



## Motion Raceworks Operator Shifter Instructions

### TH400/TH350 Clean Neutral Shifter

### P/N 16-2001, 16-2003, 16-2501, 16-2503

**Congratulations on your purchase of the Operator Series Shifter. This shifter is a result of thousands of hours of design, testing, racing, and refinement. We hope you love it!**

*\*\*\*Please note: This shifter is intended for racing. Improper operation or installation may cause damage to yourself, vehicle, or others around you.\*\*\**

#### **Installation:**

1. Insert shift cable into shifter with shifter in park position, being sure to align cable end into lower pin hole (dowel pin hole access from passenger side plate).
2. Insert dowel pin to lock shift cable to shifter handle (Figure 1). Use the 4-40 x 5/16 bolt to fasten the dowel pin plug in place, retaining the shift cable and air solenoid dowel pins (Figure 2).



**Figure 1**



**Figure 2**

3. Mount shifter in vehicle using supplied mounting feet and 1/4-20 socket head bolts and locking nuts. Other mounting options are available ala carte (tube mounts for 0.75in, 1.0in and 1.25in as well as car specific mounts)

**HOLE A: TH400, TH400 2SPD, TH350**

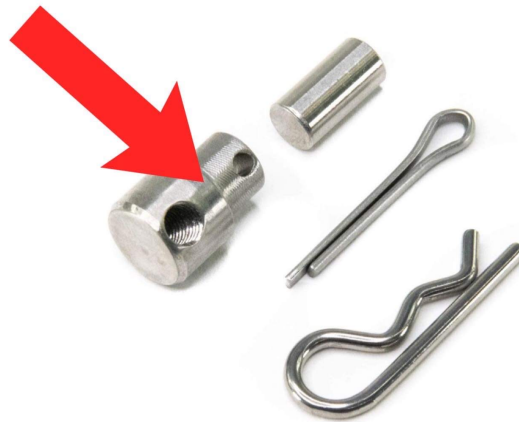
**HOLE B: 4L80E, 4L60E, 700R4**

**HOLE C: POWERGLIDE**



**Figure 3**

4. Moving down to the transmission, install the gear selector bracket on the transmission shift shaft (with the side marked OUT facing out as seen in Figure 3). Note: all Th400 2 and 3 speed use TH400 hole, TH350 uses hole A.
5. Install the shift cable mounting bracket using the supplied 5/16 x 1.5in bolts to replace the 2 corresponding transmission pan bolts.
6. Insert the shift cable into the shifter cable bracket and tighten near the middle travel using the two 7/16 nuts supplied on the shift cable.



**Figure 4**

7. Thread the shift cable swivel end (Figure 4) onto the end of the shift cable until it aligns and freely slips in and out of the hole in the gear selector corresponding to your transmission type. Figure 4
8. **IMPORTANT** : Next you'll check alignment of the shifter by ensuring that the swivel end is free to move in and out of the gear selector in each gear, especially drive gears (i.e. 1,2 etc.). Adjust as needed until free fitment in each gear is obtained. We suggest removing the swivel end completely from the selector, manually pushing selector to next gear while also moving shifter and then verifying that the selector slides in and out freely. This insures that the transmission is firmly in the next gear and the shifter is adjusted appropriately.  
Note: Failing to insure the swivel end is loose and free / loose in each gear can result in the transmission and valve body not properly engaging a gear and can result in damage or failure of the transmission or that particular gear.
9. Install either the supplied cotter pin or hair pin (quick pin) to retain the swivel end in the gear selector bracket. Note: we supply both styles so you can use what you prefer.

Notice: Insuring that the swivel end in Figure 4 is properly adjusted is something that should be periodically checked. This needs to be done anytime a transmission is serviced, a shifter is removed or anytime the cable is manipulated or unbolted from the transmission.

**Wiring:**

Each Motion shifter is supplied with both Park/Neutral safety and Reverse internal microswitches. It is recommended that the microswitch be used only as a relay trigger (ground or power) for anything over 5 amps maximum (continuous or startup). These are a simple in/out switch and the wiring is not dependent on polarity. Wiring from the shifter is supplied as flying leads to allow the use of the customer preferred connector type.

**Neutral Safety Switch Wiring: Please read complete.****(P and Furthest Away Neutral)**

Input - Purple

Output - Purple

**Reverse Switch Wiring (R/N position):**

*\*\*\*Please note, we do not recommend using this location with an automatic relay to engage the reverse switch if wired in tandem as a Neutral Safety Switch output as it will allow vehicle to be started while in reverse which is not legal with sanctioning bodies and can cause damage to persons or vehicles present nearby. If being used as reverse wired only, this can be used as an automatic relay, but will not start vehicle as a "neutral"\*\*\*\**

**Input - Black**

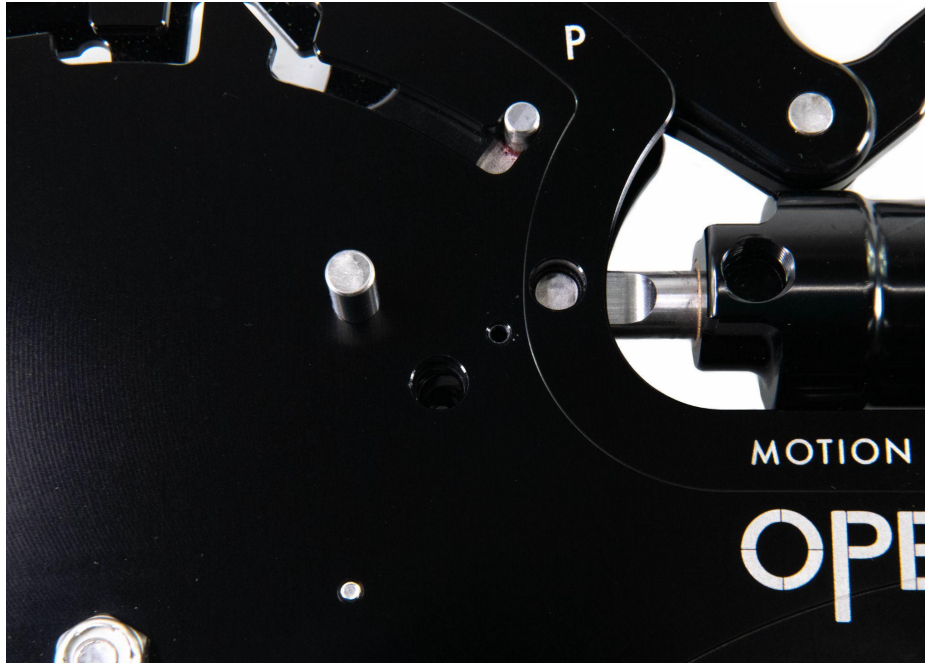
**Output - Black**

**Air Cylinder Installation:**

All Motion Shifters are CO2/Air capable, the air cylinder can be added at any time.

If you purchased a shifter with an air cylinder, it will come preinstalled. Skip to step 5.

1. Remove top/front cross bolt in the shifter housing (**Figure 5 next page**)
2. Remove dowel pin plug from passenger side plate
3. Place shift handle in detent directly before park and locate the air cylinder on shifter in order to align the air cylinder rod into the upper dowel pin hole. Insert air cylinder dowel pin and replace dowel pin plug.



**Figure 5**

4. Bolt rear of air cylinder to the shifter using the cross bolt removed in step 1
5. Plumb the air/CO2 source (80psi recommended) to port 1 of the MAC valve
6. Plumb port 2 of the MAC valve to the rear air cylinder port
7. Wire the MAC valve to your preferred control method (i.e. ECU output, RPM trigger etc)

Note: This shifter is designed to be optimized with CO2 assist. In doing so the shifter gates are designed to be used with a specific force to catch all gates. In order to avoid going from 1 to 3 gears when shifting into second, a minimum force is required to catch the second gear gate. Please become comfortable with this operation before racing.

Please note: we recommend testing air cylinder pressures with the linkages to the transmission connected and final routed before racing your vehicle. While this cylinder was designed to lower the operating pressure of normal CO2 assist shifter needs, different transmission configurations, shift linkages, and shifter cable routing can require more CO2 pressure to operate.

Please note: proper shift trigger settings need to be utilized to insure performance of CO2 assist. Failure to do so can result in missed shifts, shifters that will not come out of final gears (co2 is not released, and other complications).

**Questions/Concerns? Give us a call!**

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