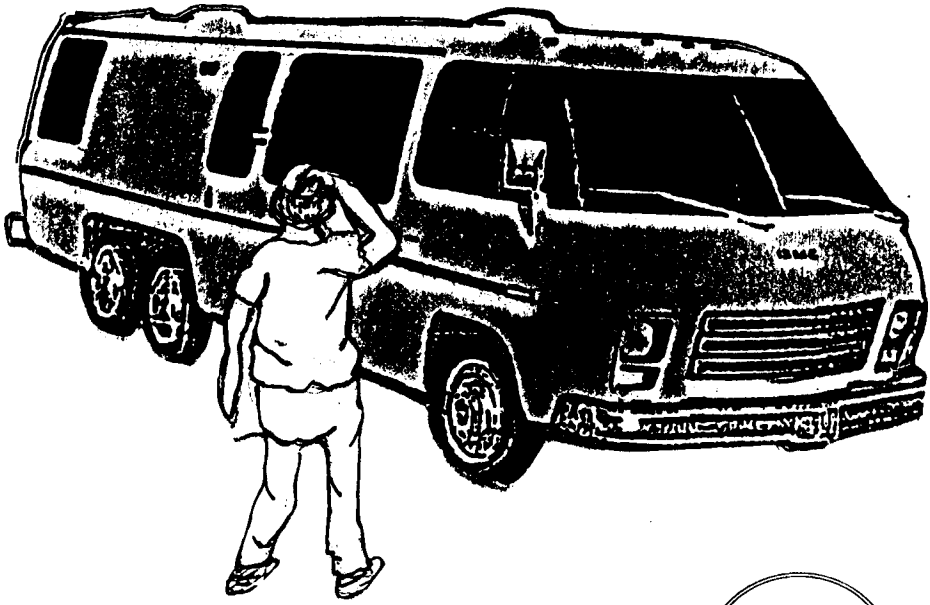
GMC WESTERN STATES RV CLUB

RIDE HEIGHT ADJUSTMENT

REAR WHEEL ALIGNMENT



(How to fix it, and what to do, made simple)

Prepared and presented by: Claude Brousson
Palm Desert, California, March 18-23, 2001

Please Note: The information presented in this document derives from a variety of sources, including that of the GMC Manuals, Tire Manufactures Tables, gleanings from other owners, and my own personal experience of what I have tried and done. It has worked well for me, however, you will have to evaluate for yourself and make your own decisions as to what will work safely and appropriately for your application. This writer, and GMC WS, take no responsibility for the safety of any modifications you may make on your vehicle.

RIDE HEIGHT ADJUSTMENT

PREPARATION: If one is going to have accurate settings for ones ride height, be sure the ground surface one is measuring from is very level, as ones ride heights will only be as level as the accuracy of this surface. This can be checked in several ways. First mark on the floor the general areas of each tire and the frame slot area of measurement. Then either using a very straight 2x4 and a long carpenters level, check whether each point of contact is completely level with all the other points of contact. Check crosswise as well. A more accurate method is to use a builders transit, and with this method one will need a helper with a stick and a ruler. One may need to build up any low areas with shims of thin plywood or other material until all wheel and measuring points are all on an even plane.

WEIGH AND INFLATE: Be sure to inflate all tires to your favorite inflation pressure. As well, it is helpful if one can weigh the coach at each wheel. Sometimes this can be done at truck weigh scales. Again accuracy will only be as good as that particular scale. Note whether one has a full load of gas, water, and holding tanks empty or full, and whether passengers are on board and where sitting- it all makes an obvious difference. Weighing ahead of time and again later after adjustments, (with similar loading), may show up original imbalances in the ride height or adjustments.

RIDE HEIGHTS. The ride heights given here are from the GMC manual, however, if one is running with tires of different size than OEM, one should add or subtract from these readings accordingly. Sample figures are given from the tables of two popular tire manufactures -Michelin and Bridgestone.

MICHELIN:

Tire size	overall dia.	Loaded radius	revs per mile	change
8.75R 16.5	29.2"	13.5"	709	0
LT225/75R16	29.4"	13.7"	706	+.2"
LT215/85R16	30.7"	14.3"	681	+.8"

Tire size	overall dia	loaded radius	revs per mile	change
LT235/85R16	32.0"	14.8"	655	+1.3"
LT245/75R16	30.6"	14.1"	676	+.6"
9.50R16.5	30.5"	14.0"	684	+.5"

BRIDGESTONE:

8.75R16.5LT	29.3"	13.8"	712	0
LT225/75R16	29.3"	13.8"	711	0
LT215/85R16	30.4"	14.2"	689	+.4"
LT235/85R16	31.7"	14.8"	660	+1.0"
9.50R16.5LT	30.4"	14.3"	686	+.5"

There are two approaches one can take in adjusting the rear height. The short, and quick method, will work well if the current heights are in side- to- side balance, but not high enough, or too high. If there is major imbalance, with one rear corner and the opposite front corner carrying disproportional amounts of weight, and thus causing likely poor handling, the longer method may be more appropriate.

SHORT METHOD: Measure and record distance from floor to top of slots in frame. Loosen the adjustment nuts on each side on the control valves beside each air bag. Then using your height control valves by the drivers seat, raise or lower, the coach to the desired height. When satisfied it is evenly raised to desired height, retighten the nuts on both sides to 70-80 in. lbs. Release some air out of the bags and raise the coach to normal height and measure again to see if one has achieved the desired level

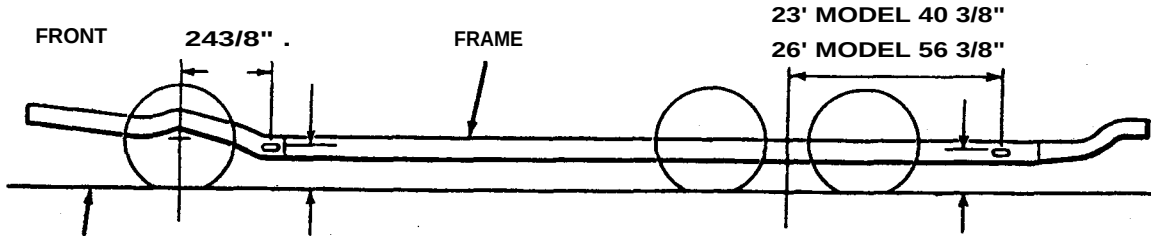


Figure 70-Checking Vehicle Ride Height

LONGER METHOD: Jack front of coach and remove front wheels.
Support front of coach on blocks under the middle of the front cross member, thus creating a three- point suspension of the vehicle. Be sure to position sufficient blocks to create the correct ride height at the front measuring points on the frame Reason for this is to remove the possibility of one of the torsion bars " fighting"

the rear suspension, and allows the rear control arms find their natural side to side balance.

Now follow the procedures of the short method. Be sure to check ride height after tightening nuts by releasing some air and raising again to see if it returns to correct height.

FRONT RIDE HEIGHT: When working under the vehicle be sure it is adequately blocked in case an air bag blew and the vehicle suddenly dropped or in the event of the vehicle moving from desired position.

Using a purchased or homemade unloading tool, take the tension off the grade 8, fine thread, adjusting bolt at the pork chop at the back end of the torsion bar. When doing this you may want to remove the bolt, counting the turns it takes to remove it, then clean it, put some grease on the threads, and a white paint dot on the end, so one does not get confused in counting revolutions of tightening. Record your numbers on paper so forgetfulness does not set in!

The number of turns on both torsion bars should likely be very similar, presuming side- to- side loading is similar, and both torsion bars are similar in tensile strength.

Do not try to turn these bolts unless the pressure has been taken off of them. Bear in mind, due to rigidity of the frame, raising or lowering just one side, will also affect the other side/and or back. So make small adjustments on both sides, and keep checking heights all round in order to keep a balance of weight on all wheels.

ADDITIONAL NOTES: 1. Contrary to original information in the Manuals, it is correct to have the HEIGHT CONTROL VALVES or ELECTRO-LEVEL CONTROLS in the AUTO position when traveling down the road. This allows the vehicle to automatically adjust to changes in weight and balance.

2. AIR SYSTEM PRESSURE SWITCH- Furnas #69MB7 put out by Furnas Electric Co. Cuts in at 95 psi and cuts out at 125 psi. and also is adjustable.

3. If one has not already upgraded the whole air suspension system with renewed Dana compressor pump or Thomas # 317, stainless steel check valve, 5 micron filter, cleaned or better yet new stainless steel air tank, and replaced any plastic air line fittings, one should do so.

REAR WHEEL ALIGNMENT:

As per previous discussion, ensure vehicle is on level surface, tires are correctly inflated, front and rear ride heights are correctly set, and vehicle wheels are in a straight ahead position. (no turning tension on any of them)

CHECKS: 1. Remove any hub caps, center spindle caps and using a straight edge, or long carpenters level, lay it horizontally across the two hubs on each side and note if the wheel is toeing in or out, or whether both wheels are parallel to each other. Make a note on paper the position of each wheel and its relation to its partner on the same side. Measure the camber of each wheel and note it.

2. Jack vehicle under bogies, release air out of air bags, raise each wheel off ground and note if bearings are correctly tightened, and that wheels spin freely. Check for control arm lateral endplay at spindle. Any more play than 1/16" suggests worn control arm pins. (They should be very frequently greased, as new pins are very expensive). With vehicle jacked equally on each side, note again the camber for each wheel. It may be 5/8-3/4 of a degree more.

SETTING UP WIRES OR STRINGS: 1. Using two- 1x2 or 2x4 boards, approximately 8.5 feet long, parallel them together. Using a knife and square mark a groove across both ends 98 inches apart. Also make a mark at the center point (49 inches) of each board. On the board you plan to use for the front, make a second set of cuts 3/8 of an inch inboard from the original marks. Note: if you use the inboard cut this will create about a 1/32" toe in for the rear wheels.

2.The board for the front will be clamped under the front bumper, how ever in order for the horizontal wire to parallel the frame at the wheel hub height, one must use a wedge or bit of 1 x2 lumber to lower the clamping point. The rear board placed under the rear bumper will be at approximately the right height. Do not fasten the boards from the ground as one will want to be free to move the vehicle forward and back. Using the center marks, align as closely as possible to the center bumper slits.

3.Stretch thin, strong wire, or thin strong thread between the boards and anchor in the outer cuts in the front board.

4. Open rear hatch doors. (for ease of measurements) Now measuring from about where the height slots are cut out in the main frame, move the boards in and out until the wires are **exactly** equa distant from the frame on both sides. Be certain one measures from the mainframe channel and not from where the frame is bolted together. The wire will be about 15 ¾" out from the frame. If one does not do this carefully, all the rest of the toe measurements will be inaccurate. When done correctly the wires will exactly parallel the frame and be just outside of the wheel hubs at the hub height. When adjusting the boards front and back to get parallelism between frame and wires, be certain that one is measuring square and level, as only a small amount off square changes the readings. One is looking for high accuracy.

5.1f one wishes to have the wheels with **zero toe**, leave the wire in the parallel position. If one wants to create approximately **1/32" toe in** on each side, then move the wire in to the inner set of cuts at the front. In either case one will be attempting to align the wheels parallel to the wires.

6. Lay a straight edge across the center of the hubs, parallel with the wire and measure from it out to the wire at the front and rear of the wheel. **Record on paper all the measurements, and graphically draw in whether the wheel is cocked inwards or out in relation to the wire.**

I found one can get very easily confused in recording and keeping track of whether the wheel is bent in or out and which wheel it is etc. Take the measurements and record for all the wheels.

(if one wishes to know what the **toe** is on the front wheels, take the measurements as done in number 6 above, **but with the wires in the outer cuts,** however be sure the front wheels are absolutely straight ahead).

TAKE NOTE: Maintenance Manual 7525A allows a **toe in** difference of 1/16" between the side- to- side wheels. Or any one wheel is within specs if no more than 1/32" in or out. Camber is 0.0 to +1/2 degree.

The 1977 & 1978 Supplement Manual provides for larger toe tolerances of +/- 3/16" or 3/32" per side. And Camber of 0.0 to + 1 degree.

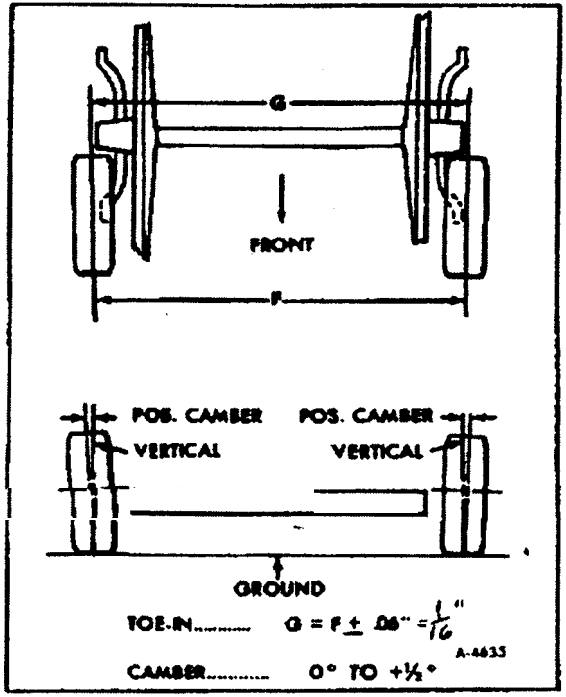


Figure 67-Rear Wheel Alignment Chart

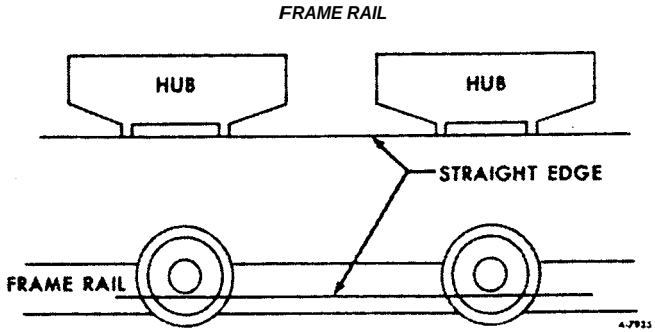
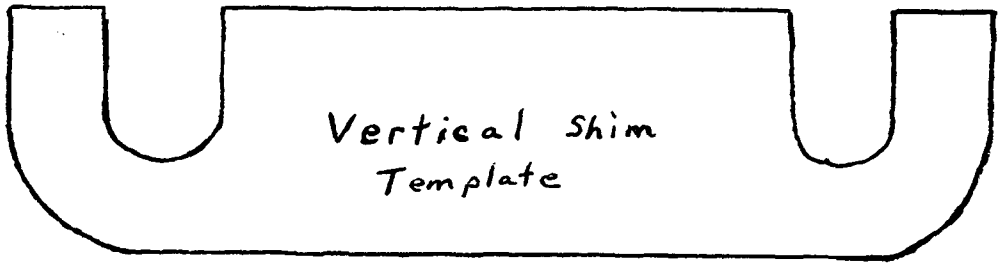


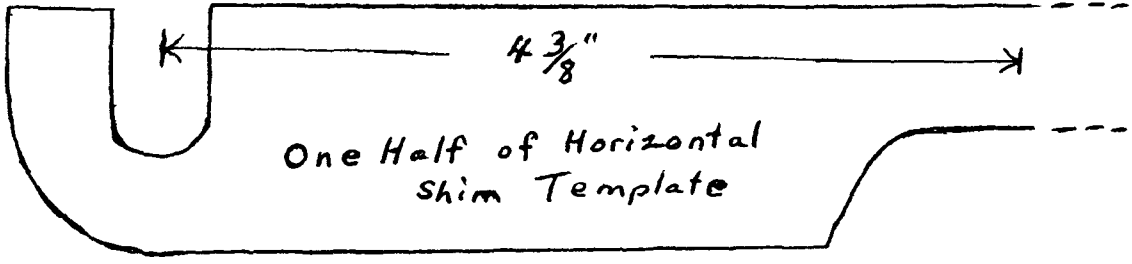
Figure 21-Measuring for Toe at Rear Suspension

When checking camber, remember that there will be more positive camber of about 5/8 to ¾ of a degree when the weight is off the wheels. When checking for final measurements, with weight on the wheels, push the vehicle forward and back a few feet to allow the tires and wheels to assume their normal running condition. With vehicle in neutral it is not hard to push back and forth, putting ones back against it for leverage.

7. If the two wheels on a side are in alignment with each other, but out of alignment with the wires, one can correct matters with vertical and/ or horizontal shims between the frame and bogey. Jack vehicle, release air from air bag, loosen six bolts holding bogey to frame. It is very likely one will find rust on the frame and any spacers already there, so one may want to put a trolley jack under the bogey and remove the whole assembly for proper cleaning, rust removal and painting again. One needs the jack as the bogey and arms are quite heavy, especially when moving back into position and getting bolt holes to all line up. It is very easy to make ones own shims from galvanized tin. Thickness is not critical, whatever on can find. Simply add or remove shims according to need.

Toe- a.020" vertical shim will change alignment at wheel about 1/16".
Camber- a .020", long horizontal shim, will change camber about 1/8 degree.





8. After installing desired shims, torque frame rail bolts to 65-85 lbs, and two cross member ones to 50-60 lbs , Lower vehicle, air up air bags, move vehicle a few feet forward and back, and retake all measurements to see if at desired specs.

9. **BENDING CONTROL ARMS** - Typically the right intermediate wheel gets bent in and is out of alignment with its mate behind. Some may be cautious to bend them and if ones frame is very rusty and weakened, it may be more risky. Jack vehicle, release air from bags, and it will be much easier if the wheels are removed and maybe also the lower attachment for the shock absorber. Using a Port-a-power hydraulic device and attachment between the control arm and the frame, one can **very carefully** start bending.the control arm out. I used a short length of spring against the frame to spred the load. From a neutral point keep measuring from the edge of the brake drum to the wire or the frame as one is jacking it out. Mine seemed to start bending when I had moved it out from about 5/8 " to 15/16". Any amounts beyond ½", keep checking by letting off pressure and seeing if it has moved then moving it out another 1/8 ". All of a sudden seems to go. Bending in is easier as one could do it next to a cement wall for leverage. While I had pressure on mine I went along the arm with a ball peen hammer tapping it, the idea being to realign the molecules to the new figure-don't know whether that helps or not!

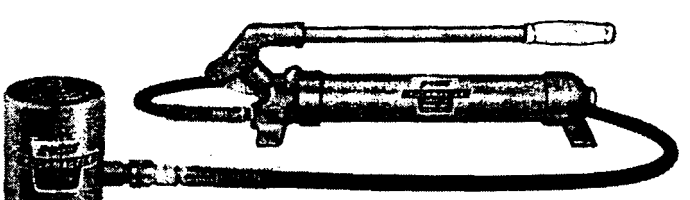
NOTE - Be sure to take measurements as accurately as possible, keeping ones ruler level and square with the frame and wire. One will find that there is slight movement in the parts for example the wheel bearings and bogey pins, so one is trying to find the average middle position for measurement readings.

10. Lower vehicle, pressurize the air bags, and move vehicle forward and back a few feet before checking setting.

The alternate method of bending the control arms is to take them off the vehicle, and mount them on an alignment jig and bend them straight.

This is a picture of a "Porta Power" hydraulic ram used to move the control arms. Because of the small distance between the back of the hub and the frame on will need a stubby ram end adapter similar to the picture. You will find that the "duck beak" jaws which many rams come with will not be strong enough to do the job as I believe one needs around 4000 lbs of leverage.

Shorty Ram. A half-ram, or shorty ram, is also available with most hydraulic-jack sets. It is designed for use in small, confined areas and is used with the single-action pump (Figure 5-38).



Courtesy Hein-Werner Corporation

Figure 5-38 Shorty Ram