How to check all aspects of your coach's alignment accurately in nine easy steps using the Jerry Work designed alignment kit. All it takes is a level paved parking area and 30 minutes of your time.

(see note at end on differences between version 1 & 2 kit components)

Step 1 - Measure ride height.

The first and most important step is to measure **ride height**. Start by making sure your tire pressure is set to the tire manufacturer's recommended inflation pressure for the weight each tire is carrying. The correct inflation will usually be less than the maximum inflation pressure stamped into the tire itself.

Start at the rear passenger side. Stand the ride height go/no-go gauge upright with the screw facing the slot in the frame behind the rear bogie. If the screw head fits inside the slot, you are at the factory recommended rear ride height. If it does not, add or subtract air in the passenger side air bag until it does.

Since the rear ride height slot on the driver's side was removed on most coaches to make room for the generator, you need to measure from the ground to a known spot on the passenger side in order to check the driver's side rear ride height. Add or subtract air in the driver's side air bag to match the measurement you took on the passenger side.

Recheck the passenger side rear ride height again with the go/no-go gauge to make sure the screw still fits inside the slot. Adjust and measure until you get the rear of the coach to be level with both sides at the factory specified rear ride height.

Because the rear ride height directly effects the front ride height, you must set the rear first. Once it is correct on both sides, now move to the front. Place the ride height go/no-go gauge so the top tang faces the front ride height slot cut in the frame just forward of where the front clip bolts to the side

frame rails. Look just to the rear of the front tires.

The parallax in the photo right makes it appear that the ride height is too low. It is actually right on as you can see in this close-up photo since the top tang fits inside the slot.

If the front ride height is off when the rear is correct, the only way to change the front is to adjust the front torsion bars. That REQUIRES the use of a special torsion bar unloading tool while the coach is jacked up and the knowledge to follow all the necessary safety procedures.

Do not attempt to do this yourself unless you are confident you know how to do it correctly and safely.

If you do adjust the front torsion bars, drive the coach at least five to ten miles to allow the suspension to fully settle in before you measure ride height again.

As before, start at the rear. Add or subtract air in the air bags until the rear is level and at the correct ride height. Now you can measure the front ride height and make additional adjustments if needed.

With the ride height properly set to factory specs, the coach will have a slightly nose up attitude. Some owners don't like that look and want to set a different front and rear ride height to achieve something they find more aesthetically pleasing. I strongly recommend keeping the ride height the factory engineers determined was best when they designed these coaches.

If you do decide to alter the ride height, know that you have to change the alignment settings as ride height has a great impact on camber, caster and toe on the front wheels, it effects the angle of the front drive shafts and how the inner and outer CV joints will move as they rotate, and it will impact the camber of the rear bogie wheels as well. In order to recheck your alignment later you will need to make sure the coach is at the ride height you established when you did your first alignment so make some form of measuring gauge like the one shown here.

Step 2 - Roll or drive the coach onto the turn plates

Turn your front tires to be approximately straight ahead. Place one turn plate in front of each front tire with the carry handle facing outward. You want the pivot point in the center of each turn table to be about even with the center of your front tires.

Since the turntables are less than 3/8” high, it is easy to push the coach up and onto them. You can also slowly drive onto them if you wish.

Stop when the front wheels are roughly centered on each turntable.

The rubber matt on the back of each turntable is glued on. In the heat, that glue can soften and the matt may squirm a bit. Before rolling or driving onto the turntables, make sure the rubber matt is properly in place.

Step 3 - Attach the stand-off plates to the front rims and the laser stand-off arms to the coach frame

Hold the stand-off plate up to the rim with the long arm down and the laser pointed to the rear. Make sure each stand-off pin is seated on the flat area just inside the lip of the rim. The upper arm is free to pivot so it is easy to get all four stand-off pins properly in position. Now use the bungie cords to hold the stand-off plate securely. Check again to make sure the stand-off pins are seated on the flat area just inside the lip of the rim as shown in the photo above.

Place the angle meter on the ground parallel with the lower stand-off arm and zero the meter.

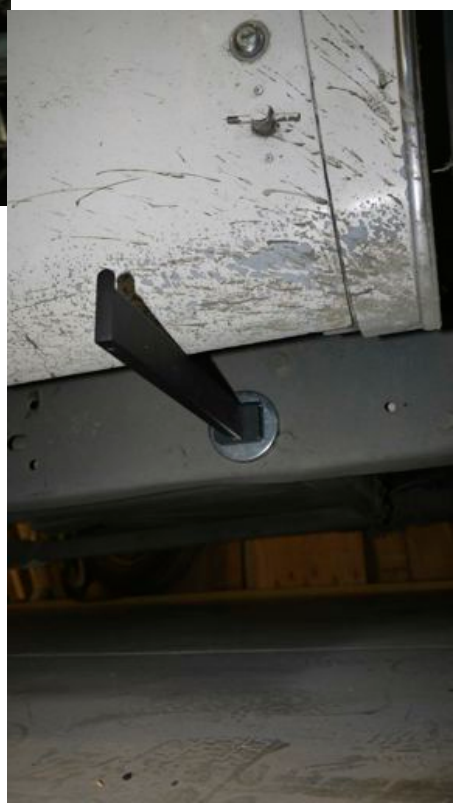
Prototype standoff plates shown, production units use precision machined standoff pins.

Place the now zeroed angle meter on top of the long arm and gently move the stand-off assembly to level the lower arm. That will also insure the upright member is exactly at 90 degrees to the parking pad surface.

The Wixey digital angle finders come in different versions that all function the same but look a bit different from the one shown here.

Magnetically attach the laser target stand-off arms to the frame front and rear near the ride height measuring slots. Place the front arm inside the four bolts that hold the front clip to the side frame rails.

Place the rear arm a bit behind the rear bogie. Be sure the magnets are seated flat against the frame member and not cocked on one of the bolt heads that hold cross members to the frame.



The next thing is to make sure your front wheel is parallel to the frame. To do so, turn on the laser and set the laser target against the end of the REAR stand-off arm. Note the line on the target the laser hits (the lines are numbered to make it easy to see). Move the target to the front and see if the laser hits the same line on the target. If not, move the steering wheel one half the difference and recheck. When the laser hits close to the same line on the target front and rear, your wheel is parallel with the frame. No need for great precision here. Close is good enough.

My coach has the front wheels spaced out to be even with the rear wheels as part of the one ton front end conversion. If yours are in the stock configuration, you will need to slide the laser target further inward matching a line on the target with the end of the magnetic stand-off arms to make your readings. If you are making your own kit you can also mount the lasers to the outside of the lower arm so it will hit the target when the target is against the outside of the stand-off arms.

Step 4 - Measure camber and record.

Set the angle meter on the ground perpendicular to the center of the wheel, turn it on and zero the unit. That will make up for any slope in your parking pad that would otherwise throw off your camber measurement. Magnetically attach the angle meter to the stand-off plate upright to directly read camber. Camber is the angle the wheel tilts in or out at the top when the coach is at the correct ride height and the wheels are parallel with the frame. You want this to be as close to zero as possible.

You want the angle meter to be parallel with the upright so as to not throw off the reading.

Turn off the laser to preserve the batteries and for safety. A laser beam shining directly into the eye can cause eye damage so be careful anytime you are around a laser source.

Step 5 - Measure caster and record

Place a mark on the turntable platter matching the center reference on the turntable base plate. This will allow you to precisely turn the front wheel 20 degrees in each direction in order to calculate the caster angle.

Note the three rivet heads on the turntable base plate. They are set to be 20 degrees from each other. The dry erase marker provided will wipe off when you are through.

Caster is a measure of how much the front wheel steering axis is canted

forward or rearward and determines how easily the coach will want to return to straight ahead after a turn. The more caster you have, the more the coach wants to go straight ahead but the harder it is on the power steering unit when you turn. Too much caster and the pressure release valve in the power steering unit may open causing damage to the unit. Too little caster and the coach will tend to wander side to side with road imperfections or from wind or passing vehicles.

Some say to get as much caster as possible up to 6 degrees, but from all I can determine I think it is safer to set caster to be between 2.5 and 5 degrees when the coach is at the correct ride height and the suspension fully seated in to where it will be when the coach is normally driven.

Caster is adjusted by moving the rear upper control arm bushing towards the center of the coach to get more caster and away from the center of the coach to get less caster.

Not all coaches are the same. The point where the upper A arm attaches to the frame was welded in place during the manufacturing process. They were set with a jig, but we cannot be sure every one wound up in exactly the same place.

You cannot measure caster directly. Caster is calculated from the difference in camber when the wheel is turned 20 degrees inward and 20 degrees outward. This is where the turntables come into play.

Turn the wheel 20 degrees outward until the center reference mark on the turntable plate is pointing to the rear 20 degree indicator as shown in the photo below. This can most easily be done with the engine turned on and idling. Turn the steering wheel all the way outward and it will

generally return to center a bit on its own, usually leaving the wheels at about the 20 degree point. Turn the wheel a bit by hand to get as close to 20 degrees as you can.

Magnetically place the angle meter on the upright part of the stand-off plate (which at this point will no longer be at 90 degrees to the parking pad). Make sure the meter is at about vertical and zero it.

Turn the wheel 20 degrees in the other direction as shown in the photo to the right, position the angle meter to be about vertical and read camber change directly.

Multiply this camber change reading by 1.43 to calculate the caster angle on that wheel. Record that amount.

Step 6 - Go to the other side and repeat steps 3, 4 and 5

Record the camber and caster for that front wheel. The two sides should be quite close to the same. If they are not, you will need to adjust one side or the other until you do get them to be close to the same camber and caster readings.

Step 7 - Measure total front toe

Return the steering wheel to point the front tires straight ahead. This is easy to do with the turntables. Move the last wheel you measured to return the center mark on the turn plate to the center mark on the turntable base plate. Note, the wheel on the other side will turn a slightly different amount so its center mark may not be exactly on. That difference doesn't matter.

Once the wheels are pointing straight ahead, put one end of a tape measure on top of the end of the lower stand-off arm and measure to the same end of the lower stand-off arm on the

other side pulling the tape taut as you make your reading. Repeat for the other end of the lower stand-off arms. These two measurements, one in front of the front wheels and one behind them should be the same. The difference between them is TOTAL TOE in or out.

Ideally you will want to adjust the tie rods on both wheels by the same amount until the total toe is close to zero.

Any slop or play in any part of your steering system will make achieving zero toe and keeping it there, difficult. Get it as close as you can to minimize tread wear on your front wheels.

The way the lower stand-off arms are mounted in this kit will allow the tape measure to clear everything under the coach front and rear, including a deep transmission pan. If the tape measure is not straight, the measurement will obviously be affected so pull it taut to make your readings.

Step 8 - Center the steering box and the steering wheel

The final ***front end*** alignment check is to see if the steering wheel is centered when the tires are pointed straight ahead. With the stand-off plates fitted to both front wheels with the lasers pointing rearward, have someone slowly turn the steering wheel all the way to the left and mark a spot on the steering wheel so you can accurately count how many turns it takes to turn the wheels all the way to the right. Now turn the wheel back to the left ONE HALF the number of turns to place the steering box as close to centered as you can. Hold the wheel in that location. Turn on the lasers and measure the distance from the laser beam to the frame just behind the front ride height measuring slot and at the rear ride height measuring slot on both sides of the coach.

Slowly move the steering wheel until the difference between the front and rear on both sides is about the same. That will tell you where your steering wheel is pointed when the steering box is centered and both tires are as close to straight ahead as your total toe measurement will allow.

Step 9 - Measure parallelism and camber on the four rear bogie wheels

This often overlooked alignment measurement is critical to the handling of your coach and long tire wear for the rear four tires. With this kit it is easy to do.

Attach the stand-off plates to the rear bogie with the laser pointed forward. Place the angle meter on the ground parallel with the long arm on the stand-off plate and zero the meter. Place it on top of the lower arm and level and level it. Now place the meter on the ground perpendicular to the wheel and zero it. Magnetically attach the angle meter to the vertical upright member and directly read camber. Record that reading.

My understanding is the coach was designed so the top of the tire will be in by around a degree or two with the coach at proper ride height. If the camber on just one of the bogies is significantly off, then either your bogie pins or bushings are worn. If both rear bogies are off by the same amount, then likely the pins and bushings are ok, but the whole bogie mounting assembly will need to be shimmed to bring them into adjustment.

Next, magnetically place the laser target stand-off arms on the frame. Place one just ahead of the two rear bogies and the other near the front ride height slot. Place the laser target against the end of the ***front most*** stand-off arm. Turn on the laser and note which line it hits. Move the laser target to the rear and compare. If the laser beam hits the target at about the same line, then that bogie wheel is running parallel with the frame. If only one bogie is off parallel and the other is parallel it likely means you have a bent arm which will need to be straightened. If both are off by about the same amount, then the whole bogie mounting assembly will likely need to be shimmed to bring them into proper parallelism for longest tire life.

Repeat this process on the middle bogie wheel on that side. This will give you camber and parallelism on both bogies on that side.

Move to the other side and do the same thing. You may be surprised by what you find. These rear bogies take a beating in normal driving. With one leading arm and one trailing arm on each side it is not uncommon for one of these four to be bent, nor is it uncommon for one side or the other to be off parallel with the frame.

Do whatever it takes to get all four close to one to two degrees negative camber and all four parallel with the frame. Your four rear tires will last a lot longer and your coach will handle much better if you do.

The rear steers the front to a far greater extent than most realize.

GMC Alignment Record

Date_____	**Specification**	**Driver Side**	**Passenger Side**
(Use tire mfg	Tire pressure front	_____	_____
(weight/pres.	Middle bogie	_____	_____
(chart)	Rear bogie	_____	_____
(13 1/8” +-)	Front Ride Height	_____	_____
(11 11/16 +-)	Rear Ride Height	_____	_____
(zero)	Front Camber	_____	_____
(2.5 - 5 even)	Front Caster	_____	_____
(zero)	Front Total toe	_____	_____
(0 - 2 deg in at top)	Middle bogie camber	_____	_____
(parallel to frame)	Middle bogie toe	_____	_____
(0 - 2 deg in at top)	Rear bogie camber	_____	_____
(parallel to frame)	Rear bogie toe	_____	_____

Date_____	**Specification**	**Driver Side**	**Passenger Side**
(Use tire mfg	Tire pressure front	_____	_____
(weight/pres.	Middle bogie	_____	_____
(chart)	Rear bogie	_____	_____
(13 1/8” +-)	Front Ride Height	_____	_____
(11 11/16 +-)	Rear Ride Height	_____	_____
(zero)	Front Camber	_____	_____
(2.5 - 5 even)	Front Caster	_____	_____
(zero)	Front Total toe	_____	_____
(0 - 2 deg in at top)	Middle bogie camber	_____	_____
(parallel to frame)	Middle bogie toe	_____	_____
(0 - 2 deg in at top)	Rear bogie camber	_____	_____
(parallel to frame)	Rear bogie toe	_____	_____

GMC Alignment Record

Date_____	**Specification**	**Driver Side**	**Passenger Side**
(Use tire mfg	Tire pressure front	_____	_____
(weight/pres.	Middle bogie	_____	_____
(chart)	Rear bogie	_____	_____
(13 1/8” +-)	Front Ride Height	_____	_____
(11 11/16 +-)	Rear Ride Height	_____	_____
(zero)	Front Camber	_____	_____
(2.5 - 5 even)	Front Caster	_____	_____
(zero)	Front Total toe	_____	_____
(0 - 2 deg in at top)	Middle bogie camber	_____	_____
(parallel to frame)	Middle bogie toe	_____	_____
(0 - 2 deg in at top)	Rear bogie camber	_____	_____
(parallel to frame)	Rear bogie toe	_____	_____

Date_____	**Specification**	**Driver Side**	**Passenger Side**
(Use tire mfg	Tire pressure front	_____	_____
(weight/pres.	Middle bogie	_____	_____
(chart)	Rear bogie	_____	_____
(13 1/8” +-)	Front Ride Height	_____	_____
(11 11/16 +-)	Rear Ride Height	_____	_____
(zero)	Front Camber	_____	_____
(2.5 - 5 even)	Front Caster	_____	_____
(zero)	Front Total toe	_____	_____
(0 - 2 deg in at top)	Middle bogie camber	_____	_____
(parallel to frame)	Middle bogie toe	_____	_____
(0 - 2 deg in at top)	Rear bogie camber	_____	_____
(parallel to frame)	Rear bogie toe	_____	_____

Components included with version 2.0 of the Jerry Work GMC alignment kit

Version two includes a couple of important redesign features which simplifies the alignment kit, makes it less expensive, provides better protection for the laser/angle finder during storage and shipment, allows the laser to be rotated up or down to better see the laser target while checking frame parallelism, and makes it easier to ship and store the kit when not in use. The basic change from the version one kit is 1) I have combined the digital angle finder and laser into a single unit replacing the separate gun sight lasers and Wixey digital angle finder box, 2) one of the magnetic standoff arms now also serves as the ride height go/no-go gauge, 3) the bungie cords now mount under the upright arm and are a bit shorter to hold the standoff arms more securely to the rims, 4) the laser/digital angle finder mounts to the laser target during shipment and storage to keep it from being damage, 5) a thumb screw mounts the laser securely to the long arms parallel with the rims, 6) the wheel stand-off assembly now ships in separate pieces, yet goes together with just two supplied stainless steel machine screws.

The text describing in nine easy steps how to properly align your GMC using this alignment kit shows the version 1.0 kit components. Just substitute the version 2.0 components and follow the same instructions. Note that the combination laser and digital angle finder can be held on either end of the lower standoff legs on either the inside or the outside by using the included thumb screw to prevent the laser/digital angle finder from falling off the arms in use.