



VW/AUDI/PORSCHE 09D

TORQUE CONVERTER AND VALVE BODY DIFFERENCES

There are two different types of torque converters used in the "09D" transmission that changes some of the internal parts. One is a "2 Port" design and the other is a "3 Port" design, and refers to the number of fluid passages in the Torque Converter. This difference required changes in the Pump, Turbine Shaft and Valve body. Refer to the Figures below as each difference is identified.

- *Refer to Figures 1 and 2 to see the differences between the 2 Port and 3 Port Torque Converters and a description of their function.*
- *Refer to Figure 3 to see the differences between the Pump body and Pump cover and how to Identify the 2 Port and 3 Port types.*
- *Refer to Figure 4 to see the differences between the turbine shaft and how to Identify the 2 Port and 3 Port types.*
- *Refer to Figure 5 to see the Early Lower Valve Body Breakdown for both the 2 Port and 3 Port Torque Converters and note that they are the same casting number 8860 1 as shown.*
- *Refer to Figure 6 to see the Early Lower Valve Body Breakdown Legend and spring specifications.*
- *Refer to Figure 7 to see the Early Lower Valve Body Small parts.*
- *Refer to Figure 8 to see the Early Upper Valve Body Breakdown. Note: Solenoid Modulating Valves A and B are known for bore wear out, can cause downshift clunk hot and/or a falling out of 5th or 6th. (Items 725 and 733)*
- *Refer to Figure 9 to see the Early Upper Valve Body Breakdown Legend.*
- *Refer to Figure 10 to see the Early Upper Valve Body Small parts.*
- *Refer to Figure 11 to see the Early Upper Valve Body spring specifications.*
- *Refer to Figure 12 to see the Early Valve Body spacer plate differences between the 2 Port and 3 Port design, and how to identify them. This is where the main difference is between the two Torque Converters.*
- *Refer to Figure 13 to see the Early Upper Valve Body 2 Port TCC Apply circuit diagram.*
- *Refer to Figure 14 to see the Early Upper Valve Body 3 Port TCC Apply circuit diagram.*

TORQUE CONVERTER DIFFERENCES

TCC "2 PORT" HYDRAULIC OPERATION

The "2 Port" Torque Converter functions like the traditional lock-up converter and has a single floating clutch plate.

The illustration below shows how the clutch and damper are riveted to the converter turbine. Converter fill fluid is fed into the release circuit from the TCC valve in the valve body through the center of the turbine shaft where it is routed between the converter cover and pressure plate. This fluid pressure keeps the converter clutch released and fills the converter. When the clutch is commanded on, fill fluid (release oil) is exhausted at the TCC apply valve and converter pressure applies the clutch against the converter cover.

Note: The Oil Pump, Turbine Shaft and Spacer Plate are unique to the 2 Port Converter.

TCC "3 PORT" HYDRAULIC OPERATION

The "3 Port" Torque Converter is uniquely constructed in that the converter clutch apply circuit is independent to the converter in and out fluid. The converter may also contain either 1 or 2 friction plates depending on engine size.

The illustration below shows how the converter clutch apply piston contours to the flywheel side of the torque converter cover. The friction plates lug to a hub splined to the turbine shaft while the steel plates lug to the converter cover. When the clutch is commanded on, apply fluid is fed through the center of the turbine shaft and fills the area between the converter cover and piston. The piston applies the friction plates to the steel plates locking the turbine shaft to the cover.

Converter fill is fed into the converter between the converter hub that drives the pump gears and the stator shaft. The fluid's return path is between the stator shaft and turbine shaft.

Note: The Oil Pump, Turbine Shaft and Spacer Plate are unique to the 3 Port Converter.

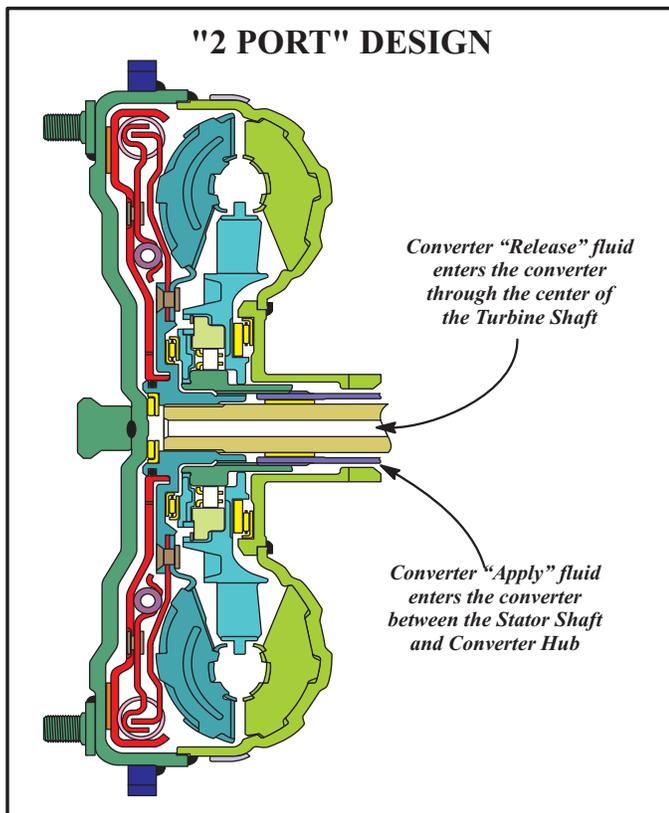


Figure 1

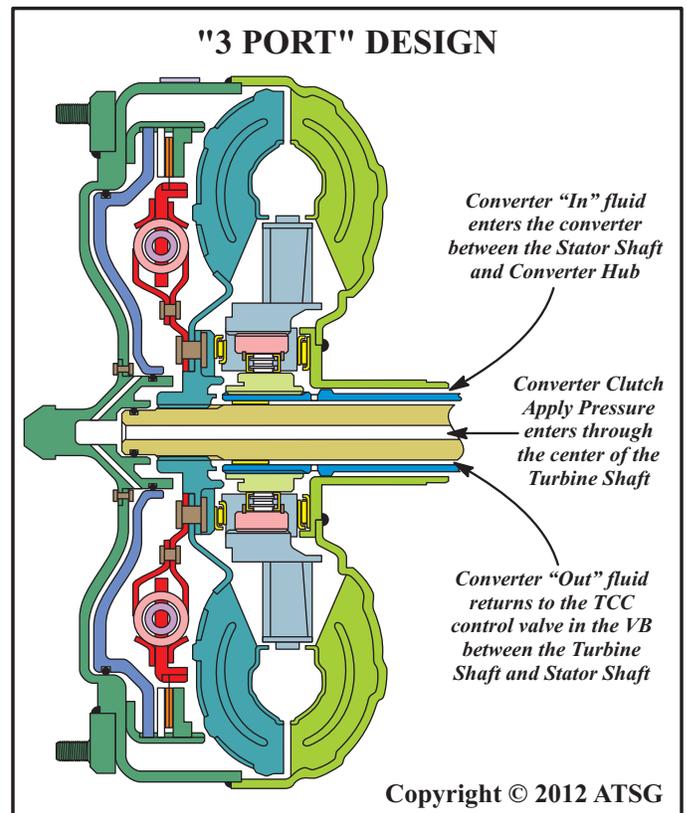


Figure 2

OIL PUMP ASSEMBLY AND TURBINE SHAFT DIFFERENCES

Oil Pump Body

The oil pump body for the 2-port converter is equipped with a caged needle bearing to support the torque converter hub and is retained with a snap ring, as shown in Figure 3. The 3-port design is equipped with the traditional bushing, and is also shown in Figure 3. Notice also that the bore diameters are different between the two.

The easiest means of visual identification is caged needle bearing, or bushing.

Note: The oil pump bodies will not interchange.

Oil Pump Cover (Stator)

The passages in the oil pump cover (stator) are different between the 2-Port version and the 3-Port version. The oil pump cover for the 2-port converter is equipped with a much shorter stator shaft than the 3-port design and has a smaller diameter spline area on the stator shaft splines, as shown in Figure 3. Notice also the holes below the spline area on the 3-port design stator shaft, which is the easiest means of visual identification.

Note: The oil pump covers will not interchange.

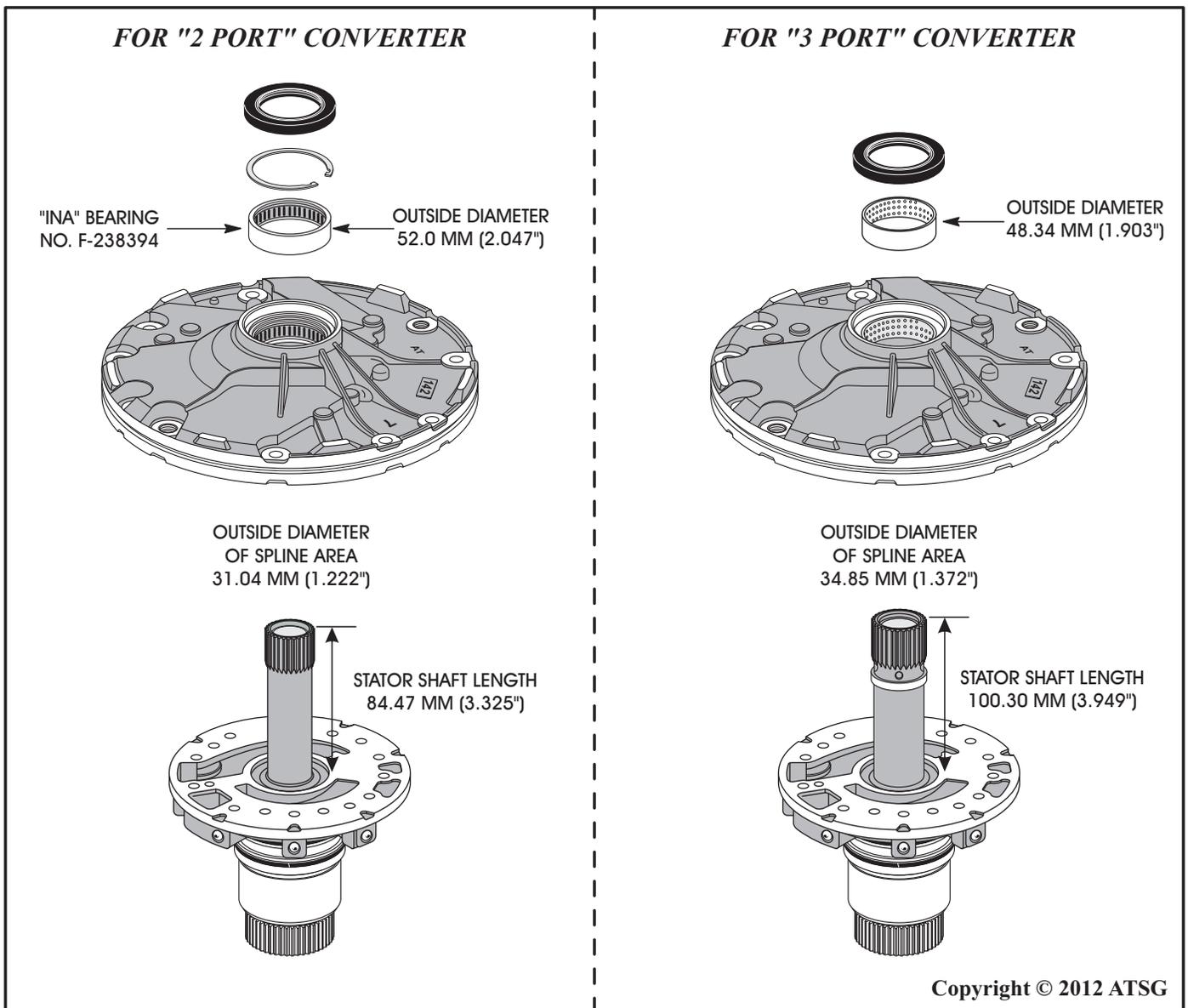


Figure 3

OIL PUMP ASSEMBLY AND TURBINE SHAFT DIFFERENCES

Turbine Shaft

There are many dimensional differences in length and diameters between the two turbine shafts, as shown in Figure 4. The easiest means of visual identification is the "2-port" design turbine shaft is equipped with 3 sealing rings with no "O" ring on pilot, and the "3-port" design turbine shaft is equipped with 4 sealing rings and an "O" ring on the pilot, as shown in Figure 4.

Note: Turbine shafts will not interchange.

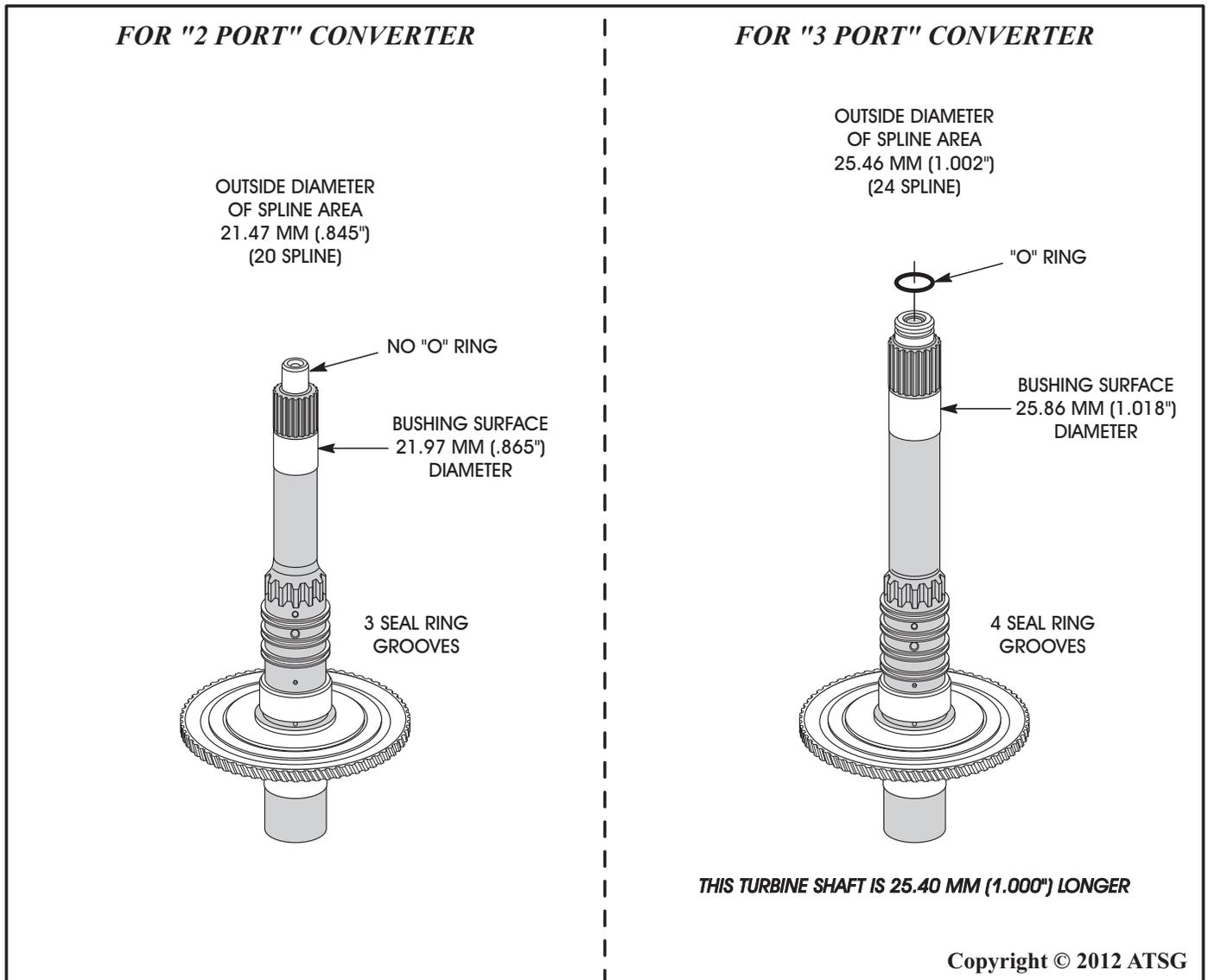


Figure 4

VW/AUDI/PORSCHE 09D TORQUE CONVERTER AND VALVE BODY DIFFERENCES

EARLY CASTING 8860 1 "09D" LOWER VALVE BODY, EXPLODED VIEW

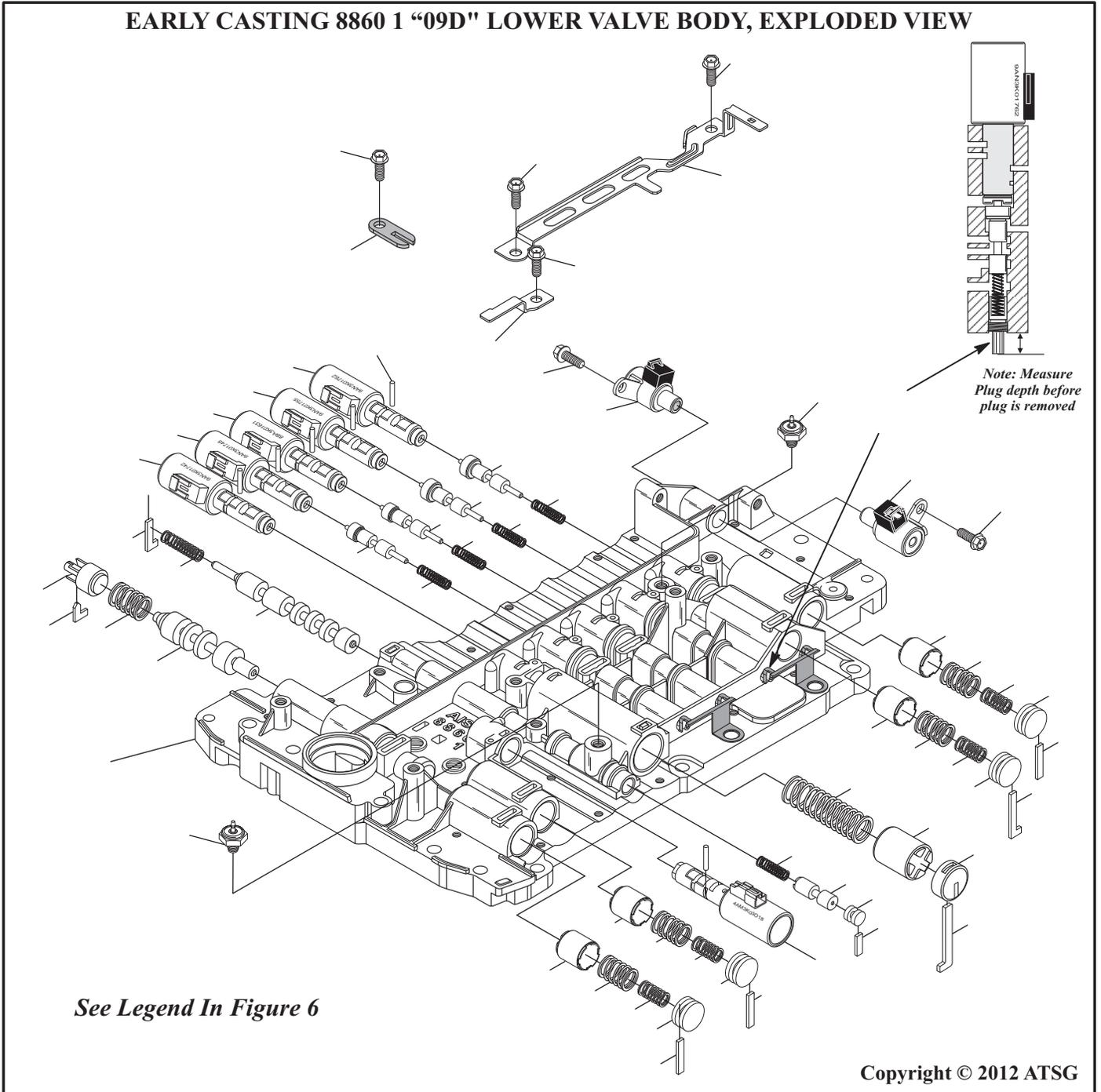


Figure 5



VW/AUDI/PORSCHE 09D

TORQUE CONVERTER AND VALVE BODY DIFFERENCES

LOWER VALVE BODY LEGEND

- 600 LOWER VALVE BODY CASTING.
- 601 SECONDARY PRESSURE REGULATOR VALVE.
- 602 SECONDARY PRESSURE REGULATOR VALVE SPRING (RED).
- 603 SECONDARY PRESSURE REGULATOR VALVE ADJUSTMENT PLUG.
- 604 SECONDARY PRESSURE REGULATOR VALVE ADJUSTMENT RETAINER.
- 605 NUMBER 1 RELAY VALVE.
- 606 NUMBER 1 RELAY VALVE SPRING (NONE).
- 607 NUMBER 1 RELAY VALVE RETAINER.
- 608 N93 PWM LINE PRESSURE CONTROL SOLENOID.
- 609 N92 PWM K1 CLUTCH CONTROL SOLENOID.
- 610 N90 PWM K3 CLUTCH CONTROL SOLENOID.
- 611 N283 PWM B1 CLUTCH CONTROL SOLENOID.
- 612 N282 PWM K2 CLUTCH CONTROL SOLENOID.
- 613 PWM SOLENOID RETAINER PINS (6 REQUIRED).
- 614 K1 CLUTCH REGULATOR VALVE SPRING (RED).
- 615 K1 CLUTCH REGULATOR VALVE.
- 616 K3 CLUTCH REGULATOR VALVE SPRING (NONE).
- 617 K3 CLUTCH REGULATOR VALVE.
- 618 B1 CLUTCH REGULATOR VALVE SPRING (NONE).
- 619 B1 CLUTCH REGULATOR VALVE.
- 620 K2 CLUTCH REGULATOR VALVE SPRING (NONE).
- 621 K2 CLUTCH REGULATOR VALVE.
- 622 N89 ON/OFF SOLENOID.
- 624 N91 PWM TCC CONTROL SOLENOID PIN RETAINER.
- 625 RETAINING BOLTS, 12 MM (0.472") LONG (6 REQUIRED).
- 626 TRANSMISSION TEMP SENSOR RETAINING BRACKET.
- 627 N93, N90, N92, N283, N282 SOLENOID PIN RETAINER.
- 628A B2 PRESSURE SWITCH (NOT USED IN ALL MODELS).
- 628B K1 PRESSURE SWITCH (NOT USED IN ALL MODELS).
- 629 N88 ON/OFF SOLENOID.
- 630 K2 ACCUMULATOR PISTON.
- 631 K2 ACCUMULATOR PISTON OUTER SPRING (NONE).
- 632 K2 ACCUMULATOR PISTON INNER SPRING (GRAY).
- 633 K2 ACCUMULATOR PISTON BORE PLUG.
- 634 K2 ACCUMULATOR PISTON BORE PLUG RETAINER.
- 635 B1 ACCUMULATOR PISTON.
- 636 B1 ACCUMULATOR PISTON OUTER SPRING (NONE).
- 637 B1 ACCUMULATOR PISTON INNER SPRING (GRAY).
- 638 B1 ACCUMULATOR PISTON BORE PLUG.
- 639 B1 ACCUMULATOR PISTON BORE PLUG RETAINER.
- 640 FORWARD ENGAGEMENT ACCUMULATOR SPRING (NONE).
- 641 FORWARD ENGAGEMENT ACCUMULATOR PISTON.
- 642 FORWARD ENGAGEMENT ACCUMULATOR BORE PLUG.
- 643 FORWARD ENGAGEMENT ACCUMULATOR BORE PLUG RETAINER.
- 644 K1 SWITCH VALVE SPRING (PINK).
- 645 K1 SWITCH VALVE.
- 646 K1 SWITCH VALVE BORE PLUG.
- 647 K1 SWITCH VALVE BORE PLUG RETAINER.
- 648 N91 PWM TCC CONTROL SOLENOID.
- 649 N93/LINE PRESSURE SOLENOID ACCUMULATOR PISTON.
- 650 N93 ACCUMULATOR PISTON OUTER SPRING (NONE).
- 651 N93 ACCUMULATOR PISTON INNER SPRING (GRAY).
- 652 N93 ACCUMULATOR PISTON BORE PLUG.
- 653 N93 ACCUMULATOR PISTON BORE PLUG RETAINER.
- 654 K3 ACCUMULATOR PISTON.
- 655 K3 ACCUMULATOR PISTON OUTER SPRING (NONE).
- 656 K3 ACCUMULATOR PISTON INNER SPRING (GRAY).
- 657 K3 ACCUMULATOR PISTON BORE PLUG.
- 658 K3 ACCUMULATOR PISTON BORE PLUG RETAINER.

See Legend In Figure 7

- 659 ROUND SCREENS (OPEN SIDE FACES SPACER PLATE) (2 REQ).
- 660 VALVE BODY SPACER PLATE.
- 661 OVAL SCREEN (OPEN SIDE FACES SPACER PLATE).
- 662 K3 EXHAUST CHECK VALVE, 9.96 MM (.392") DIAMETER.
- 663 K3 EXHAUST CHECK VALVE SPRING (WHITE).
- 664 REGULATED EXHAUST CHECK VALVE, 9.96 MM (.392") DIA.
- 665 REGULATED EXHAUST CHECK VALVE SPRING (WHITE).
- 666 B2 CLUTCH PLASTIC CHECK VALVE ASSEMBLY.
- 667 FORWARD/K2 PLASTIC CHECK VALVE ASSEMBLY.

SPECIAL NOTE: VALVE NAMES SHOWN WERE ASSIGNED BY ATSG BASED ON THEIR FUNCTION.

LOWER VALVE BODY SPRING SPECIFICATIONS

SPRING NUMBER 602 Free Length = 1.043" Spring Diameter = .623" Wire Diameter = .052" Approx Coils = 6 (RED)	SPRING NUMBER 620 Free Length = .860" Spring Diameter = .235" Wire Diameter = .032" Approx Coils = 13 (NONE)
SPRING NUMBER 606 Free Length = 1.560" Spring Diameter = .355" Wire Diameter = .025" Approx Coils = 13 (NONE)	SPRINGS 631, 636, 650, 655, Free Length = 1.085" Spring Diameter = .628" Wire Diameter = .082" Approx Coils = 6.5 (NONE)
SPRING NUMBER 614 Free Length = 1.018" Spring Diameter = .235" Wire Diameter = .025" Approx Coils = 14 (RED)	SPRINGS 632, 637, 651, 656, Free Length = 1.093" Spring Diameter = .430" Wire Diameter = .062" Approx Coils = 8.5 (GRAY)
SPRING NUMBER 616 Free Length = .860" Spring Diameter = .235" Wire Diameter = .032" Approx Coils = 13 (NONE)	SPRING NUMBER 640 Free Length = 2.456" Spring Diameter = .775" Wire Diameter = .075" Approx Coils = 10 (NONE)
SPRING NUMBER 618 Free Length = .860" Spring Diameter = .235" Wire Diameter = .032" Approx Coils = 13 (NONE)	SPRING NUMBER 644 Free Length = 1.090" Spring Diameter = .280" Wire Diameter = .025" Approx Coils = 11 (PINK)

LOWER VALVE BODY SPRING SPECIFICATIONS SMALL PARTS, WORM TRACK SIDE

SPRING NO. 663 Free Length = .600" Spring Diameter = .248" Wire Diameter = .023" Approx Coils = 11 (WHITE)	SPRING NO. 665 Free Length = .600" Spring Diameter = .248" Wire Diameter = .023" Approx Coils = 11 (WHITE)
--	--

NONE = Spring Not Colored

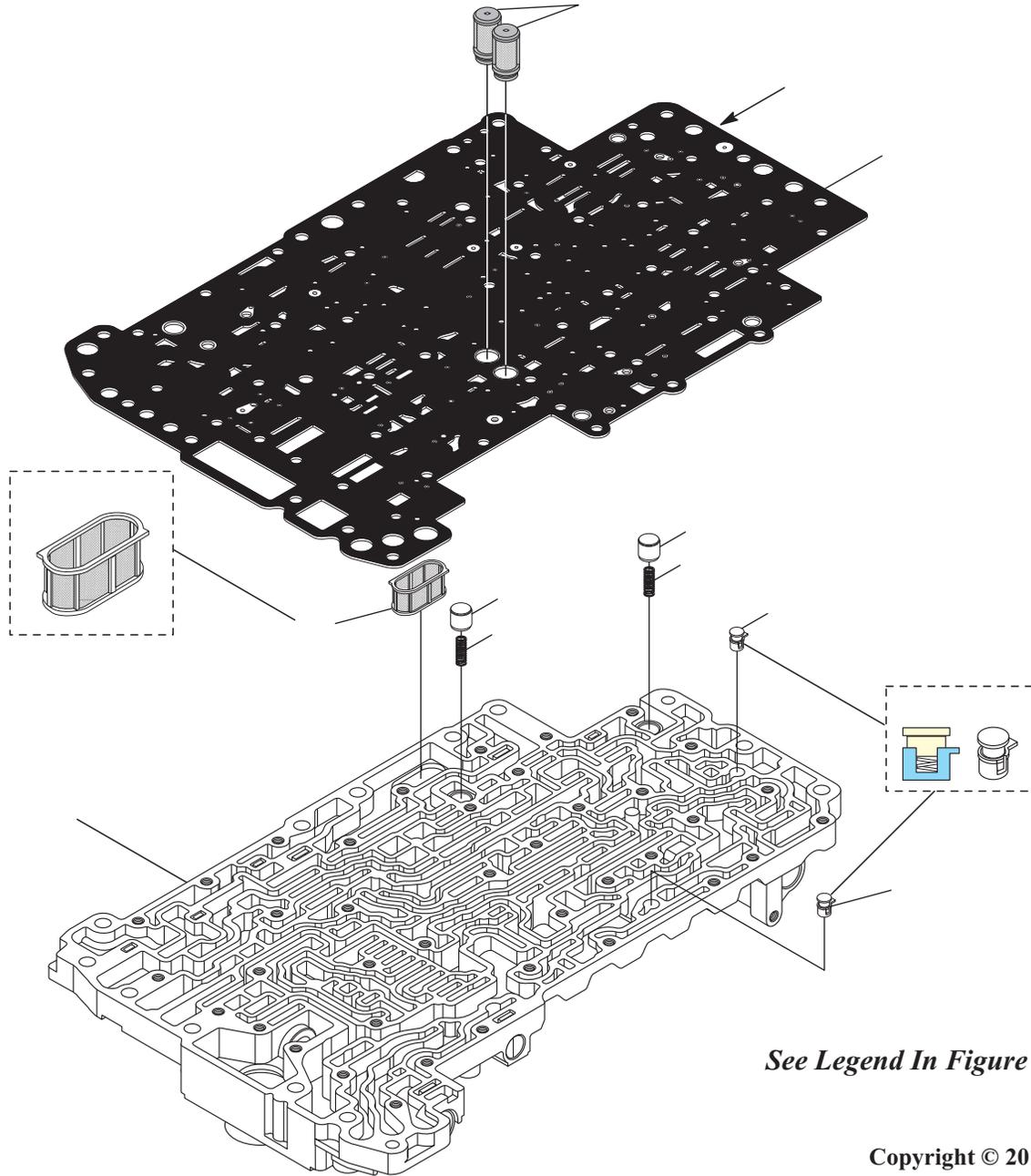
Copyright © 2012 ATSG

Figure 6

VW/AUDI/PORSCHE 09D

TORQUE CONVERTER AND VALVE BODY DIFFERENCES

EARLY CASTING 8860 1 "09D" LOWER VALVE BODY SMALL PARTS, EXPLODED VIEW

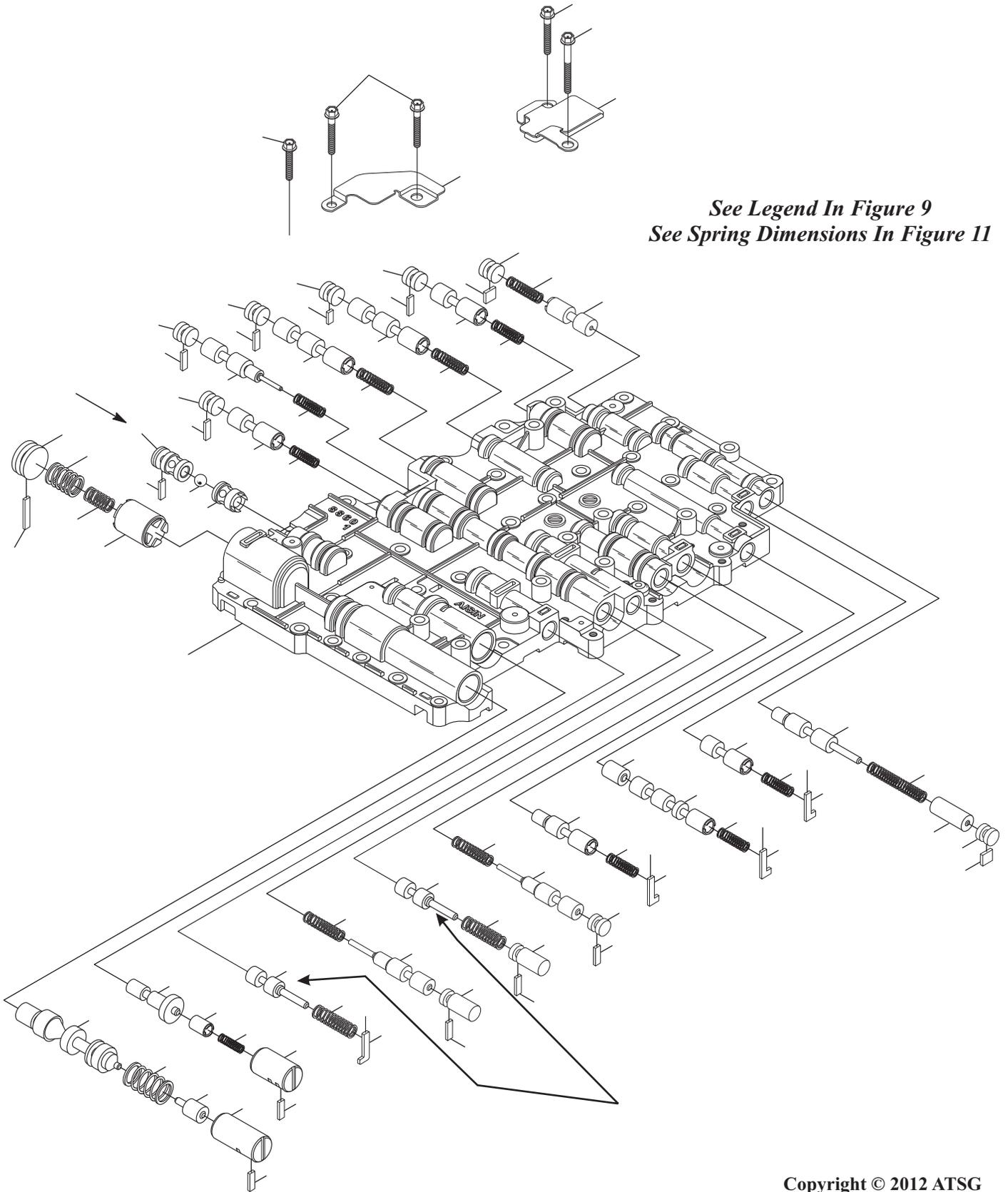


Copyright © 2012 ATSG

Figure 7

EARLY CASTING 8860 1 "09D" UPPER VALVE BODY EXPLODED VIEW

*See Legend In Figure 9
See Spring Dimensions In Figure 11*



Copyright © 2012 ATSG

Figure 8



VW/AUDI/PORSCHE 09D

TORQUE CONVERTER AND VALVE BODY DIFFERENCES

UPPER VALVE BODY LEGEND

659 ROUND SCREENS (2 REQUIRED).	720 B2 PORT CONTROL VALVE RETAINER.
660 VALVE BODY SPACER PLATE.	721 B1 RELAY VALVE SPRING (ORANGE).
668 UPPER VB TO LOWER VB BOLT, 22 MM (.866") (4 REQUIRED).	722 B1 RELAY VALVE.
669 UPPER VB TO LOWER VB BOLT, 28 MM (1.102") (25 REQUIRED).	723 B1 RELAY VALVE BORE PLUG.
670 UPPER VB TO LOWER VB BOLT, 40 MM (1.574") (10 REQUIRED).	724 B1 RELAY VALVE BORE PLUG RETAINER.
671 OIL BAFFLE NUMBER 2.	725 SOLENOID MODULATOR VALVE B VALVE.**
672 OIL BAFFLE NUMBER 1.	726 SOLENOID MODULATOR VALVE B VALVE SPRING (LT BLUE).
673 UPPER VALVE BODY CASTING.	727 SOLENOID MODULATOR VALVE B VALVE BORE PLUG.
674 K1 ACCUMULATOR PISTON.	728 SOLENOID MODULATOR VALVE B VALVE BORE PLUG RETAINER.
675 K1 ACCUMULATOR PISTON INNER SPRING (LT BLUE).	729 K3 RELAY VALVE SPRING (ORANGE).
676 K1 ACCUMULATOR PISTON OUTER SPRING (NONE).	730 K3 RELAY VALVE.
677 K1 ACCUMULATOR PISTON BORE PLUG.	731 K3 RELAY VALVE BORE PLUG.
678 K1 ACCUMULATOR PISTON BORE PLUG RETAINER.	732 K3 RELAY VALVE BORE PLUG RETAINER.
679 K3/B1 THREE WAY INNER SHUTTLE BALL SEAT.	733 SOLENOID MODULATOR VALVE A VALVE.**
680 SHUTTLE BALL (.250" DIAMETER STEEL).	734 SOLENOID MODULATOR VALVE A SPRING (LT BLUE).
681 K3/B1 THREE WAY OUTER SHUTTLE BALL SEAT.	735 SOLENOID MODULATOR VALVE A RETAINER.
682 K3/B1 THREE WAY OUTER SHUTTLE BALL SEAT RETAINER.	736 TCC APPLY CONTROL VALVE.
683 N283 SWITCH VALVE SPRING (PINK).	737 TCC APPLY CONTROL BOOST VALVE.
684 N283 SWITCH VALVE.	738 TCC APPLY CONTROL BOOST VALVE SPRING (TAN).
685 N283 SWITCH VALVE BORE PLUG.	739 TCC APPLY CONTROL BOOST VALVE SLEEVE.
686 N283 SWITCH VALVE BORE PLUG RETAINER.	740 TCC APPLY CONTROL BOOST VALVE SLEEVE RETAINER.
687 N90 SWITCH VALVE SPRING (ORANGE).	741 PRIMARY PRESSURE REGULATOR VALVE.
688 N90 SWITCH VALVE.	742 PRIMARY PRESSURE REGULATOR VALVE SPRING (PINK).
689 N90 SWITCH VALVE BORE PLUG.	743 LINE PRESSURE BOOST VALVE.
690 N90 SWITCH VALVE BORE PLUG RETAINER.	744 LINE PRESSURE BOOST VALVE SLEEVE.
691 K3 CONTROL VALVE SPRING (PINK).	745 LINE PRESSURE BOOST VALVE SLEEVE RETAINER.
692 K3 CONTROL VALVE.	746 LUBE CHECK VALVE SPRING (PINK).
693 K3 CONTROL VALVE BORE PLUG.	747 LUBE CHECK VALVE, 9.98 MM (.392") DIAMETER.
694 K3 CONTROL VALVE BORE PLUG RETAINER.	748 SECONDARY REG. VALVE PLASTIC CHECK VALVE ASSEMBLY.
695 B1 CONTROL VALVE SPRING (PINK).	749 TCC APPLY LIMIT CHECK VALVE SPRING (VIOLET).
696 B1 CONTROL VALVE.	750 TCC APPLY LIMIT CHECK VALVE, 9.98 MM (.392") DIAMETER.
697 B1 CONTROL VALVE BORE PLUG.	751 N93 SOLENOID LIMIT CHECK VALVE SPRING (LT. BLUE).
698 B1 CONTROL VALVE BORE PLUG RETAINER.	752 N93 SOLENOID LIMIT CHECK VALVE, 11.98 MM (.471") DIAMETER.
699 K2 CONTROL VALVE SPRING (PINK).	753 REVERSE LIMIT CHECK VALVE SPRING (WHITE).
700 K2 CONTROL VALVE.	754 REVERSE LIMIT CHECK VALVE, 9.98 MM (.392") DIAMETER.
701 K2 CONTROL VALVE BORE PLUG.	755 REVERSE ORIFICE PLASTIC CHECK BALL, 5.5 MM (.217") DIA.
702 K2 CONTROL VALVE BORE PLUG RETAINER.	756 LINE PRESSURE LIMIT CHECK VALVE SPRING (NONE).
703 B2 SWITCH VALVE (MANUAL "1") VALVE.	757 LINE PRESSURE LIMIT CHECK VALVE, 9.98 MM (.392") DIAMETER.
704 B2 SWITCH VALVE (MANUAL "1") SPRING (WHITE).	758 REGULATED EXHAUST CHECK VALVE SPRING (WHITE).
705 B2 SWITCH VALVE (MANUAL "1") BORE PLUG.	759 REGULATED EXHAUST CHECK VALVE, 9.98 MM (.392") DIAMETER.
706 B2 SWITCH VALVE (MANUAL "1") BORE PLUG RETAINER.	760 B2 "SMALL" CAVITY PLASTIC CHECK BALL, 5.5 MM (.217") DIA.
707 B2 REGULATOR VALVE.	761 LUBE RELIEF CHECK VALVE, 9.98 MM (.392") DIAMETER.
708 B2 REGULATOR VALVE SPRING (VIOLET).	762 LUBE RELIEF CHECK VALVE SPRING (RED).
709 B2 REGULATOR PLUNGER.	763 K2 CLUTCH PLASTIC CHECK VALVE ASSEMBLY.
710 B2 REGULATOR VALVE BORE PLUG.	764 B1 CLUTCH PLASTIC CHECK VALVE ASSEMBLY.
711 B2 REGULATOR VALVE BORE PLUG RETAINER.	765 K3 CLUTCH PLASTIC CHECK VALVE ASSEMBLY.
712 PRESSURE MODIFIER VALVE.	766 K1 CLUTCH PLASTIC CHECK VALVE ASSEMBLY.
713 PRESSURE MODIFIER SPRING (WHITE).	767 DRIVE RANGE ORIFICE PLASTIC CHECK BALL, 6.35 MM (.250") DIA.
714 PRESSURE MODIFIER RETAINER.	768 COOLER CHECK VALVE.
715A NUMBER 2 RELAY VALVE PLUG.	769 COOLER CHECK VALVE SPRING (TAN).
715 NUMBER 2 RELAY VALVE.	770 MANUAL VALVE.
716 NUMBER 2 RELAY VALVE SPRING (WHITE).	771 MANUAL VALVE BODY CASTING.
717 NUMBER 2 RELAY VALVE RETAINER.	772 MANUAL VALVE BODY RETAINING BOLT, 38 MM (1.496") (7 REQ).
718 B2 PORT CONTROL VALVE.	
719 B2 PORT CONTROL VALVE SPRING (WHITE).	

NONE = Spring Not Colored

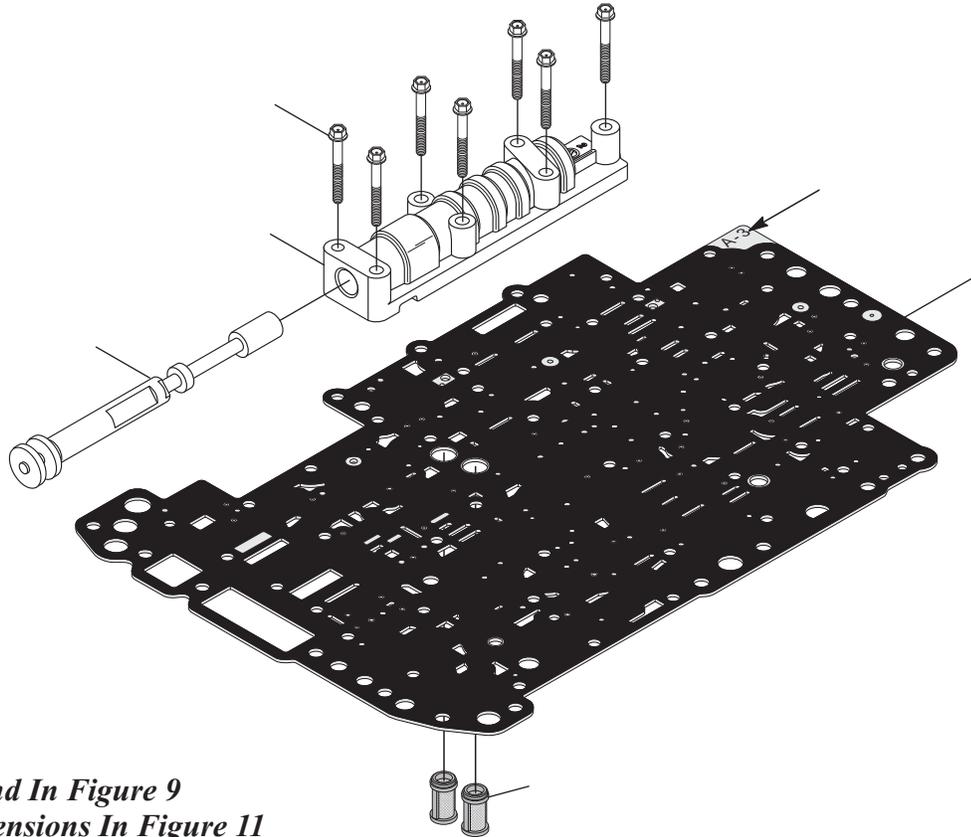
SPECIAL NOTE: VALVE NAMES SHOWN WERE ASSIGNED BY ATSG BASED ON THEIR FUNCTION.

**** = These Valves are known for bore wear out.**

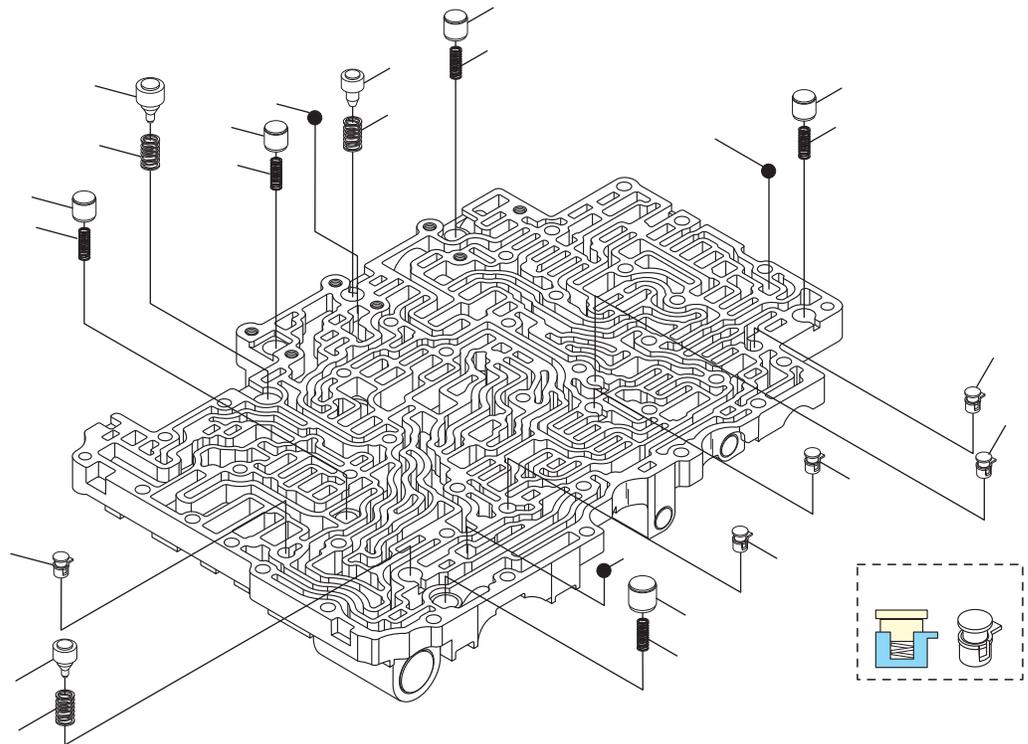
Copyright © 2012 ATSG

Figure 9

EARLY CASTING 8860 1 "09D" UPPER VALVE BODY SMALL PARTS, EXPLODED VIEW



See Legend In Figure 9
See Spring Dimensions In Figure 11



Copyright © 2012 ATSG

Figure 10



VW/AUDI/PORSCHE 09D

TORQUE CONVERTER AND VALVE BODY DIFFERENCES

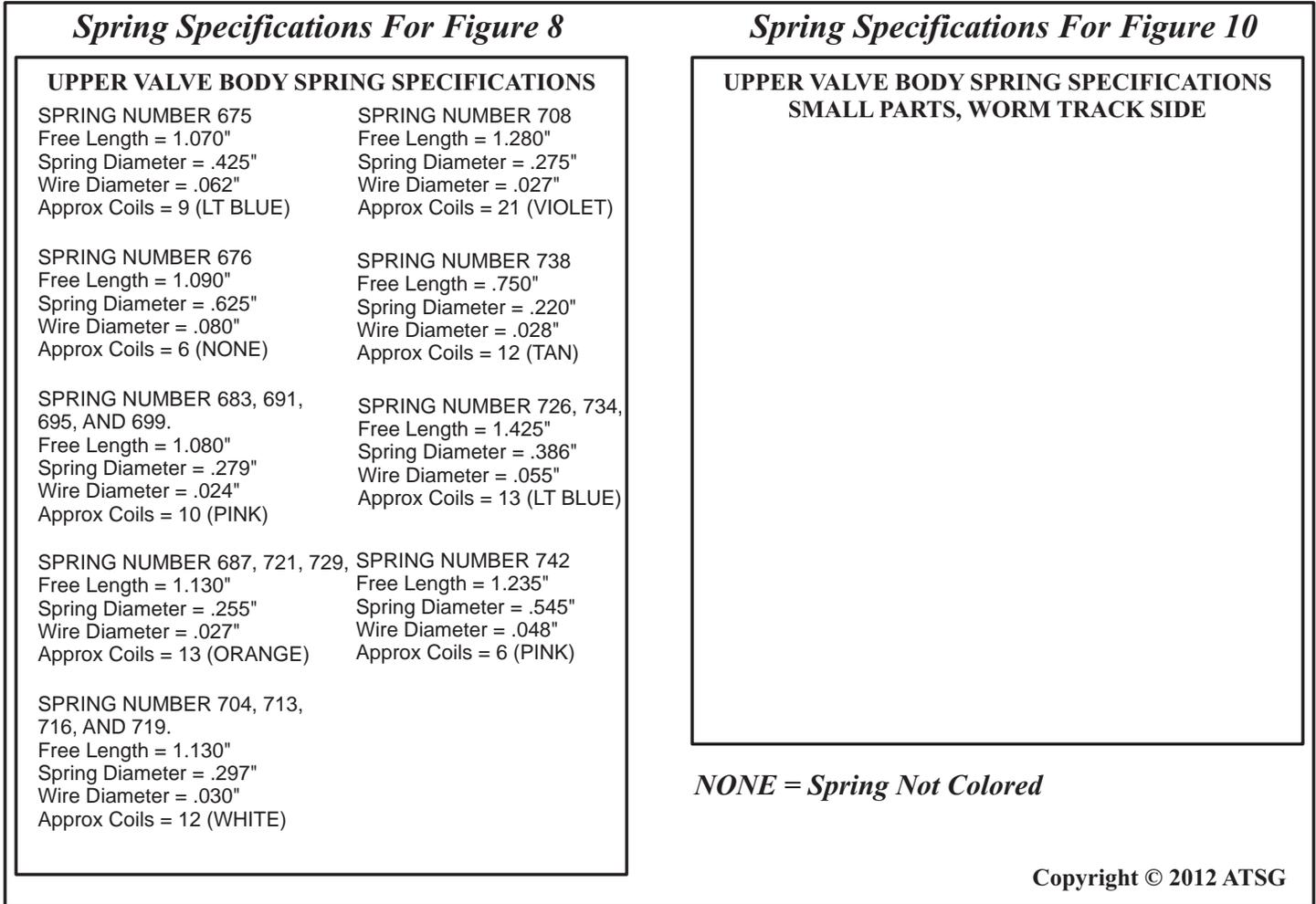
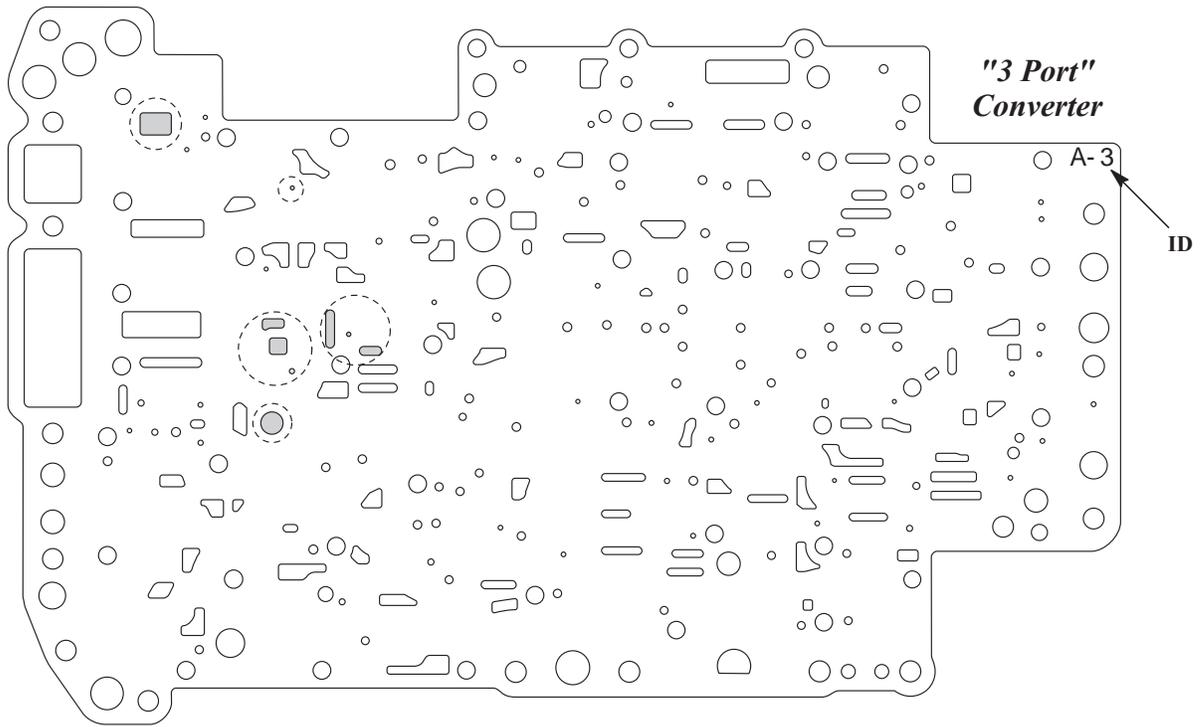
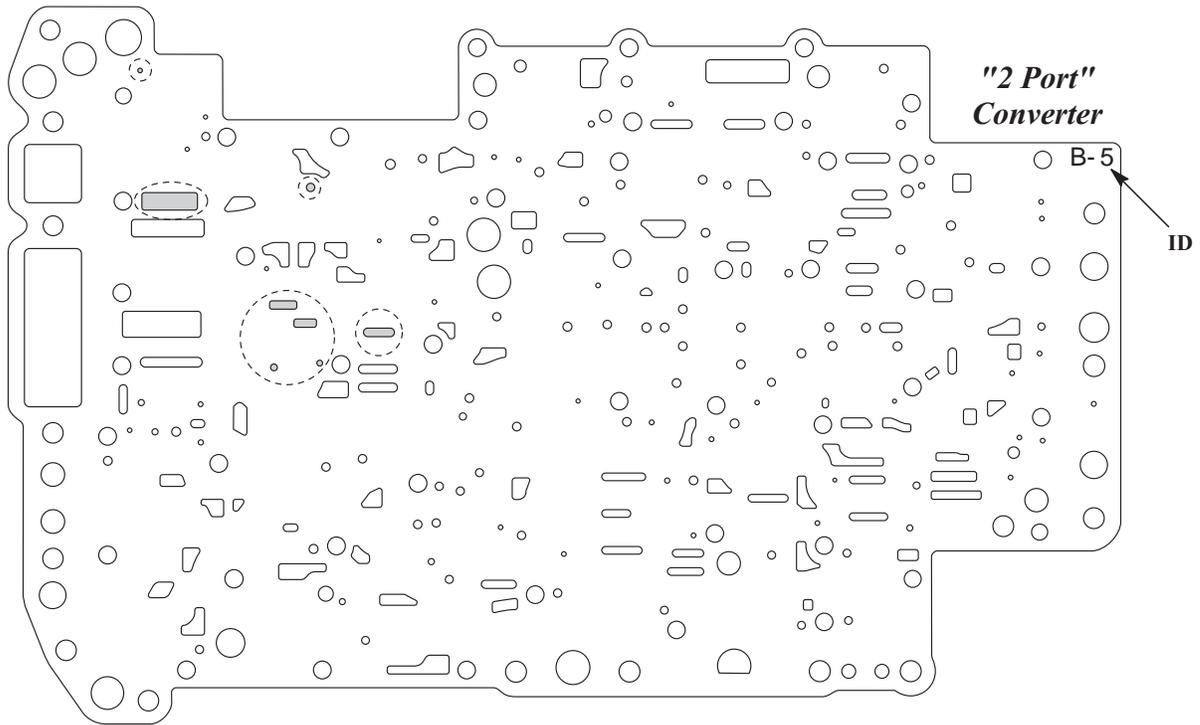


Figure 11

EARLY CASTING 8860 1 "09D" SPACER PLATE DIFFERENCES



These Spacer Plates DO NOT interchange

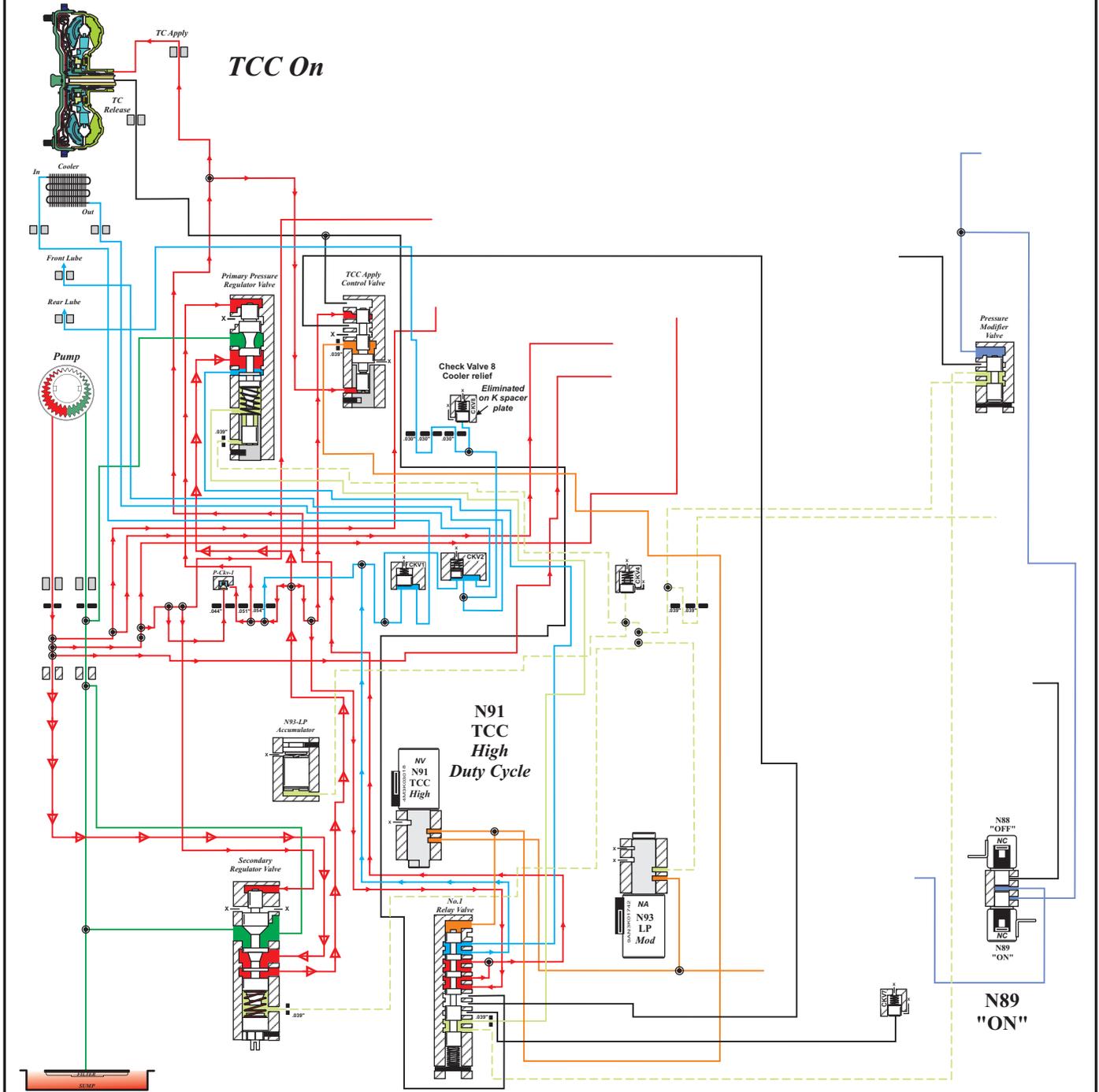


Copyright © 2012 ATSG

Figure 12

N91 TCC SOLENOID THEORY OF OPERATION

2 Port Torque Converter



N91 TCC Solenoid is at a High Duty Cycle which strokes :

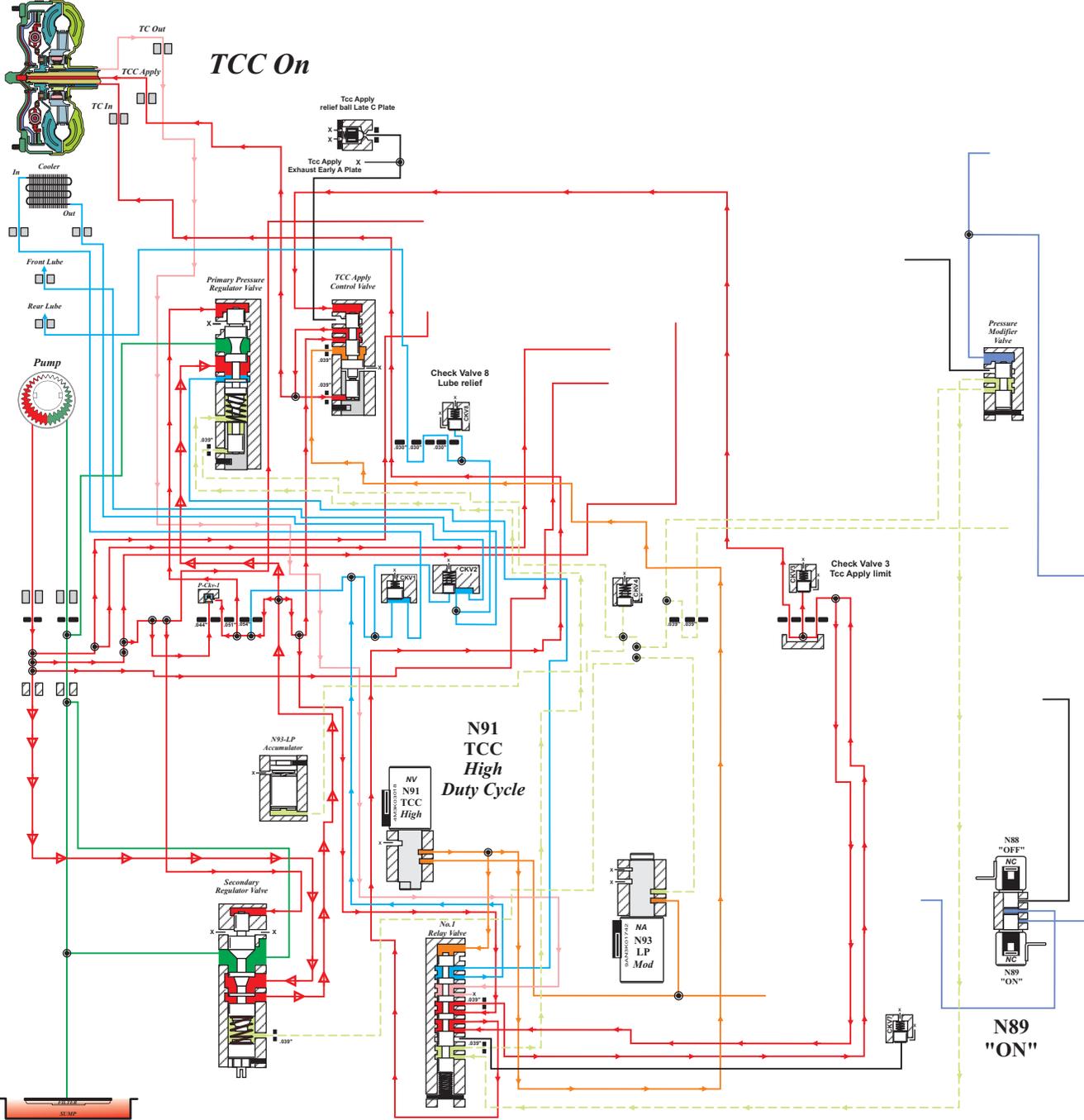
1. The TCC Apply Control Valve which connects TCC release pressure to an exhaust.
2. The No.1 Relay Valve which connects Regulated Line Pressure from the Primary Reg. Valve to the Cooler/Lube Circuit The No.1 Relay Valve also connects regulated line pressure to the TCC Apply Circuit .The No. 1 Relay Valve also makes a connection to TCC Apply Control Valve exhaust .The No. 1 Relay Valve also connects N93 pressure from the Pressure Modifier Valve to the spring side of the Primary Pressure Regulator Valve to increase line pressure when the TCC is ON.

Copyright © 2012 ATSG

Figure 13

N91 TCC SOLENOID THEORY OF OPERATION

3 Port Torque Converter



Copyright © 2012 ATSG

N91 TCC Solenoid is at a High Duty Cycle which strokes :

1. The TCC Apply Control Valve which connects regulated Secondary Regulator pressure to the Apply circuit of the Torque Converter.
2. The No.1 Relay Valve which connects Regulated Line Pressure from the Primary Reg. Valve to the Cooler/Lube Circuit. The No.1 Relay Valve also connects Torque Converter Out pressure to the sump. The No. 1 Relay Valve also makes connections from Regulated Line to the TCC Apply Control Valve. The No. 1 Relay Valve also connects N93 pressure from the Pressure Modifier Valve to the spring side of the Primary Pressure Regulator Valve to increase line pressure when the TCC is ON. The N89 Solenoid is ON which Strokes the Pressure Modifier Valve, which connects N93 pressure to the No.1 Relay Valve. This provides a line pressure increase when the TCC is ON

Figure 14