

# FOREWORD

This booklet contains a complete review of the discussional slide-film, Overhauling the 1961 4-Speed Transmission, (Corvair and Corvair 95).

Each man should have one of these booklets for on-the-job reference, and one copy should be retained in the Service Department file of Technical Information.

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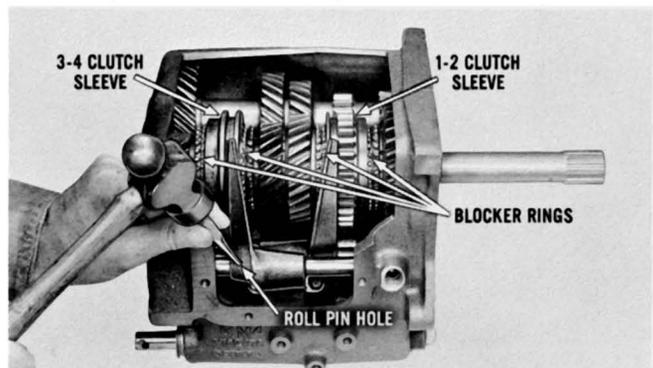
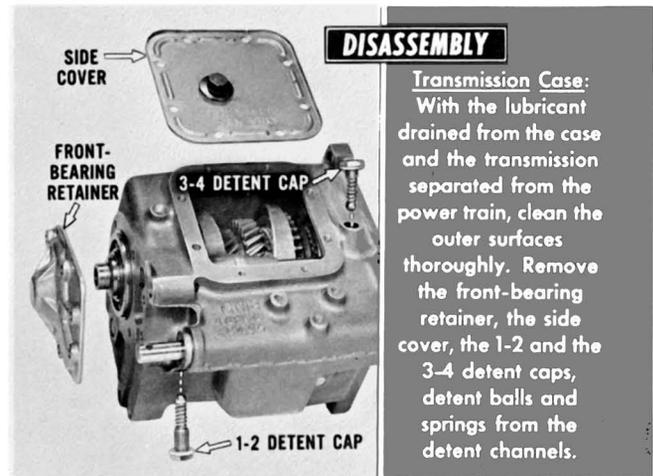
This presentation covers:

- **DISASSEMBLY**
- **INSPECTION**
- **ASSEMBLY**

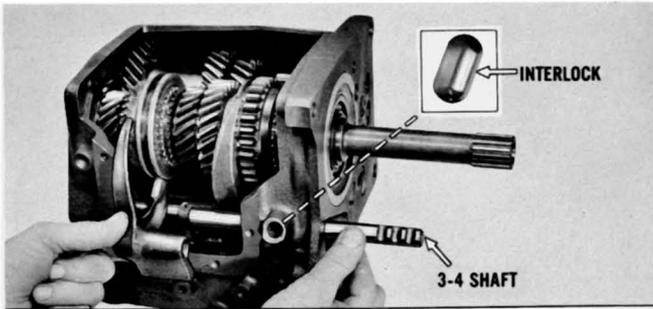


on the optional FOUR-speed transmission available for the 1961 Corvair and Corvair 95. Product improvement changes made during the model year which directly affect service procedures will be pointed out.

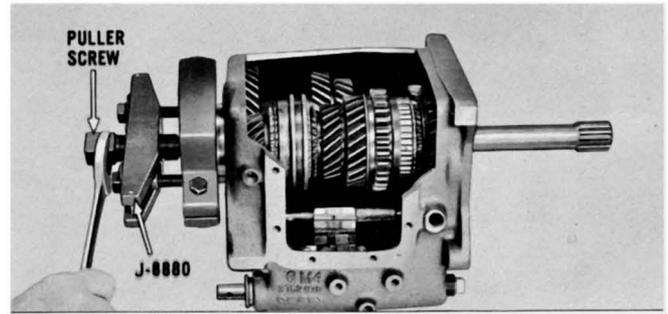
**NOTE:** In some pictures, a section of the transmission case is cut away to show internal details more clearly.



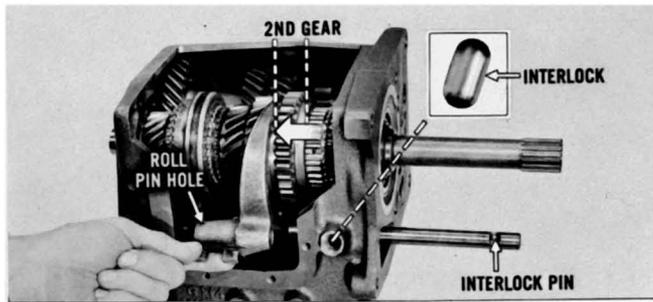
Shift the 1-2 and 3-4 synchronizer clutch sleeves into neutral position (all blocker rings will be visible). Drive the roll pin out of the 3-4 shift fork and shaft.



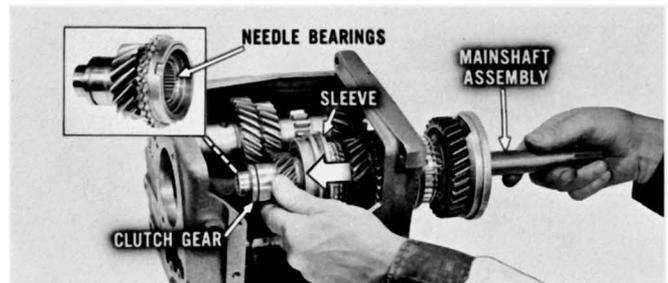
Tap the 3-4 shaft out of the case, and remove the 3-4 shift fork. Tip the case or use a magnet to remove the interlock from the detent channel. **NOTE:** The 3-4 shaft, 1-2 shaft and the reverse shaft can be removed from either end of the case.



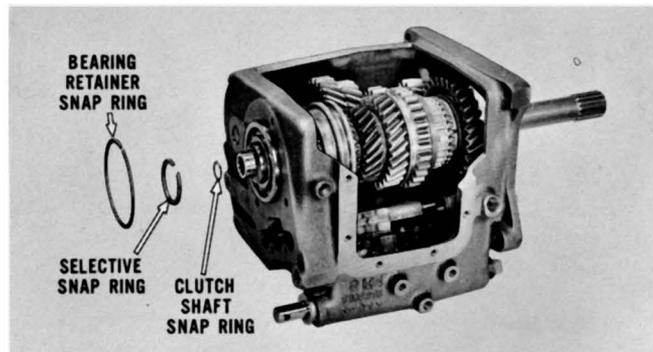
Install the clutch bearing puller plates, J-8880, into the bearing groove and the adapter plug into the clutch gear bore. Turn the puller screw slowly until the bearing is separated from the case. Remove the puller plates and adapter plug.



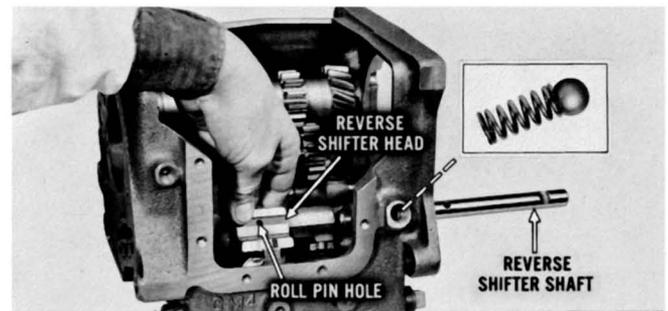
Shift the 1-2 synchronizer clutch sleeve full forward into 2nd gear. Drive the roll pin out of the 1-2 shift fork and shaft. Tap the shaft out of the case and remove the shift fork. Keep the interlock pin with the shaft. Remove the second of the two interlocks.



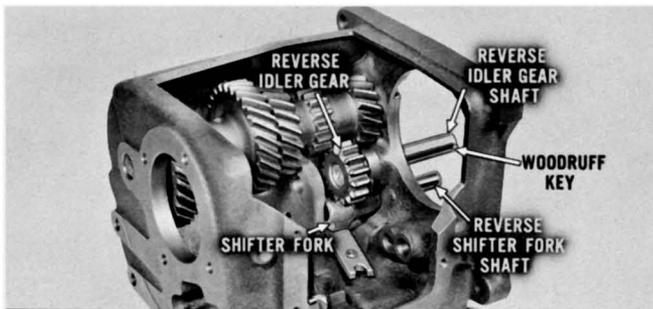
Shift the 3-4 synchronizer sleeve full forward (4th gear). Grasp the clutch gear and the rear of the mainshaft, and remove the complete mainshaft assembly from the case. **NOTE:** Be careful to prevent the clutch gear from separating from the mainshaft. There are 70 needle bearings inside the bore of the clutch gear.



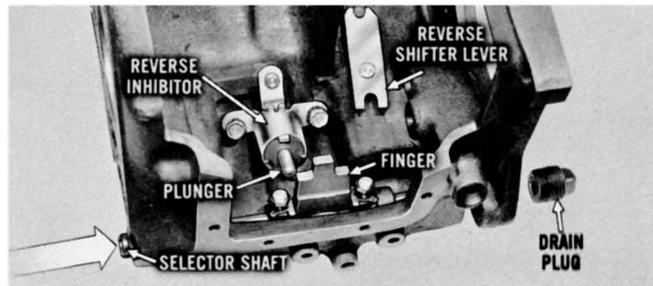
Remove the bearing retainer snap ring, the clutch bearing selective snap ring and the clutch shaft bottoming snap ring.



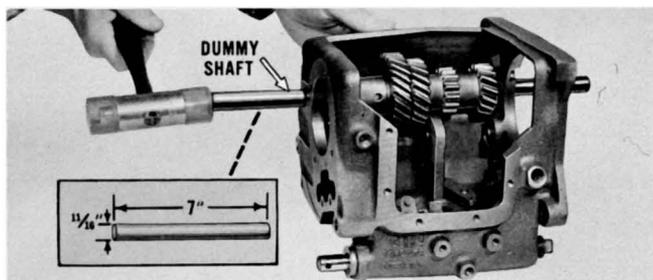
Drive the roll pin out of the reverse shifter shaft. Tap the shaft out of the case, and remove the shifter head. Remove the detent ball and spring from the bottom of the detent channel bore. **NOTE:** All detent springs and balls are identical.



Remove both the reverse shifter fork shaft and the reverse idler gear shaft by tapping the shafts out of the case. The Woodruff key in the end of the reverse idler gear shaft prevents the shaft from rotating. Remove the reverse idler gear and the shifter fork.

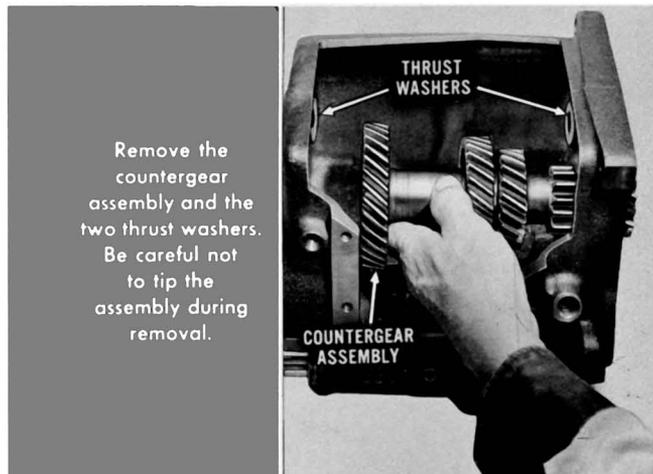
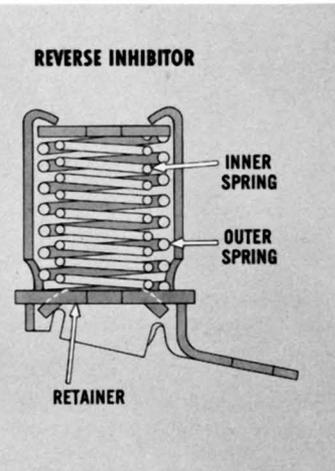


Remove the reverse shifter lever from the pivot pin and the drain plug. Remove the selector shaft finger and tap the selector shaft out of the rear of the case. Remove the reverse inhibitor with its plunger by removing the cap screws. This completes the disassembly of the case. The reverse inhibitor on . . .



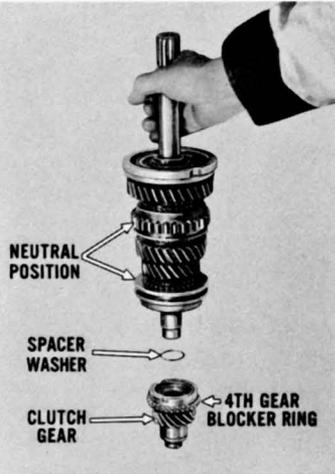
Using a drift punch, tap the counter gear shaft a short distance out of the rear of the case. Then, using a locally made dummy shaft, tap the counter gear shaft all the way out. The dummy shaft will keep the 92 needle bearings inside the counter gear bore from falling out of position as the counter gear shaft is removed.

. . . early Corvair 95 models has dual springs inside the housing. Late models use only a single spring to reduce shifting effort into reverse. Early-design inhibitors may be reworked by removing the retainer and the inner spring. Reinstall the outer spring and retainer.

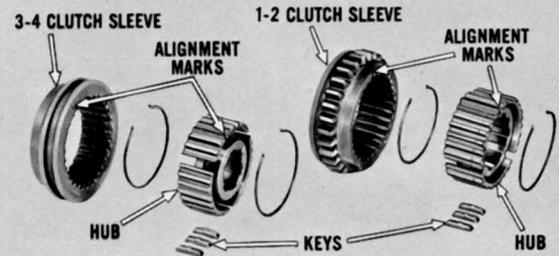
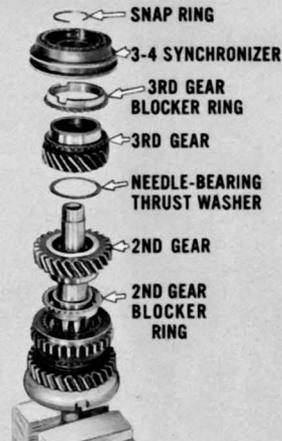


Remove the counter gear assembly and the two thrust washers. Be careful not to tip the assembly during removal.

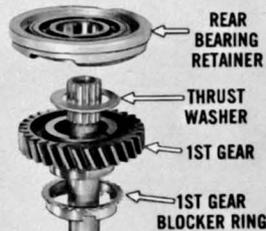
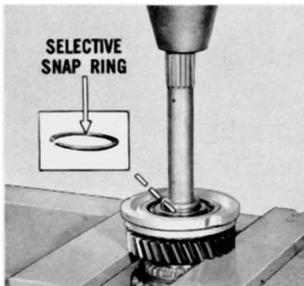
Mainshaft: Shift the synchronizer sleeves to their neutral position. Then, slowly lift the mainshaft straight upwards to prevent dislodging the clutch-gear needle roller bearings. Remove the spacer washer and the 4th gear blocker ring.



Clamp the mainshaft in a vise with the forward end of the shaft upwards. Remove the special snap ring, the 3-4 synchronizer and 3rd gear blocker ring from the shaft. Remove the 3rd gear, the needle-bearing thrust washer, the 2nd-speed gear, the 2nd gear blocker ring.

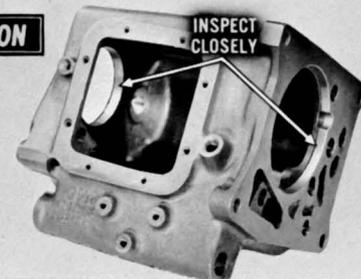


**Synchronizer Clutches:** Push the hubs out of the clutch synchronizer sleeves. The keys will fall clear. Remove the two tanged springs from each of the hubs. Note that the clutch sleeves and hubs are etched with alignment marks to insure correct assembly of matched units.

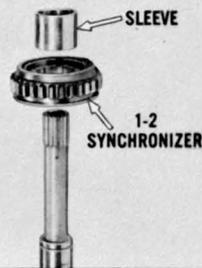
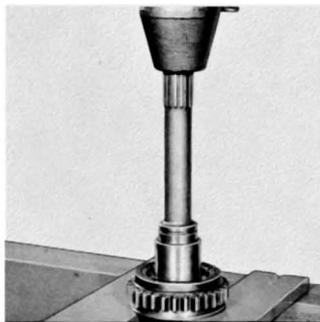


Remove the rear-bearing selective snap ring. Support the 1st-speed gear on suitable blocks, then slowly press the mainshaft out of the bearing bore. To avoid damage, the blocker ring must remain clear of the supports. Remove the 1st-speed gear thrust washer, the 1st-speed gear and the 1st-gear blocker ring.

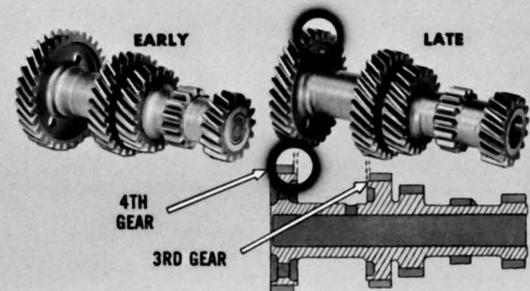
**INSPECTION**



Wash the transmission case and all individual components in a good commercial cleaning solvent or clean kerosene. Air-dry, using compressed air. Inspect the case for cracks, especially near the front- and rear-bearing bores. Clean all old gasket material from surfaces of case and covers.

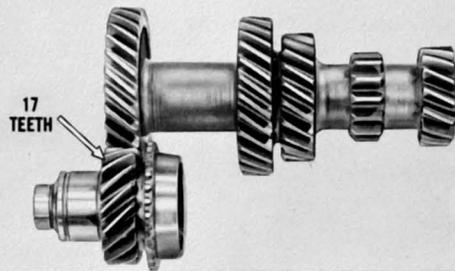


Further disassembly of the mainshaft is not required if the assembly is undamaged. However, when necessary, press the mainshaft out of the 1st-speed gear sleeve and the 1-2 synchronizer hub. This completes the disassembly of the mainshaft.

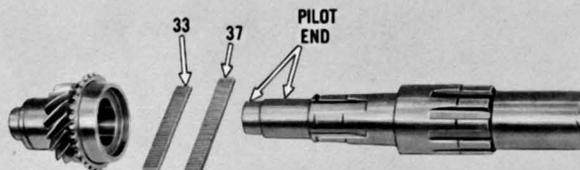


Inspect the inner faces of the 4th speed gear teeth and the 3rd-speed gear teeth on the countergear. If worn or badly galled, replace the early-type countergear with the late-type which has a .005" to .020" relief ground on the 4th and 3rd-speed gear teeth as shown.

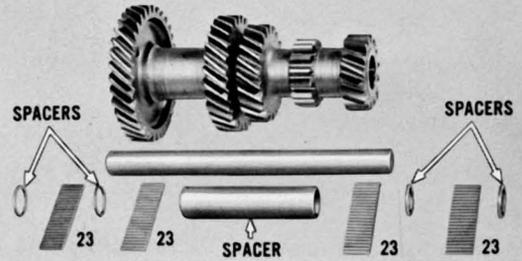
The relieved section prevents the possibility of the 3-4 synchronizer sleeve from rubbing and grating on the gear teeth when shifting into 3rd or 4th gear. On Corvair passenger models, all mainshaft gears will mesh satisfactorily with the relieved countergear. However, an additional part must be added on the . . .



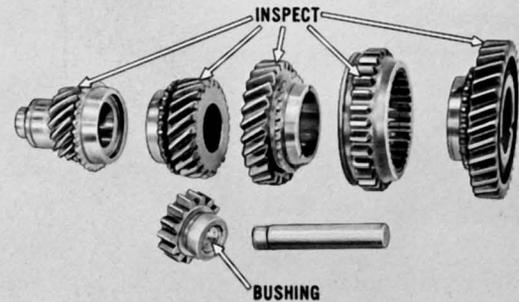
. . . Corvair 95 models (including the Greenbrier). If the clutch gear has 16 teeth, it must be replaced during assembly with part number 3785454, which has 17 teeth, in order for the countergear and clutch gear to mesh properly. All other mainshaft gears will mesh satisfactorily with the relieved countergear.



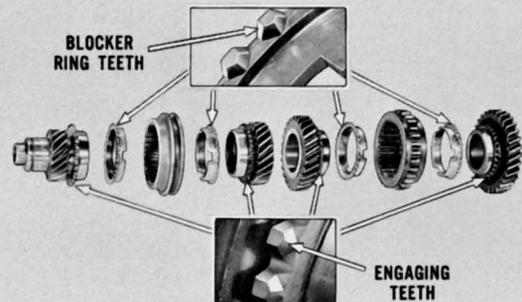
Remove the 37 outer needle bearings and the 33 inner needle bearings from the clutch gear bore. All are  $\frac{1}{32}$ " in diameter and  $\frac{1}{2}$ " long. Inspect the bearings, the clutch gear and the pilot end of the mainshaft for galling or excessive wear. Install new parts as necessary.



Remove the 92 needle bearings from the countergear four sets of 23 each. All are  $\frac{1}{64}$ " in diameter and  $\frac{1}{4}$ " long. Inspect the bearings, spacers and the countergear shaft and bore for galling or excessive wear. Install new parts as necessary. Use petroleum jelly and the dummy shaft to assist in their installation.

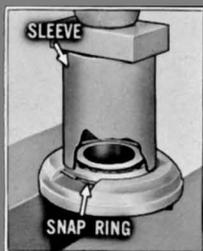


Inspect all gear teeth for chipping or excessive wear. Check the reverse-idler gear bushing as to shaft fit. Install new parts as necessary.

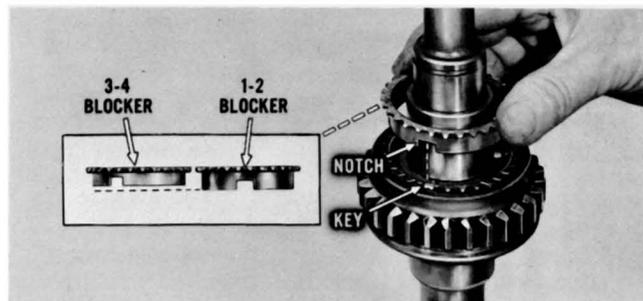


Inspect all blocker ring teeth and the engaging teeth of the synchronizer sleeves and matching gears. The teeth must be sharply defined and not rounded. Install new parts as necessary.

Turn the front and rear bearings by hand to check for a binding condition or rough spots. To replace the rear bearing, support the retainer on press plates, then expand the snap ring as the bearing is pressed out of the retainer. Reverse the procedure for installation.



Caution should be observed to prevent damage to the bearing and retainer during removal and installation. A 2 3/4" O.D. sleeve will assist in removing the bearing and prevent damage to the new bearing during installation. This completes the inspection procedures.



With the rearward end of the mainshaft held upright, position one of the 1-2 blocker rings in the synchronizer assembly. Engage the notches with the keys. NOTE: The 1-2 and the 3-4 blockers are slightly different. The 1-2 blockers have longer hubs.

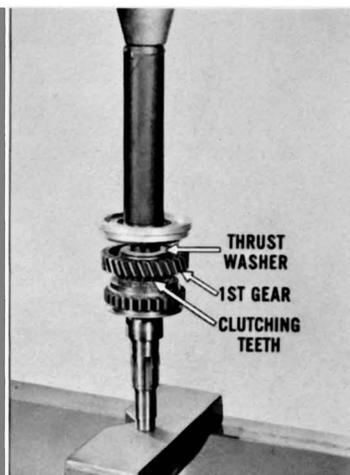
### ASSEMBLY



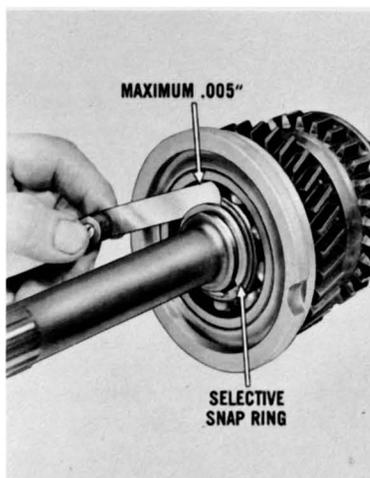
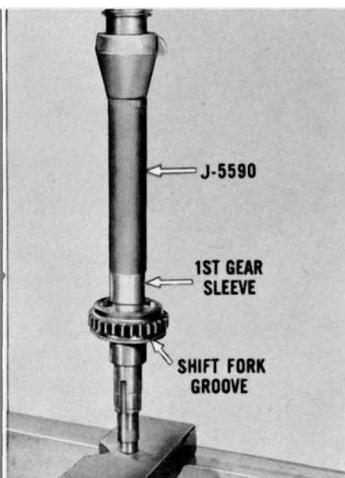
**Synchronizer Clutches:** Place two springs in each of the hubs so that the tanged end of each spring falls into the same keyway as shown. To assemble each unit, hold the three keys in position and align the etched marks. Slide the hub into the sleeve. The hook ends of each key must be located over the springs.

Install the 1st-speed gear with the clutching teeth downward. Place the thrust washer and the assembled rear-bearing retainer over the mainshaft.

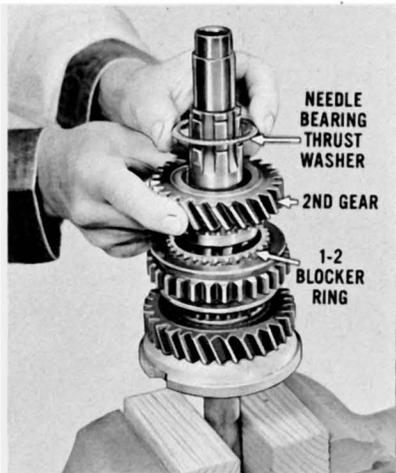
Press the rear bearing into position using tool J-5590.



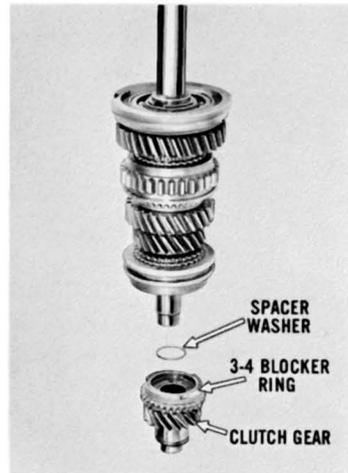
**Mainshaft:** Place the forward end of the mainshaft downward on a press plate. Place the 1-2 synchronizer assembly over the mainshaft with the shift fork groove down. Press the 1st-speed gear sleeve on the mainshaft until it bottoms, using Tool J-5590 or any other suitable hollow driver.



Install the selective snap ring. Measure the clearance between the rear face of the rear bearing and the snap ring. Maximum allowable end play should be .005". This snap ring is available in three thicknesses, .084" — .087" — .093", to obtain the correct clearance.



Clamp the mainshaft in the vise so that the forward end is up. Install the second of the 1-2 blocker rings, and engage the notches with the keys. Install the 2nd-speed gear with the clutching teeth downward. Place the needle-bearing thrust washer on the 2nd-speed gear.

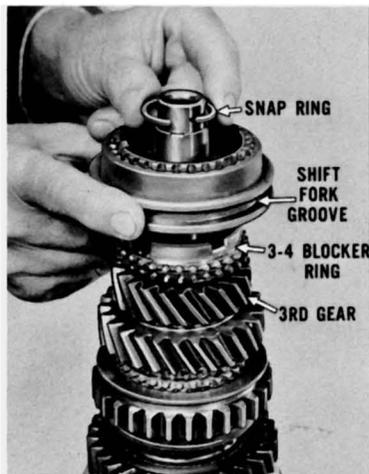
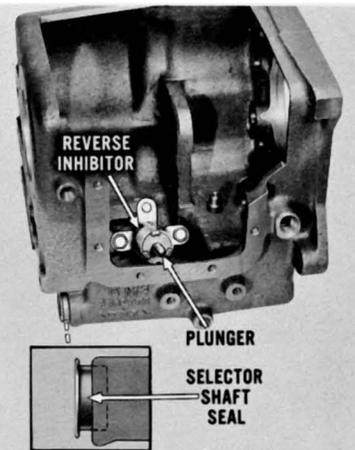


Place the clutch gear on the bench with the pilot bore upward. Place the second of the 3-4 blocker rings on the cone surface of the clutch gear, and locate the spacer washer over the needle roller bearings. Carefully insert the mainshaft into the clutch-gear bore. This completes the assembly of the mainshaft.

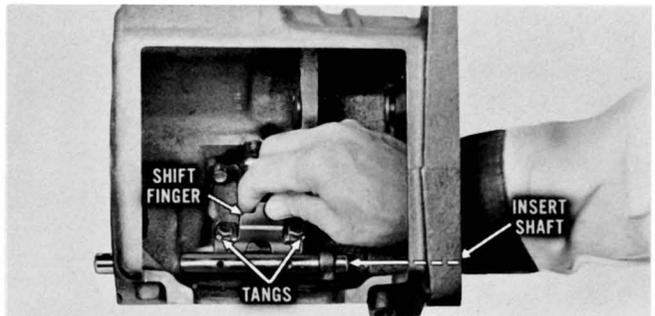
### GENERAL NOTE:

Whenever the relieved countergear and the 17-tooth clutch gear are installed on the early Corvair 95 (and Greenbrier) transmissions, it will also be necessary to install a 28-tooth second gear rather than the original 26-tooth second gear. The 28-tooth gear, part number 6257856, will produce the proper 2.35-to-1 ratio in second. The 26-tooth gear produces a 2.18-to-1 ratio which may not provide satisfactory vehicle performance.

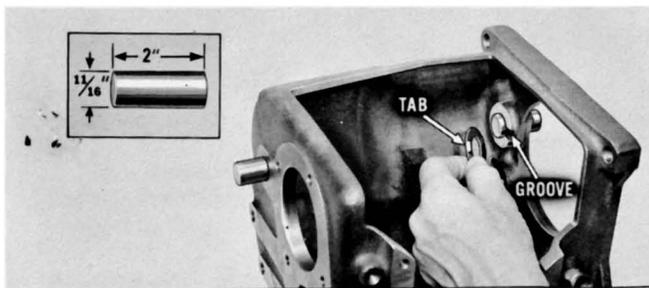
Transmission Case:  
Carefully tap a new selector shaft seal into the case until it bottoms against the inner shoulder. Place the reverse inhibitor on the locating dowel pin. Install the cap screws and lockwashers. Insert the plunger into the inhibitor body.



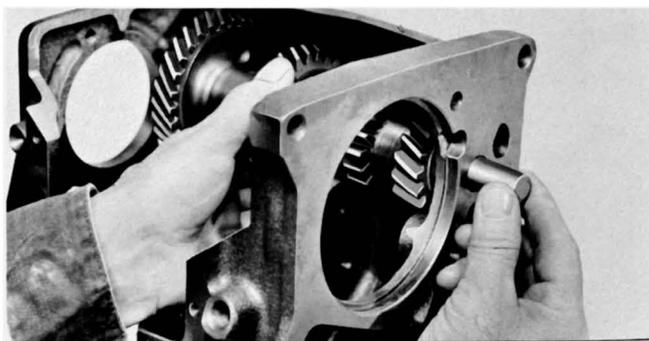
Install the 3rd-speed gear with the clutching teeth upward. Place one of the 3-4 blocker rings on the cone surface of the 3rd-speed gear. Install the 3-4 synchronizer clutch with the shift fork groove downward. Turn the blocker ring until the notches engage the keys. Install the special snap ring.



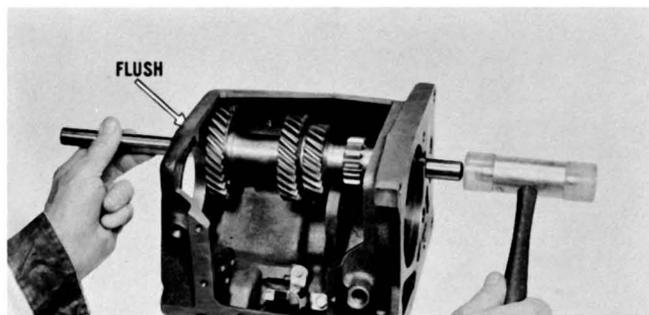
Coat the selector shaft and seal lips with petroleum jelly, and insert the shaft through the rear of the case. Attach the shift finger with cap screws. Bend the lock tangs against the heads of the cap screws. Install the drain plug.



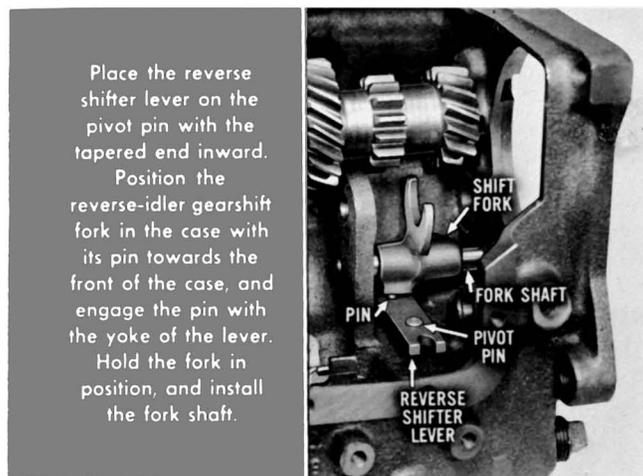
Coat both countergear thrust washers with petroleum jelly, and position each against the case with the tabs engaged in the case grooves. Two short pieces of rod ( $1\frac{1}{16}$ " O.D. x 2" long) inserted into the shaft bore, as shown, will help to hold the washers in position during countergear installation.



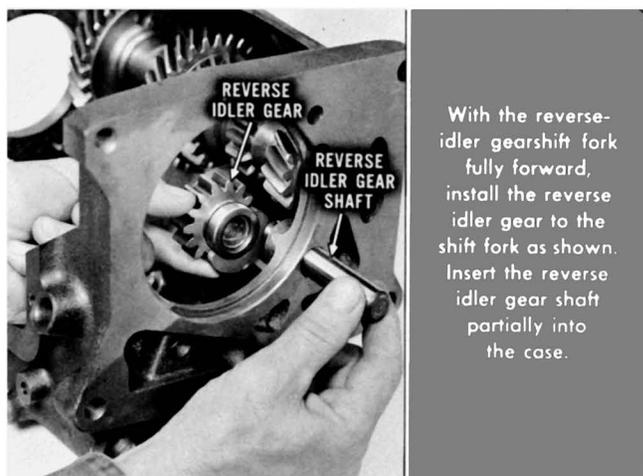
Insert the countergear assembly through the rear-bearing opening, and carefully lift the assembly into position between the thrust washers. Then, remove the two short pieces of rod.



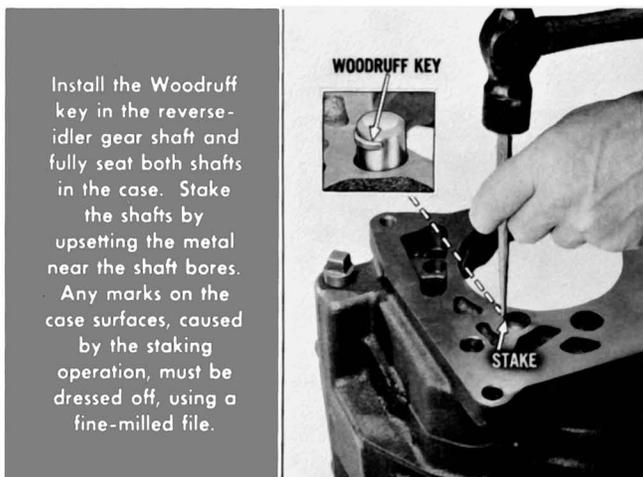
Push the countergear shaft into the rear of the case by hand. Then tap the countershaft with a soft-faced hammer until the shaft is flush with the front face of the case. The shaft is a slight press fit at the forward end. Turn the countergear by hand to check ease of rotation.



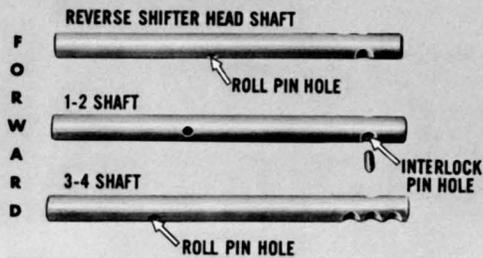
Place the reverse shifter lever on the pivot pin with the tapered end inward. Position the reverse-idler gearshift fork in the case with its pin towards the front of the case, and engage the pin with the yoke of the lever. Hold the fork in position, and install the fork shaft.



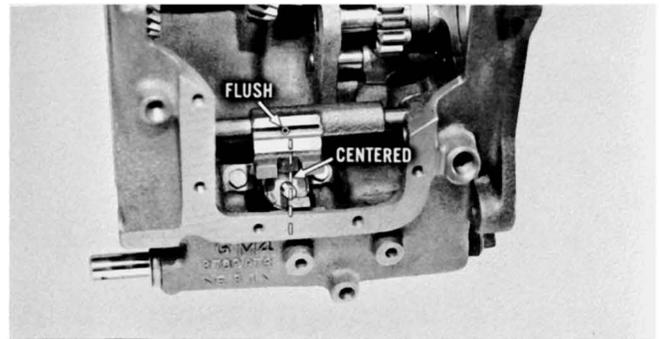
With the reverse-idler gearshift fork fully forward, install the reverse idler gear to the shift fork as shown. Insert the reverse idler gear shaft partially into the case.



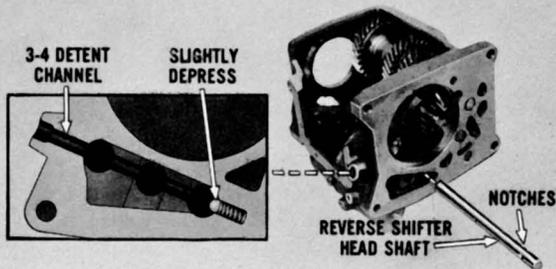
Install the Woodruff key in the reverse-idler gear shaft and fully seat both shafts in the case. Stake the shafts by upsetting the metal near the shaft bores. Any marks on the case surfaces, caused by the staking operation, must be dressed off, using a fine-milled file.



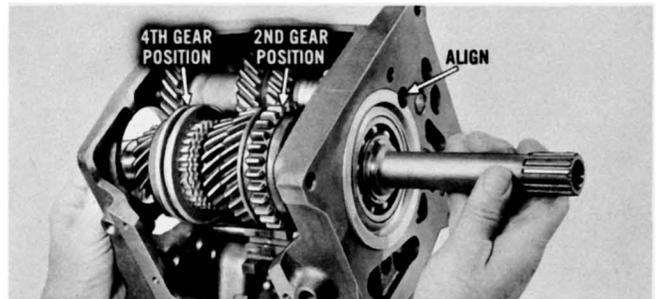
Before installing the 3 main shifter shafts, let's identify each. The reverse shifter head shaft has the roll pin hole almost centered on the shaft. The 1-2 shaft has an interlock pin hole drilled through the end of the shaft. The 3-4 shaft roll pin hole is nearest the forward end of the shaft.



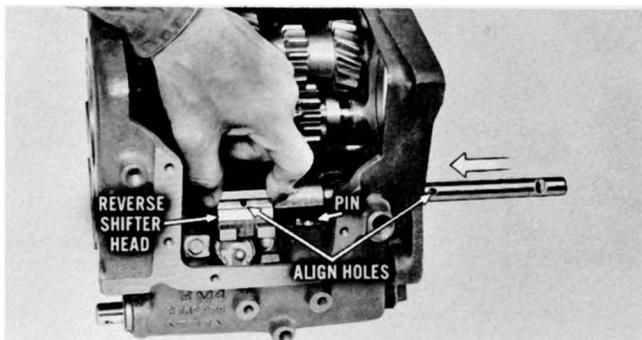
Install the roll pin until it is flush with the bottom face of the sliding gate. Move the shaft forward until it drops into the detent which centers the shifter gate opening with the inhibitor plunger. This will permit installation of the 1-2 shaft.



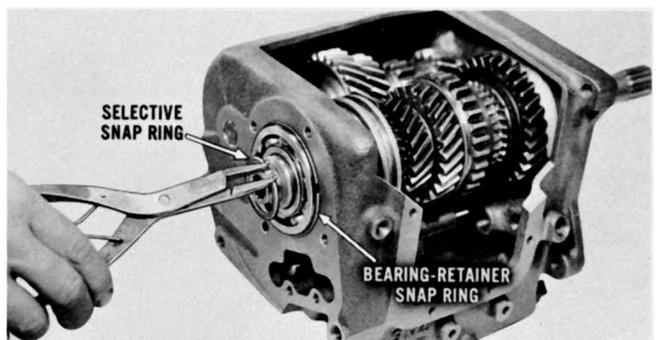
Insert one of the detent springs and a ball into the 3-4 detent channel. Slightly depress the ball and spring with a drift punch and, at the same time, insert the reverse shifter head shaft into the case past the spring-loaded ball. The two detent notches face towards the detent ball.



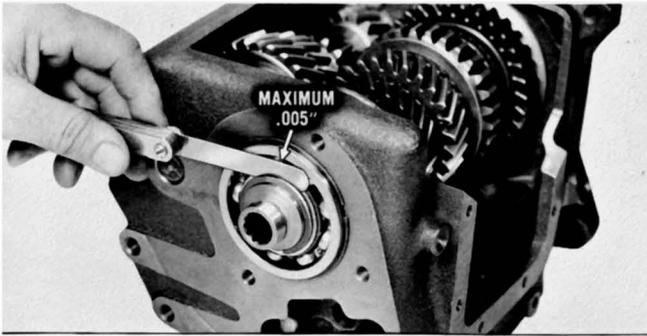
Shift the 3-4 synchronizer sleeve forward into 4th-gear position and the 1-2 synchronizer sleeve into 2nd-gear position. Then, insert the mainshaft through the case until the rear bearing retainer is flush with the rear face of the case. The clearance hole in the retainer and case must align.



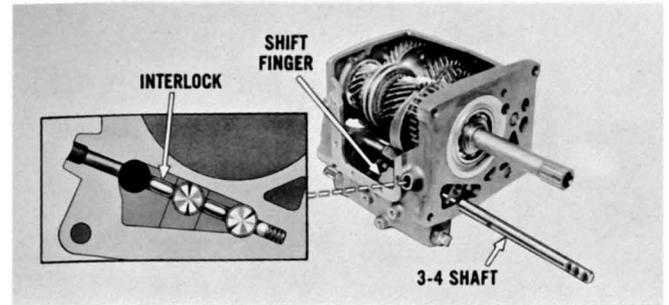
Engage the pin of the reverse shifter head with the yoke of the reverse shifter lever. Then, push the shaft into the case and through the bore of the shifter head until the roll pin holes align.



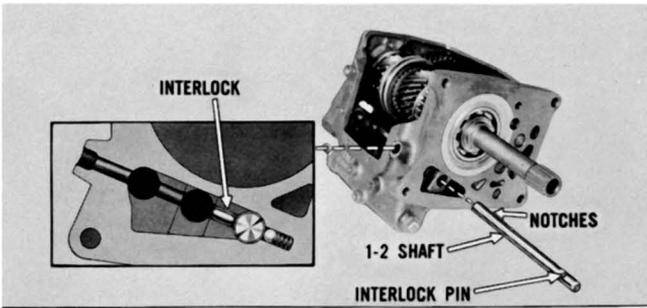
Install the front bearing (with snap ring) into the case, and tap around the outer edge of the bearing race until the snap ring seats against the case. Install the selective snap ring in the clutch gear groove.



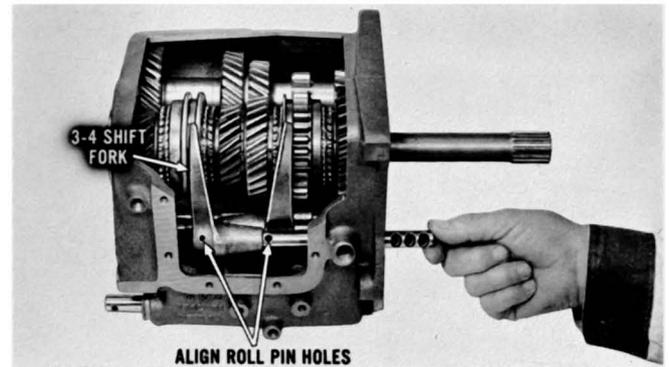
Measure the clearance between the bearing and selective snap ring. Maximum allowable clearance should be .005". This snap ring is available in three thicknesses, .084" — .087" and .093", to obtain correct clearance.



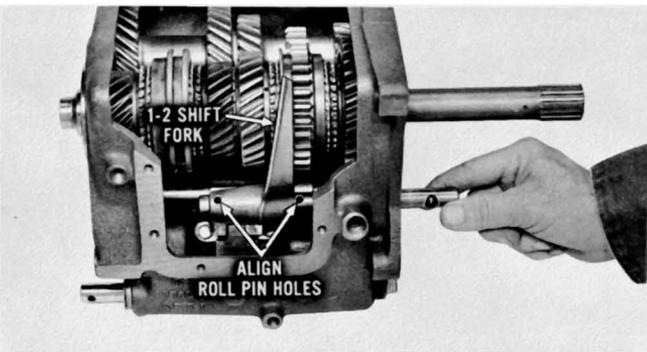
Drop the remaining interlock into the detent channel, and insert the 3-4 shift fork shaft partially into the case. The three detent notches should be up, facing away from the 1-2 shaft. If necessary, move the selector shaft so that the shift finger drops into the opening in the 1-2 shift fork gate.



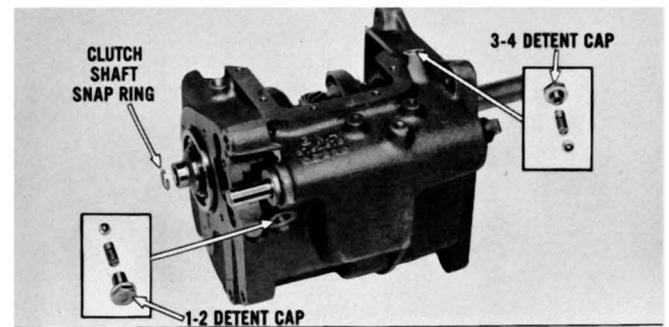
Shift the synchronizers to their neutral position, then install one of the interlocks in the 3-4 detent channel. Insert the interlock pin in the 1-2 shaft, and install the shaft partially into the case. The three detent notches at the forward end of the shaft must face towards the reverse shifter shaft.



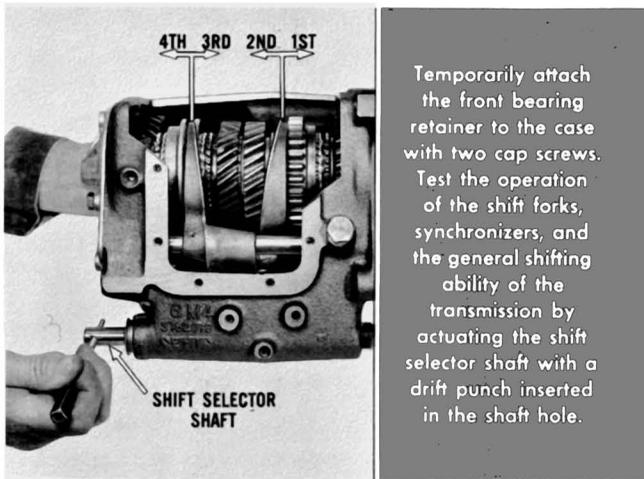
Engage the 3-4 shift fork with the synchronizer sleeve. Insert the shaft through the shift fork, and align the roll pin holes. Install the roll pin.



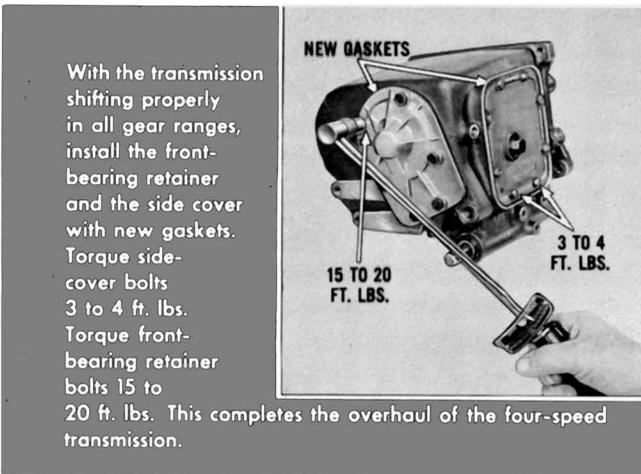
Engage the 1-2 shift fork with the 1-2 synchronizer sleeve. This shift fork is easily identified by the through gate. Push the shaft through the fork and align the roll pin holes. Install the roll pin.



Install both the 1-2 and the 3-4 detent balls, springs, nylon washers and detent caps. The 1-2 cap has the longer thread length. Install the small snap ring in the inner diameter of the clutch gear. This snap ring is a bottoming stop for the clutch shaft.



Temporarily attach the front bearing retainer to the case with two cap screws. Test the operation of the shift forks, synchronizers, and the general shifting ability of the transmission by actuating the shift selector shaft with a drift punch inserted in the shaft hole.



With the transmission shifting properly in all gear ranges, install the front-bearing retainer and the side cover with new gaskets. Torque side-cover bolts 3 to 4 ft. lbs. Torque front-bearing retainer bolts 15 to 20 ft. lbs. This completes the overhaul of the four-speed transmission.

A complaint of gear disengagement on Corvair 95 and Greenbrier models, occurring on "off-the-road" operation, may be minimized by following the suggested procedures in:

**Dealer Bulletin No. 480**

*dated May 18, 1961*

This bulletin supplies the information relative to installing cushions between the engine front mounting brackets and the rear suspension cross-member supports, to prevent forward motion of the power train.

