

## Allison Transmission

### VOCATIONAL MODELS

1000 EVS	2100 EVS	2200 EVS	2500 EVS	B 210
1000 HS	2100 HS	2200 HS	2500 HS	B 220
1000 MH	2100 MH	2200 MH	2500 MH	
1000 PTS	2100 PTS	2200 PTS	2500 PTS	
1000 RDS	2100 RDS	2200 RDS	2500 RDS	
1000 SP	2100 SP	2200 SP	2500 SP	



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# INTRODUCTION

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### NOTE:

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# IMPORTANT SAFETY NOTICE

**IT IS YOUR RESPONSIBILITY** to be completely familiar with the Warnings and Cautions described in this Service Manual. These Warnings and Cautions advise against the use of specific service methods that can result in personal injury, damage to the equipment, or cause the equipment to become unsafe. It is, however, important to understand that these Warnings and Cautions are not exhaustive. Allison Transmission could not possibly know, evaluate, and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Allison Transmission has not undertaken any such broad evaluation. Accordingly, **ANYONE WHO USES A SERVICE PROCEDURE OR TOOL WHICH IS NOT RECOMMENDED BY ALLISON TRANSMISSION MUST** first be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized by the service methods selected.

Proper service and repair are important to the safe, reliable operation of the equipment. The service procedures recommended by Allison Transmission and described in this Service Manual are effective methods for performing service operations. Some of these service operations require the use of tools specifically designed for the purpose. The special tools should be used when and as recommended.

## WARNINGS, CAUTIONS, AND NOTES

Three types of headings are used in this manual to attract your attention:

### **WARNING!**

is used when an operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

### **CAUTION:**

is used when an operating procedure, practice, etc., which, if not strictly observed, could result in damage to or destruction of equipment.

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### **NOTE:**

is used when an operating procedure, practice, etc., is essential to highlight.

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# LIST OF WARNINGS

This manual contains the following Warnings —

**IT IS YOUR RESPONSIBILITY TO BE FAMILIAR WITH ALL OF THEM.**

Operation with excessive loads can cause transmission damage and unexpected vehicle movement. To help avoid injury, property damage, and/or transmission damage, do not exceed 11 800 kg (26,000 lbs) GCW or the OEM vehicle rating, whichever is less.

If ignition is turned “OFF” and then “ON” while the CHECK TRANS light is displayed, the transmission may remain in neutral until the code is cleared. Leave ignition “ON” until you are in a safe place to stop.

For vehicles containing 1000 and 2000 Product Families transmissions with park pawl, each time you park the vehicle or leave the operator’s station with the engine running, do the following.

- Bring the vehicle to a complete stop using the service brake.
- Make sure the engine is at low idle rpm.
- Put the transmission in P (Park).
- Engage the P (Park) range by slowly releasing the service brake.
- Apply the emergency brake and/or parking brake, if present, and make sure it is properly engaged.
- If the operator’s station will be unoccupied with the engine running, chock the wheels and take any other steps necessary to keep the vehicle from moving.

If this procedure is not followed, the vehicle can move suddenly and you or others could be injured.

For vehicles containing 2000 Product Family transmissions with auto-apply parking brakes, each time you park the vehicle or leave the operator’s station with the engine running, do the following.

- Bring the vehicle to a complete stop using the service brake.
- Make sure the engine is at low idle rpm.
- Put the transmission in PB (Auto-Apply Parking Brake). Make sure that the parking brake is properly engaged.
- Apply the emergency brake, if present, and make sure it is properly engaged.
- If the operator’s station will be unoccupied with the engine running, chock the wheels and take any other steps necessary to keep the vehicle from moving.

If this procedure is not followed, the vehicle can move suddenly and you or others could be injured.

For vehicles containing 2000 Product Family transmissions without auto-apply parking brakes, each time you park the vehicle or leave the operator’s station with the engine running, do the following.

- Bring the vehicle to a complete stop using the service brake.
- Make sure the engine is at low idle rpm.
- Put the transmission in N (Neutral).
- Apply the emergency brake and/or parking brake and make sure they are properly engaged.
- If the operator’s station will be unoccupied with the engine running, chock the wheels and take any other steps necessary to keep the vehicle from moving.

If this procedure is not followed, the vehicle can move suddenly and you or others could be injured.

Observe safety precautions during hydraulic pressure check procedures. All personnel must stand clear of the vehicle. Take precautions against movement of the vehicle. Be sure that gauges (vacuum, pressure, tachometer) have extended lines so that they can be read from inside the vehicle.

# LIST OF WARNINGS

This manual contains the following Warnings —

**IT IS YOUR RESPONSIBILITY TO BE FAMILIAR WITH ALL OF THEM.**

To help avoid injury or property damage caused by sudden and unexpected vehicle movement, do not start a stationary stall test until you:

- Put the transmission in P (Park) or N (Neutral)...and
- Apply the parking brake and service brake...and
- Chock the vehicle wheels and take any other steps necessary to keep the vehicle from moving...and
- Warn personnel to keep clear of the vehicle and its path.

Use appropriate safety equipment such as safety glasses, safety shoes, and gloves.

Do not burn discarded Teflon® seals; toxic gases are produced by burning Teflon®.

Never dry bearings by spinning them with compressed air. A spinning bearing can disintegrate, allowing balls or rollers to become lethal flying projectiles. Also, spinning a bearing without lubrication can damage the bearing.

Avoid contact with the hot fluid or the sump when draining transmission fluid. Direct contact with the hot fluid or the hot sump may result in bodily injury.

Chock wheels to prevent vehicle from moving when driveline is disconnected. This is not necessary if vehicle is on a lift or jackstands.

Be sure the torque converter is moving rearward with the transmission as it is removed. Do not allow the torque converter to become disengaged from the oil pump or to fall and injure yourself or others.

The torque converter must be held to the torque converter housing by a retaining device such as shipping brackets. Without the retaining device, the torque converter may slide forward, disengaging the oil pump, or may fall completely out of the transmission causing personal injury and/or property damage.

The 1000 and 2000 Product Families transmission dry weights are approximately 150 kg (330 lb). To help avoid personal injury and/or property damage:

- Use caution when installing, removing, or moving the transmission.
- Get help when lifting the transmission. Assistance from a hoist or another person may be required.
- Make sure that the lifting equipment can properly support the transmission.

If the transmission is not secured properly to the adapter plate, it could fall. To help avoid personal injury and/or property damage:

- Use at least 5 bolts to support the transmission.
- Use M10 x 1.5 bolts with 19–25 mm (3/4–1 inch) thread engagement. If the proper bolt is not used, the PTO bolt holes may be damaged.

# LIST OF WARNINGS

This manual contains the following Warnings —

**IT IS YOUR RESPONSIBILITY TO BE FAMILIAR WITH ALL OF THEM.**

The 1000 and 2000 Product Families torque converter dry weights are approximately 29 kg (63 lb). To help avoid personal injury and/or property damage:

- Use caution when installing, removing, or moving the torque converter.
- Get help when lifting the torque converter. Assistance from a hoist or another person may be required.
- Make sure that the lifting equipment can properly support the torque converter.

The 1000 and 2000 Product Families converter housing/front support module dry weights are approximately 27 kg (60 lb). To help avoid personal injury and/or property damage:

- Use caution when installing, removing, or moving the converter housing/front support module.
- Get help when lifting the converter housing/front support module. Assistance from a hoist or another person may be required.
- Make sure that the lifting equipment can properly support the converter housing/front support module.

Always remove or install the P3 planetary carrier assembly by holding onto the output shaft. Holding onto the P3 carrier assembly instead of the output shaft may allow the output shaft to fall causing personal injury and/or property damage.

Exhaust all pressure from the torque converter before loosening the test fixture nut. Failure to relieve the pressure could cause personal injury and/or property damage.

The rotating clutch housing and turbine shaft are held together by a retaining ring. Removal of the retaining ring will allow the turbine shaft and the rotating clutch housing to move freely. Ensure that the rotating clutch housing and the turbine shaft are restrained from moving when removing the retaining ring. Personal injury and/or property damage may result from the movement of the rotating clutch housing or the turbine shaft.

Pressing the P3 planetary carrier from the bearing race requires the P3 carrier to fall from the bearing race. Ensure that the P3 carrier is safely caught when freed from the bearing race. An uncontrolled fall of the P3 carrier could cause personal injury and/or property damage.

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## SECTION 1—GENERAL INFORMATION

### 1-1. SCOPE OF MANUAL

**a. Transmission Product Families And Model Years.** The 1000 and 2000 Product Families include the 1000/2000/2400 Series. The following provides guidance in distinguishing between the various 1000 and 2000 Product Families transmissions and 1000/2000/2400 Series transmissions models and the content of the various model years. Model Year and serial number breaks identify engineering changes.

**b. Model Year 04 (MY04)** (refer to SIL 13-1K2K-03). MY04, June 2003, introduced modulated main pressure hardware and the associated calibration software. The serial number breaks for MY04 are:

- Indianapolis units:
  - 6310292155 through 6310292563
  - 6310296468 through 6310296471
  - 6310301450 through 6310301451
  - 6310303122 through 6310303124
  - 6310307722—start of MY04 production
- Baltimore units:
  - 6320218358 through 6320218387
  - 6320247492 through 6320248001
  - 6320269500—start of MY04 production

**c. MY04 Parts Changes.** MY04 parts and former parts are not interchangeable. Parts changed by MY04 are:

- Internal Wiring Harness
- Separator Plate
- Modulated Main Body Assembly
- Modulated Main Body
- Shift Valve Body
- Main Valve Body
- Control Main Valve
- Control Main Regulator and Control Main Relief Spring
- Main Pressure Regulator Valve

**d. Model Year 04i (MY04i)** (refer to SIL 3-1K2K-04). 1000 and 2000 Product Families MY04i serial number breaks are:

- S/N 6310374684 (Indianapolis)
- S/N 6320367833 (Baltimore)

**e. MY04i Parts Changes.** MY04i parts and former parts are not interchangeable. Parts changed by MY04i are:

- Front Support Assembly and Bearing
- Main Regulator Valve
- Converter Relief Valve
- Lube Regulator Valve
- Lube Regulator Spring
- Lube Regulator Stop
- Lube Regulator O-ring deleted
- C1 Clutch Backfill Valve
- C1 Clutch Backfill Spring
- C1 Clutch Backfill Stop
- Converter Flow Valve
- Retaining Clip replaces a retaining pin
- Converter/Main Housing Separator Plate
- Pump Assembly
- Pump Wear Plate

**f. Improved Shift Valve Body Casting.** Serial number breaks for 1000 and 2000 Product Families improved Shift Valve Body casting are:

- Indianapolis Units—6310368401
- Baltimore Units—6320354862

**g. Vocational Models** (refer to WATCH 309). Beginning January 2004, Allison Transmission began shipping new 1000 and 2000 Product Families transmission models for North America. 1000 and 2000 Product Families models are:

- Emergency Vehicle Series—1000 EVS, 2100 EVS, 2200 EVS, 2500 EVS
- Highway Series—1000 HS, 2100 HS, 2200 HS, 2500 HS
- Motorhome Series—1000 MH, 2100 MH, 2200 MH, 2500 MH
- Pupil Transport/Shuttle Series—1000 PTS, 2100 PTS, 2200 PTS, 2500 PTS
- Rugged Duty Series—1000 RDS, 2100 RDS, 2200 RDS, 2500 RDS
- Specialty Series—1000 SP, 2100 SP, 2200 SP, 2500 SP
- Bus Series—B210, B220

# 1000 AND 2000 PRODUCT FAMILIES SERVICE MANUAL

**h. Vocational Model Nomenclature.** The first digit of the nomenclature indicates the product family—1000, 2000. The second digit (0–4) indicates close ratio, or (5) wide ratio.

**i. Content and Organization.** This Service Manual describes overhaul procedures for 1000 and 2000 Product Families automatic transmissions (Figures 1–1 and 1–2). All 1000 and 2000 Product Families vocational models are included in this manual as are all 1000/2000/2400 Series transmissions.

- Major transmission components are described and their functions explained.
- Detailed instructions are provided for disassembly, rebuild, and re-assembly.
- Part inspection instructions are in Section 3.
- Wear limits and spring data are in Section 7.

**j. Illustrations**

1. The text is supported with line drawings, exploded, and cross-sectional views. Overhaul procedures are illustrated by line drawings. Cross-sections show the relationship of assembled parts. Cross-sections and exploded views are on foldout pages in the back of the manual.
2. Illustrations show correct procedures for all models—including models not illustrated.

**k. Maintenance Information.** Each task described in this manual has been successfully completed by service organizations and individuals. Not every service organization or individual possesses the required special tooling, training, or experience to perform all described tasks. However, any task may be performed if the following conditions are met:

1. The organization or individual has the required knowledge of the task through:
  - Formal instruction at Allison Transmission or a Distributor training facility.
  - On-the-job instruction by an Allison Transmission or Distributor representative.
  - Experience in performing the task.

2. The work environment is suitable to prevent contamination or damage to transmission parts or assemblies.
3. The required tools and fixtures, listed in Table 3–1 (Section 3 of this manual), are available.
4. Reasonable and prudent maintenance practices are used.

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**NOTE:**

**Service organizations and individuals are encouraged to contact their local Allison Transmission Distributor for information and guidance on any task outlined in this manual.**

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## **1–2. SUPPLEMENTARY INFORMATION**

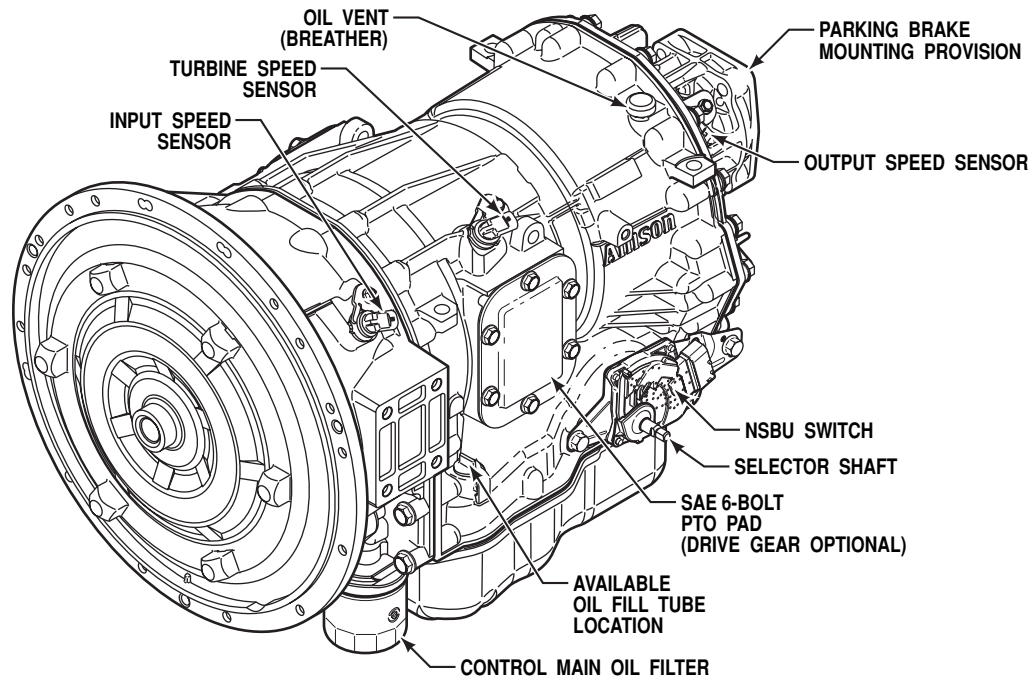
Supplementary information will be issued, as required, if any changes occur after publication of this manual. Check with your dealer or distributor to be sure you have the latest information.

## **1–3. ORDERING PARTS**

**a. Transmission Nameplate.** The nameplate (1) (Figure 1–3) is located on the right side of the transmission. The nameplate will be one of two styles (Figures 1–4 and 1–5). Both nameplates are imprinted with the transmission model, serial number, transmission identification number, engineering group number, engineering feature configuration number, and date of manufacture. Use all of these numbers when ordering replacement parts or requesting service information.

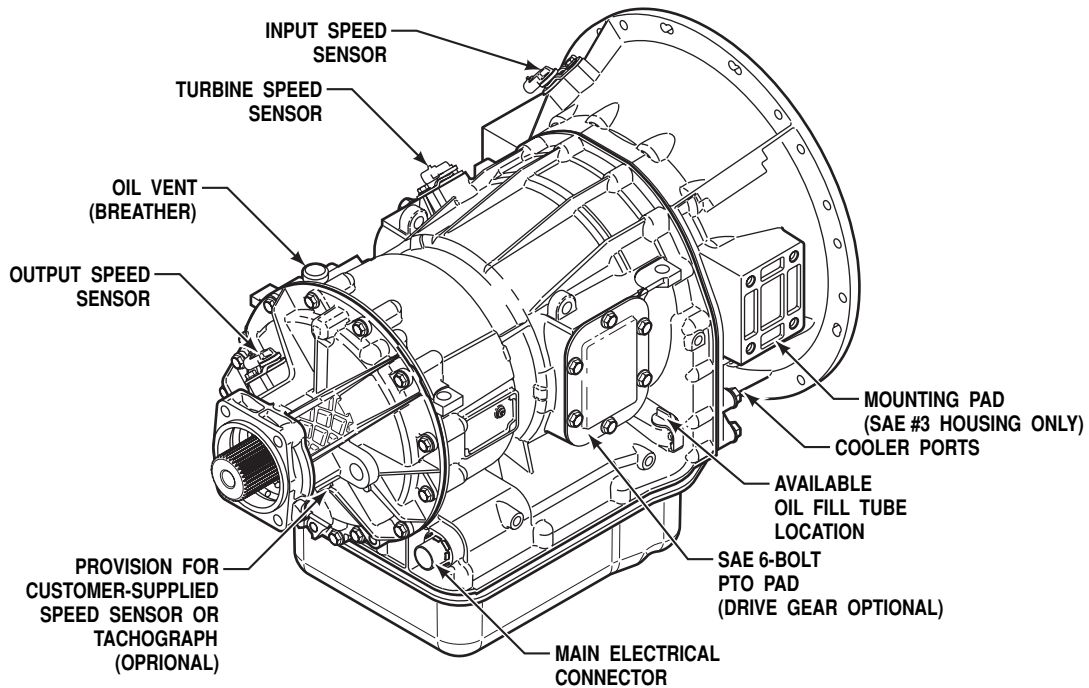
**b. Parts Catalog.** Replacement parts are listed in Parts Catalog PC3062EN. Do not order by the item numbers used on exploded views in this manual. Use the Parts Catalog to determine the correct part number. Order all replacement parts from your distributor or authorized dealer. Check the Yellow Pages for your nearest authorized service outlet. Listings are under Transmission—Truck, Tractor, Etc.

# GENERAL INFORMATION



V04779.03.00

**Figure 1–1. 1000 and 2000 Product Families Transmission—Left-Front View**



V04780.01.04

**Figure 1–2. 1000 and 2000 Product Families Transmission—Right-Rear View**

# 1000 AND 2000 PRODUCT FAMILIES SERVICE MANUAL

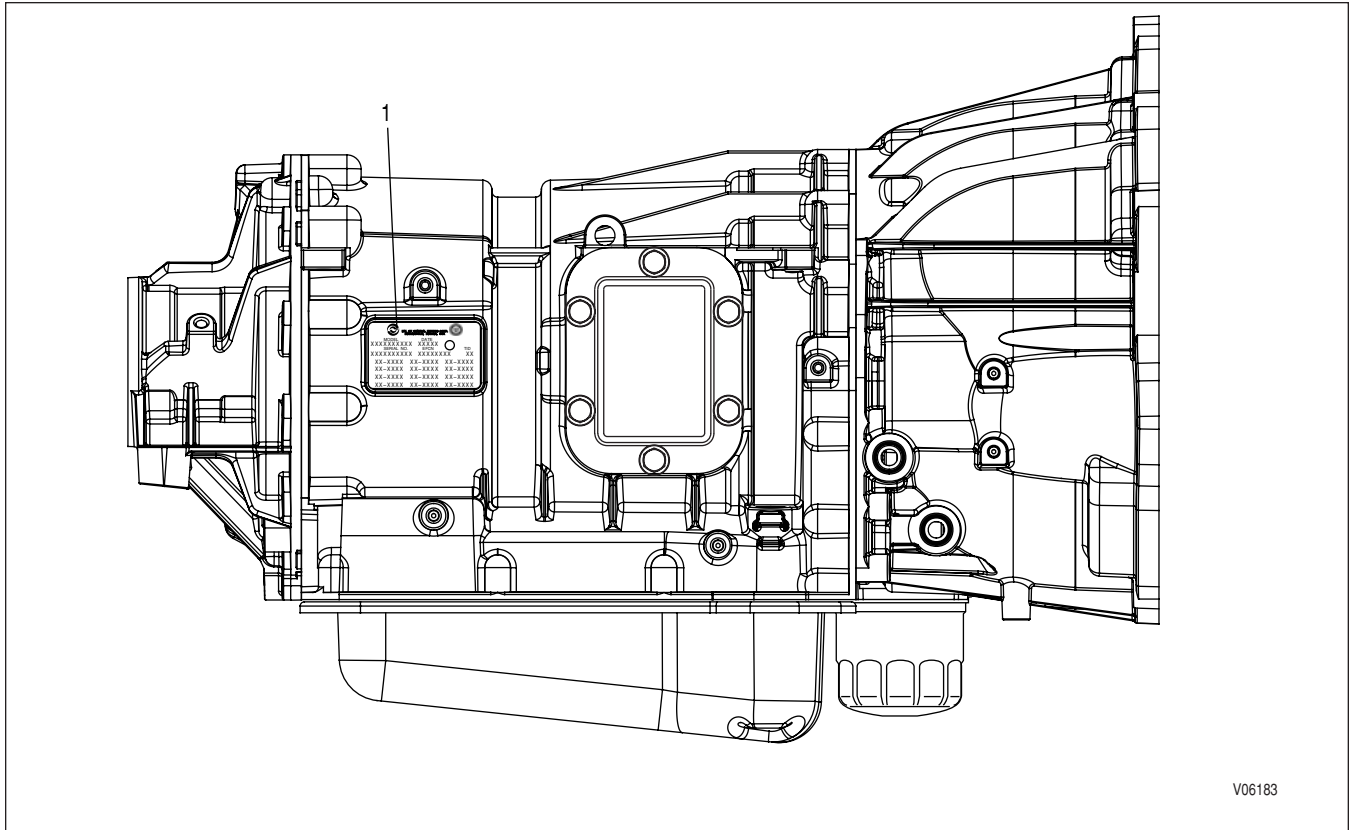
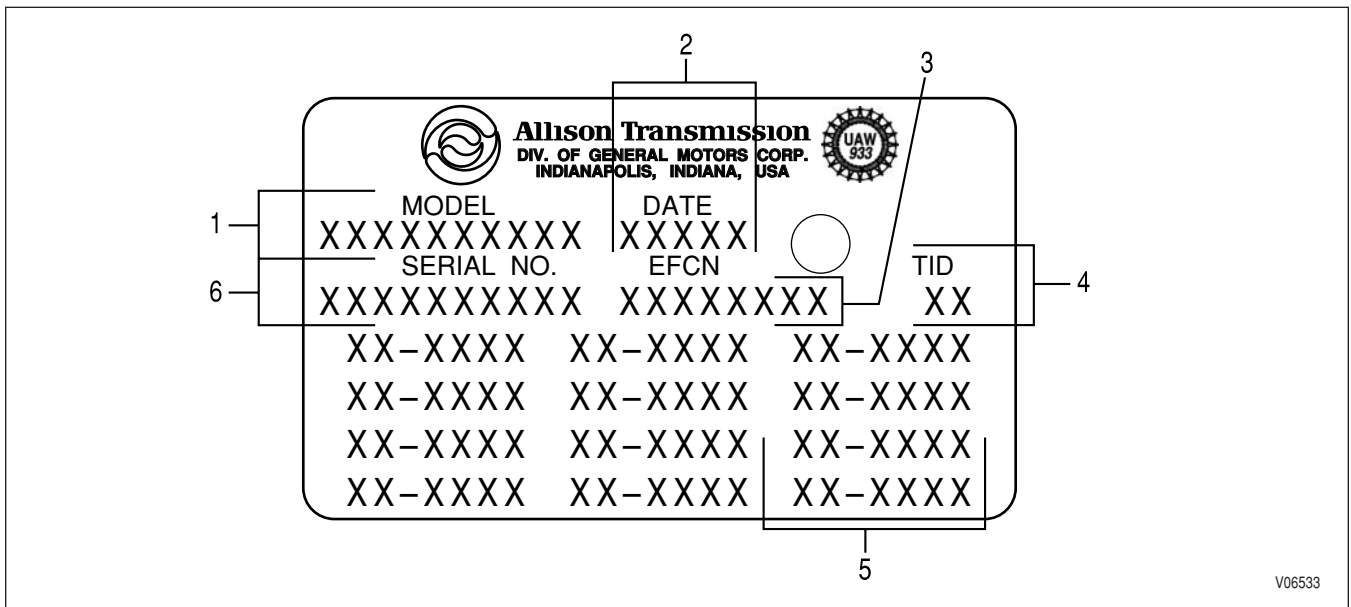


Figure 1-3. 1000 and 2000 Product Families Transmission Nameplate Location

V06183



V06533

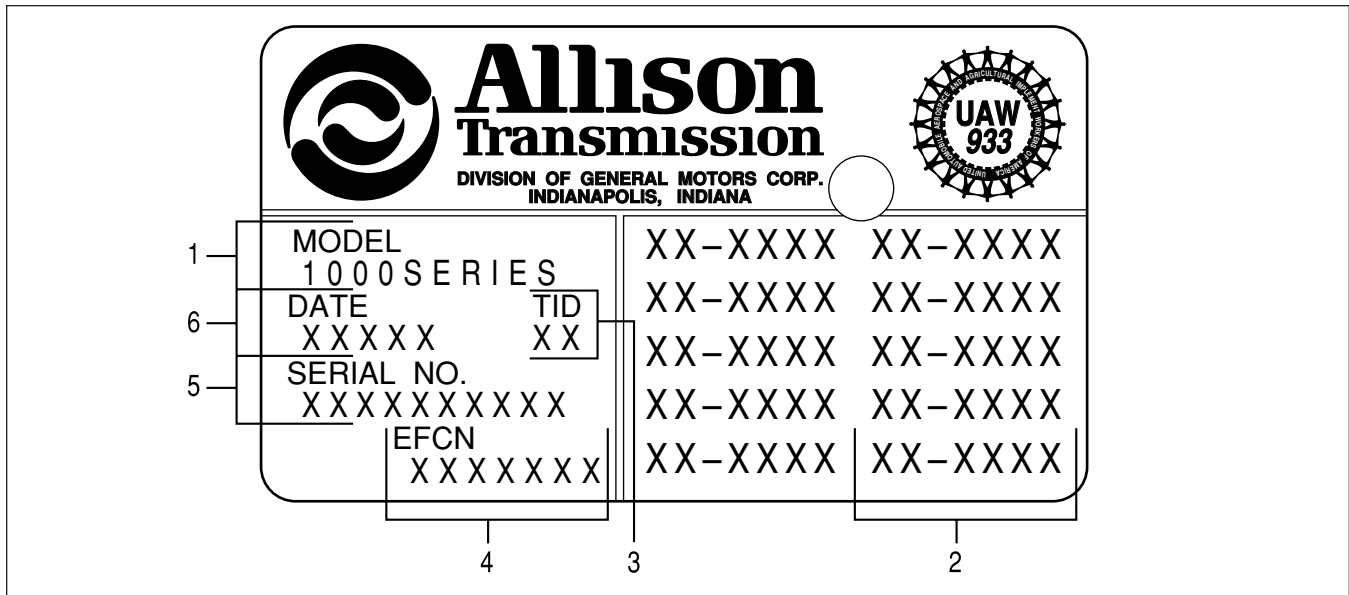
## Legend

- |  |  |
|--|--|
| (1) Model (Series)                           | (4) Transmission Identification Number |
| (2) Date of Manufacture                      | (5) Engineering Group Number           |
| (3) Engineering Feature Configuration Number | (6) Serial Number                      |

Figure 1-4. 1000 and 2000 Product Families Transmission Nameplate Components



## GENERAL INFORMATION



### Legend

- |  |  |
|--|--|
| (1) Model (Series)                     | (4) Engineering Feature Configuration Number |
| (2) Engineering Group Number           | (5) Serial Number                            |
| (3) Transmission Identification Number | (6) Date of Manufacture                      |

**Figure 1–5. 1000 and 2000 Product Families Transmission Nameplate Components (Before March, 2000)**

### 1–4. GENERAL DESCRIPTION

**a. Transmission Design Features.** Allison 1000 and 2000 Product Families (Figures 1–1 and 1–2) are torque-converter driven, electronically controlled, fully automatic transmission systems. The 1000 and 2000 Product Families transmissions have up to five forward speeds, neutral, and reverse. The fifth range has an overdrive gear ratio. The 1000 and 2000 Product Families incorporate a variety of standard and optional design features.

1. *Transmission-to-Engine Coupling.* The converter housings of 1000 and 2000 Product Families transmissions mate directly to SAE No. 2 or No. 3 flywheel housings or to the engine block in some cases. Flexplate drive is used for engine-to-transmission torque transfer.
2. *Torque Converter.* Several torque converters are available to match the transmissions to a wide variety of diesel and gasoline engines. The torque converter is a single-stage, polyphase, three-element unit, consisting of a pump, stator, and turbine. At lower output speeds, the torque converter multiplies torque and provides a fluid coupling to the engine. At higher speeds,

the torque converter clutch (TCC) is automatically engaged to provide direct drive from the engine to the transmission. Hydraulic fluid for converter charging pressure comes from the sump and is supplied by the input pump. The torque converter clutch is applied or released by changing direction of fluid in the torque converter. An integral converter damper minimizes the need for additional engine vibration control.

3. *Planetary Gearing.* The planetary gear train includes three constant-mesh, helical gear planetary sets. By the engagement of clutches in various combinations, the planetary sets act singly or together to provide five forward ranges, neutral, and reverse.
4. *Clutches.* Five clutches (two rotating and three stationary) direct the flow of torque through the transmission. All range clutches are hydraulically-actuated and spring-released, with automatic wear compensation. Clutches are cooled by the transmission fluid. The transmission electronic control module signals solenoid valves to apply and release clutches based on speed and power combinations and the range selected by the operator.

## 1000 AND 2000 PRODUCT FAMILIES SERVICE MANUAL

5. *Hydraulic System.* A common hydraulic system serves the torque converter and the transmission. Transmission fluid for all hydraulic operations, lubrication, and cooling comes from the sump and is supplied by the charging pump.

6. *Transmission Fluid Filtration.* Fluid filtration is provided by two filter systems. A suction filter, located in the sump, provides general protection to the entire hydraulic system by filtering large particulates. A spin-on filter provides full-time protection for the control solenoids and multipass protection for the entire system. The spin-on filter is externally located on the converter housing at the lower left front of the transmission.

### 7. *Electronic Controls*

- A microcomputer provides electronically-controlled automatic gear selection and automatic engagement of the torque converter clutch. The microcomputer is an independent controller and is referred to as a Transmission Control Module, or TCM.
- The electronic control system uses adaptive logic to provide optimum shift quality. Driving efficiency is improved by shifting at the exact programmed transmission shift point for every engine/transmission/vehicle combination. The electronic controls can be customized for four-speed or five-speed operation to meet vocational requirements.

8. *Remote Oil Cooler.* Ports for remote-mount oil cooler lines are located on the bottom surface of the converter housing near the converter housing/main housing splitline or on the right side of the direct-mount converter housing. Remote oil-to-water coolers require plumbing for transmission fluid and engine-cooling water. Remote oil-to-air coolers may also be used and only transmission fluid lines need to be provided. Heat is transferred from the transmission fluid to either water or air depending upon the cooler type used.

9. *Oil Fill Tube/Dipstick Provisions.* All 1000 and 2000 Product Families models have a fill tube/

dipstick provision on both sides of the transmission. The fill tube and dipstick are OEM-installed and adapted as specified by the vehicle manufacturer. A plug is installed in the unused location.

### 10. *Parking Pawl/Parking Brake*

- All 1000 models, 2200 models, 1000 Series™, and 2400 Series™ transmissions have a park pawl. The internal parking pawl is engaged by selection of the **P** (Park) position on the shift selector. The parking pawl is not available on 2100 and 2500 models and 2000 Series™ models.
- Some 1000 and 2000 Product Families models are available with an optional rear cover that accommodates an OEM-installed two-shoe, expanding-type drum brake. All parking brake controls and linkages are OEM-supplied.

11. *Power Takeoff.* 1000 and 2000 Product Families transmissions, except Highway Series and Pupil Transport/Shuttle Series, and all 1000/2000/2400 Series transmissions have a provision to drive a power takeoff (PTO) unit mounted on the left and/or right side of the transmission housing. The optional PTO drive gear is driven by the transmission torque converter turbine, with speed and torque reflecting engine input and the characteristics of the torque converter. PTO units and associated controls are provided by the vehicle manufacturer and/or body builder.

12. *Output Yokes/Flanges.* A variety of output yokes or flanges are available to meet vehicle driveline requirements. Yokes or flanges are OEM-installed and are adapted as specified by the vehicle manufacturer.

### **WARNING!**

**Operation with excessive loads can cause transmission damage and unexpected vehicle movement. To help avoid injury, property damage, and/or transmission damage, do not exceed 11 800 kg (26,000 lbs) GCW or the OEM vehicle rating, whichever is less.**

## GENERAL INFORMATION

**b. General Description.** Several transmission configurations are available within the 1000 and 2000 Product Families.

1000*	Heavy-duty automatic transmission with parking pawl Maximum GVW 19,850 lb Maximum GCW 26,000 lb
2000 2100 2500*	Heavy-duty automatic transmission without parking pawl Maximum GVW 30,000 lb Maximum GCW 30,000 lb
2100 MH 2500 MH*	Heavy-duty automatic transmission without parking pawl Limited release in motorhome applications only Maximum GVW 28,000 lb Maximum GCW 28,000 lb
1000 MH 2200 MH*	Heavy-duty automatic transmission with parking pawl Limited release in motorhome applications only Maximum GVW 28,000 lb Maximum GCW 28,000 lb
2200 2400*	Heavy-duty automatic transmission with parking pawl Maximum GVW 26,000 lb Maximum GCW 26,000 lb

\* GVW rating, GCW rating, or OEM axle rating, whichever is less.

### 1-5. DIAGNOSIS

**NOTE:**

Refer to the TS3192EN, 1000 and 2000 Product Families Troubleshooting Manual, for in-depth troubleshooting procedures.

**a. Before Starting.** Before attempting to repair the transmission, identify the faulty condition and its probable cause.

**b. CHECK TRANS Light**

1. The **CHECK TRANS** light is original equipment manufacturer (OEM)-supplied and usually located on the vehicle's instrument panel.
2. The **CHECK TRANS** light is illuminated briefly during vehicle start-up as a bulb check.

**NOTE:**

The **CHECK ENGINE** light may serve the **CHECK TRANS** function for vehicles which are compliant to industry On Board Diagnostics II (OBD-II) requirements.

3. When the **CHECK TRANS** light is "ON", shifts may be restricted by the Transmission Control Module (TCM) as follows:

**WARNING!**

If ignition is turned "OFF" and then "ON" while the **CHECK TRANS** light is displayed, the transmission may remain in neutral until the code is cleared. Leave ignition "ON" until you are in a safe place to stop.

- When the TCM senses abnormal conditions.
- The transmission may be locked in the range it was in when the problem was detected.
- The transmission may continue to operate with inhibited shifting.
- The TCM may not respond to shift selector requests.
- Direction changes and shifts from neutral-to-range may not occur.
- Whenever the **CHECK TRANS** light is displayed, the TCM logs a diagnostic code in memory. These diagnostic codes can be accessed through the PC-based Allison DOC™ diagnostic systems.

**NOTE:**

Diagnostic codes can be logged without illuminating the **CHECK TRANS** light. This occurs when the TCM senses a problem, but determines the problem won't cause immediate transmission damage or dangerous performance.

**c. Range Inhibit Indicator**

1. Some conditions detected by the TCM cause the transmission to be locked in one range. When this occurs, the torque converter clutch is automatically disengaged. Shifts out of N (Neutral) may be inhibited.

2. At the same time these events occur, a required OEM-supplied **RANGE INHIBITED** light, mounted on the dash or near the shift selector, is illuminated. This notifies the driver that shifting is inhibited and the shift selector may not respond to shifts requested.

**d. Allison DOC™ Personal Computer (PC)-Based Diagnostic System.** Allison Diagnostic Optimized Connection™ (Allison DOC™) provides tabular, graphical, and chart displays of real-time and recorded TCM data. A Help system is incorporated into the Allison DOC™ software. Allison Diagnostic Optimized Connection™ (Allison DOC™) software and interface devices are available through Allison Transmission tool sources.

1. A PC serves as the receiver/transmitter/display medium that allows the service technician to communicate with the TCM. Typical troubleshooting activities performed are installation checkout and diagnostic trouble code (DTC) retrieval.
2. The Allison DOC™ Help system contains information for performing the following:
  - Display (retrieve) DTCs. Transmission diagnostic codes begin with P0, P1, U1, or U2 followed immediately by three additional numbers. For a complete list of codes and more detailed information, refer to 1000 and 2000 Product Families Electronic Troubleshooting Manual TS3192EN.
  - Clear diagnostic codes
  - Obtain transmission data such as input speed or sump fluid temperature
  - A solenoid test
  - Clutch diagnostics (including torque converter clutch)

**e. Troubleshooting When No Diagnostic Codes Are Present**

- Always start with the basics:
  - Make sure the shifter is in the appropriate range.
  - Check the fluid level.
  - Make sure batteries are properly connected and charged.

- Make sure throttle is closed and engine speed is below 900 rpm.
- Make sure electrical connections are properly made.
- Check support equipment for proper installation and operation.
- If the shifting process is rough, give the shifts time to adapt to “converged” state before assuming there is a problem.
- Refer to Section 7 “General Troubleshooting of Performance Complaints” in the 1000 and 2000 Product Families Troubleshooting Manual TS3192EN.
  - These troubleshooting charts list a variety of conditions that may or may not relate to the TCM.
  - Some conditions and suggested checks include mechanical and hydraulic items.
- If the troubleshooting charts refer you to a TCM check, use the diagnostic code troubleshooting information that best applies to the situation.

**f. Troubleshooting Intermittent Diagnostic Codes.** Intermittent codes are a result of conditions which are not always present.

1. When conditions causing the code exist, the code is logged in memory. The code stays in memory until it is manually cleared or cycled out by forty code-free warm-up cycles.
2. When intermittently occurring codes exist, check for the following items:
  - Dirty, damaged or corroded harness connectors and terminals
  - Terminals not fully seated in connectors
  - Damaged harnesses (due to poor routing, chafing, excessive heat, tight bends, etc.)
  - Improperly mounted electronic control components
  - Poor connector seals (where applicable)
  - Exposed harness wires
  - EMI generating components and accessories
  - Loose ground connections

## GENERAL INFORMATION

3. To help locate intermittents, it sometimes helps to place the appropriate tester on the suspect component or circuit and simulate operating conditions—wiggle, pull, bump, and bend while watching the tester.

### 1–6. PRESERVATION AND STORAGE

**a. Storage (New Transmissions, Before Installation).** New transmissions are filled with transmission fluid and drained before shipment. The residual fluid in the transmission provides adequate protection to safely store the transmission without further treatment for one full year if stored indoors, in conditions of normal climate, and with all shipping plugs installed.

**b. Preservation Methods.** When the transmission is stored or inactive for an extended period (one or more years), specific preservation methods are required to prevent damage from rust, corrosion, and organic growth in the transmission fluid. Preservation methods described are for storage with or without transmission fluid. The methods are the same whether a transmission is in or out of a vehicle.

#### **c. One Year Storage (Without Fluid)**

1. Drain the fluid.
2. Remove the vent assembly per Paragraph 5–11f.
3. Spray 30 ml (one ounce) of VCI #10 (or equivalent) into the transmission through the vent assembly hole. Also, spray 30 ml (one ounce) through the fill tube hole.
4. Install the vent assembly per Paragraph 5–11f.
5. Seal all openings and the vent assembly with moisture-proof tape.
6. Coat all exposed, unpainted surfaces with preservative grease such as petrolatum (MIL-C-11796, Class 2).
7. If additional storage time is required, do the following at yearly intervals.
  - Wash all external grease from the transmission with mineral spirits.
  - Remove all tape from openings and the vent assembly.
  - Repeat Steps (2) through (6).

#### **d. One Year Storage (With Fluid)**

1. Drain the fluid and replace the oil filter elements.
2. Fill the transmission to operating level with a mixture of one part VCI #10 (or equivalent) to 30 parts TranSynd™ or DEXRON®-III transmission fluid. Add 3 ml of Biobor® JF (or equivalent) for every 10 liters (¼ teaspoon per gallon) of fluid in the system.

#### **NOTE:**

**When calculating the amount of Biobor® JF required, use the total volume of the system, not just the quantity required to fill the transmission. Include external lines, filters, and the cooler.**

3. Operate the transmission for approximately five minutes at 1500 rpm with the transmission in neutral.
4. Make sure the transmission shifts through all ranges and that the lockup clutch is also activated.
5. Continue operating the transmission in neutral at 1500 rpm until normal operating temperature is reached.

#### **CAUTION:**

**If the unit does not have a converter-out temperature gauge, do not stall the converter.**

6. If normal operating temperature is less than 107°C (225°F), shift the transmission to forward range and stall the converter. Do not exceed 107°C (225°F).
7. As soon as the transmission is cool enough to touch, seal all openings and the vent assembly with moisture-proof tape.
8. Coat all exposed, unpainted surfaces with preservative grease such as petrolatum (MIL-C-11796, Class 2).
9. If additional storage time is required, repeat Steps 2 through 8 at yearly intervals, except, it is not necessary to drain the transmission each year. Just add VCI #10 and Biobor® JF (or equivalents).

## 1-7. RESTORING TRANSMISSION TO SERVICE

**a. Transmission Exterior.** Wash all external grease from the transmission with mineral spirits.

**b. Sealed Vent Assembly and Openings.** Remove all tape from openings and the vent assembly.

**c. New Transmissions.** If the transmission is new, drain the residual preservative oil. Refill the transmission to the proper level with TranSynd™ or DEXRON®-III transmission fluid.

**d. Stored Without Fluid.** If the transmission was prepared for storage without fluid, drain the residual fluid and replace the oil filter elements. Refill the transmission to the proper level with TranSynd™ or DEXRON®-III transmission fluid.

### CAUTION:

**When a transmission has been stored, the TCM must be reset to unadapted shifts. Resetting to unadapted shifts erases previous shift adaptations and allows the transmission to begin using Fast Adaptive mode to regain adapted shifts. Use Allison DOC™ to reset to unadapted shifts.**

**e. Stored With Fluid.** If the transmission was prepared for storage with fluid, it is not necessary to drain

and refill the transmission with new transmission fluid. Check for proper fluid level. Add or drain transmission fluid, as required, to obtain the proper level.

## 1-8. OPERATING INSTRUCTIONS

### WARNING!

**Operation with excessive loads can cause transmission damage and unexpected vehicle movement. To help avoid injury, property damage, and/or transmission damage, do not exceed 11 800 kg (26,000 lbs) GCW or the OEM vehicle rating, whichever is less.**

Detailed transmission operation information is in the 1000 and 2000 Product Families Principles of Operation Manual, PO3065EN, or the 1000 and 2000 Product Families operator's manuals. Refer to the latest edition.

## 1-9. SPECIFICATIONS AND DATA

The following specifications and data provide a quick reference to the major characteristics of the transmission. More detailed information may be obtained from Tech Data Book SA3018EN.

## GENERAL INFORMATION

**Table 1-1. Specifications and Data Chart for 1000 and 2000 Product Families**

	Max Net Input Torque Without SEM		Max Net Input Torque With SEM		Max Net Input Power		Max Turbine Torque		Full Load Governed Speed (Min-Max)	Max GVW		Max GCW		Max Output Shaft Speed rpm
	N·m	lb ft	N·m	lb ft	kW	hp	N·m	lb ft		kg	lbs	kg	lbs	
1000 HS	746	550	766	565	254	340	1152	850	2200-4600	8845	19,000	11 800	26,000	5000
1000 RDS	746	550	766	565	254	340	1152	850	2200-4600	8845	19,000	11 800	26,000	5000
1000 PTS	746	550	766	565	254	340	1152	850	2200-4600	8845	19,000	11 800	26,000	5000
1000 EVS	746	550	766	565	254	340	1152	850	2200-4600	8845	19,000	11 800	26,000	5000
1000 MH	746	550	766	565	254	340	1152	850	2200-4600	10 000	22,000	11 800	26,000	5000
1000 SP	746	550	N/A	N/A	254	340	1152	850	2200-4600	10 000	22,000	11 800	26,000	5000
B 210	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	N/A	N/A	5000
2000 MH	N/A	N/A	813	600	224	300	1152	850	2200-4600	12 700	28,000	12 700	28,000	4500
2100 HS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2100 RDS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2100 PTS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2100 EVS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2100 MH	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2100 SP	740	545	N/A	N/A	224	300	1150	850	2200-4600	12,000	26,500	13 600	30,000	4500
2200 HS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2200 RDS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2200 PTS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500

## GENERAL INFORMATION

**Table 1-1. Specifications and Data Chart for 1000 and 2000 Product Families (cont'd)**

	Max Net Input Torque Without SEM		Max Net Input Torque With SEM		Max Net Input Power		Max Turbine Torque		Full Load Governed Speed (Min-Max)	Max GVW		Max GCW		Max Output Shaft Speed
	N·m	lb ft	N·m	lb ft	kW	hp	N·m	lb ft		kg	lbs	kg	lbs	
2200 EVS	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2200 MH	746	550	766	565	254	340	1152	850	2200-4600	11 800	26,000	11 800	26,000	4500
2200 SP	740	545	N/A	N/A	224	300	1150	850	2200-4600	11 800	26,000	11 800	26,000	4500
B 220	576	425	630	465	149	200	1017	750	2200-4600	11 800	26,000	N/A	N/A	4500
2500 HS	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
2500 RDS	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
Refuse	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
2500 PTS	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
2500 EVS	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
2500 MH	746	550	766	565	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500
2500 SP	740	545	N/A	N/A	224	300	1152	850	2200-4600	15 000	33,000	15 000	33,000	4500



## GENERAL INFORMATION

**Table 1–1. Specifications And Data Chart\***

**INPUT/OUTPUT RATINGS (1000 Models):**

<b>Input Speed**</b>	<b>General***</b>	<b>Refuse (On-Highway)</b>	<b>Motorhome</b>	<b>Transit Bus</b>
Max Full Load Gov. Speed	4600 rpm	4600 rpm	4600 rpm	4600 rpm
Min Full Load Gov. Speed	2200 rpm	2200 rpm	2200 rpm	2200 rpm
Max Idle Speed in Drive	900 rpm	900 rpm	900 rpm	900 rpm
Min Idle Speed in Drive	500 rpm	500 rpm	500 rpm	500 rpm
<b>Input Power</b>				
Maximum Net	254 kW (340 hp)	254 kW (340 hp)	254 kW (340 hp)	134 kW (180 hp)
<b>Input Torque</b>				
Maximum Net	705 N·m (520 lb ft)	705 N·m (520 lb ft)	705 N·m (520 lb ft)	603 N·m (445 lb ft)
<b>Turbine Torque</b>				
Maximum Net	1152 N·m (850 lb ft)	1152 N·m (850 lb ft)	1152 N·m (850 lb ft)	1017 N·m (750 lb ft)
<b>Output Shaft Speed</b>				
Maximum Speed	5000 rpm	5000 rpm	5000 rpm	5000 rpm
<b>Other</b>				
Gross Vehicle Weight (GVW)	9000 kg (19,850 lbs)	7500 kg (16,540 lbs)	9980 kg (22,000 lbs)	7500 kg (16,540 lbs)
Gross Combined Weight (GCW)	11 800 kg (26,000 lbs)	N/A	11 800 kg (26,000 lbs)	N/A
<b>Min Vehicle N/V Ratio</b>				
Output rpm/kmph (Output rpm/mph)	24 (38)	24 (38)	24 (38)	24 (38)
<b>Max Vehicle N/V Ratio</b>				
Output rpm/kmph (Output rpm/mph)	38 (62)	38 (62)	38 (62)	38 (62)
Max Angular Rotation of Output Shaft After Static Apply of Park Provision	18.5 Degrees	18.5 Degrees	18.5 Degrees	18.5 Degrees

\* All data and specifications are subject to change without notice.

\*\* Engines with full load governed speed greater than 3800 rpm require Shift Energy Management (SEM) and additional calibration development.

\*\*\* Includes truck, school buses, one-way rental trucks, and road sweepers.

**NOTE:** Values with English units shown in parentheses ( ) are for reference purposes only. Conversions between Metric and English units are not necessarily equivalent.

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