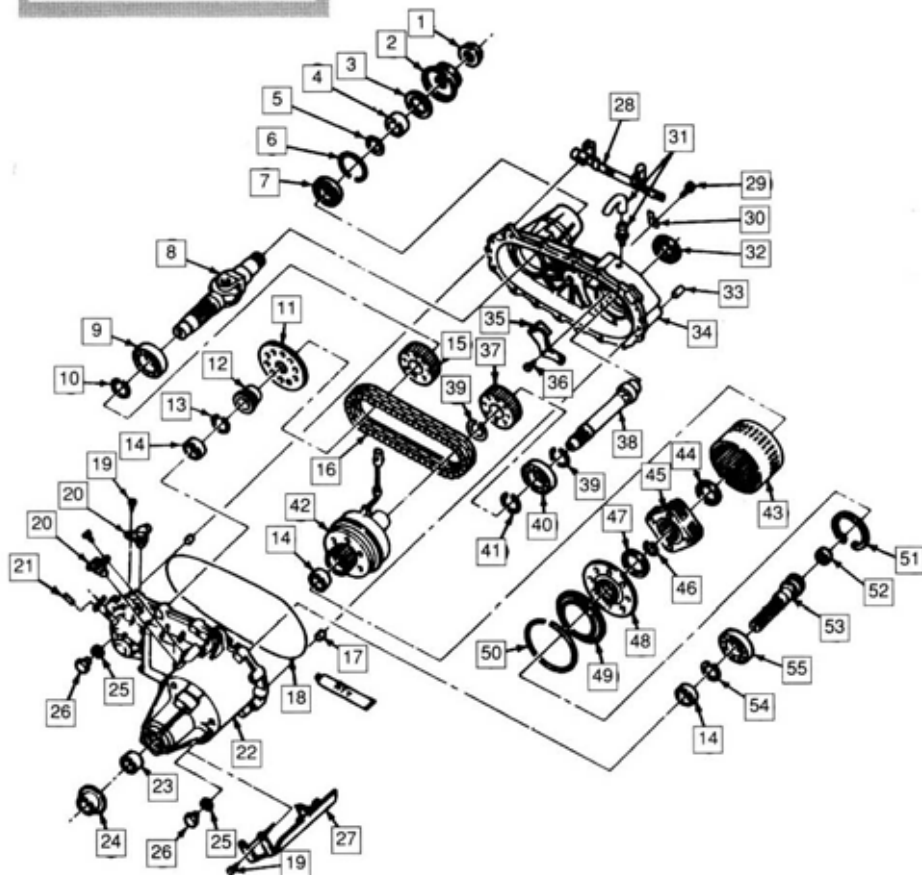




Exploring Ford's Aerostar With Electronic Four-Wheel Drive

Mike Weinberg
Contributing Editor



TC28 Transfer Case

Number	Description	Number	Description
1	Locknut	30	Clip
2	Deflector	31	Vent
3	Oil Seal	32	Oil Seal
4	Steel Bushing	33	Dowel Pin
5	O-Ring	34	Front Case Half
6	Snap Ring	35	Oil Baffle
7	Ball Bearing	36	Hex Tapping Screw
8	Front Output Shaft	37	Drive Sprocket
9	Ball Bearing	38	Input Shaft
10	Snap Ring	39	Snap Ring
11	Tone Wheel Ring	40	Ball Bearing
13	Snap Ring	41	Snap Ring
14	Needle Bearing Assembly	42	Electric Clutch Assembly
15	Drive Sprocket	43	Planetary Ring Gear
16	Drive Chain	44	Thrust Washer
17	Dowel Pin	45	Planetary Carrier Assembly
18	RTV Sealant	46	Snap Ring
19	Hex-Head Self-Tapping Screw	47	Thrust Washer
20	Sensor	48	Plate
22	Rear Case Half	49	Cover
23	Steel Bushing	50	Snap Ring
24	Oil Seal	51	Snap Ring
25	Washer	52	Steel Bushing
26	Hex-Head Plug	53	Rear Output Shaft
27	Shield, Heat	54	Snap Ring
28	Wiring Harness	55	Ball Bearing

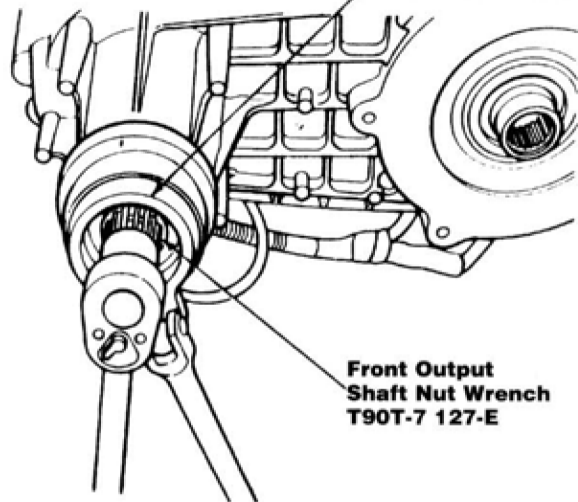
As you may have noticed, times have changed. When we were young, "souping up a car" meant at least one horsepower per cubic inch, gobs of torque, a set of laces pipes and glasspack mufflers. Nowadays, when young people speak of souping up their cars, it means adding a 5,000-Watt stereo system, an aerodynamics package and neon lighting. Housewives and senior citizens are into trucks and four-wheel drive. Minivans and trucks are a huge market, and, looking for a sales advantage, Ford has introduced an electronic four-wheel-drive system in its popular Aerostar minivan.

The Electronic Four-Wheel-Drive System consists of a computer-controlled Dana TC28 transfer case. This unit operates full time, providing torque to both axles for improved traction and handling in all weather conditions. This transfer case splits torque, providing 2/3 to the rear wheels and 1/3 to the front axle. This torque split is achieved through a planetary gear differential in the transfer case. Under normal conditions, this unit feels like a rear-wheel vehicle with none of the usual 4WD wheel-hop or steering

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Remove the locknut from the front output shaft with Front Output Shaft Nut Wrench T90T-7 127-E and Front Output Shaft Holding Tool T90T-7 127-F or equivalents. Hold the nut with the holding tool and turn the splines of the front output shaft with the wrench to remove the locknut from the shaft.

Front Output Shaft Holding Tool T90T-7 127-F



Front Output Shaft Nut Wrench T90T-7 127-E

bind. When ice and snow or wet driving conditions cause wheel slippage, an electronic clutch in the transfer case is activated by the electronic control unit found under the drivers seat, locking out the planetary differential and sending as much torque as necessary to front and rear axles. This occurs automatically with no input from the driver. Understanding the fine points of this lock-up clutch will enable you to perform the necessary diagnostics. The ECU senses wheel-slip through speed sensors that measure front and rear output shaft speeds. If the ratio of the shaft speeds changes, the ECU applies the electro-magnetic clutch, which compresses steel and fiber clutch plates.

NOTE: The control unit applies the clutch for 3.3 seconds and then releases it. If the slipping condition persists, the ECU will re-engage the clutch after 1/2 second and continue to cycle that way until wheel slip stops. Be real careful here if you get a customer complaint of "trailer hitching" (a bumping sensation). Don't promise to "fix" the normal transfer-case operation. The program parameters of the ECU will not permit clutch lock-up under braking at a vehicle speed below 5 mph, or in park or neutral.

Space doesn't permit us to get into the electronic trouble shooting. The Ford factory repair manual has 12 pages of electronic testing and diagnosis. While we're on the subject, it pays to establish good working relationships with your local dealers. When you are working on a unit that is new to you, or has complex diagnostics, borrow the factory manual and copy the sections you need. Pretty soon, you will develop a wonderful tech library. The Dana 28 is a simple transfer case, see the accompanying illustrations for a parts blow-up. The only special tools needed are a Front Output Shaft Nut Wrench (T90T-7127E) and a Front Output Shaft Holding Tool (T90T-7127F). The front output-shaft retaining nut is of the giant economy size. Most of the units I have seen have come in with heavy damage to the rear extension housing and loss of lube. Make sure your work is leak-free and check the driveshafts, U joints and extension-housing seals and bushings.

Get familiar with the theory of operation and the electronics, and the Dana 28 will be one more unit to help ring the cash register. ■

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