



Global MX-5 Cup User Guide, Version 1.3

Refer to the latest version of the Global MX-5 Technical Rules for up to date information regarding rules and regulations

Do Not Operate Vehicle until you've done the Following:

- **Read this entire document, all associated manufacturer instructions, and FIA Safety Regulations.**
- **Fully installed a FIA seat, FIA safety belts and FIA Drivers Nets.**
- **Connected the Fire Bottle Wiring in the Trunk and Activated the Fire System**

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1.0 Starting the Car and Operation of Cooling Pumps

- Check Oil and Coolant levels before starting the vehicle.
- The Switch panel on the dash has the following 3 Switches and 1 Button:
 1. 3-Way Master:
 - a. Down “Off” = Power Off
 - b. Middle “ACC” = Accessory Power On
 - c. Up “IGN” = ACC + Ignition Power
 2. Separate transmission & differential cooler pump and fan over ride switches:
 - a. Down = Power Off
 - b. Up = Power On
 3. Fire Bottle Button (Press to Operate Fire Bottle)



Figure 1: Switch Panel



Figure 2: Start Button

2.0 To Start the Engine:

- With the Key in the car, move the 3-Way Master Switch to the IGN position (figure 1). Depress Clutch Pedal (and brake as needed), Press the Factory Start Stop Button. (figure 2)

3.0 To Turn the Engine Off:

- Move the 3-Way Master Switch to the OFF Position. Or, flip the external master kill switch on the cowl near the Windshield Wipers.

4.0 Fire System:

- Before vehicle use, the Fire Bottle Cable, see figure 3, must be reconnected to the bottle in the trunk. This line is disconnected during transport to eliminate any possibility of accidental discharge.



Figure 3. Fire Bottle Cable, Trunk.

- The control unit, see figure 4, on the center console has a switch that allows you to:
 - Test the battery
 - Test the system (when the system is in TEST, you can operate the trigger buttons without discharging the system)
 - Engage or Arm the system.



Figure 4: Fire System Control Unit, Right Side of Center Console.

- Review the LifeLine instruction booklet included in the trunk kit, or online at <http://www.lifeline-fire.co.uk/>
- **!!! Always remember to TEST and ARM (or engage) the system prior to on track activity!!!**

5.0 Seat Installation:

- Before vehicle use, a FIA compliant Seat and seat mounting brackets must be installed meeting the requirements of FIA document, 2016 Appendix J – Article 253, Safety Equipment (Groups, N,A, R-GT), ART. 16, Seats, Anchorage Points and Supports. This document is available for download at <http://www.fia.com/Regulations>.
- An FIA compliant seat mounting baseplate, see figure 5, Mazda part # 0000-08-5111, is provided as a mounting surface.
 - Additional Plates may be welded to the provided seat mount plate to extend the mounting surface forward if necessary. Plates must be between 1/8" and 3/16" thick, must be attached by at least 2.75" of 1/8" weld, and may not be added for the purpose of ballast.



Figure 5: Seat Mount Base Plate

6.0 Seat Belt Installation:

- Before vehicle use, FIA compliant Safety Belts must be installed meeting the requirements given in FIA document, 2016 Appendix J – Article 253, Safety Equipment (Groups, N,A, R-GT), ART. 6, Safety Belts. This document is available for download at <http://www.fia.com/Regulations>. FIA compliant safety belts, eyebolts and backing plates are supplied with the vehicle.
- A bar for shoulder belt attachment, see figure 6, is provided in the rear of the car. Additional brackets may be welded to this bar, and this bar only, to achieve desired belt angle. All connection points must be designed to withstand 1,470 daN (3,405 lbs-force) per the FIA Safety Equipment Specification, 2016 Appendix J – Article 253, Safety Equipment (Groups, N,A, R-GT), ART. 6, Safety Belts.

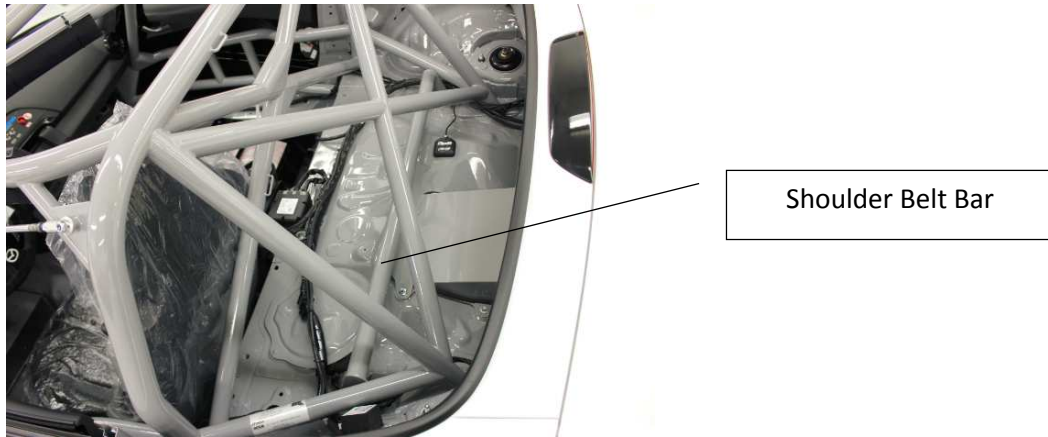


Figure 6: Shoulder Belt Bar

7.0 Fluids:

Item	GMX5 Spec Fluid
Engine Oil	5w30 Castrol Syntec European Blend
Rear Differential Oil	75W90 Castrol Syntrax
Transmission Oil	75W90 Castrol Syntrax
Brake Fluid	Castrol SRF
Fuel	91 – 101 Octane Series dependent
Coolant	Cool-aide

- The vehicles are shipped with stock Engine Coolant to prevent freezing during shipment. A bottle of Maxima Cool-Aide is included in the Trunk Kit for use in competition which should only be mixed with distilled water.
- All testing has been done with standard 93 octane premium gasoline.
- Fuel pump out: MUST HAVE MANNED FIRE EXTINGUISHER
 - 1) Connect quick release fuel line at fuel fitting



- 2) Toggle fuel pump relay to activate fuel pump



8.0 Engine, Transmission and Differential Seals:

- The Engine, Transmission and Differential have been sealed with tamper proof/evident devices to prevent modification to these parts. Evidence of removal or tampering with these seals will be cause for disqualification and or fines in Global MX-5 Cup Competition.
- Open testing can be done with unsealed components, however for official Global MX-5 Cup Practice, Qualifying and Races, only sealed components may be used.

9.0 Auxiliary Power:

- The main power panel is mounted in the trunk of the car. There is a 6 way fuse block available for powering Accessories such as helmet blowers, cool suits, etc. The fuse block is rated at 30 amp for an individual connection, with a 65 amp max for all 6 branches combined. All connections made to this block will need to be insulated. See figure 7.



Figure 7: Power Distribution Panel (Trunk)

- There is also a standard 12volt Accessory Socket located under the dash just to the right of the center console that may be used. See figure 8.

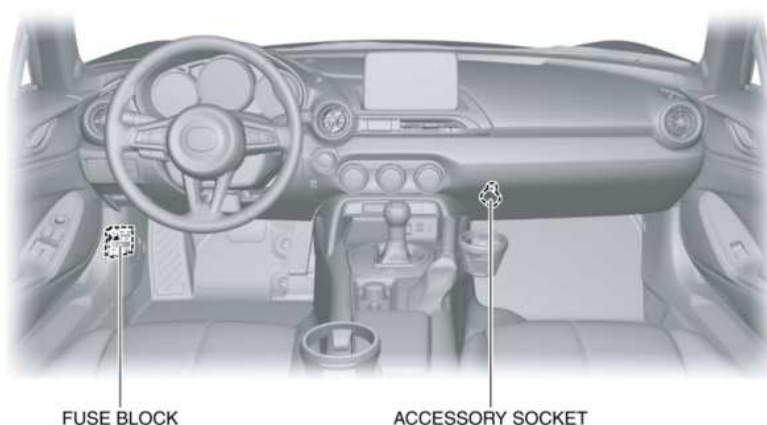


Figure 8: 12 volt Accessory Socket Location

10.0. AiM MXL2 Dash:

- The vehicle is equipped with an AiM MXL2 Dash. The MXL2 connects to the vehicle through the OBDII Port for power and CAN Communication.
- Before your vehicle shipped, the MXL2 was updated with the latest firmware and a standard configuration template. Please check for updates on the AiM website on a regular basis.
- Tracks can be uploaded to the MXL2 using AiM's GPS Manager Software.
- The MXL2 instruction booklet is included in the trunk kit. User instructions and links for Downloads of the Race Studio 3 and GPS Manager software can also be found here:
 - <http://www.aim-sportline.com/eng/products-car/mxl2/index.htm>

11.0 Ballast Box:

A standard Ballast Box, Mazda part # 0000-08-5053 that mounts in place of the passenger seat is included. Ballast may be added to the vehicle using a Right Side Seat Mount Plate, an empty Ballast Box with no lid, an empty Ballast Box with the lid, or a Ballast box with 5 and 10 pound plates as needed.

- Ballast Box, empty with the Lid and all fasteners, 27.5 lbs / 12.5 kg
- The Ballast Box will hold up to an additional 130 lbs / 59kg of ballast. Twelve 12 lbs plates and two 5 lbs plates.
- 10 Pound / 4.53kg (Part Number 0000-08-5128-10) and 5 Pound / 2.27kg (Part Number 0000-08-5128-05) weights designed to fit in the box are available for purchase.
- Secure all ballast plates inside the box with two ½" nuts, and secure the lid with the four ½" bolts provided.
- Ballast may not be installed anywhere on the vehicle except inside the ballast box.
- The Ballast Box has tabs on each of the four sides to allow for items such as cool suit units to be strapped in place.

12.0 Baseline Setup:

This vehicle has been shipped with a standard ride height and sway bar end link lengths that will need to be adjusted after your seat and ballast is installed.

To set initial balance:

- Disconnect front and rear sway bars and place vehicle on scales with ballast and driver weight in place.
 - The minimum weight of the vehicle with no fuel with driver is 2415 lbs. or 1095 kg. Use the ballast box and ballast plates described above to add ballast as needed to achieve the minimum weight with driver. The ballast box must remain in the car, extra weight(s) are optional.
- Adjust ride heights by raising or lowering the spring perches on the dampers to achieve target cross weight %.
 - The minimum ride height is 4" excluding the 2 plastic angles in front of the front tires, see figure 9, which attach to the front bumper cover and inner fender liners (see picture below). The recommended ride height would be 4-3/8" at the lowest part of the vehicle.



Plastic Angle Excluded from Ride Height Measurement

Figure 9: Plastic Angles Excluded from Ride Height Measurement

- 50.5 % Right Cross Percentage ((RF Weight + LR Weight) / Total Weight) is a recommended starting point, though this will vary by track and driver preference.

- Once desired ride height and cross weight % is achieved, set the sway bars to neutral by adjusting the end link lengths such that the sway bar can be reconnected without loading it.
- After the desired weight distribution is achieved, align your vehicle. Recommended Toe Settings are 1.5mm out on both front tires (3mm out total) and 1mm in on each rear tire (2mm in total). A very good starting point for camber is 2.8 degrees in the front and 3.0 degrees in the rear.

13.0 Dampers:

- The vehicle is equipped with 2-way adjustable Dynamic Suspension Spool Valve (DSSV) dampers by Multimatic.
 - Front Damper is Mazda Part Number 0000-04-5616
 - Rear Damper is Mazda Part Number 0000-04-5617
- The Dampers adjust 0 through 11 for Compression (Bump, Blue) and (Rebound, Red) using a square ended 4mm Allen key.
 - It is important that you do not use a ball end Allen key to make these adjustments, this could cause the Allen key receiver to strip out. A correct 4mm Allen key is provided in the Trunk kit.
 - An increase in the valve setting causes an increase in compression or an increase in rebound.
 - We recommend starting in the center, 5 Compression / 5 Rebound and adjusting from there as needed.
 - Note that there is a stop pin that prevents the valve from continuously rotating See figure 10.



Figure 10: Damper Valve with Seal. 5 Compression, 6 Rebound Shown

- The spring perches are manufactured with a 68mm hex design for adjustment and locking. A pair of 68mm Damper Perch Wrenches are needed to lock and unlock the perches to make ride height adjustments.
 - The 68mm Damper Perch Wrenches are available for purchase from Mazda Motorsports, Part # 0000-04-5620
- To service the Torrington bearing, the bottom clevis must be removed. A 36mm Damper Body wrench is needed to hold the clevis while loosening and tightening the nut.
 - The 36mm Damper Body Wrench is available for purchase from Mazda Motorsports, Part # 0000-04-5621
- Dynamic Suspension by Multimatic will make available their SpecFinder™ Software that is a fully predictive computerized simulation that precisely models the hydraulic flow of the DSSV damper spool valves. This can be used to help better understand the magnitude of changes made with valve adjustments. More information on this tool will be provided in 2016.
- The Damper valve block is sealed with a tamper proof label. Evidence of removal or tampering with these seals will be cause for disqualification and or fines in Global MX-5 Cup Competition. Valve work may only be done through Long Road Racing in conjunction with Mazda Motorsports and Multimatic.

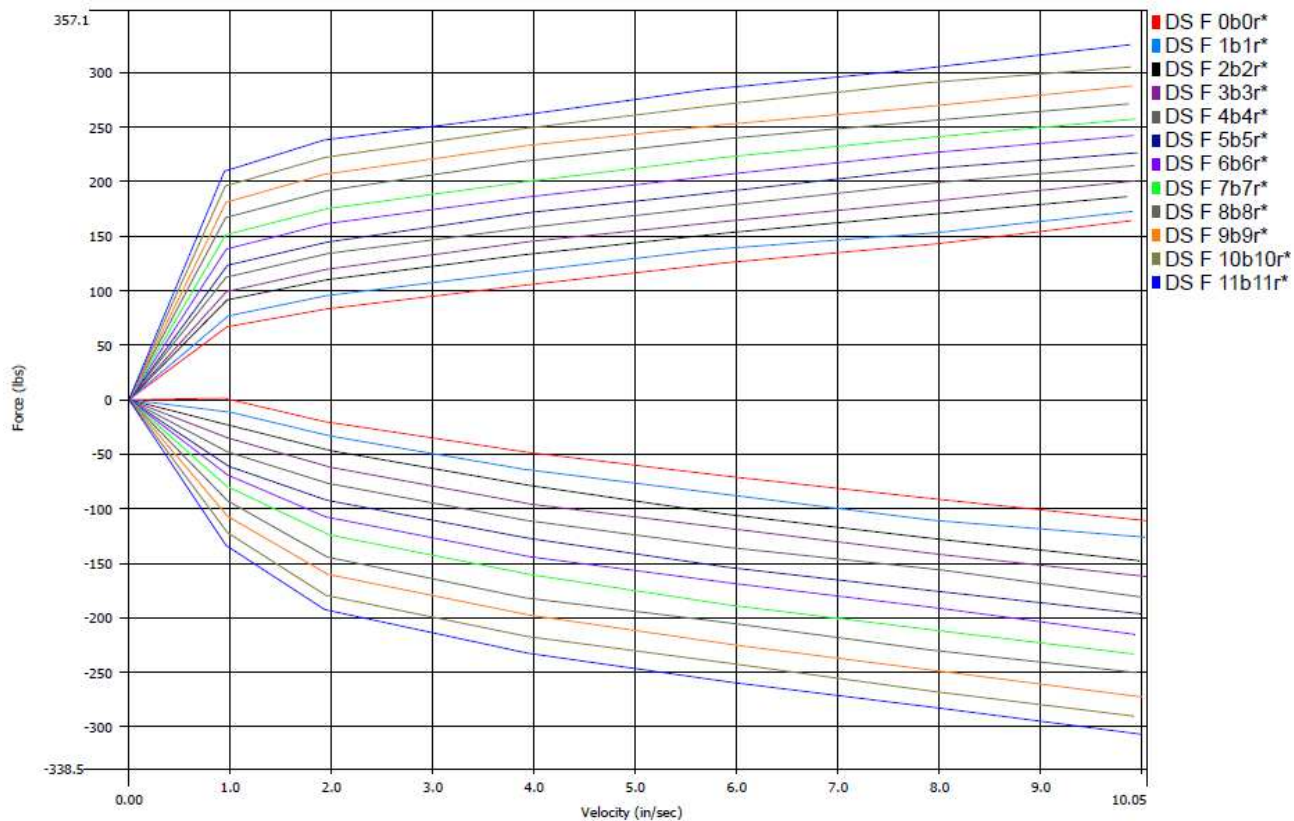


Figure 11: Typical Force Vs. Velocity Front Damper

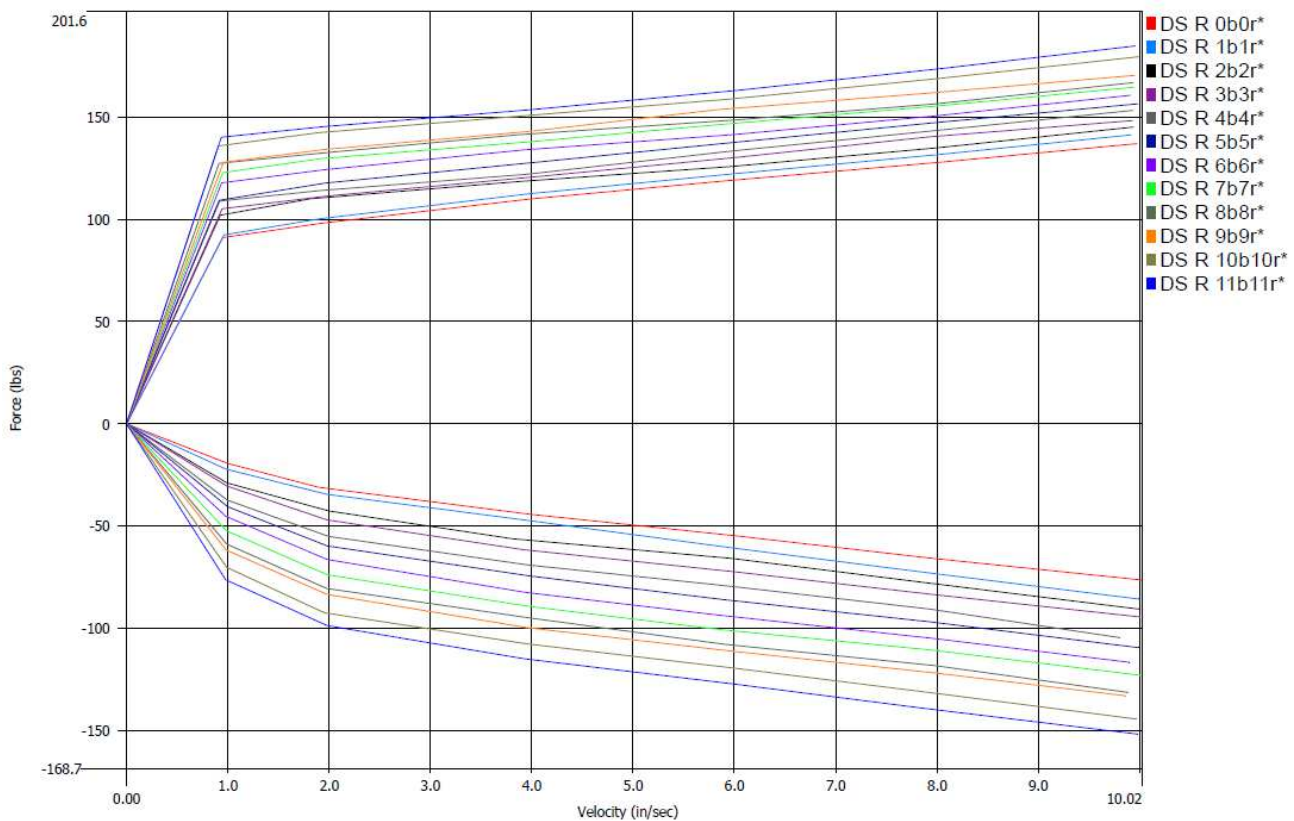


Figure 12: Typical Force Vs. Velocity Rear Damper

14.0 Front Sway Bar Settings

- The Front Sway Bar has three available stiffness settings: Stiff, Medium and Soft. The vehicle is delivered with the bar set at the recommended Medium setting.
- To soften the sway bar, disconnect the end links, adjust the lengths and spacer configurations as needed to reconnect the link to the outermost hole on the sway bar arm.
- To stiffen, disconnect the end links, adjust the length and spacer configuration as needed to reconnect the link to the inner-most hole on the sway bar arm.
- Changes must be made to both the left and right connections to achieve the stiffening or softening affect. See figure 13.

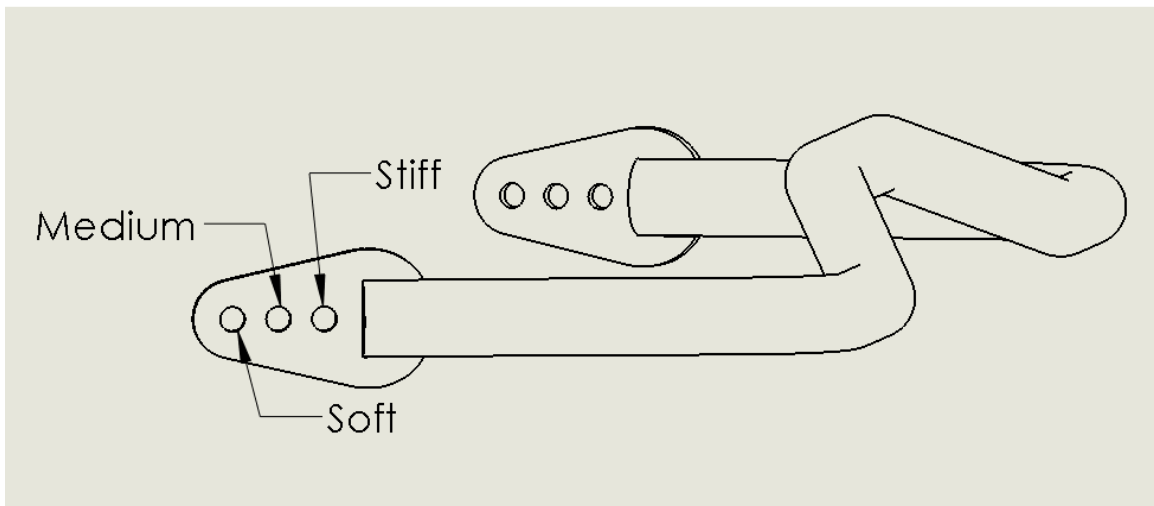


Figure 13: Sway Bar End Link Settings

15.0 Basic Handling Guide:

	Front		Rear	
	Comp / Bump	Rebound	Comp / Bump	Rebound
Straight line braking - front lockup	-			
Straight line braking - rear lockup	+			-
Trail braking - Slow turn-in response	+			+
Trail braking - Understeer	-			+
Trail braking - Oversteer	+			-
Turn in (no braking) - Understeer		-		+
Turn in (no braking) - Oversteer		+		-
Steady State Turning - Understeer*	-	-	+	+
Steady State Turning - Oversteer*	+	+	-	-
Corner exit - Understeer		-	+	
Corner exit - Oversteer		+	-	
Straight line accel - lack of traction		-	-	

* Steady state = no damper influence

16.0 Basic Service Intervals:

As with any standard service items, these intervals should be adjusted based on your level of use and special on-track conditions. The service intervals are based on 10-12 events per year, with a typical event weekend having approximately 3 hours of track time.

FLUIDS	SPEC FLUID	AFTER EACH EVENT	EVERY OTHER EVENT	ANNUALLY
Engine Oil	5w30 Castrol Syntec	Replace		
Differential Oil	75w90 Castrol Syntrax		Replace	
Transmission Oil	75w90 Castrol Syntrax		Replace	
Brake Fluid	Castrol SRF	Bleed		Full Flush
Engine Coolant	Maxima Kool Aid W/Distilled Water			Full Flush

FILTER	MAZDA PART NUMBER	AFTER EACH EVENT	EVERY OTHER EVENT	ANNUALLY
Engine Oil Filter	PE01-14-320A	Replace		
Transmission Filter	000-08-5032		Service	Replace
Differential Filter	000-08-5032		Service	Replace
Intake Air Filter	PEES-13-3A0	Replace		

CHASSIS PART	AFTER EACH EVENT	REPLACE
Hub Bearing (front/rear)	Clean and Inspect	Bi Annually
Tie Rod End (left/right)	Clean and Inspect	Annually
Eccentric Bolts	Clean and Inspect	Annually
Rear Axles	Clean and Inspect	Annually
Engine Mounts	Clean and Inspect	Annually
Drive Shaft	Clean and Inspect	Annually
Rear Upright (left/right)	Clean and Inspect	Annually
Rear Suspension (left/right)	Clean and Inspect	As needed
Upper Control Arm (left/right)	Clean and Inspect	Annually
Lower Control Arm (left/right)	Clean and Inspect	Annually
Wheels	Clean and Inspect	As Needed
Sway Bars (front/rear)	Grease Front Bushings	As Needed
Drop Links Front (left/right)	Clean and Inspect	Annually
Drop Links Rear (left/right)	Clean and Inspect	Annually
Brake Duct (left/right)	Clean and Inspect	As Needed
Torrington Bearings	Clean and Lube	As Needed
Dampers	Clean and Inspect	As Needed
Fire Bottle	Check Battery/Bottle Pressure	As Needed
Safety Equipment	Clean and Inspect	See Service Date

16.1 Transmission and Differential Filter Service:

The filter body is labeled “IN” and “OUT”, see figure 14, to indicate fluid flow direction through the filter. Note the direction of flow and ensure the filter is reinstalled in the same orientation. The Transmission and Differential Pumps

have an arrow showing the direction of fluid flow, see figure 15, these must agree with the flow direction of the filters. Fluid will not flow through the filter in the opposite direction and you will damage your transmission or differential.

To Service the Inline Filter:

- Remove filter body and disassemble as shown in figure 16.
- Clean out any debris and reassemble.
- Reinstall in correct orientation as described above.



Figure 14: Transmission and Differential Cooler Line Filter, Assembled



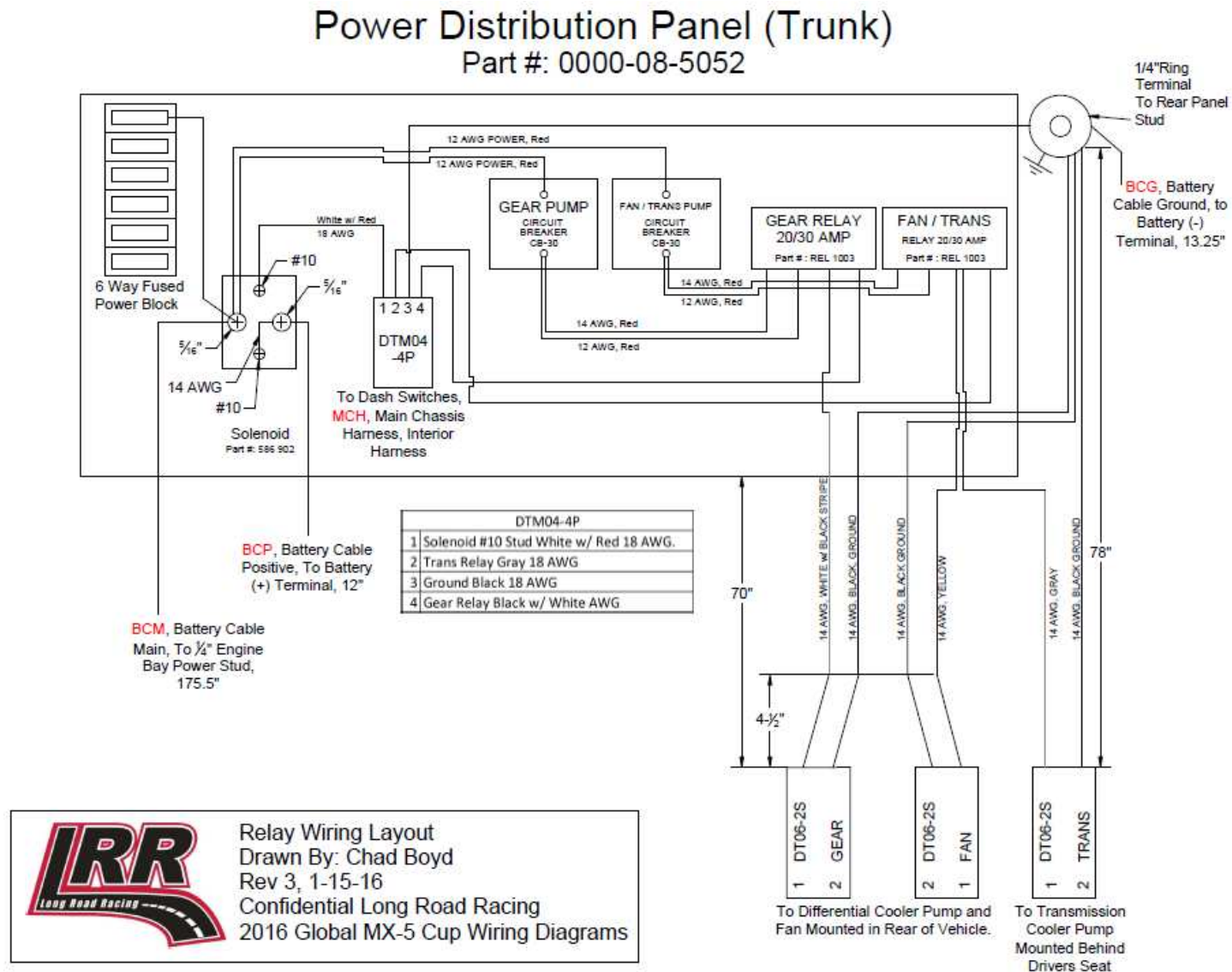
Figure 16: Transmission and Differential Cooler Line Filter, Disassembled.



Figure 15: Transmission and Differential Cooling Pump

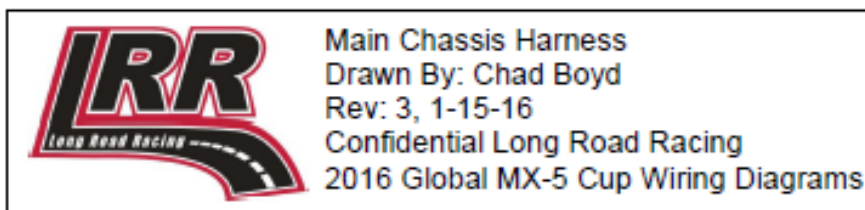
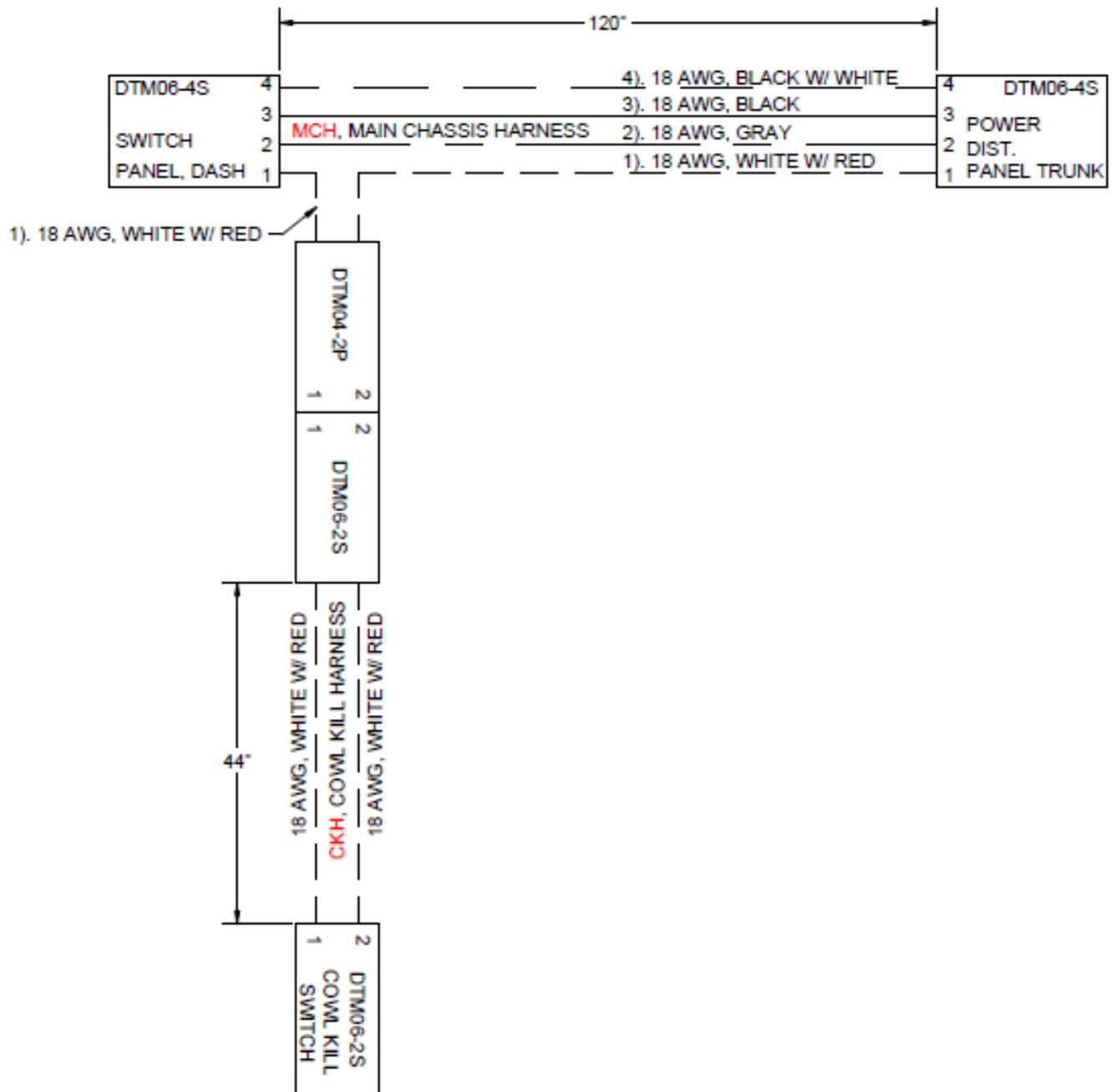
17.0 Wiring Diagrams:

17.1 Power Distribution Panel (Trunk)



Main Chassis Harness

Part # 0000-08-5050

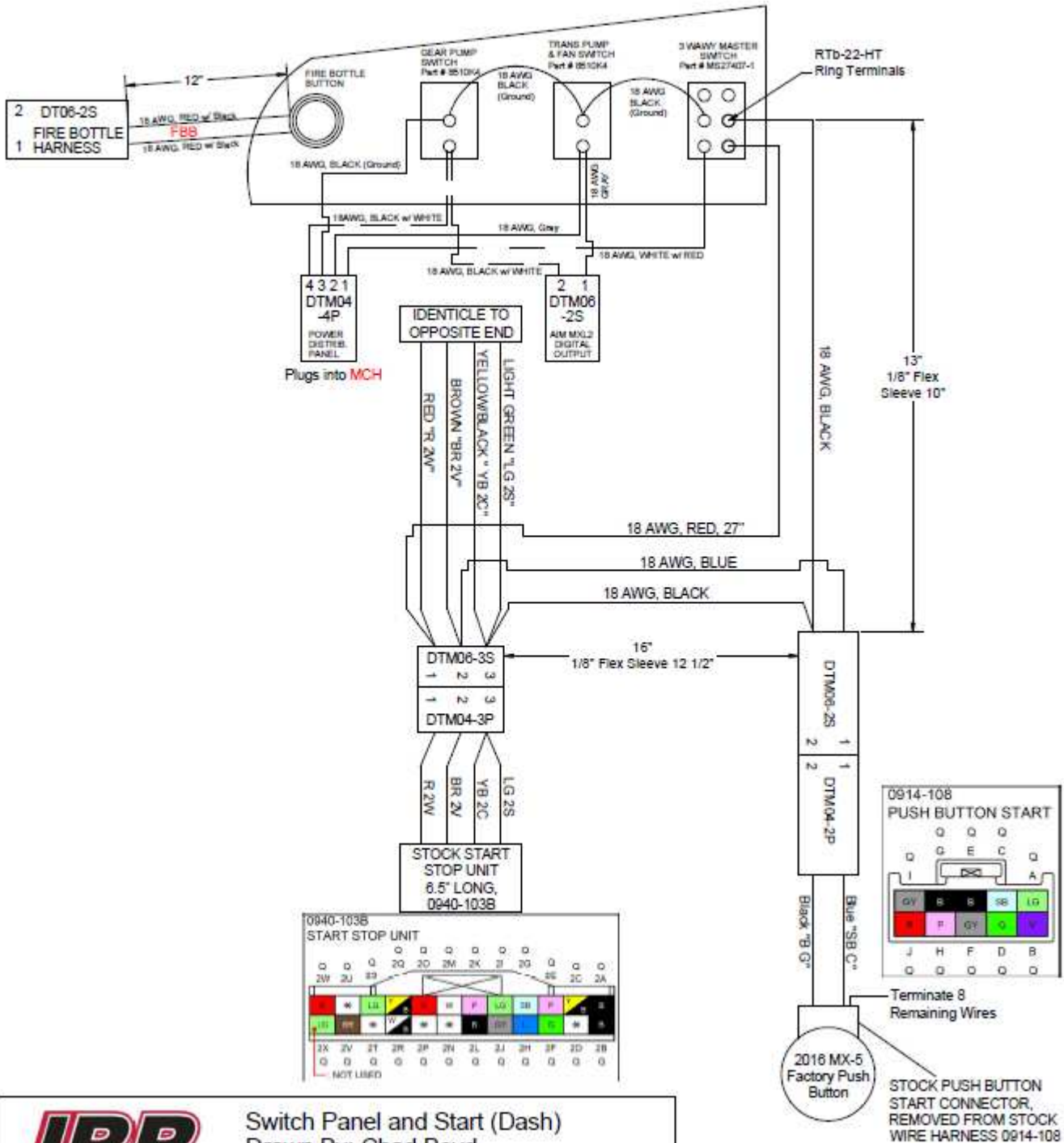


17.3 Switch Panel and Start Button (Dash)

Switch Panel and Start Stop Unit

Switch Panel Part # 0000-08-5129

Start Stop Harness 0000-08-5132



Switch Panel and Start (Dash)

Drawn By: Chad Boyd

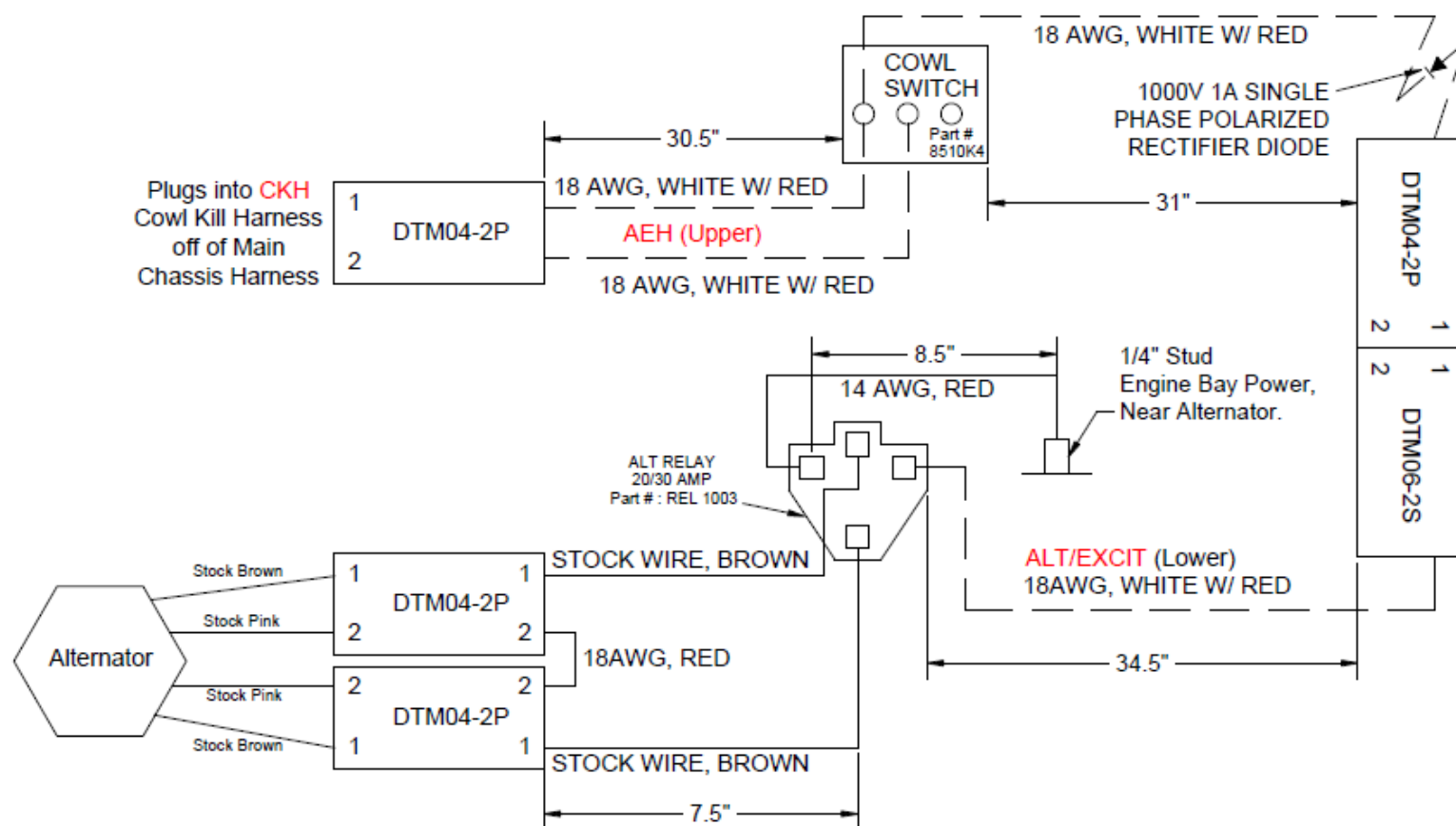
Rev: 3, 1-15-16

Confidential Long Road Racing

2016 Global MX-5 Cup Wiring Diagrams

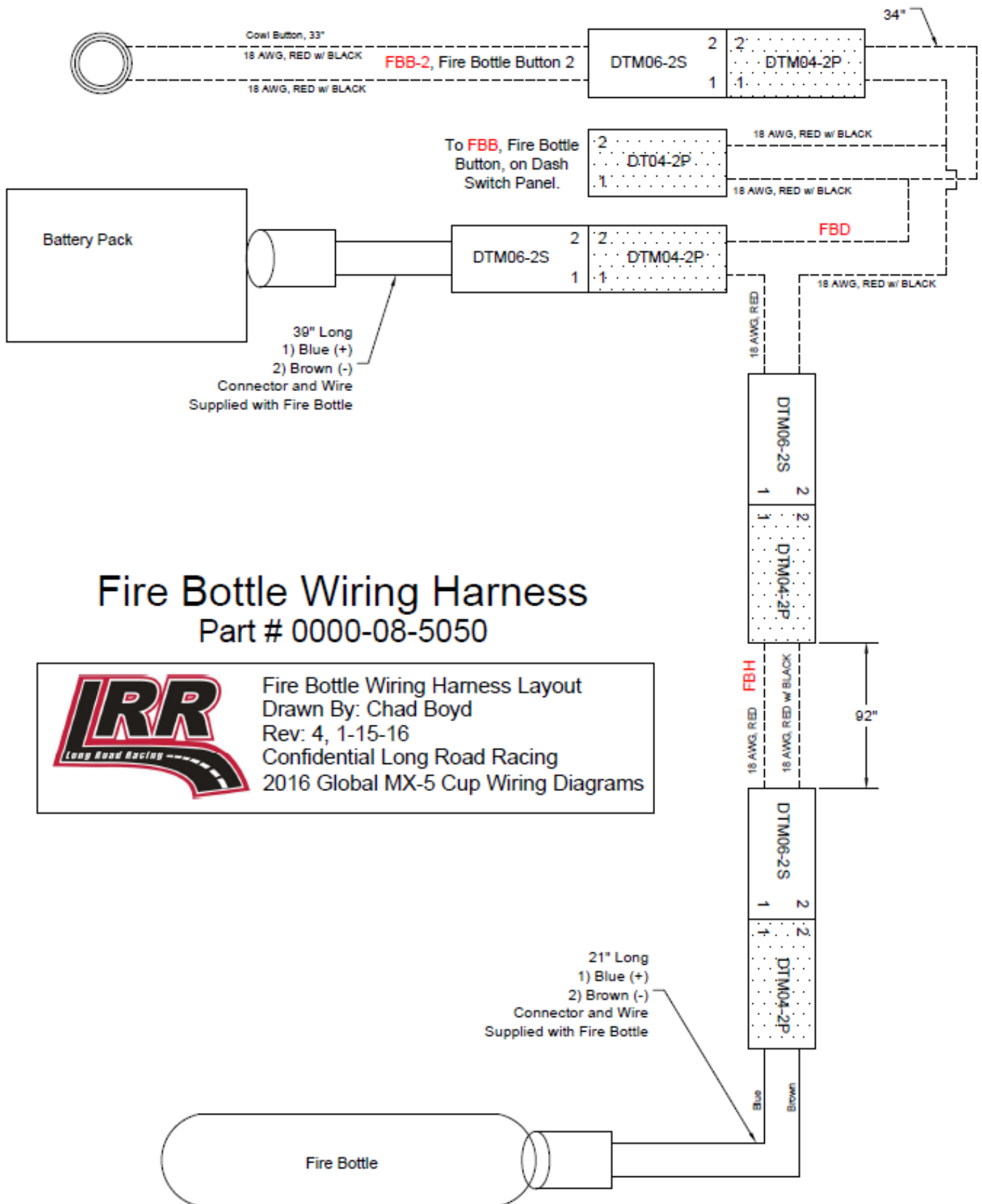
Engine Bay (Cowl Kill Switch and Alternator Relay)

Part # 0000-08-5051



Engine Bay (Cowl and Alt. Relay)
Drawn By: Chad Boyd
Rev: 4, 1-15-16
Confidential Long Road Racing
2016 Global MX-5 Cup Wiring Diagrams

17.5 Fire Bottle Wiring Harness Layout



18.0 Nut and Bolt:

- Despite the extensive Quality Processes in place during the manufacturing of your vehicle, it is highly recommended and general good practice with any race car, to do a full nut and bolt check on the car before first use, and in between on-track sessions.

19.0 Torque Specifications:

This list is not comprehensive. For items not listed consult the 2016 MX-5 Service Manual from Mazda.

	# of Fasteners	Torque Spec ft-lbs
1 Front Suspension		
Front Upper control Arm	2	40-47
Front Lower Damper Bolt	1	40-47
Front Upper Damper Nut	3	37-43
Front Hub	3	91-100

2 Front Brakes		
Front ABS Sensor	1	71-88 in-lbs
Front Caliper	2	59-74
Front Brake Line Banjo Bolt	1	110 in-lbs
Front Brake Bleeders	4	107-141 in-lbs

3 Rear Suspension		
Rear hub	3	91-100
Rear Axle Nut	2	175-202
Rear Damper Top Mount Nut	2	34-40
Rear Damper Lower Bolt	1	49-59

4 Rear Brakes		
Rear Brake Caliper Bracket	2	38-48
Rear Brake Caliper	2	15-18
Rear ABS Wheel Speed Sensor	1	71-88 in-lbs
Front Brake Line Banjo Bolt	1	110 in-lbs
Rear Brake Bleeders	2	54-70 in-lbs

5 Engine Bay		
Strut Tower Brace Center	2	12-19
Strut Tower Brace (Damper Nuts L& R)	6	37-43
Header Nuts	5	32-47
Motor Mount Lower	3	25-33
Motor Mount Upper	3	22-29
Motor Mount Upper Nut	1	24-30
Oil Filter Sandwich Plate Nut	1	35

6 Under Car		
Tunnel Member "X" Brace	4	14-19
Member Bracket	4	14-19

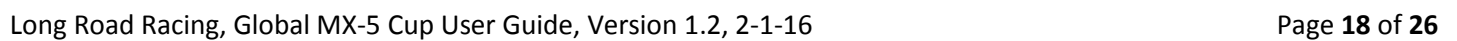
7 Differential and Transmission		
Diff Bracket Top	4	40-51
Diff Bracket Sides (Mount Rubbers)	2	40-51
Rear Subframe Primary	6	78-92
Drive Shaft (Propeller Shaft)	4	37-43
Power Plant Framework Differential End	4	121-147
Power Plant Framework Transmission End	4	100-120
8 Wheels	16	80

Diagram illustrating the rear suspension assembly, showing the shock absorber and its connection to the frame and axle.

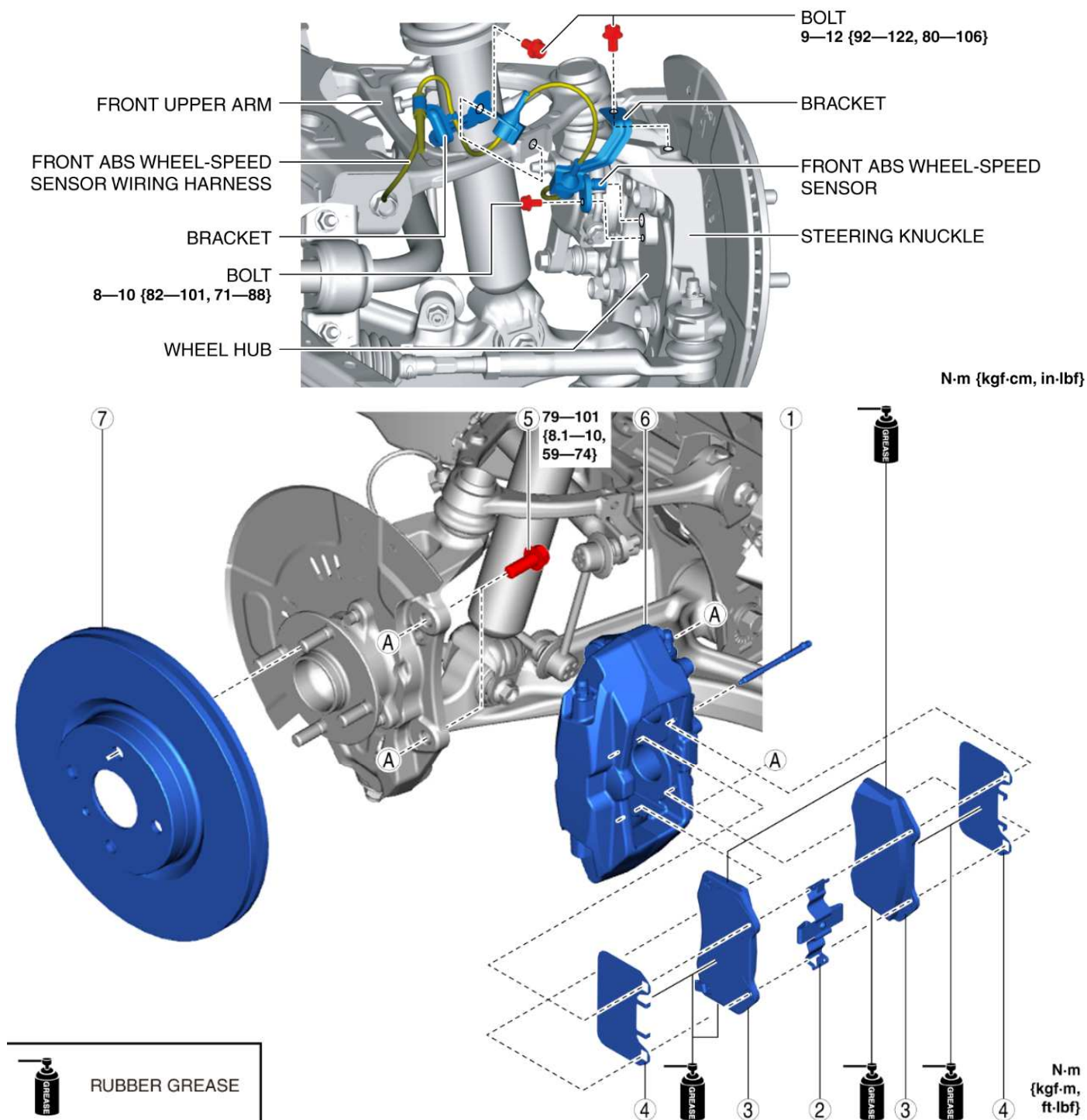
Key components and torque specifications:

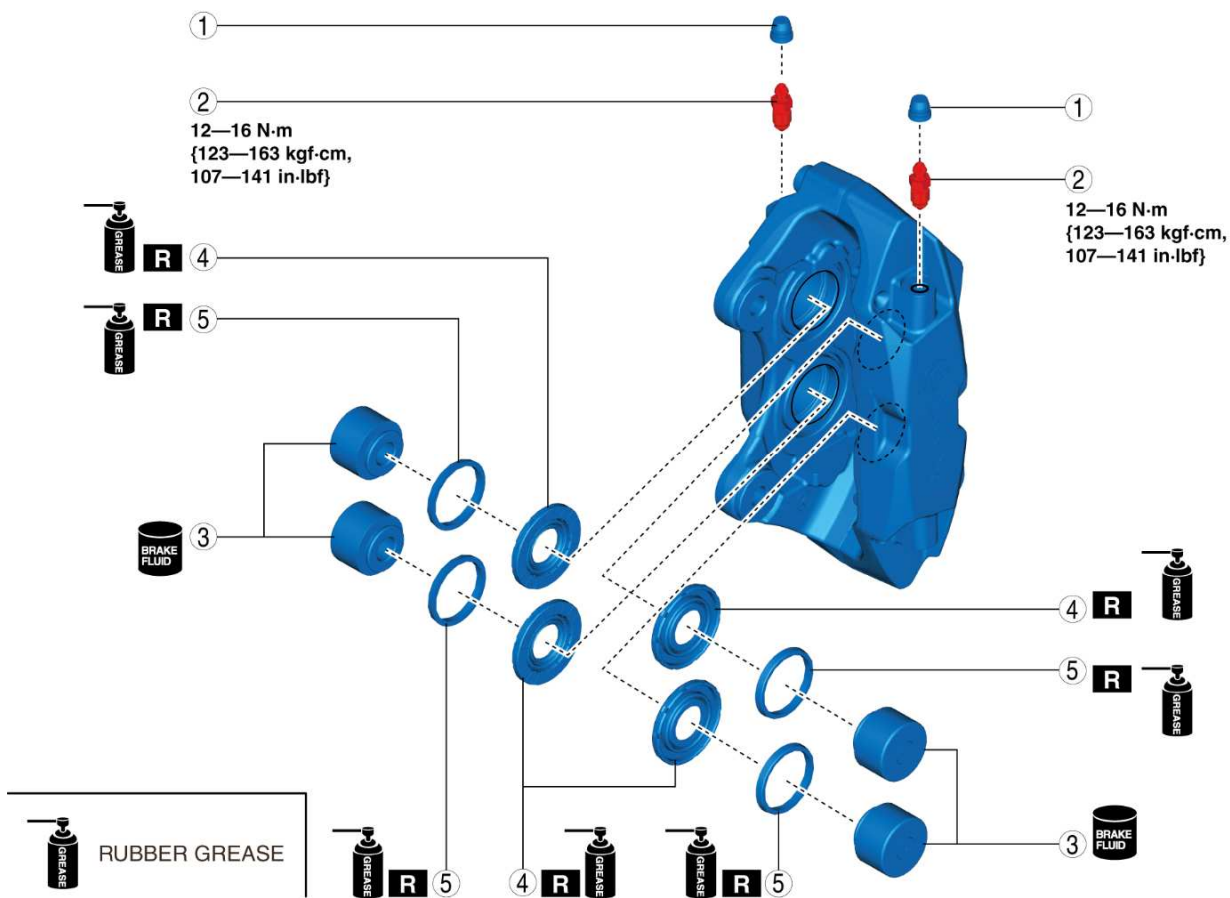
- 6** 53—64 {5.5—6.5, 40—47}
- 4** 56—78 {5.8—7.9, 42—57}
- 3** 49—59 {5.0—6.0, 37—43}
- 1** 53—64 {5.5—6.5, 40—47}
- 8** SST
- 5** SST
- 9** 56—78 {5.8—7.9, 42—57}
- 1** 123—136 {12.6—13.8, 91—100}

Units: N·m {kgf·m, ft·lbf}

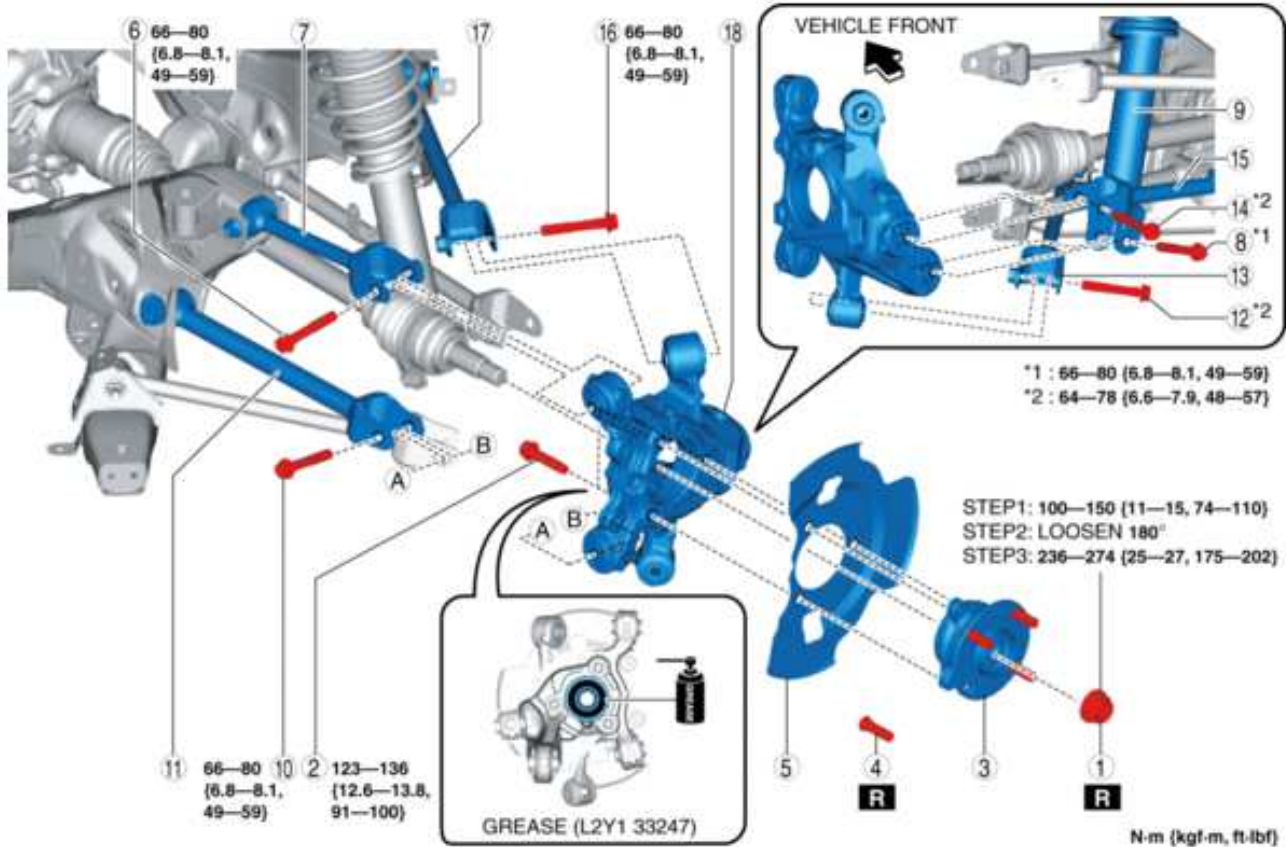


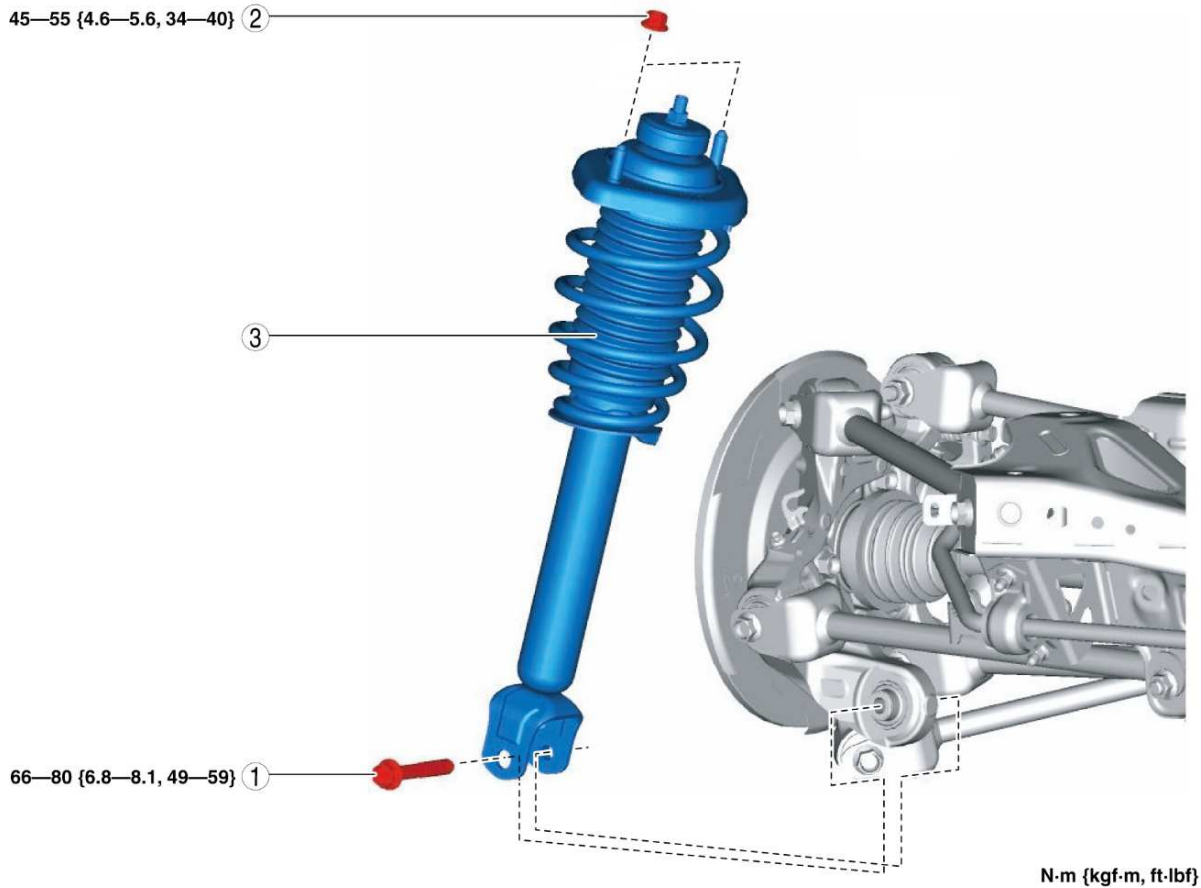
19.2 Front Brakes



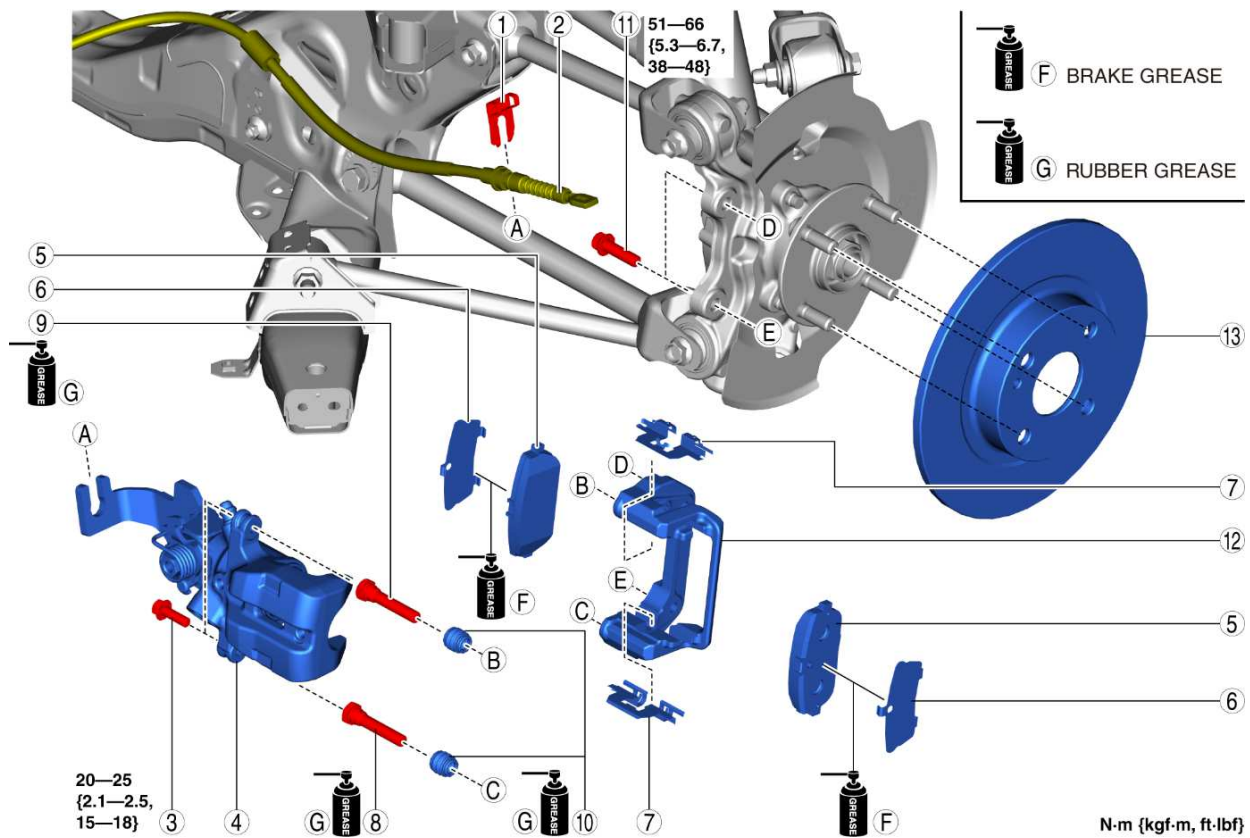


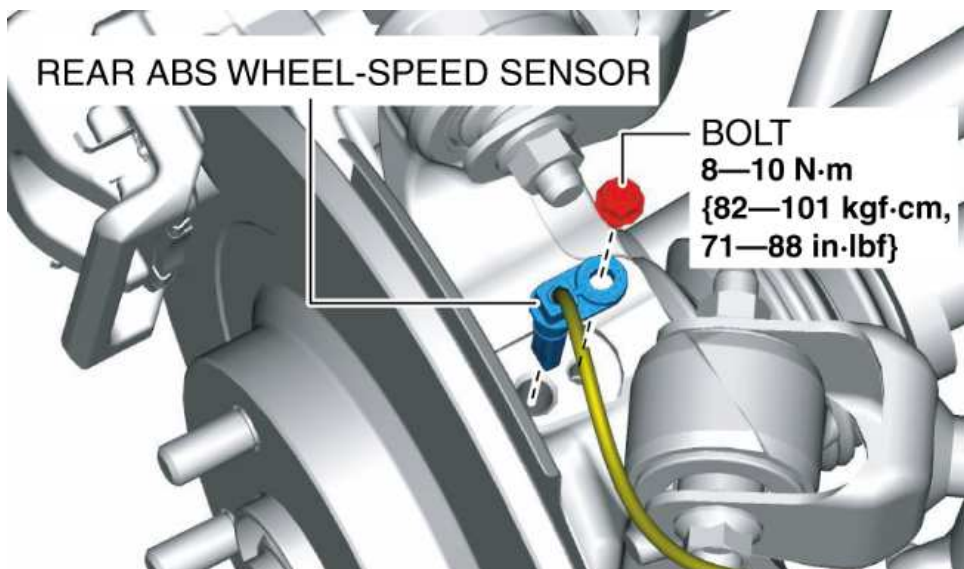
19.3 Rear Suspension





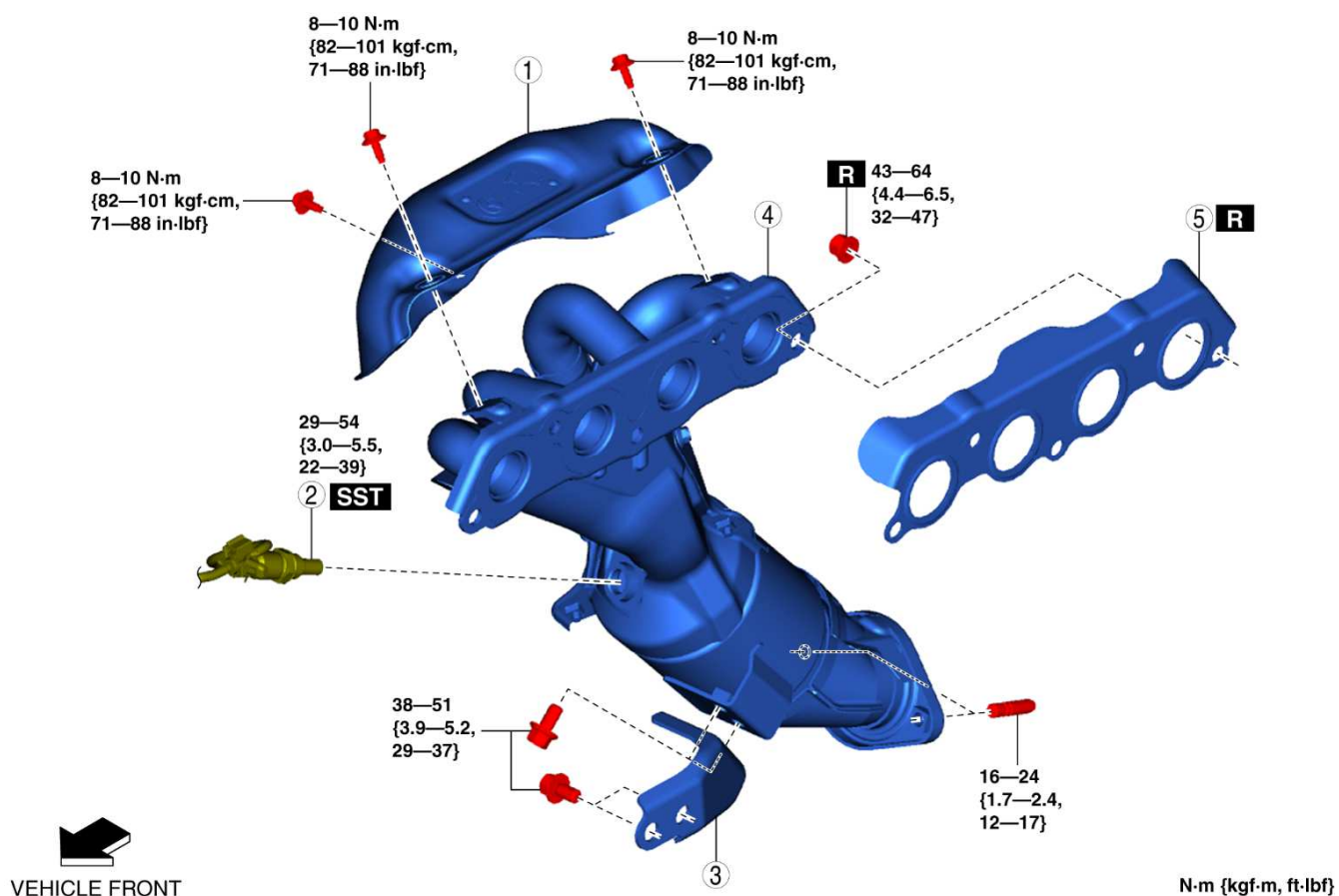
19.4 Rear Brakes



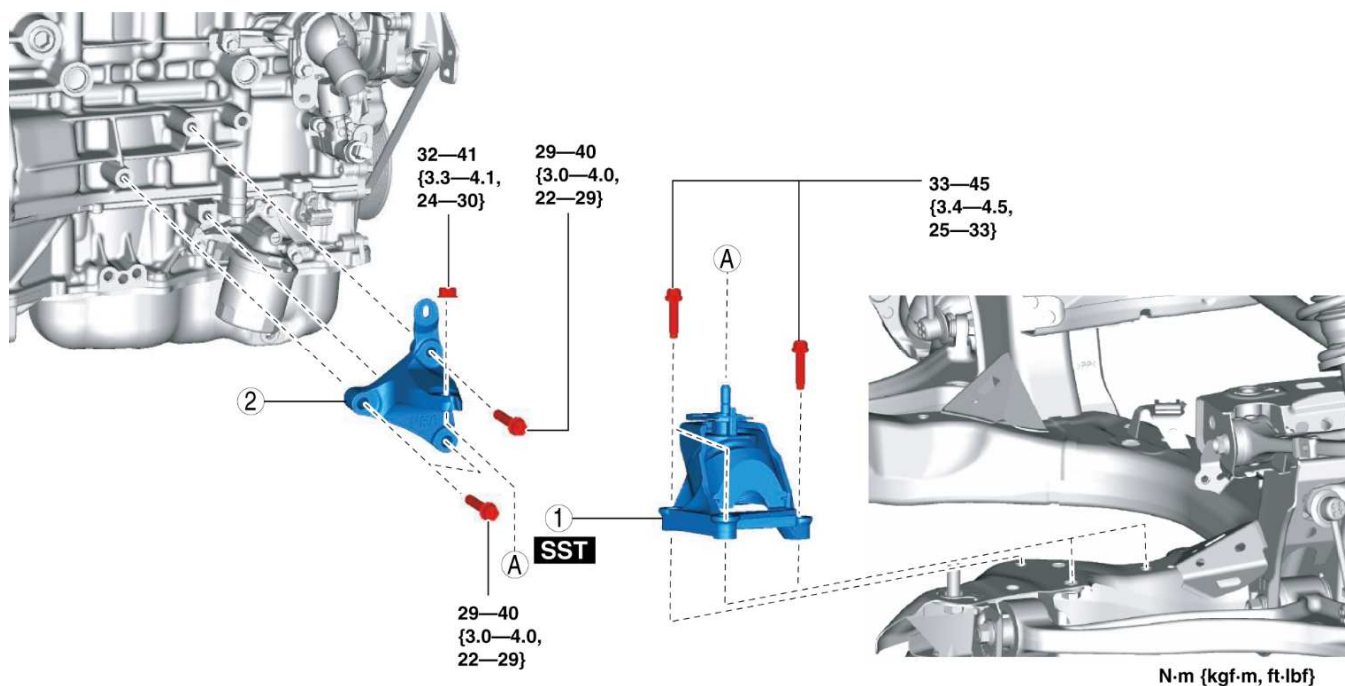


19.5 Engine Bay



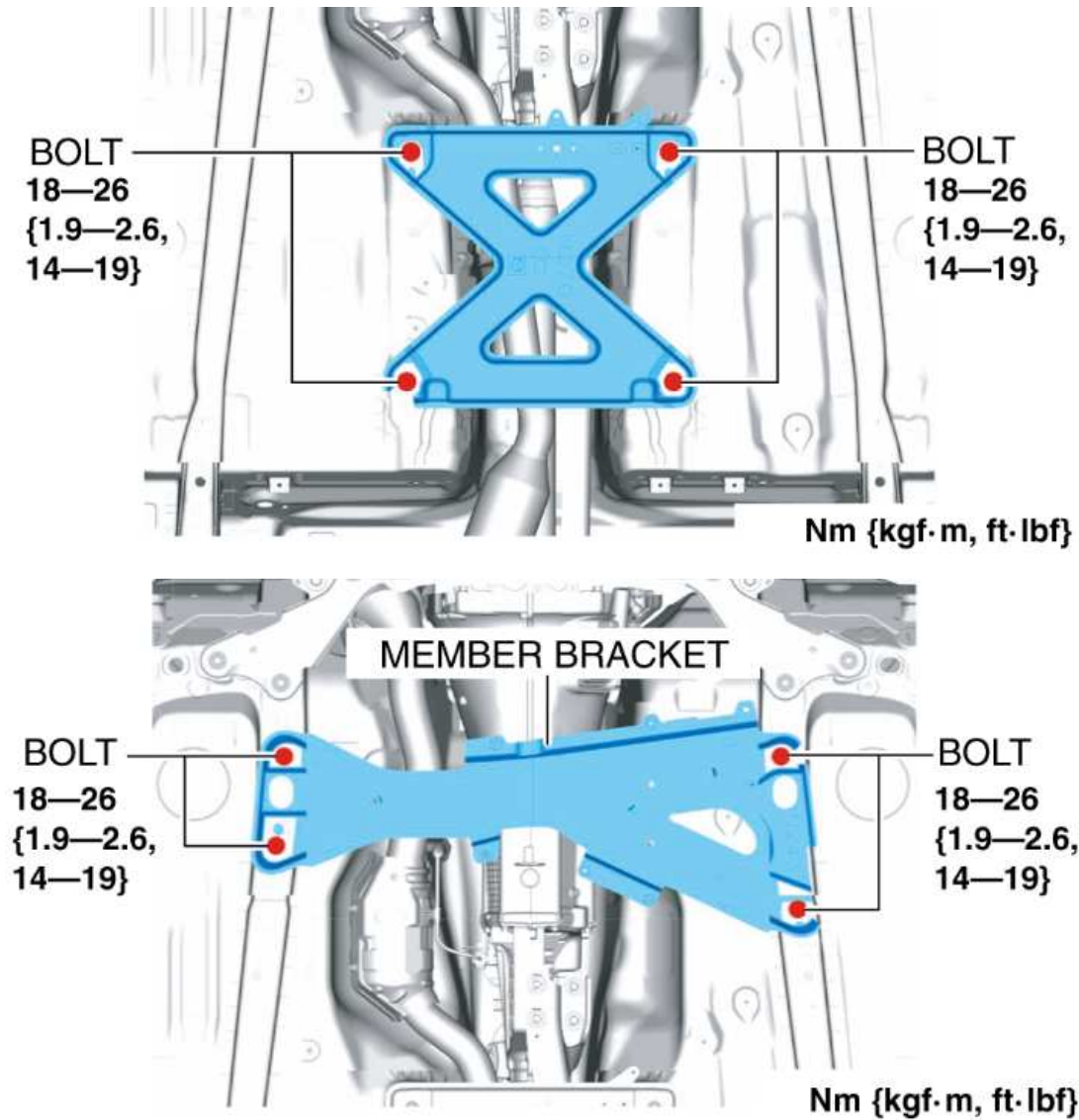


Note: Stock Exhaust Header shown. Torque specification for Motorsports Header are the same.

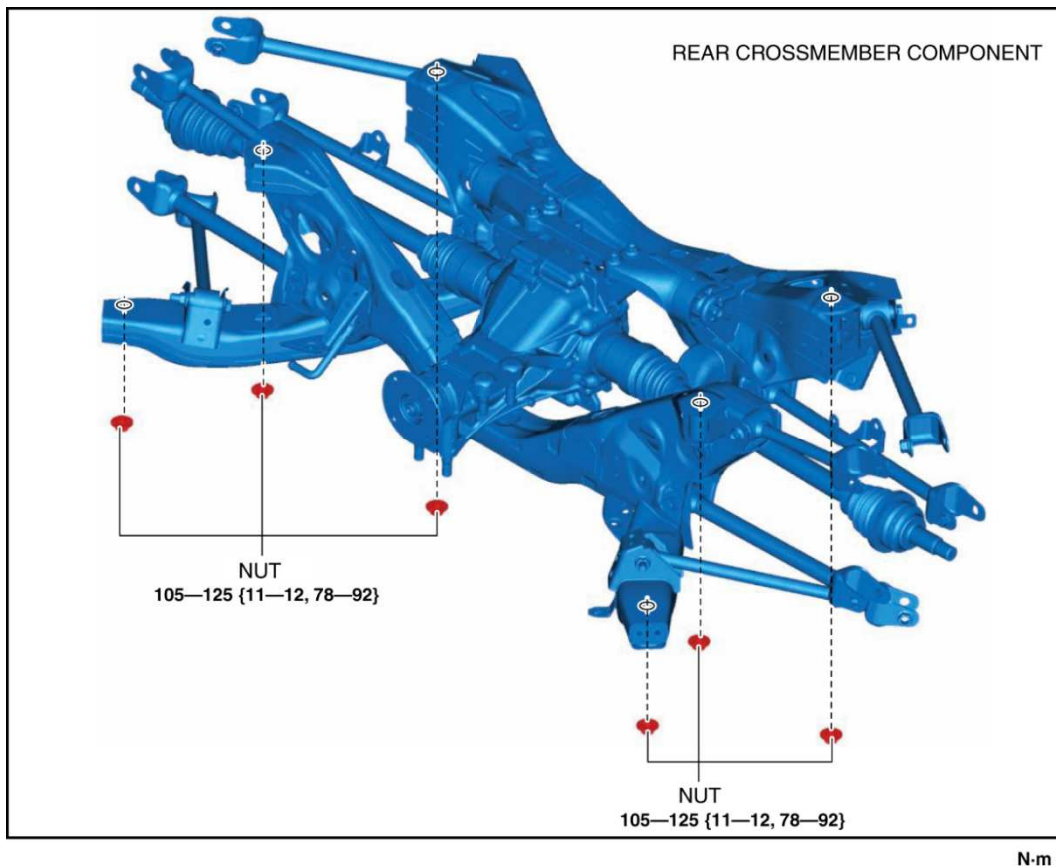
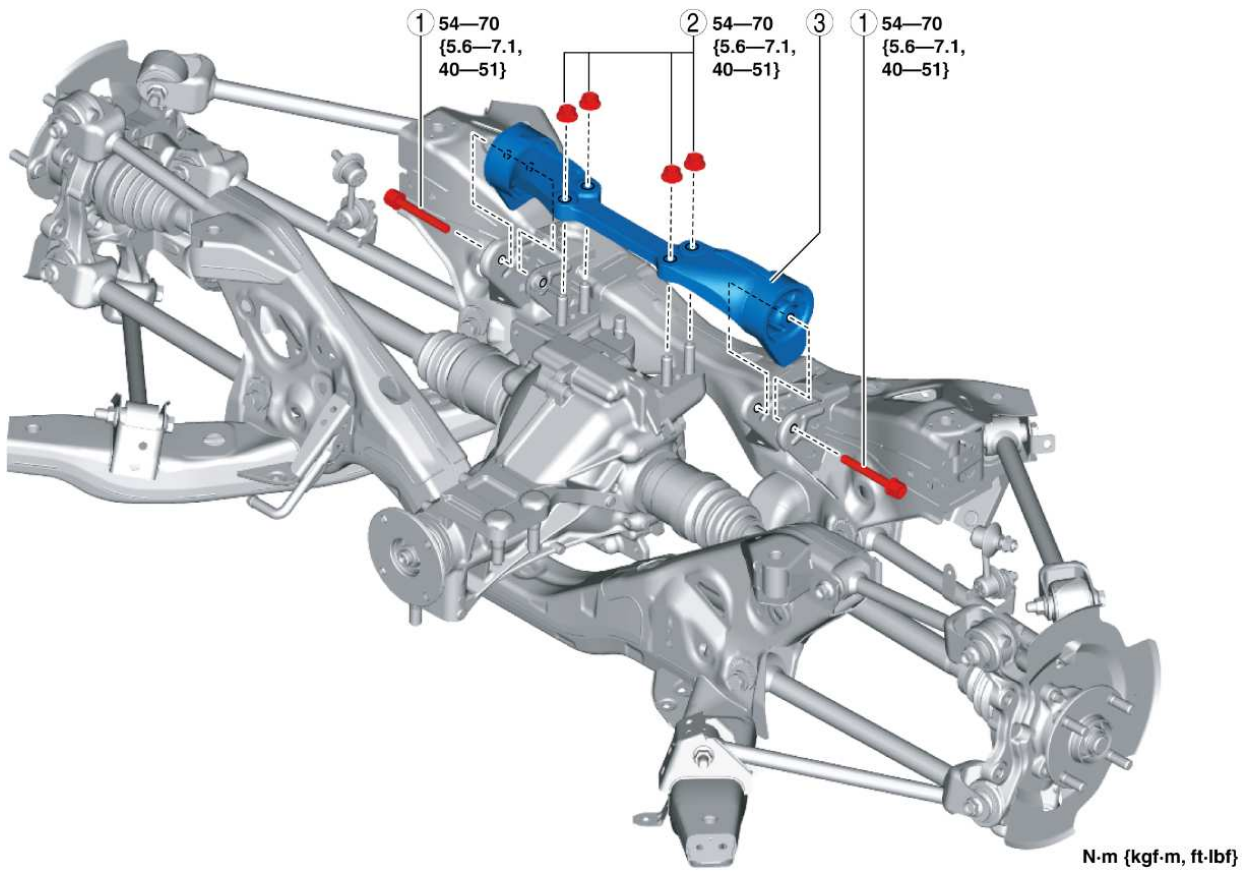


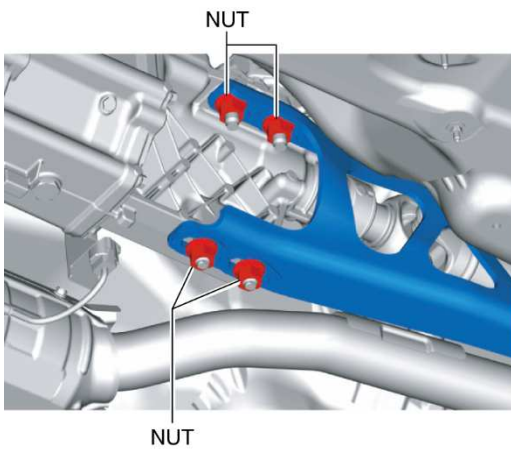
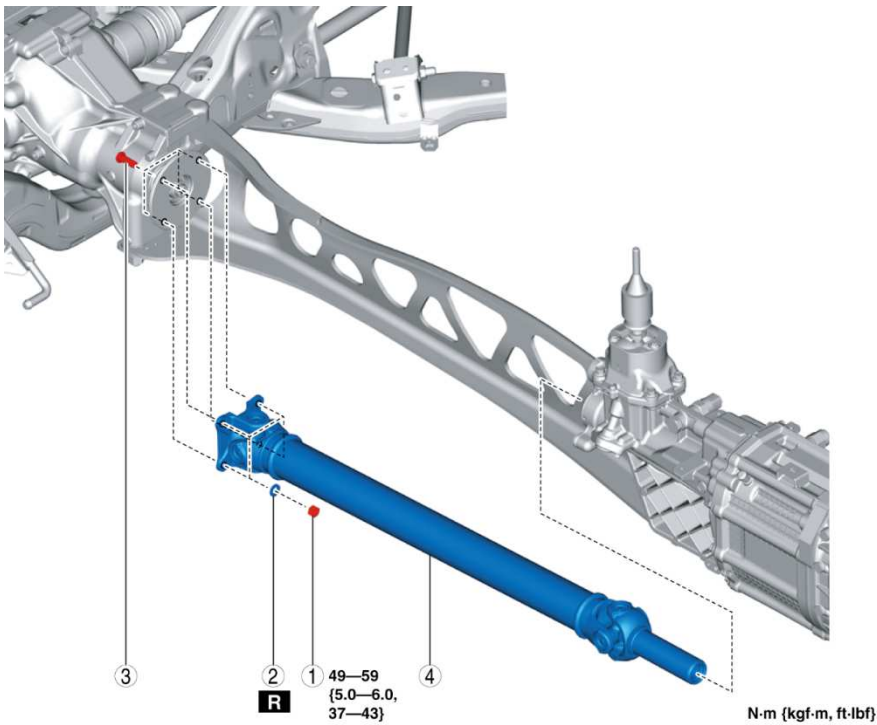
Note: Engine Mount Reinforcement Brackets are included and are installed with the Stock Bolts.

19.6 Under Car



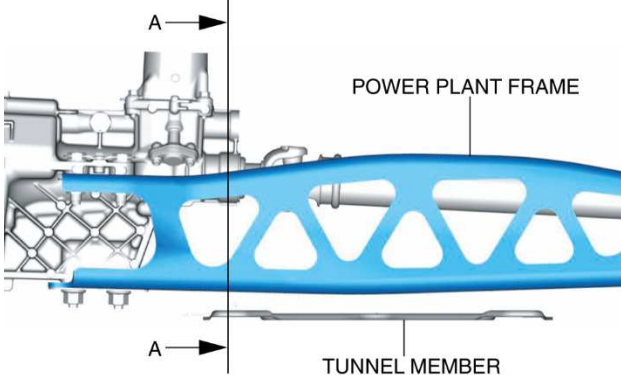
19.7 Differential and Transmission





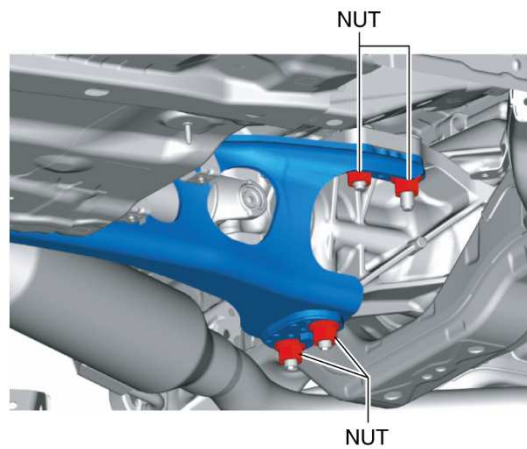
Tightening torque
135—164 N·m {14—16 kgf·m, 100—120 ft·lbf}

Power Plat Frame Spacing:



Specification

- Between bottom surface of power plant frame and top surface of tunnel member: 22.4—28.4 mm {0.89—1.11 in}



Tightening torque
164—200 N·m {17—20 kgf·m, 121—147 ft·lbf}

