

INSTRUCTIONS & RECOMMENDATIONS

Oil

We recommend the equivalent of 90-weight gear oil. Synthetic is acceptable and additives are optional. Lighter oils are not recommended, but if used, gears should be watched for wear or pitting. 5-speeds require two quarts and 4-speeds require 1 1/2.

Bellhousing Alignment

Bellhousing alignment is a critical factor in the longevity any manual transmission. We recommend a factory G.M. bronze bushing in the crank. This will help determine if alignment is correct. If bushings wear quickly, something is wrong. A pilot bearing will cover this problem, but it will quickly show up inside the transmission. A bearing is suitable if you are confident of proper alignment. Please refer to the following instructions for proper bellhousing alignment.

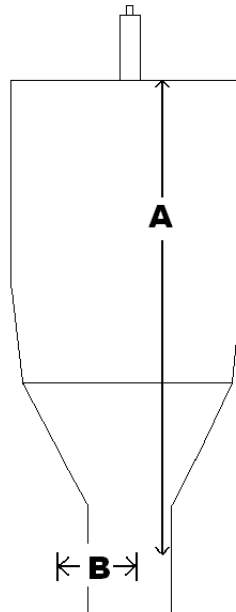
1. Remove clutch assembly from flywheel and install bellhousing on engine block. (It is easier when you leave the clutch assembly off the flywheel).
2. Install dial indicator base on the flywheel and adjust plunger to contact the register bore of the housing.
3. Rotate the flywheel and note indicator reading. Misalignment is one-half of the indicator reading (maximum allowable is .005").
4. To correct off-center condition, select the offset dowel pin pair that is closest to one-half of the indicator reading. (i.e., if reading is .016", 1/2R=.008" use .007" dowels. If reading is .024", 1/2R=.012" use .014 dowels).
5. Remove stock dowel pins by driving from back side or pulling with gripper pliers.
6. Clean engine block dowel holes and coat lightly with lubricant.
7. Lubricate dowel pins and install in block. The slot in the dowel pins indicates the direction of maximum offset. They should be installed parallel to one another, and in pairs (both .007" or both .014" and .021").
8. Install and tighten bellhousing securely. Remount the dial indicator and recheck the register bore runout (Repeat step 3).
9. Small corrections may be made by loosening the housing bolts and turning the dowels with a screwdriver to bring the register bore within limits.

NOTE: Always be careful when removing bellhousing from engine block so that offset dowel pins do not move or change position.

OFFSET DOWEL PIN CHART				
Total Indicator Reading	One-Half Indicator Reading	Size Dowel To Be Used	Lakewood Offset Dowel Part Number	
			GM	Ford/Mopar
.012" to .020"	.006" to .010"	.007"	#15920	#15950
.022" to .034"	.011" to .017"	.014"	#15930	#15960
.036" to .052"	.018" to .026"	.021"	#15940	#15970

Liberty's Manual V-Gate Shifter

Determining Manual Shifter Location



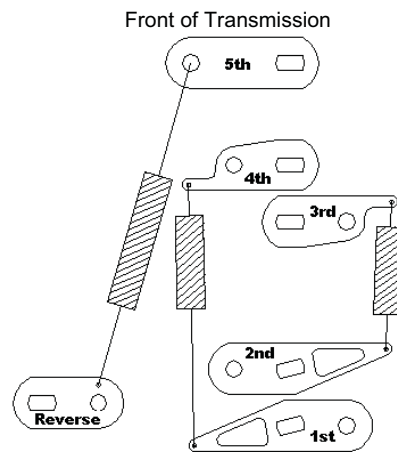
To determine shifter location:

1. Measure dimension **A**, which is from the front face of the transmission (or back face of the bellhousing) to the center of the shifter handle in neutral.
Note: shifter handle will move 2-1/2" forward and 2-1/2" backward.
2. Measure dimension **B**, which is the center of the transmission to the center of the shifter handle.

Shifting

Lift up on the lever in front of the handle and push forward for 1st gear. Hold the handle forward until the clutch is released and simply pull back for 2nd. As long as there is power going through the transmission, it will not go into neutral. To complete the run push 3rd, pull 4th, and push 5th. If at any time you need to lift on the run, a slight amount of pressure will be required to keep the shifter in its gate for the option of re-accelerating. If at any time there is a power loss through the transmission without holding the handle, it will fall to the 5th gear gate.

Manual Shifter Adjustment



Note: Do not over tighten flat arm at transmission.

SHIFT PLATE LOCATIONS ON SHIFTER HEAD

1 st	Front Right
2 nd	Top Right
3 rd	Front Center
4 th	Top Left
5 th	Front Left

- Do not attempt to remove return springs once ends are crimped
- Use “Z” pattern of side plate as a shifter stop for each forward gear
- Adjust linkage so that while bottomed out in “Z” linkage has the least amount of additional engagement as possible
- 6-32 set screws are only to relieve return spring pressure on the mainshaft.
 - After shifter linkage is fully adjusted, turn set screws in an additional ½ turn after contact with shaft plate or pin
 - Each individual gear must be in neutral while adjusting it’s particular set screw

Liberty's Air Shifter

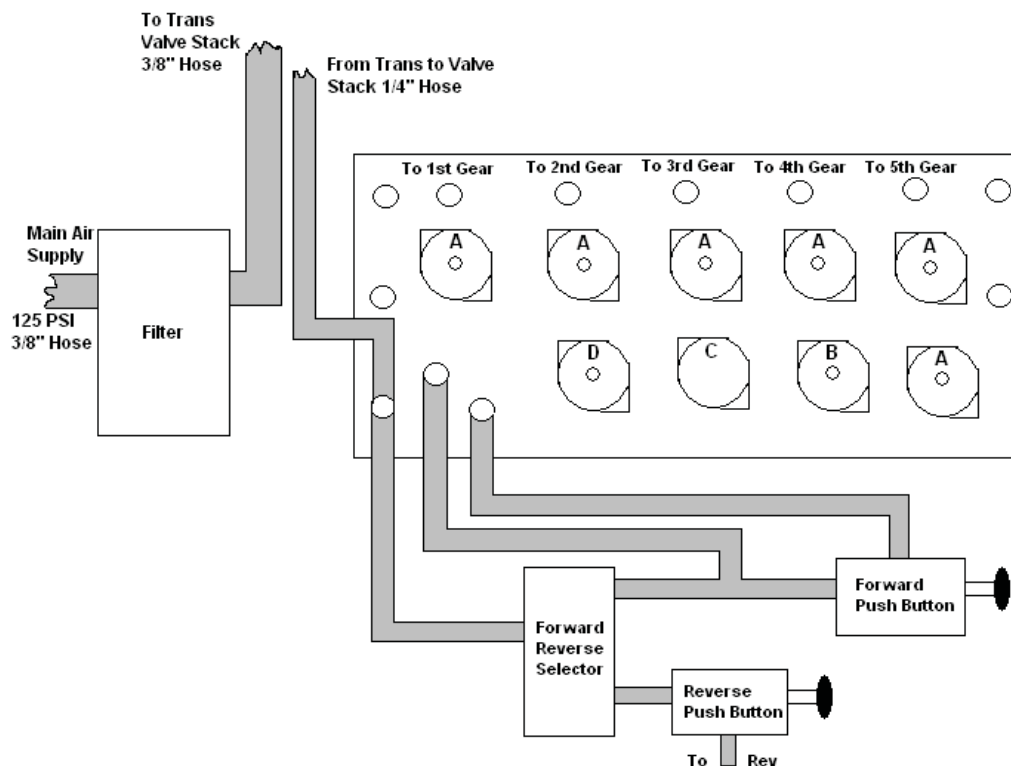
Shifting

The harder and faster you shift the transmission, the longer the shifting lugs will last. Our air shifter will always shift the transmission hard no matter how slow you push the button. The shifters are available as a single button style or with individual buttons for each shift. Either style holds constant air pressure to the chosen gear until the next shift is made. This allows you to back-pedal the throttle if necessary and re-accelerate without the transmission going to neutral. When in high gear with the single button shifter and the button is pushed again, the transmission will pneumatically go to neutral, but mechanically stay in gear until the torque is lifted.

Plumbing

We recommend using only hard air line with our shifter such as nylon or polyethylene. They can handle higher pressures and more abuse than softer line such as polyurethane. If soft line must be used for tight bends or other reasons, maximum pressure must not exceed 100 p.s.i., whereas hard line can be run at 125 p.s.i. where we like to see it. Soft line must not be used with nickel plated or stainless fittings. It requires brass or plastic fittings such as "Legris". Hard line can be used with just about any type fitting except barbed. No matter which line is used, equal pressure should be used in the shifter manifold and air logic system. A 40-micron or finer filter is recommended with all air logic systems and comes installed on the regulator with the air shift option

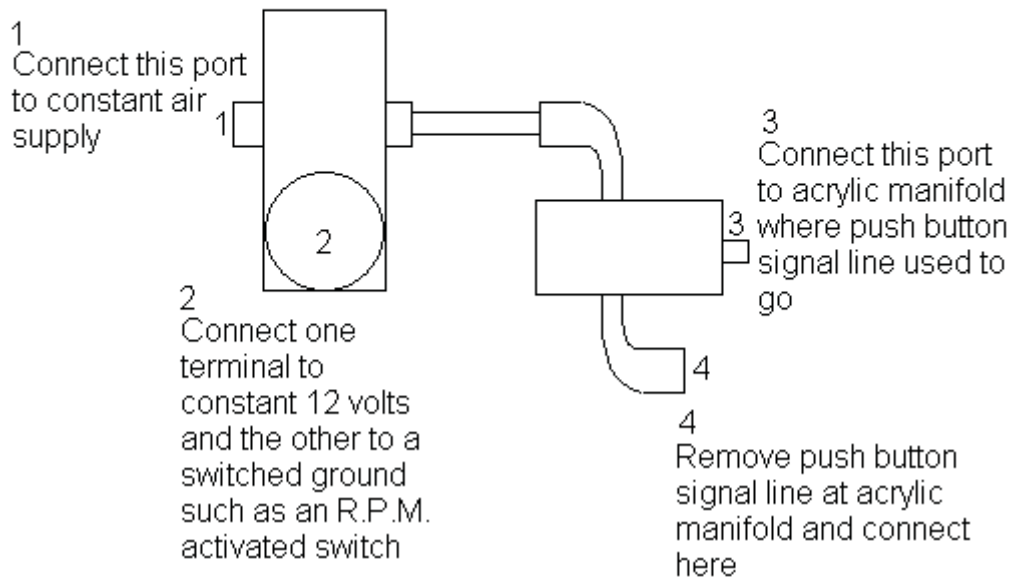
LIBERTY'S AIR LOGIC PLUMBING



Optional Electric Shift Activator

For use with an air shifter.

ELECTRIC SHIFT ACTIVATOR PLUMBING



Transmission Maintenance

Shift Lug Wear/Maintenance

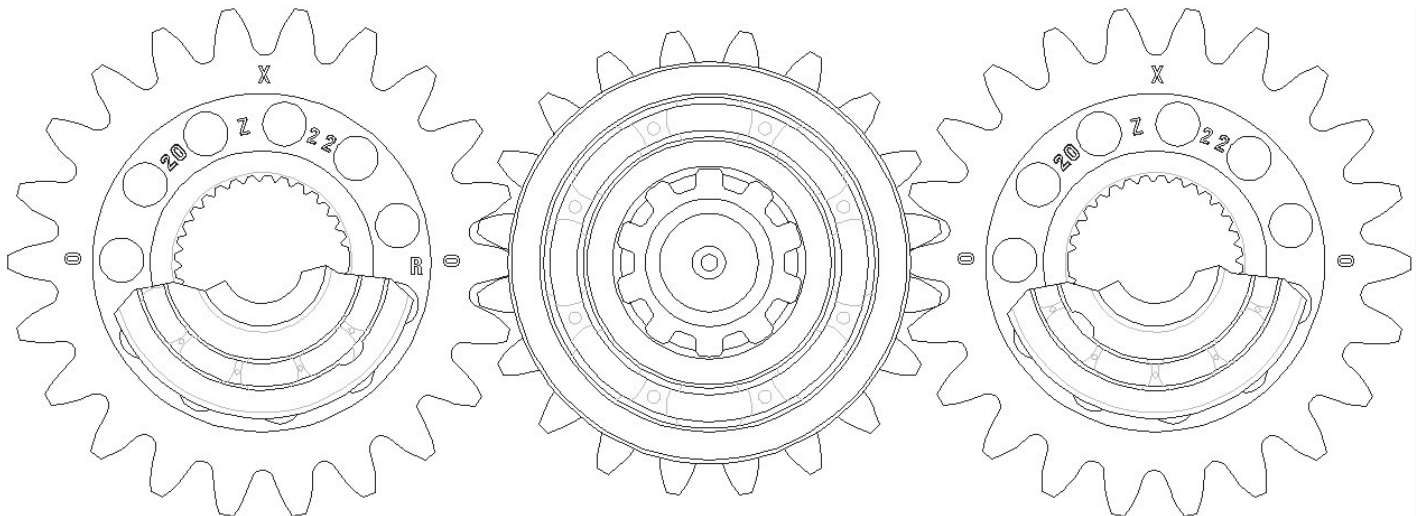
Regular maintenance is recommended. Simple inspections are as easy as removing the magnetic drain plug about every 20-30 runs and checking it for debris. A fine metal dust is nothing to worry about. Normal shifting lug wear would be long skinny slivers. As long as there is not an excessive amount, everything is probably fine, just replace the oil. If anything is questionable, flip the transmission upside down and split the transmission case.

Tear Down

Start by removing the tailhousing and bearing retainer, then the case bolts and case half. Before removing any gears, take note of the timing marks on the front face of the cluster gears.

Timing/Re-Assembly

The "O"s go across the split of the case and the "X's go up. This is the only way the clusters will go back in. Do not attempt to bolt the case back together any other way. It's easiest to drop in the complete main shaft first. It may help to prop the rear bearing about 1/2" out of the pocket until after the clusters are in proper time.



Ratios

Changing Ratios/Installing Gears on Cluster Shafts

Ratio changes can be easily made with our splined cluster shafts and gears. Gear set must remain in vertical columns (as specified on our ratio charts).

“Z” Style and Extreme Transmissions Only

- Any particular ratio consists of a 3 piece gear set (two similar cluster gears and one mainshaft gear)
 - **The cluster sections are sold as matching pairs only**
 - **The two cluster gears should have a matching number of dimples stamped opposite the tooth count**
- Each of the two cluster gears has one skip spline on the inside diameter
- One of the two cluster gears has an “R” stamped next to the skip spline (this designates **REVERSE** side cluster)
- All five gears with the “R” stamped on them must be installed on the same cluster along with the unmarked reverse cluster section
 - The reverse section gets installed with the lip toward 1st (**NOT** the flat side)
 - The other five gears (without the “R”) will be installed on the other cluster
- Be sure to install 5th cluster gears with timing marks towards the front of the transmission and all other gears with stampings facing rearward

Installing Cluster Shaft Tubes (5-Speed)

<u>Tube Description</u>	<u>Install Between Gears as Listed</u>
Shortest Tube with 1 Identification Groove	1 st & 2 nd on Reverse Cluster Shaft
Longer Tube with 1 Identification Groove	1 st & 2 nd on NON -Reverse Cluster Shaft
2 Identification Grooves	3 rd & 4 th on Both Cluster Shafts
3 Identification Grooves	4 th & 5 th on Both Cluster Shafts

Shafts are interchangeable.

The reverse shaft is only determined by installation of the shortest tube with one identification groove as listed above.

- Press front bearing on all the way to the shoulder
- Install gears and spacers as listed above
 - Be sure to install 5th cluster gears with timing marks towards the front of the transmission and all other gears with stampings facing rearward
- Install snap ring
 - Minimal pressure must be applied to the snap ring in order to compress o-rings on tube ends
- Install rear bearing

Note: Periodic additions/changes are made to our ratio charts. If the ratio you need is not listed, please contact us so that we can determine if the ratio is obtainable.