# ALL WHEEL DRIVE

## GENERAL

### 1. SPECIFICATIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Time T/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length</td>
<td>271 mm</td>
</tr>
<tr>
<td>Mating surface of front flange</td>
<td>11.9 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>27.1 Kg (with oil)</td>
</tr>
<tr>
<td>Oil capacity and Service Interval</td>
<td>1.1 L (Inspect at every 10,000 km, Change at every 60,000 km)</td>
</tr>
<tr>
<td>Oil specification</td>
<td>ATF DEXRON III</td>
</tr>
<tr>
<td>Distribution ratio of driving force</td>
<td>40 (Front) : 60 (Rear)</td>
</tr>
<tr>
<td>Bolt</td>
<td>11EA, M8 x 1.25</td>
</tr>
</tbody>
</table>
1. OVERVIEW

The AWD transfer case is installed to the full time 4WD vehicle. Unlike the TOD (Torque On Demand) transfer case, it delivers the driving force to the front wheels through the internal planetary gears without a control unit to operate AWD function. It also doesn't have the TC (Transfer Case) shift motor and 4WD transfer switch. Since it doesn't have a control unit such as TCCU (Transfer Case Control Unit), it delivers the driving force to the front and rear propeller shafts according to the gear ratio based on the gear combinations. The distribution ratio of driving force is 40:60 (front wheels:rear wheels).
2. LOCATION

Distribution of Driving Force in AWD

AWD transfer case keeps the vehicle operating the full time 4WD function and distributes the driving force to front wheels and rear wheels in the ratio of 40:60.
3. STRUCTURE

1) Sectional View
2) EXPLODED VIEW

1. Oil seal
2. Case assembly
3. Input shaft
4. Sprocket
5. Front sun gear
6. Differential carrier assembly
7. Thrust washer
8. Rear sun gear
9. Snap ring
10. Cover assembly
11. Oil seal
12. Rear output shaft assembly
13. Air breather
14. Front output shaft assembly
15. Oil seal
16. Retaining ring
17. Driven sprocket
18. Chain
19. Clip
20. Bolt
21. Plug
4. POWER FLOW

Distribution of Front Output Torque

\[ \left( \frac{\text{Front sun gear (40T)}}{\text{Step pinion (19T)}} \right) + \left( \frac{\text{Rear sun gear (40T)}}{\text{Pinion (16T)}} \times \frac{\text{Pinion (16T)}}{\text{Step pinion (13T)}} \right) = 0.40625 \]

Distribution of Rear Output Torque

\[ \left( \frac{\text{Rear sun gear (40T)}}{\text{Pinion (16T)}} \right) \times \left( \frac{\text{Pinion (16T)}}{\text{Step pinion (13T)}} \right) \times \left( \frac{\text{Front sun gear (40T)}}{\text{Step pinion (19T)}} \right) + \left( \frac{\text{Rear sun gear (40T)}}{\text{Pinion (16T)}} \times \frac{\text{Pinion (16T)}}{\text{Step pinion (13T)}} \right) = 0.59375 \]
5. OPERATION OF DIFFERENTIAL

1) Systematic Diagram

![Systematic Diagram]

2) Revolution Control

When there is a revolution difference due to the gap of turning radius while cornering, the tight corner braking symptom occurs in part time transfer case. However, for the AWD, this gap of turning radius is compensated by the differential so that the tight corner braking symptom will not occur. The ESP also operates the wheel slip under control in order to keep the vehicle stable under severe conditions such as icy road.

![Revolution Control Diagram]
If there is no revolution difference in front and rear shafts, the step pinion (19T/13T) and the pinion (16T) are fixed (integrated to the carrier) even when the carrier rotates. It makes the front sun gear and the rear sun gear move toward the moving direction with the torque ratio of 40:60.

The front wheels should rotate faster than the rear wheels while cornering (including wheel slip) since the front wheels' turning radius is larger than the rear wheels'. At this moment, the step pinion (19T/13T) should rotate faster than the pinion (13T) in relation to the carrier's movement. This function is similar to the regular differential function, which also compensates the revolution difference while maintaining the torque ratio in 40:60 (front:rear).