# Model 3 Gear Set Replacement

## Introduction, disclaimer and risk assessment.

This manual describes the procedure for replacing the gear set in a Tesla Model 3 motor.

Although the process is described using written and illustrated steps it is intended for competent personnel only. Personnel carrying out this task should correctly use appropriate PPE (Personal Protective Equipment). Using tools different from those specified may put the operator and others at risk and may cause damage to the build. Potential project risks may include: pinch or cut of hands.

## PPE (Personal Protective Equipment)

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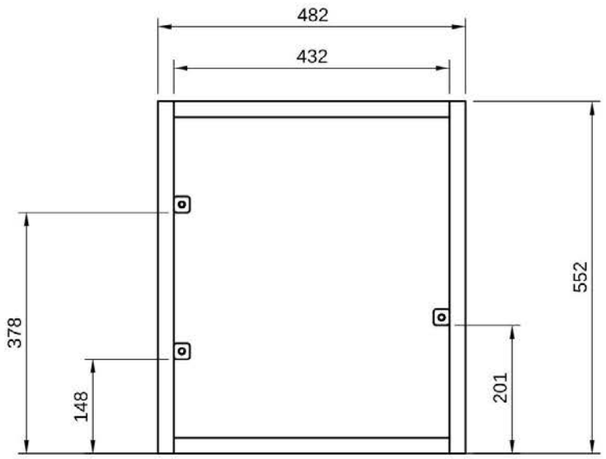
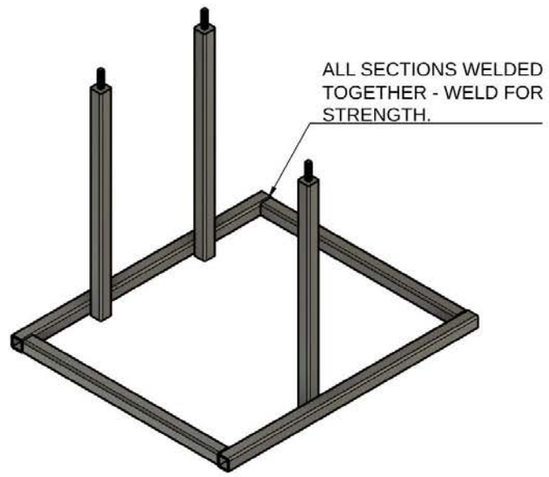
| Eye protection |  | Gloves (Recommended) |  |
| Steel Toe Cap boots |  | Respirator |  |

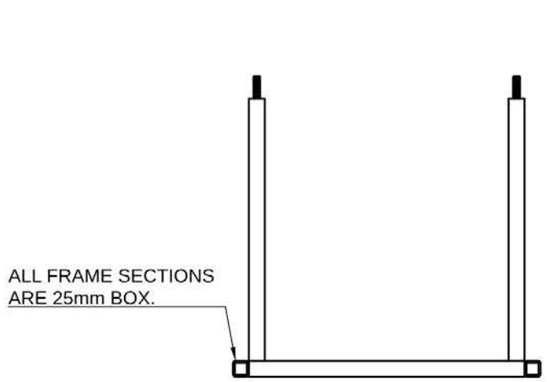
# Gear Set Replacement

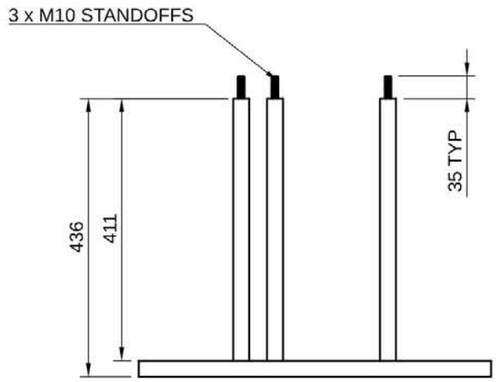
| Tools | Consumables |
|---|---|
| • Torque Wrench<br>• Pry Bar<br>• Flat blade screwdriver<br>• ¼” Ratchet with deep 10mm Socket<br>• 150mm ¼” extension bar<br>• E12 spanner<br>• Tesla E12 Socket<br>• Tesla E14 Socket<br>• 8MM Allen T bar<br>• Soft mallet<br>• Impact Gun<br>• 30 Tonne Hydraulic Press<br>• Suitable lifting winch<br>• 5 litre oil drain pan<br>• Motor support jig, see drawing below. | • Brake Cleaner<br>• Oil<br>• Oil Filter |

| Parts | # | Qty |
|---|---|---|
| Tesla Model 3 Rear Drive Unit Reduction Gearset 3.54:1 | TM3RDU-GS3541 | 1 |
| Oil filter | 1095038-00-A | 1 |


482
432
552
378
148
201


ALL SECTIONS WELDED TOGETHER - WELD FOR STRENGTH.


ALL FRAME SECTIONS ARE 25mm BOX.


3 x M10 STANDOFFS
35 TYP
436
411

## Assembly Procedure

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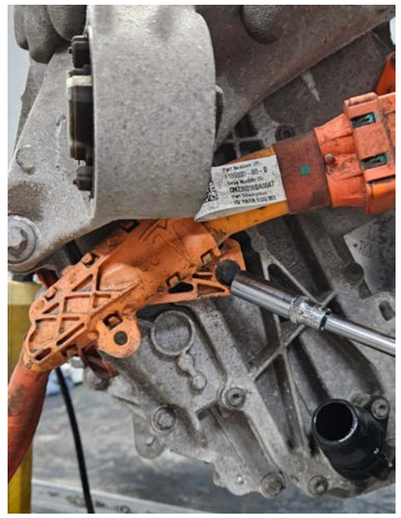
| **1.** | • Remove the 10mm bolt holding the HV power cable. |  |
| **1A.** | • Thoroughly clean the drive unit with brake cleaner and a clean cloth before starting the following procedure to avoid internal contamination. | |

**2.**

- Remove the yellow security sticker from the cover plate.
- Un-bolt the orange HV cover plate with E12 socket.
- Pry the cover plate from the motor housing using a flat blade screwdriver.

  Take care as the cover can crack easily.
- Remove the bolts from the HV terminals with the 10mm socket, be careful not to drop them into the inverter housing.



**3.**

- Fit 1 tonne Lifting eye to motor, See photo.
- Remove the oil pump in order to drain the oil from the unit and oil pump.
- Drain oil into a clean receptacle to avoid contamination.
- Keep original oil if OEM oil is not available as the unit will need to be refilled with OEM oil.
- Refit oil pump.
- Remove lifting eye.
- Fit support Jig.
- Lift the motor into a vertical orientation in the jig with the inverter side facing up.
- Remove all 18 bolts from the housing with the E12 socket and spanner.



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| **4.** | • Lift the motor case squarely off of the motor using a pry bar and lifting winch to separate the two halves.<br>•  Take care not to damage the seal and case. |  |
| **5.** | • Remove the seal.<br>• Clean with a clean cloth and store the seal safely. |   |
| **6.** | • Lift motor output shaft off of the splines by hand.<br>• Leave it resting in this position until you have completed the next stage in order to gain enough clearance. |  |

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| | • Using the pry bars apply slight pressure to release the differential from its housing.<br><br>• Place hands under the crown wheel so that the diff does not drop back down again. |  |
| **7.** | • Working from above the unit apply linear upward force, whilst wiggling the diff and intermediate shaft.<br><br>• These should come away from the housing (this can be tricky if the force is not applied perpendicular to the drive unit). |  <br>  |

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| | • The plastic shroud should come away with the gears.<br><br>• Clean the plastic shroud with a clean cloth and brake cleaner and put it to one side. |   |
| **8.** | • Check if there is a shim ring present in the housing under the differential (They sometimes stick to the differential bearing).<br>• If there is a shim ring it must be refitted. (Not all units have this shim fitted from production). |  |

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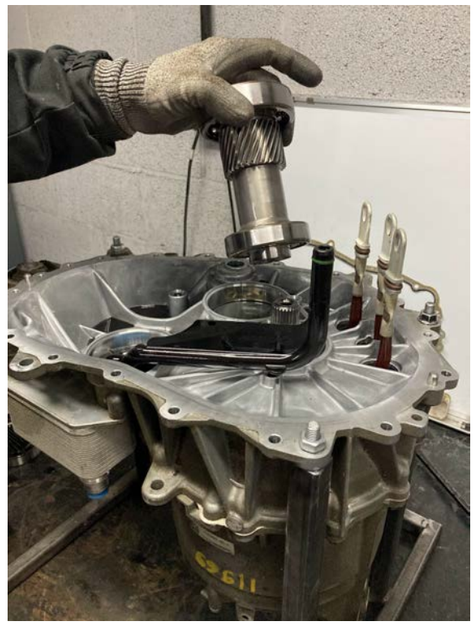
| **9.** | • Remove Motor output shaft. |  |
| **10.** | • Place the intermediate shaft in the hydraulic press (at least 25T capability).<br><br>• Press the shaft through the bearing, taking care to catch the intermediate shaft once free. |   |

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| **11.** | • Once the bearing is pressed out. Remember the original orientation as it needs to be fitted in the same way. |  |
| **12.** | • When fitting the new intermediate shaft gear, ensure that the proud face is facing the bearing. As indicated in the beside picture. |  |

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| **13.** | • Press new intermediate shaft gear onto the shaft until flush, as pictured.<br>• Place the bearing on top and press until seated.<br>• This can take in excess of 23T to seat.<br>• The gear should be sat on the shoulder of the shaft as shown in the photo. |    |
| **14.** | • Remove the plastic oil insert from the motor output shaft. |  |

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| **15.** | • Place the motor output shaft in the hydraulic press (at least 25T capability).<br><br>• Press the shaft through the bearing, taking care to catch the motor output shaft once free.<br><br>• Take note of the orientation of the bearing and which end it is attached to as they are different sizes and they need to be re-fitted in the same orientation.<br><br>• Repeat operation for the other end. |    |
| **16.** | • Press bearings onto the new output motor shaft using the hydraulic press and suitable die. (this end of the shaft is proud of the bearing face). |  |

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| **17.** | • Fit bearing to opposite end of motor output shaft. Note this bearing is flush.<br><br>• Press home the plastic oil insert, You may need to use a 19mm deep ⅜ socket and gently tap it into position with a small mallet. |   |
| **18.** | • Before reassembly, ensure all bearings are flushed with brake cleaner, lightly lubricated with drive unit oil and run smoothly. Failure to do this could cause irreversible damage to the motor internally and cause noisy operation. |  |

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| **19.** | • Refit the gears and plastic shroud to drive unit, See picture.<br>• These need to be fitted as a whole unit, as this can not be done individually<br>• Ensure the pipes on the plastic shroud are aligned correctly with the holes in the case (See photo) as it could be damaged when aligning the gears while reassembling.<br>• ⚠ Be careful as there is a risk of trapping fingers, consider getting assistance for this stage to help align all of the components. |  |
| **20.** | • Install motor output shaft separately. Apply significant downward force by hand to locate shafts in housing. This should happen abruptly and snap into place.<br>• Rotate by hand to ensure free rotation before fitting the cover. |  |

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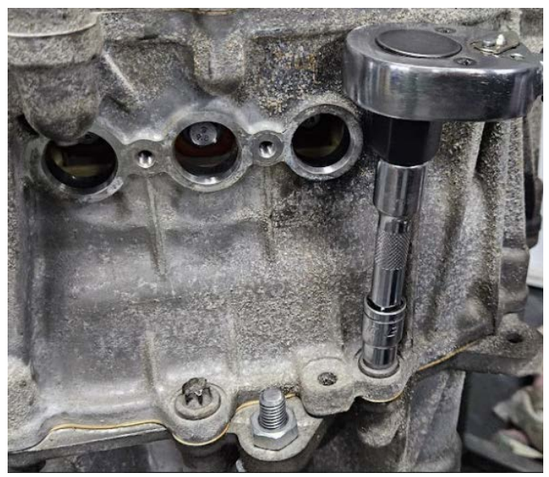
| **21.** | • Ensure the mating faces of each half of the motor and the gasket has been cleaned with a clean cloth.<br>•<br>• Refit the gasket to the motor.<br>• ⚠ Ensure the dowels line up. |  |
| **22.** | • Refit the other half of the case ensuring the HV connections are located in the 3 holes as pictured.<br>• Lower the case onto the motor and align the two halves squarely.<br>• You may require a soft mallet to seat the two halves together. |   |
| **23.** | • Refit all E12 bolts into the case.<br>• Torque these to 35nm.<br>• ⚠ Be mindful that they may stretch during torquing and may need replacing. Do not over tighten more than ¾ of a turn once the shoulder is seated onto the case as these may snap. If you reach this stage the bolt will need to be replaced. |  |

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| **24.** | • Re-install phase bolts with a 10mm socket torque to 15nm.<br>• Re-install HV cover with E12 socket torque to 5nm.<br>• Replace the HV yellow security sticker (must be purchased separately). |  |
| **25.** | • Replace oil filter.<br>• Refill with 2.75 litres of OEM oil. | |