

# RETROTEK *SPEED*

# SMART SHIFT

U.S. Patent Pending

## Instruction Manual

### LIMITED WARRANTY

Retrotek Speed. warrants to the original Purchaser of its SMART SHIFT that the product shall be free from defects in material and workmanship (normal wear and tear excluded) for a period of 12 months from the date of purchase. If within the period of the foregoing warranty Retrotek finds, after inspection, that the product or any component thereof is defective, Retrotek will at its option, repair such products or components or replace them with identical or similar parts PROVIDED that within such period Purchaser:

1. Promptly notifies Retrotek, in writing, of such defects.
2. Delivers the defective product or component to Retrotek (Attn: Warranty) with proof of purchase date; and
3. Has installed and used the product in a normal and proper manner, consistent with Retrotek printed instructions

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**For off-road use only, not intended for highway vehicles**

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# Smart Shift Tech Sheet

Key pad size (behind dash) – 2 ½” wide x 4 ¼” long

Key pad Bezel - 2” wide x 4 ¼” long

Main control - 5” wide x 7” long x 2” high

Actuator size - 2” high x 7” long x 2” wide

- Comes with billet bezel
- Shift speed 0.2 seconds per shift
- Will fit all domestic transmissions including the Hemi 5 speed
- GM 350, 700R4, 4L60, 400, 3L80, 4L80, 2004R, Powerglide
- Ford C-4, C-6, AOD, AODE
- Chrysler 727, 904, Hemi 5 speed
- All shifters will work with Gear Vendors
- Can be custom calibrated for any other unlisted transmission

## Key Pad

- 7 buttons
- Buttons are self indicating (change color when active) – except for billet buttons
- LED status light will show gear position
- Background color and status color are user selectable – choose from red or green
- Headlight switch will dim lights on keypad
- Dip switch on keypad allows user to select all transmissions and lighting features
- connector for remote push buttons and paddle shift
- Includes 6 feet of cable (extensions are available if needed)

## Actuator

- Black Anodized
- Water proof
- Fits in a 2 ¼” space between trans pan (does not hang below pan)
- 1year replacement or repair warranty
- Comes with all brackets & hardware for most transmissions

## Main Control Box

- Black Anodized
- Built-in mounting brackets & tabs

## Display

- Keypad display uses status lights to indicate which gear is in use
- Will work with Classic Instruments analog gauges

## Paddle Shift

- Remote Paddle Shifters are for up shifting and downshifting available
- Momentary button can be wired to keypad



# PARTS LIST

**Not all parts are necessary in all kits**

Part#	Description	Mfg Number	Pcs. Per Kit	
1	ROD END 1/4 X 28 Male	CM4	1 Pc	
2	JAM NUT 1/4" X 28	94846A505	1 Pc	
3	BOLT 5/16" x 1-1/4"	91309A585	2 Pcs.	
4	BOLT 8mm x 1-1/4"	91280A538	2 Pcs.	
5	WASHER 5/16 ID	90108A415	2Pcs	
6	FLANGE NUT 3/8 Flange	94831A031	1 Pc	
7	FLANGE NUT 10 mm	94920A600	1 Pc	
8	SPACER 5/16 ID x 3/8 Long	6432K13	2 Pcs	
9	BOLT 1/4" Fine x 1"	92865A008	1 Pc	
10	BOLT 1/4" Fine x 1-1/2"	912474012	1 Pc	
11	NUT 1/4" Fine	94895A805	2 Pcs	
12	NUT 1/4" Fine Lock	90640A140	1 Pc	
13	STUD COLLAR 5/16	6432K13	2 Pcs	
14	FLANGE NUT 5/16	94831A030	2 Pcs	
15	STUD 5/16 x 4"	92198A699	1 Pc	

This list is for identification purposes only and may vary depending on each kit

## Smart Shift

“Shift into the future with Smart Shift” – that means:

- Electronically controlled automatic transmission shifter
- Compact control module can be mounted anywhere vertically or horizontally
- LED display for positive gear identification
- Backlit Keypad for easy operation
- Built-in Neutral Safety Device
- Eliminates linkage, cable, or rod for a smooth operation

Smart Shift is the winner of SEMA's "Best Engineered Product 2004". The system consists of the following parts:

- Actuator to be mounted at the car's transmission
- Compact Control Unit
- Keypad

### Mounting Cables:

- Please check the required cable lengths before mounting each part of the system.
- Actuator cable: 6 feet
- Keypad cable: 6 feet
- \*Extensions can be ordered in lengths of six feet. Only one extension per cable is allowed.
- The control unit has to be connected to the vehicles electrical system. Actuator and Keypad are powered from the control unit.

### Safety Instructions

- Installation of the Smart Shift must only be performed by qualified and trained Personnel. These persons should be able to recognize and handle risks emerging for electrical, and or mechanical system parts.
- This system was designed for off road vehicles, use of an emergency brake is required for safety purposes.
- Installation by persons without the proper training and qualification may result in damages to persons and devices.
- The devices are carefully checked by the manufacturer.
- The driver of the car, however, is responsible for any risks emerging from using the system.
- When replacing the fuse the same type must be used.
- Do not cut the cables! Cutting cables voids warranty.

### Mounting the Control Box

1. Fasten the control box with 4 self-tapping screws in a dry location, the keypad and control box are not waterproof.
2. Before connecting the supply voltage, you should remove the fuse from the 12-volt power lead in the main harness.

### Connecting the ignition and ground leads

- Use standard cable colors in order to ease maintenance.
- Connect the **black** wire on the main harness to a good chassis ground.
- Connect the **fused** 12-volt power lead in the main harness to either 12V+ on either ignition or fuse panel. Make sure you have 12V+ during cranking!
- The supply voltage should be interrupted when switching off the ignition.
- When the system is ready for use, insert the fuse.

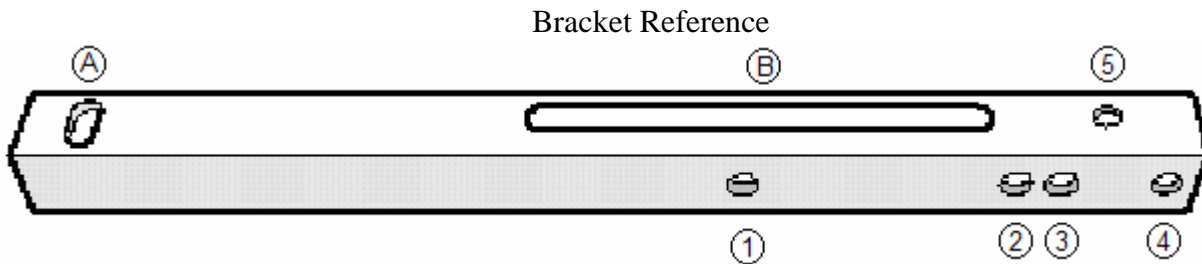
### Connecting Brake and Backlight Leads

The input "brake" is the **brown** wire on the main harness and should always be connected. Brake input should supply 12V+ when brake is applied. **Brown** wire must be wired in conjunction with the brake light switch and acts as a main safety lock for the Smart Shift.

### Optional wiring

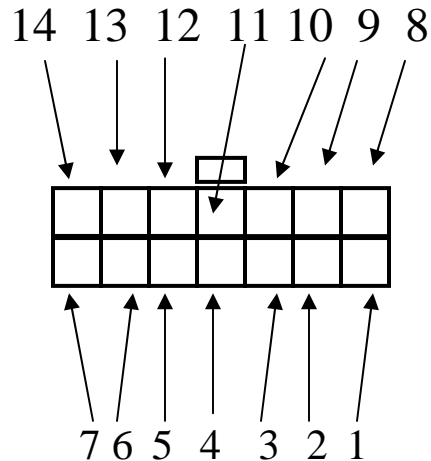
Keypad dimmer control is the **white** wire in the main harness. If keypad dimming capability is desired for night time driving, the **white** wire in the main harness should be spliced into the 12v output in the main headlight switch. This function dims the LEDs and backlights of the keypad when 12v is supplied to the **white** wire.

Analog, electric gear selector display- Smart Shift is compatible with Classic Instruments and moon eyes etc., line of analog, electric gear select gauges. The **purple** wire in the main harness will wire to the signal from the gauge.



## Main Harness Pin out

Colors may vary



1. **Red** (fused wire) - 12v+ ignition (must be 12v+ during cranking!)
2. **Brown**- Brake safety (must be wired to 12v+ when brake is applied)
3. **Yellow**- Tach Input (for Gear Vendors applications only) ref. page 13 (must be 5V or 12V square wave input signal (no points!))
4. **Blue**- Gear Vendors Bypass Switch (-) (call for further info)
5. **Black**- Chassis ground
- 6.
7. **Green / white**- Low voltage relay output for reverse lights. ref. page 16
8. **White**- Headlight dimmer
- 9.
- 10.
- 11.
- 12.
13. **Purple**- Analog gauge output
- 14.

**Note: Wire colors May Vary. Always refer to pin out above.**

### Mounting Keypad

Keypad can be mounted anywhere in the car within reach of the driver, horizontally or vertically.

Use supplied studs & nuts to fasten keypad to the desired mounting location.

The screws should be tightened very carefully to avoid cracks in the material

Press down the connector's latch before inserting or removing the connectors.

Connect keypad to the control unit with supplied grey extension.

# Actuator Installation

Install bolt & nut on shift arm, then mount shift arm on Transmission as shown using flange nut either part #6 or #7 depending on transmission. Don't tighten flange nut yet.

On Ford and Chrysler transmissions, snug bolt and Nut On shift arm. Ford requires additional spacer.

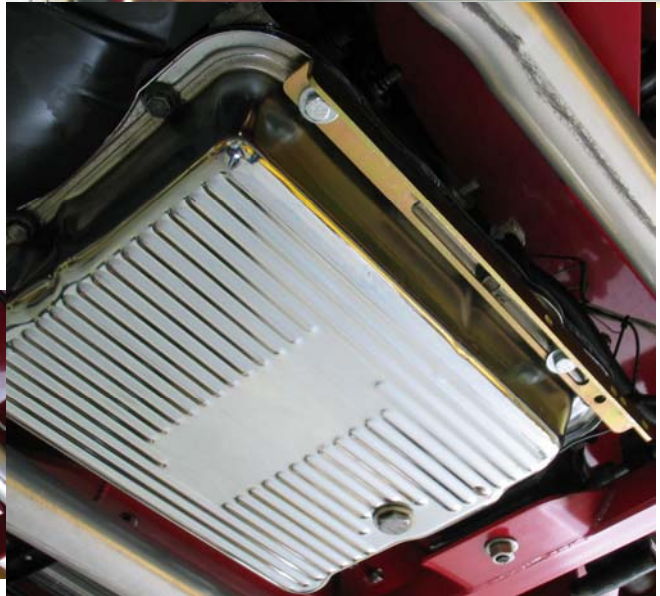
(See special installation instruction section for your specific application notes!)



Align pan rail bracket (#20) on transmission with hole (A) at front bolt on pan. Observe which bolt lines up with furthest rear slot (B) in bracket.



Remove and discard the 2 bolts to be used to mount Pan Rail bracket

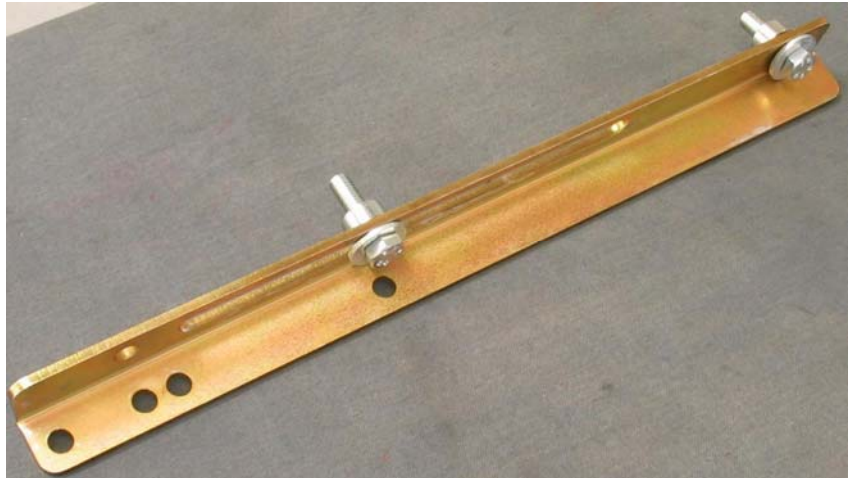


Locate bolts (Part# 3 or 4) washers (Part #5) spacers (Part# 8) and rail bracket (Part# 20) from hardware package. \*Make sure to use correct thread for your application. i.e., 5/16 coarse or 8 mm metric.

Use spacers supplied between pan and pan rail bracket.

Install rail bracket (Part# 20) to Trans.

Mount stud on pan rail bracket.



Refer to chart Bracket Location Section for your Trans and mount SS stud in proper location on bracket

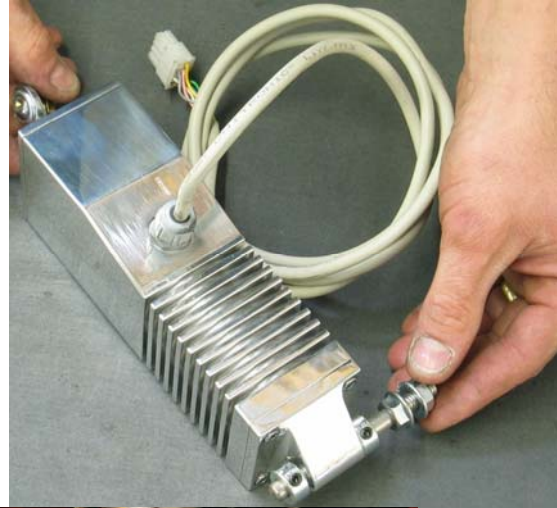


Em<sup>2</sup>: Above

Em 1: Below

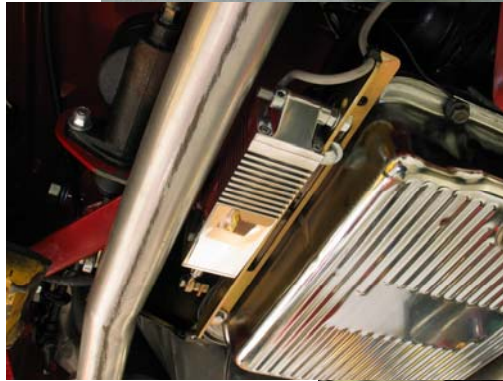
**See Bracket Location Section (Section 7) for correct slot and hole locations for your transmission.**

Tighten stud (Part# 15) to bracket using flange nuts (Part# 14) And install one collar lock (Part #13) loose on stud.



Install Rod End (Part# 1) and jam nut (Part# 2) in shaft on actuator.

Install actuator on tranny and adjust Rod End so actuator does not Bottom out in either direction (in park and First gear). Lock jam nut after verifying position. Tighten shift arm nut.



If positions are correct tighten all bolts on shift arm (Part# 6) and shift arm stud (Part# 4) Install 2nd collar lock (Part# 13) on stud and lock set screw with supplied Allen key making sure actuator is parallel to rail bracket. (See Fig 4)



Re-Check all nuts & bolts and wire locations making sure wire is not in harms way and is secure. If all is well you have completed bracket and actuator installation and can proceed to programming the actuator to each gear on your Trans.

## Getting to Know Your Keypad

### Selecting Keypad Color Scheme

Using a small wire or paper clip, the Keypad color scheme can be changed via the pin hole adjacent to the DIP switch. This can only be accessed without the aluminum bezel in place. If mounting location does not leave this hole accessible, color scheme must be set prior to installation. It can be switched between red and green.

### Note

Generation II Smart Shift components may vary from those in pictures. LED display is no longer necessary and is contained in the Keypad unit itself. Optional external displays are available, but not included in kit.

### Keypad Operation instructions

Your **Smart Shift** electronic shifter comes equipped with gear indication and safety features built into each unit. The translucent buttons will change from their primary color to the contrast color when a gear is selected. A led indicator light will also illuminate next to the gear selected to further accent the selected gear. Smart Shift keypad has 7 keys as well as 10 red & 1 green LED's. On the face of the keypad just under the DIP switch there is a small access hole to allow the user to choose the primary & secondary colors. By inserting a small wire or paper clip through this hole the backlight colors can be changed from Green to red. This may be done at any time and does not change any settings. Upon primary color selection the secondary color or indicator color is set. EXAMPLE Green primary is red secondary, Red primary is green secondary. The colors of the LED's are fixed and cannot be changed.



**PLEASE TAKE SOME TIME TO BECOME FAMILIAR WITH YOUR NEW SHIFTER AND SAFETY FEATURES BEFORE DRIVING YOUR VEHICLE!**

The first thing you may notice is the EXTRA key at the top of your keypad marked **S**. This is your safety key and is used to unlock the shifter from the park position. Earlier in the installation we hooked the brown wire to the brake light switch, this electrical safety as well as the **S** safety button are required to

move your shifter from the park position. To shift your car from park you must depress the brake and press the **S** button. Upon doing this the **S** button will begin to flash and will time out in 5 seconds. You must select the gear you desire within that 5 second time frame. If you do not the **S** (safety) should be re-pressed. This is the only gear that requires both the **S** key and the brake safety to unlock.

Once the Trans has been shifted out of park you can move through the gears by only pressing the brake pedal. **N (neutral)** is the only gear that requires no brake or safety.

You may have noticed that the keypad is also equipped with a – **and +** button next to the **D** (drive) button. These will allow you to up and down shift from drive to the lower gears and back to drive. The reason for this is to make the keypad universal and allow it to be used for 2, 3, & 4 speed transmissions. These shifts also do not require any brake or safety buttons pressed.

The keys on the 7 key pad are as follows:

<b>S</b>	safety lockout	<b>N</b>	neutral
<b>P</b>	park	<b>D</b>	drive
<b>R</b>	reverse	+ up shift & - downshift	

The bottom row of LED's are for drive gear indication. When in drive the **D** button plus the LED next to the **D** are illuminated, when you select a lower gear than drive the LED's on the bottom row take over and will display the gear you are currently in. EXAMPLE

A 4 speed Trans such as the GM 700r4 will light **D** when in drive along with the D LED. As you down shift with the – button the 3 red LEDs on the bottom left will light showing you are in third gear, down shift again and only 2 LEDs will be lit, once more and there will be one showing you are in first gear. Up shifting will reverse this process.

Also the green LED in the bottom right corner of the keypad indicates Gear Vendors operation. When the LED is illuminated the Gear Vendors is on.

## Programming

Smart Shift can be easily programmed for any automatic transmission without the use of a laptop computer. This ensures that the shifter is perfectly aligned with YOUR transmissions detent positions.

**Programming should be done prior to installing the shifter KEYPAD in the vehicle. This will allow you to access the DIP switch window and let you hold the keypad while moving the transmission through its gears**



- 1- Select the proper User Template for your transmission from the list on following page.
- 2- Ensure that # 7 & 8 DIP switches are on (programming mode).
- 3- Power up your shifter and the lights on the keypad will flash 5 times, this is to let you know you are in Programming Mode and you are ready to store your transmissions gear positions.
- 4- Gear programming can be done in any order but we find it best to start in PARK and work through the gears one at a time.
- 5- With the actuator attached to the transmission, manually move the shift lever through all its positions checking to see if anything is binding and also that the lever reaches ALL gear positions. Check that the actuator is centered in its stroke and is not fully extended one way or another. This can be accomplished by adjusting the rod end in or out and re- checking the transmissions positions. IF IT DOES FULLY EXTEND IT WILL MAKE A RATCHETING NOISE AND STOP SHIFTING!
- 6- Place the Trans in Park and press the P button on the pad. The LED will light next to the button to let you know it is ready to save the position. Press and release the S button and wait for flashing light to time out. This lets you know the position has been saved and you are ready to move to the next gear.
- 7- Place your transmission in reverse and press the R button on the keypad. The led will light next to the R, Press and release S to save and wait for flashing light to time out.

- 8- Place your Trans in Neutral and press the N button on the keypad. The led next to the N will light. Press and release S to save and wait for the flashing light to time out.
- 9- Place your Trans in Drive and press the D button on the keypad. The led next to the D will light. Press and release S to save the position and wait for the flashing light to time out.
- 10-Lower gears can only be accessed from the D position. To program the lower gears place the Trans in the desired gear and press the minus (-) button on the keypad. Depending on the transmission template you selected a number of led's will light on the bottom row. A 4 speed trans such as the GM 700R4 will have 3 led's lit , A 3 speed will have 2 led's lit and a 2 speed transmission will have 1 led lit. Each led represents a gear lower than drive and you can move through them with the + & - buttons. Use the same method of saving each gear position you used above to store each lower gear. 3 led's =third gear, 2 led's= second gear, 1 led = first gear.
- 11-When you have stored all your transmissions gear positions place the #7&#8 DIP switch positions to off.
- 12-Power down the shifter and re power. This will permanently store your settings and allow you to test its positions.
- 13-Run the shifter through all its gears and check to see that everything lines up. (Remember to press the Brake pedal to access some gears Refer to Keypad Operating Instructions for proper safety sequence).If there is a problem with a gear you may re-store its position by powering down, moving the #7&8 Dipswitch to ON , re-powering and re-calibrate the gear you desire using the same steps you used earlier. You do not need to go over any other gears, just the ones you wish to modify. When you are done power down, move dipswitch 7&8 to off and power up.
- 14-Re check your selections and install the keypad in its final position

**Smart Shift can be reprogrammed at any time and will not loose its memory when power is removed.**

#### Additional Gear Vendors Instructions

The Smart Shift Computer needs to see a change in RPM for proper Gear Vendors operation. So, if you are running through the gears in your driveway, the shifter will not turn off the gear vendors overdrive when up shifting.

Also when programming gears under drive they need to be set twice in the same position. For example program 2<sup>nd</sup> gear and 2<sup>nd</sup> gear overdrive to the same position on the tranny.

## User Template Reference Guide

Smart Shift comes with user templates for various transmission types and output features, No gear positions are stored in the system from the factory, you must store the positions for your transmissions in the system. This allows for easy installation on custom transmissions and also compensates for differences from one transmission to the next. Remember to power off and switch 7&8 dipswitch to OFF position after gear calibration to place shifter in RUN mode!

On your Keypad select the proper setting for your application. You can choose between 2-3&4 speed automatic transmissions either with or without the backup light output enabled and whether you are using a gear vendors unit. These are the most common applications and will take care of 99% of all setups.

### Reverse Light Output Enabled

4 Speed Trans 1 -4 on, 5&6 off  
3 Speed Trans 1-4 off, 5 on, 6 off  
2 Speed Trans 1 on, 2-3-4-off, 5 on 6 off

### Reverse Light Output Disabled

4 Speed Trans 1&2 off, 3 on, 4 off, 5 on, 6 off  
3 Speed Trans 1&2 on, 3&4 off, 5 on, 6 off  
2 Speed Trans 1 off, 2on, 3&4 off, 5 on, 6 off

### Reverse Light Output Enabled with Gear Vendors

4 Speed Trans 1 on, 2&3 off, 4&5 on, 6 off  
3 Speed Trans 1-3 on, 4 off, 5 on, 6 off  
2 Speed Trans 1 on, 2 off, 3 on, 4 off, 5 on, 6 off

### Reverse Light Output Disabled with Gear Vendors

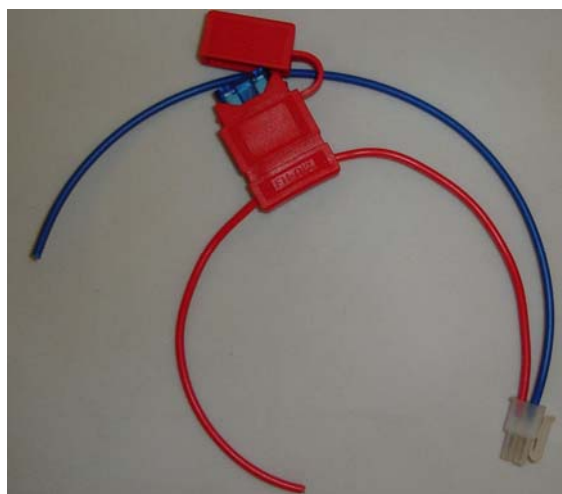
4 Speed Trans 2 on, 3 off, 4&5 on, 6 off  
3 Speed Trans 1-3 off, 4&5 on, 6 off  
2 Speed Trans 1 off, 2&3 on, 4 off, 5 on, 6 off

### Must Select For Gear Vendors Applications

(must be connected to a 5V or 12V square wave

Tach signal (no points!)

8 cylinder 7 off, 8 off  
6 cylinder 7 on, 8 off  
4 cylinder 7 off, 8 on



## Gear Vendors Wiring

### Option #1

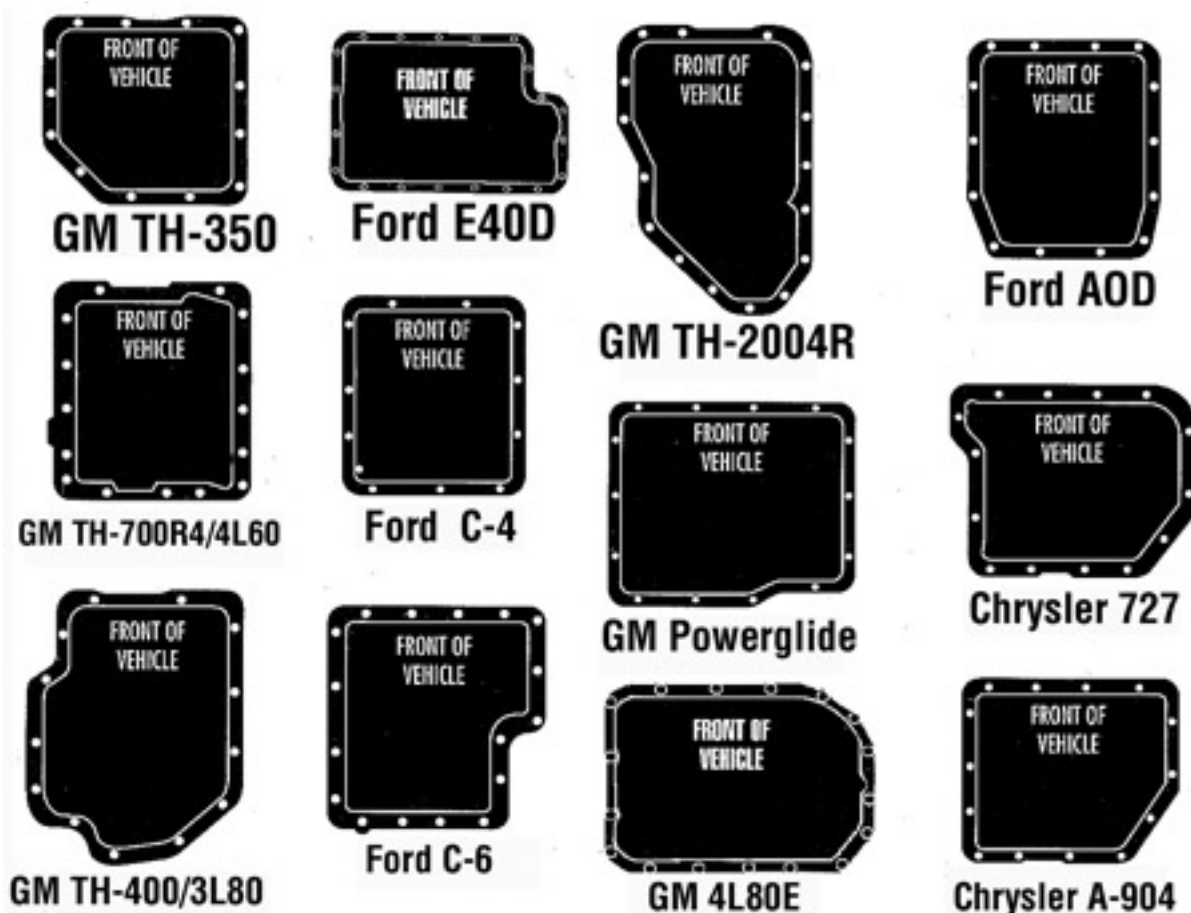
Connect one wire of the 2-pin Molex connector to 12V and the fused wire to the gear vendors. The relay in the main controller will pass the 12V current to the load.

### Option #2

Connect one wire of the 2-pin Molex connector to GND and the fused wire to the gear vendors. The relay in the main controller will pass the GND current to the load.

**Both options require using the 10A fuse (included)**

## Transmission Reference Guide



### Neutral Safety Installation

Since the neutral safety switch is a breaker that keeps the starter from engaging until the switch is closed in Neutral or Park, the color of the wires is not critical. It is only being used to break the 12V wire from the starter switch to the small wire on the starter solenoid.

On GM vehicles, the neutral safety switch may be located on the shifter (steering column or console), or it may be a mechanical interlock in the steering column. This prevents the key from turning to the Start position, unless the shifter is in the Park or Neutral position.

Identify the type of neutral safety system you have.

If the key will not turn to the Start position unless the stock shifter is in Park or Neutral, you have a mechanical interlock, otherwise you have a neutral safety switch. With either type, disconnect the battery ground cable to prevent accidental shorts.

(A) **If you have a neutral safety switch**, locate and identify the neutral safety wires (engine will not crank unless these wires are connected together). Extend the wires from the switch to the yellow harness provided in the kit. Plug the white connector into the control box, splice one yellow wire to one side and the fused red wire to the other. The solenoid makes contact only in neutral or park and completes the

circuit for your starter. Crimp the terminals onto the wires using a crimping tool or pliers. Tape the terminal connections and all other connections to prevent shorts.

(B) **If you have a mechanical interlock**, cut the wire that goes from the start position on the ignition switch to the solenoid on the starter. This wire is usually a 10 or 12 gauge purple wire. Run wires from both ends of the cut wire to the yellow harness provided in the kit. Plug the white connector into the control box, splice one yellow wire to one side and the fused yellow wire to the other. The solenoid makes contact only in neutral or park and completes the circuit for your starter. Put the slip-on terminals on the ends of the lengthened wires.

Crimp the terminals onto the wires using a crimping tool or pliers.

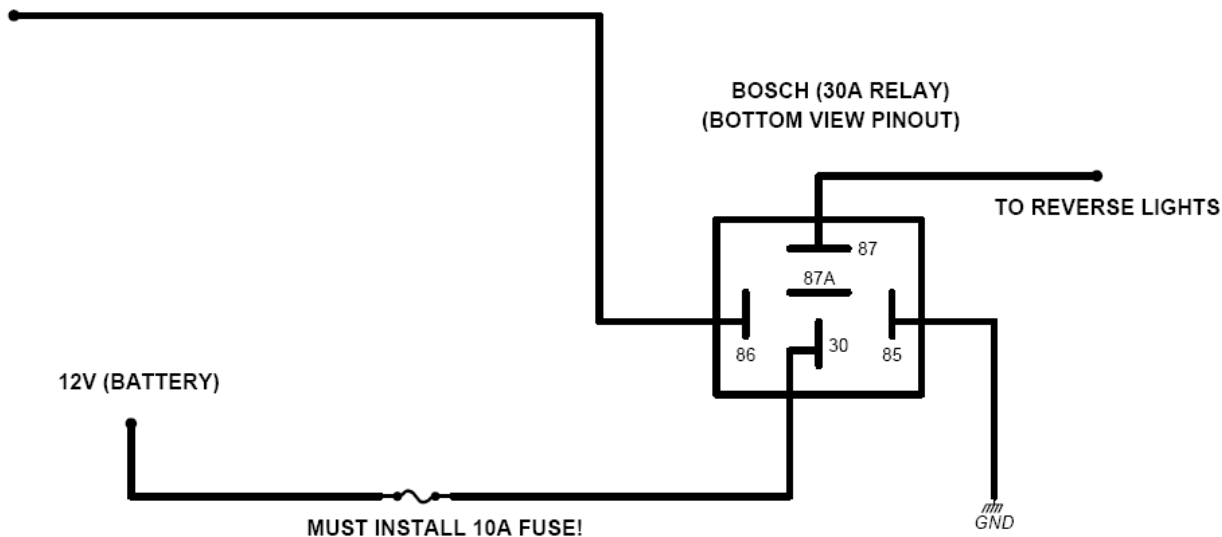
Reconnect the battery ground cable, disconnect the coil wire and set the parking brake. Check the switch operation by attempting to start the motor in each shifter position. The starter must crank only when the shifter is in the Park or Neutral position.

### Reverse Light Installation

**WARNING! The back up output wire (green / white) on the control box must be wired to an external relay. It does not provide power!**

**Do not, under any circumstance, connect power to the output back up light wire in the main harness. It is a low voltage output for relay only.**

GREEN/WHITE WIRE (FROM SMART SHIFT J1 CONNECTOR)



#### NOTES:

1. WIRE GAUGE FROM BATTERY TO RELAY CONTACT (30) MUST BE 14-16 GAUGE
2. WIRE GAUGE FROM RELAY CONTACT (87) MUST BE 14-16 GAUGE
3. WIRE GAUGE FROM RELAY CONTACT (85) MUST BE 14-16 GAUGE

**Reverse Light Schematic  
3-9-06  
REV A**

## Bracket Location Section

### GM TURBO 350



\*Stud installs in position #3 on Trans rail bracket. \*Slot "A" Aligns with 1st bolt from front of Trans.

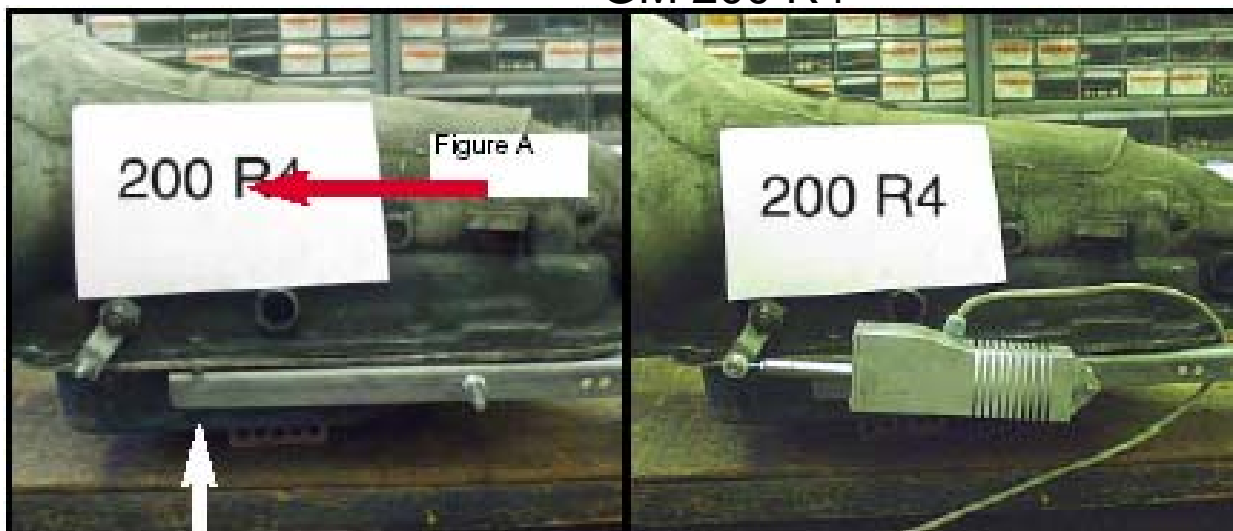
### GM TURBO 400



\*Stud installs in position #3 on Trans rail bracket. \*Slot "A" Aligns with 1st bolt from front of Trans.

NOTE: Em<sup>2</sup> Shift actuators have 1" additional stroke length from earlier designs. You may find that a location other than specified may result in better geometry and fit. The actuator should be positioned so that there is an equal amount of stroke left in park and first gear.

## GM 200 R4



\*Slot A aligns with 2nd bolt from front of Trans pan \*Stud installs in position 1 on rail bracket.

## GM 700 R4



\*Stud install in position #2 on rail bracket.

\*Slot "A" Aligns with 1st bolt from front of Trans.

NOTE: Em<sup>2</sup> Shift actuators have 1" additional stroke length from earlier designs. You may find that a location other than specified may result in better geometry and fit. The actuator should be positioned so that there is an equal amount of stroke left in park and first gear.

## GM 4L60



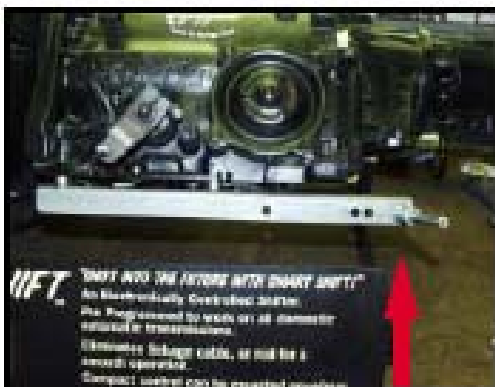
\*Stud aligns with position #2 in pan rail bracket.\* Slot "A" Aligns with 1st bolt from front of Trans.

## FORD C4

Remove existing shift arm as shown in photo. Install new shift arm part#22 over remaining portion of shift arm.

### IMPORTANT

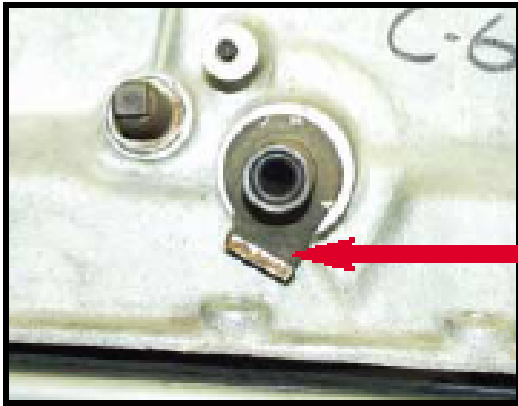
Bottom rod end and jam nut to actuator shaft.



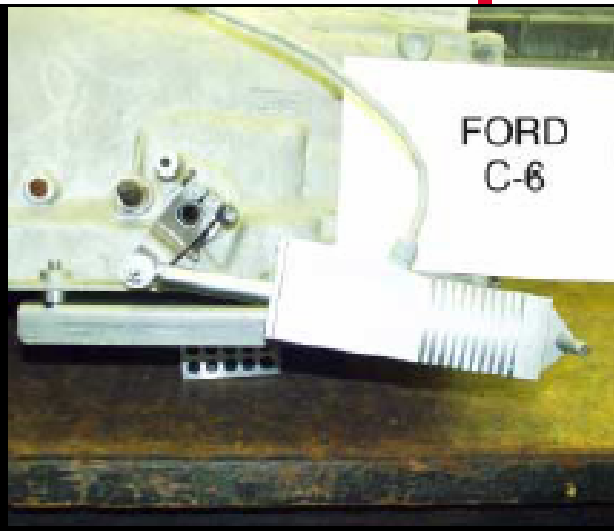
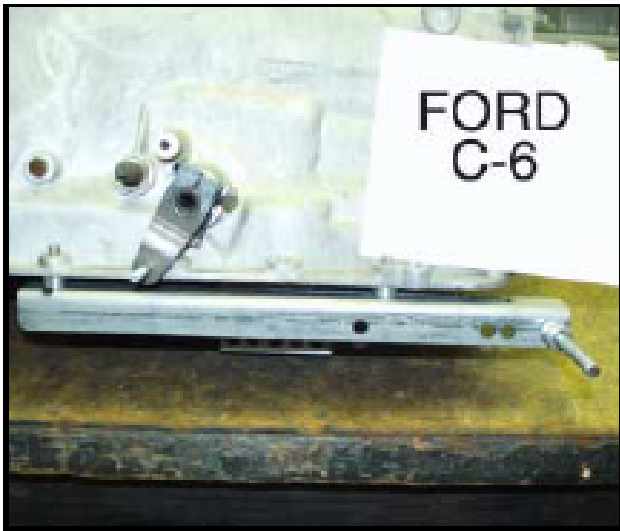
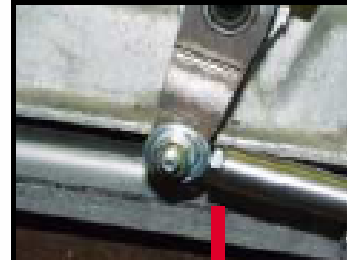
\*Install stud in position #4 on rail bracket.

**NOTE: Em<sup>2</sup> Shift actuators have 1" additional stroke length from earlier designs. You may find that a location other than specified may result in better geometry and fit. The actuator should be positioned so that there is an equal amount of stroke left in park and in first gear.**

## FORD C6



\*Slot A aligns with 2nd bolt from front of Trans pan  
Remove existing shift arm as shown in photo. Install new shift arm part#22 over remaining portion of shift arm.



\*Install stud in position #4 on pan rail bracket.

**IMPORTANT**  
Bottom rod end and jam nut to actuator shaft.

NOTE: Em<sup>2</sup> Shift actuators have 1" additional stroke length from earlier designs. You may find that a location other than specified may result in better geometry and fit. The actuator should be positioned so that there is an equal amount of stroke left in park and in first gear.

## FORD AOD

Due to the many arm designs on the AOD transmission the factory arm may be used in most applications when rotated to the down position (check with your local transmission expert) new arms are available for an additional cost through B&M: Part #

40496

## 727 TORQUE FLIGHT



\*Stud installs in top mounting position #5 (refer to bracket.

\*Actuator installs with rod end on top of shift arm diagram page 8)



**\*IMPORTANT**

Bottom rod end and jam nut to actuator shaft as shown.

Install shift arm bracket with bolt head facing front of transmission.

Place actuator and shifter in park before tightening clamp bolt on shift arm.

## 904



\*Stud installs in top mounting position #5 (refer to diagram page 8)

\*Actuator installs with rod end on top of shift arm bracket.



**\*IMPORTANT**

Bottom rod end and jam nut to actuator shaft as shown.

Install shift arm bracket with bolt head facing front of transmission.

Place actuator and shifter in park before tightening clamp bolt on shift arm.

Please Note: OVER DRIVE transmissions mount the same as above transmissions.

NOTE: Em<sup>2</sup> Shift actuators have 1" additional stroke length from earlier designs. You may find that a location other than specified may result in better geometry and fit. The actuator should be positioned so that there is an equal amount of stroke left in park and in first gear.

# Troubleshooting

1. Actuator moving slowly and/or ratcheting sound:
  - a. This is usually caused by a weak battery. The Smart shift System must have at least 12v before and during an actuator movement. The red LED located on the side of the main controller will blink rapidly if the battery voltage is under 10.5v or if the actuator has been commanded to move in/out of gear and does not extend or retract within the proper time.
  
2. No backup light output:
  - a. The correct transmission type must be selected from the table. There are three options for each transmission.
    1. No backup light output
    2. Backup light output
    3. No backup light with Gear Vendors (sequential) output
    4. Backup light with Gear Vendors (sequential) output
  
3. Actuator does not move:
  - a. The actuator must be “taught” to each gear by selecting the correct dipswitch selection, moving the actuator to each gear position by hand and storing the position via the keypad. See pages 9-12 for details.

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