NARCOA

HI-RAIL VEHICLE PURCHASING
&
OPERATING GUIDELINES

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NARCOA Hi-rail Vehicle Purchasing & Operating Guidelines

While hi-rail vehicles have been a boon to the rail industry for track inspectors and repair crews, an improperly set-up, worn out or ill-equipped hi-rail vehicle can bring a motorcar excursion to a halt in a hurry! It is imperative that the hi-rail owner pay special attention to the purchase and maintenance of his vehicle or a derailment or safety issue could quickly arise.

Purchasing a hi-rail vehicle brings many things into play. Some features that may seem unnecessary on your highway vehicle could make a big difference in helping your vehicle work more efficiently when on the rails -

➢ Bigger isn't always better….. used (worn out), long wheel base hi-rail vehicles are notorious for derailing especially during reverse moves and through turnouts (switches). They also create headaches during excursion turn arounds, especially if the turn around crossing is very narrow. Most NARCOA excursions take place on short and branch lines that have relatively sharp curves and turnouts as well as having track that is maintained to a lower class of inspection level than Class One railroads. All this makes it tough for a long wheel base vehicle that probably came off a Class one RR (with long sweeping curves and meticulously maintained turnouts) to stay on track on an lesser maintained short line. Sure it would be fun to take the family, the kids, the kid's friends, the neighbors, the dog, the cat and a big cooler of food along with you on your excursion but……. a vehicle large enough to haul all of the above will be nothing but trouble on most NARCOA excursions! So, tip #1 - The shorter the vehicle wheelbase the better.

➢ Another point that is not always thought about is that hi-rail gear is heavy and if you are building a new vehicle, don't forget that the weight of the gear as well as the weight of safety items, tools and spare parts you will carry decreases the load carrying capability of your hi-rail. Tip # 2 – The vehicle must be able to handle additional weight of the rail gear, tools, passengers and safety equipment.

➢ In the event of a derailment, the quickest way to get a hi-rail back up on the rails is by the use of four-wheel drive, low gear and some 4" X 6" timbers. Take your time, get out of the vehicle occasionally to note the location of all four road tires and guide the vehicle to slowly crawl right back up on the track. The use of FWD can aid in the starting and stopping capabilities on wet or snowy rail especially when on a grade. FWD also makes it easier to be able to navigate back up a bank where a derailed vehicle may have come to rest. Tip # 3 – A four wheel drive vehicle is highly recommended.

➢ Stay away from purchasing a very old hi-rail vehicle. It may look quaint or rail ready, but odds are, the gear is well worn and a "fixer-upper" hi-rail vehicle can also be labeled a "money-pit" with very little chance of a successful complete rebuild being accomplished at a fair price. Rail gear components are costly to purchase. Tip # 4 - Buy a premium vehicle or stick with your motorcar.

➢ Some hi-rail gear is obsolete and parts are not available. If a key component of your gear is worn out and no longer available for purchase, your gear is worthless. Tip # 5 - Do not purchase a vehicle with obsolete rail gear.

➢ Some used hi-rail vehicles have had rougher lives than others. Vehicles used by track gangs are notoriously known to have had a rough life. While executive SUV's have usually seen very little rail miles and are usually very clean and in good shape. Another good source of quality used trucks are signal maintainer's trucks. They usually don't have as many rail miles as other RR trucks as well as they have usually been assigned to one man that has the truck loaded with relatively light weight tools and electronic components. Tip # 6 – Know the history of the vehicle before you purchase it.

➢ There are various types of hi-rail gear manufactured. Over the past few years most all companies have redesigned their gear to get away from the four guide wheel arms that drop down and work independently from one another. Most modern gear has an axle connecting the guide wheels together. This design makes for very stable guide wheels. If independent arm gear is to be used, make sure it hasn't been previously used on a very heavy vehicle for a prolonged period of time. Independent arm gear that is in good condition usually performs well when re-installed on a lightweight vehicle. Tip # 7 – There is a definite advantage to your vehicle having late model gear. Used, worn gear is no bargain no matter what the price is.

➢ To sum up the purchasing portion of this text……. Unlike motorcars, there is no inexpensive way to get into owning a proper hi-rail vehicle. A short wheel based, late model, four wheel drive vehicle with quality rail gear is the only way to go if you want to assure trouble-free excursion days on the rails.

Hi-railing differs from motorcar operations in many ways –

➢ You must always have respect for your hi-rail vehicle. Your hi-rail is larger than most motorcars and careless operating on your part could cause serious injury to a motorcar operator or his passengers. So always operate with additional caution.

➢ Sometimes hi-rails are not allowed on certain excursions. Don't' take it personally, there may be no turn-around room at the end of the ride, the track may be in poor condition and not hi-rail friendly as described above in Tip #1. The EC may not feel comfortable with the size difference between the motorcars attending his meet and a hi-rail. The host RR may not want hi-rails on their RR. You may be the only hi-rail signed up and towing it in the event of a break down could be a problem. Regardless of the reason, you own a specialty vehicle and just like an owner of a large "A" car you should not expect your vehicle to be welcomed on every motorcar excursion.

➢ As a hi-rail owner you have the distinction of being able to help the EC in the event of an excursion emergency. Since your vehicle can quickly be put back on the highway at any grade crossing, you may be called into action to transport an injured person to a hospital. Your vehicle may be pressed into service to transport luggage or fuel cans that can't fit in small motorcars or carry additional tools or equipment needed to assure safe passage over the rails. Make sure you offer your services to the EC at the start of each event you attend.

➢ Since a hi-rail vehicle can be removed from the rails at most grade crossings, if you have plans to remove your vehicle and leave the excursion at any point other than the planned excursion ending point, it is imperative that you get your plans approved by the Excursion Coordinator before the start of the event.

➢ A hi-rail needs more care and inspections than a motorcar. Highway and rail gear must be checked over for flaws and defects at least a week before each event. Anything that could present a problem out on the track should be corrected before the vehicle attends its next excursion. Due to the size of a hi-rail vehicle when compared to a small motorcar and the fact that if just one component of the rail gear fails, the vehicle could become inoperable and un-towable and may block the excursion or host RR train traffic.

➢ Hi-rail vehicles have narrow, stiff side walled road tires for a reason. Narrow tires allow for clearance between the crossing timbers when rolling through grade crossings and stiff side walled tires provide more track stability as well as aid when trying to climb back up on the rails after a derail. Wide all-terrain tires are not best suited for rail use, while skinny, 10 or 12 ply heavy duty pick-up truck tires work best.

Federal inspection / NARCOA rules compliance -

➢ If a hi-rail vehicle is operated on a railroad that operates rolling equipment on track that is part of the general railroad system of transportation across America, The Federal Rail Administration requires total compliance to the standards listed under CFR 214.523. Since most NARCOA excursions are run on host railroads that are part of the general rail system, NARCOA also requires printed proof that your hi-rail vehicle complies to the summary of CFR 214.523 as modified and adopted by NARCOA that is printed below:

a) *The hi-rail gear of all hi-rail vehicles shall be inspected for safety at least annually and with no more than 14 months between inspections. Tram, wheel wear, and gage shall be measured and, if necessary, adjusted to allow the vehicle to be safely operated. All defects found during this inspection shall be corrected before vehicle can be put back into service.*

b) *Each hi-rail vehicle owner shall keep records pertaining to compliance with paragraph (a) of this section. Records may be kept on an FRA based form that is available at www.narcoa.org or on a form that may be used by a qualified, hi-rail gear service center. A copy of the inspection report shall be kept in the vehicle and copies shall be made available to any NARCOA Excursion Coordinator that may ask for a copy.*

c) *All hi-rail vehicles that were ordered before December 26, 2003 or completed after September 26, 2004 shall be equipped with:*
   (1) *An automatic change-of-direction or back-up alarm that provides an audible signal at least three seconds long and distinguishable from the surrounding noise: and*
   (2) *An operable 360-degree intermittent warning light or beacon mounted on the outside of the vehicle.*

d) (1) *The operator of a hi-rail vehicle shall check the vehicle for compliance with subpart (c), prior to using the vehicle at the start of an excursion.*
   (2) *Non-complying automatic change-of-direction alarms, back-up alarms and 360-degree intermittent warning lights or beacons shall be repaired or replaced as soon as practicable within seven calendar days.*

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➢ The annual inspection outlined on page 2 can be performed by any qualified hi-rail gear service center that can be located by referencing hi-rail gear manufacturers' web sites. This rail gear inspection can also be performed by any railroad employee or individual that is skilled in the set-up, adjustment and inspection of hi-rail gear. A compromise in the quality of this annual inspection is a compromise in the capability of your vehicle's hi-rail gear being rail worthy.

➢ Hi-rail vehicles shall be equipped with front rail sweeps, rear sweeps - optional.

➢ Hi-rail vehicles shall have all highway lighting and safety equipment in place & operable.

➢ Hi-rail vehicles used on NARCOA excursions must be compliant with any highway vehicle safety inspections in the state in which the vehicle is registered.

➢ All owners of hi-rail vehicles used on NARCOA excursions are required to show proof of a valid drivers license as well as proof of current highway vehicle insurance when applying for yearly NARCOA operators insurance.

Operating tips –

➢ Remember that your hi-rail has a different stopping distance than the motorcars you will be running with. Sometimes on a dry day, your vehicle's braking may out perform a motorcar, but on wet, frosty or greasy track it's sometimes almost impossible to stop a hi-rail. Keep your distance, be alert to changing track conditions and stay focused.

➢ Minding your vehicle's speed is important. On most spur and branch lines with jointed rail inspected to class two specs 15 to 25 mph should be maximum speed on tangent track with slower speed being taken through curves. Track inspected to class one specs should be traversed with more caution and at an even slower rate of speed. On excepted track….crawl along watch for kicked/mismatched joints and try not to fall into the gauge! Take your time and always think about how your hi-rail truck would look hanging from a tree that was half way down the bank, midpoint through a sweeping curve that your vehicle derailed on due to bad track geometry. Remember there is no AAA hi-rail wrecker service for your vehicle! The entire excursion is depending on you to keep alert and maintain a prudent speed that keeps your vehicle's tires and guide wheels on the rails at all times. When it comes to bridges just imagine what would happen if you flew off the rails and over the edge of the bridge…. that should help keep you operating at safe speeds.

➢ In the event that you have to tow a motorcar, heed the fact that you may not be able to feel if the motorcar behind is having problems staying on the track.If you are towing another hi-rail and the hi-rail being towed cannot offer any supplemental braking assistance, never exceed the capabilities of your vehicle's braking system. When considering the capability of your vehicle's braking system consider the weight of the vehicle to be towed as well as any track grades (slopes) you may encounter.

➢ A pre-excursion roll-by inspection should be performed once the vehicle is set on the rails. Have an observer check that all wheel flanges are locked down and set properly in the gauge and that all guide wheels are turning and not binding up.

➢ A hi-rail vehicle's tow bar tabs should be positioned low enough to match up with that of a motorcar. Tow bar tabs should be made from stronger (larger) material than that used for motorcars. The tabs should be mounted front and rear very securely. Tow bars should be fabricated with additional strength and length in order to handle the weight of a towed hi-rail & tow tab mismatch with a motorcar.

➢ Most hi-rail gear is designed to handle a fluctuation in vehicle payload weight for instance additional passengers. However, when your vehicle's gear is being set-up and adjusted, try to have it loaded with the standard payload it will usually be carrying. For example: spare tire, tools, jack, safety items, supplies, etc.

➢ Grade crossings and turnouts (switches) present hazards to hi-rail vehicles while steel wheeled motorcars are not so touchy. Rail that is depressed down into the crossing timbers and pavement present the problem of lifting the rail guide wheels off the track because the highway tires are riding up high on the timbers and pavement. Slow speeds and having your passenger get out and watch your guide wheels until you are out of the crossing is the proper procedure for this hazard. If your vehicle's road tires are too wide this guide wheel lifting problem will occur more frequently. Turnouts have a multitude of ways to try to knock your vehicle off the track; self guarded frogs, switch points and raised guard rails all try to lift your highway tire up thereby lifting your guide wheel up and off it's flange. Spring

frogs and for that matter spring switches are made to open with the wheel pressure of a loco or train car, so hi-rail vehicles tend to roll over the top of the frog or switch rather then push it open with their guide wheel flanges. The cure to prevent all these hazards from de-railing your vehicle is very slow speed, cautious movement, stop if anything feels wrong, and have a spotter guide you over the unit if you can't see your guide wheels for yourself.

➢ Nothing is sweeter than driving up to the set-on grade crossing, then, as everyone looks on, you back right onto the perfect spot on the tread of the rails, drop your guide wheels, do a quick walk-around check of the flanges and then jump in and roll down the track. This could be you with plenty of practice! Once you have your hi-rail outfitted to your liking, find a private industrial spur with a grade crossing in it (preferably a real short, rough one). Talk with the owner of the spur and ask permission to practice setting your vehicle on and off the rails. Practice makes perfect and in a month or two you'll be able to impress a Class One RR's Track Supervisor with your hi-rail set-on expertise. Not to mention how happy every NARCOA EC will be when they see you are not holding up their set-on by jockeying back and forth on the crossing for 15 minutes. Two quick tips: The first tip is that each hi-rail operator seems to have a favorite side of the truck that they like to back onto the track with (for instance backing into position while looking over your left shoulder). Always try to back into place the same way, same side and you'll be more accustomed to where everything is supposed to be immediately without any guessing. The second tip is knowing exactly where your rear highway tires need to be located on the tread of the rail and rolling them onto that spot while trying to keep the vehicle parallel to the rails. Open the door and lean way out if you have to. After the rear is set, turn the front tires into position and drop your back guide wheels first then the front guide wheels while making sight corrections with the steering wheel if necessary.

➢ It's going to happen….. sooner or later your vehicle is going to de-rail. Don't panic……if you were operating at a prudent speed for conditions and location your vehicle probably isn't badly damaged or resting that far off the track and it's time to get it back on. Before you start the re-railing process remember that your field of vision is being blocked by some portions of your vehicle, so have a spotter inform you that everyone is clear before you move your vehicle. Another important thing to remember is that your vehicle could fall off from where it's currently perched and crush a foot, hand or leg. First order of business; is there a grade crossing close by? If so, retract all your guide wheels, straddle the rail with two highway tires in the gauge and two rolling on the outer edges of the ties. Check for vehicle under carriage clearance between the vehicle and the top of the rail then using caution to not have your highway tires touch any of the protruding track joint bolts, ease down to the crossing and set your vehicle back on.

If only the front gear is off and the rear of the vehicle is still almost all on the rail, just retract the front gear and see if the vehicle can be eased up on the rail with the use of a few 4" X 6" blocks under the front highway tires with the rear guide wheels still down and holding the rear highway tires in place on the rails. If all your guide wheels are off the rails, retract all your gear and use 4" X 6" blocks under all the highway tires to ease the vehicle back up on the rails. The more blocks you carry with you the easier this process will be. Sometimes things from the vehicle undercarriage will be hung up on the rail and a jack may need to be used to free them. In other instances the vehicle may have to be eased closer back to the rails before the re-railing process can be started. Each predicament calls for a different solution. That's why it is important to carry a complete "arsenal" of re-railing equipment with you. Don't hurry; stop, think and make a safe plan. If you happen to have derailed on a bridge and it is at all possible to slowly and safely drive off the bridge, please do so and then re-rail the vehicle on land. If moving the vehicle off the bridge is not a possibility, do not get out of your vehicle! Radio the EC and at this point he may have to request a railroad bridge or track worker equipped with fall protection gear be called in to complete this job safely… this is another reason to run a safe speed on all bridges! Do not get a crowd of people out on a bridge trying to help, it is an unsafe, unacceptable condition!

One thing that literally throws a damper on your re-railing party is RAIN! Water makes the rails so slick that highway tires tend to slip right off the tread of the rail unless they are centered fairly well. Tires also just keep sliding along the edge of the rail rather than rolling back up on top. The answer for this dilemma is to have plenty of blocking material on hand, a four wheel drive vehicle and work to try to get the highway tires higher than the tread of the rail so they don't have to try to climb up on the side of the rail. Have the tires roll down onto the top of the rail. Sometimes the use of a high lift jack could help lift a portion of the vehicle over an obstacle or back up on the rail. Always use caution and never get between the jack and the vehicle or the vehicle and the rails. Each derail situation is unique and even though we have barely scratched the surface of re-railing procedures by using a combination of these tricks you should be able to get back on track quickly and safely.

Congrats on getting your vehicle re-railed! But…….just because your vehicle is back up on the rails does not mean it's good to go. Something may be bent, tweaked or guide wheel pressure may have been lost. Bolts, spindles or brackets may also be broken. First, visually check things out by getting down to ground level and looking at each part in

relation to the others. Check for anything that appears to be bent or out of line. Sight down the guide wheels to see if they appear to be out of alignment and then if everything looks good perform a very slow roll-by inspection and visually inspect each part as it moves for wobbles or looseness. Stand back and sight down the track to see if the vehicle is tracking squarely to the rail. If everything appears to be in order you should be able to travel on the rail at a low rate of speed, then pick up speed gradually if things are feeling normal. Don't forget to ease slowly into the first curve in order to check if the vehicle's geometry has changed. If anything feels odd or unstable, proceed cautiously to the next grade crossing and remove the vehicle from the track.

➢ Even the smallest item placed on the top of the rail can de-rail your vehicle, especially when placed on the high side rail in a curve. The hi-rail occupants must constantly scan the track ahead for rocks, spikes, branches or any other foreign material that may have come to rest on the top of the rail. Track defects (broken rail, kicked joints, joint mismatch, poor geometry) can also de-rail a hi-rail quickly. Always be aware of the track conditions ahead of your vehicle.

On-board equipment list -

High-lift Jack

Tow Bar w/ strong ¾" dia. pins – bar shall be long & heavy duty, having a minimum of 10" beyond the bumper to the center of the hitch hole when attached.

Tow Hitches - front and rear, heavy duty, mounted 8" to 16" above the top of the rail

Functional, proper sized spare tire and lug wrench

Manual gear jacking system for power failure or dead battery (vehicles w/ hyd. gear)

Hydraulic oil, spare solenoids, fuses, wire and relays (vehicles w/ hydraulic gear)

Battery Jumper Cables

Hydraulic replacement hose – preferably the longest one (vehicles w/ hydraulic gear)

Tow Chain w/ hook on both ends

Bright Flashlight

First Aid Kit

Orange or red flags (2) 16" square minimum

Fire Extinguisher ABC - 2lb minimum

NARCOA Rulebook

A copy of your vehicle's hi-rail gear inspection record

Tie down straps

Two Way RR Narrow Band Radio

Four to six 32" to 36" long 4" X 6" blocks of wood or proven steel re-railing devices

A substantial tool box containing tools sized to handle most all gear repair situations

The author, Tom Falicon, is Roadmaster for the Great Smoky Mountains RR. His "office" is a hi-rail truck in which he puts an average of 500 rail miles on it each month.