MASTER Install Guide: **GyroJoint™ ShortArm Suspensions – TJ**

Susp. System Numbers and Applications	**Nth01410** With or without **Nth190xx**	+4.5" GyroJoint-equipped ShortArm system for Jeep TJ Wrangler (93.4" wheelbase) or Unlimited (103.4" wheelbase) "X Package" – includes Tummy Tucker™, Stinger™, & Slider™
System Sub-Kits included each has it's own packing list and many have separate stand-alone instructions (Nth301xx). NOTE: *Boxes and Sub-Kits may have been consolidated for shipping. See the packing list with your invoice for a summary of individual box names for your specific order.*	Nth14001	Short Arm GyroJoint™ kit for TJ Wranglers (2 boxes)
	Nth20015	GyroJoint-ready Rear Upper Control Arms (non X-package)
	Nth20290	TJ Lower Control Arm Geometry Correction™ Drill Template
	Nth20400	Track bar kit – Front, for TJ Wranglers
	Nth25000	Drop Pitman Arm, type 1
	Nth23040 OR Nth29000	Track bar relocation kit – Rear, for TJ Wranglers OR Full-replacement Weld-on Track Bar Tower
	Nth23041	Right-Rear UCA tower for TJ Wranglers (*non*-X packages only)
	Nth21701	Coil Spring Spacers for Late coil Jeeps (+2")
	Nth21011	Spring kit – Front, for TJ Wrangler, (+3.0")
	Nth21021	Spring kit – Rear, for TJ Wrangler (+3.0")
	Nth23030	Rear Spring relocation kit for TJ Wranglers
	Nth21802	Bump Stop Spacer kit for TJ Wranglers with +4.5" of lift
	Nth80003	Brake Lines for Late Jeeps – Front, 21" long
	Nth14502	QuickSilver™ swaybar Disconnects for TJ Wranglers, 'c' length
	Nth20801	Rear Stabilizer End Links – Straight type, 'b' length
	Nth23100	Shock Shifter™ rear shock relocation brackets (for stock axles)
	Nth140xx	Tummy Tucker™ center skid plate (application specific; X pkg.)
	Nth1410x	Stinger™ center-mounted rear torque arm (wheelbase; X pkg.)
	Nth242xx	Slider™ skid for rear differential (axle specific; X pkg.)
	NOTE: *If you have chosen to delete any sub-kit(s) from the base system content, the remaining portion of this system may not fit or function properly with components not made by Nth°– it is up to you to determine what will work or not!*	
Assumptions Equipment that must be present on your vehicle for this system to fit and work properly	No other suspension-related products are being used to further alter ride height, etc.	
	TJ transmission and transfer-case models (others can work with DIY components)	
	TJ frame with original, unmodified front and rear control arm brackets, spring seats and cross-members.	
	TJ axles with original, unmodified brackets (aftermarket axles and/or aftermarket brackets may work but will likely require modifications – for X pkg. systems you must be able to use an Nth° Slider or Universal Stinger Base that fits your rear axle!)	
	Shocks of the appropriate length for your suspension height – see chart in Appendix.	
	A double-Cardan (aka 'CV') rear driveshaft has been installed.	
Required Tools and Equipment (beside common hand tools)	Vehicle lift and tall stands (or a floor jack and jackstands - labor times will be longer.)	
	Metal cutting, grinding, and (for Shock Shifter only) welding equipment	
	Pitman Arm puller	
	See Separate Instructions for each sub-kit to verify all tools needed.	

This Master Installation Guide is written to cover the installation of a *complete* Nth° Suspension *System* by 'connecting' the instructions for the individual sub-kits in an order that will make the overall installation as fast and efficient as possible. You should gather the instructions (*all of which have their own part numbers* Nth301xx) for the sub kits to refer to them as directed here. Installations that include the upgrade 'bundle' (X package) are denoted as "X" system steps where you will also be referred to instructions for those products at the appropriate times – also for "X" systems you will skip any steps that are noted as "non-X ONLY".

It is also assumed that before this installation begins, the vehicle is complete and drivable and that all other chassis and driveline components (steering, transmission, t-case, axles, etc.) that are currently part of the vehicle will be re-used. If you are also changing other components at the same time as this suspension system, most can be conveniently substituted during this installation, but any special 'adaptation' issues that arise will need to be identified and addressed by the installer at the appropriate stage of the process and are not covered or referenced here.

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Notice: Each Nth° Suspension *System* is a collection of 'sub-kits' (that are also available separately) that have been matched together to create a completely integrated package for the purpose of enhancing a vehicle's off-road mobility with minimal compromises to its on-road use. One key aspect to creating greater mobility on uneven terrain is increasing ground clearance – therefore an effect of this suspension system is an increase in the 'ride height' of the Jeep (that is further increased by the larger diameter tires it will accommodate). Increasing ride height raises the vehicle's center of mass (or gravity - often called "c.g."), and as with any similar product, the vehicle's handling limits will decrease and handling behavior may change due to changes in suspension geometry, etc.

While this Nth suspension system is designed to minimize many of the negative effects of a raised c.g., the ride, handling, and performance of your specific vehicle also depends on many other factors/products that are not part of this system package – including steering components, tires, wheels, shocks, and the effect on c.g. location from other items that have been changed or added to your vehicle. Consequently, Nth Degree Mobility makes no warrantee as to the safety, suitability, or reliability of a vehicle equipped with this system for any purpose or use. Also, as with any stock or modified vehicle, proper regular maintenance of these components by the owner/operator is required to assure correct and dependable suspension function for the remaining life of the vehicle.

It is the sole responsibility of the owner/driver(s) of this modified vehicle to make the time and effort to become familiar with its altered behavior after installation (under safe conditions), make changes to driving habits or other components if needed, and control and advise others that may drive the vehicle after modification with this system. Nth Degree also recommends taking steps to assure that your vehicle's overall combination of specific parts produces a safe and reliable dynamic behaviors that will not also endanger other people or property.

Step 0: Survey shipment. Identify each box by its external product label and match it to your shipping invoice to make sure *before proceeding* that you appear to have all necessary boxes for your system. Note that some kits come in multiple boxes, others may be consolidated into larger boxes, and that boxes may get separated from each other during shipping and arrive on different days.

Step 1: Unpack sub-kit boxes; Check and Inventory contents against their packing lists; Verify parts are in good condition. Be especially sure that for application-specific sub-kits, you have the *right* kits for your vehicle before beginning!

Step 2: Read, Understand, and Plan for the *entire* system installation before beginning! Use this master instruction guide to sequence the steps for installing the various sub-kits. There are many steps for different sub-kits that can be coordinated with other sub-kit steps to minimize unnecessary time and effort or un-do/re-do backtracking. You should gather all of the instructions from the various sub-kits that have them so that you can familiarize yourself with them before proceeding in the order outlined below. Though switching back and forth from different sub-kits may seem haphazard, keep in mind that each sub-kit's instructions were written as if that kit were the *only* item being installed on an otherwise complete-and-running Jeep. This master guide capitalizes on this 'modular approach' to instructions by directing you to the already-written sub-kit instructions in an efficient order for a total system installation.

Do not disassemble vehicle unless all parts are present and all tools and facilities required are available. Do not start or attempt this product installation if you are unsure of your abilities or do not have the resources listed above. Be sure to have all welding done by a qualified person, and check/set all specified torques with a torque wrench…too tight is not just right!!

Please take the time to read all instructions completely before beginning – they are long because we want you to get the installation right the first time for best performance with no unnecessary delays or costly mistakes.

PHASE I: Tummy Tucker (X packages only) and Rear half of GJ ShortArm kit (Nth14001). Like any 'shortarm' lift, you don't have to 'tear down' the whole vehicle at once (though you may still wish to do it this way if on a lift). It is not mandatory that these items be installed first, but we believe that it goes fastest this way – especially on TJs that have no previous lift installed.

Step I-1: Install Nth° Tummy Tucker™ ('X' ONLY). If you purchased either an X-package or just a Tummy Tucker along with your Nth01410 system, begin by following the instructions for your specific TT model. If you did not, skip to the next step.

> **Coordinated Install**: If you need to install a transfer case Slip Yoke Eliminator (SYE) product or are changing transmission or transfer cases completely, do it during the TT install.

Step I-2: Remove Rear Axle (recommended). Since the majority of any vehicle's handling behavior is determined by the design of the rear suspension, this system involves more modification/installation work to the rear suspension than the front. To speed work on both the frame and rear axle (especially with two people working in parallel), it is actually faster and easier to remove the entire rear axle from the vehicle. To do this, make sure the vehicle's weight is off the axle and disconnect the driveshaft, brake and vent hoses, and park brake cables (at body bracket) first, then completely remove the shocks and stabilizer end links. At this point the axle can be dropped far enough to remove the springs, then finally remove the track bar and the four upper and lower control arms – be sure to save and keep track of the hardware you remove as much of it will be re-used later. You may discard the springs, shocks, control arms, and end links, but will re-use the other parts (except the driveshaft if it has not already been swapped for a 'CV' shaft previously.)

NOTE: If two people are working on this project, the labor can be divided into separate, parallel activities if one does the remainder of Phase I and begins Phase III while the other works on Phase II to save overall installation time.

Step I-3: Install rear GyroJoint Subframes. Refer to the instructions for your GJ ShortArm kit (Nth30101) and perform the subframe installation for the rear suspension. You will install the rear arms in Phase III.

Step I-4: Install Shock Shifter upper brackets (Nth23100). Install the SS upper brackets according to their instruction steps (in Nth30112). Installation at this time will be most convenient while the rear axle and track bar are out of the way.

Step I-5: Install Rear Spring Relocators (Nth23030). Follow the instructions for your rear spring relocator kit (Nth30110), and add the additional 2.5" diameter bumpstops provided in the bumpstop spacer kit for your system. (Note: 1" tall pucks were included as part of your rear relocators, but more spacers were included in your BSS kit depending on what lift height you ordered. You must use ***all*** of the 2.5" spacers supplied for your system – see Appendix A for the correct total spacing needed for your kit).

PHASE II: Rear Axle Modifications and Pre-Assembly. Many things can be done most easily while the rear axle is out from beneath the vehicle. While they can be performed in any order, it's best to do the 'messy' parts first, then paint touch-up, then add/assemble the bolt-on parts.

Step II-1: Remove Shock brackets and prepare for new SS lower brackets. This is part of the Shock Shifter instructions (Nth30112): Using the method/tools of your choice, completely remove the lower shock brackets from the axle tubes, then sand the tubes smooth. Be careful not to gouge or cut into the axle tube and repair it if you do. You will wait to install the new SS axle brackets until after the axle is back under the Jeep and connected to the suspension links, but while it is easy now, you should sand

the paint off of the axle tubes in the area where the new brackets will attach – see the figures in the SS instructions for guidance on where to sand.

Step II-2: Re-drill stock LCA brackets. Refer to the re-drill template instructions (Nth3017) for guidance and pictures of how to use the template to locate and drill new holes for the arms to attach to. Also follow the steps for trimming the excess lower portions of the bracket sides as well as clearance on the top surface of each bracket.

Step II-3a: If using Nth29000 ONLY: Remove Track Bar / LRUCA bracket. If you opted for the the weld-on track bar tower (Nth29000), you should cut off the original tower bracket now, but be sure to leave the small swaybar mounting bracket in front of it intact as it will be re-used. If you didn't, follow step II-3b.

Step II-3b: Install rear track bar tower/brace (Nth23040). If you are using Nth29000, do step II-3a. The instructions provided with this kit (Nth30114) kit will guide the correct configuration of your tower and it's clevis for your suspension's 'lift' height, as well as mounting it to your axle's stock track bar tower. You can pre-install the tower-to-bridge brace, but leave it loose until the Stinger boom is installed later.

Step II-4a: Std. 'non-X' Systems ONLY: Install Right-Rear Upper Control Arm Tower (Nth23041). Follow the kit instructions (Nth30123).

Step II-4b: X packages ONLY: Install Slider™ or Universal Stinger Base. Follow the instructions for your Slider or Universal Stinger Base to attach it to your axle housing/differential casting. If using a Slider, you may also pre-attach the bridge from your Stinger kit to the four small holes on the ears of your Slider – using any provided shims that may be required with your specific Slider/Stinger combination. Be sure to leave the four bolts loose enough to allow the bridge to 'rock' back and forth some until final installation of the Stinger boom later.

Also, you may remove the Right-Rear Upper Control Arm tower if you desire. It will not be needed when using a Stinger, so if you prefer 'clean' over 'easy/fast', you can remove this bracket.

Step II-6: Install new rear brake hose (Nth25101). If your system came with a new rear brake hose (most shortarm systems do not), attach the junction-block end to the axle tube using the original breather tube fitting 'combo' bolt, then reconnect the axle-mounted hard lines to each side fitting on the block. When tightening the block, avoid touching the ferrule where the hose enters the block – if you pry on it, you may damage the line and cause a leak that will require a new hose.

PHASE III: Rear Suspension Assembly. With the rear subframes installed and the rear axle pre-modified and assembled, you are ready to put the rear suspension back together. If you left the rear axle under the vehicle, you can complete one 'corner' of the suspension at a time while the control arms on the other side help keep the axle in position.

Step III-1: Connect Rear Axle to Subframes. After completing Phase II, your rear axle should now look similar to **figure** __, and is ready to be re-positioned under the Jeep, then return to the ShortArm instructions (Nth30101) for installation of the lower control arms, and for 'non-X' systems, also install the GyroJoint-compatible rear upper arms (Nth20015).

Step III-2: X Packages ONLY: Finish Stinger. Return to the Stinger instructions for your model for direction on installing the Stinger boom and link with their bushings (or rod-ends) to the back of the TT and to the Slider/Universal-Base on the rear axle.

Step III-3: Install 'CV' Rear Drive Shaft. If it was not previously installed, you can now install your rear driveshaft – it must have a double-Cardan (aka 'CV') joint at the t-case to work properly with this system.

Step III-4: Place Rear Axle in Final Position. Now elevate the rear axle to about the correct ride height for your system and set the correct approximate ride height by measuring from the underside of the spring relocator brackets to the round seat on the axle (measure to the left or right of the raised center 'strike surface', not at the front or back edges). The measurement for +4.5" systems should be about 10-1/8".

You should also set the rear pinion angle at this time (pinion 1-2 degrees closer to horizontal than rear driveshaft's angle relative to ground/horizontal).

Step III-5a: Re-install Rear Track Bar (if using Nth23040) to the original frame bracket hole and the new clevis of the tower bracket. Consult the instructions (Nth30114) for tips and pictures.

Step III-5b: Install Weld-on Rear Track Bar Tower (Nth29000) Refer to the instructions (Nth30128) for positioning and welding this bracket in the proper location on your axle.

Step III-6: Position/Weld new Shock Shifter Axle Brackets. Next, follow the procedure in the Shock Shifter instructions (Nth30112) for modifying and pre-installing the rear shocks and using them to position the new brackets on the rear axle for welding. After tacking the brackets in place, you should disconnect the shocks from the new brackets for final welding, then paint the brackets but do not re-attach the shocks yet.

Step III-7: Connect Rear Brake Hose. If you fully removed the rear axle for Phase II, you can now connect the hose to the original hard line along the driver-side frame rail.

Step III-8: Check Rear Suspension Up/Down-travel Clearances. Because the rear springs are not yet installed, now is the most convenient time to cycle the rear axle all the way up and down to confirm several common clearance concerns, etc. To fully evaluate the suspension, you should also connect the rear shocks to the axle now so that you can confirm shock clearance issues too, but they will need to be disconnected again for the next step. Consult Appendix I for guidance on correct shock lengths and bumpstop spacing for your installation.

Step III-9: Install Rear Springs. Lower the axle down until you can fit the rear springs around the bumpstop 'stack' coming down from the rear spring relocator brackets, then maneuver them over the axle seats. The orientation of the Nth° progressive-rate rear springs does not matter, but we recommend putting the less closely spaced coils at the bottom – this will help minimize the accumulation of dirt/mud inside the spring on the axle seat.

Step III-10: Connect Shocks to New Axle Brackets. Raise the axle until you can re-connect the rear shocks to the new SS axle brackets and do so, then raise it further, but stop short of taking all of the load off of your rear frame support points.

Step III-11: Install Rear Stabilizer End Links (Nth20810/20811). Prepare the links by inserting a bushing into each end of each link using some soapy water and a mallet. Next, place one ½" USS washer on each of the four factory shoulder bolts – these will cause the link bushings to compress and 'lock' onto the bolts when tightened. Attach each link to the original frame brackets using the original flag nuts and to the outboard side of the stabilizer bar using the original locking nuts.

The rear suspension should now be complete except for final tightening and adjustments

PHASE IV: Front Suspension Assembly: This is the final phase and similar to Phase III

Step IV-1: Dismantle Front Suspension. The front axle does not need to be completely removed from the vehicle – begin by removing the following:

- track bar (discard)
- stabilizer end links (discard)
- shocks (discard)
- brake hoses (discard)
- springs (discard)
- Disconnect the drag link from the pitman arm (or remove steering completely if changing it out).
- The front driveshaft may remain connected.

At this point the four control arms should be the only thing holding the axle in position. You may perform the following step one side at a time so the arms on the other side will hold the axle partially in position.

Step IV-2: Install Front GyroJoint Subframes and Arms (Nth14001). Return to the instructions for this kit (Nth30101) and perform them for the front as you did previously for the rear suspension. After completing both sides, continue below.

Step IV-3: Install Front Suspension portion of Bump Stop Spacer kit (Nth21802). Each system uses spacing both on the axle and the frame inside the front springs to create the proper combination of total spacing. Place the 2.0" diameter spacers provided above the stock bumpstop cup using the longer metric M10 bolts provided. Also install the 3.0" diameter spacers on the axle by first drilling out the 'dimple' in the middle of each spring seat with a 5/16" bit, then mount the spacers using the self-tapping bolts provided (these bolts have 'cuts' through the threads near the tips of the bolts). Refer to Appendix A for the correct amount that should have been included with your system depending on what lift height you chose.

> NOTE: Rubicon TJs have a ½" thick steel disc welded on top of the axle seats. You may elect to leave it in place and drill/tap it for the spacer, but you cannot omit the provided axle spacers unless you run very short front shocks. An alternative is to grind the short welds and remove the disc to allow normal installation of the provided spacers.

Step IV-4: Install Front Track bar kit (Nth20400). Follow the separate instructions for this kit and set it up according to your planned suspension height (+4.5" is in the middle of the adjuster slot).

Step IV-5: Install new Pitman Arm (Nth25000). Change out the stock pitman arm for the drop-type pitman arm provided. Use caution when working with a pitman arm puller – leave the large nut on the sector shaft but loose during pulling to prevent the arm from flying once it releases. When installing the new arm, be sure to align the four master splines in the same way that the old pitman came off – do not turn the steering wheel when the pitman arm is off or you will loose track of 'center'!

Step IV-6: Install new Front Brake Hoses (Nth80003). Change the front brake hoses to the longer braided stainless steel ones provided. Note that unlike the stock hoses, the new ones go directly up from the banjo bolt on the caliper, not rearward. Be sure to use the included new brass seal-washers on both sides of the block. Assuming the rear brake system is already hooked up as well, you may set up the brakes for gravity bleeding now if desired.

Step IV-7: Install QuickSilver™ Diconnects (Nth14502). Follow the separate instructions for this kit. Do not attempt to perform the adjustments for the QSD's if your vehicle is hanging from a frame-type lift – in this case, wait until the vehicle is on the ground before completing the adjustments for your QSDs. You should leave the QSD's in their 'parked' position until after the front springs are installed

Step IV-8: Check Front suspension Up/Down-travel Clearances. Before you install the front springs, now is a good time to cycle the front suspension to confirm that everything clears each other – especially at full uptravel. Depending on how you have your Jeep supported at this point, either raise the axle or lower the Jeep until the bumpstops on top of the axle are fully compressing the bumpers themselves into their cups – checking for interference issues as you get close. The main area to check is the clearance

of the front differential cover to the new trackbar brace. Also, now is a good time to install and check that your front shocks will fit and not 'bottom out' before the axle reaches this position (you will need the shocks at least disconnected at the bottom to get the springs in). Again consult Appendix I for guidance on correct shock lengths and bumpstop spacing for your installation.

Step IV-9: Install Front Springs. Actual installation of the front springs should be easy at this stage if the swaybar disconnects, steering, and shocks are all NOT hooked up to the axle. Simply lower the front axle and be careful not to overextend the brake lines. Slip each spring over the bumpstop on the frame end and then drop the non-pigtail lower end over the spring seat/bumpstop on the axle, then rotate each until the end of the wire is at the end of the stamped spring seat, then allow the Jeep to rest on the springs. If your TJ was equipped with spring retainers on one or both springs, reinstallation will be easiest just before you put full weight on the springs. If your TJ did NOT come with retainers, Nth° highly recommends adding them (available at dealership) to keep the springs from rotating out of position when fully flexed/unloaded. All original TJ axles have the holes for mounting retainers, but if yours did not come with them, the hole closest to each spring will need to be tapped to M8. Finally, (re)connect the shocks, steering linkage, and swaybar disconnects to complete the front suspension.

PHASE V: Alignment, Final Torques, Test Drive, and Debugging: If all steps up to this point have been completed fully and correctly, this phase should be quick and painless. Keep in mind that to achieve the level of suspension refinement that was designed into this system, you must take the time to check the fit and function of every part of your suspension through all possible motions.

Step V-1: Full Chassis Alignment. If you are not performing this installation at a location with a computerized alignment machine, you may do a 'rough alignment' by eye and tape-measure for now as outlined below (It is assumed that you understand the terminology used.) This will allow you to drive the vehicle to an alignment shop for final adjustments. If these procedures are done carefully, in most cases only minor adjustments will be required when doing the computerized alignment, so you may proceed with the test drive and debugging steps now and usually not have to do them again after alignment.

Step V-2: Final Torques. This will normally be performed during the computerized alignment, so if that is being delayed until later, just make sure all fasteners are reasonably tight for now.

Step V-3: Test Drive(s) and Debugging. There is much more to a true 'shakedown test drive' than a genteel 'cruise around the block' if you want to find out now – instead of later when it's not convenient – whether your now-extensively-modified vehicle chassis has issues that require attention and correction. Of course you want to listen for clunks, rattles, and the like, but you should also be carefully searching for handling issues and other performance problems. This is a "test-fix-repeat" cycle that you should continue until you are satisfied that all issues stemming from the installation of this system have been resolved. If you commit to doing this well now, your new suspension will deliver countless years of trouble free service with only regular maintenance and inspections - see the appendix for a summary of maintenance procedures and recommended intervals.

Appendix 1: Bumpstop Setup and Shock Applications

Consult the table below to confirm the proper combination/location of the bumpstops for your system. Note that all bumpstop spacers that are used on the 'frame side' are intended to be installed above the stock bumpstop 'cup' and use the original yellow or black bumper in that cup – longer bolts are provided. All axle-mounted spacers require drilling a hole in the center of the axle seat's "strike surface" in the center of the spring. For proper function of your suspension and to protect your shocks from damage, you should use the spacers that were provided for your lift height and match the shock lengths accordingly.

Shock lengths are not arbitrary – they must be matched to the ride height and bumpstop positions of your vehicle. The fully compressed length of your shocks must be shorter than the distance between the mounting points when the axle is fully compressing the bumpstops. Nth° has researched the dimensions for proper shock fitment and provides the chart below as a guide for choosing correct-length shocks for each of the suspension systems covered by these instructions. Keep in mind that this information is valid ONLY if using the complete Nth° suspension system including the intended bumpstop spacing, rear spring relocators, and shock shifters (all of which affect what shocks will fit or not).

Front	Nth01410 (and all +4.5" suspensions)
Bumpstop Spacing – Frame side	(1) 2"Dia x 2"High puck per side
Bumpstop Spacing – Axle side	(1) 3"Dia x 2"High puck per side
Shock compressed length max. (from underside of frame tower to top of axle seat for bar pin).	17.25"
Rear	
Bumpstop Spacing – Frame side	(1) 2.5"Dia x 1"High puck + (1) 2.5"Dia x 2"High puck / side
Bumpstop Spacing – Axle side	None
Shock compressed length max. (assumes Nth° Shock Shifters are installed correctly).	14.50"