Engine Performance

Engine Repair

Steering & Suspension

Electrical Systems

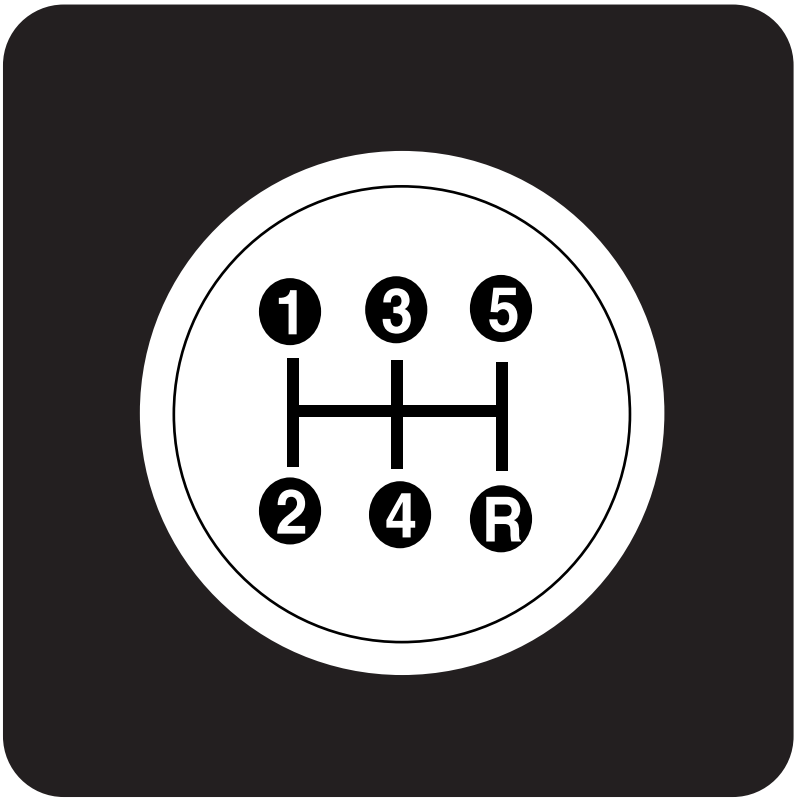
Climate Control

Manual Transmission

Automatic Transmission

Brakes

manual transmission and driveline



transfer case and 4x4 system repair

FCS-14358-REF

student guide

COURSE CODE: 36S08T0
ORDER NUMBER: FCS-14358-REF

Updated January, 2006

STST
Service Technician Specialty Training
Ford Customer Service Division
Technical Training

IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the personal safety of the individual doing the work. This manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools and parts for servicing vehicles, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from instructions provided in this manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

As you read through the procedures, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. NOTES give you added information that will help you to complete a particular procedure. CAUTIONS are given to prevent you from making an error that could damage the vehicle. WARNINGS remind you to be especially careful in those areas where carelessness can cause personal injury. The following list contains some general WARNINGS that you should follow when you work on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires you to be under the vehicle.
- Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on the vehicle. If you have an automatic transmission, set it in PARK unless instructed otherwise for a specific service operation. If you have a manual transmission it should be in REVERSE (engine OFF) or NEUTRAL (engine ON) unless instructed otherwise for a specific service operation.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep yourself and your clothing away from moving parts when the engine is running, especially the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
- Do not smoke while working on the vehicle.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle. Tie long hair securely behind your head.
- Keep hands and other objects clear of the radiator fan blades. Electric cooling fans can start to operate at any time by an increase in underhood temperatures, even though the ignition is in the OFF position. Therefore, care should be taken to ensure that the electric cooling fan is completely disconnected when working under the hood.

The recommendations and suggestions contained in this manual are made to assist the dealer in improving his dealership parts and/or service department operations. These recommendations and suggestions do not supersede or override the provisions of the Warranty and Policy Manual, and in any cases where there may be a conflict, the provisions of the Warranty and Policy Manual shall govern.

The descriptions, testing procedures, and specifications in this handbook were in effect at the time the handbook was approved for printing. Ford Motor Company reserves the right to discontinue models at any time, or change specifications, design, or testing procedures without notice and without incurring obligation. Any reference to brand names in this manual is intended merely as an example of the types of tools, lubricants, materials, etc. recommended for use. Equivalents, if available, may be used. The right is reserved to make changes at any time without notice.

WARNING: MANY BRAKE LININGS CONTAIN ASBESTOS FIBERS. WHEN WORKING ON BRAKE COMPONENTS, AVOID BREATHING THE DUST. BREATHING THE ASBESTOS DUST CAN CAUSE ASBESTOSIS AND CANCER.

Breathing asbestos dust is harmful to your health.

Dust and dirt present on car wheel brake and clutch assemblies may contain asbestos fibers that are hazardous to your health when made airborne by cleaning with compressed air or by dry brushing.

Wheel brake assemblies and clutch facings should be cleaned using a vacuum cleaner recommended for use with asbestos fibers. Dust and dirt should be disposed of in a manner that prevents dust exposure, such as sealed bags. The bag must be labeled per OSHA instructions and the trash hauler notified as to the contents of the bag.

If a vacuum bag suitable for asbestos is not available, cleaning should be done wet. If dust generation is still possible, technicians should wear government approved toxic dust purifying respirators.

OSHA requires areas where asbestos dust generation is possible to be isolated and posted with warning signs. Only technicians concerned with performing brake or clutch service should be present in the area.

Produced and Coordinated by
Technical Support Operations
Ford Customer Service Division

February, 2002

CUSTOMER EXPECTATIONS

Customer Expectations: Service

1. Make it convenient to have my vehicle serviced at your dealership.
2. The Service Advisor should demonstrate a genuine concern for my service needs.
3. Fix it right the first time.
4. Complete servicing my vehicle in a timely and professional manner.
5. Provide me with a clear and thorough explanation of the service performed.
6. Call me within a reasonable amount of time after my service visit to ensure that I'm completely satisfied.
7. Be responsive to questions or concerns I bring to your attention.

Expectation 3

"Fix It Right The First Time, on Time."

Both service advisors and technicians are important players when it comes to Expectation #3.

Why

Customers tell us "Fixing It Right The First Time, on Time" is one of the reasons they would decide to return to a dealer to buy a vehicle and get their vehicles serviced.

Technician Training

It is our goal to help the technician acquire all of the skills and knowledge necessary to "Fix It Right The First Time, on Time." We refer to this as "competency."

Technician's Role

Acquire the skills and knowledge for competency in your specialty via:

STST

- Self Study
- FordStar Broadcasts
- Ford Multimedia Training (FMT)
- Instructor Led

New Model

- Self Study
- FordStar Broadcasts
- Instructor Led

The Benefits

The successful implementation of expectations means:

- Satisfied customers
- Repeat vehicle sales
- Repeat service sales
- Recognition that Ford and Lincoln/Mercury technicians are "the Best in the Business"

DAY ONE

DAY TWO

DAY THREE

Manual Transmission and Drivetrain Curriculum

The Manual Transmission and Drivetrain Curriculum Path consists of eight courses. Each course is one of the following types:

- Self-Study – This type of course is a self-paced program. The technician is responsible for learning the material on his or her own. The training material consists of a reference book and accompanying videotape. The videotape is designed to support the material in the reference book and should not be used on its own.
- Ford Multimedia Training (FMT) – This type of course is also self-paced. The multimedia course allows the technician to interact with the training materials. The multimedia course allows the technician to utilize the knowledge attained in the self-study course. The FMT concentrates on relationships, such as the cause- and-effect relationships between symptoms and components.
- Distance Learning (FORDSTAR) – This type of course is an instructor-led, interactive type. It is presented over the FORDSTAR Distance Learning Network. The instructor can present information to, relate questions to, and interact with the technicians. Demonstrations and video presentations are used to introduce material.
- Classroom – The classroom course allows for practical, real-world application of skills and knowledge learned in the other courses.

The eight courses included in the Manual Transmission and Drivetrain Curriculum are as follows:

- Differential and Driveline Operation – Self-Study ..... Course code: 36S01S0
- Differential and Driveline Repair – Classroom ..... Course code: 36S02T0
- Manual Transmission/Transaxle Operation – Self-Study ..... Course code: 36S03S0
- Manual Transmission/Transaxle Diagnosis – FMT ..... Course code: 36S04M0
- Manual Transmission/Transaxle Repair – Classroom ..... Course code: 36S05T0
- Transfer Case and 4x4 System Operation – Self-Study ..... Course code: 36S06S0
- Transfer Case and 4x4 System Diagnosis – FORDSTAR ..... Course code: 36S07F0

* ● Transfer Case and 4x4 System Repair – Classroom ..... Course code: 36S08T0

* All students must have completed the Transfer Case and 4x4 System Operation Self-Study Course as well as the Transfer Case and 4x4 System Diagnosis – FORDSTAR prior to enrolling in this course. Students who have not completed the previous course should not be admitted to this class. Their presence will slow down the course flow, as well as monopolize valuable instructor time.

Curriculum Goals

The goals of this curriculum are:

- To provide the necessary training to enable the technician to identify, diagnose, and perform timely “Fix It Right The First Time – On Time” repairs
- Increased customer satisfaction
- Increased technician productivity
- Fewer repeat repairs

Course Objectives

Upon completion of the Transfer Case and 4x4 System Repair Classroom Course, the technician will be able to:

- Explain the components of a 4x4 system.
- Explain the mechanical components of a transfer case.
- Explain the powerflow of each transfer case used in this course.
- Explain the operation of the viscous coupling.
- Explain the operation of the A4WD electronic clutch assembly.
- Perform transfer case disassembly procedures.
- Perform transfer case inspection procedures.
- Perform transfer case assembly procedures.
- Explain the 4x4 front axles.
- Explain locking wheel hubs.
- Describe the Symptom-to-System-to-Component-to-Cause diagnosis process.
- Perform diagnostic procedures on an electronic transfer case.
- Perform locking hub inspection.

Audience

This course is designed for Ford Motor Company dealer technicians.

Course Prerequisites

Each technician enrolled in this course must meet the following prerequisites:

- Basic Electrical Part 1 – (self-study)
- Basic Electrical Part 2 – (FMT)
- Basic Electrical Part 3 – (classroom)
- Electronics Part 1 – (self-study)
- Electronics Part 2 – (FMT)
- Electronics Part 3 – (classroom)
- Measuring Devices – (FMT)
- Noise Vibration & Harshness – (classroom)
- Transfer Case and 4x4 System Operation – (self-study)
- Transfer Case and 4x4 System Diagnosis – (Fordstar)

DAY ONE
FLOWCHART