2014 CHEVROLET EXPRESS/GMC SAVANA FULL SIZE VAN ELECTRICAL

GM UPFITTER INTEGRATION

Note to User:

As part of our mission to provide an up-to-date website that includes detailed Body Builder Manuals, Technical Bulletins, and Best Practice Manuals, we are now using sectional excerpts directly from the General Motors Service Information publications for our Electrical Body Builder Manuals.

You will note that the section numbers are non-sequential as we have provided only those that are believed to be the most pertinent to the Upfitter community and best suited to their needs.*

This new usage of the Service Information provides the opportunity for us to remain consistent with the changes that take place throughout the model year and to provide you updated information in a more timely fashion.

**** If you would like to have access to all of the electrical Service Information, please apply for a subscription from ACDelco at http://acdelcotechconnect.com/html/tss_tech_esi.jsp***

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Section 1

General Information

General Information

Introduction

RPO Code List

The production/process codes provide the description of the regular production options (RPOs). The RPO list is printed on the Service Parts Identification Label.

RPO Code List

RPO	Description
01U	PRIMARY COLOR EXTERIOR, SPECIAL (96)
15U	PRIMARY COLOR EXTERIOR, CASHMERE METALLIC (04)
16U	PRIMARY COLOR EXTERIOR, GRAYSTONE METALLIC (213M)
25U	PRIMARY COLOR EXTERIOR, DARK MING BLUE (02)
40P	WHEEL COLOR – WHITE (91)
41U	PRIMARY COLOR EXTERIOR, BLACK (97)
47U	PRIMARY COLOR EXTERIOR, MEDIUM GREEN PEARL METALLIC (02)
50U	PRIMARY COLOR EXTERIOR, OLYMPIC WHITE (93)
52G	TRIM COMBINATION CLOTH, MEDIUM NEUTRAL II (G) (00)
52I	INTERIOR TRIM LIGHT NEUTRAL (I) (96)
52W	TRIM COMBINATION VINYL, MEDIUM NEUTRAL II (W) (00)
74U	PRIMARY COLOR EXTERIOR, VICTORY RED (96)
86U	PRIMARY COLOR-EXTERIOR, WHEATLAND YELLOW (02) 253A
93G	TRIM COMBINATION CLOTH, MEDIUM DARK PEWTER II (G) (03) (GMT610 – G VAN)
93I	INTERIOR TRIM MEDIUM DARK PEWTER II (03) (GMT610 – G VAN)
93W	TRIM COMBINATION VINYL, MEDIUM DARK PEWTER II (W) (03) (GMT610 – G VAN)
9N2	GVW RATING-10,050 LBS
A07	WINDOW – BODY
A08	WINDOW – BODY, RIGHT
A12	WINDOW REAR – DOOR, STA
A13	WINDOW SIDE DOOR – REAR, STA
A17	WINDOW SIDE BODY – SWING OUT, LEFT
A18	WINDOW REAR – DOOR, SWING OUT
A19	WINDOW SIDE DOOR – REAR, SWING OUT

RPO Code List (cont'd)

RPO	Description
A31	WINDOW - POWER OPERATED, ALL DOORS
AG1	ADJUSTER FRONT SEAT – POWER, MULTI-DIRECTIONAL, DRIVER
AG2	ADJUSTER PASSENGER SEAT – POWER, MULTI-DIRECTIONAL
AJ1	WINDOW TINTED – DEEP, ALL EXCEPT WINDSHIELD AND DOORS
AJ3	RESTRAINT SYSTEM – SEAT, INFLATABLE, DRIVER
AK5	RESTRAINT SYSTEM – SEAT, INFLATABLE, DRIVER AND PASSENGER
AL0	SENSOR INDICATOR – INFLATABLE RESTRAINT, FRONT PASSENGER/ CHILD PRESENCE DETECTOR
ANC	SALES PACKAGE SHUTTLE BUS
AR7	SEAT – FRONT BUCKET, STANDARD
ASF	RESTRAINT – ROOF SIDE, LEFT AND RIGHT, INFLATABLE
AS5	SEAT – FRONT BUCKET, DELUXE
AT8	RESTRAINT PROVISION CHILD, REAR SEAT, REAR FACING
ATG	LOCK CONTROL, ENTRY - REMOTE ENTRY, STANDARD RANGE
AU3	LOCK CONTROL – SIDE DOOR, ELECTRIC
AXK	VEHICLE TYPE - TRUCK
AXP	VIN IDENTIFICATION – POSITION, MULTI-PURPOSE VEHICLE
AXW	VEHICLE TYPE - BUS (NOT SCHOOL BUS)
B30	COVERING FLOOR – CARPET
B31	COVERING FLOOR – VINYL, FRONT, FULL WIDTH
B32	COVERING FRONT – FLOOR MATS, AUXILIARY
B33	COVERING REAR – FLOOR MATS, AUXILIARY
B38	COVERING FLOOR – VINYL, FRONT AND REAR, FULL WIDTH
B3D	EQUIPMENT – SCHOOL BUS
B46	TRIM EQUIPMENT – SPECIAL ORDER
BA0	ORNAMENTATION – EXTERIOR, DOOR, NAMEPLATE
BA3	COMPARTMENT – STOWAGE, I/P LOWER EXTENSION DELUXE
BAG	PARTS PACKAGE – EXPORT
BG5	COVERING FLOOR – DELETE
BNC	PARTS PACKAGE – BODY MOUNT CUSHIONS
BTV	REMOTE START - ENGINE

RPO Code List (cont'd)

RPO	Description
BUE	KIT EXHAUST DIESEL
C36	HEATER – AUXILIARY
C4K	GVW RATING-9,925 LBS
C4M	GVW RATING 4 500 KG (9,900 LB)
C42	HVAC SYSTEM – HEATER, OUTSIDE AIR, DELUXE
C49	DEFOGGER – REAR WINDOW, ELECTRIC
C6A	GVW RATING 7,300 LBS
C6P	GVW RATING – 8,600 LBS/3 900 KG
C6Y	GVW RATING – 9,600 LBS
C60	HVAC SYSTEM – AIR CONDITIONER FRONT, MANUAL CONTROLS
C69	HVAC SYSTEM REAR – AIR CONDITIONER
C7A	GVW RATING 10,000 LBS
C7I	GVW RATING 14,200 LBS
C7N	GVW RATING 12,300 LBS
C7Q	GVW RATING 4 000 KG (8,800 LB)
C8V	GVW RATING 13,980 LBS
C99	SWITCH INFLATABLE RESTRAINT, INSTRUMENT PANEL MODULE MANUAL SUPPRESSION
CEI	CERTIFICATION CERTIFICATION, EMISSION, GEOGRAPHICALLY RESTRICTED REGION FOR VEHICLES OVER 14,000 LBS GVW
CEJ	CERTIFICATION EMISSION, FEDERAL FOR VEHICLES OVER 14,000 LBS GVW
CU7	COUNTRY — KUWAIT
CU8	COUNTRY — SAUDI ARABIA
CV3	COUNTRY — MEXICO
CV4	COUNTRY — ISREAL
CW2	COUNTRY — GULF AREAS
CW3	COUNTRY — ASIA/PACIFIC
CW5	COUNTRY — VENEZUELA
CW6	COUNTRY — GUAM
CW9	COUNTRY — MISC
D28	MIRROR OUTSIDE – DELETE
D31	MIRROR INSIDE REARVIEW TILT (DUPLICATE WITH D36)
DAA	SUNSHADE VINYL
DE2	MIRROR OUTSIDE – LEFT AND RIGHT, MANUAL CONTROL, FOLDING, COLOR
DE5	MIRROR OUTSIDE – LEFT AND RIGHT, REMOTE CONTROL, ELECTRIC, HEATED, FOLDING, COLOR

RPO Code List (cont'd)

RPO	Description
DE7	MIRROR OUTSIDE – LEFT AND RIGHT, REMOTE CONTROL, ELECTRIC, HEATED, LIGHT SENSITIVE, MANUAL FOLDING, TURN SIGNAL INDICATOR, COLOR
DHC	MIRROR OUTSIDE – LEFT AND RIGHT, MANUAL CONTROL, AUX WFOV, COLOR
DH6	MIRROR INSIDE FRONT VANITY LEFT AND RIGHT, SUNSHADE, ILLUMINATED
DNS	EQUIPMENT - SUPPLIER INSTALLED
DT4	ASHTRAY – CIGARETTE LIGHTER
E24	DOOR SIDE – REAR, HINGED
E26	DOOR SIDE REAR LEFT – HINGED
E3T	HANDLE – INSIDE, DOOR RELEASE
E48	COVER - RADIATOR GRILLE OPG - COLD CLIMATE
EF7	COUNTRY-UNITED STATES OF AMERICA (USA)
ENC	HVAC PROVISIONS – AUXILIARY HEATER PLUMBING AND WIRING
EVA	TEST – DVT, EVAP EMISSION REQUIREMENT
EXP	EXPORT
FAS	ACCESSORY-NAVIGATION SYSTEM - PORTABLE - LEVEL 2
FAW	ACCESSORY-NAVIGATION SYSTEM - PORTABLE - LEVEL 3
FE9	CERTIFICATION – EMISSION FEDERAL
FHO	VEHICLE FUEL - GASOLINE E10
FHS	VEHICLE FUEL - GASOLINE E85
FHX	VEHICLE FUEL - DIESEL B20
FHZ	VEHICLE FUEL - DEDICATED CNG
G7K	EQUIPMENT - ANTENNA, CABLE AND GROUNDPLATE
G80	AXLE POSITRACTION – LIMITED SLIP
GGZ	PRIMARY COLOR EXTERIOR, SHEER SILVER METALLIC
GH0	AXLE REAR 3.54 RATIO
GT4	AXLE REAR 3.73 RATIO
GT5	AXLE REAR 4.10 RATIO
GU6	AXLE REAR 3.42 RATIO
JFF	GVW RATING-10,100 LBS
JH5	BRAKE HYDRAULIC POWER, 4 WHEEL DISC, 7,200 LBS
JH6	BRAKE HYDRAULIC POWER, 4 WHEEL DISC, 9,900 LBS
JH9	BRAKE HYDRAULIC POWER, 4 WHEEL DISC, 14,050 LBS
JL4	CONTROL – ACTIVE BRAKE
K05	HEATER ENGINE – BLOCK

RPO Code List (cont'd)

RPO	Description
K08	HEATER – AUXILIARY, FUEL FIRED
K34	CRUISE CONTROL – AUTOMATIC, ELECTRONIC
K50	FUEL – FITTING, LINE TAKE-OFF
K68	GENERATOR – 105 AMP
KC4	COOLING SYSTEM – ENGINE OIL
KD1	COOLING SYSTEM – TRANSMISSION, OIL
KD9	GENERATOR 145 AMP, DUAL
KG3	GENERATOR 145 AMP
KG7	GENERATOR 125 AMP
KO7	VEHICLE FUEL - LIQUEFIED PETROLEUM GAS, LIQUID - (PROPANE AND PROPANE / BUTANE BLENDS)
KUP	THROTTLE CONTROL – ELECTRONIC
L20	ENGINE FLEXIBLE FUEL, GAS/ ETHANOL, 8 CYLINDER, 4.8L, SFI IRON, GM
L96	ENGINE FLEXIBLE FUEL, GAS/ ETHANOL, 8 CYLINDER, 6.0L, SFI IRON, GM
LC8	ENGINE - LPG / CNG, 8 CYL, V8, 6.0L, SFI, GEN 1, GMNA
LGH	ENGINE DIESEL, 8 CYLINDER, 6.6L, DI, V8, TURBO, DURAMAX
LMF	ENGINE FLEXIBLE FUEL, (GAS/ALC) 8 CYLINDER, 5.3L, SFI, V8, OHV, IRON, GM
LU3	ENGINE GAS, 6 CYLINDER, 4.3L, MFI, V6, 90 DEGREE
M30	TRANSMISSION AUTOMATIC 4 SPEED, HMD, 4L60-E, ELECTRONIC
MTF	PROVISIONS – FIRE EXTINGUISHER MOUNTING
MYD	TRANSMISSION – AUTOMATIC 6 SPEED, HMD, 6L90
N12	EXHAUST SYSTEM – REAR EXIT
N33	STEERING COLUMN – TILT TYPE
N88	WHEEL 17 X 7.5, ALUMINUM, PREMIUM
NB8	EMISSION OVERRIDE – CALIFORNIA SYSTEM
NCF	LOCK – CHILD SECURITY FEATURE – DELETE
NC7	EMISSION OVERRIDE – FEDERAL SYSTEM
NC8	EMISSION SYSTEM CALIFORNIA, ULEV
NE1	CERTIFICATION – EMISSION, GEOGRAPHICALLY RESTRICTED REGISTRATION FOR VEHICLES UP TO 14,000 LBS GVW
NE7	FUEL TANK – 227 L, 57 GAL
NPL	PLATE NAME – DELETE

RPO Code List (cont'd)

RPO	Description
NP5	STEERING WHEEL – LEATHER WRAPPED
NT7	EMISSION SYSTEM – FEDERAL, TIER 2
NUA	EMISSION SYSTEM - CALIFORNIA, 150K, LEV 2
NU4	EMISSION SYSTEM – CALIFORNIA LEVEL 2 PLUS
NU5	EMISSION SYSTEM CALIFORNIA, BIN 4
NX7	WHEEL 17 X 7.5, STEEL
NZ4	WHEEL SPARE - FULL SIZE, 17” STEEL
P03	COVER, WHEEL – VAR 3
P46	WHEEL 17 X 7.5, ALUMINUM, UPLEVEL
PNC	PANEL – TRIM, FRONT DOORS AND SIDE REAR DOOR(S) AND REAR DOORS
PPC	PANEL – TRIM, REAR DOORS
PRP	SALES PACKAGE – COMMERCIAL TRADESMAN
QB5	WHEEL 16 X 6.5, STEEL
QT4	WHEEL 16 X 6.5, STEEL H.D.
R04	WHEEL CONFIGURATION – REAR, SINGLE
R05	WHEEL CONFIGURATION – REAR, DUAL
R25	APPEARANCE PACKAGE – EXTERIOR, CHROME GRILLE AND PAINTED BUMPER
R26	APPEARANCE PACKAGE – EXTERIOR, CHROME GRILLE AND FRONT BUMPER
T62	LAMP SYSTEM – DAYTIME RUNNING – DELETE
T74	HEADLAMPS CONTROL AUTOMATIC, DELAY
TGA	LANGUAGE CONTROL – ENGLISH, FRENCH, SPANISH
TGG	LANGUAGE CONTROL – ENGLISH, ARABIC, FRENCH
TR9	LAMP GROUP
U05	HORN – DUAL
U1C	RADIO – AM/FM STEREO, SEEK/SCAN, CD, CLOCK, ETR
U19	SPEEDOMETER – INSTRUMENT, KILOMETERS AND MILES, KILOMETER ODOMETER
U2J	DIGITAL AUDIO SYSTEM S-BAND, NOT INSTALLED
U2K	DIGITAL AUDIO SYSTEM - S-BAND
U73	ANTENNA – FIXED, RADIO
U74	ANTENNA – RADIO – DELETE
U80	DISPLAY – COMPASS

RPO Code List (cont'd)

RPO	Description
UA1	BATTERY – HIGH CAPACITY, WET
UA7	THEFT DETERRENT SYSTEM - EXPORT SPECIFIC, VAR 2
UC2	SPEEDOMETER – INSTRUMENT, KILOMETER AND MILES, KILOMETER ODOMETER, POSITIVE BIAS
UD4	ALARM – VEHICLE SPEED, 120 KM/H
UD7	PARK ASSIST-REAR
UE0	COMMUNICATION SYSTEM - VEHICLE, G.P.S. - NONE
UE1	COMMUNICATION SYSTEM - VEHICLE, G.P.S. 1
UFA	DISPLAY – OUTSIDE TEMPERATURE
UFM	PARTS PKG — COMPLETE VEHICLE KIT, 3 TANK
UFP	PARTS PKG — COMPLETE VEHICLE KIT, 4TANK
UF2	LAMP – CARGO
UF3	SWITCH – HIGH IDLE
UJM	TIRE PRESSURE INDICATOR MANUAL LEARN
UJ1	INDICATOR – SYSTEM, BRAKE WARNING
UL2	FREQUENCIES-EUROPEAN
UL5	RADIO – DELETE
UL8	FREQUENCIES – SAUDI ARABIAN
UM7	RADIO AM/FM STEREO, SEEK/SCAN, CLOCK, ETR
UPF	WIRELESS INTERFACE - SHORT RANGE, VOICE REC
US8	RADIO – AM/FM STEREO, SEEK/SCAN, CD, AUTO TONE, CLOCK, ETR, MP3, RDS
USR	RECEPTACLE - USB
UVC	CAMERA-REAR VIEW
UXZ	RADIO – PROVISIONS FOR
UY7	WIRING HARNESS – TRUCK TRAILER, HD
UYS	RADIO-AM/FM STEREO, NAV, DVD-ROM, CAF, HDD, USB, RSA, RSE (GMNA VERSION)
V10	PROVISION OPTIONS – COLD WEATHER
V14	COOLER – OIL, TRANSMISSION, AUXILIARY
V22	GRILLE – RADIATOR, CHROME
V37	BUMPER – FRONT AND REAR, CHROME
V46	BUMPER FRONT – CHROME
V4D	CALIBRATION - SEPARATED STOP/ TURN SIGNAL CIRCUITS
V8D	VEHICLE STATEMENT - US
V8I	VEHICLE STATEMENT-ISRAEL

RPO Code List (cont'd)

RPO	Description
VBX	LANGUAGE LABEL – ARABIC
VC5	LABEL – SHIPPING, EXCEPT US, US POSSESSIONS, OR JAPAN
VC7	LABEL – PRICE/FUEL ECONOMY, GUAM
VG8	VEHICLE – LABEL, NOTICE TO BUYER
VH6	BUMPER FRONT – BLACK
VJG	BUMPER REAR – BLACK
VK3	LICENSE PLATE FRONT – FRONT MOUNTING PACKAGE
VK5	SEAT – TEMPORARY, FOR SHIPPING
VPH	VEHICLE PREPARATION – OVERSEAS DELIVERY
VP6	NOISE CONTROL
VR4	TRAILER HITCH – WEIGHT DISTRIBUTING PLATFORM
VR6	HOOK – TIE-DOWN SHIPPING
VT7	OWNERS MANUAL – ENGLISH LANGUAGE
WEN	PLANT CODE – WENTZVILLE, MO, USA
W1Y	CONTROL – STEERING WHEEL, RADIO, REDUNDANT CONTROLS
XEC	TIRE FRONT LT215/85R16/E BW R/ST ST TL HWY
XHF	TIRE FRONT – LT225/75R16/E BL R/PE ST ALS
XHH	TIRE FRONT – LT245/75R16/E BW R/PE ST TL ALS 120Q
XL7	FREQUENCIES RATING - 315 MHZ, LONG DISTANCE
XLP	TIRE FRONT – LT245/75R16/E BW R/PE ST TL ALS 120/116S
XPR	TIRE FRONT P245/70R17-108S BW TL ST ALS
X88	MARKET BRAND – CHEVROLET
Y3H	MERCHANDISED PACKAGE – HANDICAPPED, MOBILITY, PARATRANSIT
YA2	DOOR SIDE – REAR, SLIDING
YB9	PAINT PROCESS – INTERIOR – DELETE
YC6	PACKAGE, CONVENIENCE — DECOR LEVEL 6
YEC	TIRE REAR LT215/85R16/E BW R/ST ST TL HWY
YF1	SALES PACKAGE – CUTAWAY UPFITTER
YF2	SALES PACKAGE – AMBULANCE UPLIFTER
YF5	CERTIFICATION – EMISSION, CALIFORNIA
YF7	SALES PACKAGE – RECREATIONAL VEHICLE, UPFITTER

RPO Code List (cont'd)

RPO	Description
YHF	TIRE REAR – LT225/75R16/E BL R/PE ST ALS
YHH	TIRE REAR – LT245/75R16/E BW R/PE ST TL ALS 120Q
YLP	TIRE REAR – LT245/75R16/E BW R/PE ST TL ALS 120/116S
YPR	TIRE REAR P245/70R17-108S BW TL ST ALS
Z49	COUNTRY - CANADA
Z82	TRAILER PROVISIONS – SPECIAL EQUIPMENT, H.D.
Z88	MARKET BRAND – GMC
ZEC	TIRE SPARE LT215/85R16/E BW R/ST ST TL HWY
ZHF	TIRE SPARE – LT225/75R16/E BL R/PE ST ALS
ZHH	TIRE SPARE – LT245/75R16/E BW R/PE ST TL ALS 120Q
ZLP	TIRE SPARE – LT245/75R16/E BW R/PE ST TL ALS 120/116S
ZPR	TIRE SPARE P245/70R17-108S BW TL ST ALS
ZP0	SEATING ARRANGEMENT – TEMPORARY DRIVER
ZP3	SEATING ARRANGEMENT 15 PASSENGER

RPO Code List (cont'd)

RPO	Description
ZP8	SEATING ARRANGEMENT 8 PASSENGER
ZQ2	SALES PACKAGE – DRIVER CONVENIENCE
ZQ3	SALES PACKAGE – DRIVER CONVENIENCE II
ZR7	APPEARANCE PACKAGE – GRILLE AND BUMPER CHROME
ZW2	WINDOW PACKAGE – REAR DOORS
ZW3	WINDOW PACKAGE – REAR DOORS, SIDE REAR DOOR
ZW4	WINDOW PACKAGE – RIGHT SIDE, REAR DOORS
ZW6	WINDOW PACKAGE – COMPLETE BODY
ZW9	BODY EQUIPMENT – BASE BODY OR CHASSIS
ZX1	SEATING ARRANGEMENT – DRIVER ONLY, HIGH BACK
ZX2	SEATING ARRANGEMENT – DRIVER AND PASSENGER, HIGH BACK
ZX5	SEATING ARRANGEMENT – 12 PASSENGER
ZX9	TIRE SPARE – WITH WHEEL – DELETE
ZY1	COLOR COMBINATION SOLID

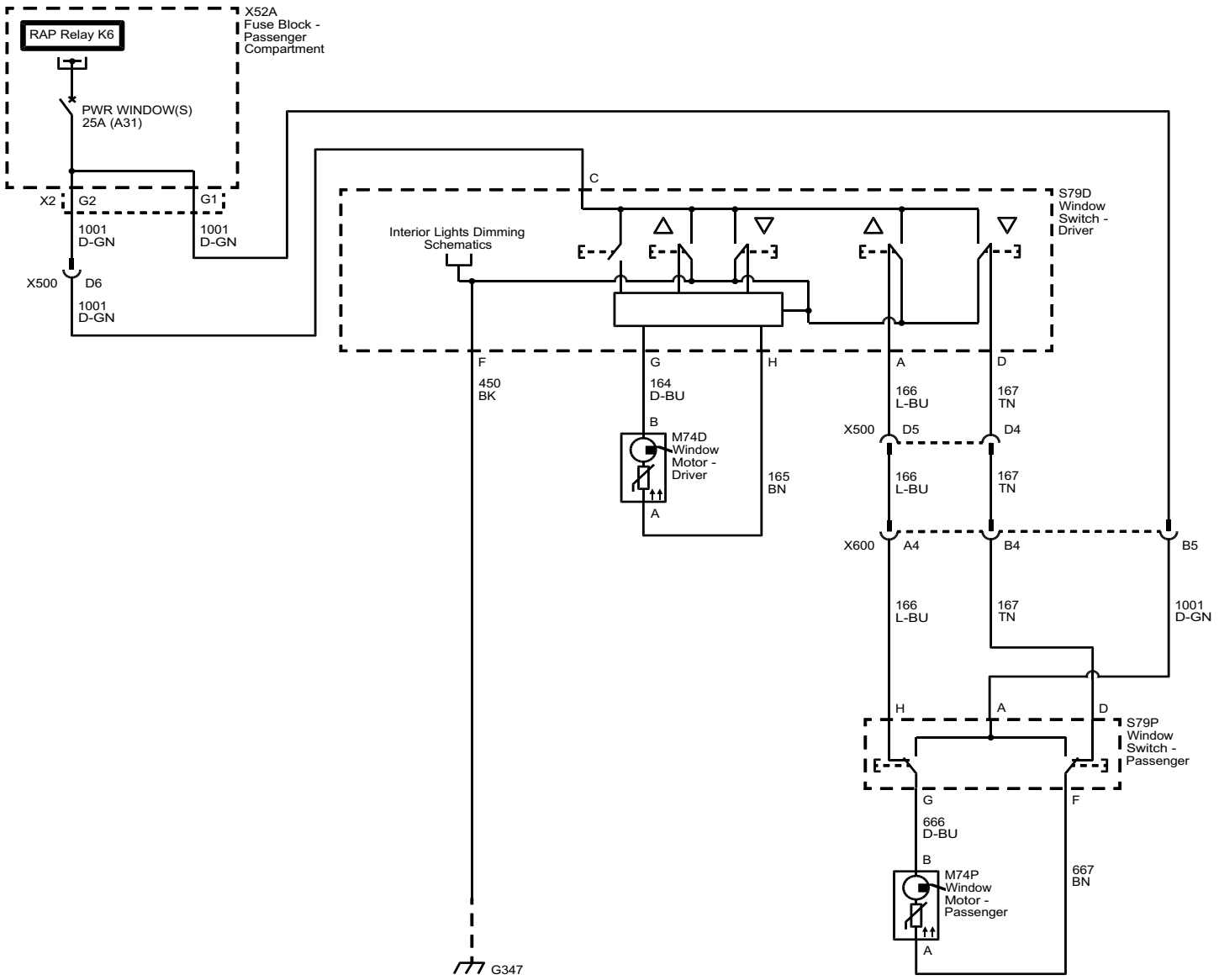
Section 4

Body Systems

Fixed and Moveable Windows

Schematic and Routing Diagrams

Moveable Window Schematics (Moveable Windows)



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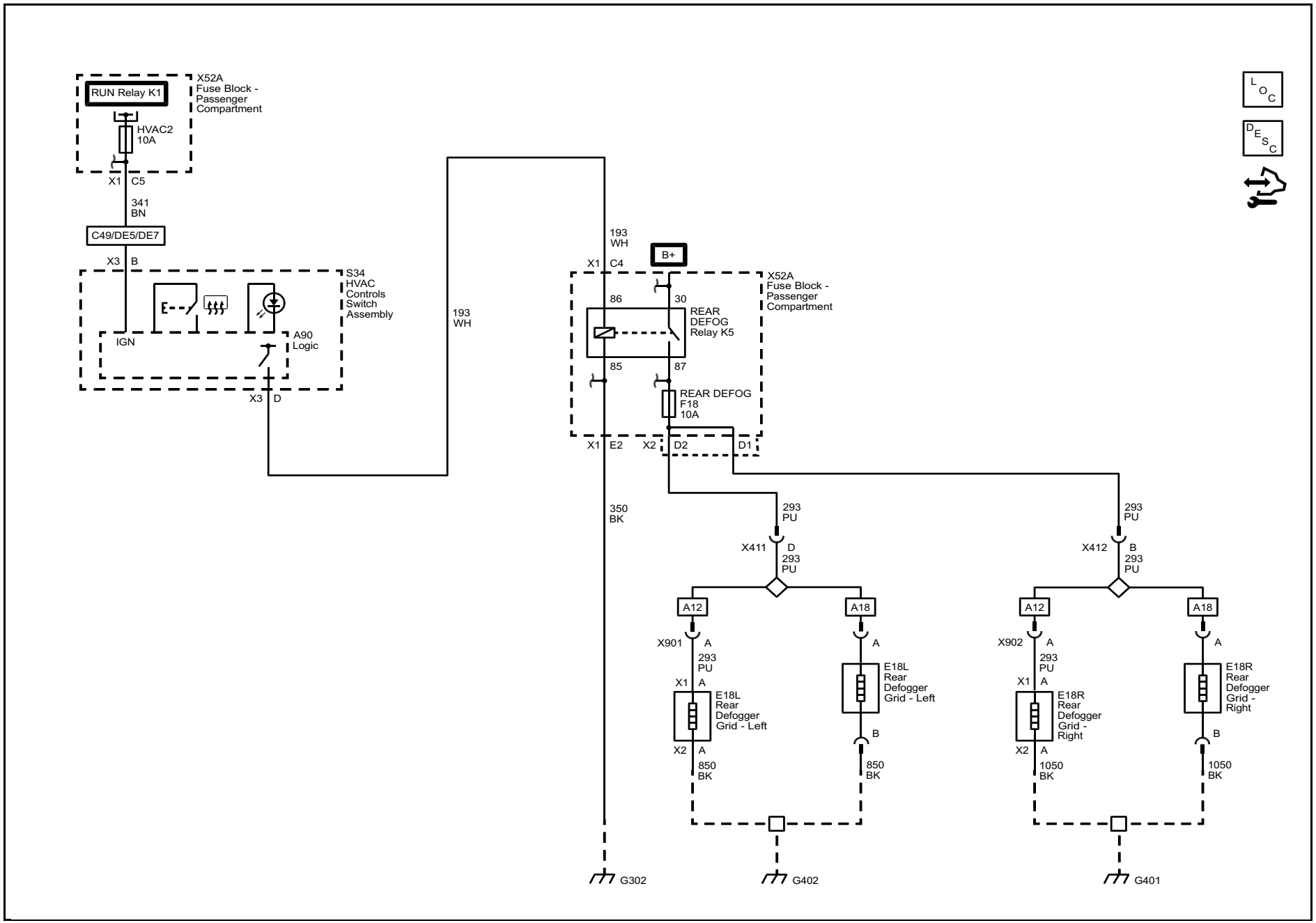
Defogger Schematics (Defogger)



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Description and Operation

Power Windows Description and Operation

Power Window System Components

The power window system consists of the following components:

- LF power window master switch
- RF power window switch
- Reversible power window motors in each of the doors (circuit breaker protected)
- PWR WNDW 25A circuit breaker

Power Window System Controls

The power window system will operate anytime the ignition switch is in the ACCY or ON position or when RAP is activated.

The LF power window master switch can control the up and down functions of both the windows in the vehicle. The passenger door power window switch can only control the up and down functions of the passenger window.

Power Window Motor Operation

A permanent magnet motor operates each of the power side windows. Each motor raises or lowers the glass when the motor receives voltage. The direction the motor turns depends on the polarity of the supply voltage. The power window switches control the polarity of the supply voltage. A built-in circuit breaker protects each motor. The circuit breaker opens when the switch is depressed for a extended period of time under the following conditions:

- The window has an obstruction.
- The window is fully open or fully closed.

The circuit breaker will reset automatically as the circuit breaker cools.

Power Window Operation

The normally closed contacts of the switch are connected to ground and the center pole is connected to the accessory voltage circuit. By placing the left power window switch in the down position, voltage is applied to the power window motor left front down circuit and to the power window motor. The other side of the power window motor is connected to ground through the normally closed contacts of the left power window switch through the power window motor left front up circuit and drives the window down.

By placing the power window switch in the up position the polarity of the motor is reversed and the motor drives the window up.

Rear Window Defogger Description and Operation

Rear Window Defogger System Components

The rear window defogger system consists of the following components:

- HVAC control assembly
- Rear window defogger relay
- Rear window defogger grid

Rear Window Defogger Operation

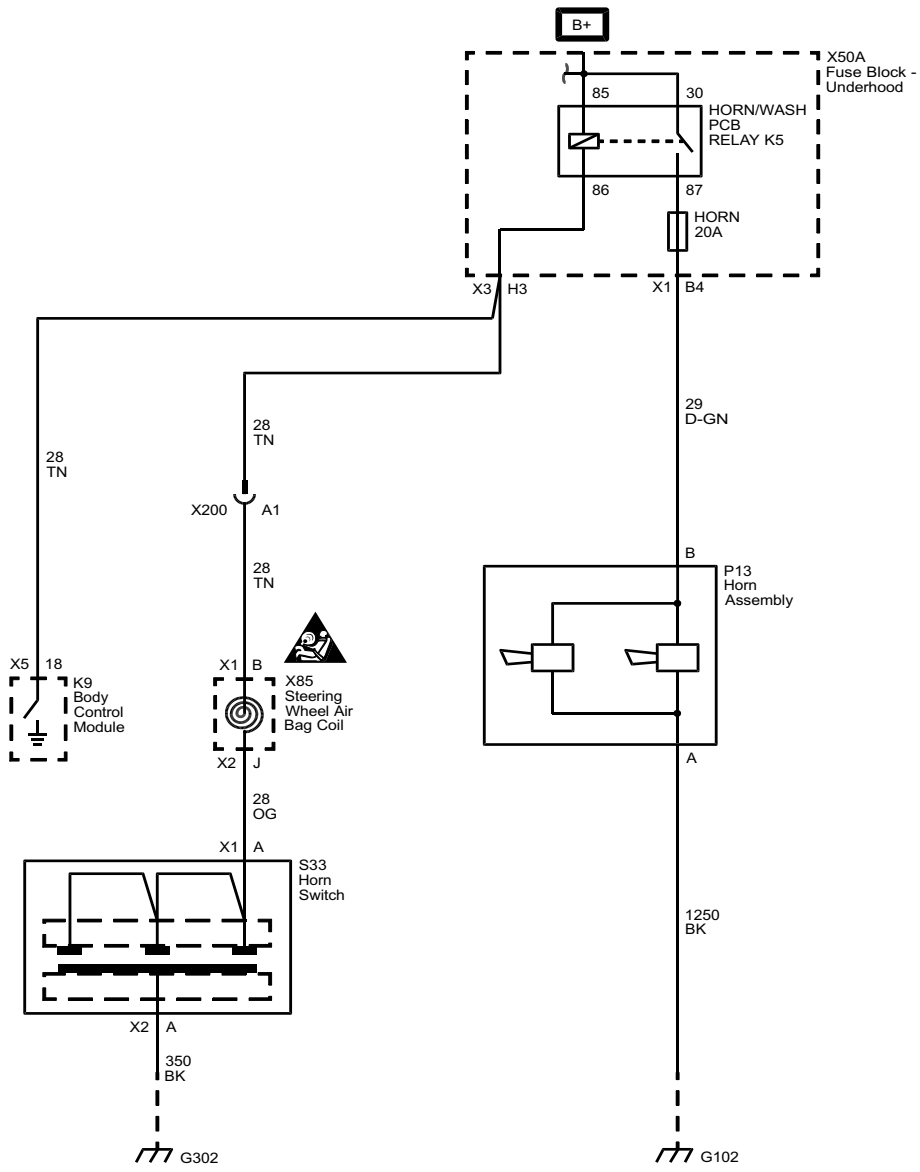
When you turn the ignition to the ON position, battery positive voltage is supplied through the HTD MIR DEFOG fuse to the rear window defogger relay switched input. Ground is for the rear window defogger relay coil is provided by G302. Battery positive voltage and ignition voltage is supplied to the HVAC control assembly for rear window defogger operation. When the rear window defogger switch is depressed, the HVAC control assembly energizes the rear window defogger relay by supplying battery positive voltage to the rear window defogger relay coil. This allows battery positive voltage from the relay switched input through the switch contacts and out the relay switched output to the rear window defogger grids. The HVAC control assembly also illuminates the rear window defogger indicator upon this request. Ground for the left rear window defogger grid is provided by G401. Ground for the right rear window defogger grid is provided by G402.

When you turn ON the ignition and press the rear window defogger switch for the first time, the defogger cycle lasts 10 minutes. Further operation results in 5 minute defogger cycles. The defogger cycle resets to 10 minutes when you cycle the ignition to the OFF position and then back to the ON position.

Horns

Schematic and Routing Diagrams

Horn Schematics (Horn Schematics)



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Description and Operation

Horns System Description and Operation

System Description

The horn system consists of the following components:

- The HORN fuse
- The Horn relay
- The Horn Contact
- The Horn Assembly
- Body Control Module (BCM)

System Operation

- The vehicle horns are activated whenever the horn switch is depressed.
- The BCM commands the horns ON under any of the following conditions:
  - When the panic button is depressed on the remote control door lock transmitter. For further information refer to *Keyless Entry System Description and Operation on page 12-16*.
  - When the keyless entry system is used to lock the vehicle, a horn chirp may sound to notify the driver that the vehicle has been locked. The notification feature may be enabled or disabled through personalization. For further information refer to *Keyless Entry System Description and Operation on page 12-16*.

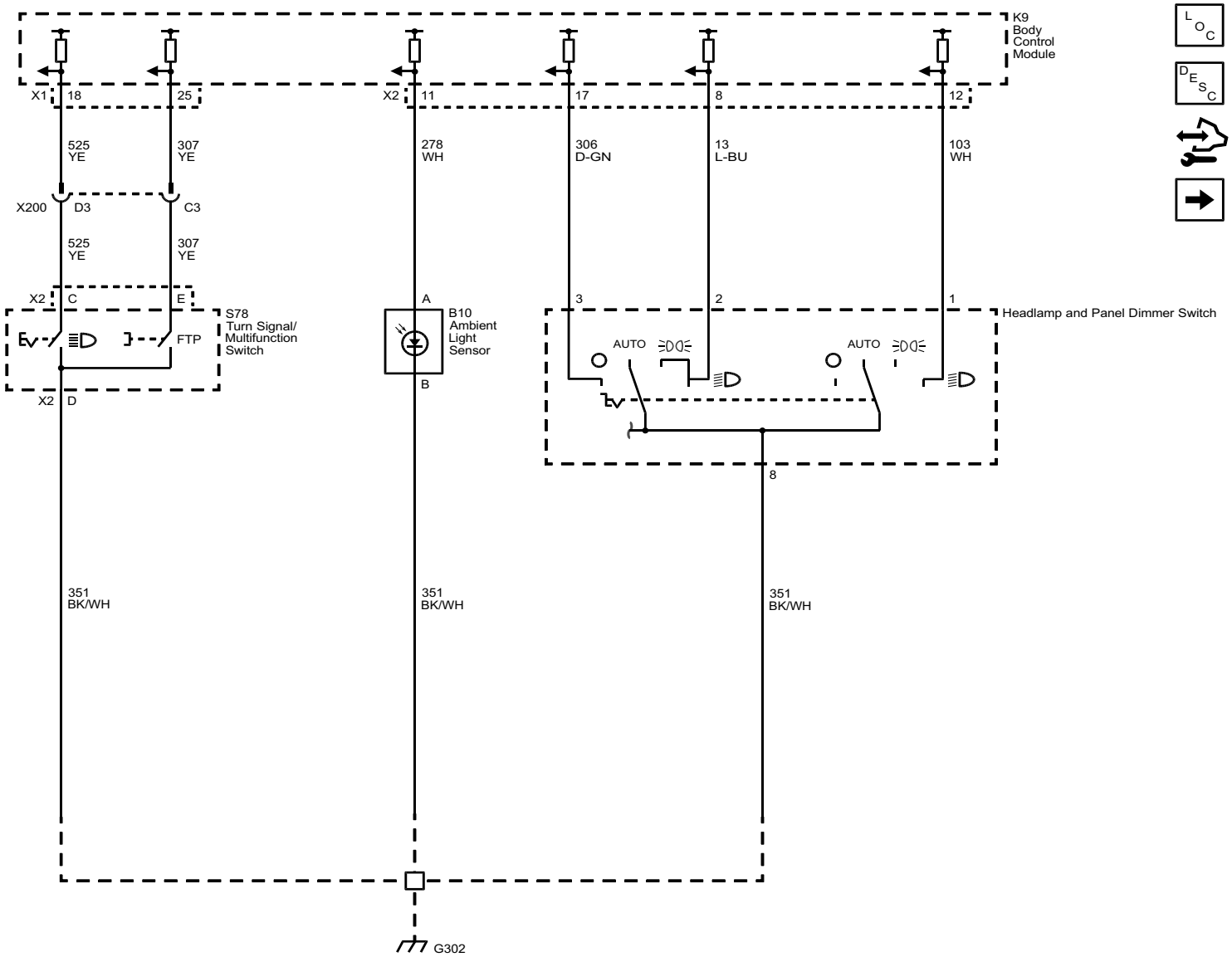
Circuit Operation

Battery positive voltage is applied at all times to the horn relay coil and the horn relay switch. Pressing the horn switch applies ground to the horn relay control circuit. When the horn relay control circuit is grounded, the horn relay is energized and battery positive voltage is applied to the horns through the horn control circuit. The horns sound as long as ground is applied to the horn relay control circuit.

Lighting

Schematic and Routing Diagrams

Headlights/Daytime Running Lights (DRL) Schematics (Headlamp and Daytime Running Lamp Controls)



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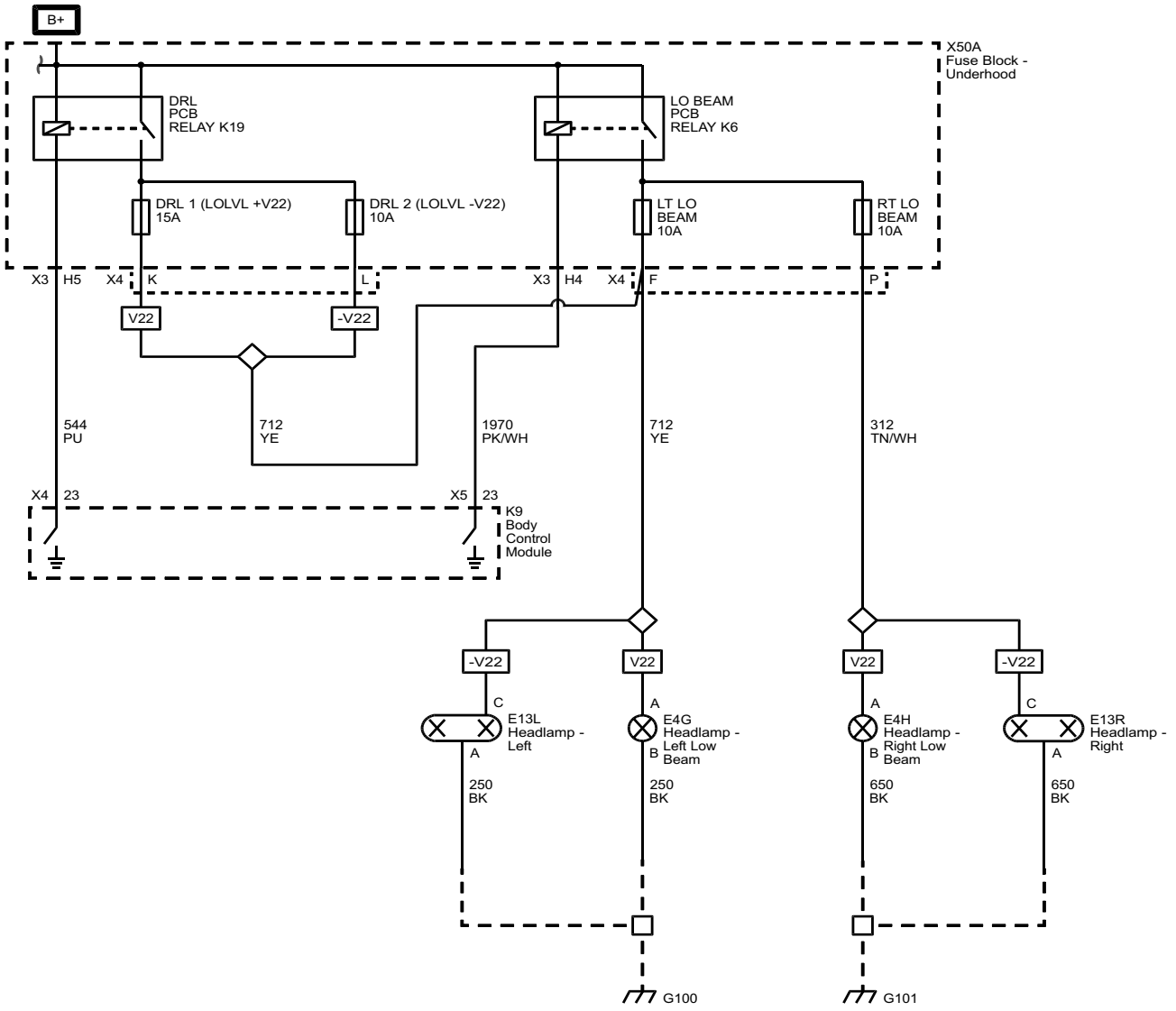
Headlights/Daytime Running Lights (DRL) Schematics (Low Beam and Daytime Running Lights (DRL))



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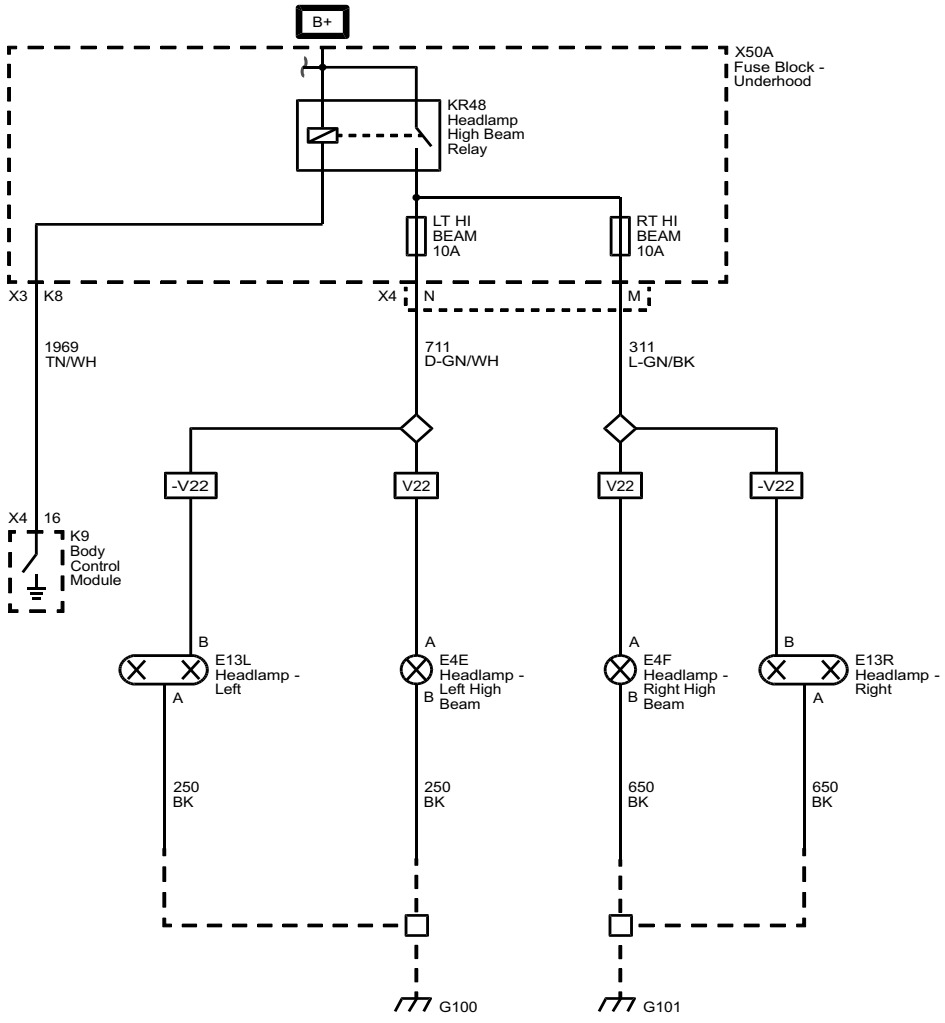
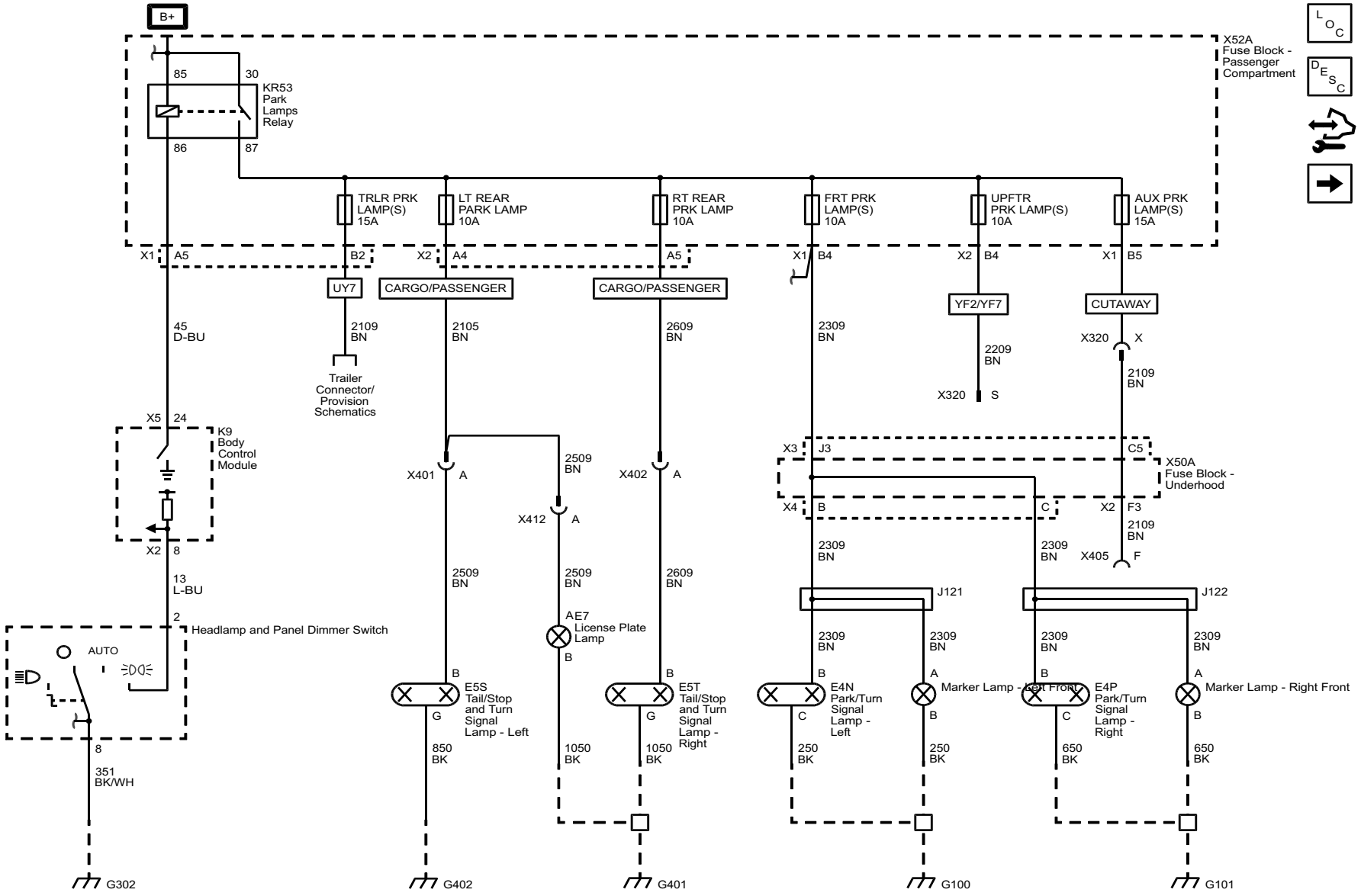
Headlights/Daytime Running Lights (DRL) Schematics (High Beams)



Exterior Lights Schematics (Park Lamp Controls and Park Lamps)



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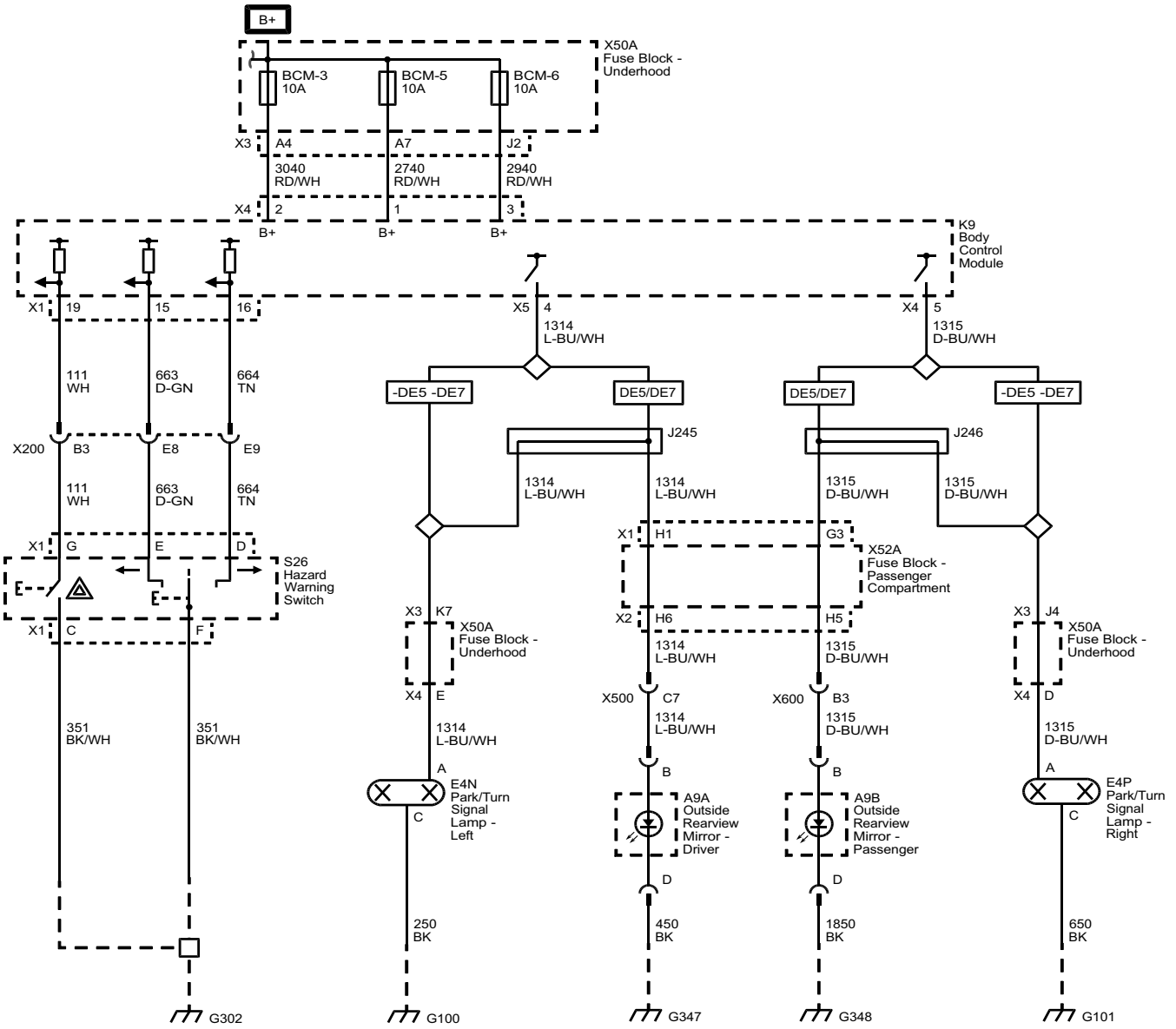
Exterior Lights Schematics (Turn Signal Controls and Front Turn Signal Lamps)



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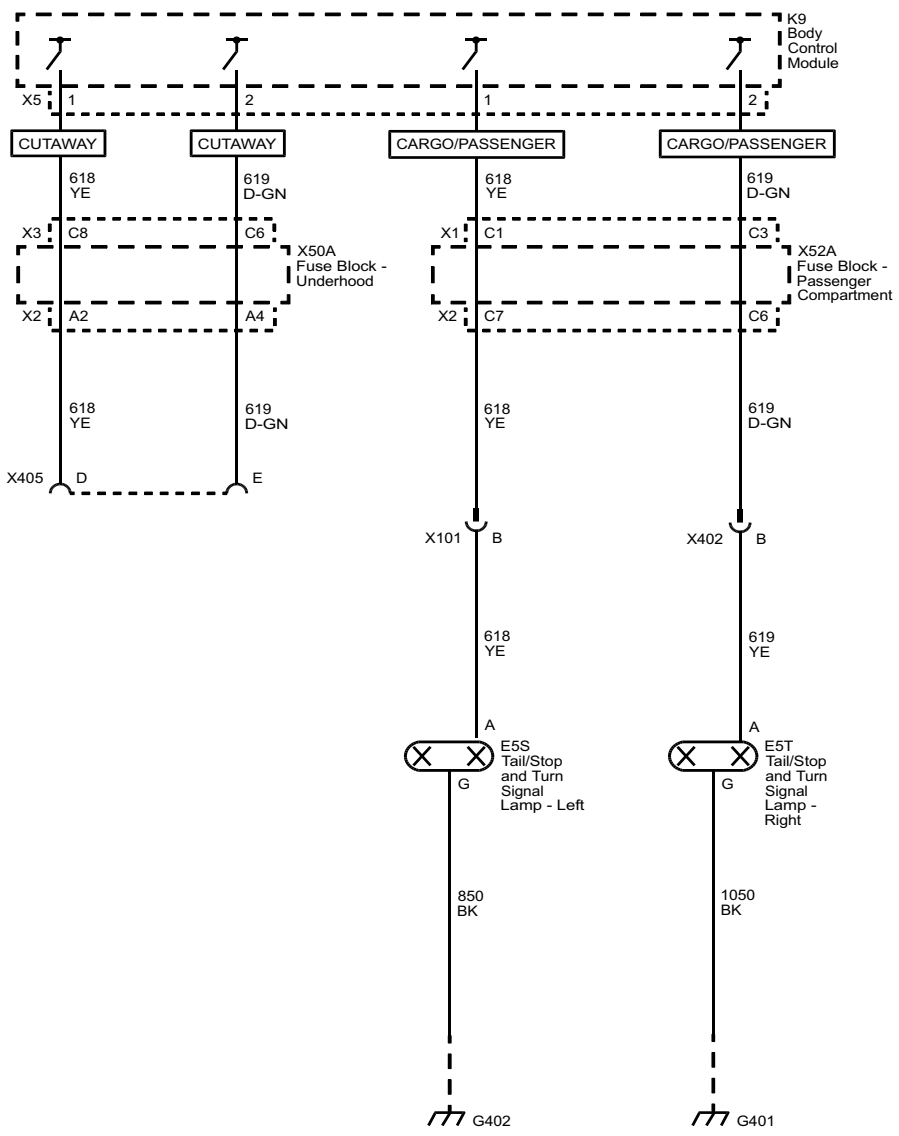
Exterior Lights Schematics (Rear Turn Signal Lamps)



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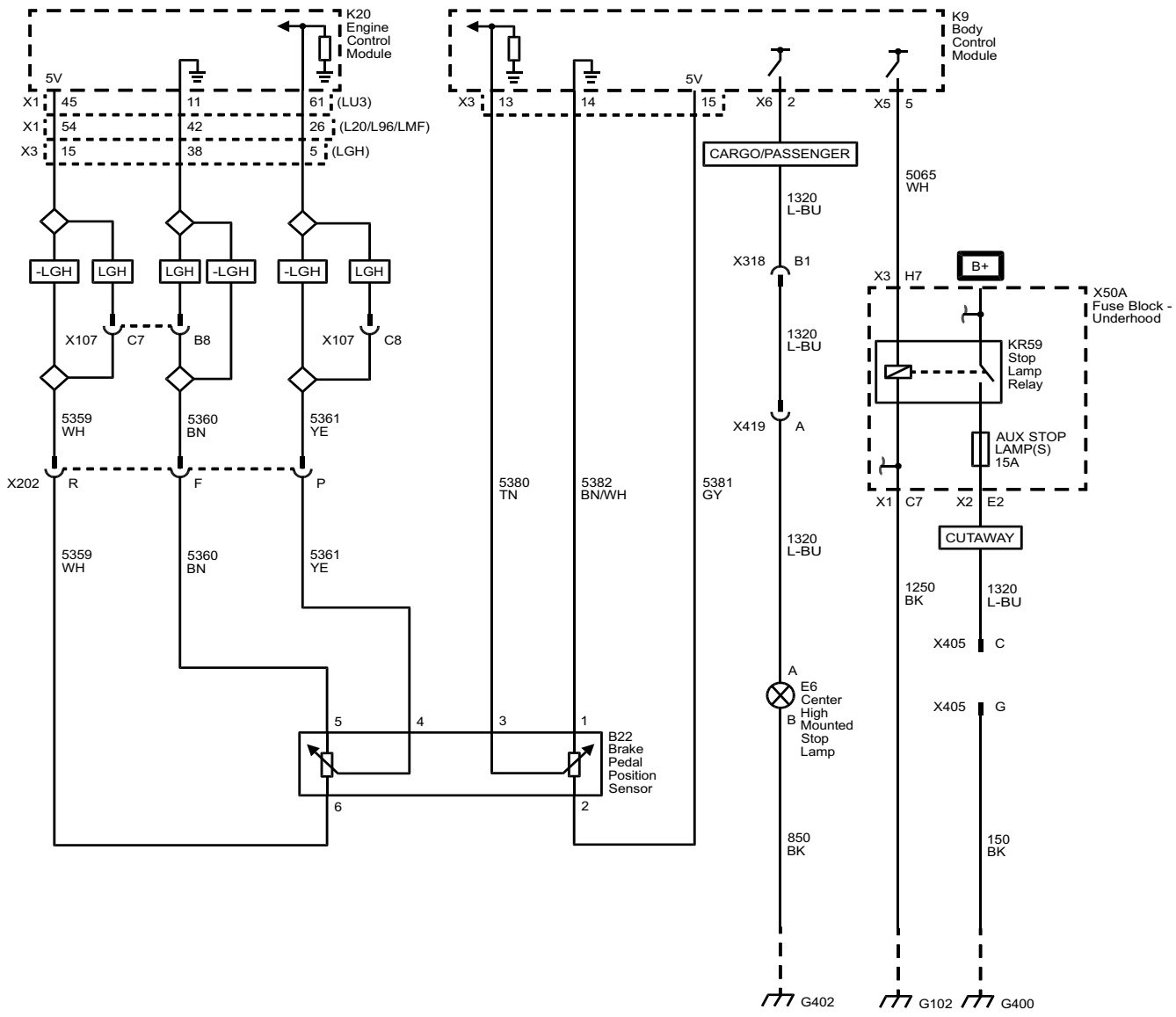
Exterior Lights Schematics (Stop Lamp Controls and CHMSL)



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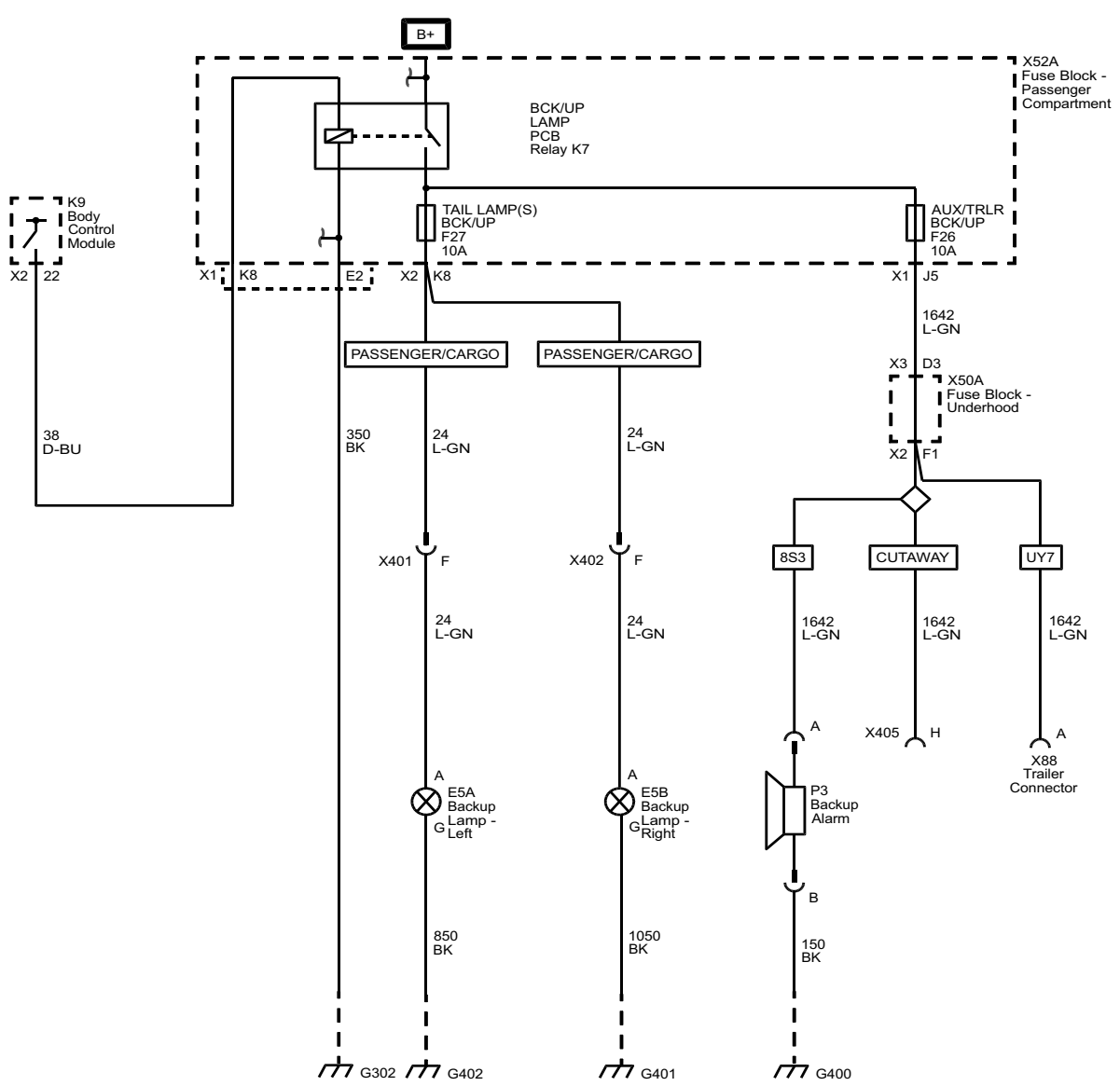
Exterior Lights Schematics (Backup Lamps and Backup Alarm)



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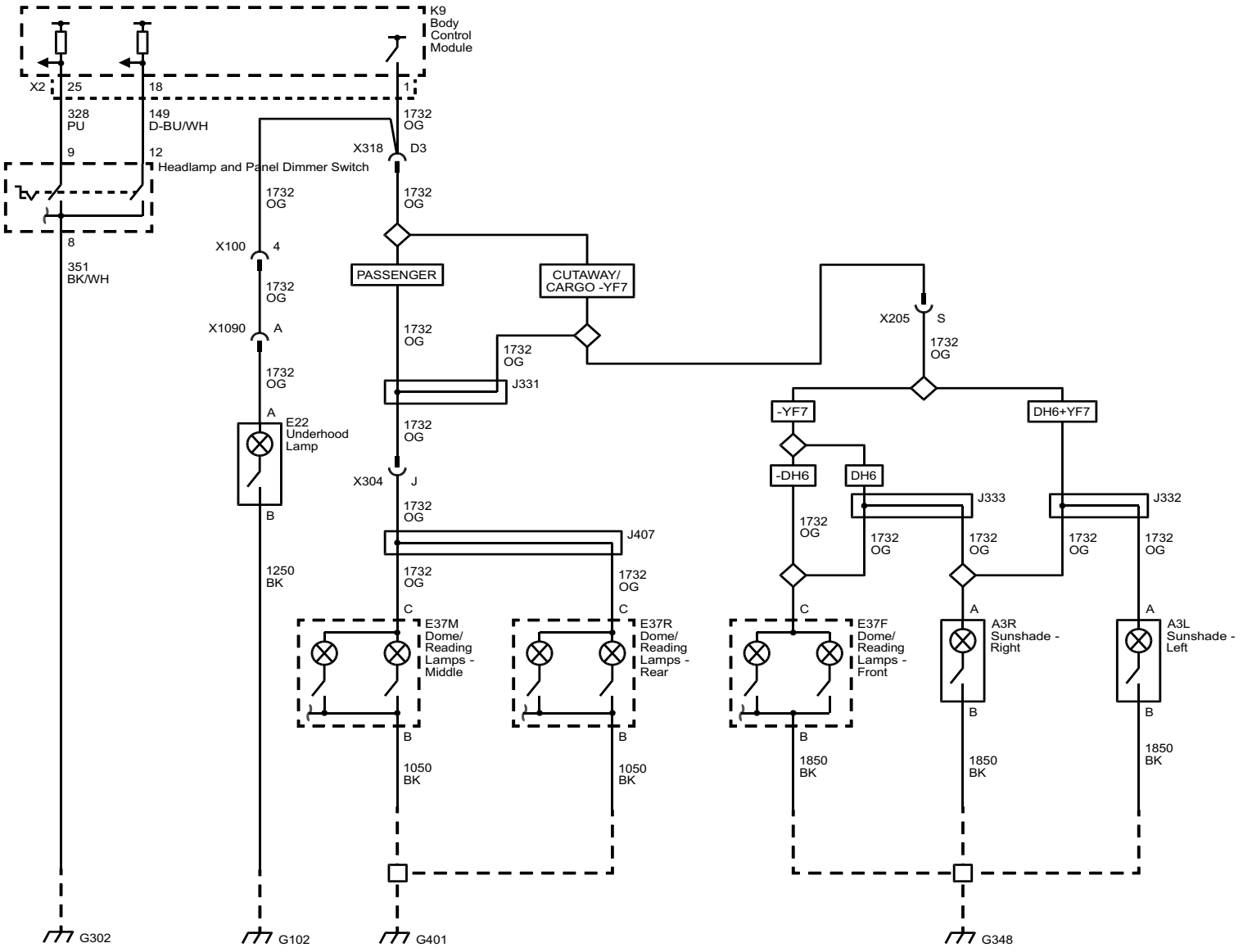
Interior Lights Schematics (Inadvertent Lamp Control)



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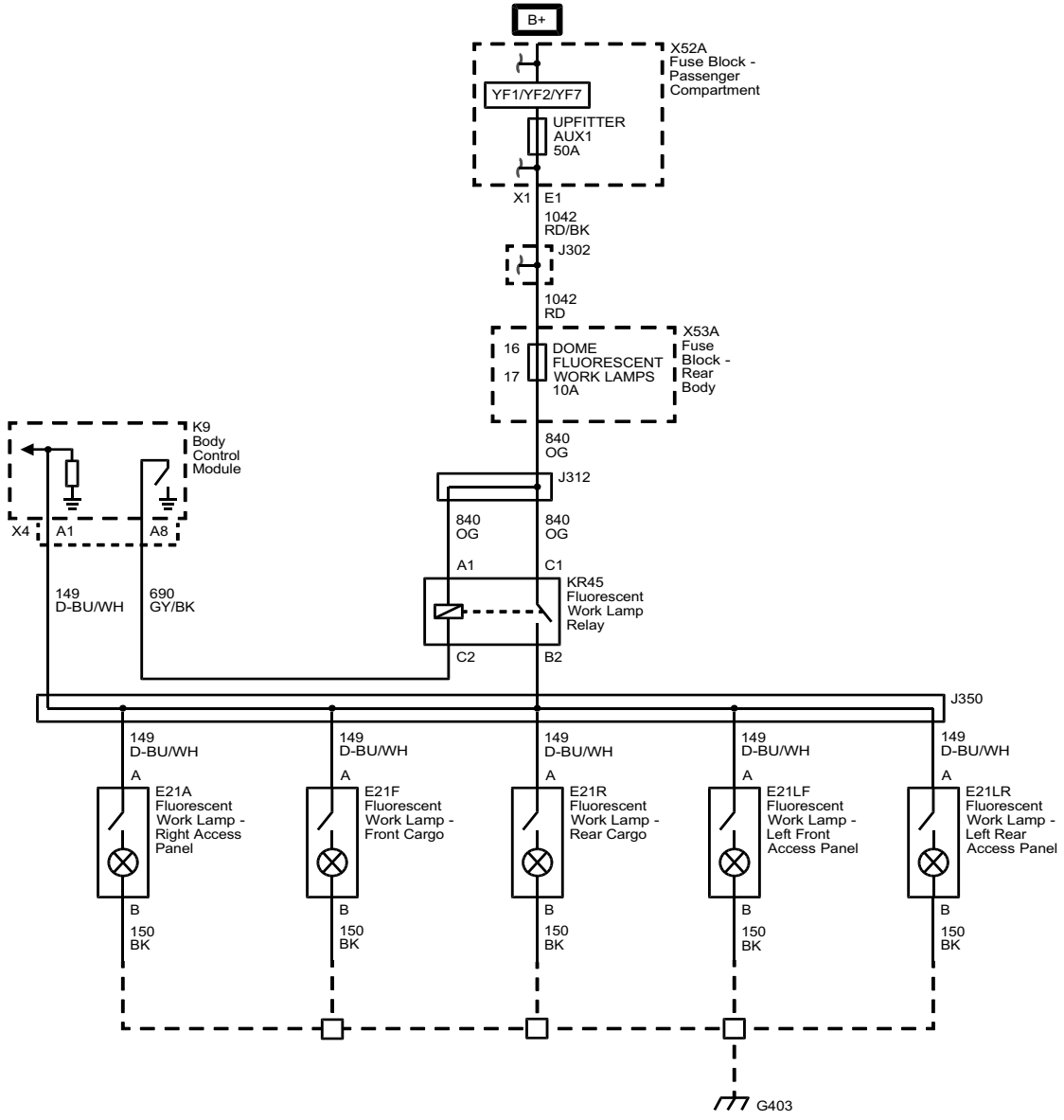
Interior Lights Schematics (Dome Fluorescent Work Lamps (PRP with UF2))



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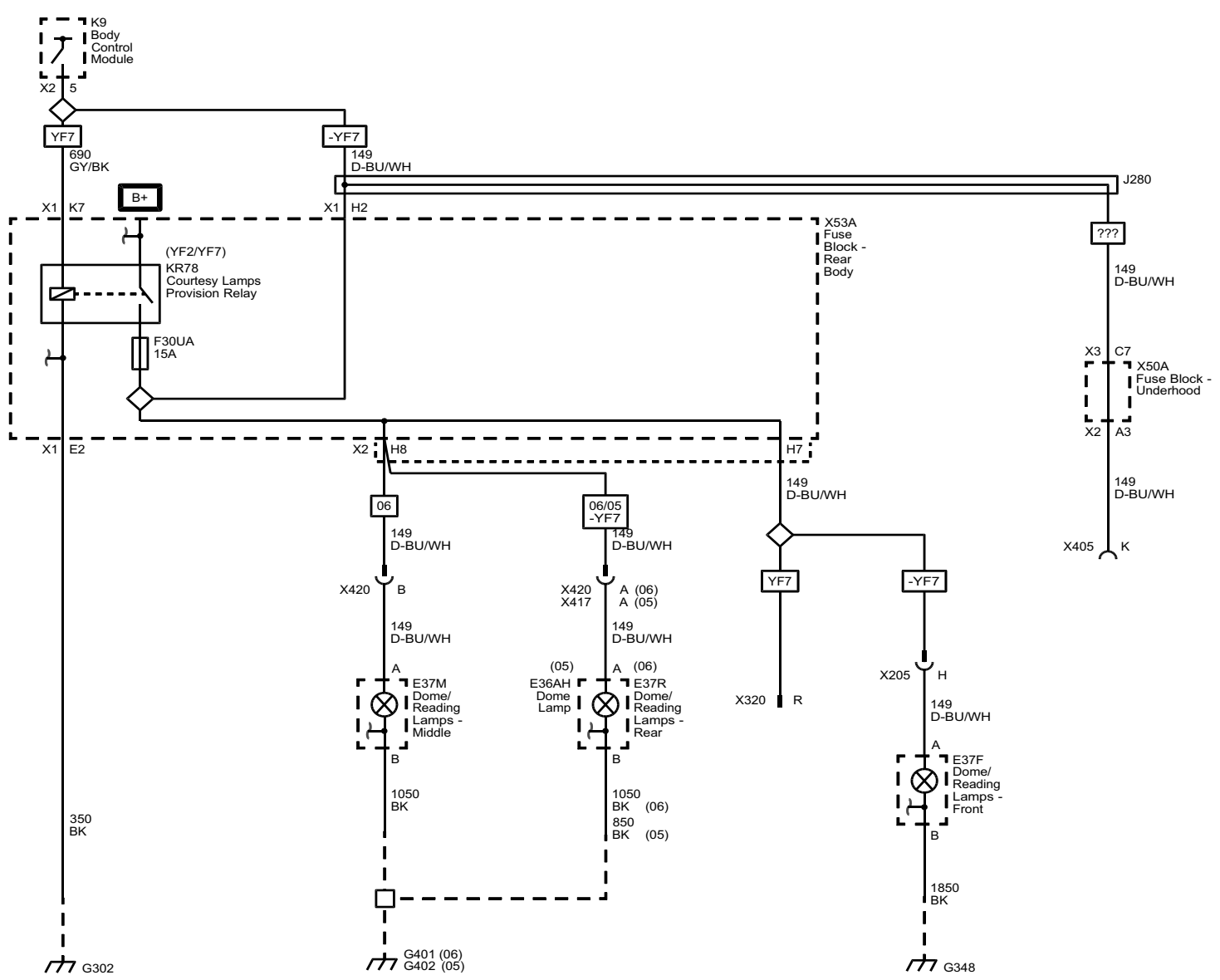
Interior Lights Schematics (Courtesy Lamp Control)



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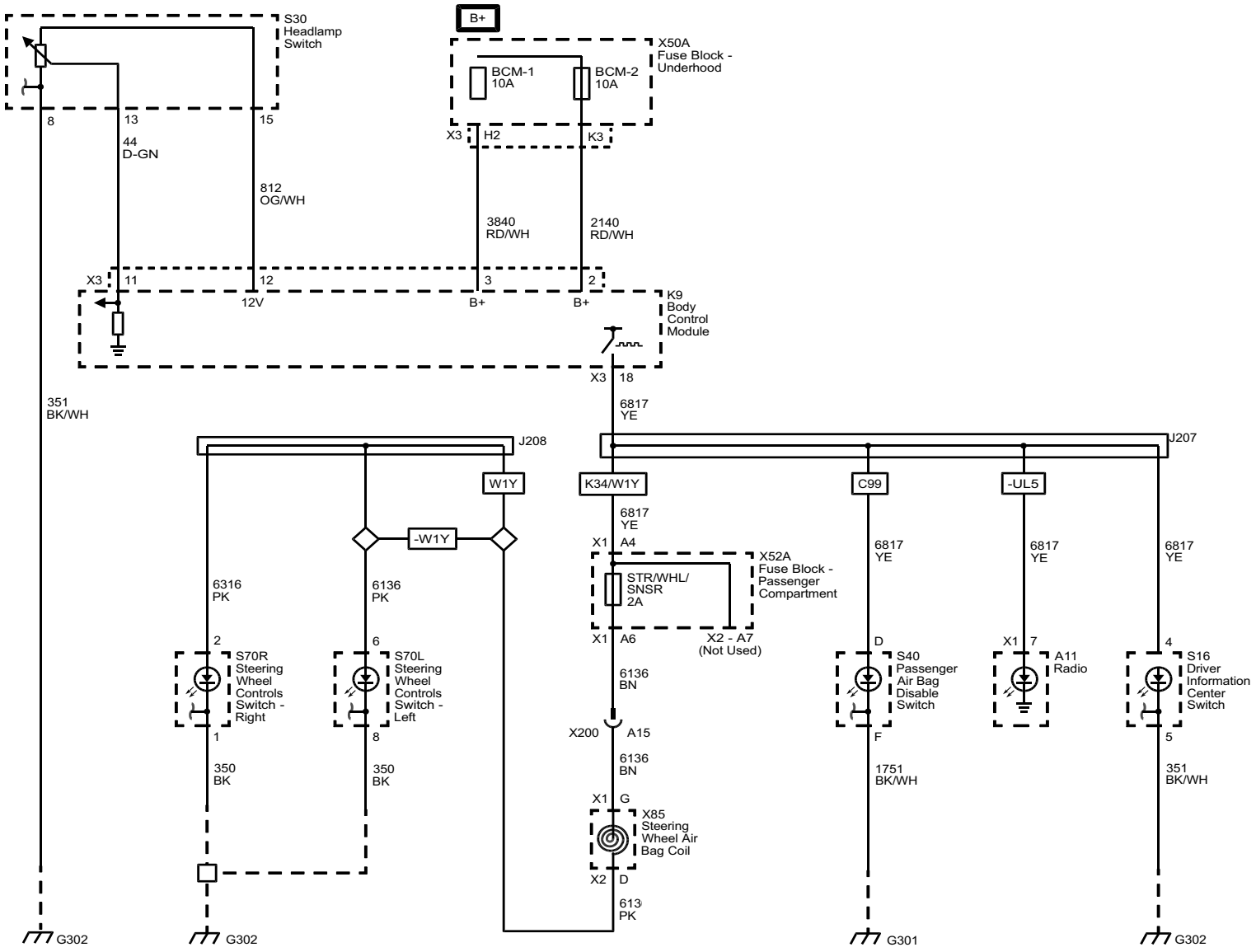
Interior Lights Dimming Schematics (Dimming Controls and LED Dimming)



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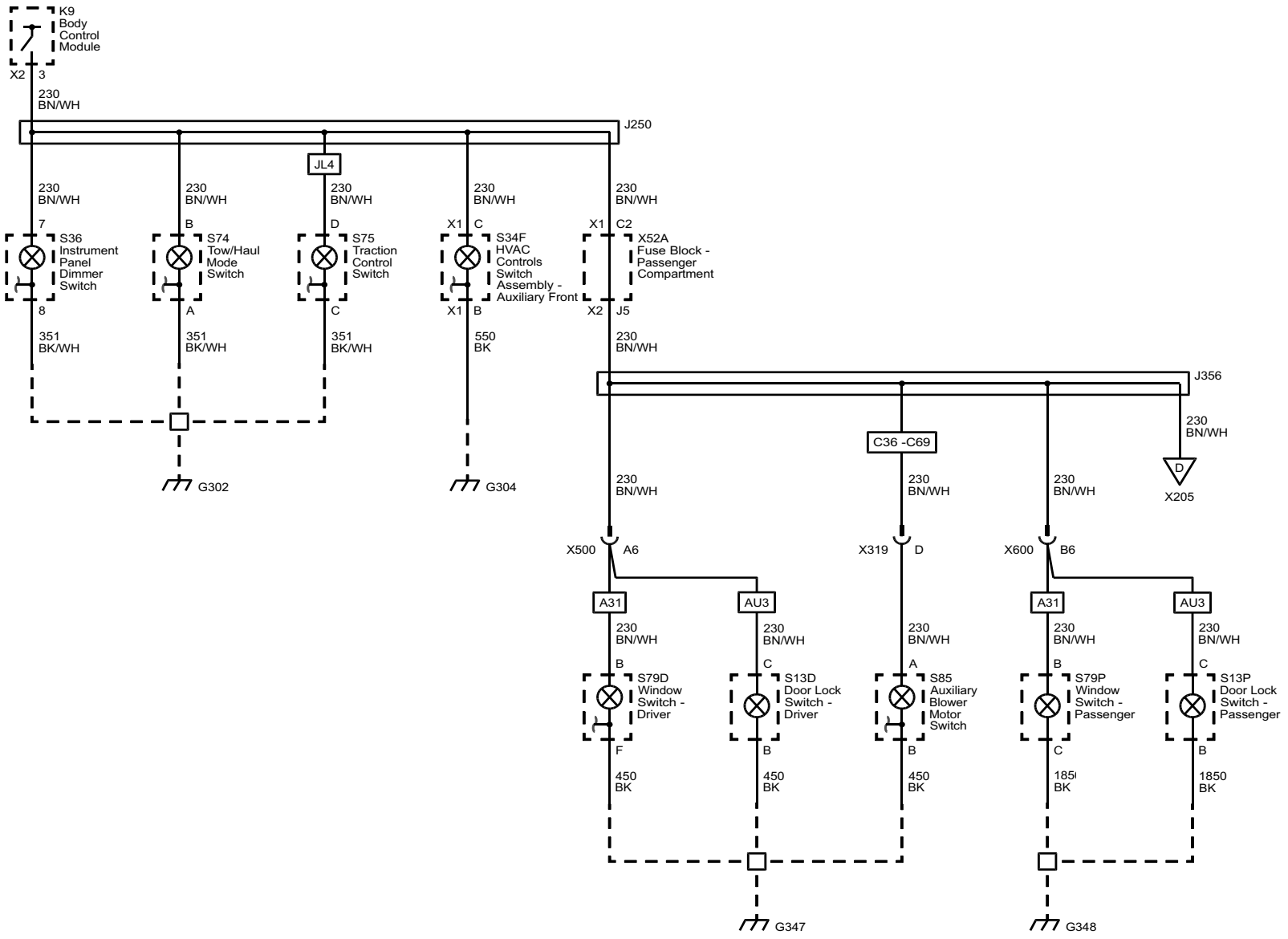
Interior Lights Dimming Schematics (I/P Bulb Dimming (1 of 2))



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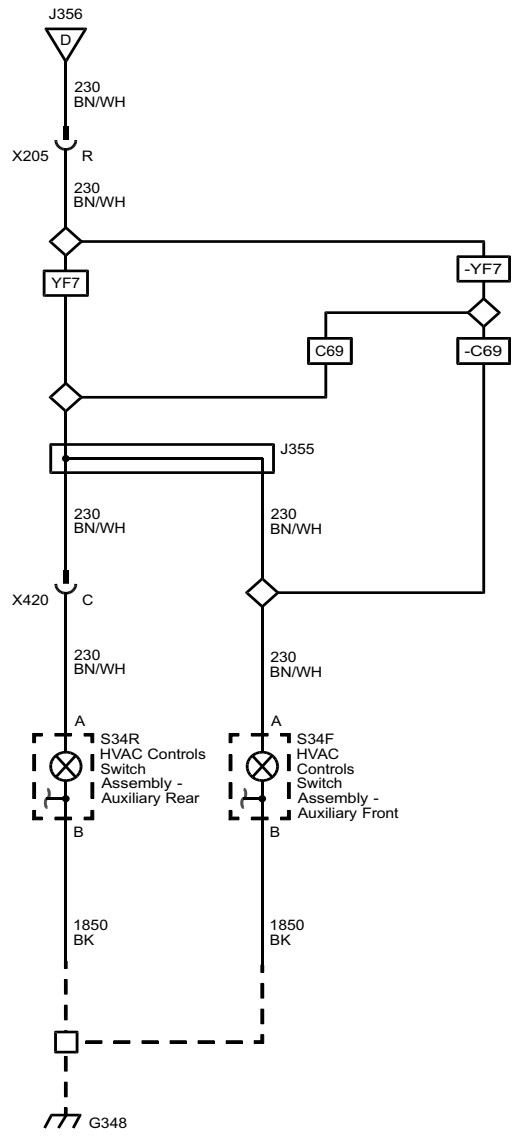
Interior Lights Dimming Schematics (I/P Bulb Dimming (2 of 2))



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Description and Operation

Exterior Lighting Systems Description and Operation

Exterior Lamps

The exterior lighting consist of the following lamps:

- Headlamps
- Daytime running lamps (DRL)
- Park lamps
- Tail lamps
- License lamps
- Marker lamps
- Turn signal lamps
- Stop lamps
- Center high mounted stop lamp (CHMSL)
- Backup lamps

Low Beam Headlamp Operation

The headlamps may be turned ON in 3 different ways:

- When the headlamp switch in the HEAD position for normal operations
- When the headlamp switch is in the AUTO position, for automatic lamp control (ALC)
- When the headlamp switch is placed in the AUTO position, with the windshield wipers ON in daylight conditions, after a 6 second delay

Battery voltage is applied at all times to the coil and switch sides of the LOW BEAM PCB Relay located in the underhood fuse block. With the headlamp switch in the headlamps ON position, ground is applied through the headlamps ON switch signal circuit to the body control module (BCM) signaling the headlamps ON request. In response to this signal, the BCM applies ground through the low beam relay control circuit energizing the LOW BEAM PCB Relay. With the relay energized, battery voltage is applied through the switch side of the relay, the LT and RT LOW BEAM fuses, and the low beam supply voltage circuits illuminating the low beam headlamps.

High Beam Headlamp Operation

Battery voltage is applied at all times to the coil and switch sides of the HIGH BEAM PCB Relay located in the underhood fuse block. When the headlamp dimmer switch is placed in the high beam position, the headlamp dimmer switch signal circuit to the BCM is pulled low signaling the headlamp high beam request. In response to this signal, the BCM applies ground through the high beam relay control circuit energizing the high beam relay. With the relay energized, battery voltage is applied through the switch side of the relay, the LT and RT HIGH BEAM fuses, and the high beam supply voltage circuits illuminating the high beam headlamps. At the same time the BCM sends a serial data message to the instrument panel cluster (IPC) requesting the IPC to illuminate the high beam indicator.

Flash to Pass (FTP)

When the headlamp dimmer switch is pulled toward the driver, the flash to pass signal circuit to the BCM is pulled low signaling the flash to pass request. The BCM then turns ON the high beam headlamps as described above until the headlamp dimmer switch is released. If the low beam headlamps were ON during FTP operation they will remain ON.

Daytime Running Lamps (DRL) and Automatic Lamp Control (ALC)

The low beam headlamps are used for DRL operation at a reduced intensity. The DRLs will operate only with the ignition ON, the headlamp switch in the AUTO position, and the gear selector out of the park position. No other exterior lamps such as the parking lamps, tail lamps, etc. will be on when the DRL are being used. The instrument panel will not be illuminated either.

DRL operation is determined by the ambient light sensor and controlled by the body control module (BCM). The ambient light sensor is a light-sensitive transistor used to monitor outside lighting conditions. The BCM provides a 5-volt reference signal to the sensor. The sensor will vary this voltage signal between 0.2 and 4.9 volts depending on outside lighting conditions. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either DRL or ALC operation. When the BCM determines the conditions are met for DRL operation, it applies ground to the DRL relay control circuit energizing the DRL PCB Relay. With the relay energized, battery voltage is applied through the switch side of the relay, the DRL 1 fuse, the DRL 2 fuse, both low beam headlamp fuses, and the low beam supply voltage circuits illuminating the headlamps at a reduced intensity. Any function or condition that turns on the headlamps will cancel DRL operation.

When the BCM detects low light conditions, it will turn OFF the daytime running lamps and turn ON the low beam headlamps as described above in Low Beam Headlamp Operation. The BCM will also turn ON the low beam headlamps in daylight conditions when the windshield wipers are turned ON.

HDLPS Suggested Indicator

If the park lamps are turned ON manually and the ambient light sensor detects a low light condition then the body control module (BCM) will send a message to the instrument panel cluster (IPC) to display the HEADLAMPS SUGGESTED message.

Lights ON Warning

The body control module (BCM) activates the lights ON warning as requested by the headlamp dimmer switch. The lights ON warning sounds when the following occurs:

- The key is out of the ignition.
- The BCM determines that the drivers door is open, signal is low.
- The BCM determines that the headlamp switch is in the PARK or HEAD position.

Park, Tail, Marker and License Lamps

The park, tail, and marker lamps are turned ON when the headlamp switch is placed in either the HEAD or PARK lamp positions, or anytime the automatic light control (ALC) turns the headlamps ON. When the headlamp switch is placed in the park lamp or headlamp positions, ground is applied through the switch signal circuit to the BCM indicating the park lamp ON request. In response to this signal, the BCM applies ground through the park lamp relay control circuit energizing the PRK LAMP Relay. With the relay energized, battery voltage is applied through the switch side of the relay, the park lamp fuses, and the supply voltage circuits illuminating the park, license, side marker, and tail lamps.

Turn Signal Lamps

The BCM 3, BCM 5, and BCM 6 fuses located in the underhood fuse block supply battery voltage to the body control module (BCM) for turn signal, hazard lamp, and stop lamp operation. Voltage from the BCM 5 fuse used for the front and rear left turn signals, voltage from the BCM 3 for the right front turn signal, while voltage from the BCM 6 fuse is used for the right rear turn signal. When the turn signal switch is place in either the LEFT or RIGHT position, ground is applied through the turn signal switch signal circuit to the BCM indicating the turn signal request. In response to this signal, the BCM applies a pulsating voltage to the front and rear turn signal lamps supply voltage circuits cycling the lamps ON and OFF. The BCM also sends a message via to the instrument panel cluster (IPC) to cycle the turn signal indicator ON and OFF depending on the position of the turn signal switch.

Hazard Lamps

The hazard flashers may be activated in any power mode. When the hazard lamp switch is placed in the ON position, ground is applied through the hazard switch signal circuit to the body control module (BCM) indicating the hazard lamps ON request. In response to this signal, the BCM applies a pulsating voltage though all front and rear turn signal supply voltage circuits cycling the lamps ON and OFF. The BCM also sends a serial data message to the instrument panel cluster (IPC) to cycle both turn signal indicators ON and OFF.

Stop Lamps

The brake pedal position sensor is used to sense the action of the driver application of the brake pedal. The brake pedal position sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body control module (BCM) provides a low reference signal and a 5-volt reference voltage to the brake pedal position sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the right and left stop lamp control circuits, transmission control module (TCM), engine control module (ECM), center high mounted stop lamp (CHMSL) control circuit, and trailer brake control module if equipped. The stop lamps on this vehicle will not illuminate unless the ignition is in the accessory, run, or crank positions. When the ignition is in the OFF position the stop lamps will not illuminate when the brake pedal is applied.

The stop lamps on this vehicle will not illuminate unless the ignition is in the accessory, run, or crank positions. When the ignition is in the OFF position the stop lamps will not illuminate when the brake pedal is applied.

Backup Lamps

When the gear selector is placed in the REVERSE position, the powertrain control module (PCM) sends a serial data message to the BCM indicating the backup lamps ON request. The BCM then applies battery voltage through the backup relay control circuit energizing the BCK/UP LAMP PCB Relay. With the relay energized, battery voltage is applied through the switch side of the relay, the T/LAMP BCK/UP fuse, the AUX/TRLR BCK/UP fuse and the supply voltage circuits illuminating the left and right backup lamps and the backup alarm. The engine may need to be running for the backup lamps to function.

Rear Fog Lamps

The rear fog lamps are located in the rear bumper. The fog lamps will operate only when the ignition in the RUN or CRANK positions. When the rear fog lamp switch is turned ON, ground is applied through the rear fog lamp switch signal circuit to the body control module (BCM) indicating the rear fog lamps ON request. In response to this signal, the BCM applies ground to the rear fog lamp relay control circuit energizing the REAR FOG LP PCB Relay. With the relay energized, battery voltage is applied through the switch side of the relay, the RR FOG LP fuse and the rear fog lamp supply voltage circuit to the left and right rear fog lamps. The BCM sends a serial data message to the instrument panel cluster (IPC) requesting the rear fog lamp indicator be illuminated. The rear fog lamps will deactivate if the headlamps are turned OFF, if the ignition is turned to the OFF position upon a key cycle, or if the driver turns the rear fog lamp switch OFF.

Battery Rundown Protection/ Inadvertent Power

The BCM controls the lighting system through circuits that enable the exterior lamp functions of the park lamps, the head lamps, the fog lamps, and the interior lamps. The BCM will open these enabling circuits 10 minutes after the ignition switch is turned OFF with no lamp switch activity. If the ignition switch is turned to any position other than OFF, or if a lamp switch is activated during this time period, the timer will reset for another 10 minutes.

Interior Lighting Systems Description and Operation

The interior lighting consist of two groups; lamps that may not be manually dimmed (Interior Lamps) and lamps that may be dimmed (Interior Lamps Dimming).

The first group listed below includes lamps that may not be dimmed:

- Front dome/reading lamps
- Middle dome/reading lamps
- Rear dome/reading lamps
- Sunshade Mirror Lamps
- Underhood Lamp

Interior Lamps Features

The interior lamps system features the following functions:

- An illuminated entry feature that illuminates the courtesy lamps when entering the vehicle or activating the remote keyless entry system.
- An illuminated exit feature that illuminates the courtesy lamps when the ignition key has been removed from the ignition.
- An inadvertent power feature that supplies voltage to all interior lamps after the ignition is turned OFF. The inadvertent power feature will deactivate all interior lamps after 10 minutes to prevent battery rundown.
- A theater dimming feature that will slowly dim the interior lamps from full brightness to OFF.
- Individual switches for control of each interior lamp that is not illuminate with the interior lamp switch.

Courtesy Lamps (−YF2/YF7)

When any one of the doors is opened, ground is applied through the door latch door open switch and the door open switch signal circuit to the BCM indicting the door open position. In response to this signal, the BCM then applies battery voltage through the courtesy lamp supply voltage circuits illuminating the courtesy lamps.

Courtesy Lamps (+YF2/YF7)

When any one of the doors is opened, ground is applied through the door latch door open switch and the door open switch signal circuit to the BCM indicting the door open position. In response to this signal, the BCM then applies battery voltage to the courtesy lamp relay control circuit energizing the UPFITTR CTSY LAMPS PCB Relay. With the relay energized. battery voltage is applied through the switch side of the relay and the supply voltage circuits illuminating the courtesy lamps.

Courtesy Lamps Manual Operation

The courtesy lamps can be manually turned ON by the IP dimmer switch. When the dimmer switch is placed in the DOME position, ground is applied through the dimmer switch and the courtesy lamp switch ON signal circuit to the BCM indicating the courtesy lamps ON request. In response to this signal, the BCM then applies battery positive voltage through the courtesy lamp supply voltage circuits illuminating the courtesy lamps listed above. The courtesy lamps ON operation of the dimmer switch will override any BCM operation of the interior lamps already in progress.

Keyless Entry Interior Illumination

When the remote function actuator transmitter is used to unlock the doors, the BCM receives a door-unlock signal. The BCM must have inputs that indicate that the ignition switch is OFF, the courtesy lamp switch is OFF, and all the doors are closed. The BCM will then illuminate the courtesy lamps and will remain illuminated for approximately 25 seconds after the door is closed. If the door locks are activated to the LOCK position, or if the ignition switch is turned to either the RUN or START position, the BCM will turn OFF the courtesy lamps immediately.

Courtesy/Illuminated Exit

The illuminated exit feature will activate the courtesy lamps when the key IN input of the BCM transitions from an active state to an inactive state (removing the ignition key). When the key is removed from the ignition, the key IN input to the BCM becomes inactive. The BCM will illuminate the courtesy lamps for approximately 25 seconds.

Theater Dimming

The theater dimming feature that will slowly dim the interior lamps from full brightness to OFF. The following actions will over ride the theater dimming feature causing the courtesy lamps to deactivate immediately if no other BCM function commands the courtesy lamps ON:

- A transition from active to inactive of the interior lamps switch, turning OFF the interior lamps switch
- A LOCK command from the remote keyless entry system
- A last door closed locking function, locking and closing all the doors

Underhood Compartment Lamp

The BCM supplies battery positive voltage through the inadvertent power courtesy lamps circuit to the underhood compartment lamp. When the hood is opened, the underhood compartment lamp switch closes to ground and the lamp illuminates.

Dome/Reading Lamps

The dome/reading lamp is a duel purpose lamp that can be illuminated two different ways. First, the lamp can be turned ON during courtesy lamp operation as described above. Second, the lamps can be turned ON individually for reading lamp operation by the lamp switch. The BCM supplies battery voltage through the inadvertent power courtesy lamp circuit to the dome/reading lamp for reading lamp operation only.

Sunshade Vanity Mirror Lamps

The BCM supplies battery voltage through the inadvertent power courtesy lamps circuit to the left and right vanity mirror lamps. When the vanity mirror cover on the sunshade is opened, the vanity mirror lamp switch is closed to ground and the lamp illuminates.

Interior Lamps Dimming

The second interior lighting group includes lamps which may be dimmed. This group may use a combination of vacuum fluorescent (VF) illumination, LED illumination and incandescent lamps.

- Headlamp switch
- Tow/haul switch
- Traction control switch
- HVAC control module
- Driver window switch
- Driver power door lock switch
- Auxiliary blower motor switch
- Front passenger window switch
- Front passenger door lock switch
- Front auxiliary HVAC control assembly

- Rear auxiliary HVAC control assembly
- Steering wheel controls
- Inflatable restraint I/P module disable switch
- Driver information center (DIC) display switch
- Radio

When the ignition switch is turned to the RUN position, the instrument panel cluster (IPC), radio VF display, and the HVAC control assembly turns ON at maximum brightness. When the headlamp switch is in the PARK or HEADLAMP ON position, all incandescent and LED back lighting turn ON at the dimming level indicated by the instrument panel (I/P) dimmer switch. The dimmer switch is used to increase and decrease the brightness of the interior backlighting components. The BCM supplies a voltage reference through the I/P dimming voltage reference circuit to the interior lamp dimmer switch, which is part of the headlamp switch. When the dimmer switch is placed in a desired brightness position, reference voltage is applied through the dimmer switch rheostat and the I/P lamps dimmer switch signal circuit to the BCM. The BCM interprets this voltage signal, then applies a pulse width modulated (PWM) voltage through the I/P lamps supply voltage circuits and the LED dimming supply circuit to all related interior backlighting lamps illuminating them to the desired level of brightness.

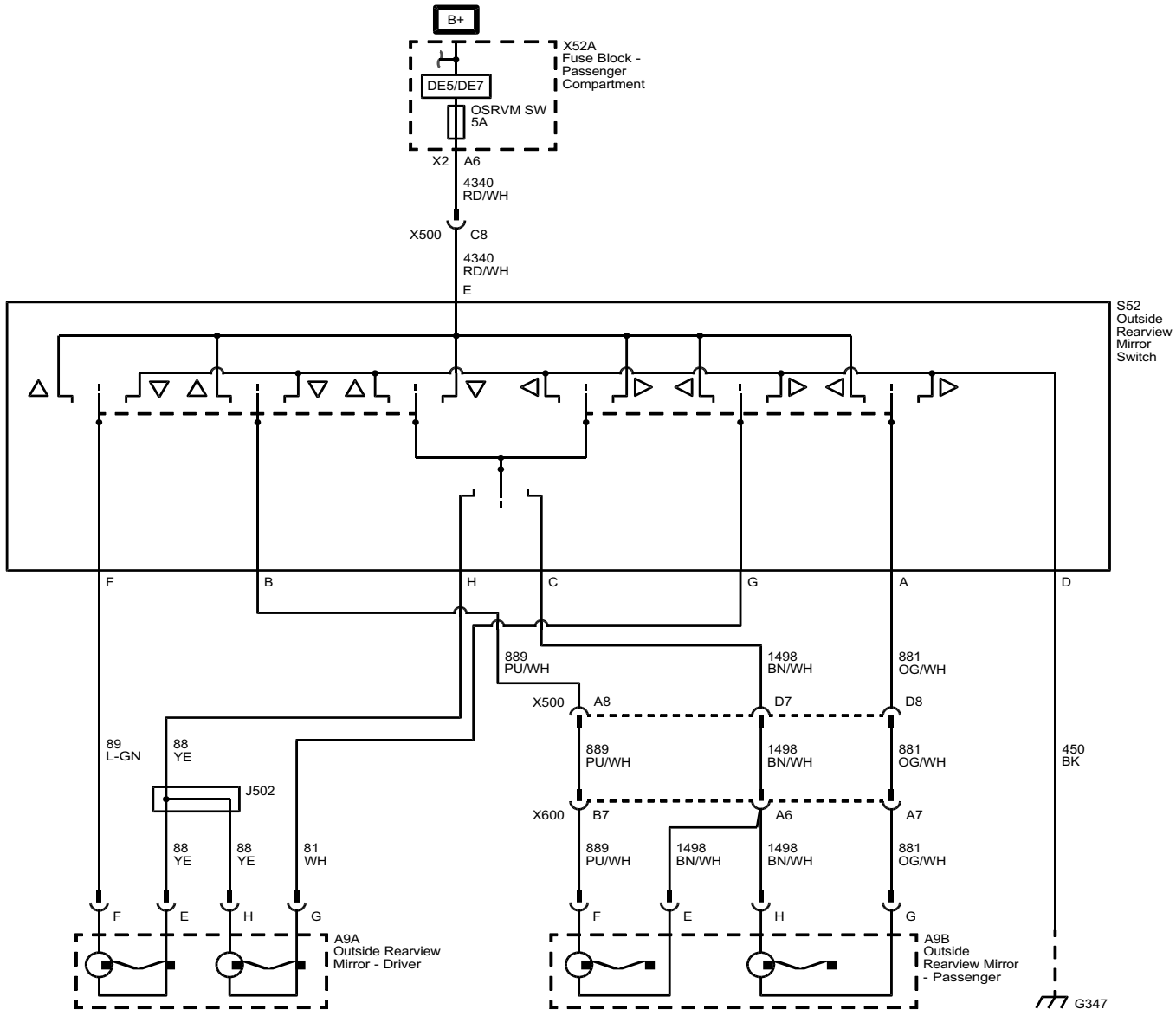
Battery Rundown Protection / Inadvertent Power

The BCM controls the lighting system through circuits that enable the exterior lamp functions of the park lamps, the head lamps, the fog lamps, and the interior lamps. The BCM opens these enabling circuits 10 minutes after the ignition switch is turned OFF with no lamp switch activity. If the ignition switch is turned to any position other than OFF, or if a lamp switch is activated during this time period, the timer resets for another 10 minutes.

Mirrors

Schematic and Routing Diagrams

Outside Rearview Mirror Schematics (Power, Ground, Power Mirror Switches and Motors)



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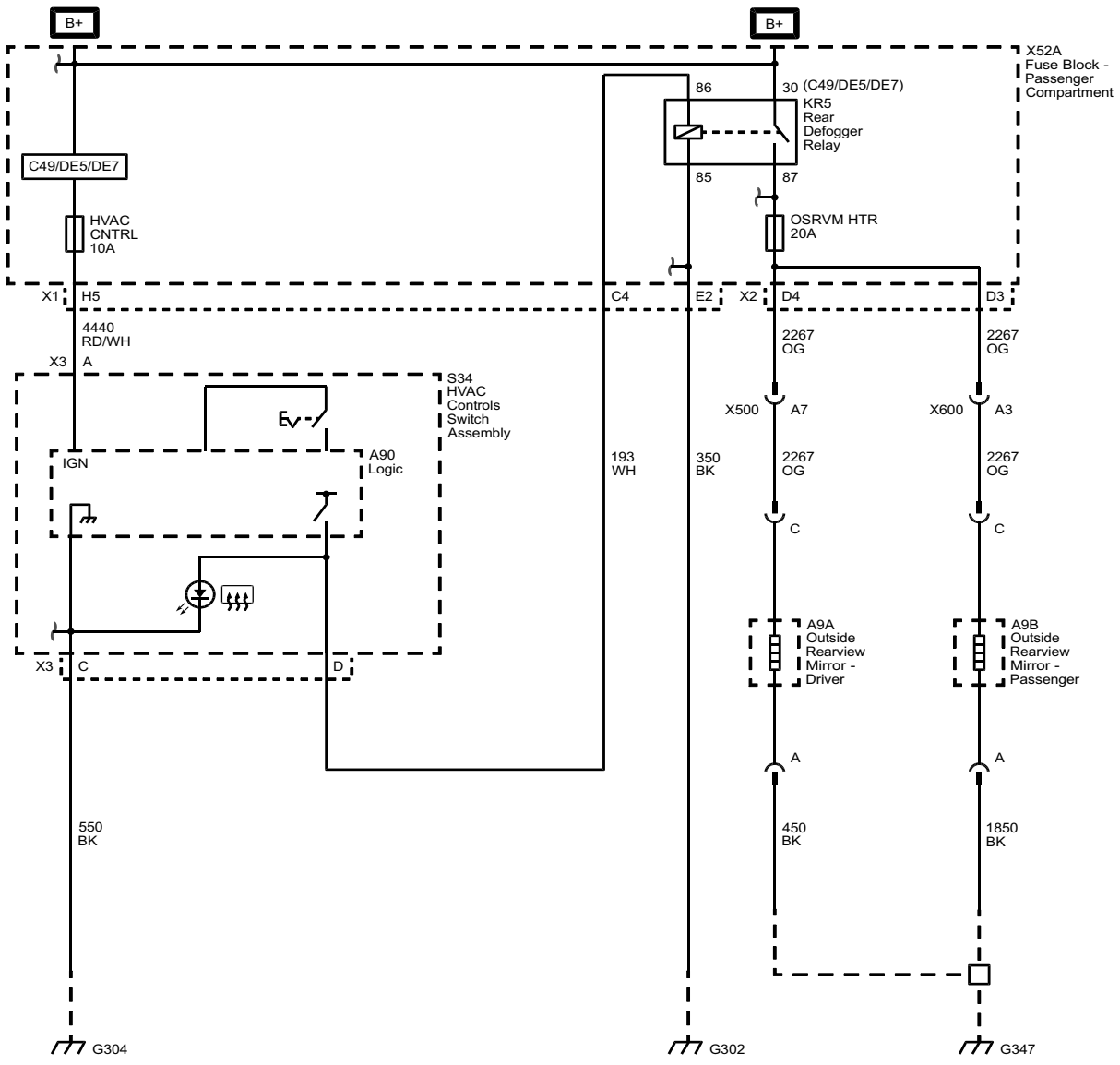
Outside Rearview Mirror Schematics (Heated Mirrors)



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Description and Operation

Outside Mirror Description and Operation

Outside Mirror System Components

The power mirror system consists of the following components:

- Power mirror switch
- Selector switch
- Left outside power mirror
- Right outside power mirror
- OSRVM 10A fuse
- HVAC control module
- Left outside power mirror
- Right outside power mirror

Each of the outside power mirrors contains two reversible motors. The vertical motor operates the up and down directions and the horizontal motor operates the left and right directions. Each of the power mirror motors are circuit breaker protected.

Power Mirror System Controls

The power mirror switch incorporates a mirror select switch and a four position mirror direction switch.

The mirror select switch allows the operator to select the mirror to be moved by rotating counterclockwise to the L position, left outside power mirror, or rotating clockwise to the R position, right outside power mirror.

The mirror direction switch is a 4 position switch that allows the operator to move the selected mirror up, down, left or right.

Power Mirror System Operation

The power mirror switch receives power through the battery supply voltage circuit and the OSRVM fuse. The power mirror switch also receives a constant ground.

The four positions of the direction switch have dual switch contacts. Each of the contacts are connected to opposing sides of the appropriate power mirror motors through the selector switch. The selector switch interrupts or completes these circuits depending on the position of the selector switch (L or R).

If the selector switch is placed in the L position and the up switch is depressed, battery voltage will be supplied to the left outside power mirror vertical motor through the left mirror motor up direction circuit and return to the power mirror switch through the mirror motor common circuit then to ground and the mirror will move up. If the down switch is depressed, the common circuit supplies battery voltage and the left mirror motor up direction circuit completes the path to the power mirror switch then to ground and the mirror will move down.

The remainder of the mirror functions operate in the same manner as described above. The thing to remember is, that by placing the power mirror switch in opposing positions (left/right or up/down) will reverse the polarity of the mirror motor, utilizing the same circuits and the power mirror will move accordingly.

Heated Mirror System Controls

The heated mirror system is activated by depressing the rear window defogger switch, which is part of the HVAC control module. For further information on the rear window defogger operation, refer to *Rear Window Defogger Description and Operation on page 4-6*.

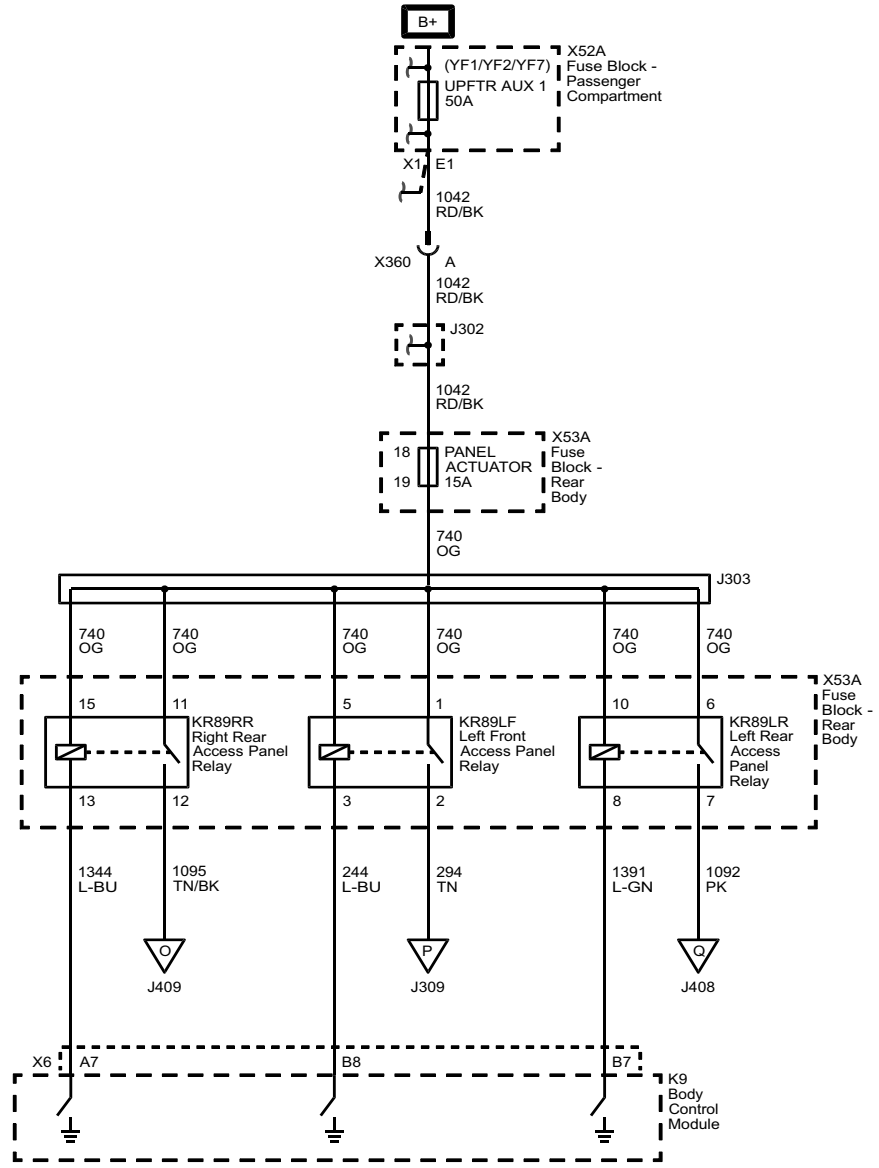
Heated Mirror System Operation

The heated mirror system operates in parallel to the rear window defogger. Each outside rearview mirror contains a heating element that is connected to a constant ground source. When the rear window defogger system is active, battery voltage is available to the outside rearview mirrors through the heated mirror supply voltage circuit. The mirrors will heat up to remove ice, snow or frost and will automatically deactivate when the rear defogger system has timed out, approximately 10 minutes.

Vehicle Access

Schematic and Routing Diagrams

Release Systems Schematics (Access Panel Relay Control)



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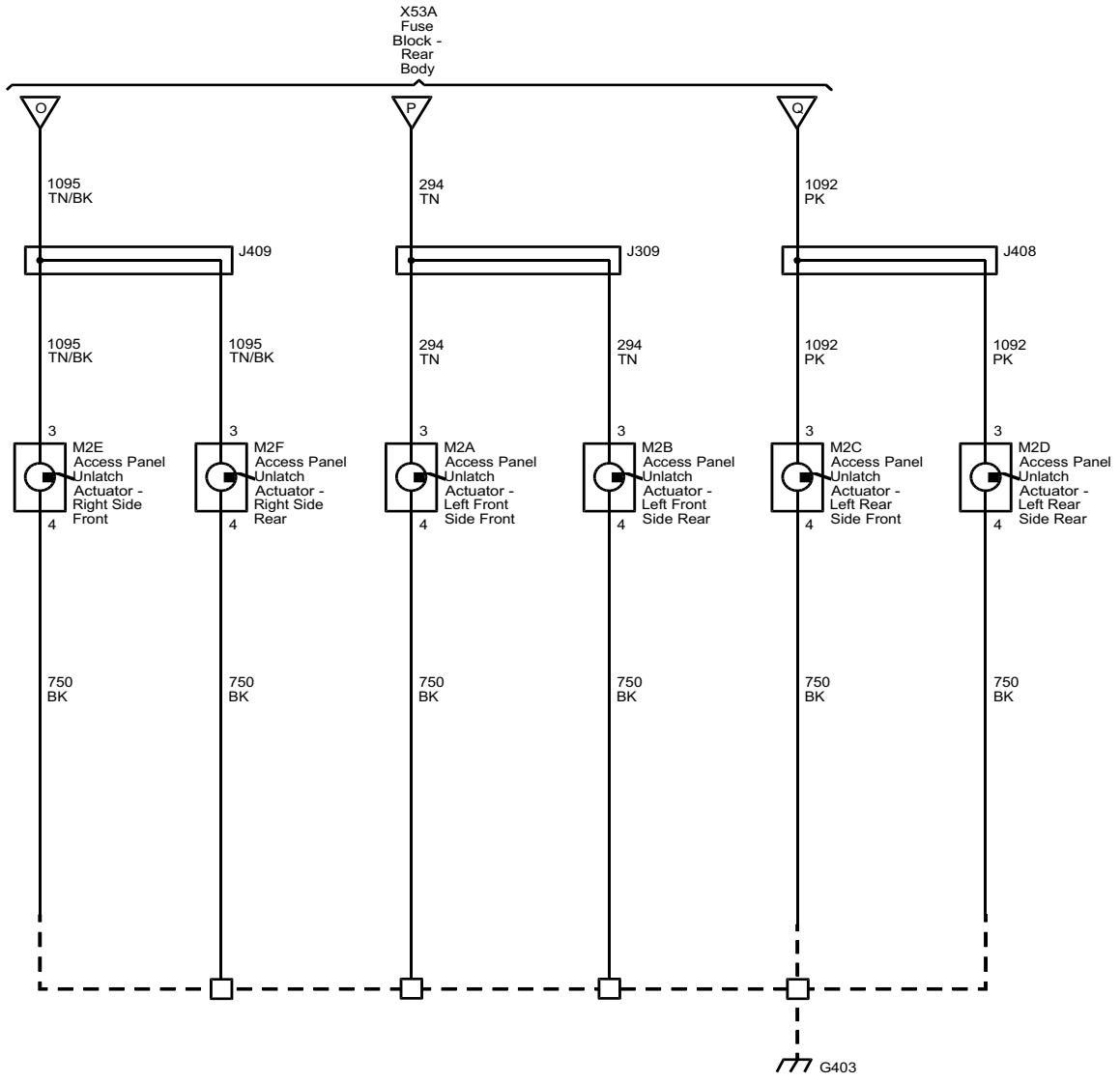
Release Systems Schematics (Access Panel Actuators)



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Description and Operation

Door Ajar Indicator Description and Operation

Door Ajar Indicator System Components

The door ajar indicator system consists of the following components:

- The body control module (BCM)
- The instrument panel cluster (IPC)
- The driver information center (DIC)
- The door ajar switch

Door Ajar Operation

The body control module (BCM) receives a discrete input from the door ajar switch to indicate the status of the door. The BCM then communicates this status to the instrument panel cluster (IPC) via GMLAN serial data. The IPC, upon receipt of this message, will illuminate the door ajar message in the driver information center (DIC) and also send a GMLAN serial data message to the radio to activate the door ajar audible warning when the following conditions are met:

- The transmission is shifted out of PARK.
- The vehicle speed is greater than 8 km/h (5 mph).

Power Door Locks Description and Operation

Door Lock System Components

The power door lock system consists of the following components:

- Driver door lock switch
- Front passenger door lock switch
- Rear cargo door lock switch
- Door lock relay
- Passenger door unlock relay
- Driver door unlock relay
- Cargo door unlock relay
- Body Control Module (BCM)
- Reversible door lock actuators in each of the doors
- DRV LKS 10A fuse, driver door unlock relay supply voltage
- CARGO UNLK 10A fuse, cargo door unlock relay supply voltage
- DOOR LKS 20A fuse, door lock relay and passenger door unlock relay supply voltage

Door Lock System Controls

The power door lock system can be controlled by any of the following:

- A power door lock or unlock switch activation
- A keyless entry transmission
- A lock out prevention function
- A last door locking function

Driver, Passenger and Cargo Door Lock Operation

When any of the door lock switches are placed in the lock position, a ground signal is applied to the BCM through the door lock signal circuit. Upon receiveing this signal, the BCM grounds the control side of the door lock relay through the door lock relay control circuit. Since the other side of the door lock relay winding is connected to battery voltage, the relay is energized. This causes the contacts to close and complete the path from the DOOR LKS fuse through the battery voltage circuit. Voltage is then applied to the lock side of the door lock actuators through the door lock actuator lock circuits. Since the other side of the all the door lock actuators are connected to the normally closed contacts of their respective unlock relays to ground, the doors lock.

The lock function can also be accomplished by the BCM supplying ground to the door lock relay control circuit by either of the following:

- A keyless entry lock transmission
- A last door lock function

Driver Door Unlock Operation

When any of the door lock switches are placed in the unlock position, a ground signal is applied to the BCM through the door unlock signal circuit. Upon receiveing this signal, the BCM grounds the control side of the driver door unlock relay through the driver door unlock relay control circuit. Since the other side of the driver door unlock relay winding is connected to battery voltage, the relay is energized. This causes the contacts to close and complete the path from the DRV LKS fuse through the battery voltage circuit. Voltage is then applied to the unlock side of the driver door lock actuator through the driver door lock actuator unlock control circuit. Since the other side of the the driver door lock actuator is connected to the normally closed contacts of the door lock relay to ground, the driver door unlocks.

The driver door unlock function can also be accomplished by the BCM supplying ground to the driver door unlock relay control circuit by either of the following:

- A keyless entry unlock transmission
- A lock out prevention function

Passenger Door Unlock Operation

When any of the door lock switches are placed in the unlock position, a ground signal is applied to the BCM through the door unlock signal circuit. Upon receiveing this signal, the BCM grounds the control side of the passenger door unlock relay through the door unlock relay control circuit. Since the other side of the door unlock relay winding is connected to battery voltage, the relay is energized. This causes the contacts to close and complete the path from the DOOR LKS fuse through the battery voltage circuit. Voltage is then applied to the unlock side of the passenger door lock actuators through the door lock actuator unlock control circuits. Since the other side of the the door lock actuators are connected to the normally closed contacts of the door lock relay to ground, the passenger doors unlock.

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Fig 1 Lk_Unlk Cont (1 of 2) 3395102

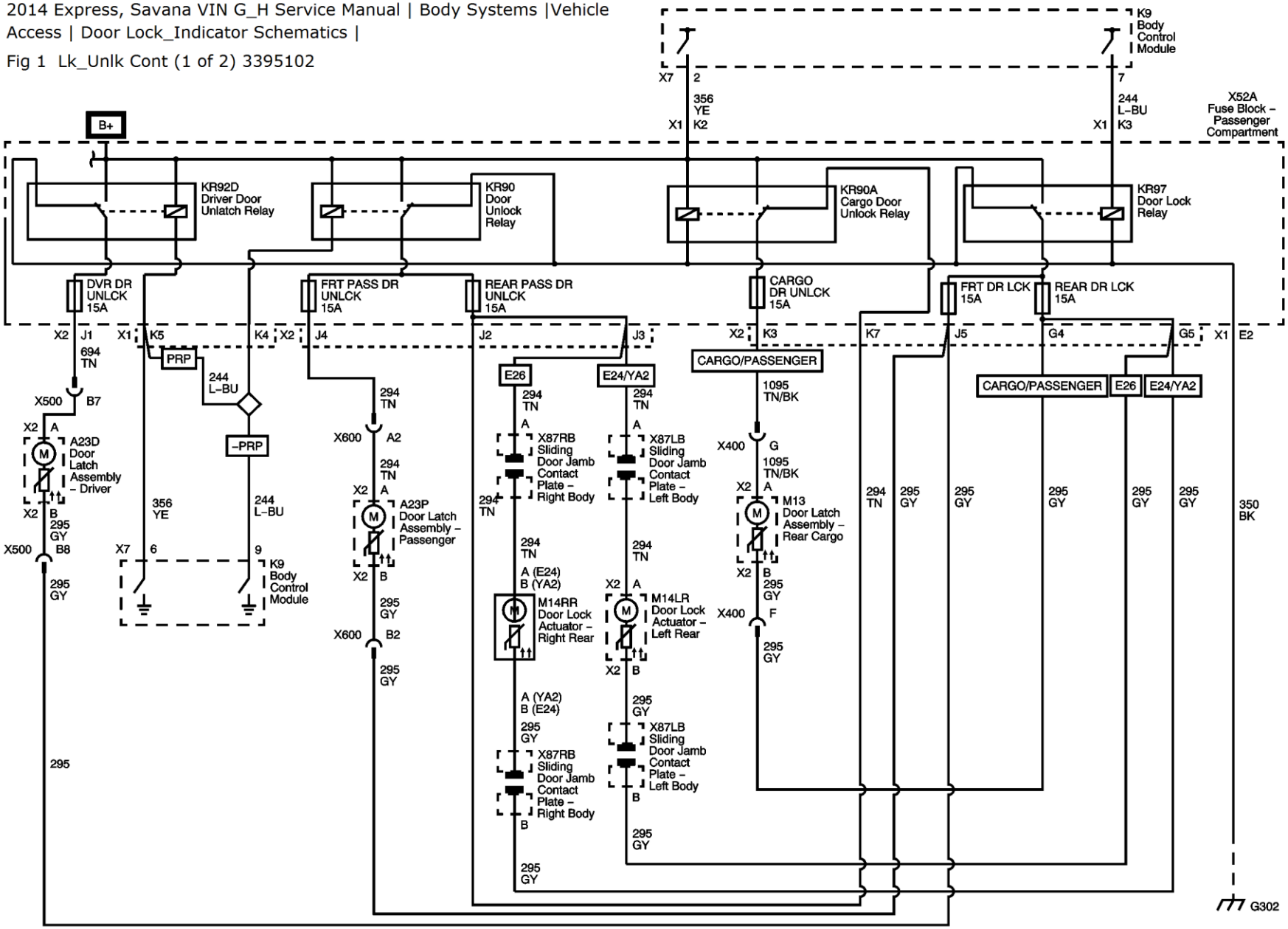

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Fig 2 Lock_Unlock Control (2 of 2) 3395104

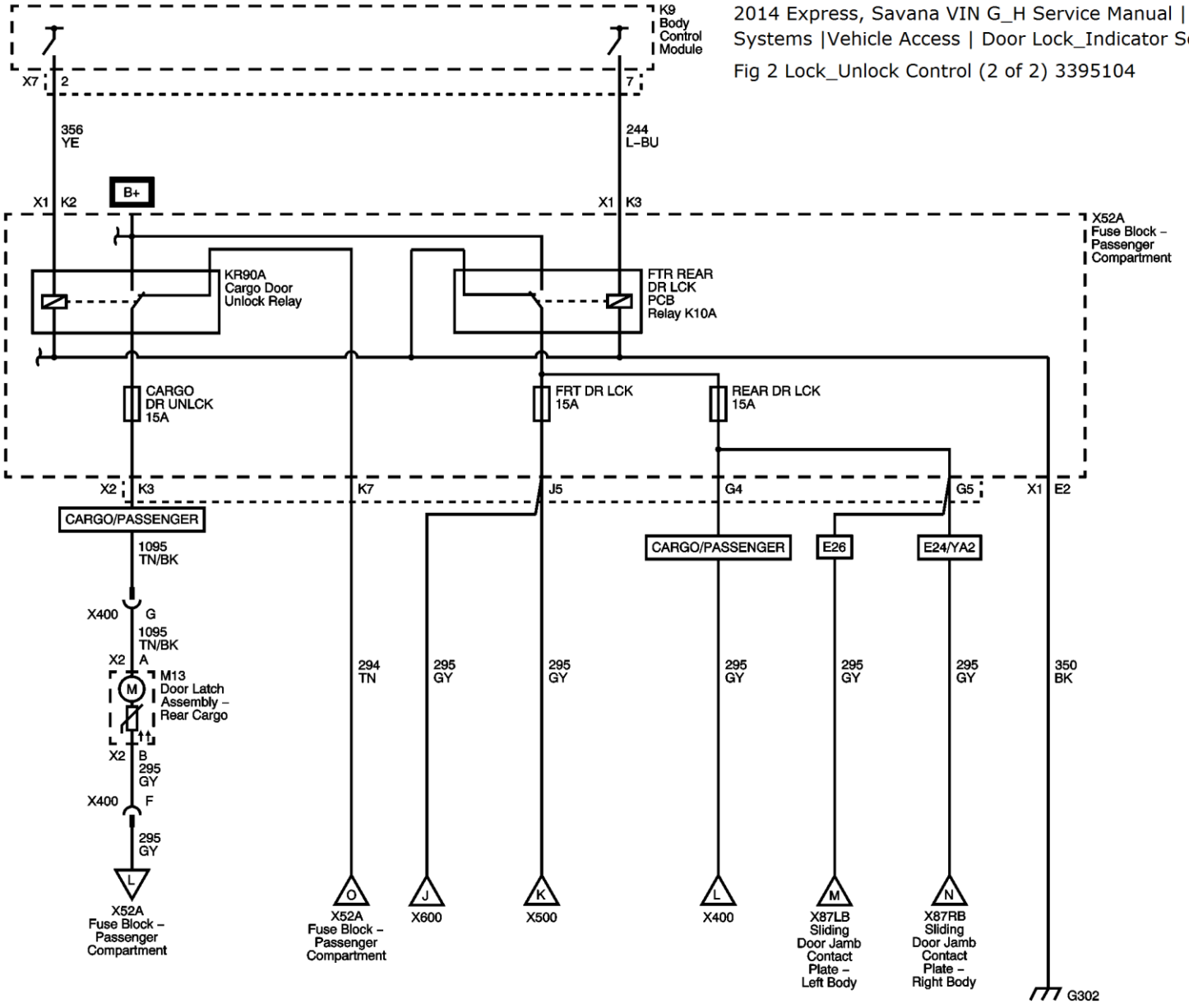

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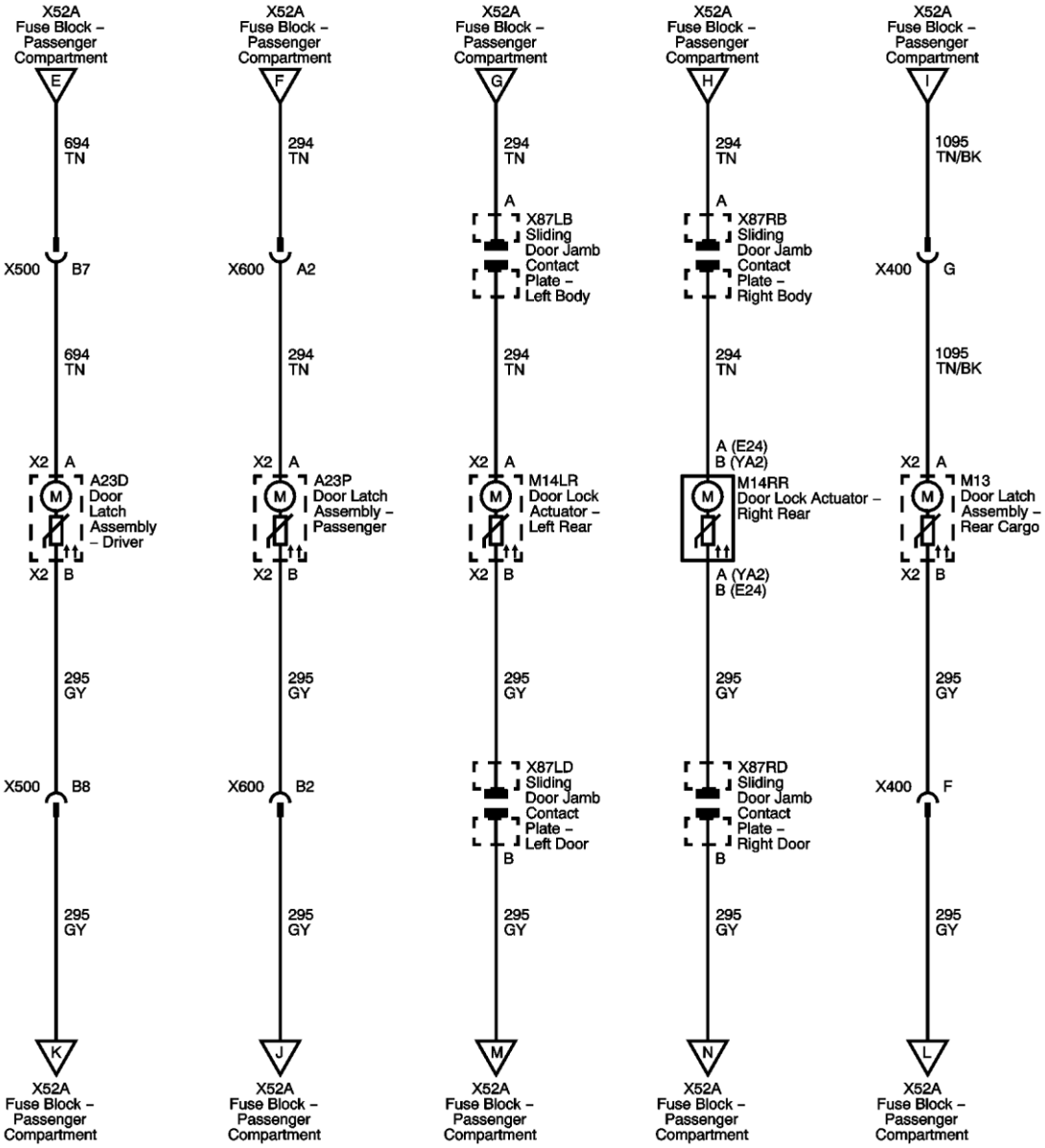
Fig 3 Door Latches and Actuators 3395106



2014 Express, Savana VIN G_H Service Manual | Body Systems |Vehicle Access | Door Lock_Indicator Schematics | Fig 4 Door Lock Switches 3395108

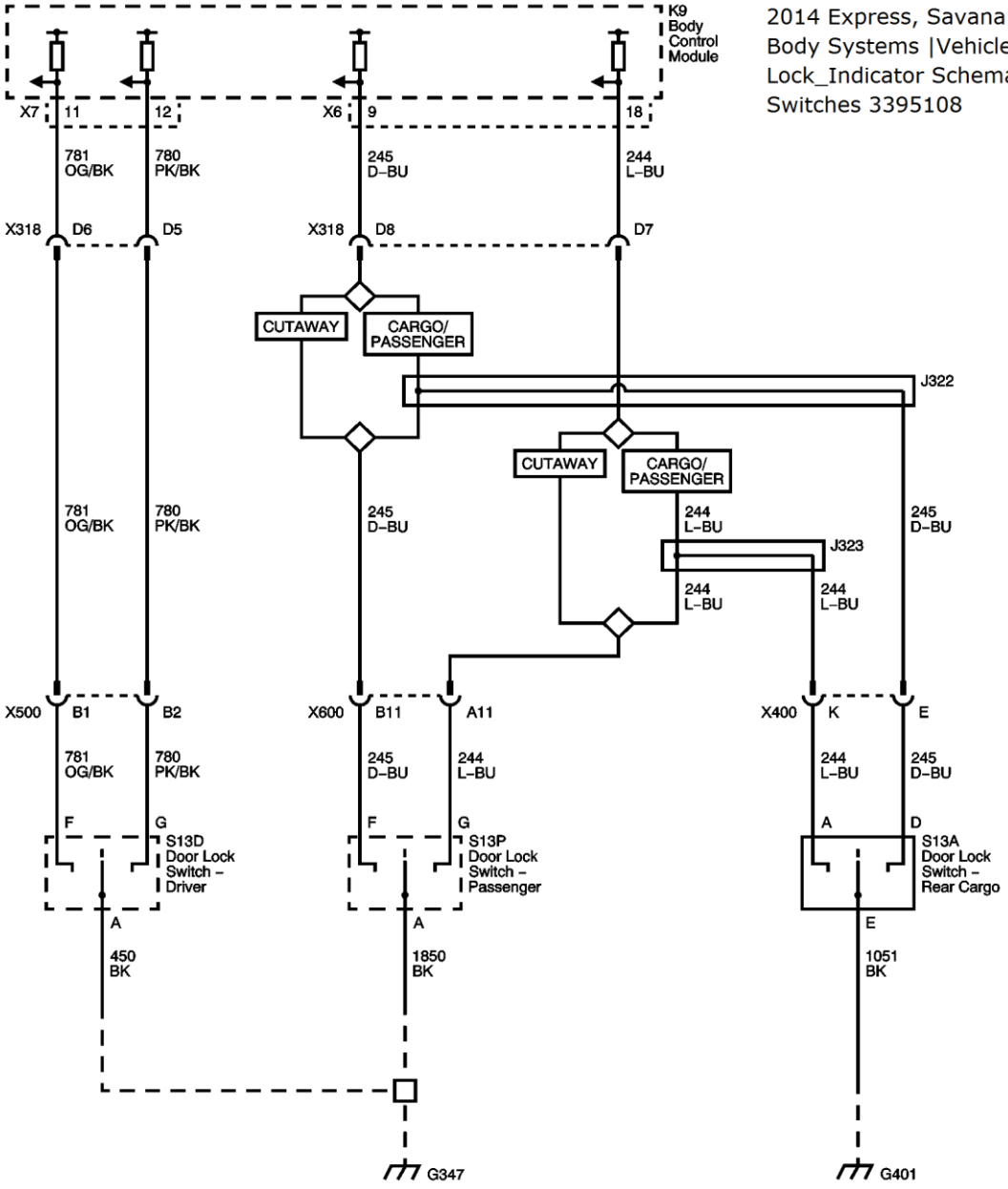
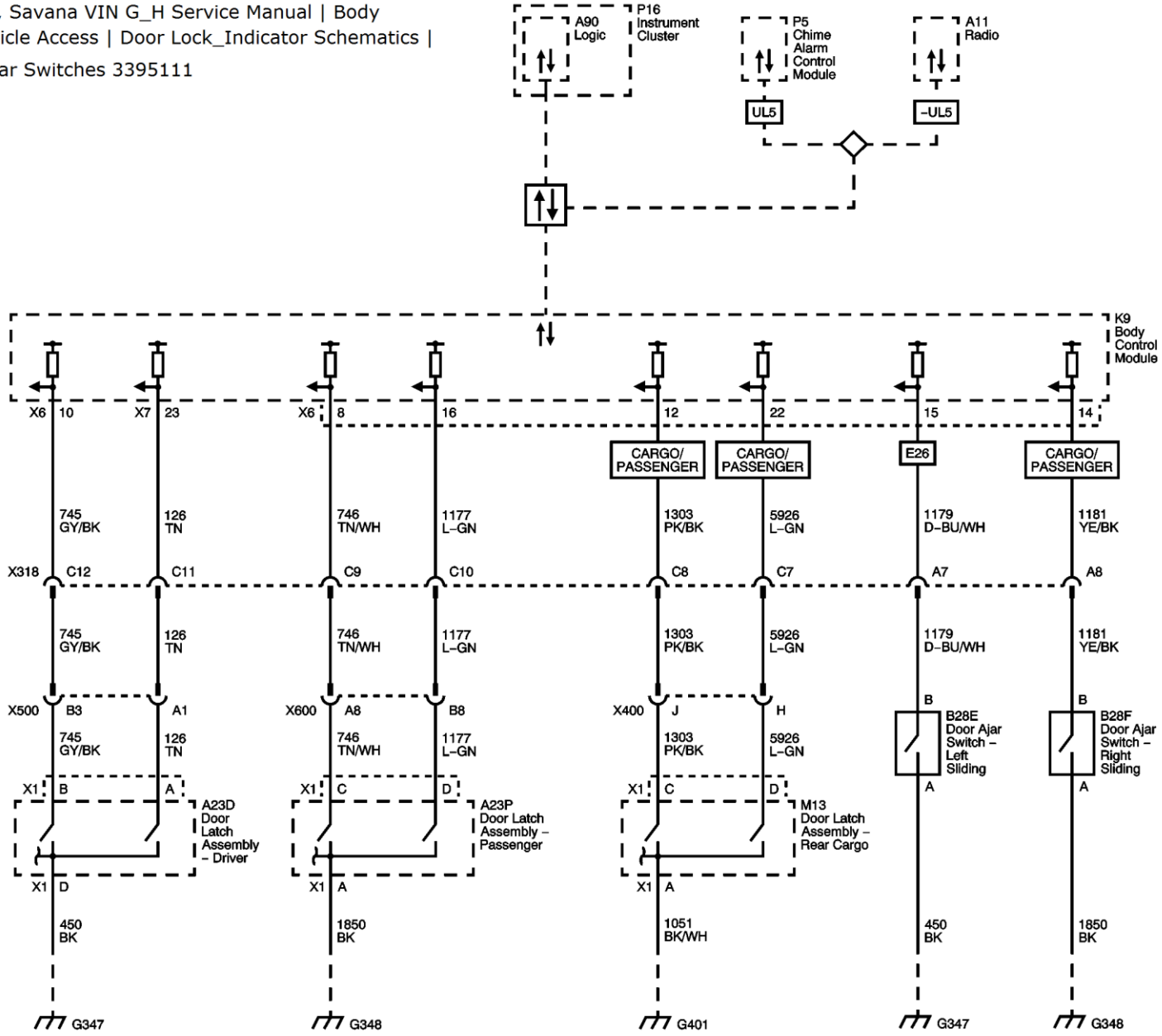


Fig 5 Door Ajar Switches 3395111



The door unlock function can also be accomplished by the BCM supplying ground to the passenger door unlock relay control circuit during a keyless entry unlock transmission.

Cargo Door Unlock Operation

When any of the door lock switches are placed in the unlock position, a ground signal is applied to the BCM through the door unlock signal circuit. Upon receiveing this signal, the BCM grounds the control side of the cargo door unlock relay through the cargo door unlock relay control circuit. Since the other side of the cargo door unlock relay winding is connected to battery voltage, the relay is energized. This causes the contacts to close and complete the path from the CARGO UNLK fuse through the battery voltage circuit. Voltage is then applied to the unlock side of the cargo door lock actuator through the door lock actuator unlock control circuit. Since the other side of the the cargo door lock actuator is connected to the normally closed contacts of the door lock relay to ground, the cargo door unlocks.

The cargo door unlock function can also be accomplished by the BCM supplying ground to the cargo door unlock relay control circuit during a keyless entry unlock transmission.

Delay Locking Operation

This feature allows the operator to lock all the doors from a door lock switch with the side doors(s) open. The side cargo doors have contact plates that complete the power door lock and unlock control circuits, among others, when the side cargo doors are closed, and interrupt these circuits when the doors are open. When a lock function occurs and the BCM senses an active state on any door ajar switch signal circuit the driver, front passenger and cargo doors will lock as described. The BCM continues to monitor door ajar switch signal circuits. When the BCM senses an inactive state, door closed, the BCM will cycle the door lock relay again after approximately 5 seconds to perform another lock function, thus locking the side cargo door(s).

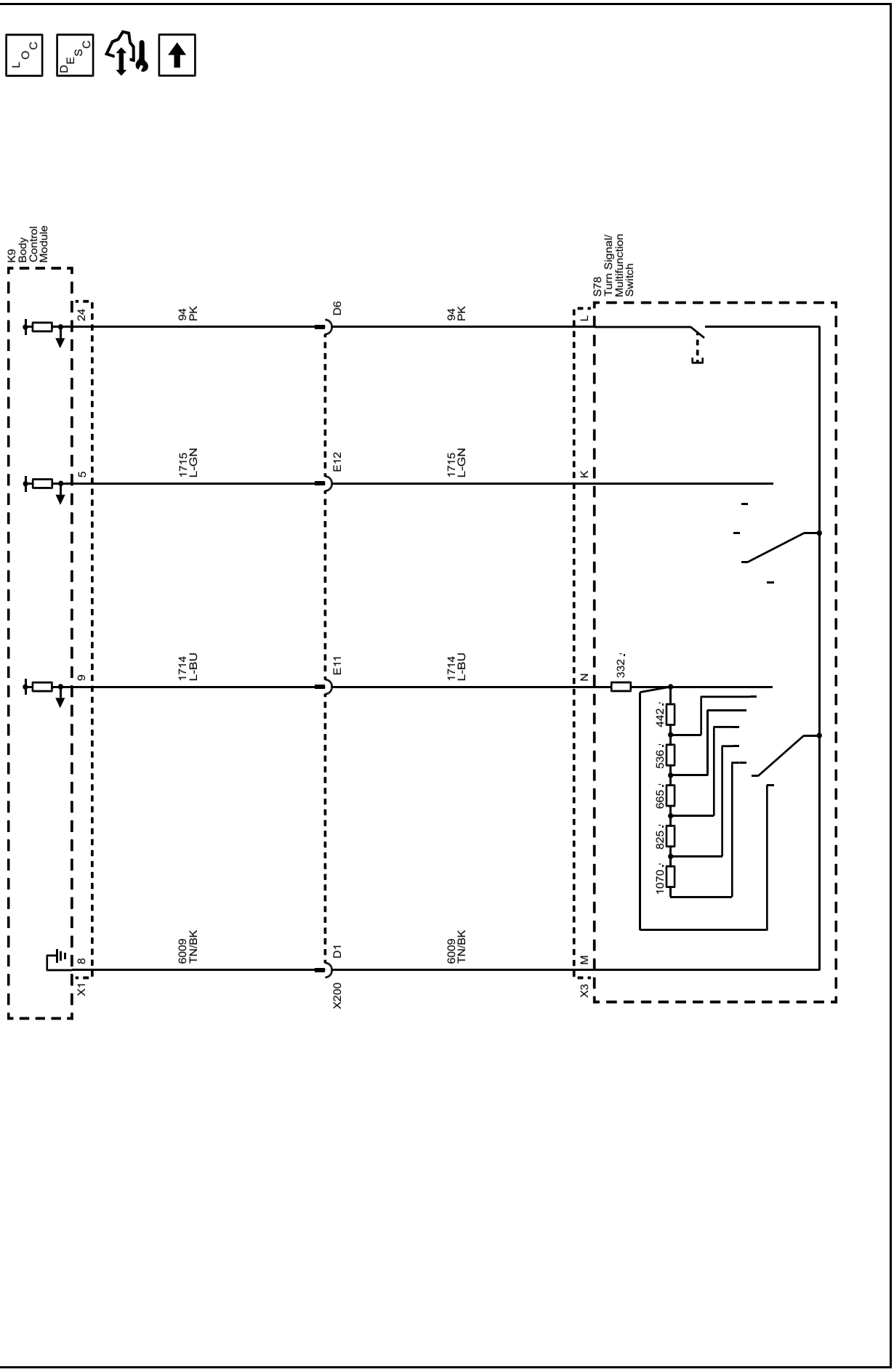
Lockout Prevention

This feature prevents the locking of the driver door if the ignition key is left in the ignition lock cylinder. If a lock function occurs from any door lock switch and the BCM senses a door ajar and the key in ignition switch signal circuit is in the yes state, the BCM will cycle the door lock relay to lock the doors and then cycle the driver door unlock relay to unlock the driver door.

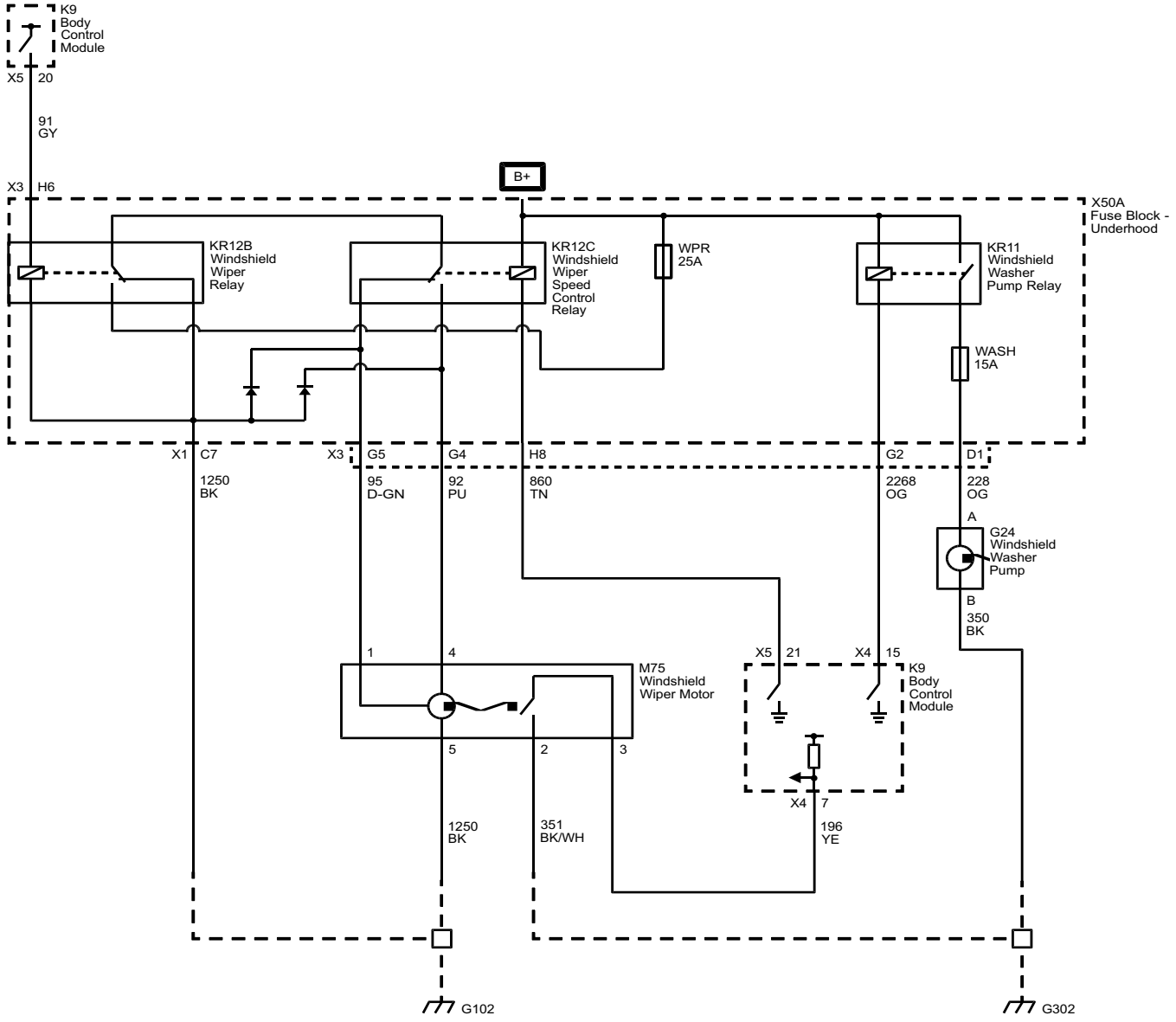
Wipers and Washers

Schematic and Routing Diagrams

Wiper/Washer Schematics (Wiper Controls)



Wiper/Washer Schematics (Wiper and Washer Motor Control)



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Description and Operation

Wiper/Washer System Description and Operation (Wiper and Washers)

Wiper/Washer System Components

The Wiper/Washer System consists of the following components:

- Windshield wiper/washer switch
- Body control module (BCM)
- WPR Relay
- WPR HI Relay
- Windshield wiper motor
- Windshield washer fluid pump
- Windshield washer fluid level switch
- Rain sensor module
- Instrument panel cluster (IPC)
- WPR Fuse 25 A
- WSW/PUMP Fuse 10 A
- RAP Fuse 10 A

Refer to *CELL Link Error - Link target cell (cell ID 62031) is invalid for this publication.* *on page ?-?*.

Power and Grounds

With the ignition in the ON position, accessory voltage is supplied through the 25A WPR fuse to the WIPER relay, the WIPER HI relay and the WSH relay that are all located in the underhood fuse block. Refer to *Wiper/Washer Schematics on page 4-39*.

G101 provides ground for the windshield wiper motor. G104 provides ground for the WPR relay, the WPR HI relay, the windshield washer fluid pump and the windshield washer fluid level switch.

Modes of Operation

The normal wiper system function positions are as follows:

- MIST
- DELAY
- MANUAL LOW
- MANUAL HIGH
- WASH

Automatic Modes of Operation

- AUTOMATIC DELAY
- AUTOMATIC LOW
- AUTOMATIC HIGH

Automatic low speed and automatic high speed wiper modes are continuous wiper operations that are controlled by the outside moisture sensor. Automatic low and high speed operation is utilized when the amount of precipitation on the windshield exceeds the automatic delay or low threshold.

Moisture Sensitive Wipers

The outside moisture sensor monitors moisture accumulation on the windshield and uses a windshield wiper/washer switch status input to provide wipe commands to the body control module (BCM). The DELAY positions on the wiper/washer switch are used to activate the AUTOMATIC rain sensing operating mode. They are also used to adjust the level of sensitivity to moisture accumulation, which determines the dwell time for commanding a wiper motor wipe cycle.

Accessory voltage is supplied to the outside moisture sensor through the 10A RAP Fuse, located in the rear fuse block. The sensor is grounded through the ground circuit and G402. Whenever the ignition is in the run or accessory positions, the BCM sends the wiper/washer switch status using a pulse width modulation (PWM) signal through the outside moisture sensor signal 1 circuit to the outside moisture sensor. When a wipe cycle is needed, the moisture sensor sends a PWM voltage signal through the moisture sensor signal 2 circuit back to the BCM requesting the wiper operation.

The outside moisture sensor uses the moisture sensor signal 2 circuit to command wiper motor wipe cycles and to confirm the moisture sensor signal 1 is being received. If at anytime communication between the outside moisture sensor and BCM is lost, the BCM will use the inputs from the windshield wiper/washer switch in the delay positions to operate the wiper motor at continuous variable delay intervals.

Low Speed Operation

When the wiper switch is in the low speed position, ground is applied through a resistor internal to the switch and the wiper switch low signal circuit to the body control module (BCM). In response to this signal, the BCM energizes the WPR relay by applying battery voltage through the wiper relay control circuit to the coil side of the relay. This allows battery positive voltage from the WPR fuse to flow through the switch input side of the WPR relay and out to the switch input side of the WPR HI relay. Since the wiper high relay is de-energized and its switch contacts are normally closed to the low speed control circuit of the windshield wiper motor, the motor will operate at low speed.

Wiper motor low speed operation and the WPR relay can also be commanded ON/OFF by using a scan tool. Refer to *CELL Link Error - Link target cell (cell ID 72864) is invalid for this publication.* *on page ?-?*.

Mist Operation

Windshield wiper/washer system MIST operation is identical to wiper Low operation, except that the mist switch is a press and release type switch. When the wiper switch is moved to the mist position and released, low speed wiper motor operation is started and will continue until 1 wipe cycle is complete. If the wiper switch is moved to the mist position and held, the wiper motor will operate in the low mode until the switch is released.

Delay Operation

Windshield wiper delay operation is a low speed wiper motor function with a variable delay interval between the wiper motor cycles. The delay interval is determined by a series of 6 resistors within the wiper/washer switch. The body control module (BCM) monitors the wiper switch low signal circuit to determine the delay interval between the low speed wiper motor wipe cycles.

High Speed Operation

When the wiper switch is in the high speed position, ground is applied through the windshield wiper switch high signal circuit to the body control module (BCM) indicating the wiper high speed request. In response to this signal, the BCM then energizes the WPR relay, as stated above, and the WPR HI relay by applying ground through the control circuit to the coil side of the relay. With the wiper high relay energized and its switch contacts closed to the high speed control circuit of the wiper motor, the motor will operate at high speed.

The wiper high speed relay can also be commanded ON/OFF by using a scan tool. However, before commanding the wiper motor high speed mode ON/OFF using a scan tool, the WPR relay must be energized by placing the wiper switch in the low speed position. Refer to *CELL Link Error - Link target cell (cell ID 72864) is invalid for this publication. on page ?-?*.

Wash Operation

When the windshield Wash switch is pressed, ground is applied through the switch contacts and the windshield washer switch signal circuit to the body control module (BCM) indicating the windshield wash request. The BCM then energizes the WPR relay, as stated above, and the WSH relay by applying ground through the control circuit to the coil side of the relay. With the wash relay energized, battery voltage from the WPR fuse is applied through the switch side of the relay and out to the control circuit of the windshield washer fluid pump. The wiper motor will operate for 2 wipe cycles after the wash switch is released.

The WSH relay can also be commanded ON/OFF by using a scan tool. Refer to *CELL Link Error - Link target cell (cell ID 72864) is invalid for this publication. on page ?-?*.

Park Position Operation

Windshield wiper motor park operation is controlled by the body control module (BCM) using an input from the park switch that is located within the wiper motor assembly. The BCM monitors the windshield wiper motor park switch signal circuit, to determine if the windshield wiper blades are at the bottom of the glass. During wiper operation, each time the wiper blades are at the bottom of the glass, the park switch is momentarily closed to ground signaling the BCM the wiper position. When the wiper switch is turned to the OFF position while the wiper motor is somewhere in mid-cycle, the BCM will continue to operate the motor until the wipers reach the park position. If the ignition is turned OFF while the wipers are in mid-cycle, the wipers will stop immediately where they are. The BCM will park the wipers the next time the ignition is turned ON.

Washer Fluid LOW ADD FLUID Message

The WASHER FLUID LOW ADD FLUID message is controlled by the instrument panel cluster (IPC) using an input from the washer fluid level switch. With the ignition in the ON position, the IPC applies ignition voltage through an internal resistor and the windshield washer fluid level signal circuit to the windshield washer fluid level switch. The IPC then monitors this voltage to determine the washer fluid level. With the washer fluid above a determined level, the washer fluid level switch is open and the IPC detects voltage on the signal circuit. When the washer fluid reaches the point where the driver should be informed that the washer fluid is low, the washer fluid level switch closes. When the washer fluid level switch is closed, the washer fluid level signal circuit is pulled low and the IPC displays the WASHER FLUID LOW ADD FLUID message on the driver information center (DIC). In order to prevent the WASHER FLUID LOW ADD FLUID message from being displayed while sloshing is occurring in the washer fluid container, the IPC is programed with a 1 minute delay before changing states of the WASHER FLUID LOW ADD FLUID message during an ignition cycle.

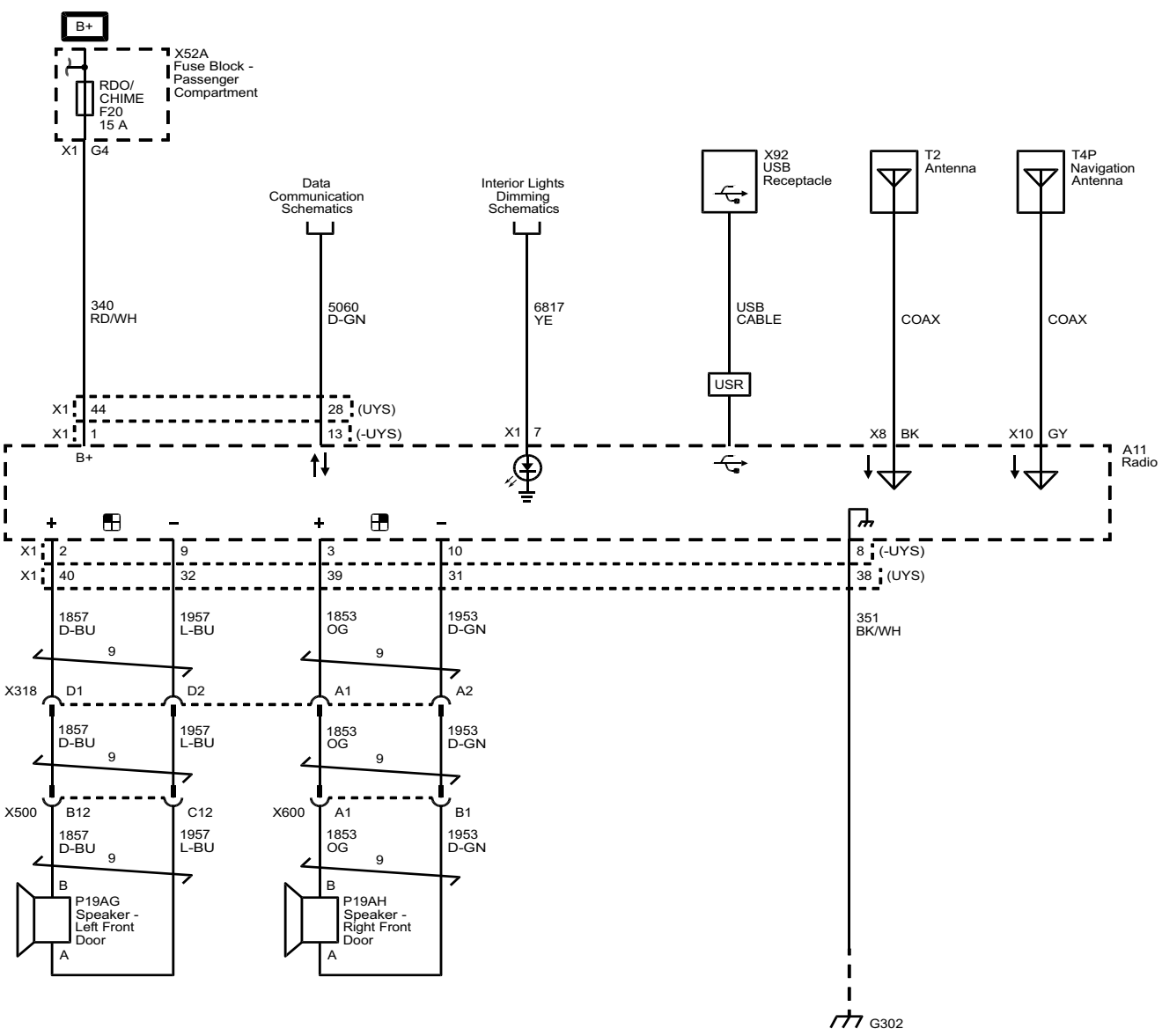
Section 8

Driver Information and Entertainment

Cellular, Entertainment, and Navigation

Schematic and Routing Diagrams

Radio/Navigation System Schematics (Power, Ground, Serial Data, Antenna and Front Speaker Outputs)



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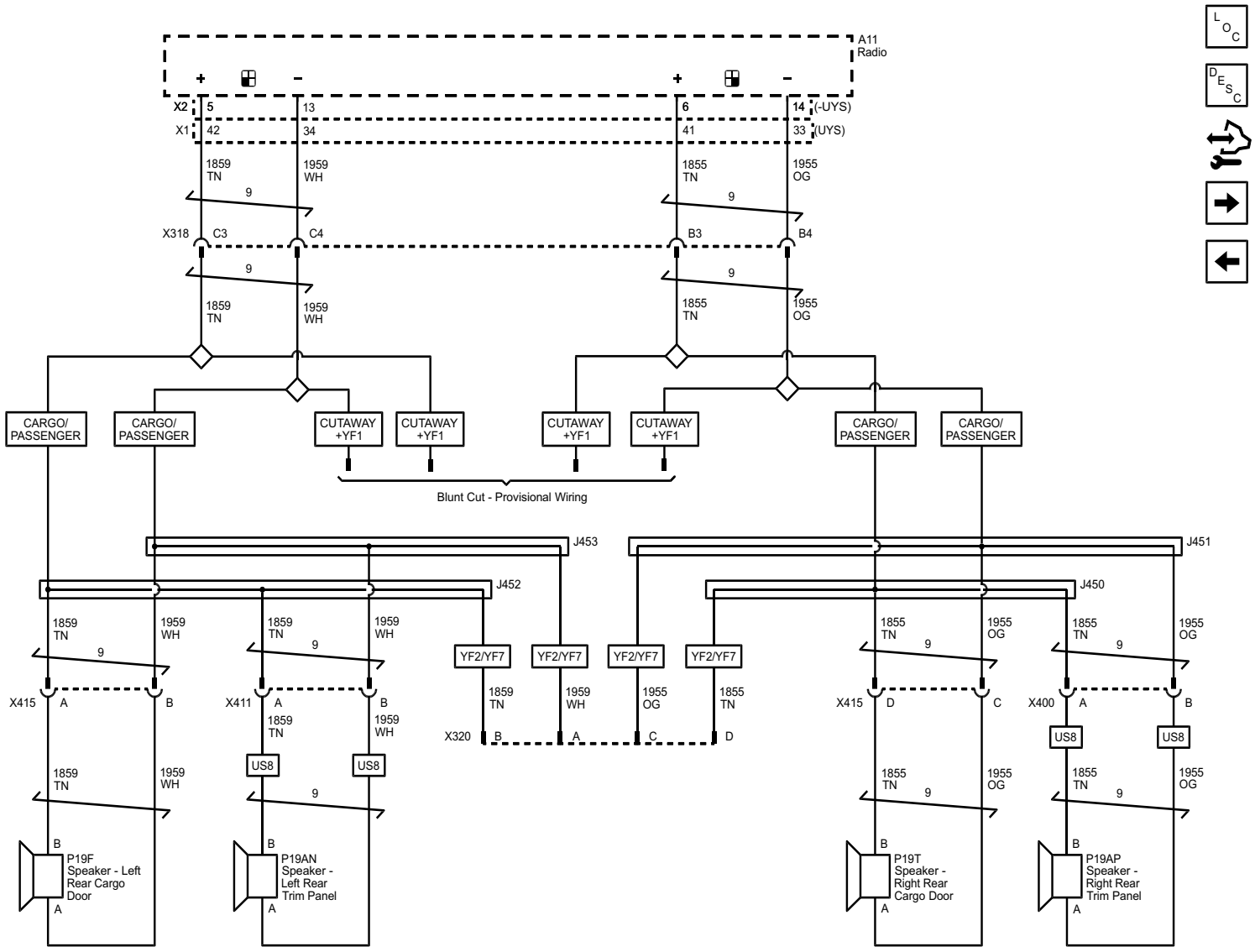
Radio/Navigation System Schematics (Rear Speaker Outputs)



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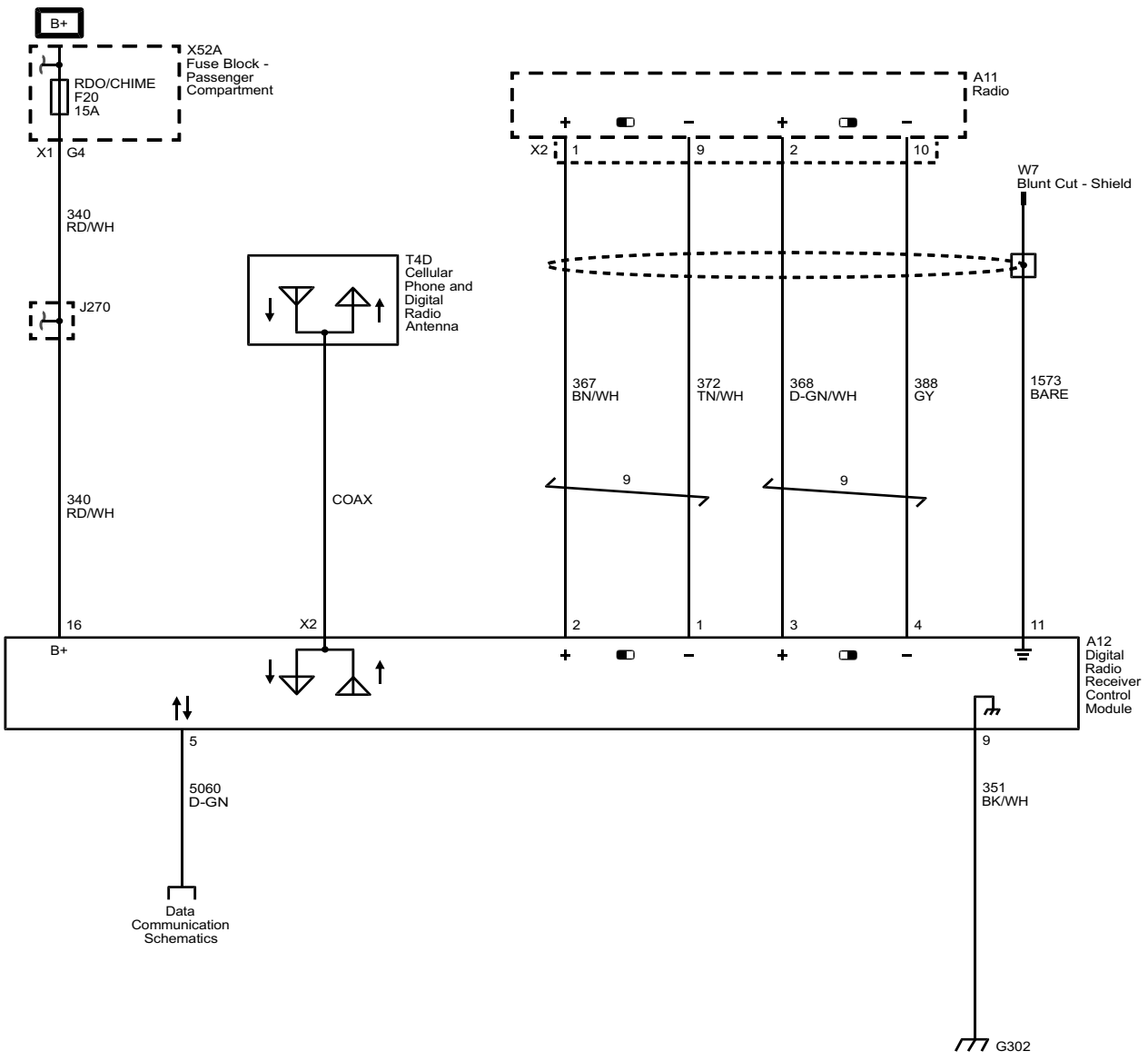
Radio/Navigation System Schematics (Digital Radio Receiver (U2K))



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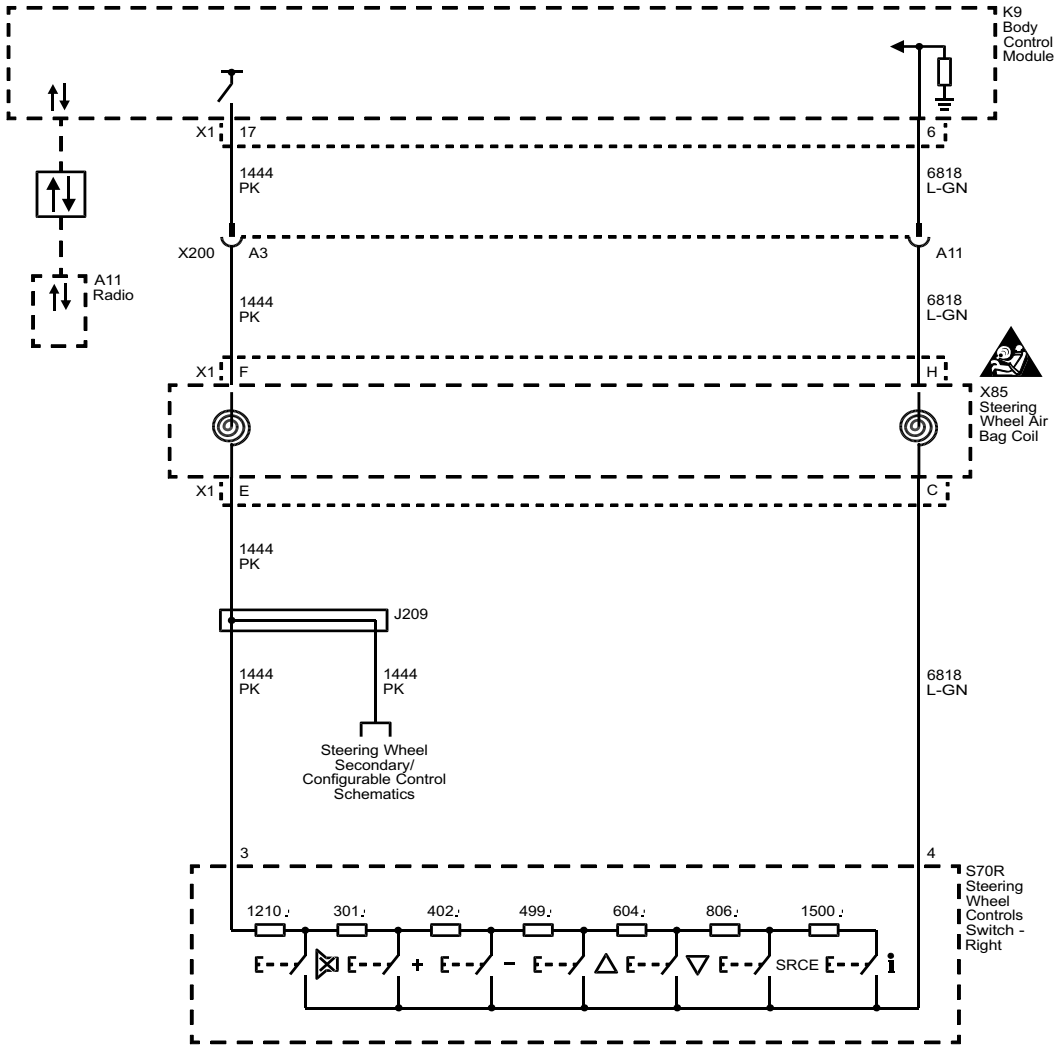
Radio/Navigation System Schematics (Steering Wheel Radio Redundant Controls)



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Description and Operation

Audible Warnings Description and Operation

The audible warnings alert the driver of a system concern or a critical vehicle condition. The radio generates the audible warning through the left front speaker. The radio receives audible warning requests via the serial data circuit. If the radio receives multiple audible warning requests, the warning with the highest priority sounds first. On vehicles without a radio, a chime module generates the audible warnings and receives audible warning requests via the serial data circuit. Either the radio or the chime module is the chime procedure. The following lists the audible warning priority and the pulse rate:

1. Fast rate chime—200 pulses per minute
2. Medium rate chime—150 pulses per minute
3. Slow rate chime—50 pulses per minute
4. Single chime

Fasten Safety Belt Warning

The chime producer activates the fasten safety belt audible warning as requested by the body control module (BCM). The BCM sends a serial data message to the audio amplifier indicating the chime frequency at a slow rate and a duration of 8 seconds. The fasten safety belt warning sounds and the fasten safety belt indicator illuminates when the following occurs:

- The ignition switch transitions to ON.
- The inflatable restraint sensing and diagnostic module (SDM) detects that the drivers seat belt is not buckled and the signal is low. The SDM sends a serial data message to the BCM indicating the seat belt status. The instrument panel cluster (IPC) receives a serial data message from the BCM indicating the driver seat belt status.

If the seat belt is buckled when the ignition is turned ON, the chime does not sound. If the seat belt is buckled while the chime is sounding, the chime stops. If the seat belt is unbuckled after the initial transition to ON, the chime does not sound.

Lights On Warning

The chime producer activates the lights on warning as requested by the body control module (BCM). The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration. The lights on warning sounds when the following occurs:

- The ignition is OFF.
- The BCM determines that the driver door is open and the signal circuit is low.
- The BCM determines that the headlamp switch is in the park or head position.

Brake Warning

The chime producer activates the brake audible warning as requested by the instrument panel cluster (IPC). The IPC sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration. The brake warning sounds and the BRAKE indicator illuminates when the following occurs:

- The ignition is ON.
- The vehicle speed is greater than 8 km/h (4.9 mph). The IPC receives a serial data message from the engine control module (ECM) indicating the vehicle speed.
- The IPC determines that the park brake is engaged and the signal circuit is low.
- The brake fluid is low.
- The Traction Control System (TCS) and the Vehicle Stability Enhancement System (VSES) have failed.

Key-In-Ignition Warning

The chime producer activates the key-in-ignition audible warning as requested by the body control module (BCM). The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and continuous duration. The key-in-ignition warning sounds when the following occurs:

- The ignition switch is OFF.
- The BCM determines that the driver door is open and the signal circuit is low. The IPC also receives a serial data message from the BCM indicating the door ajar status
- The BCM determines that the key-in-ignition switch is open and the signal circuit is high. The IPC receives a serial data message from the BCM indicating the key-in-ignition status.

Door Ajar Warning

The chime producer activates the door ajar audible warning as requested by the body control module (BCM). The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and continuous duration. The door ajar warning sounds and the appropriate door ajar indicator illuminates in the drivers information center (DIC) when the following occurs:

- The BCM determines that a door (driver door, passenger door, left rear door, right rear door) is open and the signal circuit is low. The IPC also receives a serial data message from the BCM indicating the door ajar status.
- The vehicle is not in PARK. The BCM receives a serial data message from the engine control module (ECM)/BCM indicating the gear position.

Additional Warnings

The following warnings have an associated instrument panel cluster (IPC) indicator or driver information center (DIC) message:

- Battery Voltage Low Message—The chime producer activates the audible warning as requested by the body control module (BCM). The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Cargo Open Door Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Clean Exhaust Filter Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Engine Overheated Stop Engine Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Engine Power Is Reduced Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and at a continuous duration.
- Fuel Level Low Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Oil Pressure Indicator—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Tire Pressure Low Indicator—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Turn Signal Indicators—The chime producer activates the audible warning as requested by the IPC. The chime produces two different chimes, one when the turn signal turns off and another when the turn signal turns on.
- Vehicle Dynamics Caution Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.
- Vehicle Overspeed Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a medium rate and at a finite duration.
- Transmission Hot Idle Engine Message—The chime producer activates the audible warning as requested by the BCM. The BCM sends a serial data message to the chime producer indicating the chime frequency of a fast rate and at a continuous duration.

Refer to *Indicator/Warning Message Description and Operation on page 8-31*.

Driver Information Center (DIC) Description and Operation

The driver information center (DIC) displays the DIC WOW for 5 seconds when it first powers up. If enabled through Personalization, the DIC then returns to the last display status before no power condition.

There are 4 switch functions for the DIC.

- Personalization
- Set/Reset
- Trip/Fuel
- Vehicle Information

Trip/Fuel

The Trip/Fuel switch is used to navigate between vehicle information parameters. Cycle through the following vehicle parameters by successive pressing of the Trip/Fuel switch.

- Average Fuel Economy (AFE)
- Average Vehicle Speed (AV5)
- Blank Display
- Elapsed Time
- Fuel Range
- Fuel Used
- Instantaneous Fuel Economy (IFE)/ Active Fuel Management (AFM)
- Season Odometer
- Trip A
- Trip B

Vehicle Information

The vehicle information switch is used to navigate between vehicle information parameters. Cycle through the following vehicle parameters by successive pressing of the vehicle information switch.

- Blank Display
- Compass Zone Setting
- Compass Recalibration
- Display Units Menu
- Front Tire Pressures
- Fuel Filter Life
- Hourmeter
- Key Fob Programming Menu
- Left Front Tire Pressure
- Left Rear Tire Pressure
- Oil Life Index (OLI)
- Rear Tire Pressures

- Right Front Tire Pressure
- Right Rear Tire Pressure
- Tire Programming Menu

Personalization

The personalization switch is used to set personalization features for both the vehicle and the driver. Many of the parameters in the Trip/Fuel menu and the Vehicle Information menu can be programmed through the personalization switch. In addition to the parameters in the Trip/Fuel and Vehicle Information menus, the following features can also be programmed.

- Approach Lighting
- Automatic Door Lock
- Automatic Door Unlock
- Chime Volume
- Delayed Door Lock
- Display Language
- Elevated Idle
- Exit Lighting
- Remote Door Lock
- Remote Door Unlock

Average Fuel Economy

Average fuel economy is calculated using the equation: AFE = Distance/Fuel

- Distance = The accumulated distance travelled since the last reset of this value
- Fuel = The accumulated fuel consumption since the last reset of this value

The engine control module (ECM) sends the average fuel economy serial data message to the instrument panel cluster (IPC). The value of this mode is retained during ignition OFF and can be changed between English units and metric units by selecting from the driver information center (DIC) options menu.

Average Vehicle Speed

Average speed is calculated using the equation: Average Vehicle Speed = AVS Distance/AVS Time

- Distance = The accumulated distance travelled since the last reset of this value
- Ignition On = The accumulated ignition on time since the last reset of this value

Elapsed Time

The timer records elapsed time starting from activation. When the DIC displays the timer, pressing the Set/Reset switch for 3 seconds on the DIC resets the timer. Pressing the Set/Reset button on the DIC switch for approximately 1 second starts and stops the timer. The DIC displays the timer in one of the following formats:

The DIC displays the timer in the following format: XX:XX:XX:

The first XX represents hours elapsed, the second XX represents minutes elapsed, and the third XX represents seconds elapsed. The maximum range of the timer is 99 hours, 59 minutes, and 59 seconds. After the maximum range is reached, the timer displays all zeros (00:00:00).

Fuel Range

This message indicates the estimated distance that the vehicle can travel under the current fuel economy and fuel level conditions since the last battery connection to the IPC. Fuel Range is calculated using the equation: Fuel Range = Range Distance X Fuel Total Capacity/ Range Fuel Used.

- Range Distance = The accumulated distance travelled since the last reset of this value.
- Fuel Used = The accumulated fuel delivered since the last reset of this value

The ECM sends the fuel range value to the IPC. The IPC receives a serial data message with fuel information. The fuel range value is retained during ignition OFF and can be changed between English and Metric units by accessing the DIC English/Metric menu. The Fuel Range display cannot be reset. LOW is displayed when fuel range is below a predetermined value.

Fuel Used

The DIC calculates and displays the total amount of fuel used since the last reset operation. You can reset the fuel used mode by depressing and holding the Set/ Reset button for more than 3 seconds. The value of this mode is retained during ignition OFF.

Instantaneous Fuel Economy (IFE)

Instantaneous fuel economy (IFE) is calculated using the equation: IFE = Distance/Fuel Used.

- Distance = The accumulated distance travelled for the last 2 seconds
- Fuel = The accumulated fuel delivered for the last 2 seconds

The IPC receives a serial data message from the ECM. The distance information is calculated by the IPC using the vehicle speed information from the ECM. These values are retained during ignition OFF and can be changed between English and Metric units accessing the DIC English/Metric menu. The IFE display cannot be reset.

Oil Life Remaining

The ECM sends the oil life remaining percentage to the IPC via a serial data message. The instrument panel cluster receives a serial data message indicating the engine oil life remaining. The DIC displays the current percentage of the GM Oil Life System as determined by the ECM. When the oil life remaining percentage drops below 5 percent, the DIC displays CHANGE ENGINE OIL SOON. When the engine oil is changed, reset the GM Oil Life System. Refer to *CELL Link Error - Link target cell (cell ID 53271) is invalid for this publication. on page ?-?*.

Tire Pressure Monitor

The IPC receives a serial data message from the tire pressure monitoring (TPM) system for front and rear tire pressure data. The DIC will display the pressure for each of the front and rear tires. When a tire with low air pressure is present, the DIC displays XXXX XXXX TIRE PRESSURE LOW.

Fuel Display

Parameter	Update Rate	Range	Reset Value	Units
Average Fuel Economy	1 second	0.0 – 99.9	99.9	MPG or L / 100 KM
Instant Fuel Economy	2 seconds	0 – 70	N/A	MPG or L / 100 KM
Fuel Range	1 second	0 – 999	N/A	MI/KM
Fuel Used	1 second	0 – 999.9	0.0	Gal/L

English/Metric

The English/Metric mode is used to toggle between English and Metric units and can be accessed through the driver information center (DIC) vehicle information switch.

Trip A/B

The trip odometer A or B can be accessed through the DIC Trip/Fuel switch function.

Trip Display

DIC Trip Display	Range	
	Metric	English
ODOMETER	######km	######MI
TRIP A	####.#km	####.#MI
TRIP B	####.#km	####.#MI

Language

The driver information center (DIC) is capable of displaying in 4 languages

- English
- French
- Spanish
- Arabic

Fuel Filter Life

The engine control module (ECM) sends the fuel filter life remaining percentage to the instrument panel cluster (IPC) via the serial data circuit. The instrument panel cluster receives a serial data message indicating the fuel filter life remaining. The driver information center (DIC) displays the current percentage of the fuel filter life as determined by the ECM. When the fuel filter life remaining parameter drops below 5 percent, the DIC displays the CHANGE FUEL FILTER message. The fuel filter life parameter can be reset by pressing the Set/Reset switch for 2 seconds. The fuel filter life parameter only applies to vehicles equipped with diesel engine. Refer to *Fuel System Description on page 9-116*.

Compass (without Onstar)

The driver information center (DIC) displays the compass based on serial data message from the BCM. The compass module communicates with the body control module (BCM) through a bi-directional data circuit. The instrument panel cluster (IPC) receives compass information from the BCM via the serial data circuit. The compass is displayed in the DIC with other vehicle information and is at the bottom line of the DIC. The compass display shows “- -” when a malfunction is present with the compass module or a compass serial data communication fault exists. The compass displays 'CAL' or 'C' when the compass needs to be calibrated. Cycle the ignition before performing the compass magnetic variation adjustment procedure.

Check that the compass module is properly installed in the vehicle since this may cause the compass to malfunction. The embossed arrow on the top of the compass module should be parallel to the centerline of the vehicle.

Compass (with Onstar)

The driver information center (DIC) displays the compass based on serial data message from the Vehicle Communication Interface Module (VCIM). The compass is displayed in the DIC with other vehicle information and is at the bottom line of the DIC. The compass displays 'CAL' or 'C' when the DIC has not received compass information from the VCIM.

Ambient Air Temperature

The ambient air temperature is read by the instrument panel cluster (IPC) and displayed in the driver information center (DIC). The IPC provides the logic for reading the outside air temperature sensor. The IPC is responsible for displaying the temperature and converting to Fahrenheit. The instrument panel cluster (IPC) applies 5 volts to the ambient air temperature sensor. The ambient air temperature sensor is a thermistor which varies in resistance as the temperature changes. As the resistance of the ambient air temperature sensor increases, the IPC senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the IPC senses a smaller voltage drop across the sensor, indicating a higher temperature. The IPC is responsible for displaying the temperature and converting to degrees Fahrenheit if necessary.

If the ambient air temperature sensor resistance is less than 328 ohms, the IPC displays 'SC' (short circuit) in the DIC and this corresponds to a temperature of 125° C (257°F). If the ambient air temperature sensor resistance is greater than 353.37K ohms, the IPC displays 'OC' (open circuit) in the DIC and this corresponds to a temperature less than −40°C (−40°F). The IPC displays '– –' in the DIC when the IPC receives an invalid signal or a loss of serial data communication.

Indicator/Warning Message Description and Operation

INDICATOR LIGHT ON

Refer to the OWNER'S MANUAL for the descriptions and explanations of all indicator lights.

For diagnosis and repair information related to an indicator light refer to the System Diagnosis and the Description of Operation that the message relates to.

MESSAGE DISPLAYED

Refer to the OWNER'S MANUAL for descriptions and explanations of all messages displayed.

For diagnosis and repair information related to a displayed message refer to the System Diagnosis and the Description of Operation that the message relates to.

CHANGE TIMING BELT MESSAGE

The Instrument Cluster monitors the odometer mileage to determine when timing belt (if equipped) replacement may be necessary. After the vehicle has accumulated approximately 100,000 miles (160,000 kilometers), the Instrument Cluster may display the CHANGE TIMING BELT message. After the engine timing belt has been replaced, reset the CHANGE TIMING BELT message by locating and removing the fuses that supply power to the Instrument Cluster for two minutes.

BRAKES OVERHEATED

The Electronic Brake Control Module monitors brake usage and compares it to an internal thermal model to determine if the brakes could become overheated. If the Electronic Brake Control Module determines the brakes pads have exceeded a desirable temperature based on the thermal model, it sends a serial data message to the Instrument Cluster to display the BRAKES OVERHEATED message. The message remains displayed until the estimated temperature returns to a desirable range.

Transmission Shift Lever Position Indicator

The Transmission Shift Lever Position Indicator (if equipped) is located on the center console and indicates the current transmission shift lever position. The Transmission Shift Lever Position Indicator receives power and ground and is controlled by the Body Control Module (BCM) via serial data. The Transmission Control Module determines transmission shift lever position based on signals from the Transmission Internal Mode Switch and sends the shift lever position information to the BCM via serial data.

Instrument Cluster Description and Operation

Displays Test

Certain instrument panel cluster (IPC) features are tested when the ignition is turned on in order to verify the features are working properly. The following occurs at key up:

- The air bag indicator flashes 7 times (not IPC controlled).
- The ABS indicator illuminates briefly.
- The battery indicator illuminates briefly.
- The brake indicator illuminates briefly.
- The cruise engage indicator illuminates briefly.
- The engine oil pressure indicator illuminates briefly.
- The malfunction indicator lamp (MIL) illuminates briefly (not IPC controlled).
- The seat belt indicator illuminates for 70 seconds or until the driver seat belt is latched (not IPC controlled).
- The security indicator illuminates briefly.
- The tire pressure low indicator illuminates briefly.
- The vehicle dynamics caution (VDC) indicator illuminates briefly.
- All segments of the driver information center (DIC) illuminate briefly.
- All odometer segments illuminate briefly.
- The PRNDL segment illuminates briefly.

Indicators and Warning Messages

Refer to *Indicator/Warning Message Description and Operation on page 8-31*, *Data Link Communications Description and Operation on page 11-15* , and *Body Control System Description and Operation on page 11-15*.

Engine Coolant Temperature Gauge

The instrument panel cluster (IPC) displays the engine coolant temperature as determined by the engine control module (ECM). The IPC receives a serial data message from the ECM indicating the engine coolant temperature. The engine coolant temperature gauge defaults to 60°C (140°F) or below if:

- The ECM detects a malfunction in the engine coolant temperature sensor circuit.
- The IPC detects a loss of serial data communications with the ECM.
- The body control module (BCM) detects a loss of serial communications with the ECM.

Fuel Gauge

The instrument panel cluster (IPC) displays the fuel level as determined by the ECM. The IPC receives a serial data message from the ECM indicating the fuel level percent. The fuel gauge defaults to empty if:

- The ECM detects a malfunction in the fuel level sensor circuit.
- The IPC detects a loss of serial data communications with the ECM

The fuel level sensor changes resistance in response to the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via the serial data circuit to the instrument cluster in order to control the fuel gauge. When the fuel level is less than a pre-determined value, the low fuel indicator illuminates in the IPC.

Fuel Gauge CNG

The alternative fuel tank pressure sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and a 5 V reference circuit. The compressed natural gas control module (CNGCM) monitors the signal of the pressure sensor to determine the amount of pressure in the tank. The CNGCM uses this signal in order to calculate the percentage of remaining gas in the tank and converts it to a PWM signal sent to the ECM. The ECM sends the fuel level percentage via the serial data circuit to the instrument cluster in order to control the fuel gauge.

Fuel Gauge LPG

The liquid propane gas control module monitors the signal of the of the primary fuel level sensor to determine the amount of liquid propane in the tank. The liquid propane gas control module uses this signal in order to calculate the percentage of remaining liquid propane gas in the tank and converts it to a PWM signal sent to the ECM. The ECM sends the fuel level percentage via the serial data to the instrument cluster in order to control the fuel gauge. The secondary fuel level sensor is only used as a input to the liquid propane gas control module to transfer fuel to the primary tank. The primary and secondary fuel level sensors have a resistance value of 40 to 240 Ohms. When the fuel tank is full, the resistance of the sensor should be around 40 Ohms and around 240 Ohms when empty.

Odometer

The vehicle odometer is calculated and stored electronically in the instrument panel cluster (IPC). The IPC contains a season odometer and trip odometer A or B. Momentarily press the DIC trip/fuel button on the IPC in order to toggle between the season odometer and the trip odometer. Press the DIC set/reset button for greater than 0.25 seconds, while the trip odometer is displayed, in order to reset the trip odometer. The IPC displays the vehicle mileage and trip mileage as determined by the IPC. The IPC calculates the mileage based on the serial data vehicle speed information from the ECM. The odometer will display 'error' if an internal IPC memory failure is detected. The odometer displays either miles or kilometers and can be set through the personalization programming menu in the DIC.

PRNDL Display

The IPC displays the selected gear position as determined by the ECM. The IPC receives a serial data message from the ECM indicating the gear position. The PRNDL display blanks if:

- The ECM detects a malfunction in the transmission range switch circuit.
- The IPC detects a loss of serial data communications with the ECM.

Speedometer

The IPC displays the vehicle speed as determined by the ECM. The IPC calculates the mileage based on the serial data vehicle speed information from the ECM. The speedometer defaults to 0 km/h (0 mph) if the IPC detects a loss of serial data communications with the ECM.

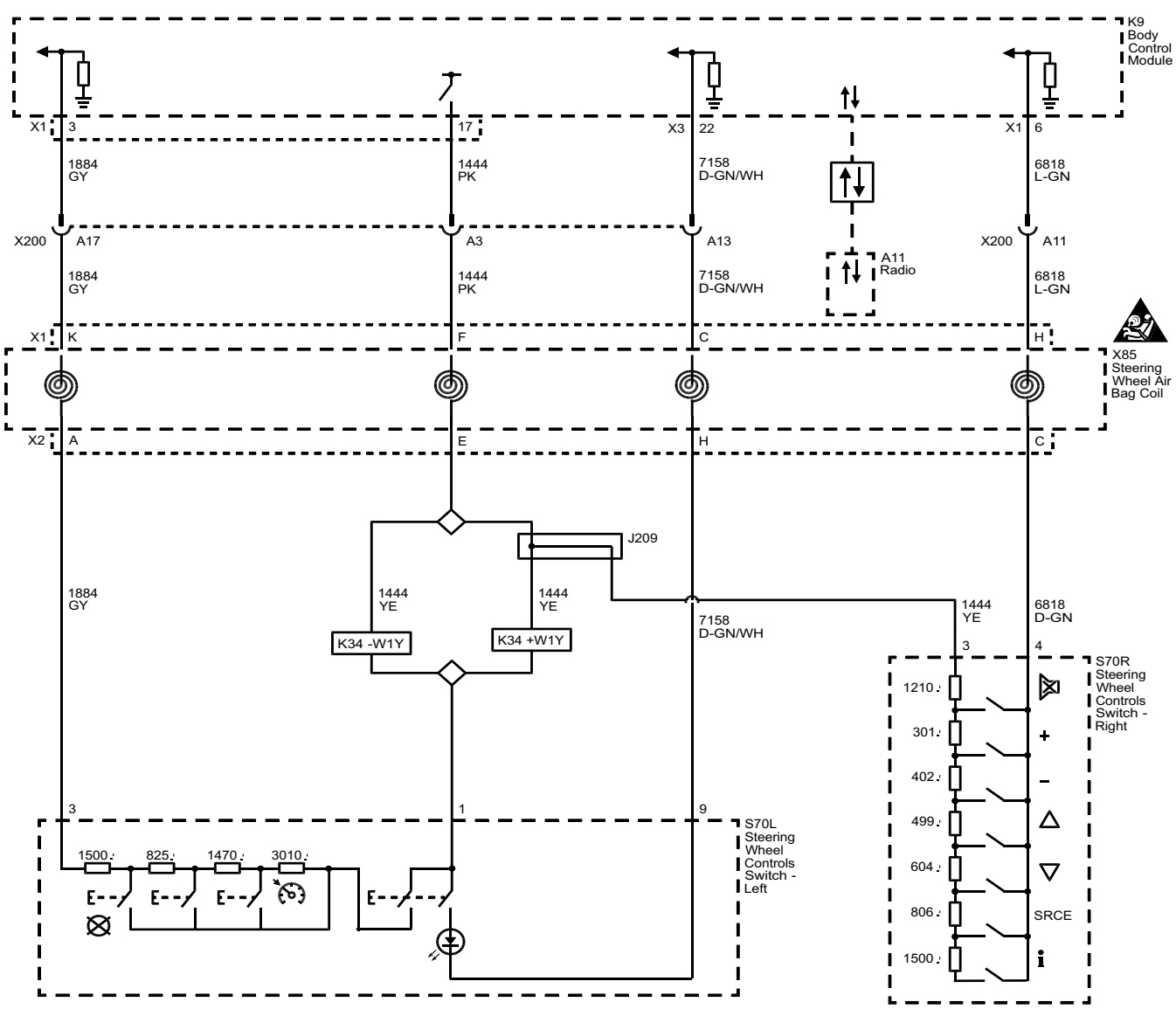
Battery Gauge

The instrument panel cluster (IPC) displays the voltage as determined by the regulated voltage control (RVC). The IPC receives a serial data message from the BCM indicating the battery voltage. When the engine is ON, the gauge should be between 10–16 volts. The gauge will default to 0 volts if the IPC detects a loss of communication with the BCM.

Secondary and Configurable Customer Controls

Schematic and Routing Diagrams

Steering Wheel Secondary/Configurable Control Schematics (Steering Wheel Secondary/Configurable Controls)



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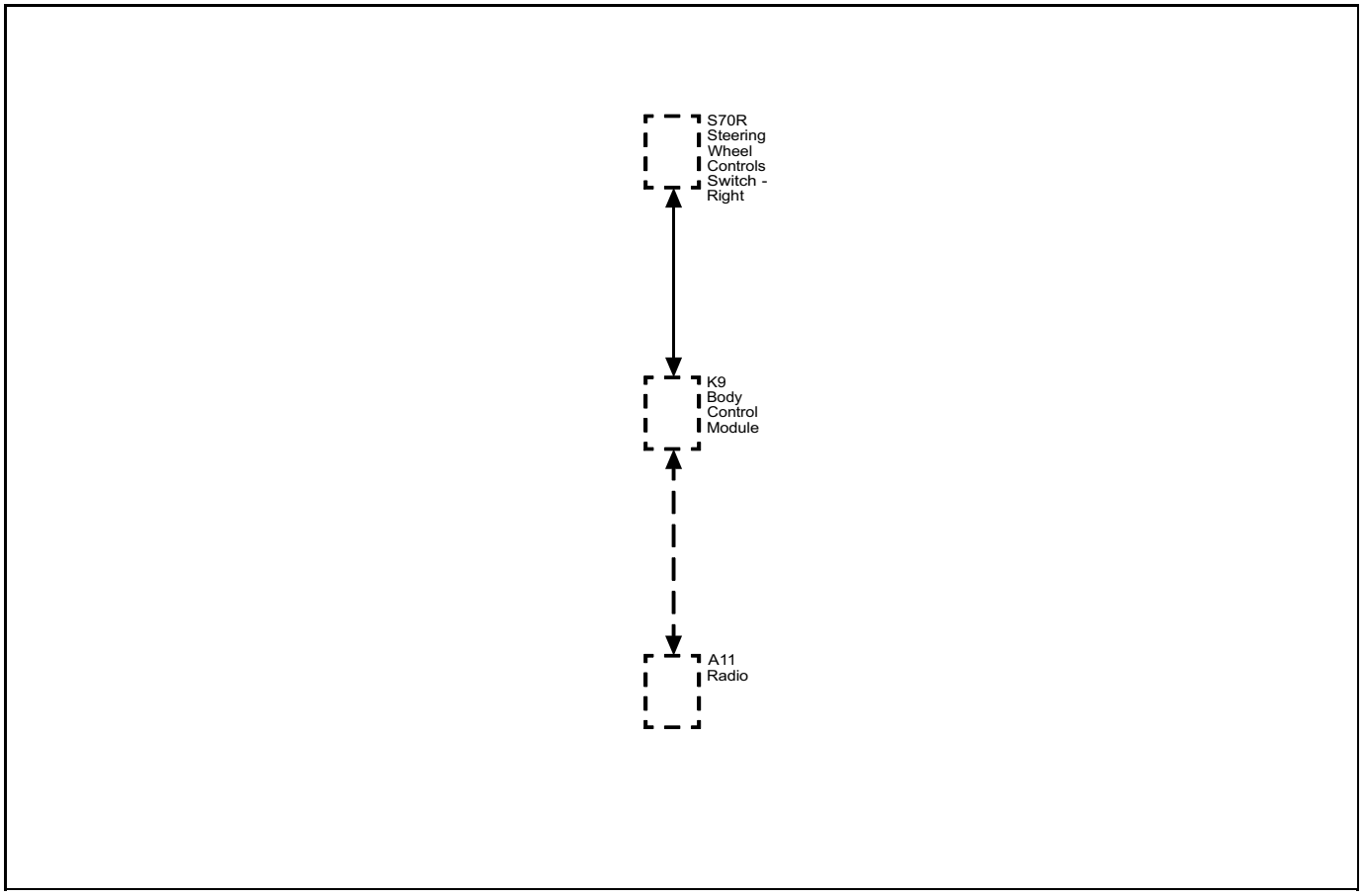
Description and Operation

Steering Wheel Controls Description and Operation

Steering Wheel Controls Block Diagram



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The steering wheel control switches duplicate the function of the primary controls of the associated component, through a network of momentary contact switches and a series of resistors. The body control module (BCM) supplies voltage to the switches and monitors the return signal. When a switch is pressed, a specific voltage drops across the resistor unique to that switch. The BCM identifies the switch selected and sends a serial data message to the component controlled by the switch, activating the feature.

This section is intended to diagnose the circuits between the BCM and the steering wheel control switches. If the primary control for the device is inoperative, refer to the appropriate section for the component the steering wheel control switch is used for.

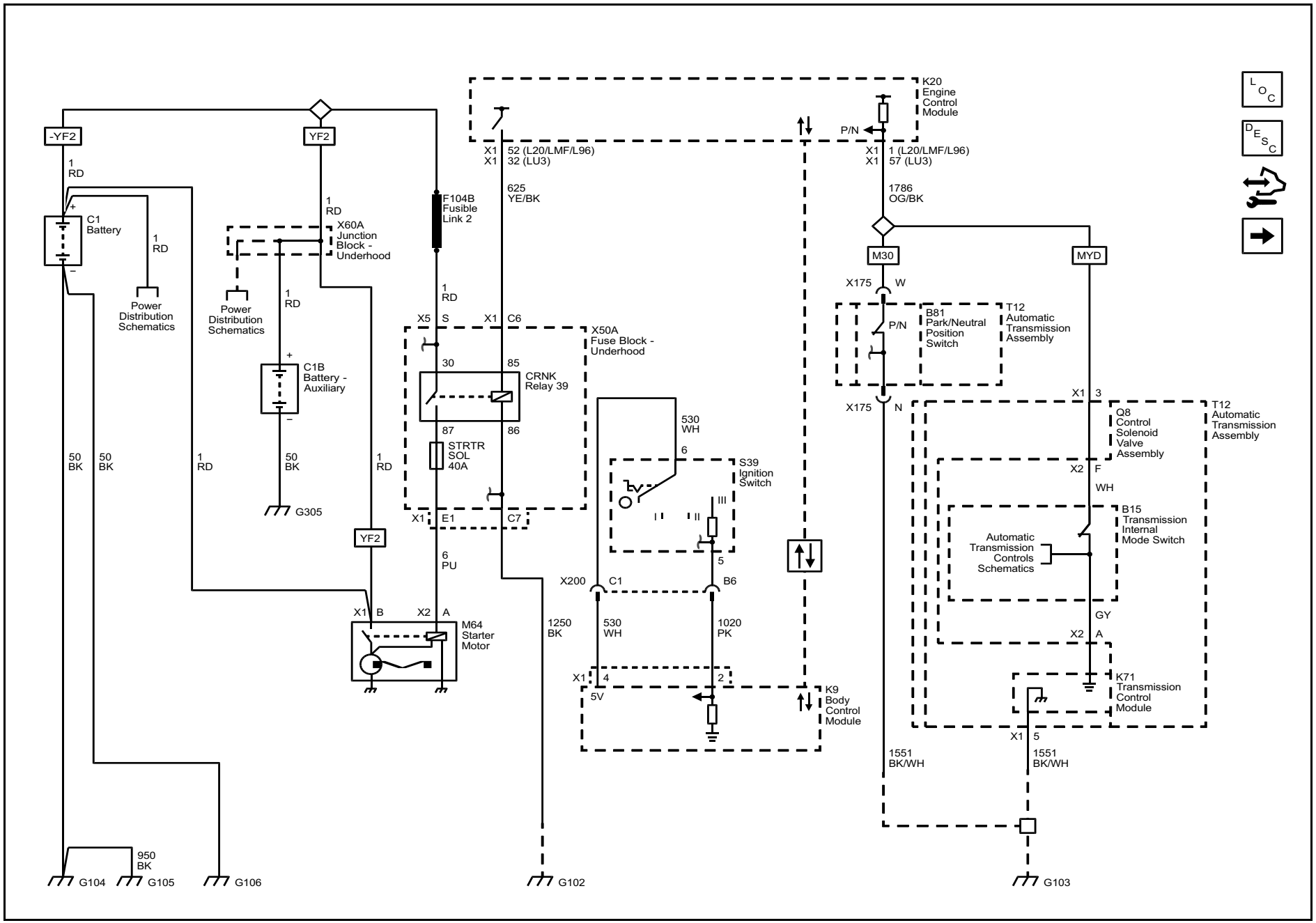
Section 9

Engine/Propulsion

12 V Starting and Charging

Schematic and Routing Diagrams

Starting and Charging Schematics (Starting System (Gas))



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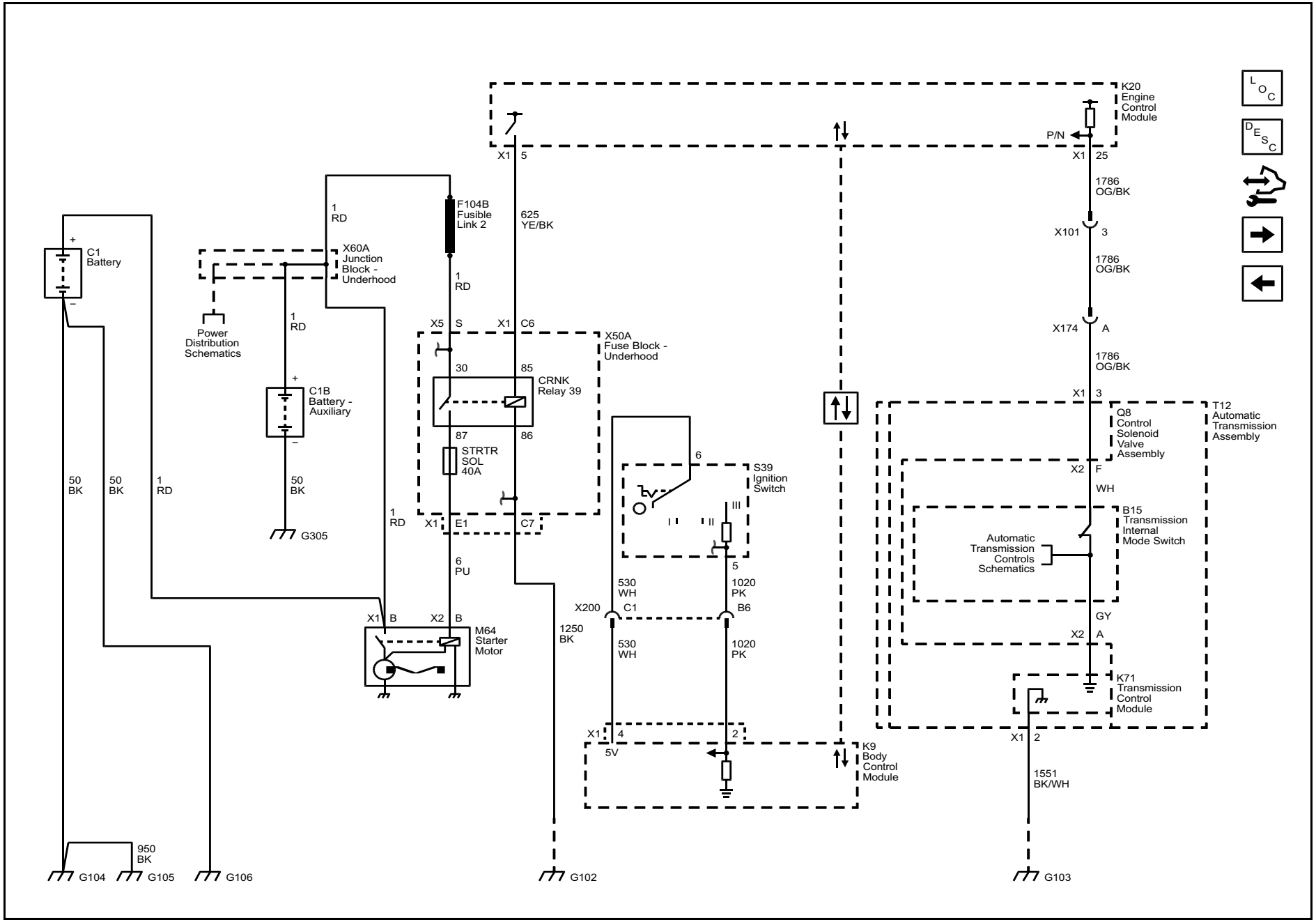
Starting and Charging Schematics (Starting System (Diesel))



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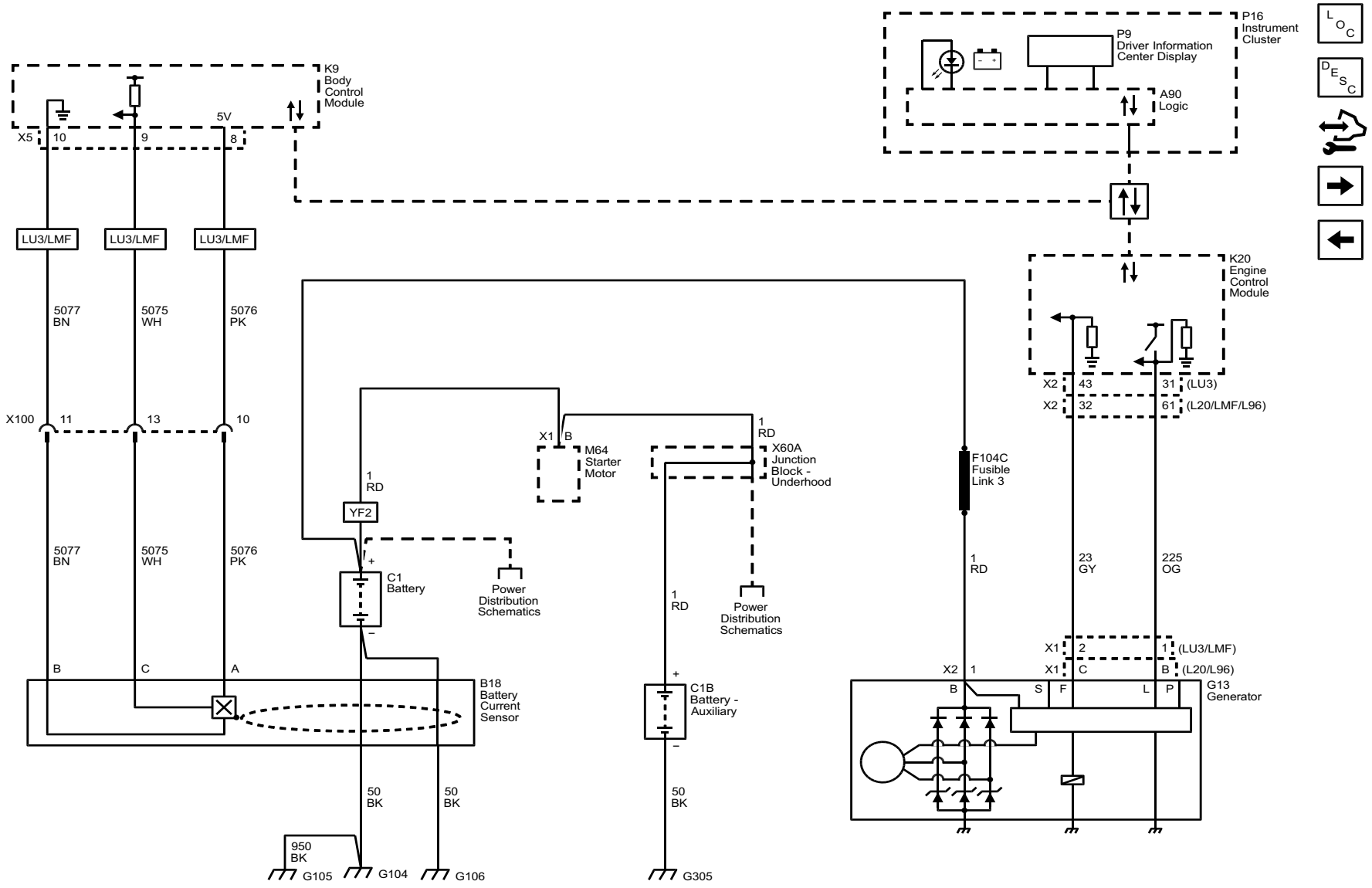
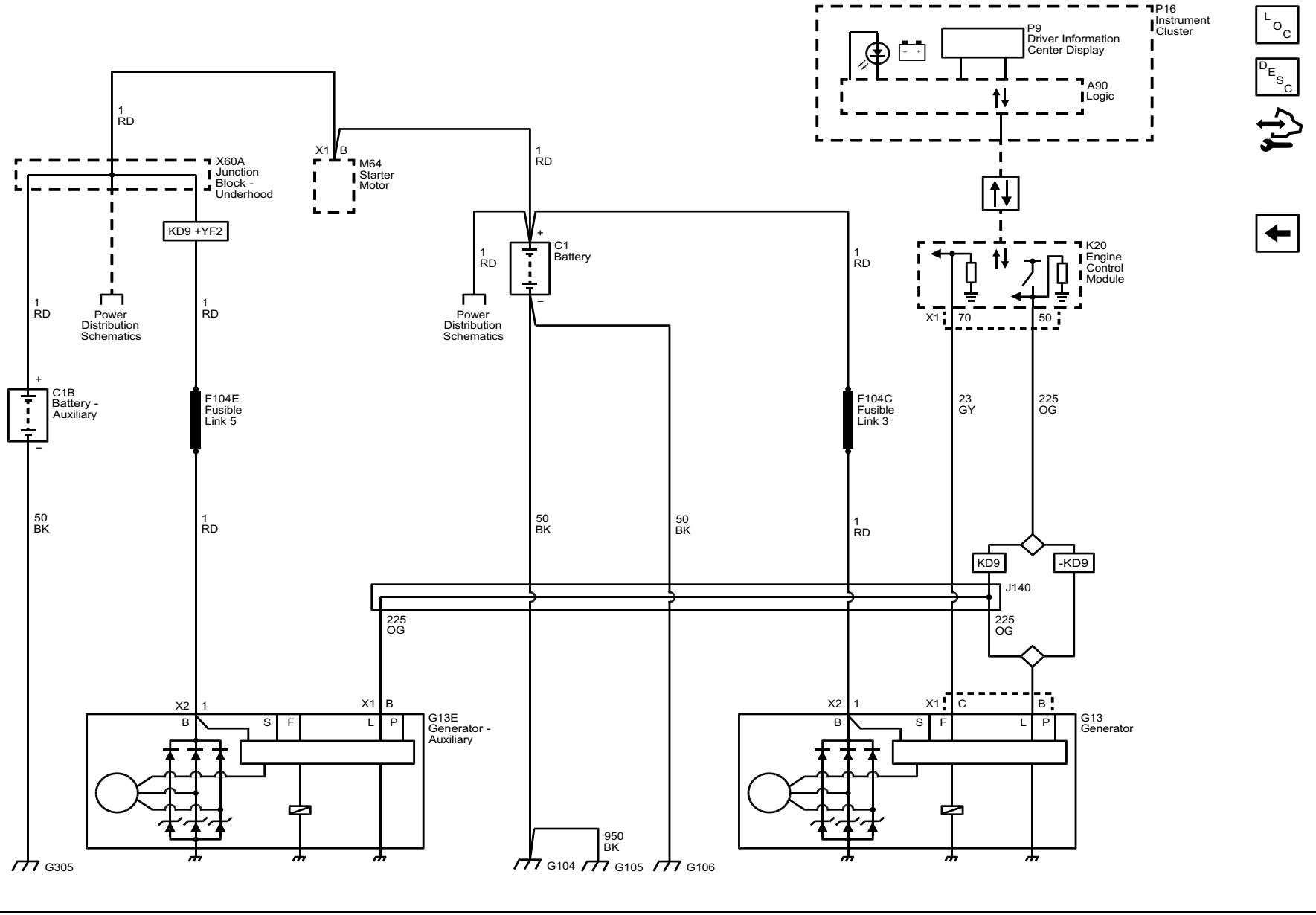
Starting and Charging Schematics (Charging System (Gas))



Starting and Charging Schematics (Charging System (Diesel))



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Description and Operation

Charging System Description and Operation

Electrical Power Management Overview

The electrical power management system is designed to monitor and control the charging system and send diagnostic messages to alert the driver of possible problems with the battery and generator. This electrical power management system primarily utilizes existing on-board computer capability to maximize the effectiveness of the generator, to manage the load, improve battery state-of-charge and life, and minimize the system's impact on fuel economy. The electrical power management system performs 3 functions:

- It monitors the battery voltage and estimates the battery condition.
- It takes corrective actions by boosting idle speeds, and adjusting the regulated voltage.
- It performs diagnostics and driver notification.

The battery condition is estimated during ignition-off and during ignition-on. During ignition-off the state-of-charge of the battery is determined by measuring the open-circuit voltage. The state-of-charge is a function of the acid concentration and the internal resistance of the battery, and is estimated by reading the battery open circuit voltage when the battery has been at rest for several hours.

The state-of-charge can be used as a diagnostic tool to tell the customer or the dealer the condition of the battery. Throughout ignition-on, the algorithm continuously estimates state-of-charge based on adjusted net amp hours, battery capacity, initial state-of-charge, and temperature.

While running, the battery degree of discharge is primarily determined by a battery current sensor, which is integrated to obtain net amp hours.

In addition, the electrical power management function is designed to perform regulated voltage control to improve battery state-of-charge, battery life, and fuel economy. This is accomplished by using knowledge of the battery state-of-charge and temperature to set the charging voltage to an optimum battery voltage level for recharging without detriment to battery life.

The Charging System Description and Operation is divided into 3 sections. The first section describes the charging system components and their integration into the electrical power management. The second section describes charging system operation. The third section describes the instrument panel cluster operation of the charge indicator, driver information center messages, and voltmeter operation.

Charging System Components

Generator

The generator is a serviceable component. If there is a diagnosed failure of the generator it must be replaced as an assembly. The engine drive belt drives the generator. When the rotor is spun it induces an alternating current (AC) into the stator windings. The AC voltage is then sent through a series of diodes for rectification. The rectified voltage has been converted into a direct current (DC) for use by the vehicles electrical system to maintain electrical loads and the battery charge. The voltage regulator integral to the generator controls the output of the generator. It is not serviceable. The voltage regulator controls the amount of current provided to the rotor. If the generator has field control circuit failure, the generator defaults to an output voltage of 13.8 V.

Body Control Module (BCM)

The body control module (BCM) is a GMLAN device. It communicates with the engine control module (ECM) and the instrument panel cluster for electrical power management (electrical power management) operation. The BCM determines the output of the generator and sends the information to the ECM for control of the generator turn on signal circuit. It monitors the generator field duty cycle signal circuit information sent from the ECM for control of the generator. It monitors a battery current sensor, the battery positive voltage circuit, and estimated battery temperature to determine battery state of charge. The BCM performs idle boost.

Battery Current Sensor

The battery current sensor is a serviceable component that is connected to either the negative or positive battery cable at the battery. The battery current sensor is a 3-wire hall effect current sensor. The battery current sensor monitors the battery current. It directly inputs to the BCM. It creates a 5-volt pulse width modulation (PWM) signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–95 percent. Between 0–5 percent and 95–100 percent are for diagnostic purposes.

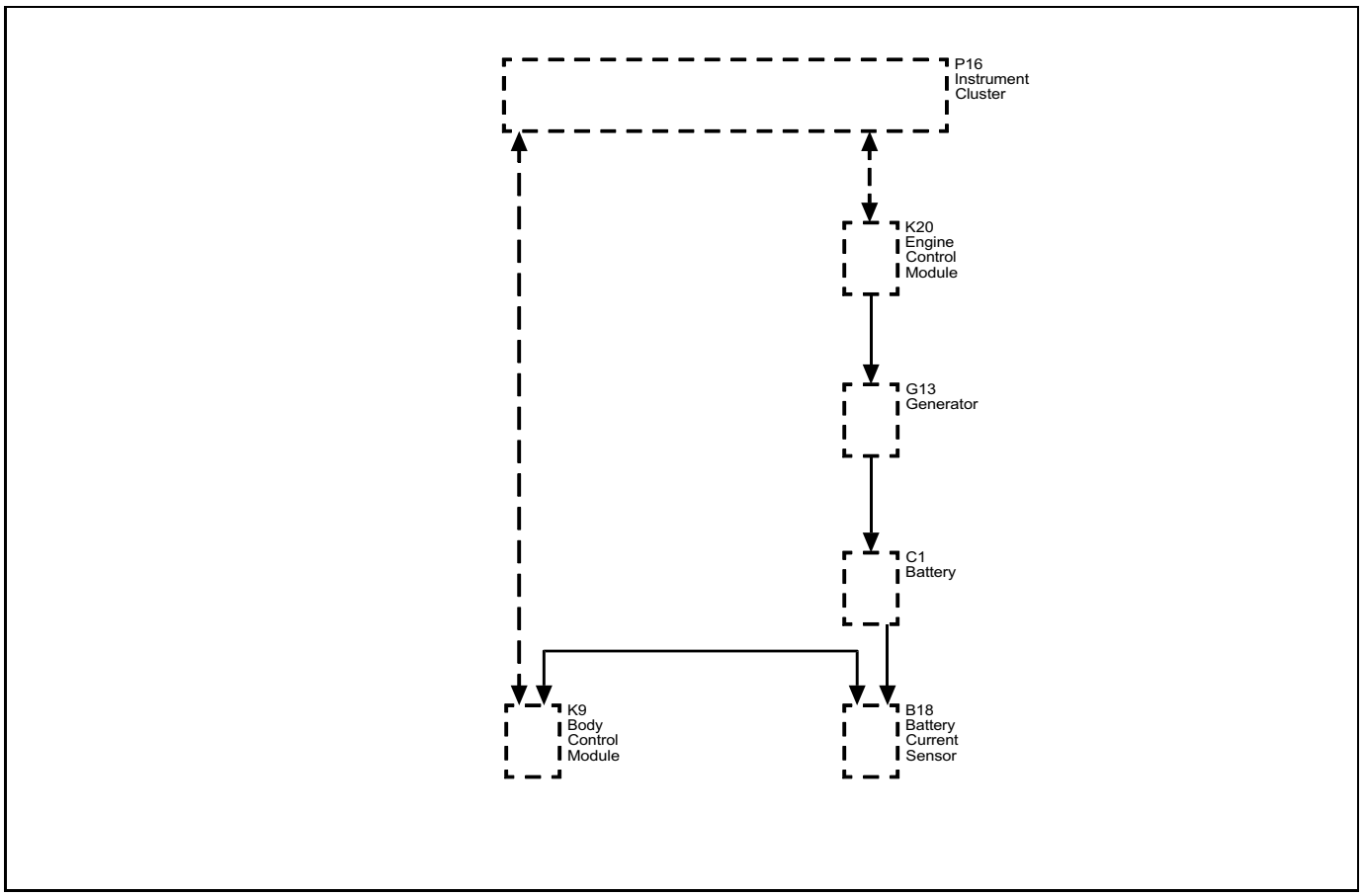
Engine Control Module (ECM)

When the engine is running, the generator turn-on signal is sent to the generator from the ECM, turning on the regulator. The generator's voltage regulator controls current to the rotor, thereby controlling the output voltage. The rotor current is proportional to the electrical pulse width supplied by the regulator. When the engine is started, the regulator senses generator rotation by detecting AC voltage at the stator through an internal wire. Once the engine is running, the regulator varies the field current by controlling the pulse width. This regulates the generator output voltage for proper battery charging and electrical system operation. The generator field duty terminal is connected internally to the voltage regulator and externally to the ECM. When the voltage regulator detects a charging system problem, it grounds this circuit to signal the ECM that a problem exists. The ECM monitors the generator field duty cycle signal circuit, and receives control decisions based on information from the BCM.

Instrument Panel Cluster

The instrument panel cluster provides the customer notification in case a concern with the charging system. There are 2 means of notification, a charge indicator and a driver information center message of SERVICE BATTERY CHARGING SYSTEM if equipped.

Charging System Block Diagram



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Charging System Operation

The purpose of the charging system is to maintain the battery charge and vehicle loads. There are 6 modes of operation and they include:

- Battery Sulfation Mode
- Charge Mode
- Fuel Economy Mode
- Headlamp Mode
- Start Up Mode
- Voltage Reduction Mode

The engine control module (ECM) controls the generator through the generator turn ON signal circuit. The ECM monitors the generator performance though the generator field duty cycle signal circuit. The signal is a pulse width modulation (PWM) signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–95 percent. Between 0–5 percent and 95–100 percent are for diagnostic purposes. The following table shows the commanded duty cycle and output voltage of the generator:

Commanded Duty Cycle	Generator Output Voltage
10%	11 V
20%	11.56 V
30%	12.12 V
40%	12.68 V
50%	13.25 V
60%	13.81 V
70%	14.37 V
80%	14.94 V
90%	15.5 V

The generator provides a feedback signal of the generator voltage output through the generator field duty cycle signal circuit to the ECM. This information is sent to the body control module (BCM). The signal is PWM signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–99 percent. Between 0–5 percent and 100 percent are for diagnostic purposes.

Battery Sulfation Mode

The BCM will enter this mode when the interpreted generator output voltage is less than 13.2 V for 45 minutes. When this condition exists the BCM will enter Charge Mode for 2–3 minutes. The BCM will then determine which mode to enter depending on voltage requirements.

Charge Mode

The BCM will enter Charge Mode when ever one of the following conditions are met.

- The wipers are ON for more than 3 seconds.
- GMLAN (Climate Control Voltage Boost Mode Request) is true, as sensed by the HVAC control head. High speed cooling fan, rear defogger and HVAC high speed blower operation can cause the BCM to enter the Charge Mode.
- The estimated battery temperature is less than 0° C (32°F).
- Battery State of Charge is less than 80 percent.
- Vehicle speed is greater than 145 km/h (90 mph)
- Current sensor fault exists.
- System voltage was determined to be below 12.56 V

When any one of these conditions is met, the system will set targeted generator output voltage to a charging voltage between 13.9–15.5 V, depending on the battery state of charge and estimated battery temperature.

Fuel Economy Mode

The BCM will enter Fuel Economy Mode when the estimated battery temperature is at least 0°C (32°F) but less than or equal to 80°C (176°F), the calculated battery current is less than 15 amperes and greater than −8 amperes, and the battery state-of-charge is greater than or equal to 80 percent. Its targeted generator output voltage is the open circuit voltage of the battery and can be between 12.5–13.1 V. The BCM will exit this mode and enter Charge Mode when any of the conditions described above are present.

Headlamp Mode

The BCM will enter Headlamp Mode when ever the headlamps are ON (high or low beams). Voltage will be regulated between 13.9–14.5 V.

Start Up Mode

When the engine is started the BCM sets a targeted generator output voltage of 14.5 V for 30 seconds.

Voltage Reduction Mode

The BCM will enter Voltage Reduction Mode when the calculated ambient air temperature is above 0°C (32° F). The calculated battery current is less than 1 ampere and greater than −7 amperes, and the generator field duty cycle is less than 99 percent. Its targeted generator output voltage is 12.9 V. The BCM will exit this mode once the criteria are met for Charge Mode.

Instrument Panel Cluster Operation

Charge Indicator Operation

The instrument panel cluster illuminates the charge indicator and displays a warning message in the driver information center if equipped, when the one or more of the following occurs:

- The engine control module (ECM) detects that the generator output is less than 11 V or greater than 16 V. The instrument panel cluster receives a GMLAN message from the ECM requesting illumination.
- The instrument panel cluster determines that the system voltage is less than 11 V or greater than 16 V for more than 30 seconds. The instrument panel cluster receives a GMLAN message from the body control module (BCM) indicating there is a system voltage range concern.
- The instrument panel cluster performs the displays test at the start of each ignition cycle. The indicator illuminates for approximately 3 seconds.

Display Message: BATTERY NOT CHARGING SERVICE CHARGING SYSTEM or SERVICE BATTERY CHARGING SYSTEM

The BCM and the ECM will send a serial data message to the driver information center for the BATTERY NOT CHARGING SERVICE CHARGING SYSTEM or SERVICE BATTERY CHARGING SYSTEM message to be displayed. It is commanded ON when a charging system DTC is a current DTC. The message is turned OFF when the conditions for clearing the DTC have been met.

Electrical Power Management Description and Operation (Gasoline)

The electrical power management is used to monitor and control the charging system and alert the driver of possible problems within the charging system. The electrical power management system makes the most efficient use of the generator output, improves the battery state-of-charge, extends battery life, and manages system electrical loads.

The load shed operation is a means of reducing electrical loads during a low voltage or low battery state-of-charge condition.

The idle boost operation is a means of improving generator performance during a low voltage or low battery state-of-charge condition.

Each electrical power management function, either idle boost or load shed, is discrete. No two functions are active at the same time. Idle boost is activated in incremental steps, idle boost 1 must be active before idle boost 2 can be active. The criteria used by the body control module (BCM) to regulate electrical power management are outlined below:

Function	Battery Temperature Calculation	Battery Voltage Calculation	Amp-Hour Calculation	Action Taken
Idle Boost 1 Start	Less Than −15°C (5°F)	Less Than 13 V	—	First level Idle boost requested
Idle Boost 1 Start	—	—	Battery has a net loss greater than 0.6 AH	First level Idle boost requested
Idle Boost 1 Start	—	Less Than 10.9 V	—	First level Idle boost requested
Idle Boost 1 End	Greater Than −15°C (5°F)	Greater Than −12 V	Battery has a net loss less than 0.2 AH	First level Idle boost request cancelled
Load Shed 1 Start	—	—	Battery has a net loss of 4 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 20% of their cycle
Load Shed 1 Start	—	Less Than 10.9 V	—	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 20% of their cycle
Load Shed 1 End	—	Greater Than 12 V	Battery has a net loss of less than 2 AH	Clear Load Shed 1
Idle Boost 2 Start	—	—	Battery has a net loss greater than 1.6 AH	Second level Idle boost requested
Idle Boost 2 Start	—	Less Than 10.9 V	—	Second level Idle boost requested
Idle Boost 2 End	—	Greater Than 12 V	Battery has a net loss less than 0.8 AH	Second level Idle boost request cancelled
Idle Boost 3 Start	—	—	Battery has a net loss of 10.0 AH	Third level Idle boost requested
Idle Boost 3 Start	—	Less Than 10.9 V	—	Third level Idle boost requested
Idle Boost 3 End	—	Greater Than 12 V	Battery has a net loss of less than 6.0 AH	Third level Idle boost request cancelled
Load Shed 2 Start	—	Less Than 10.9 V	Battery has a net loss greater than 12 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 50% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 2 Start	—	Less Than 10.9 V	—	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 50% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 2 End	—	Greater Than 12.6 V	Battery has a net loss of less than 10.5 AH	Clear Load Shed 2

Function	Battery Temperature Calculation	Battery Voltage Calculation	Amp-Hour Calculation	Action Taken
Load Shed 3 Start	—	Less Than 11.9 V	Battery has a net loss greater than 20 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 100% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 3 End	—	Greater Than 12.6 V	Battery has a net loss of less than 15 AH	Clear Load Shed 3

Electrical Power Management Description and Operation (Diesel)

The electrical power management is used to monitor and control the charging system and alert the driver of possible problems within the charging system. The electrical power management system makes the most efficient use of the generator output, improves the battery state-of-charge, extends battery life, and manages system electrical loads.

The load shed operation is a means of reducing electrical loads during a low voltage or low battery state-of-charge condition.

The idle boost operation is a means of improving generator performance during a low voltage or low battery state-of-charge condition. Idle boost consists of three steps: idle boost 1, idle boost 2, and idle boost 3 (approximately 725, 850, and 850 rpm respectively). Idle boost is activated in incremental steps, idle boost 1 must be active before idle boost 2 can be active.

Each electrical power management function, either idle boost or load shed, is discrete. No two functions are active at the same time. The criteria used by the body control module (BCM) to regulate electrical power management are outlined below:

Function	Battery Temperature Calculation	Battery Voltage Calculation	Amp-Hour Calculation	Action Taken
Idle Boost 1 Start	Less Than −15°C (5°F)	Less Than 13 V	—	First level Idle boost requested
Idle Boost 1 Start	—	—	Battery has a net loss greater than 0.6 AH	First level Idle boost requested
Idle Boost 1 Start	—	Less Than 10.9 V	—	First level Idle boost requested
Idle Boost 1 End	Greater Than −15°C (5°F)	Greater Than −12 V	Battery has a net loss less than 0.2 AH	First level Idle boost request cancelled
Load Shed 1 Start	—	—	Battery has a net loss of 4 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 20% of their cycle
Load Shed 1 Start	—	Less Than 10.9 V	—	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 20% of their cycle
Load Shed 1 End	—	Greater Than 12 V	Battery has a net loss of less than 2 AH	Clear Load Shed 1
Idle Boost 2 Start	—	—	Battery has a net loss greater than 1.6 AH	Second level Idle boost requested
Idle Boost 2 Start	—	Less Than 10.9 V	—	Second level Idle boost requested
Idle Boost 2 End	—	Greater Than 12 V	Battery has a net loss less than 0.8 AH	Second level Idle boost request cancelled
Idle Boost 3 Start	—	—	Battery has a net loss of 10.0 AH	Third level Idle boost requested
Idle Boost 3 Start	—	Less Than 10.9 V	—	Third level Idle boost requested
Idle Boost 3 End	—	Greater Than 12 V	Battery has a net loss of less than 6.0 AH	Third level Idle boost request cancelled

Function	Battery Temperature Calculation	Battery Voltage Calculation	Amp-Hour Calculation	Action Taken
Load Shed 2 Start	—	Less Than 10.9 V	Battery has a net loss greater than 12 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 50% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 2 Start	—	Less Than 10.9 V	—	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 50% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 2 End	—	Greater Than 12.6 V	Battery has a net loss of less than 10.5 AH	Clear Load Shed 2
Load Shed 3 Start	—	Less Than 11.9 V	Battery has a net loss greater than 20 AH	Rear Defrost, Heated Mirrors, Heated Seats cycled OFF for 100% of their cycle. The BATTERY SAVER ACTIVE message will be displayed on the DIC
Load Shed 3 End	—	Greater Than 12.6 V	Battery has a net loss of less than 15 AH	Clear Load Shed 3

Starting System Description and Operation

The starter motors are non-repairable starter motors. They have pole pieces that are arranged around the armature. Both solenoid windings are energized. The pull-in winding circuit is completed to the ground through the starter motor. The windings work together magnetically to pull and hold in the plunger. The plunger moves the shift lever. This action causes the starter drive assembly to rotate on the armature shaft spline as it engages with the flywheel ring gear on the engine. Moving at the same time, the plunger also closes the solenoid switch contacts in the starter solenoid. Full battery voltage is applied directly to the starter motor and it cranks the engine.

As soon as the solenoid switch contacts close, current stops flowing thorough the pull-in winding because battery voltage is applied to both ends of the windings. The hold-in winding remains energized. Its magnetic field is strong enough to hold the plunger, shift lever, starter drive assembly, and solenoid switch contacts in place to continue cranking the engine. When the engine starts, pinion overrun protects the armature from excessive speed until the switch is opened.

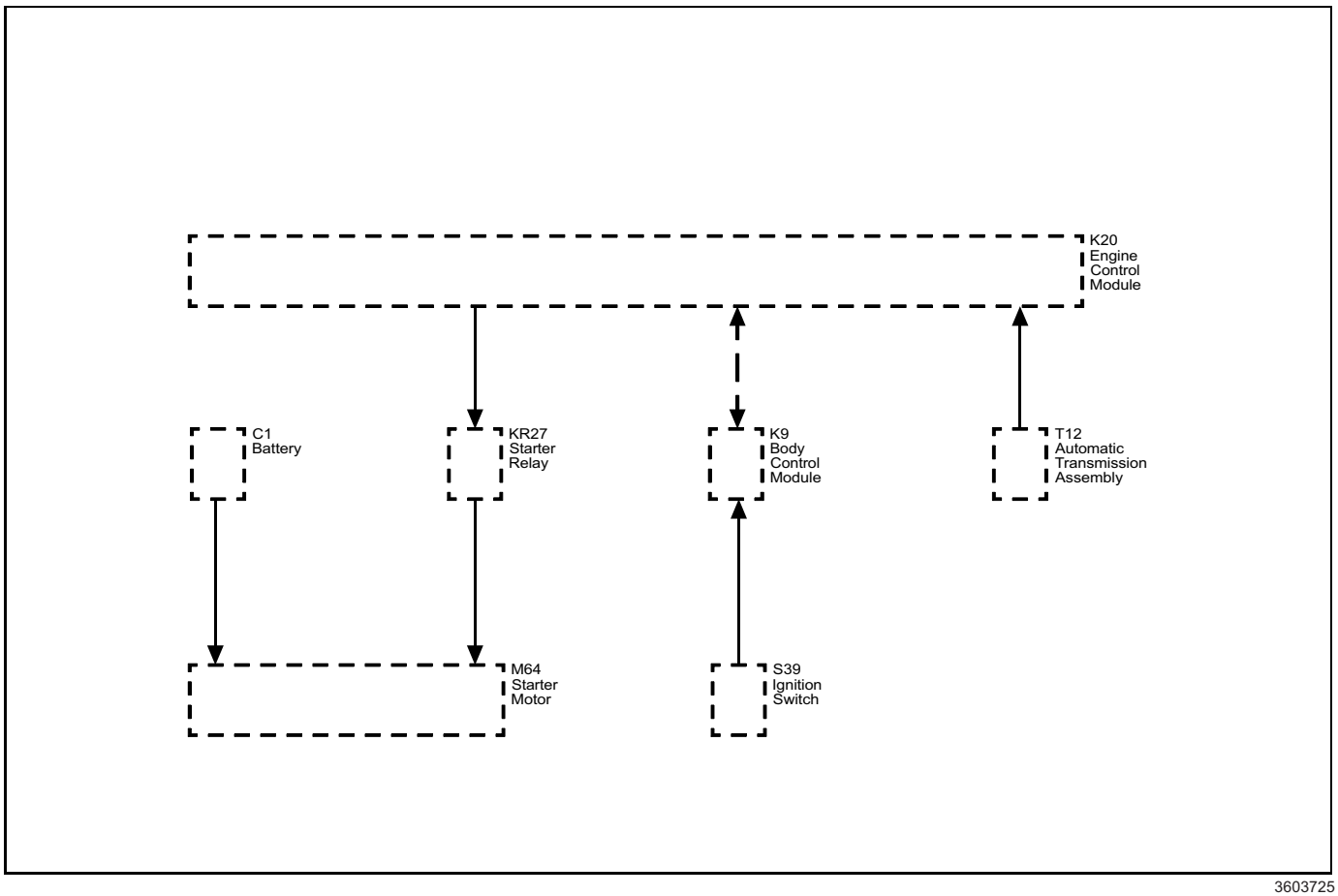
When the ignition switch is released from the START position, the START relay opens and battery voltage is removed from the starter solenoid S terminal. Current flows from the motor contacts through both windings to the ground at the end of the hold-in winding. However, the direction of the current flow through the pull-in winding is now opposite the direction of the current flow when the winding was first energized.

The magnetic fields of the pull-in and hold-in windings now oppose one another. This action of the windings, along with the help of the return spring, causes the starter drive assembly to disengage and the solenoid switch contacts to open simultaneously. As soon as the contacts open, the starter circuit is turned off.

Circuit Description (Key Start)

When the ignition switch is placed in the Start position, a discrete signal is supplied to the body control module (BCM) notifying it that the ignition is in the Start position. The BCM then sends a message to the engine control module (ECM) notifying it that CRANK has been requested. The ECM verifies that the transmission is in Park or Neutral. If it is, the ECM then supplies 12 V to the control circuit of the crank relay. When this occurs, battery positive voltage is supplied through the switch side of the crank relay to the S terminal of the starter solenoid.

Starting System Block Diagram



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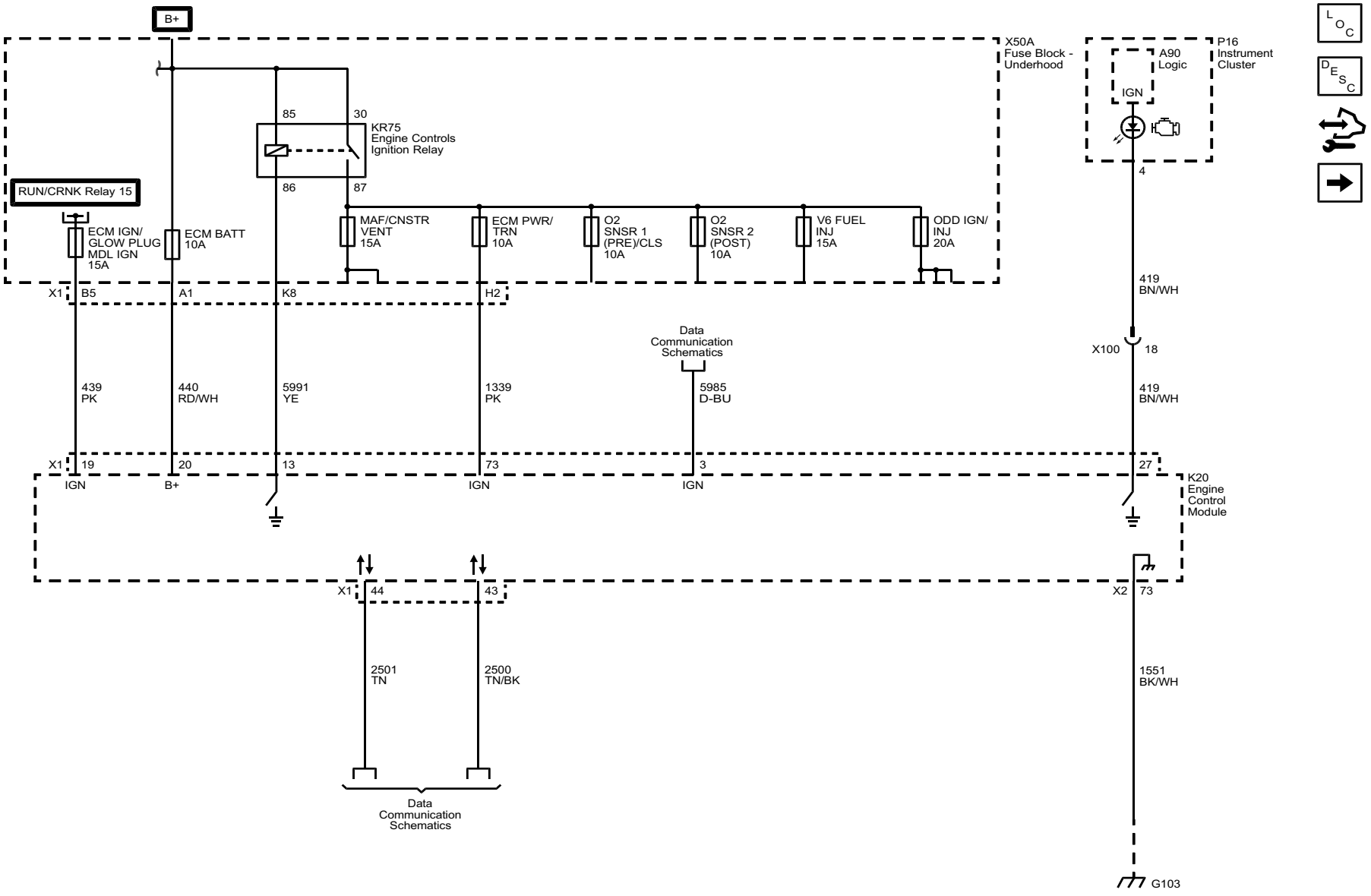
Engine Controls and Fuel - 4.3L (LU3)

Schematic and Routing Diagrams

Engine Controls Schematics (Module Power, Ground, Serial Data and MIL)



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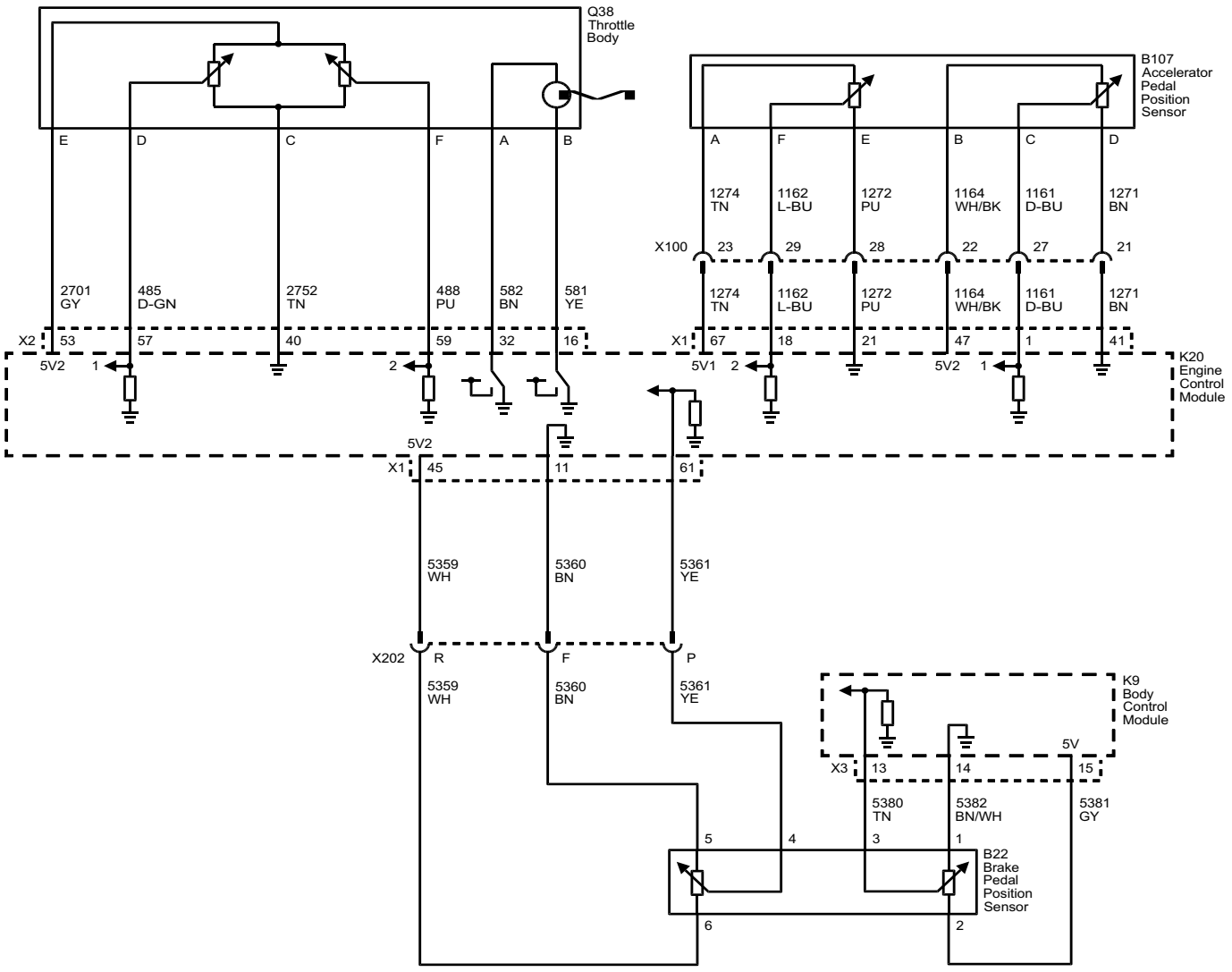
Engine Controls Schematics (Engine Data Sensors - Throttle Controls)

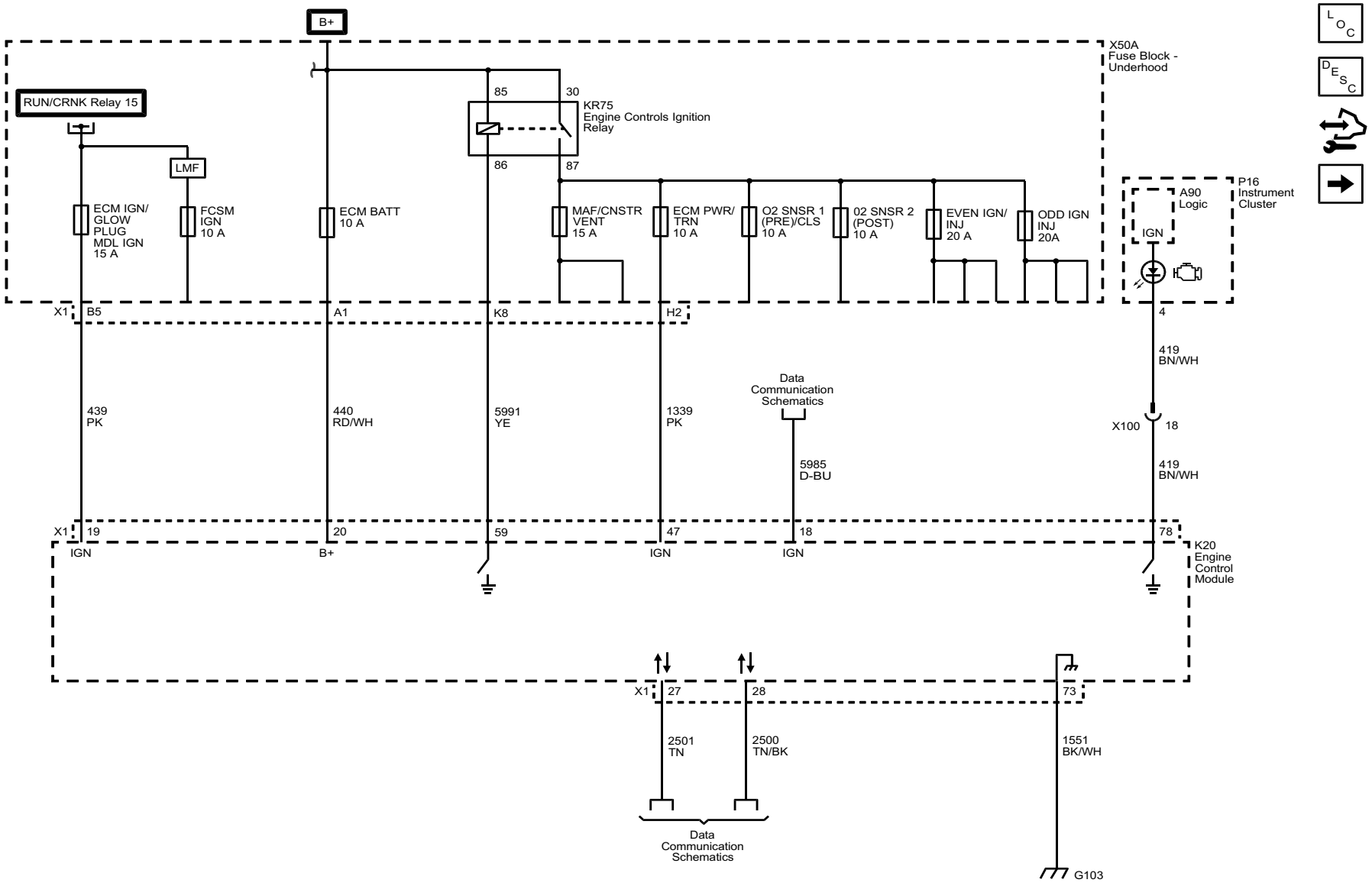


3395189

Engine Controls and Fuel - 4.8L (L20), 5.3L (LMF), or 6.0L (L96 LC8)

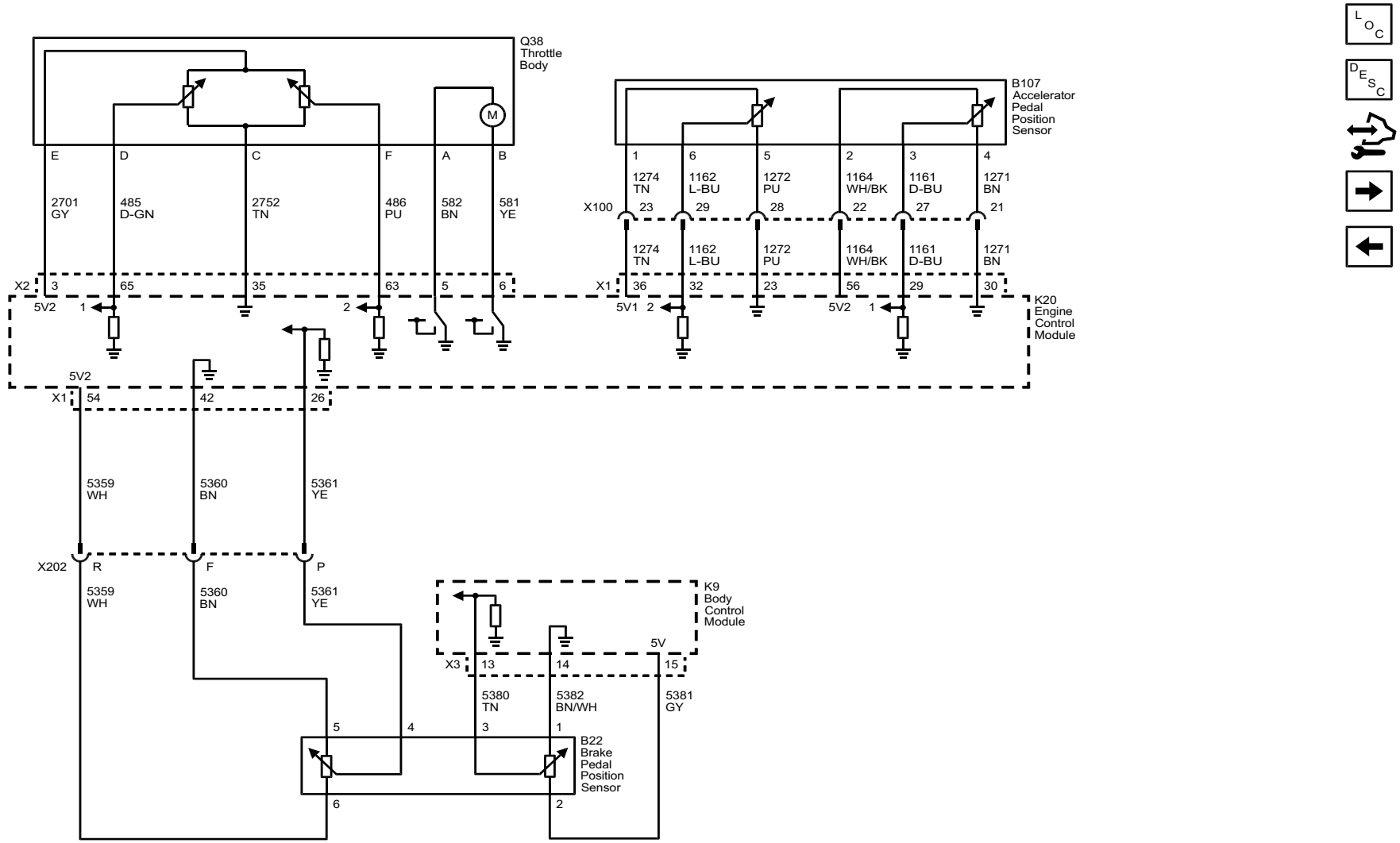
Schematic and Routing Diagrams

Engine Controls Schematics (Module Power, Ground, Serial Data and MIL)



3395214

Engine Controls Schematics (Engine Data Sensors - Throttle Controls)

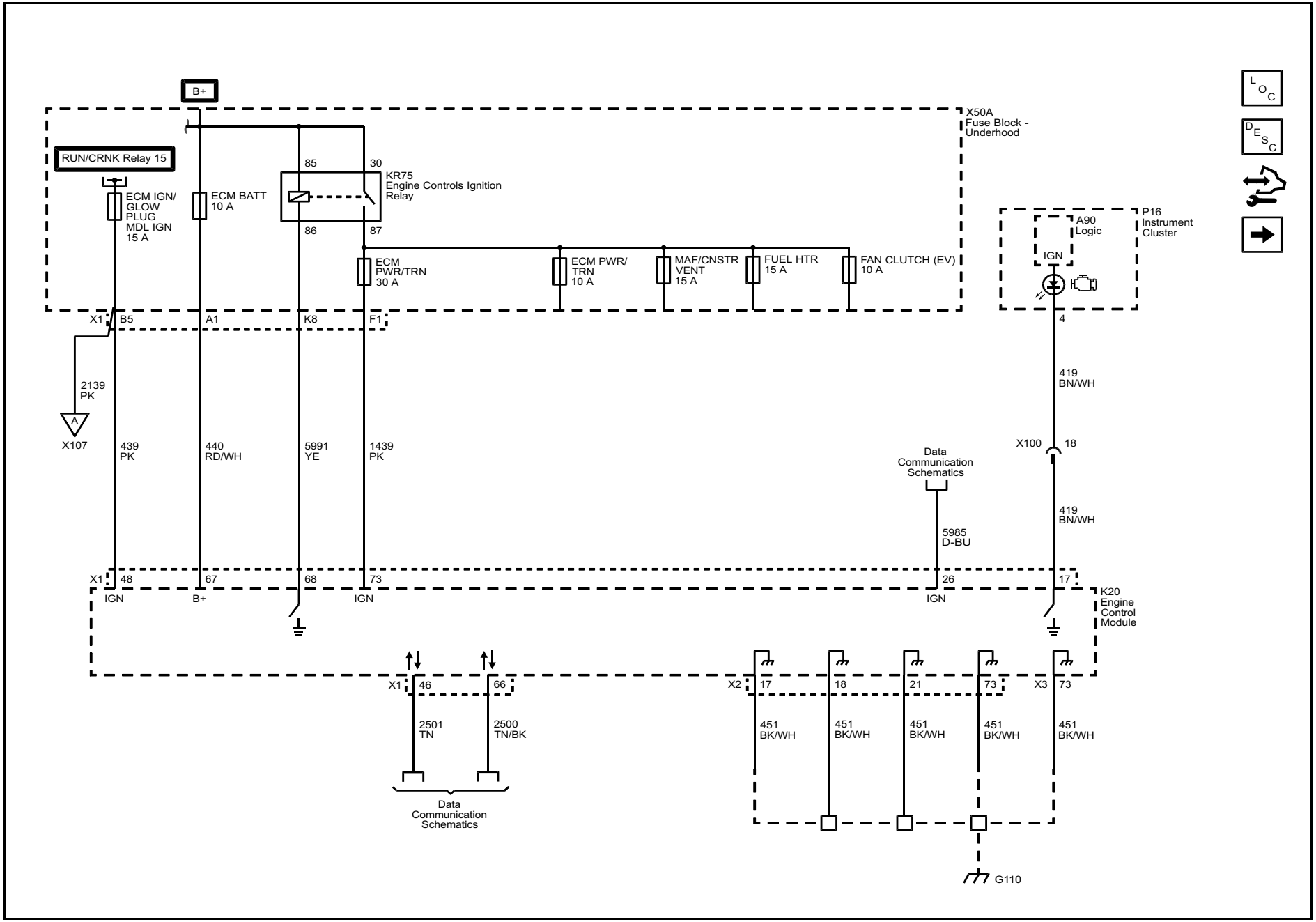


3395231

Engine Controls and Fuel - 6.6L (LGH)

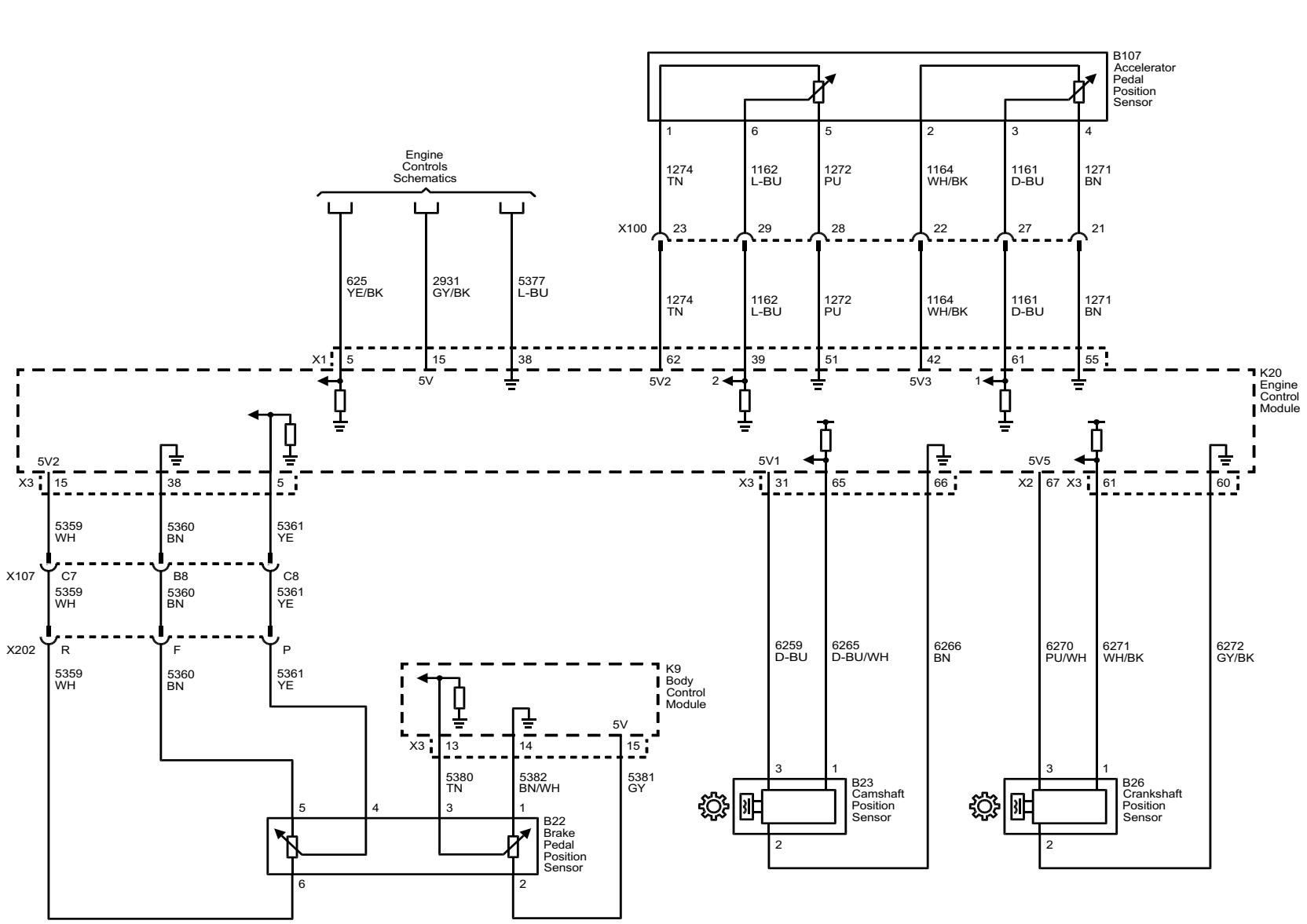
Schematic and Routing Diagrams

Engine Controls Schematics (Module Power, Ground, Serial Data and MIL)



3395273

Engine Controls Schematics (Engine Data Sensors - Pedal Position and Injector Timing)

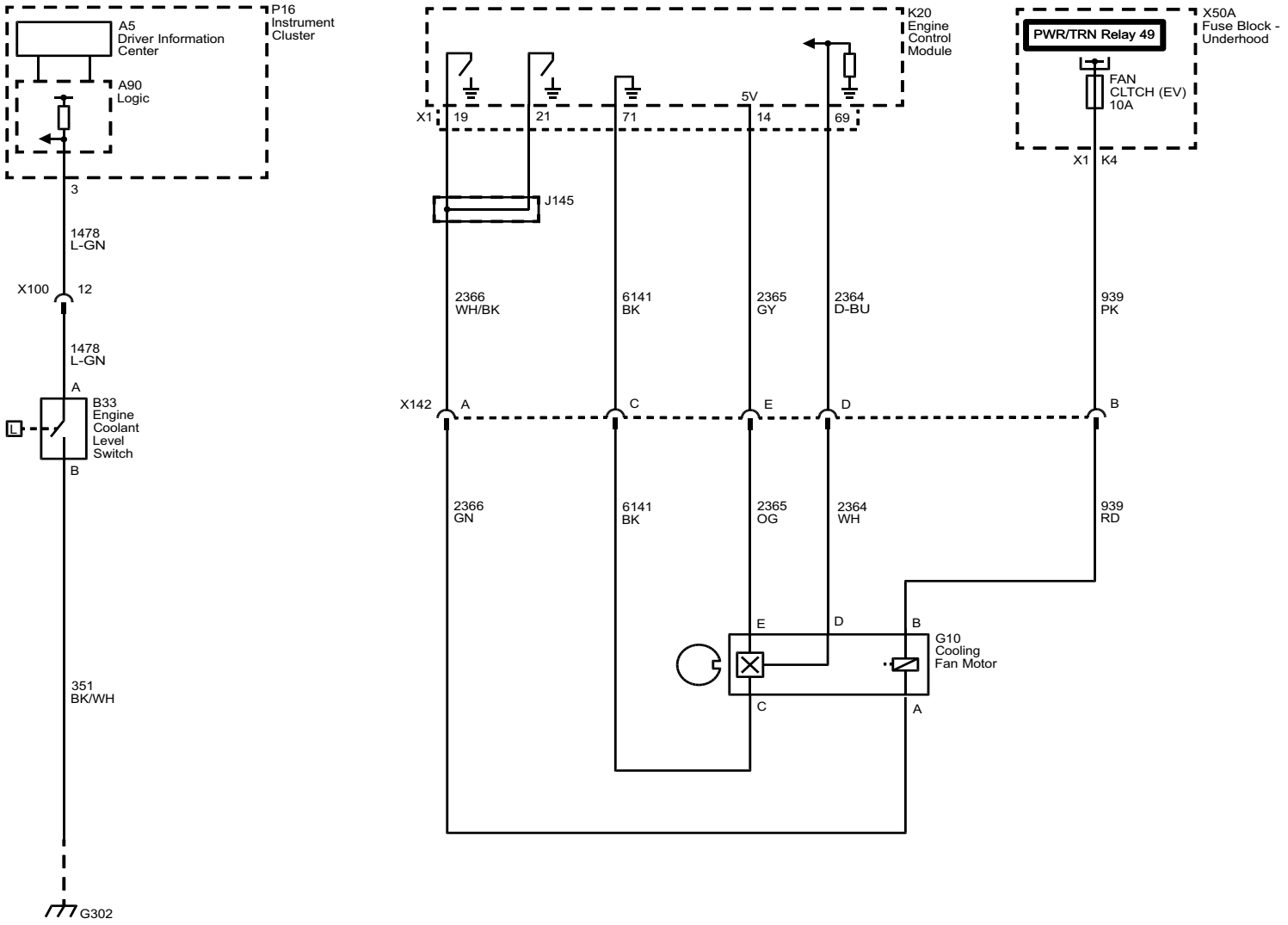


3395295

Engine Heating and Cooling

Schematic and Routing Diagrams

Engine Heating/Cooling Schematics (Engine Cooling (LGH))



3395316

Description and Operation

Cooling Fan Description and Operation (w/LGH)

Cooling Fan Control

The purpose of the electro-viscous (EV) fan clutch is to maintain powertrain cooling requirements. The engine control module (ECM) monitors the following sensors to regulate the fan speed:

- Engine coolant temperature
- A/C refrigerant pressure
- Vehicle speed
- Intake air temperature
- Transmission fluid temperature
- Ambient air temperature
- Cooling fan speed

The EV cooling fan clutch system enables the engine control module (ECM) to change the speed of the pulley driven cooling fan in relation to the engine speed. Ignition voltage is supplied directly to the fan clutch solenoid valve. The ECM uses two output drivers and a parallel circuit to directly control the EV fan clutch solenoid valve. The ECM controls the solenoid valve by pulse width modulating (PWM) the parallel control circuits to ground, with a solid state device called a driver. The ECM changes the cooling fan speed by increasing or decreasing the solenoid valve ON time, known as duty cycle. As the ECM command increases, so does the ON time of the solenoid. When the solenoid in the fan clutch is energized, it opens the spring loaded valve and allows fluid to flow from the storage chamber to the fluid coupling of the cooling fan clutch, increasing the fan speed. When the solenoid is de-energized, the spring loaded valve closes, and allows the fluid in the coupling of the fan clutch to drain back to the storage chamber, reducing fan speed. The rapid modulation of the fan clutch solenoid valve gives the ECM the ability to precisely control the amount of fluid that remains in the fluid coupler, allowing more effective regulation of the fan speed and powertrain cooling requirements.

The fan clutch supplies a feedback signal to the ECM, as an actual fan speed input. The fan speed sensor is a hall effect sensor which is internal to the fan clutch. The ECM supplies a 5-volt reference and a low reference to the hall effect sensor. The hall effect sensor returns a signal pulse through the cooling fan speed signal circuit in response to the reluctor track passing by the magnetic field of the hall effect sensor.

The scan tool can operate the cooling fan clutch. This is done through the controls function menu screen. Cooling fan clutch engagement can take up to 2 minutes with a 100 percent command and the engine speed at 2,000 RPM. The lower the engine speed, the longer it will take for the fan to engage. Cooling fan disengagement can take up to 2 minutes with the engine speed at 2,000 RPM. The lower the engine speed, the longer it will take to disengage. In lower ambient air temperatures the cooling fan will engage in less time, however, it will take longer to disengage due to the properties of the fluid vs. temperature.

Under certain conditions the cooling fan may be engaged at engine start. The cooling may have been engaged at the time the engine was turned off. Or, fluid may bleed from the storage chamber into the fluid coupling of the cooling fan clutch while the engine is off. Although the fan clutch is commanded off during a cold start, this is the most likely time a vehicle driver will notice that the fan noise is excessive in comparison to engine starts when the fan clutch is disengaged.

Cooling System Description and Operation

Coolant Heater

The optional engine coolant heater (RPO KO5) is designed to warm the coolant in the engine block area for improved starting in very cold weather (temperatures below −29°C (−20°F). The coolant heater helps reduce fuel consumption when a cold engine is warming up. The engine coolant heater operates using AC external power and a heating element installed in the water jacket of the engine block. The heating element warms the coolant when the heater cord is plugged into an AC power source.

The unit is equipped with a detachable AC power cord. A weather shield on the cord is provided to protect the plug when not in use.

Cooling System

The cooling systems function is to maintain an efficient engine operating temperature during all engine speeds and operating conditions. The cooling system is designed to remove approximately one-third of the heat produced by the burning of the air-fuel mixture. When the engine is cold, the coolant does not flow to the radiator until the thermostat opens. This allows the engine to warm quickly.

Coolant Level Control

The engine cooling system contains an engine coolant level switch which alerts the driver in the event of a coolant loss. When the engine coolant level switch reads a low coolant level in the surge tank, the switch opens. This sends a coolant loss signal to the instrument panel cluster (IPC) by the coolant level switch signal circuit. Ground is provided for the coolant level control.

Cooling Cycle

Coolant flows from the radiator outlet and into the water pump inlet. Some coolant flows from the water pump, to the heater core, then back to the water pump. This provides the passenger compartment with heat and defrost capability as the coolant warms up.

Coolant also flows from the water pump outlet and into the engine block. In the engine block, the coolant circulates through the water jackets surrounding the cylinders where it absorbs heat.

The coolant then flows through the cylinder head gasket openings and into the cylinder heads. In the cylinder heads, the coolant flows through the water jackets surrounding the combustion chambers and valve seats, where it absorbs additional heat.

Some engine applications, coolant is also directed to the throttle body. There it circulates through passages in the casting. The coolant assists in regulating the throttle body temperature.

From the cylinder heads, the coolant flows to the thermostat. The flow of coolant will either be stopped at the thermostat until the engine reaches operating temperature or it will flow through the thermostat and into the radiator where it is cooled. At this point, the coolant flow cycle is completed.

Efficient operation of the cooling system requires proper functioning of all cooling system components. The cooling system consists of the following components:

Coolant

The engine coolant is a solution made up of a 50-50 mixture of DEX-COOL and suitable drinking water. The coolant solution carries excess heat away from the engine to the radiator, where the heat is dissipated to the atmosphere.

Radiator

The radiator is a heat exchanger. It consists of a core and 2 tanks. The aluminum core is a tube and fin cross-flow design that extends from the inlet tank to the outlet tank. Fins are placed around the outside of the tubes to improve heat transfer to the atmosphere. The inlet and outlet tanks are a molded high temperature, nylon reinforced plastic material. A high temperature rubber gasket seals the tank flange edge to the aluminum core. The tanks are clamped to the core with clinch tabs. The tabs are part of the aluminum header at each end of the core. The radiator also has a drain cock located in the bottom of the left hand tank. The drain cock unit includes the drain cock and drain cock seal.

The radiator removes heat from the coolant passing through it. The fins on the core transfer heat from the coolant passing through the tubes. As air passes between the fins, it absorbs heat and cools the coolant.

During vehicle use, the coolant is heated and expands. The increased coolant volume flows into the surge tank. As the coolant circulates, any air is allowed to bubble out. Coolant without air bubbles absorbs heat much better than coolant with bubbles.

Coolant Recovery System

The coolant recovery system consists of a plastic coolant recovery reservoir, an overflow tube, and a pressure cap on the radiator. The recovery reservoir is also called a recovery tank or expansion tank. It is partially filled with coolant and is connected to the radiator fill neck with the overflow tube. Coolant can flow back and forth between the radiator and the reservoir.

In effect, a cooling system with a coolant recovery reservoir is a closed system. When the pressure in the cooling system gets too high, it will open the pressure valve in the pressure cap. This allows the coolant, which has expanded due to being heated, to flow through the overflow tube and into the recovery reservoir. As the engine cools down, the temperature of the coolant drops and a vacuum is created in the cooling system. This vacuum opens the vacuum valve in the pressure cap, allowing some of the coolant in the reservoir to be siphoned back into the radiator. Under normal operating conditions, no coolant is lost. Although the coolant level in the recovery reservoir goes up and down, the radiator and cooling system are kept full. An advantage to using a coolant recovery reservoir is that it eliminates almost all air bubbles from the cooling system. Coolant without air bubbles absorbs heat much better than coolant with bubbles.

Pressure Cap

The pressure cap seals the cooling system. It contains a blow off or pressure relief valve and a vacuum or atmospheric valve. The pressure valve is held against its seat by a spring, which protects the radiator from excessive cooling system pressure. The vacuum valve is held against its seat by a spring, which permits opening of the valve to relieve vacuum created in the cooling system as it cools off. The vacuum, if not relieved, might cause the radiator and/or coolant hoses to collapse.

The pressure cap allows cooling system pressure to build up as the temperature increases. As the pressure builds, the boiling point of the coolant increases. Engine coolant can be safely run at a temperature much higher than the boiling point of the coolant at atmospheric pressure. The hotter the coolant is, the faster the heat transfers from the radiator to the cooler, passing air.

The pressure in the cooling system can get too high. When the cooling system pressure exceeds the rating of the pressure cap, it raises the pressure valve, venting the excess pressure.

As the engine cools down, the temperature of the coolant drops and a vacuum is created in the cooling system. This vacuum causes the vacuum valve to open, allowing outside air into the surge tank. This equalizes the pressure in the cooling system with atmospheric pressure, preventing the radiator and coolant hoses from collapsing.

Cooling Fan and Clutch

The engine cooling fan and clutch are driven by the crankshaft via the drive belt. The cooling fan draws air through the radiator to improve the transfer of heat from the coolant to the atmosphere. As the fan blades spin, they pull cool, outside air past the radiator core. The fan clutch drives the cooling fan. The fan clutch controls the amount of torque that is transmitted from the crankshaft to the fan blades. The clutch allows more torque to engage on the fan when the engine operating temperature increases and/or the vehicle speed is low. As the torque increases, the fan turns more quickly. The fan clutch decreases the torque applied to the cooling fan when the engine temperature decreases and/or the vehicle speed is high. As the torque decreases, the fan speed decreases.

Air Baffles and Seals

The cooling system uses deflectors, air baffles and air seals to increase cooling system capability. Deflectors are installed under the vehicle to redirect airflow beneath the vehicle and through the radiator to increase engine cooling. Air baffles are also used to direct airflow through the radiator and increase cooling capability. Air seals prevent air from bypassing the

radiator and A/C condenser, and prevent recirculation of hot air for better hot weather cooling and A/C condenser performance.

Water Pump

The water pump is a centrifugal vane impeller type pump. The pump consists of a housing with coolant inlet and outlet passages, a retaining plate, pulley and an impeller. The impeller is mounted on the pump shaft, and consists of a series of flat or curved blades or vanes on a flat plate. When the impeller rotates, the coolant between the vanes is thrown outward by centrifugal force. The impeller shaft is supported by one or more sealed bearings. The sealed bearings never need to be lubricated. Grease cannot leak out, dirt and water cannot get in as long as the seal is not damaged or worn.

The purpose of the water pump is to circulate coolant throughout the cooling system. The water pump is driven by the crankshaft via the drive belt.

Thermostat

The thermostat is a coolant flow control component. It's purpose is to help regulate the operating temperature of the engine. It utilizes a temperature sensitive wax-pellet element. The element connects to a valve through a small piston. When the element is heated, it expands and exerts pressure against a small piston. This pressure forces the valve to open. As the element is cooled, it contracts. This contraction allows a spring to push the valve closed.

When the coolant temperature is below 85°C (185°F) for diesel engines and below 91°C (195°F) for gas engines, the thermostat valve remains closed. This prevents circulation of the coolant from the radiator and allows the engine to warm up. After the coolant temperature reaches 85°C (185°F) or 91°C (195°F), the thermostat valve will open. The coolant is then allowed to circulate through the thermostat to the engine and then to the radiator where the engine heat is dissipated to the atmosphere. The thermostat also provides a restriction in the cooling system, after it has opened. This restriction creates a pressure difference which prevents cavitation at the water pump and forces coolant to circulate through the engine block.

Engine Oil Cooler

The engine oil cooler is a heat exchanger. It is located inside the left side end tank of the radiator. The engine oil temperature is controlled by the temperature of the engine coolant that surrounds the oil cooler in the radiator.

The engine oil pump pumps the oil through the engine oil cooler line to the oil cooler. The oil then flows through the cooler where the engine coolant absorbs heat from the oil. The oil is then pumped through the oil cooler return line, to the oil filter, to the engine block oil system.

Transmission Oil Cooler

The transmission oil cooler is a heat exchanger. It is located inside the right side end tank of the radiator. The transmission fluid temperature is regulated by the temperature of the engine coolant in the radiator.

The transmission oil pump, pumps the fluid through the transmission oil cooler line to the transmission oil cooler. The fluid then flows through the cooler where the engine coolant absorbs heat from the fluid. The fluid is then pumped through the transmission oil cooler return line, to the transmission.

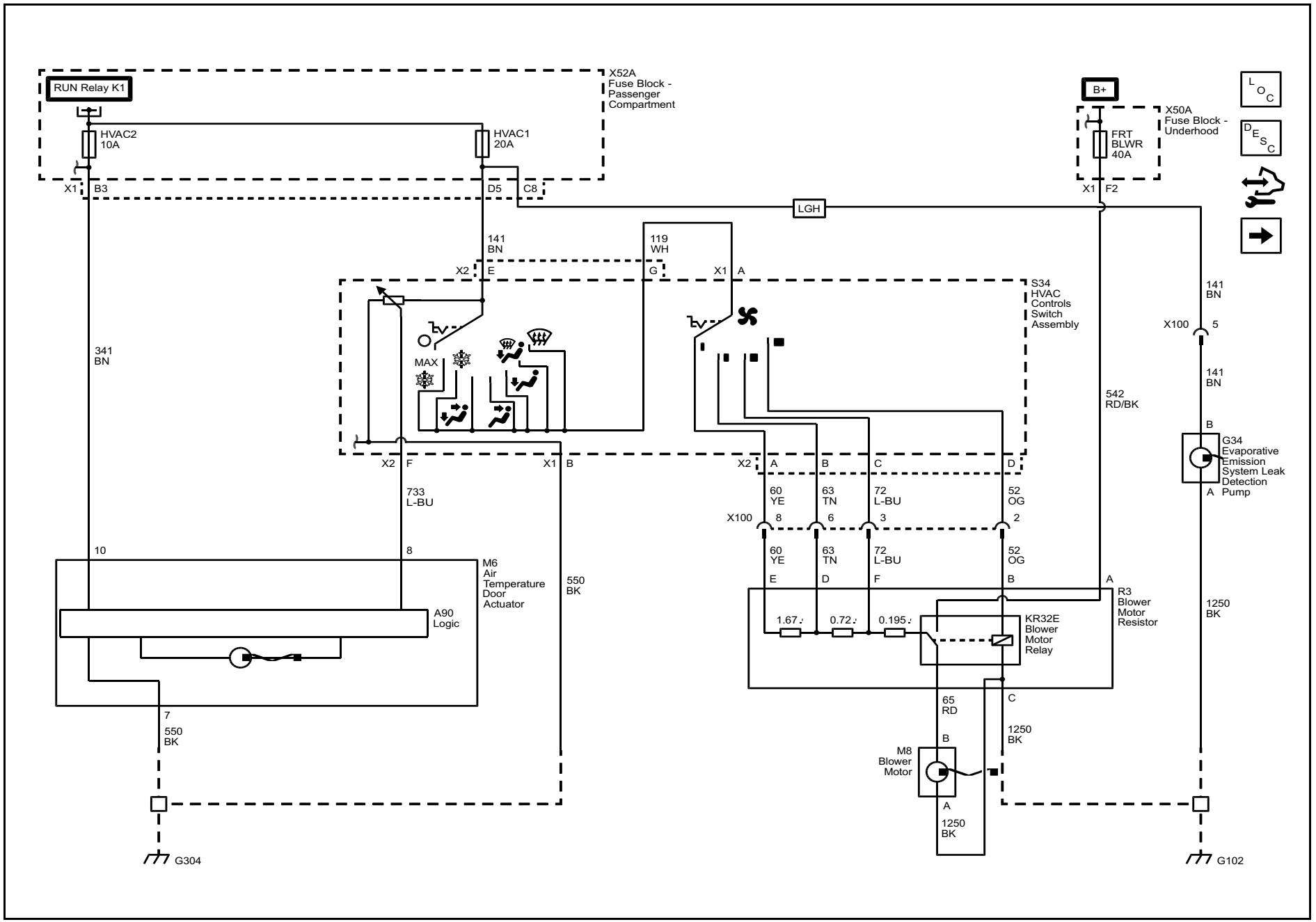
Section 10

HVAC

HVAC - Manual

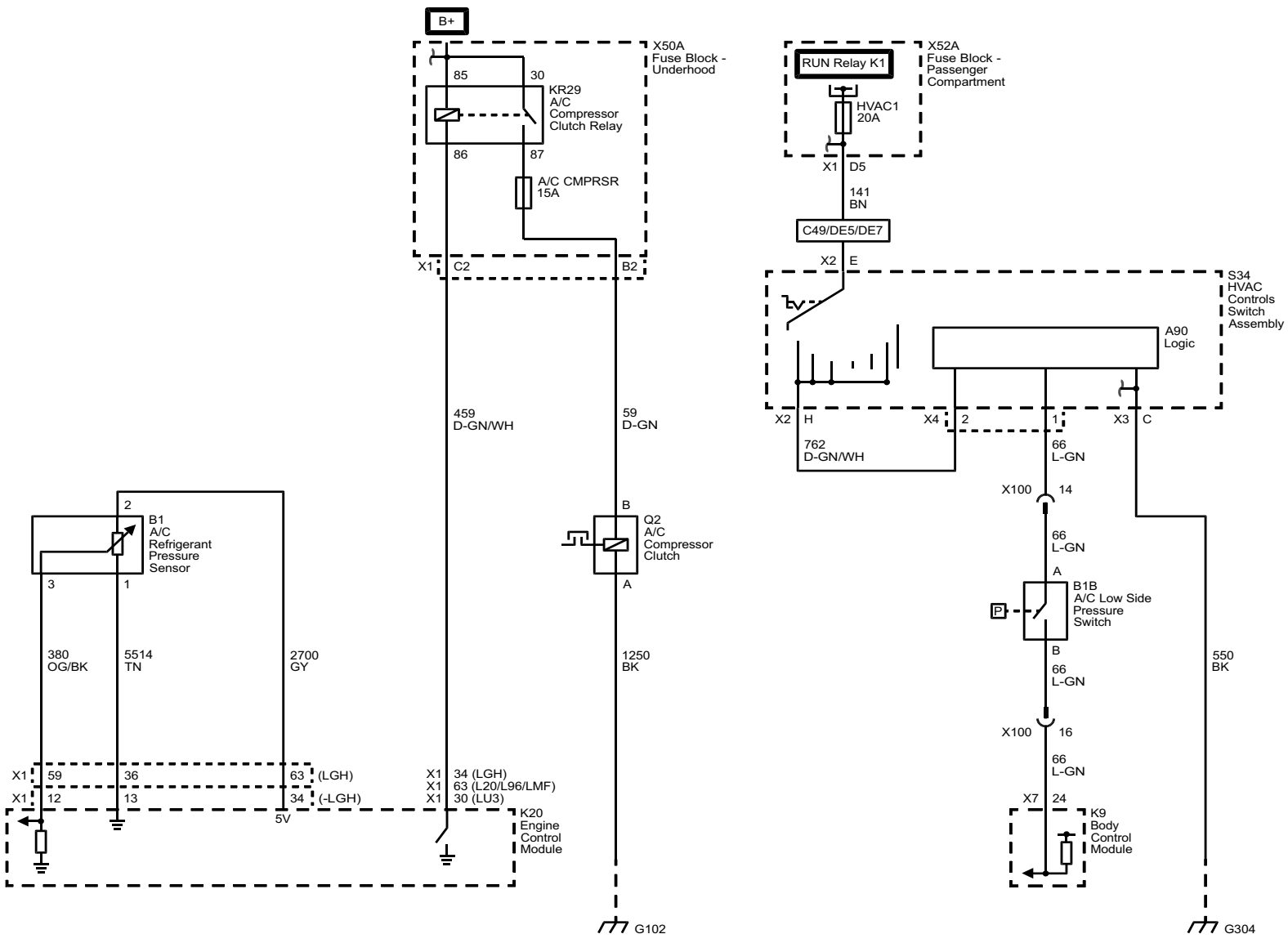
Schematic and Routing Diagrams

HVAC Schematics (Primary Blower and Air Delivery Controls (C42) and Vacuum Pump (Diesel))



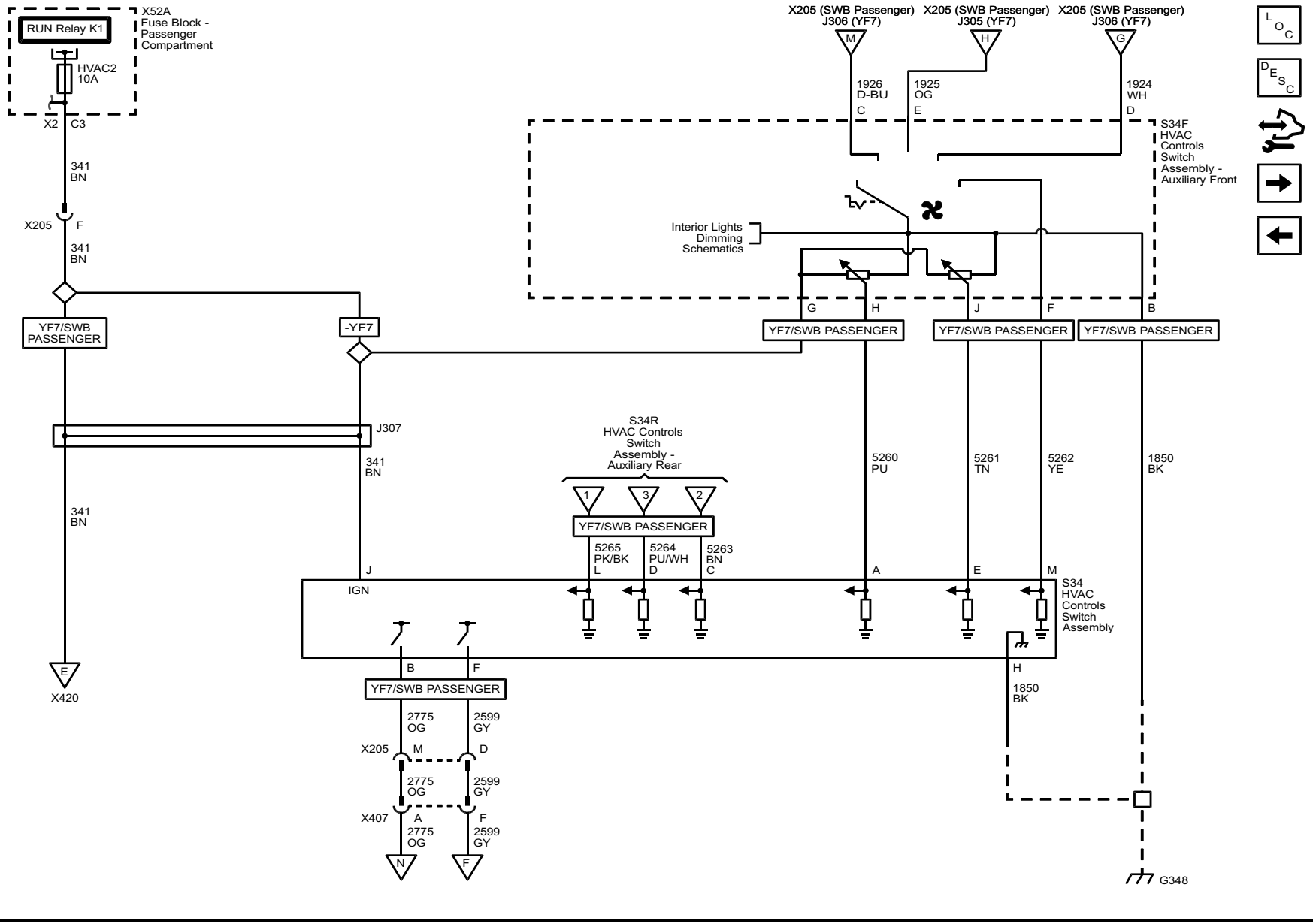
3395548

HVAC Schematics (Compressor Controls (C60))



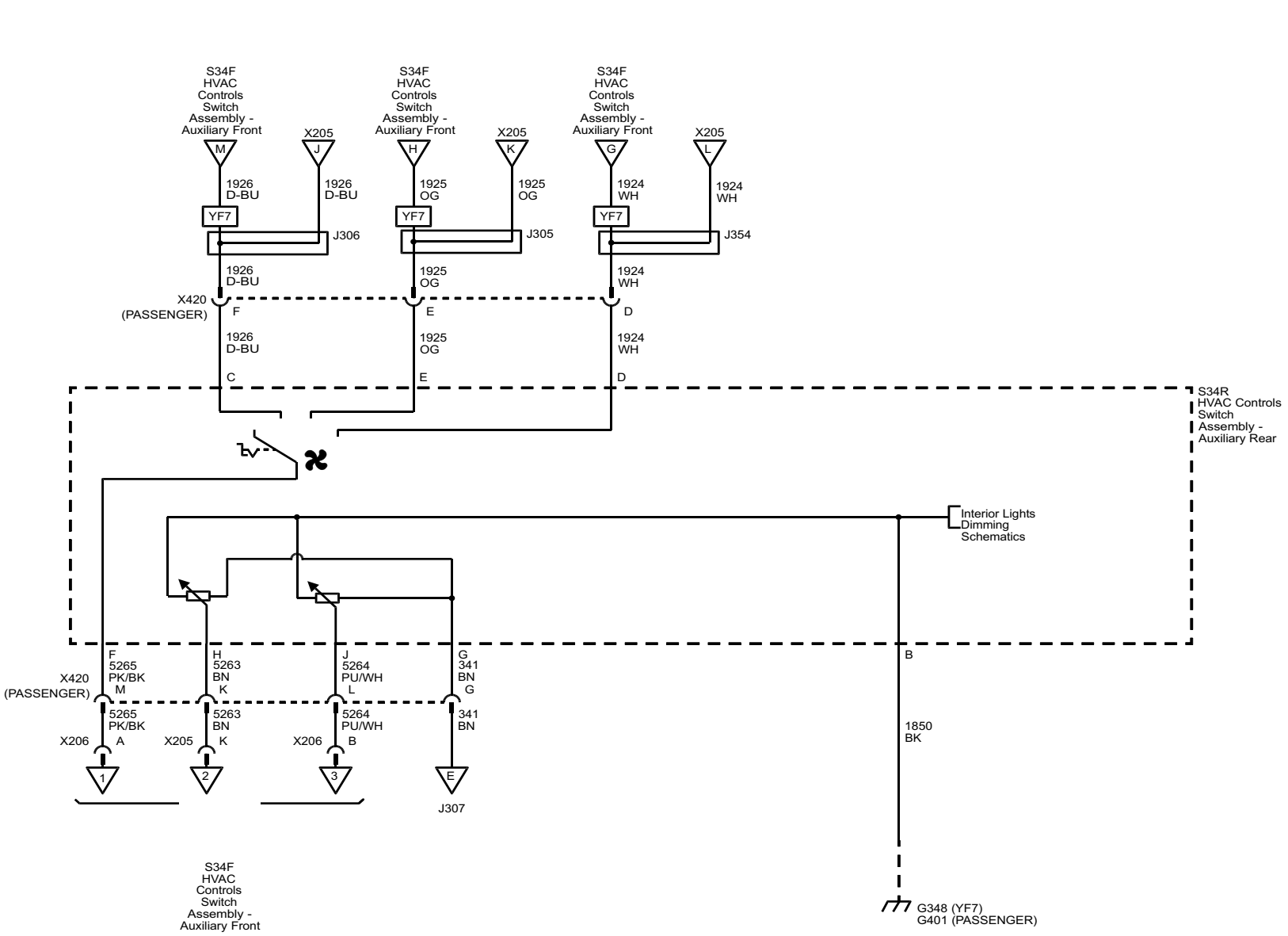
3395549

HVAC Schematics (Rear HVAC (C69) with Rear Auxiliary Controls - Front Controls)



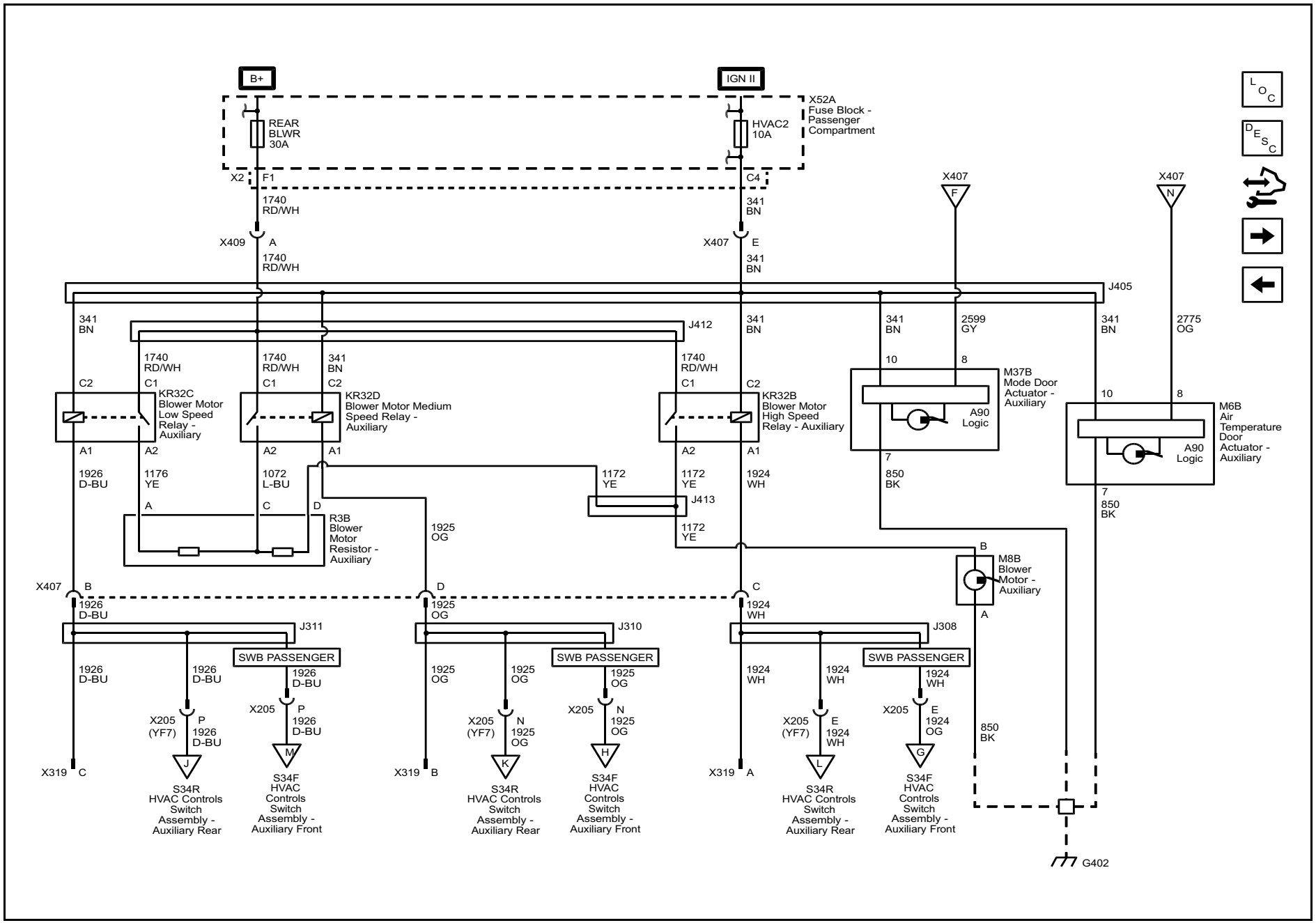
3395550

HVAC Schematics (Rear HVAC (C69) with Rear Auxiliary Controls - Rear Controls)



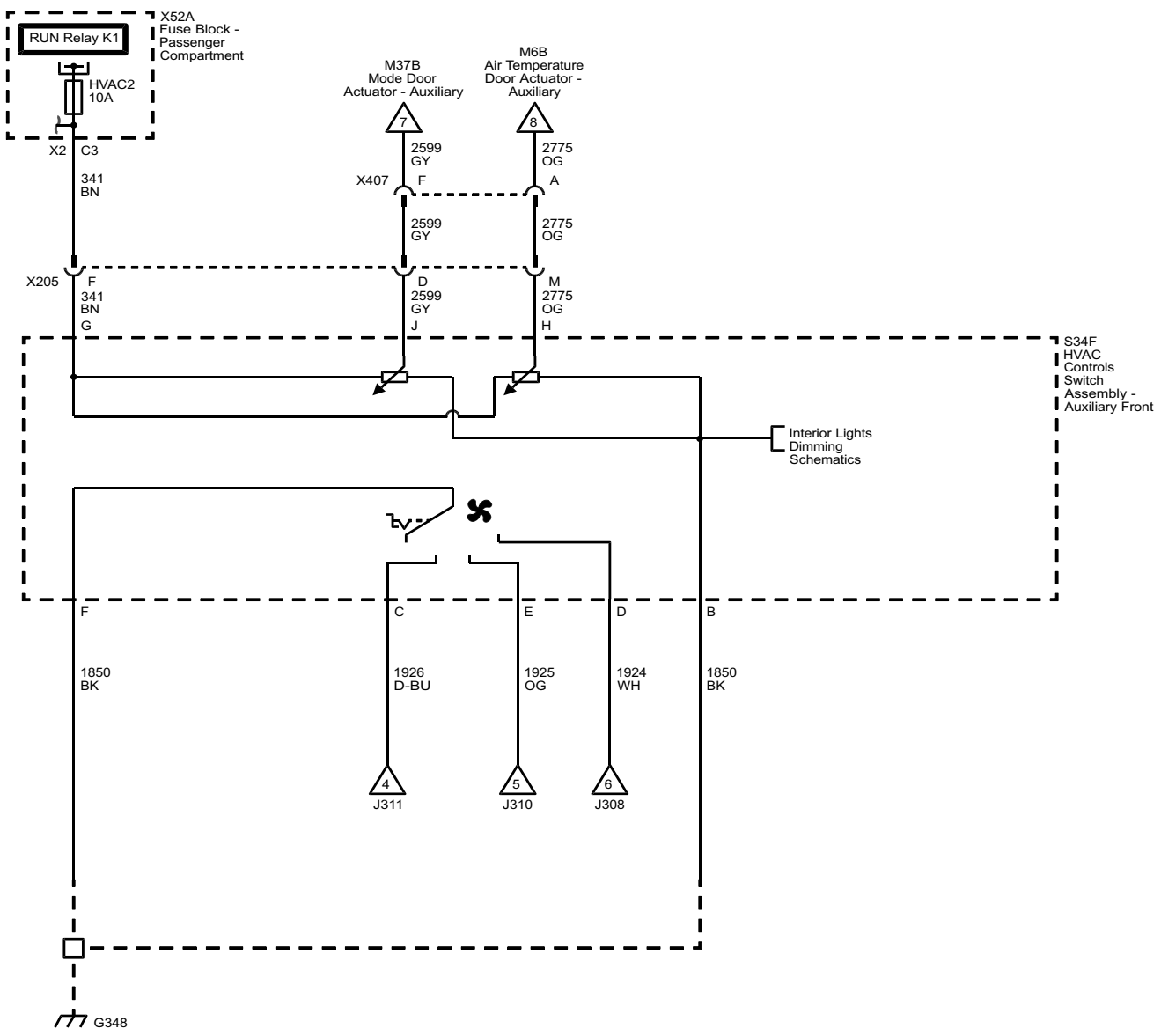
3395551

HVAC Schematics (Rear HVAC (C69) with Rear Auxiliary Controls - Air Delivery Controls)



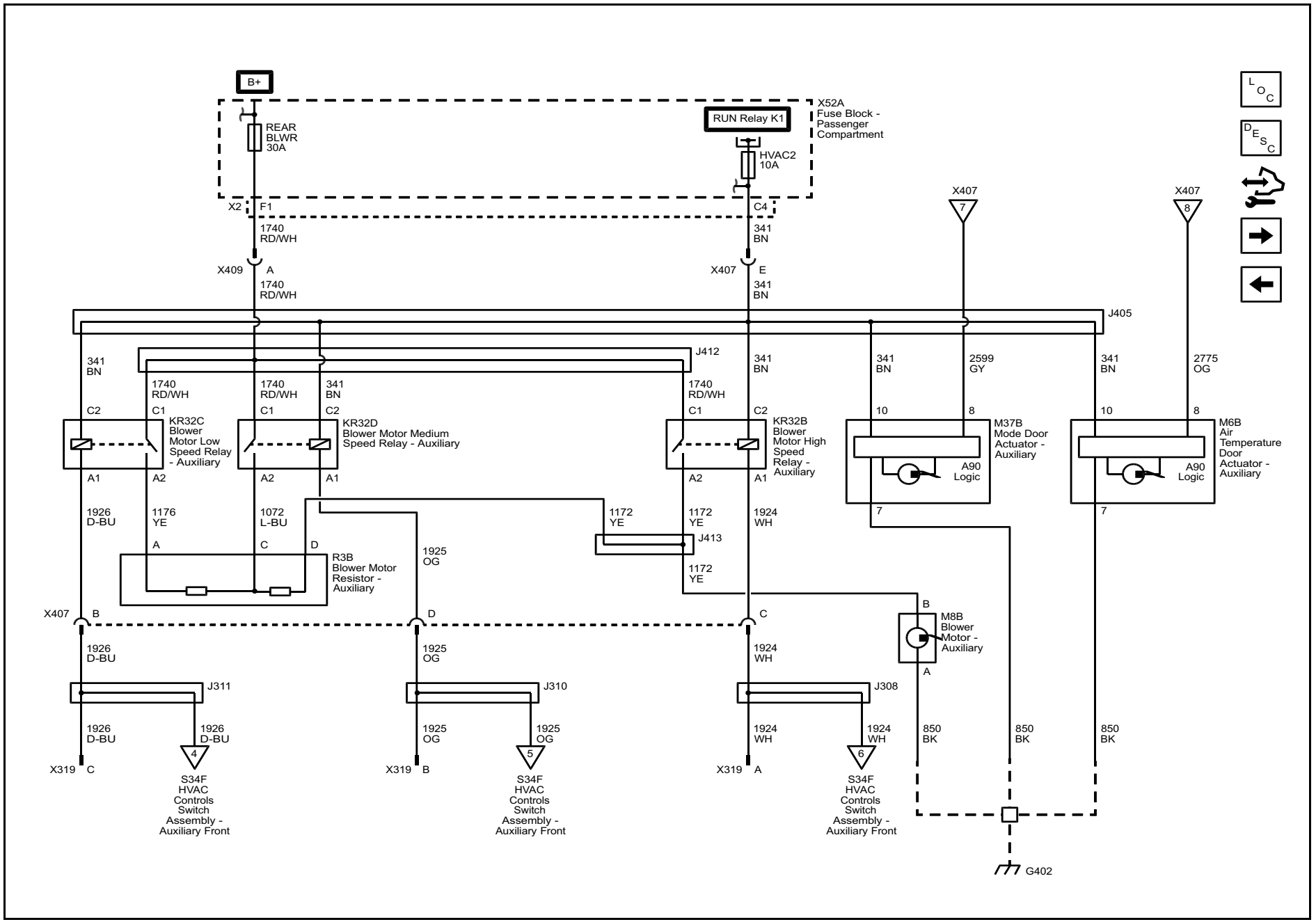
3395552

HVAC Schematics (Rear HVAC (C69) without Rear Auxiliary Controls - Front Controls)



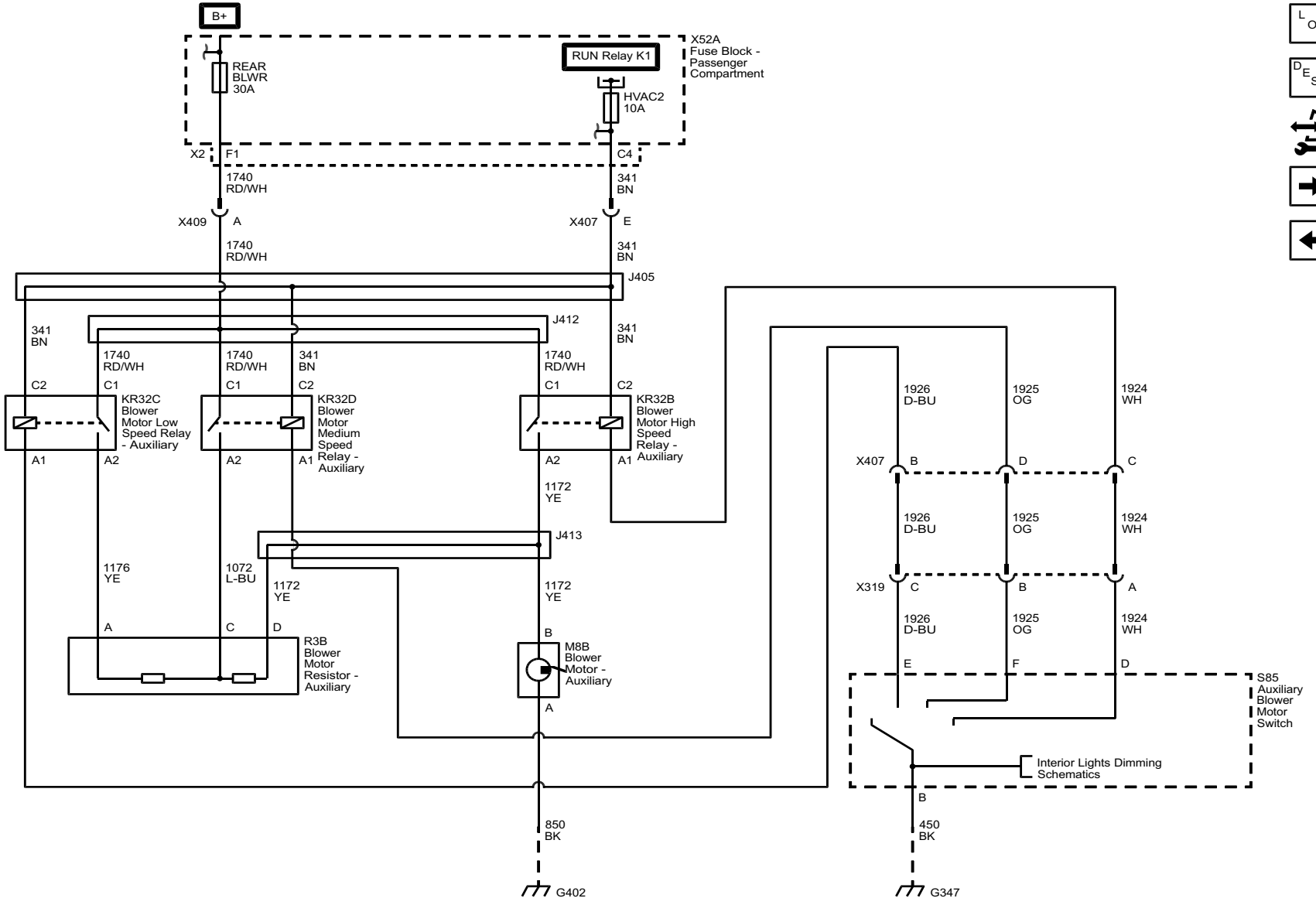
3395553

HVAC Schematics (Rear HVAC (C69) without Rear Auxiliary Controls - Air Delivery Controls)



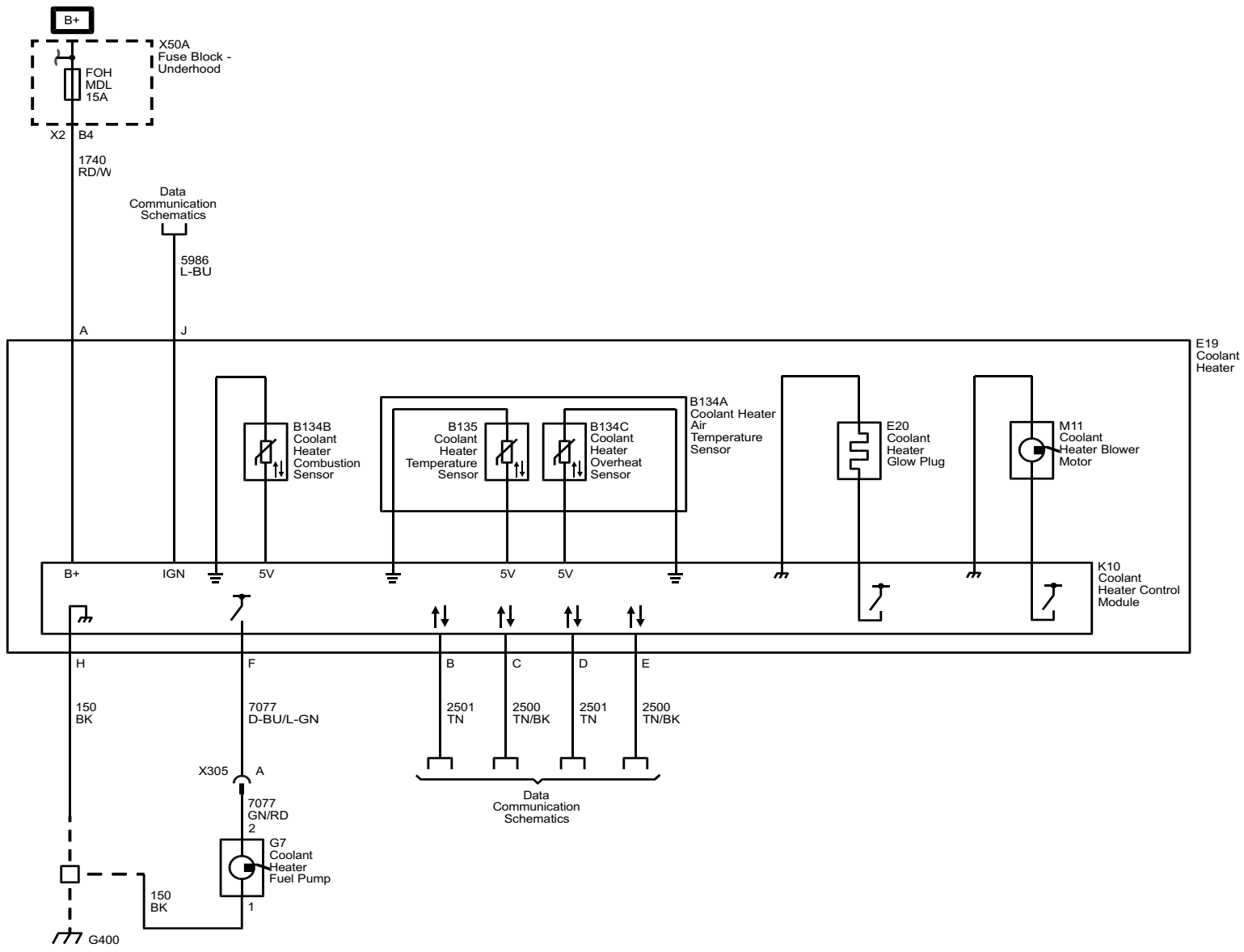
3395554

HVAC Schematics (Rear HVAC (C36 without C69))



3395555

HVAC Schematics (Coolant Heater (K08))



3395556

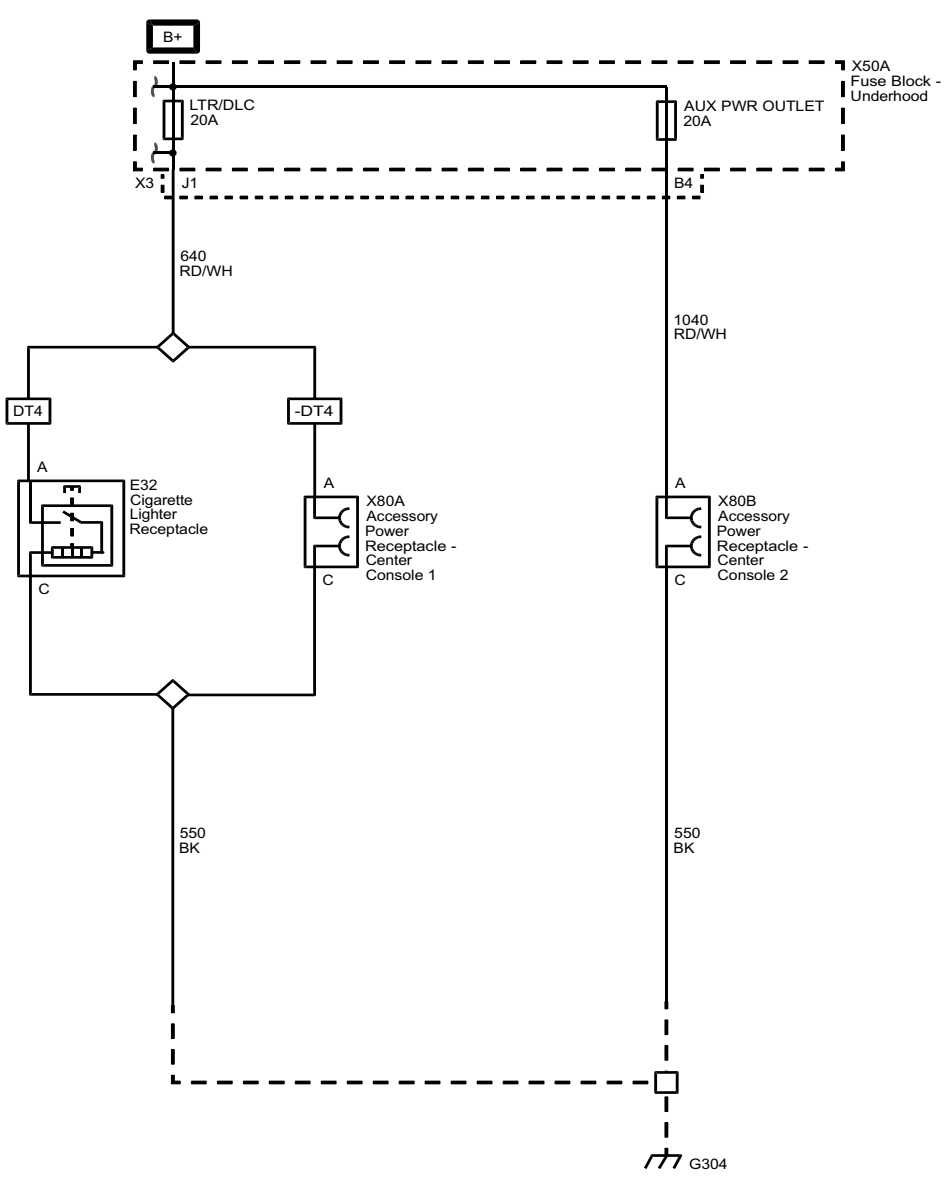
Section 11

Power and Signal Distribution

Power Outlets

Schematic and Routing Diagrams

Cigar Lighter/Power Outlet Schematics (Cigar Lighter/Power Outlet)



3395568

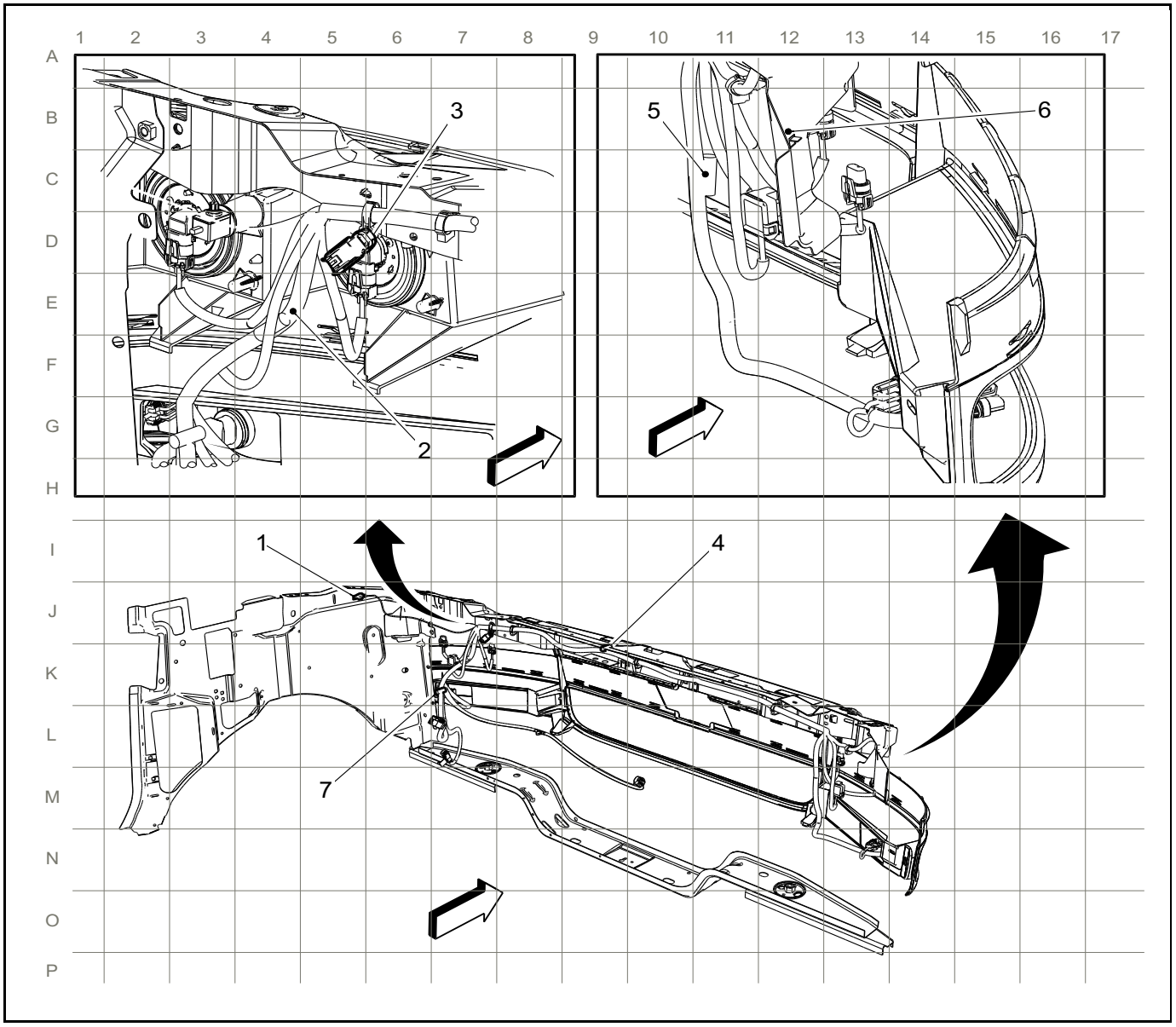
Description and Operation

Power Outlets Description and Operation

12 Volt Power Outlet Receptacle Description and Operation

The accessory power receptacles and cigarette lighter receptacle are supplied with battery voltage when the ignition is ON or in the accessory position.

Harness Routing Views (Forward Lamp Harness Routing)

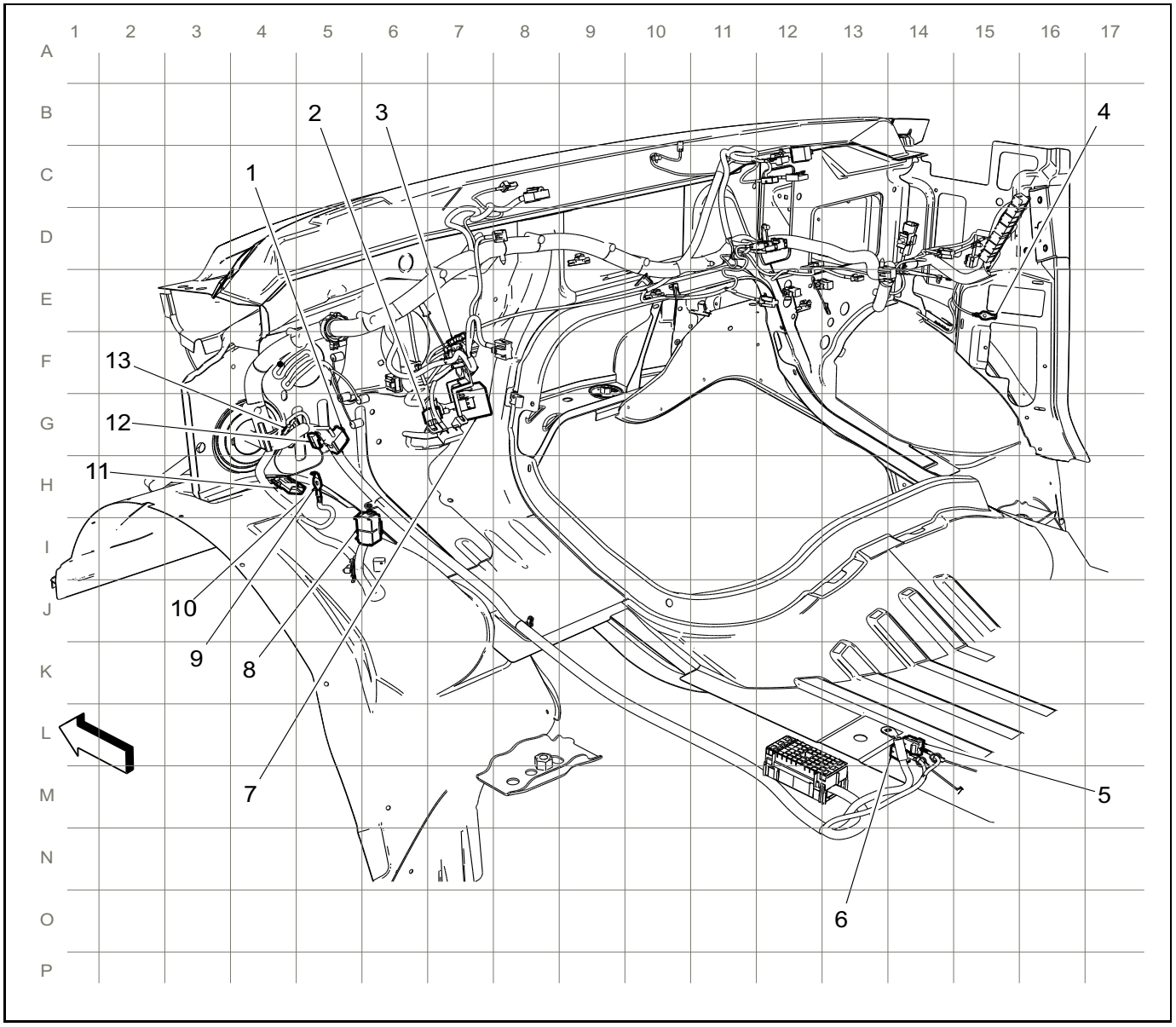


2830533

Items

(1) G100
(2) J110
(3) X150 (UFA)
(4) J121
(5) J118
(6) G101
(7) J122

Harness Routing Views (Instrument Panel Harness Routing - Passenger Compartment)

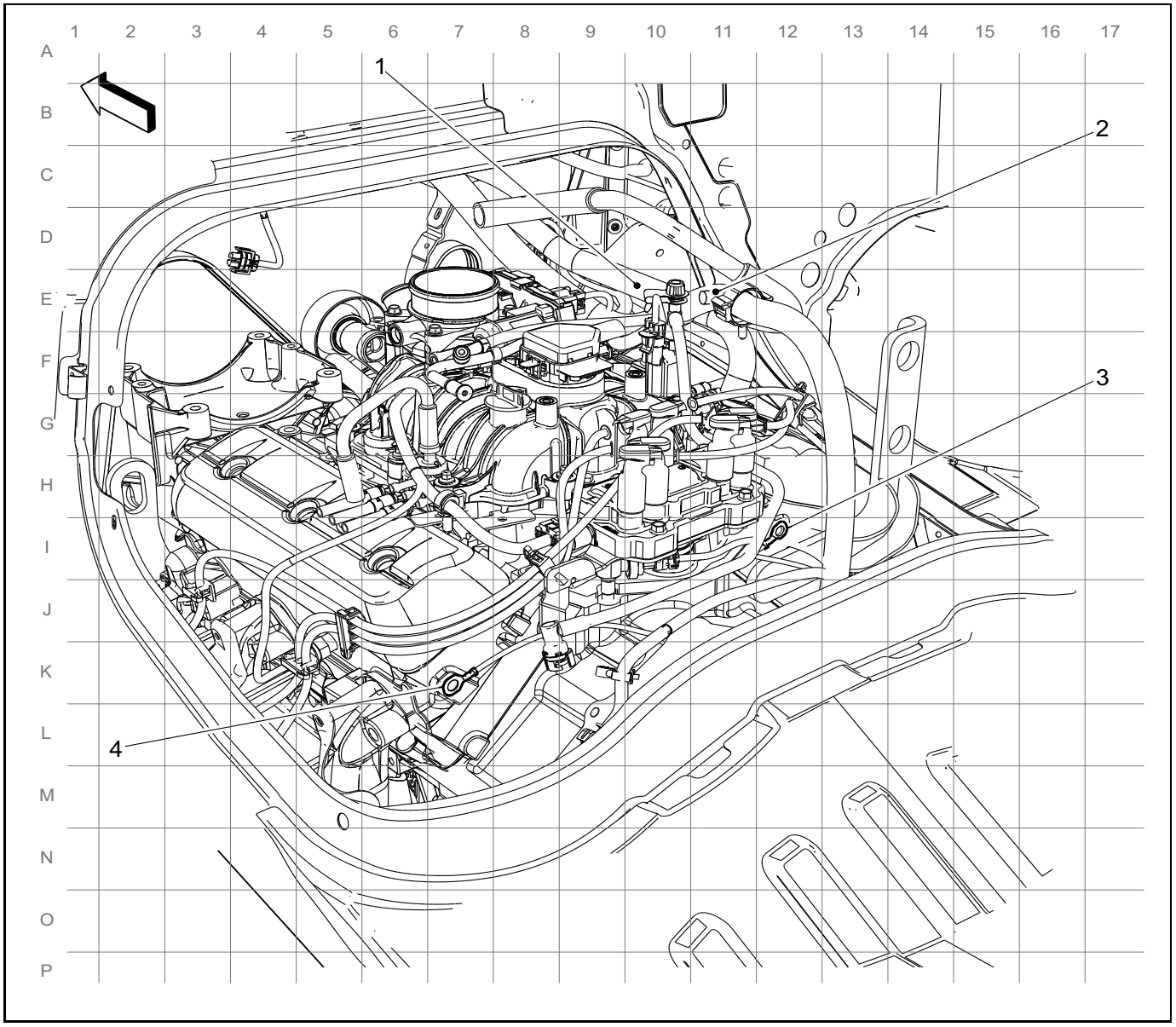


2830778

Items

(1) JX250
(2) X221
(3) X276
(4) G304
(5) X331
(6) X330
(7) X200
(8) X318
(9) G301
(10) G302
(11) X222 (YF2 or YF7)
(12) X220
(13) JX200

Harness Routing Views (Engine Harness Routing - Left Rear (LU3))

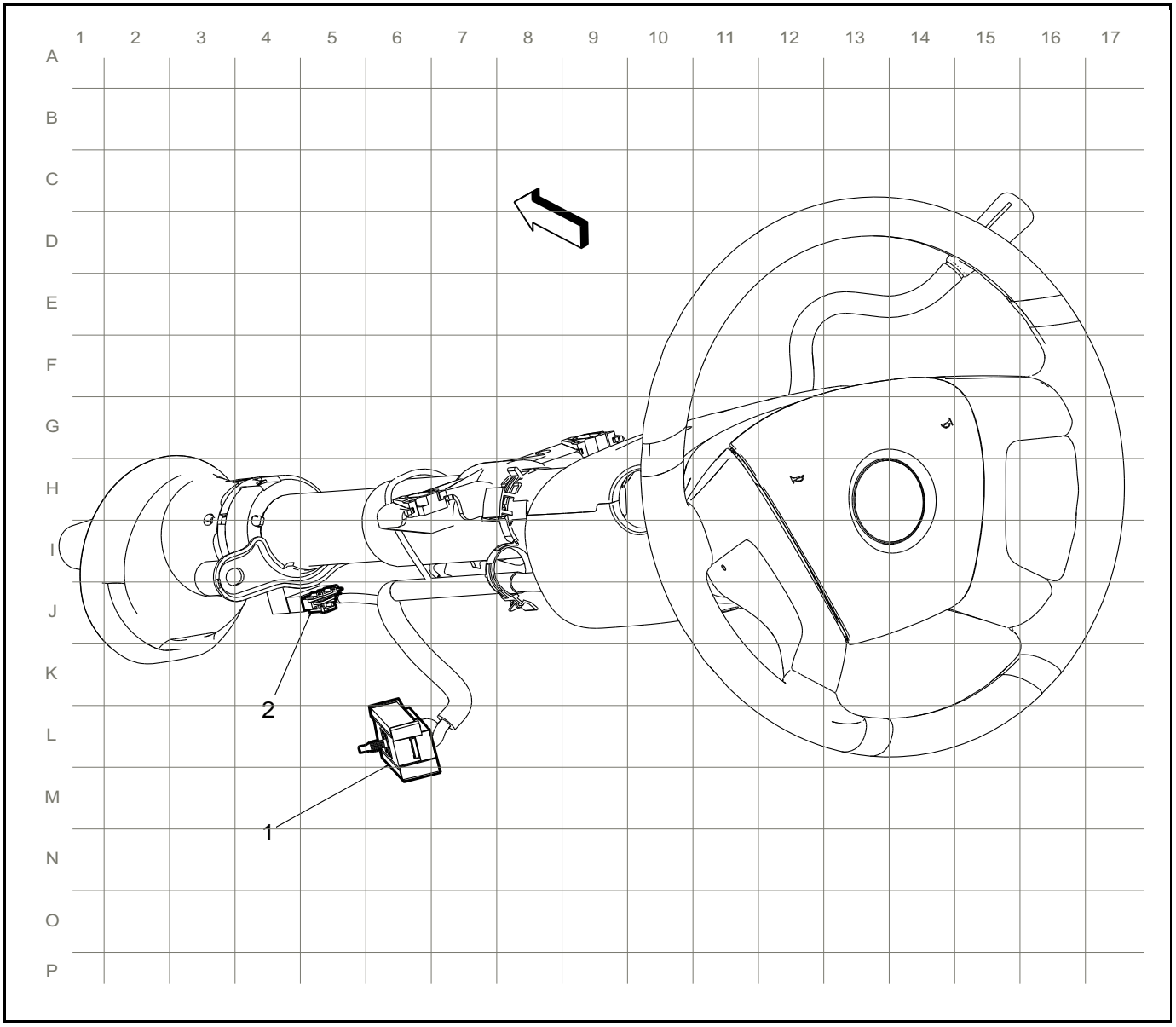


2830758

Items

(1) J101
(2) J102
(3) G102
(4) G103

Harness Routing Views (Steering Column Harness Routing)



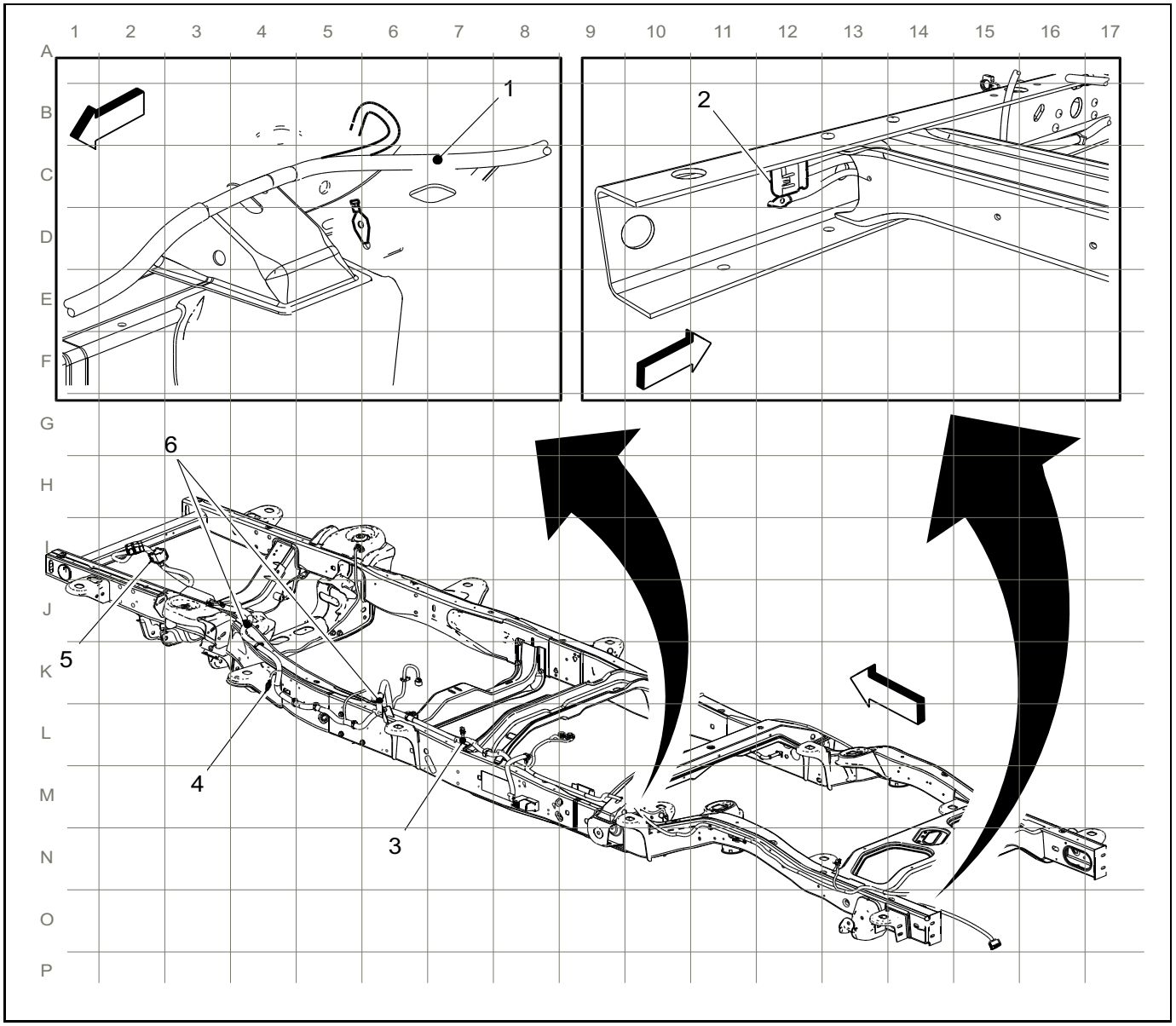
2830784

Items

(1) X200

(2) B99 Steering Wheel Angle Sensor (JL4)

Harness Routing Views (Chassis Harness Routing (LC8, LMF, LU3, L20, or L96))

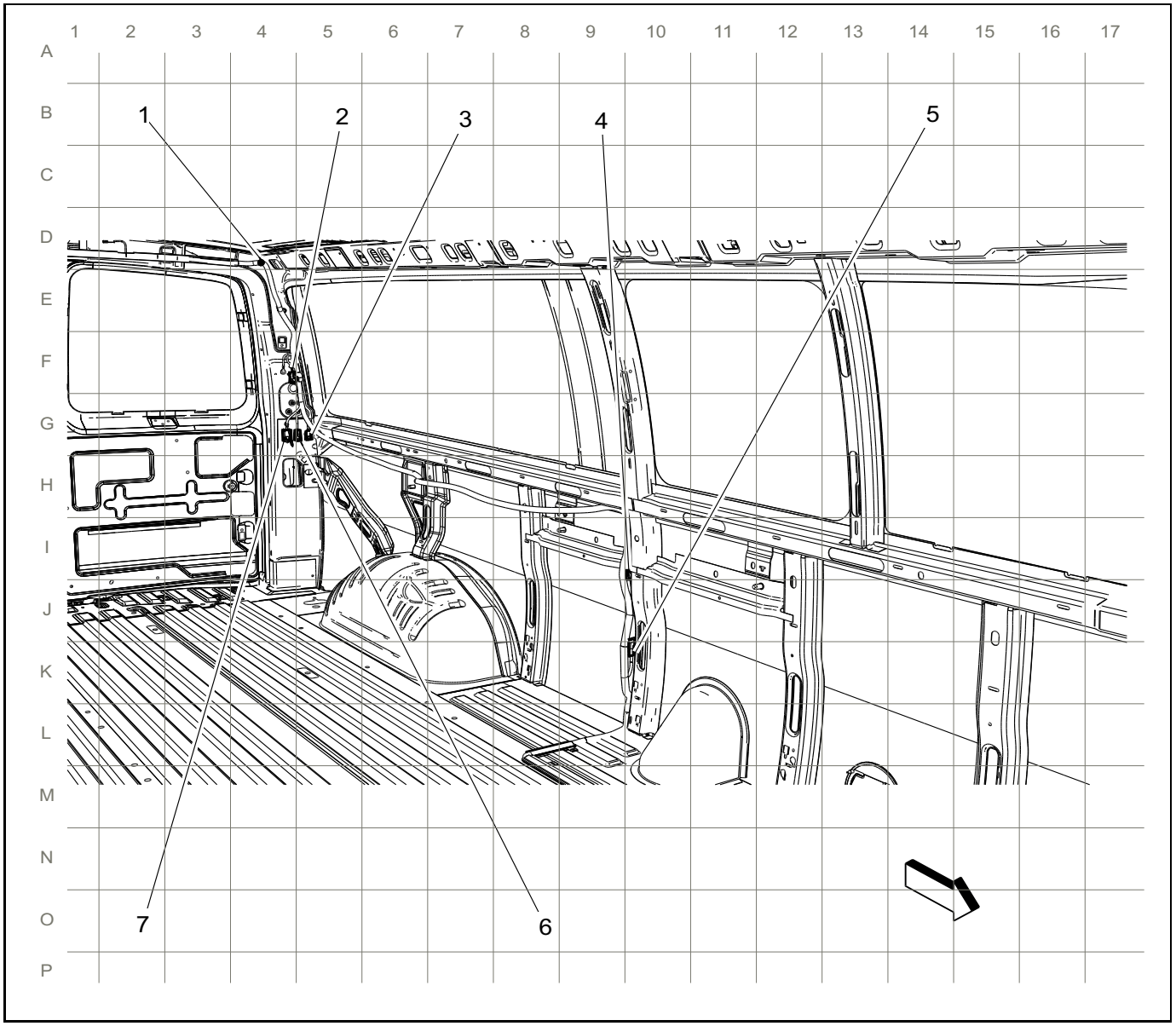


2830812

Items

(1) J402
(2) X405
(3) J301
(4) G300
(5) X101
(6) J315

Harness Routing Views (Body Harness Routing - Right Rear (Passenger or Cargo))

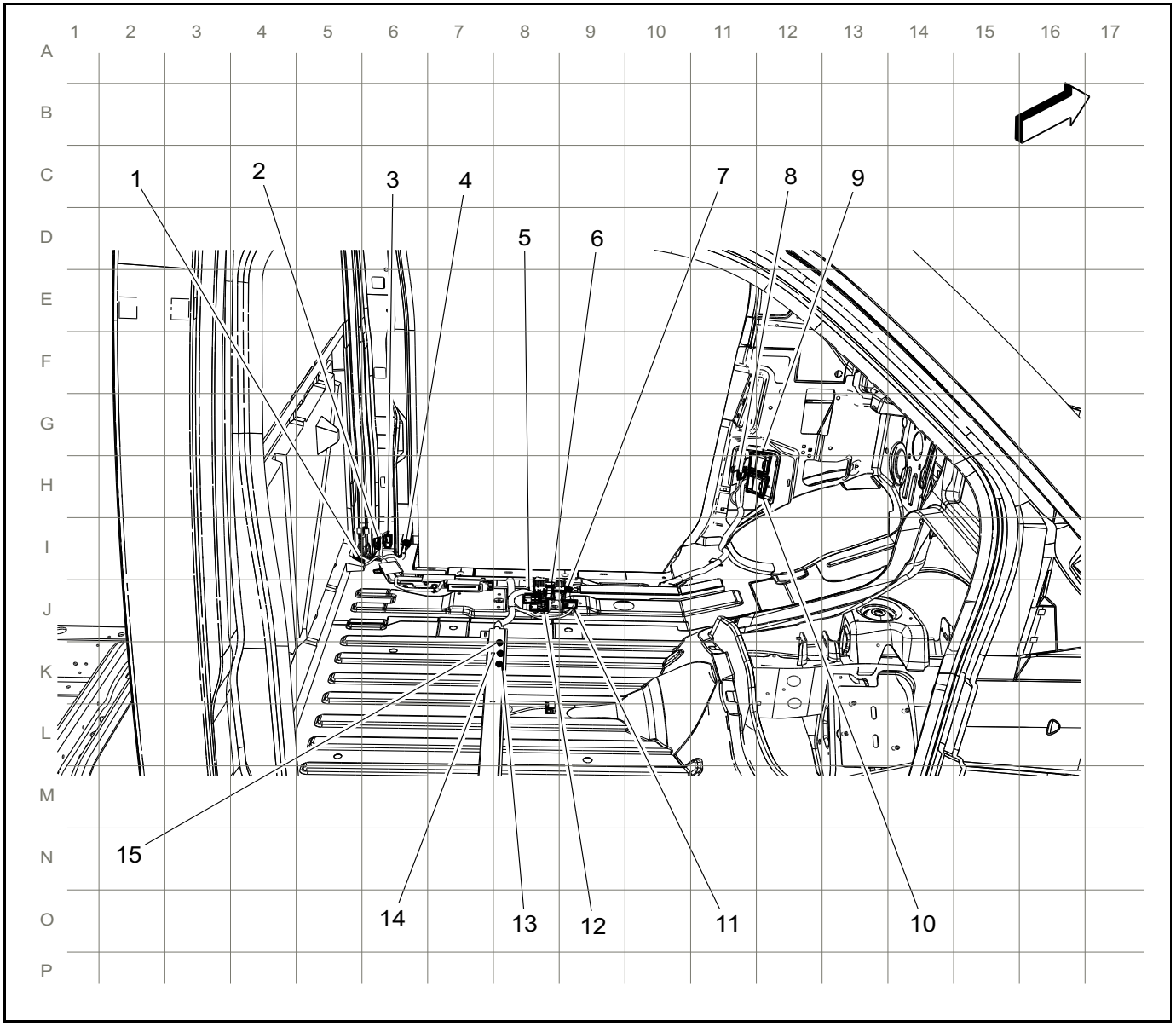


2830799

Items

(1) J410
(2) X401
(3) X407 (C36 with C69)
(4) X222 (YF2 or YF7)
(5) X320 (YF2 or YF7)
(6) X409 (C36 with C69)
(7) X411

Harness Routing Views (Body Harness Routing - Left Front Passenger Compartment)



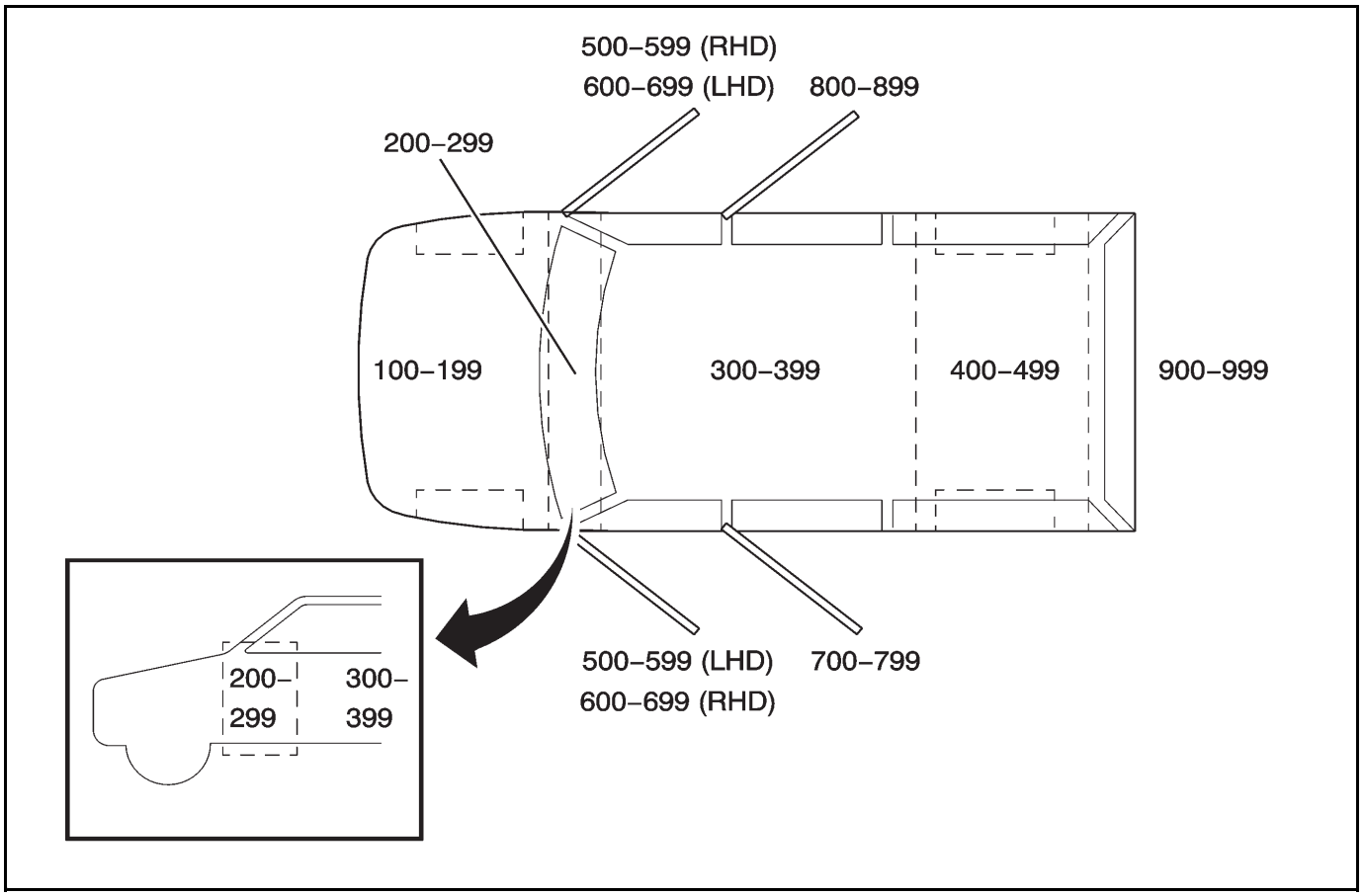
2830786

Items

(1) X403 (UVC)
(2) X409 (C36 with C69)
(3) X407 (C36 with C69)
(4) JX347
(5) X330
(6) X331
(7) J356 (C69 or AU3)
(8) X319 (C36 or ENC)
(9) X318
(10) X500
(11) X329 (UVC)
(12) X331
(13) J371
(14) J370
(15) J372

Vehicle Zoning Strategy

All grounds, in-line connectors, and splices have identifying numbers that correspond to where they are located in the vehicle. The following table explains the numbering system.



160996

Vehicle Zoning Strategy

Callout Numbers	Zone Description
100-199	Engine compartment (all forward of the instrument panel)
200-299	Within the instrument panel area (between the bulkhead and the front plane of the instrument panel)
300-399	Passenger compartment (from instrument panel to the back of the 2nd row seats)
400-499	Luggage compartment (from the back of the 2nd row seats to the rear of the vehicle, including any additional rows of seating rear of the 2nd row seats)

Vehicle Zoning Strategy (cont'd)

Callout Numbers	Zone Description
500-599	Inline harness connectors to or within the driver door
600-699	Inline harness connectors to or within the front passenger door
700-799	Inline harness connectors to or within the left rear door
800-899	Inline harness connectors to or within the right rear door
900-999	Inline harness connectors to or within the liftgate, lift window, endgate, or rear doors

Schematics RPO Code List

RPO	Option Name	Country Group
5B3	TBD	TBD
5H4	TBD	TBD
8S3	TBD	TBD
8S8	TBD	TBD
A12	WINDOW RR-DR, STA	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
A18	WINDOW RR-DR, SWING OUT	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
A31	WINDOW-POWER OPERATED, ALL DOORS	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
AG1	ADJUSTER FRT ST-POWER, MULTI-DIRECTIONAL, DRIVER	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
AG2	ADJUSTER PASS ST-POWER, MULTI-DIRECTIONAL	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
ASF	RESTRAINT-ROOF SIDE, LH **and RH, INFLATABLE**	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
AU0	TBD	TBD
AU3	LOCK CONTROL-SIDE DR, ELEC	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
BTV	REMOTE START-ENGINE	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
C36	HEATER-AUXILIARY	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
C49	DEFOGGER-RR WINDOW, ELECTRIC	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
C60	HVAC SYSTEM-AIR CONDITIONER FRT, MAN CONTROLS	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
C69	HVAC SYSTEM RR-AIR CONDITIONER	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
C99	SWITCH-INFL RST I/P MDL MAN SUPPRESSION	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
DE5	MIRROR O/S-LH **and RH, REMOTE CONTROL, ELECTRIC, HEATED, FOLDING, COLOR.**	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
DE7	TBD	TBD
DH6	MIRROR I/S FRT VAN-LH **and RH, SUNSHADE, ILLUM**	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
DT4	ASHTRAY-CIGARETTE LIGHTER	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
E24	DOOR SIDE-REAR, HINGED	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
E26	DOOR SIDE REAR LH-HINGED	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
ENC	HVAC PROVISIONS-AUXILLIARY HEATER PLUMBING **and WIRING**	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
FHZ	VEHICLE FUEL-DEDICATED CNG	U.S.A., PR and USVI (MAH),Canada (MBC)
JL4	CONTROL,-ACTIVE BRAKE	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
JL9	TBD	TBD
K07	TBD	TBD
K08	HEATER-AUXILIARY, FUEL FIRED	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Israel (MBI)

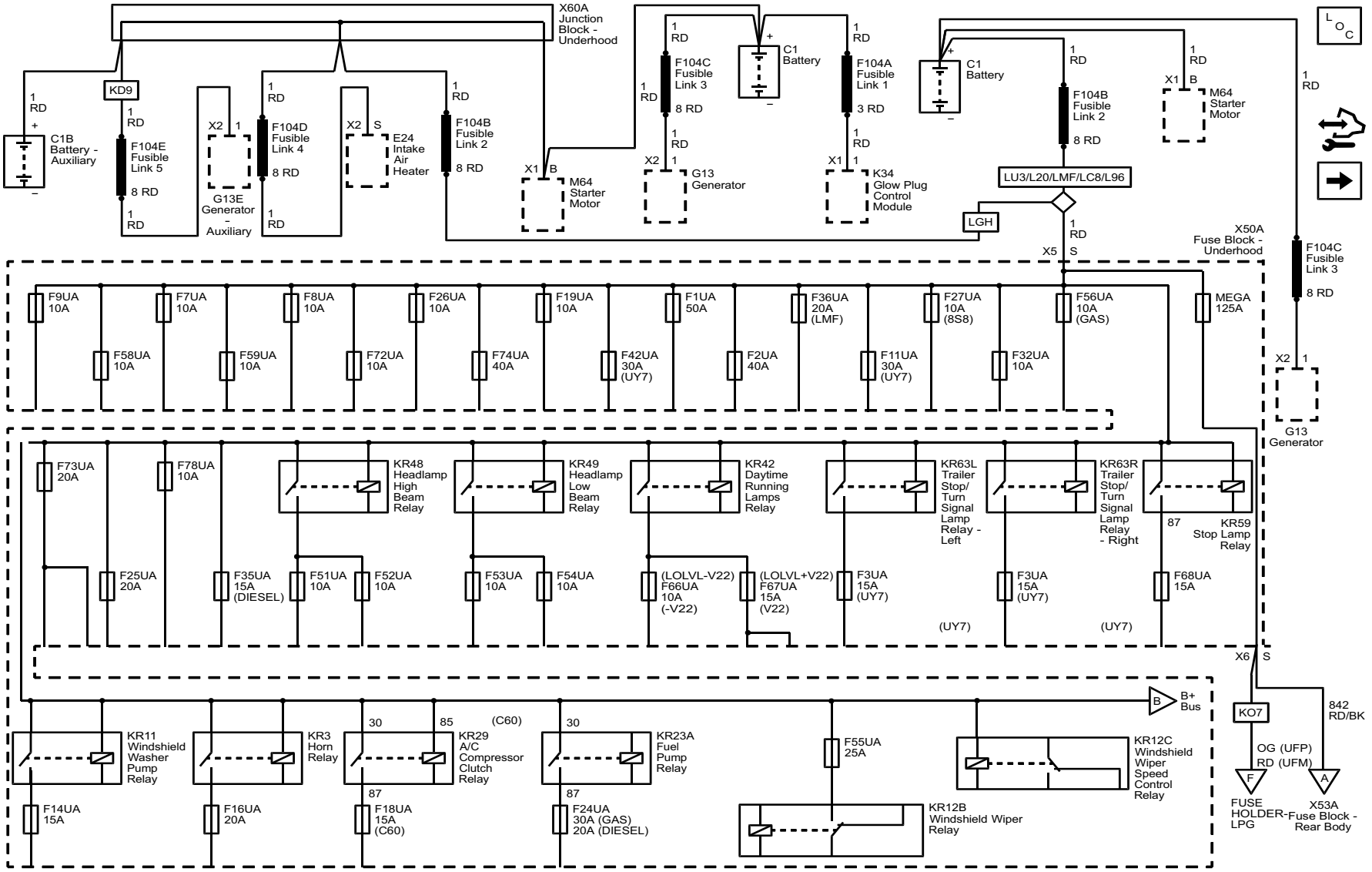
Schematics RPO Code List (cont'd)

RPO	Option Name	Country Group
K34	CRUISE CONTROL-AUTOMATIC, ELECTRONIC	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
KD9	GENERATOR-145 AMP, DUAL	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
KO7	VEHICLE FUEL-DEDICATED LIQUEFIED PETROLEUM GAS, LIQUID	U.S.A., PR and USVI (MAH)
L20	ENGINE-GAS, 8 CYL, 4.8L, SFI, E85 MAX, IRON, GM	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Mid-East (MAM)
L2C	TBD	TBD
L96	ENGINE-GAS, 8 CYL, 6.0L, SFI, E85 MAX, IRON, GM	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Mid-East (MAM)
LC8	ENGINE-LPG/CNG, 8 CYL, V8, 6.0L, SFI, GEN 1, GMNA	U.S.A., PR and USVI (MAH),Canada (MBC)
LGH	ENGINE-DIESEL, 8 CYL, 6.6L, DI, V8, TURBO, DURAMAX	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Israel (MBI)
LMF	ENGINE-FLEXIBLE FUEL, (GAS/ ALC), 8 CYL, 5.3L, SFI, V8, OHV, IRON, GM	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA)
LS0	TBD	TBD
LU3	ENGINE-GAS, 6 CYL, 4.3L, MFI, V6, 90 DEG	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX)
M30	TRANSMISSION-AUTO 4 SPD, HMD, 4L60-E, ELECTRONIC	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA)
MYD	TRANSMISSION-AUTO 6 SPD, HMD, 6L90	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
NE7	FUEL TANK-216L, 57 GAL	U.S.A., PR and USVI (MAH),Canada (MBC),Africa (MAA),Israel (MBI)
PRP	SALES PACKAGE-COMMERCIAL TRADESMAN	U.S.A., PR and USVI (MAH),Canada (MBC),Africa (MAA)
U2K	DIGITAL AUDIO SYSTEM-S-B and	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX)
U80	DISPLAY-COMPASS	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
UD7	PARK ASSIST-REAR	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
UE1	COMMUNICATION SYSTEM-VEHICLE, ONSTAR	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX)
UF2	LAMP-CARGO	U.S.A., PR and USVI (MAH),Canada (MBC),Africa (MAA)
UFA	DISPLAY-OUTSIDE TEMPERATURE	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
UFM	PARTS PKG-COMPLETE VEHICLE KIT, 3 TANK	U.S.A., PR and USVI (MAH),Canada (MBC)
UFP	PARTS PKG-COMPLETE VEHICLE KIT, 4 TANK	U.S.A., PR and USVI (MAH),Canada (MBC)
UJ1	INDICATOR-SYSTEM, BRAKE WARNING	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Israel (MBI), Mid-East (MAM)
UJ6	TBD	TBD
UL5	RADIO-(NONE)	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
US8	RADIO-AM/FM STEREO, SEEK/ SCAN, CD, AUTO TONE, CLOCK, ETR, MP3, RDS	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
USR	RECEPTACLE-USB	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
UY7	WIRING HARNESS-TRUCK TRAILER, HD	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)

Schematics RPO Code List (cont'd)

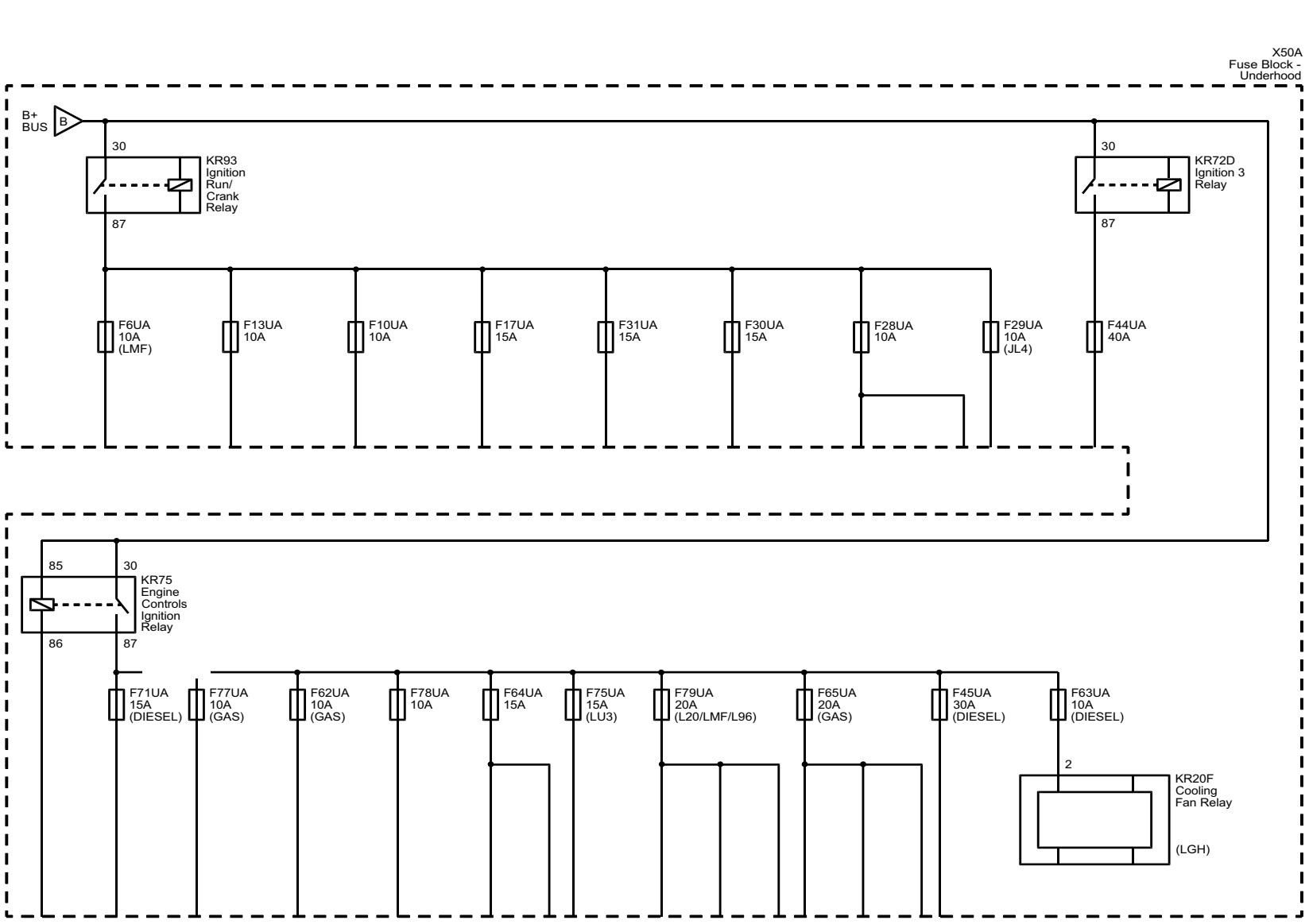
RPO	Option Name	Country Group
UYS	RADIO-AM/FM STEREO, NAV, DVD-ROM, CAF, HDD, USB, RSA, RSE (GMNA VERSION)	U.S.A., PR and USVI (MAH),Canada (MBC)
V22	GRILLE-RADIATOR, CHROME	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
W1Y	CONTROL-STEERING WHEEL, RADIO, REDUNDANT CONTROLS	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
YA2	DOOR SIDE-REAR, SLIDING	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI),Mid-East (MAM)
YF1	SALES PACKAGE-CUTAWAY UPFITTER	U.S.A., PR and USVI (MAH),Canada (MBC)
YF2	SALES PACKAGE-AMBULANCE UPFITTER	U.S.A., PR and USVI (MAH),Canada (MBC),Mexico (MCX),Africa (MAA), Israel (MBI)
YF7	SALES PACKAGE-RECREATIONAL VEHICLE, UPFITTER	U.S.A., PR and USVI (MAH),Canada (MBC),Africa (MAA),Mid-East (MAM)

Power Distribution Schematics (B+ Bus - Underhood Fuse Block (1 of 2))



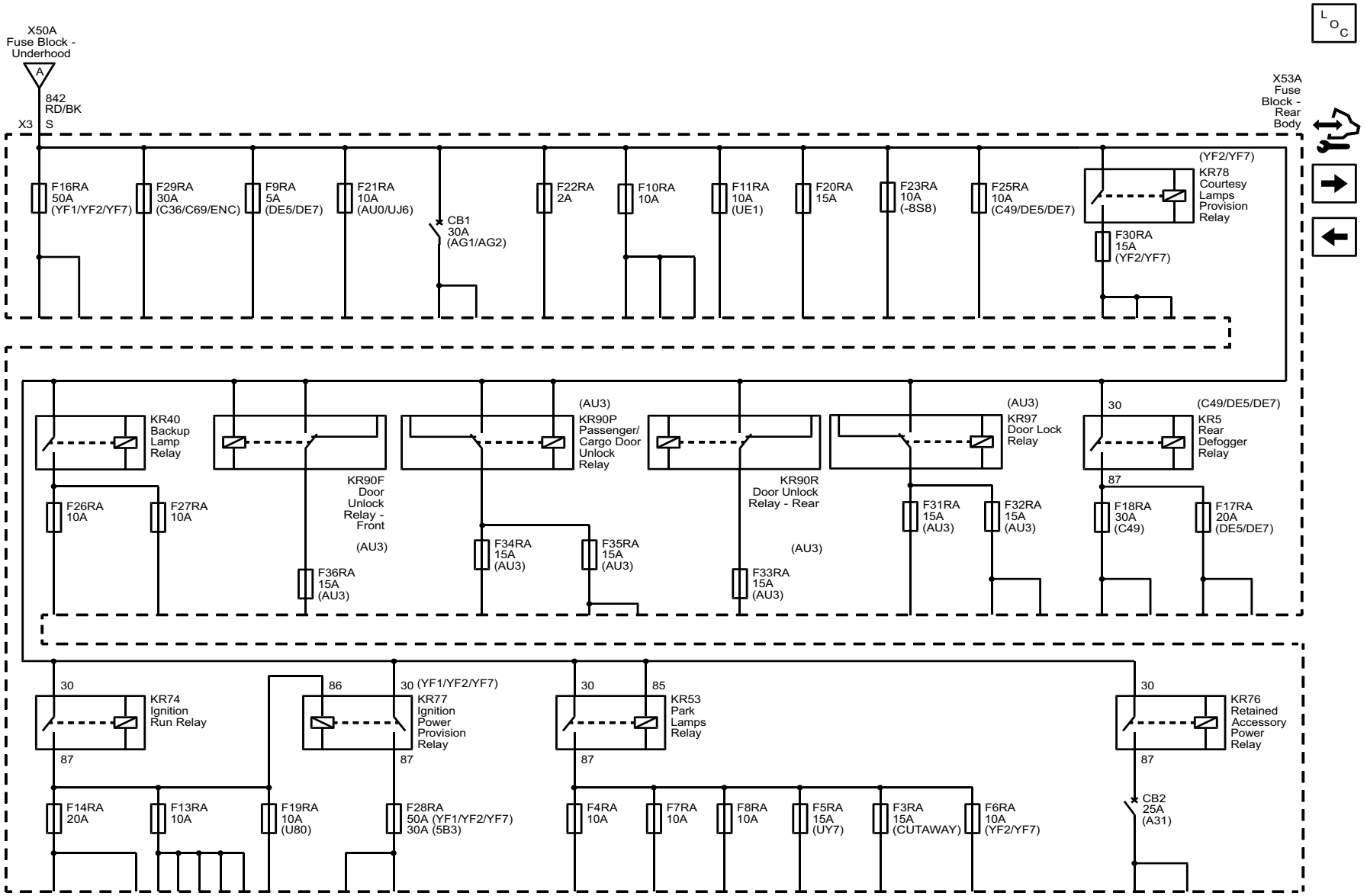
3395569

Power Distribution Schematics (B+ Bus - Underhood Fuse Block (2 of 2))



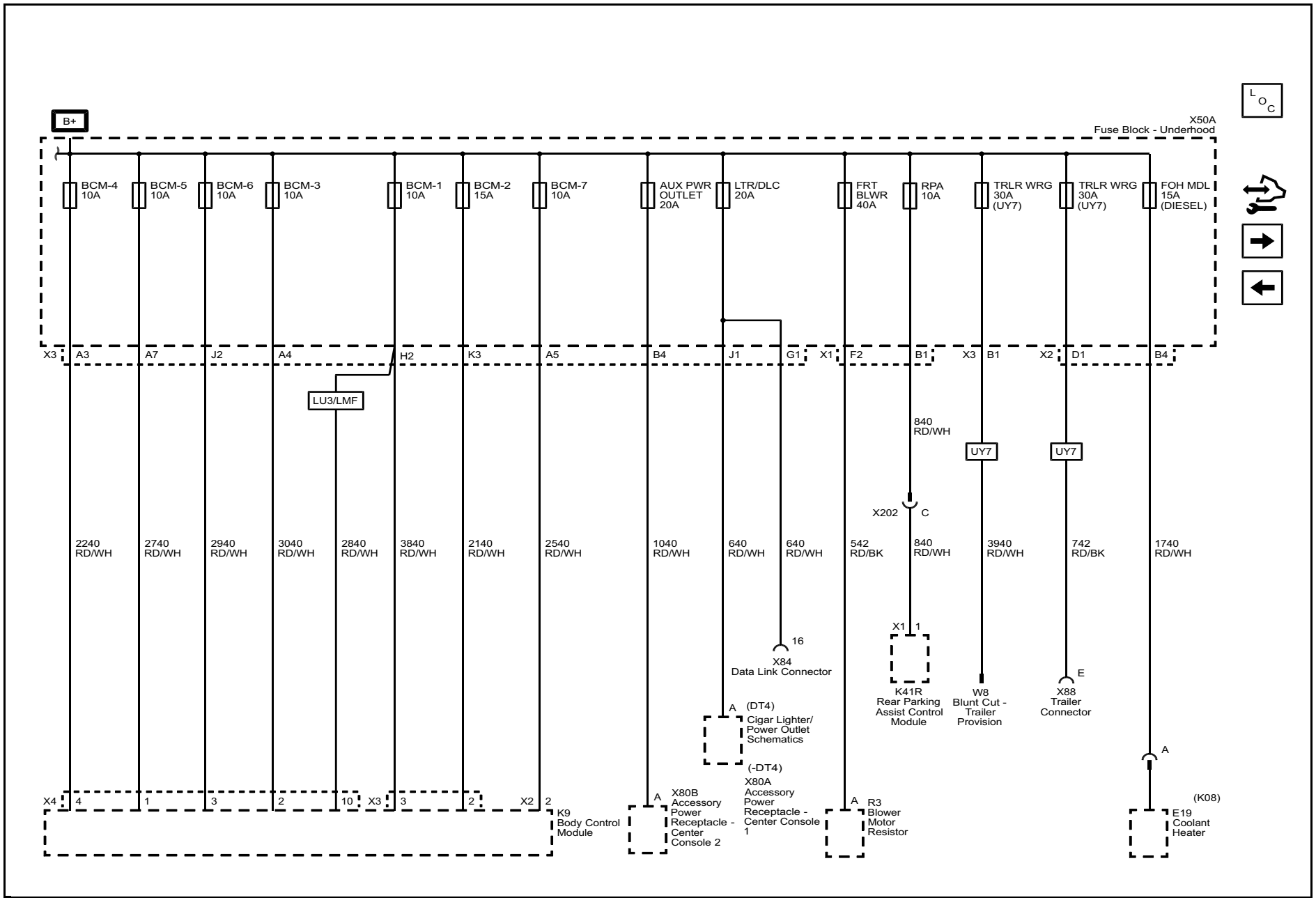
3395570

Power Distribution Schematics (B+ Bus - Body Fuse Block)



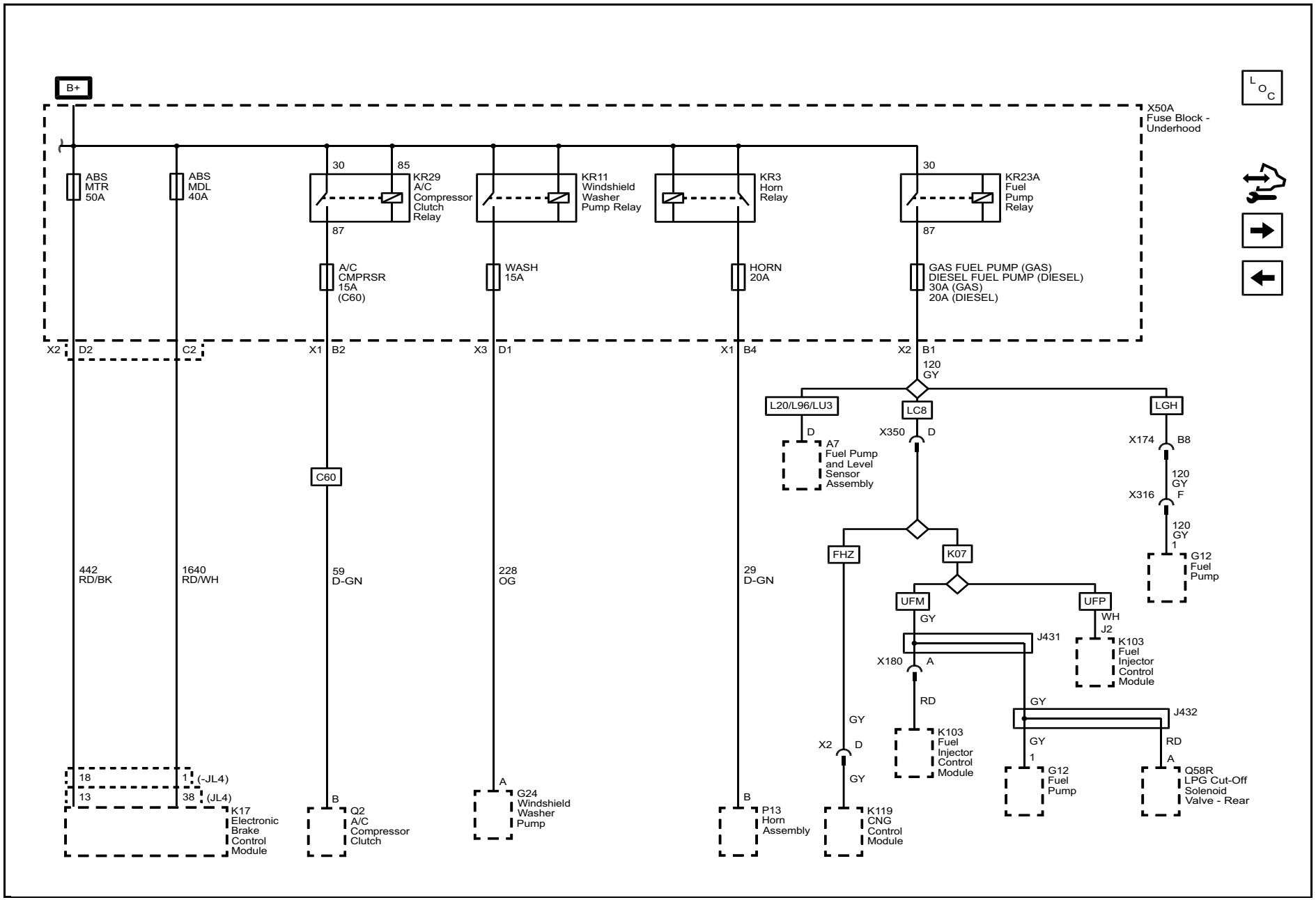
3395571

Power Distribution Schematics (AUX PWR OUTLET, BCM-1, BCM-2, BCM-3, BCM-4, BCM-5, BCM-6, BCM-7, FOH MDL, FRT BLWR, LTR/DLC, and TRLR WRG Fuses)



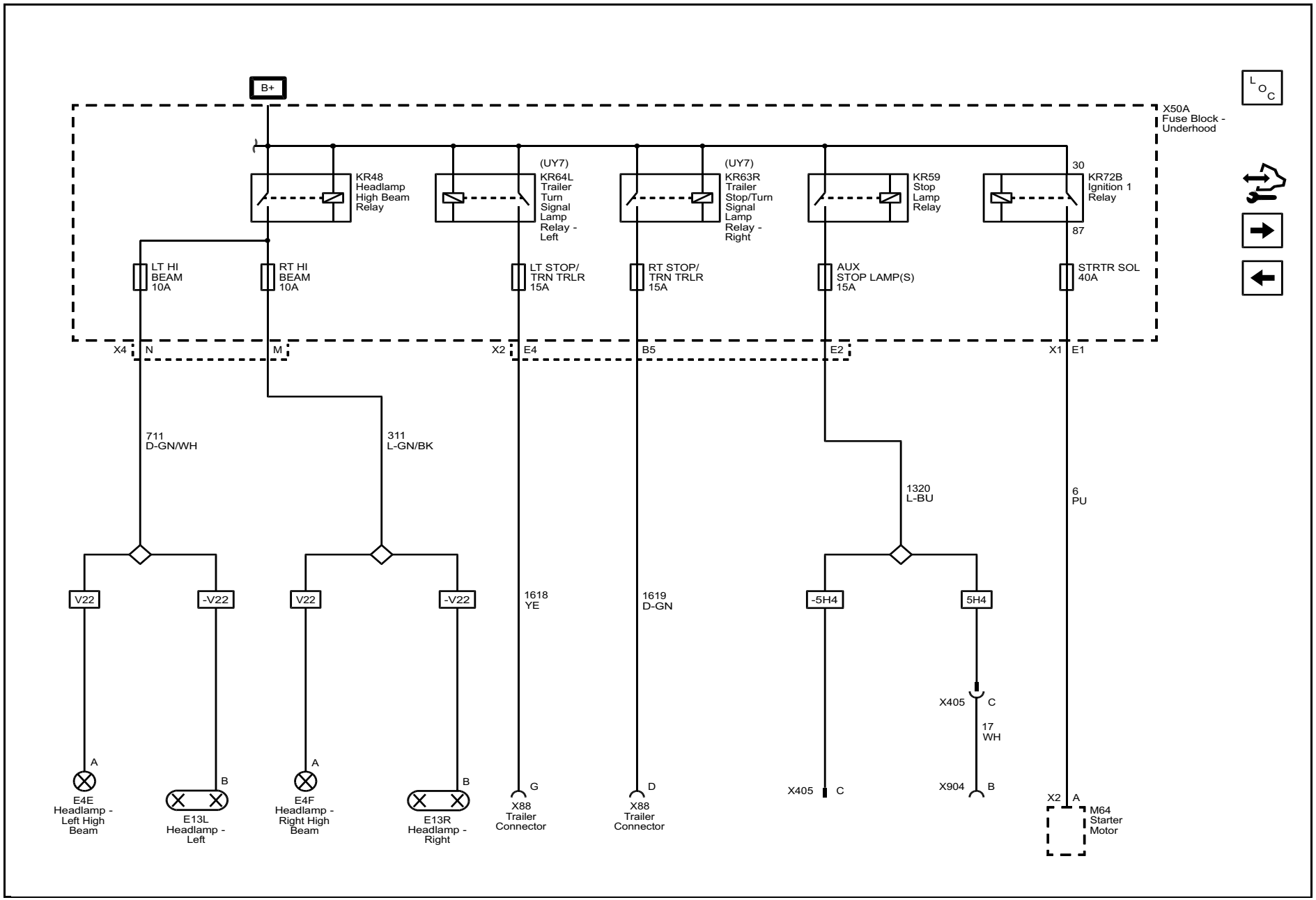
3395572

Power Distribution Schematics (A/C CMPRSR, ABS MDL, ABS MTR, DIESEL FUEL PUMP, GAS FUEL PUMP, HORN, and WASH Fuses)



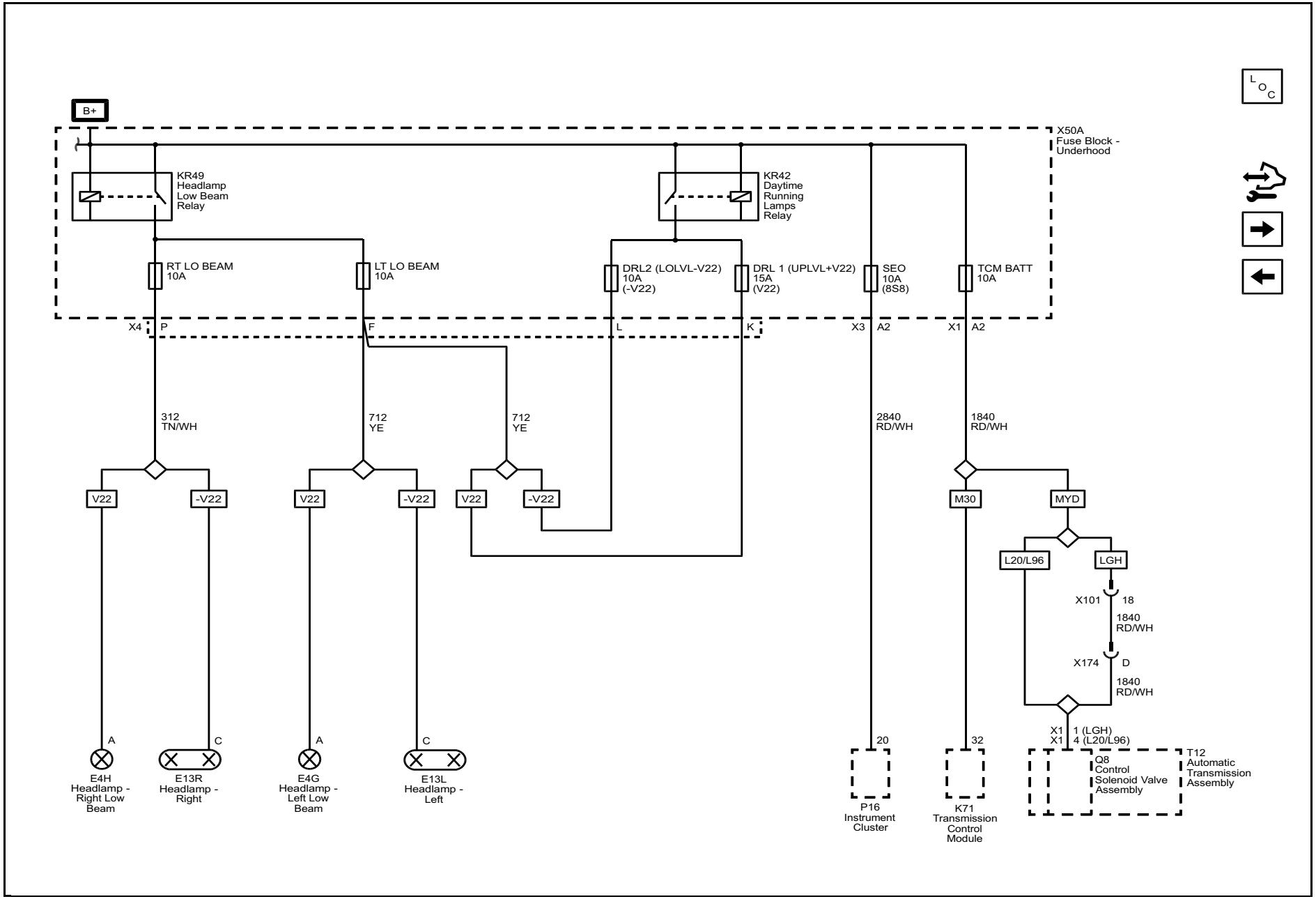
3395573

Power Distribution Schematics (AUX STOP LAMP(S), LT HI BEAM, LT STOP/TRN TRLR, RT HI BEAM, RT STOP/TRN TRLR, and STRTR SOL Fuses)



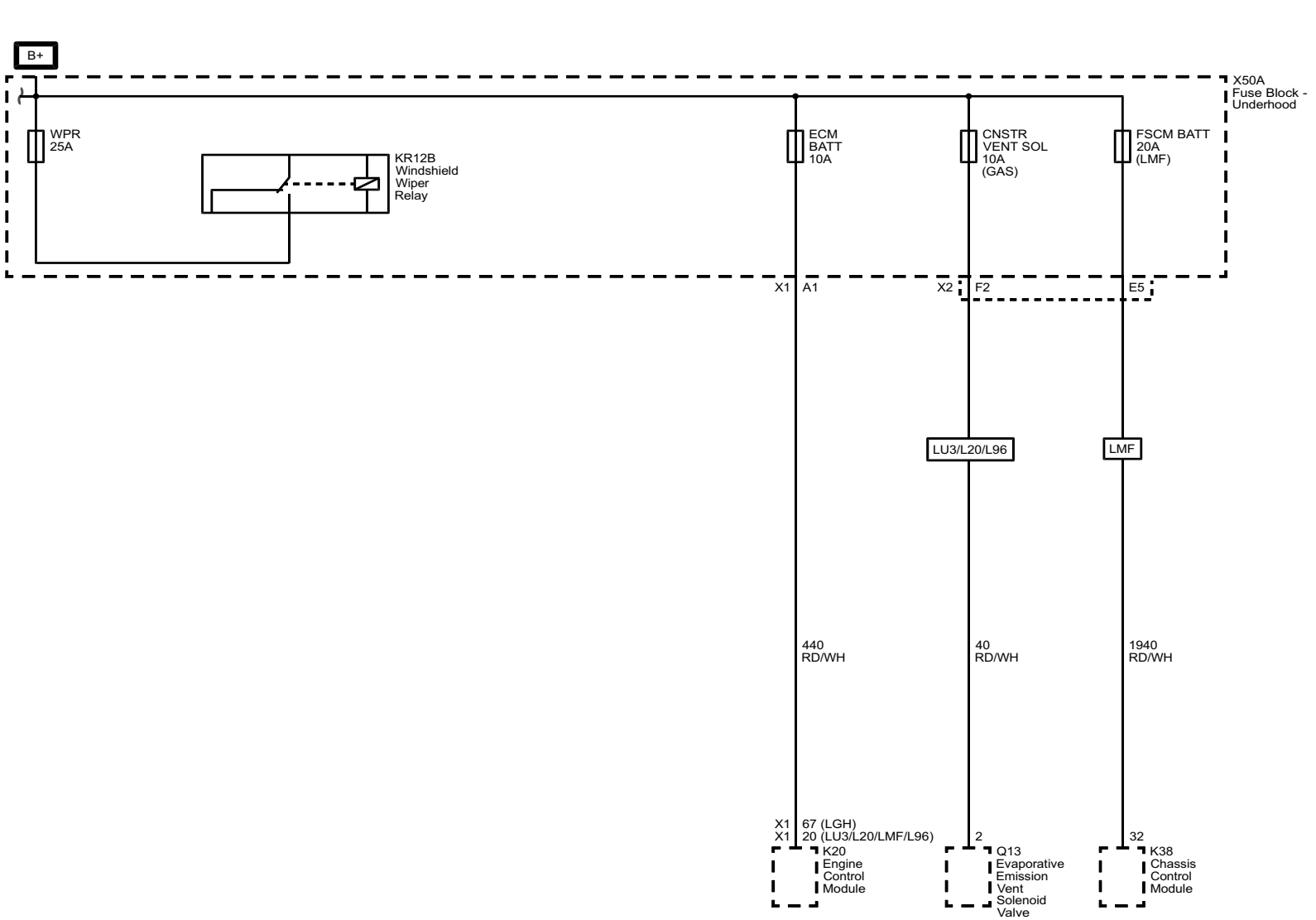
3395575

Power Distribution Schematics (DRL 1, (UPLVL+V22), DRL 2 (LOLVL-V22), LT LO BEAM, RT LO BEAM, SEO, and TCM BATT Fuses)



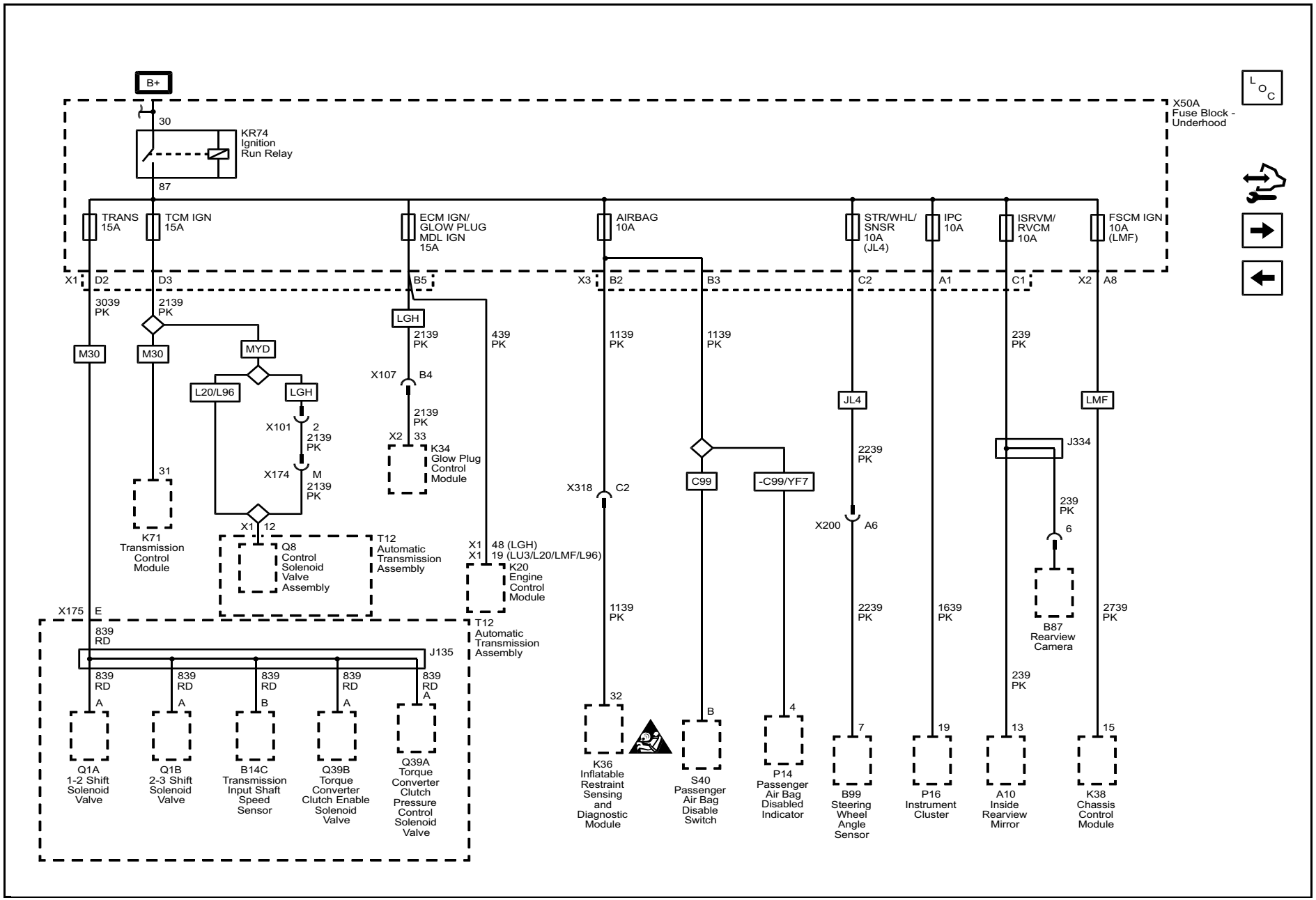
3395576

Power Distribution Schematics (CNSTR VENT SOL, ECM BATT, FCSM BATT, and WPR Fuses)



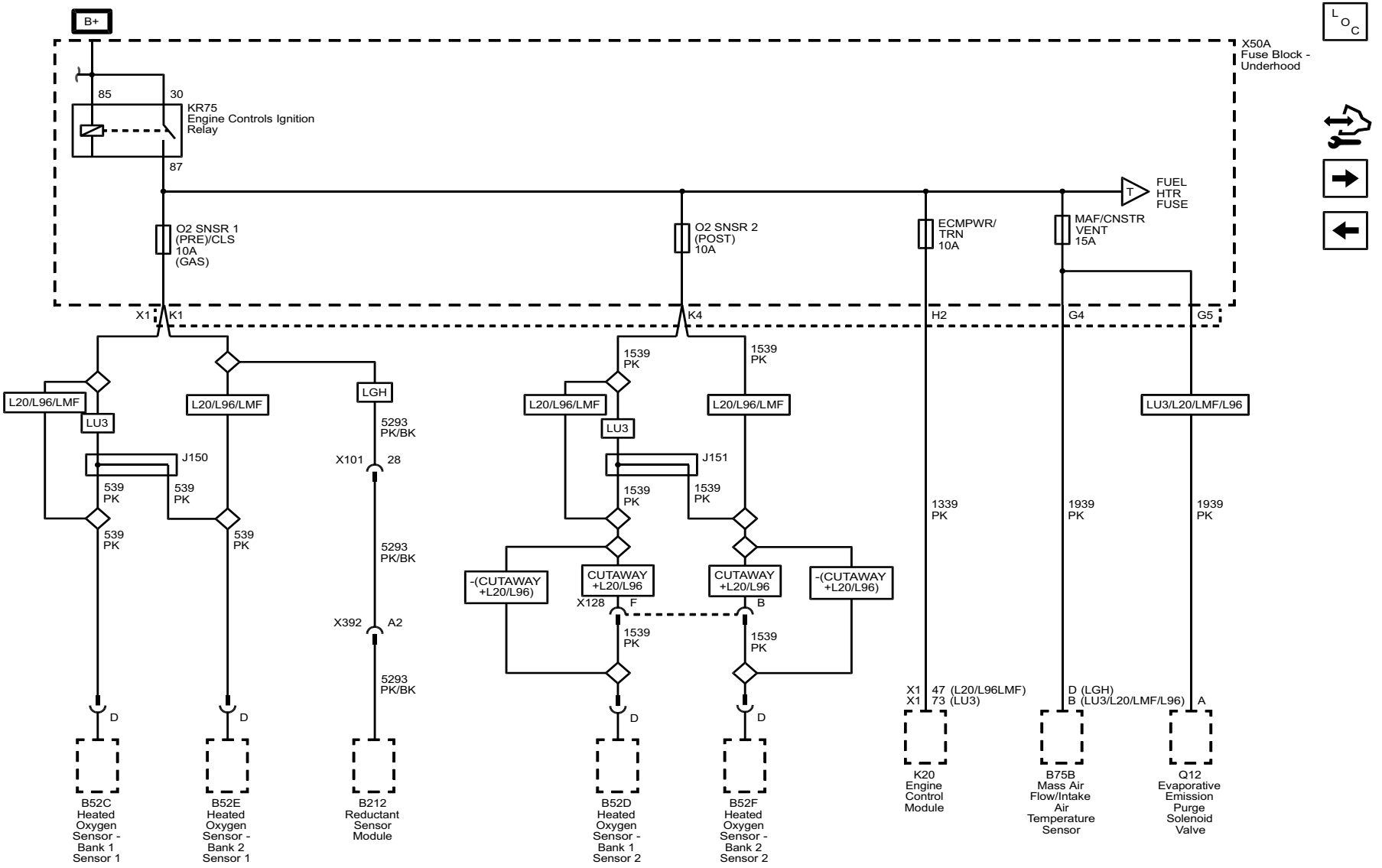
3395578

Power Distribution Schematics (AIRBAG, BRK SW, ECM IGN/GLOW PLUG MDL IGN, FCSM IGN, IPC, STR/WHL/SNSR, TCM IGN, and TRANS Fuses)



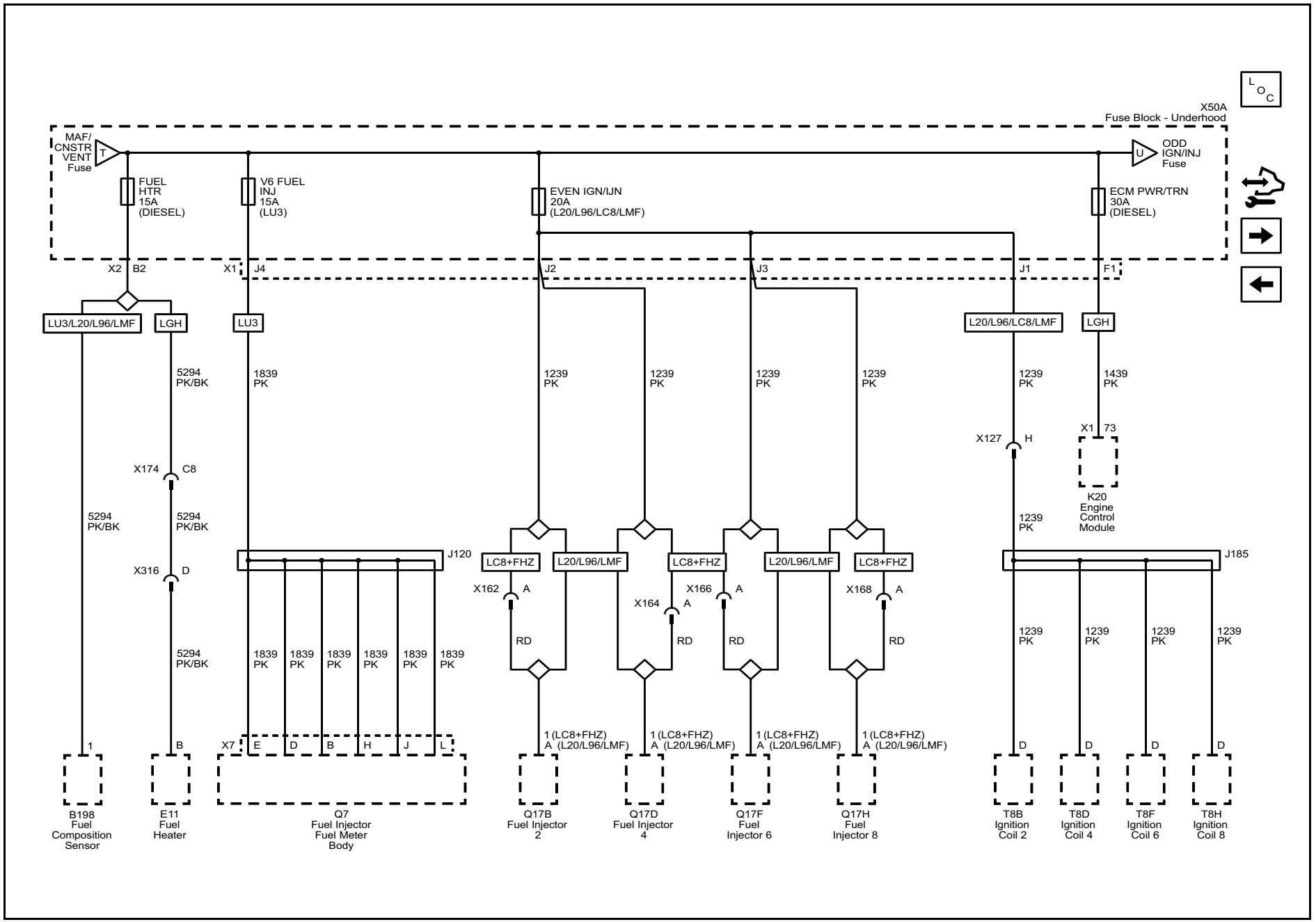
3395579

Power Distribution Schematics (ECM PWR/TRN, MAF/CNSTR VENT, O2 SNSR 1 (PRE)/CLS, and O2 SNSR 2 (POST) Fuses)



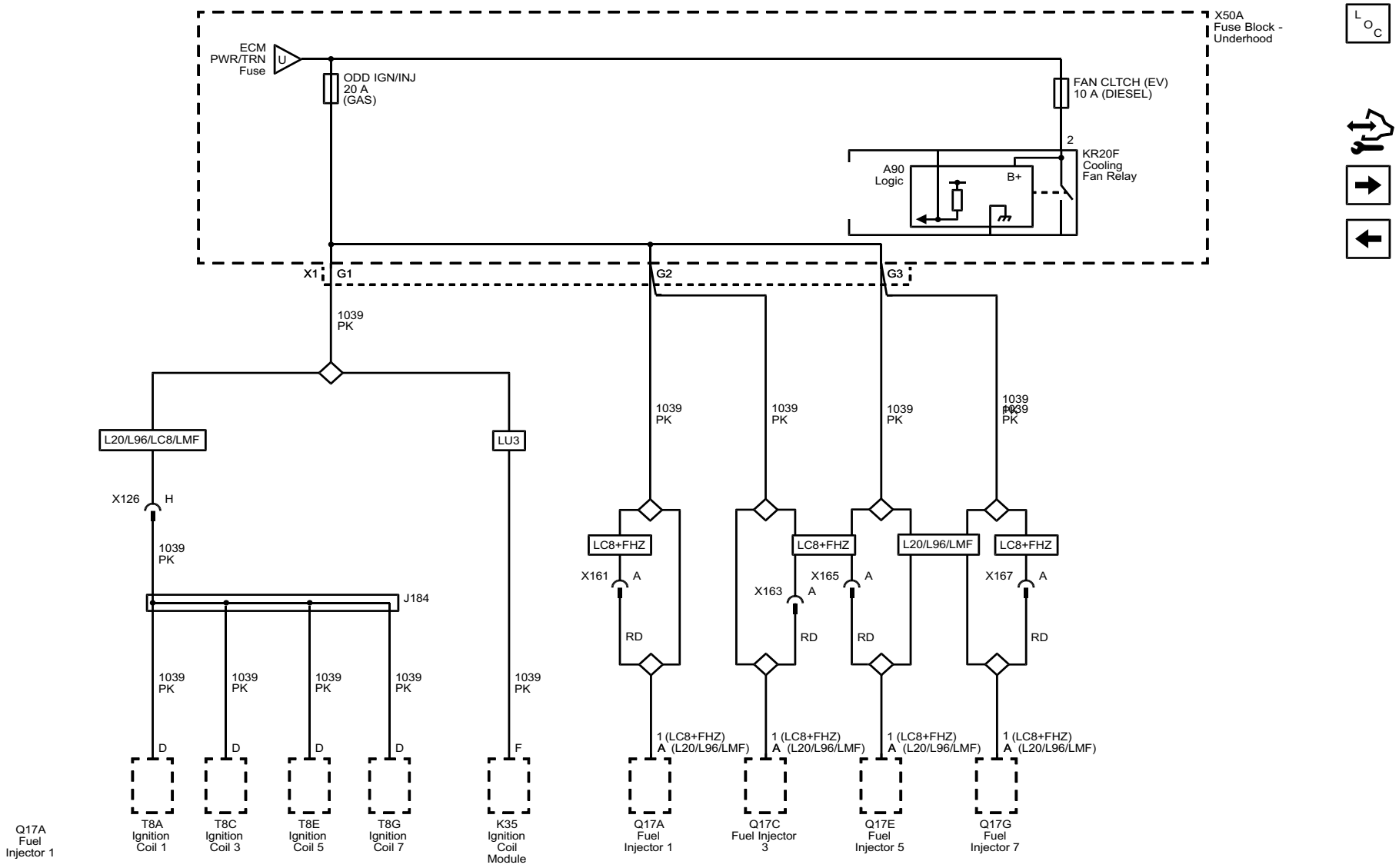
3395580

Power Distribution Schematics (ECM PWR/TRN, EVEN IGN/IJN, FUEL HTR, and V6 FUEL INJ Fuses)



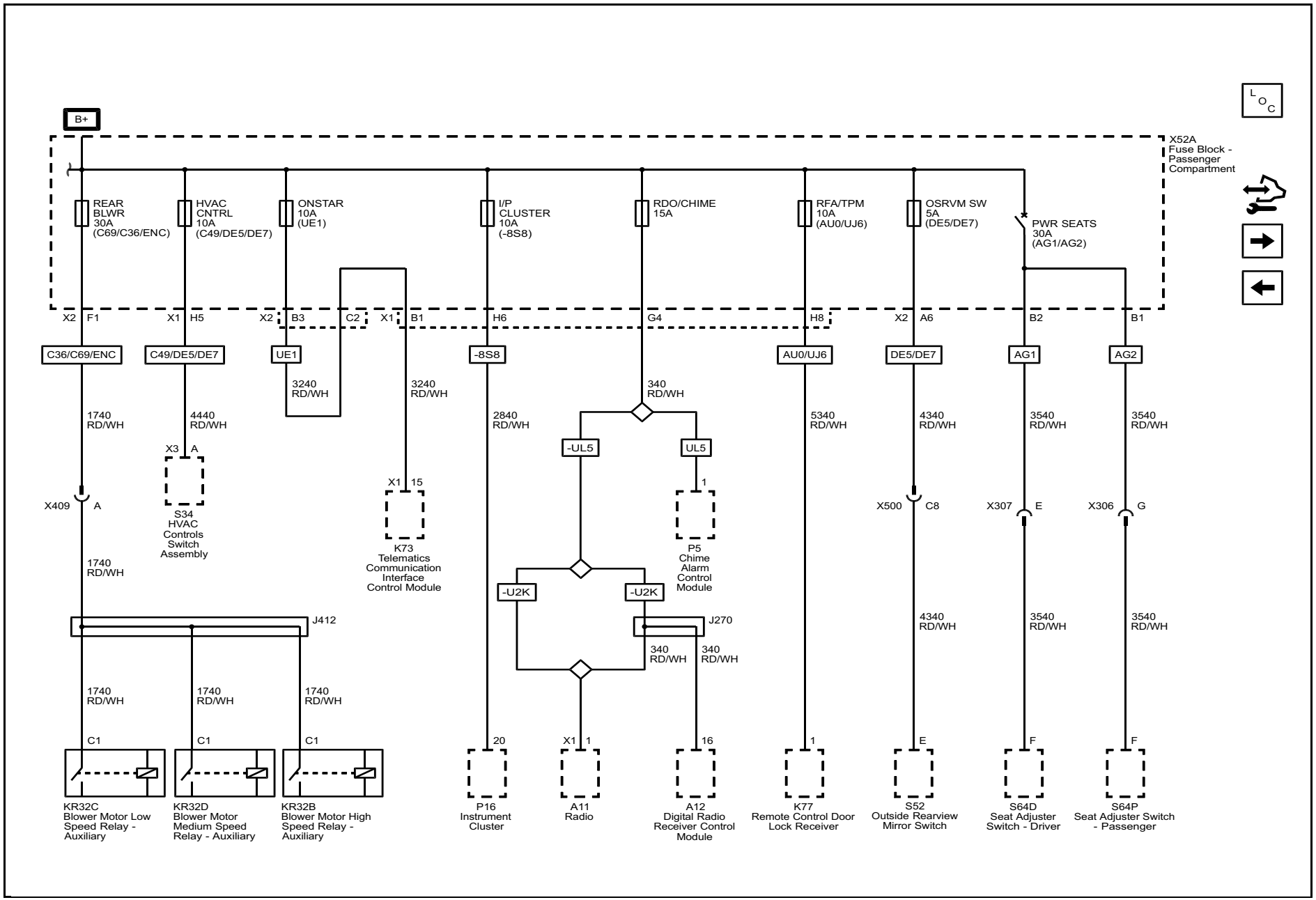
3395581

Power Distribution Schematics (FAN CLTCH (EV) and ODD IGN/INJ Fuses)



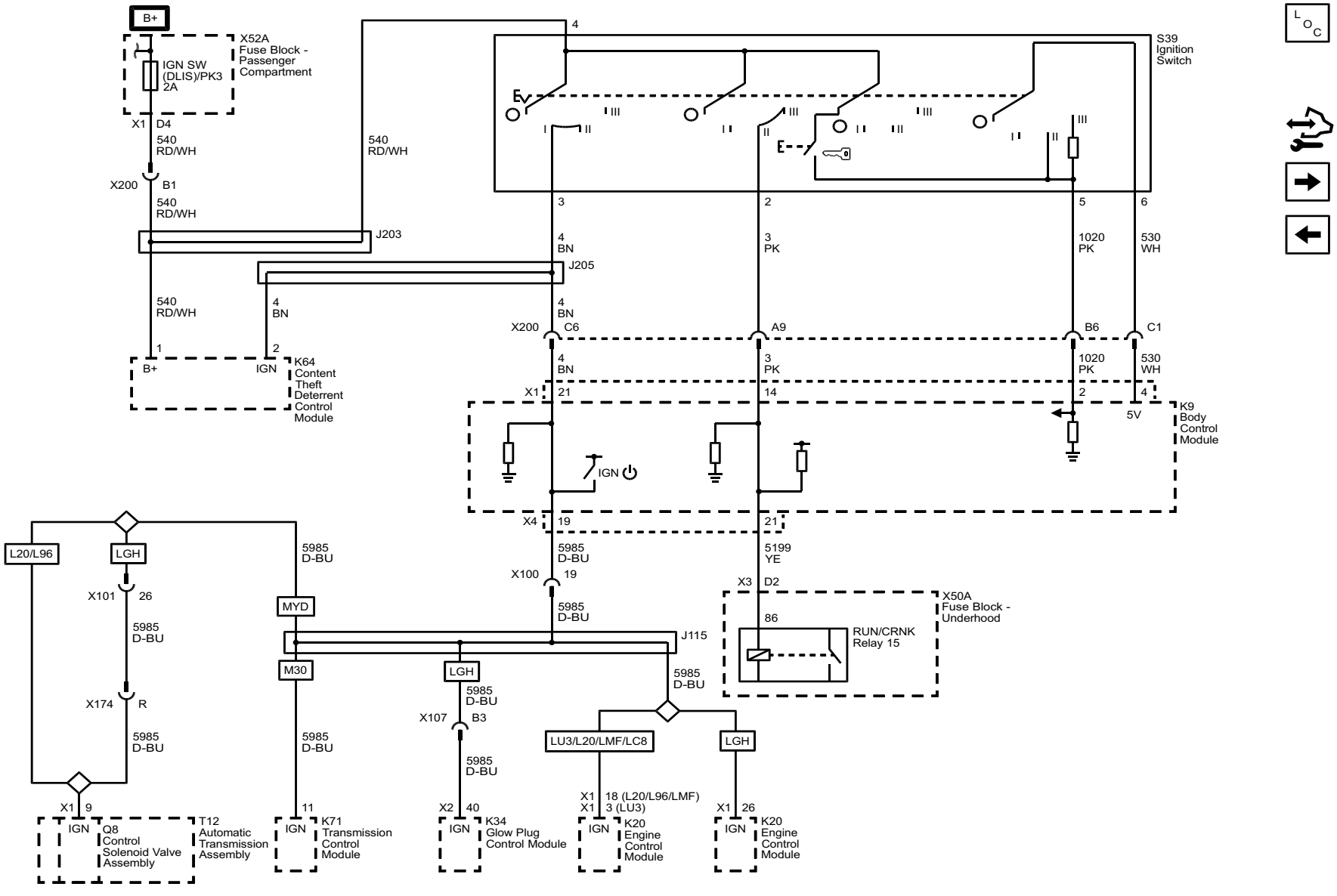
3395583

Power Distribution Schematics (HVAC CNTRL, I/P CLUSTER, ONSTAR, OSRVM SW, RDO/CHIME, REAR BLWR, and RFA/TPM Fuses and PWR SEATS Circuit Breaker)



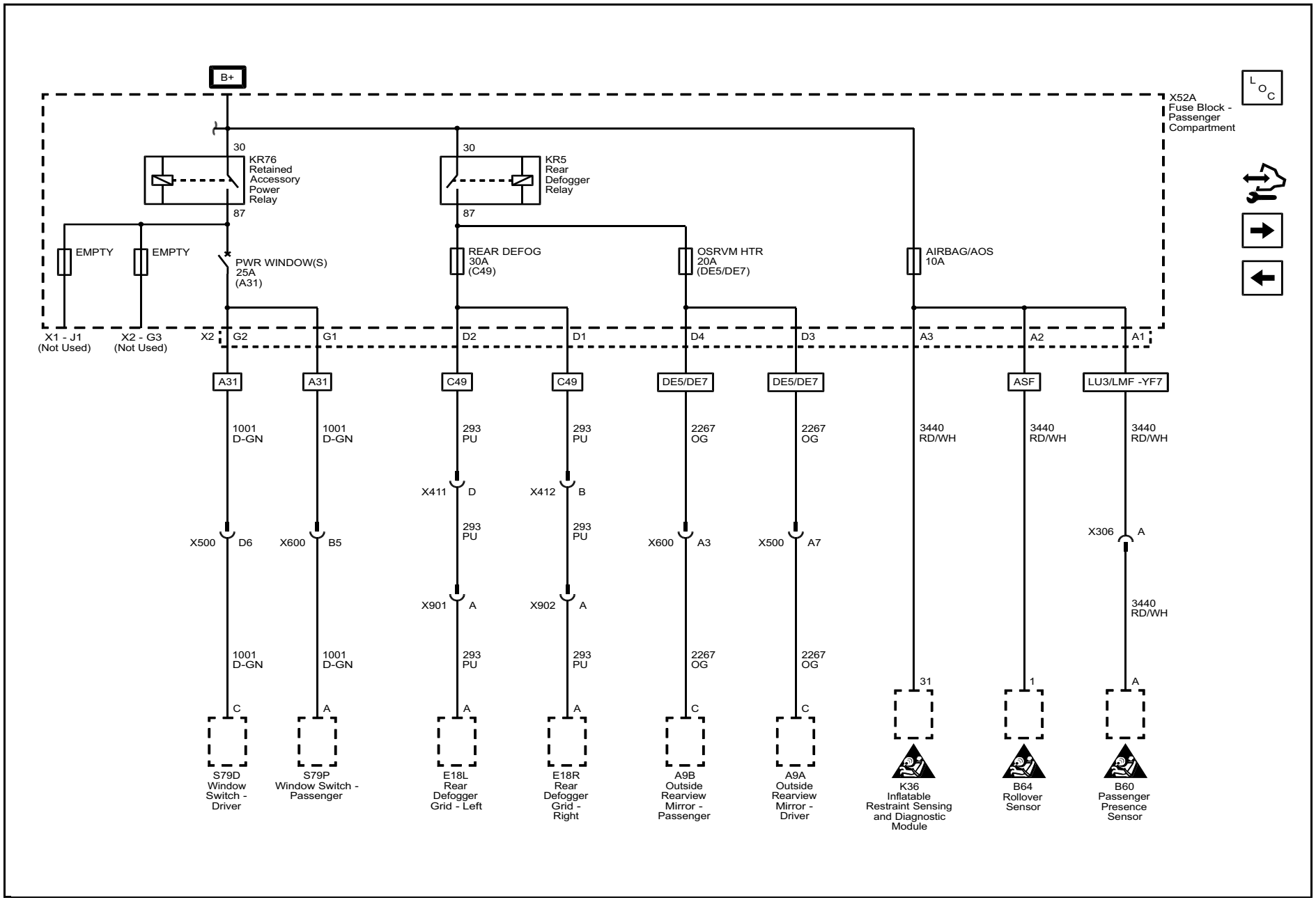
3395584

Power Distribution Schematics (Ignition Switch and IGN SW (DLIS)/PK3 Fuse)



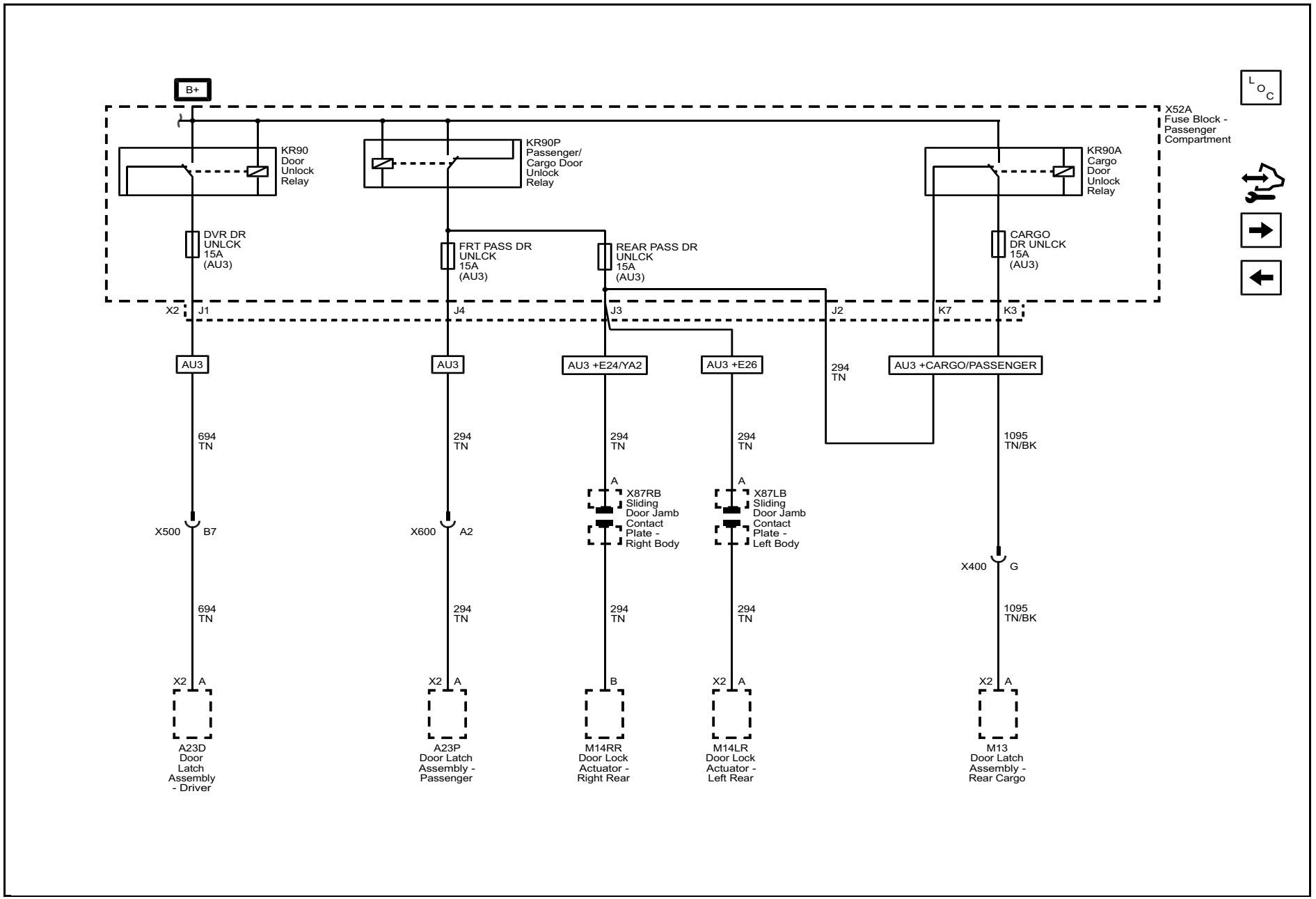
3395585

Power Distribution Schematics (AIRBAG/AOS, OSRVM HTR, and REAR DEFOG Fuses and PWR WINDOW(S) Circuit Breaker)



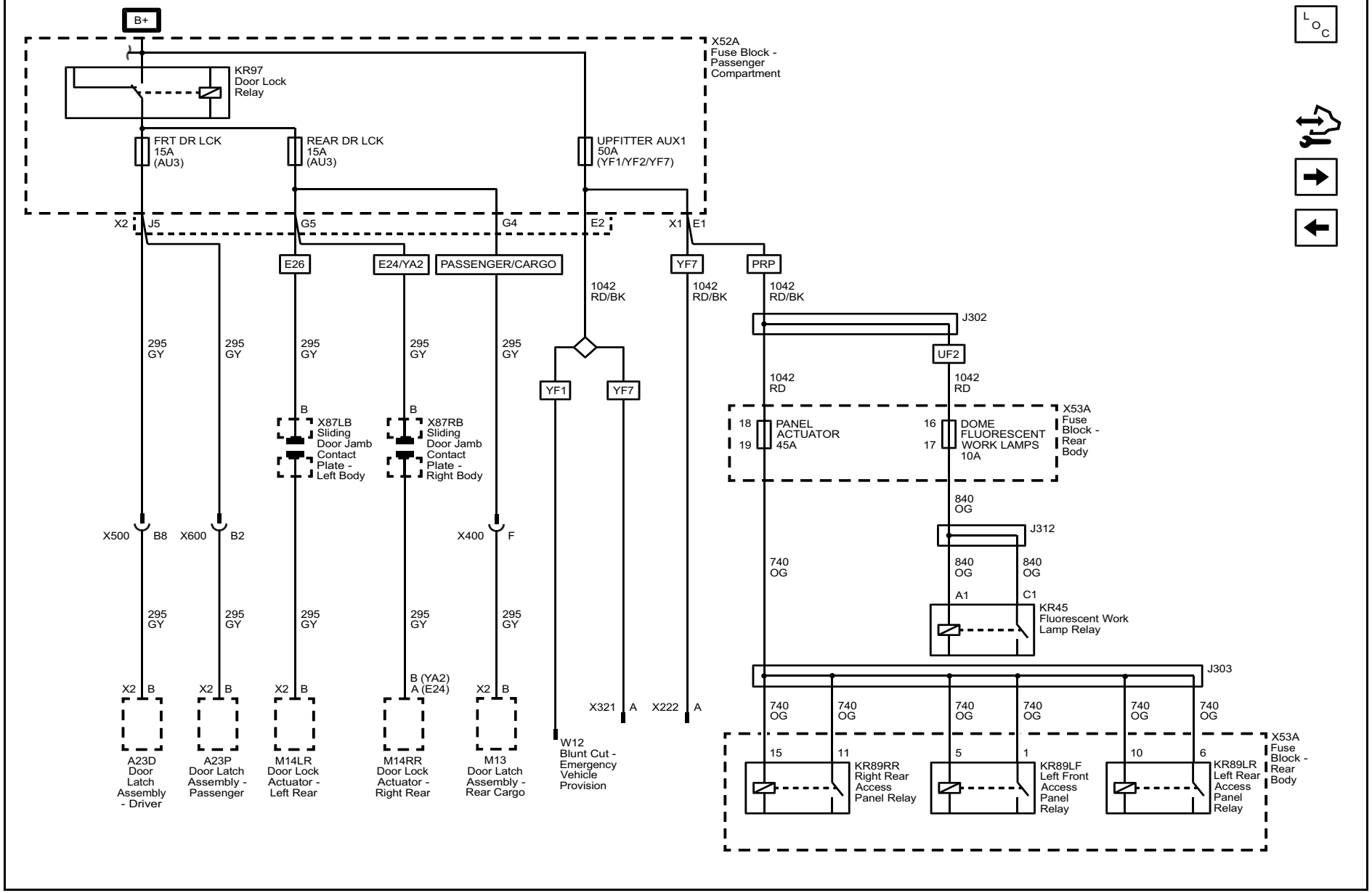
3395586

Power Distribution Schematics (CARGO DR UNLCK, DVR DR UNLCK, FRT PASS DR UNLCK and REAR PASS DR UNLCK Fuses)



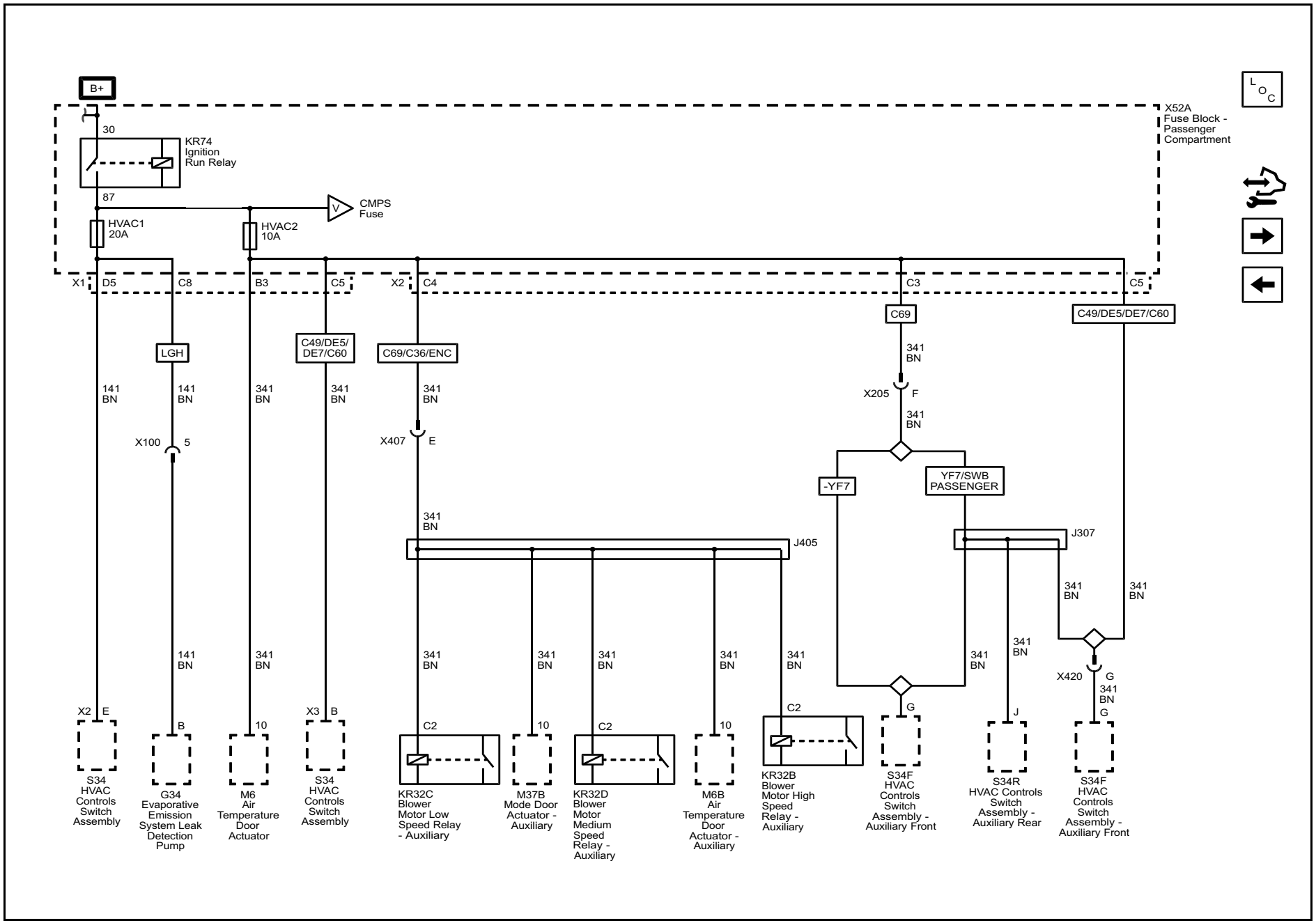
3395587

Power Distribution Schematics (FRT DR LCK, REAR DR LCK and UPFITTER AUX1 Fuses)



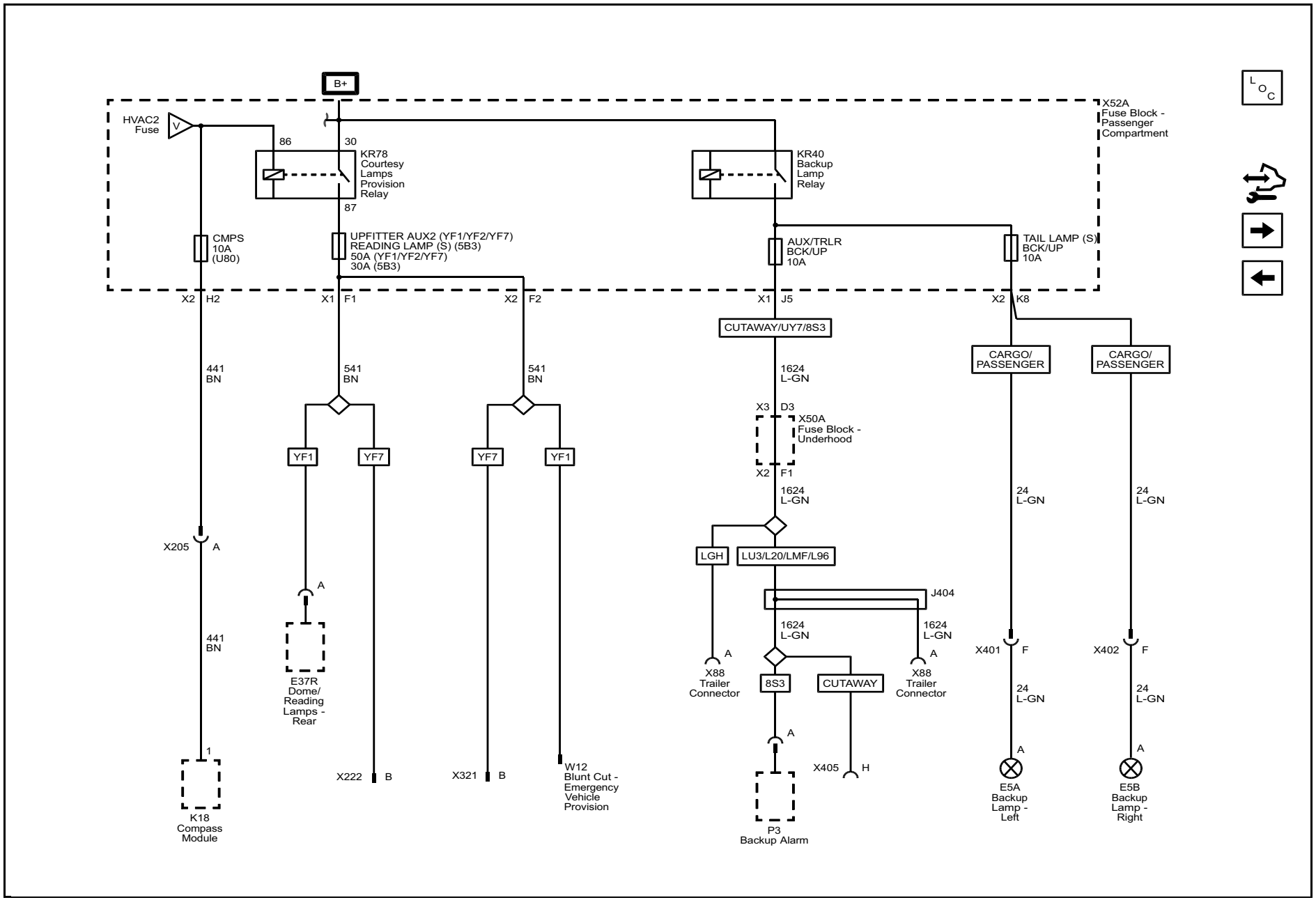
3395589

Power Distribution Schematics (HVAC1 and HVAC2 Fuses)



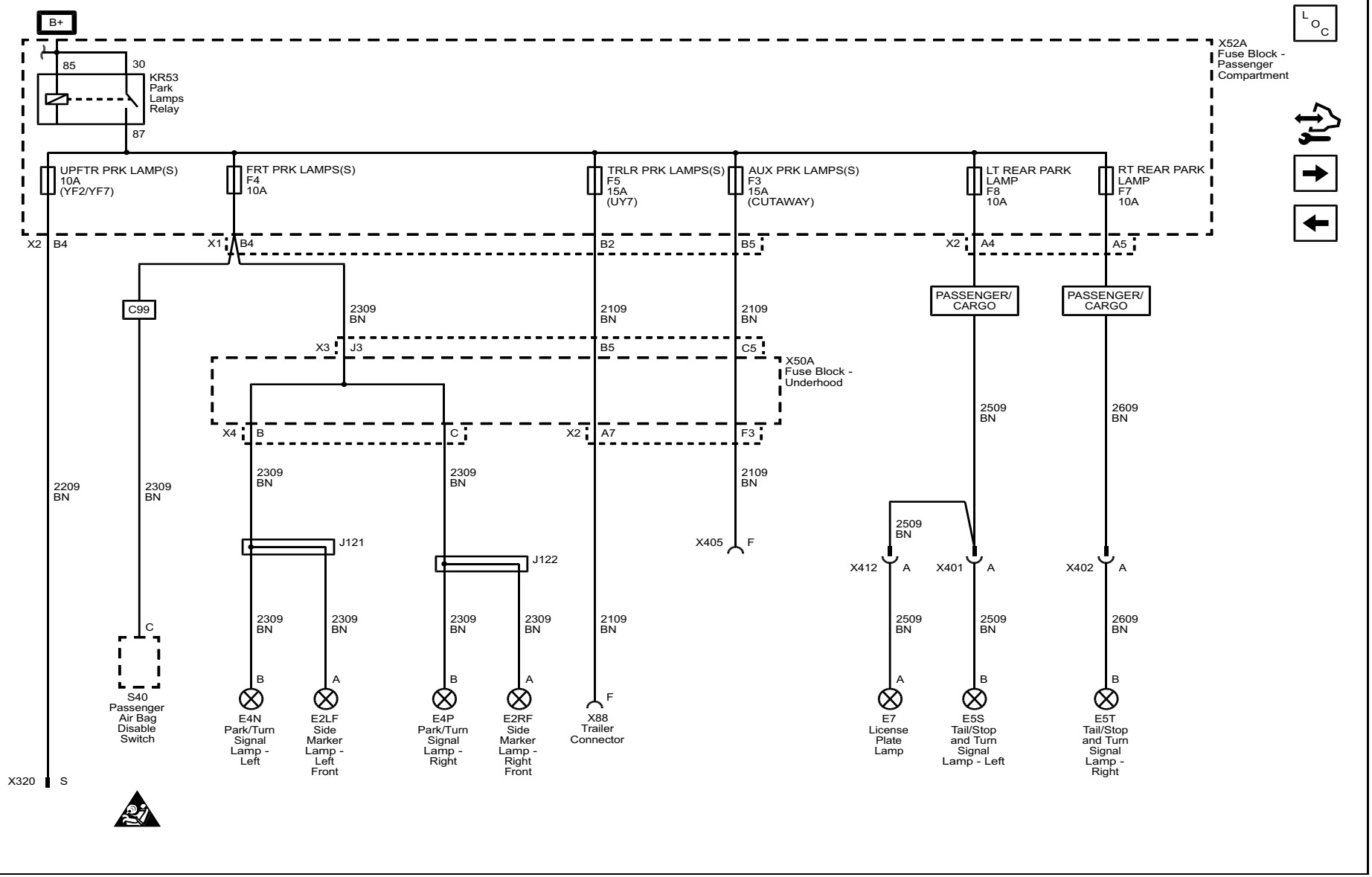
3395590

Power Distribution Schematics (AUX/TRLR BCK/UP, CMPS, READING LAMP(S), TAIL LAMP(S), AND UPFITTER AUX2 Fuses)



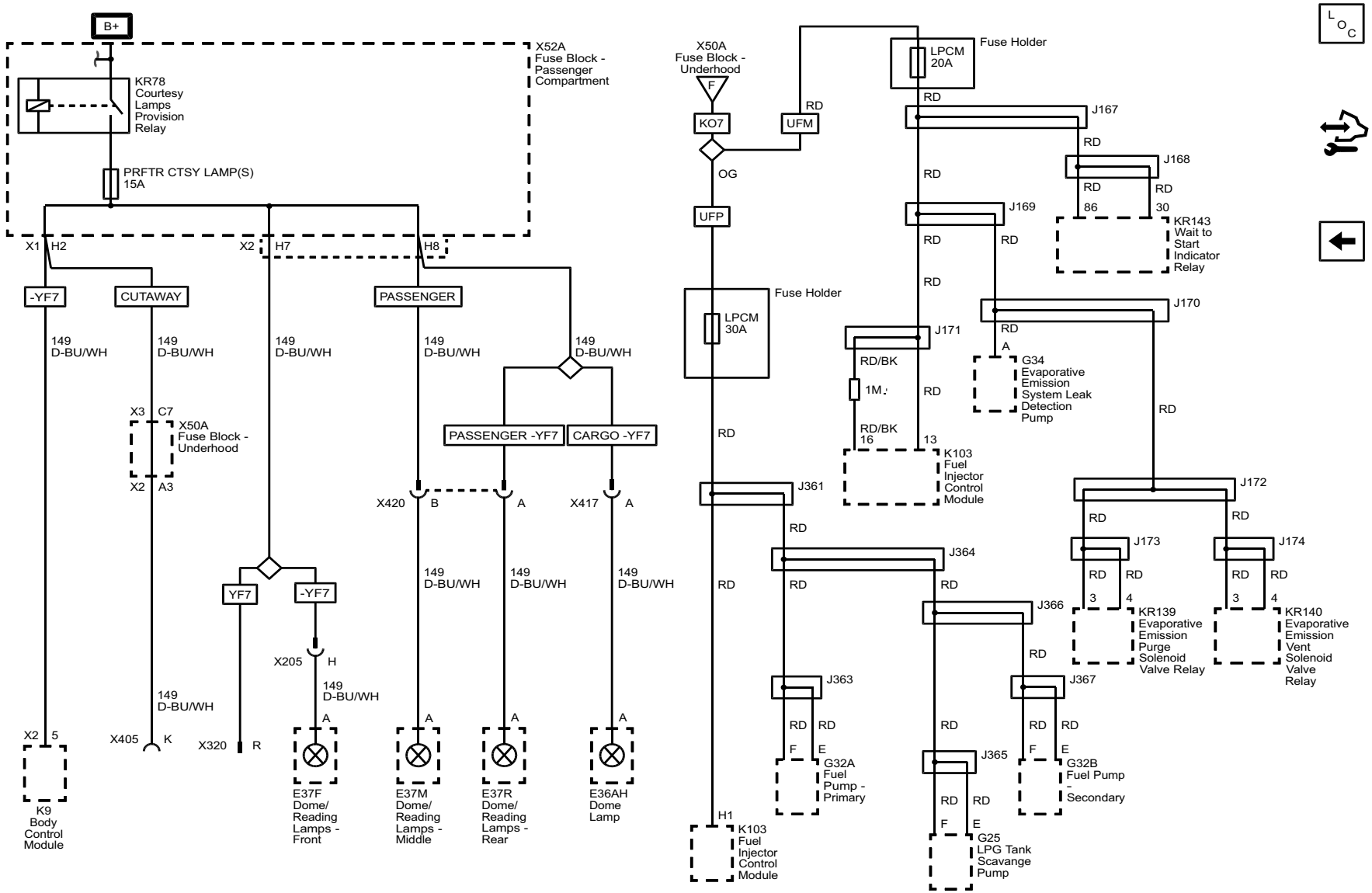
3395591

Power Distribution Schematics (AUX PRK LAMP(S), FRT PRK LAMP(S), LT REAR PARK LAMP, RT REAR PRK LAMP, TRLR PRK LAMP(S), and UPFTR PRK LAMP(S) Fuses)



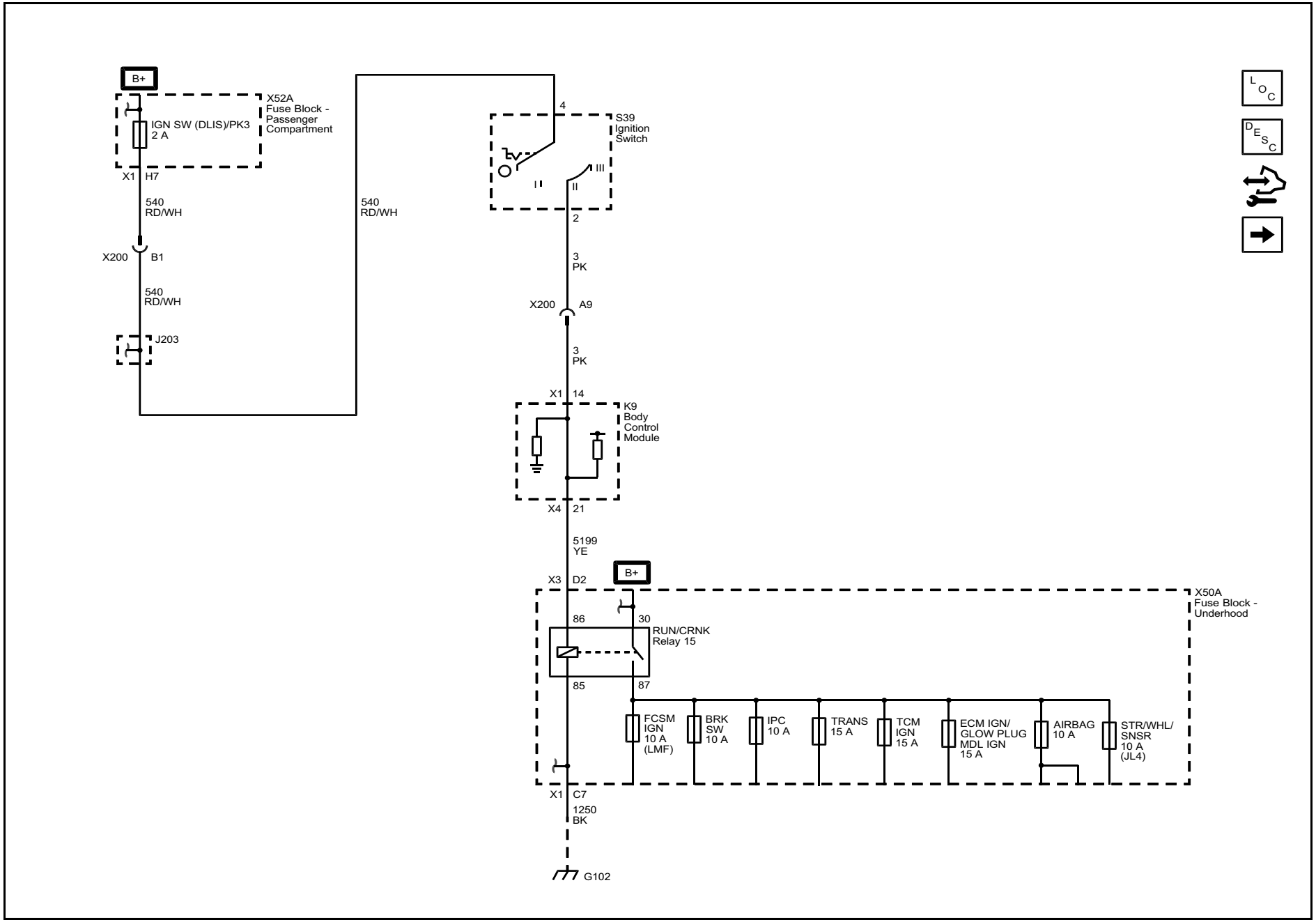
3395592

Power Distribution Schematics (UPFTR CTSY LAMP(S) Fuse and LPCM Fuse (KO7))



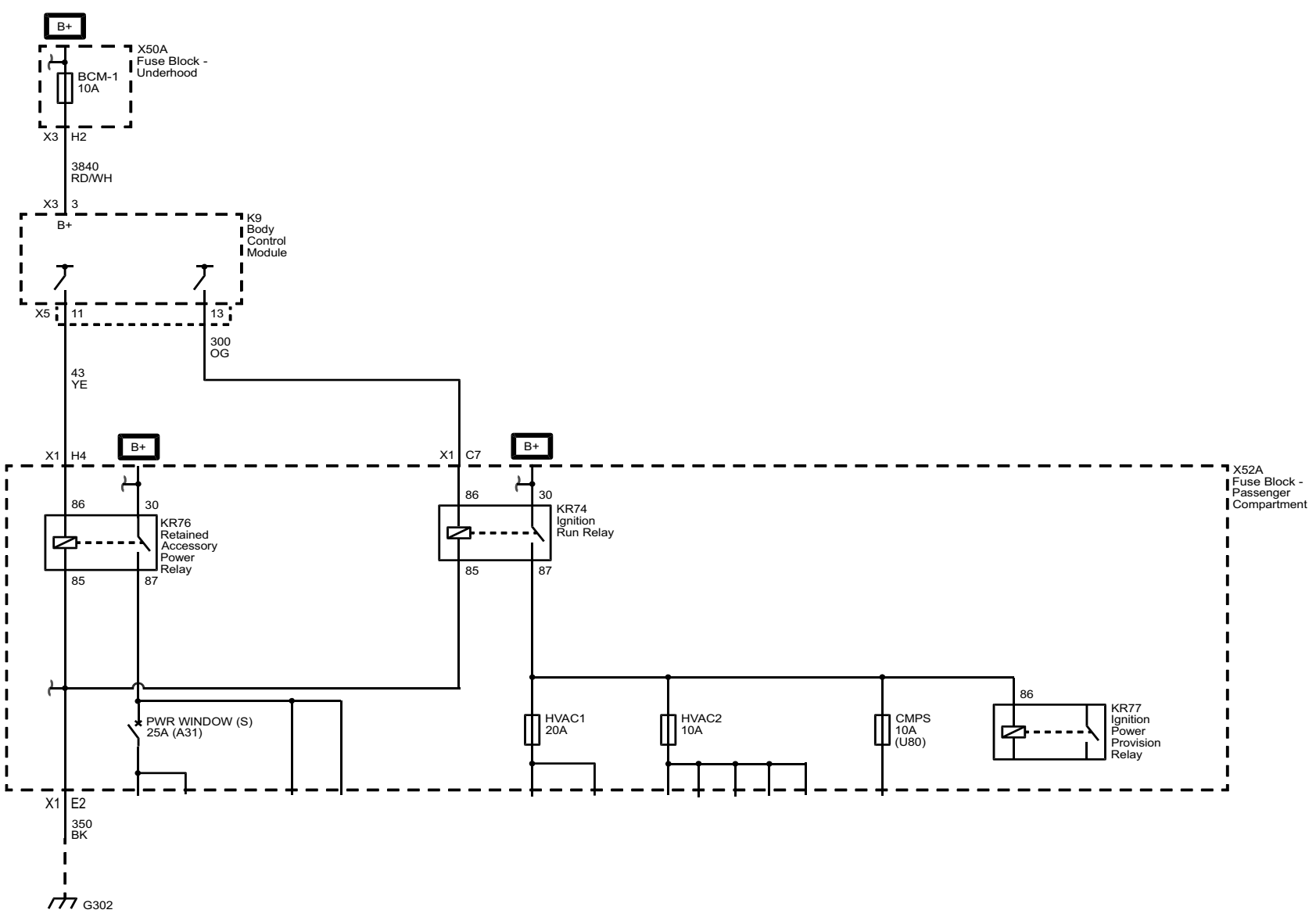
3395593

Power Moding Schematics (RUN/CRNK Relay)



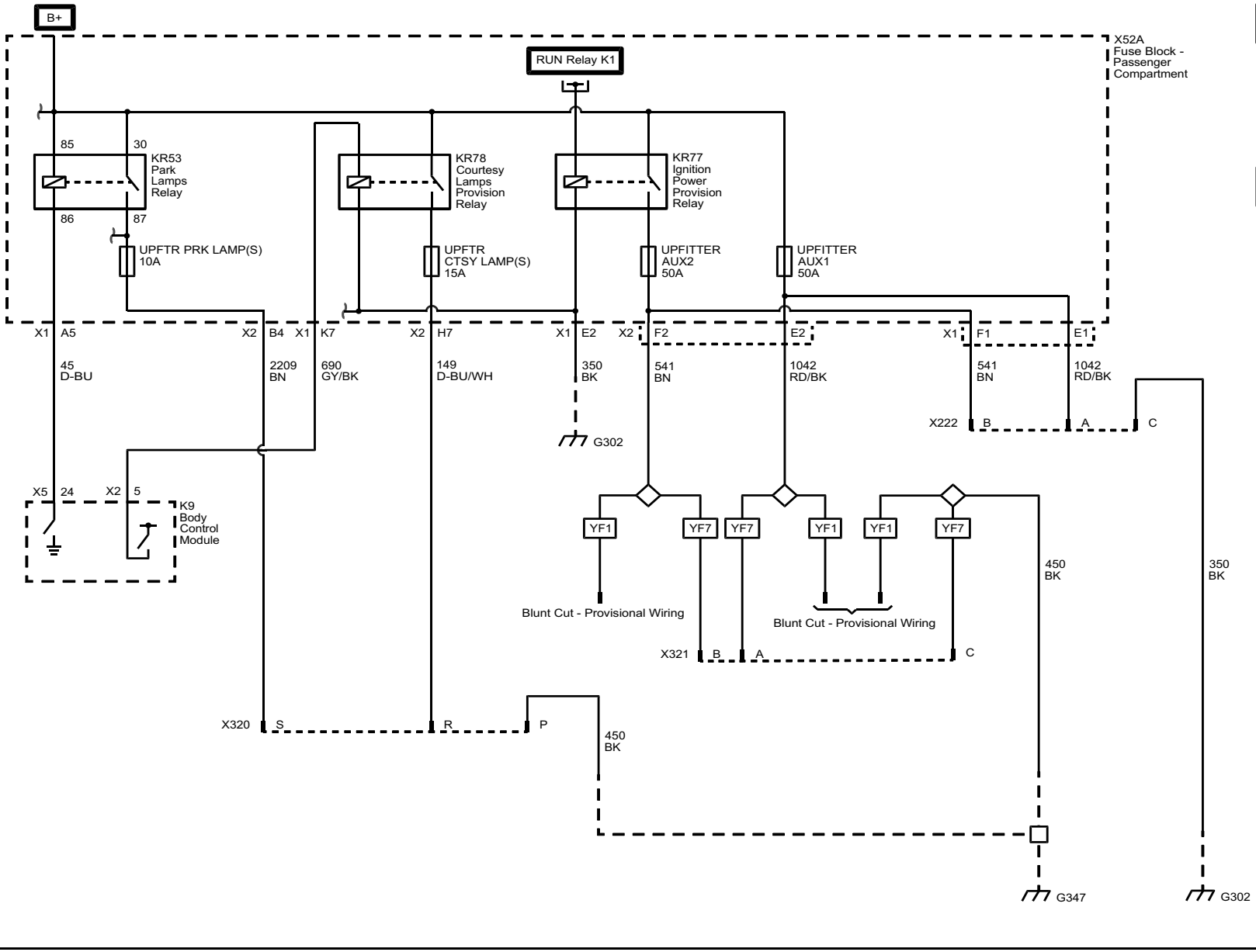
3395594

Power Moding Schematics (RAP and RUN Relays)



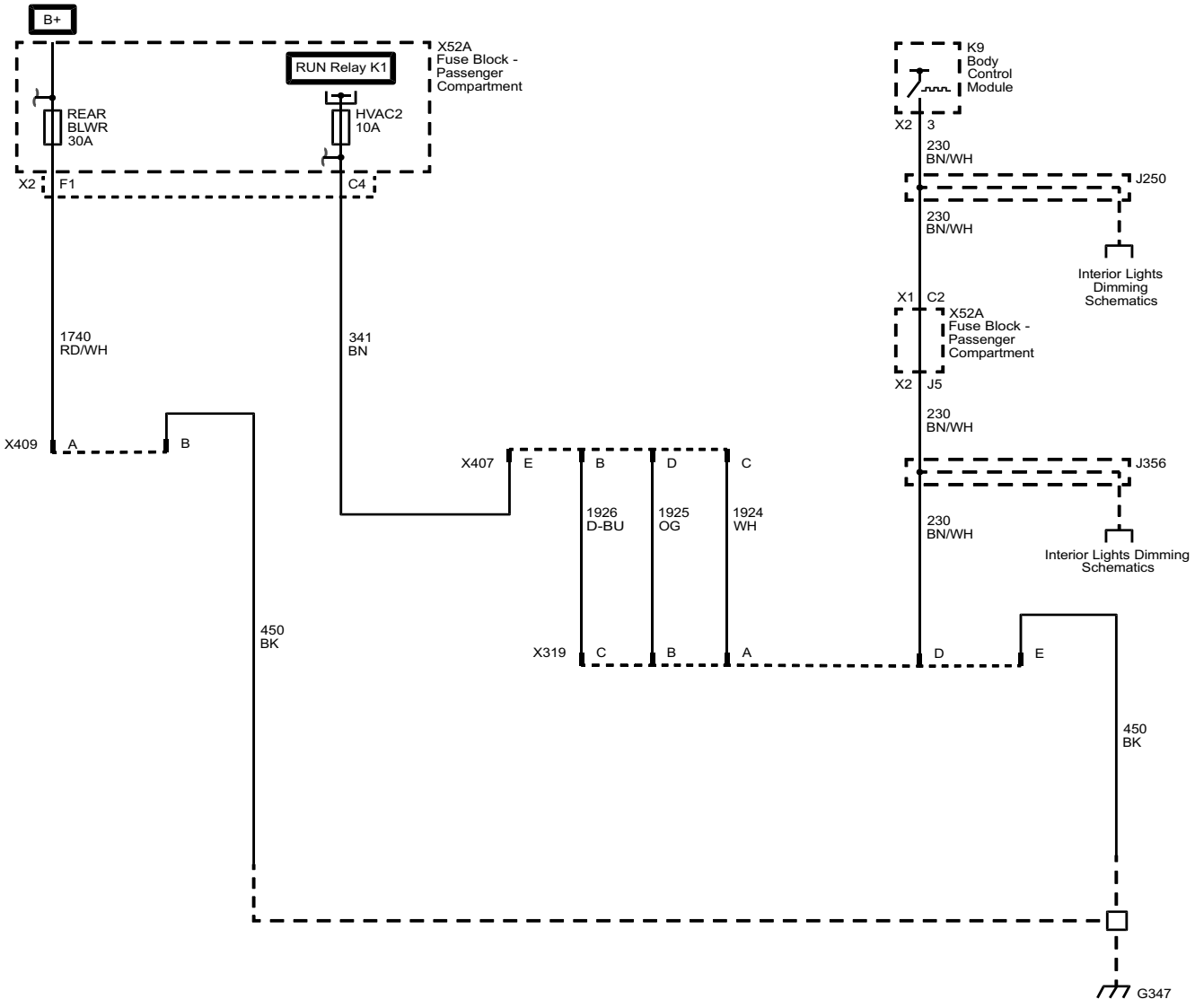
3395595

Upfitter Provision Schematics (Power, Ground and Relay Controls)



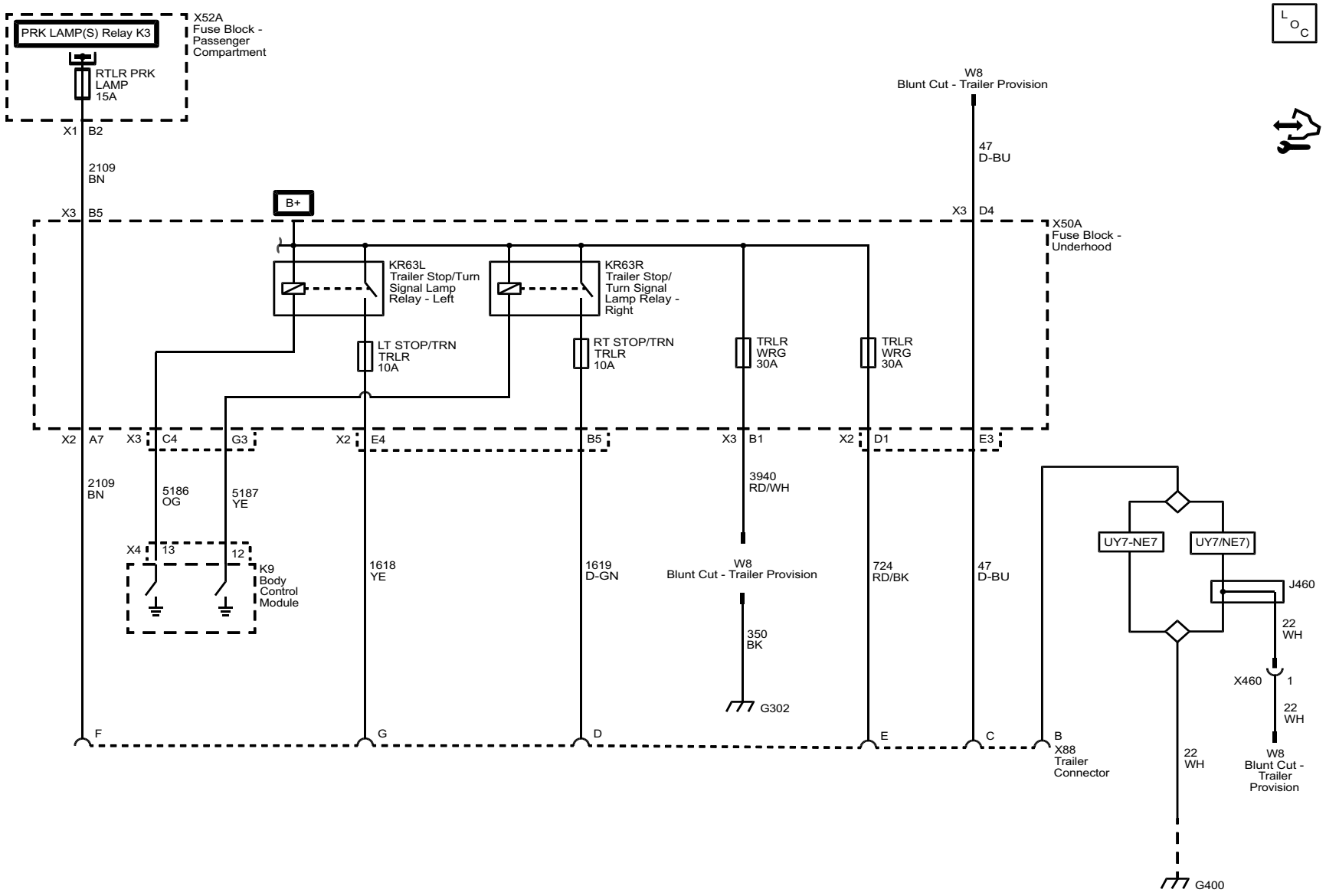
3395613

Upfitter Provision Schematics (Rear Heat Auxiliary (ENC))



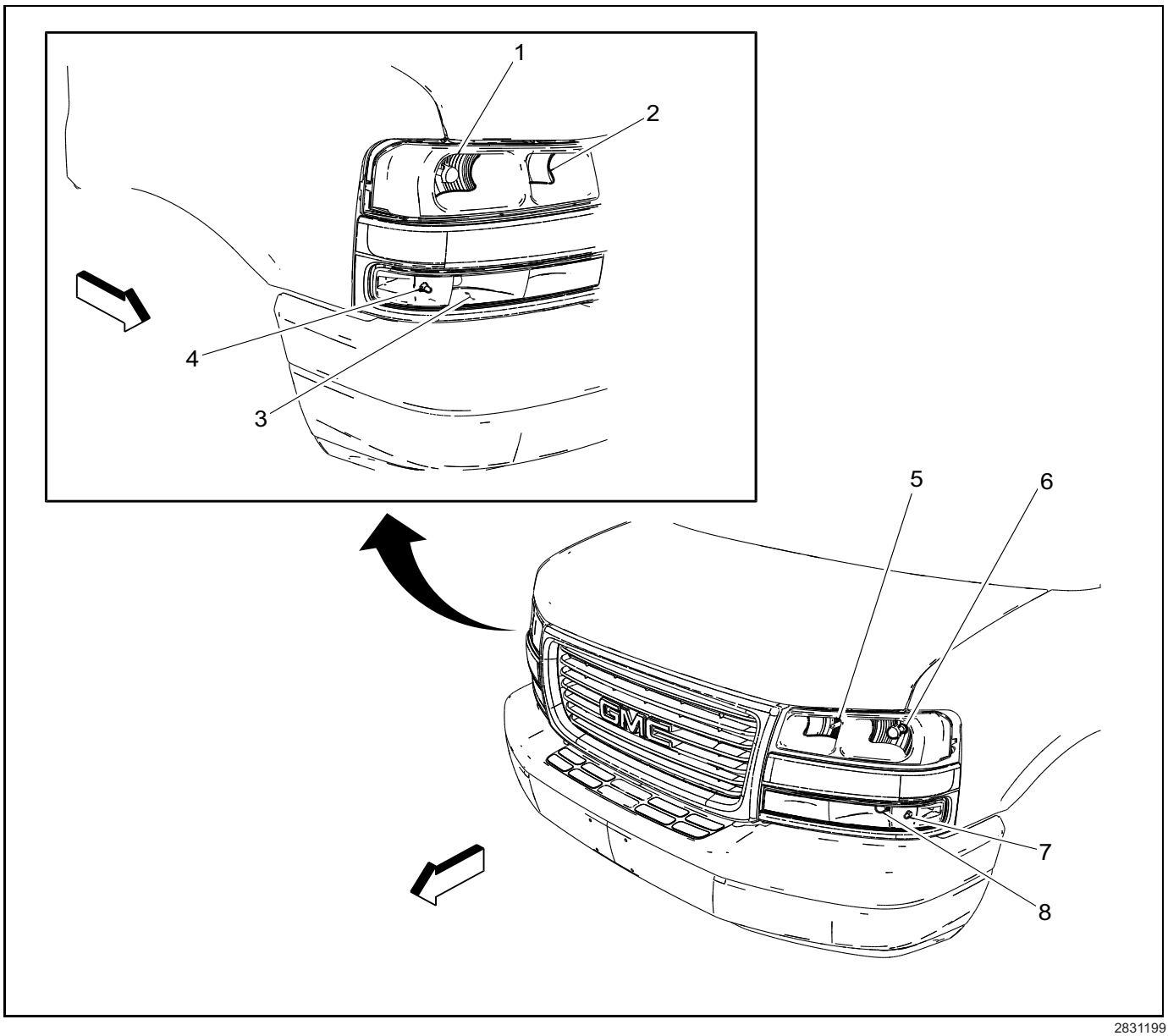
3395615

Trailer Connector/Provision Schematics (Trailer Connector/Provision)



3395616

Front Exterior Lighting (Uplevel)

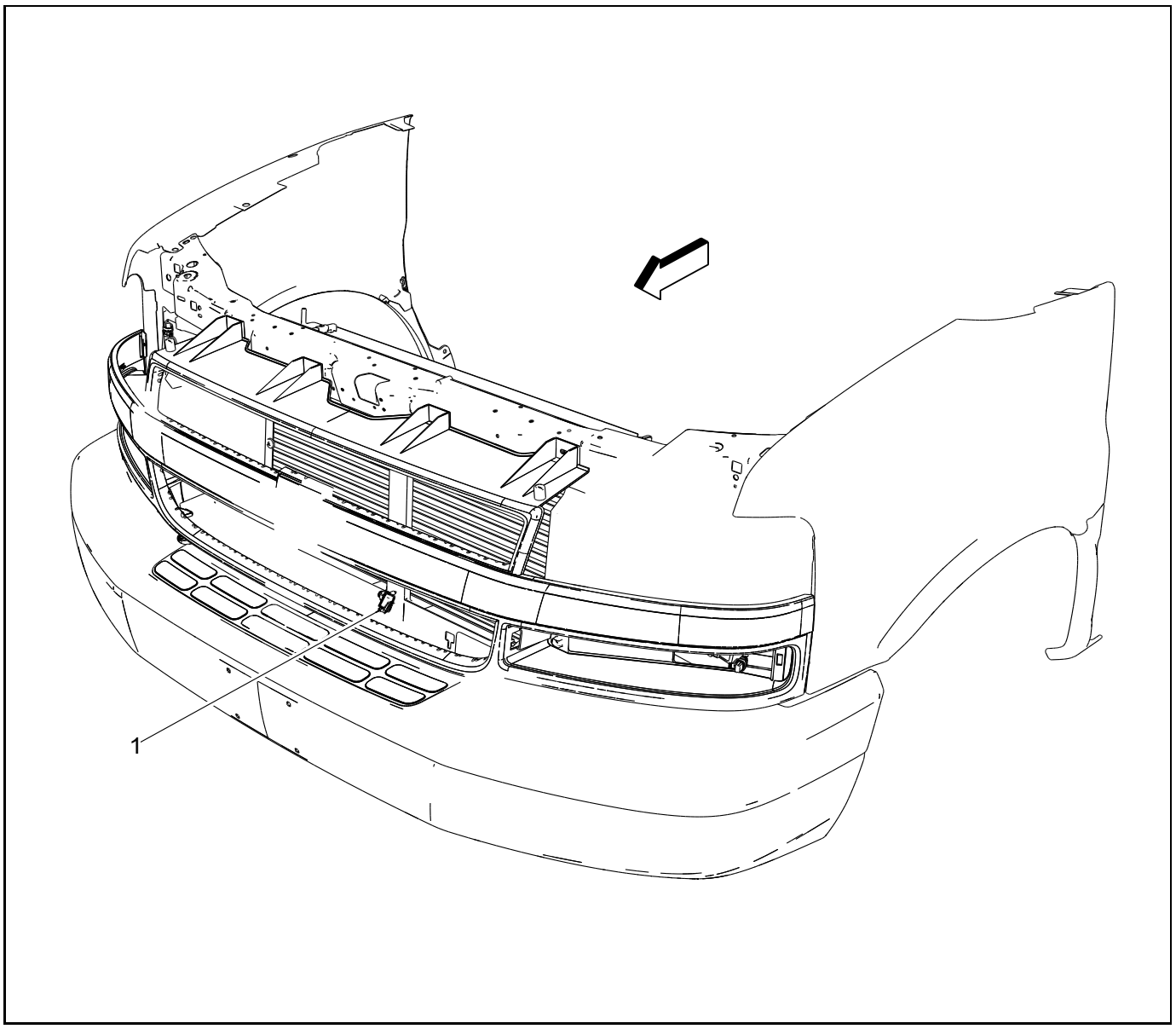


2831199

Items

(1) E4H Headlamp - Right Low Beam
(2) E4F Headlamp - Right High Beam
(3) E4P Park/Turn Signal Lamp - Right
(4) E2RF Side Marker Lamp - Right Front
(5) E4E Headlamp - Left High Beam
(6) E4G Headlamp - Left Low Beam
(7) E2LF Side Marker Lamp - Left Front
(8) E4N Park/Turn Signal Lamp - Left

Ambient Air Temperature Sensor (UFA)

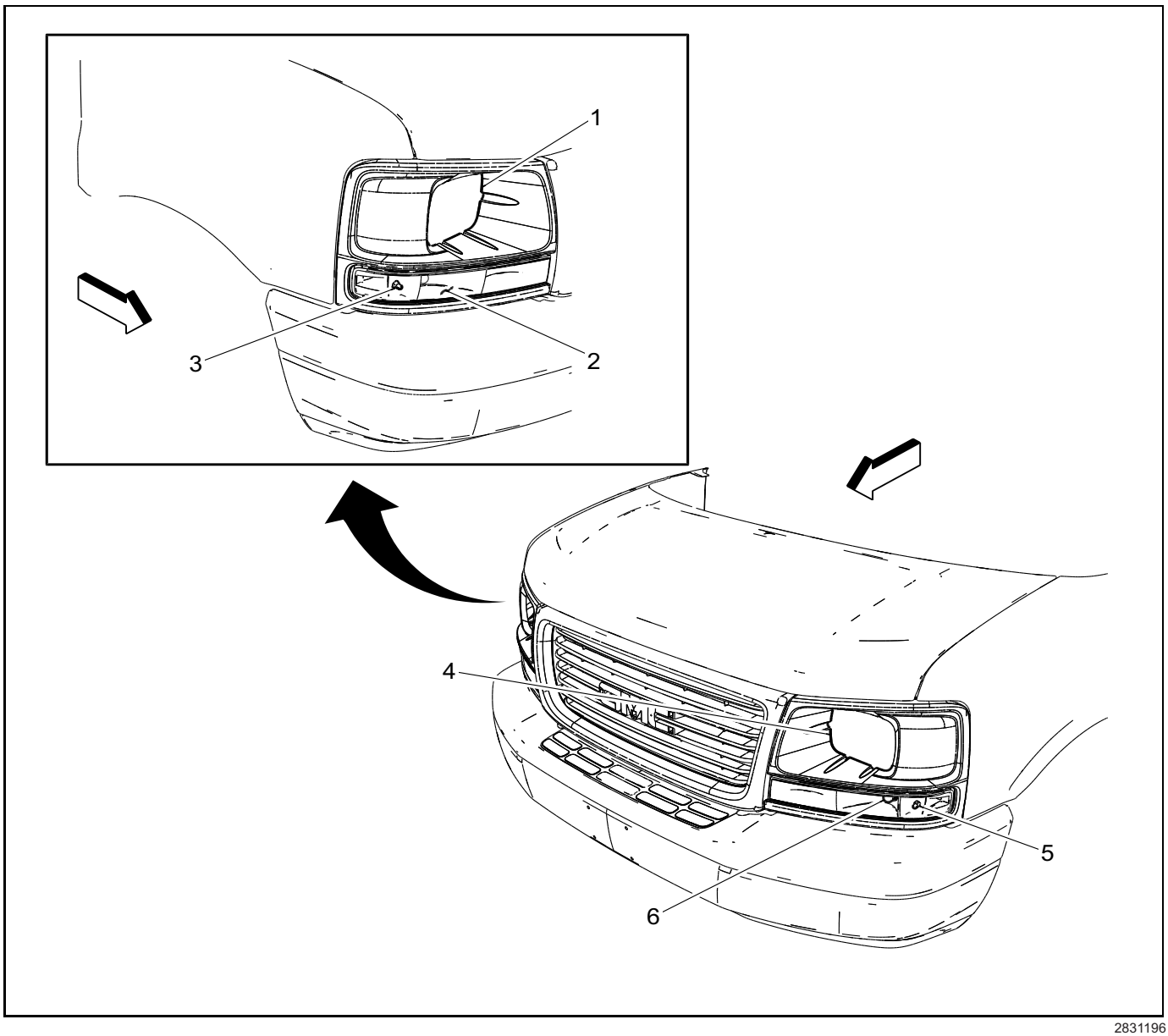


2831211

Items

(1) B9 Ambient Air Temperature Sensor (UFA)

Front Exterior Lighting (Base)

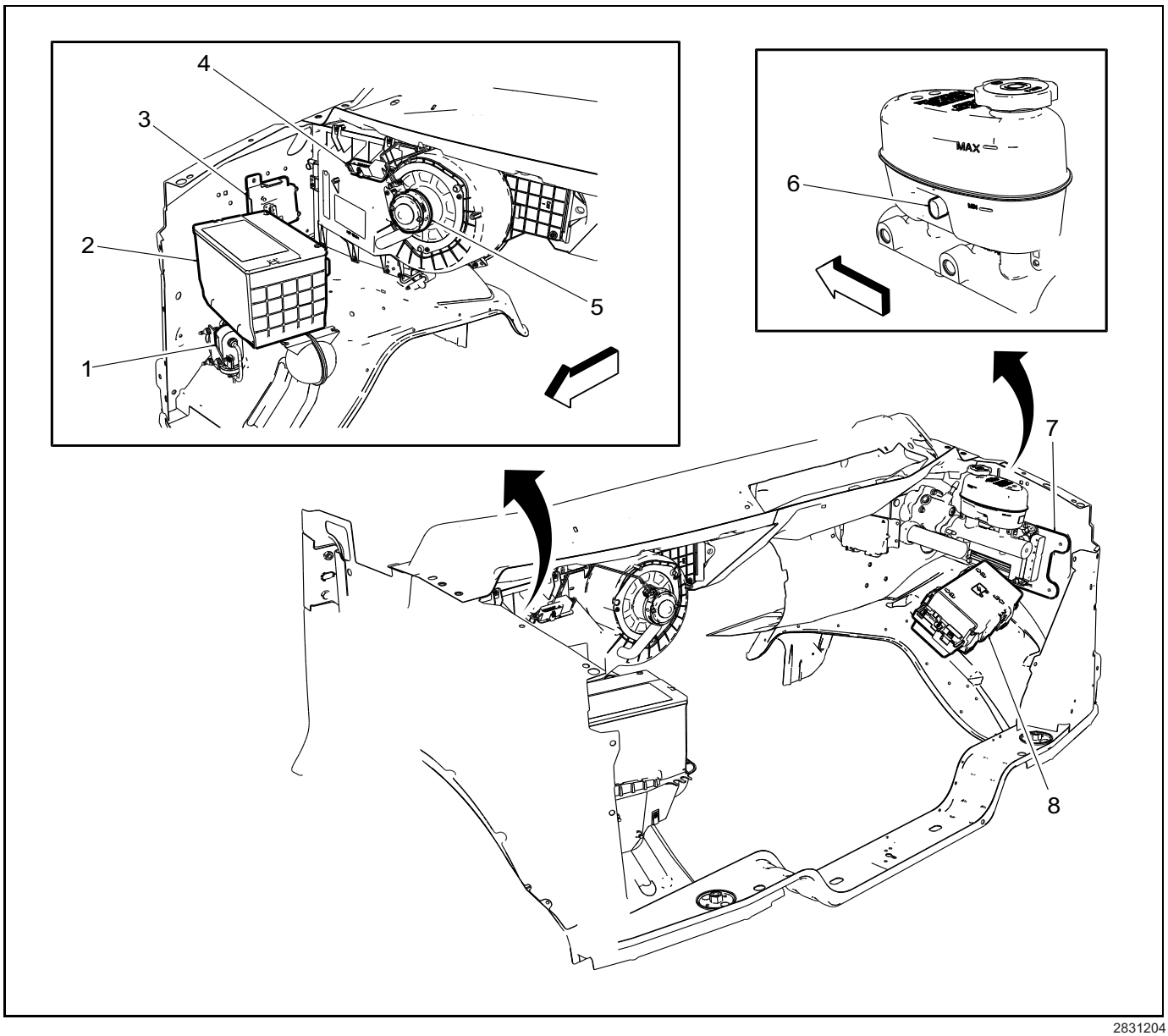


2831196

Items

(1) E13R Headlamp - Right
(2) E4P Park/Turn Signal Lamp - Right
(3) E2RF Side Marker Lamp - Right Front
(4) E13L Headlamp - Left
(5) E2LF Side Marker Lamp - Left Front
(6) E4N Park/Turn Signal Lamp - Left

Engine Compartment

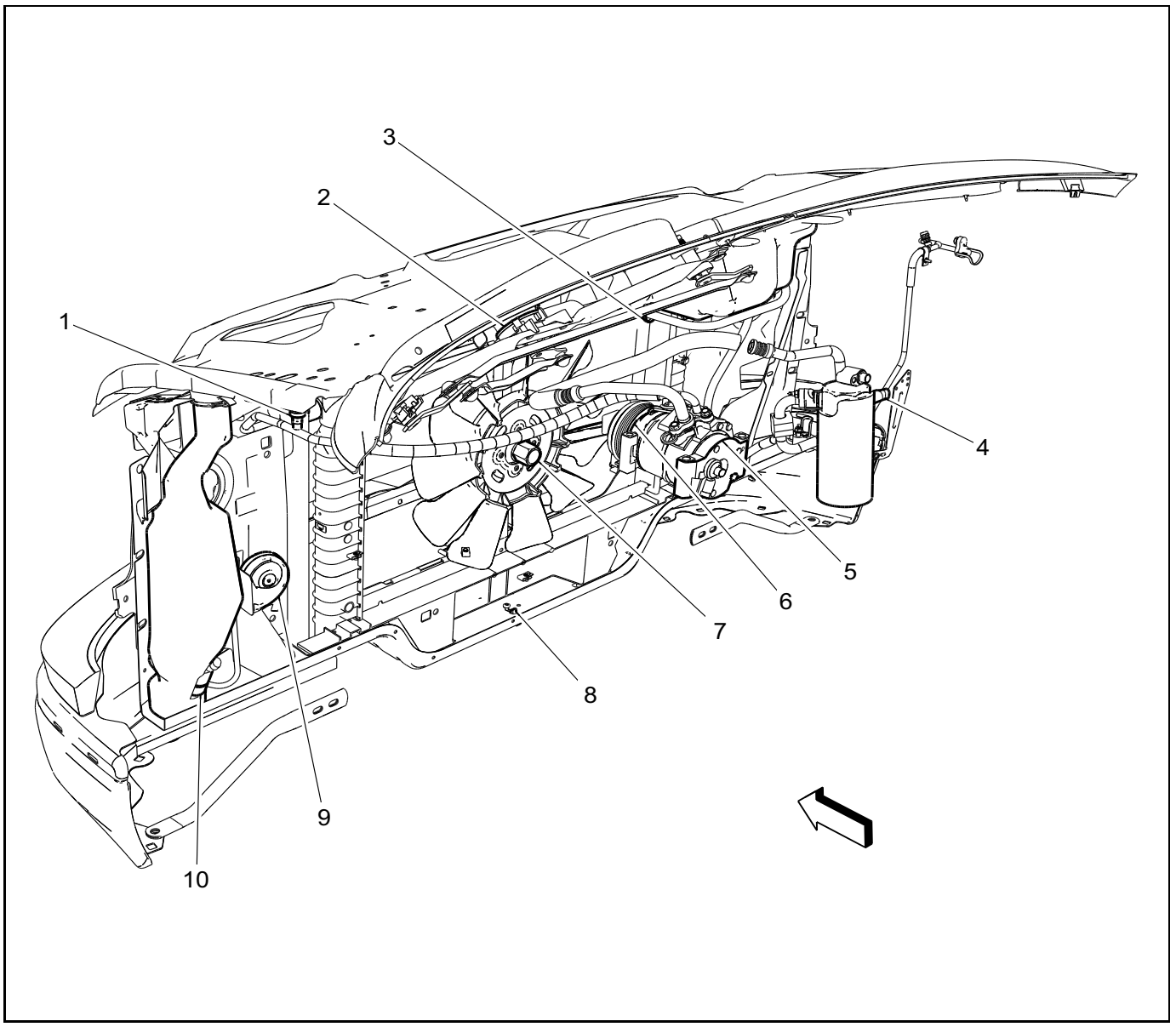


2831204

Items

(1) G34 Evaporative Emission System Leak Detection Pump
(2) C1 Battery
(3) K71 Transmission Control Module (M30)
(4) R3 Blower Motor Resistor
(5) M8 Blower Motor
(6) B20 Brake Fluid Level Switch
(7) K20 Engine Control Module (ECM)
(8) X50A Fuse Block - Underhood

Front of Engine Compartment

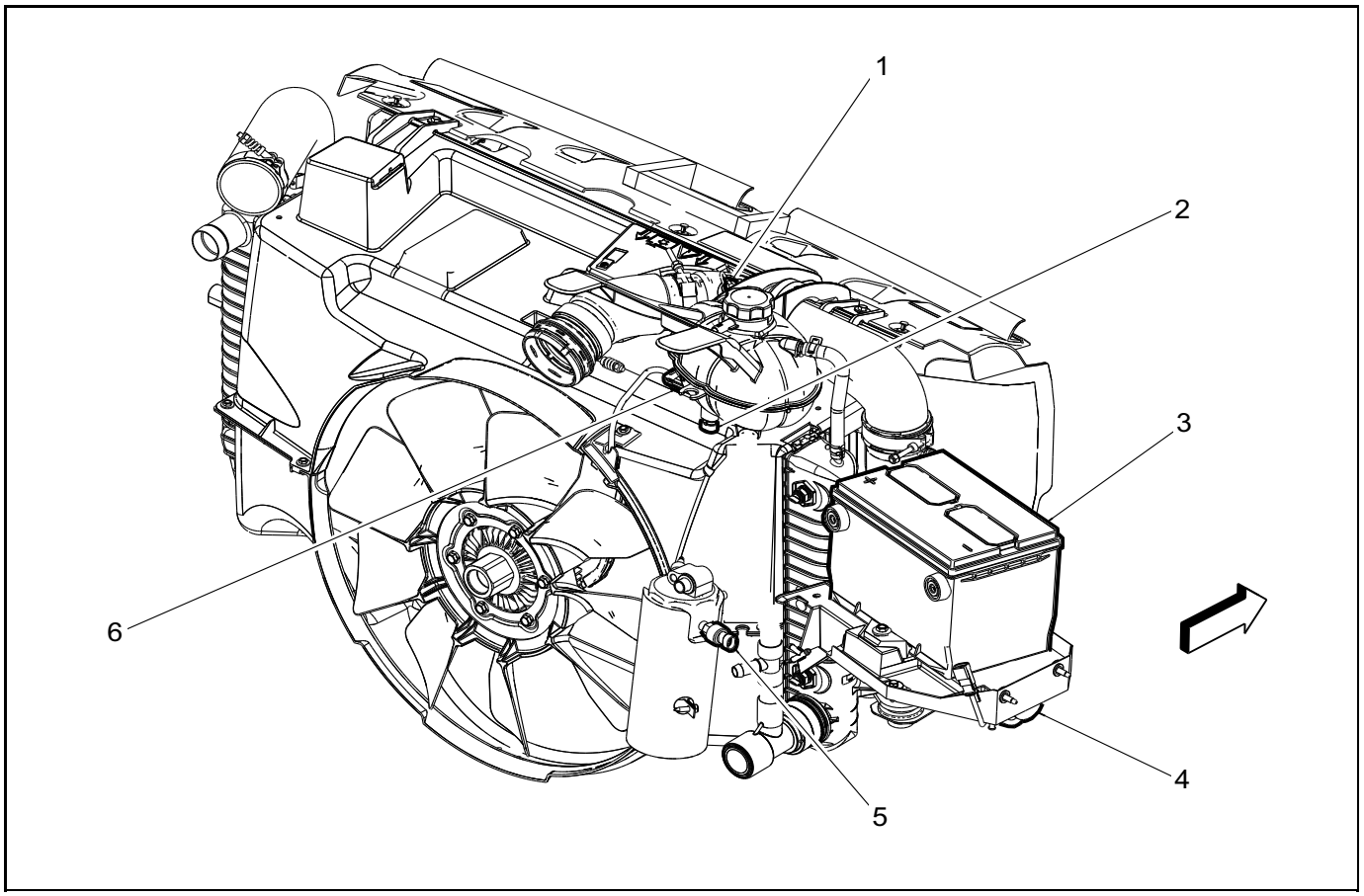


2831200

Items

(1) B1 A/C Refrigerant Pressure Sensor (C60)
(2) M75 Windshield Wiper Motor
(3) B33 Engine Coolant Level Switch (LGH)
(4) B1B A/C Low Side Pressure Switch (C60)
(5) Q2 A/C Compressor Clutch
(6) Q2 A/C Compressor Clutch
(7) G10 Cooling Fan Motor (LGH)
(8) B59 Front Impact Sensor
(9) P13 Horn Assembly
(10) G24 Windshield Washer Pump

Front of Engine Compartment Components (LGH)



2831202

Items

(1) B193B Charge Air Cooler Outlet Temperature Sensor (LGH)

(2) B33 Engine Coolant Level Switch (LGH)

(3) C1 Battery

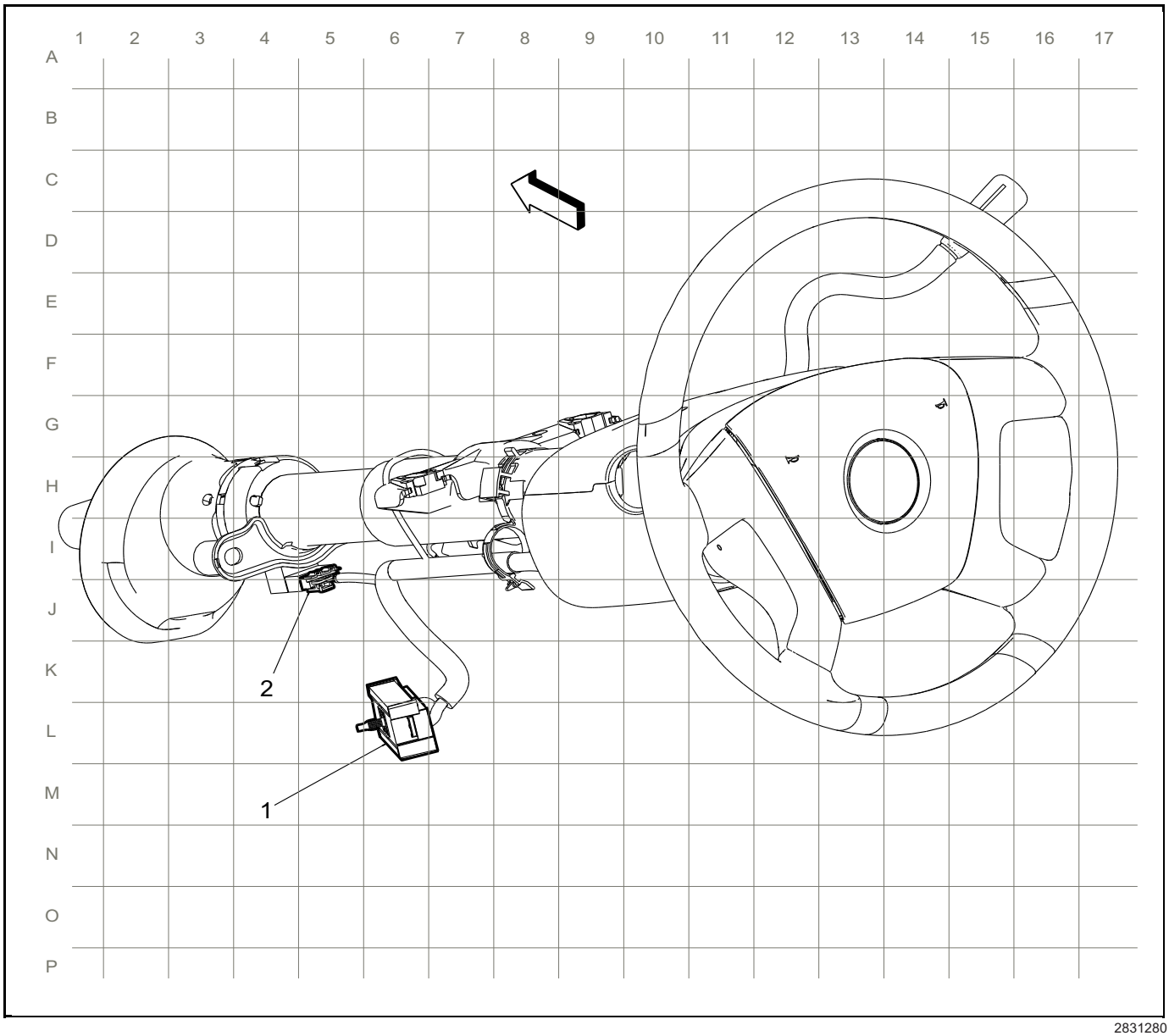
(4) G34 Evaporative Emission System Leak Detection Pump

(5) B1B A/C Low Side Pressure Switch (C60)

(6) X142 (LGH)

Instrument Panel/Center Console Component Views

Steering Column



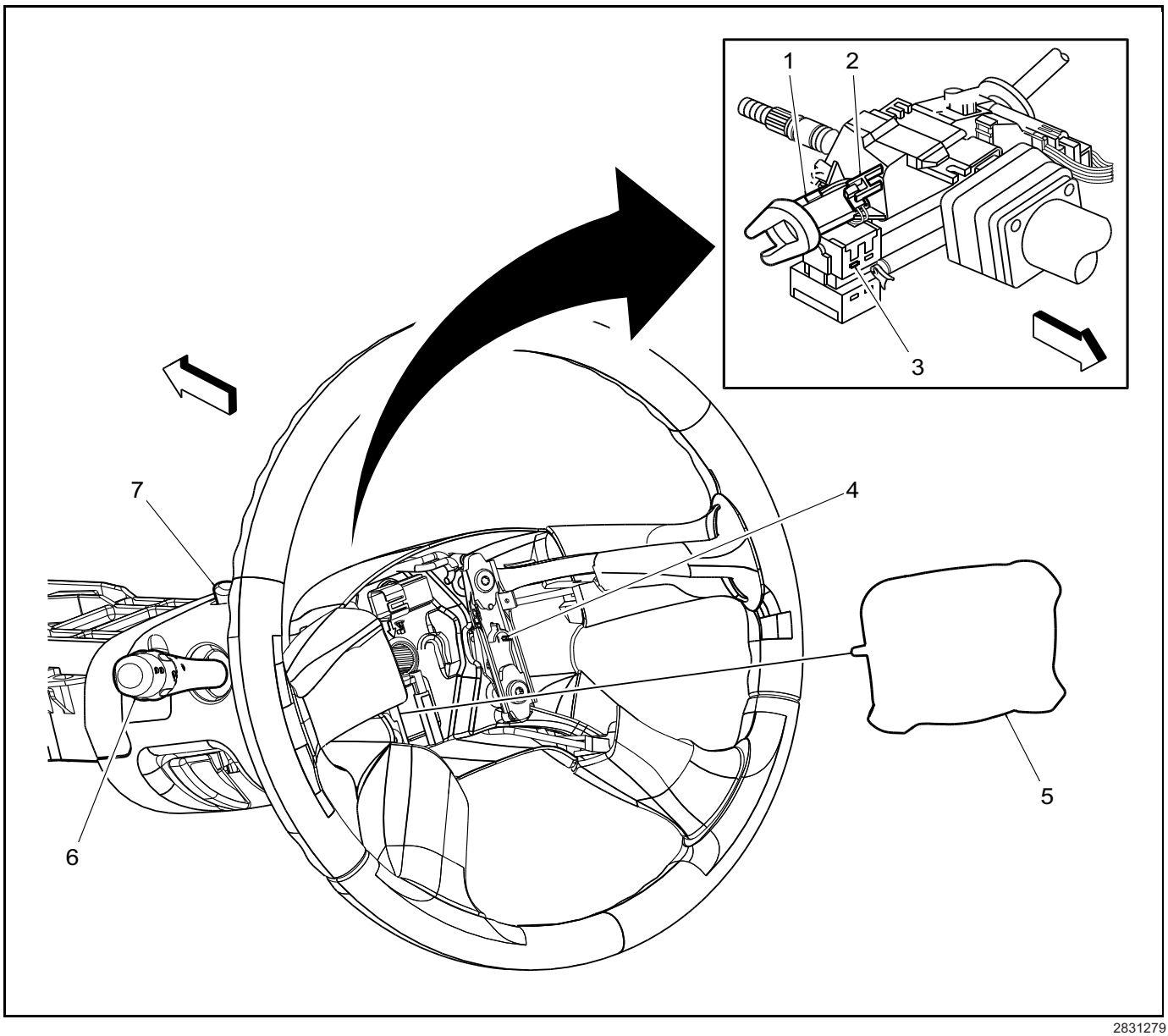
2831280

Items

(1) X200

(2) B99 Steering Wheel Angle Sensor (JL4)

Upper Steering Column

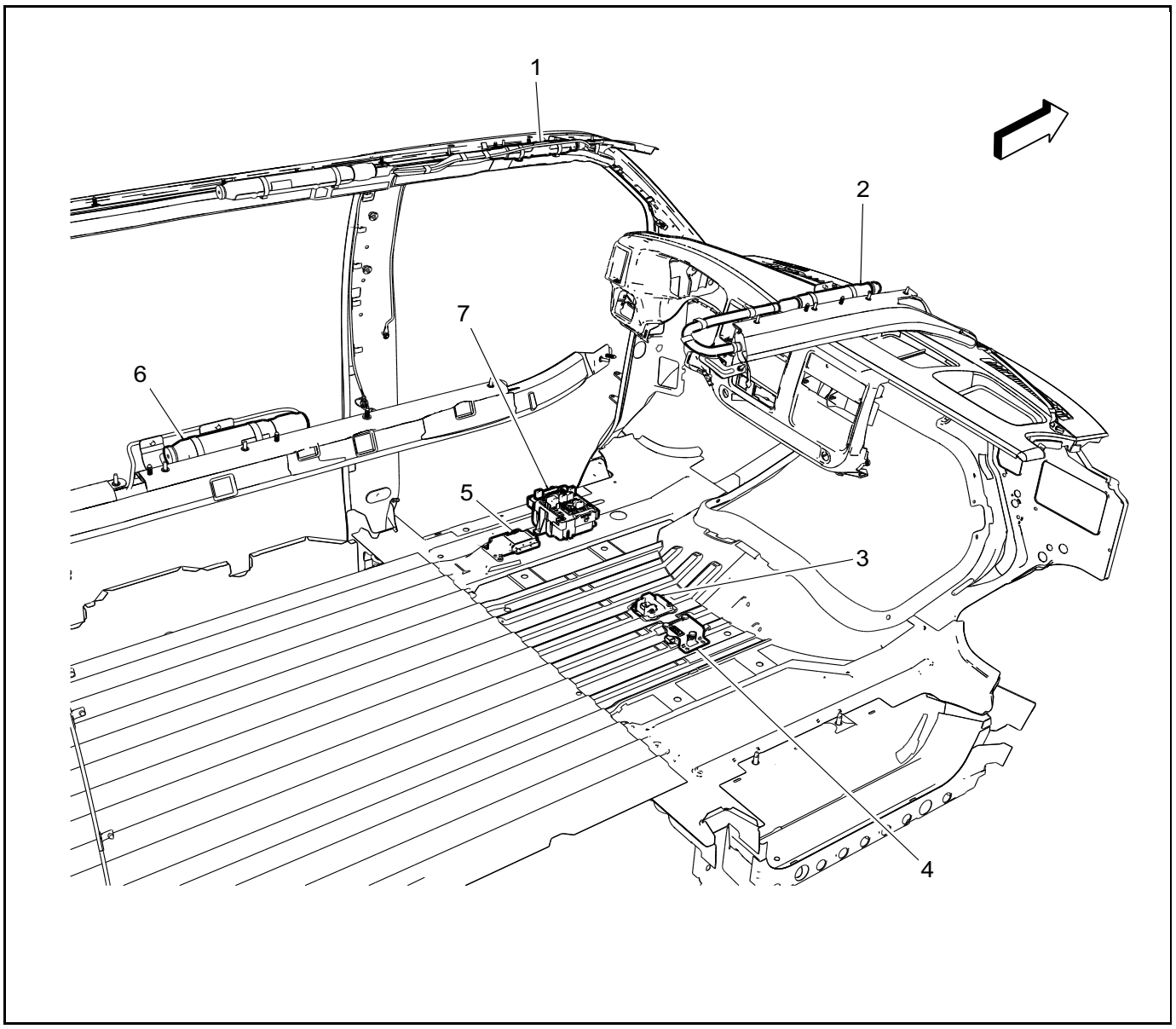


2831279

Items

(1) K64 Content Theft Deterrent Control Module
(2) M7 Transmission Shift Lock Control Solenoid Actuator
(3) S39 Ignition Switch
(4) S33 Horn Switch
(5) F107 Steering Wheel Air Bag
(6) S78 Turn Signal/Multifunction Switch
(7) S26 Hazard Warning Switch

Front Left Side of Passenger Compartment



2831285

Items

(1) F105LF Roof Rail Air Bag - Left Front (ASF)

(2) F105RF Roof Rail Air Bag - Right Front (ASF)

(3) B64 Rollover Sensor

(4) B119 Multi-axis Acceleration Sensor (JL4)

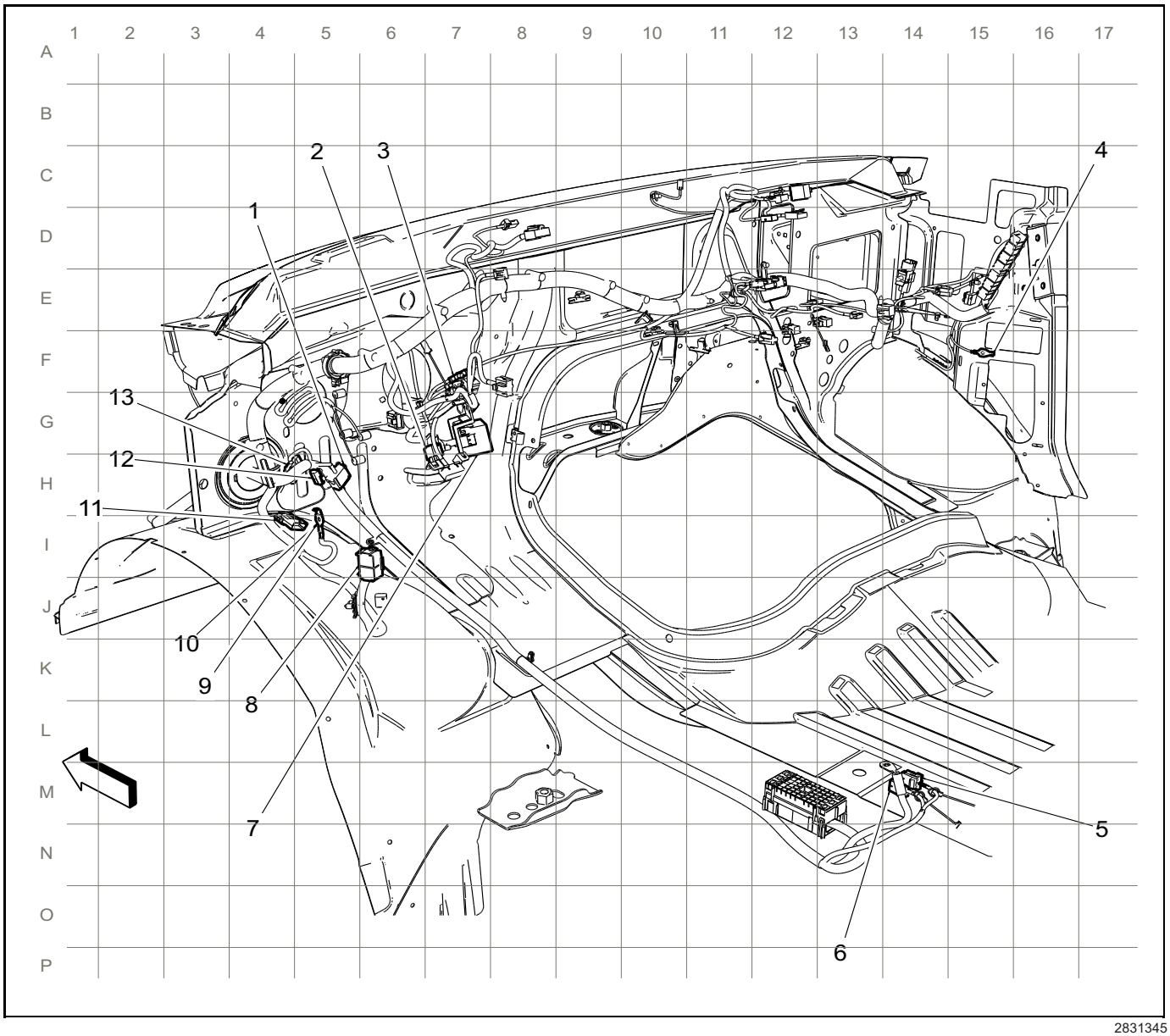
(5) K36 Inflatable Restraint Sensing and Diagnostic Module (SDM)

(6) F105RR Roof Rail Air Bag - Right Rear (ASF with YA2)

(7) X53A Fuse Block - Rear Body

Ground Views

Instrument Panel Harness Routing - Passenger Compartment

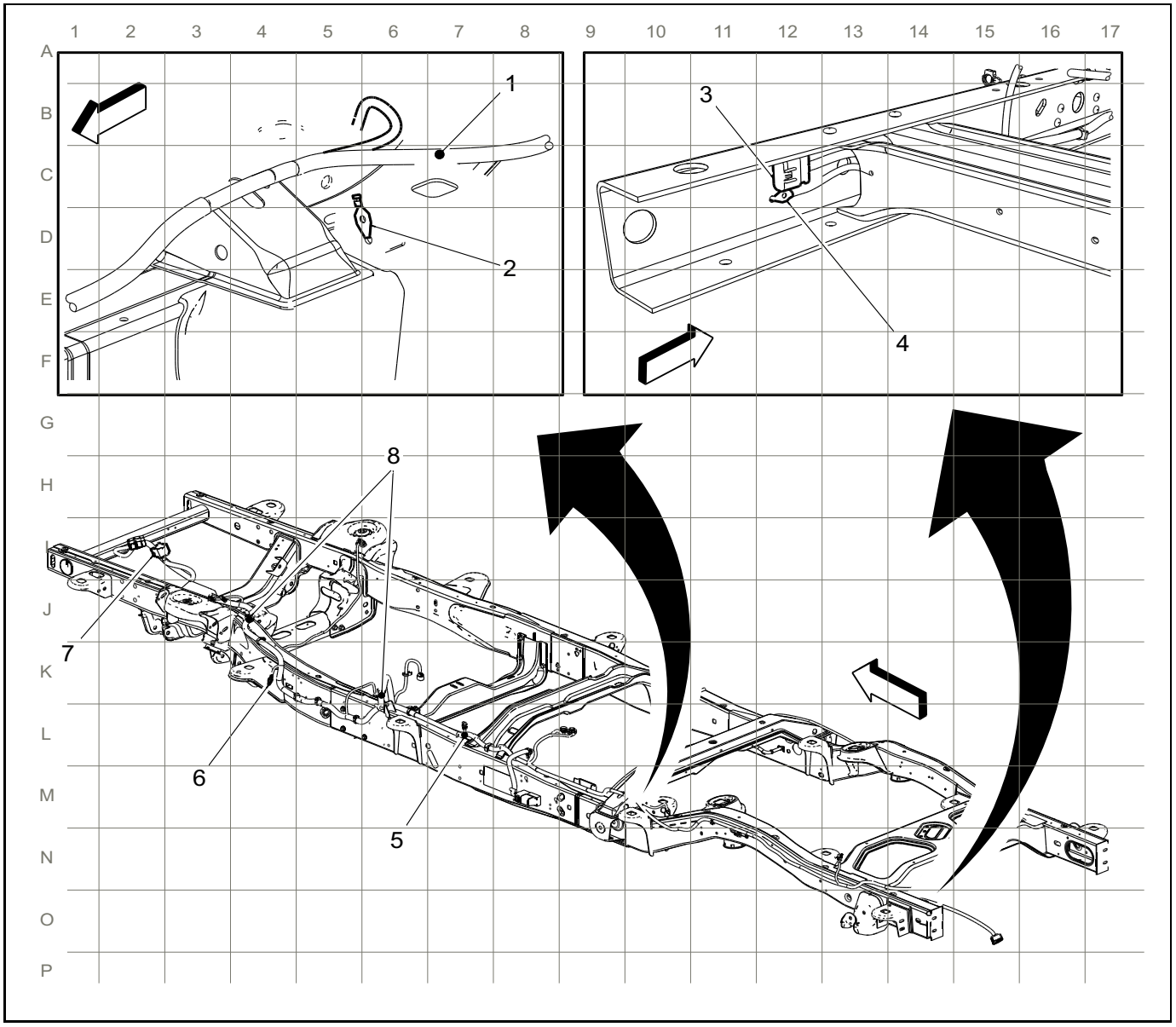


2831345

Items

(1) JX250
(2) X221
(3) X276
(4) G304
(5) X331
(6) X330
(7) X200
(8) X318
(9) G301
(10) G302
(11) X222 (YF2 or YF7)
(12) X220
(13) JX200

Chassis Harness Routing (LU3, L20, LMF or L96)

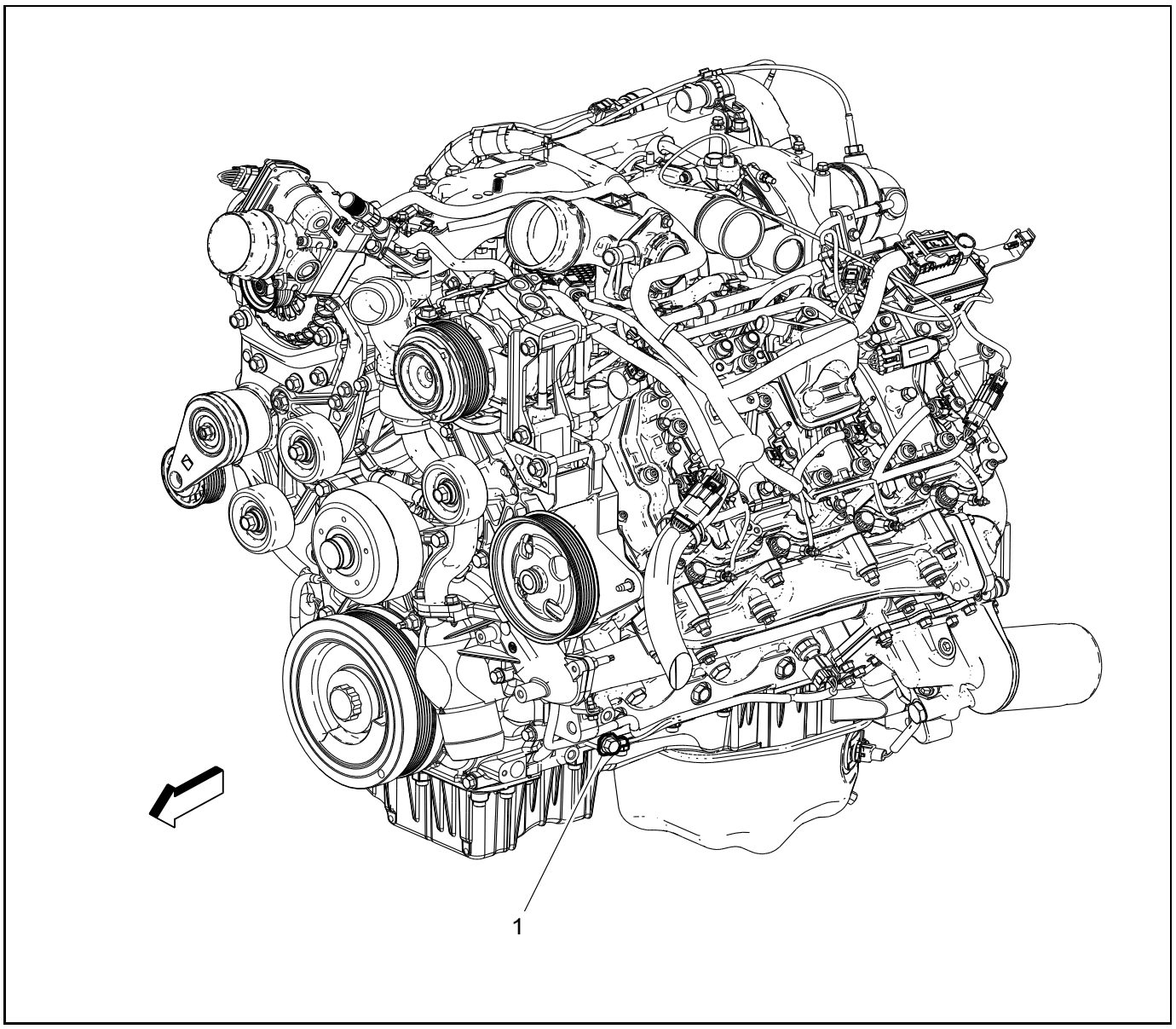


2831358

Items

(1) J402
(2) G400
(3) X405
(4) G400
(5) J301
(6) G300
(7) X101
(8) J315

G110 (LGH)

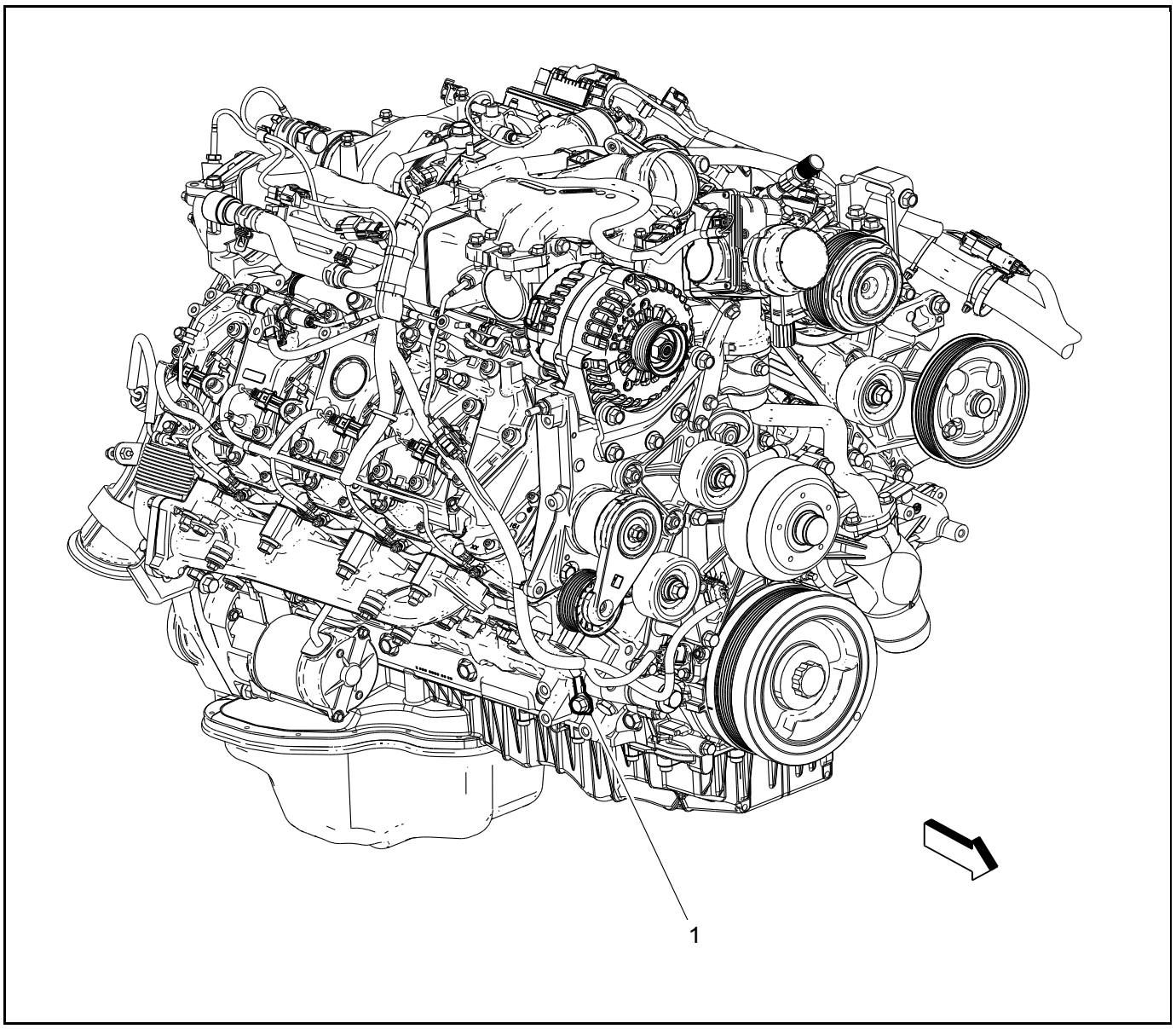


2832038

Items

(1) G110

G109 (LGH)

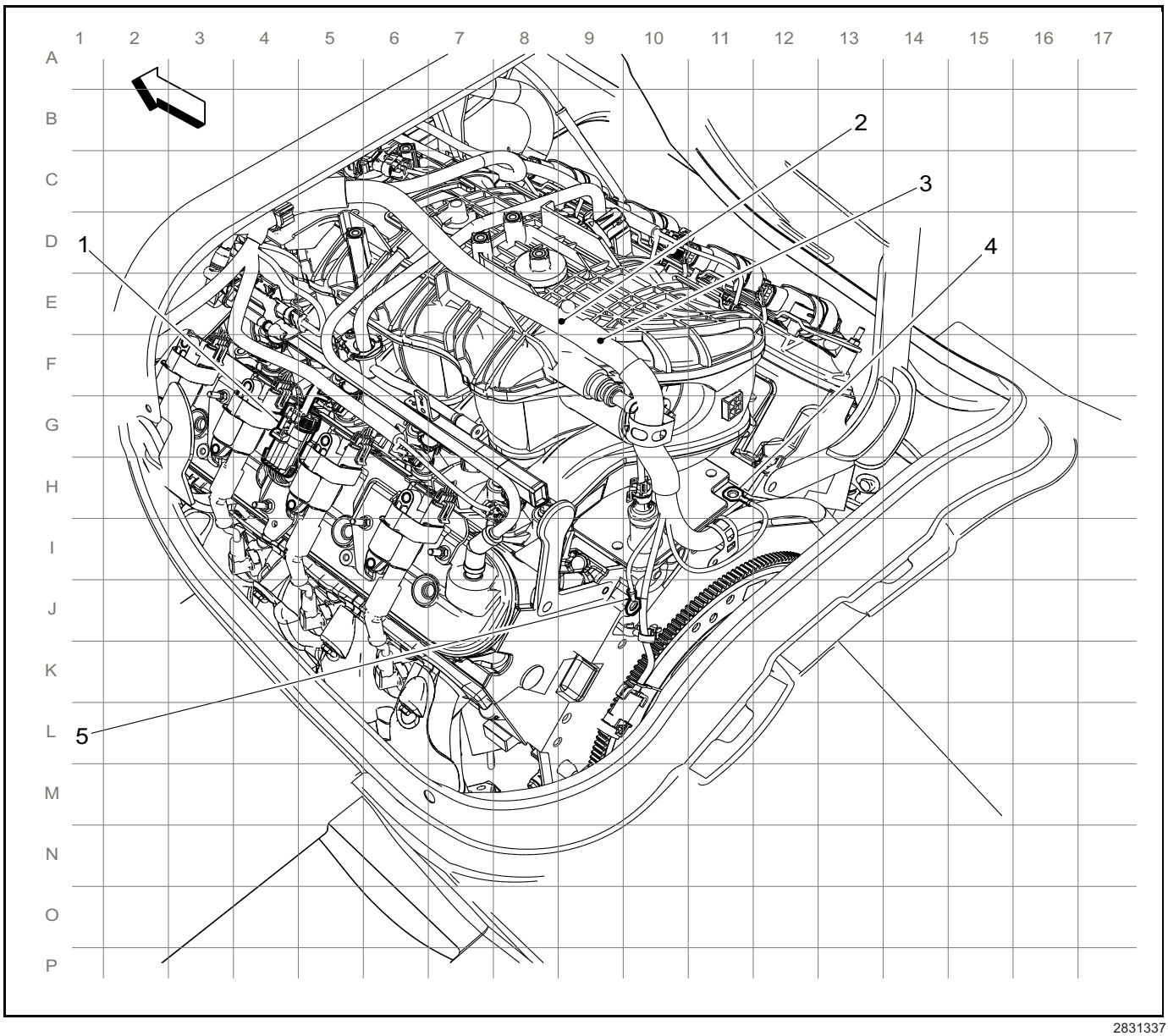


2832045

Items

(1) G109 (LGH)

Engine Harness Routing - Left Rear (LMF)

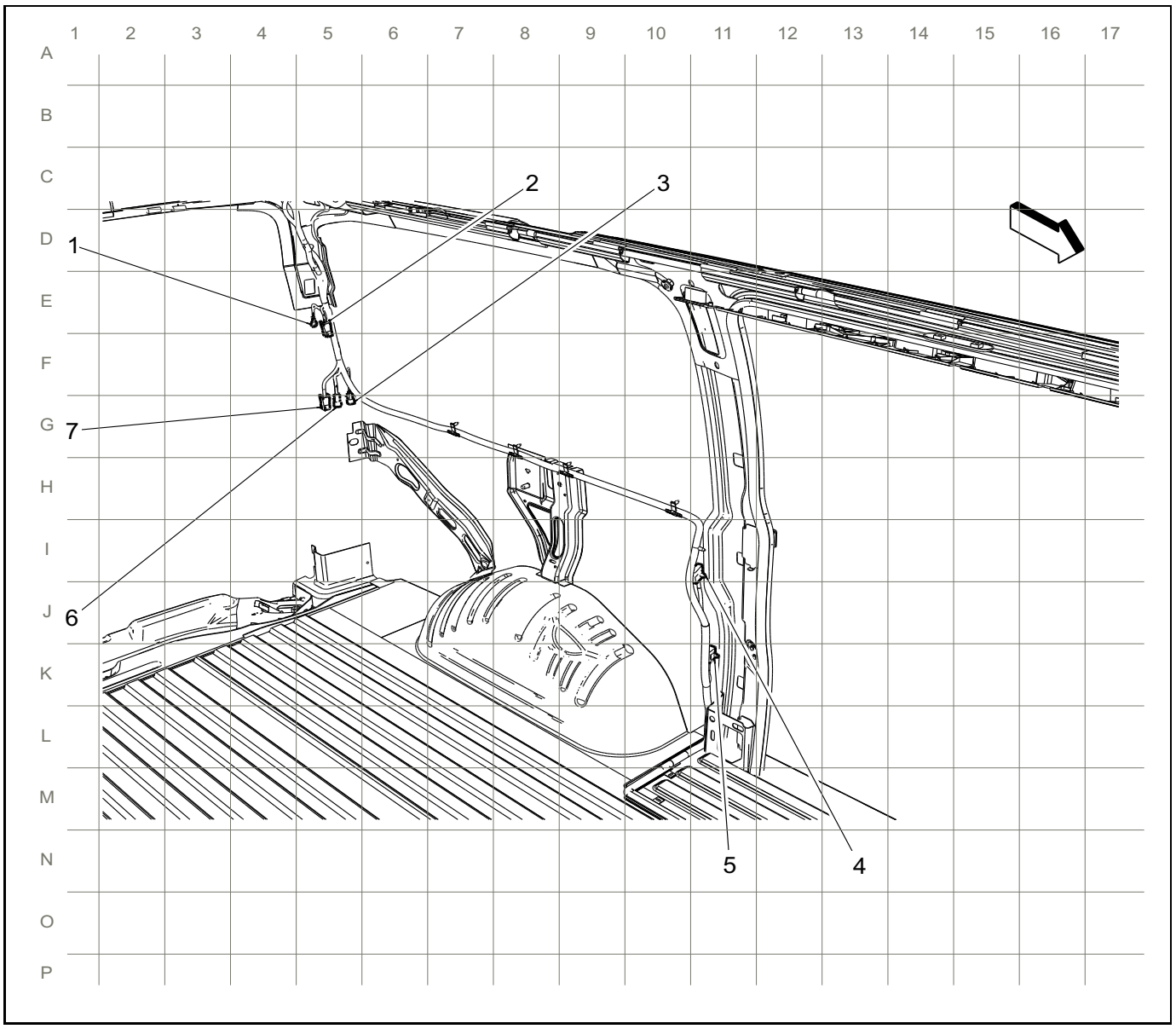


2831337

Items

(1) X126 (L20, LMF, L96 or LC8)
(2) J102
(3) J101
(4) G102
(5) G103

Body Harness Routing - Left Rear (Passenger and Cargo)

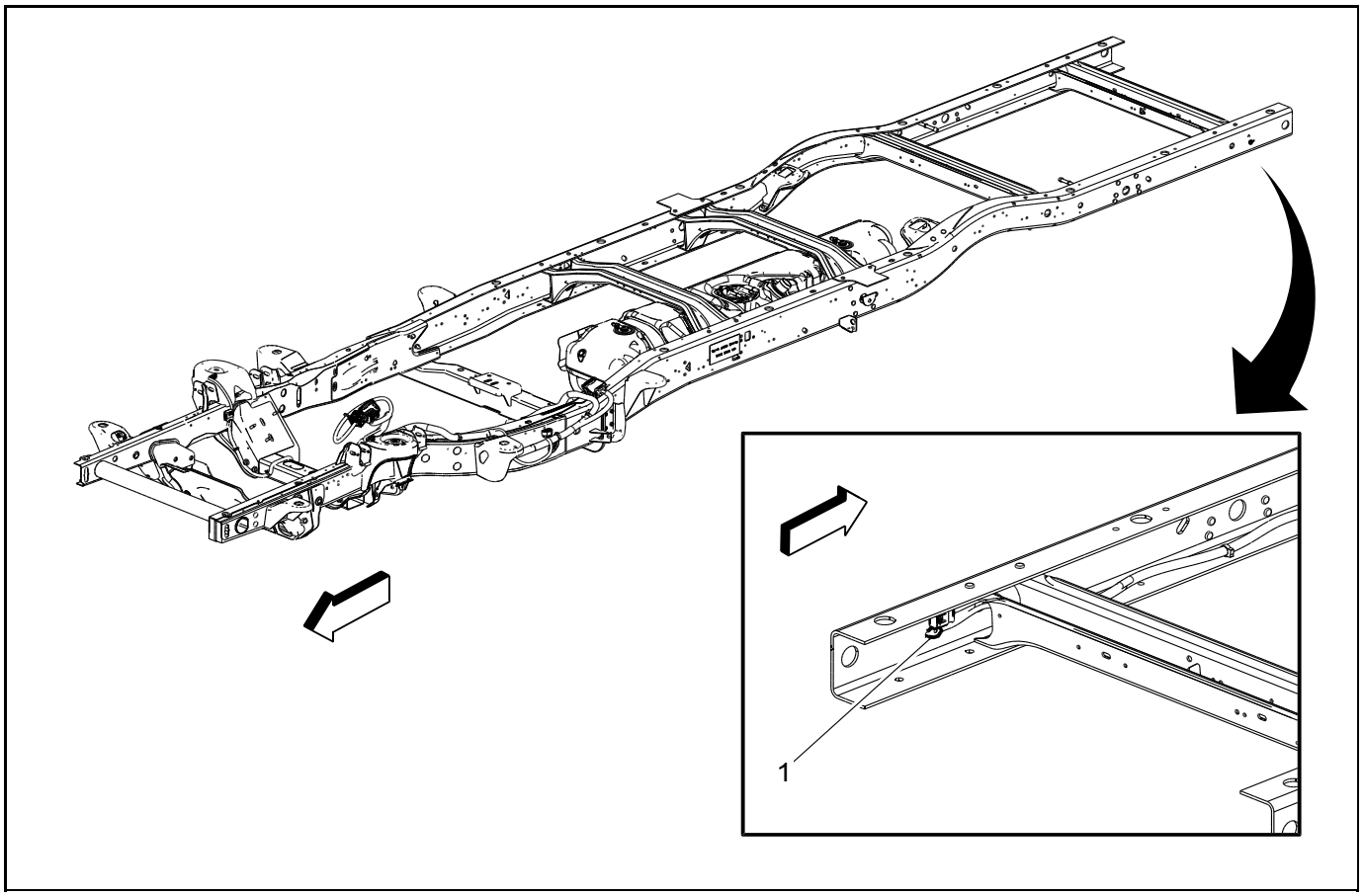


2831351

Items

(1) G402 (Passenger or Cargo)
(2) X401
(3) X411
(4) X321 (YF2 or YF7)
(5) X320 (YF2 or YF7)
(6) X407 (C36 with C69)
(7) X409 (C36 with C69)

G400 (LGH)

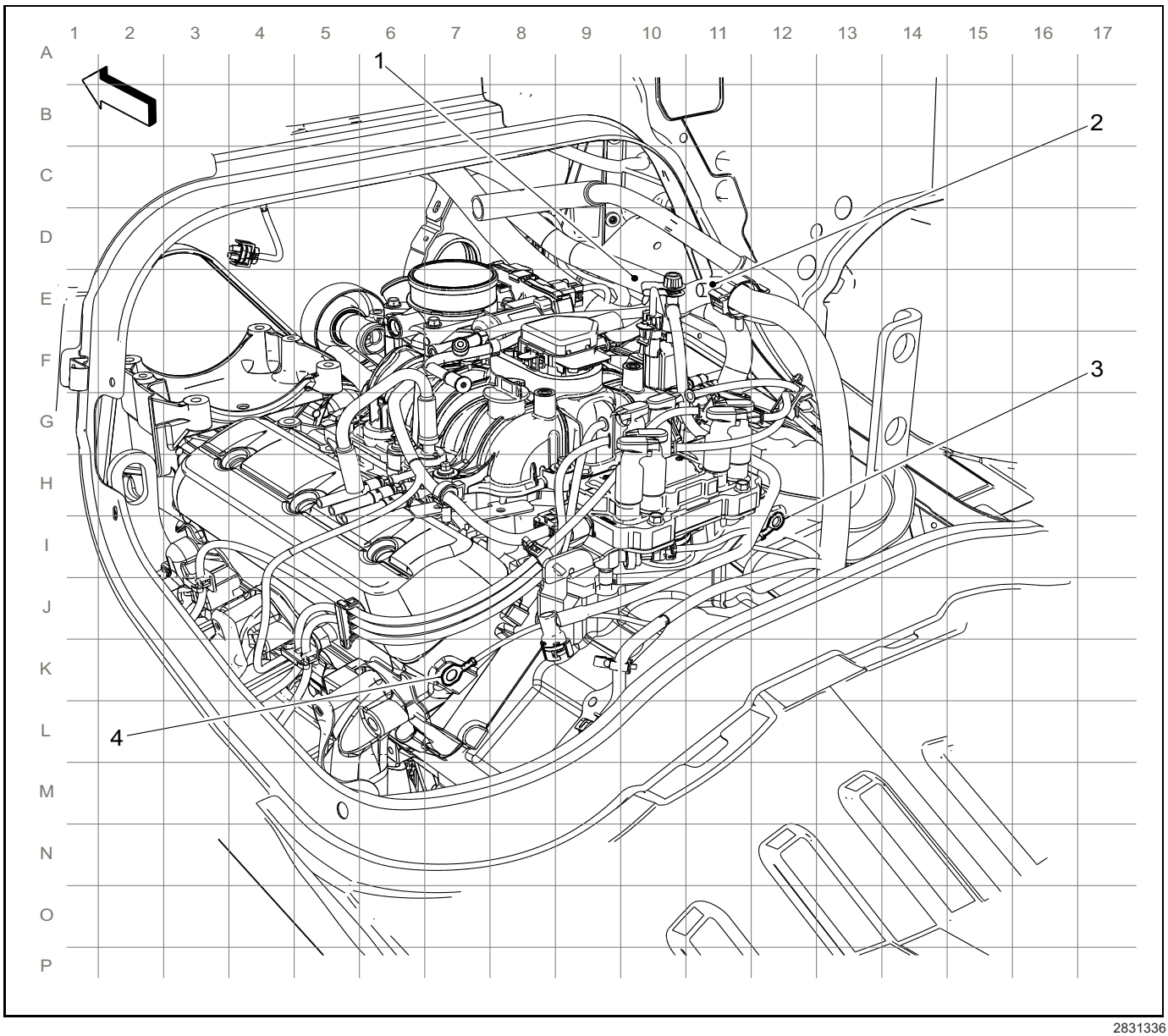


2831874

Items

(1) G400

Engine Harness Routing - Left Rear (LU3)

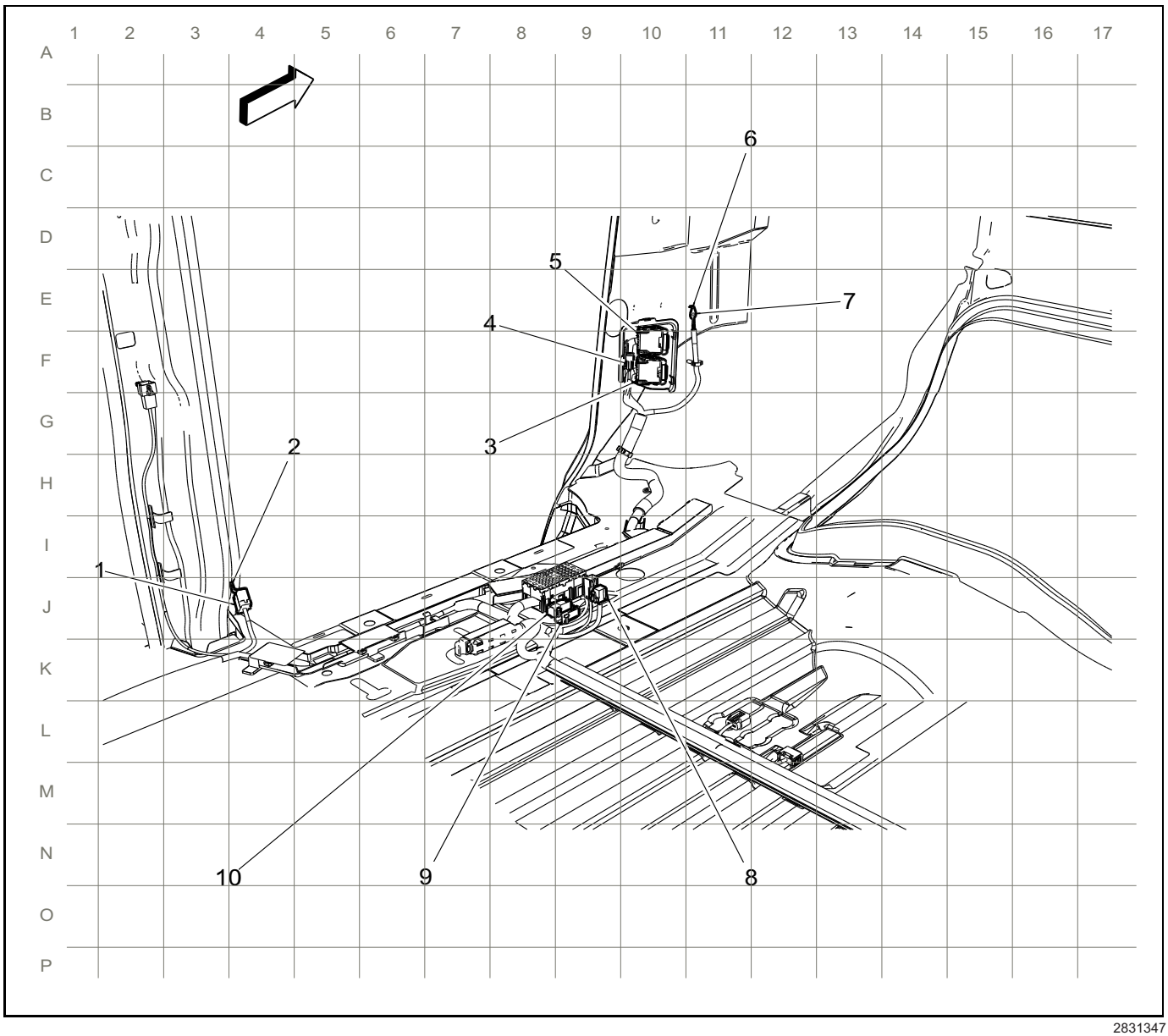


2831336

Items

(1) J101
(2) J102
(3) G102
(4) G103

Body Harness Routing - Left Front Passenger Compartment

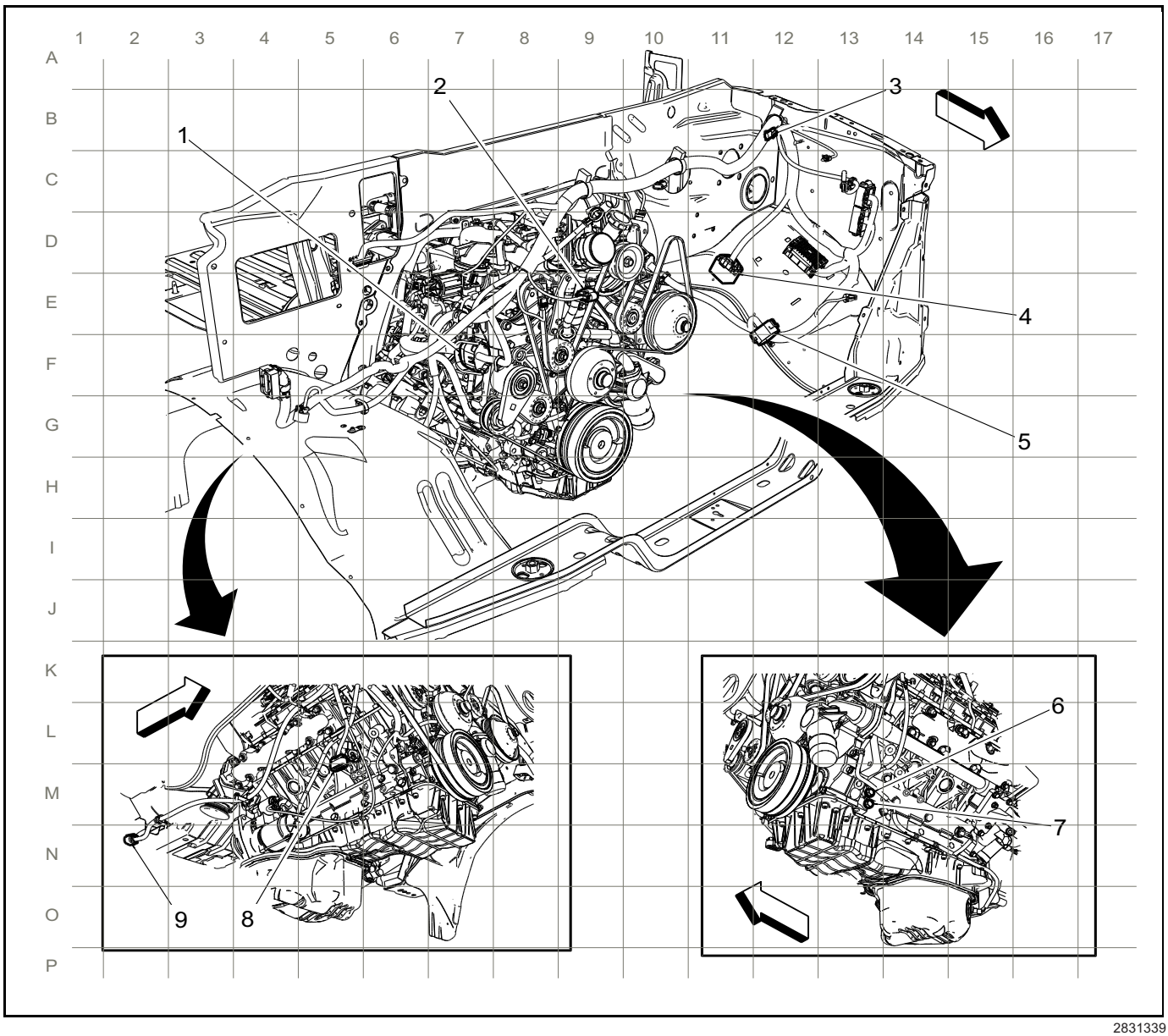


2831347

Items

(1) JX347
(2) G347
(3) X500
(4) X319 (C36 or ENC)
(5) X318
(6) G301
(7) G302
(8) X307
(9) X330
(10) X331

Engine Harness Routing - Front View (LMM)

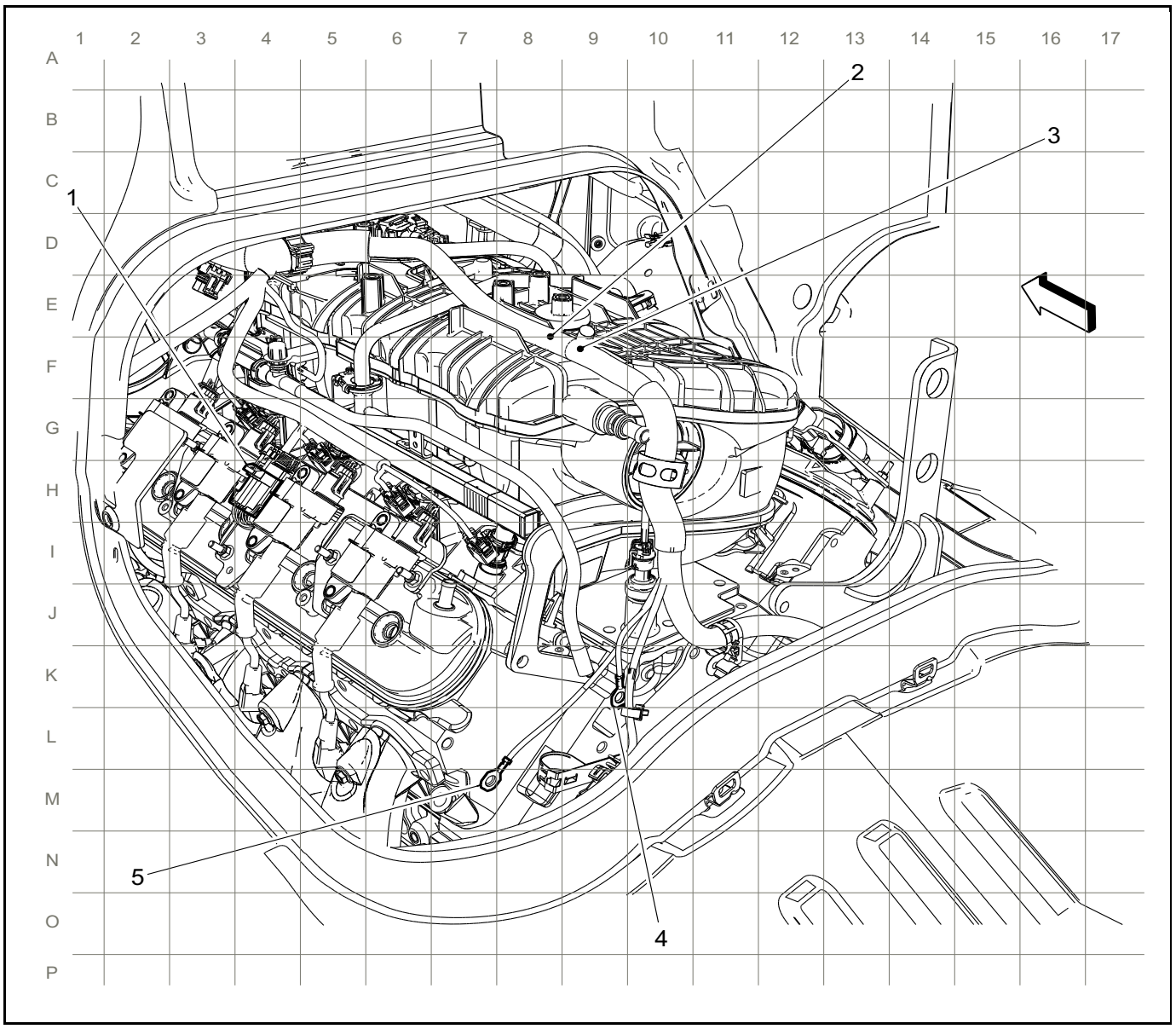


2831339

Items

(1) X108 (LGH)
(2) X142 (LGH)
(3) X109
(4) X101
(5) X100
(6) G102
(7) G103
(8) X105
(9) X115 (LGH Cutaway)

Engine Harness Routing - Left Rear (L20 or L96)

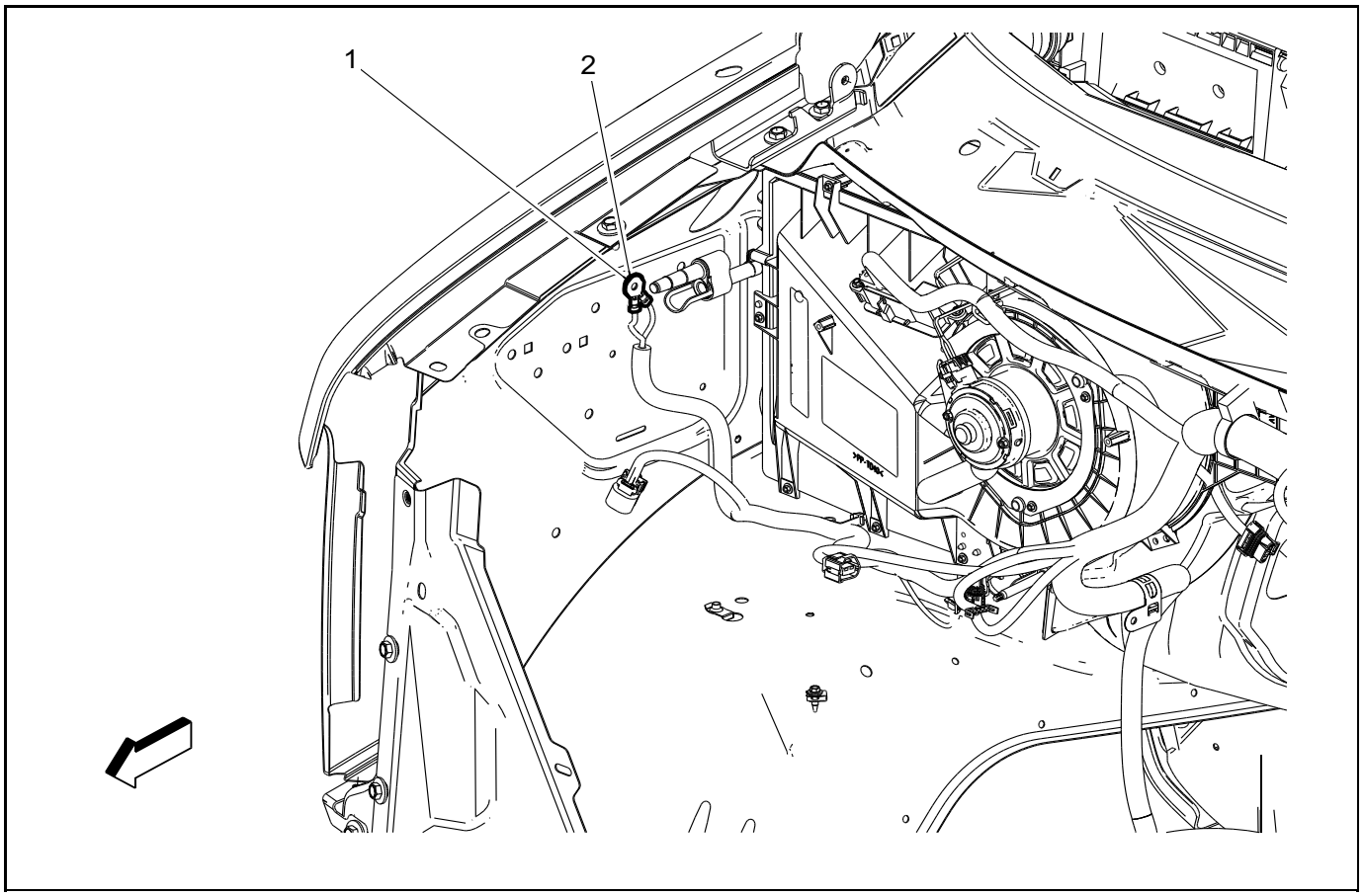


2831338

Items

(1) X126 (L20, LMF, L96 or LC8)
(2) J101
(3) J102
(4) G103
(5) G102

G102/G103 (LGH)

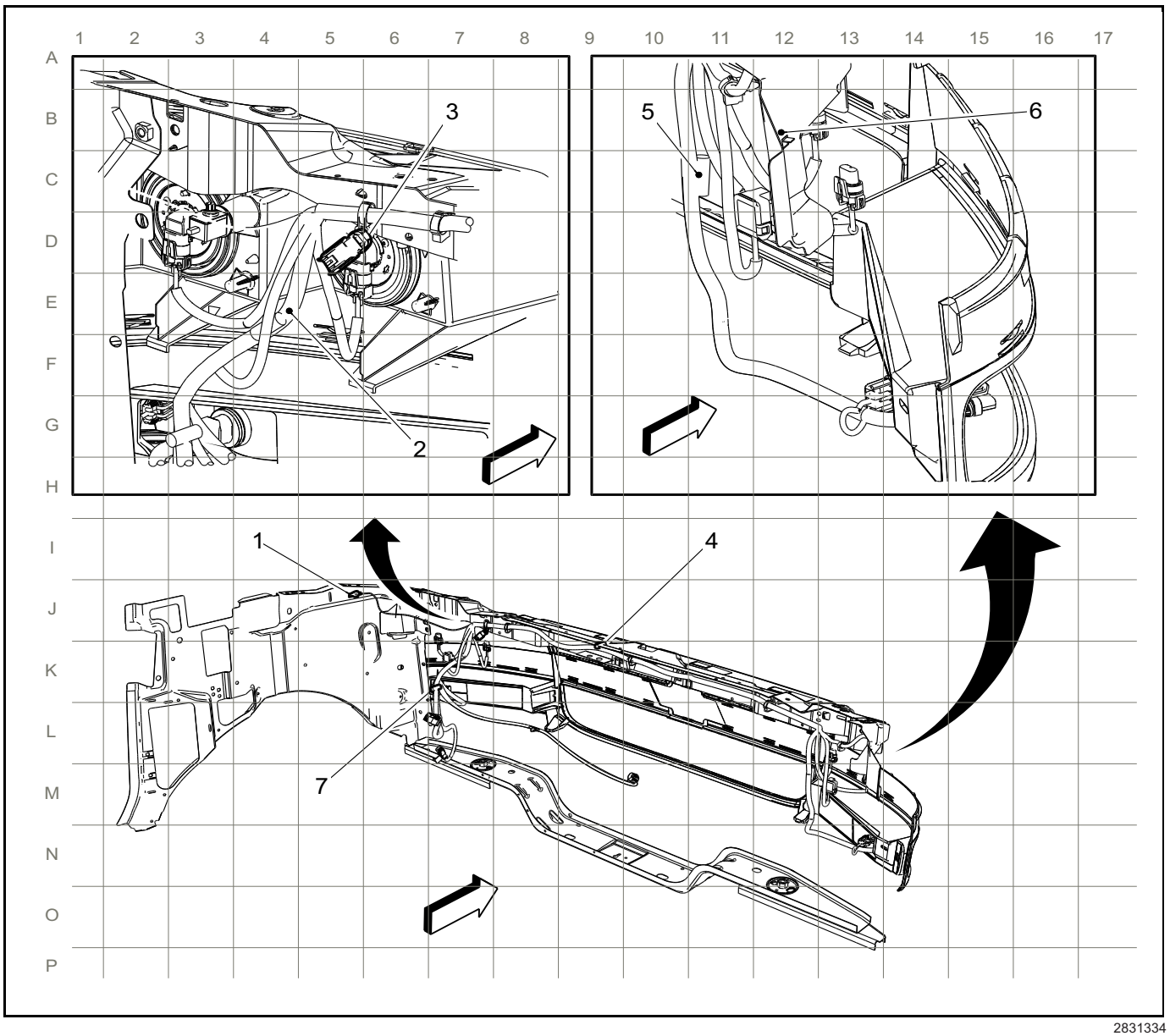


2832033

Items

(1) G102
(2) G103

Forward Lamp Harness

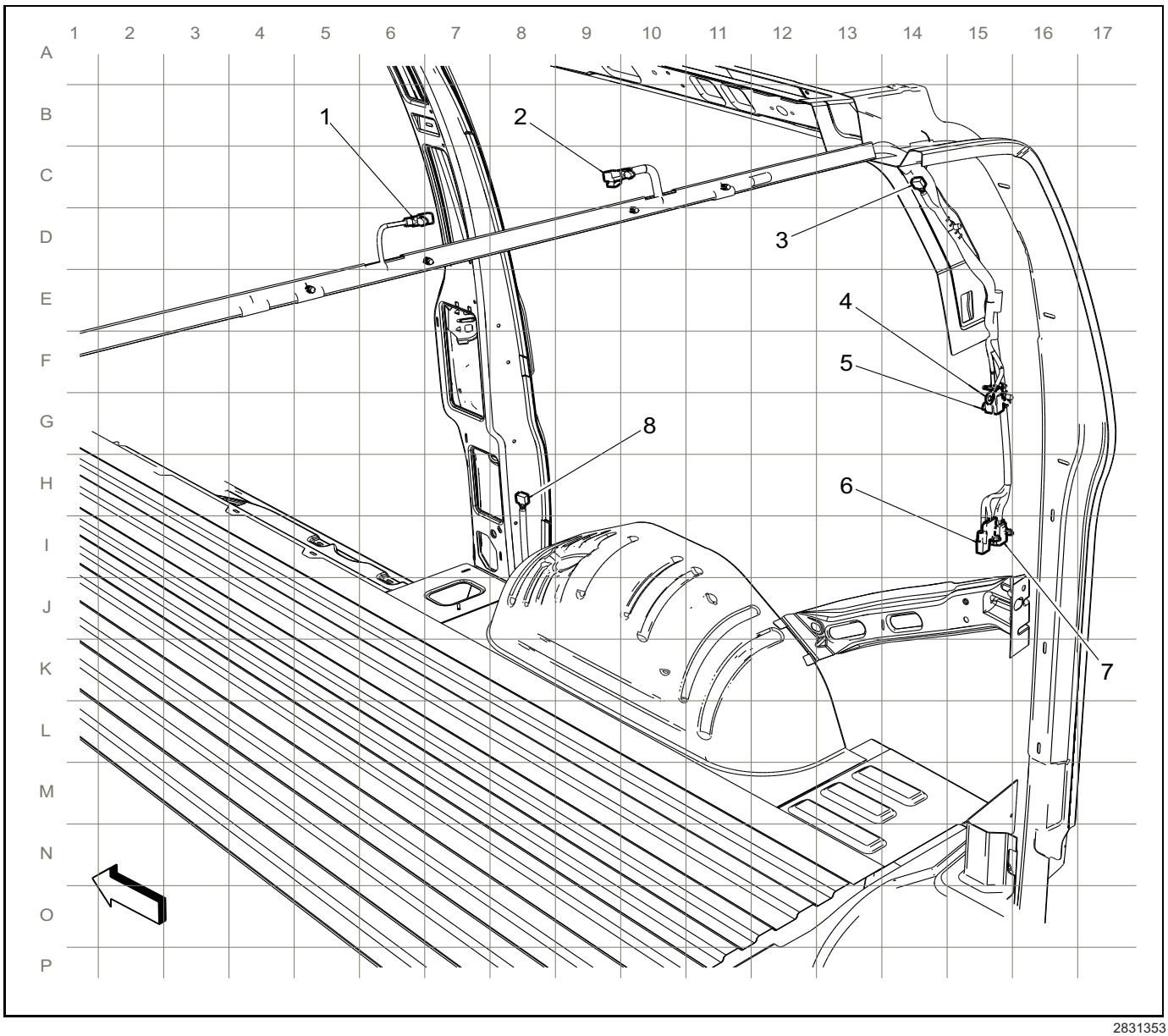


2831334

Items

(1) G100
(2) J110
(3) X150 (UFA)
(4) J121
(5) J118
(6) G101
(7) J122

Body Harness Routing - Right Rear (Passenger and Cargo)

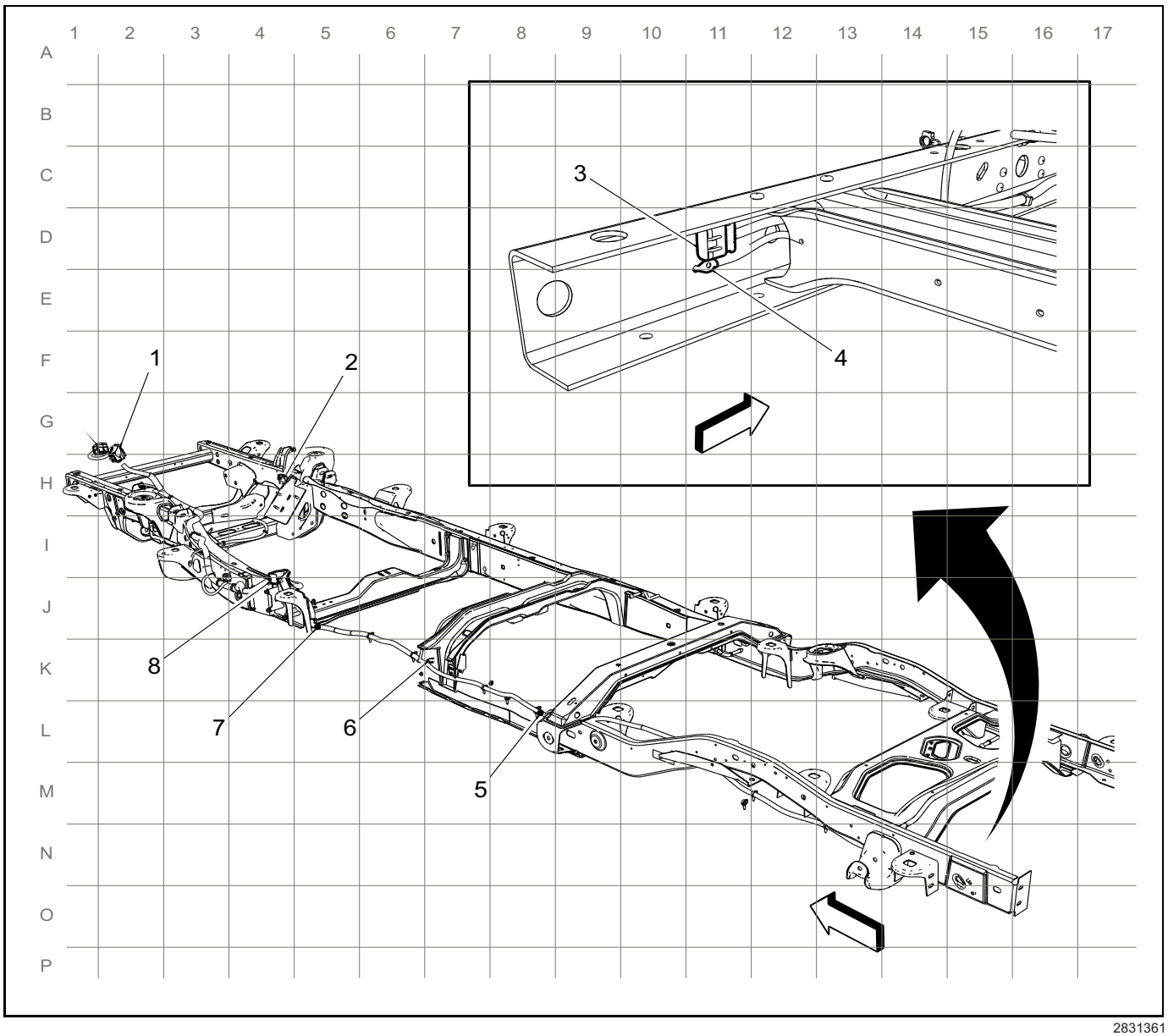


2831353

Items

(1) X419
(2) X415
(3) X420
(4) G401 (Passenger or Cargo)
(5) X402
(6) X412
(7) X400
(8) X324 (ASF)

Chassis Harness Routing (LMM)

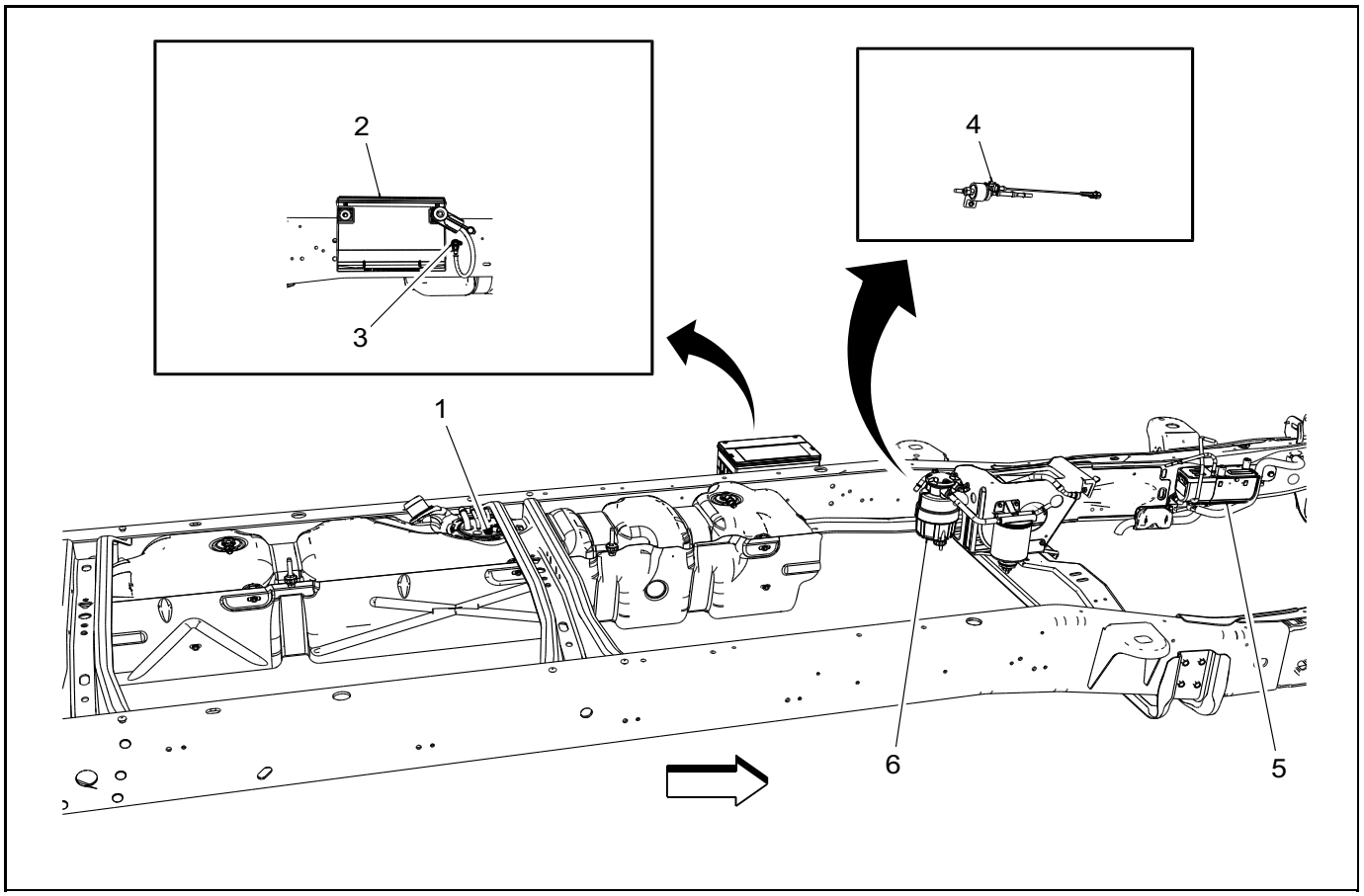


2831361

Items

(1) X101
(2) X105
(3) X405
(4) G400
(5) J402
(6) X305 (K08)
(7) J119 (LGH)
(8) X174 (LGH)

Left Side Frame (LMM or LGH)



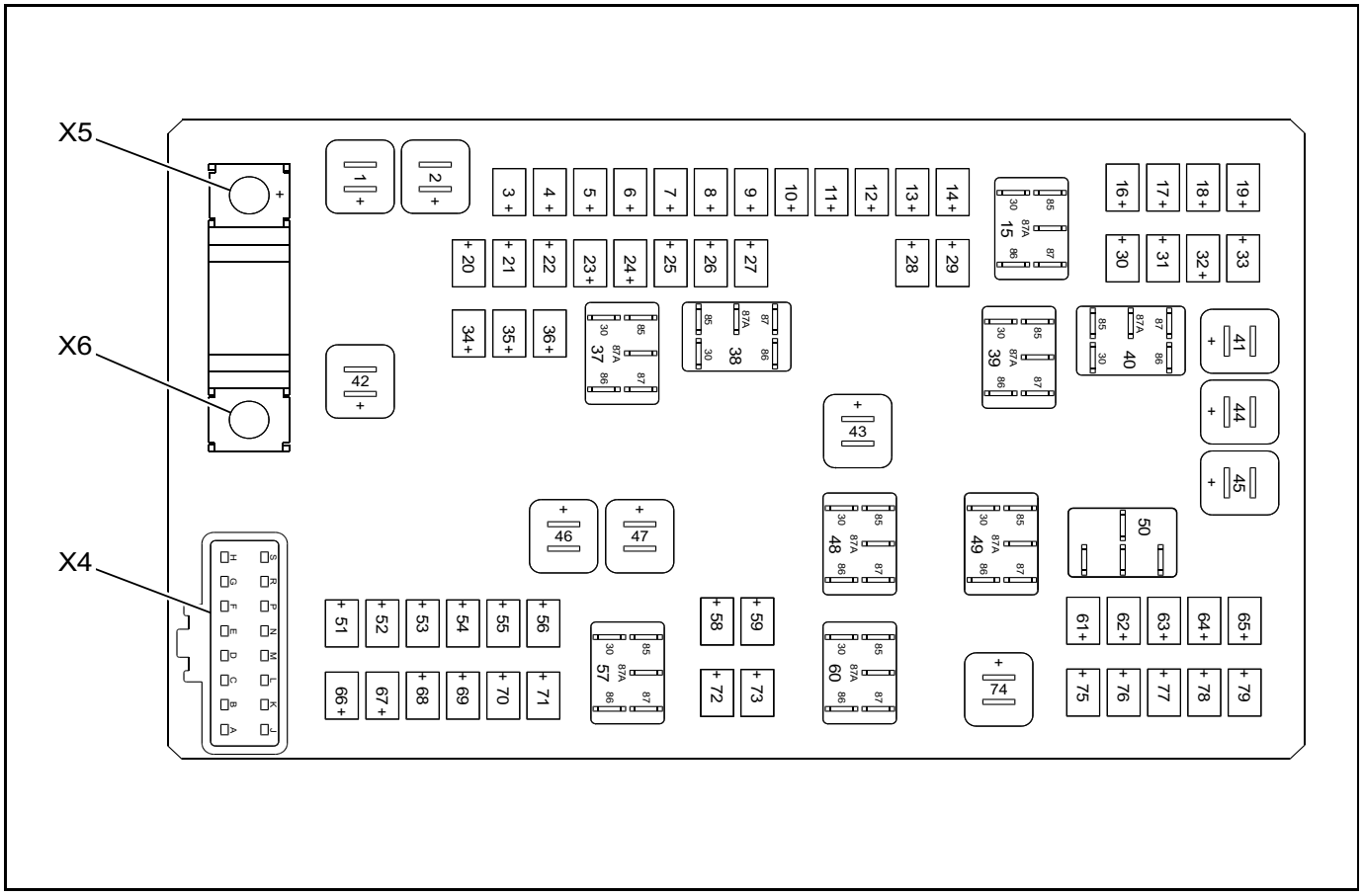
2831485

Items

(1) B46 Fuel Level Sensor
(2) C1B Battery - Auxiliary (LGH)
(3) G305 (LGH)
(4) G7 Coolant Heater Fuel Pump (K08)
(5) E19 Coolant Heater (K08)
(6) G12 Fuel Pump

Electrical Center Identification Views

Fuse Block - Underhood Top View



2832054

Fuse Block – Underhood Usage

No.	Device Label Name	Device Assigned Name	Rating	Description
1	ABS MTR Fuse		50A	Electronic Brake Control Module (EBCM)
2	ABS MDL Fuse		40A	Electronic Brake Control Module (EBCM)
3	RT STOP/TRN TRLR Fuse		15A	Trailer Connector
4	SPARE Fuse		10A	Not Used
5	SPARE Fuse		10A	Not Used
6	FCSM IGN Fuse		10A	Fuel Pump Flow Control Module (LMF)
7	BCM–5 Fuse		10A	Body Control Module
8	BCM–7 Fuse		10A	Body Control Module
9	BCM–4 Fuse		10A	Body Control Module
10	IPC Fuse		10A	Instrument Panel Cluster (IPC)
11	TRLR WRG Fuse		30A	Blunt Cut (UY7)
12	SPARE Fuse		10A	Not Used
13	BRK SW Fuse		10A	Stop Lamp Switch
14	WASH Fuse		15A	Windshield Washer Fluid Pump
15	RUN/CRNK Relay		—	AIRBAG, BRK SW, ECM IGN/GLOW PLUG MDL IGN, FCSM IGN (LMF), IPC, STR/WHL/SNSR (JL4), TCM IGN and TRANS Fuses
16	HORN Fuse		20A	Horn Assembly

Fuse Block – Underhood Usage (cont'd)

No.	Device Label Name	Device Assigned Name	Rating	Description
17	TRANS Fuse		15A	Automatic Transmission
18	A/C CMPRSR Fuse		15A	A/C Compressor Clutch (C60)
19	ECM BATT Fuse		10A	Engine Control Module (ECM) (L20, L96 or LMF)
20	SPARE Fuse		10A	Not Used
21	LT STOP/TRN TRLR Fuse		15A	Trailer Connector
22	SPARE Fuse		10A	Not Used
23	SPARE Fuse		15A	Not Used
24	FUEL PUMP Fuse		30A	Fuel Pump and Sender Assembly (L20, L96 or LU3)
			20A	Fuel Pump (LGH)
25	AUX PWR OUTLET Fuse		20A	Accessory Power Outlet – Center Console 2
26	BCM–3 Fuse		10A	Body Control Module
27	SEO Fuse		10A	Instrument Panel Cluster (IPC) (8S8)
28	AIRBAG Fuse		10A	Inflatable Restraint I/P Module Disable Switch (C99) or Inflatable Restraint I/P Module Indicator (without C99) and Inflatable Restraint Sensing and Diagnostic Module (SDM)
29	STR/WHL/SNSR Fuse		10A	Steering Wheel Speed/Position Sensor (JL4)
30	ECM IGN/GLOW PLUG MDL IGN Fuse		15A	Engine Control Module (ECM) (L20, L96, LMF or LU3) or Glow Plug Control Module (GPCM) (LGH)
31	TCM IGN Fuse		15A	Transmission Control Module (TCM)
32	TCM BATT Fuse		10A	Control Solenoid Valve Assembly (MYD) or Transmission Control Module (TCM) (M30)
33	SPARE Fuse		15A	Not Used
34	SPARE Fuse		15A	Not Used
35	FOH MDL Fuse		15A	Coolant Heater (LGH with K08)
36	FCSM BATT Fuse		20A	Fuel Pump Flow Control Module (LMF)
37	SPARE Relay		—	Not Used
38	FUEL PUMP Relay		—	FUEL PUMP Fuse (except LMF)
39	CRNK Relay		—	STRTR SOL Fuse
40	A/C CMPRSR Relay		—	A/C CMPRSR Fuse
41	SPARE Fuse		20A	Not Used
42	TRLR WRG Fuse		30A	Trailer Connector (UY7)
43	FAN HI Fuse		40A	Not Used
44	STRTR SOL Fuse		40A	Starter Motor
45	ECM PWR/TRN Fuse		30A	Engine Control Module (ECM) (LGH)
46	SPARE Fuse		30A	Not Used
47	FAN LO Fuse		40A	Not Used
48	FAN HI Relay		—	Not Used
49	PWR/TRN Relay		—	ECM PWR/TRN, EVEN IGN/INJ (L20, L96 or LMF), FAN CLTCH (EV) (LGH), FUEL HTR (LGH), MAF/CNSTR VENT, O2 SNSR 1 (PRE)/CLS (L20, L96 or LMF), O2 SNSR 2 (POST) (L20, L96 or LMF), ODD IGN/INJ (L20, L96 or LMF) and V6 FUEL INJ (LU3) Fuses

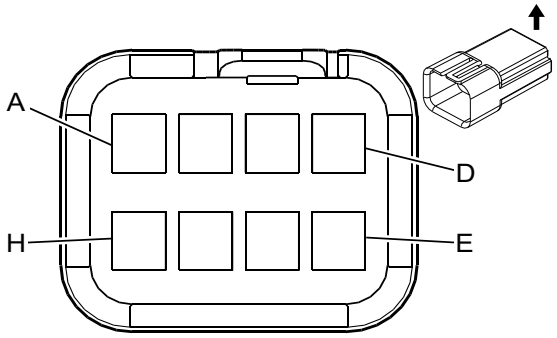
Fuse Block – Underhood Usage (cont'd)

No.	Device Label Name	Device Assigned Name	Rating	Description
50	FAN CLTCH (EV) Relay		—	Engine Cooling Fan (LGH)
51	LT HI BEAM Fuse		10A	Headlamp - Left High Beam (Composite) or Headlamp - Left (Sealed)
52	RT HI BEAM Fuse		10A	Headlamp - Right High Beam (Composite) or Headlamp - Right (Sealed)
53	LT LO BEAM Fuse		10A	Headlamp - Left Low Beam (Composite) or Headlamp - Left (Sealed)
54	RT LO BEAM Fuse		10A	Headlamp - Right Low Beam (Composite) or Headlamp - Right (Sealed)
55	WPR Fuse		25A	WPR PCB Relay
56	CNSTR VENT SOL Fuse		10A	Evaporative Emission (EVAP) Canister Vent Solenoid Valve (L20, L96, LMF or LU3)
57	FAN LO Relay		—	Not Used
58	BCM–2 Fuse		10A	Body Control Module
59	BCM–1 Fuse		10A	Body Control Module
60	FAN CNTRL Relay		—	Not Used
61	SPARE Fuse		15A	Not Used
62	O2 SNSR 2 (POST)/EV FAN Fuse		10A	HO2S Bank 1 Sensor 2 (L20, L96, LMF or LU3) and HO2S Bank 2 Sensor 2 (L20, L96, LMF or LU3)
63	FAN CLTCH (EV) Fuse		10A	FAN CLTCH (EV) Relay (LGH)
64	MAF/CNSTR VENT Fuse		15A	Evaporative Emission (EVAP) Canister Purge Solenoid Valve (L20, L96, LMF or LU3) and Mass Air Flow (MAF)/ Intake Air Temperature (IAT) Sensor
65	ODD IGN/INJ Fuse		20A	Ignition Control Module (LU3), Odd Fuel Injectors (L20, L96 or LMF) and Odd Ignition Coils (L20, L96 or LMF)
66	DRL2 (LOLVL −V22) Fuse		10A	Headlamp - Left (Sealed) and LT LO BEAM Fuse
67	DRL1 (UPLVL +V22) Fuse		15A	Headlamp - Left Low Beam (Composite) and LT LO BEAM Fuse
68	AUX STOP LAMP(S) Fuse		15A	X405 (Cutaway)
69	SPARE Fuse		10A	Not Used
70	—		—	Not Used
71	FUEL HTR Fuse		15A	Fuel Heater (LGH)
72	BCM–6 Fuse		10A	Body Control Module
73	LTR/DLC Fuse		20A	Accessory Power Outlet – Center Console 1 (without DT4) or Cigar Lighter (DT4) and Data Link Connector (DLC)
74	FRT BLWR Fuse		40A	Blower Motor Resistor
75	V6 FUEL INJ Fuse		15A	Fuel Injectors (LU3)
76	SPARE Fuse		10A	Not Used
77	O2 SNSR 1 (PRE)/ CLS Fuse		10A	HO2S Bank 1 Sensor 1 (L20, L96, LMF or LU3) and HO2S Bank 2 Sensor 1 (L20, L96, LMF or LU3)
78	ECM PWR/TRN Fuse		10A	Engine Control Module (ECM)
79	EVEN IGN/INJ Fuse		20A	Even Fuel Injector (L20, L96 or LMF) and Even Ignition Coils (L20, L96 or LMF)

Fuse Block – Underhood Usage (cont'd)

No.	Device Label Name	Device Assigned Name	Rating	Description
Note: Relays listed below are non-serviceable Printed Circuit Board (PCB) relays and are internal to the block.				
K3	WPR HI PCB Relay		—	Windshield Wiper Motor
K5	HORN/WASH PCB Relay		—	HORN and WASH Fuses
K6	LO BEAM PCB Relay		—	LT LO BEAM and RT LO BEAM Fuses
K7	HI BEAM PCB Relay		—	LT HI BEAM and RT HI BEAM Fuses
K9	TRLR LT STOP/ TRN PCB Relay		—	LT STOP/TRN TRLR Fuse (UY7)
K11	STOP LAMP(S) PCB Relay		—	AUX STOP LAMP(S) Fuse
K13	WPR PCB Relay		—	Windshield Wiper Motor and WPR HI PCB Relay
K18	TRLR RT STOP/ TRN PCB Relay		—	RT STOP/TRN TRLR Fuse (UY7)
K19	DRL PCB Relay		—	DRL1 (UPLVL+V22) and DRL2 (LOLVL-V22) Fuses

A9A Outside Rearview Mirror - Driver (DE5 or DE7)



62434

Connector Part Information

Harness Type: Driver Door
OEM Connector: 12085396
Service Connector: Service by Harness - See Part Catalog
Description: 8-Way M Metri-Pack 150 Series(NA)

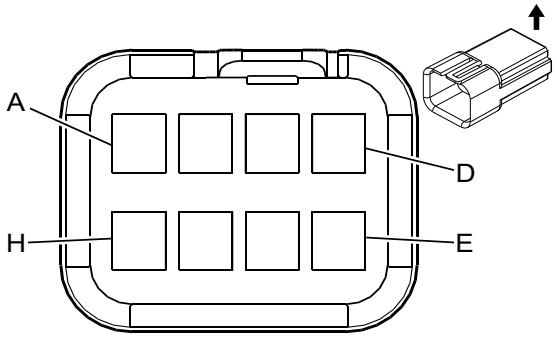
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: A, C–13505668	J-35616-3 (GY)	J-38125-12A	12047581	2	Pins: A, C–E	A

A9A Outside Rearview Mirror - Driver (DE5 or DE7)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	BK	450	Ground	I	-
B	0.5	L-BU/WH	1314	Left Front Turn Signal Lamp Control	I	-
C	0.8	OG	2267	Mirror Heating Element Control	I	-
D	0.5	BK	450	Ground	I	-
E	0.35	YE	88	Driver Mirror Motor Up Control	I	-
F	0.35	L-GN	89	Driver Mirror Motor Down Control	I	-
G	0.35	WH	81	Driver Mirror Motor Right Control	I	-
H	0.35	YE	88	Driver Mirror Motor Up Control	I	-

A9B Outside Rearview Mirror - Passenger (DE5 or DE7)



62434

Connector Part Information

Harness Type: Passenger Door
OEM Connector: 12162427
Service Connector: 12162427
Description: 8-Way M Metri-Pack 150 Series (NA)

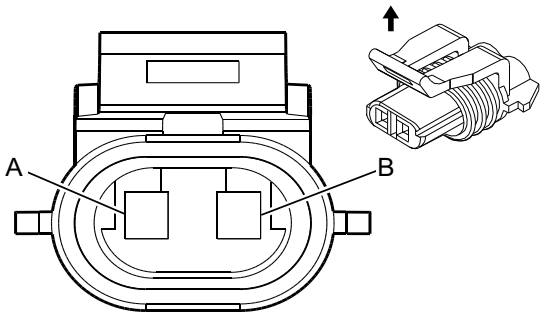
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: A, C–13505668	J-35616-3 (GY)	J-38125-12A	12047581	2	Pins: A, C–E	A

A9B Outside Rearview Mirror - Passenger (DE5 or DE7)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	BK	1850	Ground	I	-
B	0.5	D-BU/WH	1315	Right Front Turn Signal Lamp Control	I	-
C	0.8	OG	2267	Mirror Heating Element Control	I	-
D	0.5	BK	1850	Ground	I	-
E	0.35	BN/WH	1498	Passenger Mirror Motor Left/Down Control	I	-
F	0.35	PU/WH	889	Passenger Mirror Motor Down Control	I	-
G	0.35	OG/WH	881	Passenger Mirror Motor Right Control	I	-
H	0.35	BN/WH	1498	Passenger Mirror Motor Left/Down Control	I	-

B1B A/C Low Side Pressure Switch



537107

Connector Part Information

Harness Type: Engine (LU3, L20, LMF or L96)
Harness Type: Engine Chassis (LMM or LGH)
OEM Connector: 12052644
Service Connector: 53306302
Description: 2-Way F Metri-Pack 150 Series, Sealed (GY)

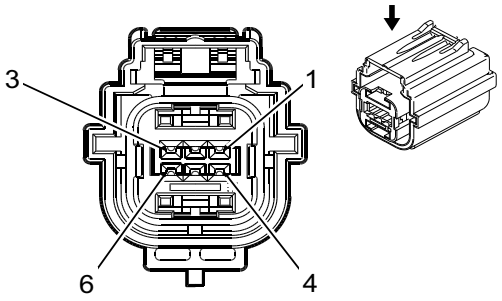
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575419	J-35616-14 (GN)	J-38125-12A	12048074	2	E	1

B1B A/C Low Side Pressure Switch

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	L-GN	66	A/C Request Signal	I	-
B	0.5	L-GN	66	A/C Request Signal	I	-

B87 Rearview Camera (UVC)



2133378

Connector Part Information

Harness Type: Rearview Camera Jumper
OEM Connector: 13629704
Service Connector: Service by Harness – See Part Catalog
Description: 6-Way F 0.64 Series, Sealed (GY)

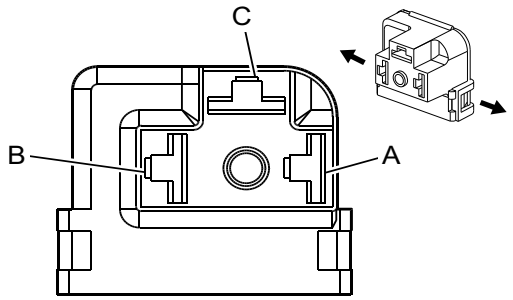
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575845	J-35616-64B (L-BU)	J-38125-215A	Not Stocked in Kit	NA	P	P

B87 Rearview Camera (UVC)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.5	WH	7641	Camera Rear Vision Signal +	I	-
2	0.5	GY	6799	Camera Shield	I	-
3	0.5	L-GN	24	Backup Lamp Supply Voltage	I	-
4	0.5	L-BU	7642	Camera Rear Vision Signal (-)	I	-
5	0.5	BK/WH	351	Signal Ground	I	-
6	0.5	PK	239	Run/Crank Ignition 1 Voltage	I	-

E13L Headlamp - Left (Sealed)



306269

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12034372
Service Connector: 12117369
Description: 3-Way F Metri-Pack 800 Series (BK)

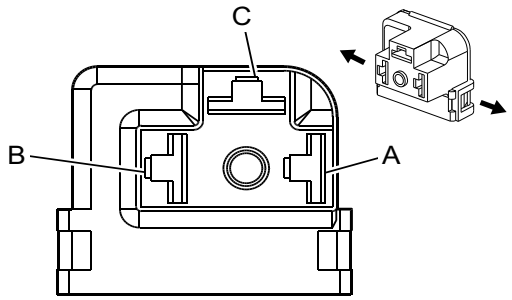
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-44 (YE)	J-38125-558	12020634	18	C	A

E13L Headlamp - Left (Sealed)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	BK	250	Ground	I	-
B	0.5	D-GN/WH	711	Left Headlamp High Beam Control	I	-
C	0.5	YE	712	Left Headlamp Low Beam Control	I	-

E13R Headlamp - Right (Sealed)



306269

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12034372
Service Connector: 12117369
Description: 3-Way F Metri-Pack 800 Series (BK)

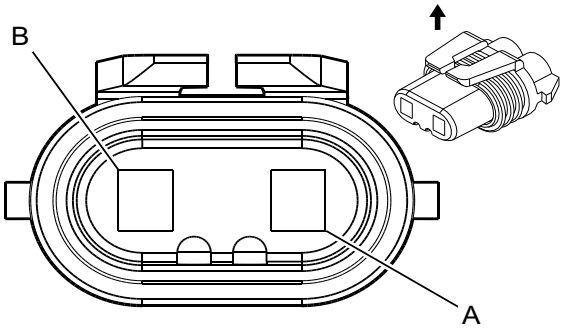
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-44 (YE)	J-38125-558	12020634	18	C	A

E13R Headlamp - Right (Sealed)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	BK	650	Ground	I	-
B	0.8	L-GN/BK	311	Right Headlamp High Beam Control	I	-
C	0.8	TN/WH	312	Right Headlamp Low Beam Control	I	-

E4E Headlamp - Left High Beam (Composite)



684797

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12059183
Service Connector: 12101898
Description: 2-Way F Metri-Pack 280 Series, Sealed (BK)

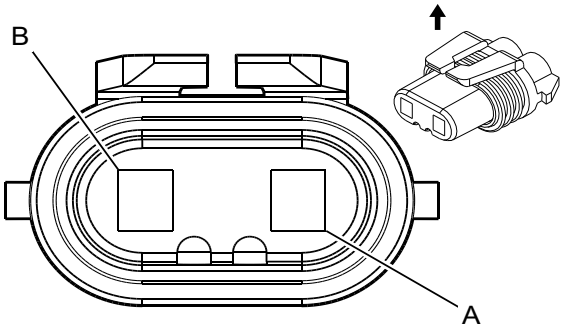
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pin A–13575418	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4E Headlamp - Left High Beam (Composite)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	D-GN/WH	711	Left Headlamp High Beam Control	I	-
B	0.8	BK	250	Ground	I	-

E4F Headlamp - Right High Beam (Composite)



684797

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12059183
Service Connector: 12101898
Description: 2-Way F Metri-Pack 280 Series, Sealed (BK)

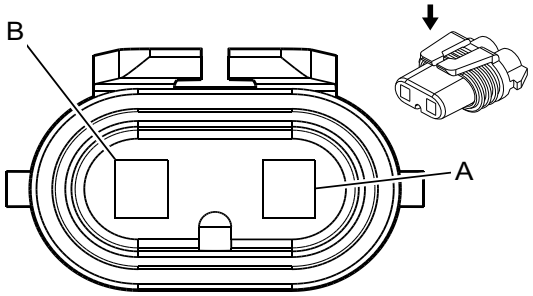
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4F Headlamp - Right High Beam (Composite)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	L-GN/BK	311	Right Headlamp High Beam Control	I	-
B	0.8	BK	650	Ground	I	-

E4G Headlamp - Left Low Beam (Composite)



684796

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12059181
Service Connector: 12101897
Description: 2-Way F Metri-Pack 280 Series, Sealed (GY)

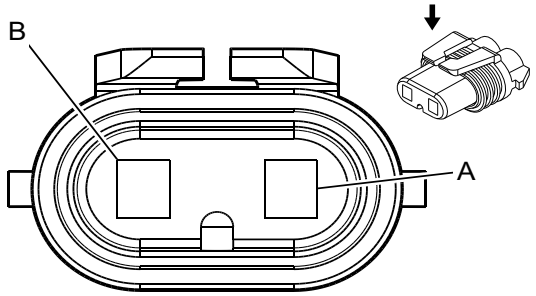
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pin A–13575418	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4G Headlamp - Left Low Beam (Composite)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	YE	712	Left Headlamp Low Beam Control	I	-
B	0.8	BK	250	Ground	I	-

E4H Headlamp - Right Low Beam (Composite)



684796

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12059181
Service Connector: 12101897
Description: 2-Way F Metri-Pack 280 Series, Sealed (GY)

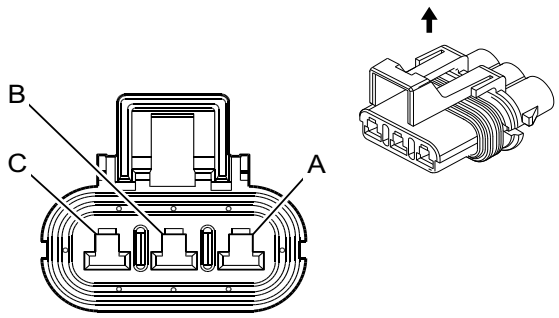
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4H Headlamp - Right Low Beam (Composite)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	TN/WH	312	Right Headlamp Low Beam Control	I	-
B	0.8	BK	650	Ground	I	-

E4N Park/Turn Signal Lamp - Left



847206

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12040977
Service Connector: 12085492
Description: 3-Way F Metri-Pack 280 Sealed (BK)

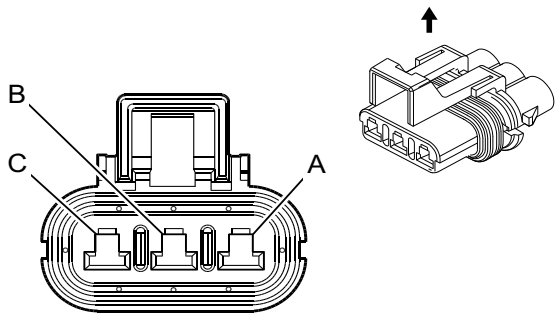
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pin A–Pending	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4N Park/Turn Signal Lamp - Left

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	L-BU/WH	1314	Left Front Turn Signal Lamp Control	I	-
B	0.5	BN	2309	Front Park Lamps Control	I	-
C	0.5	BK	250	Ground	I	-

E4P Park/Turn Signal Lamp - Right



847206

Connector Part Information

Harness Type: Forward Lamp
OEM Connector: 12040977
Service Connector: 12085492
Description: 3-Way F Metri-Pack 280 Sealed (BK)

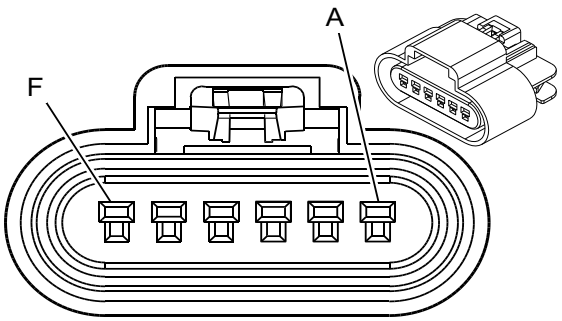
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pin A–Pending	J-35616-4A (PU)	J-38125-11A	12077411	2	2	5

E4P Park/Turn Signal Lamp - Right

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.8	D-BU/WH	1315	Right Front Turn Signal Lamp Control	I	-
B	0.5	BN	2309	Front Park Lamps Control	I	-
C	0.5	BK	650	Ground	I	-

G10 Cooling Fan Motor (LGH)



632357

Connector Part Information

Harness: Fan Jumper
OEM: 15326829
Service: 88988944
Description: 6-Way F GT 150 Series Sealed (BK)

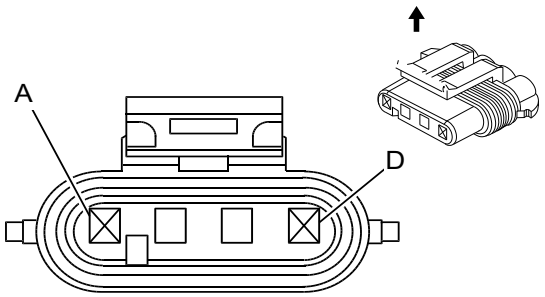
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I				See Terminal Repair Kit	See Terminal Repair Kit	See Terminal Repair Kit	See Terminal Repair Kit

G10 Cooling Fan Motor (LGH)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	0.5	BK	1250	Ground	I	-
B	0.5	WH	2368	Cooling Fan Clutch Control	I	-
C	0.5	BN/WH	6141	Low Reference	I	-
D	0.5	D-BU	2364	Cooling Fan Speed Signal	I	-
E	0.5	GY	2365	Low Reference	I	-
F	-	-	-	Not Occupied	-	-

G13 Generator X1 (LC8, LGH, L20 or L96)



647991

Connector Part Information

Harness: Engine
OEM: 15355066
Service: 15306329
Description: 2-Way F Metri-Pack 150 Series Sealed (BG)

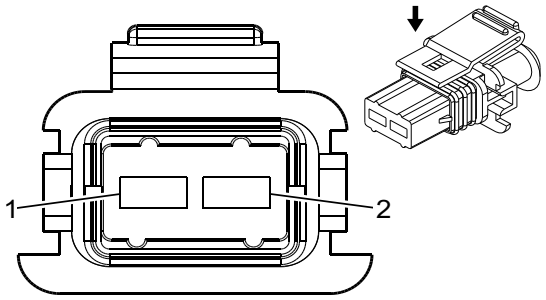
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I				12048074	2	E	1

G13 Generator X1 (LC8, LGH, L20 or L96)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	-	-	-	Not Occupied	-	-
B	0.5 0.8	OG OG	225 225	Generator Turn On Signal Generator Turn On Signal	I	L20 or L96 LGH
C	0.5 0.8	GY GY	23 23	Generator Field Duty Cycle Signal Generator Field Duty Cycle Signal	I	L20 or L96 LGH
D	-	-	-	Not Occupied	-	-

G13 Generator X1 (LU3 or LMF)



1522871

Connector Part Information

Harness Type: Engine
OEM Connector: 12186308
Service Connector: 13585849
Description: 2-Way F Junior Power Timer Series, Sealed (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13581346	J-35616-35 (VT)	J-38125-36	4-964286-1	16	E	1

G13 Generator X1 (LU3 or LMF)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.5	OG	225	Generator Turn On Signal	I	-
2	0.5	GY	23	Generator Field Duty Cycle Signal	I	-

G13 Generator X2

Connector Part Information

Harness Type: Battery Positive
OEM Connector: 15355282
Service Connector: Service by Harness – See Part Catalog
Description: Ring Terminal

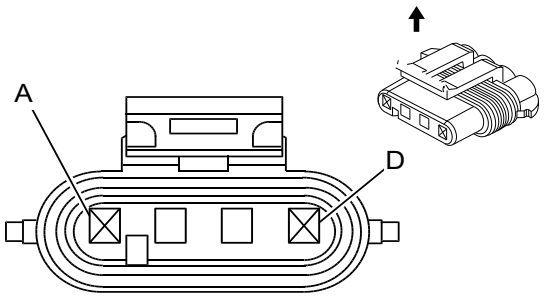
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Not Available	No Tool Required	No Tool Required	Not Available	Not Available	Not Avail-able	Not Avail-able

G13 Generator X2

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	19	RD	1	Battery Positive Voltage	I	-

G13E Generator - Auxiliary X1 (KD9 with YF2)



647991

Connector Part Information

Harness Type: Engine Chassis
OEM Connector: 15355066
Service Connector: 15306329
Description: 2-Way F Metri-Pack 150 Series, Sealed (BG)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575427	J-35616-14 (GN)	J-38125-12A	12048074	2	E	1

G13E Generator - Auxiliary X1 (KD9 with YF2)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	-	-	-	Not Occupied	-	-
B	0.8	BN/WH	7076	Charge Indicator Control	I	-
C–D	-	-	-	Not Occupied	-	-

G13E Generator - Auxiliary X2 (KD9 with YF2)

Connector Part Information

Harness Type: Auxiliary Battery Positive
OEM Connector: 15355282
Service Connector: Service by Harness – See Part Catalog
Description: Ring Terminal

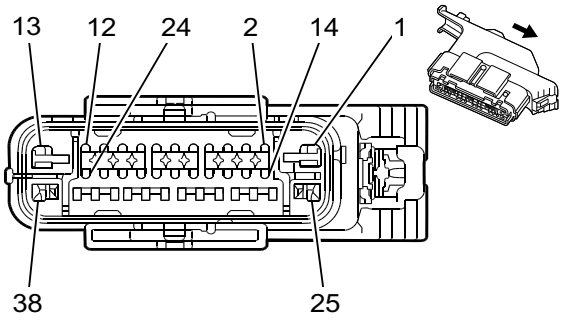
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Not Available	No Tool Required	No Tool Required	Not Available	Not Available	Not Available	Not Available

G13E Generator - Auxiliary X2 (KD9 with YF2)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	19	RD	1	Battery Positive Voltage	I	-

K17 Electronic Brake Control Module (JL4)



1862109

Connector Part Information

Harness Type: Chassis
OEM Connector: 13528146
Service Connector: 19178085
Description: 38-Way F 2.8 Series, Sealed (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13578926	J-35616-42 (RD)	J-38125-11A	7116-4142-02	10	D	3
II	13578883	J-35616-64B (L-BU)	J-38125-215A	SAITS-A03T-M064	14	9	9
III	13575408	J-35616-4A (PU)	J-38125-553	15392777	23	D	5

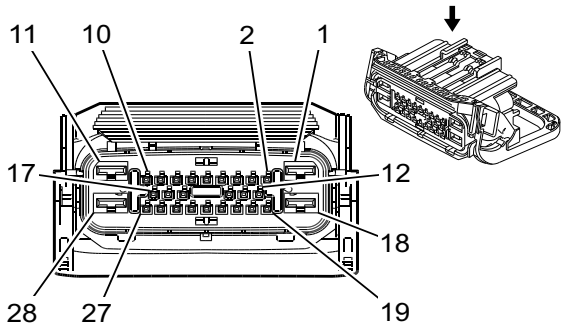
K17 Electronic Brake Control Module (JL4)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	5	BK	2150	Ground	I	-
2	0.5	WH	883	Low Reference	II	-
3	0.5	BN	882	Right Rear Wheel Speed Sensor Signal	II	-
4	0.5	TN	884	Left Rear Wheel Speed Sensor Signal	II	-
5	0.5	OG	885	Low Reference	II	-
6	0.5	TN	833	Low Reference	II	-
7	0.5	YE	6046	Steering Angle Sensor Phase A	II	-
8	0.5	TN	6048	Steering Angle Sensor Phase C	II	-
9	0.5	L-GN	6043	Steering Angle Sensor Signal	II	-
10–11	-	-	-	Not Occupied	-	-
12	0.5	L-BU	5986	Serial Data Communication Enable	II	-
13	5	RD/BK	442	Battery Positive Voltage	I	-
14–15	-	-	-	Not Occupied	-	-
16	0.5	OG/BK	6045	Low Reference	II	-
17	0.5	D-GN	872	Right Front Wheel Speed Sensor Signal	II	-
18	-	-	-	Not Occupied	-	-
19	0.5	GY/BK	1337	12-Volt Reference	II	-

K17 Electronic Brake Control Module (JL4) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
20	0.5	D-BU	6047	Steering Angle Sensor Phase B	II	-
21	0.5	WH/BK	6436	CAN Bus Low Terminated Serial Data	II	-
22	-	-	-	Not Occupied	-	-
23	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	II	-
24	0.5	TN	2501	High Speed GMLAN Serial Data Bus (–)	II	-
25	3	BK	2150	Ground	III	-
26–27	-	-	-	Not Occupied	-	-
28	0.5	L-BU	830	Left Front Wheel Speed Sensor Signal	II	-
29	0.5	YE	873	Low Reference	II	-
30	0.5	BK/PU	7499	Low Reference	II	-
31	0.5	GY	6044	5-Volt Reference	II	-
32	0.5	YE/BK	1827	Vehicle Speed Signal	II	-
33	0.5	BN/WH	6437	CAN Bus High Terminated Serial Data	II	-
34–35	-	-	-	Not Occupied	-	-
36	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
37	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
38	3	RD/WH	1640	Battery Positive Voltage	-	-

K17 Electronic Brake Control Module (without JL4)



2056935

Connector Part Information

Harness Type: Chassis
OEM Connector: 13628862
Service Connector: 19149286
Description: 28-Way F 0.64/6.3 Series, Sealed (BK)

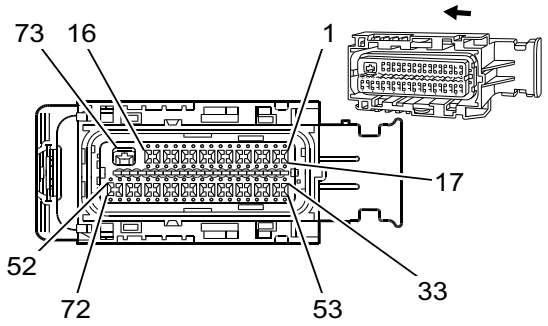
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: 1, 11 – Pending	J-35616-42 (RD)	J-38125-11A	7116-4142-02	10	Pins: 1, 11 – A	3
II	13575378	J-35616-64B (L-BU)	J-38125-215A	SAITS-A03T-M064	14	9	9

K17 Electronic Brake Control Module (without JL4)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	3	RD/WH	1640	Battery Positive Voltage	I	-
2	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
3	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
4–10	-	-	-	Not Occupied	-	-
11	3	BK	2150	Ground	I	-
12	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	II	-
13	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	II	-
14	-	-	-	Not Occupied	-	-
15	0.5	L-BU	830	Left Front Wheel Speed Sensor Signal	II	-
16	0.5	YE	873	Low Reference	II	-
17	-	-	-	Not Occupied	-	-
18	5	RD/BK	442	Battery Positive Voltage	I	-
19	0.5	L-BU	5986	Serial Data Communication Enable	II	-
20	0.5	YE/BK	1827	Vehicle Speed Signal	II	-
21–25	-	-	-	Not Occupied	-	-
26	0.5	D-GN	872	Right Front Wheel Speed Sensor Signal	II	-
27	0.5	TN	833	Low Reference	II	-
28	5	BK	2150	Ground	I	-

K20 Engine Control Module X1 (LC8, LMF, L20 or L96)



1673472

Connector Part Information

Harness Type: Engine
OEM Connector: 13580802
Service Connector: 88988931
Description: 73-Way F MX123 34566 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: 1, 12–13, 23, 29–30, 32, 34, 36, 50, 52, 56–57, 63, 68 – 13575811	J-35616-64B (L-BU)	J-38125-213	Pins: 1, 12, 13, 23, 29, 30, 32, 34, 36, 50, 52, 56, 57, 63, 68 – 33467-0003	23	Pins: 9, 16, 18-20, 24, 26-28, 31, 33, 47, 54, 59, 61, 71 – J	J
II	Service by Harness - See Part Catalog	J-35616-35 (VT)	J-38125-11A	7116-4152-02	9	A	5

K20 Engine Control Module X1 (LC8, LMF, L20 or L96)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.5	OG/BK	1786	Park/Neutral Signal	I	-
2−8	-	-	-	Not Occupied	-	-
9	0.5	L-BU/WH	6311	Torque Converter Clutch (TCC) Brake Signal	I	-
10	0.8	PU/WH	1668	Heated Oxygen Sensor (HO2S) High Signal – Bank 1 Sensor 2	I	-
11	0.8	TN/WH	1669	Heated Oxygen Sensor (HO2S) Low Signal – Bank 1 Sensor 2	I	-
12	0.35	OG/BK	380	A/C Refrigerant Pressure Sensor Signal	I	C60
13	0.35	TN	5514	Low Reference	I	C60
14–15	-	-	-	Not Occupied	-	-
16	0.5	PU	1589	Fuel Level Sensor Signal – Primary	I	-
17	-	-	-	Not Occupied	-	-
18	0.5	D-BU	5985	Accessory Wakeup Serial Data	I	-
19	0.5	PK	439	Ignition Voltage	I	-
20	0.5	RD/WH	440	Battery Positive Voltage	I	-

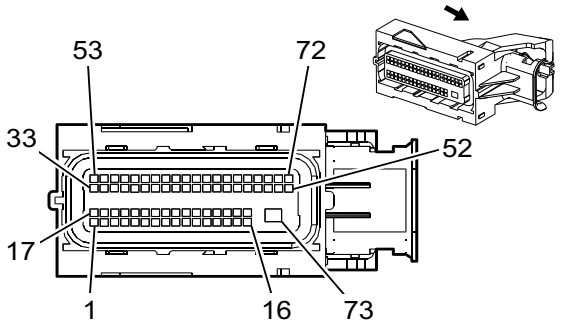
K20 Engine Control Module X1 (LC8, LMF, L20 or L96) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
21	-	-	-	Not Occupied	-	-
22	0.8	L-BU/BK	6813	Low Reference	I	-
23	0.35	PU	1272	Low Reference	I	-
24	0.5	D-GN	890	Fuel Tank Pressure Sensor Signal	I	-
25	-	-	-	Not Occupied	-	-
26	0.5	YE	5361	Brake Apply Sensor Signal	-	-
27	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	I	-
28	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	I	-
29	0.35	D-BU	1161	Accelerator Pedal Position (APP) Sensor 1 Signal	I	-
30	0.35	BN	1271	Low Reference	I	-
31	0.5 0.5	TN/BK TN/BK	2759 6049	Low Reference Low Reference	I	L20 or L96 LMF
32	0.35	L-BU	1162	Accelerator Pedal Position (APP) Sensor 2 Signal	I	-
33	0.5	GY	2709	5-Volt Reference 1	I	-
34	0.35	GY	2700	5-Volt Reference 1	I	C60
35	-	-	-	Not Occupied	-	-
36	0.35	TN	1274	5-Volt Reference 1	I	-
37	0.5	TN/WH	472	Intake Air Temperature (IAT) Sensor Signal	I	-
38	0.8	TN	2760	Low Reference	I	-
39	0.8	L-GN	2032	Engine Coolant Temperature (ECT) Sensor Signal	I	-
40	-	-	-	Not Occupied	-	-
41	0.8	YE	492	Mass Air Flow (MAF) Sensor Signal	I	-
42	0.5	BN	5360	Brake Apply Sensor Low Reference	-	-
43–46	-	-	-	Not Occupied	-	-
47	0.5	PK	1339	Ignition Voltage	I	-
48	-	-	-	Not Occupied	-	-
49	0.8	TN	1671	Heated Oxygen Sensor (HO2S) Low Signal – Bank 2 Sensor 2	I	-
50	0.35	D-GN/WH	465	Fuel Pump Relay Control – Primary	I	-
51	-	-	-	Not Occupied	-	-
52	0.35	YE/BK	625	Starter Enable Relay Control	I	-
53	-	-	-	Not Occupied	-	-
54	0.5	WH	5359	Brake Apply Sensor Supply Voltage	-	-
55	-	-	-	Not Occupied	-	-
56	0.35	WH/BK	1164	5-Volt Reference 2	I	-
57	0.35	YE/BK	1827	Vehicle Speed Signal	I	-
58	-	-	-	Not Occupied	-	-
59	0.5	YE	5991	Powertrain Relay Control	I	-
60	-	-	-	Not Occupied	-	-
61	0.5	WH	1310	Evaporative Emission (EVAP) Canister Vent Solenoid Control	I	-
62	-	-	-	Not Occupied	-	-
63	0.35	D-GN/WH	459	A/C Compressor Clutch Relay Control	I	C60
64	0.8	OG/WH	3223	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 2 Sensor 2	I	-

K20 Engine Control Module X1 (LC8, LMF, L20 or L96) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
65	0.8	GY/WH	3122	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 1 Sensor 2	I	-
66–67	-	-	-	Not Occupied	-	-
68	0.35	BN/WH	419	MIL Control	I	-
69	0.8	PU	1670	Heated Oxygen Sensor (HO2S) High Signal – Bank 2 Sensor 2	I	-
70	-	-	-	Not Occupied	-	-
71	0.5	OG/BK	6399	Replicated TOS Signal	I	-
72	-	-	-	Not Occupied	-	-
73	3	BK/WH	1551	Ground	II	-

K20 Engine Control Module X1 (LGH)



1968294

Connector Part Information

Harness Type: Engine Chassis
OEM Connector: 13649839
Service Connector: 13574946
Description: 73-Way F MX123 34566 Series (BU)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575575	J-35616-64B (L-BU)	J-38125-213	33467-0005	23	Pins: 1–2, 6, 50, 53, 70 – K	K
II	Pending	J-35616-35 (VT)	J-38125-11A	7116-4152-02	9	A	5

K20 Engine Control Module X1 (LGH)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.8	BN/WH	3100	DEF Dosing Valve Low Control	I	-
2	0.8	BN	3099	DEF Dosing Valve High Control	I	-
3	0.5	D-BU	3105	DEF Smart Pump Control	I	-
4	0.5	D-GN/WH	465	Fuel Pump Primary Relay Control	I	-
5	0.5	YE/BK	625	Starter Enable Relay Control	I	-
6	0.8	D-GN	3101	DEF Reverting Valve High Control	I	-
7	0.5	BN/WH	6783	Low Reference	I	-
8	-	-	-	Not Occupied	-	-
9	0.5	L-BU/WH	6311	Cruise/ETC/TCC Brake Signal	I	-
10–13	-	-	-	Not Occupied	-	-
14	0.5	GY	2365	5 Volt Reference	I	-
15	0.5	GY/BK	2931	Low Reference	I	-
16	0.5	L-BU/WH	6288	Low Reference	I	-
17	0.5	BN/WH	419	Check Engine Indicator Control	I	-
18	0.5	PU	2927	Hydrocarbon Injector Low Control	I	-
19	0.5	WH/BK	2366	Cooling Fan Control Relay Speed Signal	I	-
20	0.5	D-BU	507	Wait To Start Indicator Control	I	-
21	0.5	WH/BK	2366	Cooling Fan Control Relay Speed Signal	-	-

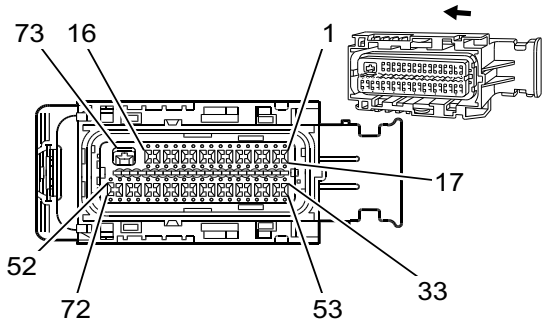
K20 Engine Control Module X1 (LGH) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
22	0.5	TN	3657	Low Reference	I	-
23–24	-	-	-	Not Occupied	-	-
25	0.5	OG/BK	1786	Transmission Park/Neutral Signal	I	-
26	0.5	D-BU	5985	Accessory Wakeup Serial Data	I	-
27	0.5	TN	3661	Low Reference	I	-
28	0.5	TN	2759	Low Reference	I	-
29	0.5	BN	3108	DEF Pressure Sensor Signal	I	-
30	0.5	GY	3106	5 Volt Reference	I	-
31	0.5	TN	3107	Low Reference	I	-
32	-	-	-	Not Occupied	-	-
33	0.5	D-BU	2926	Hydrocarbon Injector High Control	I	-
34	0.5	D-GN/WH	459	A/C Compressor Clutch Relay Control	I	-
35	0.5	TN	3104	Low Reference	I	-
36	0.5	TN	5514	Low Reference	I	-
37	-	-	-	Not Occupied	-	-
38	0.5	L-BU	5377	Exhaust Gas Temperature Sensor 2 Signal	I	-
39	0.5	L-BU	1162	Accelerator Pedal Position Signal 2	I	-
40	0.5	TN/BK	6289	Induction Air Temperature Sensor Signal	I	-
41	0.5	D-BU	6053	Exhaust Pressure Sensor Signal 1	I	-
42	0.5	WH/BK	1164	5 Volt Reference	I	-
43	0.5	GY	6054	5 Volt Reference	I	-
44	0.5	YE	6055	Low Reference	I	-
45	0.5	L-GN	7494	High Speed GMLAN Serial Data (-) (3)	I	-
46	0.5	TN	2501	High Speed GMLAN Serial Data (-) (1)	I	-
47	-	-	-	Not Occupied	-	-
48	0.5	PK	439	Run/Crank Ignition 1 Voltage	I	-
49	0.5	YE	492	Mass Air Flow Sensor Signal	I	-
50	0.8	OG	225	Generator Turn On Signal	I	-
51	0.5	PU	1272	Low Reference	I	-
52	-	-	-	Not Occupied	-	-
53	0.8	BK	3102	DEF Reverting Valve Low Control	I	-
54	0.5	GY	3103	DEF Smart Pump Supply Voltage	I	-
55	0.5	BN	1271	Low Reference	I	-
56	0.5	D-BU/WH	3660	Exhaust Gas Temperature Sensor 4 Signal	I	-
57	0.5	L-GN	5378	Exhaust Gas Temperature Sensor 3 Signal	I	-
58	0.5	PU	1589	Primary Fuel Level Sensor Signal	I	-
59	0.5	OG/BK	380	A/C Refrigerant Pressure Sensor Signal	I	-
60	-	-	-	Not Occupied	-	-
61	0.5	D-BU	1161	Accelerator Pedal Position Signal 1	I	-
62	0.5	TN	1274	5 Volt Reference	I	-
63	0.5	GY	2700	5 Volt Reference	I	-
64	-	-	-	Not Occupied	-	-
65	0.5	D-GN	7493	High Speed GMLAN Serial Data (+) (3)	I	-
66	0.5	TN/BK	2500	High Speed GMLAN Serial Data (+) (1)	I	-
67	0.5	RD/WH	440	Battery Positive Voltage	I	-

K20 Engine Control Module X1 (LGH) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
68	0.5	YE	5991	Powertrain Relay Coil Control	I	-
69	0.5	D-BU	2364	Cooling Fan Speed Signal	I	-
70	0.8	GY	23	Generator Field Duty Cycle Signal	I	-
71	0.5	BN/WH	6141	Low Reference	I	-
72	0.5	OG/BK	6399	Replicated TOS Signal	I	-
73	3	PK	1439	Run/Crank Ignition 1 Voltage	-	-

K20 Engine Control Module X1 (LU3)



1673472

Connector Part Information

Harness Type: Engine
OEM Connector: 13580810
Service Connector: 88988931
Description: 73-Way F MX123 34566 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: 1, 6, 8, 18, 21, 25, 27, 30, 32, 41, 47, 50, 57, 65, 67 – 13575811	J-35616-64B (L-BU)	J-38125-213	Pins: 1, 6, 8, 18, 21, 25, 27, 30, 32, 41, 47, 50, 57, 65, 67 – 33467-0003	23	Pins: 1, 6, 8, 18, 21, 25, 27, 30, 32, 41, 47, 50, 57, 65, 67 – H	H
II	Service by Harness – See Part Catalog	J-35616-35 (VT)	J-38125-12A	1326030-8	17	A	4

K20 Engine Control Module X1 (LU3)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.35	D-BU	1161	Accelerator Pedal Position (APP) Sensor 1 Signal	I	-
2	0.8	PU	1670	Heated Oxygen Sensor (HO2S) High Signal – Bank 2 Sensor 2	I	-
3	0.5	D-BU	5985	Accessory Wakeup Serial Data	I	-
4–5	-	-	-	Not Occupied	-	-
6	0.35	D-GN/WH	465	Fuel Pump Relay Control – Primary	I	-
7	-	-	-	Not Occupied	-	-
8	0.35	TN	5514	Low Reference	I	C60
9	0.8	TN/WH	1669	Heated Oxygen Sensor (HO2S) Low Signal – Bank 1 Sensor 2	I	-
10	0.8	TN	1671	Heated Oxygen Sensor (HO2S) Low Signal – Bank 2 Sensor 2	I	-
11	0.5	BN	5360	Brake Apply Sensor Low Reference	I	-
12	-	-	-	Not Occupied	-	-
13	0.5	YE	5991	Powertrain Relay Control	I	-
14	-	-	-	Not Occupied	-	-

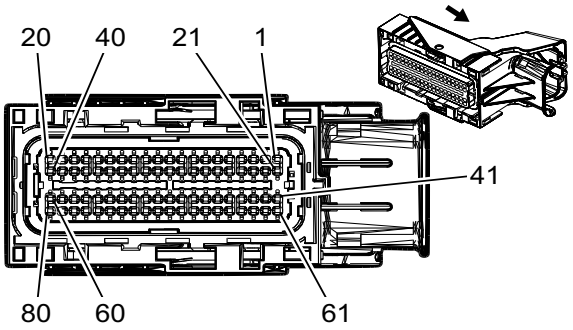
K20 Engine Control Module X1 (LU3) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
15	0.8	GY/WH	3122	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 1 Sensor 2	I	-
16	0.8	OG/WH	3223	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 2 Sensor 2	I	-
17	0.8	PU/WH	1668	Heated Oxygen Sensor (HO2S) High Signal – Bank 1 Sensor 2	I	-
18	0.35	L-BU	1162	Accelerator Pedal Position (APP) Sensor 2 Signal	I	-
19	0.5	PK	439	Ignition Voltage	I	-
20	0.5	RD/WH	440	Battery Positive Voltage	I	-
21	0.35	PU	1272	Low Reference	I	-
22–23	-	-	-	Not Occupied	-	-
24	0.5	TN/BK	6049	Low Reference	I	-
25	0.35	OG/BK	380	A/C Refrigerant Pressure Sensor Signal	I	C60
26	-	-	-	Not Occupied	-	-
27	0.35	BN/WH	419	MIL Control	I	-
28–29	-	-	-	Not Occupied	-	-
30	0.35	D-GN/WH	459	A/C Compressor Clutch Relay Control	I	C60
31	-	-	-	Not Occupied	-	-
32	0.35	YE/BK	625	Starter Enable Relay Control	I	-
33–34	-	-	-	Not Occupied	-	-
35	0.8	TN	2760	Low Reference	I	-
36	-	-	-	Not Occupied	-	-
37	0.5	YE	492	Mass Air Flow (MAF) Sensor Signal	I	-
38	-	-	-	Not Occupied	-	-
39	0.5	PU	1589	Fuel Level Sensor Signal – Primary	I	-
40	-	-	-	Not Occupied	-	-
41	0.35	BN	1271	Low Reference	I	-
42	0.5	D-GN	890	Fuel Tank Pressure Sensor Signal	I	-
43	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	I	-
44	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	I	-
45	0.5	WH	5359	Brake Apply Sensor Supply Voltage	I	-
46	-	-	-	Not Occupied	-	-
47	0.35	WH/BK	1164	5-Volt Reference 2	I	-
48–49	-	-	-	Not Occupied	-	-
50	0.35	YE/BK	1827	Vehicle Speed Signal	I	-
51–53	-	-	-	Not Occupied	-	-
54	0.5	OG/BK	6399	Replicated TOS Signal	I	-
55	0.5	L-BU/WH	6311	Torque Converter Clutch (TCC) Brake Signal	I	-
56	-	-	-	Not Occupied	-	-
57	0.35	OG/BK	1786	Park/Neutral Signal	I	-
58	0.5	TN	472	Intake Air Temperature (IAT) Sensor Signal	I	-
59–60	-	-	-	Not Occupied	-	-
61	0.5	YE	5361	Brake Apply Sensor Signal	-	-
62–64	-	-	-	Not Occupied	-	-
65	0.35	GY	2700	5-Volt Reference 1	I	C60
66	0.5	GY	2709	5-Volt Reference 1	I	-

K20 Engine Control Module X1 (LU3) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
67	0.35	TN	1274	5-Volt Reference 1	I	-
68–69	-	-	-	Not Occupied	-	-
70	0.5	WH	1310	Evaporative Emission (EVAP) Canister Vent Solenoid Control	I	-
71–72	-	-	-	Not Occupied	-	-
73	0.5	PK	1339	Ignition Voltage	-	-

K20 Engine Control Module X2 (LC8, LMF, L20 or L96)



1830236

Connector Part Information

Harness Type: Engine
OEM Connector: 13536319
Service Connector: 19115670
Description: 80-Way F MX123 34566 Series (GY)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575575	J-35616-64B (L-BU)	J-38125-213	33467-0005	23	Pins: 2, 12-13, 16, 21-22, 26-27, 29-30, 34, 41, 43-44, 50, 52-53, 56-60, 64, 66, 68-79 – K	K
II	13575811	J-35616-64B (L-BU)	J-38125-213	33467-0003	23	H	H

K20 Engine Control Module X2 (LC8, LMF, L20 or L96)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.35	PU/WH	6270	5-Volt Reference 2	I	-
3	0.35	GY	2701	5-Volt Reference 2	II	-
4	-	-	-	Not Occupied	-	-
5	0.5	BN	582	Throttle Actuator Control Motor Control – 2	I	-
6	0.5	YE	581	Throttle Actuator Control Motor Control – 1	I	-
7	-	-	-	Not Occupied	-	-
8	0.5	D-GN/WH	428	Evaporative Emission (EVAP) Canister Purge Solenoid Control	I	-
9–11	-	-	-	Not Occupied	-	-
12	0.8	GY/WH	3113	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 1 Sensor 1	I	-
13	0.8	L-GN	3212	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 2 Sensor 1	I	-
14–15	-	-	-	Not Occupied	-	-

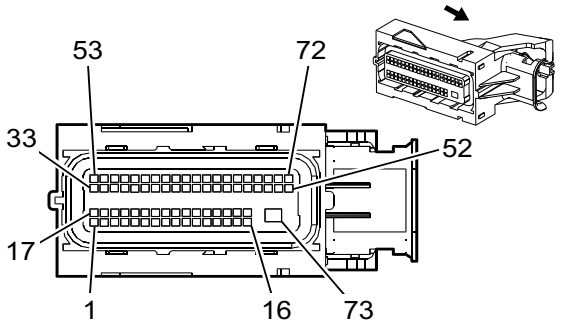
K20 Engine Control Module X2 (LC8, LMF, L20 or L96) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
16	0.8	PU	5284	Camshaft Phaser Intake Solenoid (1)	I	L96
17	0.5	D-BU/WH	878	Fuel Injector 8 Control	I	-
18	0.5	TN/WH	845	Fuel Injector 5 Control	I	-
19	0.5	YE/BK	846	Fuel Injector 6 Control	I	-
20	0.5	TN	1744	Fuel Injector 1 Control	I	-
21	0.5	YE	410	Engine Coolant Temperature (ECT) Sensor Signal	I	-
22	0.5	TN	2761	Low Reference	I	-
23–25	-	-	-	Not Occupied	-	-
26	0.8	D-BU	496	Knock Sensor (KS) 1 Signal	I	-
27	0.8	GY	1716	Knock Sensor (KS) 1 Signal	I	-
28	-	-	-	Not Occupied	-	-
29	0.8	L-BU	1876	Knock Sensor (KS) 2 Signal	I	-
30	0.8	GY	2303	Knock Sensor (KS) 2 Signal	I	-
31	-	-	-	Not Occupied	-	-
32	0.5	GY	23	Generator Field Duty Cycle Signal	I	-
33	-	-	-	Not Occupied	-	-
34	0.35	BK	2755	Low Reference	I	-
35	0.35	TN	2752	Low Reference	II	-
36	-	-	-	Not Occupied	-	-
37	0.5	L-GN/BK	1745	Fuel Injector 2 Control	I	-
38	0.5	PK/BK	1746	Fuel Injector 3 Control	I	-
39	0.5	L-BU/BK	844	Fuel Injector 4 Control	I	-
40	0.5	OG/BK	877	Fuel Injector 7 Control	I	-
41	0.35	GY	2705	5-Volt Reference 1	I	-
42	-	-	-	Not Occupied	-	-
43	0.35	GY	2704	5-Volt Reference 1	I	-
44	0.35	D-BU	6259	5-Volt Reference 1	I	-
45–49	-	-	-	Not Occupied	-	-
50	0.35	TN/WH	331	Oil Pressure Sensor Signal	I	-
51	-	-	-	Not Occupied	-	-
52	0.8	TN	2199	Low Reference	I	L96
53	0.35	OG/BK	469	Low Reference	I	-
54–55	-	-	-	Not Occupied	-	-
56	0.8	TN	1664	Heated Oxygen Sensor (HO2S) Low Signal – Bank 1 Sensor 1	I	-
57	0.8	PU/WH	1665	Heated Oxygen Sensor (HO2S) High Signal – Bank 1 Sensor 1	I	-
58	0.35	L-GN	432	Manifold Absolute Pressure (MAP) Sensor Signal	I	-
59	0.8	PU	1666	Heated Oxygen Sensor (HO2S) High Signal – Bank 2 Sensor 1	I	-
60	0.8	TN	1667	Heated Oxygen Sensor (HO2S) Low Signal – Bank 2 Sensor 1	I	-
61	0.5	OG	225	Generator Turn On Signal	I	-
62	-	-	-	Not Occupied	-	-
63	0.35	PU	486	Throttle Position (TP) Sensor 2 Signal	II	-
64	0.35	D-BU/WH	6265	Camshaft Position (CMP) Sensor Signal	I	-

K20 Engine Control Module X2 (LC8, LMF, L20 or L96) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
65	0.35	D-GN	485	Throttle Position (TP) Sensor 1 Signal	II	-
66	0.35	BN	6266	Low Reference	I	-
67	-	-	-	Not Occupied	-	-
68	0.35	WH/BK	6271	Crankshaft Position (CKP) Sensor Signal	I	-
69	0.35	GY/BK	6272	Low Reference	I	-
70	0.8	PU	2121	Ignition Coil 1 Control	I	-
71	0.8	PU/WH	2128	Ignition Coil 8 Control	I	-
72	0.8	OG	2127	Ignition Coil 7 Control	I	-
73	0.8	OG/WH	2122	Ignition Coil 2 Control	I	-
74	0.8	L-BU/WH	2126	Ignition Coil 6 Control	I	-
75	0.8	D-GN	2125	Ignition Coil 5 Control	I	-
76	0.8	D-GN/WH	2124	Ignition Coil 4 Control	I	-
77	0.8	L-BU	2123	Ignition Coil 3 Control	I	-
78	0.8	BN	2129	Low Reference	I	-
79	0.8	BN/WH	2130	Low Reference	I	-
80	-	-	-	Not Occupied	-	-

K20 Engine Control Module X2 (LGH)



1968294

Connector Part Information

Harness Type: Engine
OEM Connector: 12603596
Service Connector: 13574947
Description: 73-Way F MX123 34566 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575575	J-35616-64B (L-BU)	J-38125-213	33467-0005	23	Pins: 3, 5–10, 22, 25, 27, 41, 47, 66–67 – J	J
II	Pending	J-35616-35 (VT)	J-38125-11A	7116-4152-02	9	A	5

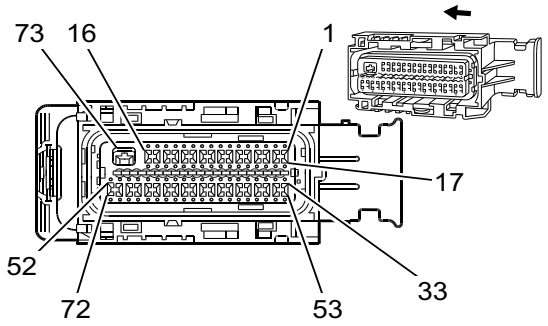
K20 Engine Control Module X2 (LGH)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1–2	-	-	-	Not Occupied	-	-
3	0.5	YE	2928	Fuel Metering Valve High Control	I	-
4	0.8	PU/WH	2530	Fuel Rail Pressure Solenoid Supply Voltage	I	-
5	0.5	BK	2929	Fuel Metering Valve Low Control	I	-
6	0.5	WH	5931	Variable Nozzle Turbo Solenoid Low Signal	I	-
7	0.5	TN	2752	Low Reference	I	-
8	0.5	TN	2753	Low Reference	I	-
9	0.5	BN	1174	Oil Level Switch Signal	I	-
10	0.5	BN	6782	Low Reference	I	-
11–12	-	-	-	Not Occupied	-	-
13	0.8	BN/WH	4901	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 1	I	-
14	0.8	TN/WH	4907	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 7	I	-
15	0.8	L-BU	4804	Direct Fuel Injector (DFI) High Voltage Control Cylinder 4	I	-
16	0.8	BN	4801	Direct Fuel Injector (DFI) High Voltage Control Cylinder 1	I	-

K20 Engine Control Module X2 (LGH) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
17	0.8	BK/WH	451	Ground	I	-
18	0.8	BK/WH	451	Ground	I	-
19	0.8	YE	2834	Low Reference	I	-
20	-	-	-	Not Occupied	-	-
21	0.8	BK/WH	451	Ground	I	-
22	0.5	D-BU	5930	Variable Nozzle Turbo Solenoid High Signal	I	-
23–24	-	-	-	Not Occupied	-	-
25	0.5	OG/BK	5929	Low Reference	I	-
26	-	-	-	Not Occupied	-	-
27	0.5	YE/BK	1827	Vehicle Speed Signal	I	-
28	-	-	-	Not Occupied	-	-
29	0.8	L-BU/WH	4904	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 4	I	-
30	0.8	PU/WH	4906	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 6	I	-
31	0.8	TN	4807	Direct Fuel Injector (DFI) High Voltage Control Cylinder 7	I	-
32	0.8	PU	4806	Direct Fuel Injector (DFI) High Voltage Control Cylinder 6	I	-
33–40	-	-	-	Not Occupied	-	-
41	0.5	BK	2755	Low Reference	I	-
42–46	-	-	-	Not Occupied	-	-
47	0.5	GY	2702	5 Volt Reference	I	-
48–65	-	-	-	Not Occupied	-	-
66	0.5	TN	5928	Variable Nozzle Turbo Position Sensor Voltage Reference	I	-
67	0.5	PU/WH	6270	5 Volt Reference	I	-
68–72	-	-	-	Not Occupied	-	-
73	3	BK/WH	451	Ground	II	-

K20 Engine Control Module X2 (LU3)



1673472

Connector Part Information

Harness Type: Engine
OEM Connector: 13580811
Service Connector: 88988372
Description: 73-Way F MX123 34566 Series (L-GY)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pins: 4–5, 6–13, 16, 20, 30–33, 35–39, 41, 43, 45–46, 48–51, 54, 58, 65–66, 68, 70–71 – 13575575	J-35616-64B (L-BU)	J-38125-213	Pins: 4–5, 6–13, 16, 20, 30–33, 35–39, 41, 43, 45–46, 48–51, 54, 58, 65–66, 68, 70–71 – 33467-0005	23	Pins: 4–5, 13, 20, 33, 35–39, 41, 45–46, 48–51, 54, 58, 65–66, 68, 70–71 – K	K
II	Pending	J-35616-35 (VT)	J-38125-11A	7116-4152-02	9	A	5

K20 Engine Control Module X2 (LU3)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1–3	-	-	-	Not Occupied	-	-
4	0.5	TN	2761	Low Reference	I	-
5	0.35	GY/BK	6272	Low Reference	I	-
6	0.5	TN	1744	Fuel Injector 1 Control	I	-
7	0.5	YE/BK	846	Fuel Injector 6 Control	I	-
8	0.5	TN/WH	845	Fuel Injector 5 Control	I	-
9	0.5	BN	2129	Low Reference	I	-
10	0.5	L-BU/BK	844	Fuel Injector 4 Control	I	-
11	0.5	PK/BK	1746	Fuel Injector 3 Control	I	-
12	0.5	L-GN/BK	1745	Fuel Injector 2 Control	I	-
13	0.5	GY	2704	5-Volt Reference 1	I	-
14–15	-	-	-	Not Occupied	-	-
16	0.5	YE	581	Throttle Actuator Control Motor Control – 1	I	-
17–19	-	-	-	Not Occupied	-	-

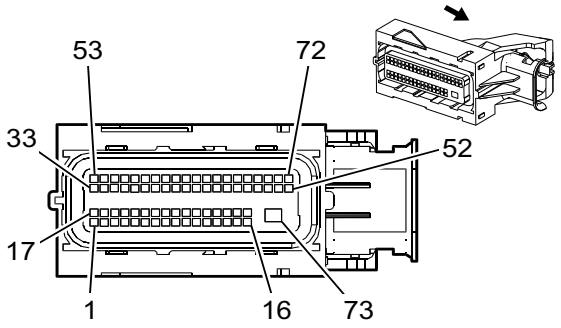
K20 Engine Control Module X2 (LU3) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
20	0.35	BN	6266	Low Reference	I	-
21	-	-	-	Not Occupied	-	-
22	0.5	PU	2121	Ignition Coil 1 Control	-	-
23	0.5	L-BU	2123	Ignition Coil 3 Control	-	-
24	0.5	OG/WH	2122	Ignition Coil 2 Control	-	-
25–29	-	-	-	Not Occupied	-	-
30	0.5	D-GN/WH	428	Evaporative Emission (EVAP) Canister Purge Solenoid Control	I	-
31	0.5	OG	225	Generator Turn On Signal	I	-
32	0.5	BN	582	Throttle Actuator Control Motor Control – 2	I	-
33	0.35	D-BU	6259	5-Volt Reference 1	I	-
34	-	-	-	Not Occupied	-	-
35	0.35	GY	2705	5-Volt Reference 1	I	-
36	0.35	TN/WH	331	Oil Pressure Sensor Signal	I	-
37	0.8	PU/WH	1665	Heated Oxygen Sensor (HO2S) High Signal – Bank 1 Sensor 1	I	-
38	0.8	PU	1666	Heated Oxygen Sensor (HO2S) High Signal – Bank 2 Sensor 1	I	-
39	0.5	L-GN	432	Manifold Absolute Pressure (MAP) Sensor Signal	I	-
40	0.35	TN	2752	Low Reference	I	-
41	0.35	BK	2755	Low Reference	I	-
42	-	-	-	Not Occupied	-	-
43	0.5	GY	23	Generator Field Duty Cycle Signal	I	-
44	-	-	-	Not Occupied	-	-
45	0.35	WH/BK	6271	Crankshaft Position (CKP) Sensor Signal	I	-
46	0.35	D-BU/WH	6265	Camshaft Position (CMP) Sensor Signal	I	-
47	-	-	-	Not Occupied	-	-
48	0.8	TN	1664	Heated Oxygen Sensor (HO2S) Low Signal – Bank 1 Sensor 1	I	-
49	0.5	OG/BK	469	Low Reference	I	-
50	0.5	GY	1716	Knock Sensor (KS) 1 Signal	I	-
51	0.5	D-BU	496	Knock Sensor (KS) 1 Signal	I	-
52	-	-	-	Not Occupied	-	-
53	0.35	GY	2701	5-Volt Reference 2	I	-
54	0.35	PU/WH	6270	5-Volt Reference 2	I	-
55–56	-	-	-	Not Occupied	-	-
57	0.35	D-GN	485	Throttle Position (TP) Sensor 1 Signal	I	-
58	0.5	YE	410	Engine Coolant Temperature (ECT) Sensor Signal	I	-
59	0.35	PU	486	Throttle Position (TP) Sensor 2 Signal	I	-
60–64	-	-	-	Not Occupied	-	-
65	0.8	GY/WH	3113	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 1 Sensor 1	I	-
66	0.8	L-GN	3212	Heated Oxygen Sensor (HO2S) Heater Low Control – Bank 2 Sensor 1	I	-
67	-	-	-	Not Occupied	-	-
68	0.8	TN	1667	Heated Oxygen Sensor (HO2S) Low Signal – Bank 2 Sensor 1	I	-

K20 Engine Control Module X2 (LU3) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
69	-	-	-	Not Occupied	-	-
70	0.5	GY	2303	Knock Sensor (KS) 2 Signal	I	-
71	0.5	L-BU	1876	Knock Sensor (KS) 2 Signal	I	-
72	-	-	-	Not Occupied	-	-
73	3	BK/WH	1551	Ground	-	-

K20 Engine Control Module X3 (LGH)



1968294

Connector Part Information

Harness Type: Engine Chassis
OEM Connector: 12603597
Service Connector: 13574948
Description: 73-Way F MX123 34566 Series (GY)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575575	J-35616-64B (L-BU)	J-38125-213	33467-0005	23	Pins: 2, 4, 6–7, 9–14, 15–21, 24, 27–32, 36–38, 40, 44, 46, 48, 54–55, 60–61, 65–68 – J	J
II	Pending	J-35616-35 (VT)	J-38125-11A	7116-4152-02	9	A	5

K20 Engine Control Module X3 (LGH)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.5	BU/YE	6861	Water In Fuel Sensor Signal	I	-
3	-	-	-	Not Occupied	-	-
4	0.5	TN/WH	331	Oil Pressure Sensor Signal	I	-
5	0.5	YE	5361	Brake Apply Sensor Signal	-	-
6	0.5	PU/WH	7584	Exhaust Gas Recirculation Temperature Sensor 1 Supply Voltage	I	-
7	0.5	D-BU	7583	Exhaust Gas Recirculation Temperature Sensor 2 Supply Voltage	I	-
8	-	-	-	Not Occupied	-	-
9	0.5	BN/WH	5763	Exhaust Gas Recirculation Valve Sensor Signal	I	-
10	0.5	YE	5947	Variable Nozzle Turbo Position Sensor Signal	I	-
11	0.5	YE	1578	Fuel Temperature Signal	I	-
12	0.5	BN	3681	Charge Air Cooler Outlet Temperature Sensor Signal	I	-

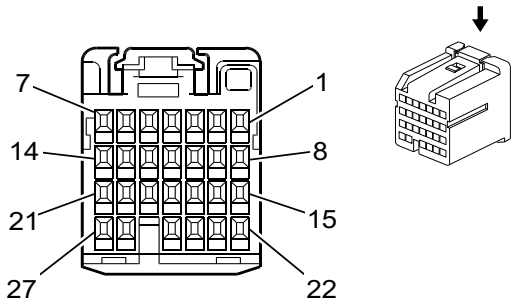
K20 Engine Control Module X3 (LGH) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
13	0.5	TN	3680	Charge Air Cooler Outlet Temperature Sensor Return	I	-
14	0.5	TN	2917	5 Volt Reference	I	-
15	0.5	WH	5359	Brake Apply Sensor Supply Voltage	I	-
16	0.5	GY	2704	5 Volt Reference	I	-
17	0.5	D-BU	6863	Low Reference	I	-
18	0.5	D-BU	5277	Exhaust Gas Temperature Sensor 1 Signal	I	-
19	0.5	D-GN	485	Throttle Position Sensor Signal 1	I	-
20	0.5	YE	2918	Fuel Rail Pressure Sensor Signal	I	-
21	0.5	L-GN	432	Manifold Absolute Pressure Sensor Signal	I	-
22–23	-	-	-	Not Occupied	-	-
24	0.5	YE	410	Engine Coolant Temperature Sensor Signal	I	-
25–26	-	-	-	Not Occupied	-	-
27	0.5	BN/GY	7072	Sensor Fuel Temperature 1 Signal	I	-
28	0.5	D-GN	3683	Charge Air Cooler Inlet Temperature Sensor Signal	I	-
29	0.5	TN/BK	3682	Charge Air Cooler Inlet Temperature Sensor Return	I	-
30	0.5	GY	2705	5 Volt Reference	I	-
31	0.5	D-BU	6259	5 Volt Reference	I	-
32	0.5	GY	2701	5 Volt Reference	I	-
33–35	-	-	-	Not Occupied	-	-
36	0.5	OG/BK	2919	Low Reference	I	-
37	0.5	OG/BK	469	Low Reference	I	-
38	0.5	BN	5360	Brake Apply Sensor Low Reference	I	-
39	-	-	-	Not Occupied	-	-
40	0.5	TN	2761	Low Reference	I	-
41–43	-	-	-	Not Occupied	-	-
44	0.5	GY/BK	5765	Fuel Filter Pressure Switch Signal	I	-
45	-	-	-	Not Occupied	-	-
46	0.5	BN/WH	7073	Sensor Fuel Temperature 1 Return	I	-
47	-	-	-	Not Occupied	-	-
48	0.5	BN	6062	Low Reference	I	-
49	0.8	GY/WH	4908	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 8	I	-
50	0.8	D-BU/WH	4902	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 2	I	-
51	0.8	D-BU	4802	Direct Fuel Injector (DFI) High Voltage Control Cylinder 2	I	-
52	0.8	L-BU	4805	Direct Fuel Injector (DFI) High Voltage Control Cylinder 5	I	-
53	-	-	-	Not Occupied	-	-
54	0.5	L-GN/BK	5746	Exhaust Gas Recirculation Valve Motor Low Signal	I	-
55	0.5	OG/BK	5764	Exhaust Gas Recirculation Valve Motor High Signal	I	-
56	0.8	BN	582	Throttle Actuator Control Close	I	-
57	0.8	YE	581	Throttle Actuator Control Open	I	-
58–59	-	-	-	Not Occupied	-	-
60	0.5	GY/BK	6272	Low Reference	I	-
61	0.5	WH/BK	6271	CKP Sensor Signal	I	-

K20 Engine Control Module X3 (LGH) (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
62–64	-	-	-	Not Occupied	-	-
65	0.5	D-BU/WH	6265	CMP Sensor Signal	I	-
66	0.5	BN	6266	Low Reference	I	-
67	0.5	BN	6274	Low Reference	I	-
68	0.5	WH	6275	Low Reference	I	-
69	0.8	D-GN/WH	4903	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 3	I	-
70	0.8	L-GN/WH	4905	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 5	I	-
71	0.8	D-GN	4803	Direct Fuel Injector (DFI) High Voltage Control Cylinder 3	I	-
72	0.8	GY	4808	Direct Fuel Injector (DFI) High Voltage Control Cylinder 8	I	-
73	3	BK/WH	451	Ground	-	-

K9 Body Control Module X1



1664495

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15482789
Service Connector: 88988838
Description: 27-Way F HIT Series (L-GN)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

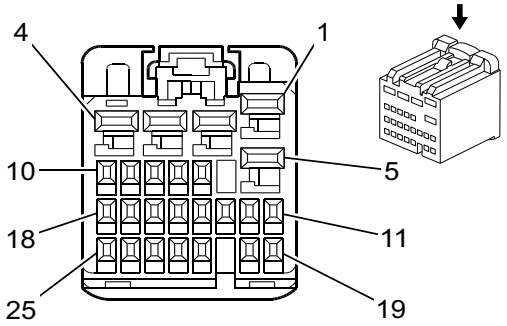
K9 Body Control Module X1

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.35	PK	1020	Ignition Voltage	I	-
3	0.35	GY	1884	Cruise Control Switch Signal	I	-
4	0.35	WH	530	Ignition Voltage	I	-
5	0.35	L-GN	1715	Windshield Wiper Switch High Signal	I	-
6	0.35	L-GN	6818	Steering Wheel Control Signal	I	-
7	-	-	-	Not Occupied	-	-
8	0.35	TN/BK	6009	Low Reference	I	-
9	0.35	L-BU	1714	Windshield Wiper Switch Low Signal	I	-
10–13	-	-	-	Not Occupied	-	-
14	0.35	PK	3	Ignition Voltage	I	-
15	0.35	D-GN	663	Hazard Switch Left Turn Signal	I	-
16	0.35	TN	664	Hazard Switch Turn Right Signal	I	-
17	0.35	PK	1444	12-Volt Reference	I	-
18	0.35	YE	525	Headlamp Dimmer Switch Low Beam Signal	I	-
19	0.35	WH	111	Theft Deterrent Alarm Enable Signal	I	-
20	0.35	PU	5526	Tap Up/Tap Down Switch Signal	I	-
21	0.35	BN	4	Ignition Voltage	I	-
22	-	-	-	Not Occupied	-	-
23	0.35	L-BU	1788	Tow/Haul Switch Signal	I	-

K9 Body Control Module X1 (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
24	0.35	PK	94	Windshield Washer Switch Signal	I	-
25	0.35	YE	307	Headlamp Switch Flash to Pass Signal	I	-
26	0.5	TN/WH	816	A/T Shift Lock Solenoid Control	I	-
27	-	-	-	Not Occupied	-	-

K9 Body Control Module X2



1664496

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15482790
Service Connector: 88988839
Description: 25-Way F HIT Series (NA)

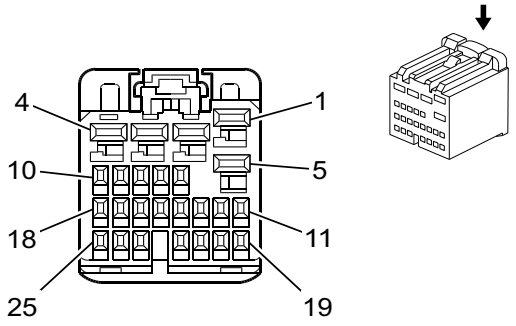
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13327199	J-35616-35 (VT)	J-38125-12A	SNAC-A061T-M2.8	20	E	A
II	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

K9 Body Control Module X2

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.8	OG	1732	Courtesy Lamp Control	I	-
2	0.5	RD/WH	2540	Battery Positive Voltage	I	-
3	0.5	BN/WH	230	Instrument Panel Lamps Dimming Control	I	-
4	-	-	-	Not Occupied	-	-
5	0.5 0.8	GY/BK D-BU/WH	690 149	Courtesy Lamp Control Courtesy Lamp Control	I	YF7 without YF7
6–7	-	-	-	Not Occupied	-	-
8	0.35	L-BU	13	Headlamp Switch Park Lamps Signal	II	-
9–10	-	-	-	Not Occupied	-	-
11	0.35	WH	278	Ambient Light Sensor Signal	II	-
12	0.35	WH	103	Headlamp Switch Headlamps On Signal	II	-
13–16	-	-	-	Not Occupied	-	-
17	0.35	D-GN	306	Headlamp Switch Headlamps Off Signal	II	-
18	0.35	D-BU/WH	149	Courtesy Lamp Control	II	-
19–20	-	-	-	Not Occupied	-	-
21	0.5	D-BU	6727	Traction Control Preference Switch Signal	II	JL4
22	0.35	D-BU	38	Backup Lamp Relay Control	II	-
23–24	-	-	-	Not Occupied	-	-
25	0.35	PU	328	Interior Lamp Defeat Switch Signal	II	-

K9 Body Control Module X3



1664498

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15482791
Service Connector: 88988840
Description: 25-Way F HIT Series (L-BU)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575871	J-35616-35 (VT)	J-38125-12A	SNAC-A061T-M2.8	20	E	A
II	13327195	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

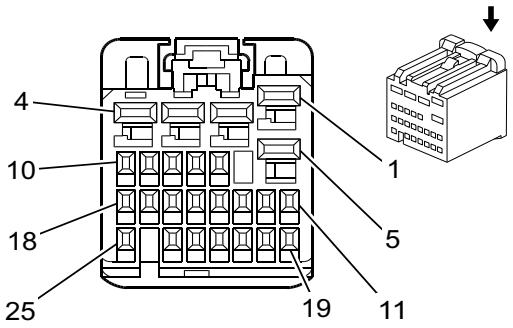
K9 Body Control Module X3

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.8	BK/WH	351	Ground	I	-
2	0.8	RD/WH	2140	Battery Positive Voltage	I	-
3	0.5	RD/WH	3840	Battery Positive Voltage	I	-
4	-	-	-	Not Occupied	-	-
5	0.8	BK/WH	351	Ground	I	-
6–7	-	-	-	Not Occupied	-	-
8	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
9	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	II	-
10	0.35	D-GN	5060	Low Speed GMLAN Serial Data	II	-
11	0.35	D-GN	44	Instrument Panel Lamps Dimmer Switch Signal	II	-
12	0.35	OG/WH	812	IP Dimming Voltage Reference	II	-
13	0.5	TN	5380	Brake Position Sensor Signal	II	-
14	0.5	BN	5382	Brake Position Sensor Low Reference	II	-
15	0.5	GY	5381	Brake Position Sensor 5 Volt Reference	II	-
16	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	II	-
17	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	II	-
18	0.35	YE	6817	LED Backlight Dimming Control	II	-
19	0.5	L-BU	5986	Serial Data Communication Enable	II	-

K9 Body Control Module X3 (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
20–21	-	-	-	Not Occupied	-	-
22	0.35	D-GN/WH	7158	Cruise Control Indicator Dimming Signal	II	-
23–25	-	-	-	Not Occupied	-	-

K9 Body Control Module X4



1664499

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15482792
Service Connector: 88988841
Description: 25-Way F HIT Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13327199	J-35616-35 (VT)	J-38125-12A	SNAC-A061T-M2.8	20	E	A
II	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

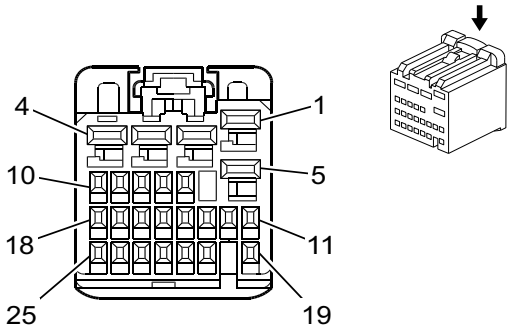
K9 Body Control Module X4

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.8	RD/WH	2740	Battery Positive Voltage	I	-
2	0.8	RD/WH	3040	Battery Positive Voltage	I	-
3	0.8	RD/WH	2940	Battery Positive Voltage	I	-
4	0.8	RD/WH	2240	Battery Positive Voltage	I	-
5	0.8	D-BU/WH	1315	Right Front Turn Signal Lamp Control	I	-
6	0.35	D-GN	6134	Local Interconnect Network 3	II	-
7	0.35	YE	196	Windshield Wiper Motor Park Switch Signal	II	-
8	-	-	-	Not Occupied	-	-
9	0.5	BK/WH	451	Ground	II	LU3 or LMF
10	0.5	RD/WH	2840	Battery Positive Voltage	II	LU3 or LMF
11	0.5	L-GN	1391	Ignition Voltage	II	PRP
12	0.35	YE	5187	Right Trailer Turn Signal Lamp	II	UY7
13	0.35	OG	5186	Left Trailer Turn Signal Lamp	II	UY7
14	-	-	-	Not Occupied	-	-
15	0.35	OG	2268	Windshield Washer Relay Control	II	-
16	0.35	TN/WH	1969	Headlamp High Beam Relay Control	II	-
17–18	-	-	-	Not Occupied	-	-
19	0.5	D-BU	5985	Accessory Wakeup Serial Data	II	-

K9 Body Control Module X4 (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
20	0.5	L-BU	1344	Trunk Release Control	II	PRP
21	0.35	YE	5199	Run/Crank Relay Coil Control	II	-
22	-	-	-	Not Occupied	-	-
23	0.35	PU	544	Headlamp Low Beam Control	II	-
24	0.5	L-BU	244	Front Passenger Door Lock Switch Lock Control	II	PRP
25	-	-	-	Not Occupied	-	-

K9 Body Control Module X5



1664500

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15480179
Service Connector: 88988837
Description: 25-Way F HIT Series (BN)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J
II	13327199	J-35616-35 (VT)	J-38125-12A	SNAC-A061T-M2.8	20	Pins: 1-2 – C	A

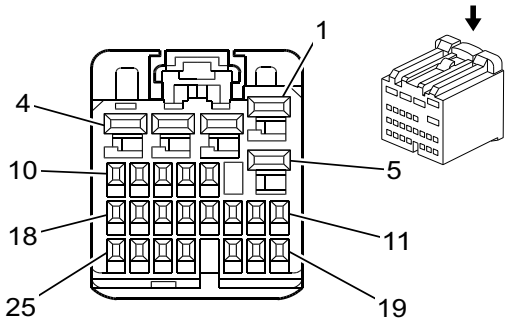
K9 Body Control Module X5

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	1	YE	618	Left Rear Turn Signal Lamp Control	II	-
2	1	D-GN	619	Right Rear Turn Signal Lamp Control	II	-
3	-	-	-	Not Occupied	-	-
4	0.8	L-BU/WH	1314	Left Front Turn Signal Lamp Control	II	-
5	0.5	WH	5065	Stop Lamps Control	II	-
6	0.35	L-BU/WH	6311	Torque Converter Clutch (TCC) Brake Signal	I	-
7	-	-	-	Not Occupied	-	-
8	0.5	PK	5076	5-Volt Reference	I	LU3 or LMF
9	0.5	WH	5075	Current Sensor Signal	I	LU3 or LMF
10	0.5	BN	5077	Low Reference	I	LU3 or LMF
11	0.35	YE	43	Ignition Voltage	I	-
12	-	-	-	Not Occupied	-	-
13	0.35	OG	300	Ignition Voltage	I	-
14–15	-	-	-	Not Occupied	-	-
16	0.35	L-BU	1134	Park Brake Switch Signal	I	-
17	-	-	-	Not Occupied	-	-
18	0.35	TN	28	Horn Relay Control	I	-
19	-	-	-	Not Occupied	-	-

K9 Body Control Module X5 (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
20	0.35	GY	91	Windshield Wiper Switch Signal 2	I	-
21	0.35	TN	860	Front Windshield Wiper Switch High Signal	I	-
22	-	-	-	Not Occupied	-	-
23	0.35	PK/WH	1970	Headlamp Low Beam Relay Control	I	-
24	0.35	D-BU	45	Park Lamp Control	I	-
25	-	-	-	Not Occupied	-	-

K9 Body Control Module X6



1664502

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15482793
Service Connector: 88988842
Description: 25-Way F HIT Series (PK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13327199	J-35616-35 (VT)	J-38125-12A	SNAC-A061T-M2.8	20	E	A
II	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

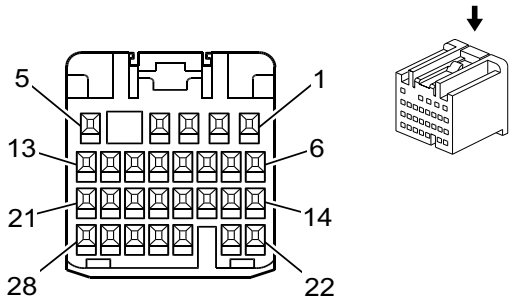
K9 Body Control Module X6

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.8	L-BU	1320	CHMSL Control	-	Passenger or Cargo
3–7	-	-	-	Not Occupied	-	-
8	0.35	TN/WH	746	Right Front Door Ajar Switch Signal	II	-
9	0.35	D-BU	245	Passenger Door Lock Switch Unlock Control	II	AU3
10	0.35	GY/BK	745	Left Front Door Ajar Switch Signal	II	-
11	-	-	-	Not Occupied	-	-
12	0.35	PK/BK	1303	Liftgate Ajar Switch Signal	II	Passenger or Cargo
13	-	-	-	Not Occupied	-	-
14	0.35	YE/BK	1181	Right Rear Door Open Switch Signal	II	Passenger or Cargo
15	0.35	D-BU/WH	1179	Left Rear Door Open Switch Signal	II	E26
16	0.35	L-GN	1177	Right Front Door Open Switch Signal	II	-
17	-	-	-	Not Occupied	-	-
18	0.35	L-BU	244	Passenger Door Lock Switch Lock Control	II	AU3
19–21	-	-	-	Not Occupied	-	-
22	0.35	L-GN	5926	Rear Access Open Switch Signal	II	Passenger or Cargo

K9 Body Control Module X6 (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
23–25	-	-	-	Not Occupied	-	-

K9 Body Control Module X7



1664505

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15466053
Service Connector: 88988806
Description: 28-Way F HIT Series (GY)

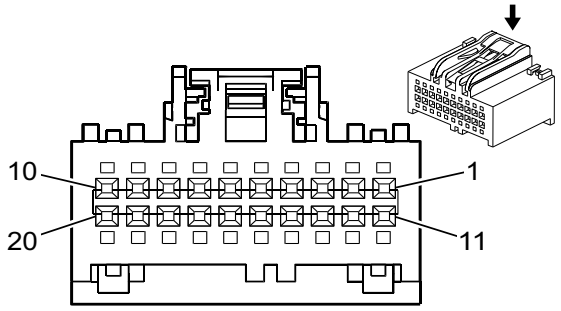
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575870	J-35616-64B (L-BU)	J-38125-12A	SNAC3-A021T-M0.64	20	J	J

K9 Body Control Module X7

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.5	YE	356	Driver Door Lock Relay Unlock Control	I	Passenger or Cargo with AU3
3–5	-	-	-	Not Occupied	-	-
6	0.5	YE	356	Driver Door Lock Relay Unlock Control	I	AU3
7	0.5	L-BU	244	Passenger Door Lock Switch Lock Control	I	AU3
8	-	-	-	Not Occupied	-	-
9	0.5	L-BU	244	Passenger Door Lock Switch Lock Control	I	AU3 without PRP
10	-	-	-	Not Occupied	-	-
11	0.5	OG/BK	781	Driver Door Lock Switch Unlock Signal	I	AU3
12	0.5	PK/BK	780	Driver Door Lock Switch Lock Signal	I	AU3
13–22	-	-	-	Not Occupied	-	-
23	0.5	TN	126	Left Front Door Open Switch Signal	I	-
24	0.5	L-GN	66	A/C Request Signal	I	C60
25–28	-	-	-	Not Occupied	-	-

P16 Instrument Cluster



1715223

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15489824
Service Connector: 15126711
Description: 20-Way F 64 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575845	J-35616-64B (L-BU)	J-38125-215A	SAIT-A03T-M064	14	P	P

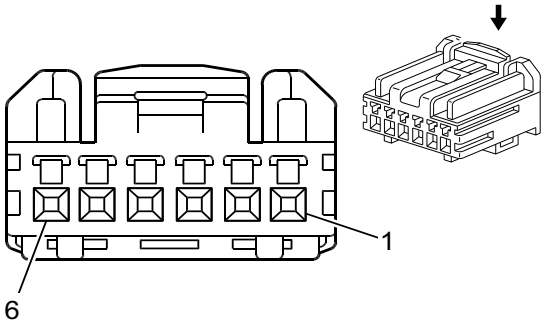
P16 Instrument Cluster

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.35	D-GN	5060	Low Speed GMLAN Serial Data	I	-
2	-	-	-	Not Occupied	-	-
3	0.5	L-GN	1478	Coolant Level Switch Signal	I	LMM or LGH
4	0.35	BN/WH	419	MIL Control	I	-
5	0.35	PU	5234	Passenger Seat Belt Indicator	I	Light Duty without YF7
6	-	-	-	Not Occupied	-	-
7	0.35	BK/WH	351	Ground	I	-
8	-	-	-	Not Occupied	-	-
9	0.35	D-BU	507	Wait to Start Indicator Control	I	LMM or LGH
10	0.5	D-GN/WH	636	Ambient Air Temperature Sensor Signal	I	UFA
11	0.5	YE	61	Low Reference	I	UFA
12	0.35	D-BU	2307	Passenger Air Bag On Indicator Control	I	Light Duty without YF7
13	0.35	D-GN	2308	Passenger Air Bag Off Indicator Control	I	Light Duty without YF7
14	0.5	TN/WH	33	Brake Warning Indicator Control	I	-
15	0.5	PU	333	Brake Fluid Level Sensor Signal	I	-
16	0.35	PK	893	Driver Information Center (DIC) Select Menu Switch Signal	I	-
17	0.35	D-GN/WH	1358	Driver Information Center (DIC) Switch Signal	I	-

P16 Instrument Cluster (cont'd)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
18	0.35	BN	897	Low Reference	I	-
19	0.35	PK	1639	Ignition Voltage	I	-
20	0.35	RD/WH	2840	Battery Positive Voltage	I	-

S39 Ignition Switch



1664548

Connector Part Information

Harness Type: Steering Column
OEM Connector: 15484551
Service Connector: 19153174
Description: 6-Way F HCM Series (BK)

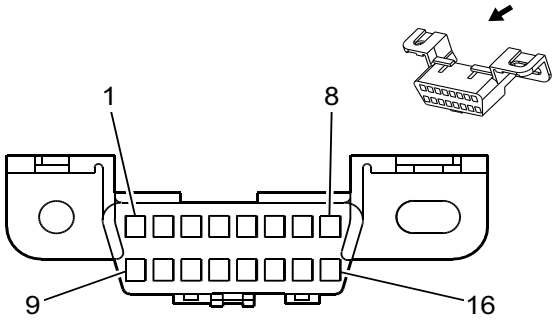
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-64B (L-BU)	J-38125-12A	SHCM-A03T-P025	20	J	J

S39 Ignition Switch

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	-	-	-	Not Occupied	-	-
2	0.35	PK	3	Ignition Voltage	I	-
3	0.35	BN	4	Ignition Voltage	I	-
4	0.35	RD/WH	540	Battery Positive Voltage	I	-
5	0.35	PK	1020	Ignition Voltage	I	-
6	0.35	WH	530	Ignition Voltage	I	-

X84 Data Link Connector



68793

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 12110250
Service Connector: 12110250
Description: 16-Way F Metri-Pack 150 Series (BK)

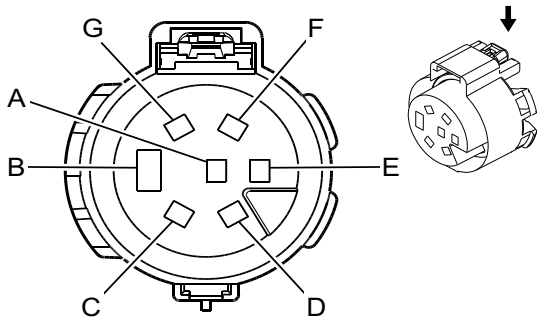
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575725	J-35616-14 (GN)	J-38125-12A	12129484	19	Pins: 1, 4-6, 14 – E	C

X84 Data Link Connector

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
1	0.35	D-GN	5060	Low Speed GMLAN Serial Data	I	-
2–3	-	-	-	Not Occupied	-	-
4	0.5	BK/WH	351	Ground	I	-
5	0.5	BK/WH	351	Ground	I	-
6	0.5	TN/BK	2500	High Speed GMLAN Serial Data Bus (+)	I	-
7–13	-	-	-	Not Occupied	-	-
14	0.5	TN	2501	High Speed GMLAN Serial Data Bus (−)	I	-
15	-	-	-	Not Occupied	-	-
16	0.8	RD/WH	640	Battery Positive Voltage	I	-

X88 Trailer Connector (UY7)



525095

Connector Part Information

Harness Type: Chassis
OEM Connector: 15354653
Service Connector: 15306164
Description: 7-Way F Metri-Pack 280, Sealed (BK)

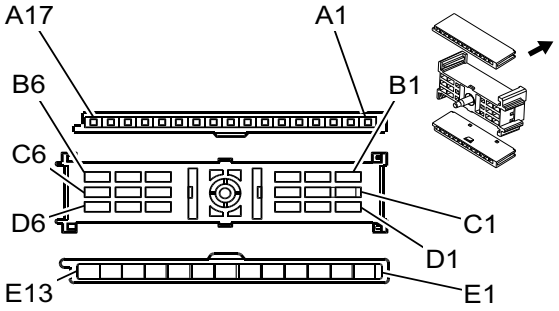
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Pending	J-35616-4A (PU)	J-38125-553	12110845	4	Pins: A, D, F, G– Not Available	Pins: A, D, F, G– Not Available
II	Service by Connector Assembly - 15354653	Not Available	Not Available	Not Available	Not Available	Not Avail-able	Not Avail-able

X88 Trailer Connector (UY7)

Pin	Size	Color	Circuit	Function	Terminal Type ID	Option
A	1	L-GN	1624	Trailer Backup Lamps Control	I	-
B	8	WH	22	Ground	-	-
C	3	D-BU	47	Trailer Auxiliary Control	I	-
D	1	D-GN	1619	Trailer Right Rear Turn/Stop Lamp Control	I	-
E	3	RD/BK	742	Battery Positive Voltage	I	-
F	1	BN	2109	Trailer Park Lamps Control	I	-
G	1	YE	1618	Trailer Left Rear Turn/Stop Lamp Control	I	-

X200 Steering Column Harness to Instrument Panel Harness



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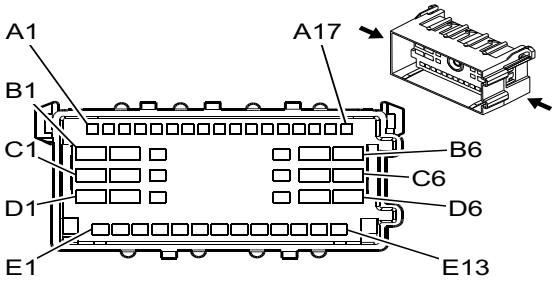


510556

Connector Part Information

Harness Type: Steering Column
OEM Connector: 12047842
Service Connector: 12047842
Description: 17-Way F Metri-Pack 280 Series (BK)
OEM Connector: 15492581
Service Connector: Service by Harness - See Part Catalog
Description: 18-Way F Metri-Pack 280 630 Series Unsealed (BK)
OEM Connector: 12047840
Service Connector: 12047840
Description: 13-Way F Metri-Pack 280 Series (BK)

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 15492579
Service Connector: Service by Harness - See Part Catalog
Description: 48-Way M Metri-Pack 150 280 630 Series (BK)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575464	J-35616-14 (GN)	J-38125-12A	15326030	5	E	C
II	Pending	J-35616-42 (RD)	J-38125-11A	12015869	3	E	A
III	Pending	J-35616-4A (PU)	J-38125-11A	12034046	2	E	A
IV	13575462	J-35616-3 (GY)	J-38125-12A	12047581	2	E	C
V	13575463	J-35616-3 (GY)	J-38125-12A	12047581	2	E	C
VI	Service by Harness – See Part Catalog	J-35616-43 (RD)	J-38125-11A	12020126	2	E	A

X200 Steering Column Harness to Instrument Panel Harness

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
A1	0.35	TN	28	I I	-	Horn Relay Control	A1	0.35	TN	28	IV IV	-
A2	-	-	-	-	-	Not Occupied	A2	-	-	-	-	-
A3	0.35	PK	1444	I I	K34	12-Volt Reference	A3	0.35	PK	1444	IV IV	K34

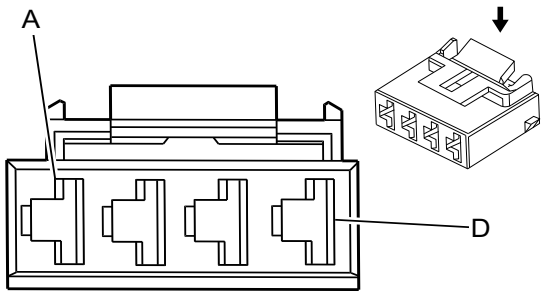
X200 Steering Column Harness to Instrument Panel Harness (cont'd)

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
A4–A5	-	-	-	-	-	Not Occupied	A4–A5	-	-	-	-	-
A6	0.35	PK	2239	I I	-	Ignition Voltage	A6	0.35	PK	2239	IV IV	-
A7–A8	-	-	-	-	-	Not Occupied	A7–A8	-	-	-	-	-
A9	0.35	PK	3	I I	-	Ignition Voltage	A9	0.35	PK	3	IV IV	-
A10	-	-	-	-	-	Not Occupied	A10	-	-	-	-	-
A11	0.35	L-GN	6818	I	W1Y	Steering Wheel Control Signal	A11	0.35	L-GN	6818	IV	W1Y
A12	0.35	YE	6046	I	JL4	Steering Angle Sensor Phase A	A12	0.5	YE	6046	IV	JL4
A13	0.35	D-GN/WH	7158	I	K34	Cruise Control Indicator Dimming Signal	A13	0.35	D-GN/WH	7158	IV	K34
A14	0.35	D-BU	6047	I	JL4	Steering Angle Sensor Phase B	A14	0.5	D-BU	6047	IV	JL4
A15	0.35	BN	6136	I	K34/W1Y	Supply Voltage	A15	0.35	BN	6136	IV	K34/W1Y
A16	0.35	TN	6048	I	JL4	Steering Angle Sensor Phase C	A16	0.5	TN	6048	IV	JL4
A17	0.35	GY	1884	I	K34	Cruise Control Switch Signal	A17	0.35	GY	1884	IV	K34
B1	0.35	RD/WH	540	II	-	Battery Positive Voltage	B1	0.35	RD/WH	540	VI	-
B2	-	-	-	-	-	Not Occupied	B2	-	-	-	-	-
B3	0.35	WH	111	III	-	Theft Deterrent Alarm Enable Signal	B3	0.35	WH	111	V	-
B4–B5	-	-	-	-	-	Not Occupied	B4–B5	-	-	-	-	-
B6	0.35	PK	1020	II	-	Ignition Voltage	B6	0.35	PK	1020	VI	-
C1	0.35	WH	530	II	-	Ignition Voltage	C1	0.35	WH	530	VI	-
C2	-	-	-	-	-	Not Occupied	C2	-	-	-	-	-
C3	0.35	YE	307	III	-	Headlamp Switch Flash to Pass Signal	C3	0.35	YE	307	V	-
C4–C5	-	-	-	-	-	Not Occupied	C4–C5	-	-	-	-	-
C6	0.35	BN	4	II	-	Ignition Voltage	C6	0.35	BN	4	VI	-
D1	0.35	TN/BK	6009	II II III	-	Low Reference	D1	0.35	TN/BK	6009	VI	-
D2	-	-	-	-	-	Not Occupied	D2	-	-	-	-	-
D3	0.35	YE	525	II III	-	Headlamp Dimmer Switch Low Beam Signal	D3	0.35	YE	525	V	-
D4	0.5	TN/WH	816	II III	-	A/T Shift Lock Solenoid Control	D4	0.5	TN/WH	816	V	-
D5	0.35	L-GN	6043	II III	JL4	Steering Angle Sensor Signal	D5	0.5	L-GN	6043	VI	JL4
D6	0.35	PK	94	II III	-	Windshield Washer Switch Signal	D6	0.35	PK	94	VI	-

X200 Steering Column Harness to Instrument Panel Harness (cont'd)

Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on	Function	Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on
E1	0.5	BK	350	III III III	-	Ground	E1	0.5	BK	350	V V	-
E2	-	-	-	-	-	Not Occupied	E2	-	-	-	-	-
E3	0.5	BK/WH	351	III III	-	Ground	E3	0.5	BK/WH	351	V V	-
E4	0.35	OG/BK	6045	III III	JL4	Low Reference	E4	0.5	OG/BK	6045	V V	JL4
E5–E7	-	-	-	-	-	Not Occupied	E5–E7	-	-	-	-	-
E8	0.35	D-GN	663	III III	-	Hazard Switch Left Turn Signal	E8	0.35	D-GN	663	V V	-
E9	0.35	TN	664	III III	-	Hazard Switch Turn Right Signal	E9	0.35	TN	664	V V	-
E10	0.35	GY	6044	III III	JL4	5-Volt Reference	E10	0.5	GY	6044	V	JL4
E11	0.35	L-BU	1714	III III	-	Windshield Wiper Switch Low Signal	E11	0.35	L-BU	1714	V	-
E12	0.35	L-GN	1715	III III	-	Windshield Wiper Switch High Signal	E12	0.35	L-GN	1715	V	-
E13	0.35	D-GN	5060	III III	-	Low Speed GMLAN Serial Data	E13	0.35	D-GN	5060	V	-

X222 Upfitter Provision Harness to Instrument Panel Harness (YF2 or YF7)



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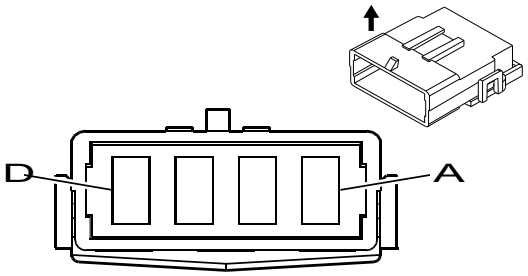


655680

Connector Part Information

Harness Type: Upfitter Provision
OEM Connector: 12015664
Service Connector: 12085487
Description: 4-Way F Metri-Pack 630 Series (BK)

Connector Part Information

Harness Type: Instrument Panel
OEM Connector: 12052623
Service Connector: 15306008
Description: 4-Way M Metri-Pack 630 Series (BK)

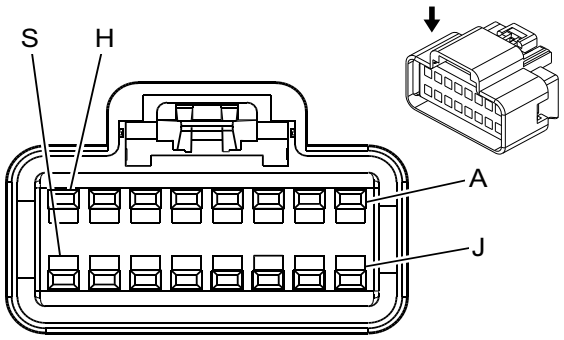
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Service by Connector Assembly -12015664	Not Available	Not Available	Not Available	Not Available	Not Avail-able	Not Avail-able
II	Pending	J-35616-43 (RD)	J-38125-11A	12066493	3	B	G

X222 Upfitter Provision Harness to Instrument Panel Harness (YF2 or YF7)

Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on	Function	Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on
A	—	—	1042	I	-	Battery Positive Voltage	A	5	RD/BK	1042	II	-
B	—	—	541	I	-	Ignition Voltage	B	5	BN	541	II	-
C	—	—	350	I	-	Ground	C	5	BK	350	II	-
D	-	-	-	-	-	Not Occupied	D	-	-	-	-	-

X320 Upfitter Provision Harness to Body Harness (YF2 or YF7)



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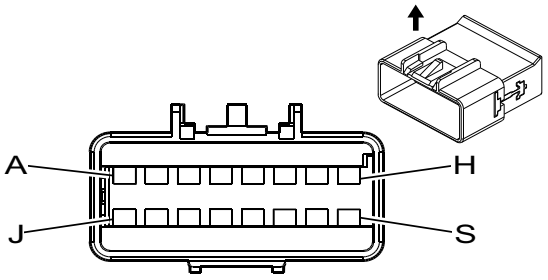


646377

Connector Part Information

Harness Type: Upfitter Provision
OEM Connector: 15332177
Service Connector: 15332177
Description: 16-Way F GT 150 Series (BK)

Connector Part Information

Harness Type: Body
OEM Connector: 13516907
Service Connector: 19153746
Description: 16-Way M GT 150 Series (BK)

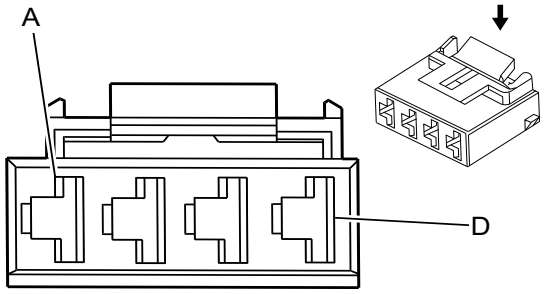
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Service by Connector Assembly - 15332177	Not Available	Not Available	Not Available	Not Available	Not Avail-able	Not Avail-able
II	13575502	J-35616-3 (GY)	J-38125-553	15304702	19	Pins: A– D – 2	4

X320 Upfitter Provision Harness to Body Harness (YF2 or YF7)

Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on	Function	Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on
A	—	—	1959	I	-	Left Rear Midrange Speaker Output (−)	A	1	WH	1959	II	-
B	—	—	1859	I	-	Left Rear Midrange Speaker Output (+)	B	1	TN	1859	II	-
C	—	—	1955	I	-	Right Rear Midrange Speaker Output (−)	C	1	OG	1955	II	-
D	—	—	1855	I	-	Right Rear Midrange Speaker Output (+)	D	1	TN	1855	II	-
E–N	-	-	-	-	-	Not Occupied	E–N	-	-	-	-	-
P	—	—	450	I	-	Ground	P	0.5	BK	450	II	-
R	—	—	149	I	-	Courtesy Lamp Control	R	0.5	D-BU/ WH	149	II	-
S	—	—	2209	I	-	Rear Park Lamps Control	S	0.5	BN	2209	II	-

X321 Upfitter Provision Harness to Body Harness (YF2 or YF7)



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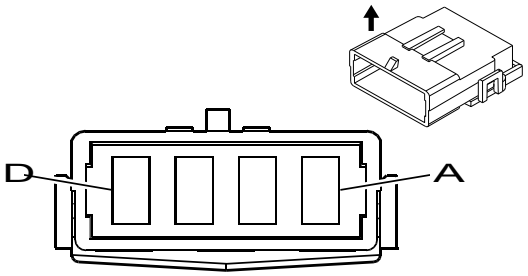


655680

Connector Part Information

Harness Type: Upfitter Provision
OEM Connector: 12015664
Service Connector: 12085487
Description: 4-Way F Metri-Pack 630 Series (BK)

Connector Part Information

Harness Type: Body
OEM Connector: 12052623
Service Connector: 15306008
Description: 4-Way M Metri-Pack 630 Series (BK)

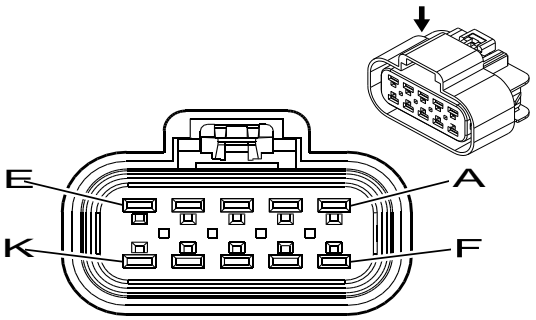
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	Service by Connector Assembly - 12015664	Not Available	Not Available	Not Available	Not Available	Not Avail-able	Not Avail-able
II	Pending	J-35616-43 (RD)	J-38125-11A	12066493	3	B	G

X321 Upfitter Provision Harness to Body Harness (YF2 or YF7)

Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on	Function	Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on
A	—	—	1042	I	-	Battery Positive Voltage	A	5	RD/BK	1042	II	-
B	—	—	541	I	-	Ignition Voltage	B	5	BN	541	II	-
C	—	—	450	I	-	Ground	C	5	BK	450	II	-
D	-	-	-	-	-	Not Occupied	D	-	-	-	-	-

X405 Cutaway Rear Lighting Connector to Chassis Harness (Cutaway)



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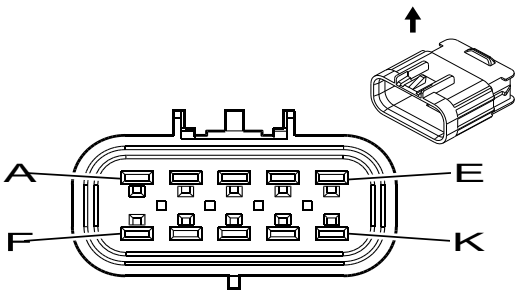


655819

Connector Part Information

Harness Type: Cutaway Rear Lighting Connector
OEM Connector: 15326660
Service Connector: 88986262
Description: 10-Way F GT 280 5.8 Series, Sealed (BK)

Connector Part Information

Harness Type: Chassis
OEM Connector: 15326661
Service Connector: 88986245
Description: 10-Way M GT 280 5.8 Series, Sealed (BK)

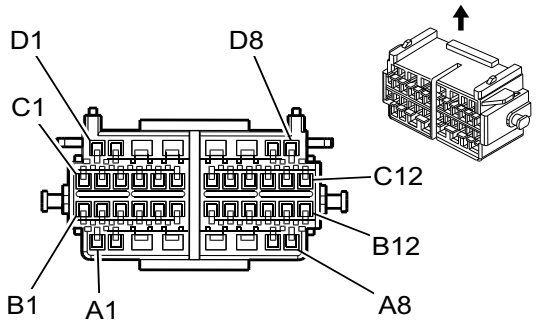
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575405	J-35616-4A (PU)	J-38125-553	15304719	19	2	5
II	13327135	J-35616-5 (PU)	J-38125-553	15304731	19	Pins: C–H – 2	5

X405 Cutaway Rear Lighting Connector to Chassis Harness (Cutaway)

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
A–B	-	-	-	-	-	Not Occupied	A–B	-	-	-	-	-
C	1	WH	17	I	-	Center High Mounted Stop Lamp (CHMSL) Control	C	1	L-BU	1320	II	-
D	1	YE	618	I	-	Left Rear Turn Signal Lamp Control	D	1	YE	618	II	-
E	1	D-GN	619	I	-	Right Rear Turn Signal Lamp Control	E	1	D-GN	619	II	-
F	1	BN	2109	I	-	Trailer Park Lamps Control	F	1	BN	2109	II	-
G	1	BK	150	I	-	Ground	G	1	BK	150	II	-
H	1	L-GN	1624	I	-	Trailer Backup Lamps Control	H	1	L-GN	1624	II	-
J	-	-	-	-	-	Not Occupied	J	-	-	-	-	-
K	0.8	D-BU/ WH	149	I	-	Courtesy Lamp Control	K	0.8	D-BU/ WH	149	II	-

X500 Driver Door Harness to Body Harness



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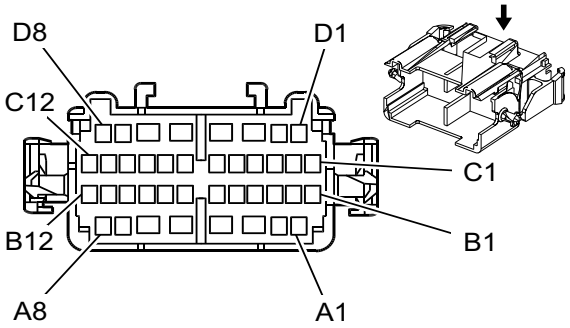


1715230

Connector Part Information

Harness Type: Driver Door
OEM Connector: 15448129
Service Connector: 89046969
Description: 40-Way F GT 150 280 Series (BK)

Connector Part Information

Harness Type: Body
OEM Connector: 15416976
Service Connector: Service by Harness - See Part Catalog
Description: 40-Way M GT 150 280 Series (BK)

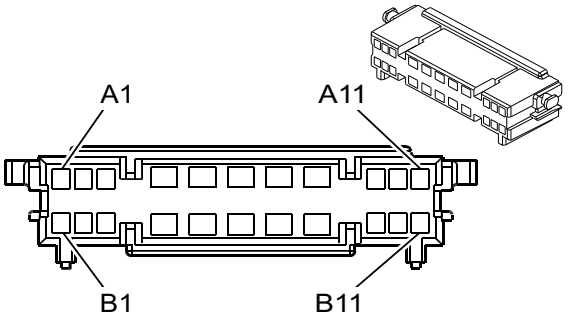
Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575735	J-35616-2A (GY)	J-38125-553	12191812	19	Pins: A1, A8, B1–B4, D7–D8 – E	C
II	Pins: A5 (AU3 without DE5, DE7 or A31), A6 – 13575753	J-35616-4A (PU)	J-38125-553	Pins: A5 (AU3 without DE5, DE7 or A31), A6 – 15304711	8	Pins: A5 (AU3 without DE5, DE7 or A31), A6 – E	A
III	13575502	J-35616-3 (GY)	J-38125-553	15304702	19	Pins: A1, A6, B1–B4 – E	C
IV	13575510	J-35616-5 (PU)	J-38125-553	15304724	8	A	D

X500 Driver Door Harness to Body Harness

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
A1	0.35	TN	126	I I II	-	Left Front Door Open Switch Signal	A1	0.35	TN	126	III III	-
A2–A4	-	-	-	-	-	Not Occupied	A2–A4	-	-	-	-	-
A5	0.35 3	BK BK	450 450	I II	AU3 without DE5, DE7 or A31	Ground Ground	A5	3	BK	450	III IV	-

X600 Passenger Door Harness to Body Harness



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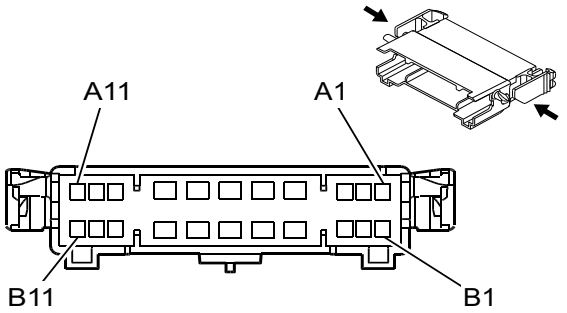


524211

Connector Part Information

Harness Type: Passenger Door
OEM Connector: 15326063
Service Connector: 15326063
Description: 22-Way F GT 150, 280 (GY)

Connector Part Information

Harness Type: Body
OEM Connector: 15326064
Service Connector: 15326064
Description: 22-Way M GT 150, 280 (GY)

Terminal Part Information

Terminal Type ID	Terminated Lead	Diagnostic Test Probe	Terminal Removal Tool	Service Terminal	Tray	Core Crimp	Insulation Crimp
I	13575735	J-35616-2A (GY)	J-38125-553	12191812	19	Pins: A1–A3, B1–B2 – C	A
II	13575756	J-35616-4A (PU)	J-38125-553	15304713	19	F	D
III	13575753	J-35616-4A (PU)	J-38125-553	15304711	8	Pin A5 – 2	A
IV	13575502	J-35616-3 (GY)	J-38125-553	15304702	19	Pins: A1–A3, B1–B2 – 2	4
V	13575510	J-35616-5 (PU)	J-38125-553	15304724	8	A	D
VI	13575507	J-35616-5 (PU)	J-38125-553	Pin A5 – 15304724	8	Pin A5 – 2	A

X600 Passenger Door Harness to Body Harness

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
A1	0.8	OG	1853	I I III	-	Right Front Midrange Speaker Output (+)	A1	0.8	OG	1853	IV IV VI	-
A2	0.8	TN	294	I I III	AU3	Door Lock Actuator Unlock Control	A2	0.8	TN	294	IV IV VI	AU3
A3	0.8	OG	2267	I I III	DE5 or DE7	Mirror Heating Element Control	A3	0.8	OG	2267	IV IV VI	DE5 or DE7
A4	3	L-BU	166	I I	A31	Power Window Master Switch Right Front Up Signal	A4	3	L-BU	166	IV IV	A31

X600 Passenger Door Harness to Body Harness (cont'd)

Pin	Size	Color	Circuit	Terminal Type ID	Option	Function	Pin	Size	Color	Circuit	Terminal Type ID	Option
				II III							V VI	
A5	0.8	BK	1850	I I III	-	Ground	A5	0.8	BK	1850	IV IV VI	-
A6	0.35 0.35	BN/WH BN/WH	1498 1498	I I III	DE5 or DE7 DE5 or DE7	Passenger Mirror Motor Left/Down Control Passenger Mirror Motor Left/Down Control	A6	0.5	BN/WH	1498	IV IV VI	DE5 or DE7
A7	0.35	OG/WH	881	I I III	DE5 or DE7	Passenger Mirror Motor Right Control	A7	0.5	OG/WH	881	IV IV VI	DE5 or DE7
A8	0.35	TN/WH	746	I I III	-	Right Front Door Ajar Switch Signal	A8	0.35	TN/WH	746	IV IV VI	-
A9	0.35	BK	1850	I I III	-	Ground	A9	0.35	BK	1850	IV IV VI	-
A10	0.5	D-GN	2134	I I III	-	Side Impact Sensing Module – Right – Signal	A10	0.5	D-GN	2134	IV IV VI	-
A11	0.35	L-BU	244	I I III	AU3	Passenger Door Lock Switch Lock Control	A11	0.35	L-BU	244	IV IV VI	AU3
B1	0.8	D-GN	1953	I I II III	-	Right Front Midrange Speaker Output (−)	B1	0.8	D-GN	1953	IV IV V VI	-
B2	0.8	GY	295	I I II III	AU3	Door Lock Actuator Lock Control	B2	1	GY	295	IV IV V VI	AU3
B3	0.5	D-BU/WH	1315	I I II III	DE5 or DE7	Right Front Turn Signal Lamp Control	B3	0.5	D-BU/WH	1315	IV IV V VI	DE5 or DE7
B4	3	TN	167	I I II III	A31	Power Window Master Switch Right Front Down Signal	B4	3	TN	167	IV IV V VI	A31
B5	3	D-GN	1001	I I II III	A31	RAP Control	B5	3	D-GN	1001	IV IV V VI	A31
B6	0.35 0.35	BN/WH BN/WH	230 230	I I II III	AU3 A31	Instrument Panel Lamps Dimming Control Instrument Panel Lamps Dimming Control	B6	0.35	BN/WH	230	IV IV V VI	AU3 or A31

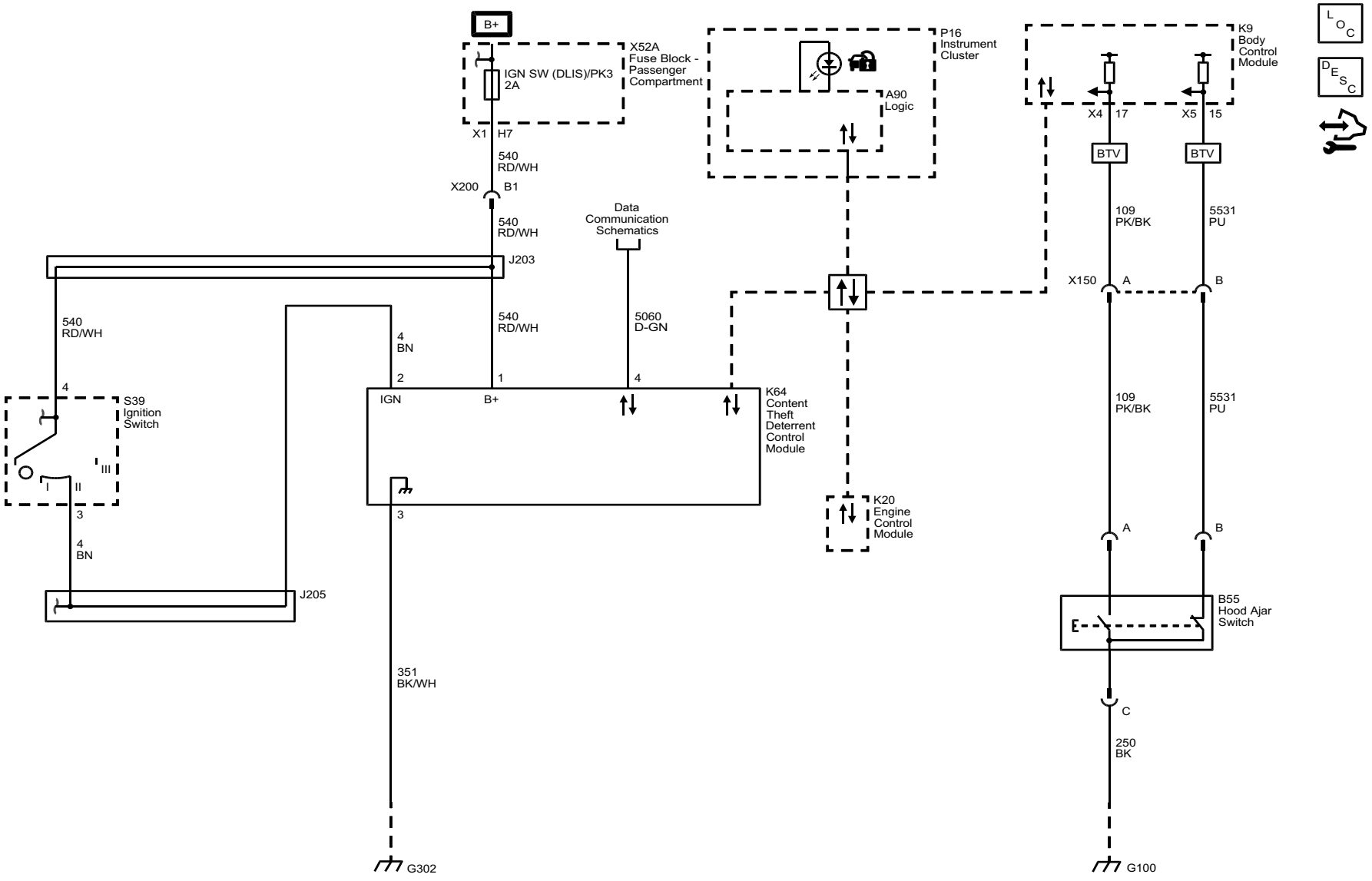
X600 Passenger Door Harness to Body Harness (cont'd)

Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on	Function	Pin	Size	Color	Circ-uit	Termin-al Type ID	Opti-on
B7	0.35	PU/WH	889	I I II III	DE5 or DE7	Passenger Mirror Motor Down Control	B7	0.5	PU/WH	889	IV IV V VI	DE5 or DE7
B8	0.35	L-GN	1177	I I II III	-	Right Front Door Open Switch Signal	B8	0.35	L-GN	1177	IV IV V VI	-
B9	-	-	-	-	-	Not Occupied	B9	-	-	-	-	-
B10	0.5	WH/BK	6629	I I II III	ASF	Low Reference	B10	0.5	WH/BK	6629	IV IV V VI	ASF
B11	0.35	D-BU	245	I I II III	AU3	Passenger Door Lock Switch Unlock Control	B11	0.35	D-BU	245	IV IV V VI	AU3

Immobilizer

Schematic and Routing Diagrams

Immobilizer Schematics (Immobilizer)



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Description and Operation

Immobilizer Description and Operation

The immobilizer system functions are provided by the theft deterrent module (TDM) and the engine control module (ECM). When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coil surrounding the ignition lock cylinder. This exciter coil is part of the TDM. The energized transponder transmits a signal that contains its unique value, which is received by the TDM. The TDM then compares this value to a value stored in memory. If the values match, the TDM will send the prerelease password via the serial data circuit to the ECM. If the transponders unique value is incorrect, the TDM will send the fuel disable password to the ECM.

When the ECM receives the TDM prerelease password, the ECM will challenge the password. The ECM sends this challenge back to the TDM via the serial data circuit. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

The components of the theft system are as follows:

- TDM
- ECM
- Ignition key (Transponder)
- Security indicator

Theft Deterrent Module (TDM)

Vehicles with steering column mounted ignition switches have the exciter integral with the theft deterrent module (TDM), which is located within the steering column. The TDM can learn up to 10 keys (transponder values).

The TDM uses the following inputs:

- Battery voltage
- Ignition switched voltage
- Ground circuit

The theft deterrent control module uses the following outputs:

- Password exchange
- Challenge/response with the engine control module (ECM)

When an ignition key is inserted into the ignition lock cylinder and the ignition is switched ON, the transponder embedded in the head of the key is energized by the exciter coils surrounding the ignition lock cylinder. The energized transponder transmits a signal that contains its unique value, which is received by the TDM. The TDM then compares this value to the learned key code stored in memory. The TDM then performs one of the following functions:

- If the transponder value matches the values stored in the TDM memory, the TDM will send the prerelease password to the ECM via the serial data circuit.
- If the transponders unique value does not match the value stored in the TDM, the TDM will send the fuel disable message to the ECM via the serial data circuit.
- If the TDM is unable to measure the ignition key transponder value, the TDM will not send any messages to the ECM.

Engine Control Module (ECM)

When the engine control module (ECM) receives the theft deterrent module (TDM) prerelease password, the ECM will challenge the password. The ECM sends this challenge back to the TDM via the serial data circuit. Both the ECM and TDM perform a calculation on this challenge. If the calculated response from the TDM equals the calculation performed by the ECM, the ECM will allow vehicle starting.

The ECM will disable vehicle starting if any of the following conditions occur:

- The prerelease password is invalid.
- The fuel disable password is sent by the TDM.
- No passwords are received. There is no communication with the TDM.
- The TDM calculated response to the challenge does not equal the calculation performed by the ECM.

The Ignition Key (Transponder)

Note: The ignition key will be stamped with a + or a + surrounded by a circle. This symbol only identifies the key as a PassKey III+ transponder key and is not a reliable way to determine if a particular key is the correct key for a vehicle. Service parts may have a different stamped symbol than the production part. The only way to determine the proper key for a vehicle is by referencing the parts catalog.

The ignition key for PassKey III+ (PK3+) equipped vehicles is a standard ignition key with a transponder located in the plastic head of the key. The transponder value is fixed and unable to be changed. The immobilizer system uses the ignition key transponder value to determine if a valid ignition key is being used to start the vehicle. There are approximately 3 trillion possible transponder values. There are no visible electrical contacts. The immobilizer system use the following types of ignition keys:

Master Keys

Master keys have a black plastic head for full access operation of the vehicle. Master keys may perform the following functions:

- Start the vehicle.
- Lock/unlock all of the door locks and rear compartment.
- Lock/unlock all of the storage compartments.

Valet Keys

Important: Valet keys are NOT standard equipment on all GM vehicle lines.

Valet keys have a gray plastic head and are for restricted operation of the vehicle. Valet keys may perform the following functions:

- Start the vehicle.
- Lock/unlock all of the door locks.

Fleet Keys

Important: Fleet keys are NOT standard equipment on all GM vehicle lines.

Fleets keys allow full access to the vehicle just as a master key would. However, unlike a master key which may only learn 10 keys to a particular vehicle, an unlimited number of fleet keys may be learned to the vehicle. Fleet keys are only used in vehicles configured for fleet use with RPO 6E2 or 6E8.

- Start the vehicle.
- Lock/unlock all of the door locks and rear compartment.
- Lock/unlock all of the storage compartments.

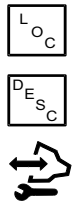
Security Indicator

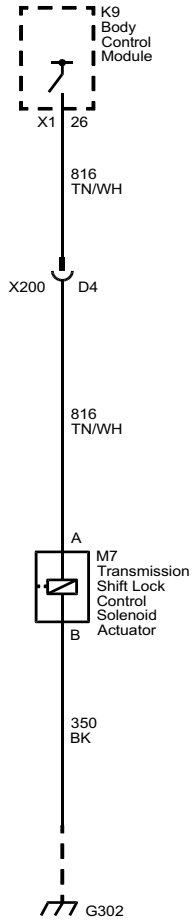
The theft deterrent module (TDM) can command the instrument panel cluster (IPC) to illuminate the security indicator only when the ignition key is in the ON position. The TDM will command the security indicator be illuminated any time a fault is noted in the immobilizer system and when the engine starting is disabled.

Shift Lock Control

Schematic and Routing Diagrams

Shift Lock Control Schematics (Shift Lock Control)





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