The Aisin Group developed the world's first front wheel drive 8-speed transverse mounted automatic transmission called the AWF8F35. This transmission is currently being used in BMW, GM, Toyota/Lexus and Volvo applications. Each manufacturer using this transmission will assign its own designation. BMW calls it the GA8F22AW transmission. GM refers to it as their 8F45. Toyota/Lexus calls it their U880F transmission, while Volvo refers to this transmission as their TG-81SC replacing the TF-80SC.

**BMW:**
- 2015 BMW 2 Series Active Tourer (F45) and Gran Tourer (F46)
- 2016 BMW X1 (F48)
- 2016 Mini Clubman (F54) with 4-cylinder engines

**GM:**
- 2016 Chevrolet Malibu

**TOYOTA/LEXUS:**
- 2013 Lexus RX50 F Sport

**VOLVO:**
- 2014–2016 Volvo S80 II
- 2014–2016 Volvo V70 III
- 2015–present Volvo S60 II
- 2015–present Volvo V60

**GEAR RATIOS:**

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### THE WORLD'S FIRST FWD 8 SPEED TRANSMISSION

**AWF8F35-GA8F22AW-8F45-U880F-TG-81SC**

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<th>C3 Clutch</th>
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**Figure 2**

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Solenoid and TFT Specifications:

The S1 and S2 Solenoids are normally closed solenoids blocking pressure to their respective circuits. These two solenoids measure 11 to 15 ohms at 68°F.

The SL1, SL2, SL3, SL4, SL5 and the SLU solenoids are normally vented solenoids venting pressure in their respective circuits. These solenoids measure 5.0 to 5.6 ohms at 68°F.

The SLT solenoid is a normally applied solenoid supplying pressure to its respective circuit. This solenoid measure 5.0 to 5.6 ohms at 68°F.

Basic TFT resistance range will be 5 to 8K at 50°F and 0.22 to 0.28K at 230°F.
THE WORLD'S FIRST FWD 8 SPEED TRANSMISSION
AWF8F35-GA8F22AW-8F45-U880F-TG-81SC

Upgrader Body Valve Location

See legend in figure 6

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Figure 4
THE WORLD'S FIRST FWD 8 SPEED TRANSMISSION
AWF8F35-GA8F22AW-8F45-U880F-TG-81SC

MIDDLE VALVE BODY VALVE LOCATION

Figure 5

See legend in figure 6
### Valve and Spring Legend

1. B1 Brake (Band) Accumulator
2. B1 Brake Accumulator Outer Spring - 1.107”x.438”x.068”x8c
3. B1 Brake Accumulator Inner Spring - 1.137”x.308”x.045”x13c
4. Retainer
5. C4 Clutch Accumulator
6. C4 Clutch Accumulator Outer Spring - 1.107”x.438”x.068”x8c
7. C4 Clutch Accumulator Inner Spring - 1.137”x.308”x.045”x13c
8. Pilot Valve (Regulated pressure supply to the SLT, SLU, S1 and S2 solenoids)
9. Pilot Valve Spring - .985”x.337”x.045”x10c
10. Bore Plug
11. N-D Accumulator
12. N-D Accumulator Spring - 2.212”x.618”x.062”x11c
13. C2 Clutch Accumulator Inner Spring - 1.137”x.308”x.045”x13c
14. C2 Clutch Accumulator Outer Spring - 1.107”x.438”x.068”x8c
15. C2 Clutch Accumulator
16. Shift Solenoid 2 Relay Valve Spring - 1.403”x.324”x.025”x12c
17. Shift Solenoid 2 Relay Valve
18. Shift Solenoid 1 Shift Valve 1 Spring - 1.142”x.234”x.021”x.15c
19. Shift Solenoid 1 Shift Valve 1
20. C3 Clutch Accumulator Inner Spring - 1.137”x.308”x.045”x13c
21. C3 Clutch Accumulator Outer Spring - 1.107”x.438”x.068”x8c
22. C3 Clutch Accumulator
23. SLT Damper Valve Spring - .862”x.350”x.045”x9c
24. SLT Damper Valve
25. Lock-Up Control Valve
26. Lock-Up Control Regulating Valve
27. Lock-Up Control Valve Spring - .822”x.215”x.026”x12c
28. Lock-Up Control Valve Sleeve
29. Torque Converter Clutch Switch Valve
30. Torque Converter Clutch Switch Valve Spring - 1.420”x.385”x.023”x.16c
31. C2 Clutch Valve
32. C2 Clutch Valve Spring - .992”x.308”x.021”x10c
33. Clutch Relay Valve Spring - .718”x.210”x.020”x9c
34. Clutch Relay Valve
35. Torque Converter and Cooler Regulator Valve
36. Torque Converter and Cooler Regulator Valve Spring - 1.493”x.391”x.046”x13c
37. Pressure Regulator Valve
38. Pressure Regulator Valve Spring - 1.192”x.559”x.050”x6c
39. Shift Solenoid 1 Shift Valve 2 (B2-C3 Relay Valve)
40. Shift Solenoid 1 Shift Valve 2 (B2-C3 Relay Valve) Spring - 1.134”x.236”x.021”x15c
41. B2 Brake Valve (Low/Reverse Brake)
42. B2 Brake Valve (Low/Reverse Brake) Spring - 1.435”x.325”x.025”x12c
43. C1 Clutch Accumulator Inner Spring - 1.137”x.308”x.045”x13c
44. C1 Clutch Accumulator Outer Spring - 1.107”x.438”x.068”x8c
45. C1 Clutch Accumulator
46. Manual Valve - Not shown (Located in the solenoid outer valve body housing)

**Note:** Valve names have been identified by their generic function and are subject to a future change expressing their more specific function.

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**Figure 6**

**Automatic Transmission Service Group**

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1. Cooler By-Pass Check Valve  
2. Cooler By-Pass Check Valve Spring - .622"x.248"x.035"x8 coils  
3. To Cooler Check Valve  
4. Cooler Check Valve - .600"x.246"x.022"x12c  
5. SL2 Solenoid Back Pressure Relief Valve  
6. SL2 Solenoid Back Pressure Relief Valve Spring - .600"x.246"x.022"x12c
1. SL3 Solenoid Back Pressure Relief Valve
2. SL3 Solenoid Back Pressure Relief Valve Spring - .600"x.246"x.022"x12c
3. SL5 Solenoid Circuit Pre-Fill Check Valve
4. SL5 Solenoid Back Pressure Relief Valve
5. SL5 Solenoid Back Pressure Relief Valve Spring - .600"x.246"x.022"x12c
6. SL4 Solenoid Back Pressure Relief Valve
7. SL4 Solenoid Back Pressure Relief Valve Spring - .600"x.246"x.022"x12c
8. Filter - Filters line pressure to the Pilot Valve and the Clutch Relay Valve
9. SL1 Solenoid Back Pressure Relief Valve
10. SL1 Solenoid Back Pressure Relief Valve Spring - .600"x.246"x.022"x12c
12. Reverse Engagement Check Valve
13. Reverse Engagement Check Valve Spring - .600"x.246"x.022"x12c
14. Line Pressure Relief Valve
15. Line Pressure Relief Valve Spring - .438"x.369"x.050"x4c
16. Manual Valve Check Valve
17. N-D Pre-Fill Check Valve
TCC Apply 1
TCC Release
TCC Apply 2
Front Lube
C1 Clutch
C3 Clutch
Pump Out
C4 Clutch
Pump In
To Cooler
B1 Brake
Cooler Return
To Tap for B1 Brake Pressure

Un-tapped Line Passage
C2 Clutch
B2 Brake (L/R Brake)
Rear Lube