



The automatic transmission system for coaches



ZF-AS Tronic





A revolution in transmission technology.

Expect more from your transmission. A lot more. ZF-AS Tronic. A smooth, quiet, lightweight, fuel-efficient, completely integrated bus transmission with automatic shift capability and easy-to-use touch-pad operation. Changing what it means to drive...forever.

- Increased fuel economy.
- Automatic and manual shifting modes.
- No transmission cooling required.
- 185,000 miles between oil changes, and no paper filters!
- High-torque capacity up to 1850 ft-lbs.
- Lightweight system for reduced GVW, only weighs 572 lbs. dry.
- No clutch pedal!
- Lets the drivers drive!



The future of driving starts with innovations from ZF. Like the ZF-AS Tronic.

What is the ZF-AS Tronic? It is a universal transmission system, based on a simple design and packaged in a compact unit that enables tour, charter and line-haul coaches to operate reliably, economically, and virtually maintenance-free. We developed the ZF-AS Tronic specifically for vehicles with EDC engines and CAN communication capabilities. They represent the only way of achieving direct exchange of information between individual vehicle systems, i.e. the engine, transmission, brakes etc. This innovative transmission system combines tried-and-tested ZF technology with modern electronics, grouping together all the major transmission components in a single housing.

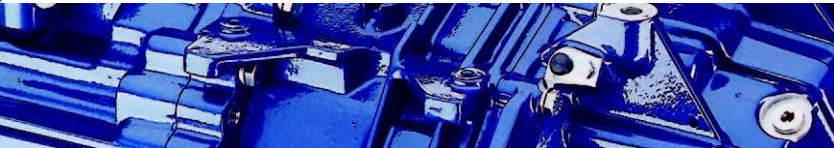
Push Button Shifter

Features unique to ZF:

- Two-digit alphanumeric display (gear attained and diagnostic information)
- Upshift
- Downshift
- Function key (toggles between automatic/manual modes)

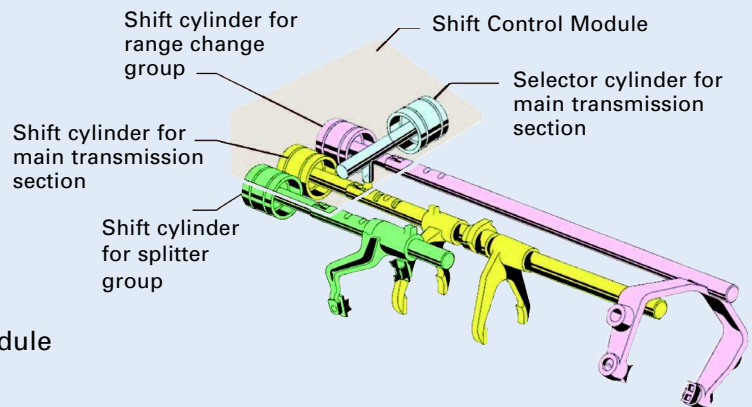


ZF-AS Tronic's automatic shift capability and easy-to-use touch pad operation minimize the stress on a coach driver as much as on the bus driveline. ZF-AS Tronic will select appropriate gear changes depending on conditions such as driver demand, engine load, vehicle acceleration, driven versus non-driven wheel speed, and many others. If the situation so requires, the driver can override the automatic mode at any time. An information display keeps drivers continuously updated on driving conditions and system status.



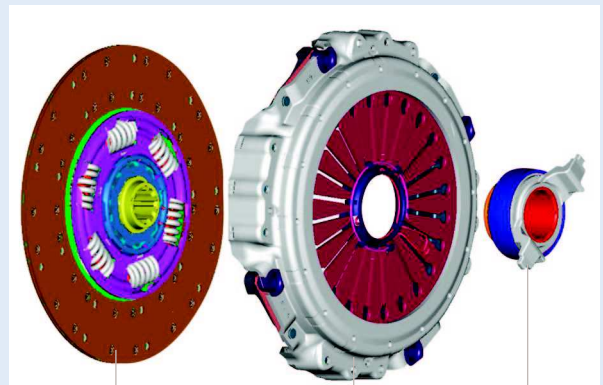
Shift System

- The shift control module handles gear shifts pneumatically
- One shift cylinder for each shift rail
- One shift cylinder for selection of the main transmission section
- Valves, cylinders, sensors and the outer connections are integrated in the shift module
- The shift commands are issued by the electronics or if necessary by the driver



ZF-Sachs Clutch

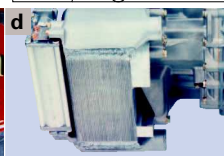
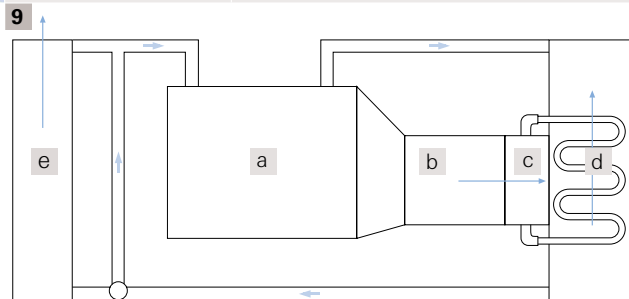
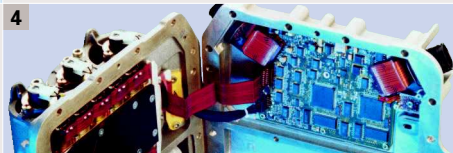
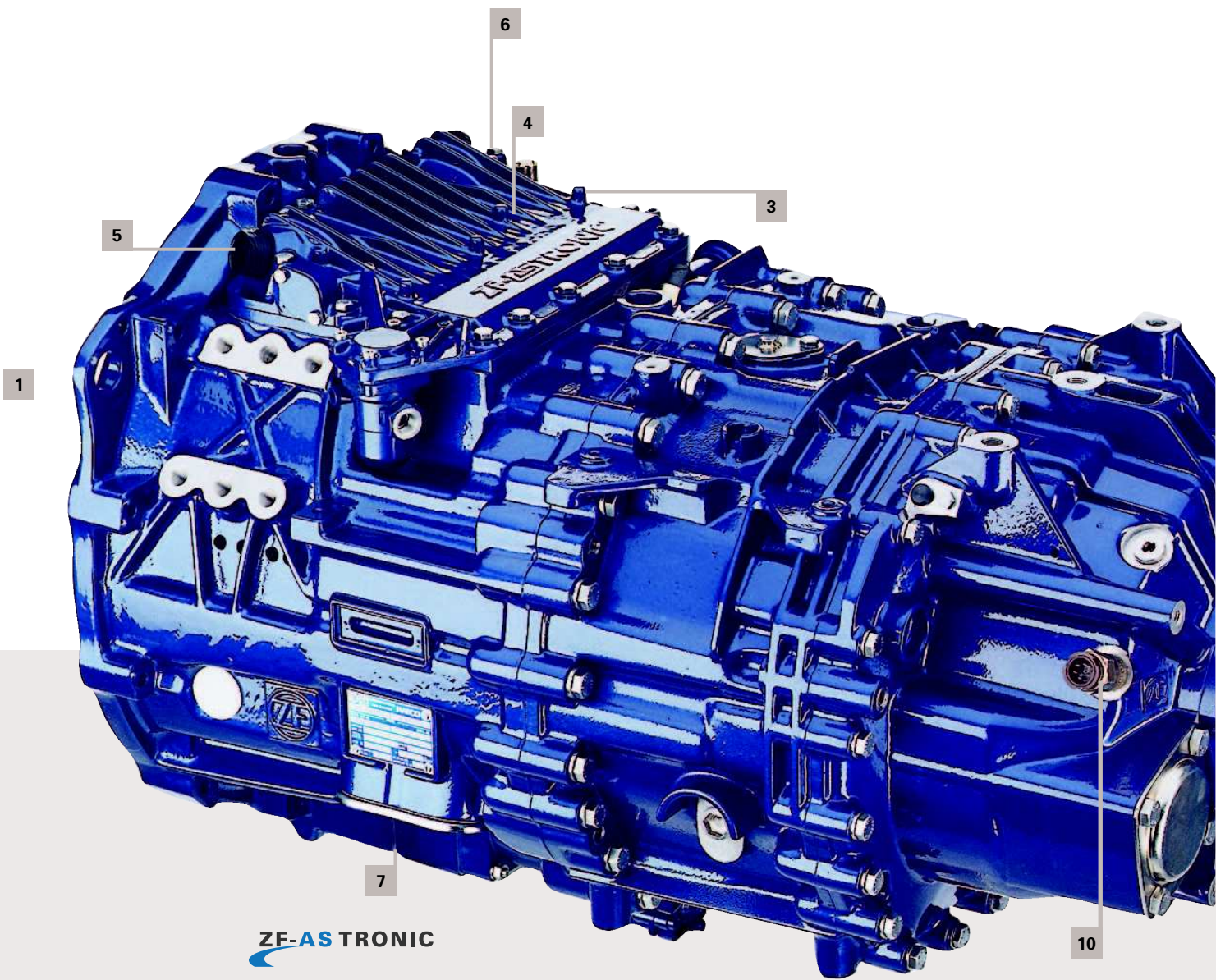
- No preventative maintenance required
- Micro-processor controlled self-adjusting system
- Release bearing, clutch fork, and push rod do not need periodic lubrication
- In-field tests show no wear after 100,000 miles
- Estimated life 500,000 miles plus
- System will warn driver of clutch overload or need of replacement



17" DIA single disk dry clutch with organic facing

Diaphragm style, pull-type pressure plate

Lube-for-life, sealed, self-centering release bearing



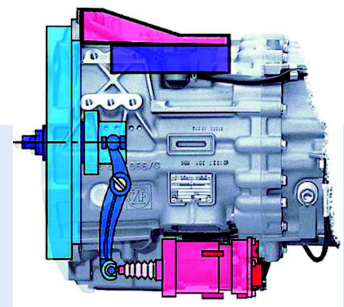
Clutch Actuation

- No clutch pedal or hydraulics
- Electro-pneumatic feedback-controlled clutch processes when starting and stopping, shifting or maneuvering
- The standard dry clutch is actuated by the clutch module
- Automatic clutch adjustment
- Automatic driver information (on display) when clutch is overloaded
- Display to indicate when clutch needs changing



Shift Control Module

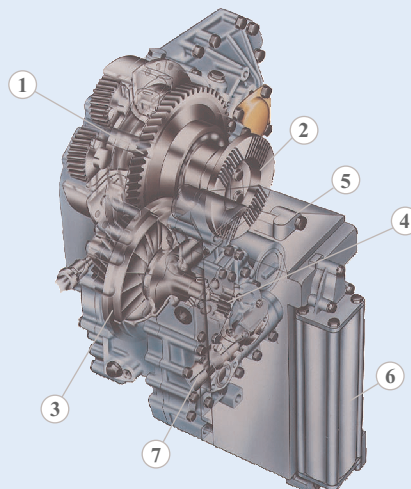
- Installed on the top of the transmission
- Transmission ECU with shift control logic
- Air solenoids and valves for selecting and actuating the shift rails
- Air pressure regulator
- Sensors for input shaft speed, air pressure, temperature, and shift rail location



Integration is the key

- 1 Transmission
- 2 Output Flange – Most North American yokes available
- 3 Air breather
- 4 Shift module with integrated electronic control unit
- 5 Electrical connection – Transmission plug
- 6 Electrical connection – Vehicle plug
- 7 Clutch module
- 8 Pushbutton shifter

- 9 Integrated retarder system
 - a Engine
 - b Transmission
 - c Intarder
 - d Heat exchanger
 - e Engine heat exchanger
- 10 Output Speed Sensor



- 1. Step-up gear
- 2. Transmission output flange
- 3. Rotor/stator
- 4. Pump
- 5. Heat exchanger
- 6. Oil reservoir
- 7. Control, hydraulic

The ZF-Intarder Integrated Retarder System is an OE-dependent option.



Savings realized by using ZF-AS Tronic when compared to a powershift transmission.

Year 1

Mileage	Fuel Saved	Oil/Filter	Labor	Total Savings
50,000/year	\$1,023	\$320	\$65	\$1,408
75,000/year	\$1,534	\$320	\$65	\$1,919
100,000/year	\$2,045	\$640	\$130	\$2,815
150,000/year	\$3,068	\$960	\$195	\$4,223

Year 3

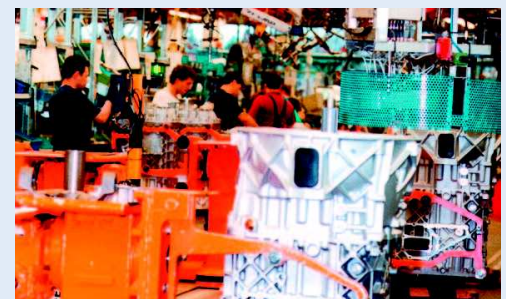
Mileage	Fuel Saved	Oil/Filter	Labor	Total Savings
50,000/year	\$3,068	\$960	\$195	\$4,223
75,000/year	\$4,602	\$1,220	\$260	\$6,082
100,000/year	\$6,136	\$1,860	\$390	\$8,386
150,000/year	\$9,205	\$2,760	\$585	\$12,550

Year 5

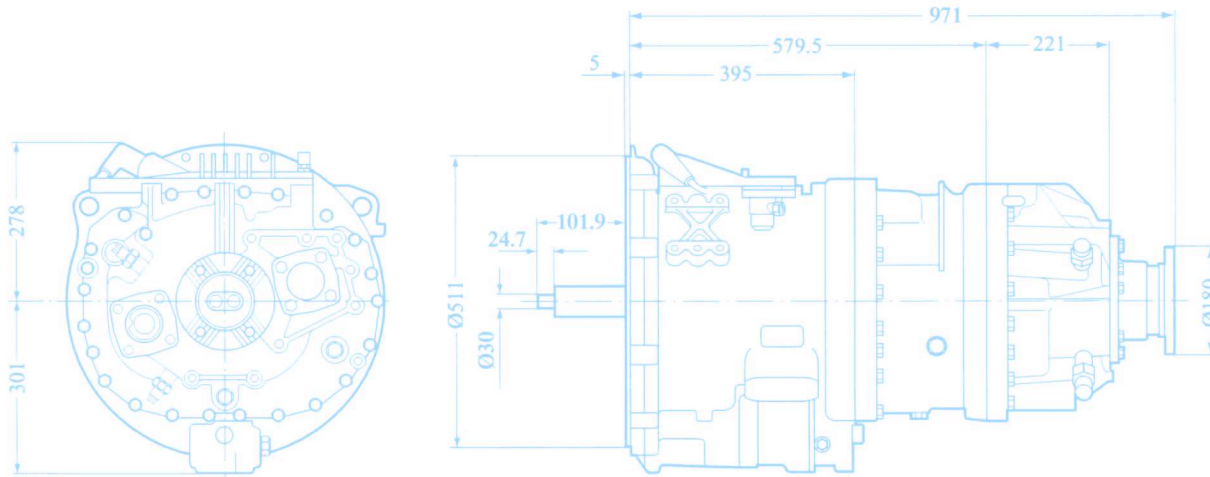
Mileage	Fuel Saved	Oil/Filter	Labor	Total Savings
50,000/year	\$5,114	\$1,540	\$325	\$6,979
75,000/year	\$7,670	\$2,120	\$455	\$10,245
100,000/year	\$10,227	\$3,080	\$650	\$13,957
150,000/year	\$15,341	\$4,560	\$975	\$20,876

Assumed:

- \$65/hr labor rate.
- \$1.35/gal for diesel fuel.
- \$45 for a filter kit.
- \$25/gal for synthetic transmission fluid.
- Powershift average fuel economy 6.0 mpg.
- AS Tronic average fuel economy 6.6 mpg.



**Installation Dimensions
(mm)**



ZF-AS Tronic Approved Oils

- Triton Syn Lube CD-50
- Altra Syntec CD-50
- Allied Mag Synthetic 50
- Amalie Synthetic Transmission Fluid
- Syntrans CD-50
- Amoco CD-50 Synthetic Trans Fluid
- Syn-Tech CD-50
- SYN-CD Gear Lubricant SAE 50
- SYNSTAR GL 50
- Mystik Synguard SX-7000 SAE 50
- Citgo Synthetic Gear Lube CD 50
- Emgard SAE 50 Syn Trans Lubricant
- Syncon HP Synthetic CD 50
- Maxtron MT SAE 50
- Synergy Synthetic Lube SAE-50
- Sonic MP Gear Oil 50
- Synpro 50
- Syn Manual Trans Lube #12345724
- FS Synthetic 50
- Gulf Synthetic Transmission Oil 50
- Fleetrite Synthetic SAE 50 Transmission Oil
- IDO Synthetic 50
- Kendall SHP Manual Trans Gear Lube 50
- Lubemaster Syn 50 Transmission Lube
- LE-50 Transmission Lubricant #650
- SYN HD Gear Oil CD-50
- NEO CD-50
- Syngear E SAE 50
- Transoil 50 (CD-50)
- Raloy Transintex Plus SAE 50
- Schaeffer Synthetic Lubricant 50
- SEN SYN CD-50 E
- Shell Dentax S
- Sunoco Duratrans 50
- SYN-STAR TL 50
- Syntex 2000
- Dyna-Plex 21C Synzol SAE 50
- Valvoline HD Syn Trans Oil SAE 50
- Gibraltar Syn-Gear CD-50
- Castrol Syntrans 75W-85

Gear Ratios	Direct Drive	Overdrive
1	9.59	7.44
2	7.43	5.78
3	5.78	4.57
4	4.56	3.55
5	3.55	2.70
6	2.70	2.10
7	2.10	1.63
8	1.63	1.27
9	1.27	1.00
10	1.00	0.78
R	11.41	11.41

Decades of driveline experience, leading-edge technology and unique user benefits are all combined into our integrated, automatic transmission system. From the coach manufacturer to the tour company operator to the driver to the passengers, the ZF-AS Tronic automatically makes every journey a better experience.

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Driveline and Chassis Technology



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