



# GM Mini Starter

## INSTALLATION INSTRUCTIONS

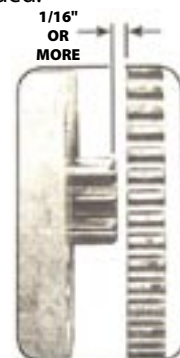
**Proper mounting of the starter is important because this determines whether the starter pinion will engage properly with the ring gear. When the starter is positioned correctly, the starter pinion will engage the ring gear without binding, minimizing the chance of starter pinion and/or ring gear damage.**

1. **CLOCK STARTER-** (This only applies to CLOCKABLE starters) This starter comes "clocked" from the factory to fit most applications. For certain custom applications it may be necessary to re-clock the starter mounting block. If this is required, remove the socket head bolts and reposition the block as needed. Hold the starter block squarely against the starter-mating surface while tightening the bolts in an alternating manner. Torque to 50 in/lbs. Use of medium strength Loctite is recommended.

2. **MOUNT STARTER-** Make sure the mounting surface of the engine block is smooth, flat and free of paint buildup. Torque starter mounting bolts to engine manufacturer's specifications, typically 32 ft. lbs.

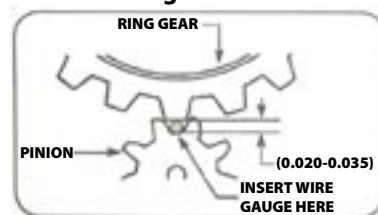
3. **CHECK PINION CLEARANCE-** There should be 1/16" minimum from the back side of ring gear to the front edge of teeth on the starter pinion. Check in at least three locations on the ring gear (see Figure 1). If not in spec., verify that the ring gear is properly mounted.

4. **CHECK PINION ENGAGEMENT-** Pull pinion out to engage ring gear. Pry the pinion out of the starter or connect 12 VDC to the "Switch" terminal only (DO NOT connect battery cable to "BAT" terminal on the starter solenoid). This engages the solenoid but does not spin the starter. CAUTION: Do not leave the solenoid engaged like this for more than 30 seconds at a time as the solenoid will overheat.



**FIGURE 1**

**PLEASE NOTE: After releasing the solenoid, the pinion may STAY ENGAGED in the ring gear until the engine is started. This is normal for gear reduction starters and does NOT require shimming to correct.** Insert a wire gauge to check for proper clearance between the ring gear and starter pinion (see Figure 2). There should be a 0.020" to 0.035" clearance measured from the valley of the starter pinion to the tip of the ring gear tooth. (NOTE: A #1 standard paper clip is usually about 0.035" in diameter and makes an easy tool.) Check clearance at least three places on the ring gear. If the clearance is too small, add one shim at a time between the starter and engine block to bring it into specifications. In many installations, no shims are necessary.



**FIGURE 2**

5. **ATTACH BATTERY CABLE AND SWITCH WIRE-** The switch wire should be capable of handling 15A, typically a 14AWG wire. The battery cable must be the proper size for the length of the cable (**see chart**). All connections should be clean and tight and terminals should be soldered if possible. The ground cable to the frame should be the same size as the starter cable. Also, a ground strap should be installed from the frame to the motor. If the original solenoid has a connection to the "R" terminal (ballast resistor bypass), this wire can usually be eliminated.

CABLE RECOMMENDATIONS				
DISTANCE:	3'	5'	7'	10' +10'
AWG:	4	2	1	0 00

6. **OPERATE STARTER-** It should operate quietly. Any loud grinding noises must be corrected. If the starter makes a high pitched whine during cranking, the pinion to ring gear engagement is too great. If the starter makes a high pitched whine after cranking as the button or key is released, the clearance is too little. The cables and connectors themselves should be checked for voltage drop with a voltmeter. To check any wire or cable for voltage drop, connect one side of the voltmeter to one end of the cable and the other side of the voltmeter to the other end. OPERATE THE CIRCUIT and simultaneously measure the volt drop. It should be 0.5VDC or less. High voltage drops indicate a bad connector or undersized cable. The ground circuit can be checked in the same manner. Measure input voltage by connecting the positive probe of a voltmeter to the "MOTOR" terminal of the solenoid and connecting the negative to the starter housing (should be 9.0V minimum while cranking).

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