

## TABLE OF CONTENTS



What Driving a Jeep Means to Me . . .	5	Ignition and Charging Systems . . . . .	34
Acknowledgments . . . . .	5	Cooling Upgrades . . . . .	35
Introduction . . . . .	6	Superchargers . . . . .	36
<b>Chapter 1: The Birth of the Wrangler TJ . . . . .</b>	<b>7</b>	Engine Swaps . . . . .	36
Jeep History . . . . .	8	<b>Chapter 4: TJ Transmissions . . . . .</b>	<b>39</b>
Evolution of the Wrangler . . . . .	9	Manual Transmissions . . . . .	39
What's a TJ? . . . . .	11	Aisin-Warner AX-5 . . . . .	39
Jeep Life . . . . .	12	Aisin-Warner AX-15 . . . . .	40
The 2007 Jeep Wrangler . . . . .	14	NV1500 . . . . .	40
<b>Chapter 2: Models, Special Editions</b>		NV3550 . . . . .	40
<b>and Options . . . . .</b>	<b>15</b>	NSG370 . . . . .	41
Wrangler SE . . . . .	15	Automatic Transmissions . . . . .	41
Wrangler X . . . . .	16	30RH/32RH . . . . .	41
Wrangler Sport . . . . .	17	42RLE . . . . .	42
Wrangler Sahara . . . . .	18	Transmission Troubleshooting . . . . .	43
Wrangler Unlimited . . . . .	19	Transmission Upgrades . . . . .	43
Wrangler Rubicon and		Transmission Swap Options . . . . .	44
Unlimited Rubicon . . . . .	20	<b>Chapter 5: TJ Transfer Cases . . . . .</b>	<b>48</b>
Wrangler Special Editions . . . . .	21	The NP231J Transfer Case . . . . .	48
Trail Rated . . . . .	24	NVG241OR Rock-Trac Transfer Case . . . . .	50
<b>Chapter 3: TJ Engines . . . . .</b>	<b>25</b>	NP231J T-Case Beefing Ideas . . . . .	51
4.0L Power Tech I-6 . . . . .	25	Slip-Yoke Eliminators/Tail Shaft	
2.5L Power Tech I-4 . . . . .	26	Conversions . . . . .	51
2.4L DOHC I-4 . . . . .	26	Low Gears . . . . .	52
Ignition System . . . . .	27	Crawl Ratio . . . . .	53
Powertrain Control Module (PCM) . . . . .	27	Stronger Planetary Units and	
Charging System . . . . .	28	Wide Chain Kits . . . . .	54
Cooling System . . . . .	28	Achieving 2-Low Ability . . . . .	54
Wrangler Engine Build Date Code . . . . .	29	Shifter Assemblies . . . . .	54
Making it Run on the Cheap . . . . .	29	Transfer Case Swap Options . . . . .	55
Fuel Economy . . . . .	30	Driveshaft Upgrades . . . . .	57
Engine Performance Upgrades . . . . .	31	<b>Chapter 6: TJ Axles . . . . .</b>	<b>58</b>
Air Filters and Intake Systems . . . . .	31	Dana 30 . . . . .	58
Headers and Exhaust . . . . .	32	Dana 35c . . . . .	60

## CONTENTS

Dana 44 .....	61	Tire Tuning .....	106
Trac-Lok Limited-Slip Differential ...	62	Tires vs. Gearing .....	107
Rubicon Dana 44 .....	63	Wheel Upgrades .....	108
Axle Upgrades .....	64	Wheel Size and Fitment .....	109
Differentials .....	68		
Axle Swaps Ideas .....	70		
<b>Chapter 7: Coil-Spring Suspension .....</b>	<b>74</b>	<b>Chapter 10: Interior and Exterior Upgrades ...</b>	<b>111</b>
Stock Suspension .....	74	Year-To-Year Interior/	
Big Tires = Mas Macho .....	75	Exterior Updates .....	112
Which Lift is Right for Your Rig? ...	75	Aftermarket Tops .....	113
Body Lifts .....	76	Doors .....	115
Suspension Lifts .....	77	Fender Flares .....	116
Adjustable Control Arms .....	78	Bumpers .....	117
Sway Bar Links and Disconnects .....	78	Body Armor .....	118
Slip-Yoke Eliminators .....	79	Roof and Cargo Racks .....	121
Short Arm vs. Long-Arm .....	79	Lighting .....	121
Issues for Lifted TJs .....	82	Chrome Extras .....	122
Triangulated Rear Suspension .....	83	Interior Upgrades .....	122
Coil-Over Shock Systems .....	84	Seating .....	122
Selecting the Right Shocks .....	84	Roll Cages and Safety .....	123
Quick Lift Guide .....	86	Carpet Kits and Coatings .....	124
Suspension Maintenance .....	89	CBs and GPS .....	125
		Accessory Switch Control .....	125
		Storage and Security .....	126
<b>Chapter 8: TJ Steering and Brakes .....</b>	<b>91</b>	<b>Chapter 11: Taking Your TJ off the Pavement ..</b>	<b>127</b>
Steering System .....	91	Pick Your Terrain .....	127
Alignment .....	94	Avoiding Rollover .....	130
Steering Upgrades .....	94	Buckle Up .....	131
Brake System .....	98	Winch Use .....	131
Brake Upgrades .....	99	Air Systems .....	132
		Making the Most out of Your Stock TJ ..	133
<b>Chapter 9: Tires and Wheels: .....</b>	<b>100</b>	Buying Used Parts .....	135
OE Tire Fitments .....	100	Packing for the Trail .....	136
OE Wheels .....	100		
Tire Upgrades .....	101	<b>Appendix: Source Guide .....</b>	<b>140</b>
What's in a Tread Pattern? .....	104		



## TJ TRANSMISSIONS



*TJs with automatic transmissions feature a floor-mounted shifter. The shifter for the NP231J transfer case is also shown. There were also a variety of manual transmissions available in the TJ.*

Jeep used eight different transmissions during TJ production, with each replacement offering some degree of improved performance. There were five manual transmissions employed from 1997 to 2006. The automatic transmission selection was much more stable, with the first two of the three available transmissions lasting until 2002. A 4-speed unit was introduced in 2003 and remained in use for the duration of TJ production. The majority of the TJs produced are factory-fit with a manual transmission.

Transmission selection was updated rather frequently. The NV3550 introduced in 2000 has become a desirable swap candidate for earlier TJs. 2003 not only saw the introduction of the Rubicon Wrangler, but it also brought about a new transmission offering with the 42RLE 4-speed overdrive automatic replacing the 30RH and 32RH autos. A final change to the transmission lineup came in 2005 with the release of the 6-speed NSG370 manual transmission. None of the Wrangler transmissions are so problematic that you should avoid them, but the later, beefier trannys are definitely more durable for heavy-duty use.

### Manual Transmissions

#### *Aisin-Warner AX-5*

The Japanese-made Aisin-Warner AX-5 5-speed transmission was standard equipment in TJs equipped with 2.5L I-4 engines up to 2002. It was also used in Jeep Wrangler YJs and was first introduced in the 1984 Cherokee XJ. It looks very similar to the AX-15, though the bellhousing pattern and spline counts differ, so the two are not interchangeable. The AX-5 is a light-duty, overdrive (fifth gear) transmission that features a cast-aluminum split-case design halved

by an iron mid-plate. It uses a special adapter to attach to the transfer case and has an integral shift mechanism mounted in the shift tower portion of the adapter housing. The AX-5 uses helically cut, fully synchronized gears and offers a 21-spline output shaft and a 14-spline input shaft that extends outward 7½ inches. It's a decent transmission for the 2.5L, but you may have problems if you add a lot of extra power or subject it to heavy-duty abuse.

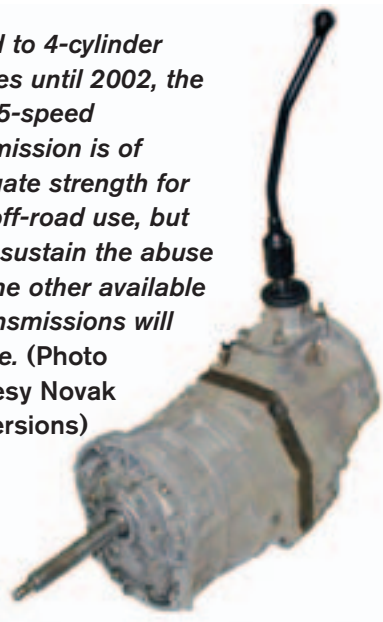
The AX-5 can be identified by a series of numbers stamped at the bottom surface of the transmission case, near the fill plug, which is located on the passenger-side of the adapter housing. The

#### *Aisin-Warner AX-5*

First gear: 3.93:1  
 Second gear: 2.33:1  
 Third gear: 1.45:1  
 Fourth gear: 1.00:1  
 Fifth gear: 0.85:1  
 Reverse: 4.74:1

Approximate fluid capacity: 3.5 quarts (3.3 liters)  
 Recommended lubricant: Mopar 75W-90 API Grade GL-5

*Mated to 4-cylinder engines until 2002, the AX-5 5-speed transmission is of adequate strength for mild off-road use, but won't sustain the abuse that the other available TJ transmissions will endure. (Photo courtesy Novak Conversions)*



first number indicates the year of manufacture and the second and third numbers indicate the month of manufacture. The final series of numbers is the unit's serial number.

#### **Aisin-Warner AX-15**

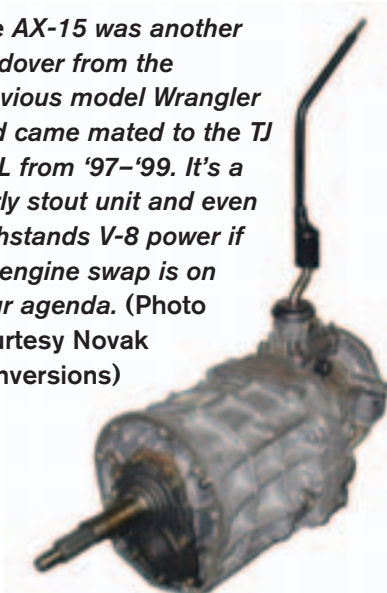
The Aisin-Warner AX-15 is a medium-duty, 5-speed manual transmission that came in '97-'99 4.0L I-6 Wranglers. It was initially introduced in the '88 Wrangler YJ, Cherokee, and Comanche. It uses a split cast-aluminum case with an aluminum mid-plate. The AX-15 is fully synchronized in all five gears, features helically cut gears throughout, a 1½-inch, 10-spline input shaft that sticks out 7½ inches, and a long, 23-spline output shaft. This unit also uses an internal hydraulic throw-out/release bearing assembly and a reverse lockout mechanism that requires the shifter to pass through neutral before it can be shifted into reverse. The AX-15 can be identified in the same manner as the AX-5 using the numbers stamped on the lower portion of the case. The fill plug is situated on the driver's side of the transmission case and the drain plug and reverse light switch are on the passenger side.

#### **Aisin-Warner AX-15**

First gear: 3.83:1  
Second gear: 2.33:1  
Third gear: 1.44:1  
Fourth gear: 1.00:1  
Fifth gear: 0.79:1  
Reverse: 4.22:1

Approximate fluid capacity: 3.27 quarts (3.10 liters)  
Recommended lubricant: Mopar 75W-90, API Grade GL-5

*The AX-15 was another holdover from the previous model Wrangler and came mated to the TJ 4.0L from '97-'99. It's a fairly stout unit and even withstands V-8 power if an engine swap is on your agenda. (Photo courtesy Novak Conversions)*



#### **NV1500**

The NV1500 had the shortest run in the TJ, and was employed for just two model years ('03-'04). It replaced the long standing AX-5 as the four-cylinder 5-speed, coinciding with the introduction of the 2.4L Power Tech DOHC I-4. The NV1500 is a constant mesh, fully synchronized manual transmission with a two-piece aluminum gear housing and a detachable clutch housing. Like the NV3550, it also uses a single-shaft shift mechanism mounted outside the case to activate three shift forks for gear shifting. This transmission is easily identified by the year of vehicle and the engine installed, but it can also be identified by

a pair of barcode tags. The tags are located below the shift tower; the right side tag indicates the part number and the left side tag offers build sequence and manufacture date information. The fluid fill plug is located on the side of the case and the drain plug is on the bottom. The NV1500 isn't very sought after, considering it was replaced by a 6-speed, and it's only up to handling the torque load of the 4-cylinder engine.

#### **NV1500**

First gear: 3.85:1  
Second gear: 2.25:1  
Third gear: 1.48:1 or 1.46:1  
Fourth gear: 1.00:1  
Fifth gear: 0.80:1 or 0.83:1  
Reverse: 3.52:1

Approximate fluid capacity: 4.8 pints (2.3 liters)  
Recommended lubricant: Mopar Manual Transmission Lubricant

#### **NV3550**

Jeep began using this medium-duty 5-speed transmission in the 4.0L-equipped 2000 TJ. It uses the same oblong bolt pattern as the AX-15, and is secured with nine metric bolts. With its two-piece cast-aluminum case, the



*The NV3550 5-speed, used in 4.0L TJs from 2000 to 2004, is an excellent transmission that is capable of handling off-road abuse. It's also a good replacement for the earlier AX-15.*