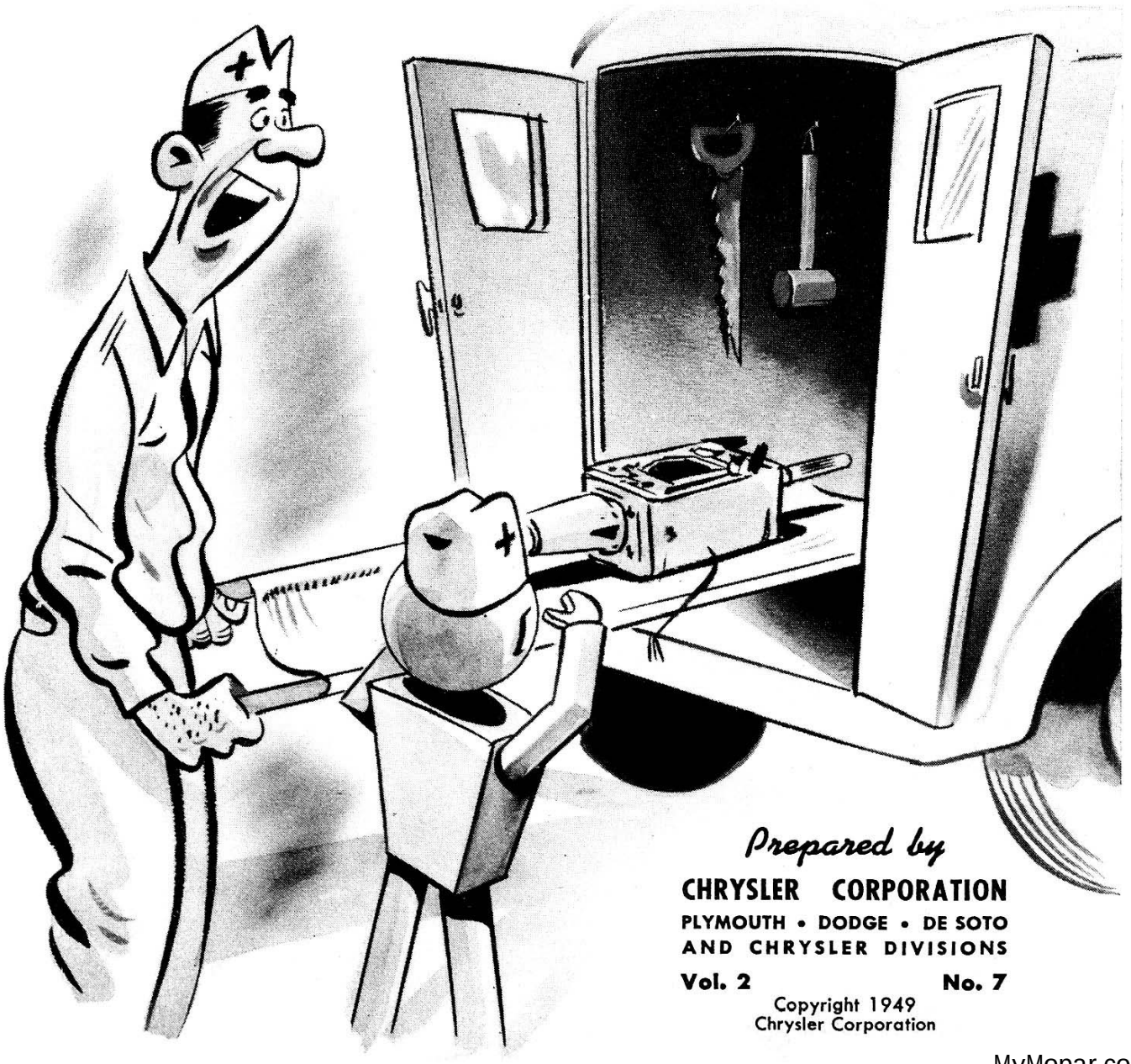
SERVICE REFERENCE BOOK

TROUBLE-SHOOTING IN THE TRANSMISSION



Prepared by

CHRYSLER CORPORATION

PLYMOUTH • DODGE • DE SOTO
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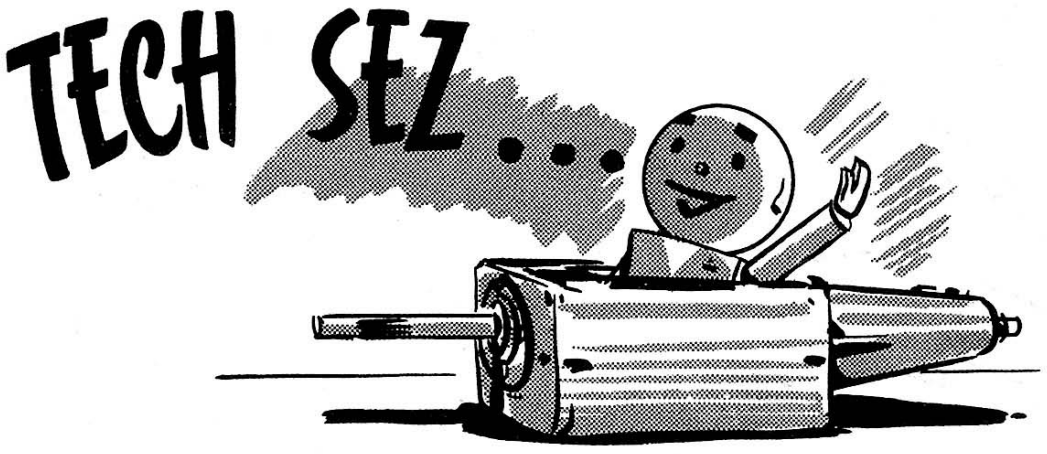
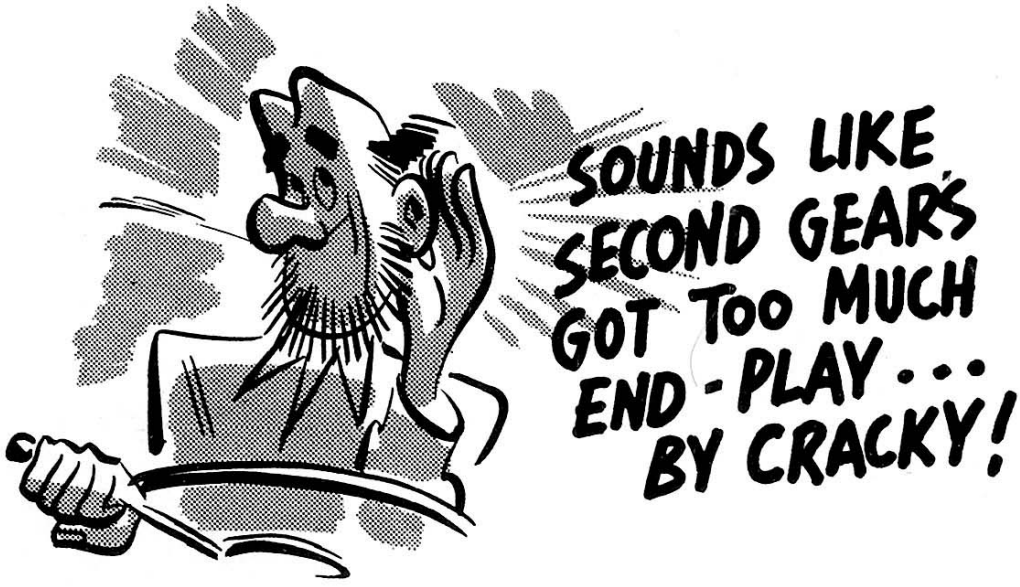
Vol. 2 **No. 7**



For the most part, trouble-shooting in the transmission is an "inside job!" In other words, once you've decided that the transmission is the unit that needs fixin', you've gotta get inside to find out what's wrong.

'Course, I know some old-timers who can pretty well tell what's ailin' a transmission just by listenin' to it. But it takes a whale of a lot of transmission experience to get that good! And there are some boys who can make a few checks with the transmission still in the car. But again, it's a case of needin' plenty of old-fashioned "know how" in order to figure the trouble out right.



Now, gettin' inside a transmission and findin' out what's wrong may sound like a tall order. Actually, it's not so tough, once you know the right way to take a transmission down . . . what to look for as you go . . . and how to put her back together again.

And that's why lots of fellows are going to find that this book is a handy one to keep around the bench. It's full of the right kind of trouble-shooting tips that'll help you on your next transmission job.

BEFORE YOU OPERATE

When you've decided that the trouble you're tracking down is somewhere inside the transmission, it naturally means the transmission has to come out of the car for disassembly.

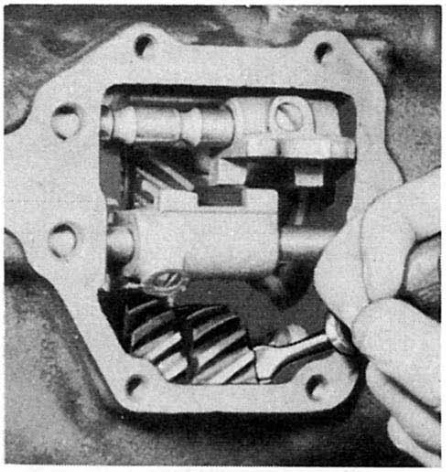
But . . . taking first things first, let's mention a couple of points you can cover *before* you pull the transmission.

Take that main shaft flange nut, for example. That nut is usually turned on tighter than the bark on a tree. And sometimes it's hard to get 'er off when you've got the transmission on the bench. So here's a tip that may save you needless sweat and tears.

Break the nut loose while the transmission is still in the car. Then you'll have the clutch and the engine to keep the main shaft from turning. Just slip 'er into low and set the handbrake. Then you can break that nut loose as easy as rollin' off a log.

and another thing...

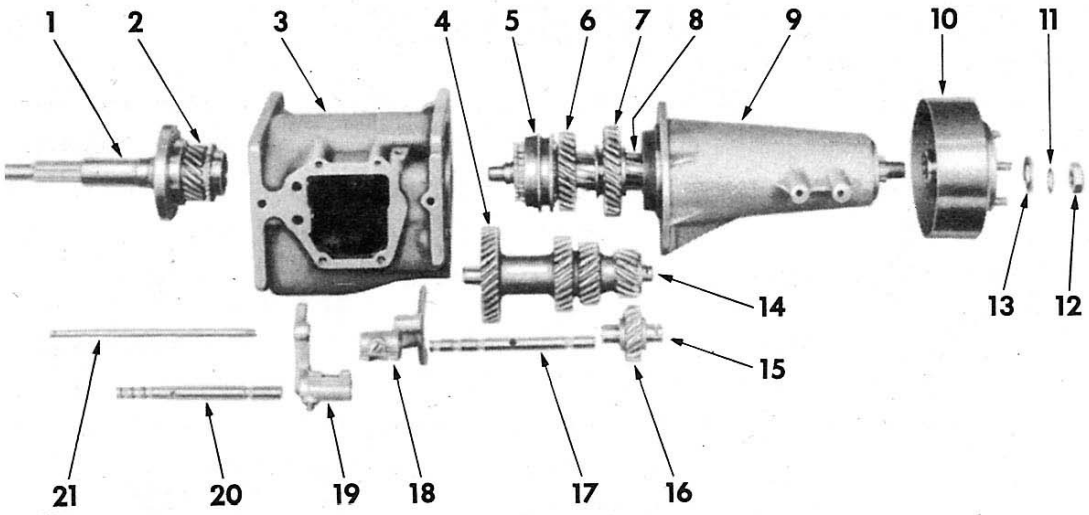
Suppose you thought you heard a clunking or backlash noise when you had the car on the road. You know, that kind of a noise *could* come from too much end-play in the cluster gear or in the second speed gear. So—if you want to make sure that the noise is in the transmission, you can check it before pulling the transmission out of the car. Just pull that gearshift housing off the side (you've got to disconnect the control rods anyway) and stick a screwdriver in there. See if you can move the cluster gear or the second speed gear back and forth. 'Course they'll move a little . . . but if it seems like they move more than you think they ought to, that's probably where the trouble is. Two to eight thousandths of an inch end-play isn't much—and more than that'll give you noise.



GETTING INSIDE THE GEAR BOX

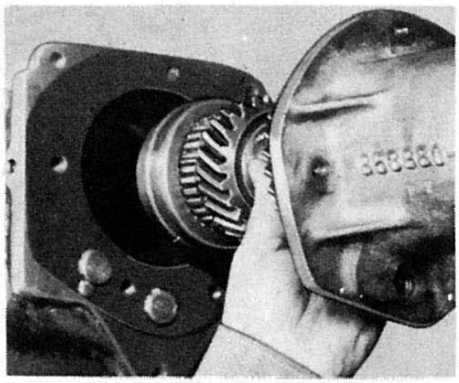
As soon as you get the transmission on the bench, take that gearshift housing off—that is, if you didn't take it off before. Then, take the gearshift fork guide rail out. Remember, that rail screws into the case. All you need is a screwdriver to get it loose—and it comes out the front of the case. Then you've got to loosen up the shift fork set screws so you can get the shift rails out. Those rails come out the front, too. Don't try to dig out the welch plug in the case at the front end of the second and high rail. Just slide that rail as far forward as you can, and you'll see the notch in the rail where the interlock fits. Hold a drift in that notch and give it a light tap with a hammer, driving the rail forward—and presto! the welch plug pops out of the case.

TRANSMISSION



1. BEARING RETAINER
2. DRIVE PINION
3. TRANSMISSION CASE
4. COUNTERSHAFT GEAR
5. SYNCHRONIZER UNIT
6. SECOND SPEED GEAR
7. LOW AND REVERSE GEAR
8. MAIN SHAFT
9. EXTENSION
10. HAND BRAKE DRUM
11. FLANGE NUT LOCKWASHER
12. FLANGE NUT
13. FLANGE WASHER
14. COUNTERSHAFT
15. REVERSE IDLER GEAR SHAFT
16. REVERSE IDLER GEAR
17. LOW AND REVERSE SHIFT RAIL
18. LOW AND REVERSE SHIFT FORK
19. SECOND AND HIGH SHIFT FORK
20. SECOND AND HIGH SHIFT RAIL
21. FORK GUIDE RAIL

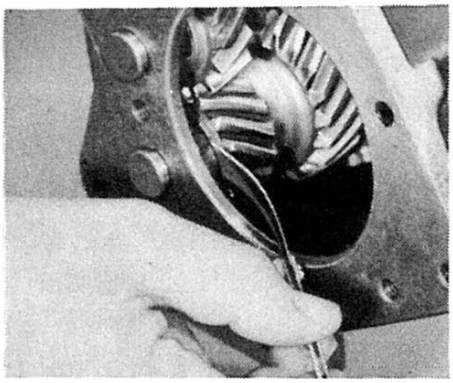
Then you pull the rail out. There's nothing to getting the main shaft and its gears out of the case. Just take out the cap screws that hold the extension to the rear of the case. Slide the clutch sleeve forward to the clutch teeth on the pinion to allow a little clearance between the sleeve and the cluster second gear. Then grab hold of the extension and pull. The main shaft with all its gears will come right out, and you can take the gears off the shaft one at a time at your leisure.



CHECKING FOR END-PLAY IN THE CLUSTER GEAR

Remember we said you could check that cluster gear to see if it had too much end-play—before you pulled the transmission out? Sure . . . you could get a look at it then, but you couldn't tell exactly how much end-play it had. But you can now, with the main shaft and its gears out of the way.

And you always want to check it, whether you heard any noise from it or not. Like we said, two to eight-thousandths of an inch end-play isn't much, but more than eight will give you a noise. And another thing . . . while you've got the job down this far it won't take but a minute to make a good check of this end-play. Suppose it is still under the eight-thousandths limit . . . but not *much* under. It's a safe bet that it'll get noisy pretty soon . . . and then the owner is sure to be unhappy if he has to pay for pulling the job down again. He's going to wonder why you didn't take care of it when you had a chance.



So slip a feeler gauge in between the case and the bronze thrust washer at the rear end of the cluster gear. If you've got more than eight-thousandths end-play—or close to it—you know you're going to have to put in thicker bronze thrust washers when you put the job back together. And when you pick out the washers you're going to put back in, select the ones that'll hold the end-play down to as close to two-thousandths as possible.

THE CLUSTER GEAR COMES NEXT

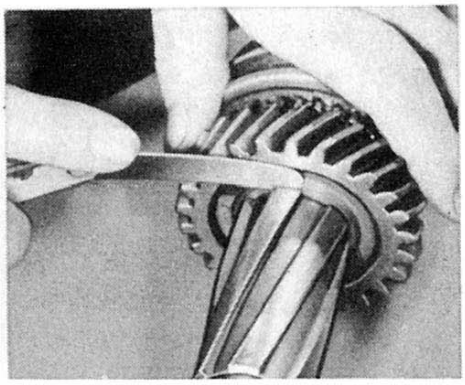
After you've got that taken care of you're ready to take the cluster gear out. Remember . . . the countershaft drives out from front to rear. Be sure to use a soft hammer, and drive the arbor (C-578) into the gear as you drive the countershaft out. That arbor will keep the roller bearings in the cluster gear from falling out, so leave the arbor in the gear . . . and drop the gear to the bottom of the case in order to get the drive pinion out.

THEN THE REVERSE IDLER GEAR

Now you're ready to remove the reverse idler gear. You've got an arbor (C-464) to use here, too, to keep the roller bearings from falling out of the gear. Start the reverse idler gear shaft out with a drift, driving the shaft toward the rear. Then drive the arbor through the gear as the shaft comes out.

CHECKING FOR END-PLAY IN THE SECOND SPEED GEAR

Maybe you checked the end-play of the second speed gear before you pulled the transmission out. But check it again, now that you've got the gear and shaft out where you can *measure* the amount of end-play. Remember—it's supposed to be between three and eight-thousandths if there's more than eight you'll get a clunking noise when the car is being driven in second gear.



You can use a feeler gauge to measure the clearance between the rear face of the gear and the ends of the splines on the main shaft. Another way to check second speed gear end-play is to use a dial indicator. Clamp the dial indicator to the main shaft and position the indicator button against the gear. By moving the gear back and forth you can read clearance direct. If you find more than eight-thousandths of an inch end-play, it's probably due to one or more of these conditions:

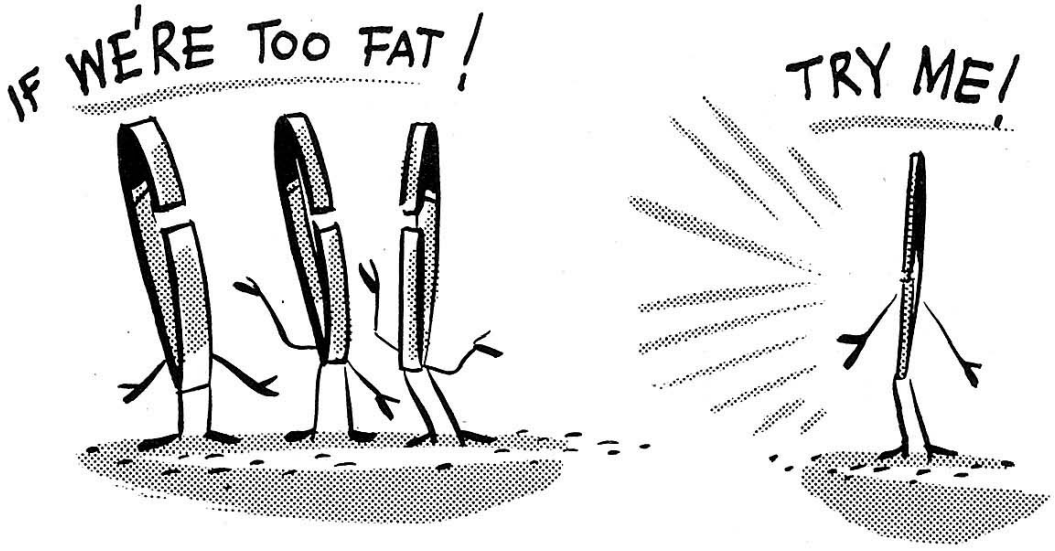
The rear face of the gear has worn into the ends of the main shaft splines.

The main shaft splines have worn into the gear.

The front face of the gear cone has worn the rear face of the clutch gear hub.

Too thin a snap ring was used at the front of the clutch gear.

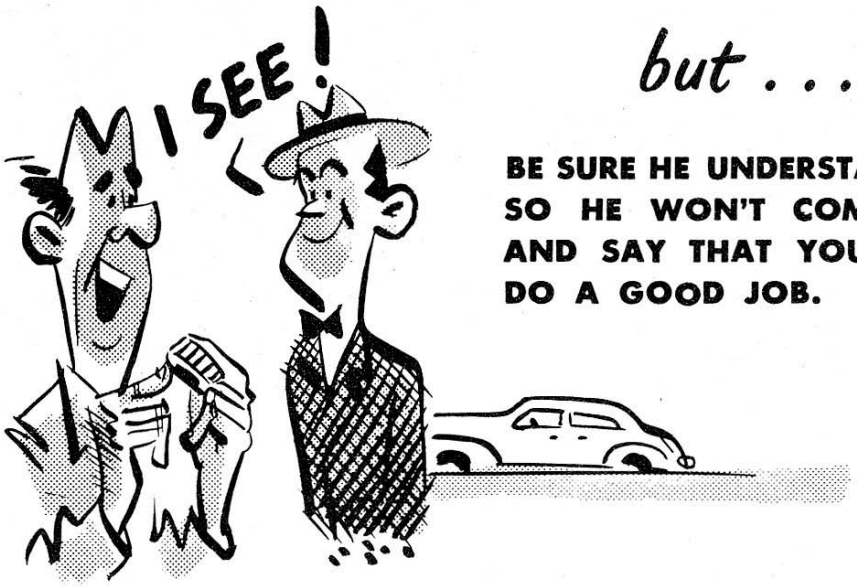
In order to find out which of these conditions is responsible for the excessive end-play, you'll have to take the second speed gear off the shaft. Naturally, you'll pull the clutch gear and sleeve off first, so you'll have a chance to check that snap ring before you take it out. That snap ring is supposed to hold the clutch gear on the shaft with *no end-play.* If there is end-play, it'll allow the second speed gear to move forward on the main shaft. There are four thicknesses of snap rings to select, so you'll be able to pick out one that will hold the clutch gear in place and won't allow end-play.



CHECK AND DOUBLE-CHECK

If the snap ring is all right—no end-play in the clutch gear—check the rear of the gear hub for wear. Check the rear face of the second speed gear, and the ends of the splines on the main shaft for wear. If you find wear enough to give the second speed gear more than eight-thousandths of an inch end-play, you'll know that is the cause of the clunking noise you heard when driving in second gear. The only thing you can do to eliminate this end-play is to replace the worn parts.

NOTE: End-play in second may cause a little noise, but replacing the parts that cause the end-play may cost more than the owner is willing to pay. Maybe he'd be satisfied to have the transmission operate with a little backlash in second as long as he knows it isn't going to do any harm. After all—you'd hate to have a radio repairman replace everything in your radio except the cabinet, just to get rid of a little static! So explain the condition to the owner. If he wants the noise out, he shouldn't complain about the cost. If he doesn't mind the noise he can save some money.

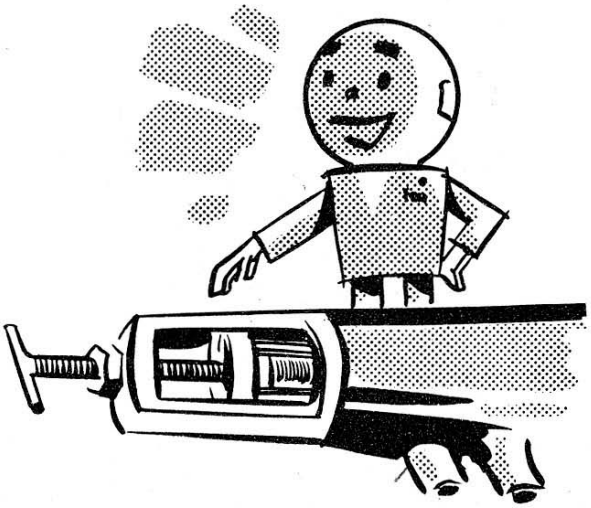


but . . .

BE SURE HE UNDERSTANDS IT, SO HE WON'T COME BACK AND SAY THAT YOU DIDN'T DO A GOOD JOB.

Here's one more word of Caution!

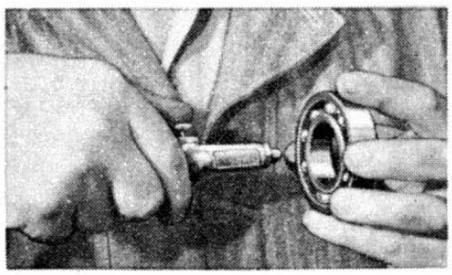
When you pull the oil seal out of the rear of the extension, use a puller. Sure—you can pry it out with almost anything! But you might gouge the surface of the extension. Then, when you put a new seal back in, grease will leak past the outside of the seal.



GIVE ALL THE PARTS A BATH

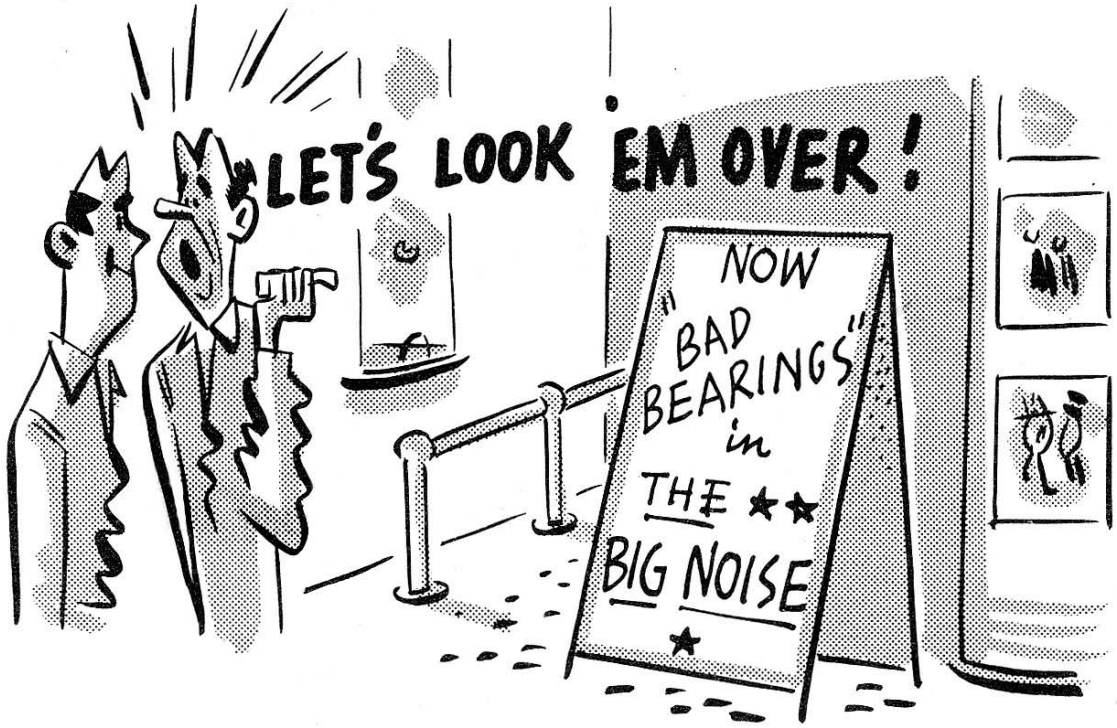
You can't make a good inspection of dirty parts, so clean all parts thoroughly in solvent. Most mechanics find it's wise to use *two* solvent tanks: one for very dirty parts, like the case, and one for precision parts, like the bearings.

Dry the parts with compressed air so you can get a good look at them. Give the oil passages in the gears an extra shot of air to make sure they're clear so the lubricant can flow through.



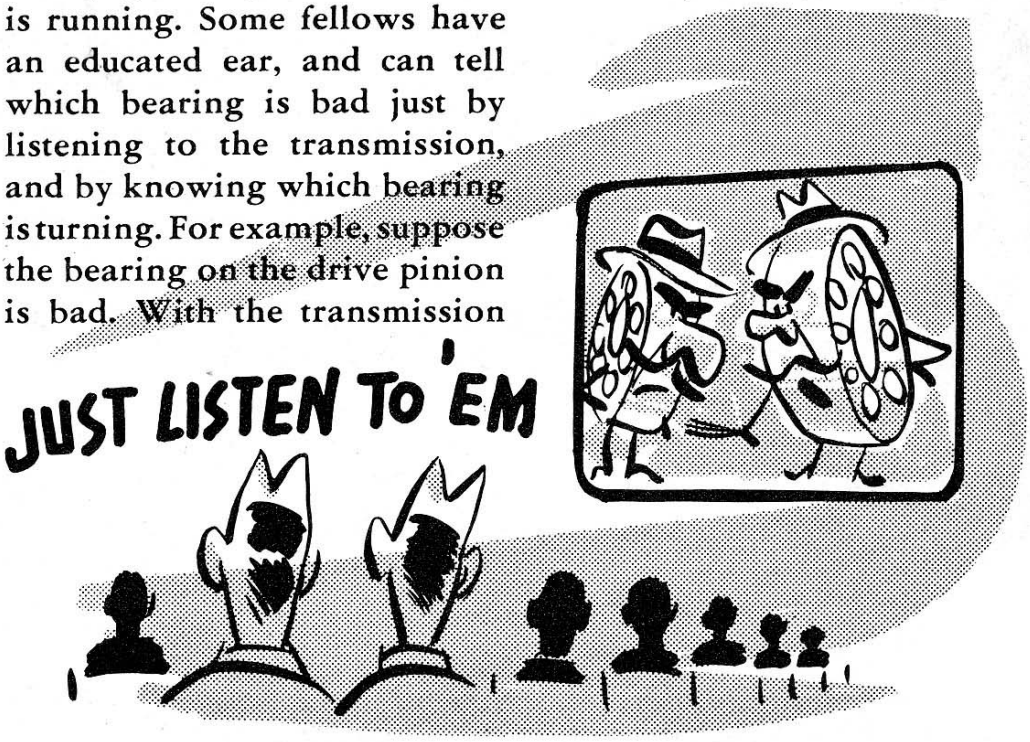
And when you dry the ball bearings, blow the air through the *side* of the bearing. Don't spin the bearing with the air stream—spinning a dry bearing at high speed may score the balls or races.

CAUTION. Cleaning the transmission parts is one of the most important services you give the owner. That goes for the gears and the case, too. Wash out all the old lubricant and dirt. Tiny particles of dirt and bits of metal will be carried around in the lubricant, and will wear the parts. And be particularly careful during assembly to see that no dirt gets on the parts from your bench or from your hands.



Start out by inspecting the ball bearings. Put a few drops of oil on the balls. A bearing that's okay might sound noisy if you spin it dry. Stick two or three fingers through the inner race of the bearing, and turn the outer race. A good bearing is a silent bearing, so spin it by hand, hold it up to your ear, and listen for a noise. A flat spot on one of the balls will cause a clicking sound, and means the bearing must be replaced. A flat spot may not work around to contacting the race on the first spin, so spin the bearing several times. You can check it for looseness, too, by comparing it with a new bearing. If it seems to be quite a bit looser than the new one, replace it.

A rough bearing will give a steady grinding noise when it is running. Some fellows have an educated ear, and can tell which bearing is bad just by listening to the transmission, and by knowing which bearing is turning. For example, suppose the bearing on the drive pinion is bad. With the transmission

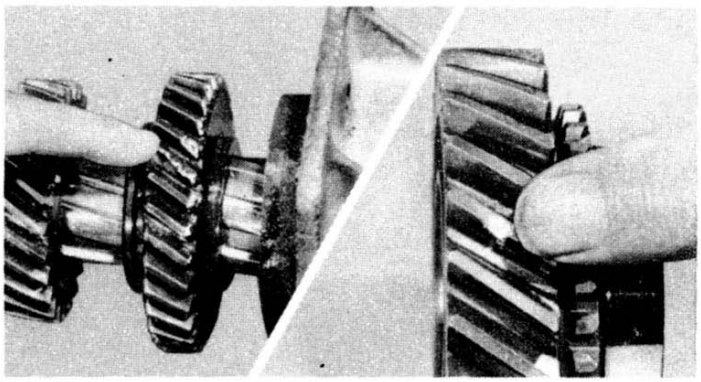


in neutral and the engine running, you'll hear the noise when you let in the clutch but you won't hear it with the clutch pedal depressed. Why? Because the drive pinion stops turning when you depress the clutch pedal! On the other hand you won't hear a bad bearing on the main shaft unless the car is in motion. That's because the main shaft doesn't turn unless the rear wheels are turning.

NOTE: When replacing a bearing it's wise to inspect the package. You may find it has been opened. If it has, there's a chance that the bearing has picked up some dust or dirt. So clean the bearing in solvent, put a few drops of oil on the balls, and inspect the bearing just as you'd check one you'd just taken out of the transmission. A new bearing that comes to you in a sealed package won't need this cleaning and inspecting operation. Keep it wrapped in its oiled paper until you're ready to install it—and then be careful to keep it clean when you handle it.

CHECK THE GEAR TEETH

You've probably been around long enough to recognize the bumping sound that comes from the transmission when a tooth has been broken off one of the gears. But if you'd like to learn how to get a pretty good idea of which gear is broken, here's a few tips on what to listen for.



If you heard the bumping noise only while the transmission was in low and reverse, chances are there's something wrong with the main shaft low and reverse gear or with its mating cluster gear.

If you heard the sound in all gear positions, and in neutral, the broken or damaged tooth may be on any of the constant mesh gears. A broken tooth means you'll need a new gear, of course.

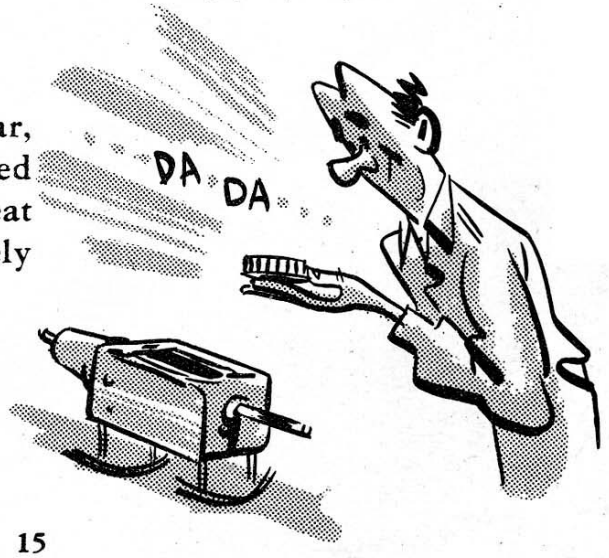
You'd better look the gears over for rough teeth, because rough teeth will cause a whining sound that gets higher as the driver picks up speed. You'll have to put in a new gear in order to get rid of the noise.

A small nick on a gear tooth, however, can usually be dressed down with an oil stone. A nick can be caused by bits of metal or part of a broken gear tooth which has run through the gears. There's another reason for keeping the transmission clean!

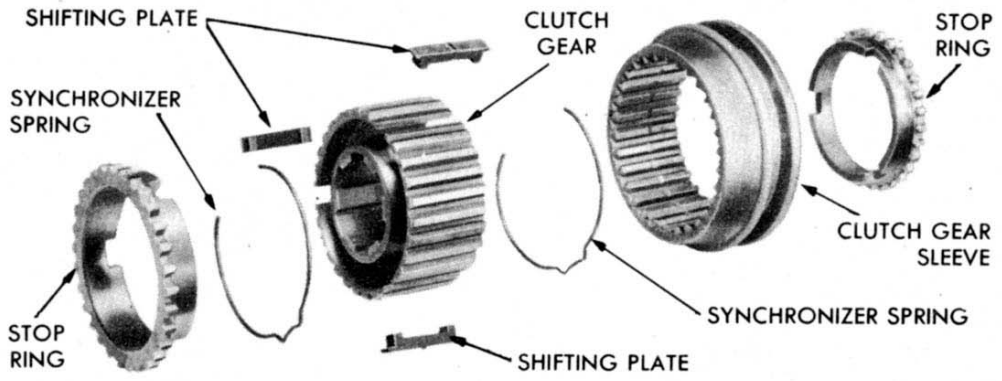
NOTE: We suggested you check with the owner before putting in the parts necessary to get rid of a backlash noise caused by second gear end-play. It'd be a good idea to check with him before replacing a gear that's making a whining noise because the teeth are rough. Maybe he's willing to pay for a perfectly quiet transmission—but you'd better let him decide.

That goes for the wear patterns you'll find on old gears that aren't really damaged. The wear pattern develops when meshing gears have been in service for a long time. Maybe you're replacing one of the meshing gears because it's damaged. The new gear will be a little noisy when it meshes with the old gear—and you should check with the owner to see if he wants *both* gears replaced so his transmission will be quiet as well as working properly.

When installing any new gear, look it over for nicks caused by rough handling. Then treat it like a baby until it's safely in place in the transmission!

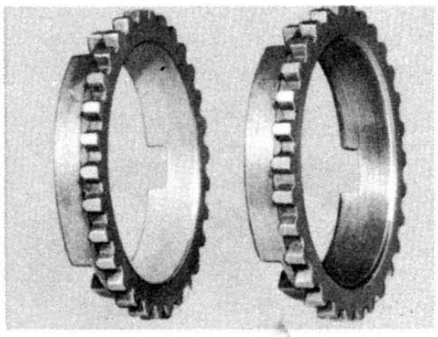


INSPECT THE SYNCHRONIZER, INSIDE AND OUT

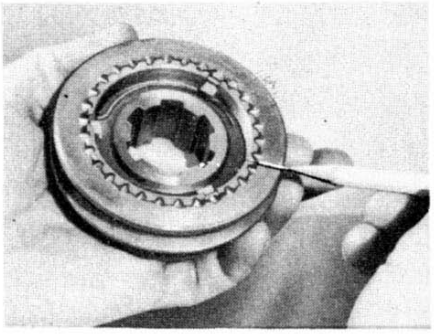


Take a good look at the teeth on the stop rings and the clutch teeth on the drive pinion and the second speed gear. If the driver has a habit of forcing the transmission into second and high before the gears are synchronized, the clutch teeth and the stop ring teeth are apt to be battered up. Battered teeth would cause hard shifting, so you should replace the damaged parts.

While you're working with the stop rings, check the threads that are cut on the inside of each ring. The rings, you know, are forced onto the cones of the drive pinion and the second speed gear to slow down or speed up those gears. They need friction to do their job, and the rings get that friction when the threads on the inside of the rings cut through the oil film on the gear cones. If those threads are worn off you'll get gear clashing when you shift. So you'll want to discard a ring with worn threads.

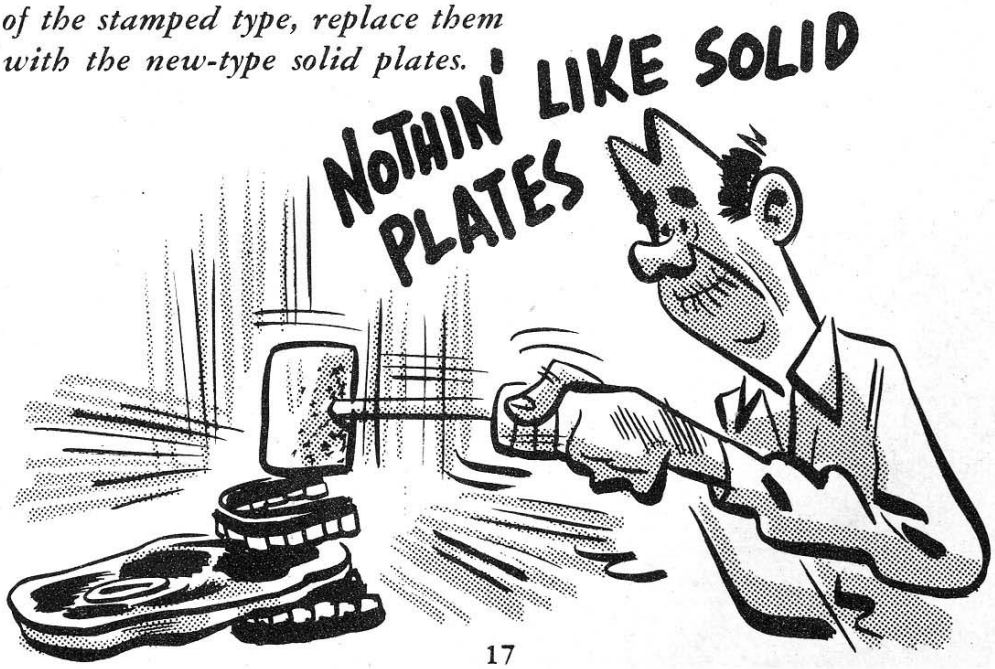


The clutch gear is splined to the main shaft, and the clutch sleeve is splined to the clutch gear. And the low and reverse gear is splined to the main shaft. Take a look at those splines to make sure there aren't any nicks or rough spots. That kind of damage prevents the transmission from being shifted easily and quietly. Sliding gears can't slide on a rough shaft!



If you're discarding either the clutch sleeve or the clutch gear, throw away its mate, too. You'll want to use a complete new set because the sleeve and the gear are mated during production to hold backlash to a maximum of one-thousandth of an inch. And when you're installing the parts make sure the etched marks are lined up properly.

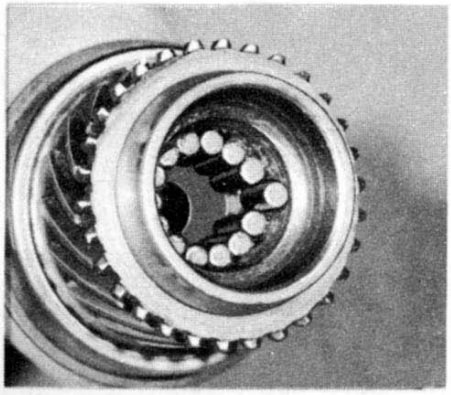
Before you're through inspecting the synchronizer parts, be sure the shifting plates aren't worn or bent. They can't do their job of controlling the stop rings unless they're in perfect condition. *And if the plates are of the stamped type, replace them with the new-type solid plates.*



FITTING THE PIECES TOGETHER!

There's a couple of points you should keep in mind while you're putting the transmission together. Be sure there's no end-play in the drive pinion, or in the synchronizer clutch gear. Keep the end-play of the countershaft gear and the second speed gear within limits. And when you come to the snap rings, be sure they're seated snugly in their grooves. Before you start assembling, it's a good idea to see that you have all the roller bearings. Here's a chart that shows you how many rollers go where.

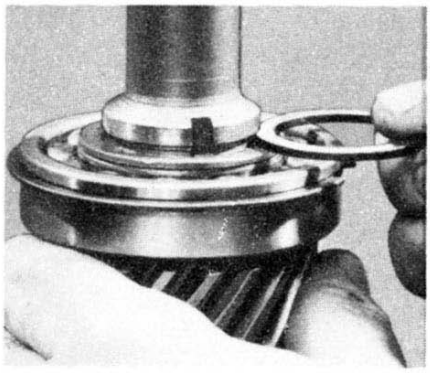
Bearing Position	*Number of Rollers*
Drive pinion pocket	14
Cluster gear (each end)	22
Reverse idler gear	22



Let's start with the drive pinion. You'll find that if you grease the pocket lightly, the roller bearings will stay in place while you're installing them.

You have to slide the last bearing in from the end. If there's any play after you've installed this fourteenth bearing, the rollers are worn and should be replaced. When they're all in, install the snap ring with a screwdriver. That snap ring keeps 'em lined up, so they won't be able to walk out of position.

Now, with the bearing washer on the pinion shaft, you've got to select a snap ring that'll give a snug fit in the groove, so it will hold the bearing and washer on the shaft and eliminate end-play.



You know, that snap ring is pretty important. If it isn't snug in the groove, or if it breaks, you'll get end-play in the drive pinion—and end-play means backlash.

Those snap rings come in four thicknesses. Find the one that gives you the best fit, slip it over the shaft and seat it with a short length of pipe (or other tube-shaped tool) and a hammer. It's not such a good idea to use snap ring pliers here—you may distort the ring.

ASSEMBLE THE CLUSTER GEAR

Now you can put the bearing spacer inside the cluster gear, and slip the arbor (C-578) inside. Work a little grease down between the arbor and the gear at both ends, so the 22 roller bearings will stay in place while you're installing them. The arbor will keep them from falling out of place when you set the gear in the transmission and when you install the countershaft.

Now you're ready to put the thrust washers on the cluster gear. If you found that cluster gear end-play was more than eight-thousandths of an inch, or close to that figure, remember to use thicker bronze thrust washers. They come in three thicknesses. Shoot for two-thousandths of an inch end-play—or as close as you can come to it.

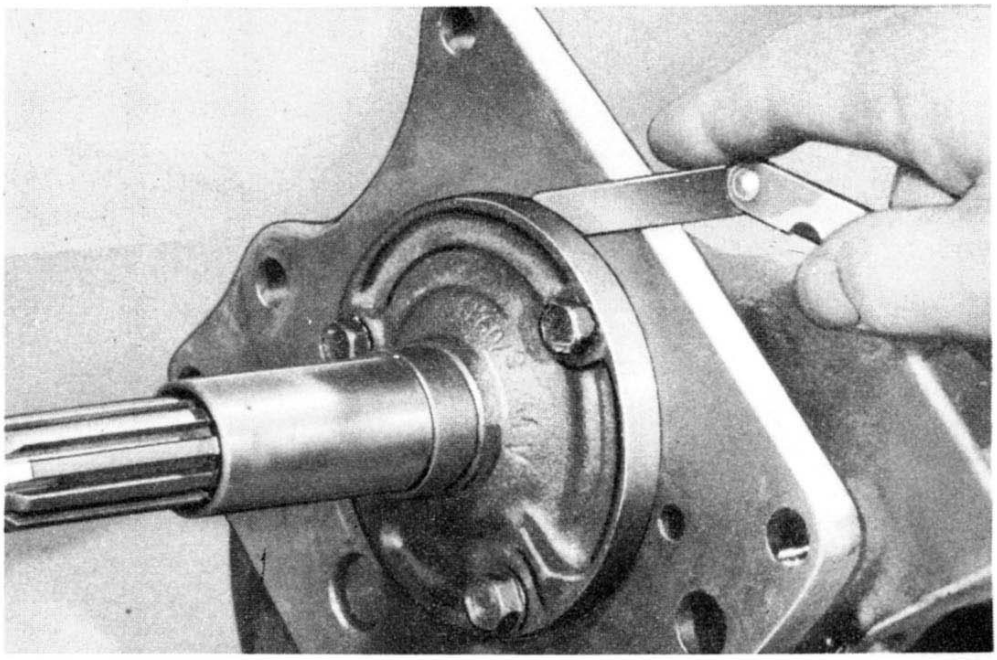
Coat the steel washers with a little oil so they'll stay in place, and put them on the gear first. (The roller bearings would cut through the bronze washers if you put the bronze washers on first.) Now put a little oil on the bronze washers and stick them to the steel ones. You're using oil instead of grease because grease takes up too much space, when you're working with clearances in thousandths of an inch.

You can put the cluster gear, with its arbor, bearings, and thrust washers, in the case now. Take it easy, though—you don't want to knock those thrust washers off. Leave the gear in the bottom of the case until after you've installed the drive pinion, which is the next job.

INSTALL THE DRIVE PINION AND RETAINER

Place the pinion in its bore, and tap it into position until the lock ring on the ball bearing bottoms against the case. But be sure the bearing isn't cocked in the bore.

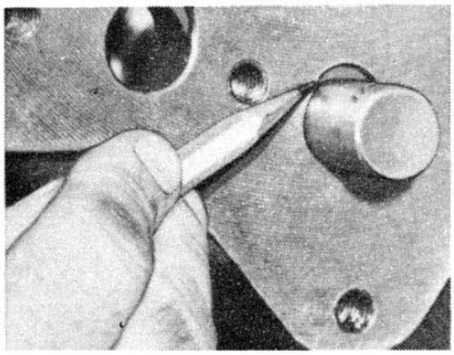
Now you'll have to select a gasket to go between the drive pinion bearing retainer and the case. With the retainer tightened firmly against the case, take a feeler gauge and measure the space between the retainer and the case. There are two gasket thicknesses to choose from. The one you'll use is both an oil seal and a shim to prevent end-play, so select the gasket that'll give you about five-thousandths of an inch more thickness than the space you just measured. This will provide enough squeeze on the gasket to prevent oil leakage.



When you put the bearing retainer cap screws back, it'd be smart to use new grommets on all three. Two of those bolt holes are below the oil level, and with new grommets you'll be sure there won't be any leakage there.

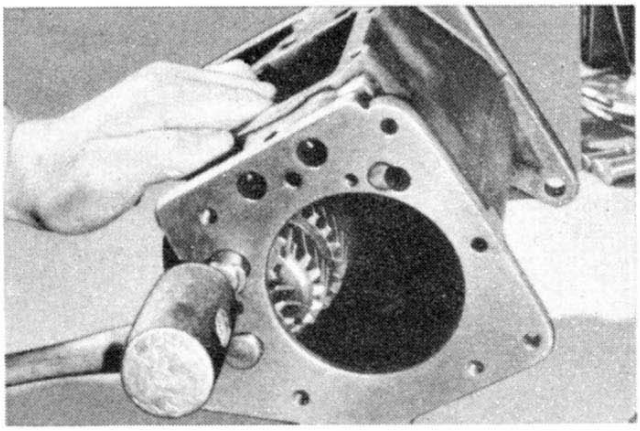
INSTALL THE COUNTERSHAFT

Now let's get back to the cluster gear you left lying in the case. Lift the gear up to the level of the holes in the case, and push the countershaft through the rear hole until the keyway is about to enter. Line up the keyway with the cut-out in the hole, put the key in, and drive the countershaft home with a soft mallet. The cluster gear arbor will be forced out by the countershaft.



ASSEMBLE THE REVERSE IDLER GEAR

Again, a little grease on the inside of the reverse idler gear will hold the roller bearings in place as you fit them in around the arbor. There are 22 of 'em. A dab of grease on each face of the gear will hold the washers on, and you can set the gear and washers in position in the case. Be sure the chamfered ends of the gear teeth are forward!



Slip the reverse idler gear shaft through the rear of the case, and put the gear on the shaft as you continue to drive the shaft home and force the arbor out. Be sure to pick the arbor out. Don't forget the key.

ASSEMBLE THE MAIN SHAFT GEARS

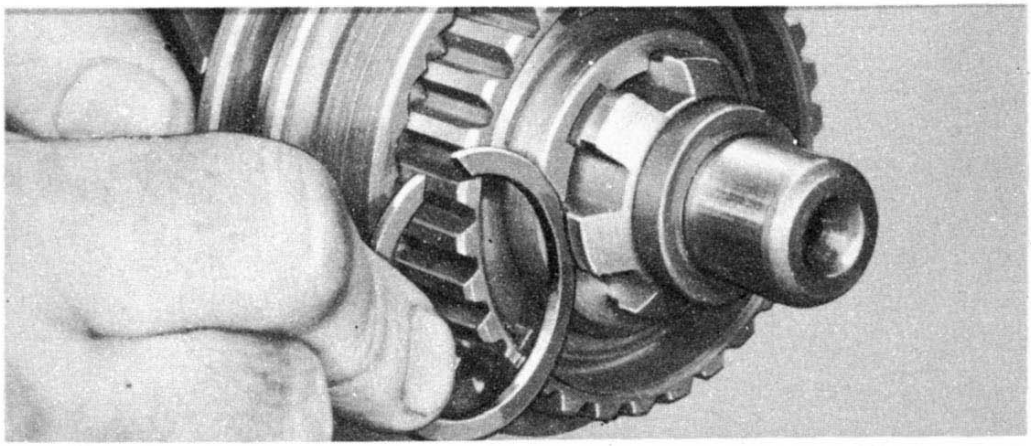
Slip the second speed gear on the shaft with the clutch teeth forward. Then, holding the shifting plates on the clutch gear, line up the etched marks on the sleeve and the gear, then slide the clutch sleeve onto the gear. The two pieces are positioned as marked to hold a maximum of one-thousandth of an inch backlash between the gear and the sleeve.

Put the synchronizer springs in place, with the hump of each ring under the projection on one of the plates.

Now you can slip the assembled synchronizer unit and one of the stop rings on the main shaft, with the tapered end of the sleeve toward the front. Tap it lightly so it rests flush against the shoulder on the main shaft.

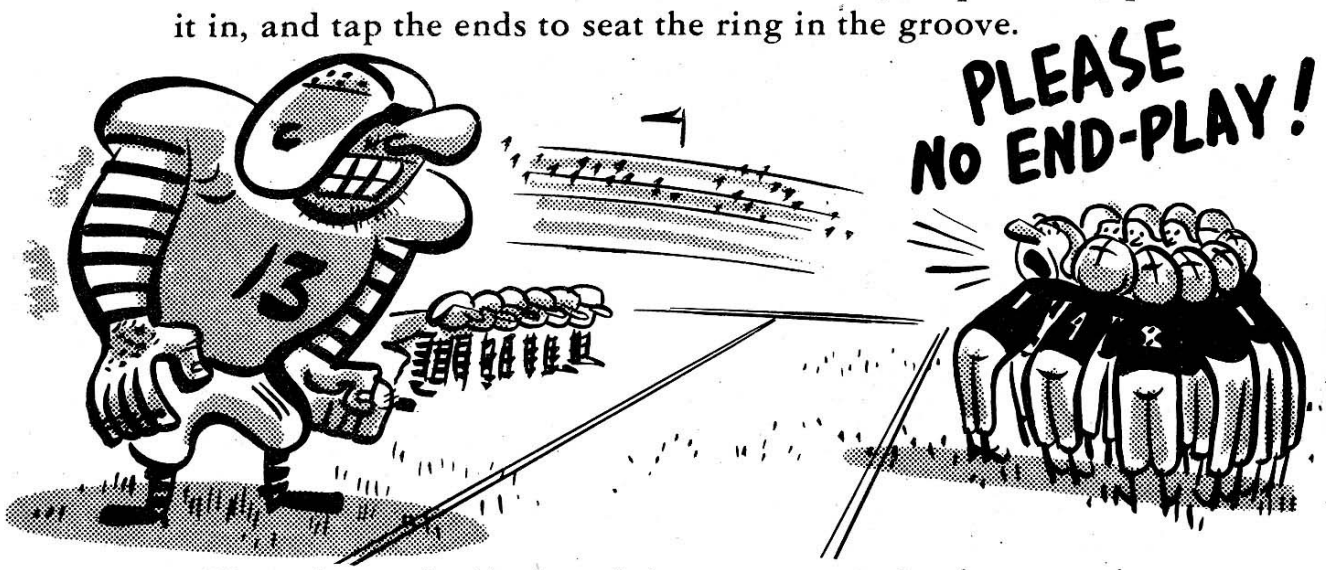
Now you'll have to select one of the four snap rings to put in front of the clutch gear. The snap ring you choose has to lock the clutch gear in place—you don't want any end-play here. So make sure you get a tight fit. Then put the ring in the groove, and tap the ends of the ring to seat them.

The sliding low and reverse gear goes on the main shaft now, with the fork groove forward.

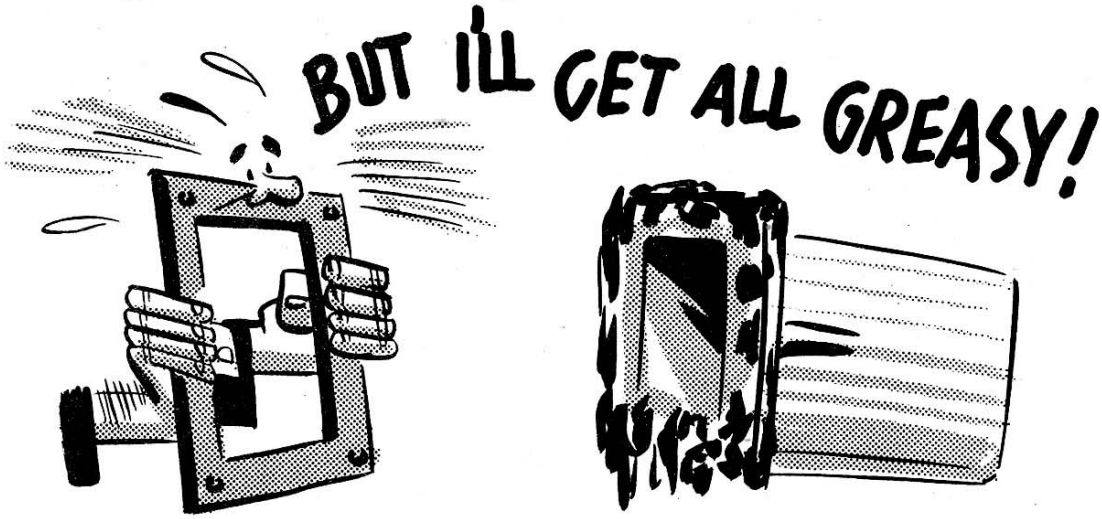


THE EXTENSION IS NEXT

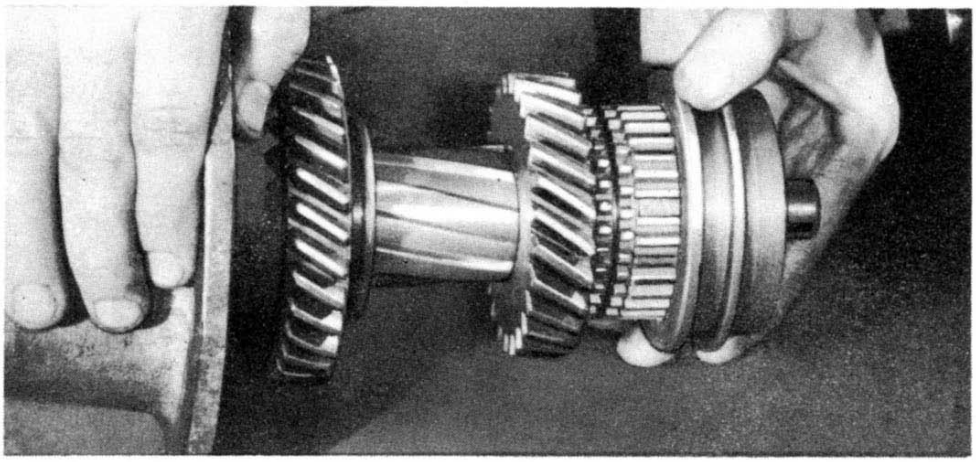
The main shaft rear ball bearing is the first part to install on the extension—it goes on the front end. Now you need a snap ring to fit in front of the bearing—one that will fit snug, and prevent end-play between the bearing and the extension. There are four thicknesses to choose from, so pick one, put it in, and tap the ends to seat the ring in the groove.



Now the main shaft and its gears goes in the extension, with the ends of the splines resting against the ball bearing. Coat the rear face of the transmission with grease and place the gasket (a new one!) in position.

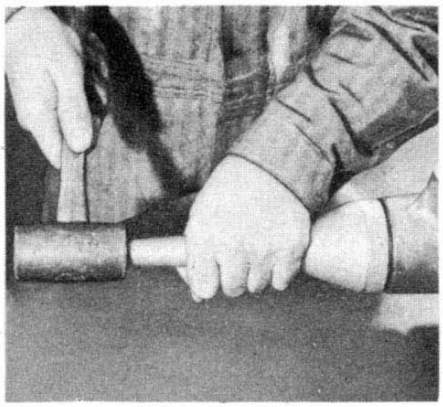


You're ready to put the main shaft and its gears into the case, and bolt the extension to the rear of the case. Slide the clutch sleeve forward about half way and it'll be easier to slide the sleeve over the second speed cluster gear. Then put the other stop ring on the cone of the drive pinion and push the main shaft into the pocket of the drive pinion.



Secure the extension to the case with the screws. Use new grommets on the two lower screws—again, these are below the oil level, so you've got to guard against leaks.

The speedometer gear, with its teeth facing the rear, can be put on the main shaft next. And you can put the bearing spacer and the rear ball bearing in now.



Use a seal drift (C-579) to seat the new oil seal on the end of the main shaft. This drive will position the seal properly, and it won't let the seal press against the bearing.

INSTALL THE BRAKE DRUM

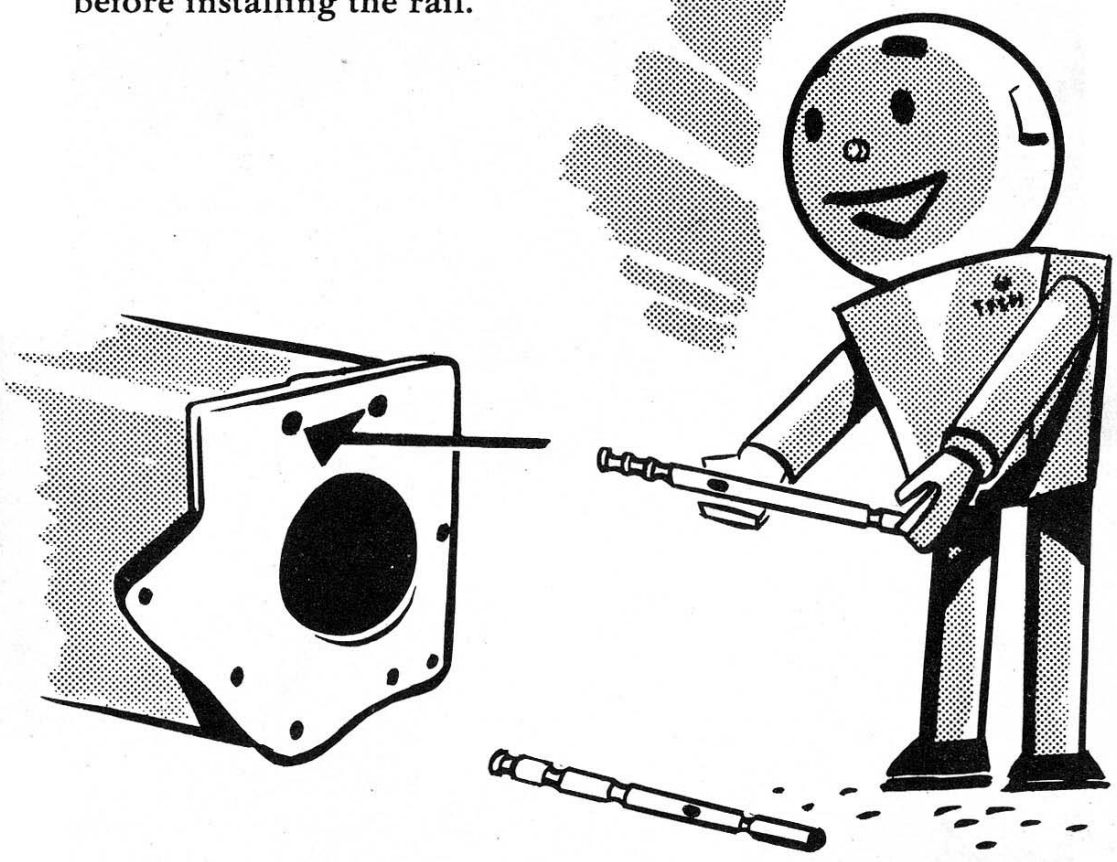
Now put the hand brake drum on, and install the washer and nut. That nut has to be turned up tight—95 to 105 foot-pounds. If you can't get it that tight on the bench, finish the tightening when the transmission is back in the car.

The nut has to be tight so the drum will crowd the rear bearing up against the spacer and prevent the speedometer gear from turning on the shaft. If the gear slips on the shaft, your speedometer won't read right.

INSTALLING THE CONTROLS

Now you're ready to work on the shifting mechanism. Start off with the sliding gears in neutral, and then install the two shifting forks through the opening in the left side of the case.

The second and high gear rail is installed next. (That's the one with the detents close together.) It goes in the lower hole in the case and through the fork. You'll have to tip the transmission and slide the interlock up and out of the way before installing the rail.



The low and reverse gear rail (with the detents farther apart) goes in the upper hole and through the fork. Now tighten the lock screws in the forks. Better use an offset screwdriver for this job—if those screws lose their grip on the forks you'll have more trouble-shooting to do in the transmission!

Slide the fork guide rail in through the front of the case, through both forks, and tighten it in place with a screwdriver.

Now you'll notice the second and high shift rail hole is below the oil level, so put a new welch plug in there to prevent leakage. Place the two detent balls in position in the side of the case, and you're ready for the gearshift housing itself.

Get a new gasket for the housing, and set it in place, tightening the screws securely. Install the two detent ball springs and their screws.

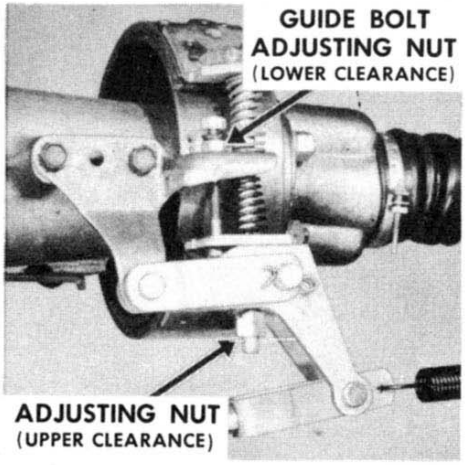
FINISHING UP

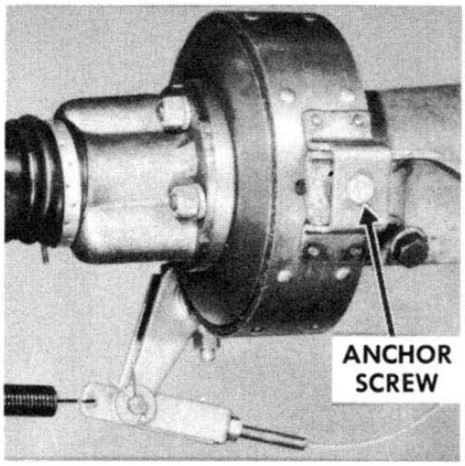
Now you'd better see that the new oil seal is properly seated in the speedometer pinion sleeve. If this seal gets pinched, the spinning cable will draw the oil out of the transmission and carry it right up to the speedometer head! When you're sure the seal is secure, install the pinion and sleeve in the extension.

Mount the hand brake band assembly on the drum, and your transmission is completely assembled.

ADJUST THE HAND BRAKE!

After you get the transmission back in the car and the control rods hooked up, you'll want to check the hand brake adjustment as you hook up the hand brake cable. Be sure there's not more than .005-inch clearance between the bracket on the band and each side of the anchor. Otherwise the band will be distorted when the brake is applied. If there is excessive free play at this point, compress the bracket in a vise. Then adjust the clearance between the band and the drum at the anchor to .020-inch. You get that by adjusting the anchor screw.





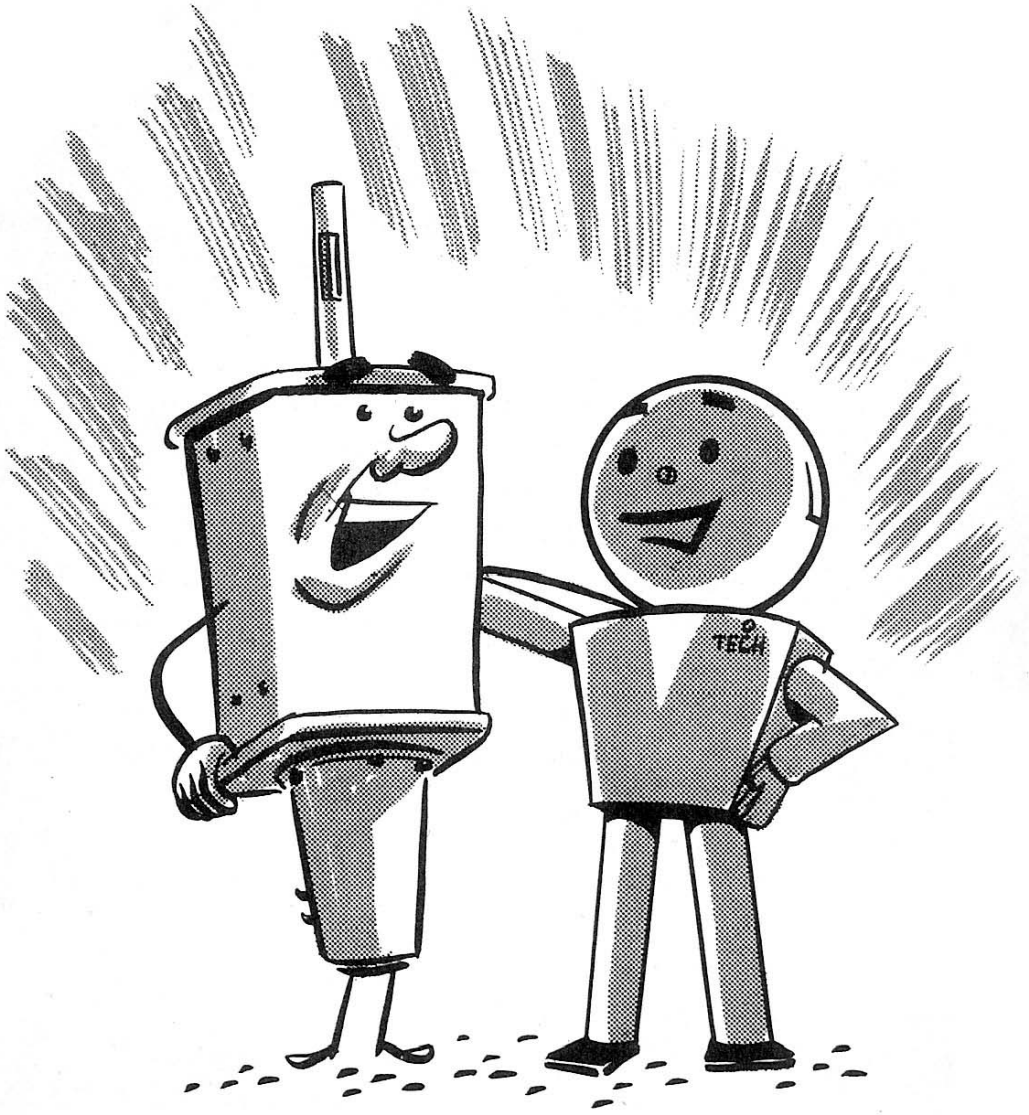
Next, you should see that there's .020-inch clearance between the drum and the upper half of the band, and .020-inch between the drum and the lower half. You get the clearance for the lower half of the band by adjusting the guide bolt adjusting nut. Clearance for the upper half of the band is controlled by the adjusting nut on the long bolt which connects the two halves of the band. When you have these clearances set, you'll have a hand brake that will be free when the hand brake lever is released, and will hold when the lever is pulled on. And you'll still have a little spare travel of the hand brake lever to allow for additional movement as the brake lining wears.

GIVE 'ER A TEST RUN

The car should be road-tested when you have replaced the repaired transmission. Make sure it shifts easily and quietly into all gears. Listen for noise at high speeds, low speeds, and when the engine is idling in neutral. A road test is the final check of your workmanship on the transmission.

TEST YOURSELF WITH THESE QUESTIONS!

1. When installing the cluster gear, select the thrust washer that will hold end-play as close to the low limit of two-thousandths of an inch as possible. RIGHT ☐ WRONG ☐
2. The main shaft flange nut should be tightened to 95 to 105 foot-pounds to keep the speedometer drive pinion from slipping. RIGHT ☐ WRONG ☐
3. End-play in the clutch gear hub does not affect end-play in the second speed gear. RIGHT ☐ WRONG ☐
4. Small nicks on a gear tooth can usually be dressed down with an oil stone. RIGHT ☐ WRONG ☐
5. Battered clutch teeth on the drive pinion and second speed gear cause hard shifting. RIGHT ☐ WRONG ☐
6. Worn threads on the inside of the synchronizer stop ring cause gear clashing when shifting gears. RIGHT ☐ WRONG ☐
7. When replacing the clutch gear or clutch sleeve, use a complete new set because the sleeve and gear are mated when manufactured. RIGHT ☐ WRONG ☐
8. Bent or worn shifting plates should be replaced with the new type solid shifting plate. RIGHT ☐ WRONG ☐
9. There are 22 roller bearings in the drive pinion to support the front end of the transmission main shaft. RIGHT ☐ WRONG ☐
10. The gasket used between the drive pinion bearing retainer and the case is both an oil seal and a shim to prevent end-play. RIGHT ☐ WRONG ☐



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