis inclination relative to a vertical plane. Add to the measured king pin axis angle the value of the positive camber angle (subtract if the camber is negative) and compare the resulting angle to the value given in the specification.

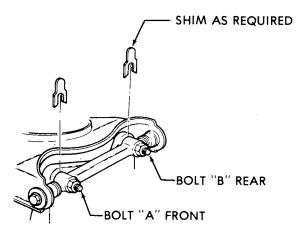
There is no adjustment for theoretical king pin inclination as this factor depends on the accuracy of the front suspension parts. Distorted steering knuckles should be replaced with new parts.

CAUTION: Any heating, welding, or bending of front suspension parts to correct errors or repair damage must be avoided as this may pro-

CASTER AND CAMBER ADJUSTMENT TEAMBUICK.COMFRONT END ALIGNMENT 3D-3

FOR CASTER AND CAMBER DIMENSIONS, SEE WHEEL ALIGNMENT AND SPEC CHART.

FOR INCREASED OR POSITIVE CASTER, DECREASE SHIMS AT BOLT "A" AND INCREASE SHIMS AT BOLT "B" BY SAME AMOUNT



FOR DECREASED OR NEGATIVE CASTER, INCREASE SHIMS AT BOLT "A" AND DE-CREASE SHIMS AT BOLT "B" BY SAME AMOUNT

FOR INCREASED CAMBER, DECREASE SHIMS AT BOTH "A" AND "B" BOLTS. SHIMMING GREATER THAN .750 NOT PERMISSIBLE

SHIM THICKNESS AT "A" AND "B" LOCATION TO BE WITHIN .40 OF EACH OTHER

4B3D1

Figure 3D-1 - X-A-B-C-E Series Shimming Location

duce soft spots in the metal in which fatigue and breakage may develop in service.

Checking and Adjusting Toe-In

Toe-in is the distance in fractions of an inch that the front of the wheels are turned inward from a straight-ahead position.

Car must be at curb weight and front and rear suspension trim should be within specified limits. Bounce front end and allow it to settle to operating height. Steering gear and front wheel bearings must be properly adjusted with no looseness at tie rod ends. The car should be moved forward one complete revolution of the wheels before the toe-in check and adjustment are started and the car should never be moved backward while making the check and adjustment. This presets the front suspension and removes lash from the joints.

1. Turn steering wheel to straight-ahead position, with front wheels in same position.

2. Using a suitable toe-in gauge, measure the distance

between outside walls of tires at the front at a height approximately horizontal to floor and through the centerline of the wheel assembly. An accurate check also can be made by raising and rotating front wheels to scribe a fine line near the center of each tire, then, with tires on the floor and front end at running height, measure between scribed lines with a suitable trammel.

3. Roll the car forward until measuring points on tires are approximately 180 degrees from point used in Step 2 above.

The measurement at the front should be 1/16'' less than the measurement at the rear.

4. If toe-in is not within specified limits, loosen clamp bolts and turn adjusting sleeves at tie rod ends as required.

Left and right adjusting sleeves must be turned exactly the same amount but in opposite directions when changing toe-in, in order to maintain front wheels in straight-ahead position when steering wheel is in straight-ahead position.

Approximately the same amount of thread engagement in the adjuster sleeve should be noted for the inner and outer tie rod ends. The distance between the inner and outer tie rod ends in the adjuster sleeve should be approximately equal for both right and left wheels. The tie rods should never be lengthened to the point where the inner and outer threaded tie rod ends are outboard of the inner edge of the adjuster sleeve "U" clamps. If proper toe-in cannot be obtained within this amount of adjustment, inspect the suspension and steering linkage for bent parts.

5. After correct toe-in is secured, tighten clamp bolts securely.

The steering knuckle and steering arm "rock" or tilt as front wheel rises and falls. Therefore, it is of vital importance to center the travel of the inner tie rod joint by centering the tie rod stud in the socket (socket front face should be approximately vertical) and then position the bottom face of tie rod end parallel with machined surface at outer end of steering arm when tie rod length is adjusted. Severe damage and possible failure can result unless this precaution is observed. Tie rod clamp opening must not be over the sleeve opening. Refer to Steering Linkage Section for tie rod sleeve clamp position.

Checking Steering Geometry (Turning Angles)

Be sure that caster, camber, and toe-in have all been properly corrected before checking steering geometry. Steering geometry must be checked with the weight of the car on the wheels.

X-A-B-C-E Series

1. With the front wheels resting on full floating turntables, turn wheels to the right until the outside (left) wheel is set at 20 degrees. The inside (right) wheel should then be at the angle specified.

2. Repeat this test by turning front wheels to the left until the outside (right) wheel is at 20 degrees; the inside (left) wheel should then be at the angle specified.

3. Errors in steering geometry generally indicate bent steering arms, but may also be caused by other incorrect front end factors. If the error is caused by a bent steering

3D-4 1975 BUICK SERVICE MANUALY. Team steering arm or Bruckle to correct steering geometry, since doing so may cause the part to break in service.

arm, the complete knuckle must be replaced. Replacement of such parts must be followed by a complete front end alignment check as described above. Never heat or bend

H Series

Be sure that caster, camber, and toe-in have all been prop-

FRONT END ALIGNMENT

Satisfactory vehicle operation may occur over a wide range of front end (wheel) alignment settings. Nevertheless, should settings vary beyond certain tolerances, readjustment of alignment is advisable. The specifications stated in Chart "A" of this manual should be used by owners, dealers, and repairmen as guidelines in vehicle diagnosis, either for repairs under the new vehicle warranty or for maintenance service at customers' requests. These specifications provide an acceptable all-around operating range in that they prevent abnormal tire wear caused by wheel alignment.

WHEEL ALIGNMENT SPECIFICATIONS

		CHART A	CHART B
		Specifications for Diagnosis for Warranty Repairs Or Customer Paid Service	Specifications for Resetting Alignment
Caster	H Series X Series (Man/Strg.) X Series (P/Strg.) A Series B-C-E Series	$\begin{array}{c} -1 \ 3/4^{\circ} \ to \ +1/4^{\circ} \\ -2^{\circ} \ to \ 0 \\ 0 \ to \ +2^{\circ} \\ +1^{\circ} \ to \ +3^{\circ} \\ +1/2^{\circ} \ to \ +2 \ 1/2^{\circ} \end{array}$	$\begin{array}{r} -1 \ 1/4^{\circ} \ to \ -1/4^{\circ} \\ -1 \ 1/2^{\circ} \ to \ -1/2^{\circ} \\ +1/2^{\circ} \ to \ +1 \ 1/2^{\circ} \\ +1 \ 1/2^{\circ} \ to \ +2 \ 1/2^{\circ} \\ +1/2^{\circ} \ to \ +2 \ 1/2^{\circ} \end{array}$
Camber	H Series X Series A Series R.H. Side L.H. Side B-C-E Series R.H. Side	$-3/4^{\circ} \text{ to +1 } 1/4^{\circ}$ 0 to +1 1/2° $-1/4^{\circ} \text{ to +1 } 1/4^{\circ}$ +1/4° to +1 3/4° $-1/4^{\circ} \text{ to +1 } 1/4^{\circ}$	$-1/4^{\circ}$ to +3/4° +1/4° to +1 1/4° O to +1° +1/2° to +1 1/2° O to +1°
Toe In	L.H. Side H Series X-A-B-C-E Series	+1/4 ^o to +1 3/4 ^o 1/16" out to 3/16" in 1/16" <u>+</u> 1/8"	+1/2 ⁰ to+1 1/2 ⁰ 0 to 1/8" in O to 1/8"
C r oss Caster	All Series	No more than 1º side to side variation	No more than 1/2 ⁰ side to side variation
Cross Camber	H Series X-A-B-C-E Series	No more than 1° side to side variation <u>Desirable</u> - L.H. camber +1/2 ⁰ more than R.H. camber. <u>limits</u> - L.H. camber to +1 1/2 ⁰ of R.H. camber	No more than 1/2 ⁰ side to side variation L.H. camber to be +1/4 ⁰ to +3/4 ⁰ of R.H. camber

Governmental Periodic Motor Vehicle Inspection programs usually include wheel alignment among items that are inspected. To provide useful information for such inspections, the tc erances shown in Chart "C" are applicable and well within the range of safe vehicle operation.

MOTOR VEHICLE INSPECTION STATION TOLERANCES

		<u>CHART C</u>		
	H SERIES X SE	RIES (MAN/STRG) (P/STRG)	A SERIES	B-C-E SERIES
Caster Camber	-2 3/4 ^o to +1 1/4 ^o -1 1/4 ^o to +1 3/4 ^o	$\begin{array}{rr} -3^{0} \text{ to } +1^{0} & -1^{0} \text{ to } +3^{0} \\ -3/4^{0} \text{ to } +2 \ 1/4^{0} \end{array}$	O to +4 ⁰ R.H. +2 ⁰ to −1 ⁰ L.H. +2 1/2 ⁰ to −1/2 ⁰	–1/2 ⁰ to+3 1/2 ⁰ R.H. +2 ⁰ to −1 ⁰ L.H. +2 1/2 ⁰ to −1/2 ⁰
Toe-in	5/16" <u>+</u> 7/16"	1/16" <u>+</u> 3/8"	1/16" <u>+</u> 3/B"	1/16'' <u>+</u> 3/8''

In the event the actual settings are beyond the specifications set forth in Chart "A" or "C" (whichever is applicable), or whenever for other reasons the alignment is being reset, Buick recommends that the specifications given in Chart "B" of the aforesaid applicable chart be used.

erly corrected before checking steering/geometry. Steering BUICK.CONFRONT END ALIGNMENT 3D-5 geometry must be checked with the weight of the car on the wheels.

Measure the distance between the suspected bad arm and a stationary point on the brake backing plate or splash

FRONT SUSPENSION ALIGNMENT CHART

X SERIES MANUAL STEERING

shield, compare it with the same measurement on the other arm. The angle of the steering arms must be the same for both arms.

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Figure 3D-3 - X Series Manual Steering Alignment Shim Chart

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FRONT SUSPENSION ALIGNMENT CHART

X SERIES POWER STEERING

MEASURED CASTER READING

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MEASURED CAMBER READING Ħ

Figure 3D-4 - X Series Power Steering Alignment Shim Chart

1975	BUICK	SERVICE	MA	N Ù Â	¥.	I.
				A.7. A.4	1 Mile 1915	a - 5

SPECIFICATIONS

FRONT END ALIGNMENT SPECIFICATION

+200

+411 +101

+600

+211 +210 +510 +501 +111

-1-1/4

CHARTS

0	FRONT	+300	+211	+211	+210	+210	+201	+201	+201	+200	+200	+200	+111	+111	+111	0114	011+	011	101+	101+
7+	REAR	000	+001	+010	+010	+011	+100	+101	+110	+111	+200	+201	+210	+211	+300	+301	+310	+311	+400	+401
	-	+210	+210	+201	+201	+200	+200	+200	+111	+111	+110	+110	+110	+101	+101	+101	+100	+100	+100	+011
+1-3/4	_	- 010	001	000	+001	+010	+011	+100	+101	+110	+110	+111	+200	+201	+211	+300	+301	+310	+311	+400
	-	+200	+200	+200	+111	+111	+110	+110	+110	+101	+101	+100	+100	+100	+011	+011	+011	+010	+010	+010
+1-1/2	- I -	- 011	-011	- 010	.001	000	+001	+010	+011	+100	+101	+110	+111	+200	+201	+210	+211	+300	+301	+310
		; 1 1	+110	+110	+110	+101	+101	+100	+100	+100	+011	+011	+011	+010	+010	+010	+001	+001	+001	000
= +1-1/4°	_		100	- 011	- 010	- 001	-001	000	+ 001	+010	+011	+100	+101	+110	+111	+200	+201	+210	+300	+301
	FRONT	+101	+101	+100	+100	+100	+011	+011	+010	+010	+010	+001	+001	+001	000	000	000	- 001	-001	- 001
°_+	REAR		-110	- 101	.100	- 011	-010	001	000	+001	+010	+011	+100	+101	+110	+111	+200	+201	+210	+211
	FRONT	+100	+01	+011	+011	+010	+010	+001	+001	000	000	000	-001	-001	-001	- 010	- 010	- 010	-011	- 011
ξ +3/4°	RFAR	. 200	-111	.110	-110	- 101	-100	-011	-010	-001	000	+001	+010	+011	+100	+101	+110	+111	+200	+201
	FRONT	+010	+010	+001	+001	+001	000	000	-001	-001	-001	-010	-010	-010	-011	- 011	- 011	-100	-100	- 100
+1/2°	RFAR	- 210	- 201	- 200	-111	- 110	- 101	.100	- 011	- 010	- 001	000	+001	+010	+011	+100	+101	+110	+111	+200
	t	+001	000	000	.001	- 001	-001	- 010	-010	-011	-011	-011	-100	-100	-100	- 101	- 101	- 101	-110	- 110
+1/4°	1.	- 211	-210	- 210	- 201	- 200	-111	- 110	-101	-100	-011	-010	-001	000	+001	+010	+011	+100	+101	+110
	FRONT	- 001	100	- 010	- 010	-011	-011	- 011	-100	-100	-101	-101	-101	-110	-110	- 110	- 111	-111	-111	- 111
°0	REAR	- 301	-300	- 211	- 210	- 201	-200	- 200	-111	- 110	-101	-100	-011	-010	-001	000	+001	+010	+100	+101
	FRONT	- 010	-011	- 011	. 100	- 100	-101	- 101	-101	-110	-110	-110	-111	-111	-111	. 200	- 200	- 200	-201	- 201
-1/4°	REAR	- 311	-310	- 301	- 300	- 211	-210	- 201	-200	- 111	-110	-101	-100	-011	-010	. 001	000	+001	+010	+011
	FRONT	100	-100	- 101	. 101	.110	-110	- 110	-111	-111	-200	-200	-200	-201	-201	- 201	- 210	- 210	-210	- 211
-1/2°	RFAR	400	-311	. 310	. 301	- 301	·300	- 211	-210	-201	-200	-111	-110	-101	-100	- 011	- 010	- 001	000	+001
	FRONT	- 101	-110	- 110	.111	- 111	-200	- 200	-200	-201	-201	-210	-210	-210	-211	- 211	- 211	- 300	-300	- 300
-3/4°	RFAR	- 410	-401	400	- 311	- 310	-301	- 300	-211	-210	-201	-200	-111	-110	-101	- 100	- 011	- 010	-001	000
	FRONT	=	111	- 200	- 200	- 201	-201	. 210	-210	-210	-211	-211	-211	-300	-300	- 300	- 301	- 301	-301	- 310
°	RFAR	- 411	-410	- 410	- 401	- 400	-311	- 310	- 301	-300	-211	-210	-201	-200	-111	- 110	- 101	100	- Ģ	- 010
	+	- 201	.201	- 201	. 210	- 210	-211	. 211	-211	-300	-300	-301	-301	-301	-310	-310	- 310	- 311	-311	- 311
-1-1/4°	- L .,	- 501	-500	- 411	- 410	- 401	-400	. 311	-311	-310	-301	-300	-211	-210	-201	- 200	- 111	- 101	-100	- 011
	+	- 210	-211	- 211	- 211	- 300	-300	- 301	-301	-301	-310	-310	-311	-311	-311	- 400	. 400	- 400	-400	- 401
-1-1/2	+	- 510	-510	- 501	- 500	- 411	-410	- 401	-400	-311	-310	-301	-300	-211	-210	- 201	- 200	-11	-110	- 101
					١r			K	^									0003	•	
FRONT	8 	REQUIF	RED AT	SHIM REQUIRED AT FRONT BOLT	0LT			~	レ									20304	4	
REAR	ท	REGUL	TED AL	SHIM REQUIRED AT REAR BOLT]		-	2						DAA A Y						
							-	_	J			4	-!	EXAMPLE	LL LL					
								_				┝ ┝	ļ	= # OF S	MALL (.0	# OF SMALL (.03) SHIMS				
														= # OF MED.		SMIHS (90')				
													1	# 0F	ARGE (.	LARGE (.12) SHIMS				

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													•									
-	-with Power Steering	teering	+4-1/2°	+4-1/4°	+4°	+3-3/4°	+3-1/2°	+3-1/4°	+3°	+2-3/4°	+2-1/2"	+2-1/4°	+2°	+1-3/4°	+1-1/2°	+1-1/4°	¢+	+3/4°	+1/2°	+1/4°	°0+	- 1/4°
Hiw	-with Manual S	Steering	+3-1/2°	+3-1/4°	+3°	+2-3/4°	+2-1/2"	+2-1/4°	+2°	+1-3/4°	+1-1/2"	+1-1/4"	÷	+3/4°	+1/2°	+1/4°	ĉ		06/17	° V , C		
LEFT	RIGHT	BOLT]]						2/1-	-3/4-	<u>,</u>	-1-1/4
+3.1/40	07/2-67		114+	+410	+410	+401	+401	+400	+400	+311	112+	+ 110	0161	0101	100.					ľ		
	-		+110	111+	+200	+201	+210	+211	+211	+300	+301	+310	112	110+	1001	1300	1005+	+211	+211	+210	+201	+201
°5+	0C/1 CT	_	+401	+401	+400	+400	+311	+311	+310	+310	198+	102+	+300	0001	10.	100	1041	11.410	40	Ē	+500	+500
,			101+	+110	011+	111+	+200	+201	+210	+210	+211	+300	+301	102+	121	1171	0174	017+	102+	+200	+200	Ę
0V/E"C+	0 V 1 CT	FRONT	+400	+311	118+	+310	+310	+301	+301	002+	1002 +	116+	100-	1061	1310	E i	Er l	400	+401	+401	+410	+411
+/0-2.	-	REAR	110+	+100	+101	110	+110	111+	+200	+201	016+	117.	1121	0021	017+	102+	+201	+200	Ę		+110	+110
		FRONT	+310	+310	+301	+301	1300	005+	1167			017		005+	+300	1301	+310	+310	+311	+400	+400	+401
7/1-74	-7+	REAR	+010	+010	110+	+100	101+	011+	0117	1171	1200	012+	102+	+201	+200	+200	Ę	111+	+110	101+	101+	+100
	-	FRONT	102+	1300	00¢+	1164	1167	0101				107+	107+	012+	+211	112+	+300	+301	+301	+310	+311	+311
+2-1/4	+1-3/4	REAR		100+	010+	0101	117	7210	0174	107+	102+	+200	+200	Ę	Ę	+110	+110	101+	00 l+	100	110+	010+
		FRONT	110+	1167		0101	10+	001+	10	0[+	0117	Ę	+200	+200	+201	+210	+210	+211	+300	100+	+301	+310
"Z+	+1-1/2°	9F ÅD		100	000	017+	107+	102+	102+	¢200	Ę	Ę	0[1	+110	101+	101+	+100	110+	110+	010+	+010	100+
		EDONT	010-	100-	000	100+	+010	+010	101	+100	101+	011+	+110	[]]+	111+	+200	+201	+210	+210	112+	002+	002+
+1-3/4°	+]-]/4°		0124	102+	107+	+200	+200	Ę	Ę	+110	011+	+101	+101	+100	100	110+	010+	+010	100+	100+		100-
		CONT	110-	010-	-010	100-	000	100+	+010	+010	110+	+100	101+	101+	+110	Ē	Ę	+200	+201	102+	+210	110+
+1-1/2	•] •		002+	u02+	Ę	Ę	011 -	0[[+	101+	101+	+100	+100	110+	110+	-010	010+	100+	000	000	100-	010-	
		REAR EDONT	101-	B0 -	Eq.	000	-010	[00-	000	100+	+010	+010	110+	110+	+100	101+	110	011+	Ę	+200	+200	102+
+1-1/4°	+3/4°	L KUNI		01 -	₽ ∓	101+	10 1	+1 00	+100	110+	+010	+010	100+	100+	100+	000	100-	100-	010-		110	
		KLAK	Ę	0[[-	-101	-100	110-	-010	-010	-001	000	100+	100+	1010+	110+	[10+	100	101+				
°[+	+1/20	+ KUN	101+	9 7	00 7	(l0+	110+	010+	+010	100+	100+	000	000	000	100-	010	-010	10-	10			
		REAR	-200	Ę	-110	-110	101-	-100	110-	-010	010-	100-	000	000	100+	010+		101	001	0.00	101-	
+3/4°	+1/4°	FRONT	[10+	110+	+010	+010	100+	100+	000	000	-001	100-	100-	-010	[10-	110-	001	001-			101+	₽
		REAR	-210	-201	- 200	-111	-110	-110	-101	-100	110-	[10-	-010	100-	100-	000	100+	010+	0101	1107		
+1/2°	•0	FRONT	010+	100+	100+	000	000	100-	100-	-010	010-	110-	-011	-100	-100	101-	101,	011-	111-			
		KEAK	211	-211	-210	-201	- 200	111-	-110	011-	-101	-100	-100	110-	010-	-010	100-	000	1001	1001	1010	
+1/4°	-1/4°	FRONT	80	000	100-	100-	010-	-010	110-	-011	001-	-100	-101	-101	011-	011-		11-	000-	1001	0101	-
		REAR	- 301	- 300	-211	-210	-210	-211]	-200	Ē	Ę	011-	101-	101-		10			100	107-	10.7	017-
°0	-1/20	FRONT	-01	-010	-010	110-	110-	-100	-100	101-	101-	0[1-	011-	111		000	010-	010-	inn-	200	000	- 00+
		REAR	-311	-310	-301	- 300	-211	-210	-210	-201	-200				╉	007-	007-	107-	-210	-210	-211	-300
-1/40	.3/4.	FRONT	110-	110-	-100	-100	-101	101-	011-	011-	<u>-</u>		1 1 1	011-	╉	101-	BD -		- []	-010	-00	ē
		REAR	-400	-311	-311	-310	- 301	-300	-211	-211	-210	- 201	- 201	007-	╉	107-	017-	112-	-211	- 300	-300	۲ ۳
-1/20	° [-	FRONT	-100	-101	-101	-110	-110	Ę	111-	-200	-200	- 201	-201	-210	┿	110	011-	101-	00 -	001	Ģ	-010
		REAR	-410	-401	-400	-311	-311	-310	-301	- 300	-211	-211	-210	-201	- 201	╉	000-	nn:-	- 301	105-	016-	Er-
-3/4°	-1-1/40	FRONT	-110	-110	111-	11.7	-200	- 200	-201	- 201	-210	- 211	112-		+	+			011-	10 	00	8
		REAR	-411	-411	-410	-401	-400	116-	-311	-310	102 -	- 200	300	110	╉	╉		- 210	015	- <u>-</u> -	-400	-400
°[1	-1-1/20	FRONT	- 200	- 200	-201	-201	-210	-210	-211	-211	300	002-	200	+	╋	+	107-	007-	Ē	Ę	2	101-
		REAR	-501	- 500	-411	-411	-410	-401	-400	-311	-311	╋	105 -	102-	000	╉	- 1	- 510	-400	104	-401	410
-].1/4°	-1-3/40	FRONT	- 201	-210	-210	-211	- 211	-300	-300	-301	- 301	╀	- 10	+	╉	117-	017-	-710	10,7-	007-	-200	Ę
		REAR	-511	-510	-501	-500	-411	-411	014-	104-		╉		+	+	┥	-400	-401	410	-410	-411	-411
											-100			-310	-310	-301	- 300	-211	-211	-210	-201	- 201
		FRONT = 5	FRONT = SHIM REQUIRED AT FRONT BOLT	RED AT FR	ONT BOLT	r—				N ⊲												
		REAR = S	* SHIM REOUIRED AT REAR BOLT	RED AT RE	AR BOLT				-						L					ſ		
						1					/						•	<u>EXAMPL, E</u>				
											/		- -		,	⇒┣━ ┲╺┝━	۔ لم	= # OF SMALL (.03) SHIMS	5 (203) 5	SHIMS		
											/				T		1	# OF MEO.	(.06) S	SHIMS		
															_			= # OF LARGE	SHIMS (.12) SHIMS	SHIMS	5B	5B3D5
															L]		

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CHART	
LIGNMENT	
ENSION A	
FRONT SUSP	

MEASURED CASTER READING B-C-E SERIES

-3/4°		+211	+511	+201	+501	+111	+411	+110	+410	+100	+400	+011	+311	+001	+301	000	1171	+210	-100	+200	-101	+111	-111-	+101	-200	+100	-210	+010	000	-301	.001	-310	-011	-400	-100	-410	-110						
-1/20		+211	+510	+201	+500	+200	+410	+110	+401	+101	+311	+011	+310	+010	+300	000	117+	+201	-011	+111	-101	+110	-110	+100	-200	+011	-201		-100-	-301	-010	-310	-100	-400	-101	-401	-111						
-1/40		+211	+501	+210	+411	+200	+410	+11 +	+400	+101	+310	+100	+301	+010	+211	80	012+	+200	011	+110	-100	+101	-110	+011	-111	+010	-201	000	-010-	-300	-011	-310	-101	- 311	-110	-401	-200	5B3D6					
00	>	+300	+500	+210	+410	+201	+401	+111	+311	+110	+301	+100	+300	+010	+210	+001	+701+	+111	-010	+101	-100	+100	-101	+010	-111	+001	-201	-001	117-	-300	- 100	-301	.110	311	Ē	-400	-201	ى س	r		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Ø	S
+1/10		+300	+411	+211	+401	+201	+400	+200	+310	+110	+300	+100	+211	+011	+201	+001	+200	+110	-010	+101	-011	+011	-101	+001	-111	000	-200	-010	-110	-211	-101	-301	-111	-310	-200	400	-210				# OF SMALL (.03) SHIMS	(.06) SHIMS	12) SHIN
04/17	1 7/1+	+301	+410	+211	+400	+210	+311	+200	+301	+110	+300	+101	+210	+011	+200	+010	+111	1010	100	+100	-011	+010	-101	000	-110	-001	-200	-011	102	-211	-110	-300	-200	-310	-201	- 311	-211			Ш	SMALL (OF MED. (.	LARGE (.12) SHIMS
01/0.	+3/4	+301	+401	+300	+311	+210	+310	+200	+300	+111	+211	+101	+201	+100	+111	+010	+110	1001	200	+011	-011	+001	-100	000	-110	-010	-111	-100	-201	-210	-111	-300	-200	-301	-210	-311	-300			EXAMPLE	:#0E	OF	= # OF
ę	-	10101	+400	+300	+311	+210	+301	+201	+211	+111	+210	+110	+200	+100	+111	+011	+101	+001	100	1010+	-010	000	-100	-00-	-101	-011	-111	-101	-200	-210	-200	-211	-201	-301	-211	-311	-300			-	Ĺ.		
0/1 1/40	1-1/4	1310	+311	+301	+310	+211	+300	+201	+210	+200	+201	+110	+111	+101	+110	+011	+100	+010			-010	-001	-011	-010	-101	-100	-110	-101	-200	201	-201	-211	-210	-301	-300	-310	-301			4	>] -
0 4 1 1 1 1 1 1 1 1 0 LT	7/1-11	1 1 1 1	+310	+301	+301	+211	+211	+210	+210	+200	+200	+111	+110	+101	+101	+100	+011	+010			.001	- 010	- 011	- 011	.100	- 101	- 110	- 110	- 111	- 201	- 201	- 210	.211	• 300	- 301	- 310	- 310						
_	+1-3/4	111	+310	. +310	+300	+300	+210	+210	+201	+201	+111	+111	+110	+110	+100	+100	+010	+011	100+	100+	100,	010	- 010	- 100	- 100	- 110	-101	- 111	. 111	102.	- 210	- 210	- 300	- 300	- 301	· 301	- 311						
9	+2~	000	+400	+310	+211	+300	+201	+211	+230	+201	+110	+200	+101	+110	+011	+101	+010	+011	000	100+		. 011	- 010	- 101	- 011	- 110	- 101	- 200	-110	012 -	. 211	- 201	- 301	. 211	- 310	- 301	- 400	Λ					
	+2-1/4	1 000	+300	+311	+210	+301	+201	+211	+111	+210	+101	+200	+100	+111	+010	+101	+001	+100	100	1010		100	-001	-110	-011	-111	-100	-201	-110	111	300	-201	-310	-211	-311	-300	-401		5	<u>_</u>			
	2-3/4° +2-1/2°	1 101	+401	+311	+201	+301	+200	+300	+110	+210	+101	+201	+011	+111	+001	+110	000	+100	010-	+010+	1001	101	001	- 110	- 010	. 200	- 100	- 210	- 101	112-	301	200	- 310	- 210	- 400	- 300	- 401						
	+2-3/4		+401	+400	+201	+310	+111	+300	+101	+211	+100	+201	+010	+200	+001	+110	- 001	+101	- 010	+011	001-	110		- 111	- 010	. 201	- 011	- 210	- 101	. 300	310	. 200	- 311	- 201	- 401	- 211	- 410						
	+3°		+410	400	+200	+311	+110	+301	+101	+211	+011	+210	+001	+200	000	+111	- 010	+101	- 011	+100	101 -			000 .	- 001	- 210	- 011	. 211	- 100	- 301	210	- 111	- 400	- 201	- 401	- 210	- 411		LT L]			
	+3-1/4°		+410	1001	+111	+311	+101	+310	+100	002+	+010	+210	100+	+201	100	+111	-010	+110	100	-100 +100	011-		100+	- 201	-001	-210	-010	-300	-100	-310	101-	- - - - - -	401	-200	-410	-210	-500		REAR BOLT				
	+3-1/2°	ł	+411	1007	+110	+400	t	+	+011	+ 201	100+	+ 211		+201	- 010	+200	- 011	+110	-101	+101	011 -	1104	+010	210	000	- 211	- 010	- 301	- 011	- 310		110	401	200	-411	- 201	- 501		(EU AI F (ED AT F				
		BOLT	FRONT		REAR	FRONT	REAR	FRONT	REAR	EBONT	RAB	TNOOD	RAB	FRONT	REAR	FRONT	REAR	FRONT	REAR	FRONT	REAR	L NON-	E D NT		FRONT	REAR	FRONT	REAR	FRONT	REAR		FRONT	REAR	FRONT	REAR	FRONT	REAR		SHIM REQUIRED AT REAR BOLT				
		Right	+2-3/4°		+2-1/2°	0	+2-1/4		+2°		+1-3/4°		+1-1/2°		+1-1/4°		• 	+3/4°		+1/2°		+1/4°		°		-1/4°	9	-2/1-	-3/40		•-		-1-1/4°		-1-1/2	•	-1-3/4						
		Left	+3-1/4°	1	+3°	-	+2-3/4	-+	+2-1/2°	_	+2-1/4°		+2°		+1-3/4°		-2/1-1+	+1-1/40		•[+		+3/4°		+1/2°		+1/4°	q	5	-1/40		-1/2°		-3/4°	,	<u>.</u>	ſ	-1-1/4		REAR				

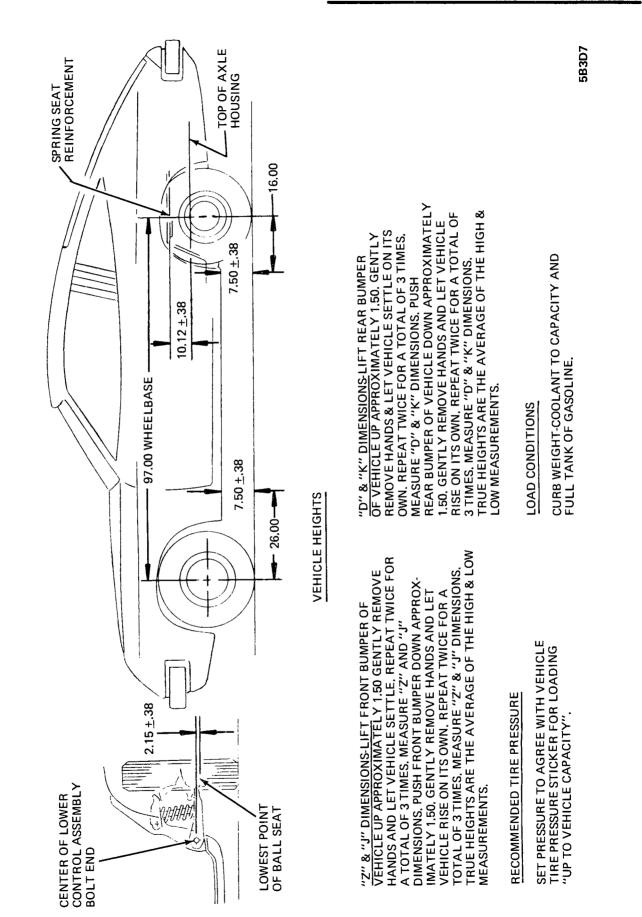


Figure 3D-7 - H Series Trim Height

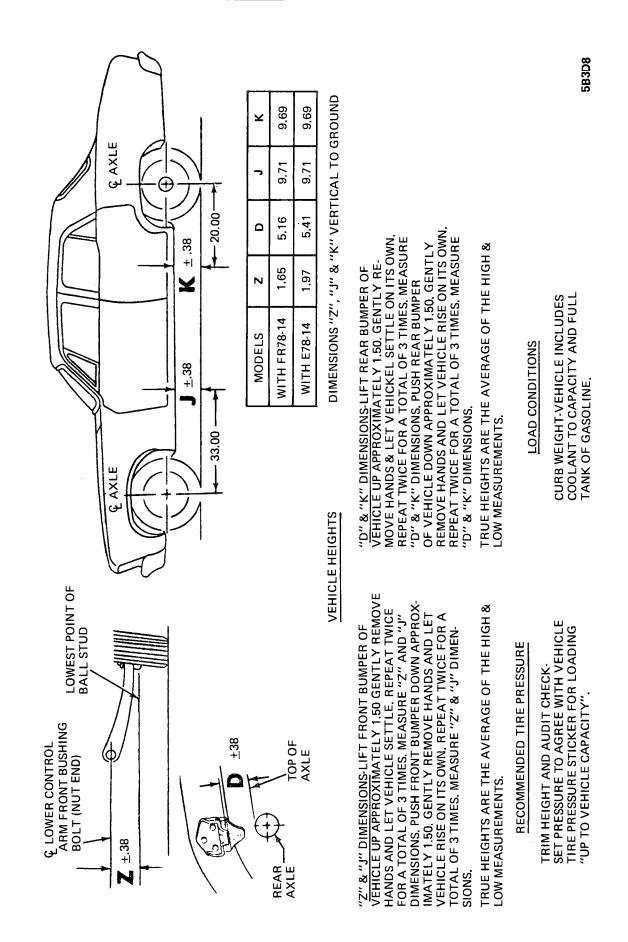
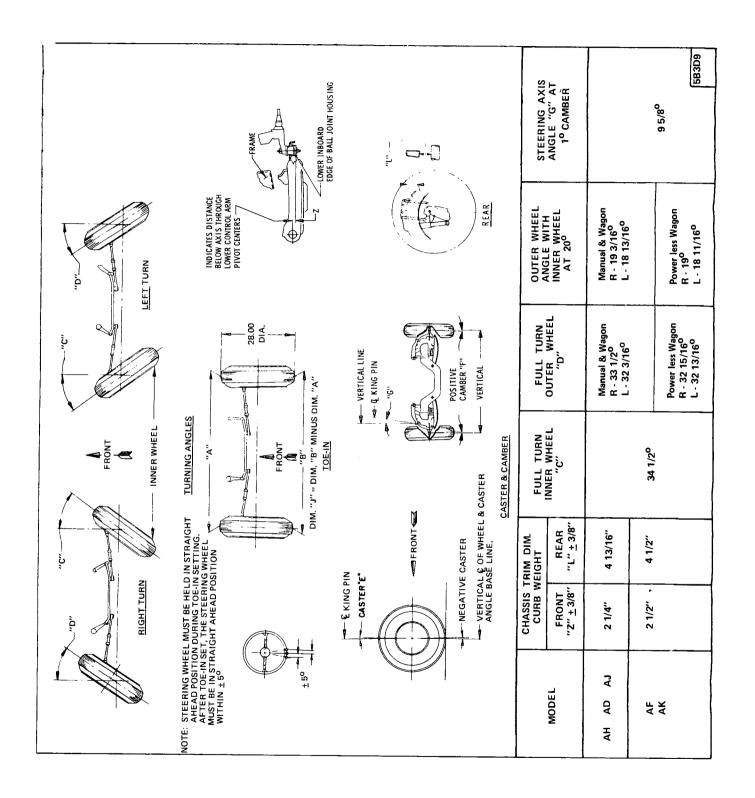


Figure 3D-8 - X Series Trim Height



3D-12

