

# MASTER Install Guide: Conventional ShortArm Suspensions – TJ

<b>Suspension System Part Numbers and Applications</b>	<b>Nth01300</b> or <b>Nth01400</b> with or without <b>Nth190xx</b>	+3.0" system for Jeep TJ Wrangler or Unlimited +4.0" system for Jeep TJ Wrangler or Unlimited  "X Package" – includes Tummy Tucker™, Stinger™, & Slider™
<b>System Sub-Kits included</b> 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.	Nth20100	Lower Control Arms – Conventional Type, 'a' length for std. TJ
	Nth20020	Front Upper Control Arms – 9" tubes
	Nth20011	Rear Upper Control Arms – 10" tubes
	Nth20290	TJ Lower Control Arm Geometry Correction™ Drill Template
	Nth20401	Track bar, Front, Late Jeep – reworked
	Nth23040	Track bar relocation kit – Rear, for TJ Wranglers
	Nth23041	Right-Rear UCA tower for TJ Wranglers ( <i>non-X</i> systems only)
	Nth2101x	Spring kit – Front, for TJ Wrangler (height specific)
	Nth2102x	Spring kit – Rear, for TJ Wrangler (height specific)
	Nth21801/21804	Bump Stop Spacer kit for TJ Wranglers with +3.0" or +4.0" lift
	Nth80003	Brake Lines for Late Jeeps – Front, 21" long
	Nth14501/14502	QuickSilver™ stabilizer bar Disconnects for TJ Wranglers
	Nth20800/20801	Rear Stabilizer End Links – Straight type
	Nth23100	Shock Shifter™ rear shock relocation brackets (for stock axles)
	Nth140xx	Tummy Tucker™ center skid plate (application specific; X pkg.)
Nth141xx	Stinger™ center-mounted rear torque arm (wheelbase; X pkg.)	
Nth242xx	Slider skid for rear differential (axle specific; X pkg.)	
<b>NOTE:</b> If you have chosen to delete any sub-kit(s) from the normal 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!		
<b>Assumptions</b> 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 F/R 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.	
<b>Required Tools and Equipment</b> (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	
	<i>See Separate Instructions for each sub-kit to verify all tools needed.</i>	

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.

## MASTER Install Guide: Conventional ShortArm Suspensions – TJ

**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 warranty 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° 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.*

# MASTER Install Guide: Conventional ShortArm Suspensions – TJ

**PHASE I: Tummy Tucker (X packages only) and Rear Suspension Prep.** 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 experience has shown that it goes fastest this way – especially on TJs that have no previous lift installed.

**Step I-1:** Install Nth° Tummy Tucker™ ('X' packages 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) or are changing transmission or transfer cases completely, do it during the TT install.

**Step I-2:** Dismantle Rear Suspension. Begin by disconnecting the driveshaft (unless a CV 'shaft is already installed) and brake hose, then completely remove the shocks and stabilizer end links. Now use jackstands to get the vehicle's weight off the rear springs so you can remove them, then remove the track bar. Finally, remove one of the rear lower control arms, but leave the two upper and other LCA in place for now to hold the axle from moving around. 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.

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:** Redrill new LCA Holes. On the side that you already removed the stock LCA from, use the redrill template Nth20290 to locate the new holes in *both* the frame and axle-end brackets. Instructions for this are included with the template (Nth30127) – do both the axle and frame holes on the first side, then temporarily replace the stock arm (to hold the axle from moving around) and remove the other stock LCA and repeat the redrill procedure.

**Step I-4:** Remove Shock brackets and prepare for new SS lower brackets. This is part of the Shock Shifter instructions (Nth30012): Using the method/tools of your choice, completely remove the lower shock brackets from the axle tubes and sand the tubes smooth. 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 can also sand the paint off of the axle tubes where the new brackets will attach.

Also, if you purchased an X-package (including a Stinger), 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.

**PHASE II: Rear Suspension.** Many of these steps can be performed in any order, but the order below will generally be the fastest and easiest.

**Step II-1:** Install Rear Lower Control Arms (Nth20100). Replace each stock lower arm with one of the four supplier heavy-wall tubular arms. All four arms are the same length and have the same bushings – and there is no specific frame- or axle-end to them. The only thing that matters is to note that the main center tube is offset to one side of each end-ring/bushing. Mount each arm so that the center tube is 'low' – this will make a smoother surface for dragging the arm over rocks, etc. without 'catching' the bushings at the ends.

**Step II-2:** X packages ONLY: Install Slider™ or Universal Stinger Base. Follow the instructions for your specific Slider & Stinger combination or Universal Stinger kit.

# MASTER Install Guide: Conventional ShortArm Suspensions – TJ

**Step II-3:** Install rear track bar tower/brace (Nth23040). The instructions provided with this kit (Nth30014) will guide the correct configuration of your tower and it's clevis for your suspension height, as well as mounting it to your axle's stock track bar tower.

**Step II-4:** Std. 'non-X' Systems ONLY: Install Right-Rear Upper Control Arm Tower (Nth23041) and Rear Upper Control Arms (Nth20011). Follow the kit instructions for each kit (Nth30123 & Nth30107).

**Step II-5:** Install Rear portion of BumpStop Spacer Kit (Nth21801/21802). Locate the 2.5" diameter bumpstop spacers provided in the your BSS kit. Insert the spacers above the original bumpstop cups in the center of the upper spring seats using the longer metric bolts supplied. (see Appendix A for the correct spacing needed for your kit).

**Step II-6:** 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 forward edge of the stock bumpstop cup's "lip" to the round seat on the axle (measure to the middle of the raised center 'strike surface', not at the front or back edges). The measurement for +3.0" systems should be about 5.0", and for +4.0" systems it should be about 6.5".

You can also set the rear pinion angle at this time (pinion 1-2 degrees closer to horizontal than rear driveshaft's angle relative to horizontal) as outlined in your Stinger instructions (Nth30102) or RUCA instructions (Nth30107). This will prepare you to complete the next step.

**Step II-7:** Install Shock Shifter™ (Nth23100) Follow the instructions (Nth30112). After the brackets are welded in place, paint the brackets but do not re-attach the shocks until after the next step.

**Step II-8:** Install Rear Springs. Lower the axle down until you can fit the rear springs around the frame-mounted bumpstop, 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.

**NOTE:** If you are installing system **Nth01400**, there are additional bumpstop spacers that must be attached to the axle. These spacers are the same size/style as the ones that you will install on the front axle (see appendix A). For the rear, these spacers must be inserted between the coils of the rear spring and will serve to 'capture' the springs and keep them seated on the rear axle – thus they must be bolted down after the springs are installed. To prepare for this, drill a 3/8" hole in the center of each spring seat on your axle before placing the springs.

**Step II-9:** Re-install Rear Track Bar to the original frame bracket hole and the new clevis of the trackbar tower bracket (Nth23040) – consult the tower instructions (Nth30114) for tips and pictures.

**Step II-10:** 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 1/2" 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.

**Step II-11:** 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.

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

# MASTER Install Guide: Conventional ShortArm Suspensions – TJ

**PHASE III: Front Suspension:** This is the last phase and similar to parts of Phase II

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

- stabilizer end links (discard)
- shocks (discard)
- brake hoses (discard)
- springs (discard)
- bumpstops and cups (to be reused)
- track bar (discard – or it can be saved for a spare, but will not allow full suspension travel unless modified like the one provided)
- The drag link and pitman arm may be left connected, but separating them from each other will make changing the front springs easier.
- 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 III-2: Install New Front Lower Control Arms (Nth20100).** Replace each stock LCA one at a time with the new heavy duty tubular arms supplied. As with the rear, mount the arms with the main tube flush to the bottom of the bushings to assure a smoother surface for sliding over obstacles.

**Step III-3: Install Front Upper Control Arms (Nth20020).** Follow the instructions for this kit. You will also refer to these instructions later to set the caster angle using these adjustable upper arms.

**Step III-4: Install Front Suspension portion of Bump Stop Spacer kit (Nth21801/21802).** 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 and use the longer 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 III-5: Install New Front Track Bar (Nth20401).** To prepare for the new front track bar, you must drill a new hole in the bracket on the axle. Measure ¾" to the driver's side of the original hole and drill a new hole of the same diameter (approx. 7/16", but can be as small as .400"). Install the new supplied track bar in the same manner as the original was removed using the same original hardware, but in the new hole on the axle end.

**Step III-6: 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-up travel. 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 that your front shocks will fit and not 'bottom out' before the axle reaches this position (install your front shocks now for

## MASTER Install Guide: **Conventional ShortArm Suspensions – TJ**

this purpose, but you will need to disconnect them at the bottom afterwards to get the front springs in). Consult Appendix I for guidance on correct shock lengths and bumpstop spacing for your installation.

**Step III-7: 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 (p/n 52005917, available at Jeep 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.

**Step III-8: 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 III-9: Install QuickSilver™ Disconnects (Nth1450x).** 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

**PHASE IV: 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 IV-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 IV-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 IV-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.

# MASTER Install Guide: **Conventional ShortArm Suspensions – TJ**

## **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).

<b>Front</b>	Nth01300 (+3.0")	Nth01400 (+4.0")
Bumpstop Spacing – Frame side	(1) 2"Dia x 1"High puck per side	(1) 2"Dia x 2"High puck per side
Bumpstop Spacing – Axle side	(1) 3"Dia x 2"High puck per side	(1) 3"Dia x 2"High puck per side
Shock compressed length max. (from underside of frame tower to underside of bottom bar pin).	16.25"	17.25"
<b>Rear</b>		
Bumpstop Spacing – Frame side	(1) 2.5"Dia x 3"High puck	(1) 2.5"Dia x 2"High puck
Bumpstop Spacing – Axle side	None	(1) 3.0"Dia x 2"High puck / side
Shock compressed length max. (assumes Nth° Shock Shifters are installed correctly).	13.60"	14.60"