



CHECKBALL BOOK

Import Volume III

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INTRODUCTION

IMPORT CHECKBALL BOOK

VOLUME III

*1st Printing
September, 2008*

The third volume of the series of import checkball location manuals contains the most current valve body checkball and small parts locations for the most current import transmissions on the road today.

All checkball locations are shown even when they are contained in a check valve located in one of the valve body bores. These check valve balls are often overlooked because they are not in plain sight.

This manual also contains information on what material the checkballs are constructed of as well as checkball and spring dimensions wherever possible.

However, there is one very important caution, and that is for the technician to exercise caution when disassembling these valve bodies contained in this manual because many of these valve bodies are used in transmissions that are utilized by multiple car manufacturers. As a result of this, checkball and small parts locations may be different than the valve body you are working with.

The technician should make notes as to any differences in checkball and small parts locations for future reference. We at ATSG would appreciate being notified of these differences in order to add this information when this manual goes to reprint.

*We wish to thank Hardparts For Transmissions
and European Exchange for supplying ATSG with
the necessary valve bodies and photos that have
made this booklet possible.*

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*The information and part numbers contained in this booklet have
been carefully compiled from industry sources known for their
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WAYNE COLONNA
PRESIDENT

DALE ENGLAND
FIELD SERVICE CONSULTANT

PETE LUBAN
TECHNICAL SUPERVISOR

JON GLATSTEIN
TECHNICAL CONSULTANT

GERALD CAMPBELL
TECHNICAL CONSULTANT

GABE DE LOS REYES
TECHNICAL CONSULTANT

JIM DIAL
TECHNICAL CONSULTANT

ED KRUSE
TECHNICAL CONSULTANT

GREGORY LIPNICK
TECHNICAL CONSULTANT

DAVID CHALKER
TECHNICAL CONSULTANT

ROLAND ALVAREZ
TECHNICAL CONSULTANT

GREG CATANZARO
TECHNICAL CONSULTANT

AUTOMATIC TRANSMISSION SERVICE GROUP
18635 S.W. 107 AVENUE
CUTLER BAY, FLORIDA 33157
(305) 670-4161



CHECKBALL BOOK

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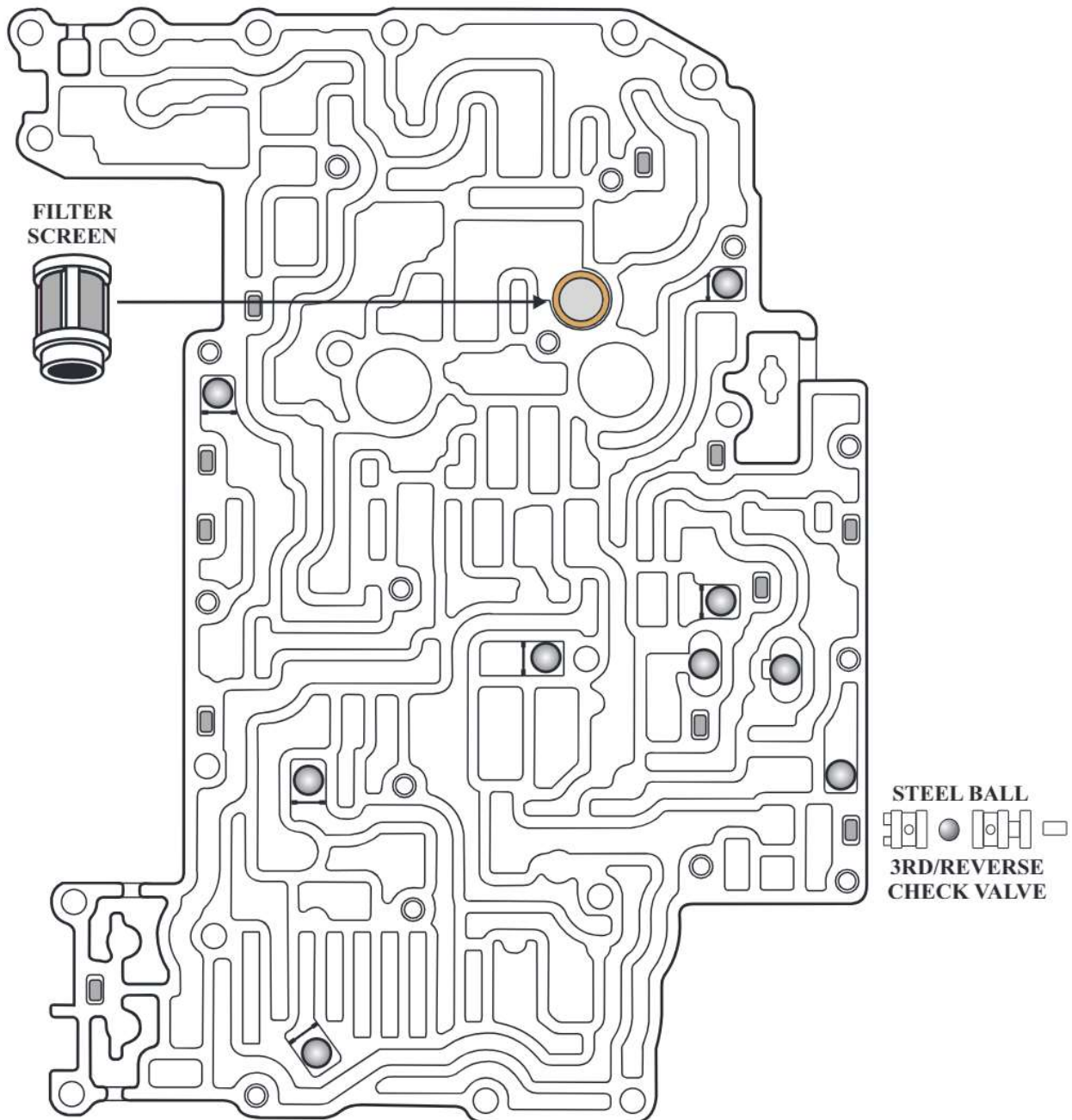
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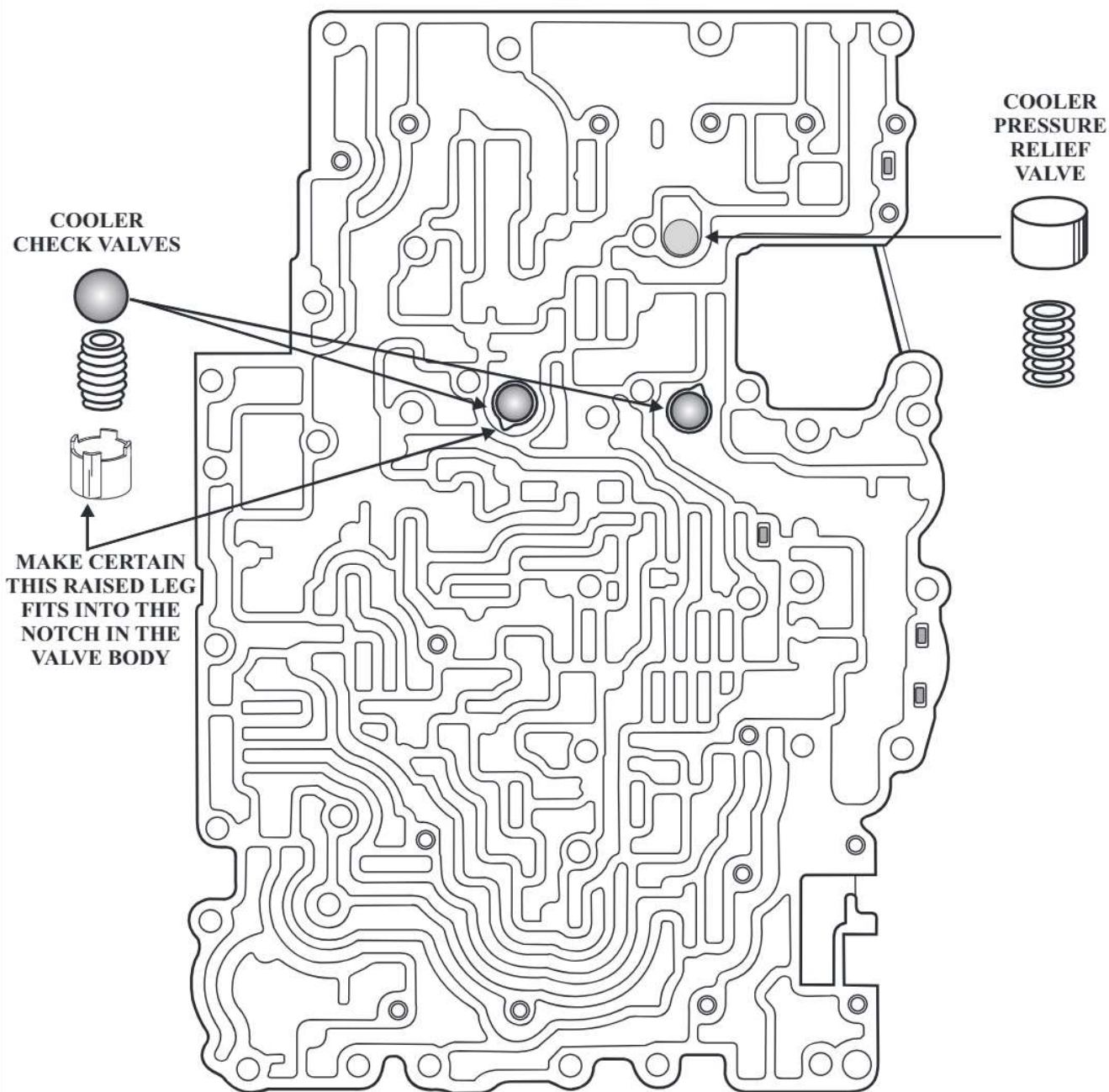
**AISIN SEIKI
 450-43LE
 UPPER VALVE BODY**



**THE UPPER VALVE BODY HAS NINE & ONE ENCAPSULATED
 6.35MM (.250") STEEL CHECKBALLS**

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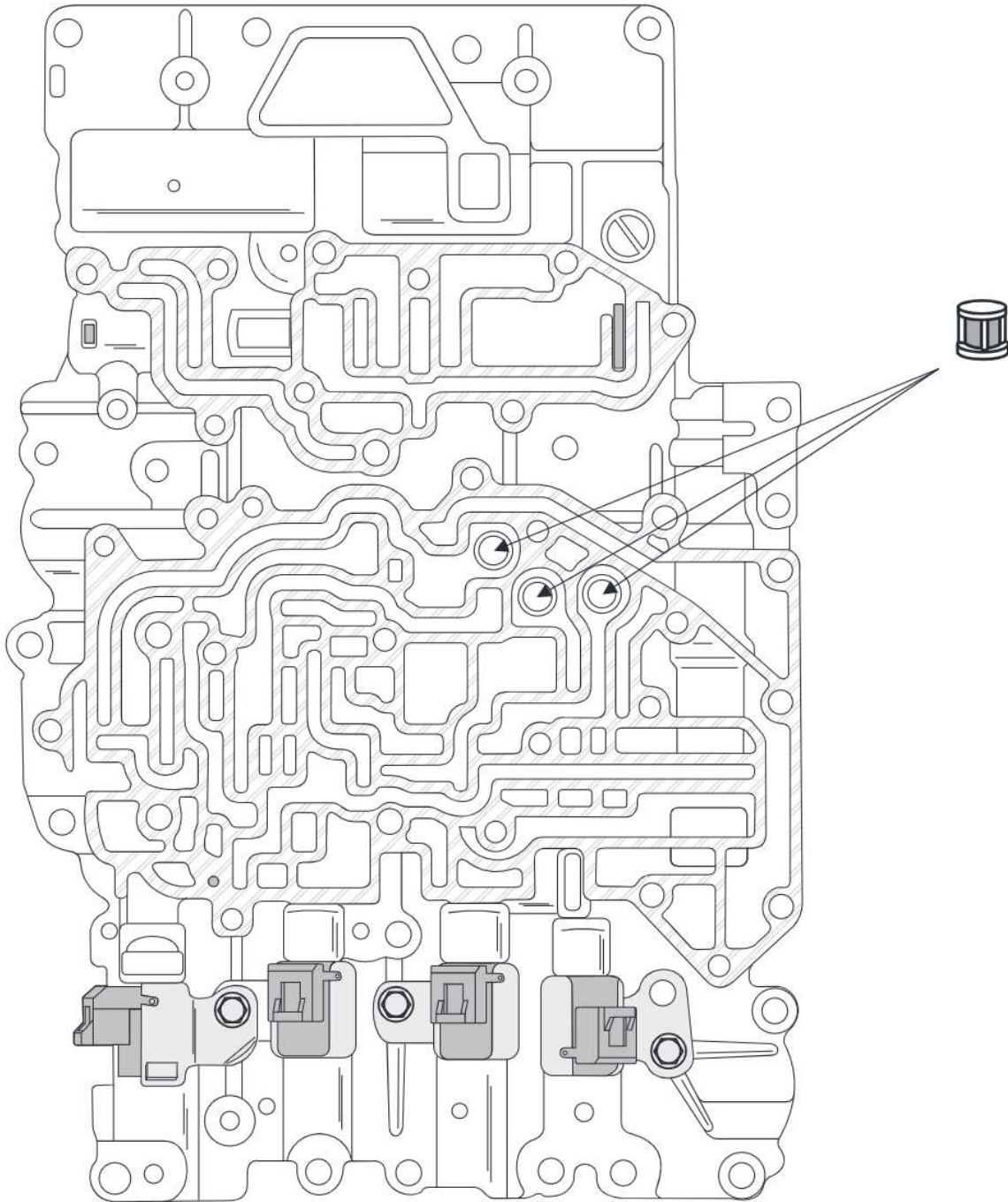
AISIN SEIKI 450-43LE LOWER VALVE BODY



THE LOWER VALVE BODY HAS TWO 10.00MM (.394") STEEL CHECKBALLS
ON BARREL SPRINGS AND CAPSULES

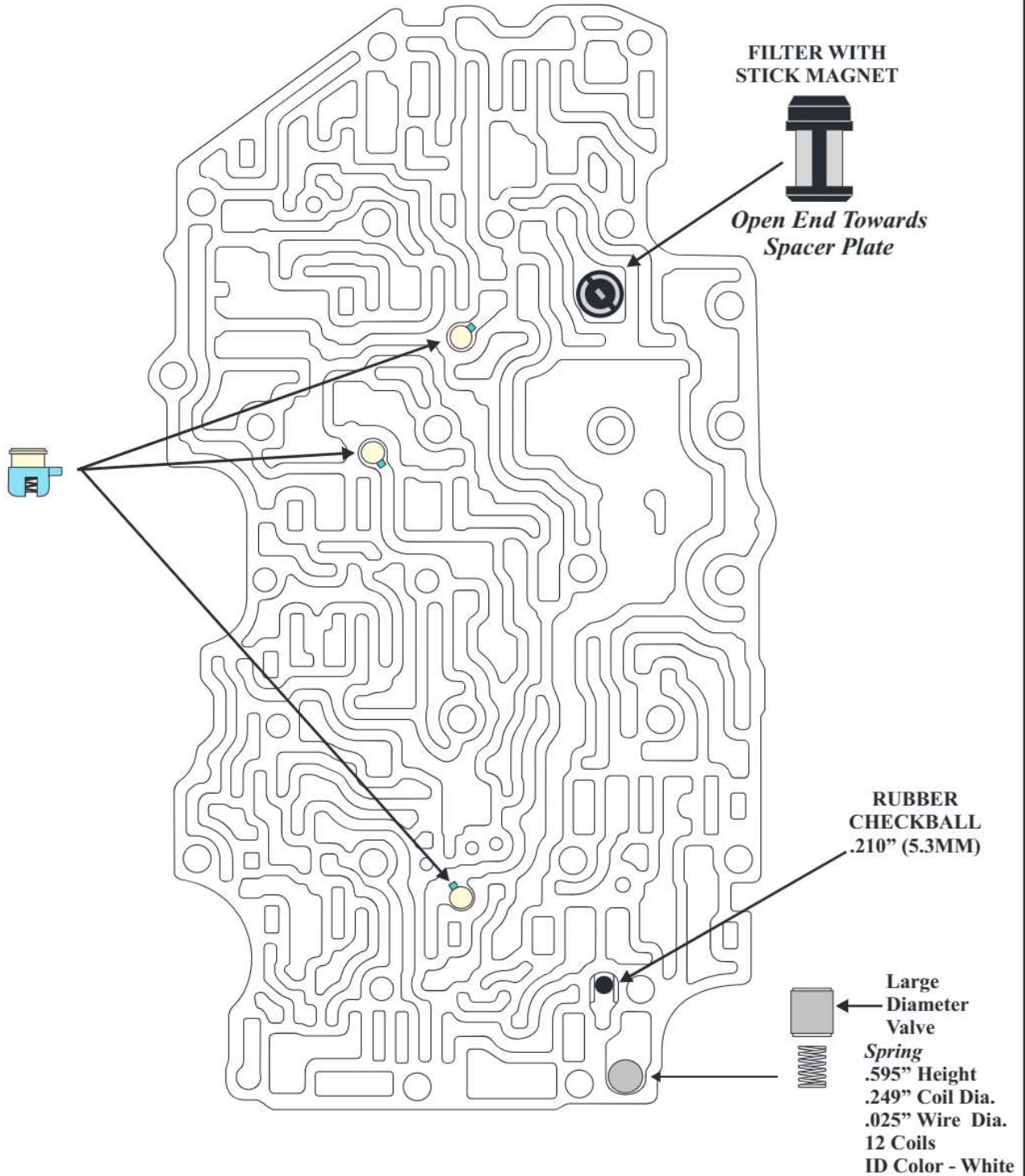
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AISIN SEIKI
450-43LE
LOWER VALVE BODY - FILTER SIDE



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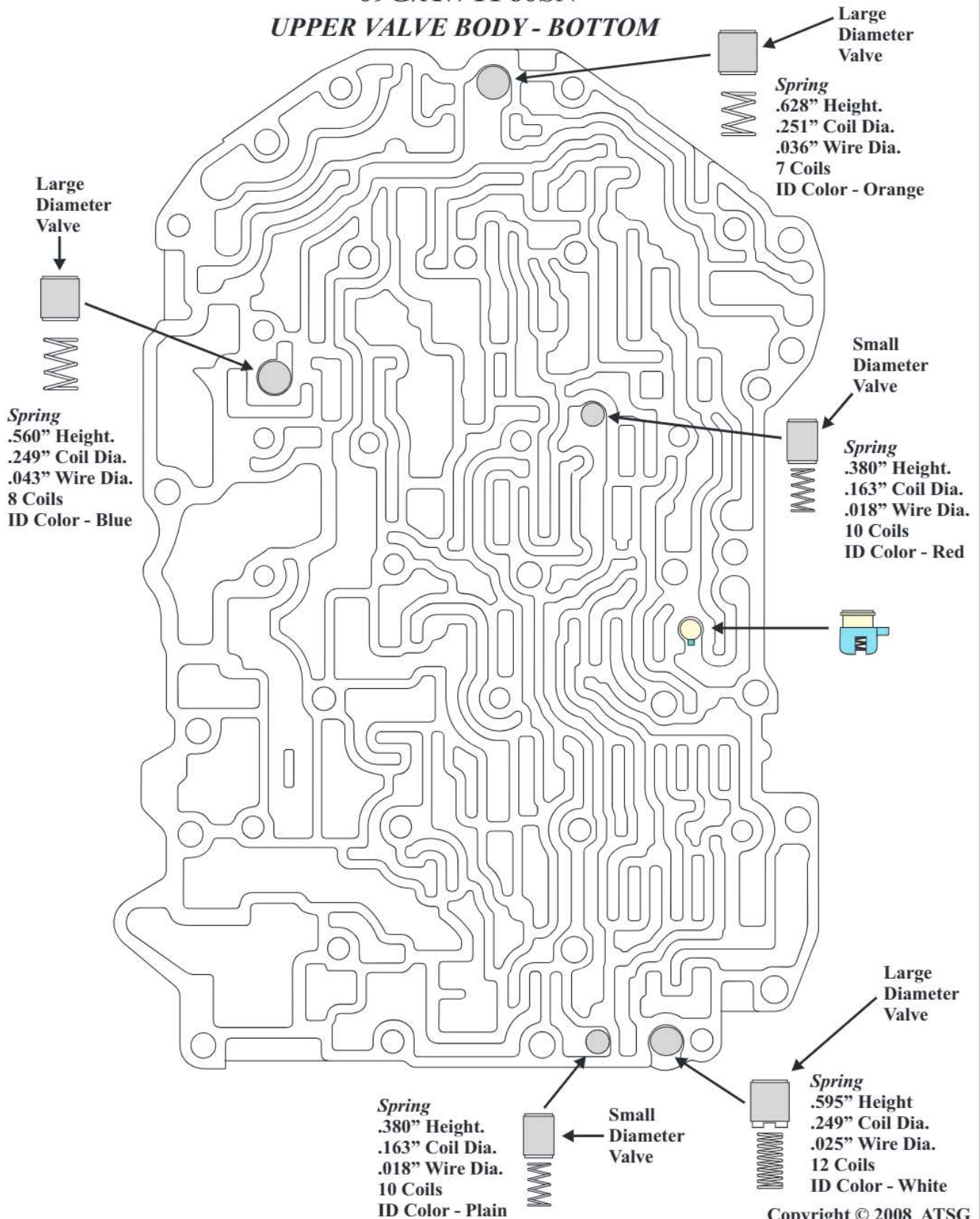
AUDI/VOLKSWAGEN/MINI COOPER 09G/AWTF60SN LOWER VALVE BODY



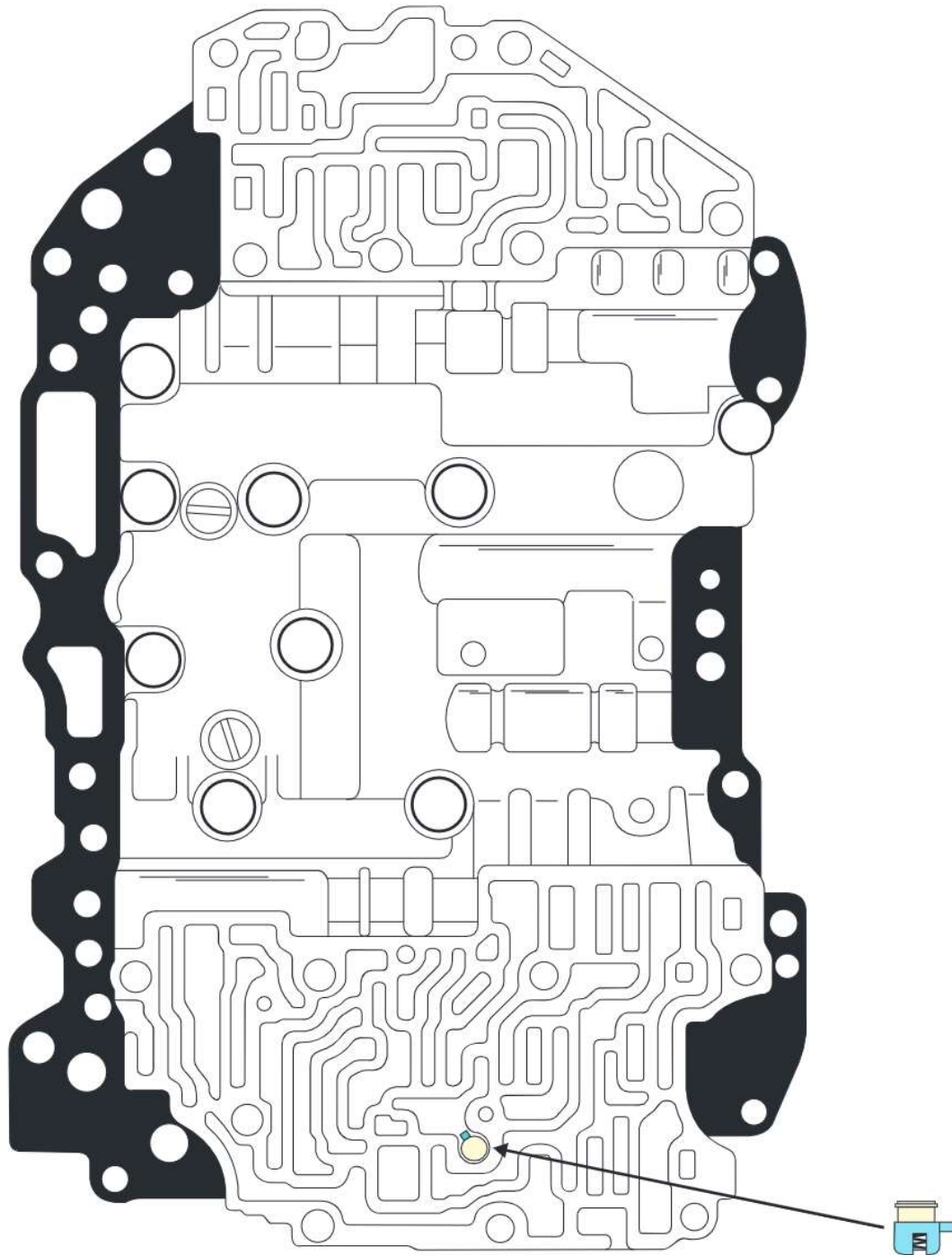
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AUDI/VOLKSWAGEN/MINI COOPER 09G/AWTF60SN

UPPER VALVE BODY - BOTTOM

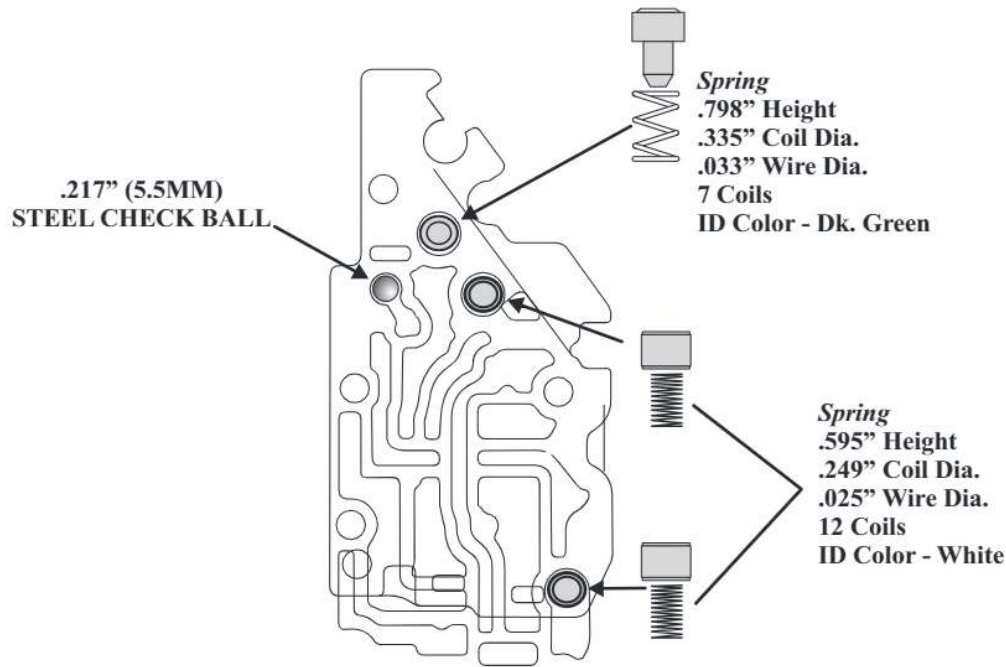


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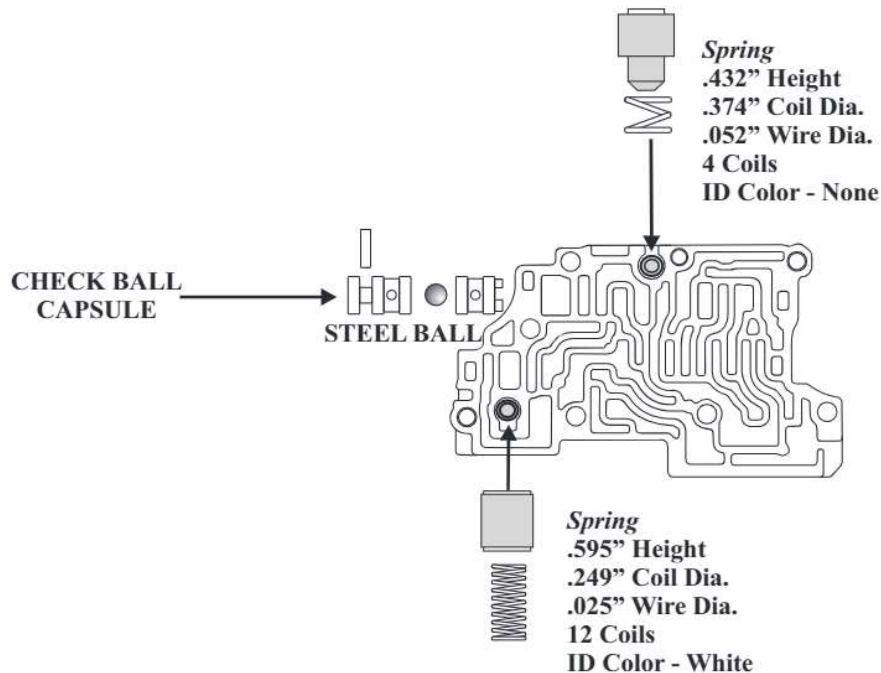
**AUDI/VOLKSWAGEN/MINI COOPER
09G/AWTF60SN*****UPPER VALVE BODY - TOP***

AUDI/VOLKSWAGEN/MINI COOPER 09G/AWTF60SN

ACCUMULATOR VALVE BODY #1

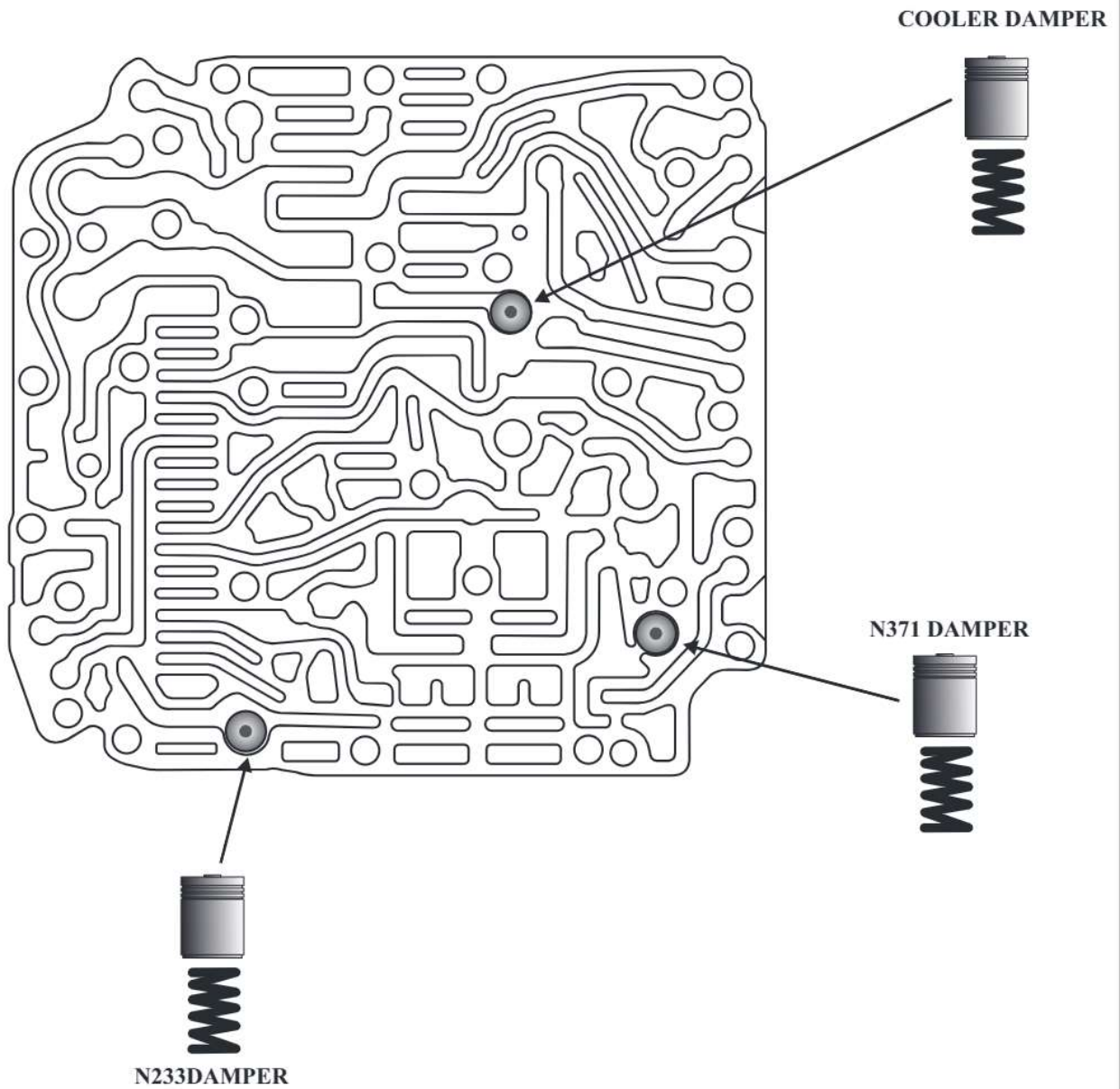


ACCUMULATOR VALVE BODY #2



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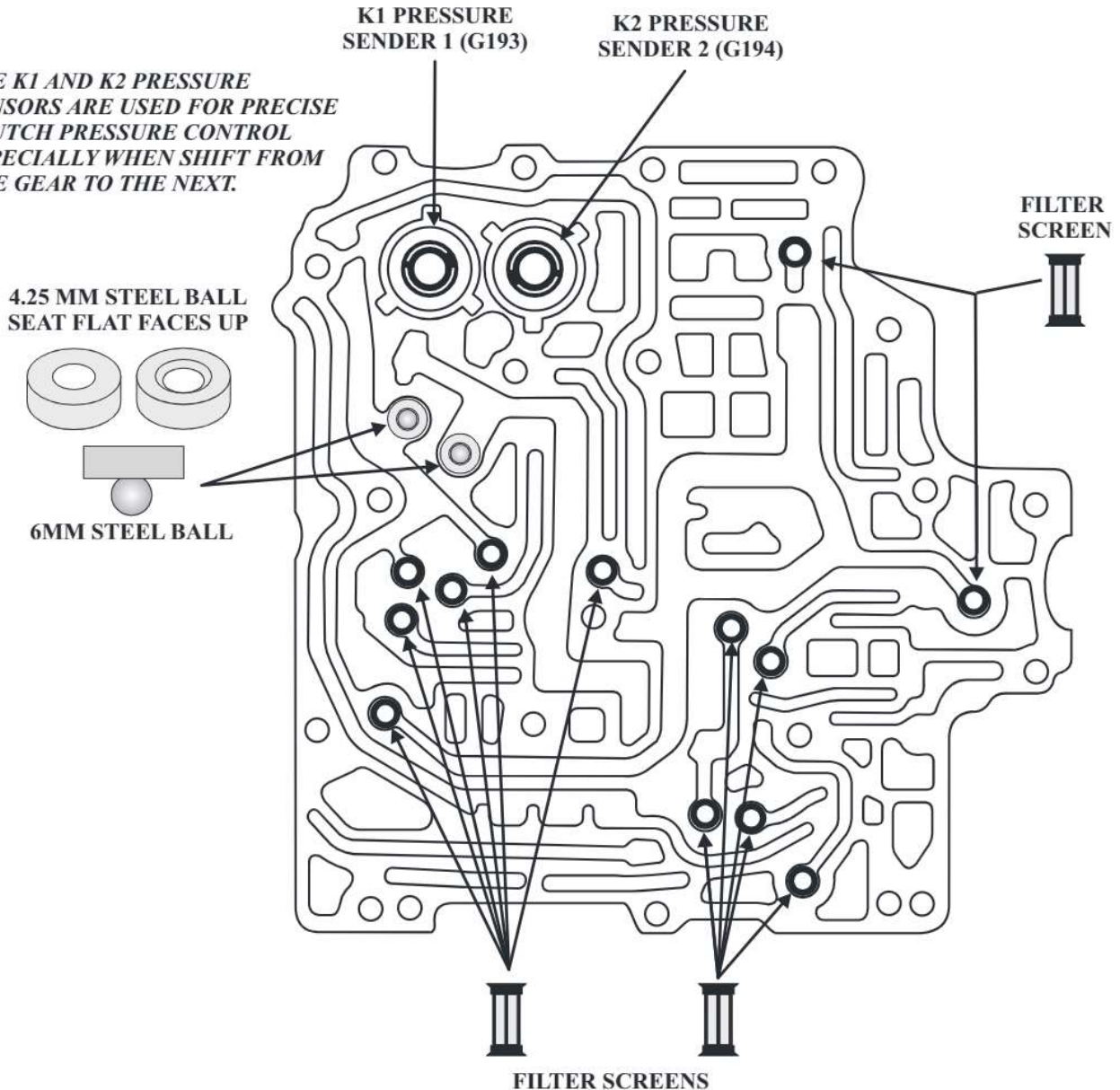
**AUDI/VW "02E DSG"
VALVE BODY
DIRECT SHIFT GEARBOX**



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AUDI/VW "02E DSG" VALVE BODY DIRECT SHIFT GEARBOX

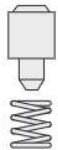
THE K1 AND K2 PRESSURE SENSORS ARE USED FOR PRECISE CLUTCH PRESSURE CONTROL ESPECIALLY WHEN SHIFT FROM ONE GEAR TO THE NEXT.



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VOLVO/SAAB/NISSAN AW55-50SN/RE5F22A FRONT CONTROL VALVE BODY

PRESSURE RELIEF VALVE

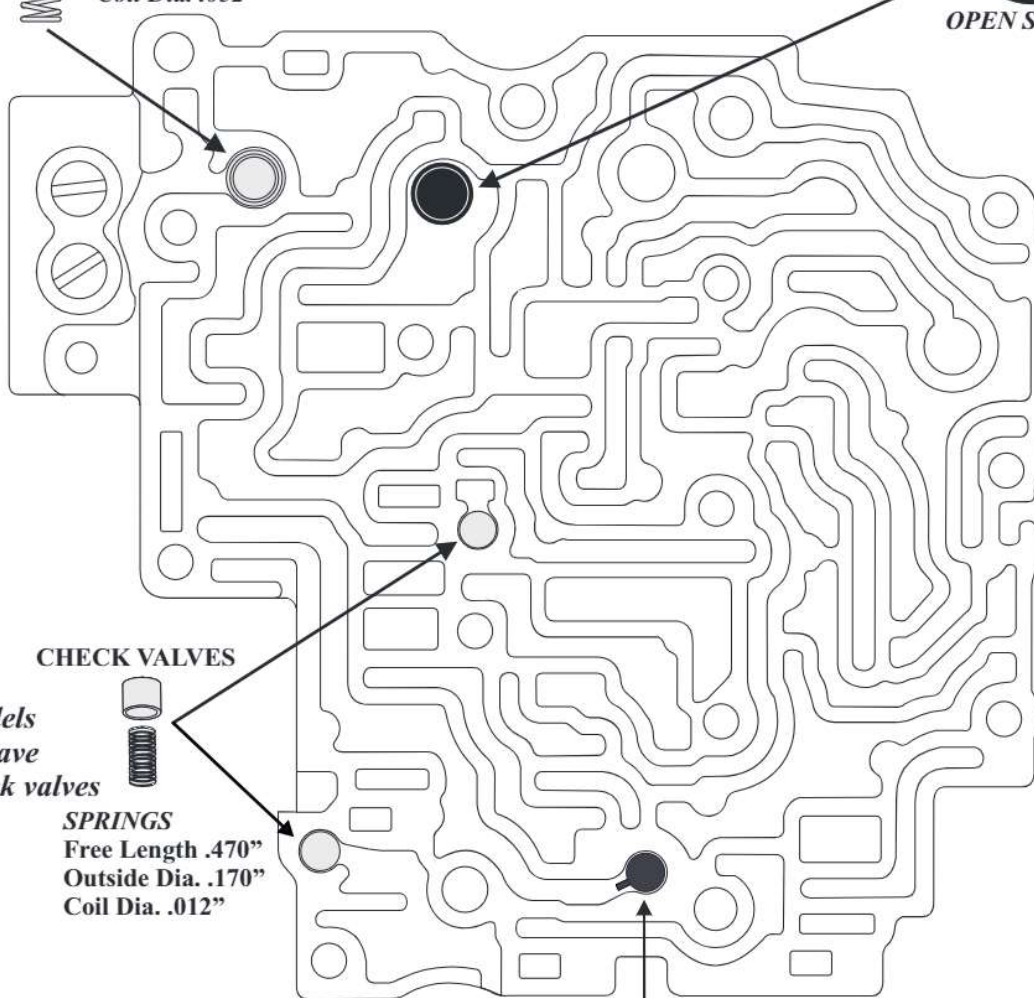


Spring
Free Length .432"
Outside Dia. .375"
Coil Dia. .052"

FILTER SCREEN



OPEN SIDE UP



NOTE:

*Some models
may not have
these check valves*

CHECK VALVES



SPRINGS
Free Length .470"
Outside Dia. .170"
Coil Dia. .012"

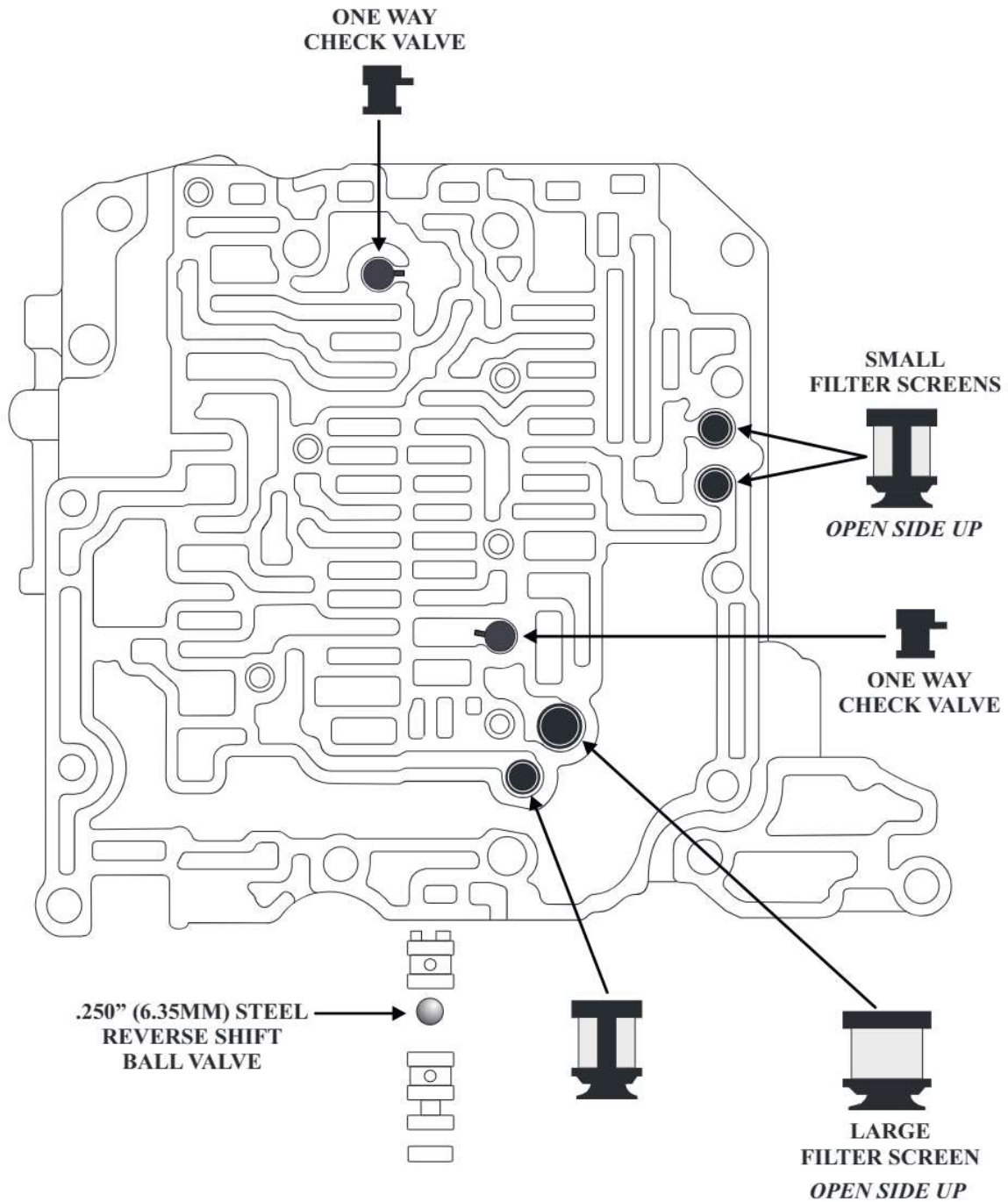


**ONE WAY
CHECK VALVE**

*NOTE: Some models may have a
checkball in this location*

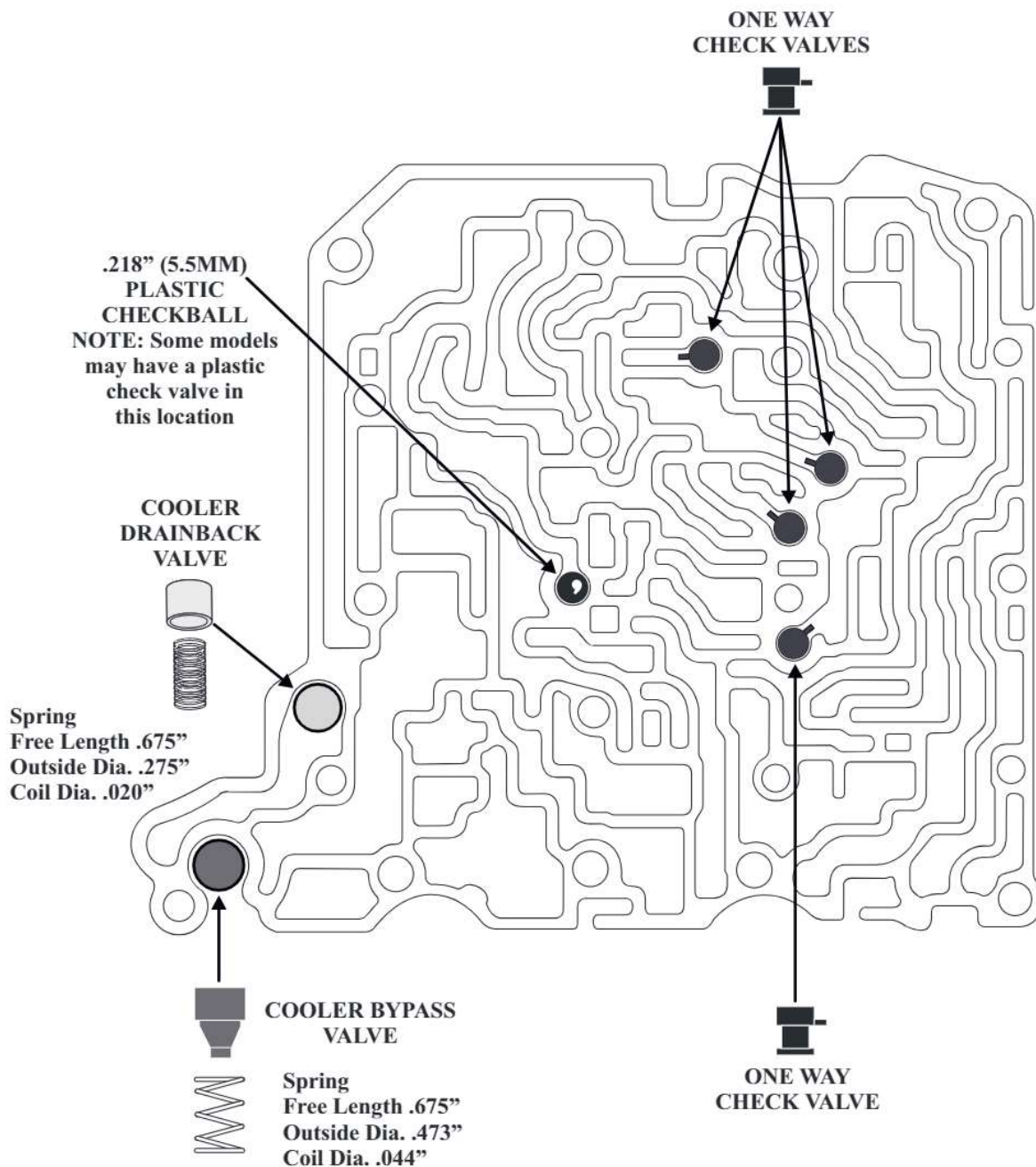
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VOLVO/SAAB/NISSAN AW55-50SN/RE5F22A MIDDLE VALVE BODY (FRONT SIDE)



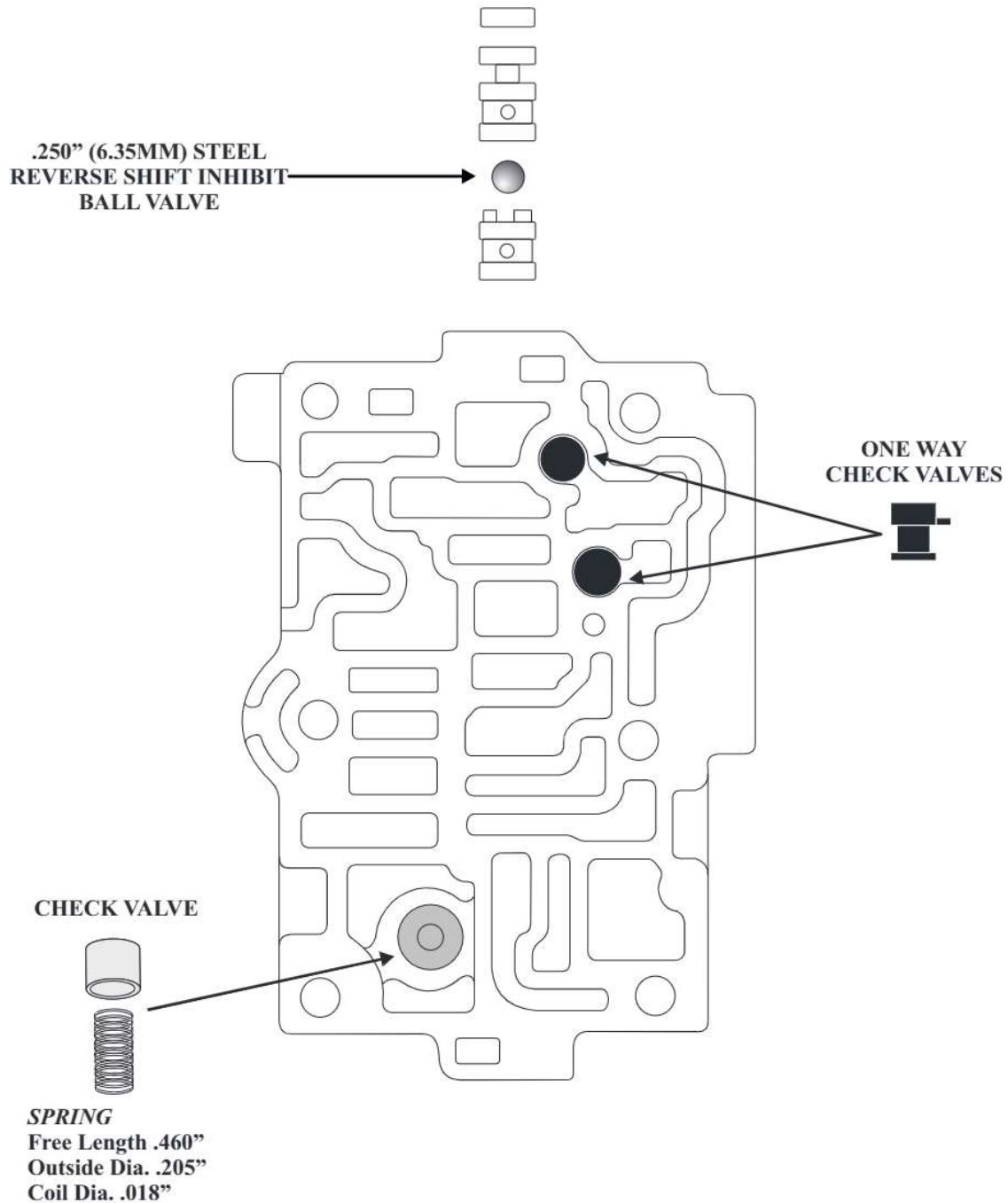
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VOLVO/SAAB/NISSAN AW55-50SN/RE5F22A MIDDLE VALVE BODY (REAR SIDE)



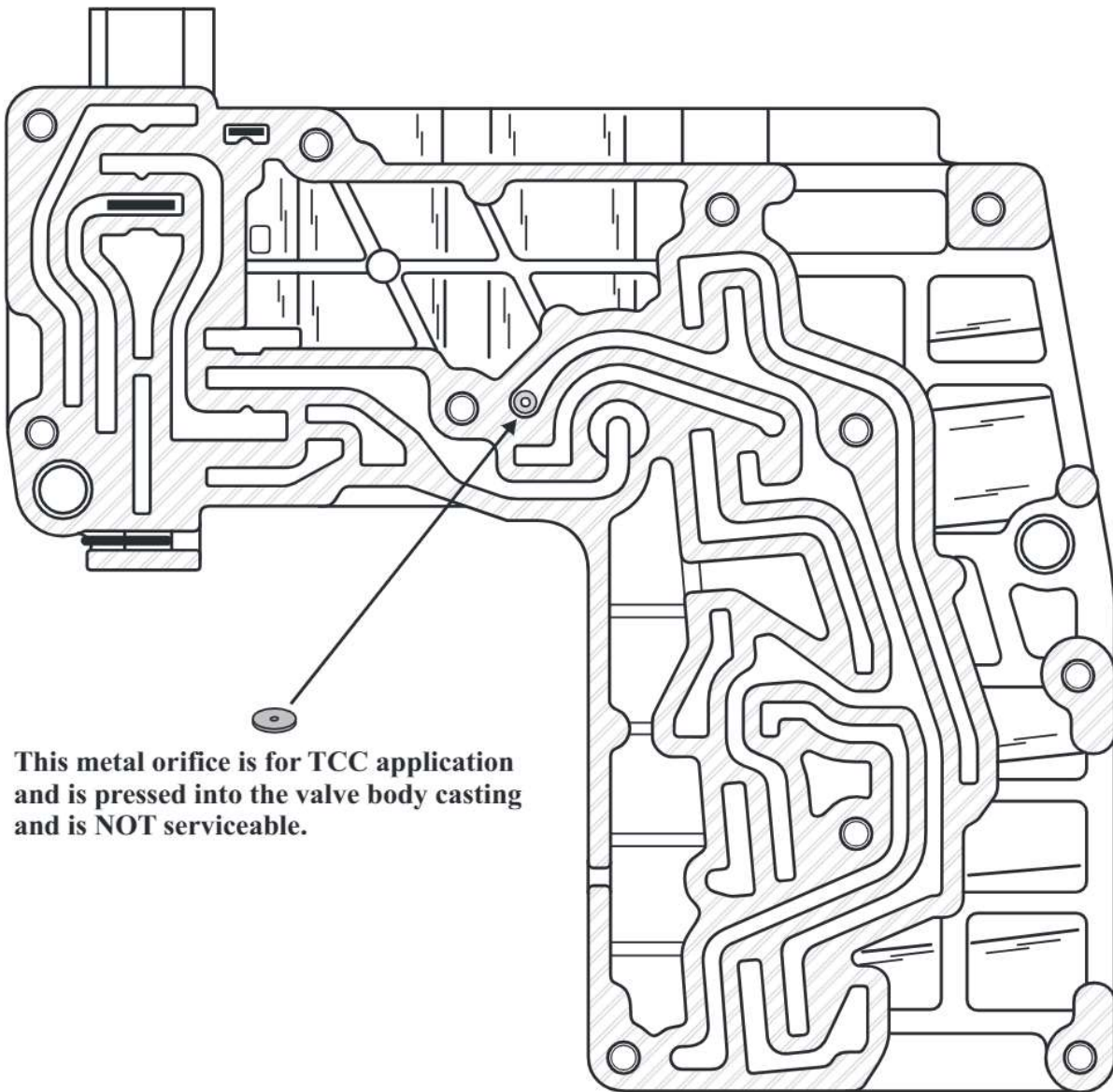
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VOLVO/SAAB/NISSAN AW55-50SN/RE5F22A REAR VALVE BODY (REAR SIDE)



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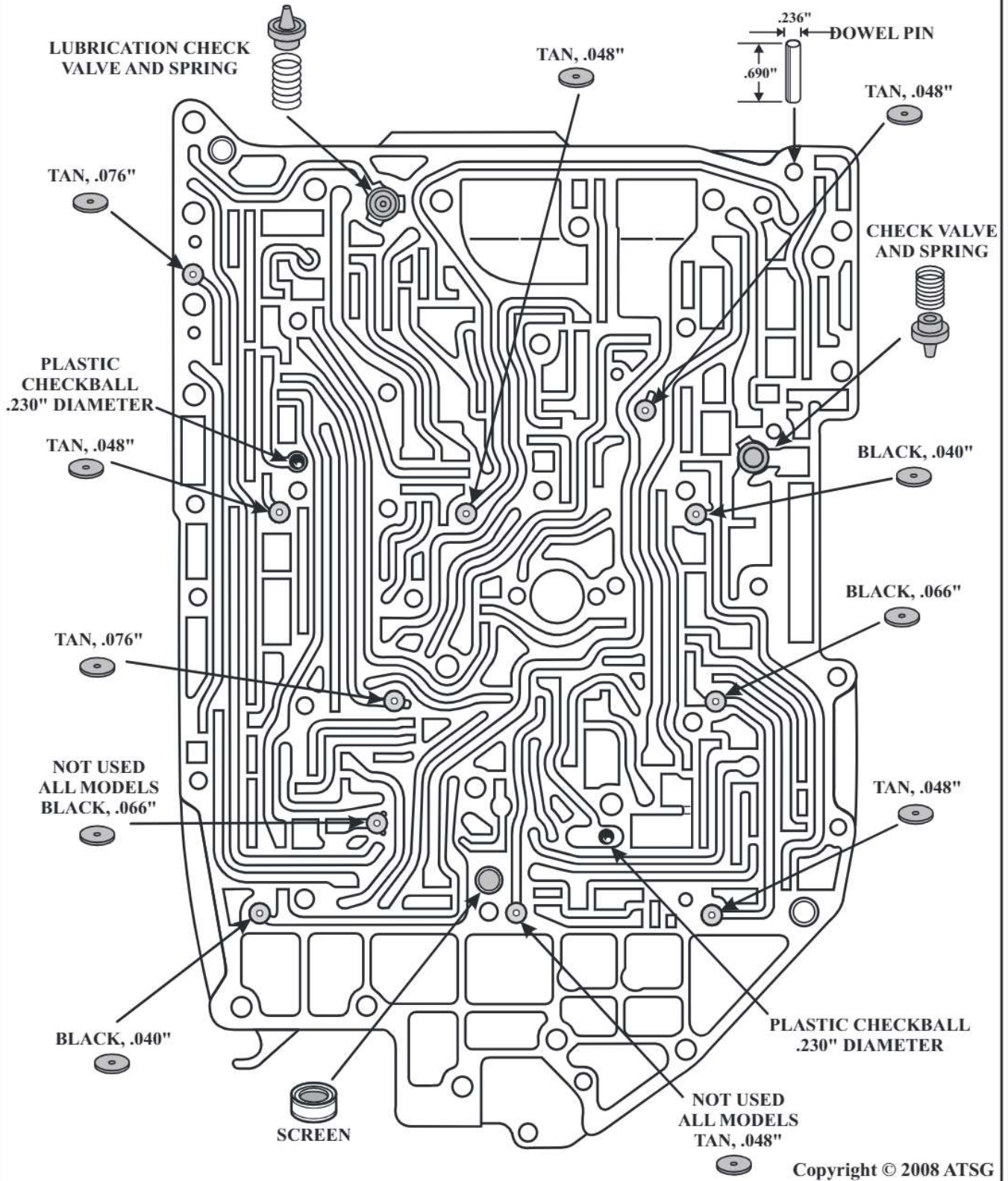
BMW ZF5HP18 SOLENOID VALVE BODY



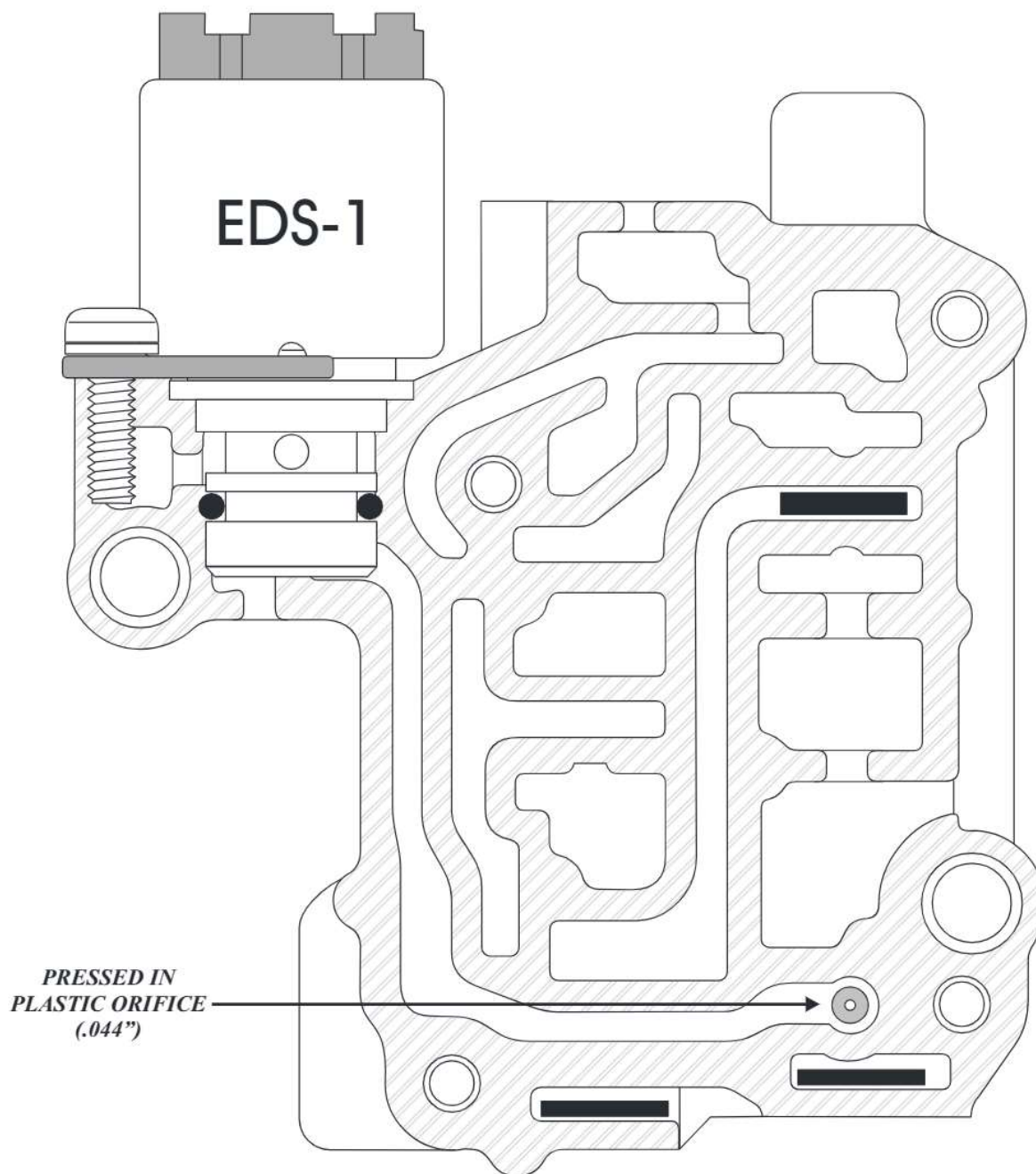
**This metal orifice is for TCC application
and is pressed into the valve body casting
and is NOT serviceable.**

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BMW ZF5HP18 CHANNEL PLATE

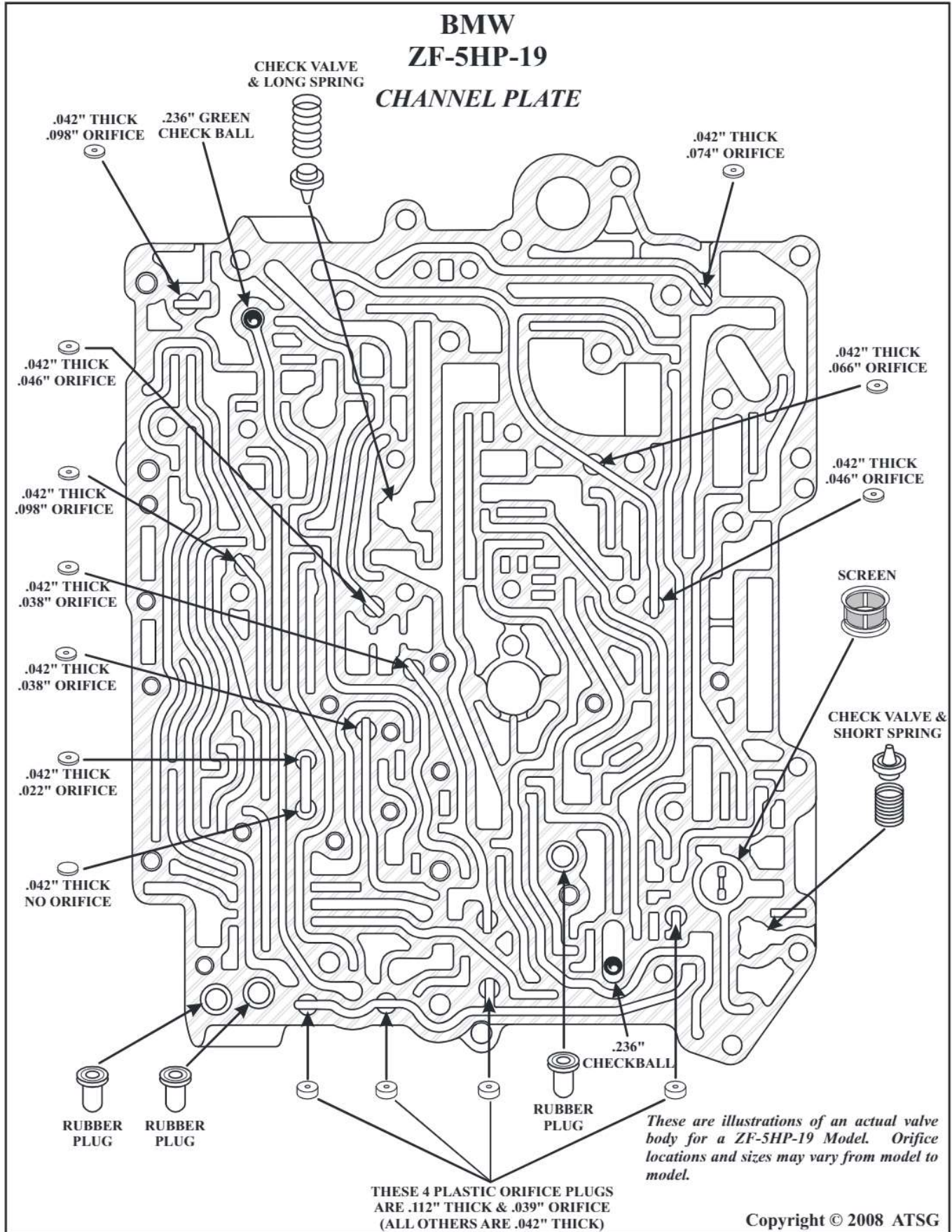


BMW ZF-5HP-19 UPPER REAR VALVE BODY

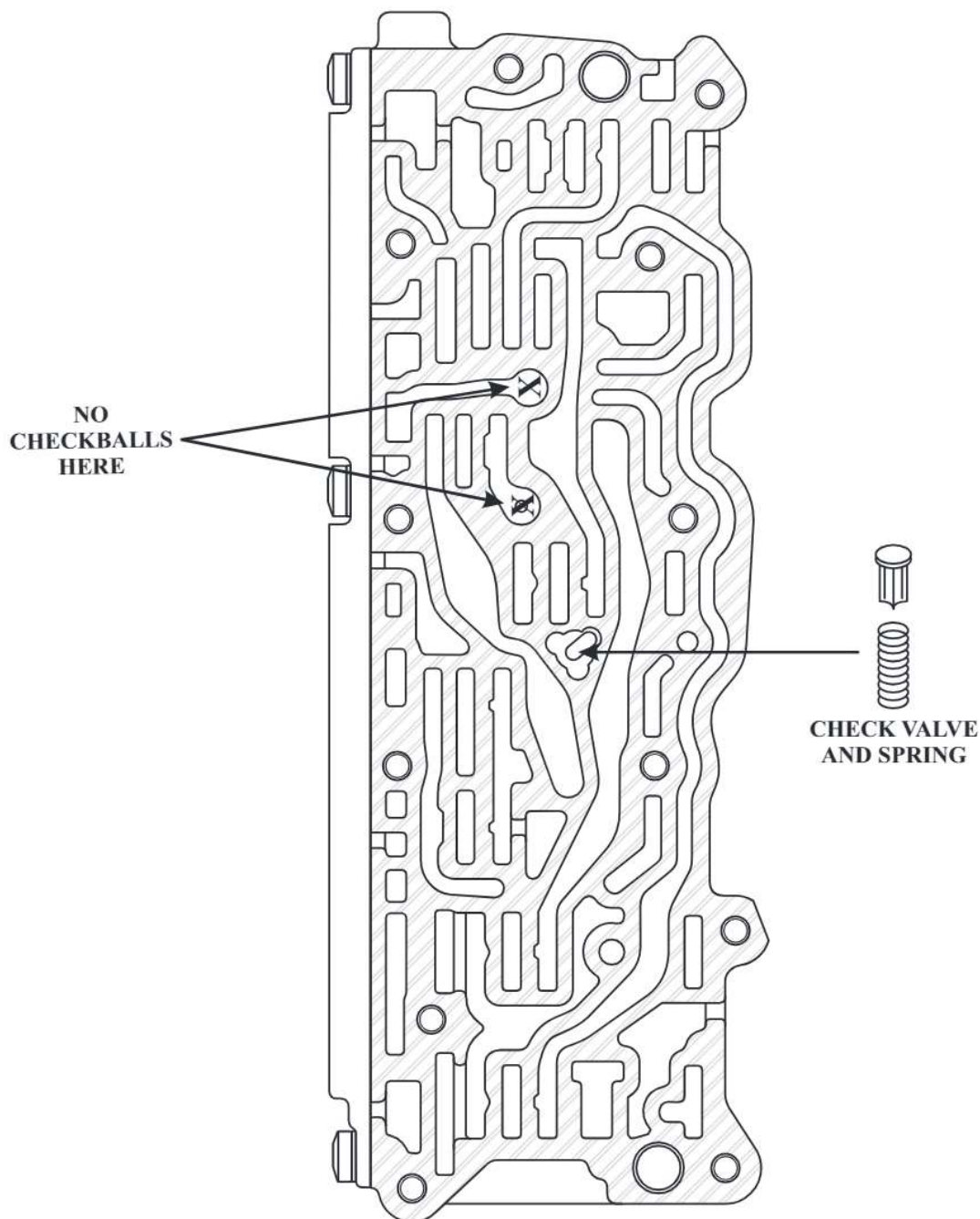


NOTE: This transmission can also be found in Audi and Volkswagen (01V/01L), small parts locations may be different.

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BMW ZF5HP24 UPPER VALVE BODY

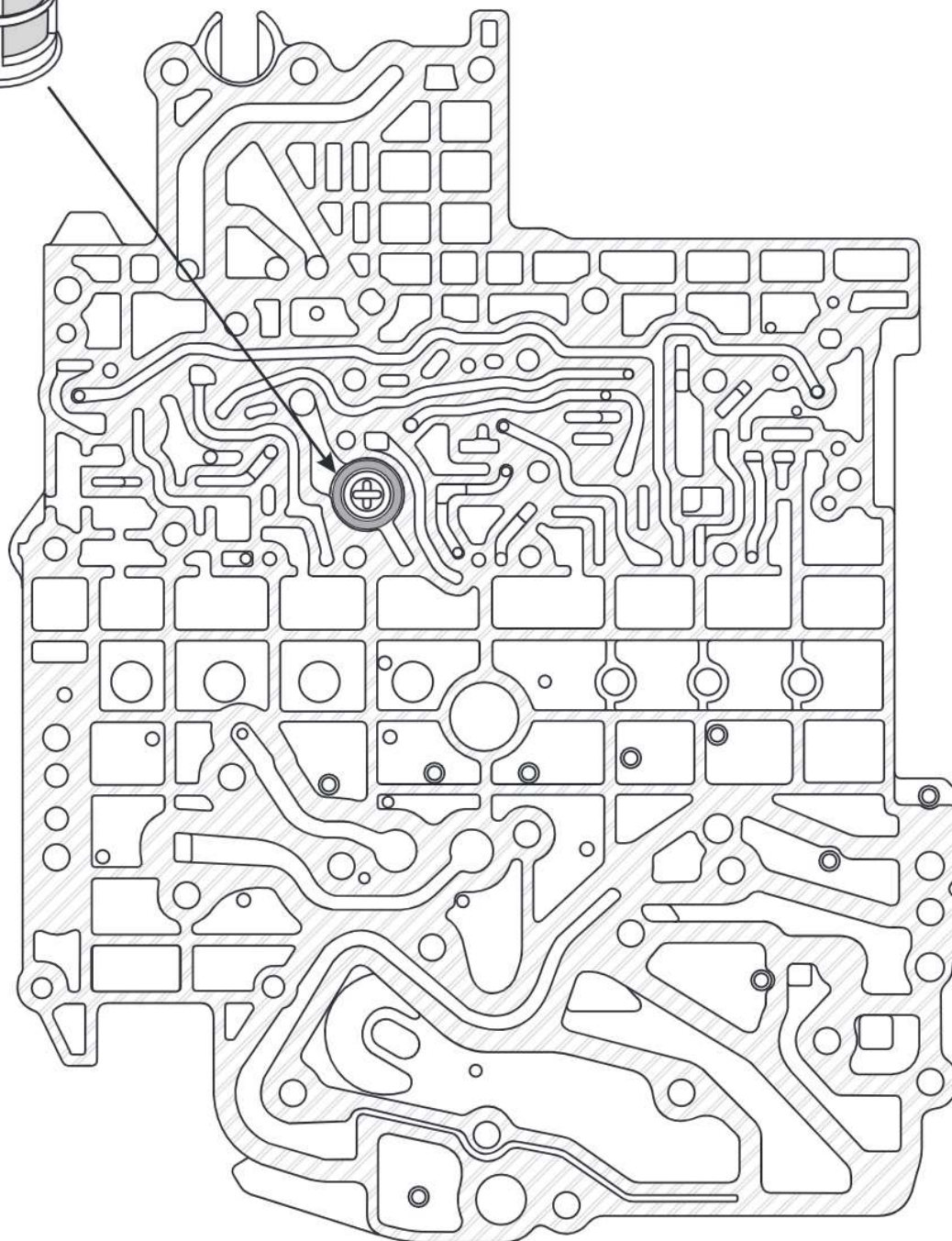
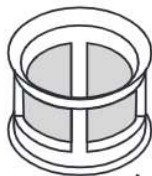


NOTE: This transmission can also be found in Jaguar and Land Rover, small parts locations may be different.

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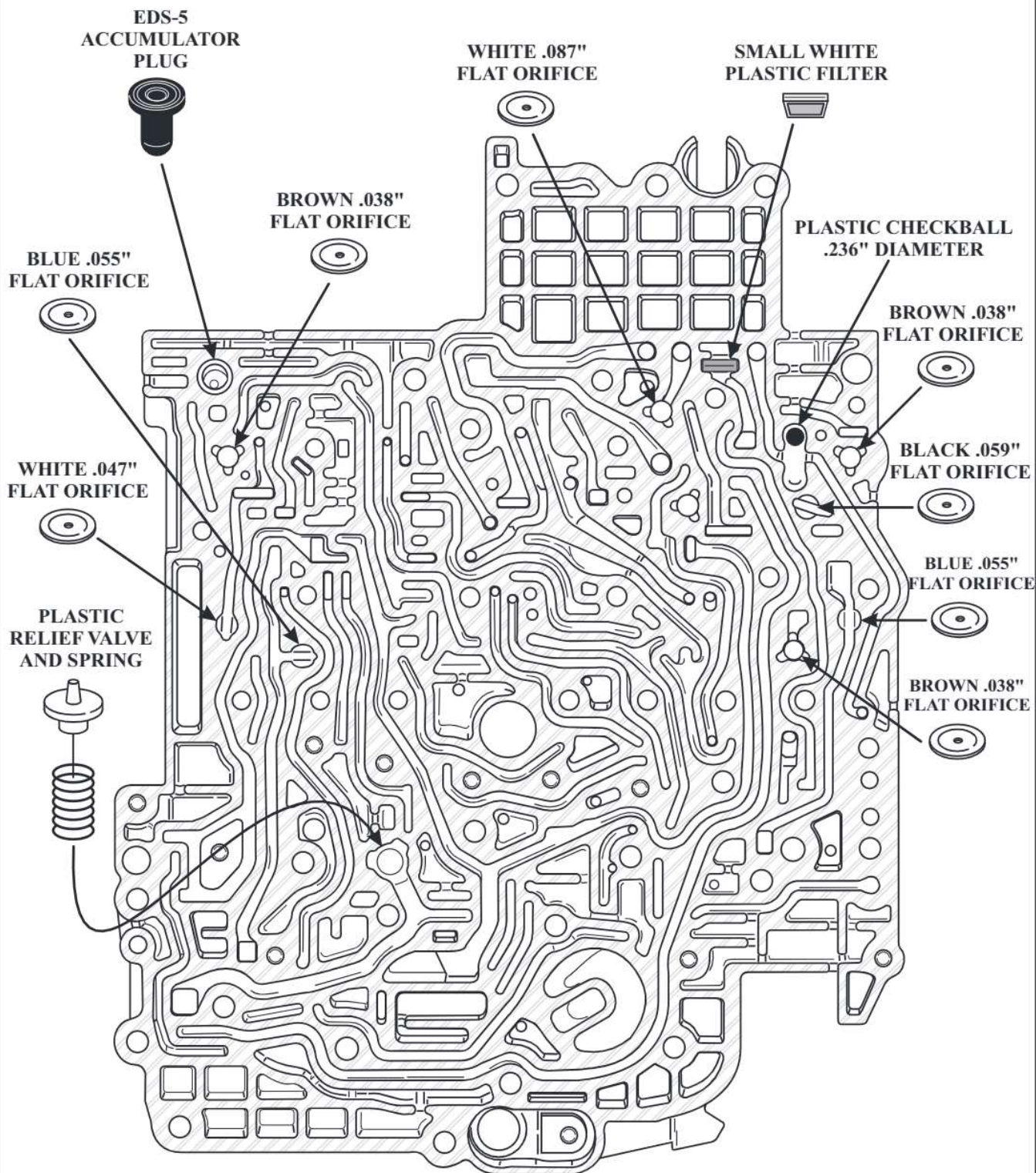
BMW
ZF5HP24
CHANNEL PLATE - BOTTOM

ROUND SCREEN



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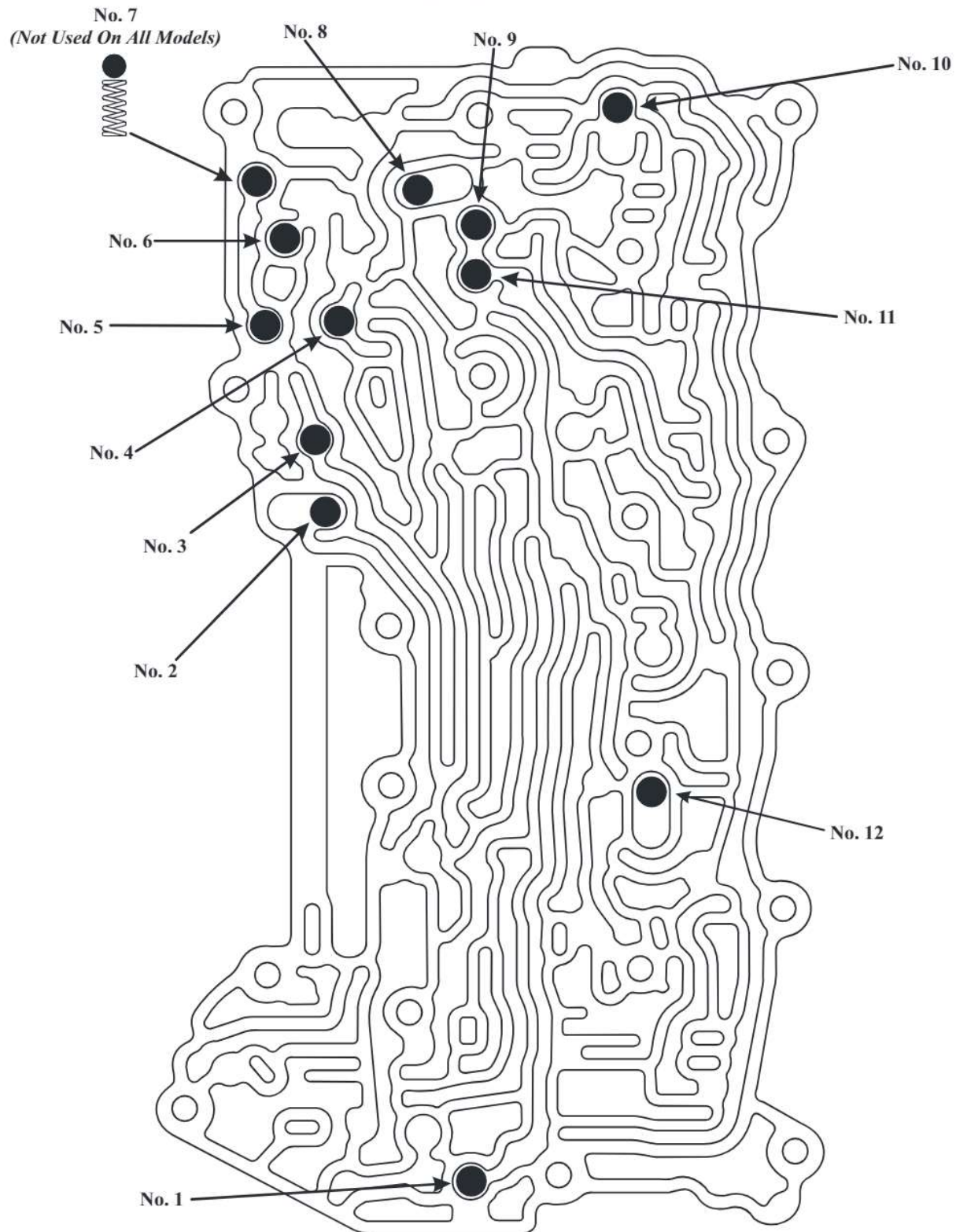
BMW ZF5HP24 CHANNEL PLATE - TOP



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BMW 5L40E

BOTTOM CHANNEL PLATE



NOTE: All Checkballs Are .254" (6.5MM) Plastic

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BMW 5L40E

CHECKBALL FUNCTION

Check Ball No. 1: Seats to force reverse lockout fluid through orifice 13 in the spacer plate, and into the reverse clutch circuit to help control the apply rate of the reverse clutch.

Check Ball No. 2: Seats to allow either reverse fluid (In Reverse) or 2345 fluid (In 2nd, 3rd, 4th, and 5th) to enter the reverse or 2345 circuit, while blocking the other fluid circuit.

Check Ball No. 3: Seats to force four five fluid through orifice 27 in the spacer plate and into the overdrive clutch feed circuit to help control the apply rate of the overdrive clutch.

Check Ball No. 4: Seats to force 123 fluid through orifice 16 in the spacer plate and into the coast clutch feed circuit to help control the apply rate of the coast clutch.

Check Ball No. 5: Seats to force forward clutch fluid through orifice 17 in the spacer plate to help control the apply rate of the coast clutch.

Check Ball No. 6: Seats to force forward clutch fluid through orifice 15 in the spacer plate and into the forward clutch circuit to help control the apply rate of the forward clutch.

Check Ball No. 7: Seated by a calibrated spring that goes in channel plate before the check ball and provides extra D432 fluid in the forward and coast clutch circuits to reduce garage shift response time.

NOTE: Not used in all models.

Check Ball No. 8: Seats to allow either low/reverse clutch fluid (In 1st gear coast condition) or reverse lockout (RLO) fluid (In Reverse) to enter the low/reverse clutch or reverse lockout circuit, while blocking the other fluid circuit.

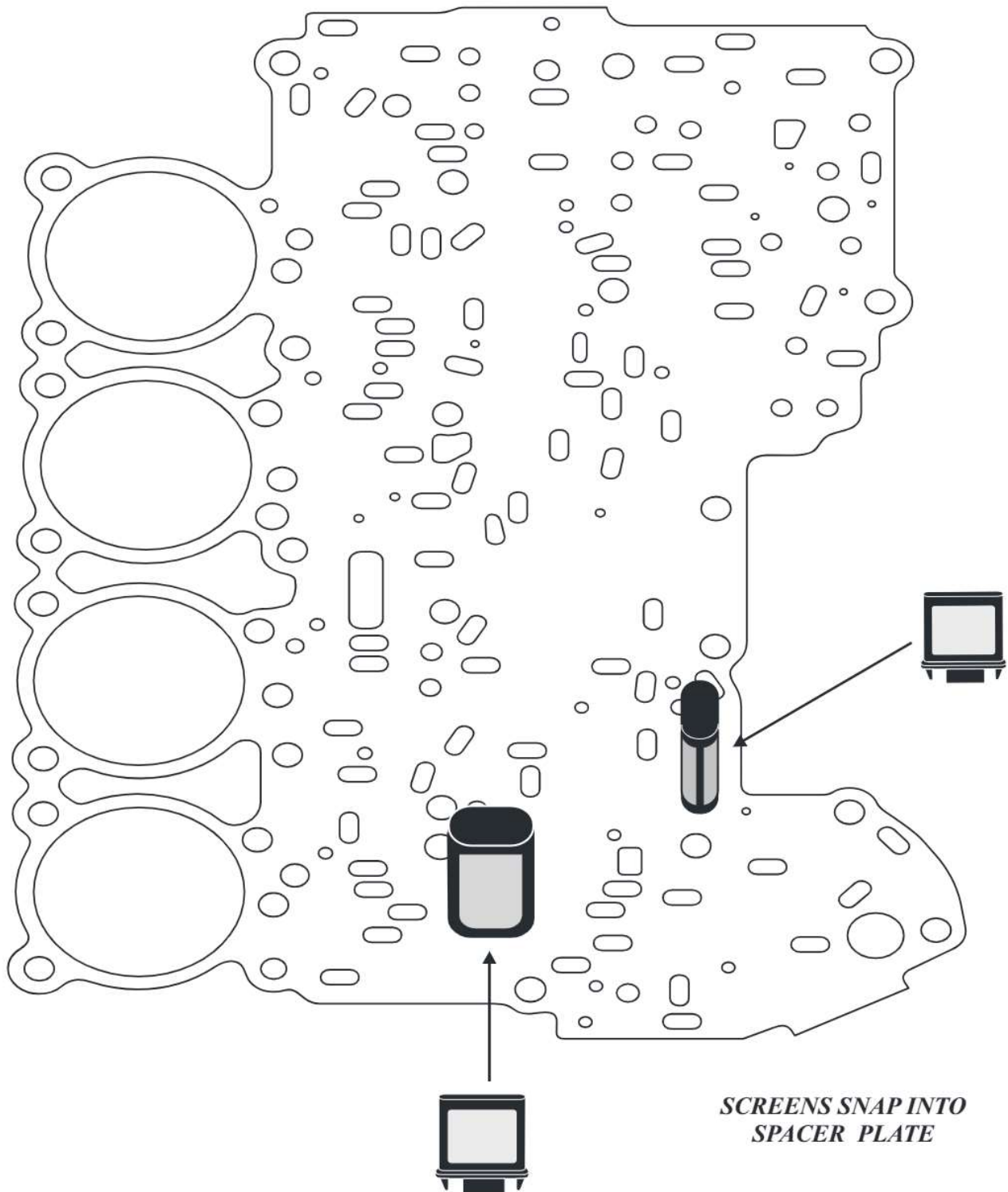
Check Ball No. 9: Seats to force two-three regulated fluid through orifice 22 in the spacer plate and into the overdrive clutch feed 1 circuit to help control the apply rate of the overdrive clutch when in a 3rd gear coast condition.

Check Ball No. 10: Seats to allow either three-two safety mode fluid (Safety Mode Operation Only) or FDL fluid (In 1st Gear) to enter the 3-2 safety mode or FDL fluid circuit while blocking the other.

Check Ball No. 11: Seats to force two-three regulated fluid through orifice 23 in the spacer plate and into the second coast clutch circuit to help control the apply rate of the 2nd coast clutch when in a 2nd gear coast condition.

Check Ball No. 12: Seats to allow either overdrive clutch feed 1 fluid (In a 3rd Gear Coast condition) or overdrive clutch feed 2 fluid (In 5th Gear) to enter the overdrive clutch circuit while blocking the other fluid circuit.

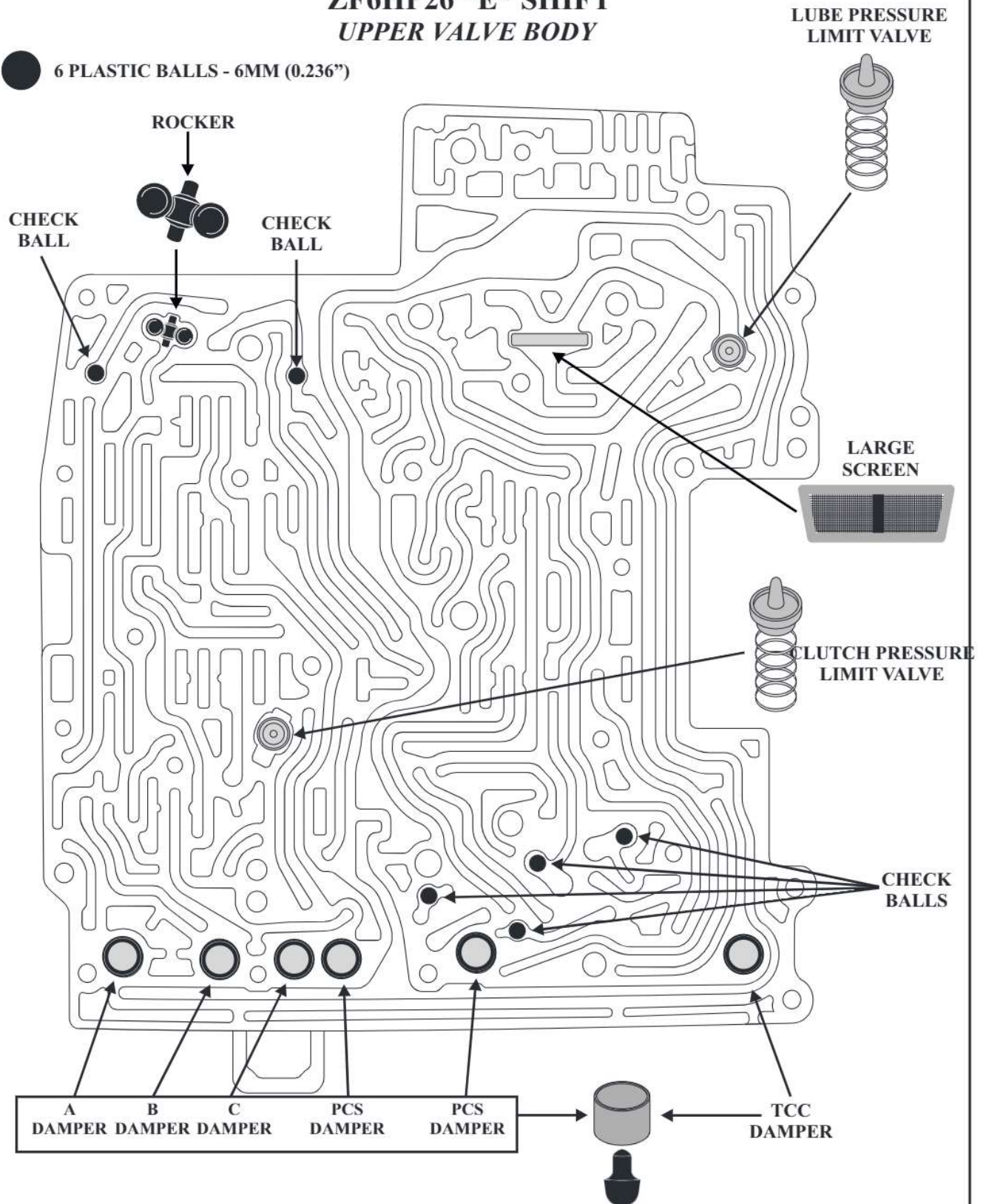
BMW 5L40E SPACER PLATE FILTERS



Copyright © 2008 ATSG

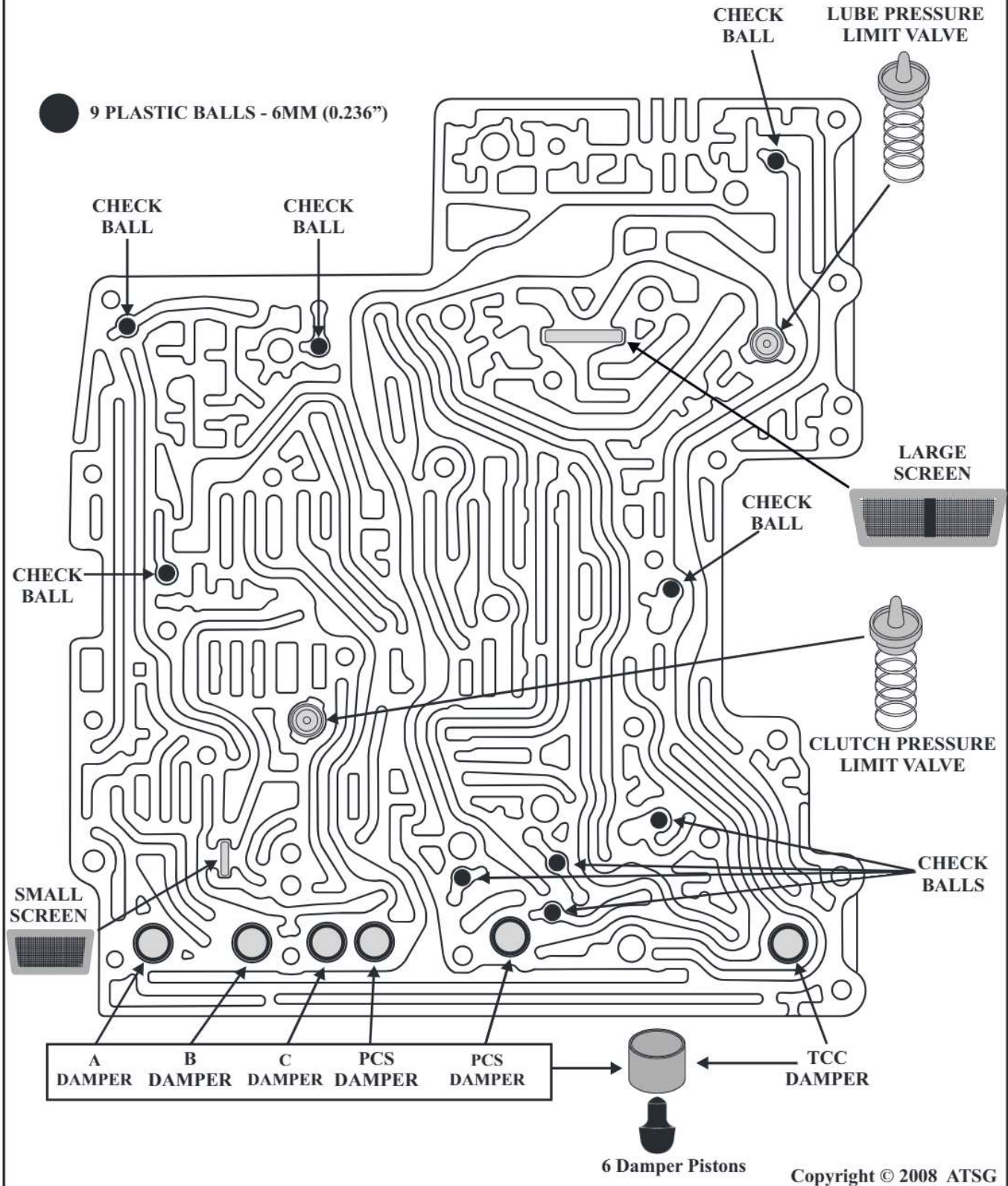
BMW ZF6HP26 "E" SHIFT UPPER VALVE BODY

● 6 PLASTIC BALLS - 6MM (0.236")

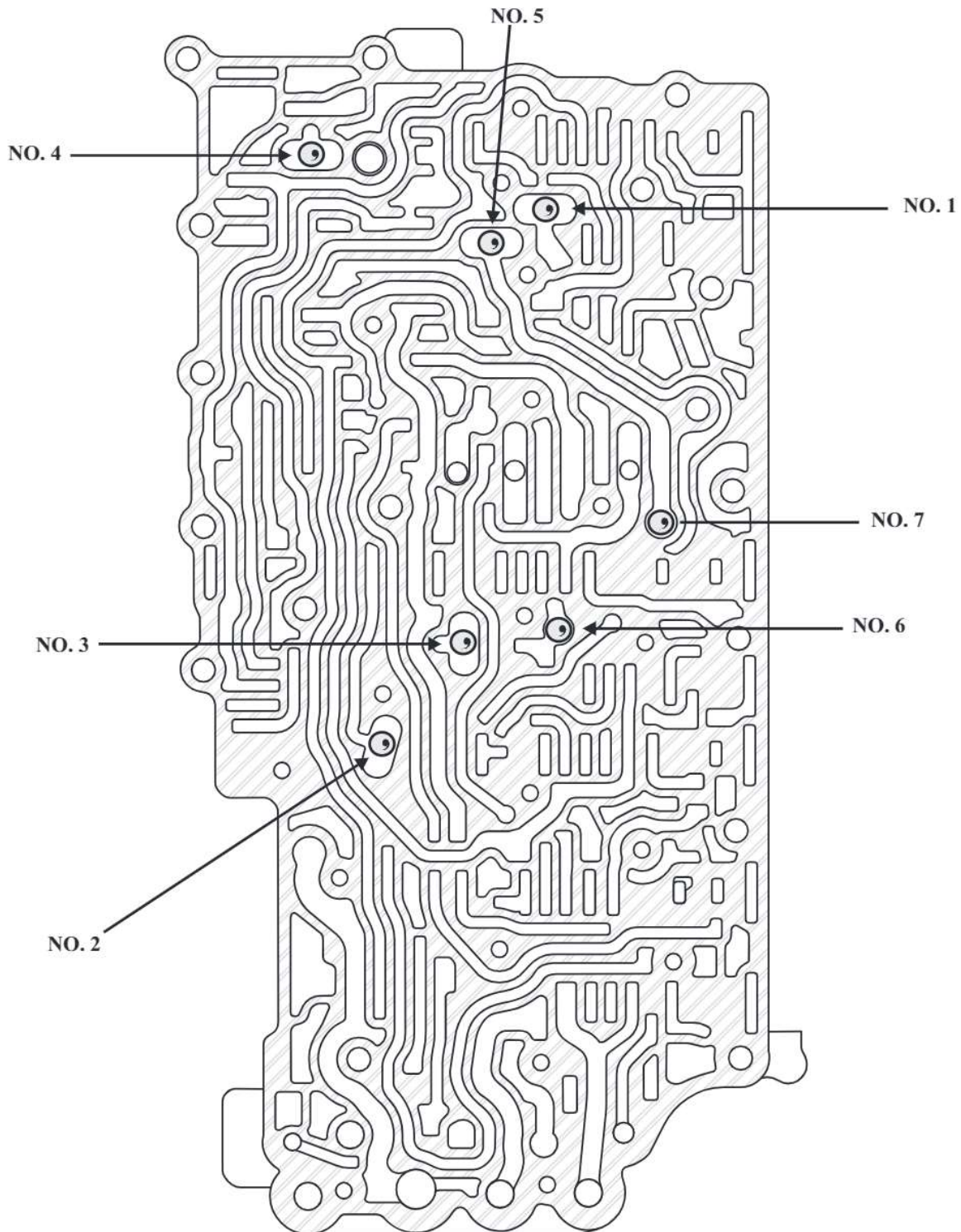


6 DAMPER PISTONS Copyright © 2008 ATSG

BMW/JAGUAR ZF6HP26 "M" SHIFT UPPER VALVE BODY



BMW 6L45 UPPER VALVE BODY



All Checkballs Are .250" (6.35MM) White Plastic

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BMW 6L45

CHECKBALL FUNCTION

Number 1 Checkball

The number one checkball is located in the upper valve body. When the transmission is operating in Drive 1st, 2nd, 3rd, 4th, 5th or 6th gear, drive 1-6 fluid seats the checkball against the drive braking passage and enters the 2-6 clutch/1-2-3-4 clutch feed circuit to apply the 1-2-3-4 clutch.

Number 2 Checkball

The number two checkball is located in the upper valve body. This shuttle type checkball is seated against the reverse passage while the transmission is operating in Park, Neutral and Drive 1st. With the checkball in this position, shift solenoid 1 fluid enters the CSV2 enable circuit to the "clutch select valve 2". When the transmission is operating in Reverse, the checkball seats against shift solenoid 1 passage to allow reverse fluid to enter the CSV2 enable circuit and hold the "clutch select valve 2" in the applied position.

Number 3 Checkball

The number three checkball is located in the upper valve body. This shuttle type checkball is seated against the 4-5-6 clutch passage while the transmission is operating in Park, Reverse, Neutral, Drive 1st, 2nd and 3rd gear. With the checkball in this position, shift solenoid 2 fluid enters the CSV3 enable circuit to apply the "clutch select valve 3". When the transmission is operating in Drive 4th, 5th or 6th gear, the checkball seats against the shift solenoid 2 passage to allow 4-5-6 clutch fluid to enter the CSV3 enable circuit and hold the "clutch select valve 3" in the applied position.

Number 4 Checkball

The number four checkball is located in the upper valve body. This shuttle type checkball is seated against the 4-5-6 clutch passage by Pressure Solenoid 5 fluid, while the transmission is operating in Park, Reverse, Neutral, Drive 1st, 2nd and 3rd gear. With the checkball in this position, PS 5 fluid enters the CSV2 latch circuit to hold the "clutch select valve 2" in the released position. When the transmission is operating in Drive 4th, 5th or 6th gear, 4-5-6 clutch fluid seats the checkball against the PS 5 passage to allow 4-5-6 clutch fluid to enter the CSV2 latch circuit to hold the "clutch select valve 2" in released the position.

Number 5 Checkball

The number five checkball is located in the upper valve body. This shuttle type checkball is seated against the Drive 1-6 passage by 3-5/Reverse Feed fluid while the transmission is operating in Reverse. With the checkball in this position, 3-5/Reverse Feed fluid enters the 3-5/Reverse Supply circuit and is routed to the number 7 checkball. When the transmission is operating in Drive 1st, 2nd, 3rd, 4th, 5th or 6th gear, Drive 1-6 fluid seats the ball against the 3-5/Reverse Feed passage to allow Drive 1-6 fluid to enter the 3-5/Reverse Supply circuit.

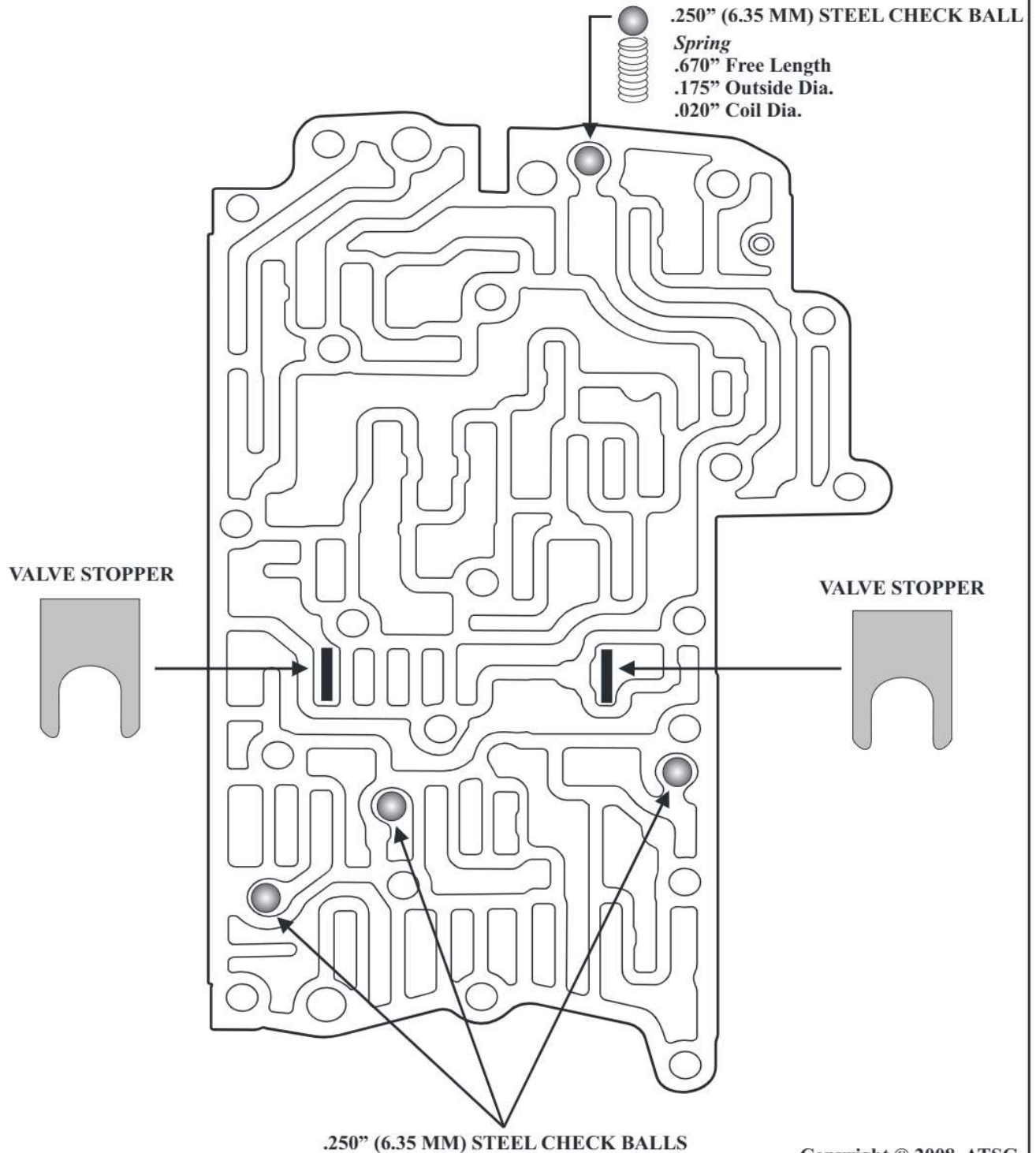
Number 6 Checkball

The number six checkball is located in the upper valve body. This "one way orifice control" type checkball is used to differentiate the flow rate of fluid between applying and releasing the 1-2-3-4 clutch. 2-6 clutch/1-2-3-4 clutch feed fluid opens the checkball, while the transmission is operating in Drive 1st, 2nd, 3rd, 4th, 5th or 6th gear. With the ball in this position, 2-6 clutch/1-2-3-4 clutch feed fluid flows freely into the 1-2-3-4 clutch feed passage. When Park, Reverse or Neutral is selected after the transmission was operating in Drive, exhausting 1-2-3-4 clutch feed fluid seats the checkball, and forces exhausting fluid through orifice number 32, which allows for a controlled exhaust of the 1-2-3-4 clutch.

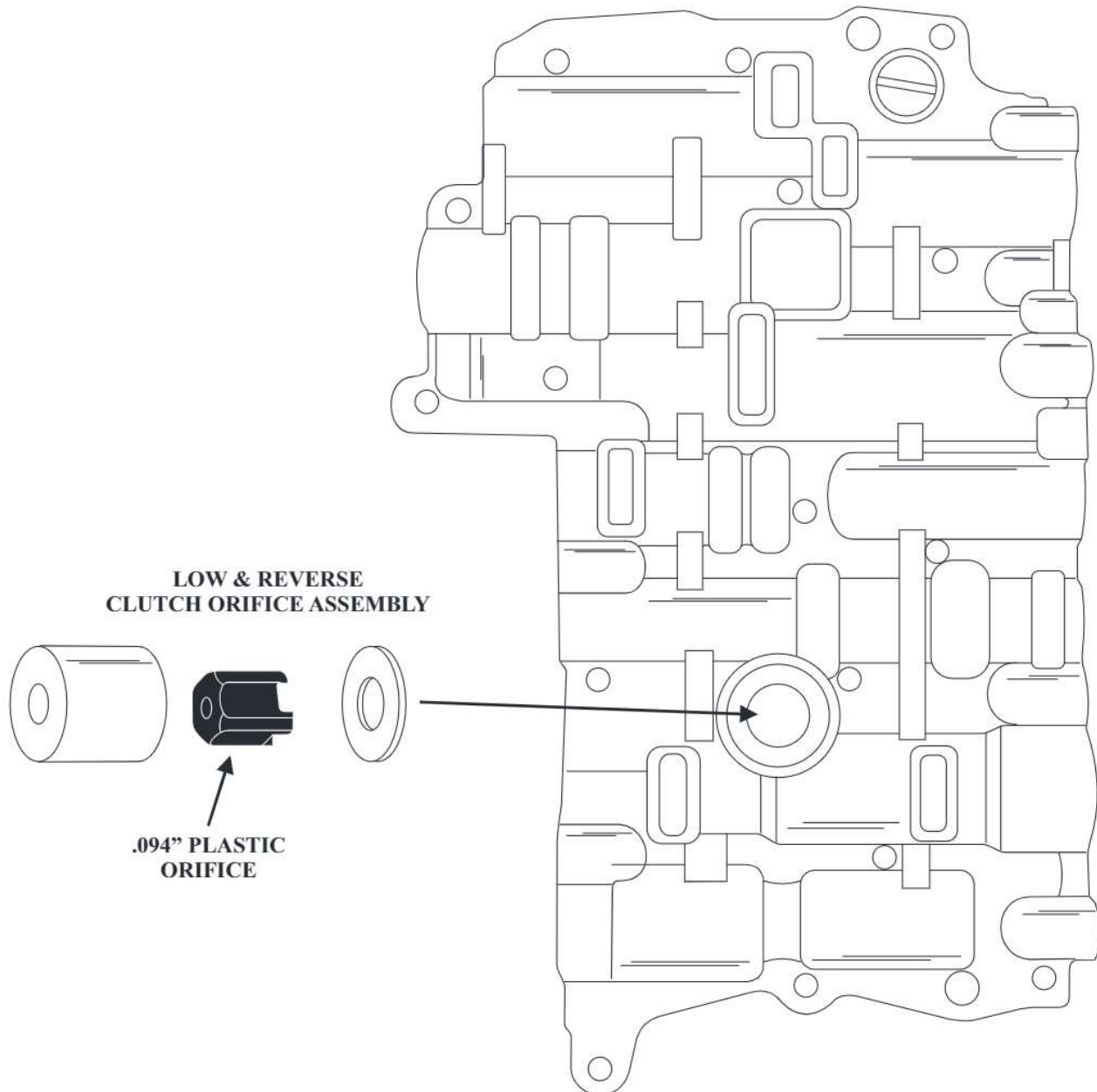
Number 7 Checkball

The number seven checkball is located in the upper valve body. This "one way orifice control" type checkball is used to differentiate the flow rate of fluid between applying and releasing the 3-5/Reverse clutch. 3-5/Reverse Supply fluid pressure seats the checkball against the 3-5/Reverse Feed passage, while the transmission is operating in Reverse, Drive 1st, 2nd, 3rd, 4th, 5th or 6th gear. With the checkball in this position, 3-5/Reverse Supply fluid is forced through orifice number 25 before entering the 3-5/Reverse Feed passage. The orifice helps control the apply rate of the 3-5/Reverse clutch when the transmission shifts into Reverse, 3rd or 5th gear. When Park or Neutral is selected after the transmission was operating in Drive, or Reverse, exhausting 3-5/Reverse Feed fluid unseats the checkball. This allows for a faster exhaust of 3-5/Reverse Feed fluid and a quick release of the 3-5/Reverse clutch.

**HYUNDAI
A4AF1/A4AF2/A4BF1
A4AF3/A4BF2
UPPER VALVE BODY**

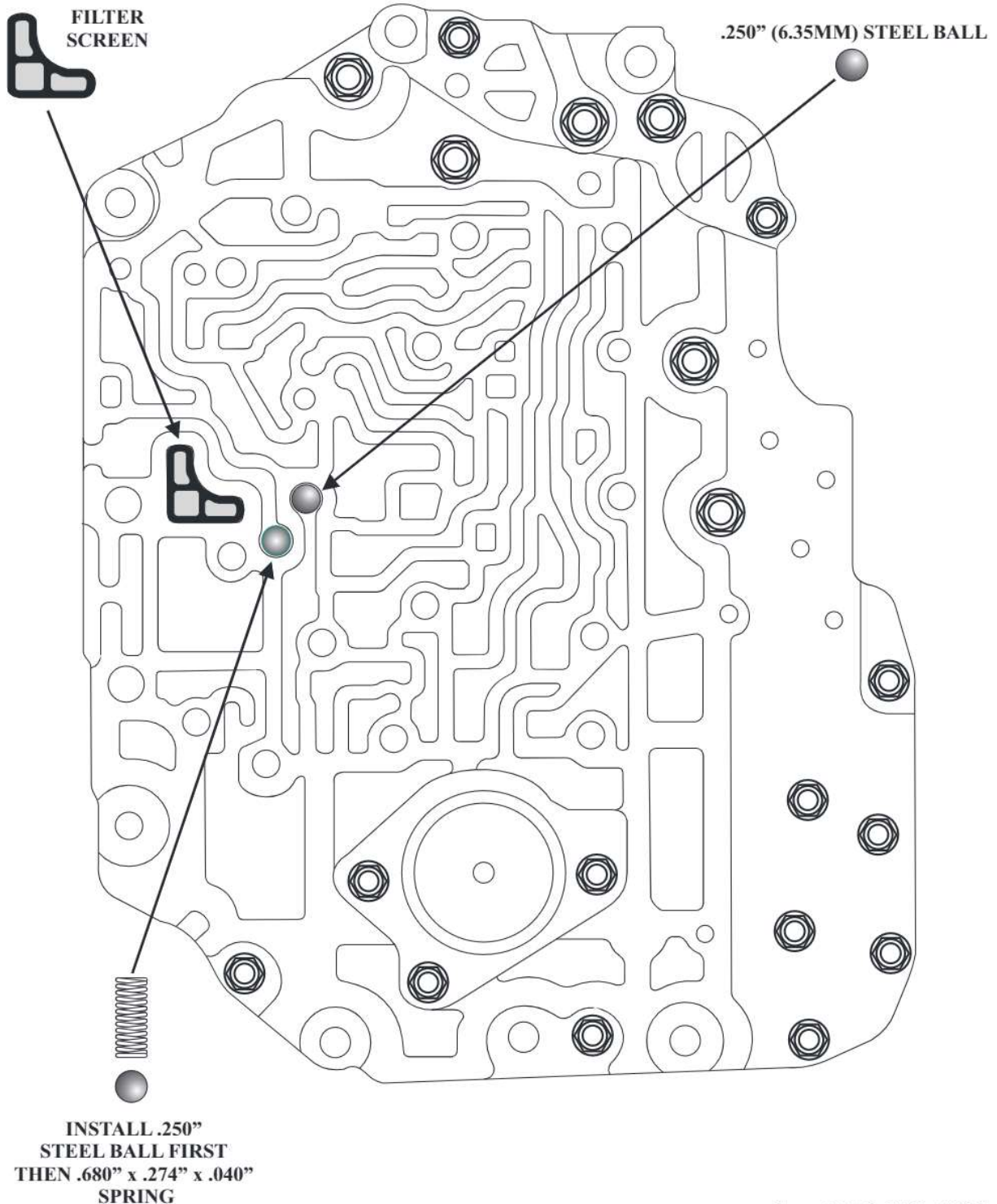


HYUNDAI
A4AF1/A4AF2/A4BF1
A4AF3/A4BF2
(REVERSE SIDE)



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HYUNDAI A4AF1/A4AF2/A4BF1 A4AF3/A4BF2 INTERMEDIATE PLATE

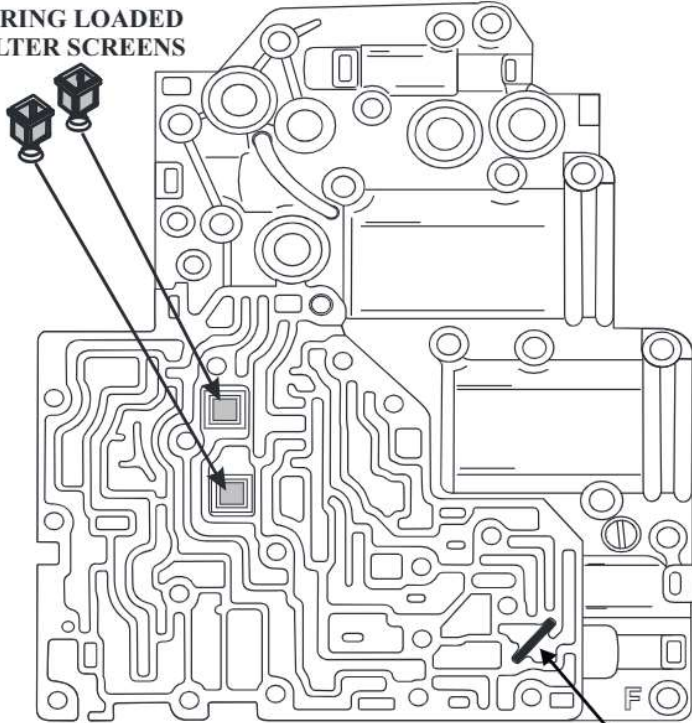


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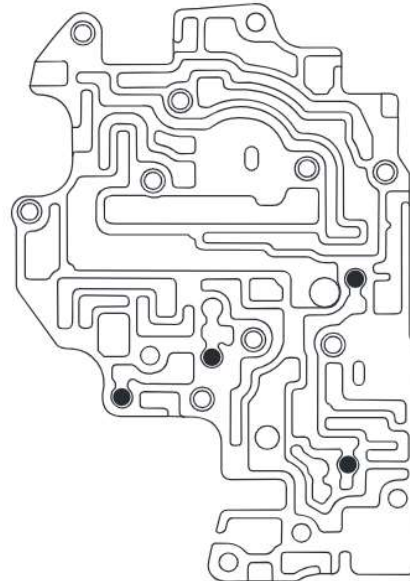
MAZDA JA5A-EL/5F31J (JF506E)

LOWER VALVE BODY

SPRING LOADED
FILTER SCREENS



UPPER VALVE BODY



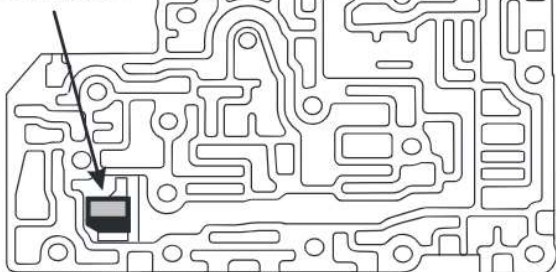
- = 9 PLASTIC BALL .218" (5.5MM) DIAMETER
- = 4 STEEL BALL .218" (5.5MM) DIAMETER

FILTER
SCREEN

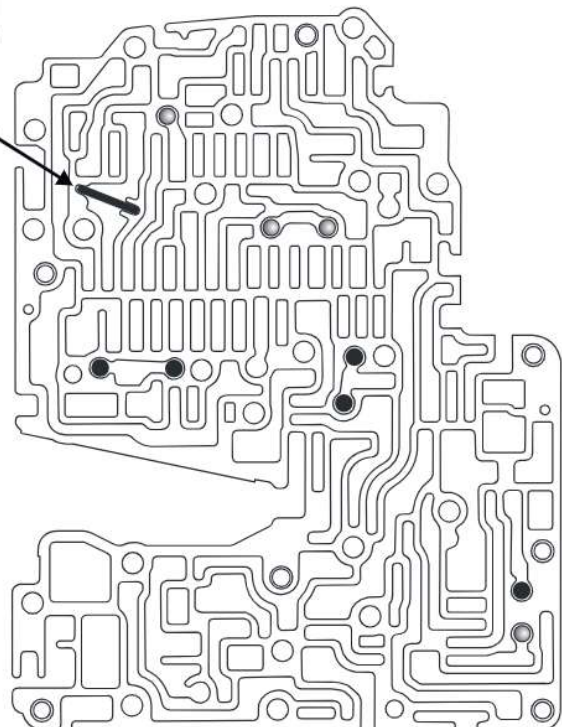
STAND OFF
FILTER SCREEN



"LEAF SPRING"
FACES DOWN



SUB LOWER VALVE BODY



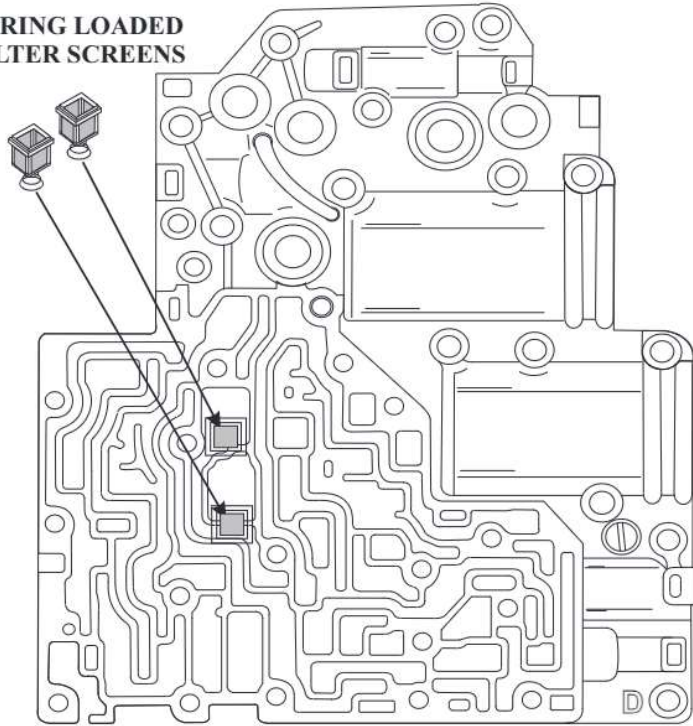
INTERMEDIATE VALVE BODY

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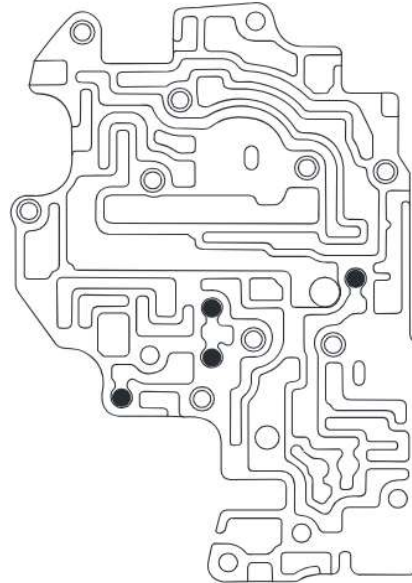
VOLKSWAGEN 09A (JF506E)

LOWER VALVE BODY

SPRING LOADED
FILTER SCREENS



UPPER VALVE BODY

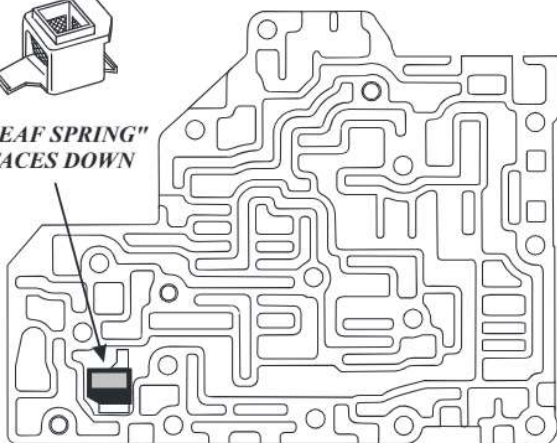


- = 9 PLASTIC BALL .218" (5.5MM) DIAMETER
- = 4 STEEL BALL .218" (5.5MM) DIAMETER

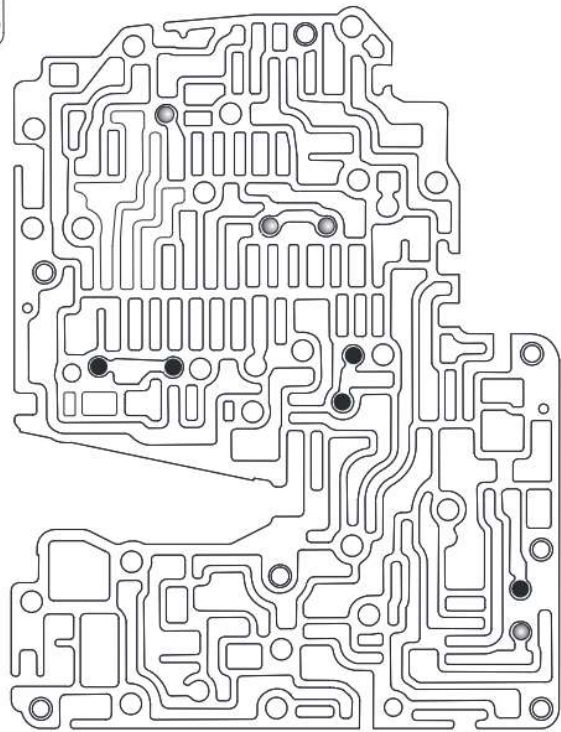
STAND OFF
FILTER SCREEN



"LEAF SPRING"
FACES DOWN



SUB LOWER VALVE BODY



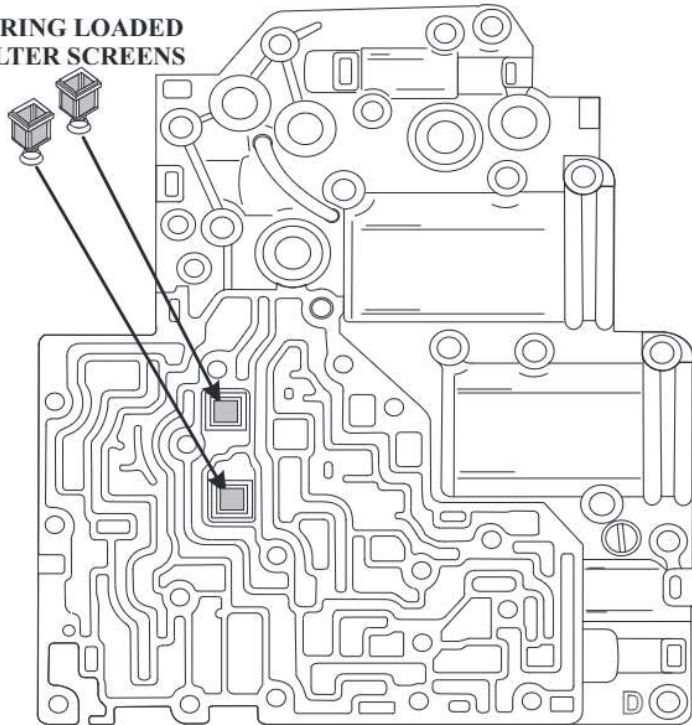
INTERMEDIATE VALVE BODY

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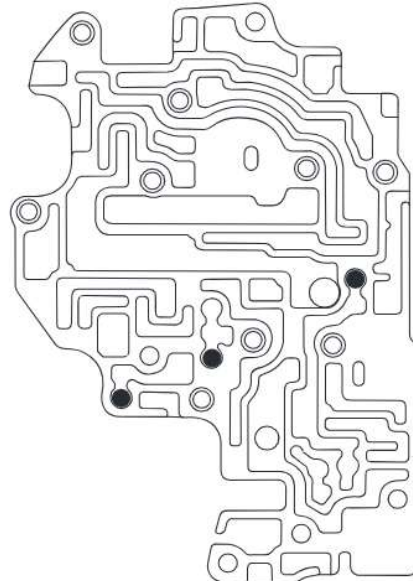
JAGUAR JF506E

LOWER VALVE BODY

SPRING LOADED
FILTER SCREENS



UPPER VALVE BODY

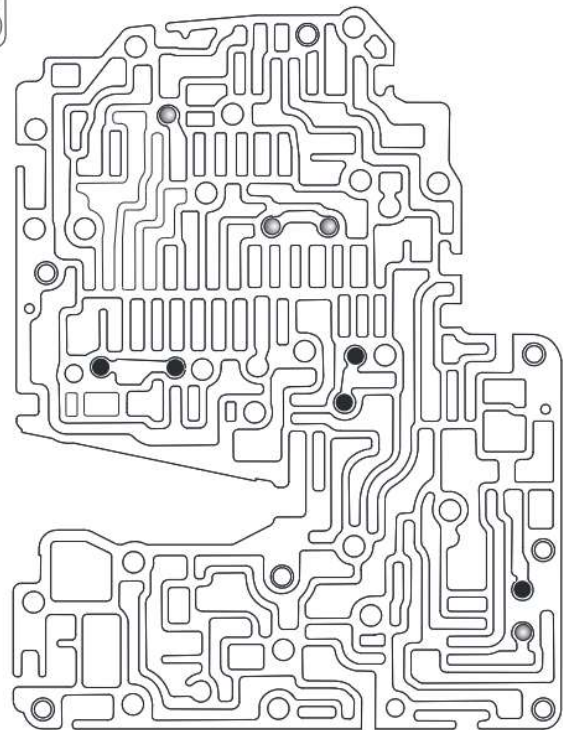
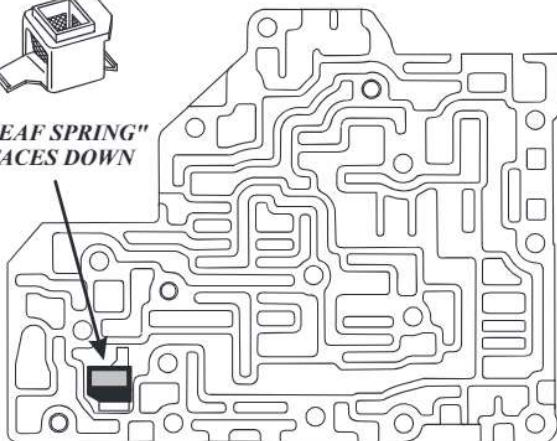


- = 8 PLASTIC BALL .218" (5.5MM) DIAMETER
- ◎ = 4 STEEL BALL .218" (5.5MM) DIAMETER

STAND OFF
FILTER SCREEN



"LEAF SPRING"
FACES DOWN



SUB LOWER VALVE BODY

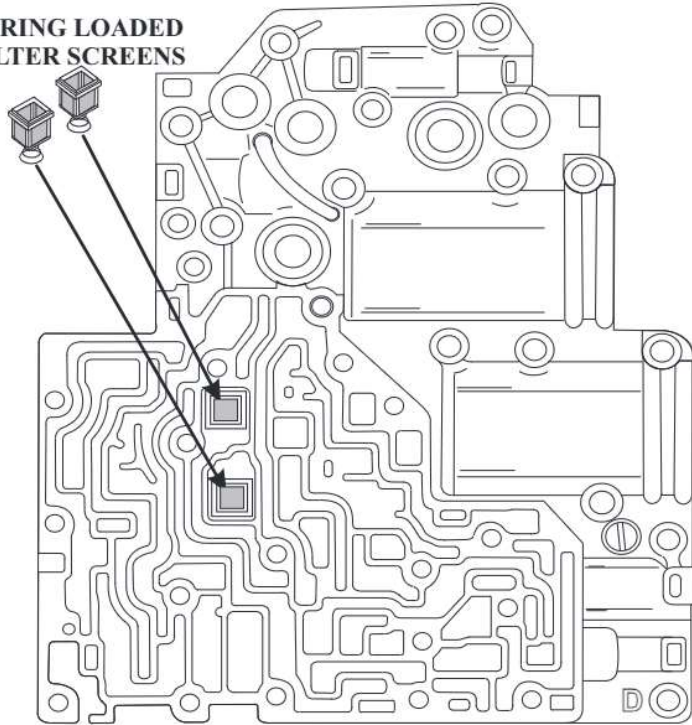
INTERMEDIATE VALVE BODY

Copyright © 2008 ATSG

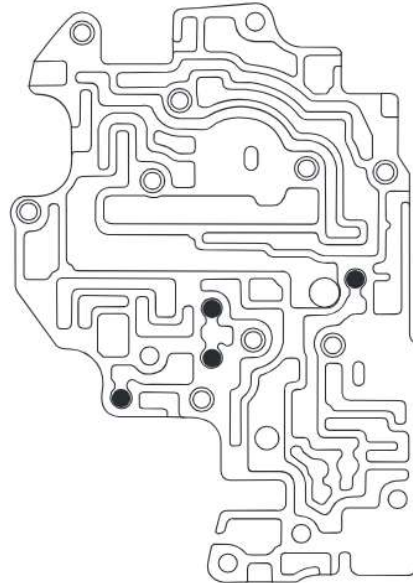
LAND ROVER FREELANDER JF506E

LOWER VALVE BODY

SPRING LOADED
FILTER SCREENS



UPPER VALVE BODY

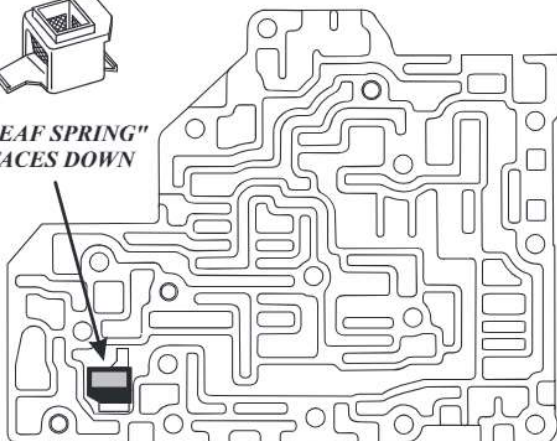


- = 9 PLASTIC BALL .218" (5.5MM) DIAMETER
- = 4 STEEL BALL .218" (5.5MM) DIAMETER

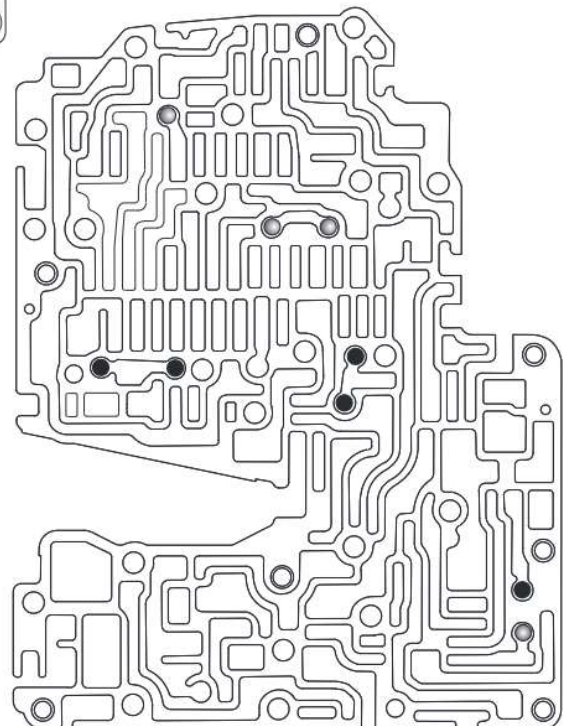
STAND OFF
FILTER SCREEN



"LEAF SPRING"
FACES DOWN



SUB LOWER VALVE BODY



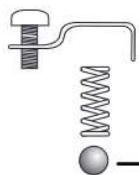
INTERMEDIATE VALVE BODY

Copyright © 2008 ATSG

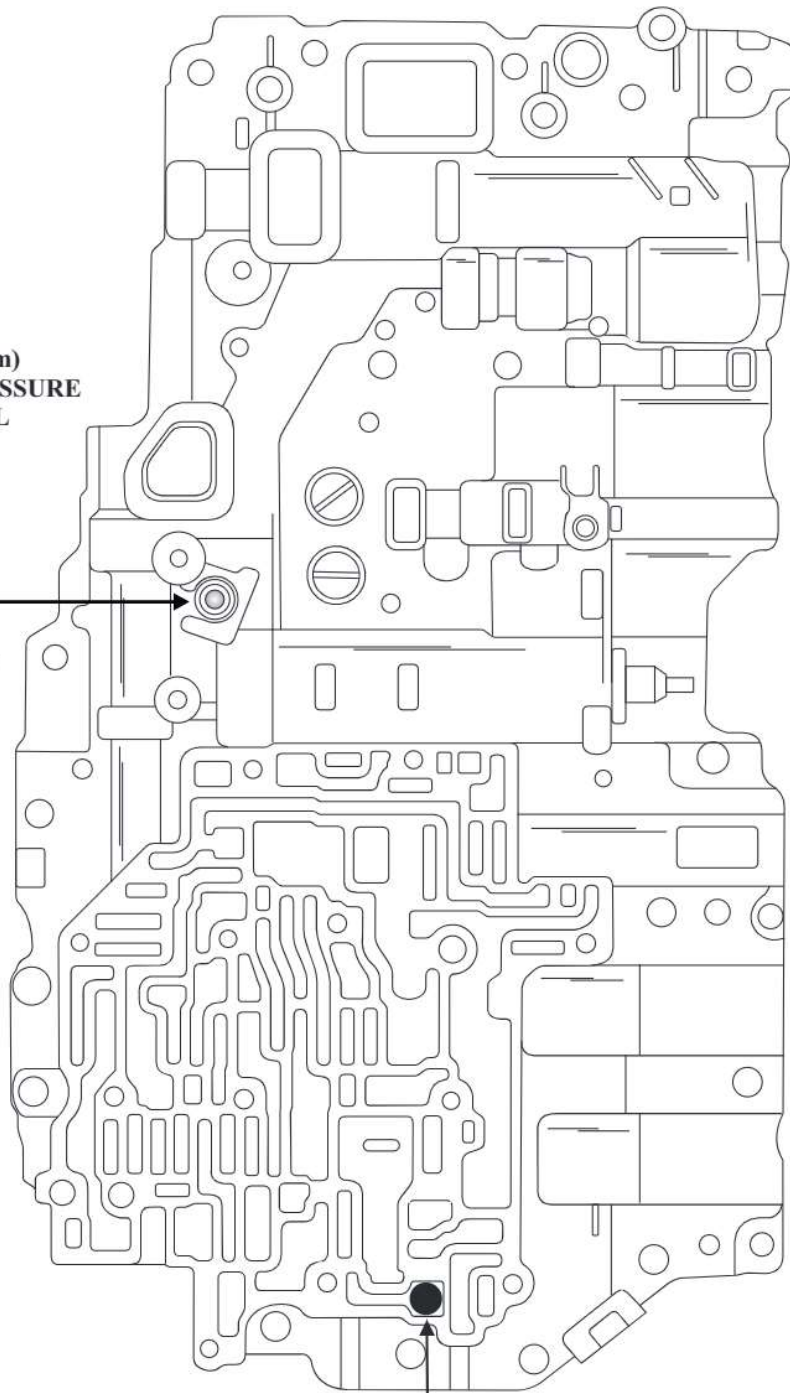
LEXUS A650E

LOWER VALVE BODY - BOTTOM SIDE (LARGE)

.312" (7.92mm)
STEEL LINE PRESSURE
LIMIT BALL



Spring
Free Length .802"
Outside Dia. .357
Coil Dia. .048"

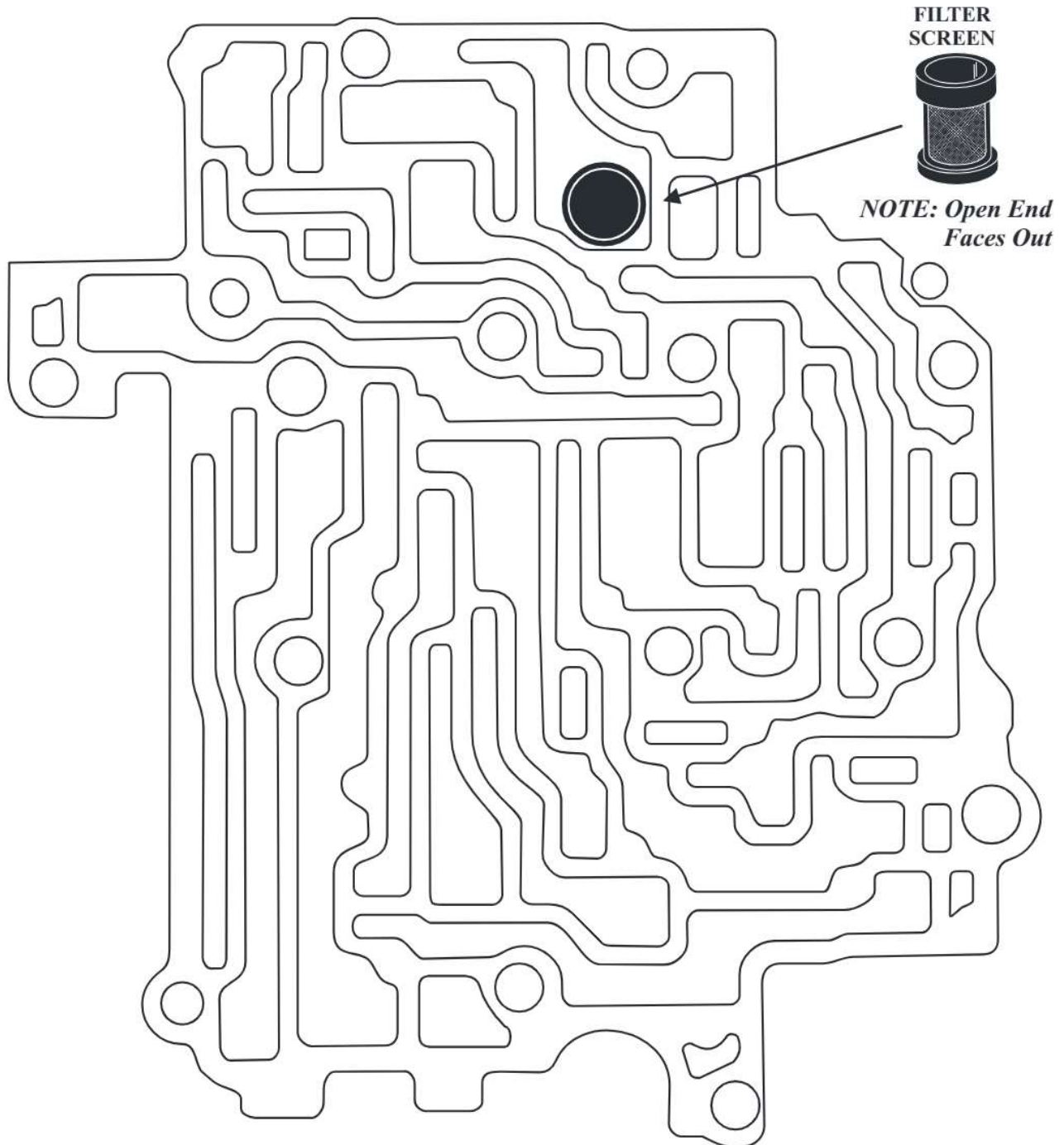


.218" (5.5mm)
PLASTIC BALL

Copyright © 2008 ATSG

**LEXUS
A650E**

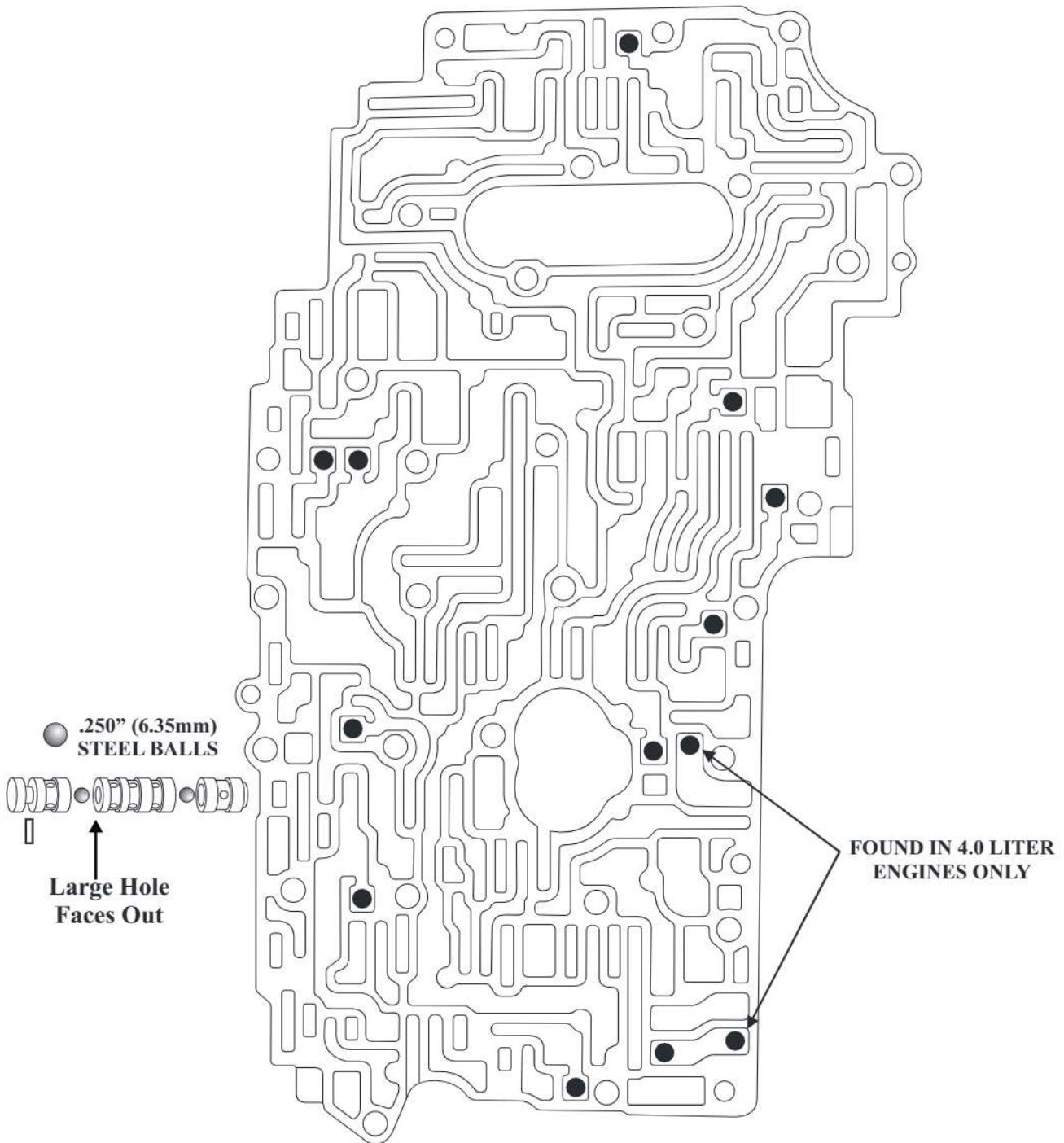
LOWER VALVE BODY - BOTTOM SIDE (SMALL)



Copyright © 2008 ATSG

LEXUS A650E

UPPER VALVE BODY

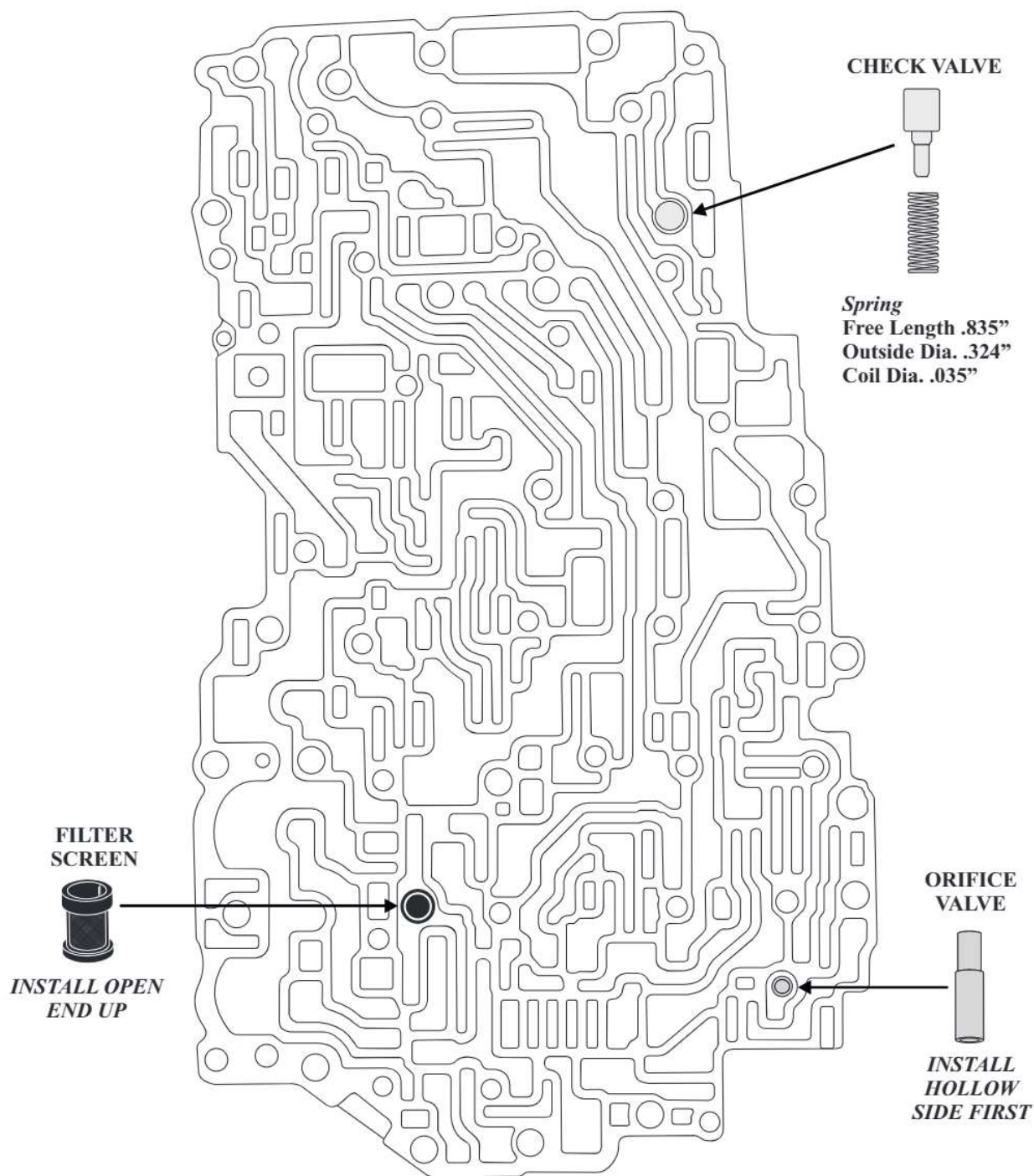


All Checkballs. 218" Plastic Balls

Copyright © 2008 ATSG

LEXUS A650E

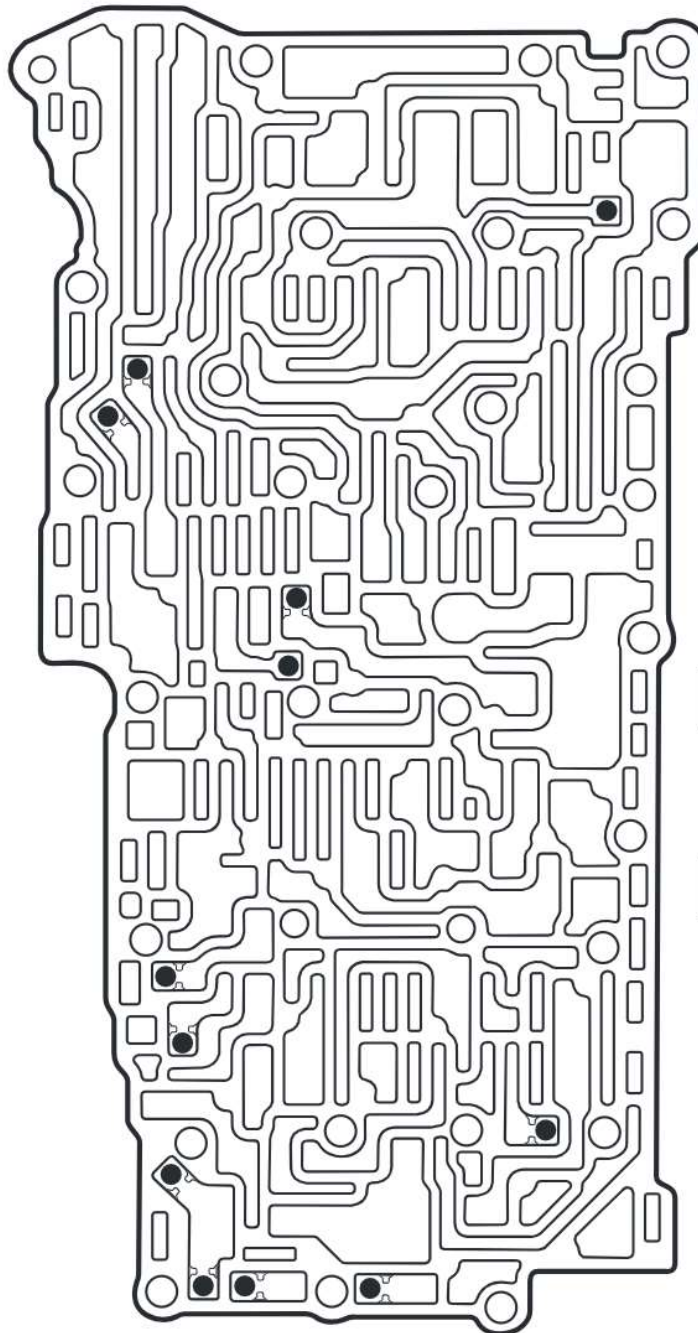
LOWER VALVE BODY



Copyright © 2008 ATSG

LEXUS A761E

UPPER VALVE BODY #1



C3 CHECK VALVE



B4 CHECK VALVE



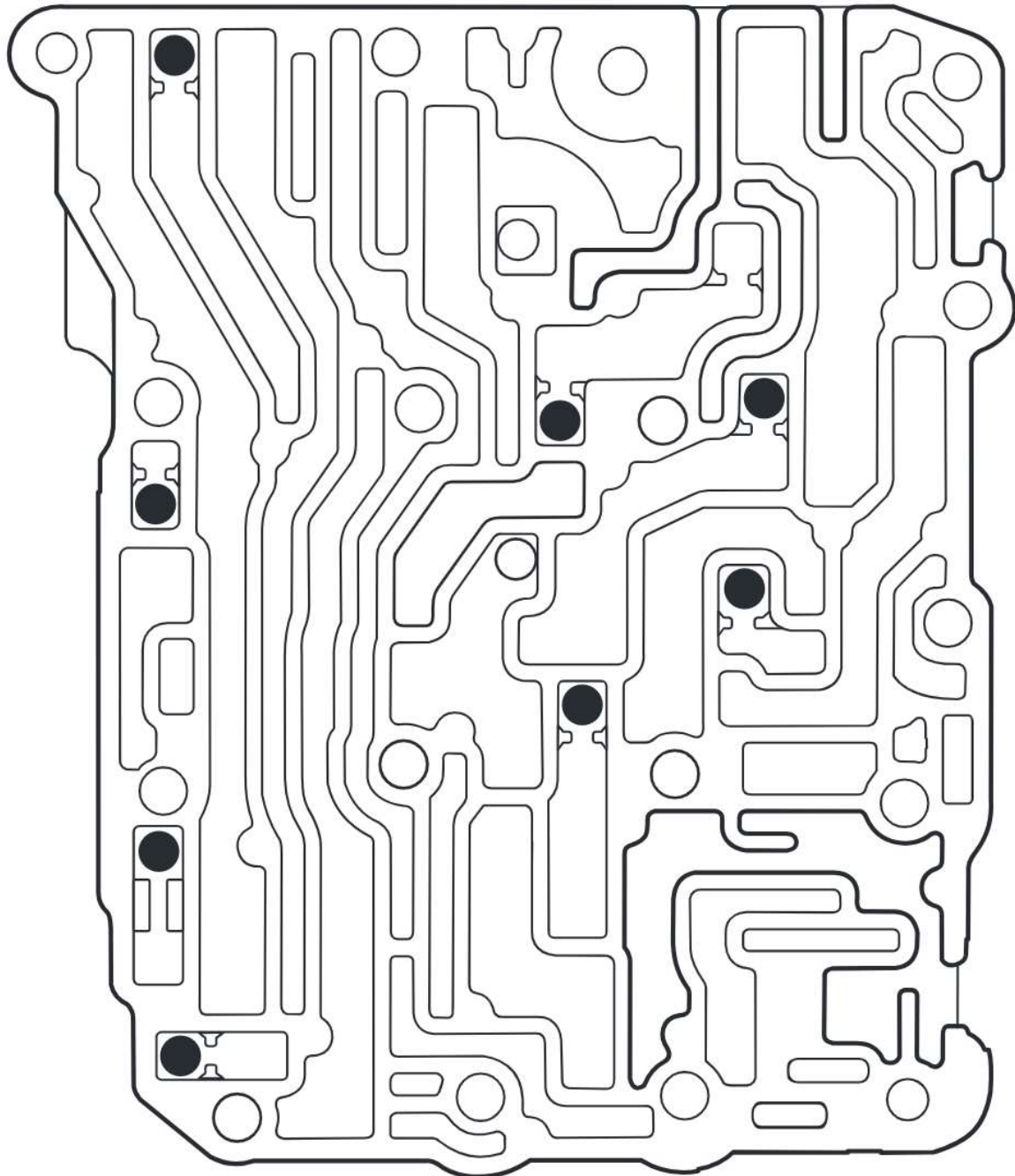
.250" (6.35mm)
STEEL BALLS

All Checkballs Are Rubber .217" (5.5mm)

Copyright © 2008 ATSG

LEXUS
A761E

UPPER VALVE BODY #2

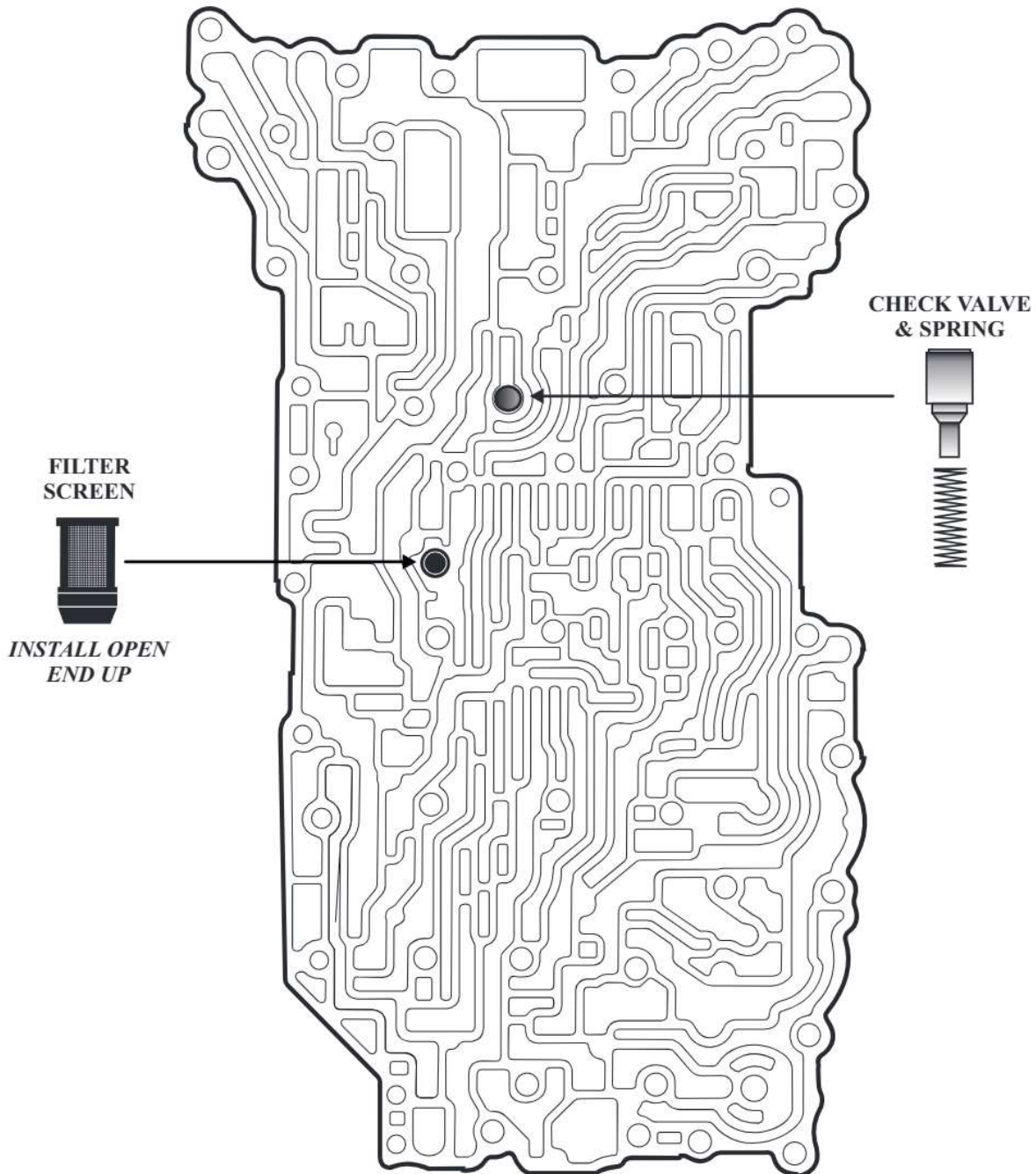


All Checkballs Are Rubber .217" (5.5mm)

Copyright © 2008 ATSG

LEXUS
A761E

LOWER VALVE BODY #1



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MAZDA AW6A-EL

SOLENOID VALVE BODY

NOTE: This is an AW6A-EL valve body from a Mazda.
This transmission is used in the other following vehicles:

Ford - AWF21

Saab - AF40-6

Volvo - AWTF-80SC

Land Rover - AWF21

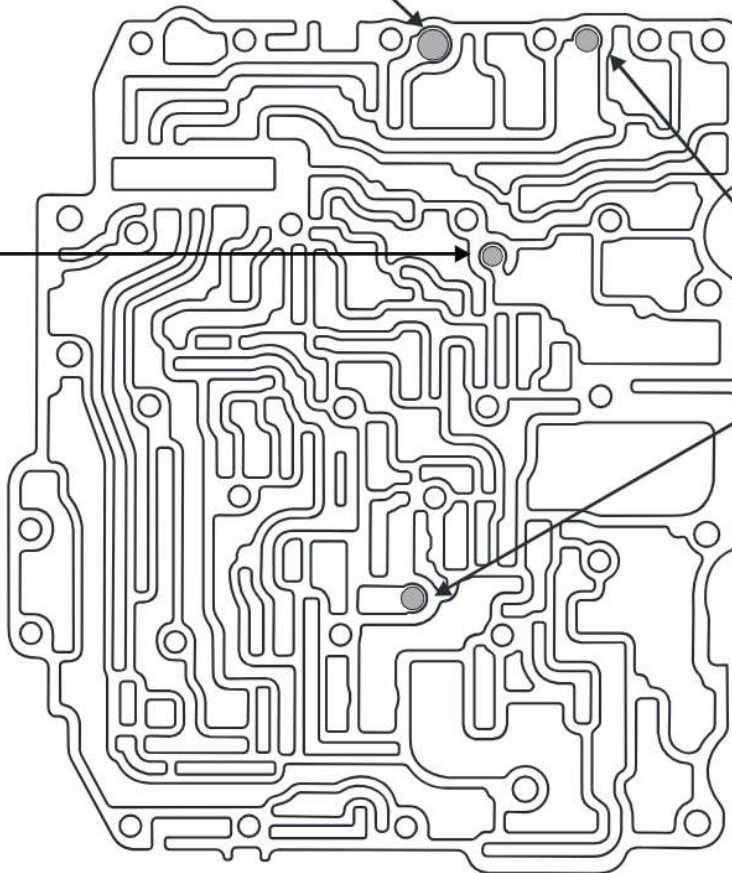
Hyundai - Shiftronic

*Exercise care when disassembling your valve body
as it may have different small parts locations.*

Piston
.392" Outside Dia.
.433" Height



Spring
.585" Height
12 Coils
ID Color - None

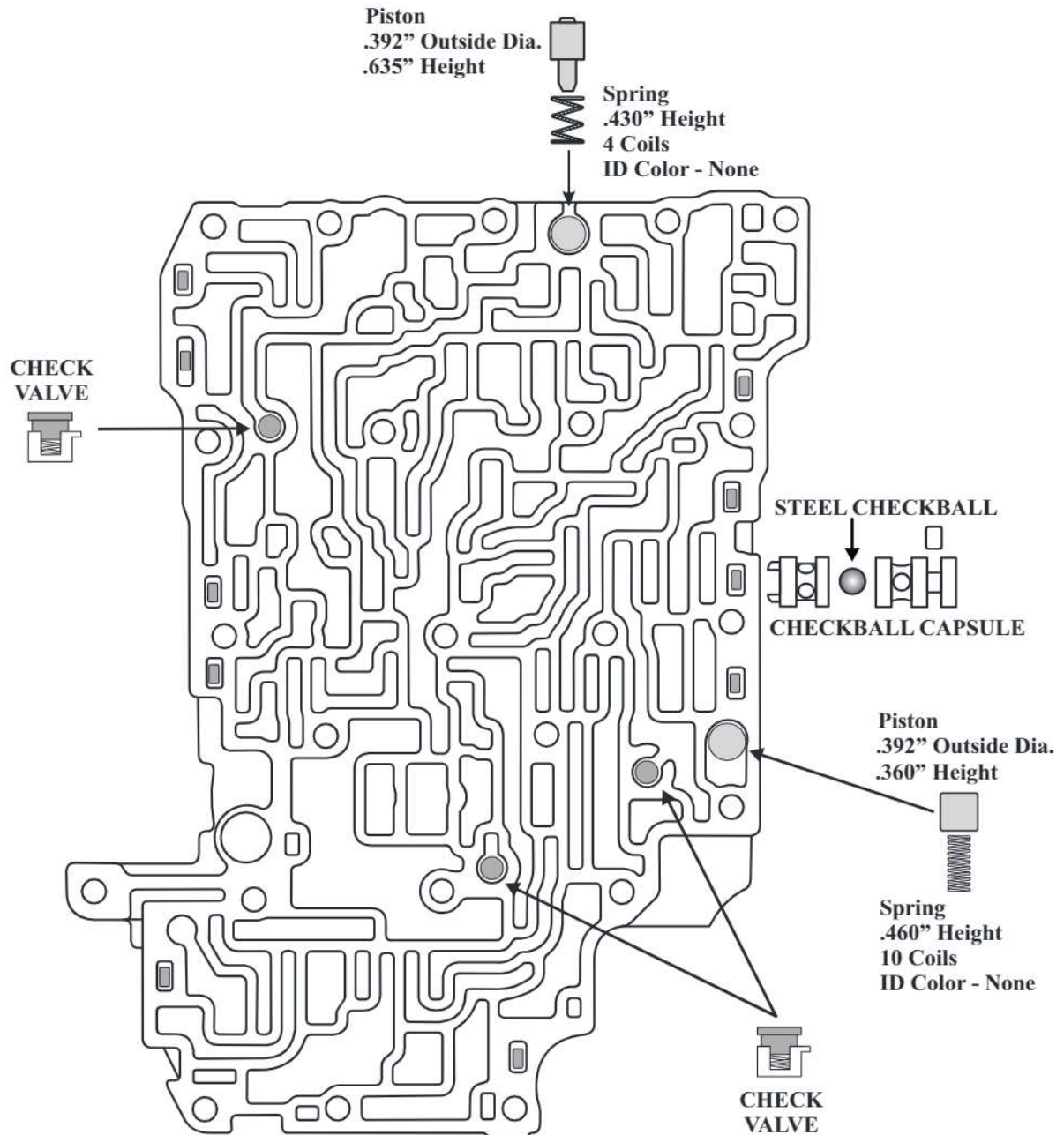


Piston
.313" Outside Dia.
.298" Height



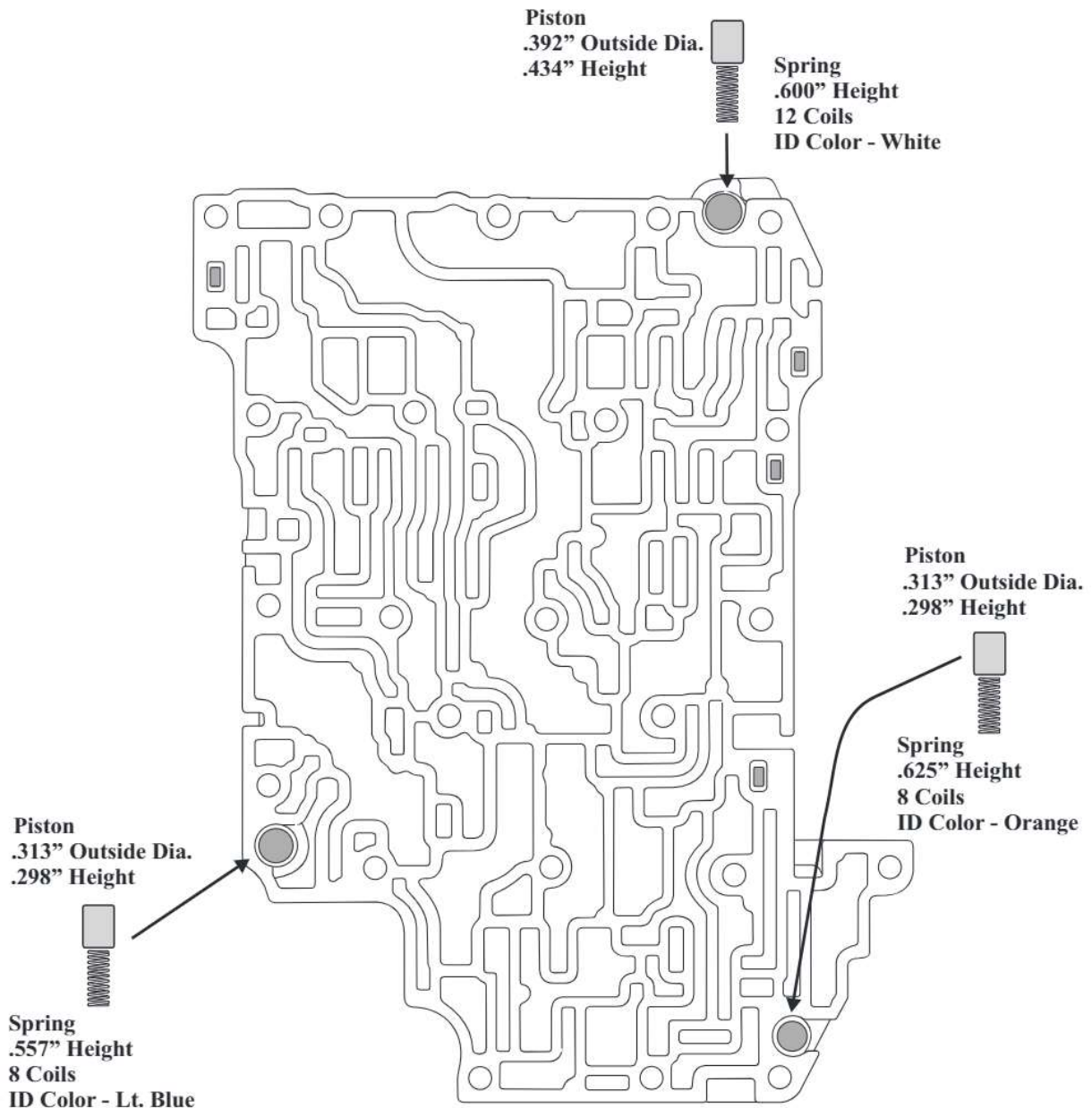
Spring
.377" Height
10 Coils
ID Color Orange

MAZDA AW6A-EL MIDDLE VALVE BODY (Front Side)



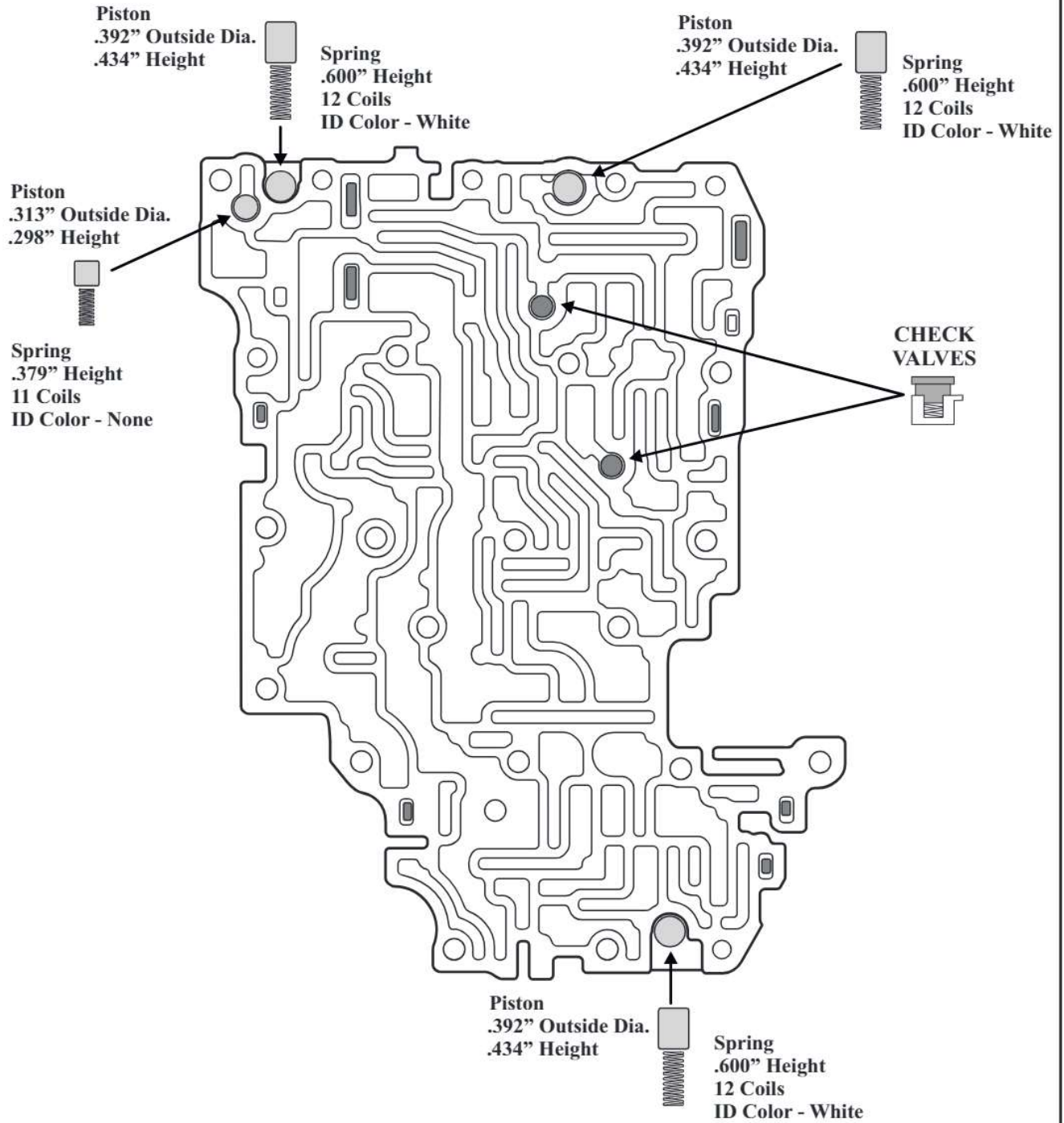
Copyright © 2008 ATSG

MAZDA AW6A-EL MIDDLE VALVE BODY (Rear Side)



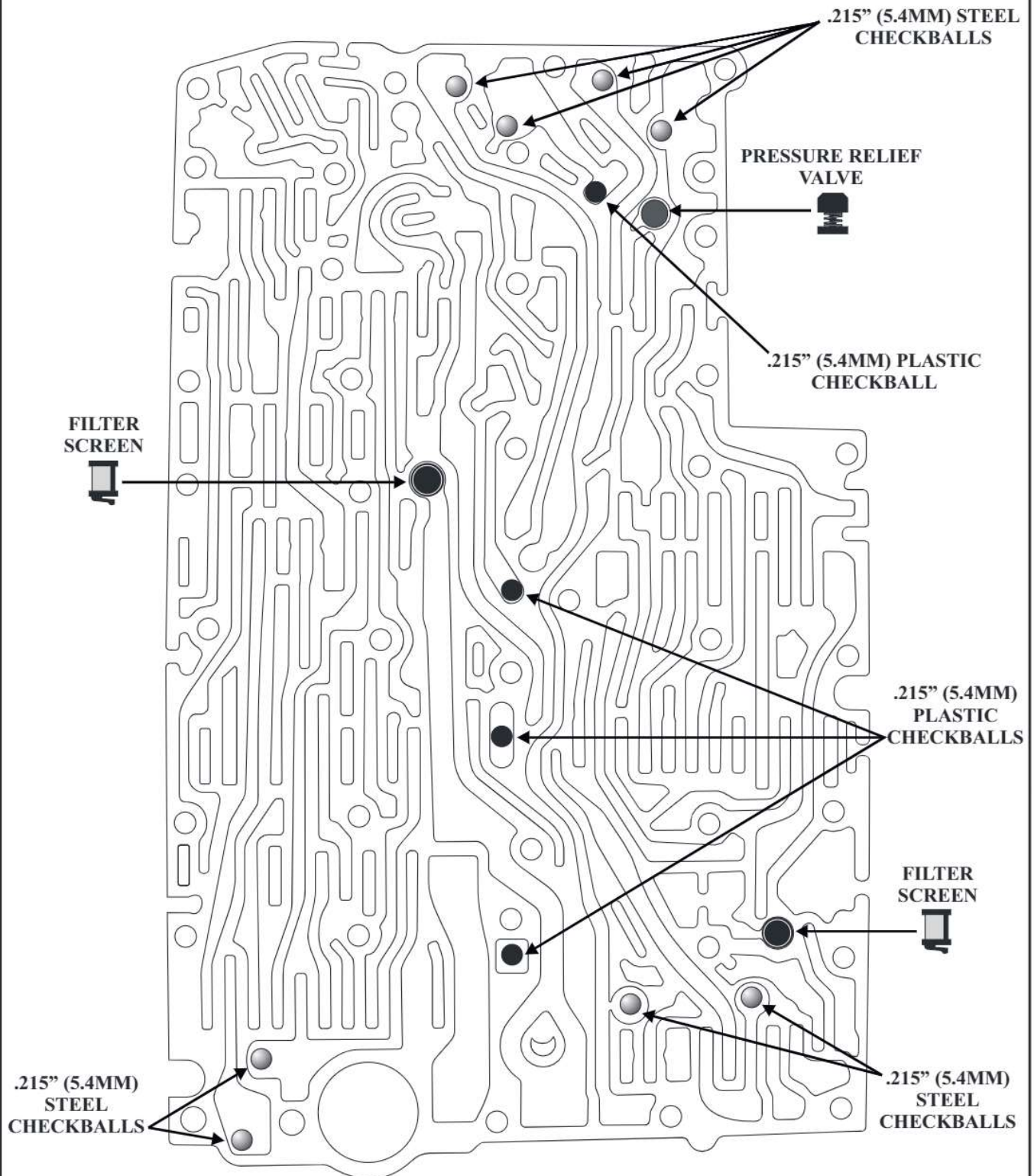
Copyright © 2008 ATSG

MAZDA AW6A-EL ACCUMULATOR VALVE BODY



Copyright © 2008 ATSG

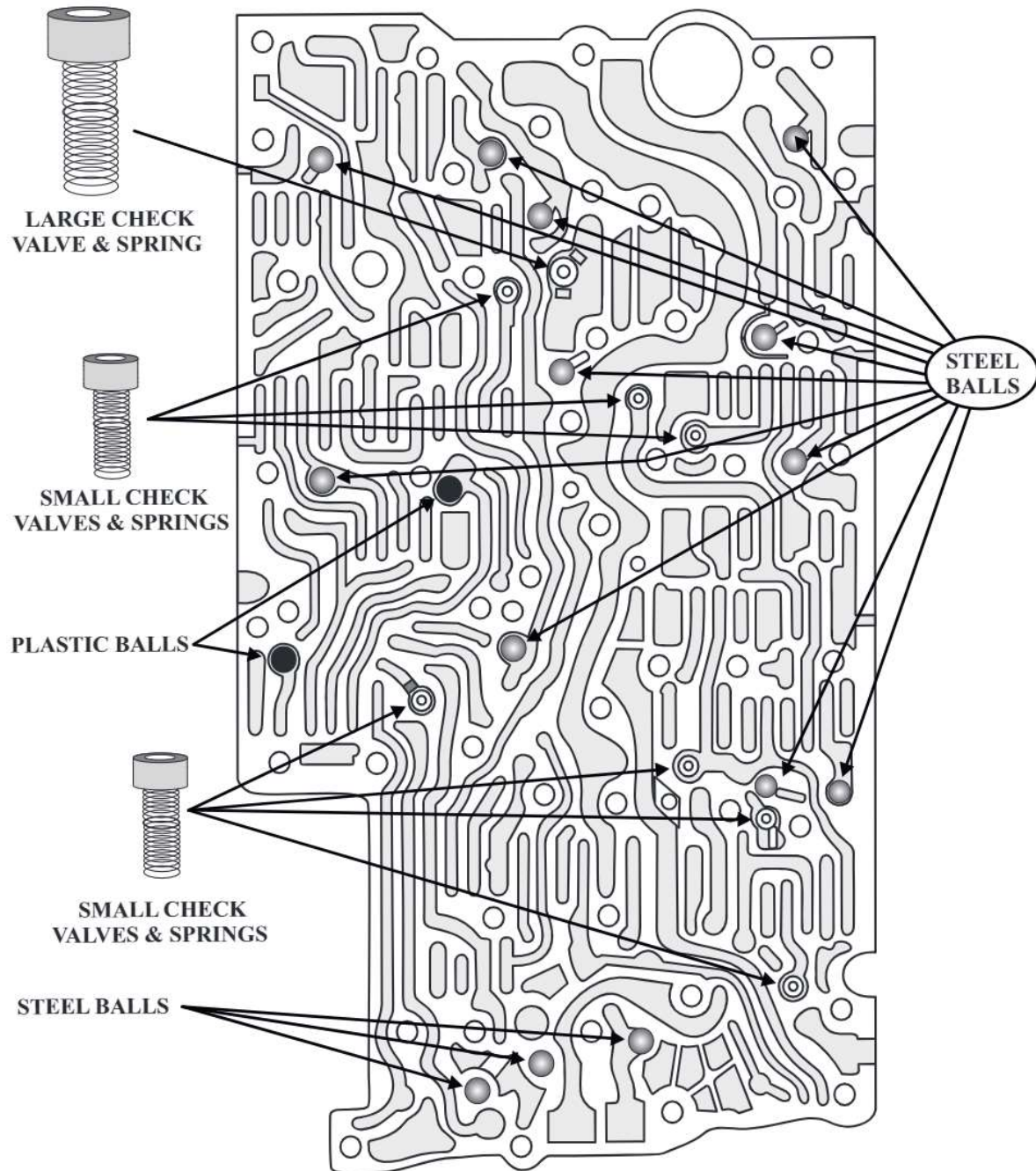
MERCEDES BENZ 722.6 LOWER VALVE BODY



Copyright © 2008 ATSG

MERCEDES BENZ 722.9

7 SPEED

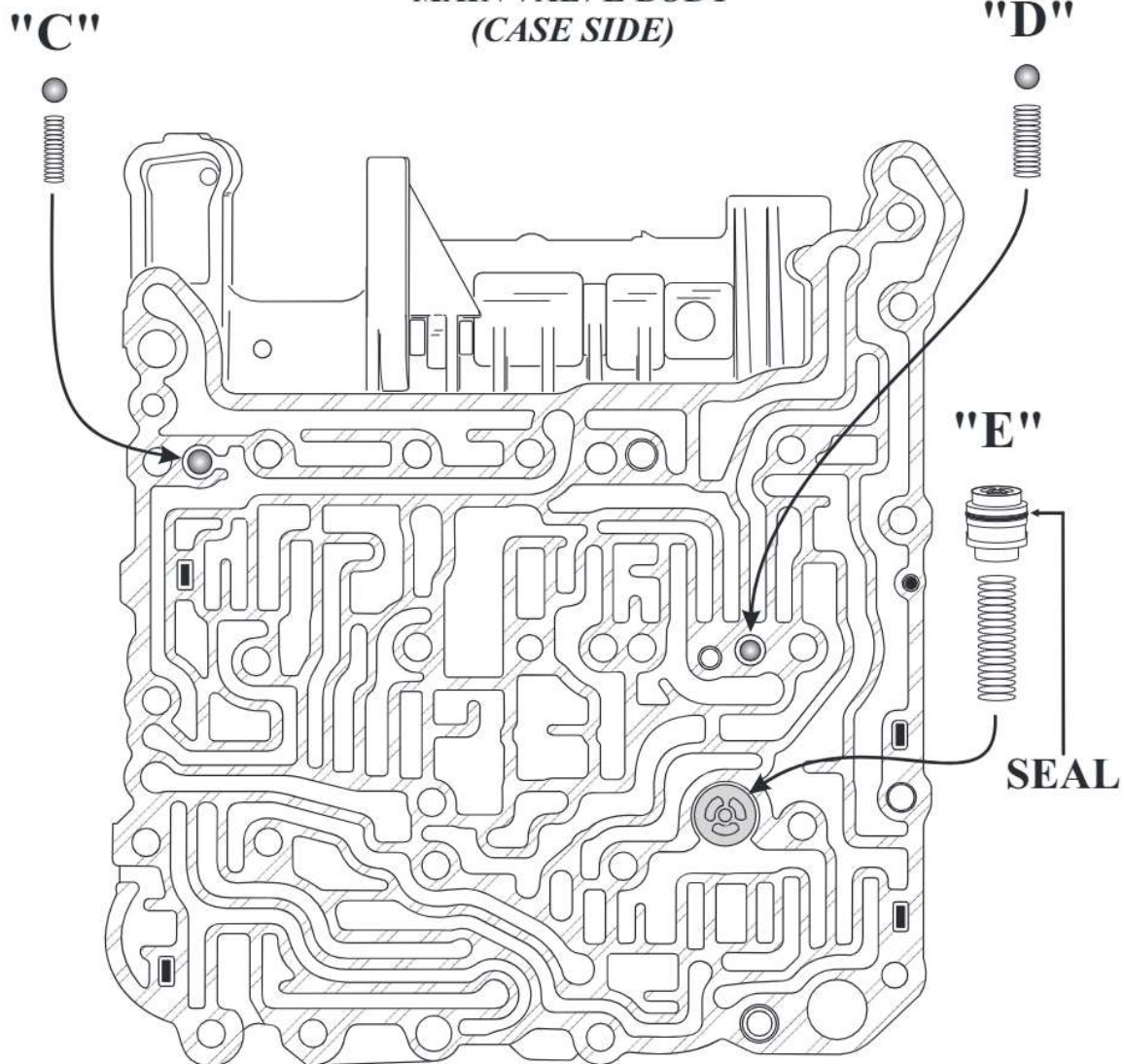


- 14 STEEL CHECK BALLS
- 2 PLASTIC CHECK BALLS
- ⊙ 8 CHECK VALVES

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MITSUBISHI/HYUNDAI/KIA F4A42/51/F4A4B F5A51/F5A5A

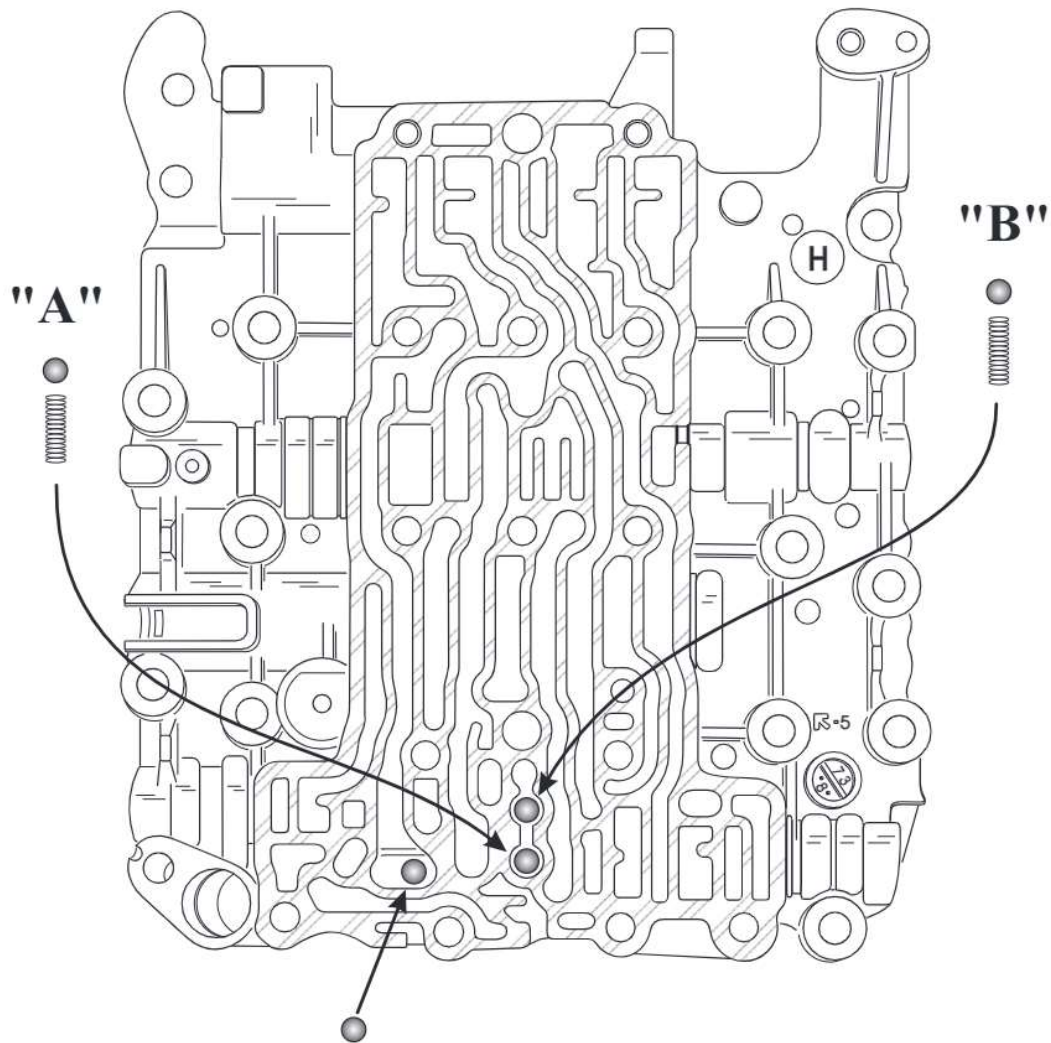
MAIN VALVE BODY (CASE SIDE)



CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"C"	.665"	.177"
"D"	.677"	.277"
"E"	1.398"	.300"
ALL CHECKBALLS ARE .250" (6.35MM) DIAMETER STEEL		

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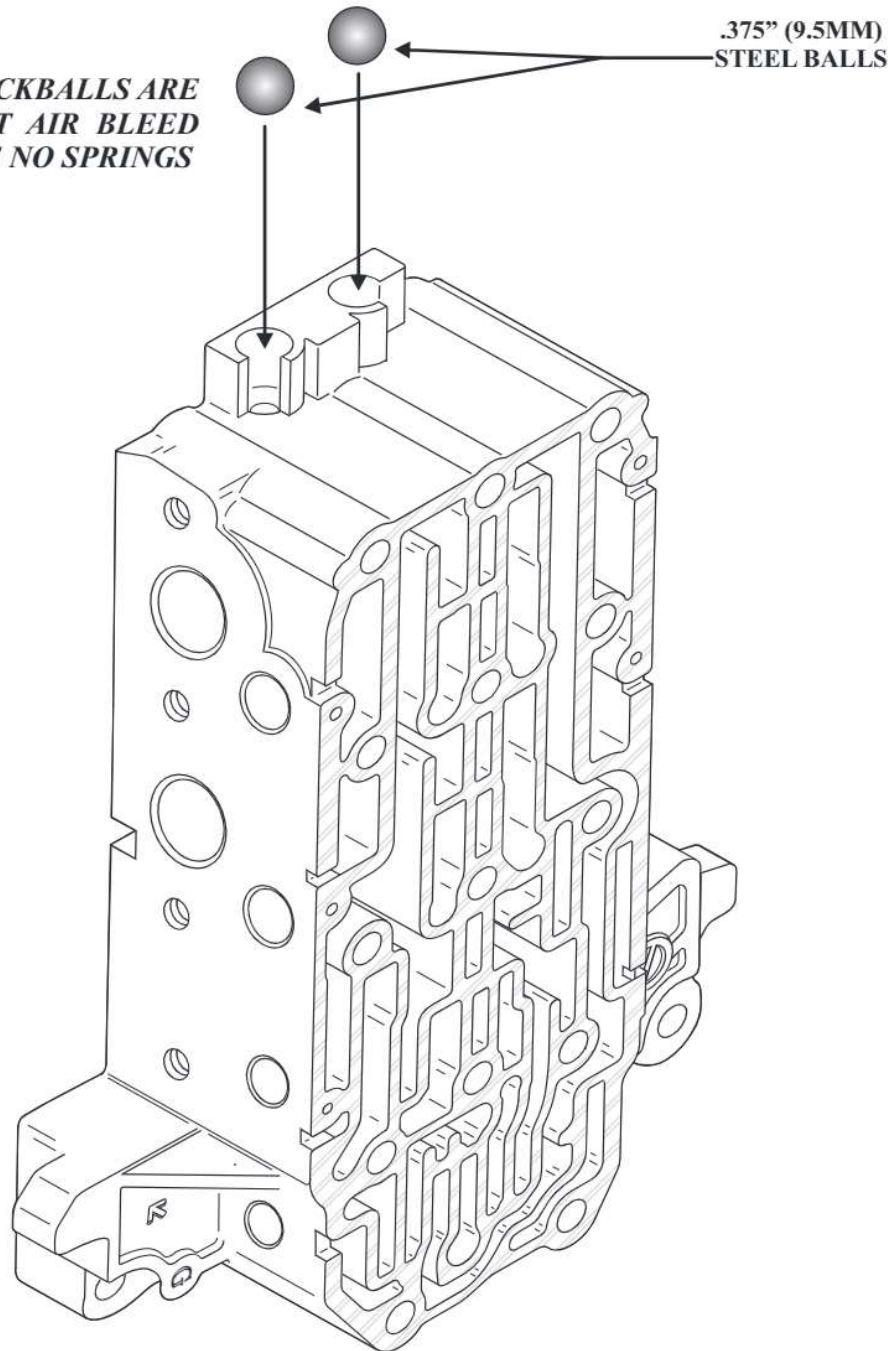
MITSUBISHI/HYUNDAI/KIA
F4A42/51/F4A4B
F5A51/F5A5A
MAIN VALVE BODY
(SOLENOID BODY SIDE)



CHECKBALL AND SPRING DIMENSIONS		
SPRING	LENGTH	DIAMETER
"A"	.665"	.177"
"B"	.665"	.177"
ALL CHECKBALLS ARE .250" (6.35MM) DIAMETER STEEL		

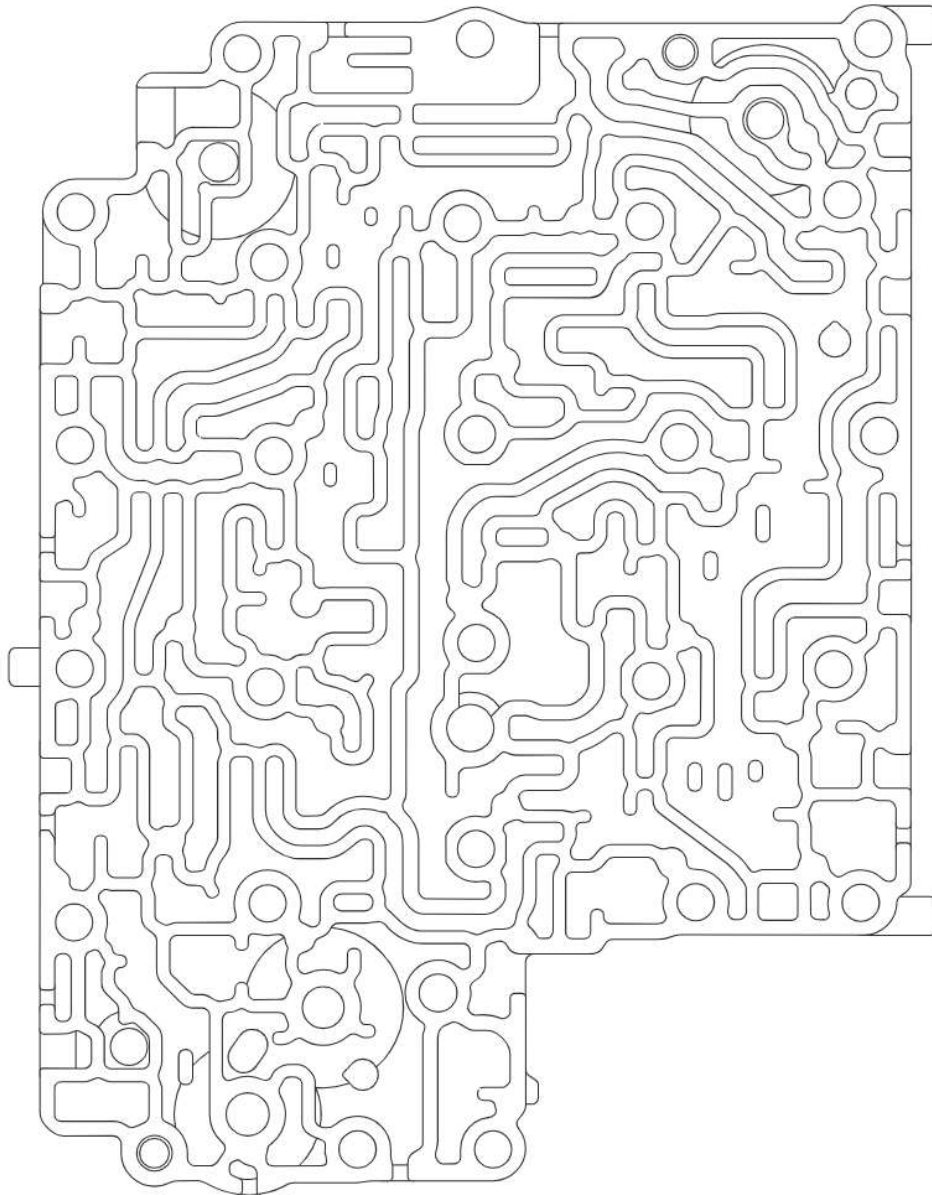
MITSUBISHI/HYUNDAI/KIA
F4A42/51/F4A4B
F5A51/F5A5A
SOLENOID VALVE BODY

**THESE TWO CHECKBALLS ARE
CLUTCH CIRCUIT AIR BLEED
BALLS AND HAVE NO SPRINGS**



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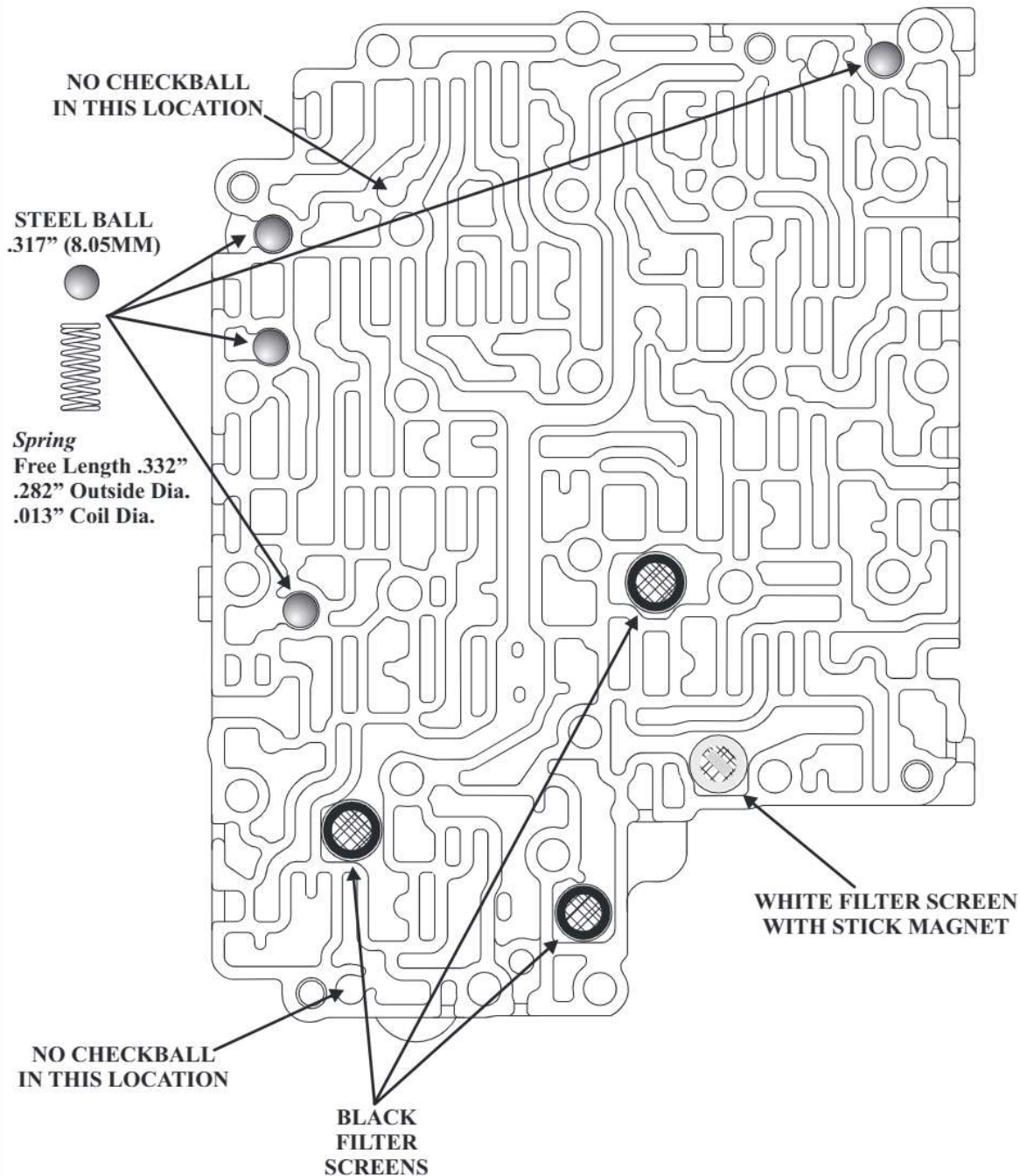
MITSUBISHI
F6AJA/JF613E
LOWER VALVE BODY



THERE ARE NO SMALL PARTS IN THIS VALVE BODY SECTION

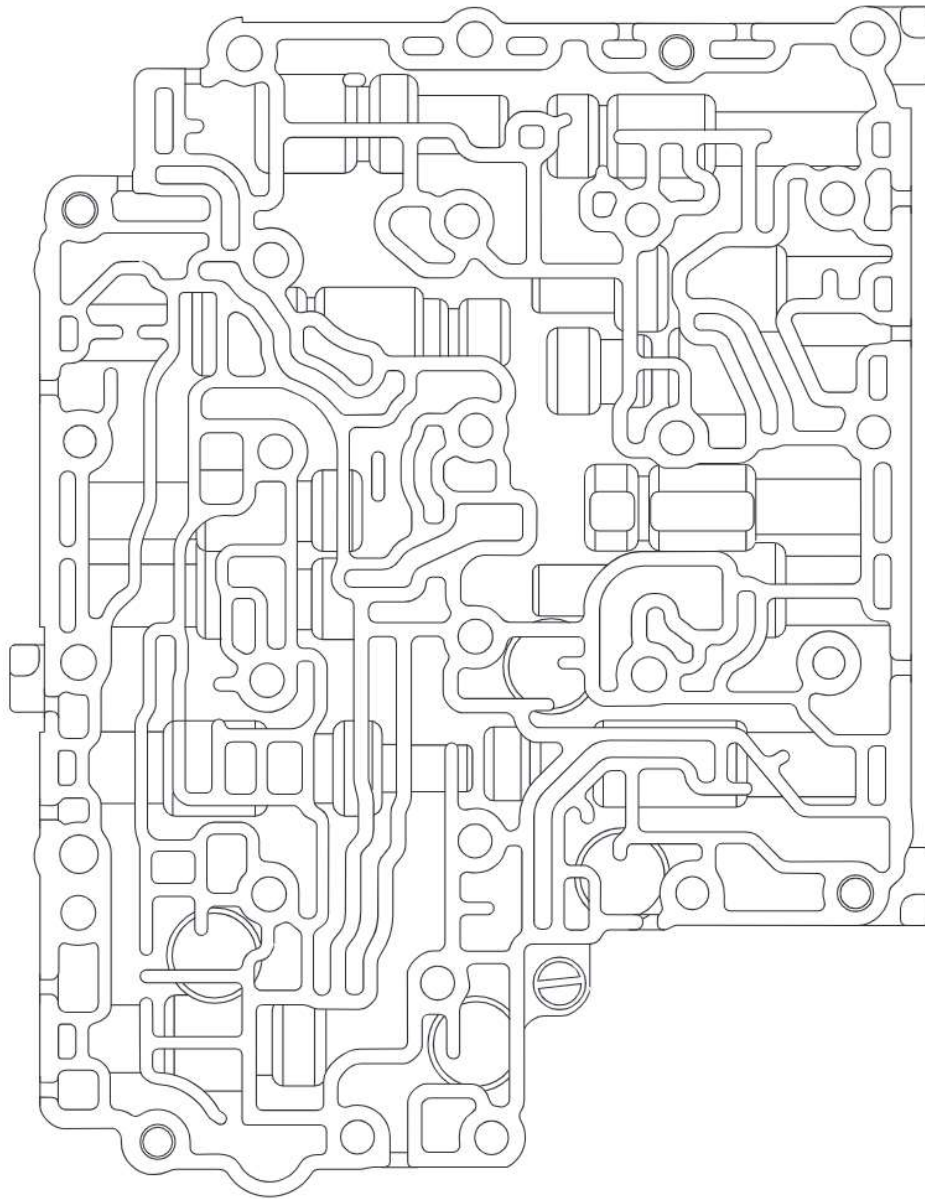
Copyright © 2008 ATSG

MITSUBISHI F6AJA/JF613E CENTER VALVE BODY - LOWER VB SIDE



Copyright © 2008 ATSG

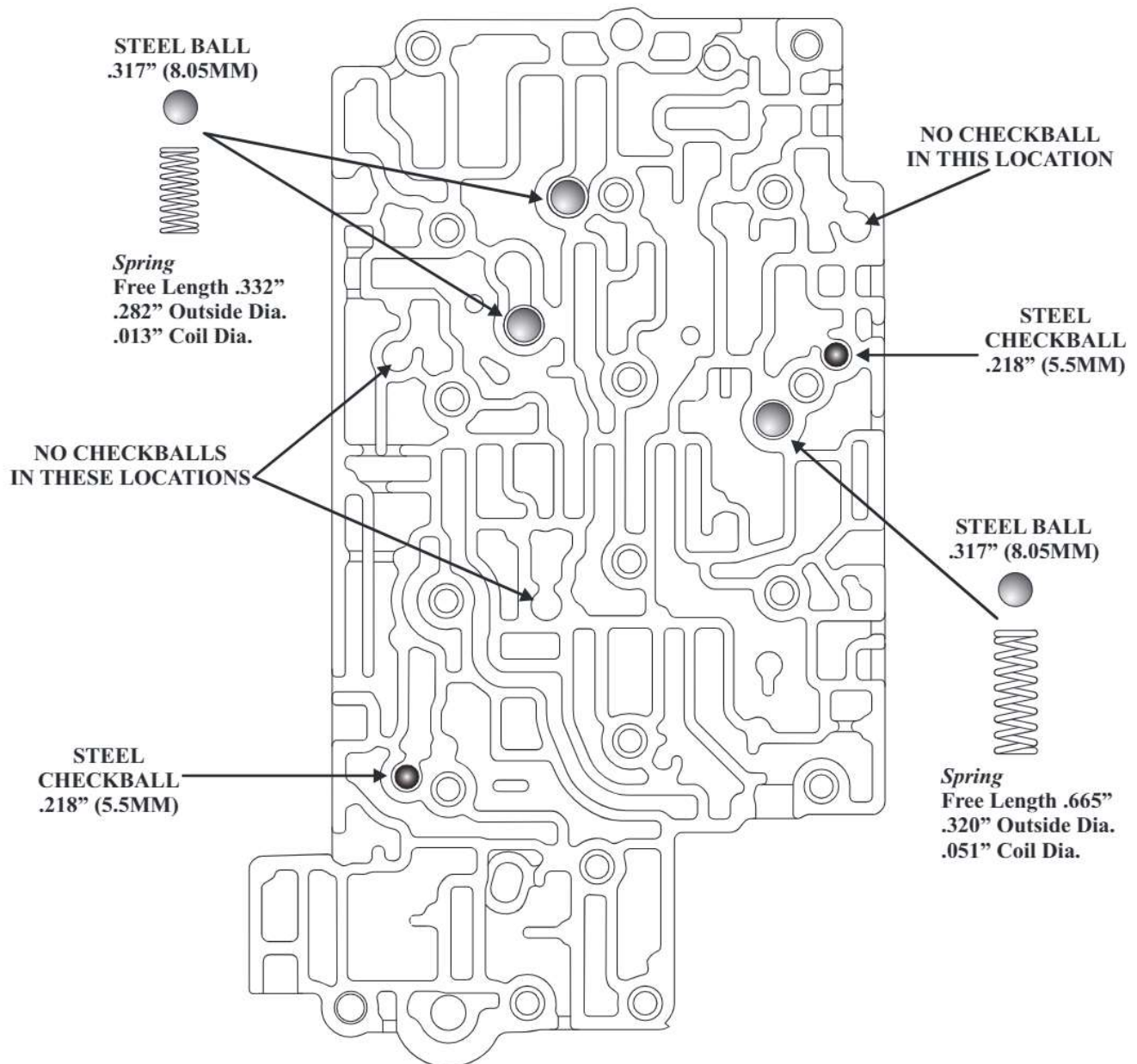
MITSUBISHI
F6AJA/JF613E
CENTER VALVE BODY - UPPER VB SIDE



THERE ARE NO SMALL PARTS IN THIS VALVE BODY SECTION

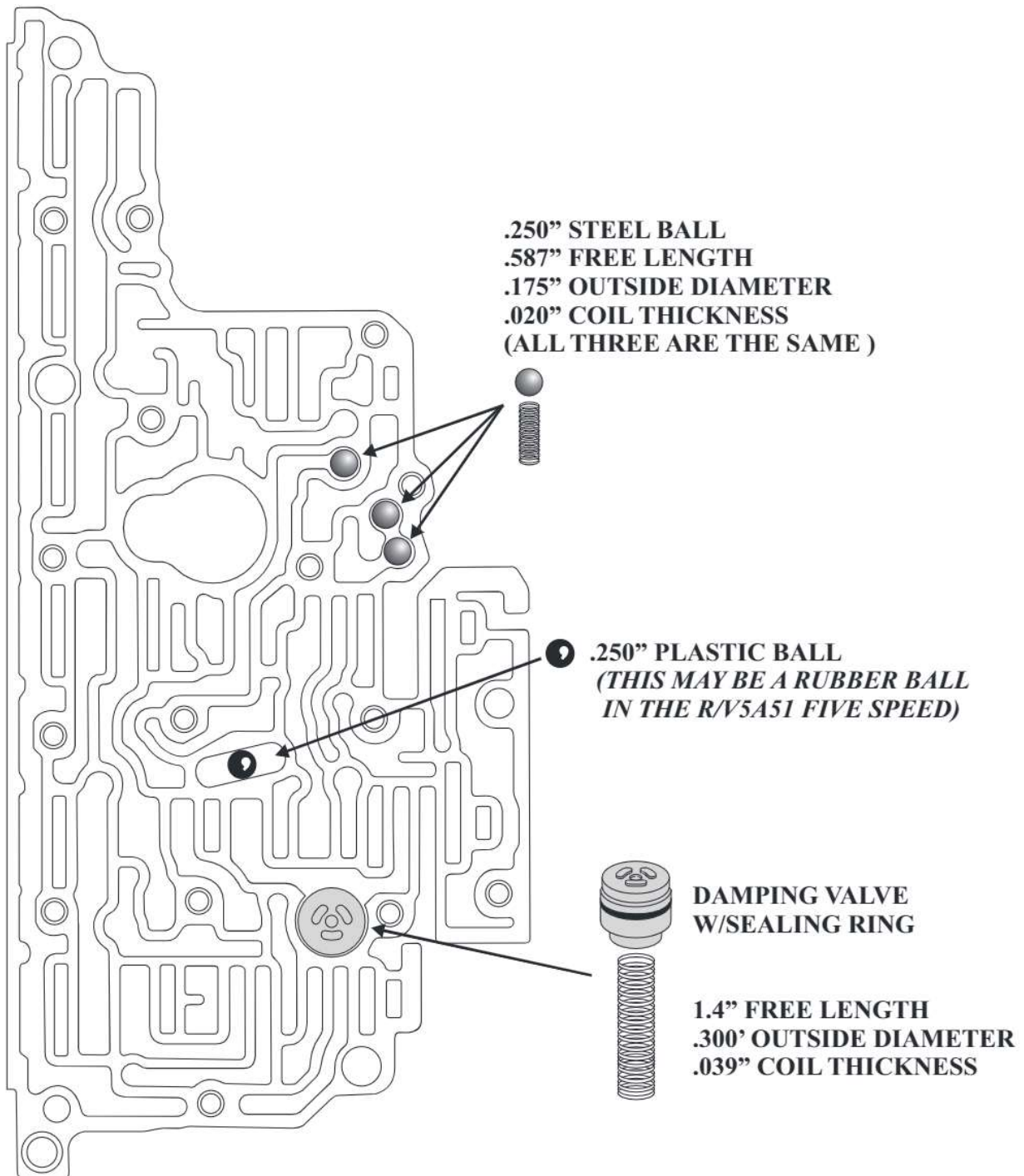
Copyright © 2008 ATSG

MITSUBISHI F6AJA/JF613E UPPER VALVE BODY



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MITSUBISHI
R/V4A51
R/V5A51
UPPER VALVE BODY



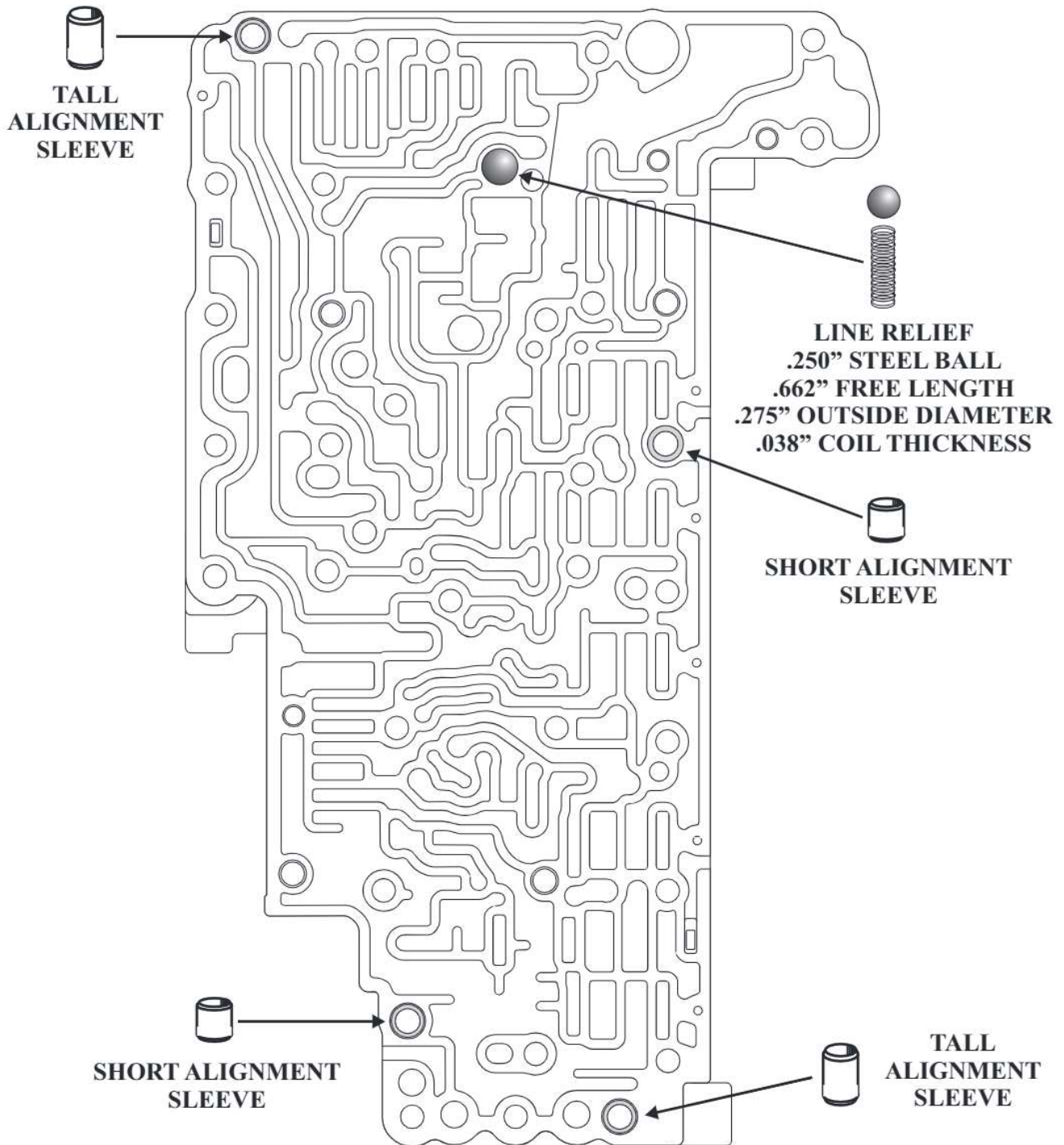
Copyright © 2008 ATSG

MITSUBISHI

R/V4A51

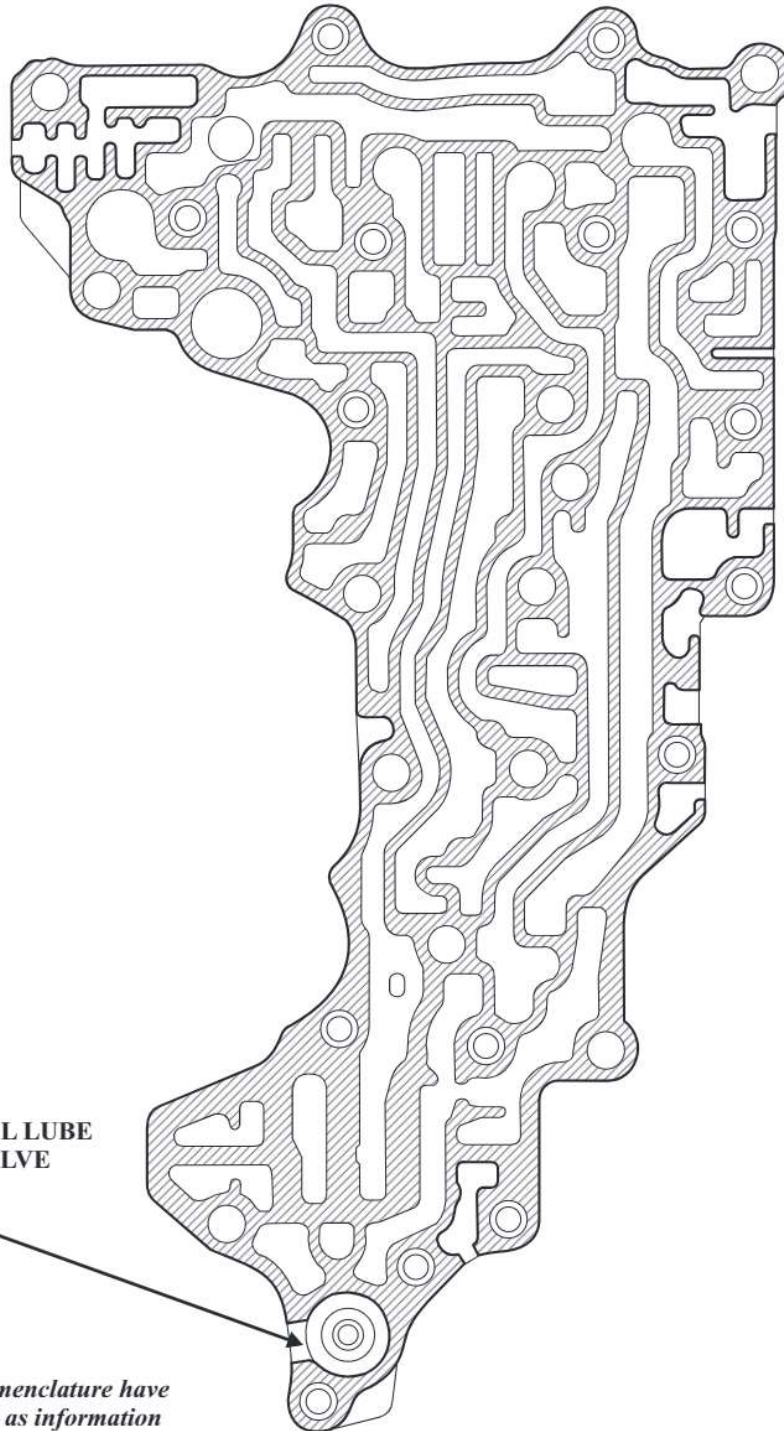
R/V5A51

LOWER VALVE BODY



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NISSAN RE0F09/JF010E CVT UPPER VALVE BODY



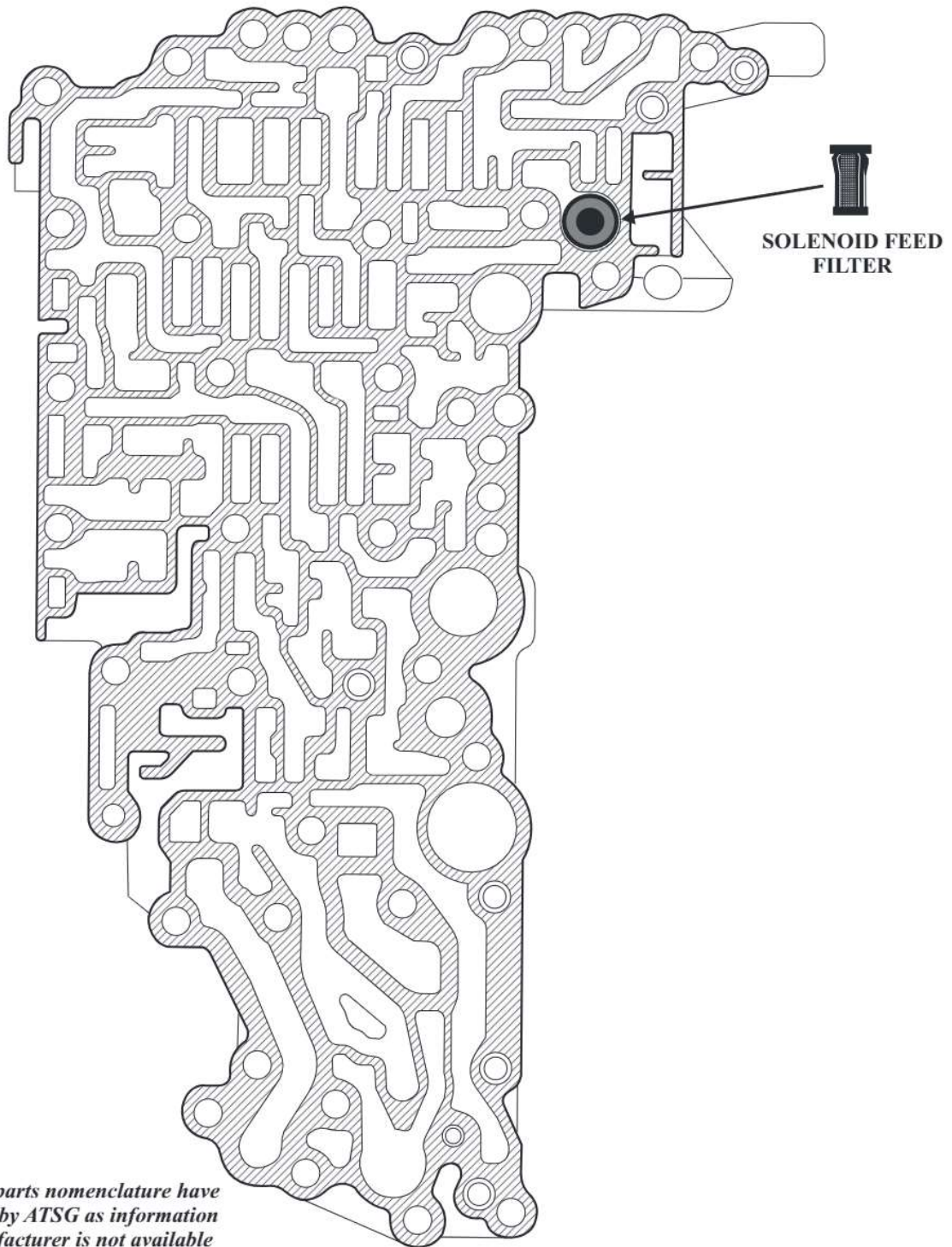
DIFFERENTIAL LUBE
RELIEF VALVE



NOTE: Small parts nomenclature have been assigned by ATSG as information from the manufacturer is not available at the time of printing.

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NISSAN
RE0F09/JF010E CVT
CENTER VALVE BODY UPPER SIDE



NOTE: *Small parts nomenclature have been assigned by ATSG as information from the manufacturer is not available at the time of printing.*

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NISSAN RE0F09/JF010E CVT CENTER VALVE BODY BOTTOM SIDE

FORWARD CLUTCH APPLY AND
RELEASE CONTROL STEEL BALLS
(0.218" DIA.)

REVERSE CLUTCH APPLY AND
RELEASE CONTROL STEEL BALLS
(0.218" DIA.)

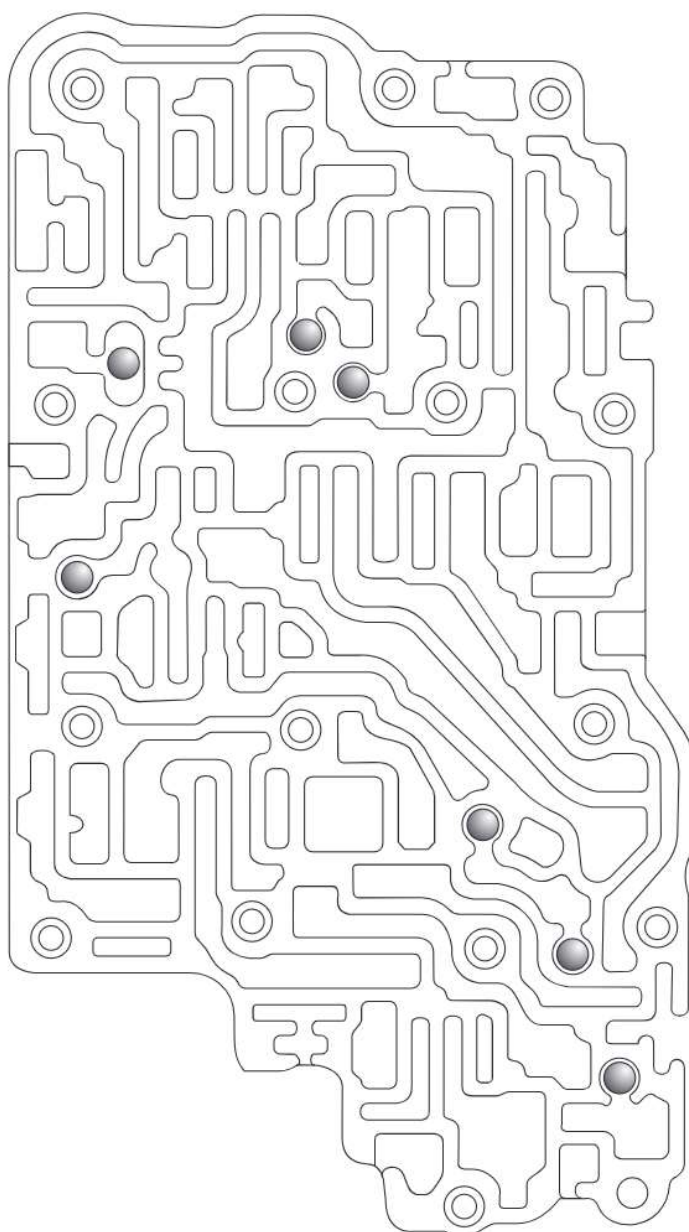
CLUTCH REGULATOR
VALVE FILTER

VALVE LINE
FEED FILTER

NOTE: Small parts nomenclature have been assigned by ATSG as information from the manufacturer is not available at the time of printing.

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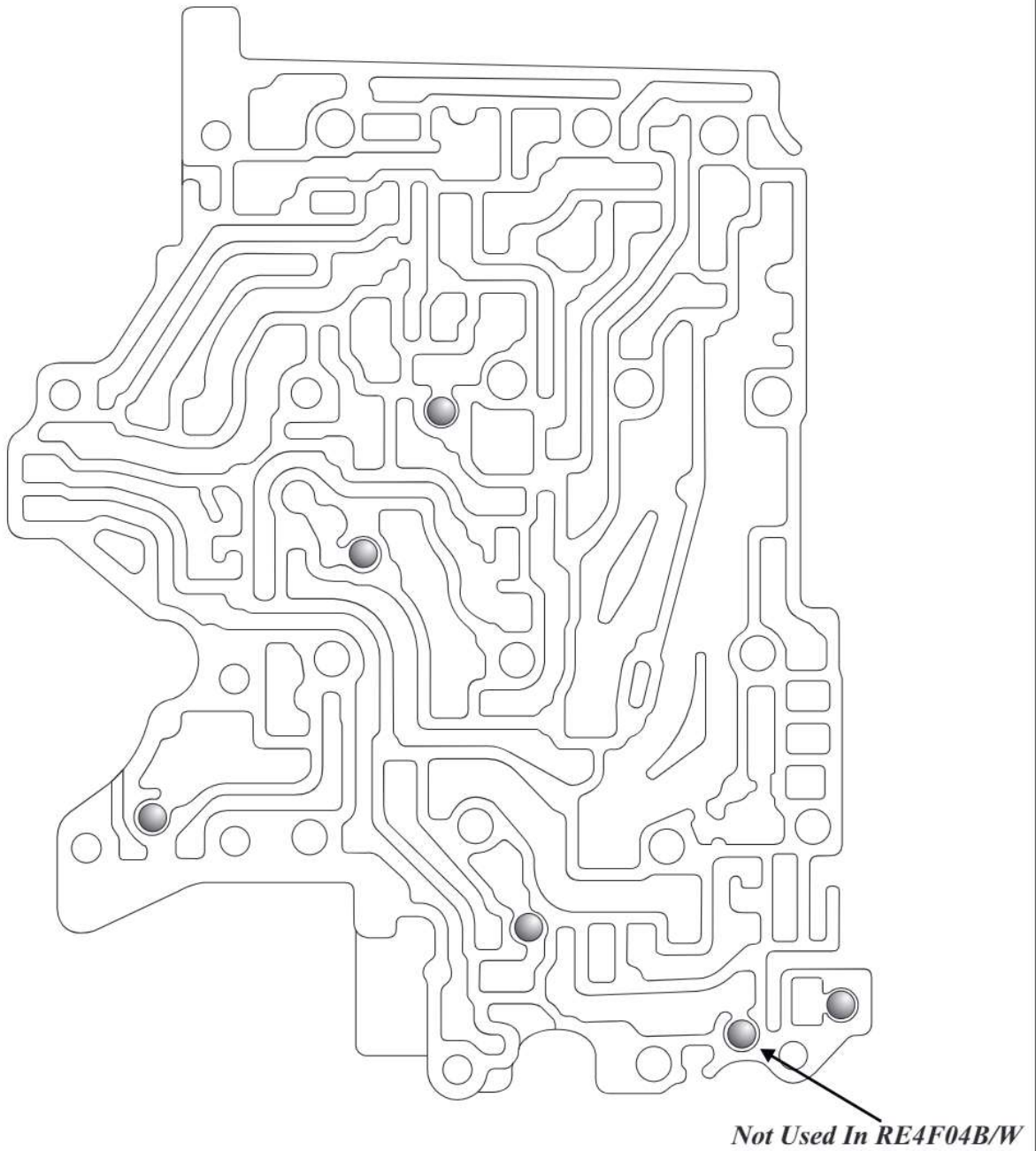
NISSAN/INFINITI
RE4F03B/W - RE4F04B/W
UPPER VALVE BODY



All 7 CheckBalls Are Steel .218" (5.5MM)

Copyright © 2008 ATSG

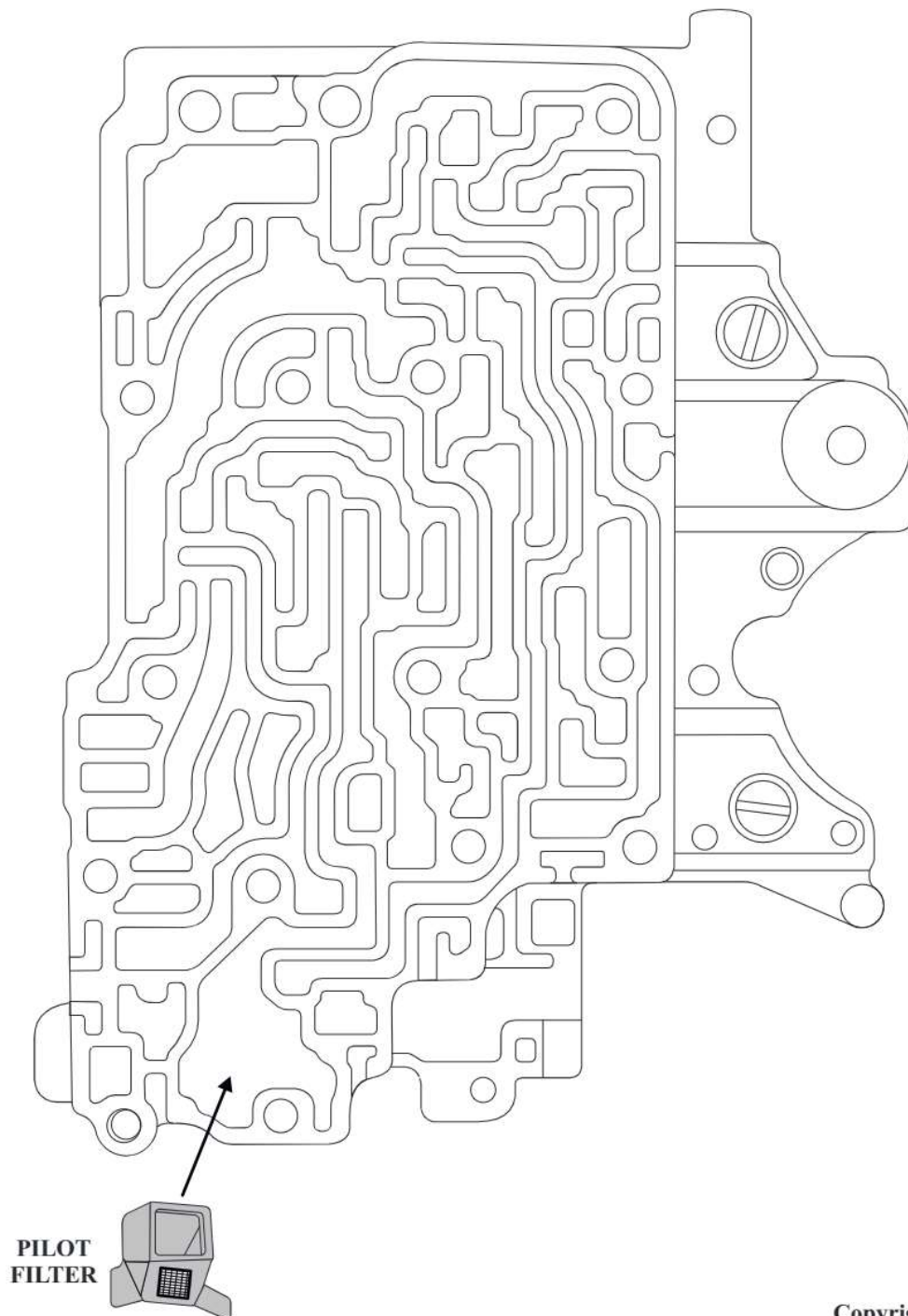
NISSAN/INFINITI
RE4F03B/W - RE4F04B/W
INTERMEDIATE VALVE BODY - BOTTOM SIDE



All 6 CheckBalls Are Steel .218" (5.5MM)

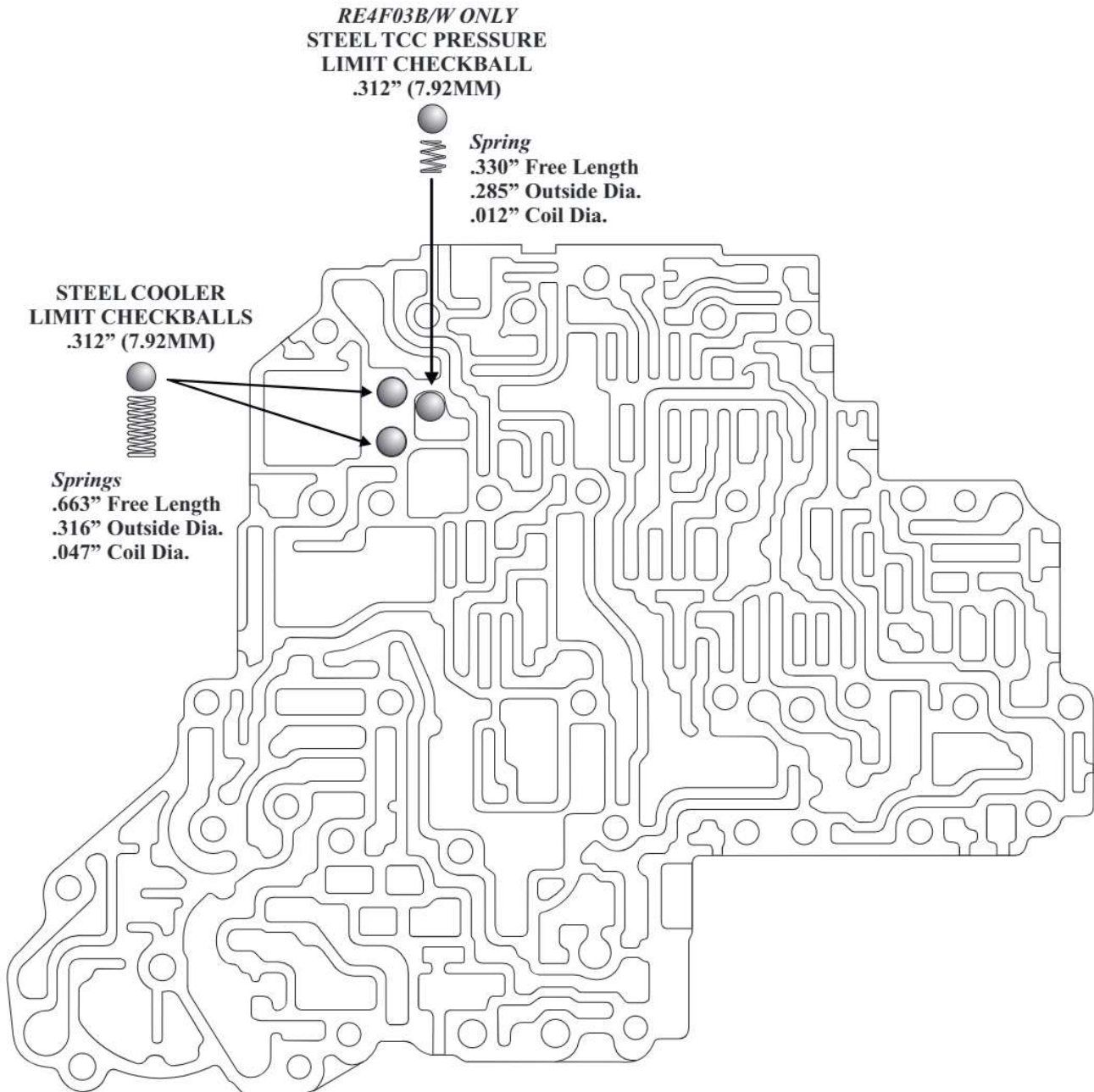
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**NISSAN/INFINITI
RE4F03B/W - RE4F04B/W**
INTERMEDIATE VALVE BODY - TOP SIDE



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NISSAN/INFINITI RE4F03B/W - RE4F04B/W MAIN VALVE BODY

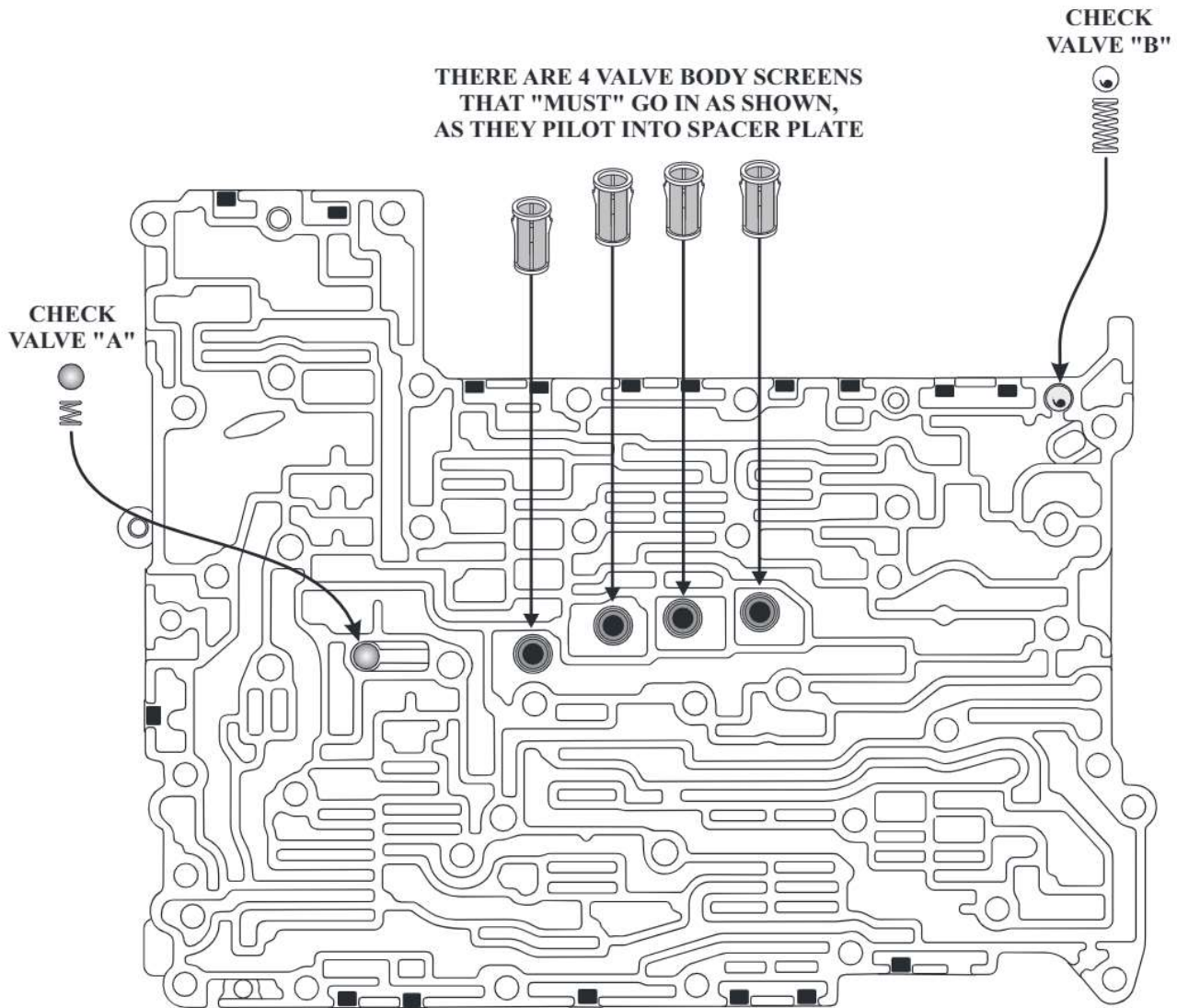


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NISSAN RE5R05A

UPPER VALVE BODY (EARLY)

THERE ARE 4 VALVE BODY SCREENS
THAT "MUST" GO IN AS SHOWN,
AS THEY PILOT INTO SPACER PLATE



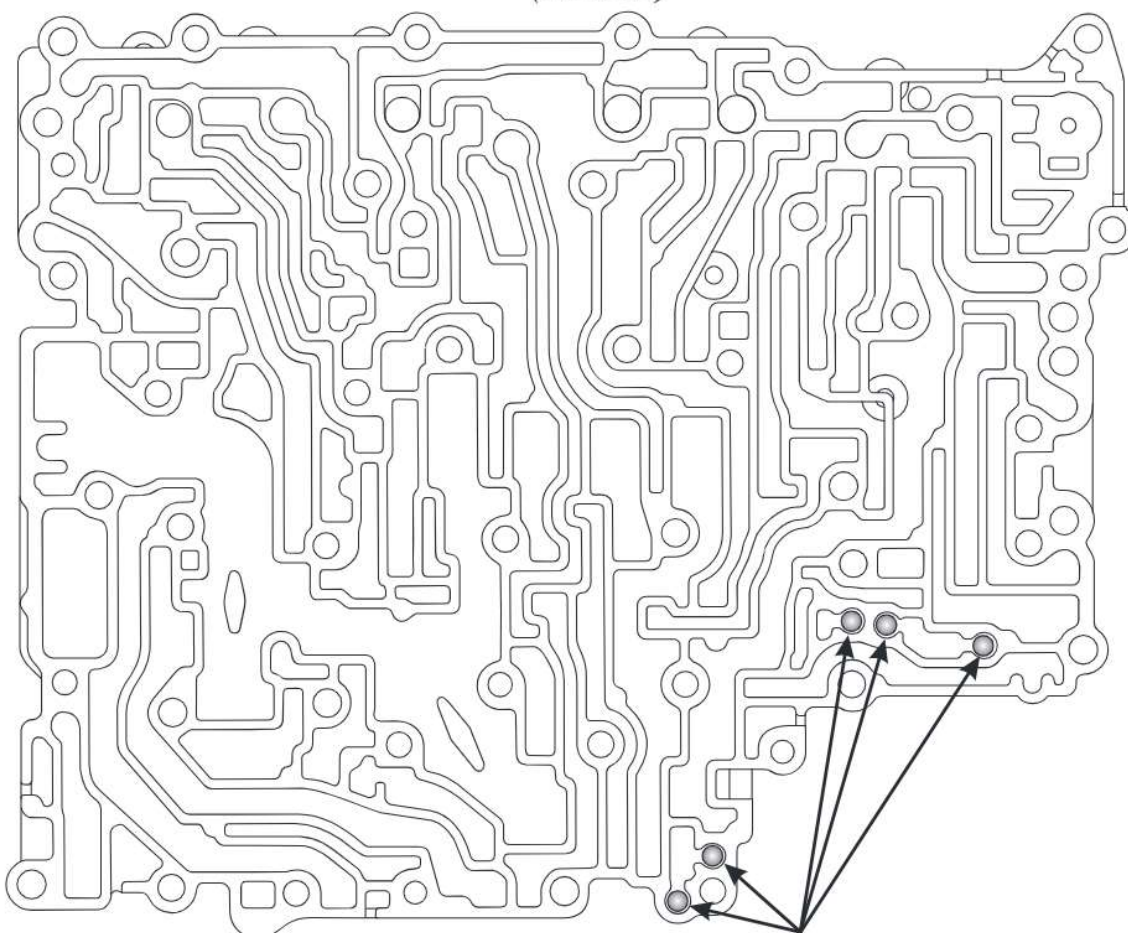
CHECK VALVE "A"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.350"
SPRING DIAMETER	.285"
WIRE DIAMETER	.016"
APPROX COILS	5

CHECK VALVE "B"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.705"
SPRING DIAMETER	.316"
WIRE DIAMETER	.039"
APPROX COILS	11

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NISSAN RE5R05A

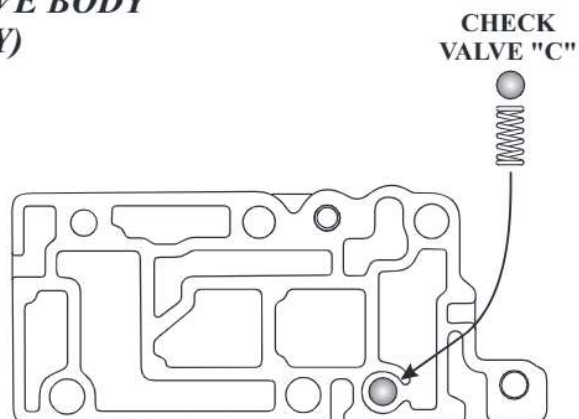
LOWER VALVE BODY (EARLY)



5 STEEL CHECK BALLS REQUIRED
5.5MM (.218") DIAMETER

MANUAL VALVE BODY (EARLY)

CHECK VALVE "C"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.705"
SPRING DIAMETER	.316"
WIRE DIAMETER	.039"
APPROX COILS	11

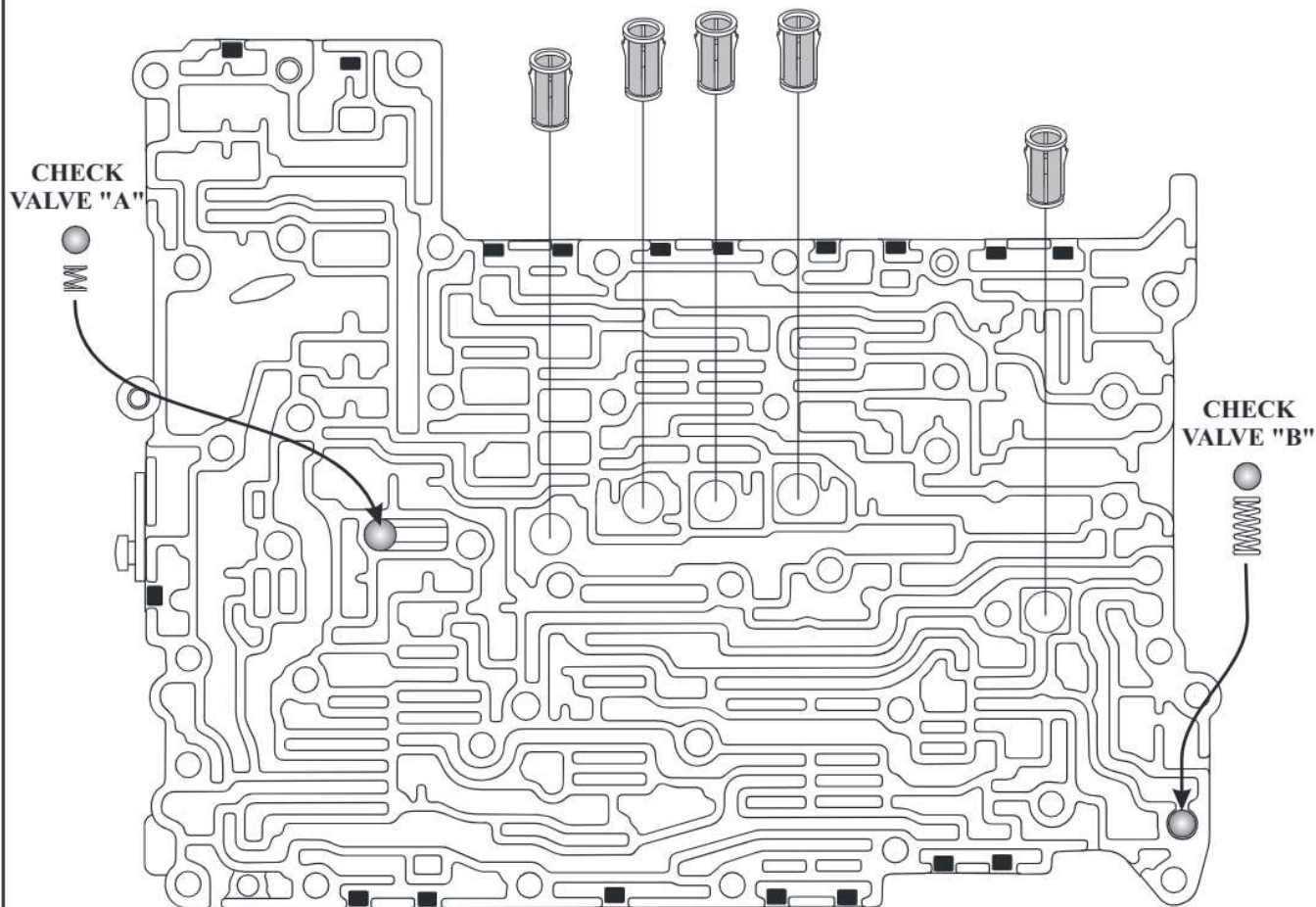


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NISSAN RE5R05A

UPPER VALVE BODY (LATE)

THERE ARE 5 VALVE BODY SCREENS
THAT "MUST" GO IN AS SHOWN,
AS THEY PILOT INTO SPACER PLATE



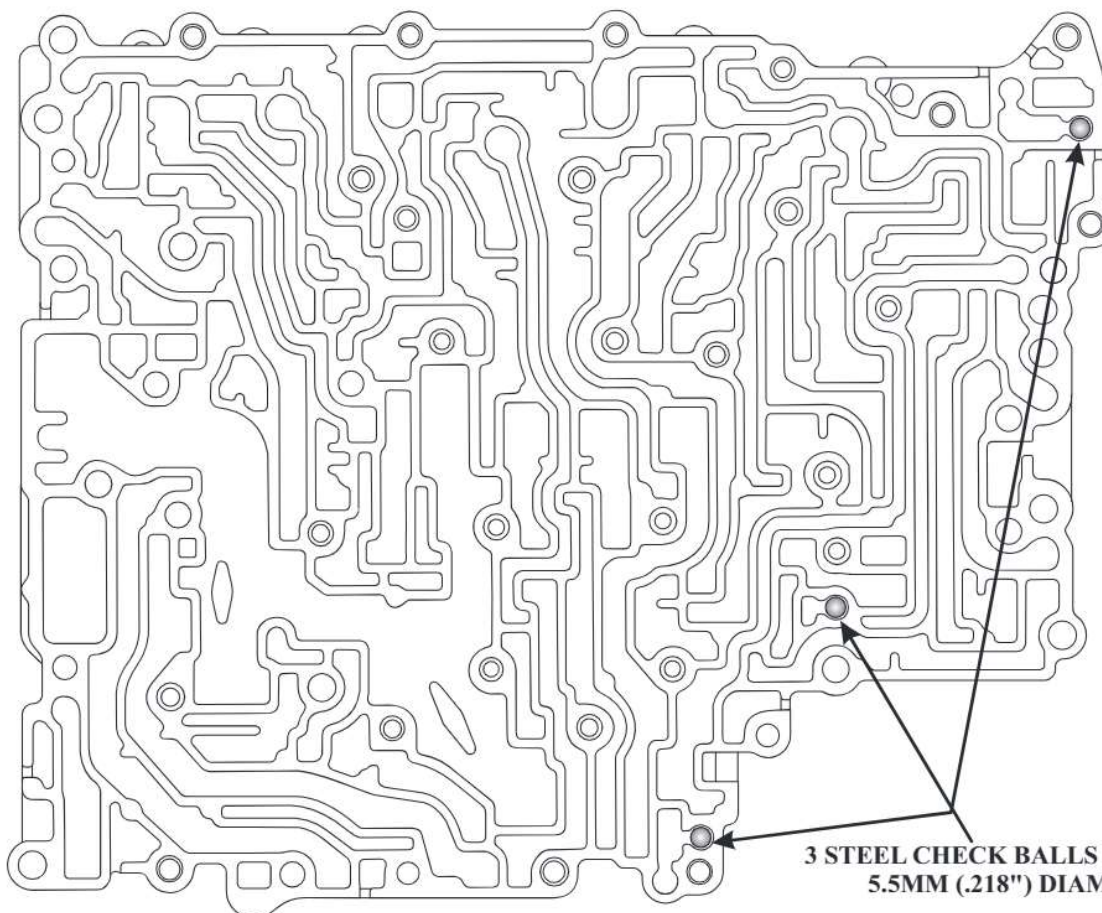
CHECK VALVE "A"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.350"
SPRING DIAMETER	.285"
WIRE DIAMETER	.016"
APPROX COILS	5

CHECK VALVE "B"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.705"
SPRING DIAMETER	.316"
WIRE DIAMETER	.039"
APPROX COILS	11

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NISSAN RE5R05A

LOWER VALVE BODY (LATE)

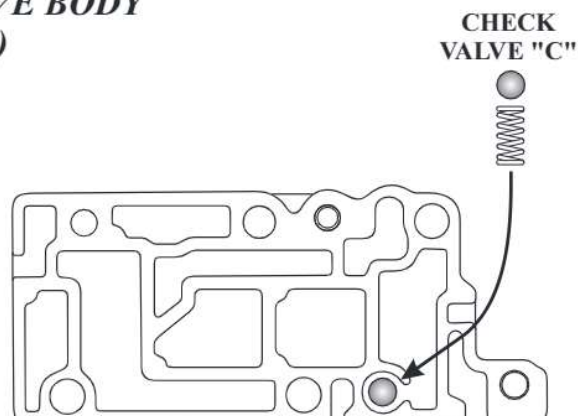


3 STEEL CHECK BALLS REQUIRED
5.5MM (.218") DIAMETER

NOTE: This transmission can also be found in the Kia Sorrento (A5SR1/2), checkball locations may be different.

MANUAL VALVE BODY (LATE)

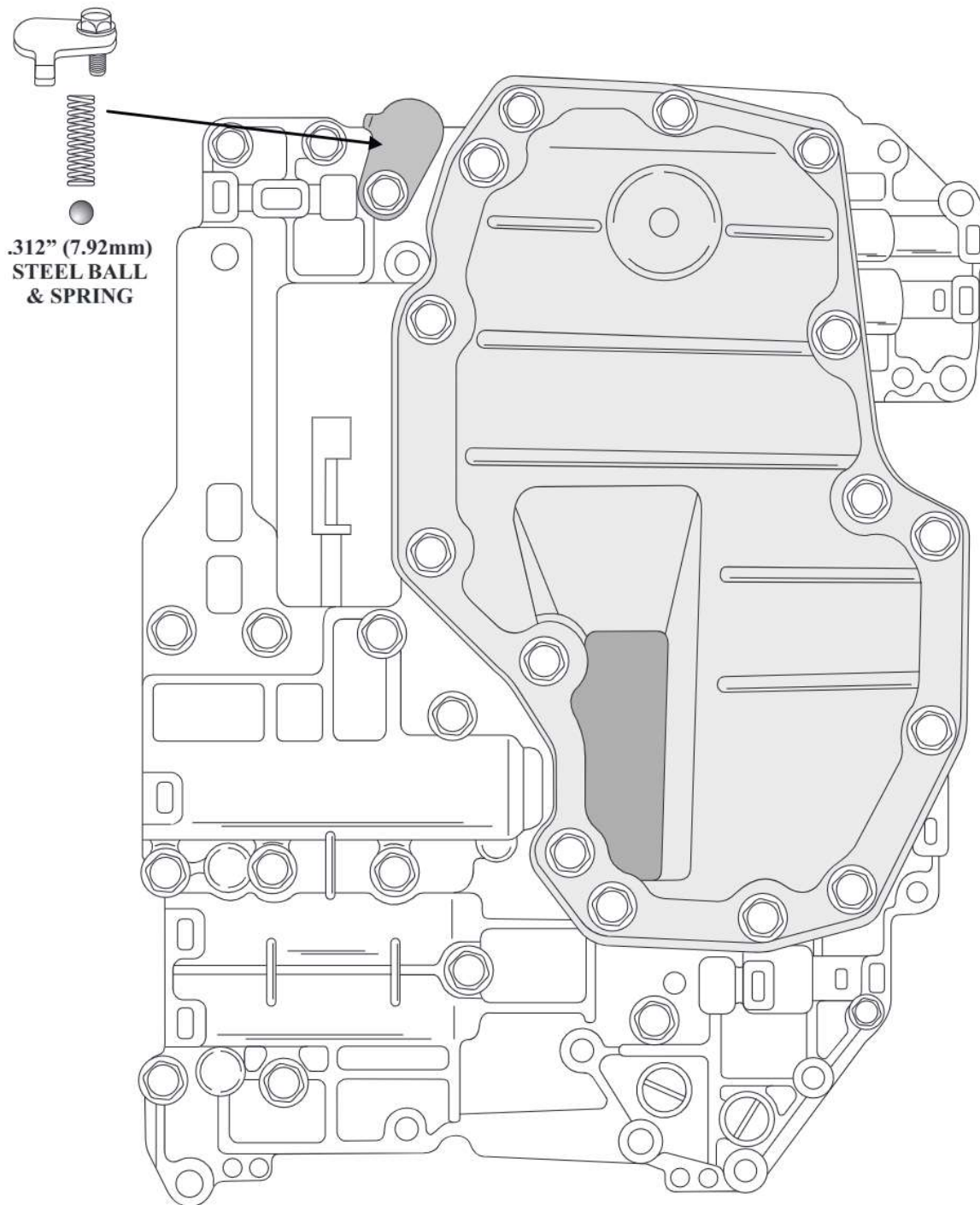
CHECK VALVE "C"	
BALL DIAMETER	.312"
SPRING FREE LENGTH	.705"
SPRING DIAMETER	.316"
WIRE DIAMETER	.039"
APPROX COILS	11



Copyright © 2008 ATSG

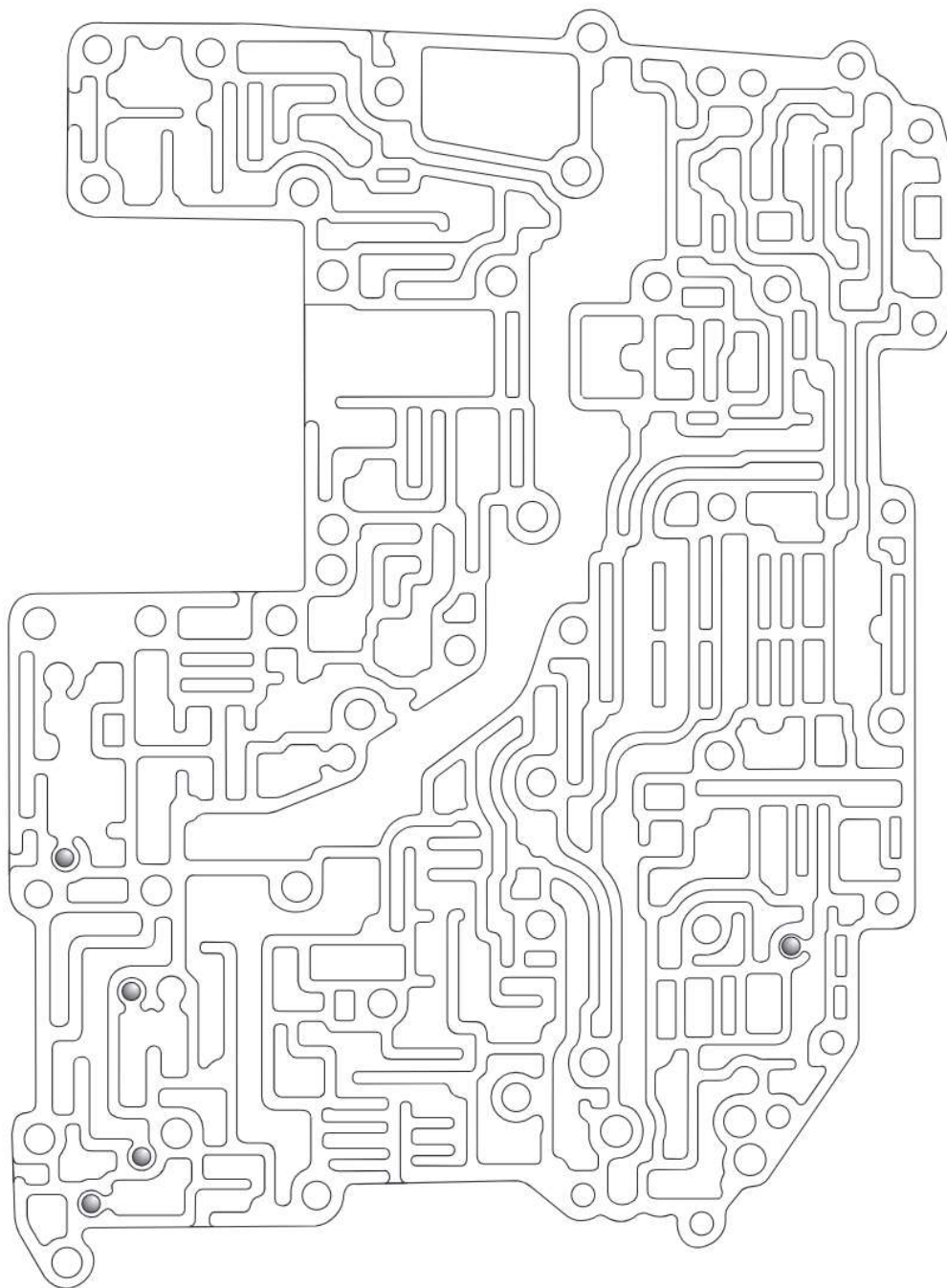
SUBARU 5EAT

LOWER VALVE BODY (BOTTOM SIDE)



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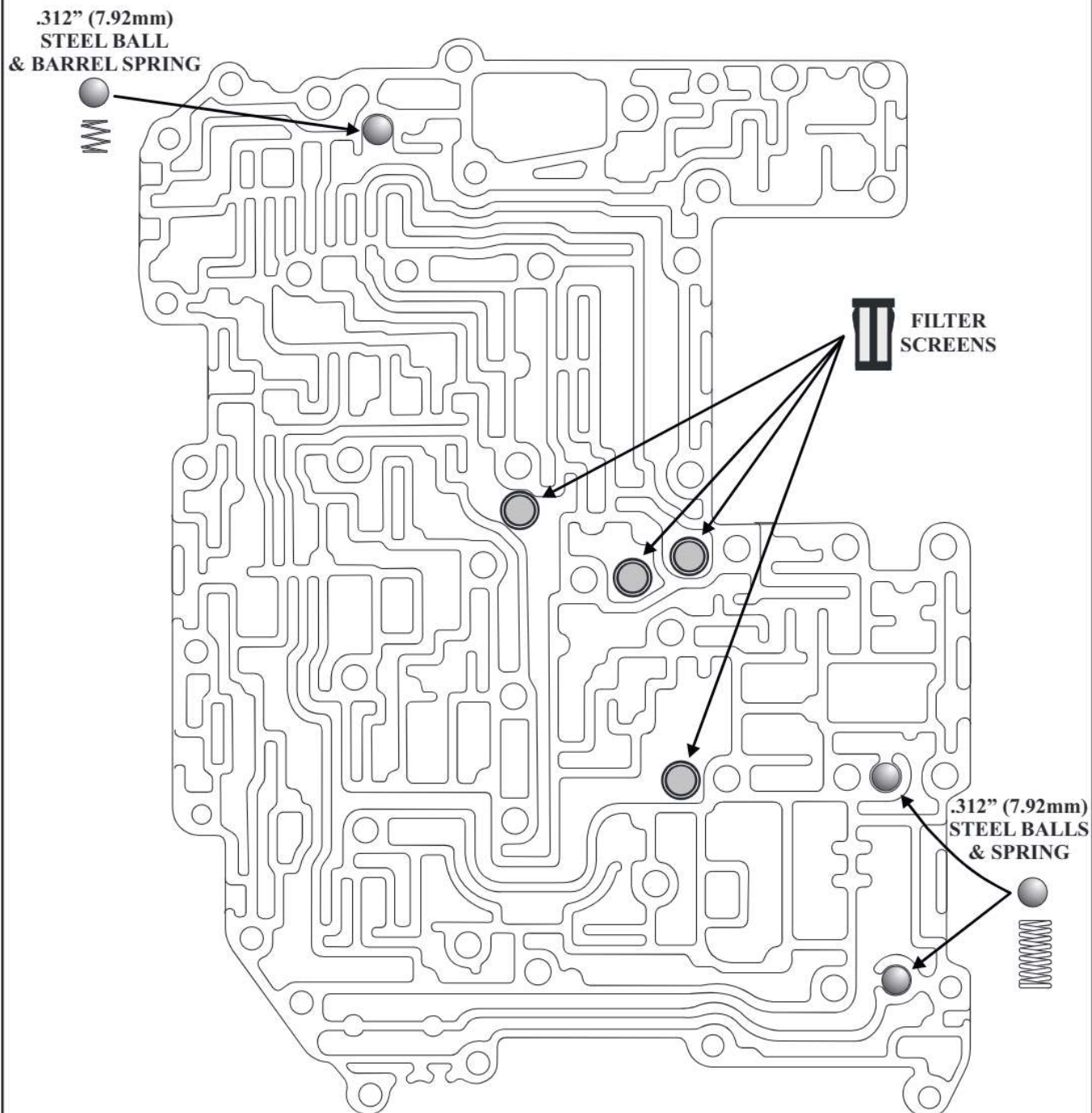
SUBARU 5EAT
LOWER VALVE BODY (TOP SIDE)



All 5 checkballs are Steel .250" (6.35mm)

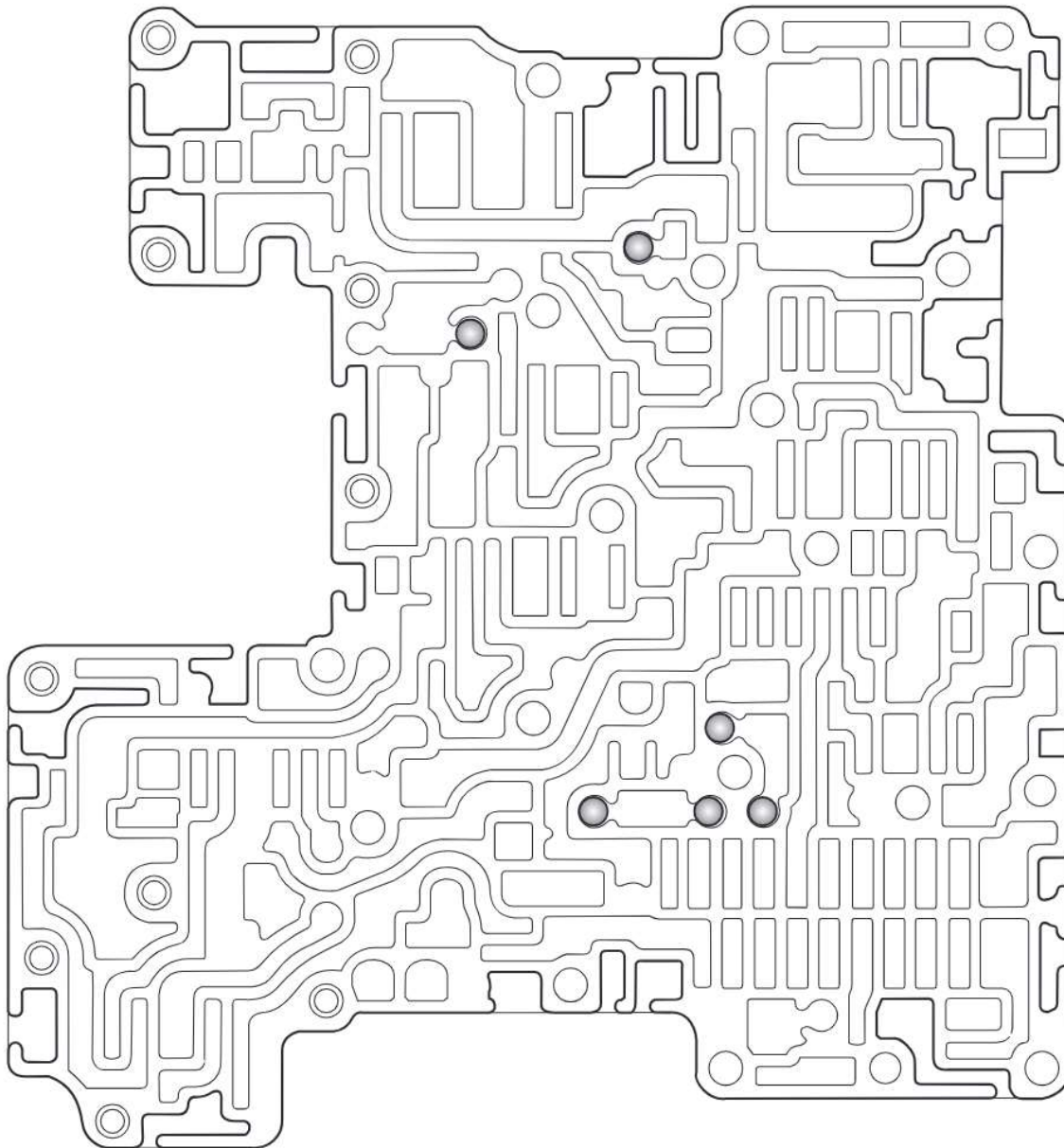
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SUBARU 5EAT UPPER VALVE BODY



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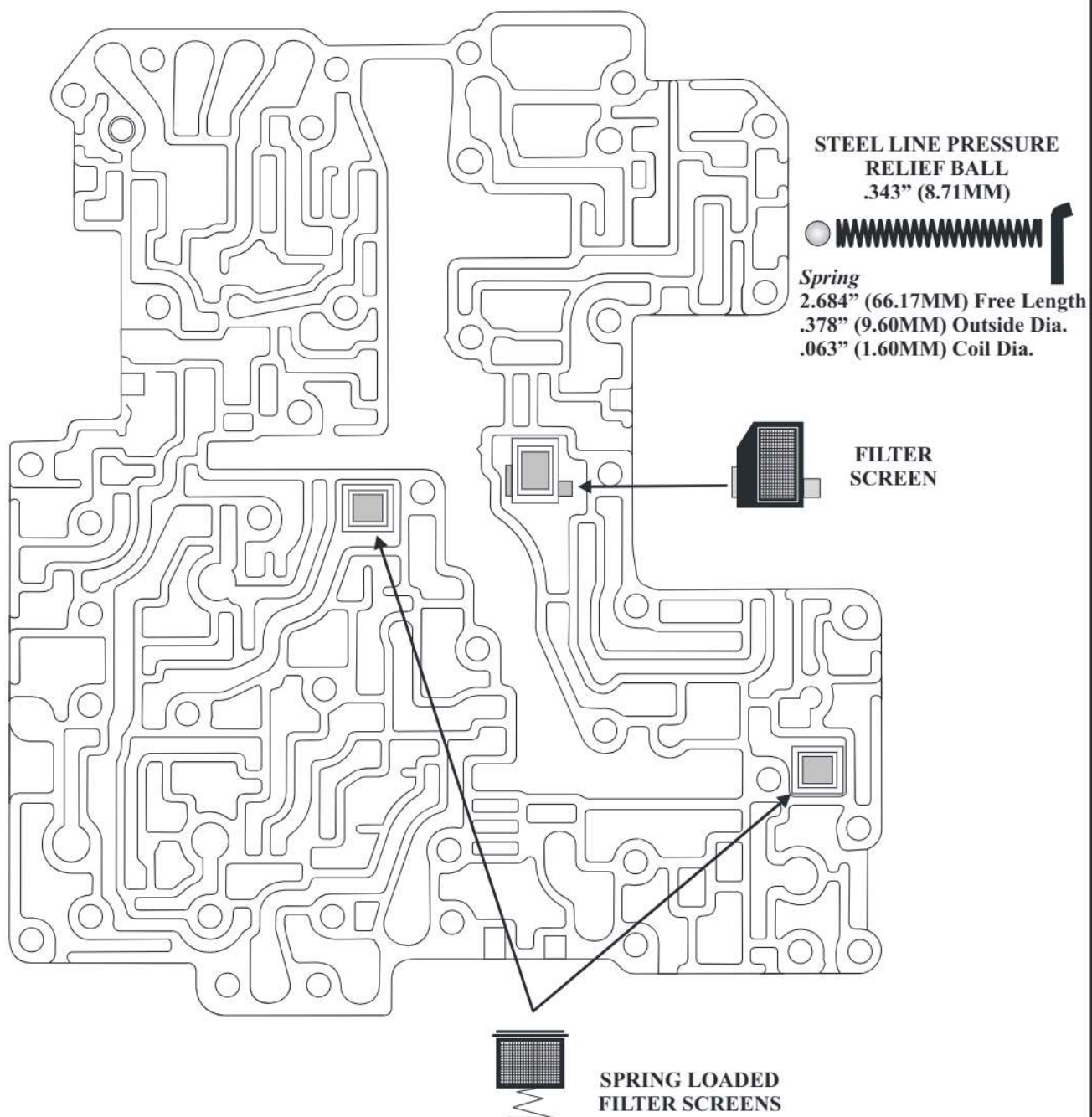
**SUBARU 4EAT
PHASE II
*MIDDLE VALVE BODY***



ALL 6 CHECKBALLS ARE STEEL .215" (5.5MM)

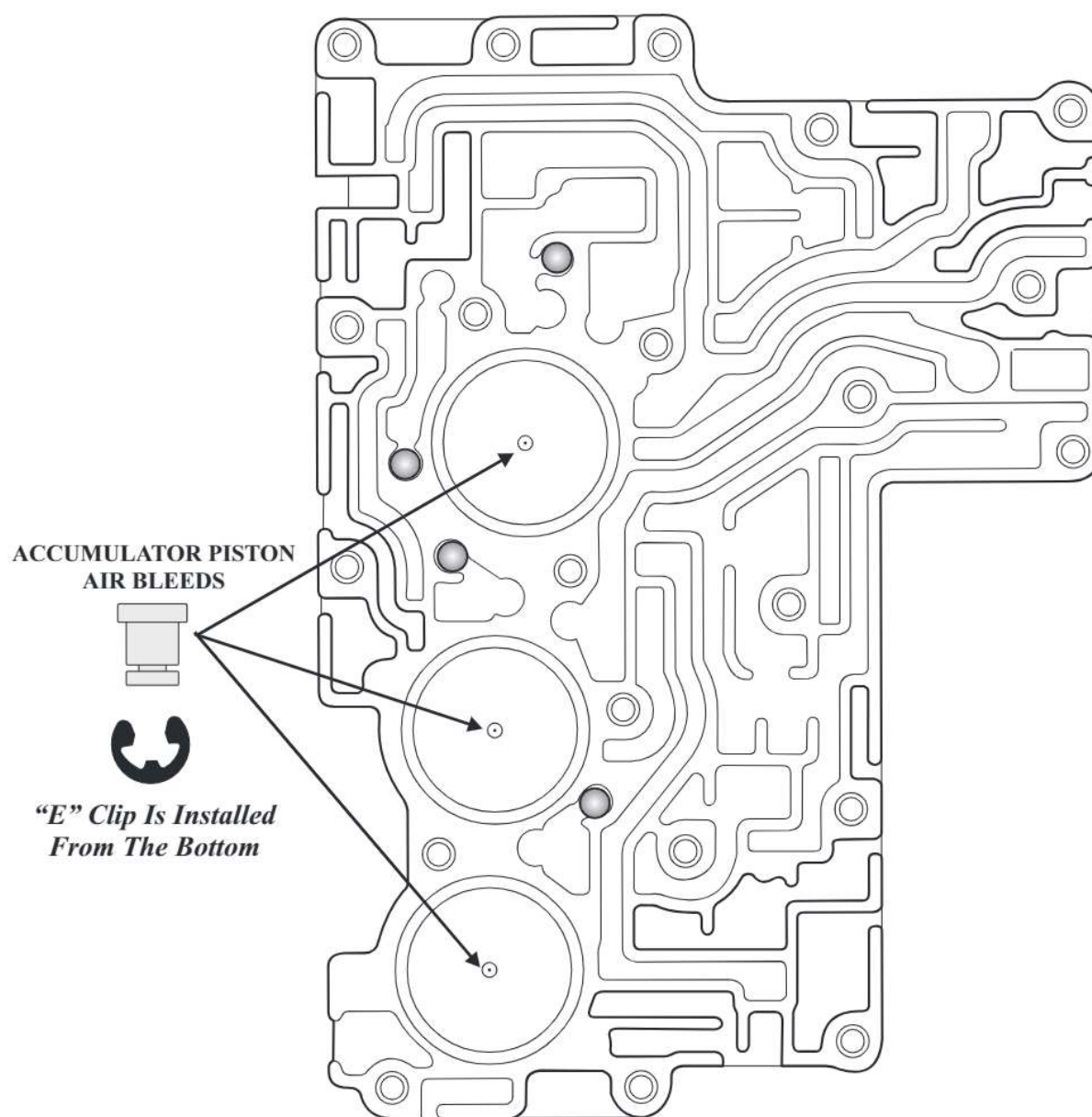
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SUBARU 4EAT PHASE II LOWER VALVE BODY



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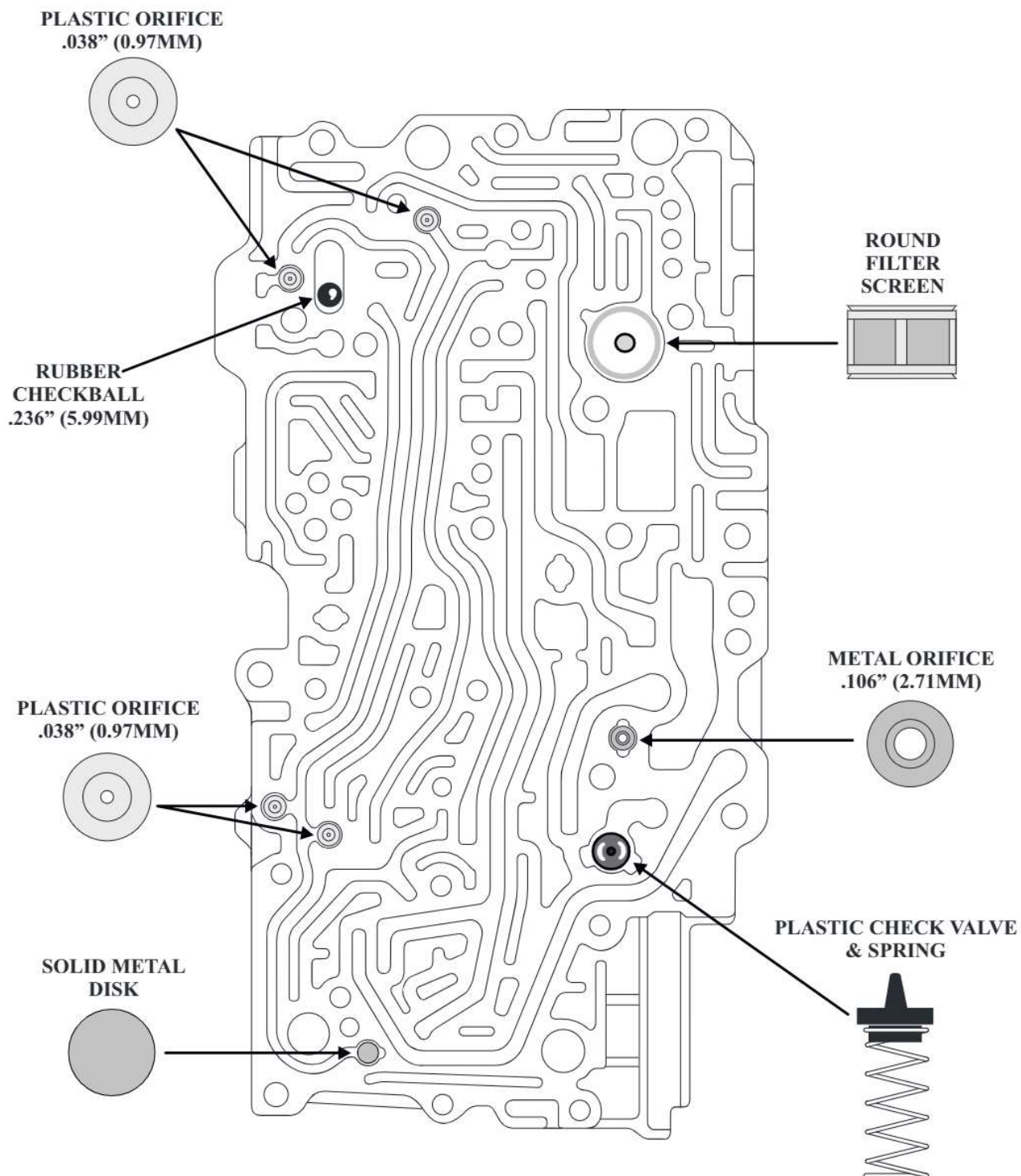
SUBARU 4EAT PHASE II *UPPER VALVE BODY*



ALL 4 CHECKBALLS ARE STEEL .215" (5.5MM)

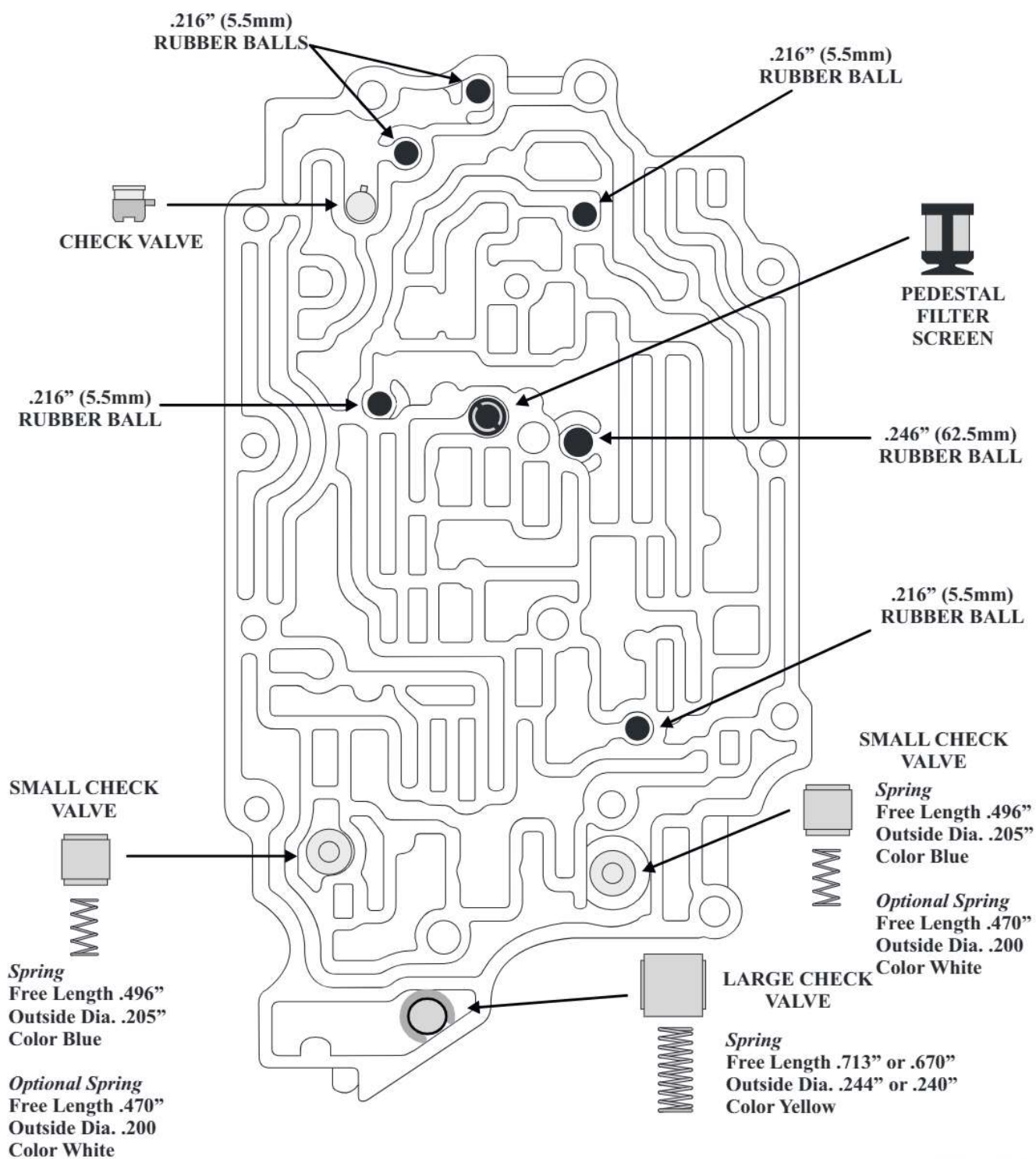
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SUZUKI ZF4HP16 UPPER VALVE BODY



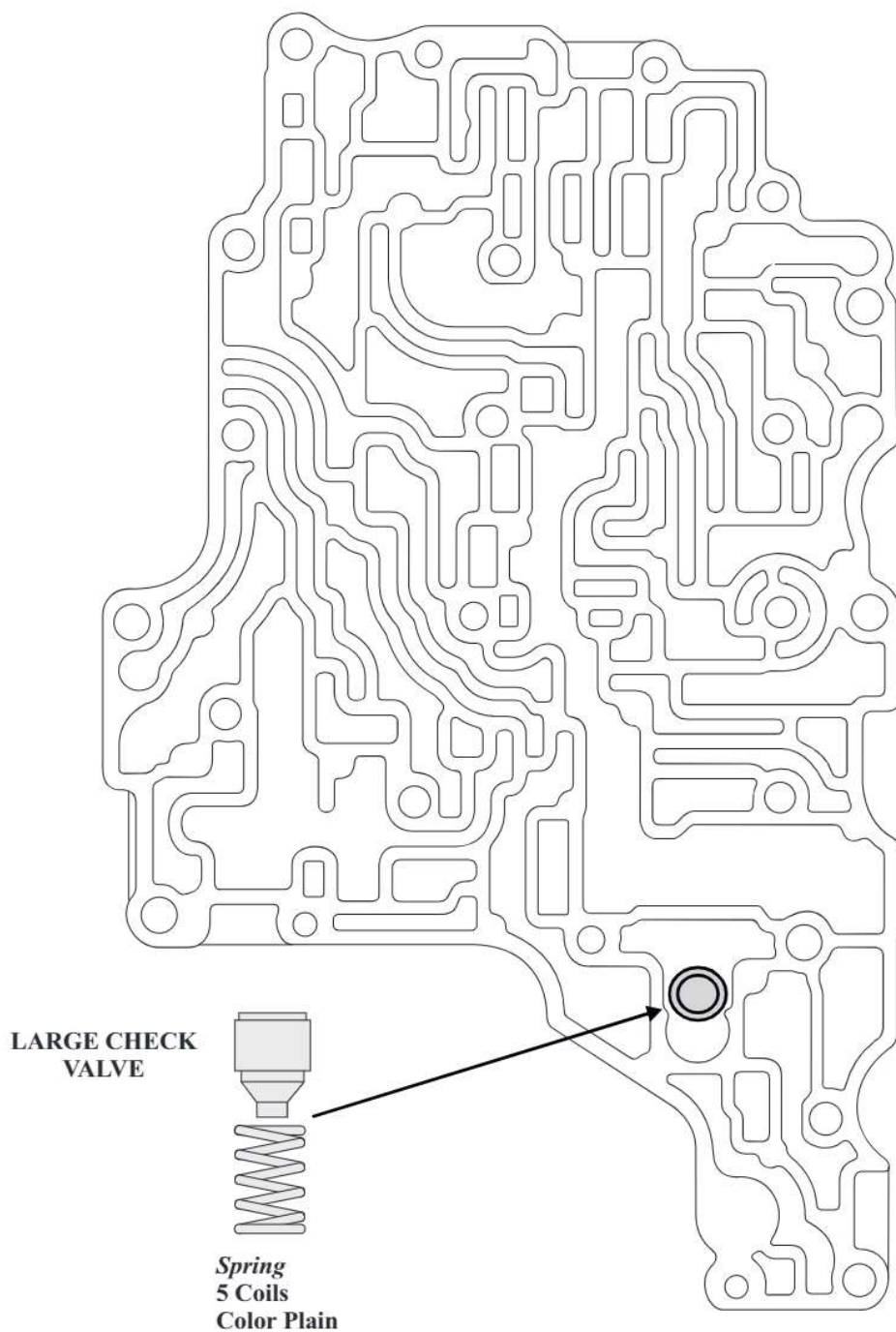
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SUZUKI AW60-40LE/AF13 REAR VALVE BODY



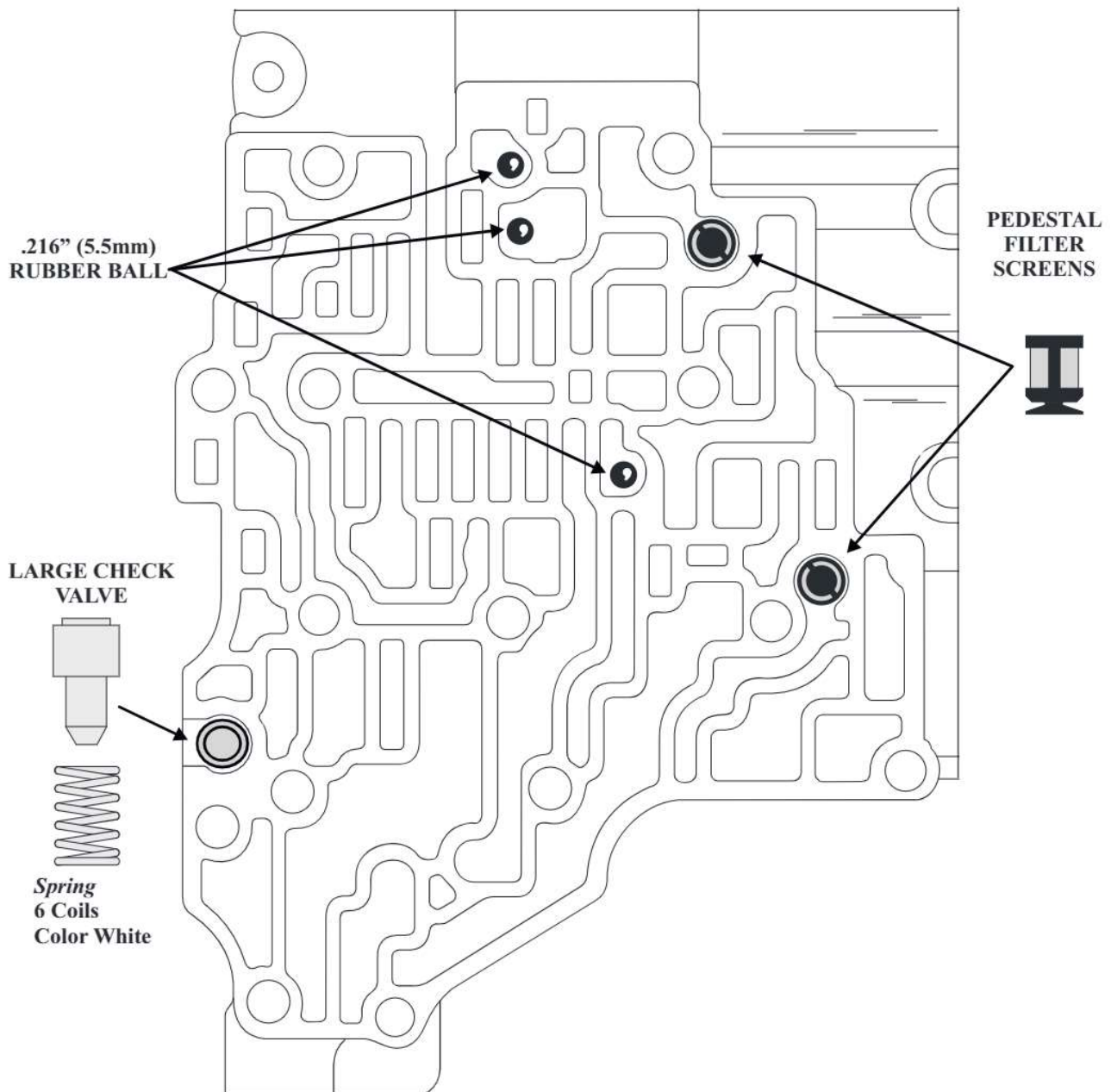
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SUZUKI
AW60-40LE/AF13
FRONT VALVE BODY - TOP SIDE



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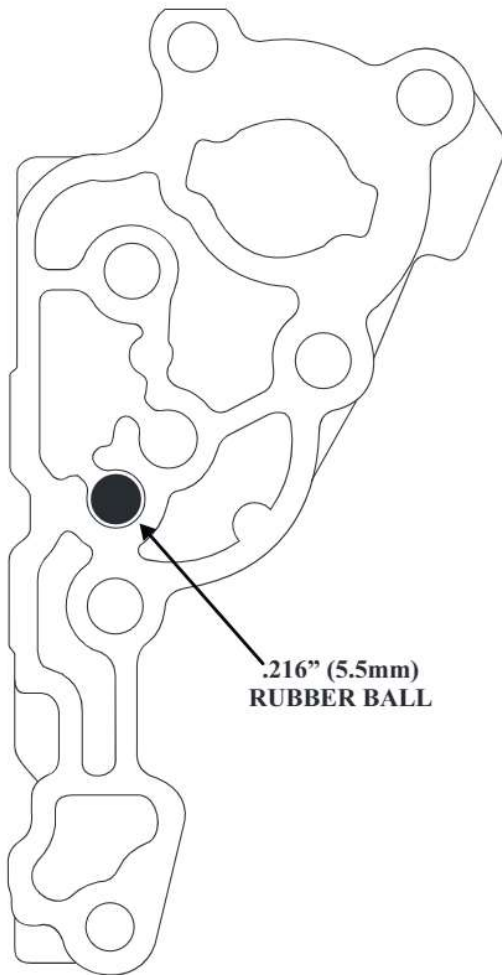
SUZUKI
AW60-40LE/AF13
FRONT VALVE BODY - BOTTOM SIDE



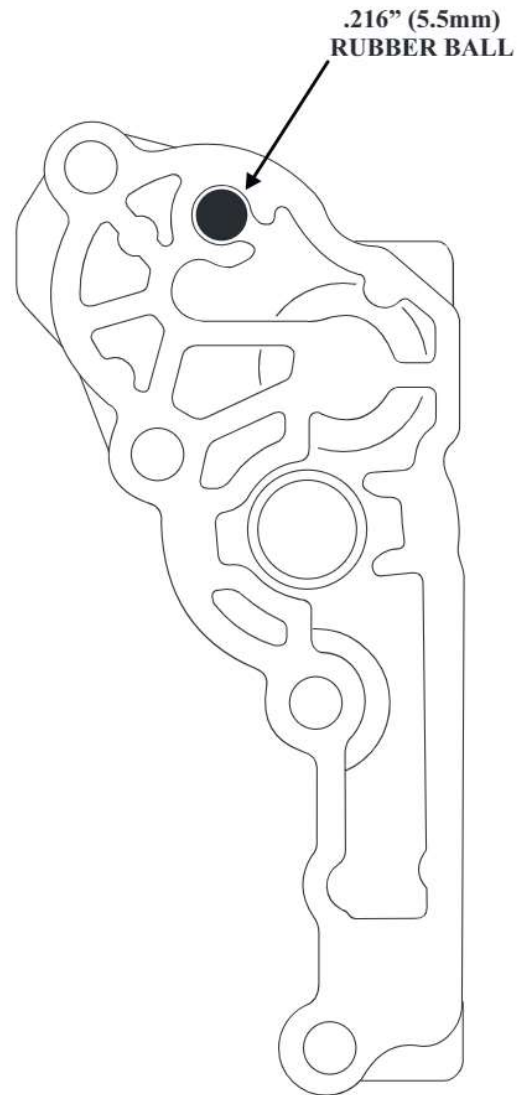
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SUZUKI AW60-40LE/AF13

FRONT ACCUMULATOR COVER



REAR ACCUMULATOR COVER



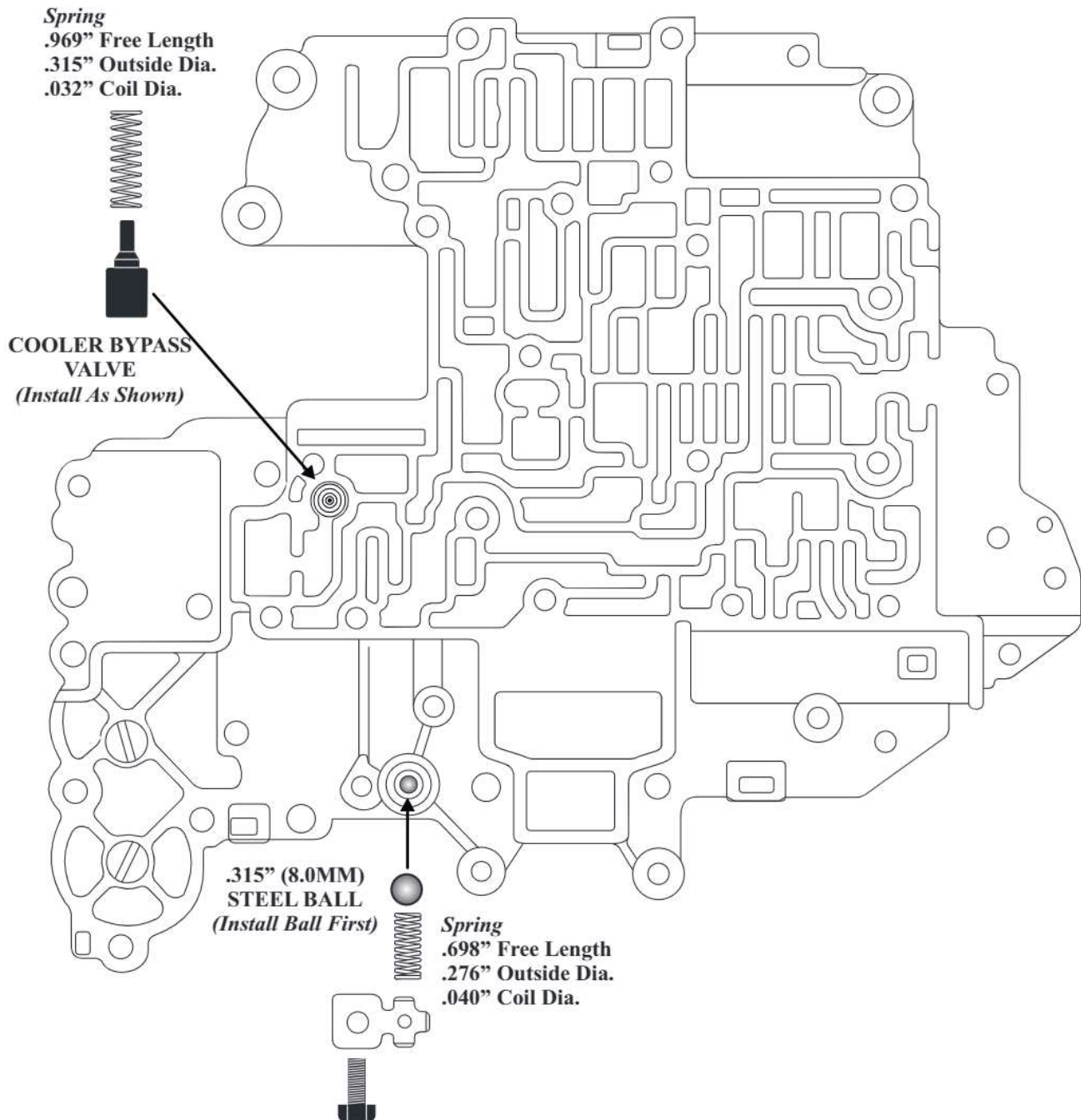
NOTE: Care should be taken when removing these accumulator covers due to spring tension.
These covers contain a total of five accumulator springs & 4 accumulator pistons.

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TOYOTA A245E/246E

LOWER VALVE BODY (Bottom Side)

(Early With TV Cable)

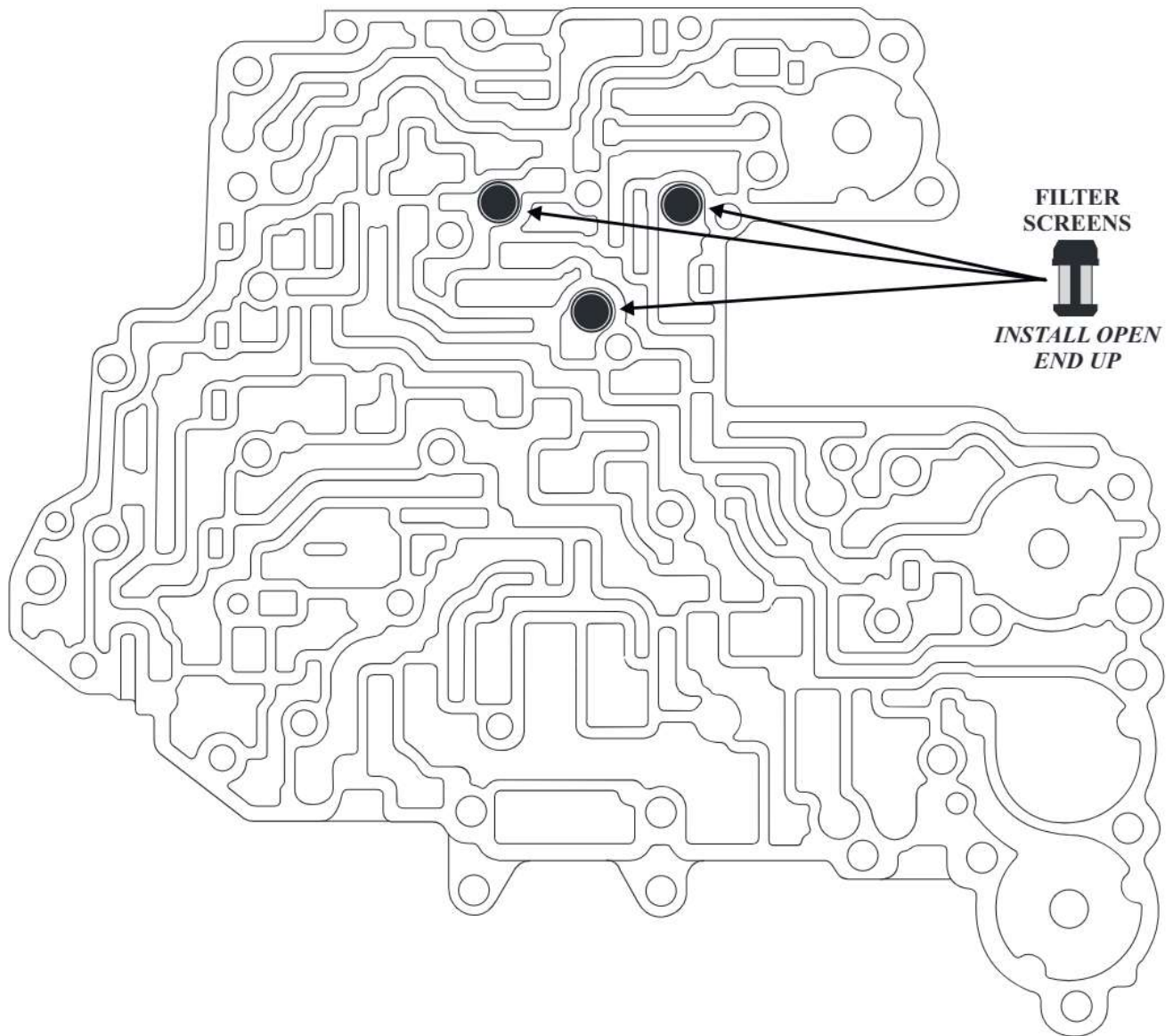


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TOYOTA A245E/246E

LOWER VALVE BODY (Top Side)

(Early With TV Cable)

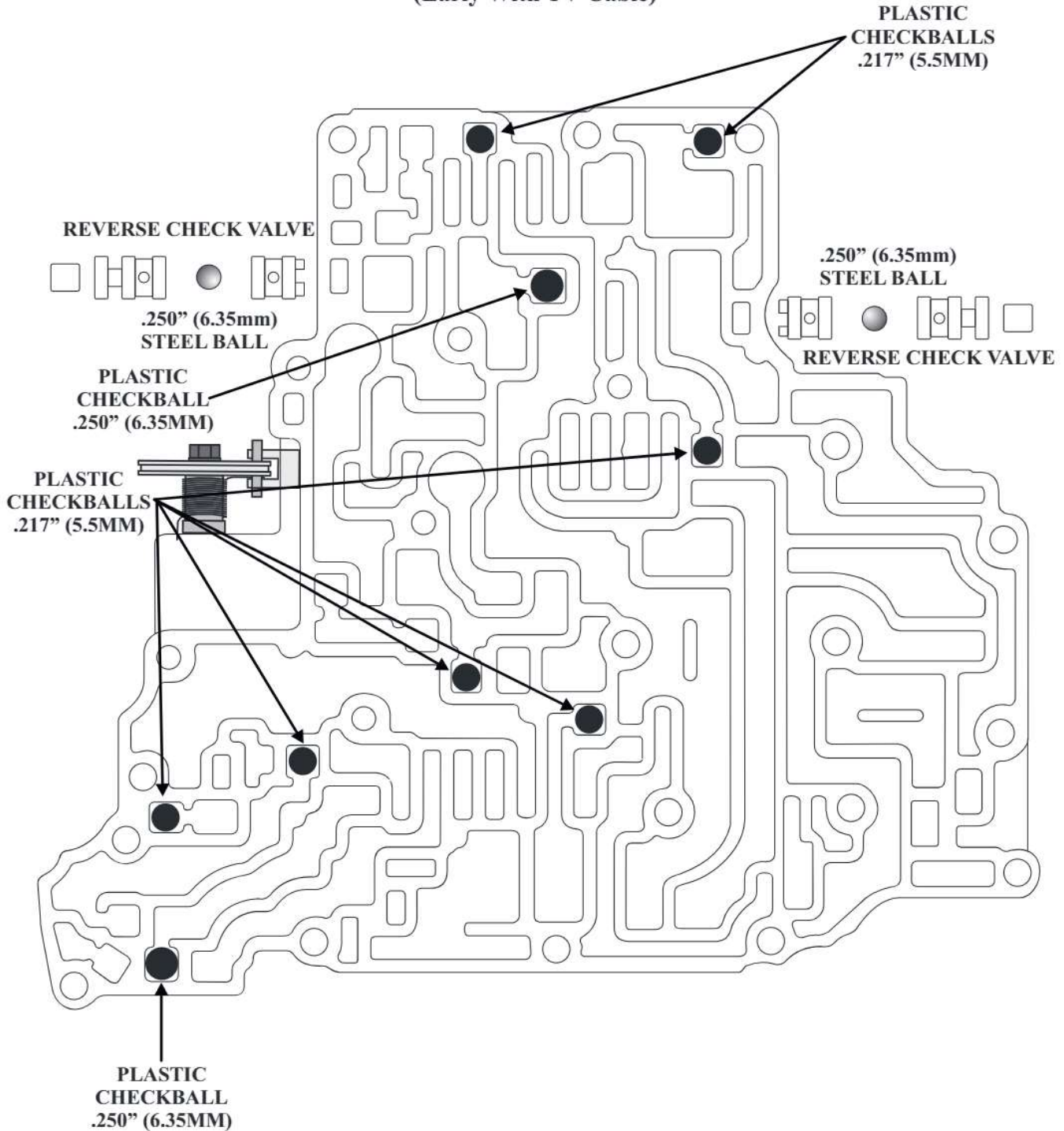


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TOYOTA A245E/246E

UPPER VALVE BODY (Front Side)

(Early With TV Cable)

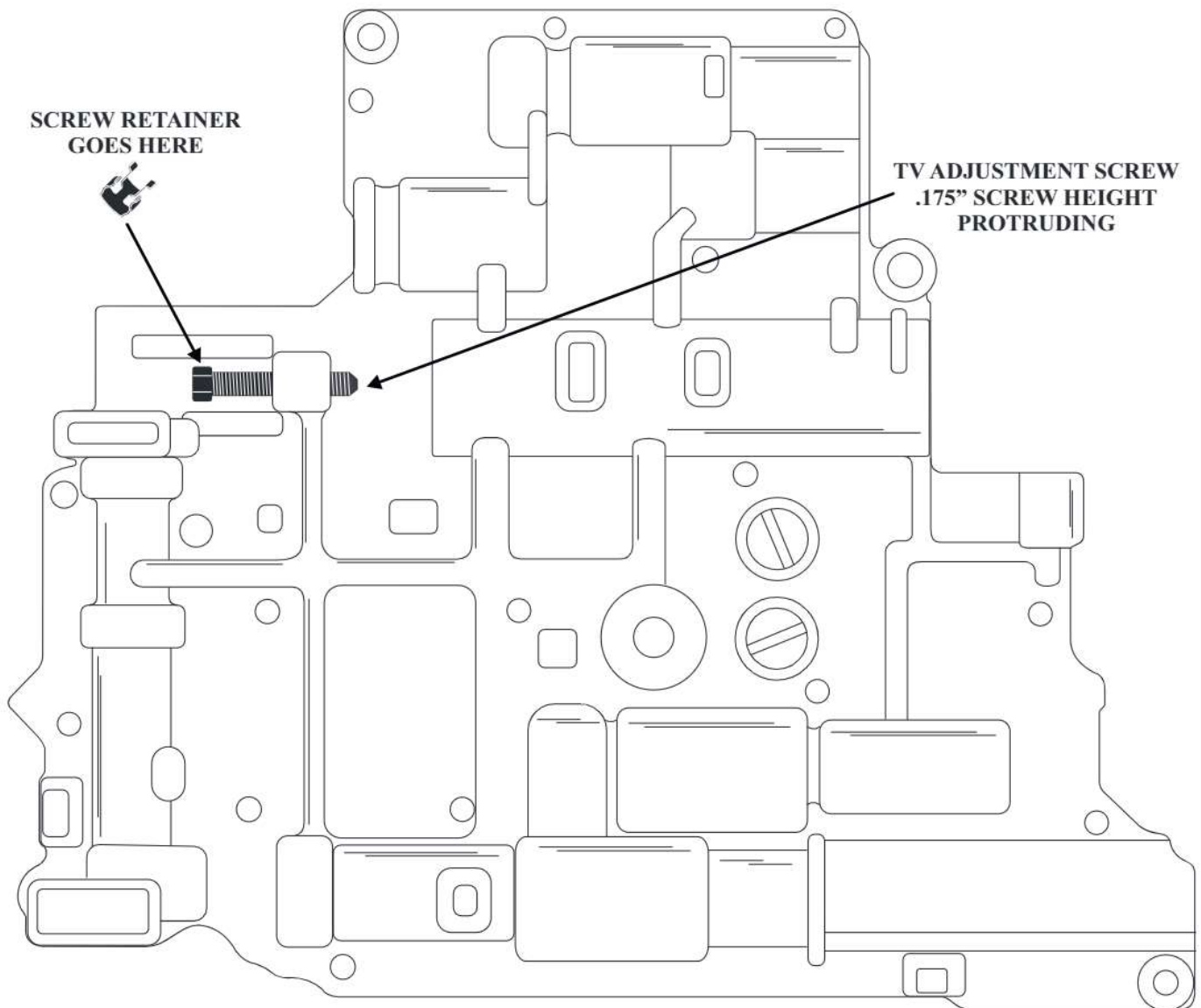


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TOYOTA A245E/246E

UPPER VALVE BODY (Back Side)

(Early With TV Cable)



Copyright © 2008 ATSG

TOYOTA A245E/246E

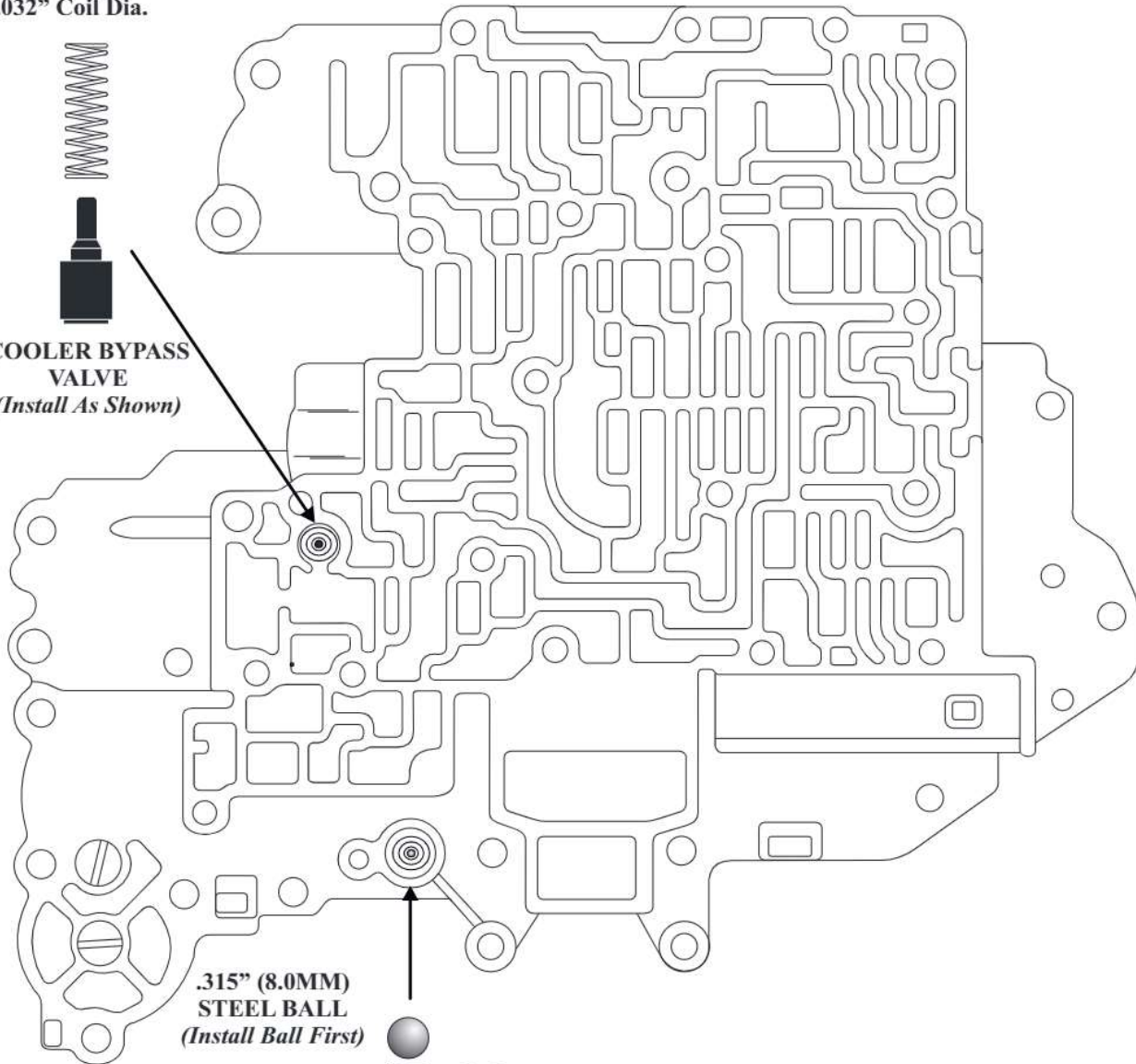
LOWER VALVE BODY (Bottom Side)

(Late With TV Cable)

Spring
.969" Free Length
.315" Outside Dia.
.032" Coil Dia.



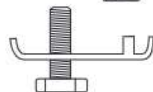
**COOLER BYPASS
VALVE**
(Install As Shown)



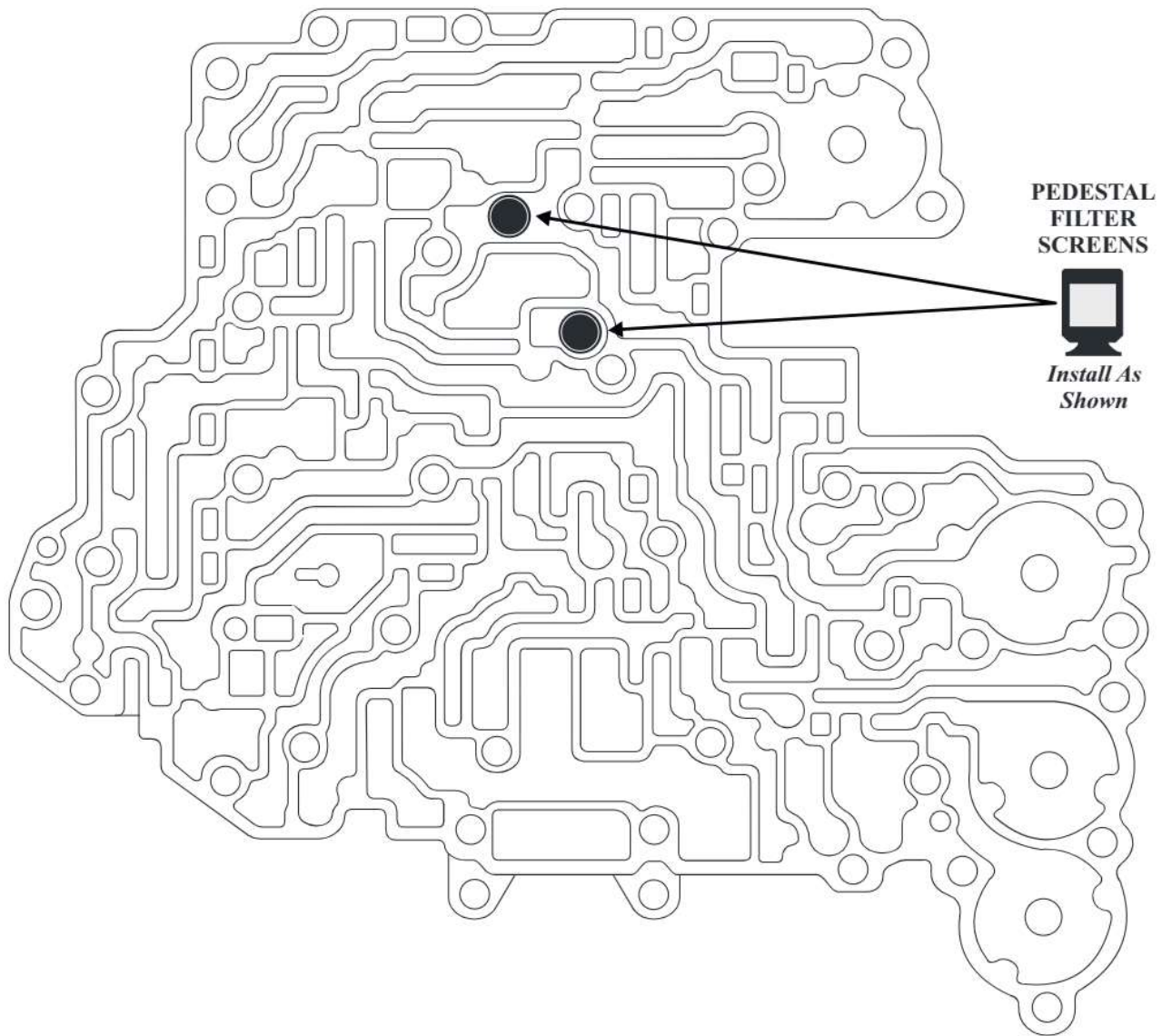
**.315" (8.0MM)
STEEL BALL**
(Install Ball First)



Spring
.698" Free Length
.276" Outside Dia.
.040" Coil Dia.



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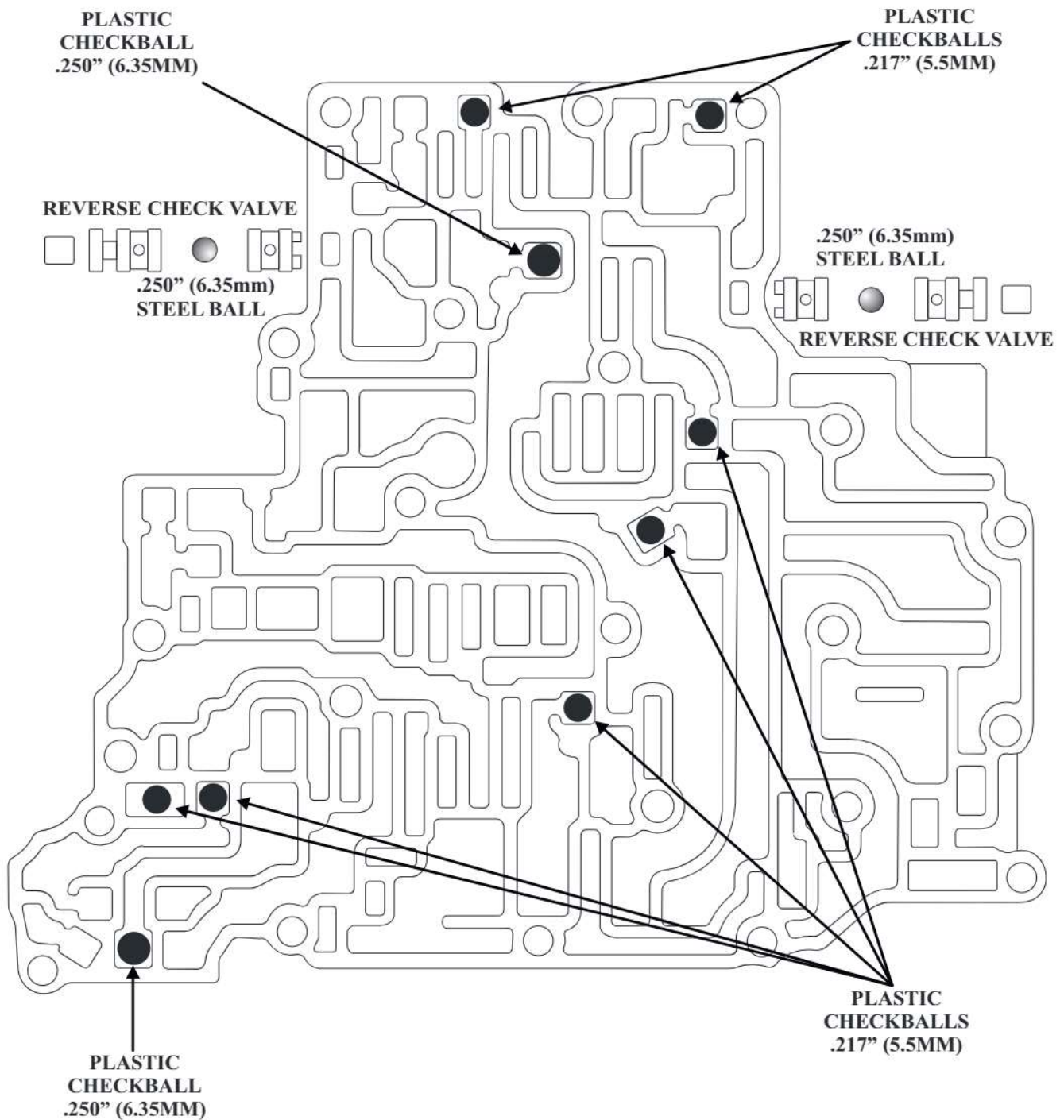
TOYOTA A245E/246E***LOWER VALVE BODY (Top Side)*****(Late With TV Cable)**

Copyright © 2008 ATSG

TOYOTA A245E/246E

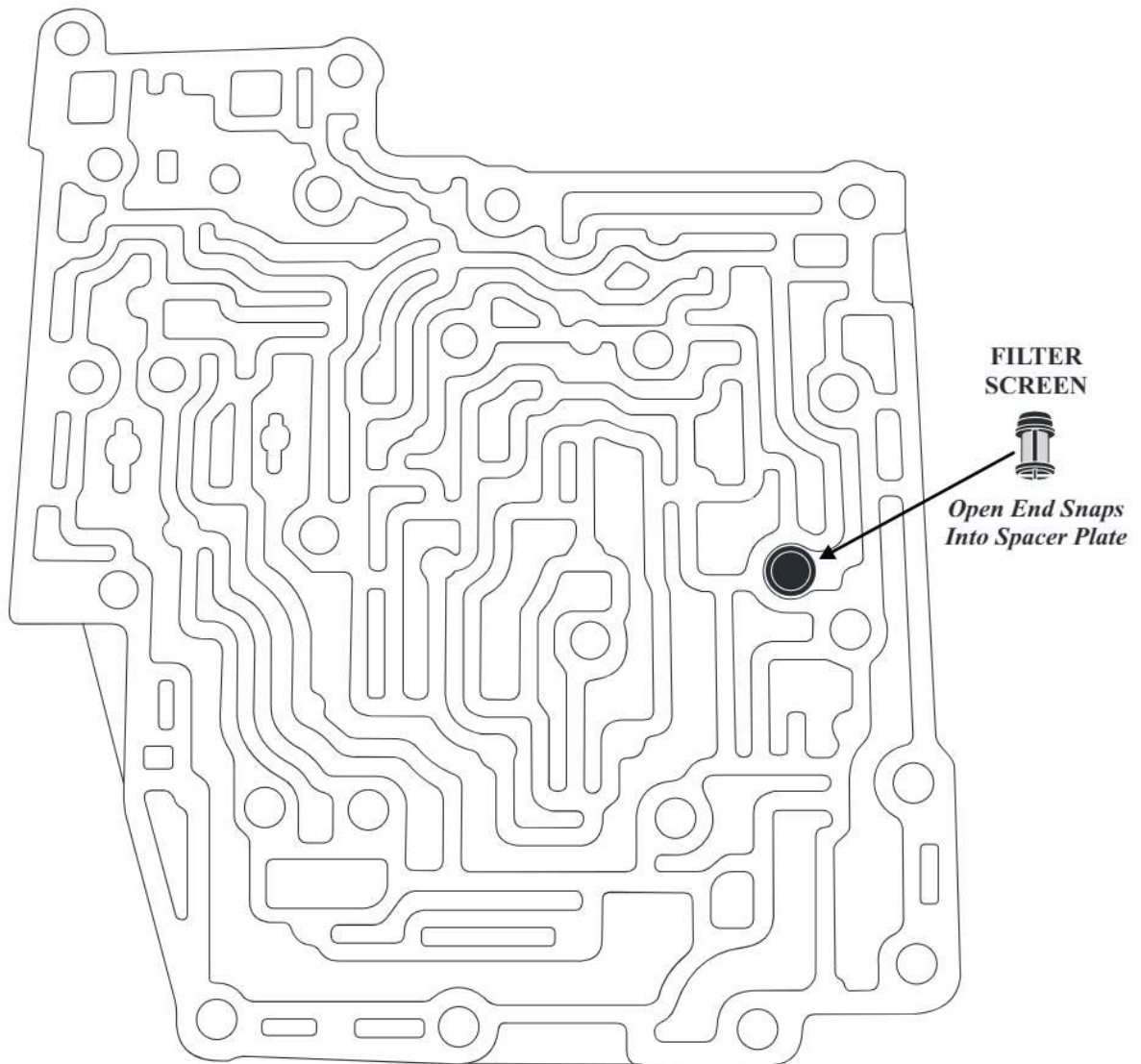
UPPER VALVE BODY

(Late With TV Cable)



Copyright © 2008 ATSG

TOYOTA A245E/246E
LOWER VALVE BODY COVER
(Late With TV Cable)

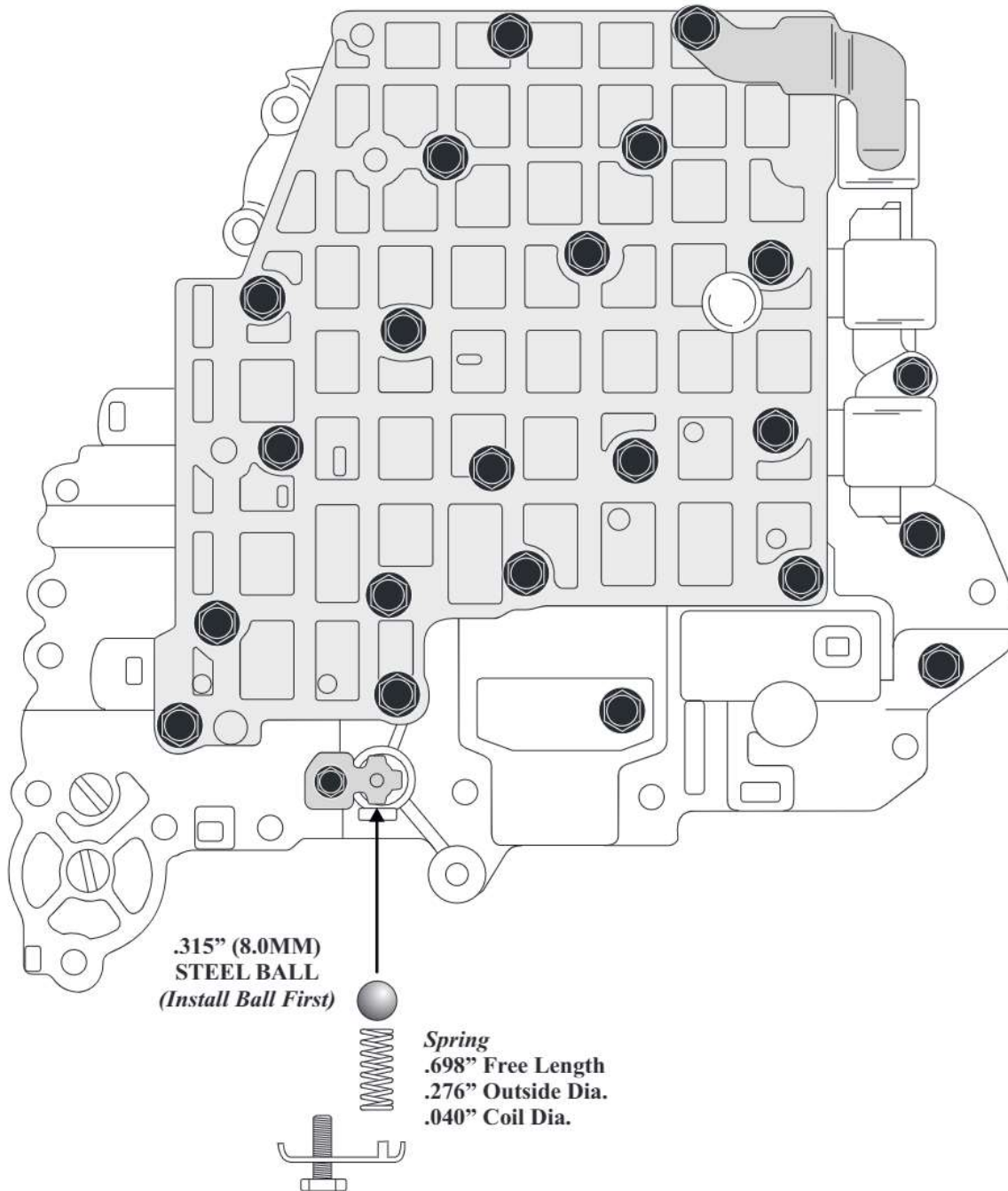


Copyright © 2008 ATSG

TOYOTA A245E/246E

LOWER VALVE BODY (Bottom Side)

(With Line Pressure Solenoid)

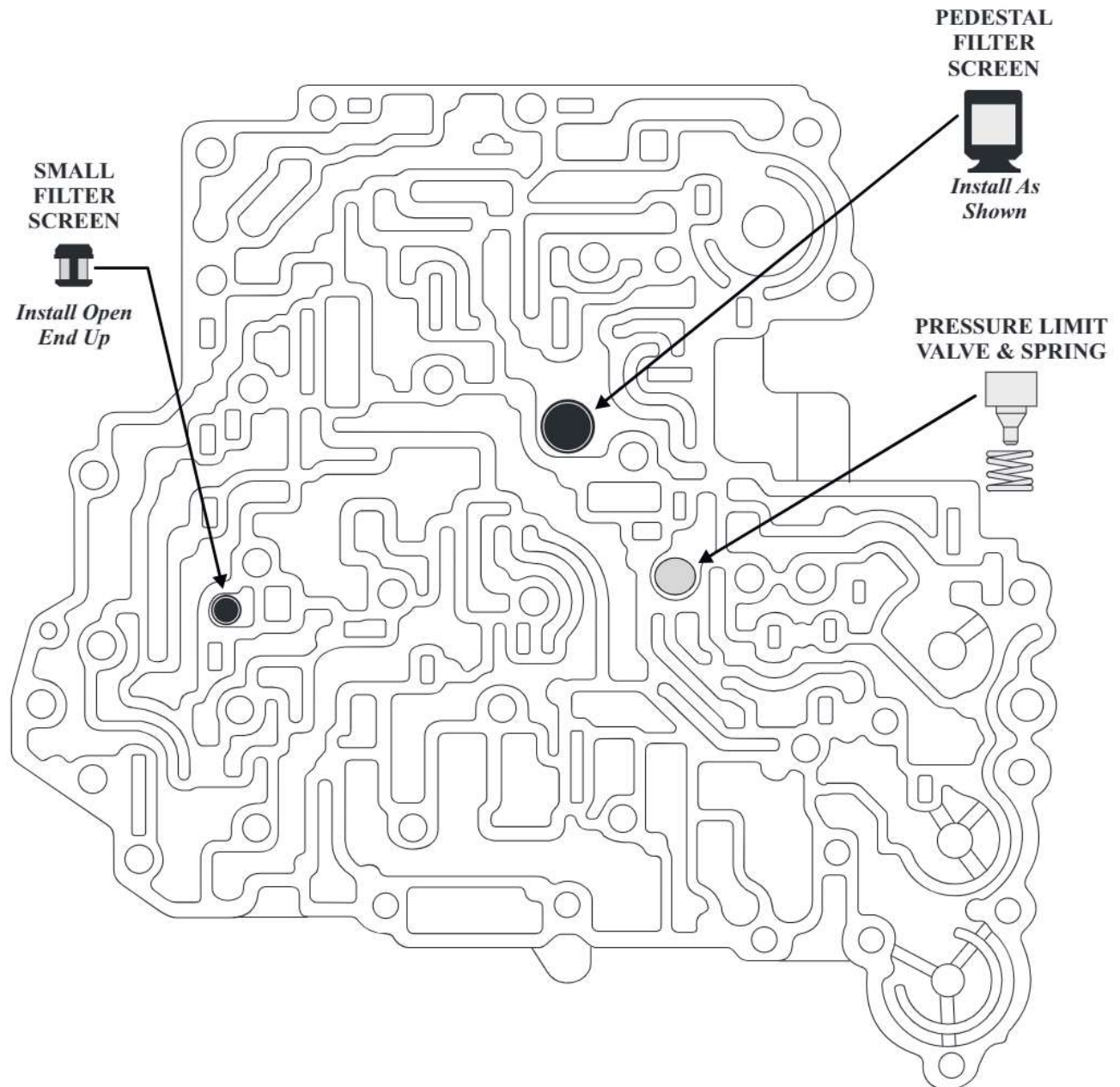


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TOYOTA A245E/246E

LOWER VALVE BODY (Top Side)

(With Line Pressure Solenoid)

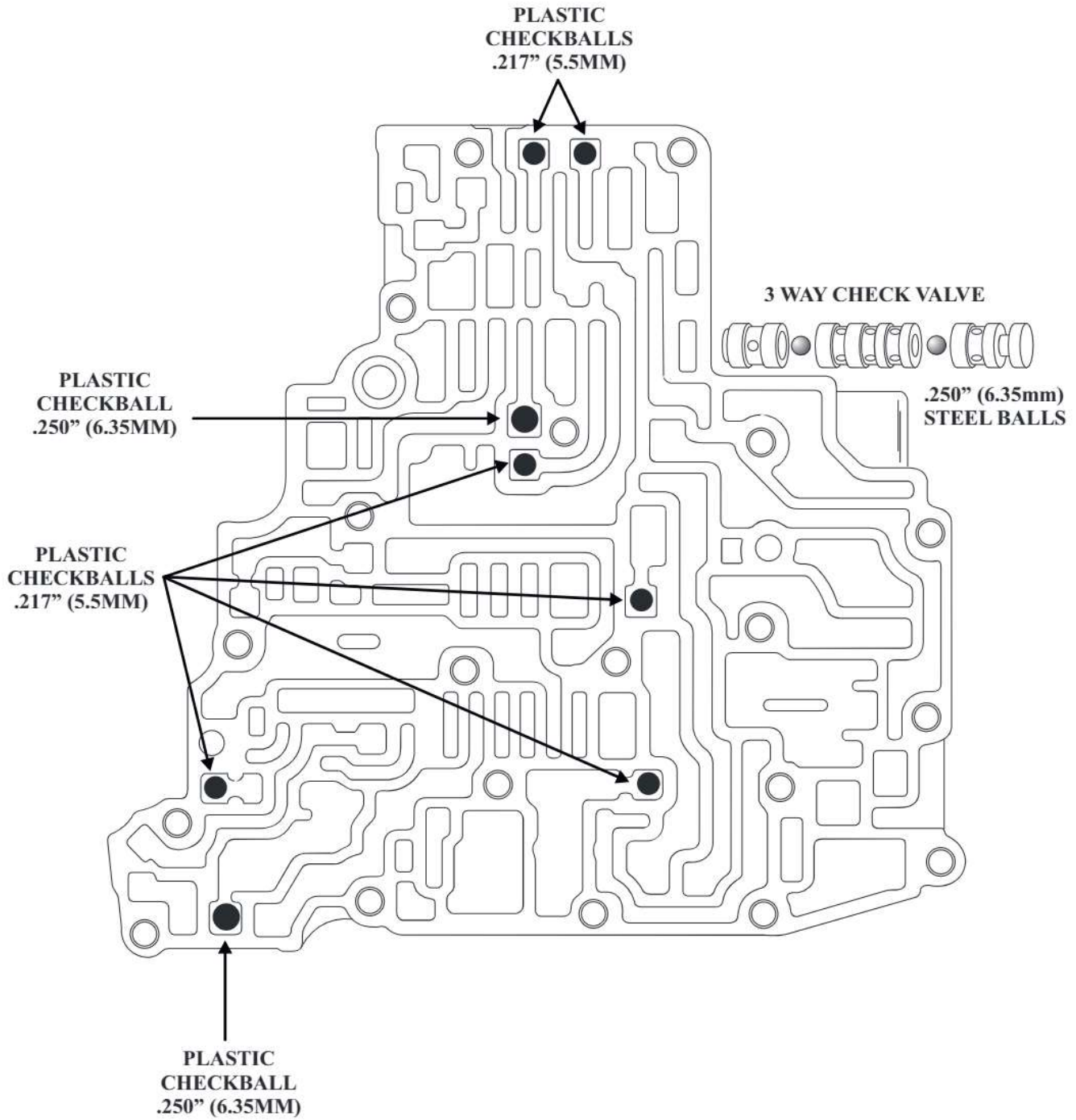


Copyright © 2008 ATSG

TOYOTA A245E/246E

UPPER VALVE BODY

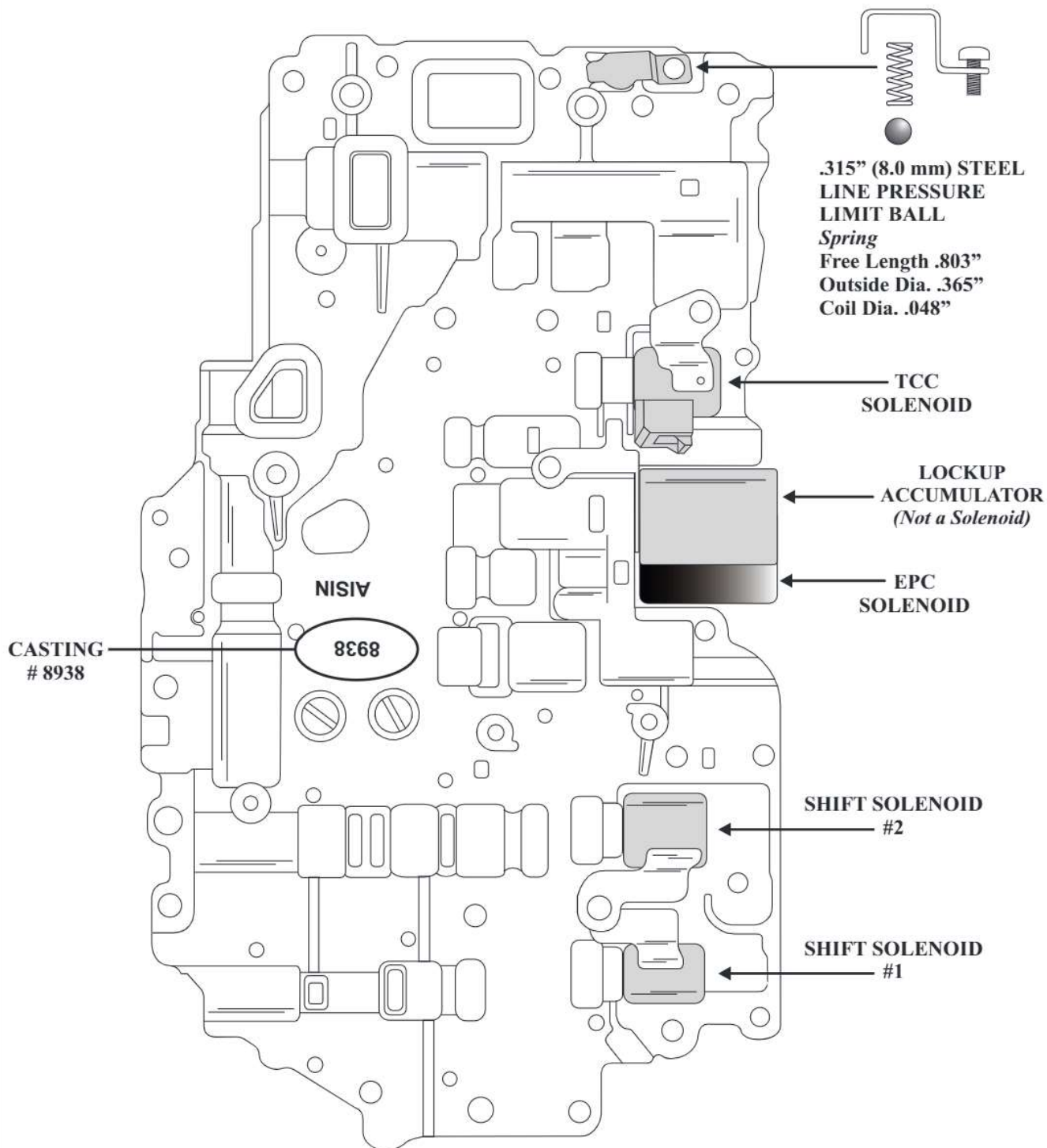
(With Line Pressure Solenoid)



Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER

VALVE BODY CASTING NUMBER 8938 WITH EPC SOLENOID



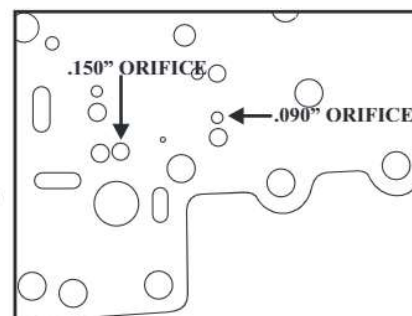
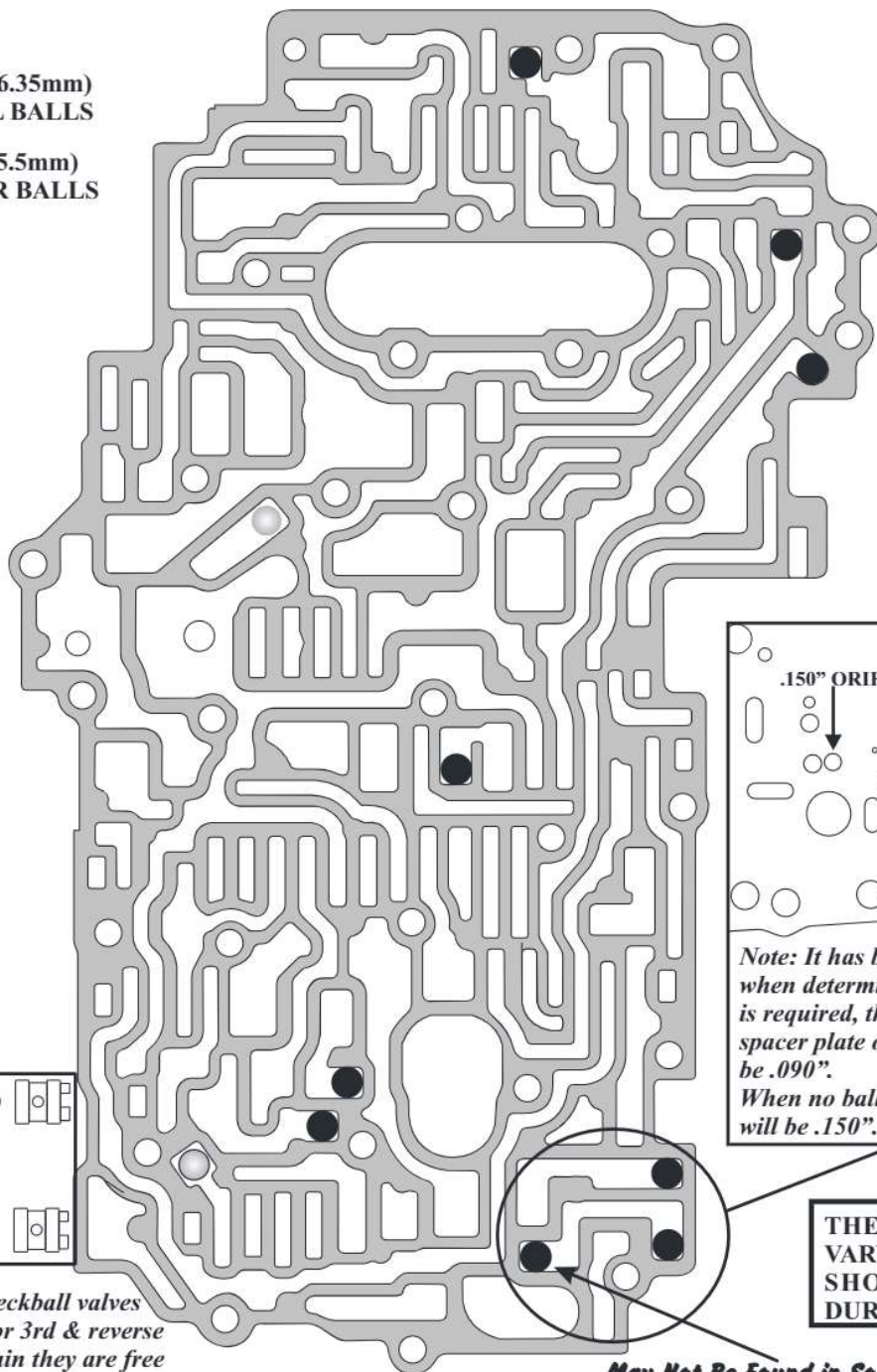
Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER

VALVE BODY CASTING NUMBER 8938 WITH EPC SOLENOID

UPPER VALVE BODY

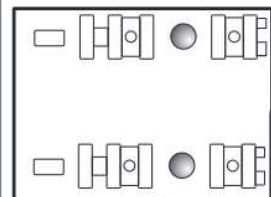
-  .250" (6.35mm)
STEEL BALLS
-  .218" (5.5mm)
RUBBER BALLS



Note: It has been ATSG's experience when determining when a checkball is required, the circuit's orifice in the spacer plate over that location will be .090". When no ball is required, the orifice will be .150".

THESE CHECKBALLS VARY GREATLY, CARE SHOULD BE TAKEN DURING DISASSEMBLY

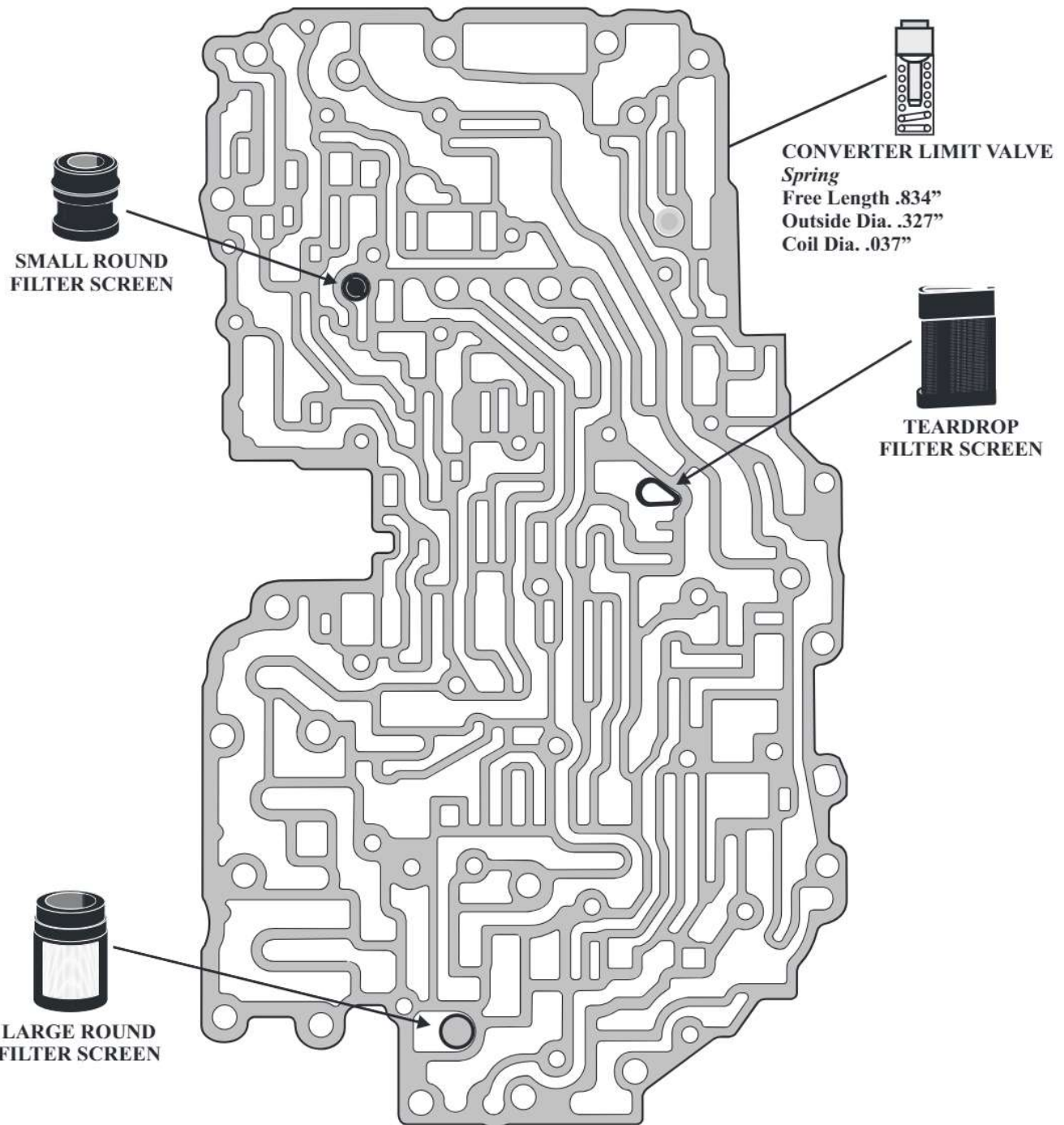
May Not Be Found in Some Sequoia V8 or Tundra V8 Models



NOTE: These checkball valves are responsible for 3rd & reverse gears. Make certain they are free of trash and are in place. The keepers can fall out due to no spring tension.

Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER
VALVE BODY CASTING NUMBER 8938 WITH EPC SOLENOID
LOWER VALVE BODY

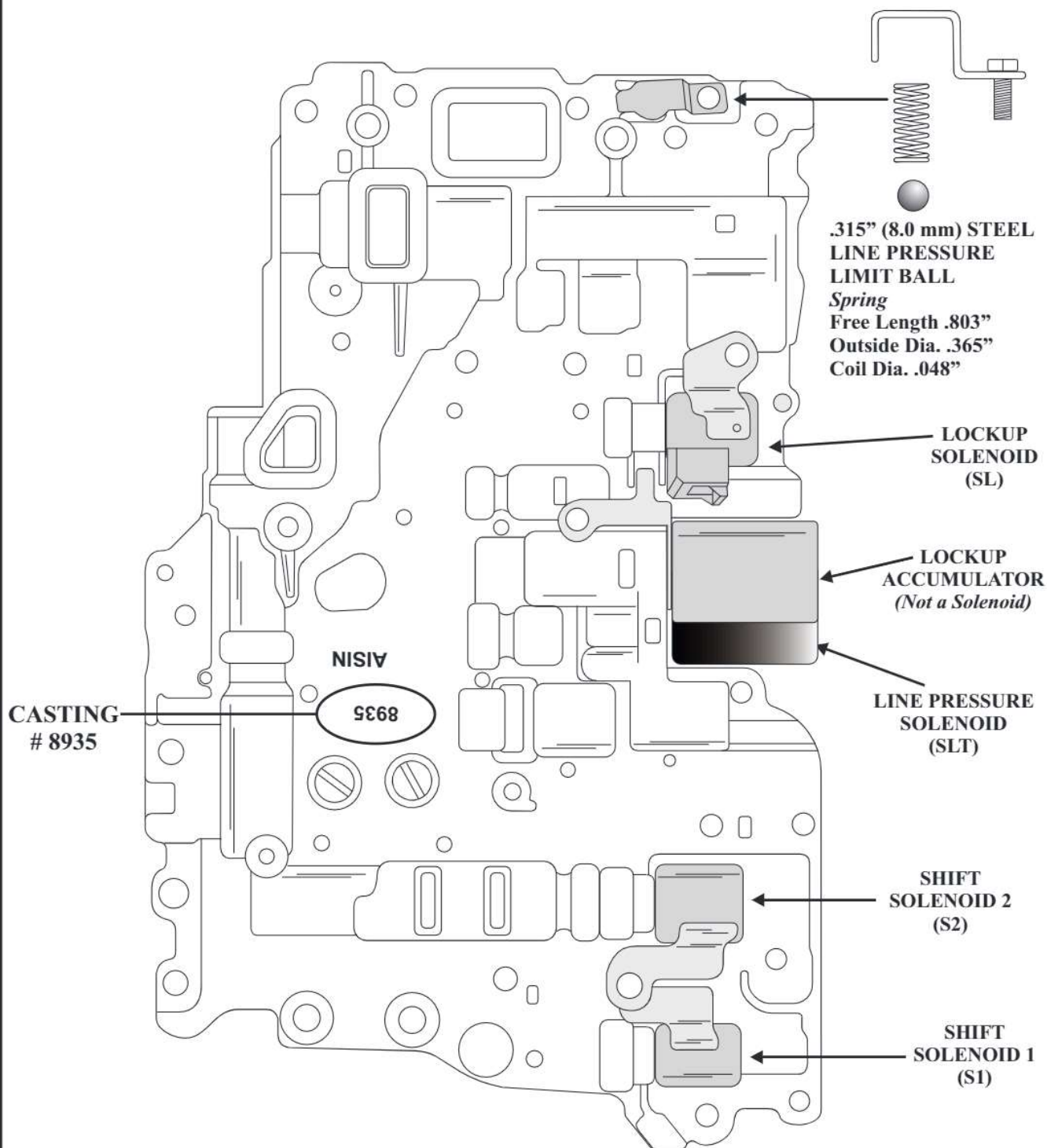


NOTE: Open End Of Screens Face Separator Plate And Snap In

Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER

VALVE BODY CASTING NUMBER 8935 WITH EPC SOLENOID

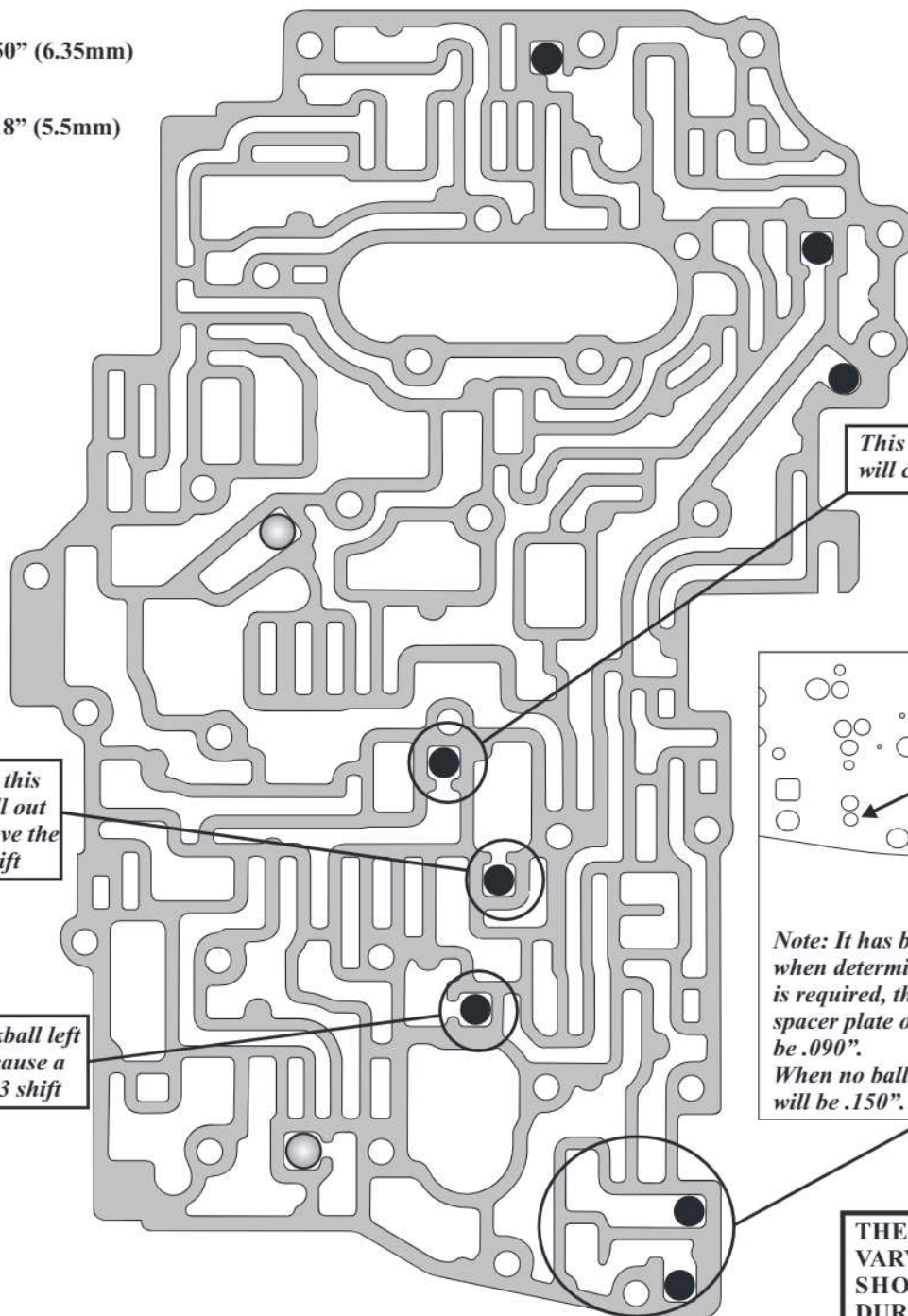


Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER
VALVE BODY CASTING NUMBER 8935 WITH EPC SOLENOID
UPPER VALVE BODY

 .250" (6.35mm)

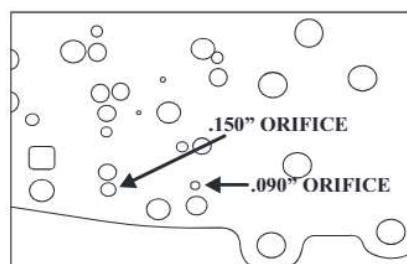
 .218" (5.5mm)



This checkball left out will cause a harsh 1-2 shift

Leaving this checkball out will improve the 3-4 shift

This checkball left out will cause a harsh 2-3 shift

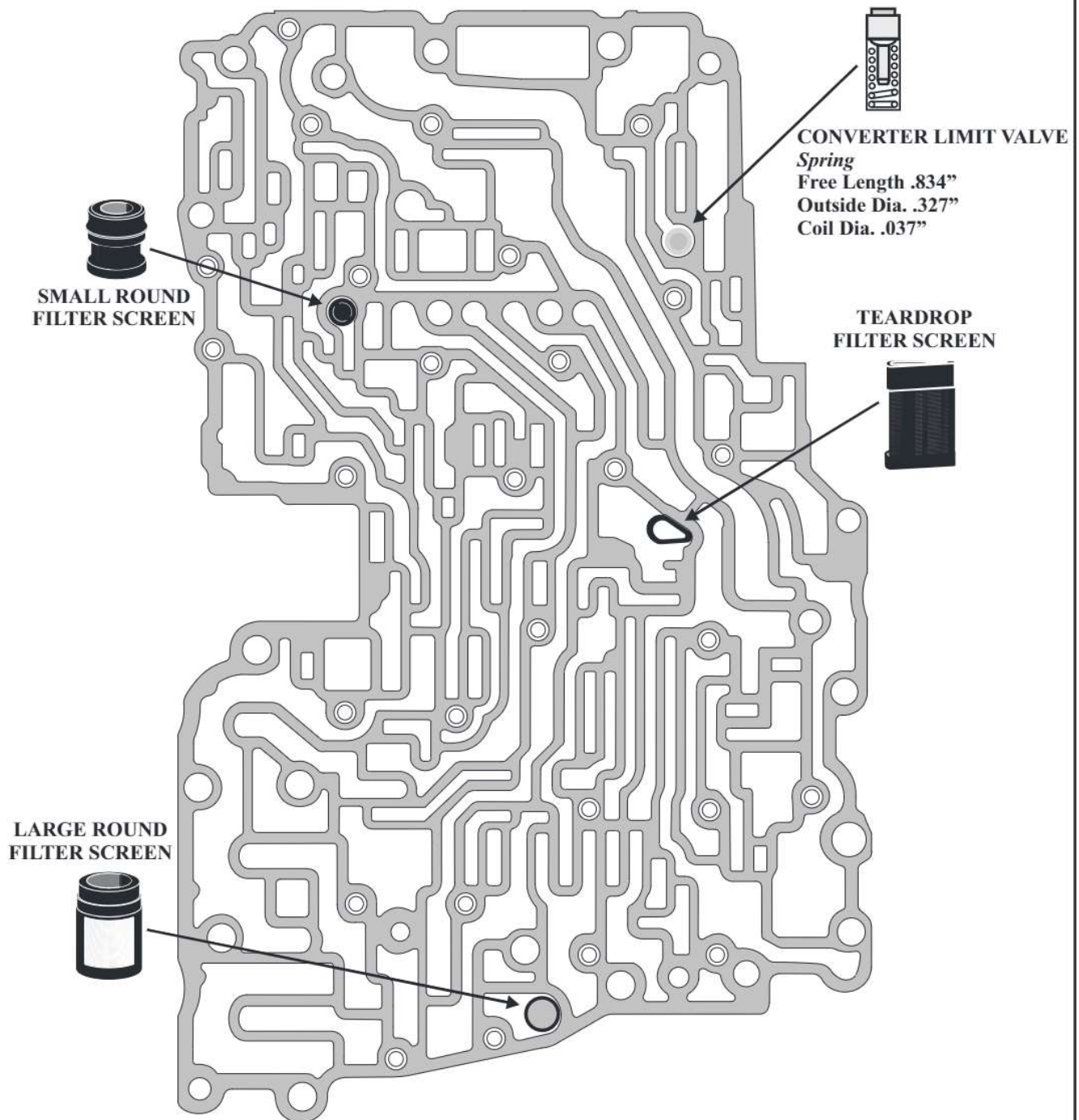


Note: It has been ATSG's experience when determining when a checkball is required, the circuit's orifice in the spacer plate over that location will be .090". When no ball is required, the orifice will be .150".

THESE CHECKBALLS VARY GREATLY, CARE SHOULD BE TAKEN DURING DISASSEMBLY

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TOYOTA A340E/F - 2000 & LATER
VALVE BODY CASTING NUMBER 8935 WITH EPC SOLENOID
LOWER VALVE BODY

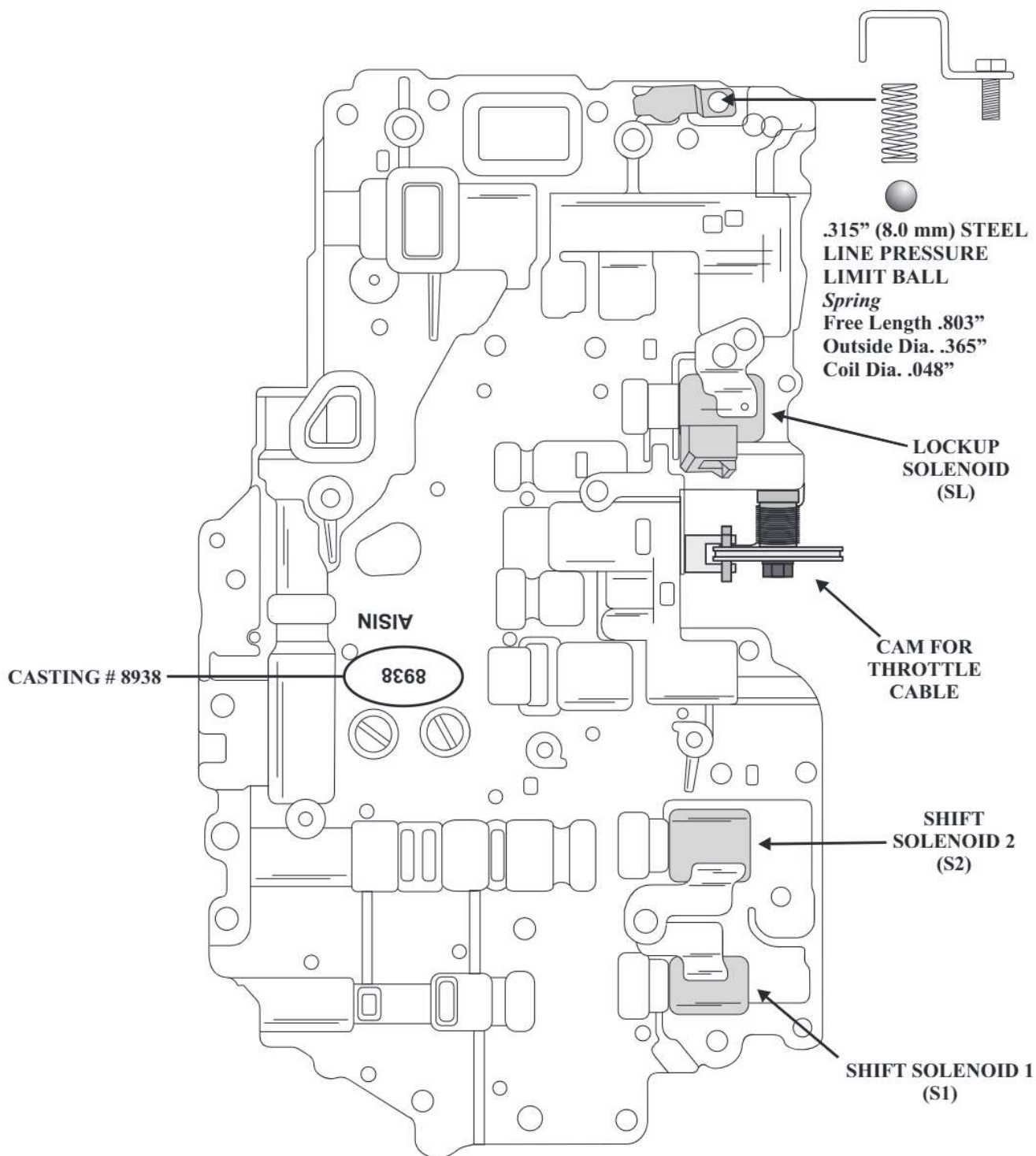


NOTE: Open End Of Screens Face Separator Plate And Snap In

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TOYOTA A340E/F - 2000 & LATER

VALVE BODY CASTING NUMBER 8938 WITH TV CABLE



Copyright © 2008 ATSG

TOYOTA A340E/F - 2000 & LATER

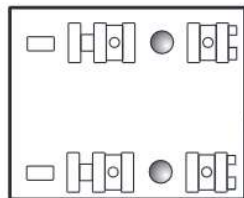
VALVE BODY CASTING NUMBER 8938 WITH TV CABLE

UPPER VALVE BODY

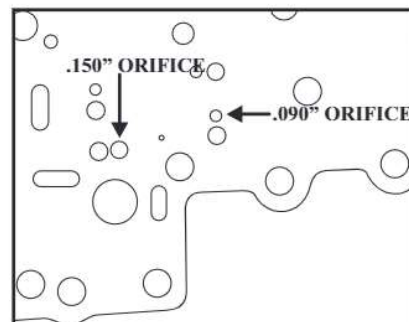
 .250" (6.35mm)

 .218" (5.5mm)

*Not Found Is Some
Vehicles w/3.4L V6*



NOTE: These checkball valves are responsible for 3rd & reverse gears. Make certain they are free of trash and are in place. The keepers can fall out due to no spring tension.



Note: It has been ATSG's experience when determining when a checkball is required, the circuit's orifice in the spacer plate over that location will be .090".

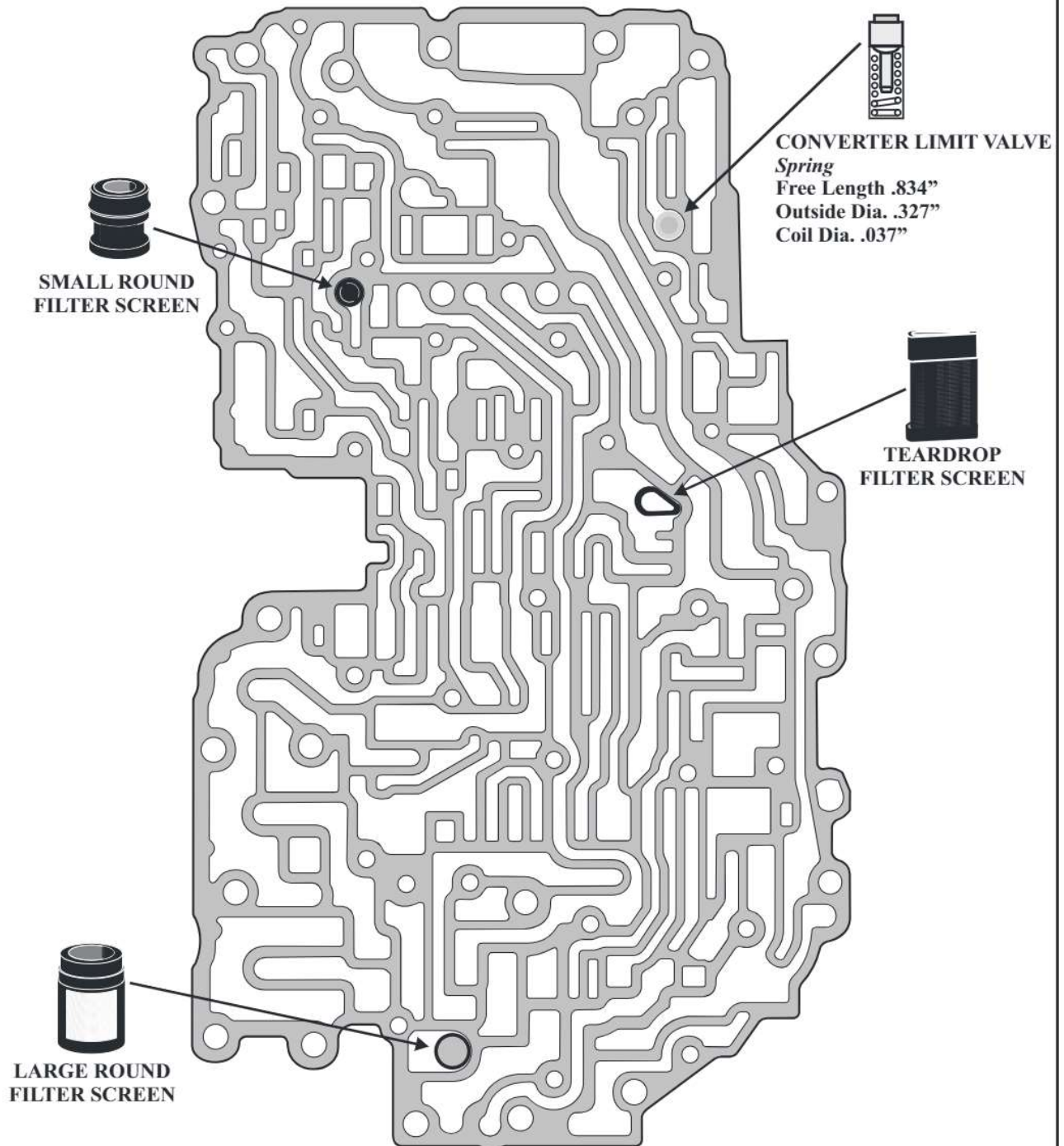
When no ball is required, the orifice will be .150".

THESE CHECKBALLS VARY GREATLY, CARE SHOULD BE TAKEN DURING DISASSEMBLY

*Not Found Is Some
Vehicles w/3.4L V6*

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TOYOTA A340E/F - 2000 & LATER
VALVE BODY CASTING NUMBER 8938 WITH TV CABLE
LOWER VALVE BODY

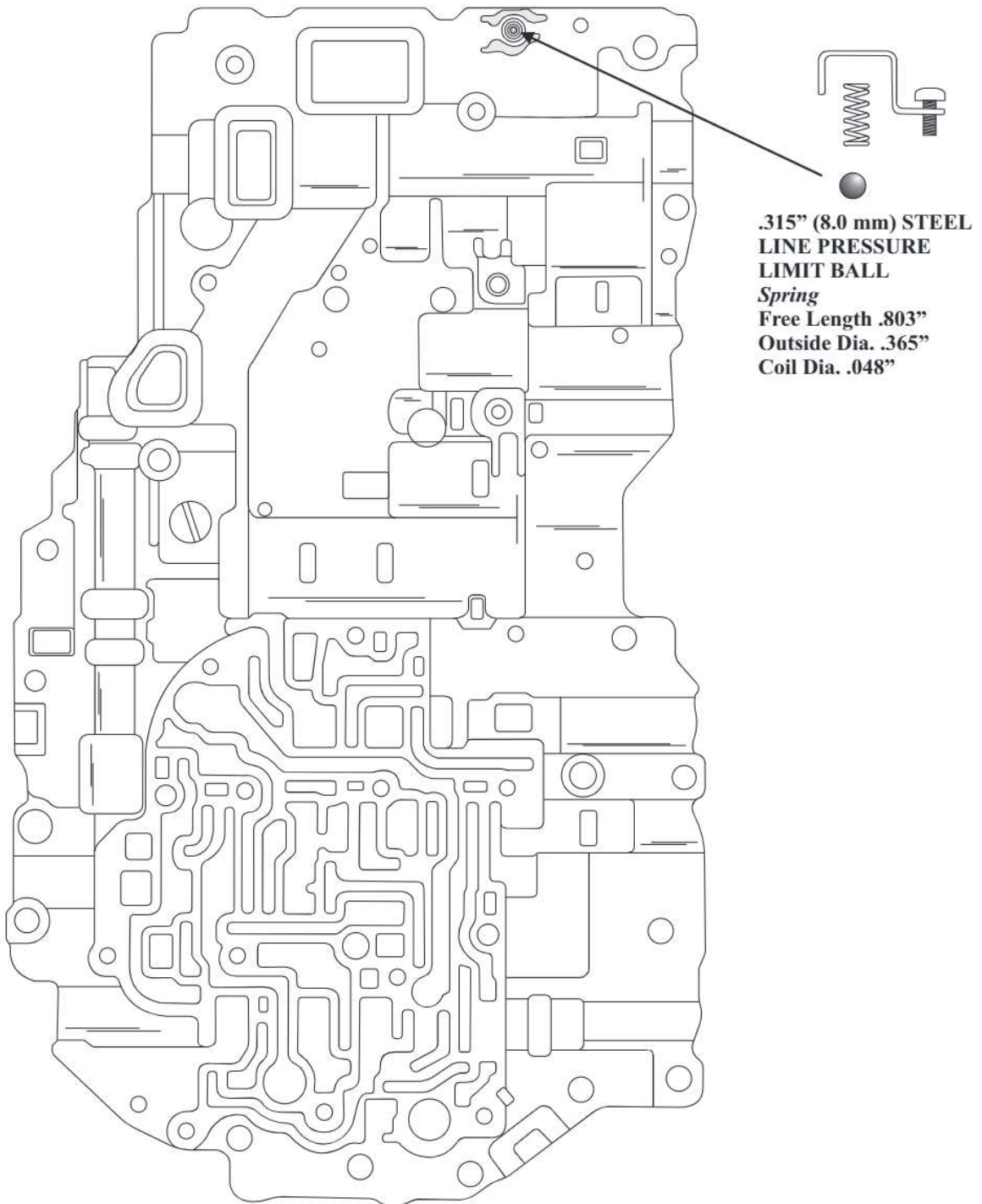


NOTE: Open End Of Screens Face Separator Plate And Snap In

Copyright © 2008 ATSG

LEXUS A350E

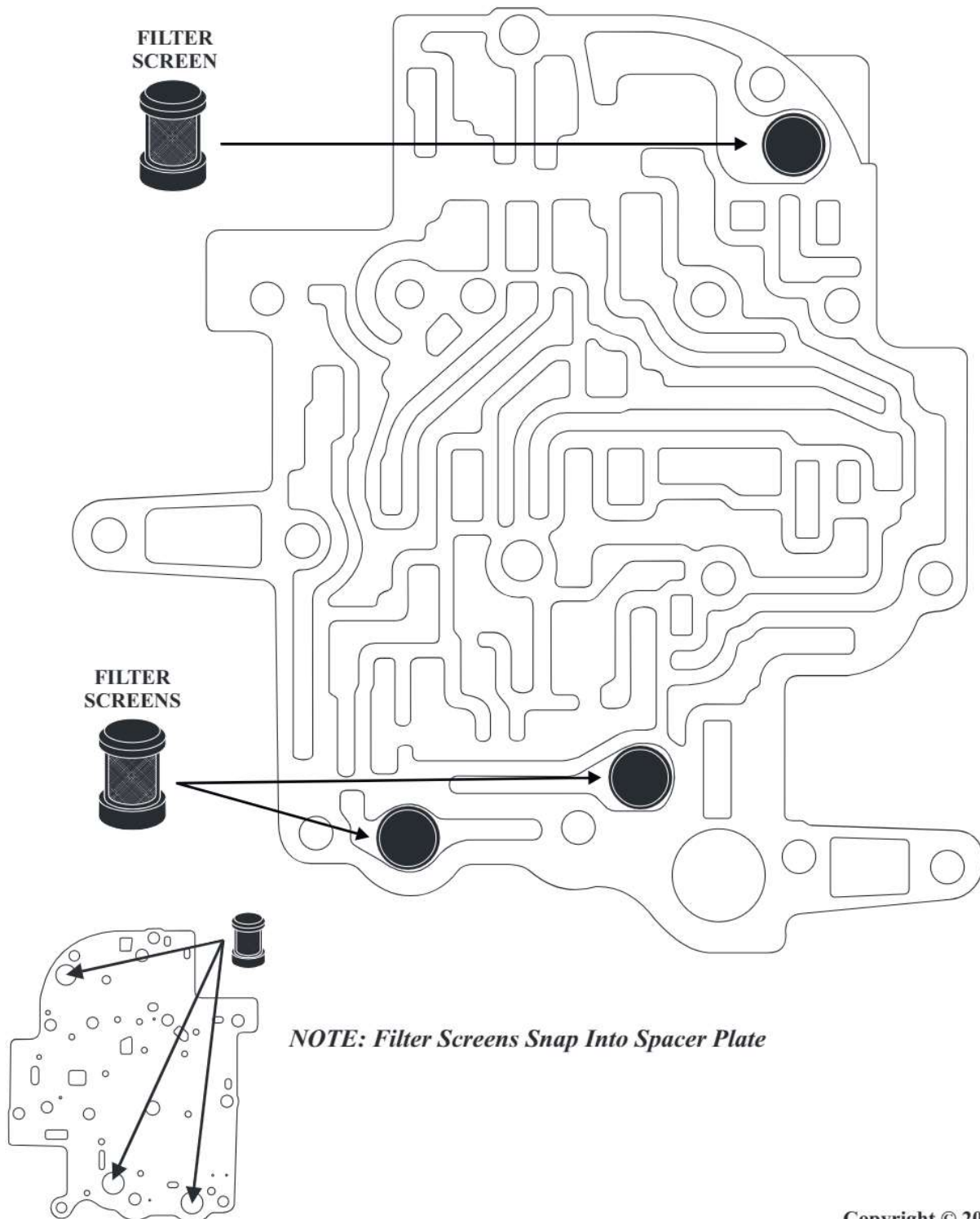
LOWER VALVE BODY - BOTTOM (LARGE)



Copyright © 2008 ATSG

LEXUS A350E

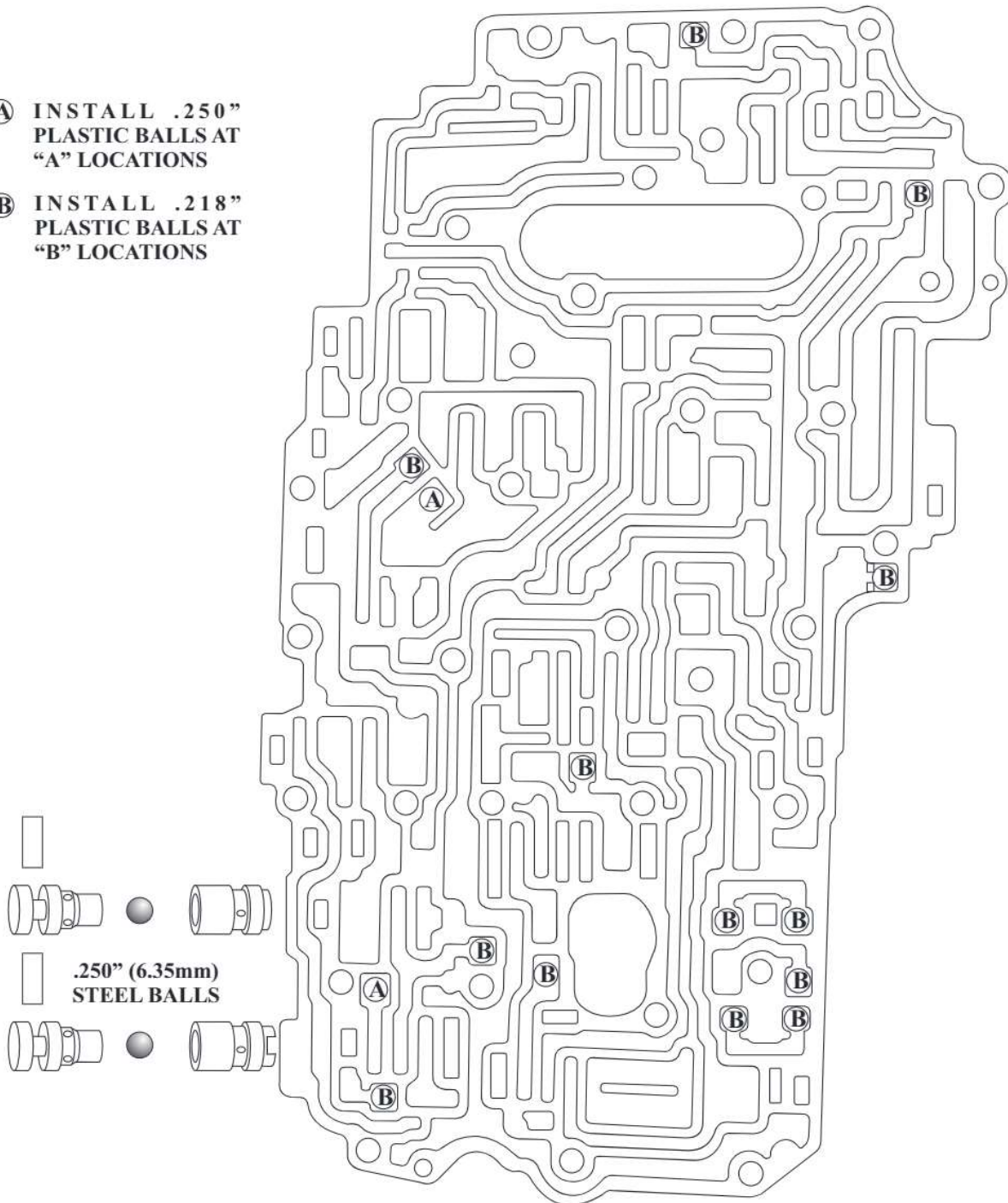
LOWER VALVE BODY - BOTTOM (SMALL)



Copyright © 2008 ATSG

LEXUS A350E UPPER VALVE BODY

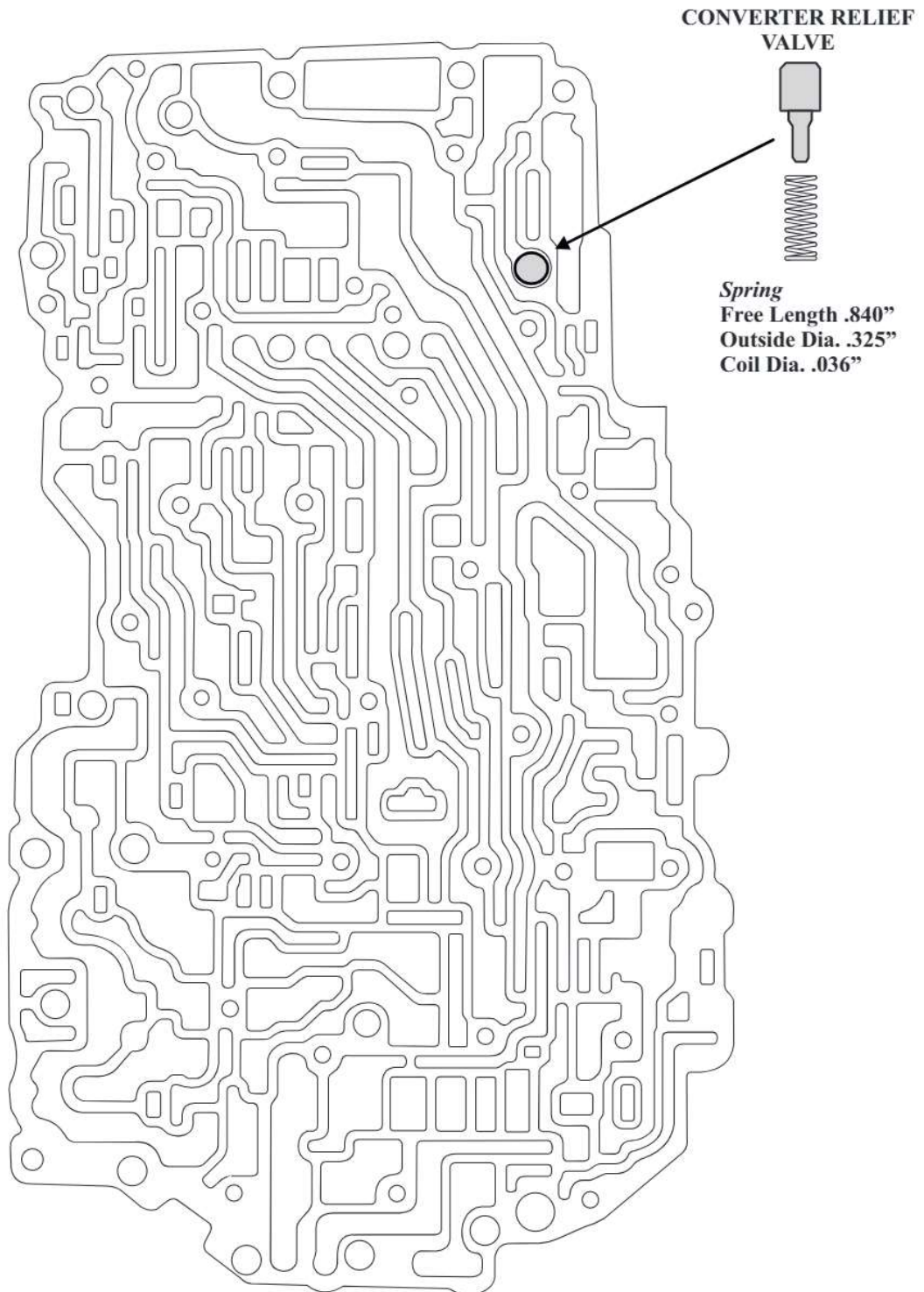
- Ⓐ INSTALL .250" PLASTIC BALLS AT "A" LOCATIONS
- Ⓑ INSTALL .218" PLASTIC BALLS AT "B" LOCATIONS



Copyright © 2008 ATSG

LEXUS A350E

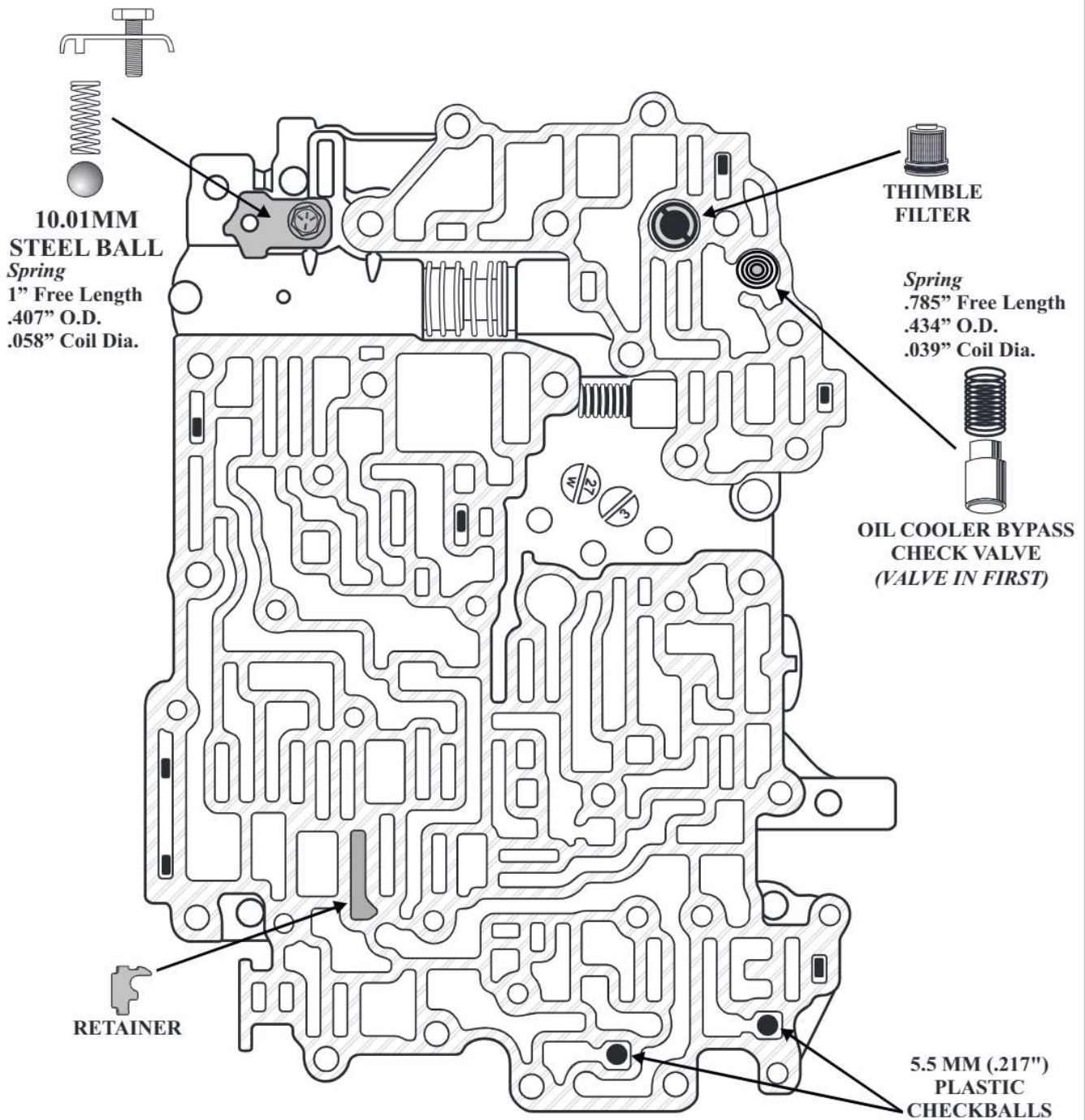
LOWER VALVE BODY



Copyright © 2008 ATSG

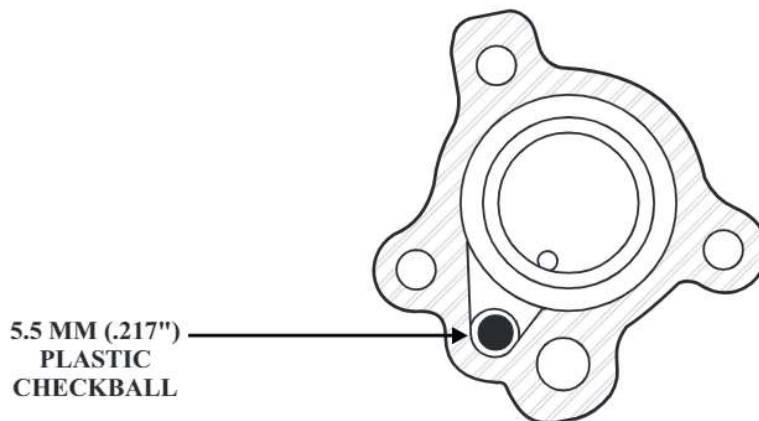
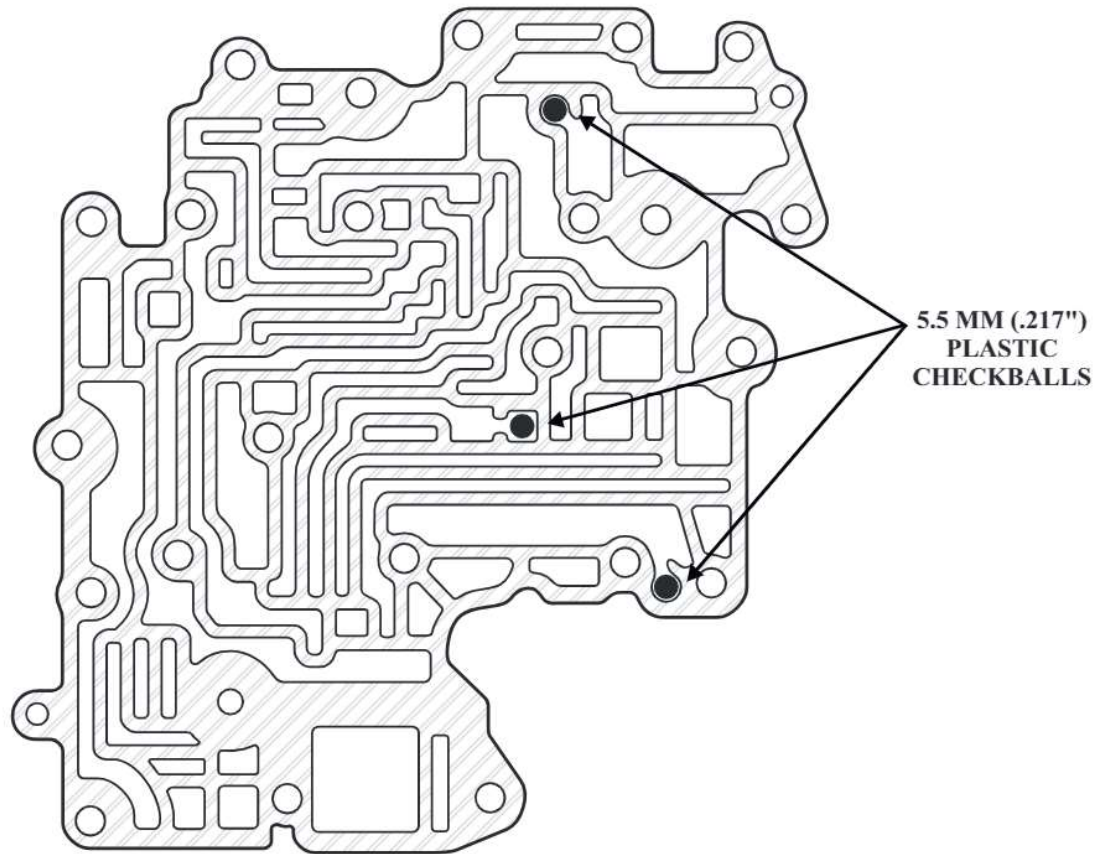
TOYOTA/LEXUS A541E

LOWER VALVE BODY - FILTER SIDE



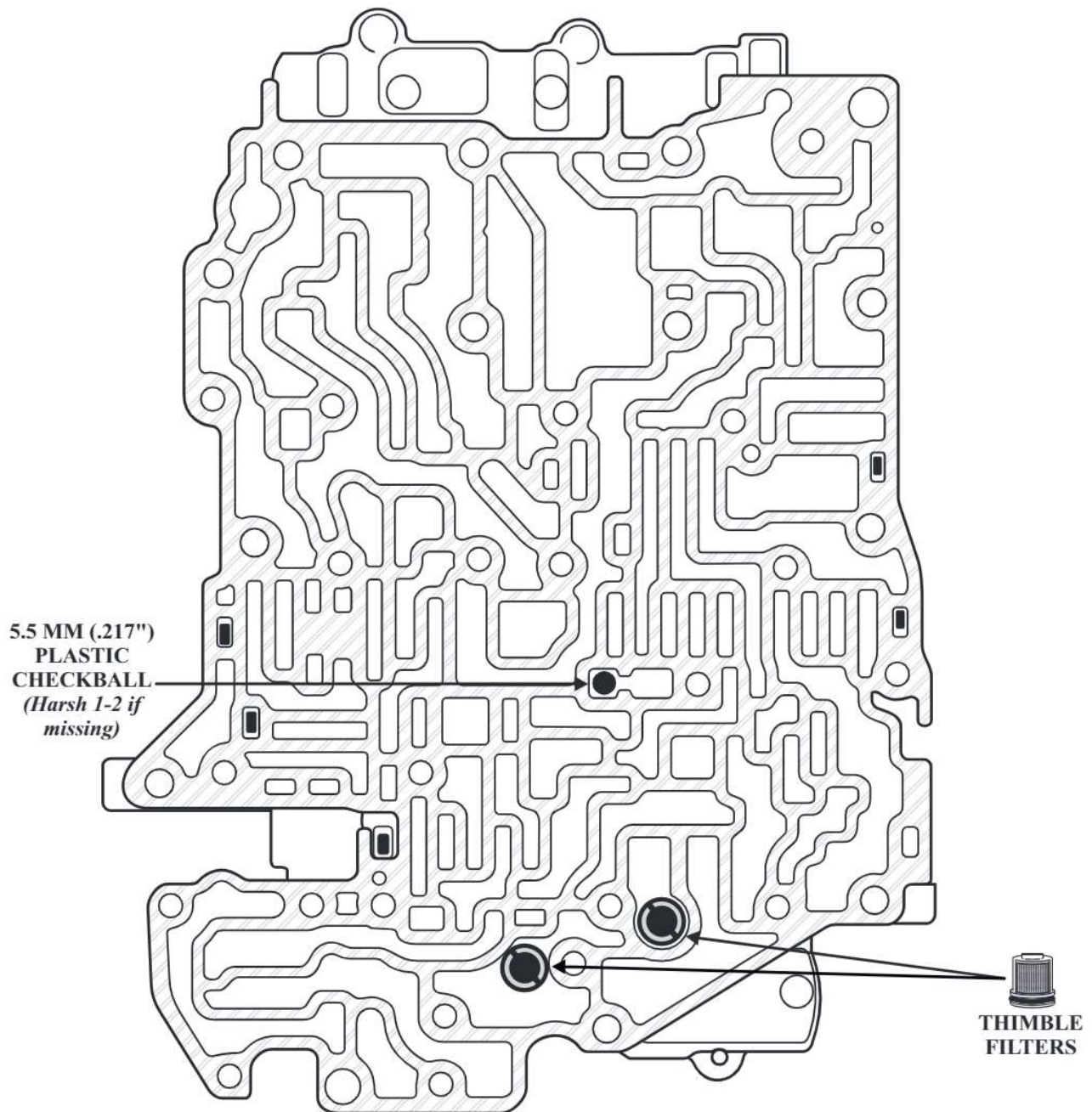
Copyright © 2008 ATSG

TOYOTA/LEXUS
A541E
LOWER VALVE BODY COVER
OVERDRIVE CLUTCH (B0) ACCUMULATOR



Copyright © 2008 ATSG

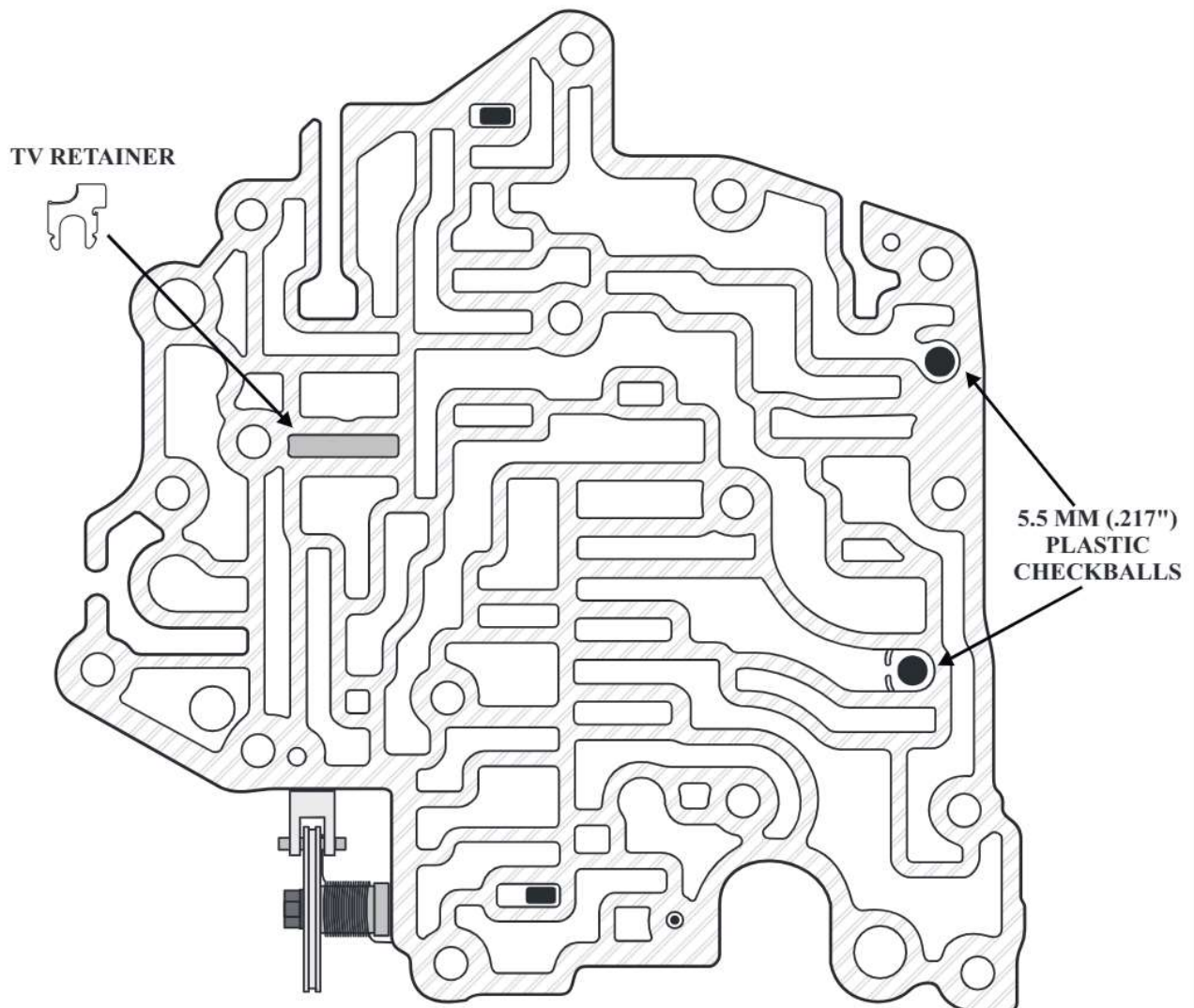
TOYOTA/LEXUS A541E LOWER VALVE BODY - CASE SIDE



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TOYOTA/LEXUS
A541E

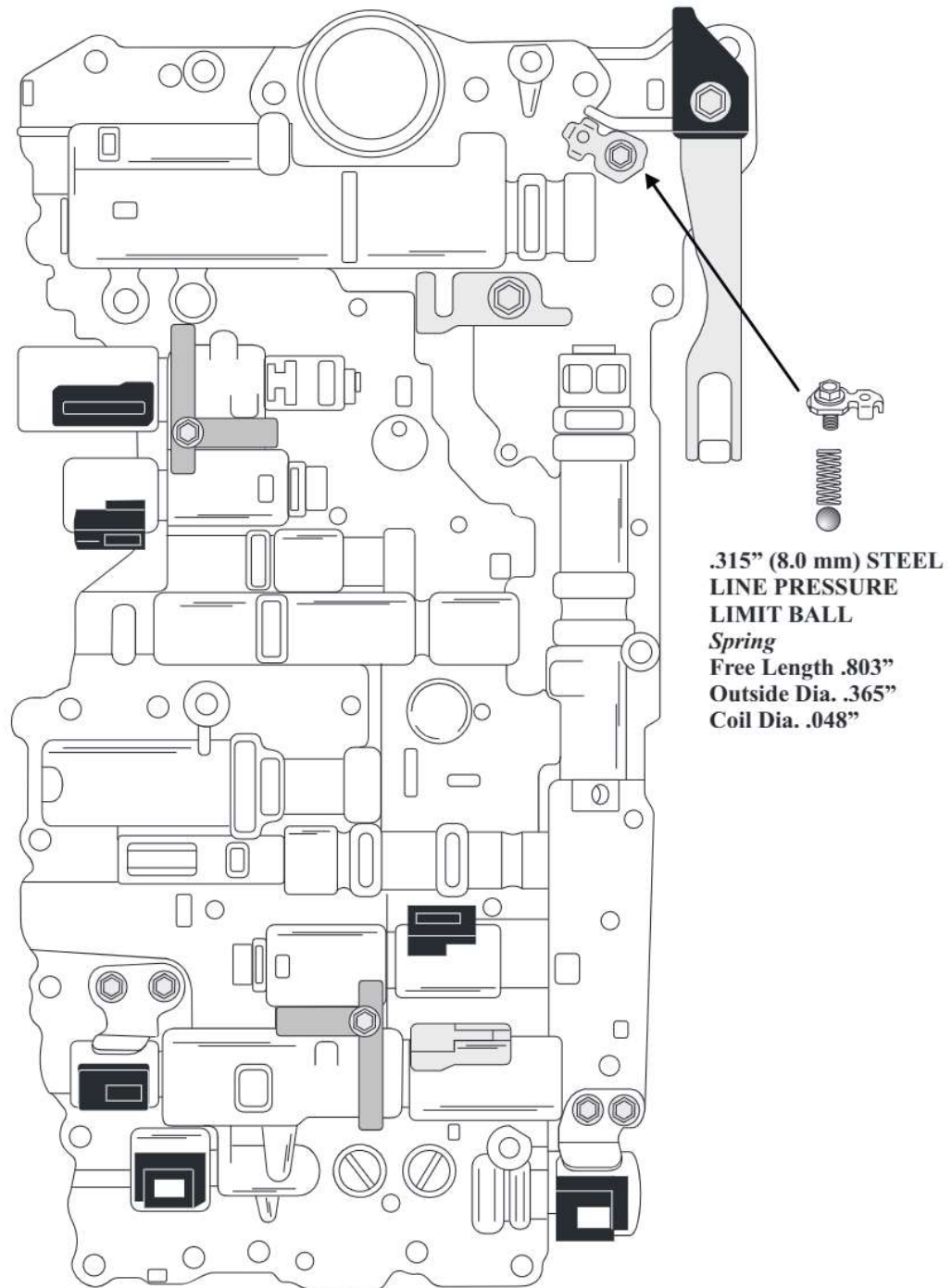
THROTTLE VALVE BODY



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TOYOTA/LEXUS A750E/F

LOWER VALVE BODY - BOTTOM SIDE

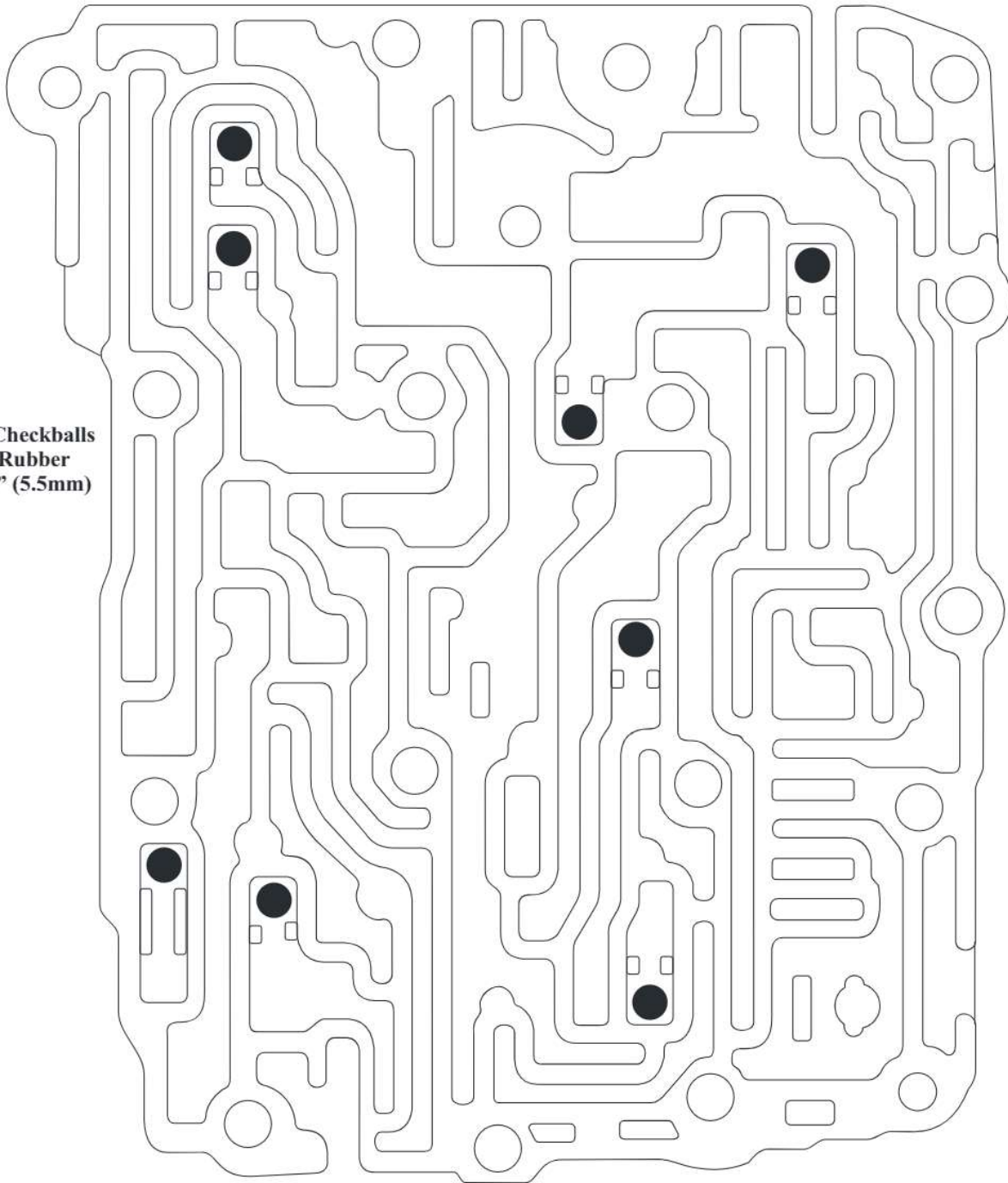


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TOYOTA/LEXUS A750E/F

UPPER VALVE BODY - COVER

All Checkballs
Are Rubber
.217" (5.5mm)

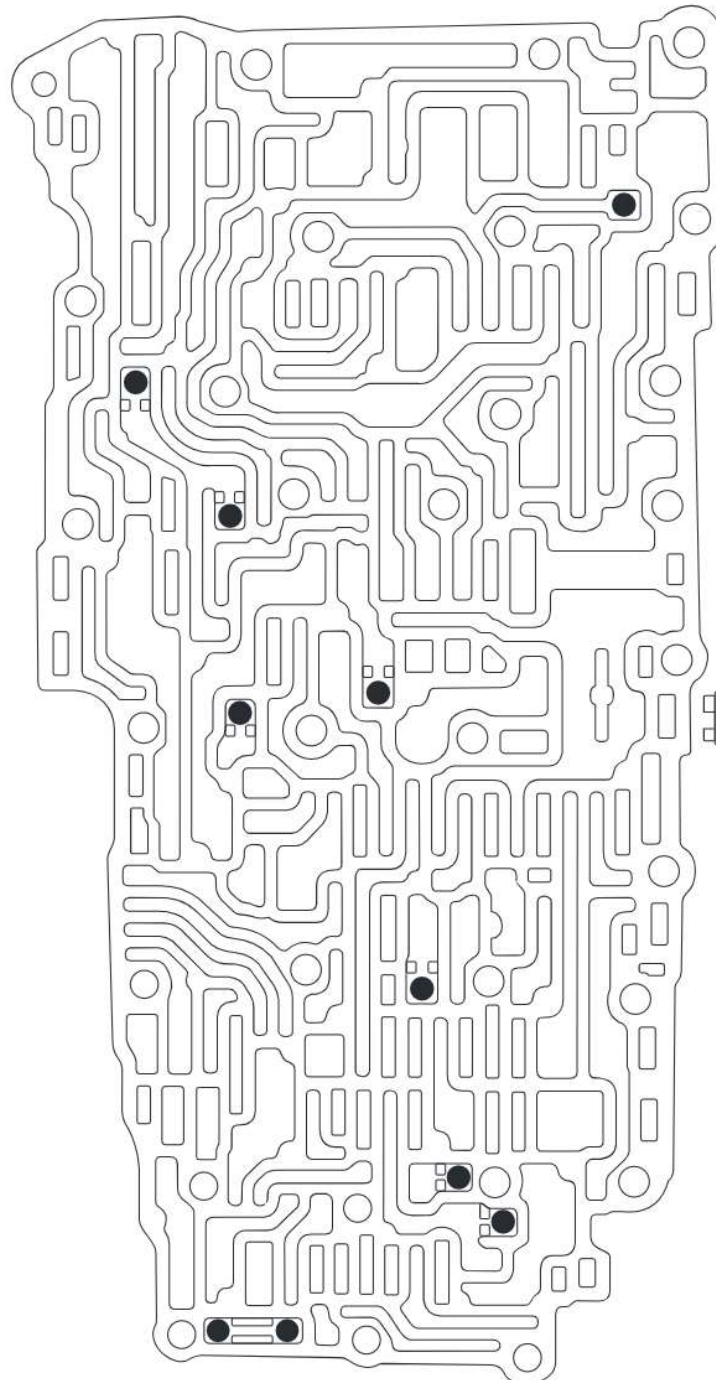


IMPORTANT NOTE: The Checkball Locations Shown Here Are From A 2006 Toyota Land Cruiser,
Exercise Caution During Dis-Assembly As Other Models May Be Different.

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TOYOTA/LEXUS A750E/F UPPER VALVE BODY

All Checkballs
Are Rubber
.217" (5.5mm)



.250" (6.35mm)
STEEL BALL



*This Ball Left Out Can
Cause No Reverse*

IMPORTANT NOTE: The Checkball Locations Shown Here Are From A 2006 Toyota Landcruiser,
Excercise Caution During Dis-Assembly As Other Models May Be Different.

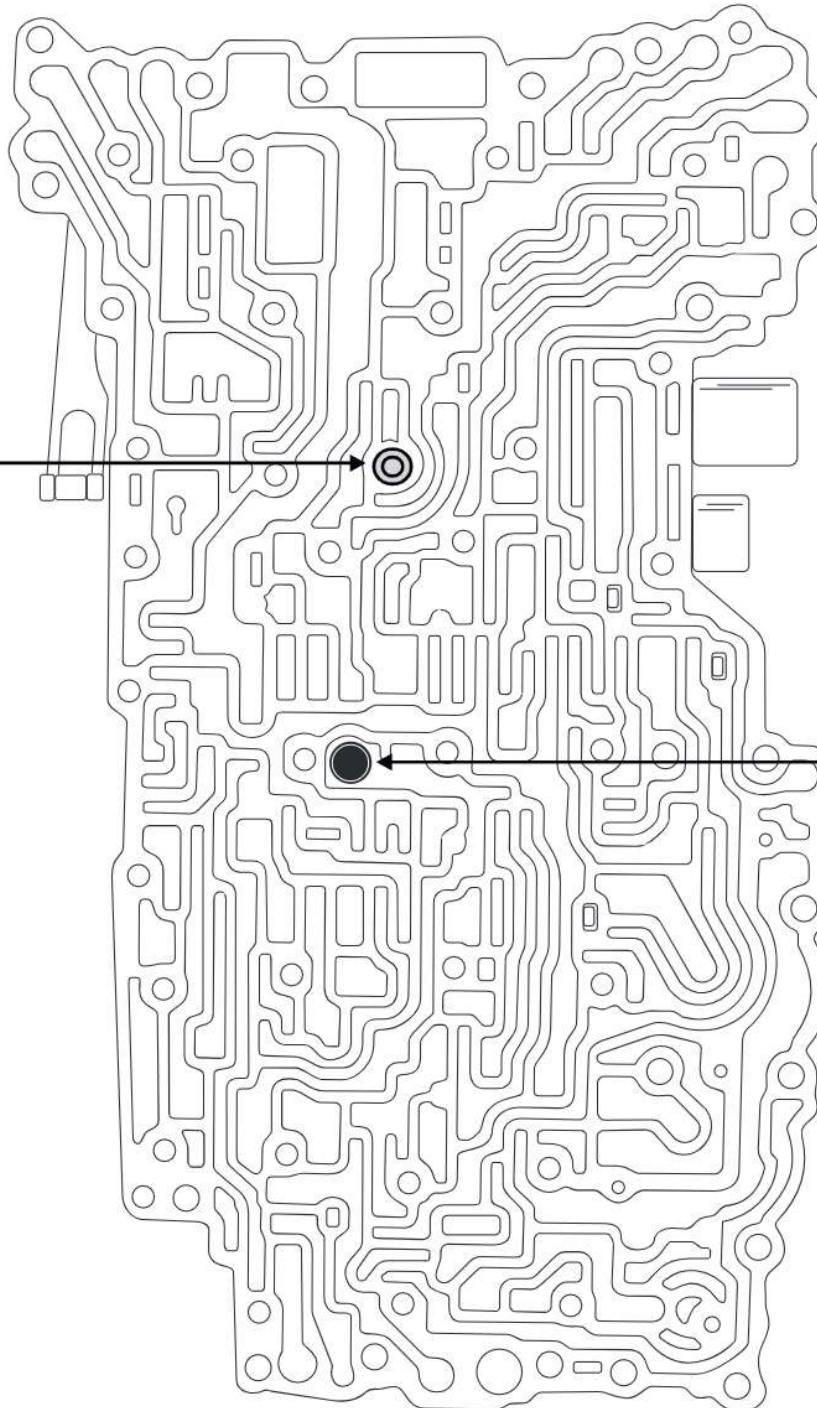
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TOYOTA/LEXUS A750E/F LOWER VALVE BODY

CHECK VALVE



Spring
Free Length .835"
Outside Dia. .324"
Coil Dia. .035"



FILTER
SCREEN

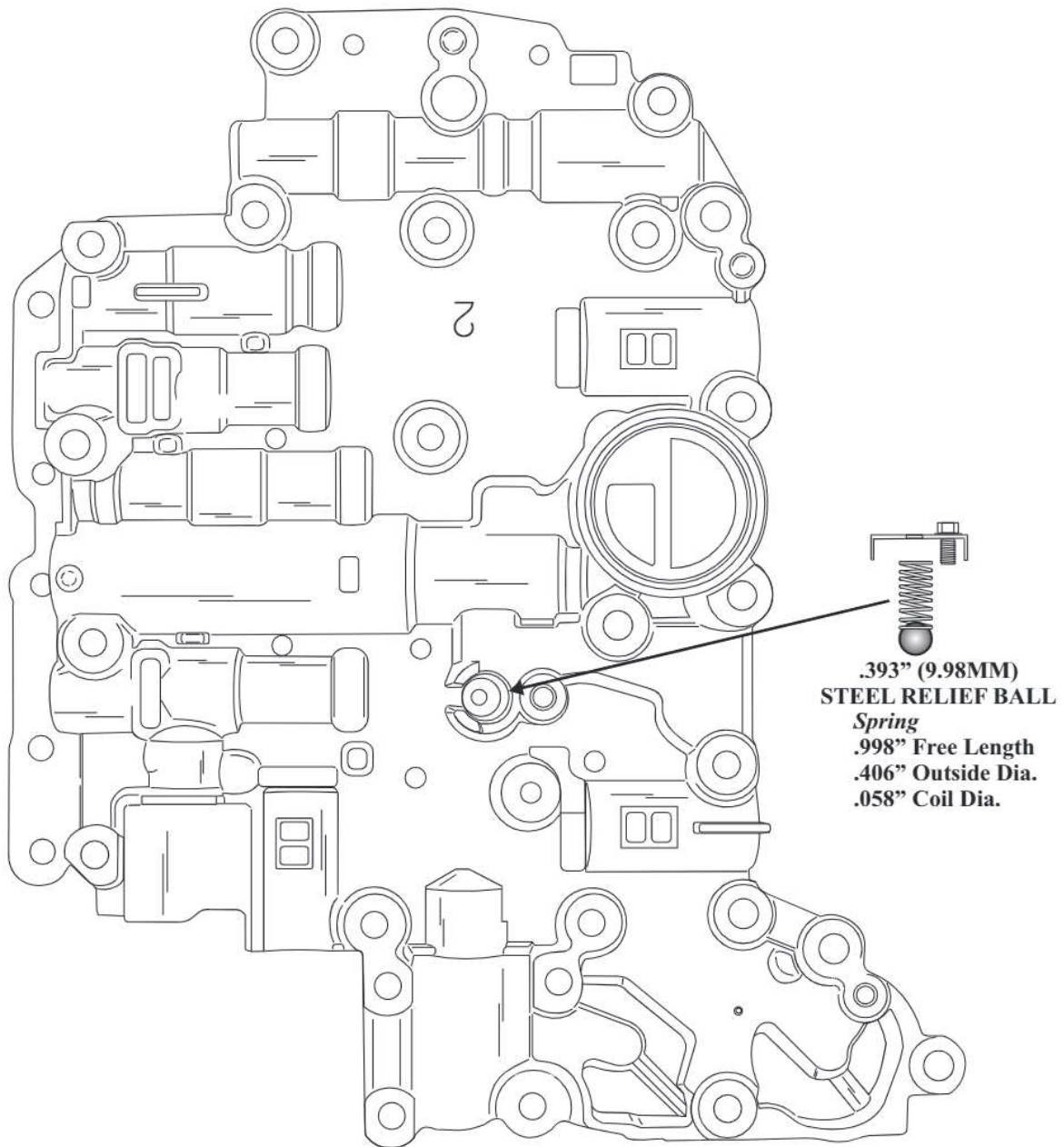


*INSTALL OPEN
END UP*

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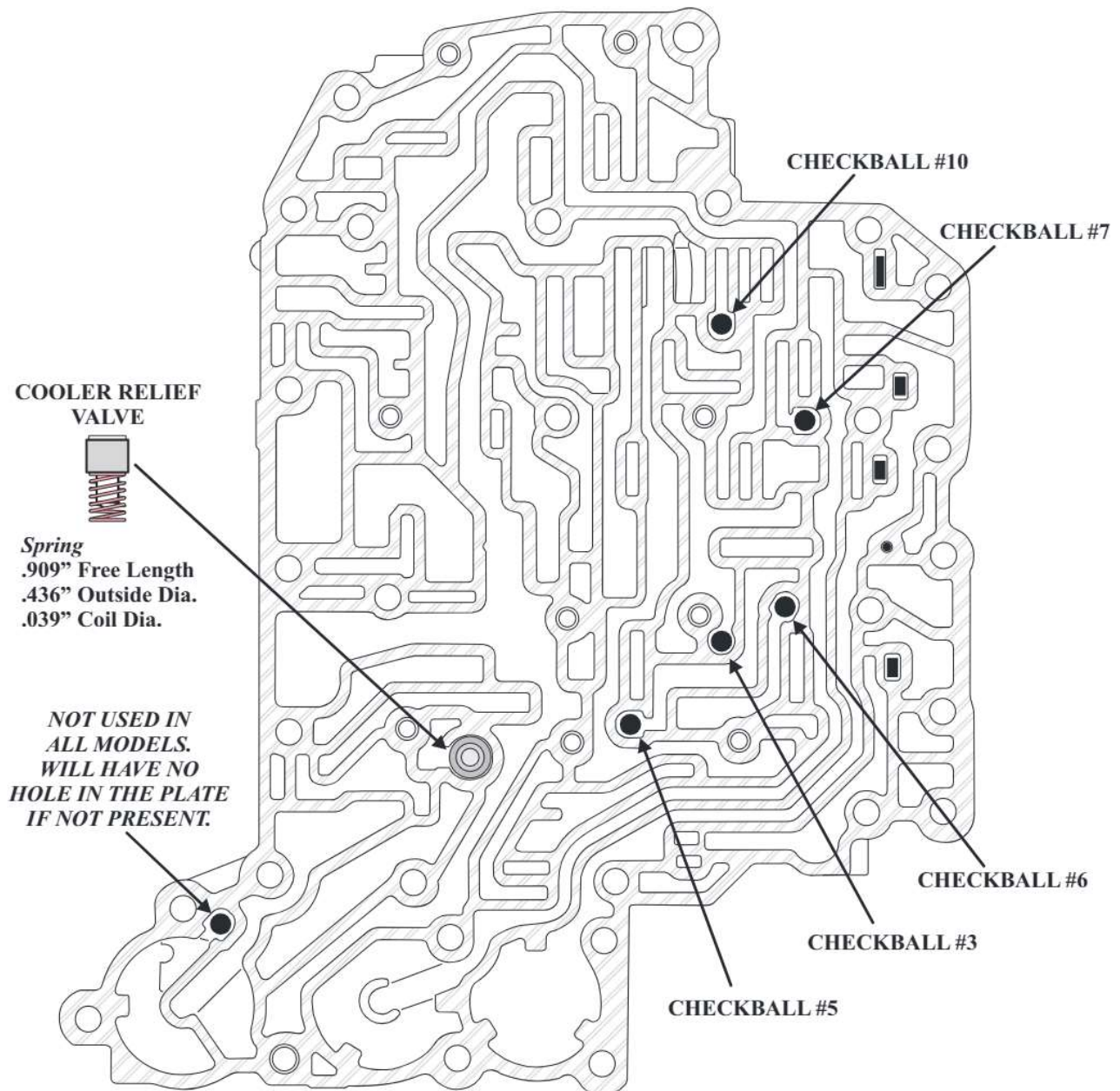
TOYOTA U140E/240E

LOWER VALVE BODY (Filter Side)



Copyright © 2008 ATSG

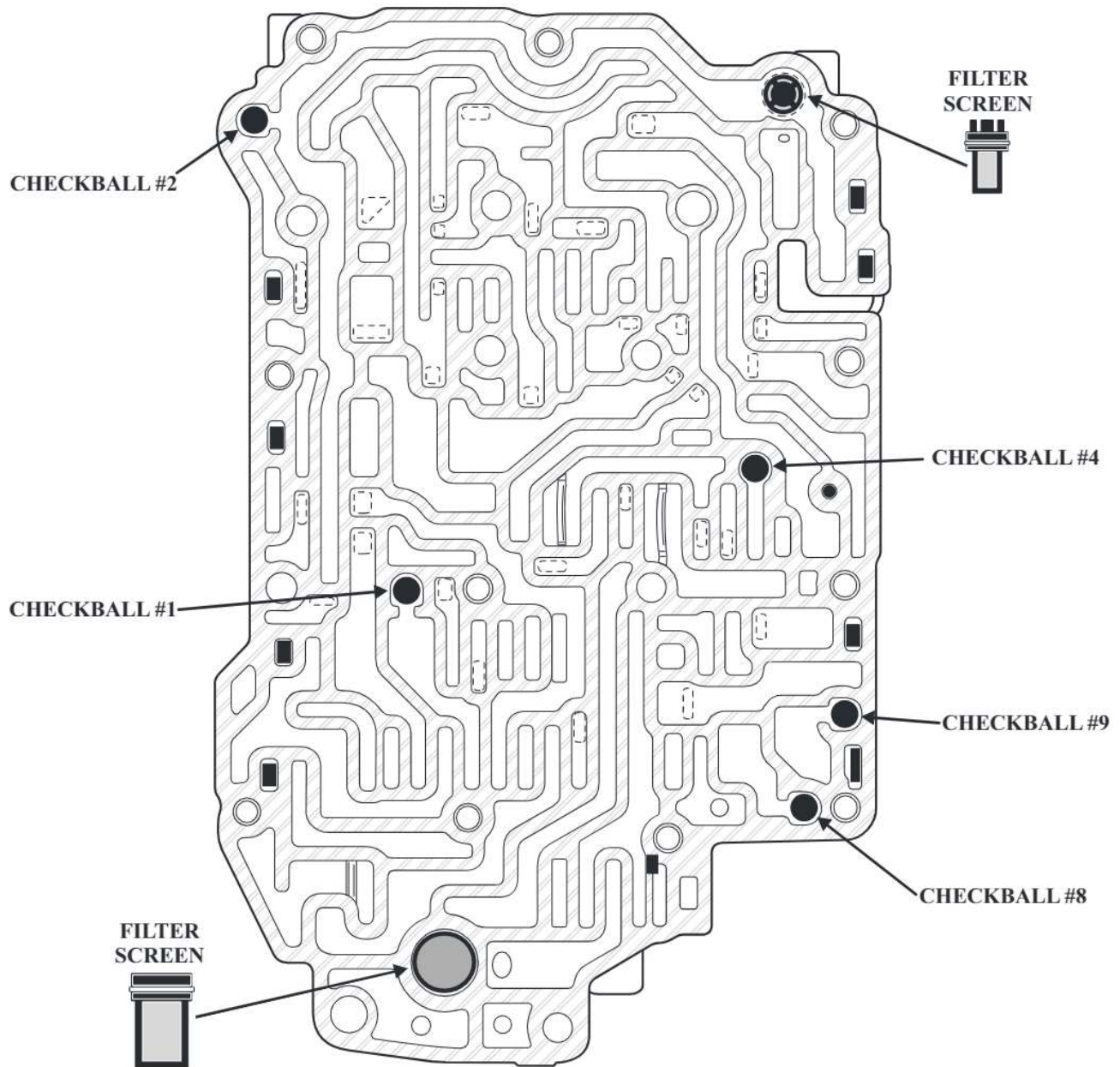
TOYOTA U140E/240E LOWER VALVE BODY



NOTE: All Checkballs are Plastic 5.5 mm (.217")

Copyright © 2008 ATSG

TOYOTA U140E/240E UPPER VALVE BODY

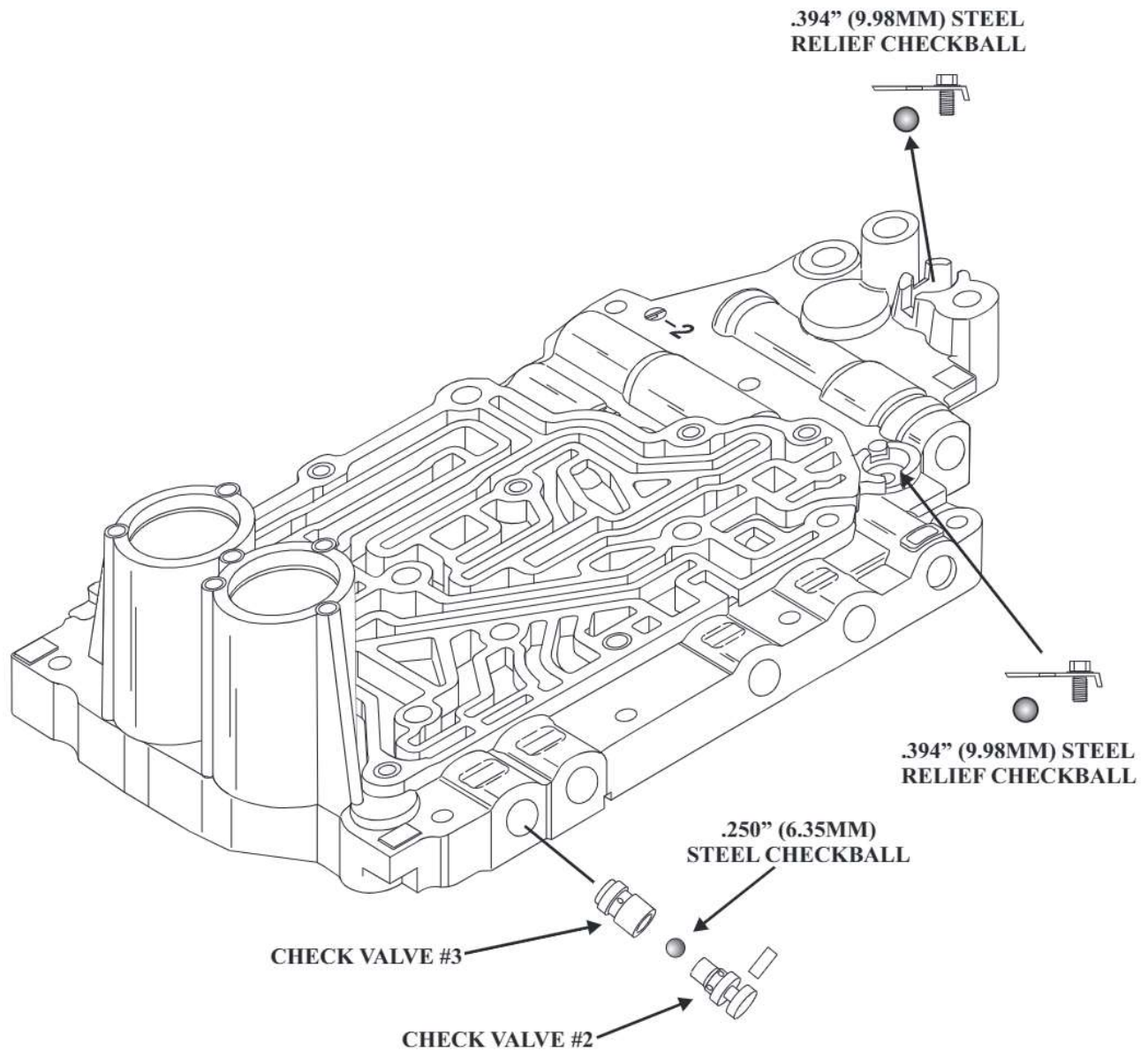


NOTE: All Checkballs are Plastic 5.5 mm (.217")

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TOYOTA U140E/240E

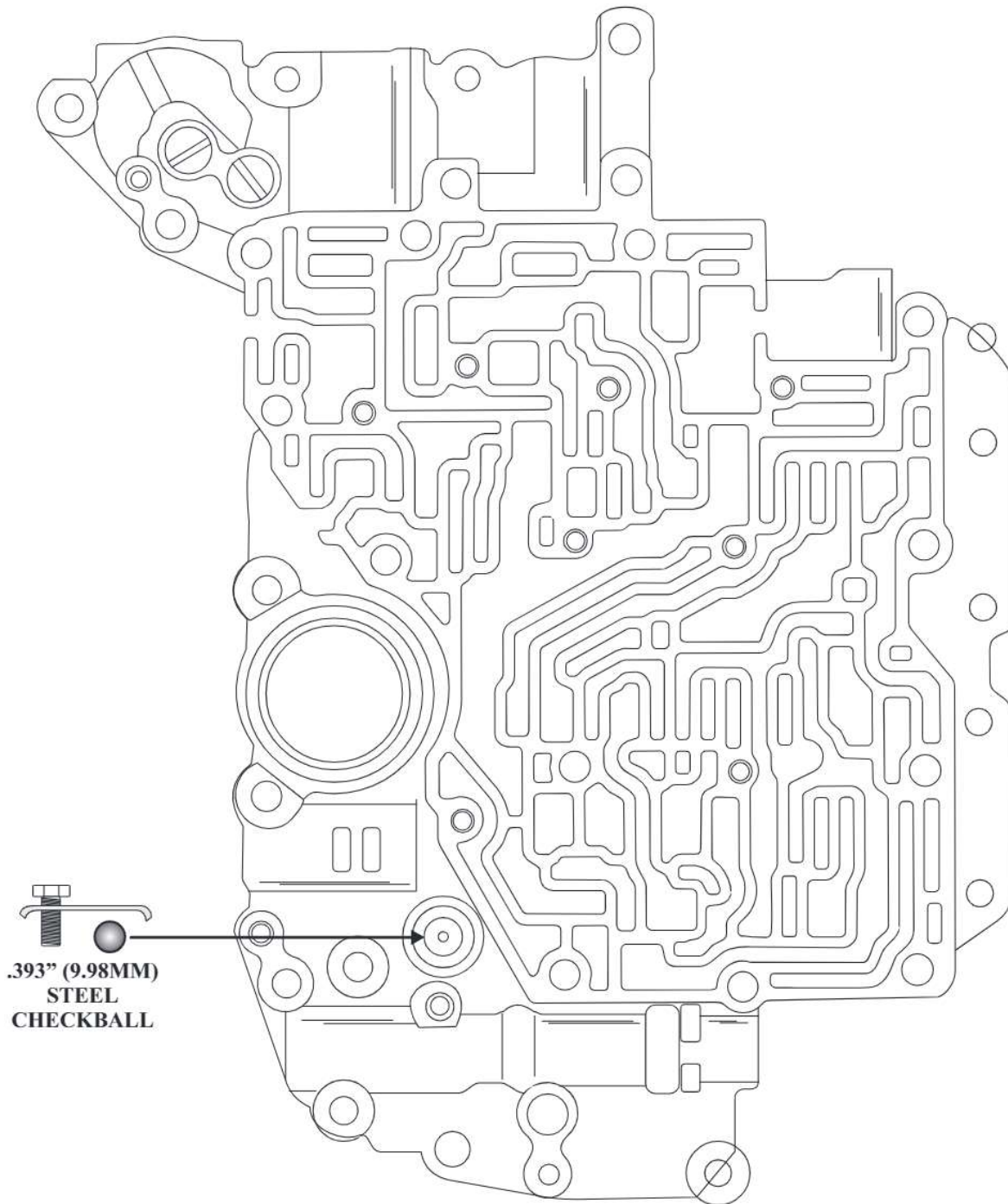
UPPER VALVE BODY (Case Side)



Copyright © 2008 ATSG

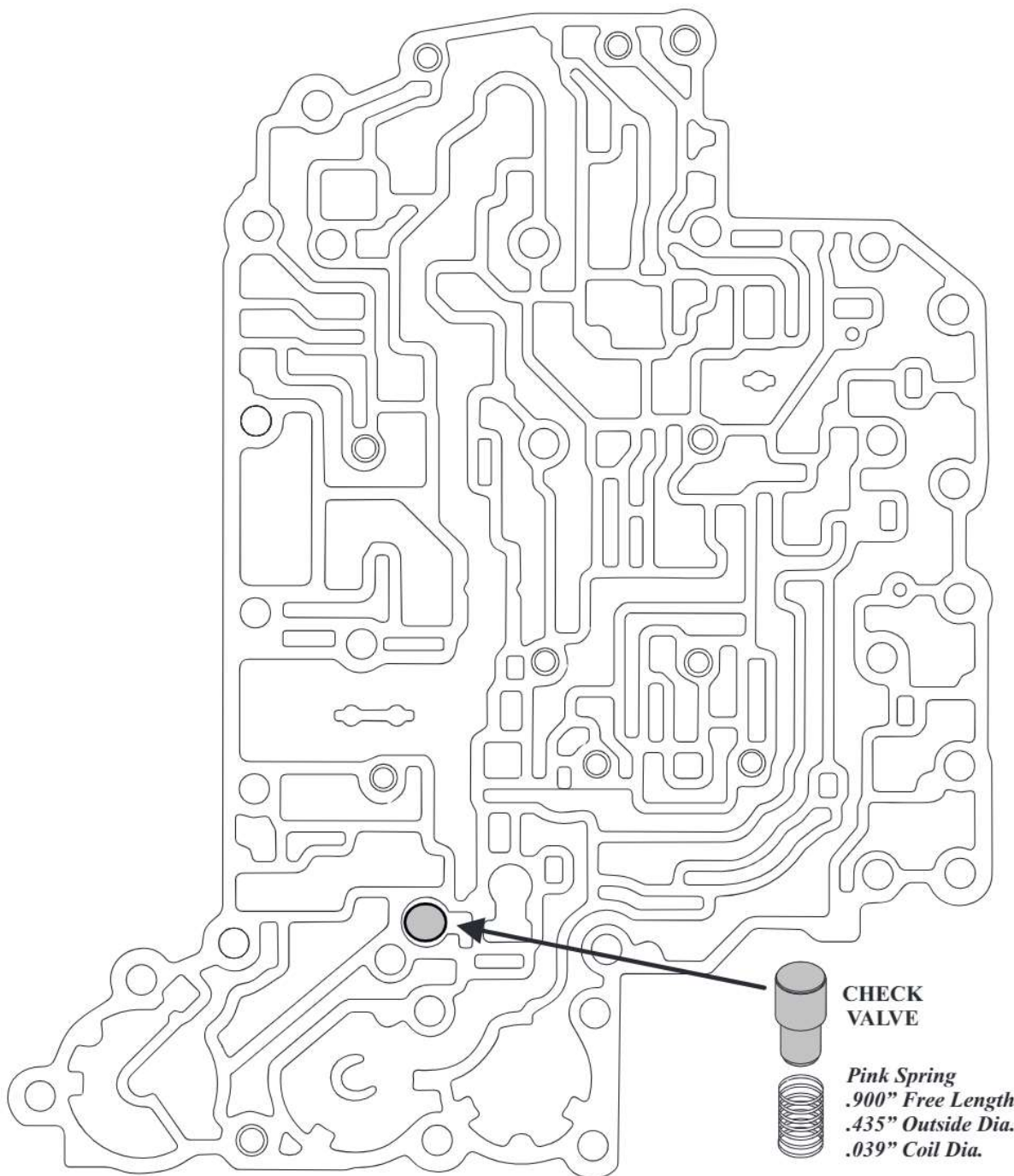
TOYOTA/LEXUS
U151E

LOWER VALVE BODY - FILTER SIDE



Copyright © 2008 ATSG

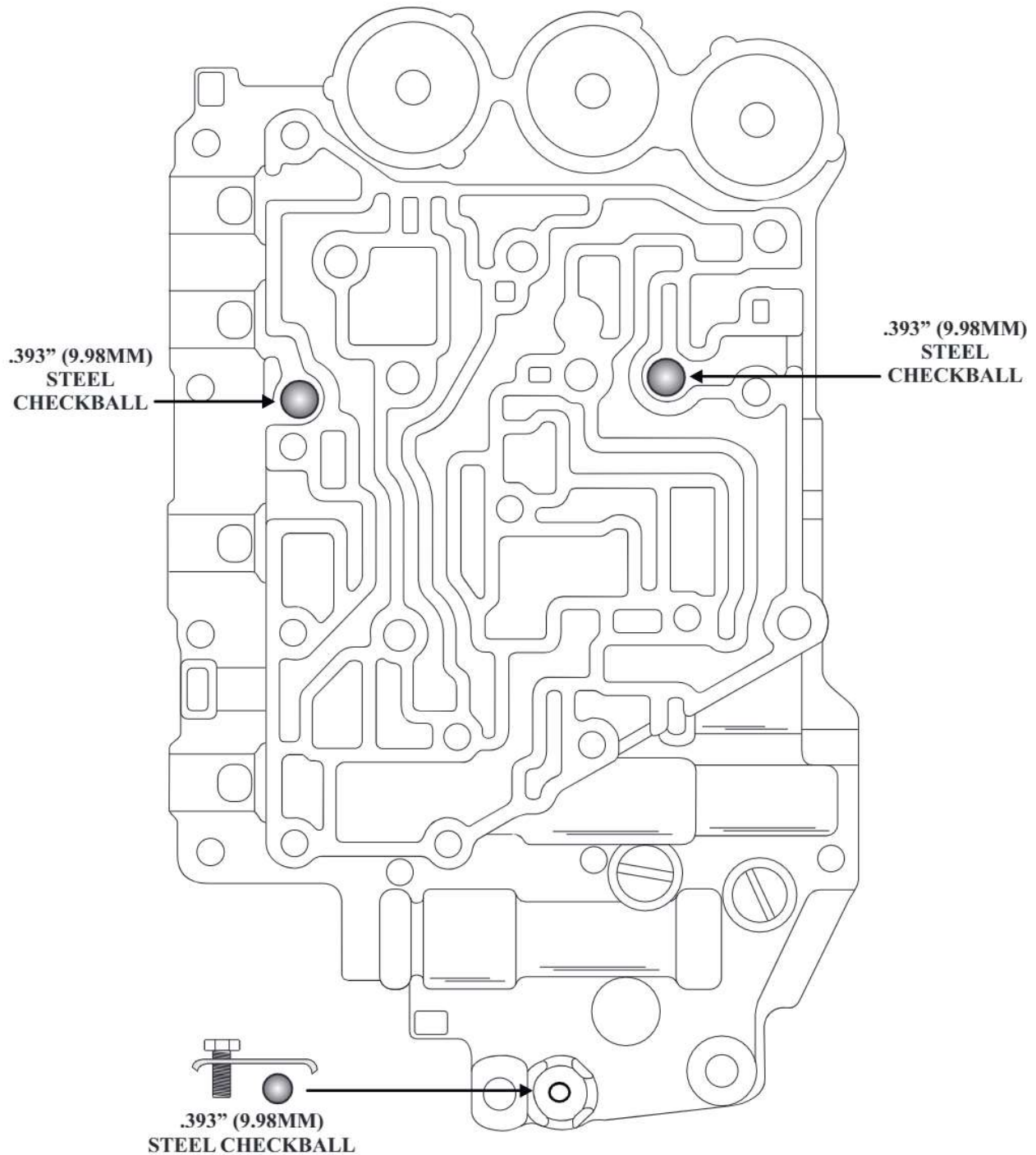
TOYOTA/LEXUS U151E *LOWER VALVE BODY*



Copyright © 2008 ATSG

TOYOTA/LEXUS U151E

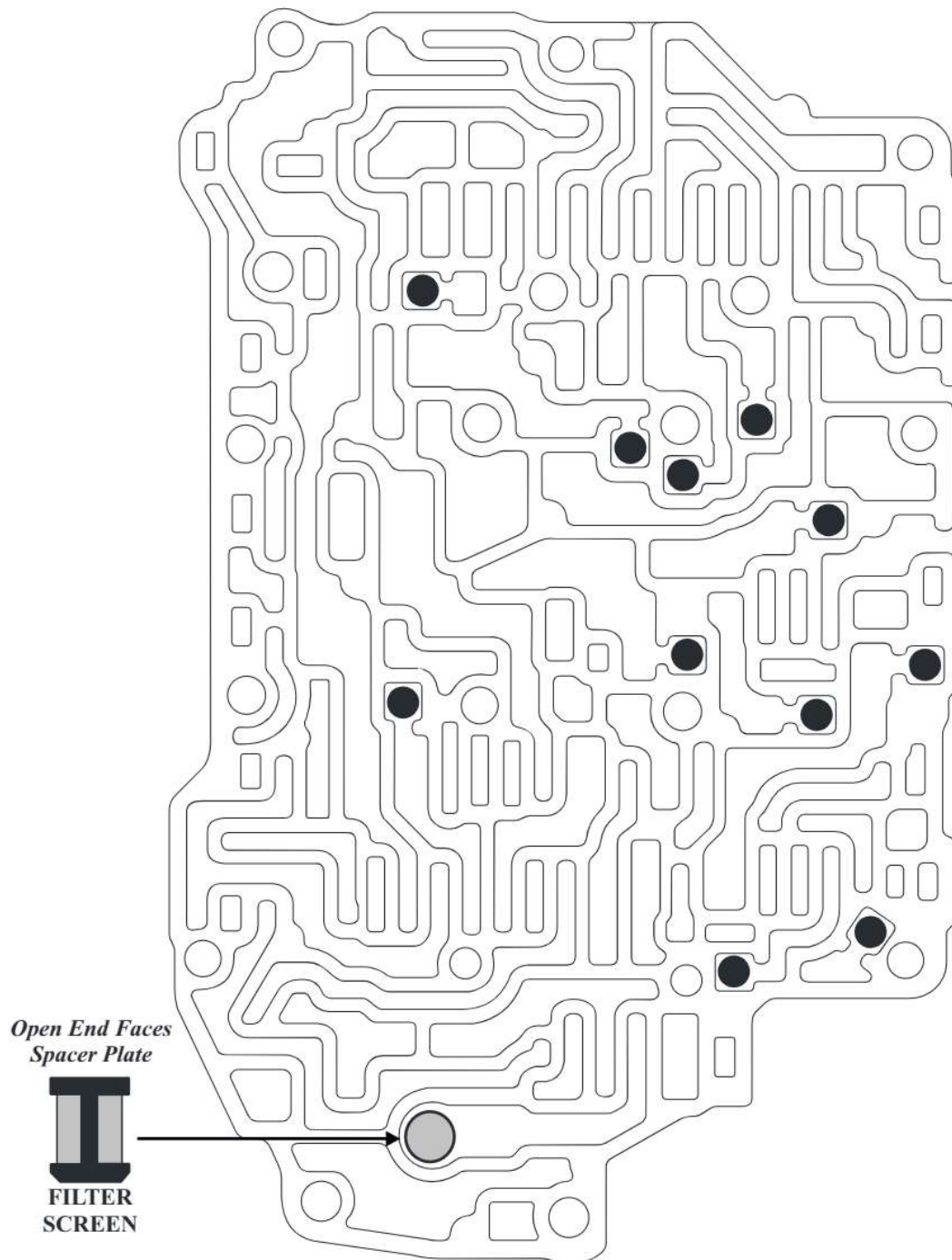
UPPER VALVE BODY - ACCUMULATOR SIDE



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TOYOTA/LEXUS U151E

UPPER VALVE BODY

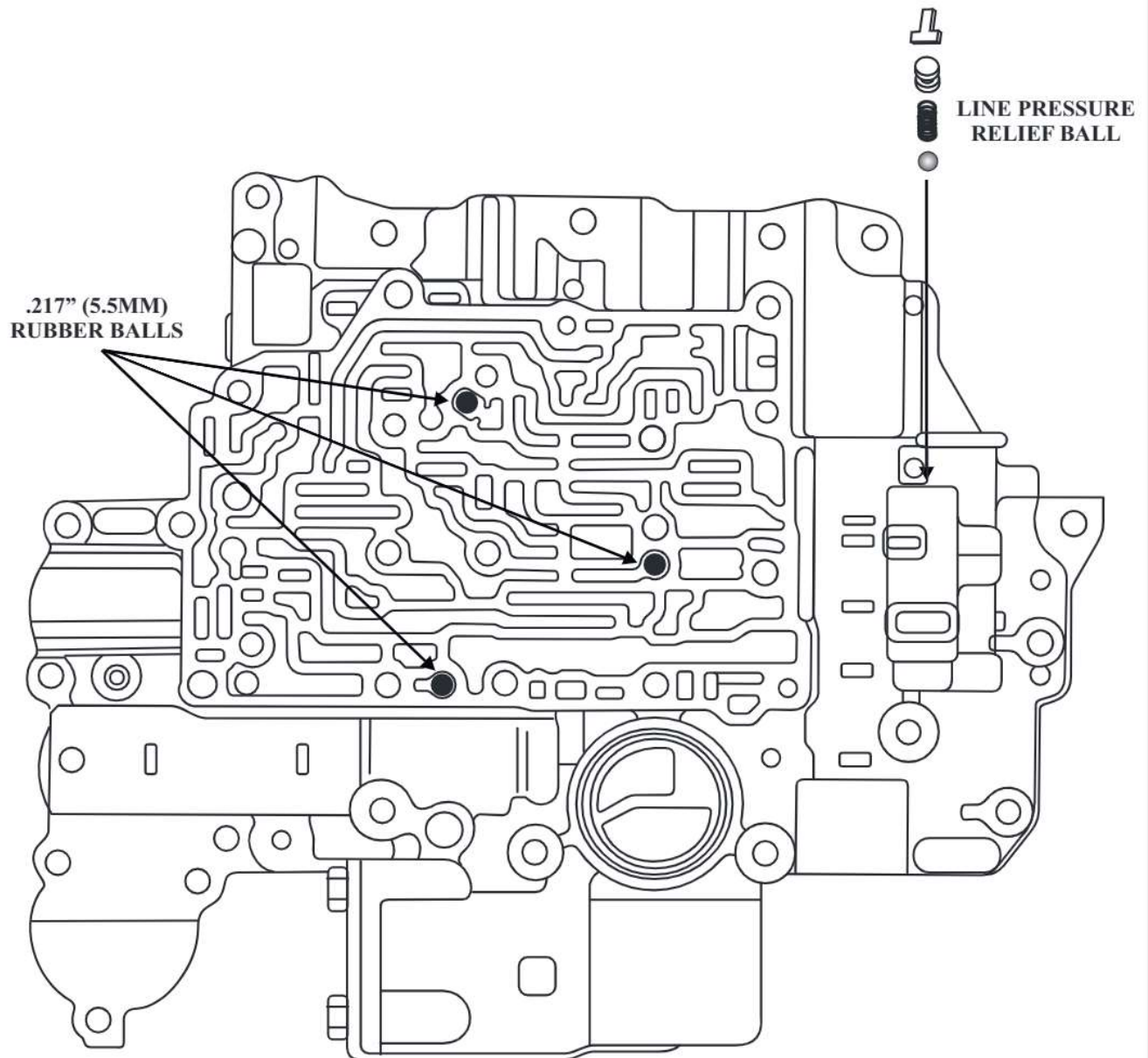


NOTE: All 11 Plastic Checkballs Are .218" (5.5MM)

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TOYOTA U341E/F

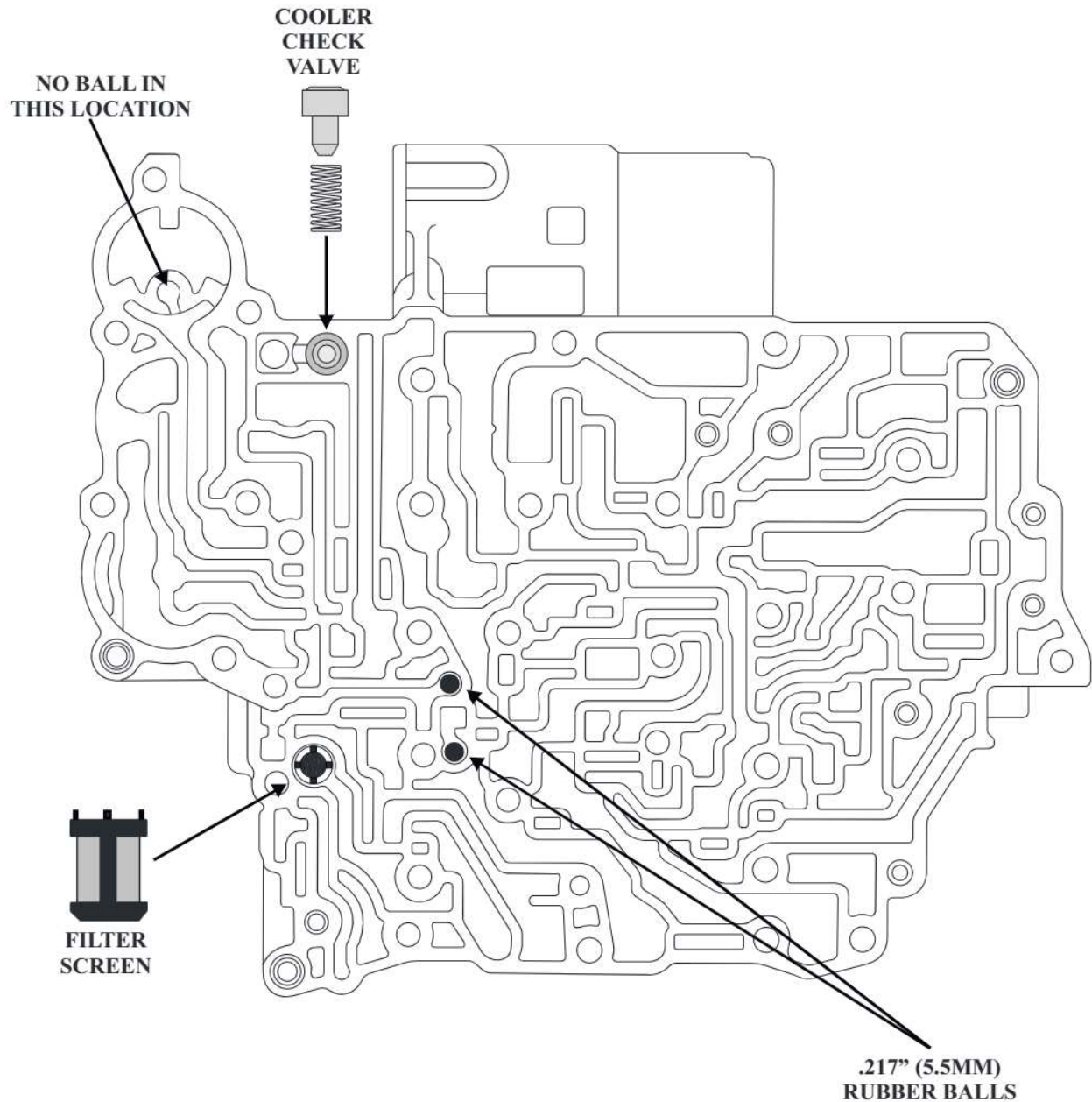
LOWER VALVE BODY (Filter Side)



Copyright © 2008 ATSG

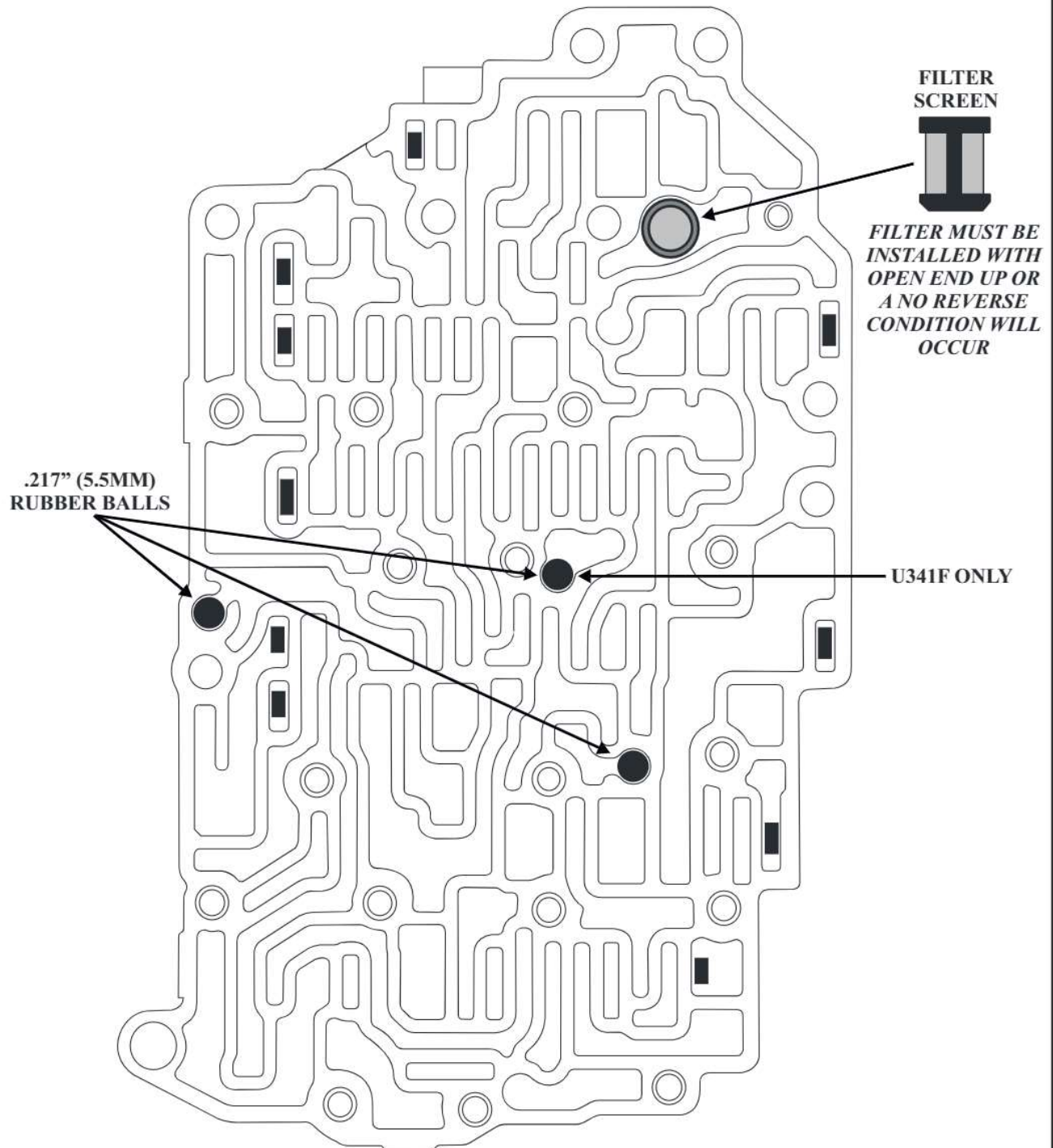
TOYOTA U341E/F

LOWER VALVE BODY (Upper Valve Body Side)



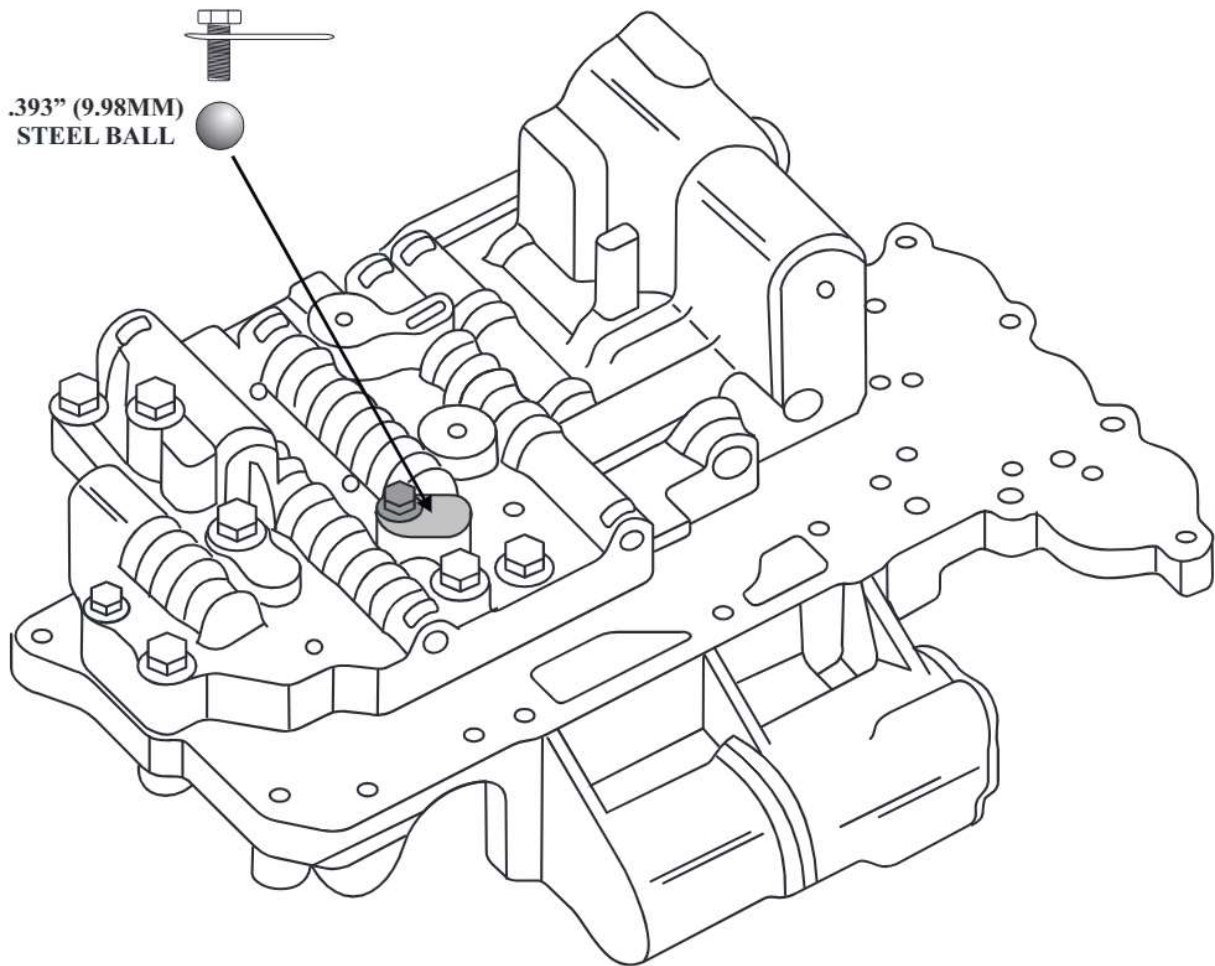
Copyright © 2008 ATSG

TOYOTA U341E/F UPPER VALVE BODY



Copyright © 2008 ATSG

TOYOTA U341E/F UPPER VALVE BODY



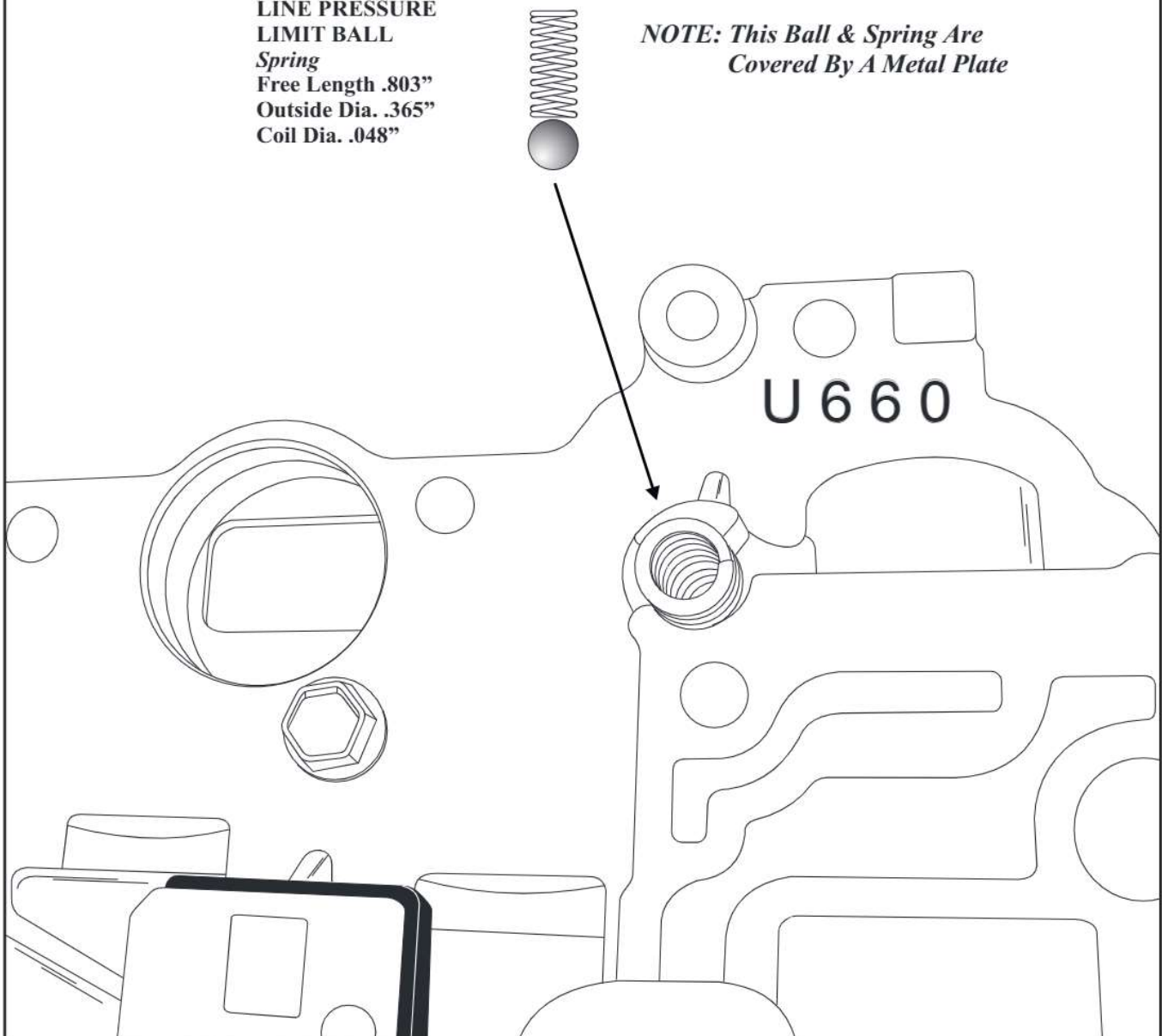
Copyright © 2008 ATSG

TOYOTA/LEXUS U660E

LOWER VALVE BODY - BOTTOM

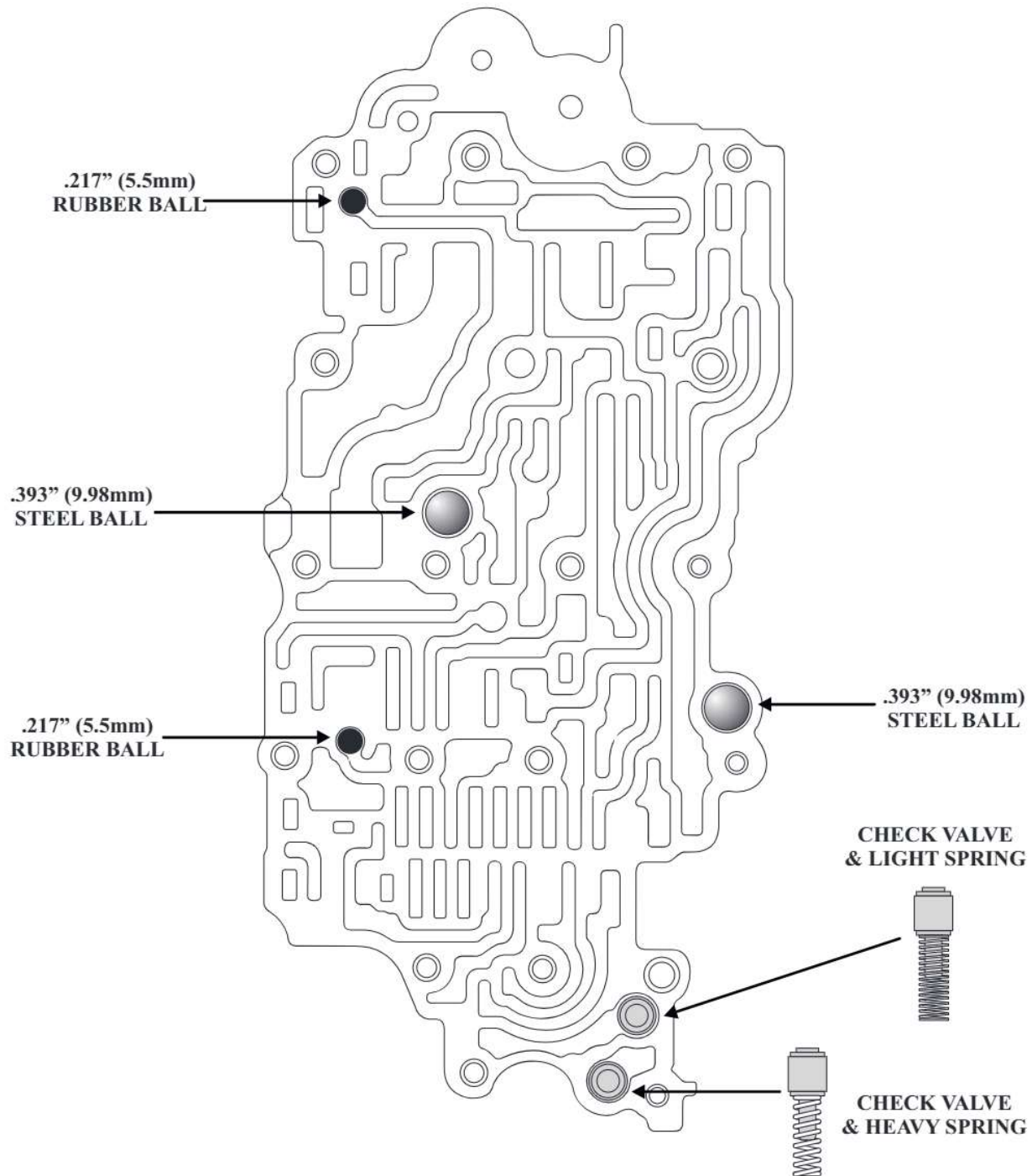
.315" (8.0 mm) STEEL
LINE PRESSURE
LIMIT BALL
Spring
Free Length .803"
Outside Dia. .365"
Coil Dia. .048"

*NOTE: This Ball & Spring Are
Covered By A Metal Plate*



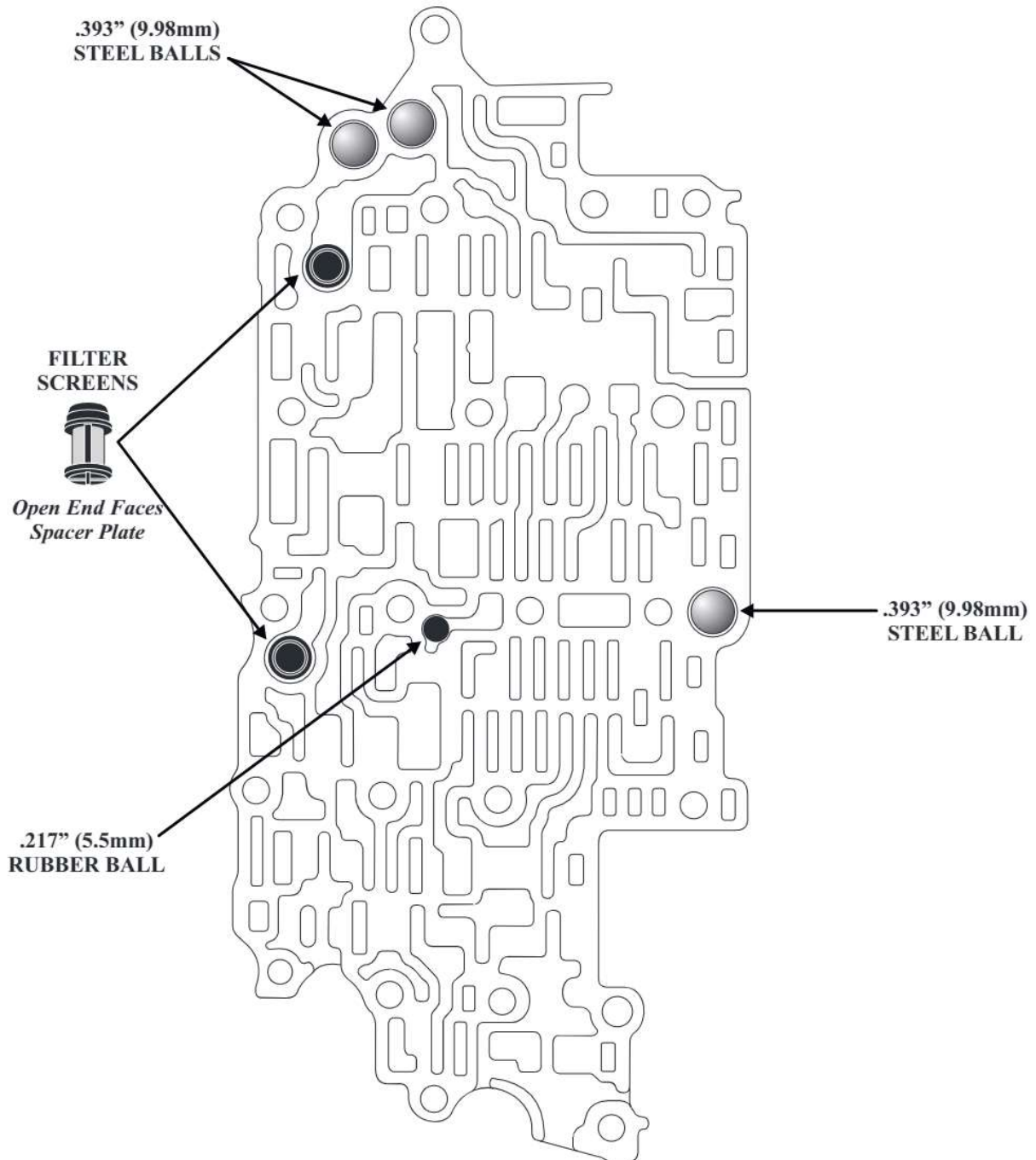
Copyright © 2008 ATSG

TOYOTA/LEXUS U660E UPPER VALVE BODY



Copyright © 2008 ATSG

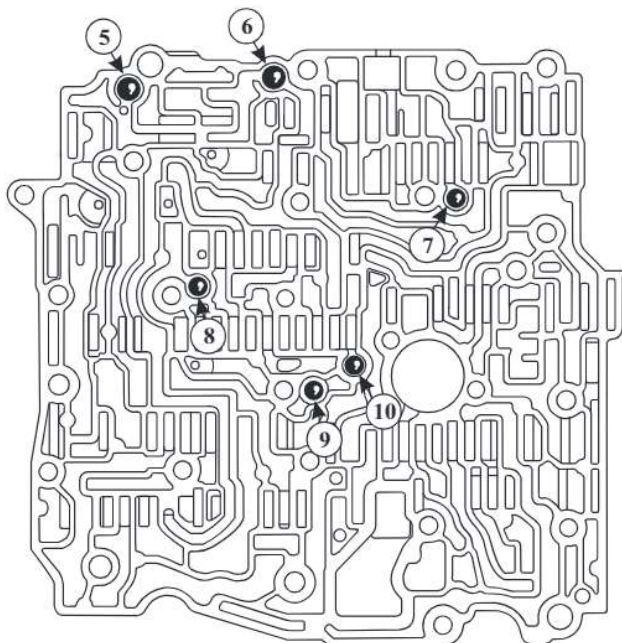
TOYOTA/LEXUS U660E MIDDLE VALVE BODY



Copyright © 2008 ATSG

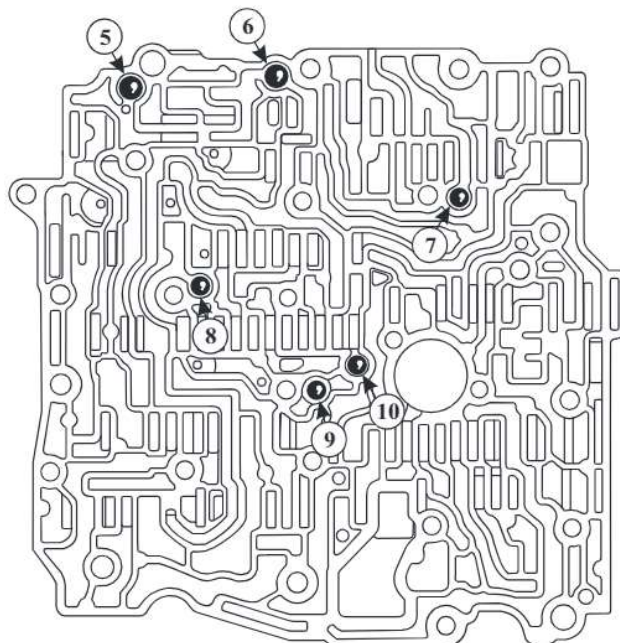
VOLVO 4T65E/EV-GT VALVE BODY

CONVENTIONAL PRNDL VERSION



Checkballs 5 and 6 are .375" (9.52mm) steel balls
All other steel checkballs are .250" (6.35mm)

GEARTRONIC/TIPTRONIC VERSION



Checkballs 5 and 6 are .375" (9.52mm) steel balls
All other steel checkballs are .250" (6.35mm)

Checkball locations are the same for both "Conventional" and "Tiptronic", but the No. 7 and No. 8 Checkball functions are different between the two.

CONVENTIONAL PRNDL VERSION

Number 7: LO/LO-1st

Located in the valve body, it blocks the lo-1st passage when Drive Range Manual First gear is selected, and sends Lo fluid pressure to the 1-2 shift valve where it passes through the valve and is forced through orifice 27 into the Lo-1st circuit.

Number 8: D2/Manual 2-1 Servo Feed

Located in the valve body, it is fed by D-2 fluid from the manual valve and seated against orificed manual 2-1 servo feed fluid at the spacer plate. D-2 fluid is then directed to the 3-2 Manual Downshift valve, where it enters the 2-1 manual servo feed passage and is forced through orifice 13. When the 2-1 manual band servo releases, the ball check valve unseats and fluid exhausts without going through orifice 13.

GEARTRONIC/TIPTRONIC VERSION

Number 7: LO

Located in the valve body, it is part of the Lo fluid circuit but has no function as the fluid is blocked at the spacer plate.

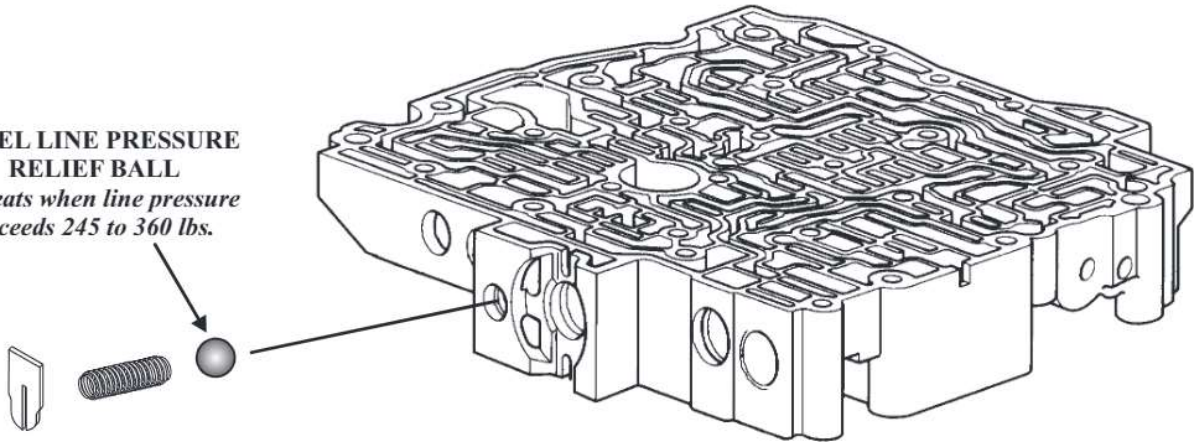
Number 8: D2/Manual 2-1 Servo Feed

Located in the valve body, it is fed by D-3 and D-2 fluid from the manual valve and seated against orificed manual 2-1 servo feed fluid at the spacer plate. D-2 or D3 fluid is then directed to the 3-2 Manual Downshift valve, where it enters the 2-1 manual servo feed passage and is forced through orifice 13. When the 2-1 manual band servo releases, the ball check valve unseats and fluid exhausts without going through orifice 13. **The D3 and D2 circuits are connected in this version.**

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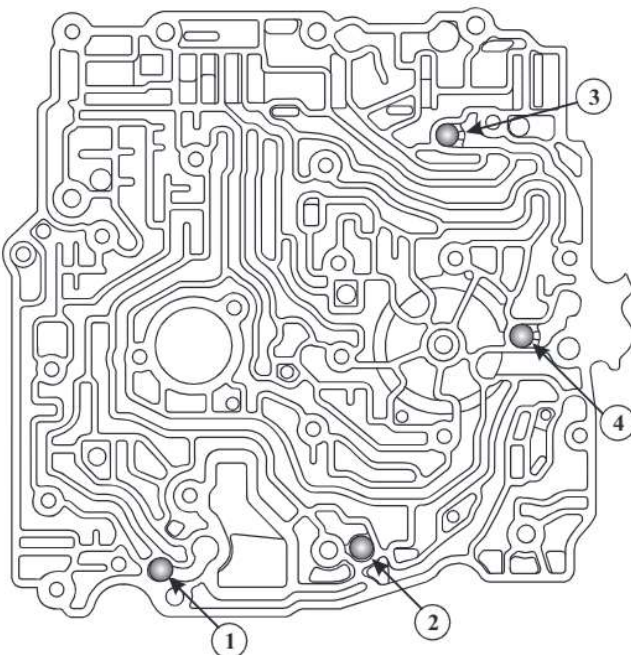
VOLVO 4T65E/EV-GT VALVE BODY

**STEEL LINE PRESSURE
RELIEF BALL**
*Unseats when line pressure
exceeds 245 to 360 lbs.*

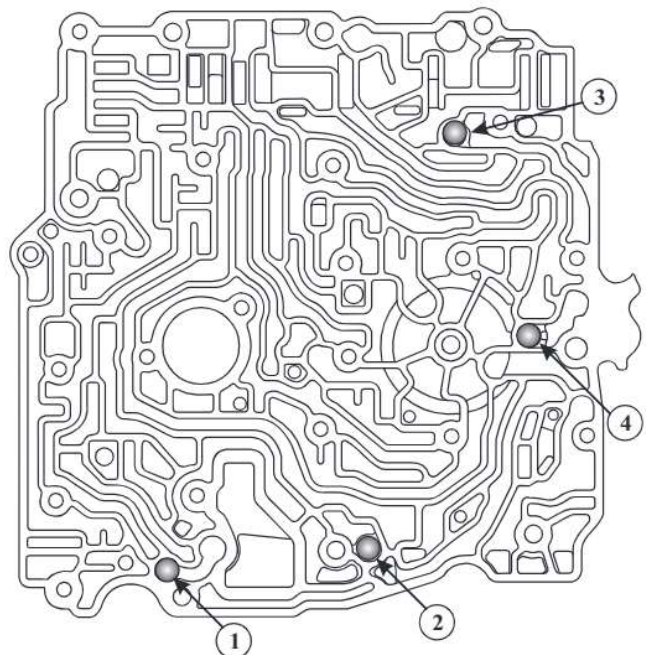


CHANNEL PLATE (Valve Body Side)

CONVENTIONAL PRNDL VERSION



GEARTRONIC/TIPTRONIC VERSION



*Checkball Function and Locations in the Channel Plate are the same for both versions.
All channel plate checkballs are steel .250" (6.35mm)*

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VOLVO

4T65E/EV-GT

CHECKBALL LOCATION & FUNCTION

#1 Converter Clutch Release/Apply

Located in the case cover, it directs either release or apply fluid pressures to the TCC blow off ball check valve in the case cover.

#2 2nd Clutch

Located in the case cover, it directs 2nd (apply) fluid through orifice 25 on the spacer plate into the 2nd clutch passage. When the 2nd clutch releases, it seats in the case cover forcing 2nd clutch fluid through orifice 26 and into the 2nd fluid passage.

#3 Input Clutch/PRN

Located in the case cover, it blocks the PRN passage to direct input clutch fluid to the input clutch during the appropriate gear range. In Park, Reverse or Neutral gear ranges, PRN fluid unseats the ball check valve and also feeds the input clutch.

#4 3rd Clutch/Low Reg

Located in the case cover, during Overdrive Range Third Gear, it seats against the low reg passage allowing 3rd clutch fluid into the 3rd clutch/low reg passage to apply the 3rd clutch. During a 3-2 shift, it allows 3rd clutch/low reg fluid to exhaust into the 3rd clutch fluid passage. In Drive Range - Manual First, it seats against 3rd clutch fluid allowing low reg fluid to enter the 3rd clutch/low reg fluid passage to apply the 3rd clutch.

#5 Reverse/Reverse Servo Feed

Located in the valve body, it blocks the reverse servo feed passage forcing reverse fluid through an orifice before entering the reverse servo feed passage. When the manual valve is moved out of Reverse gear range, the ball check valve unseats allowing reverse servo fluid to exhaust through the reverse fluid passage.

#6 D4/Servo Apply

Located in the valve body, it blocks the forward servo apply passage and forces D4 fluid pressure to the forward servo feed orifice on the spacer plate. When the manual valve is moved from Drive Range to Park or Neutral or Reverse, the ball check valve unseats to allow for a quick exhaust of the servo apply fluid and release of the forward band assembly.

#9 3rd/3rd Clutch

Located in the valve body, it forces 3rd fluid through feed orifice 24 into the 3rd clutch passage during apply of the 3rd clutch. When the 3rd clutch releases, 3rd clutch fluid seats the ball check valve against the 3rd passage, forcing fluid through orifice 28 and into the 3rd fluid passage to the 2-3 shift valve where it exhausts.

#10 Line/4th Clutch

Located in the valve body, it is seated against the 1st gear fluid passage during all forward ranges, except first, and directs line fluid through orifice 33. In drive range first gear or manual first 1st gear fluid pressure unseats the ball check valve and bypasses orifice 33 to send fluid to the input clutch apply passage.

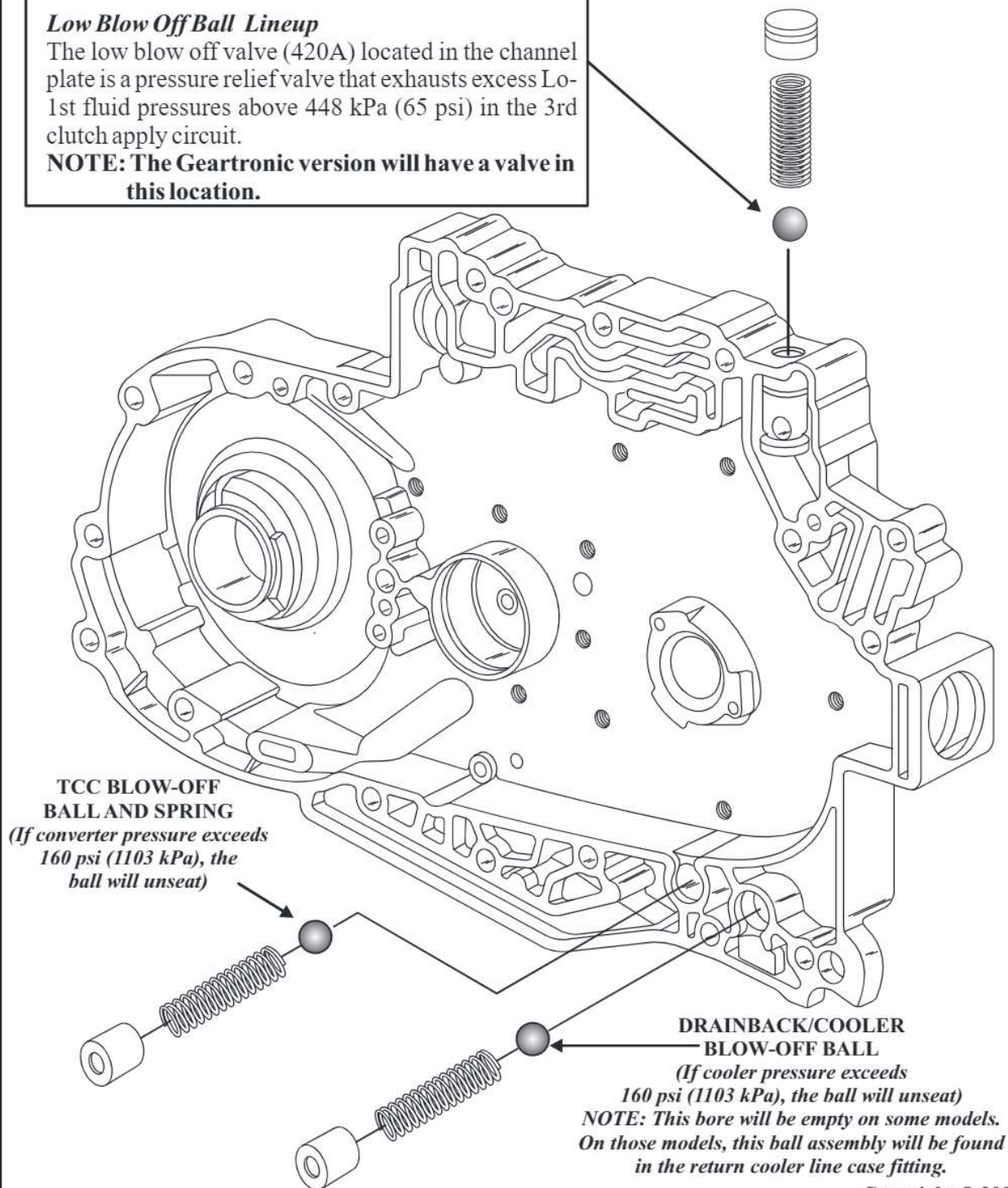
VOLVO 4T65E/EV-GT CHANNEL PLATE (Case Side)

Volvo Non-Geartronic Application Only

Low Blow Off Ball Lineup

The low blow off valve (420A) located in the channel plate is a pressure relief valve that exhausts excess Lo-1st fluid pressures above 448 kPa (65 psi) in the 3rd clutch apply circuit.

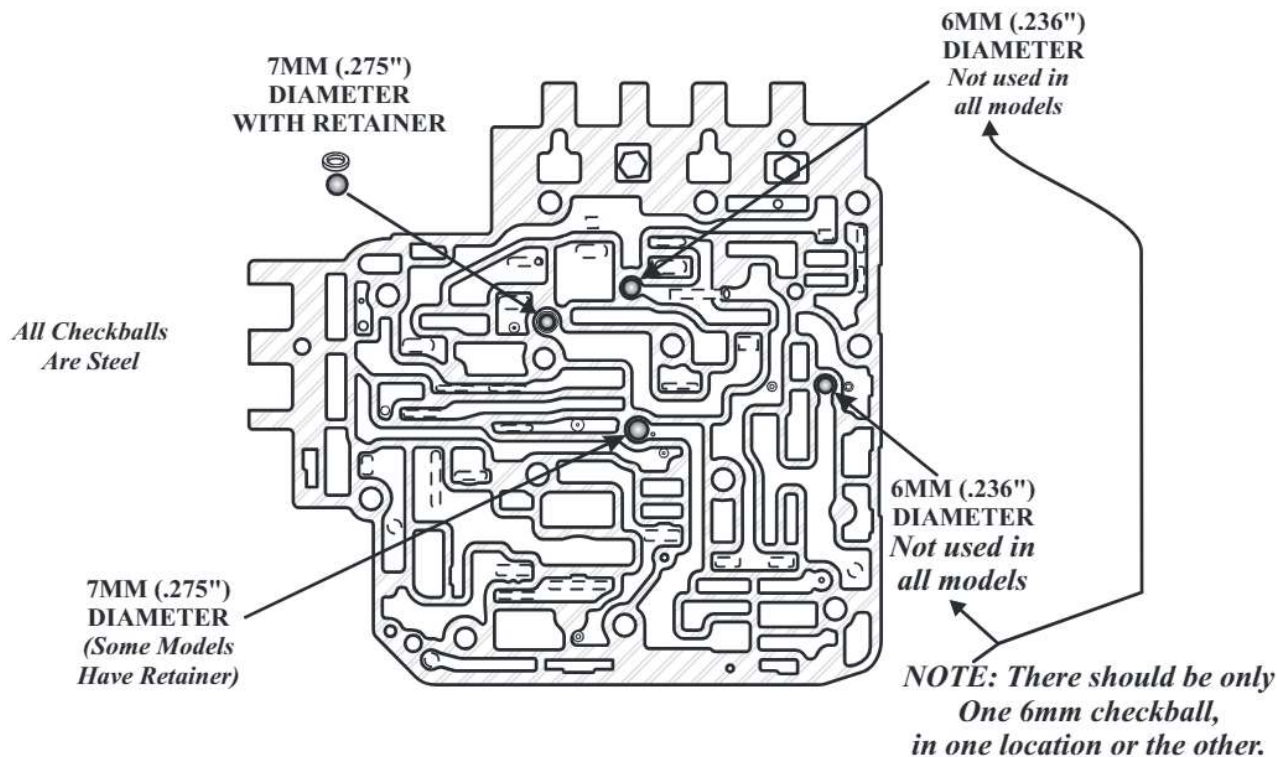
NOTE: The Geartronic version will have a valve in this location.



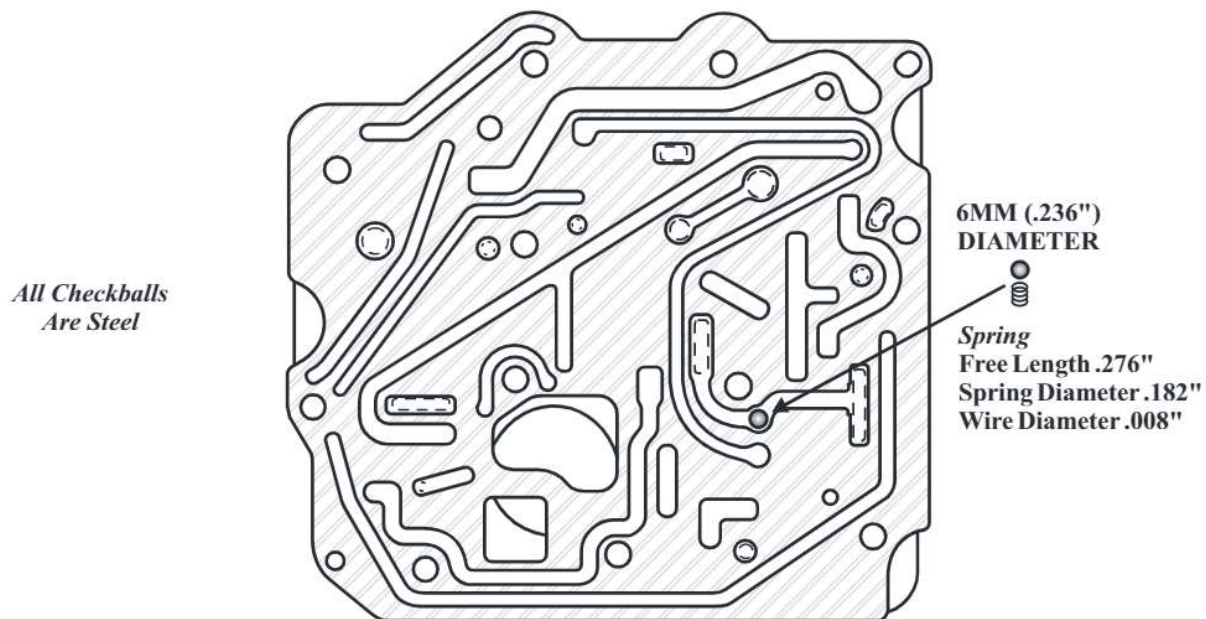
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VOLKSWAGEN 01M

95-97 UPPER VALVE BODY



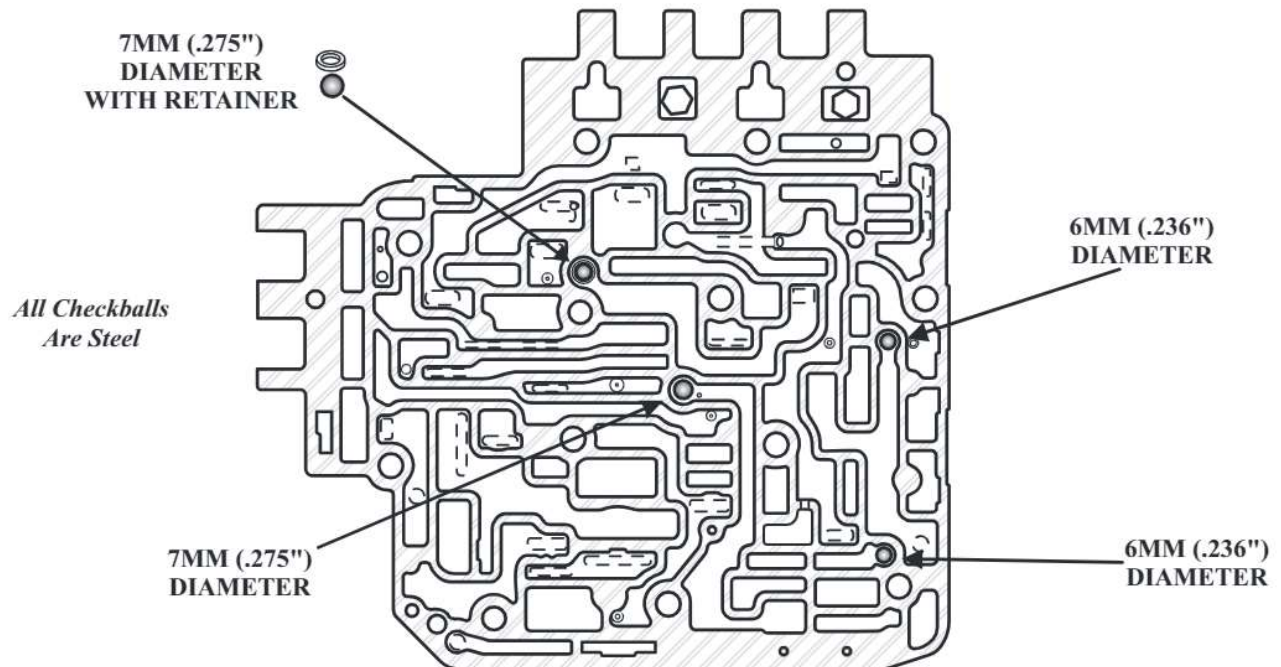
95-97 CHANNEL PLATE



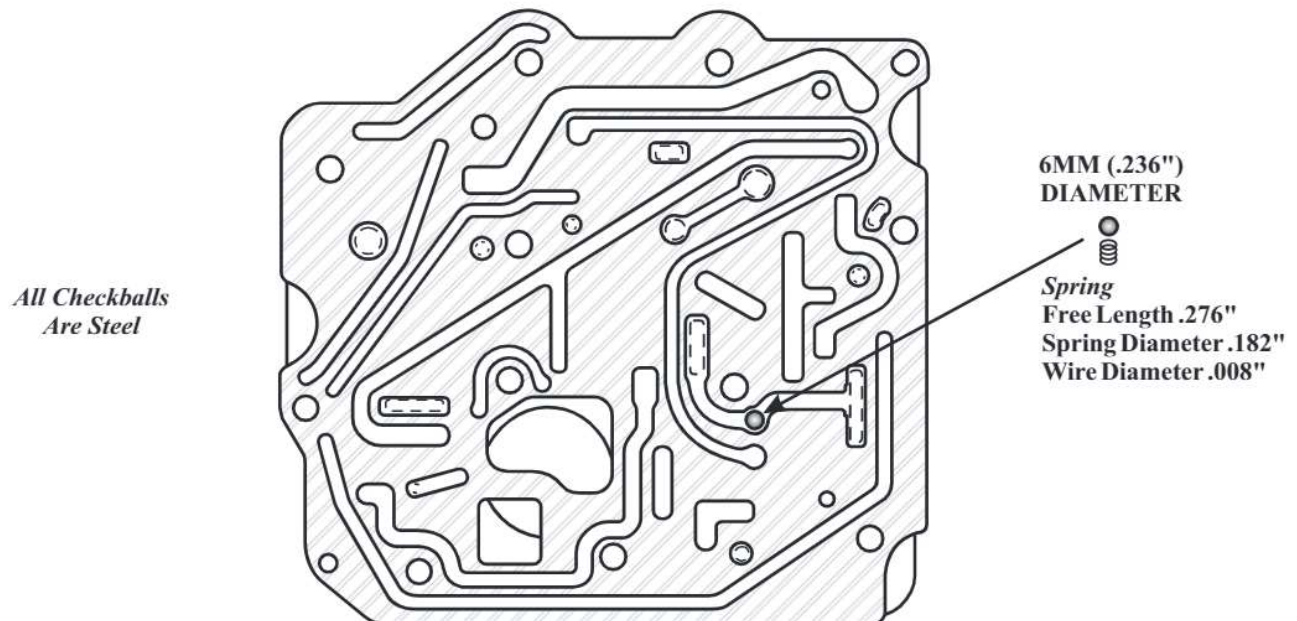
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VOLKSWAGEN 01M

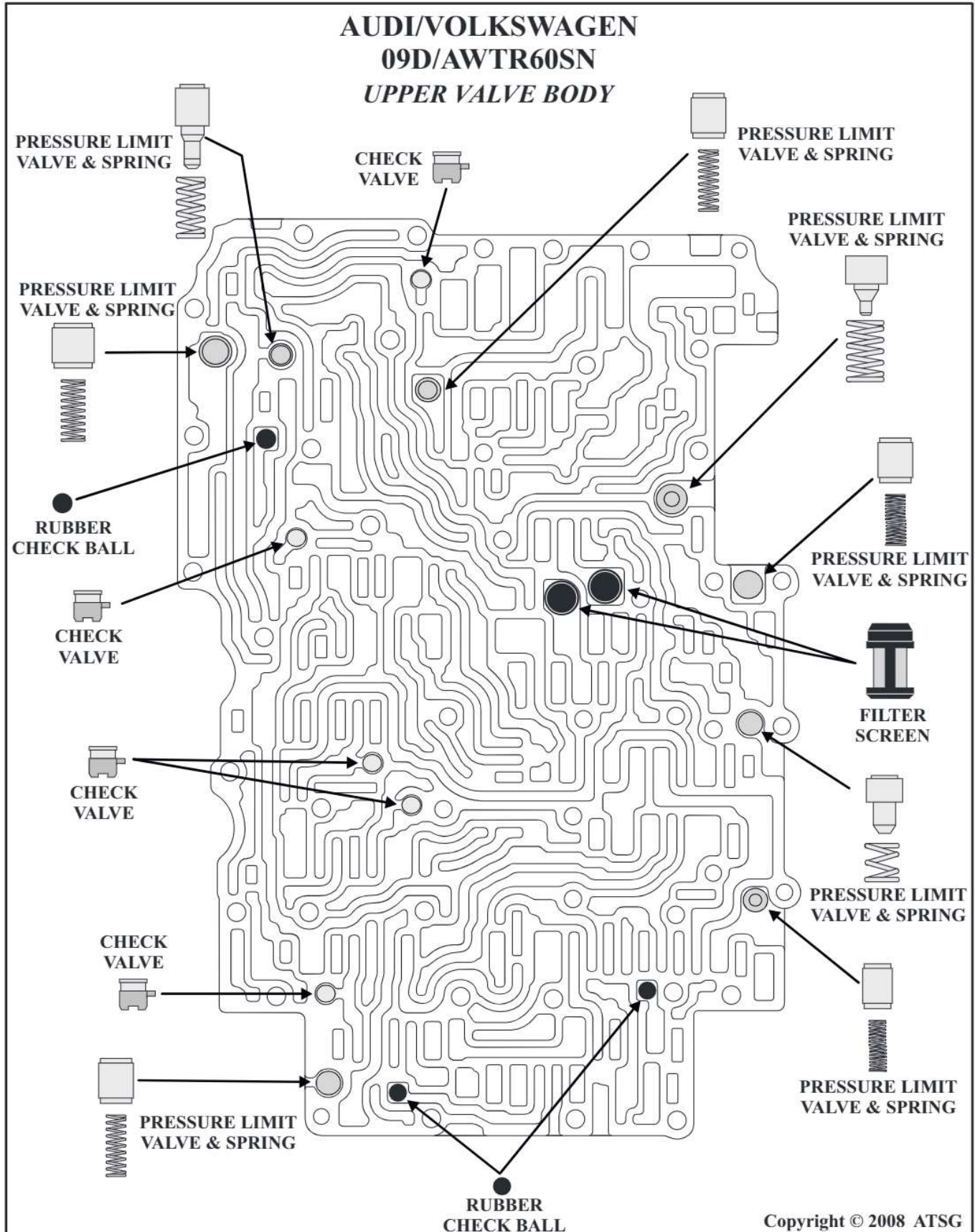
98 AND LATER UPPER VALVE BODY



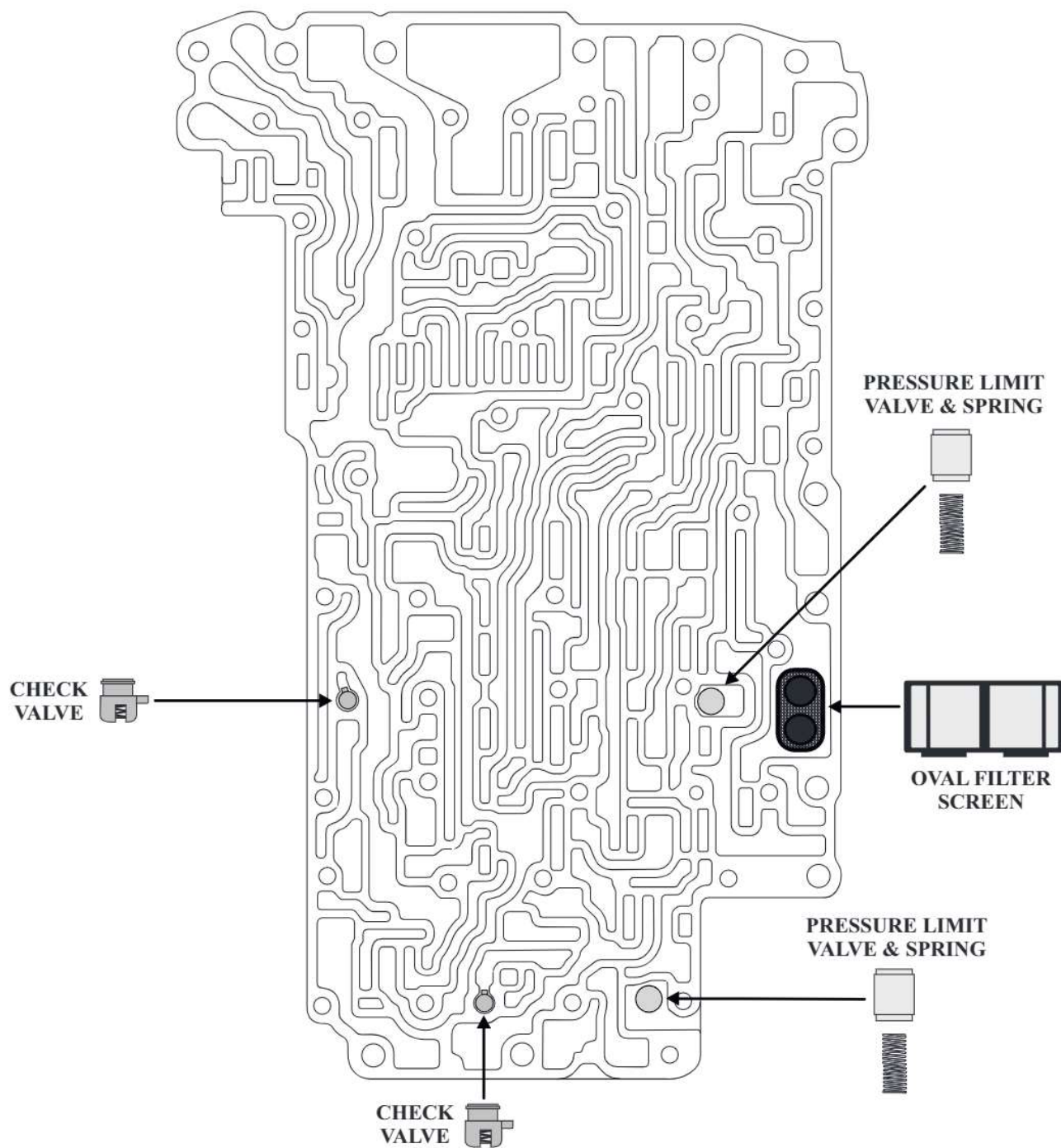
98 AND LATER CHANNEL PLATE



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AUDI/VOLKSWAGEN 09D/AWTR60SN LOWER VALVE BODY



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