

# OPERATION

## ELECTRONIC SHIFT CONTROL SYSTEM

### Electronic Shift Operation

The system consists of a pushbutton control, electronic control module, electric shift motor with integral shift position sensor and a speed sensor.

The transfer case is equipped with a magnetic clutch located inside the case next to the 2WD/4WD shift collar. The clutch is used to spin up the front drive system from zero to vehicle speed in less than a second. This spin-up allows the 2WD to 4WD shift to be made at any speed.

When the transfer case rear and front output shafts reach the same rotating speed, the spring loaded shift collar mechanically engages the mainshaft hub to the chain drive sprocket. The magnetic clutch is then deactivated. Shifts between 4WD high and 4WD low only occur with clutch interlock or transmission safety switches closed. Vehicle speed must also be 3 MPH or under.

When the operator selects the 4WD or 2WD drive mode, the actual shifting is carried out by electric motor mounted on the transfer case.

### Electronic Control Module

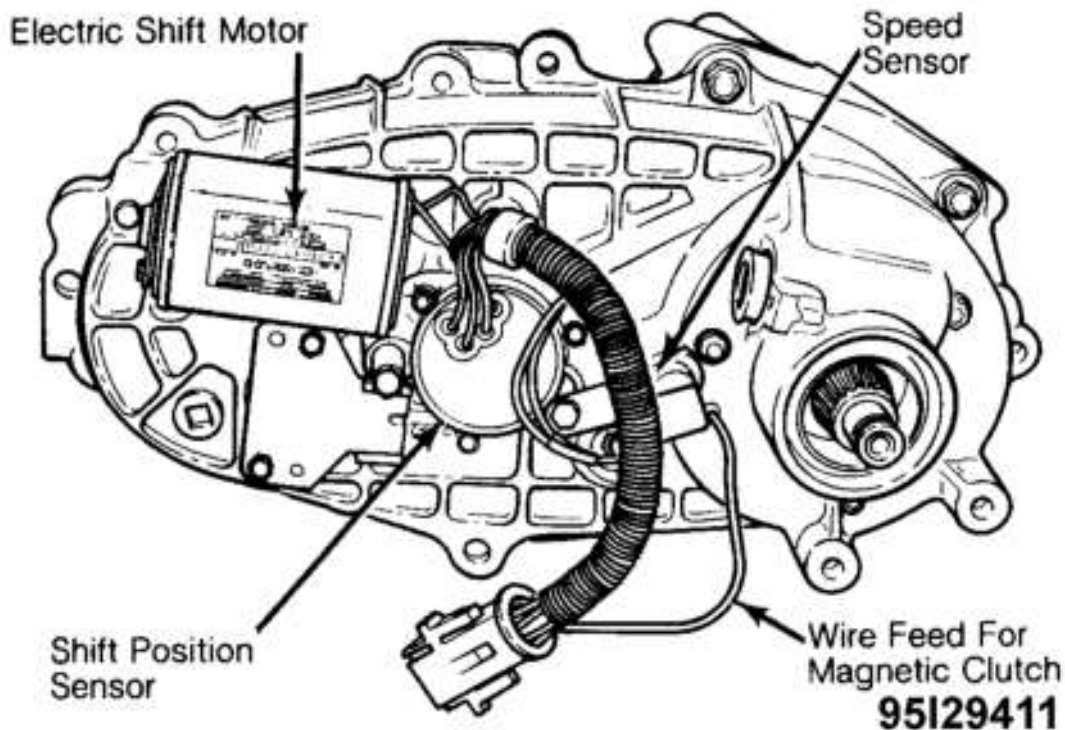
This module controls the operation of the transfer case using inputs from the pushbutton controls, speed sensor and shift position sensor. The module is equipped with a self-test capability.

When either of the 2 switches in the overhead console are depressed, the electronic control module will analyze information from the transfer case shift position sensor to verify its current position. The module also receives data from the speed sensor and clutch interlock switch, or Neutral safety switch depending on application.

If all design conditions are met, the electronic control module will signal the electric shift motor to shift gear positions. After shift takes place, the module will read the input from the shift position sensor to determine if transfer case is in desired position. The electronic control module also will illuminate pushbuttons on overhead console indicating shift is completed.

### Speed Sensor

Mounted on the rear of the transfer case, the speed sensor tells the electronic control module the correct speed to shift the transfer case. Speed sensor picks up rotating speed of output shaft from 2 notches cut in opposite sides of outer ring of clutch housing assembly. See **Fig. 1** .



**Fig. 1: Electronic Shift Control Transfer Case**  
Courtesy of FORD MOTOR CO.

### **Shift Position Sensor**

The shift position sensor tells the electronic control module the shift position of the transfer case. It is an integral part of the transfer case. See **Fig. 1** .

### **Electric Shift Motor**

Mounted externally on the rear of the transfer case, this motor is responsible for shifting between 4WD and 2WD. The motor drives a rotary helical cam which moves the 2WD/4WD shift fork and "4H-4L" reduction shift fork to selected drive position.