MECHANIC'S HANDBOOK

TECUMSEH / PEERLESS MOTION DRIVE SYSTEMS

TRANSMISSIONS / TRANSAXLES / DIFFERENTIALS / RIGHT ANGLE

Reprinted

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CHAPTER 1.
SECTION 1. TERMS USED

A. PEERLESS UNITS

1. GENERAL

Peerless makes power transmission gear drives for use in all types of lawn and garden equipment.

2. TRANSAXLES

A combination of transmission and differential axle are in one compact unit. Peerless transaxles are manufactured in many different gear ratio combinations and from 2 to 5 forward speeds with one reverse.

A. 600 Series. The 600 series is a lightweight unit usually used in riding mower or similar application. The 600 series has a vertical input shaft at the top of the case. The case is aluminum, contributing to a considerable weight saving.

Variations in the series (which determines the specific model number such as 603, 603A, 609, etc.) includes:

1. Shift lever shape.
2. Axle lengths.
3. Axle machining for wheel hub attachment.
4. Axle housing variations.
5. Size of the brake shaft.

There may be other slight differences, however, these are present as a result of product improvement which are not options to an O.E.M. (Original Equipment Manufacturer).

B. 800 Series. This unit has 4 or 5 speeds forward and 1 reverse. The bearings are oil impregnated bushings with needle bearings or ball bearings on axles, input and output shaft.

C. 900 Series. The unit is like the 800 series transaxle except that the 900 can be 2, 3, or 4 speeds forward and 1 reverse.

D. 910 Series. This transaxle will offer a forward and reverse unit. The speed will change with the use of a vari-drive pulley arrangement.

E. 920 Series. This series of 900 transaxle offers a 5, 6, or 7 speeds forward and 1 reverse.

F. 1200 Series. The distinguishing feature of the 1200 series transaxles is that the axle support housings are pressed from the inside of the case and cover, therefore, are not readily removable until the unit is completely disassembled. The casing is cast iron for rugged, long-time wear. The input shaft extends horizontally through the case while the larger brake shaft extends through the cover on the opposite side. The shift lever housing attaches to the case.

A basic difference within the 1200 series itself is that the input can be either right or left depending upon equipment application, therefore, the case can be either the left hand or right hand "half" of the casing, depending upon the application. This, along with the variations listed for the 600 series (above) determines the model number within the 1200 series basic type.

G. 1700 Series. The 1700 design resembles the 1200 series except that the axle support housings bolt to the case and cover and are removed prior to disassembly of the case and cover.

H. 2000 Series. These units are similar to the 1700 series except that the axle support housing contains sealed ball bearings rather than bushings. Other differences are apparent internally which will be described in the teardown procedure of these units.

I. 2300 Series. Generally similar to the 2000 series transaxle. The distinguishing features are a more massive casing, and a larger shift lever opening machined area. The obvious difference from the standpoint of application is that these units have four speeds forward and will be found on equipment that can be used with ground engagement operations.

NOTE: The transaxles described in paragraphs D, E, F and G , are fairly similar in appearance, but do have specific recognizable characteristics. All these units have cast iron bodies for rugged application, although the 2300 series only can be used in ground engaging equipment applications.

3. REDUCTION GEAR AND DIFFERENTIAL UNITS

GENERAL

These units do not have a transmission function characteristic of transaxles, but rather, are units to reduce input speed and torque to a suitable axle speed and torque. The hydrostatic units which match to these units perform the transmission function.

a. **1300 Series.** This unit is the hydrostatic counterpart of the three-speed forward units (1200, 1700, and 2000). It has an aluminum casing and pressed through axle support housings, characteristic of the 1200 series.

The hydrostatic unit is of Eaton, Yale, Towne manufacture and is not serviced by Tecumseh Service Dealers.

b. **2400, 2500 & 2600 Series.** This series of hydrostatically driven reduction gear and differential units can be used in ground engaging operations such as plowing. The hydrostatic unit is manufactured by Sundstrand Corp. in LaSalle, Ill.

4. TRANSMISSIONS

These units as manufactured by Peerless consist of the shifting mechanism to take a constant input shaft speed and reduce it to the desired output speed. The differential or axle unit is connected through a chain drive.

a. **350 Series.** This 3-speed forward, 1-speed reverse transmission has a cast aluminum casing. Bronze sintered bushings are porous, allowing for a lubricant to flow through them.

b. **400 Series.** This unit is like the 350 unit except the caged needle bearings replace bushings at the input and output shafts.

c. **500 Series.** This unit can be either 3 or 4 speeds forward and 1 reverse. It has dual caged needle bearings around the input shaft. The brake system can be mounted on either side of the unit.

d. **700 Series.** This unit is like the 500 unit except that the shifting gears and shifting keys have been improved for easier shifting. This can be 3, 4 or 5 speeds forward and 1 reverse.

e. **700 "H" Series.** This unit is built with almost all interchangeable parts with in it's two cases except that this will be a "H" shift pattern. This unit has 3 or 4 speeds forward and 1 reverse.

f. **2800 Series.** This unit is built to work on the 2600 series. It is used as a P.T.O. transmission to run external equipment.

5. DIFFERENTIALS

The only self contained differential/axle unit built by Peerless is the 100 series. It features hardened axle shafts of various length and machined for various methods of hub attachment. The case is cast aluminum and the differential gears are sintered metal. The differential pin is held in place by the four retaining capscrews. Oilite bushings reduce friction during differential operation.

The drive sprocket is part of the unit, which depending upon application, can be in any of several diameters in size, thus having a different number of gear teeth.

6. ANGLE DRIVES

These units are used primarily to change the direction of drive at the point where the working equipment attaches.

They can be assembled for right or left hand rotation so that they can be used in various combinations for synchronous operation.

a. **Right Angle Drive.** These units consist of input shafts, output shafts, and the beveled gearing necessary to change the direction of power transmission at right angles. By positioning the drive bevel gear on the input shaft nearest the input end, opposite rotation will be attained from that of switching the beveled gear around to the side away from the input end of the shaft.

Casing and bearings are identical. A cover identifies each unit as being either a left hand (LH) or a right hand (RH) right angle drive.

b. **"T" Drives.** The "T" drive is essentially the same as the right angle drive except that the input shaft extends out the other side of the case to transmit power in the same line to additional right angle drives or other equipment.

c. **Shafts, Couplings, Pulleys, etc.** These items are part of the total transmission unit and are used to connect angle drives, and other attachments. The serrated couplings match the serrations on the shafts of the angle drives or on connecting shafts.

C. IDENTIFICATION OF MODELS

Since acquisition by Tecumseh Products Co. in 1964, all Peerless assemblies have a model number identification tag, or stamping.

On units containing axles (transaxles, or reduction gear and differential units) the identification should be visible by viewing the case/cover unit from below and behind as it is mounted in the driven equipment.

If the area is dirt or oil covered, however, some cleaning may be necessary. Write down any numbers found in locations pointed out, then compare with the Master Parts Manual Div. 8 index.

For right angle and "T" drives, the identification number is stamped into the housing under the input shaft boss opposite the cover.

On transmissions the identification number is stamped on the cover back of the output drive sprocket.

On the 100 series differential, the number is stamped either on cast housing diameter or on the housing end near axle bushing.

D. TERMS USED

AXLE - The shaft which connects the wheel or hub to the differential unit and transmits force back to the wheels. Sometimes axle refers to the differential and axle combination as in the term TRANSAXLE.

AXLE HOUSING (or AXLE SUPPORT) - An extension of the case and cover to support the outer ends of the axles. Because the housing is visible, it is often the best means of distinguishing the series in question.

BEVEL (on a gear - different from bevel gear) - Roundness of the meshing sides of gear teeth allow easy shifting. Because this is about the only allowance made to make easier shifting, the unit should be stopped before the shift to keep these spur gears from getting chewed up.

BEVEL GEAR - A gear with teeth ground on a diagonal so that when it meshes with a second bevel gear, power is transmitted at an angle. If the angle is 90°, the gear is known as a MITER GEAR.

BEVEL PINION - The smaller of two meshed bevel gears in a gear train.

BRAKE (or BRAKESHAFT) - The shaft on a Peerless unit (Transaxles and Transmission) to which a braking system may be attached. It is in the gear train with the differential to stop it when the operator "brakes". It is usually larger in diameter than the input shaft due to its function of taking shock loads experienced in braking.

CASE - That part of the unit "casing half" which contains the shift lever and input shaft openings. The other "half" is the COVER because the re-assembly must be done into one or the other depending upon the series.

CHAMFER - Diagonal milling at the corners of gear teeth to remove sharp edges. The usual reason for chamfer is to eliminate the possibility of hardened gears chewing softer metal.

COUPLING - A sleeve to connect two serrated shafts in the same axial plane. Used in right angle drive systems or in connecting the hydrostatic drive to the input shaft on 2400 series transaxles.

COVER - That part of the unit "casing half" which contains the brake shaft opening (except the 600 series in which all openings are in the CASE as described in CASE - above). The case and the cover switch sides depending upon whether the transaxle is right or left hand drive.

DIFFERENTIAL GEAR BOLTS - Through bolts holding the differential parts together. The heads of these bolts must be opposite the output shaft gear (except in the 2400 series). This is an early check to see that the unit is being assembled correctly.

DOWEL PIN - Alignment pin is used to align the case and cover and other parts in a transmission or transaxle. The dowel should be tapped in to hold the parts in alignment before tightening the retaining screws. Failure to install dowel pins first will usually lead to a unit that binds after assembly.

DUO-TRAK* DIFFERENTIAL (*Trademark -- Illinois Tool Works) - A type of differential which increases torque to the tractive wheel to keep it turning, however in situations where differentiation is necessary (as in turning) the unit acts much like a regular differential.

EQUIPMENT - The complete assembly (riding mower, tractor, etc.) is built by a manufacturer, a part of which is the Peerless unit. A check of the equipment manual is recommended prior to servicing the Peerless unit.

HEAD ASSEMBLY - A complete unit containing all parts of one right angle or "T" drive assembly of a right angle drive system. The head assembly is permanently lubricated and sealed.

IDENTIFICATION NUMBER - See **MODEL NUMBER**

IDLER - A gear used in a gear train to transfer motion or direction. The gear rotates independently of the shaft upon which it is located.

INPUT OR INPUT SHAFT - The part of a Peerless unit which is always connected to the drive. Its rotational speed is dependent on the driving mechanism. All parts of the input system are always in mesh with input shaft and turn whenever it turns.

LIMITED SLIP DIFFERENTIAL - See **DUO-TRAK* DIFFERENTIAL.**

MITER GEAR - One of a pair of interchangeable bevel gears with axles at right angles. Since all bevel gears are miter gears in Peerless units, the terms can be the same.

MODEL NUMBER - The identifying number of a Peerless unit which will permit selection of the proper parts to repair that unit. See page 1-7 for locations of the model number.

OIL SEAL, DOUBLE LIP - An oil seal with two sealing surfaces to prevent entrance of foreign matter, and leakage of lubricant.

OIL SEAL, QUAD RING - A seal with two external and two internal sealing lips. Used in the shifter housing.

OIL SEAL, SINGLE LIP - An oil seal with one sealing surface to either prevent entrance of foreign matter or prevent leakage of lubricant.

OUTPUT, OR OUTPUT SHAFT - On a transaxle, the shaft that contains the output pinion which is in direct mesh with and drives the differential. In a transmission, the exposed shaft which contains the sprocket for driving the axles. The output shaft is driven by the large **OUTPUT GEAR.**

OUTPUT SHAFT GEAR - The importance of defining this gear is to point out that it must be opposite the differential bolts in Peerless units (except the 2400 series). The output gear assembles into transaxle cover.

PEERLESS UNIT OR UNITS - The complete Peerless assembly which is part of the **EQUIPMENT.** The Peerless unit is that assembly being described.

REDUCTION GEAR AND DIFFERENTIAL UNIT -A Peerless unit that reduces a high RPM input speed to a suitable axle speed without the use of a transmission. Since there is a single gear train, there is a single input speed to output speed ratio, however, axle speeds are infinite, depending upon input speed.

REVERSE IDLER - A gear added to the gear train so when in mesh, reverses the direction of all gears driven after it. Its number of teeth also affects the reverse gear ratio. The center gear of the three gear cluster always is in mesh with the **REVERSE IDLER,** and the large shifter gear always shifts into it.

RIGHT ANGLE DRIVE - Interchangeable with **HEAD ASSEMBLY.** The major operating parts are a pair of miter gears. A system consists of other right angle or "T" drive head assemblies and connecting hardware.

SEAL - A mechanism which stops leakage. It can be a rubber ring, as in an "O" ring or "Quad" ring, a sealing type ball bearing, or most commonly, a rubber-like sealing surface encased in a metal form.

SEAL RETAINER - Found on some models of transaxles and on right angle drives. The center of the retainer is bored to the size of the outer diameter of the seal. On transaxles the retainer acts to position the differential. In the casing on right angle drives, it

acts as the end cap of the case and is secured with four capscrews.

SPROCKET - A geared wheel designed to turn a link chain drive. Various numbers of teeth (hence, sprocket diameter) are available to change output ratios.

SPUR GEAR - A gear having the shaft bore and teeth in a parallel plane.

SHIFT LEVER - The lever by which the operator manually changes the shifter gears to vary reduction speed ratios in the transmission. The configuration of the lever is variable and is often the only reason for a unit being given a new model number.

SHIFTER FORK - A mechanical arm which moves on rod to position the shifter gear at an exact spot axially along the shifter shaft.

SHIFTER GEAR, LARGE -This gear transmits 1st (low) and reverse (1st, 2nd and reverse in 4-speed units) gear ratio force to the output shaft. It is beveled on both sides.

SHIFTER GEAR, SMALL - This gear transmits 2nd and 3rd (3rd and 4th in a 4-speed unit) gear ratio force to the output shaft. It can have two different tooth diameters and be beveled on the outside of each, or it can have a beveled spine to engage 3rd (or 4th) gear through a splined shaft.

SHIFTER HOUSING - This housing contains the shift lever and must be re-installed in the proper position to function correctly. If housing does not already have guide marks, scribe the shifter housing and transmission case before removal.

SHIFTER ROD - One of two similar smooth rods of equal length with grooves which match the fork position to meshed positions of the shifter gears and gears of the three gear cluster. Each rod has a snap ring to act as a fork stop, but can also be used to determine how the fork is assembled to it.

SHIFTER SHAFT - A splined shaft which meshes with the internal splines of the shifter gears, to transmit force to the output shaft gear.

SHIFTER STOP - A stamped metal plate which separates the shifter forks. The stop has a notch cut in it which corresponds to the neutral position on the shifter forks and rod. The shifter lever must return the engaged fork back to neutral before it can cross to actuate the other fork.

"T" DRIVE - A right angle drive with an input shaft extending thru the case to transmit power axially in a second direction to the right angle output. On "T" drive with dissimilar input and out end of the input shaft, care must be taken to insure that the parts do not run in reverse when reassembled.

THREE GEAR CLUSTER - A 3 gear assembly in mesh with the input shaft. The gears are of different sizes to change gear ratios when meshing with the two shifter gears.

THRUSTER RACE - A thrust washer in which the outer edge is cupped to fit the outer diameter of a thrust bearing. This fit positions the thrust race concentric with the axle diameter. It further acts as a thrust washer.

THRUST WASHER - A flat polished surface separating metals of different hardness. It also acts as a spacer between shafts and the case and cover.

TRANSMISSION - A system of varying sized gears in a case, some of which can be slid along a shaft to vary gear ratio in the gear train. The net effect is to change speeds to the rear wheel according to the type of work being done.

UNIT - See **PEERLESS UNIT.**

E. GENERAL SERVICING PROCEDURES

1. Introduction:

   The following service procedures should be understood and practiced whenever service must be performed on a Peerless unit.

2. Before removal of unit from equipment, look for:
   a. Loose drive belts.
   b. Improperly adjusted or badly worn clutch.
   c. Loose or lost set screws and/or sheared keys in drive and driven pulleys.
   d. Oil saturated drive belts and clutches.
   e. Bad operating habits, such as clutch riding.
   f. Oil leaks. If found, refer to paragraph F, page 1-5.
   g. Any trouble, which might be pointed up by operating the unit and equipment, IF POSSIBLE.

3. Removal of the Peerless unit from the equipment:
   a. Jack up equipment so that transaxle is accessible. Use wood blocks to prevent equipment movement. Do not use bricks, cement or cinder blocks.
   b. Visually inspect Peerless unit for oil leaks, cracked housing, binding or rubbing of parts, or other symptoms of malfunction.
   c. Use a jack under the Peerless unit to support it's weight when attachments are removed.
   d. Remove wheels, drive belts, pulleys, chains and other associated equipment from Peerless unit. Be aware of positioning of parts. Scribe mark, if in doubt, to be able to reassemble parts quickly.
   e. If shifter lever will interfere with unit in any way, remove it before unit is removed.
   f. Remove attaching hardware holding Peerless unit to equipment at case, cover, axle supports, shifter or by other means.
   g. With Peerless unit free and supported, remove it from the area of equipment to the work bench.

4. Preparing for disassembly:
   a. Visually inspect for evidence of oil seepage, tampering, misalignment, freedom of rotating shafts, etc.
   b. Clean unit thoroughly of dirt, oil, debris.
   c. Remove shift housing and drain oil from unit. Observe oil to see if metal particles are present.
   d. Check axle shafts carefully for smoothness. Use a stone or suitable abrasive to rub down high spots and eliminate rust or paint.

e. Check model number at appropriate spot. It is advisable to have the exploded parts view handy.
f. Have seal sleeves, driver, tools, shop clothes and informational material at hand.

F. OIL LEAKS, SEAL AND GASKET SERVICE

Peerless units contain various styles and sizes of oil seals. The function of any oil seal can be:

1. To seal inward (single lip) to prevent lubricant leaks.
2. To seal outward (single lip) to prevent lubricant leaks.
3. To seal both inward and outward (double lip).

Some seals are spring loaded. That is a spring creates a positive light compressing action to insure that the seal lip will make a 100% contact around the shaft. All Peerless seals, seal on the inner diameter.

1. Other than leaking seals, gaskets and "O" rings, leakage can occur due to a cracked case or cover, flats on shafts, porosity (rarely, if ever), and worn bushings and shafts.
2. Single lip inward sealing can be salvaged by the use of the proper seal protector when pulling the seal over a shaft. Outward sealing seal (both single and double lip) must be replaced since there is no assurance that the initial sealing surface can be protected.
3. If you can't protect the sealing lip, replace the entire seal. The cost of the seal is small in comparison to a return repair due to reuse for seals.
4. Check seals for cracks, scuffs, cuts and distortion. Check seal areas for evidence of oil leak both at sealing surface and between metal-to-metal contact surface areas.
5. Some seals have a "Redicoat" sealant applied, while others may need a thin coat of this or a similar sealant.
6. The surface over which the seal lips must slide must be free of all cuts, scratches, high spots, or rust. The shafts should be smooth, shiny and a thin film of light oil applied. Sleeves should be used to clear keyways, splines, or other sharp edges machined into shafts.

G. TORQUE VALUES - TROUBLE SHOOTING

1. All torque values must be applied. The torque value for any fastener will be found in the assembly instruction where that fastener is used. All torque specs. will be found on page 1-8.
2. Overtightening can strip threads, compress the gasket excessively, and possibly cause binding.
3. Cross tightening sequence to half the torque then finally to full torque value.
4. Undertightening - Oil leakage, loosening of attaching parts, and possible shifting of the internal parts causing complete failure.
5. Since all bolts are readily accessible there is no reason that a torque wrench cannot be used for all bolt and screw tightening.

H. TESTING

The absence of binding and oil leakage are the best indications that the unit has been properly reassembled. Though other, more elaborate tests can be done, this would be the prerogative of the servicing agency, since the following checks are considered adequate.

With the shift forks in neutral, rotate both axle ends in the same direction. They should turn smoothly although a little effort may be necessary. The brake shaft should rotate whenever the axles turn together, but in neutral, the input shaft should not turn.

By moving any shifter gear into mesh, a greater drag should be felt on the axles, and both the input and brakeshaft should turn.

To ease in turning of the various shafts, insert a tool (such as a punch or a socket head screw key) into the keyway, however, do not force if shaft is binding.

Reason for unit binding:

1. Reused or lack of gasket.
2. Oil seal retainers installed backward.
3. Mis-installed thrust washers.
4. Differential installed backwards.
5. Mis-assembly of shifting parts.
6. Mis-placement of spacers.
7. Foreign matter blocking gear teeth mesh.
8. Shifter stop installed backwards.
9. Input shaft not completely in case.
10. Mis-alignment of case and cover. Align with dowels before tightening cap screws.

SECTION 2. LUBRICATION CHART

Check the Peerless unit model number before filling with lubricant. There may be a difference in the quantity recommended. This is dictated by the design of the vehicle and the position of the Peerless unit in it.

TRANSAXLES

Model No.	Quantity
600	24 oz./710 ml Oil
800	30 oz./887 ml Grease
801	36 oz./1065 ml Grease
900	24 oz./769 ml Grease
910	18 oz./532 ml Grease
920	30 oz./887 ml Grease
1200	48 oz./1420 ml Oil††
1305 1309 1313 1301	32 oz./946 ml Oil
1302 1303 1304 1306 1307 1308 1310 1311 1312 1314 1315 1316 1317 1318 1320 1321 1322 1325 1328 1329	44 oz./1301 ml Oil
1319 1323 1326 1327	24 oz./710 ml Oil

TRANSAXLES

Model No.	Quantity
1400 1401 1403 1405	32 oz./946 ml Oil
1402 1404 1406	48 oz./1420 ml Oil
1700	32 oz./946 ml Oil
2000	32 oz./946 ml Oil††
2300	64 oz./1892 ml Oil††
2400	32 oz./946 ml Oil
2500	†
2600	†

TRANSMISSIONS

Model No.	Quantity
350 350A 351 351A 352 353 401	12 oz./355 ml Grease
400 401A	12 oz./355 ml Oil
500	12 oz./355 ml Grease
700	12 oz./355 ml Grease
700H	12 oz./355 ml Grease
2800	†

RIGHT ANGLE AND T DRIVES

Model No.	Quantity
All Models Except *	4 oz./118 ml Grease
*1408-P91 *1409-P91 *1410-P91 *3002 *3003 *3028 *3029 *3035	3 oz./89 ml Grease
1100	16 oz./473 ml Oil

DIFFERENTIALS

All Models	1 oz./30 ml Grease

TWO SPEED AXLE

All Models	2 oz./59 ml Grease

THREE SPEED AXLE

All Models	2 oz./59 ml Grease

NOTICE

Grease: Bentonite Grease
Oil: SAE E.P. 90 Oil

† Refer to O.E.M. Mechanic's Manual for type of lubricant

†† To be filled through shift lever opening

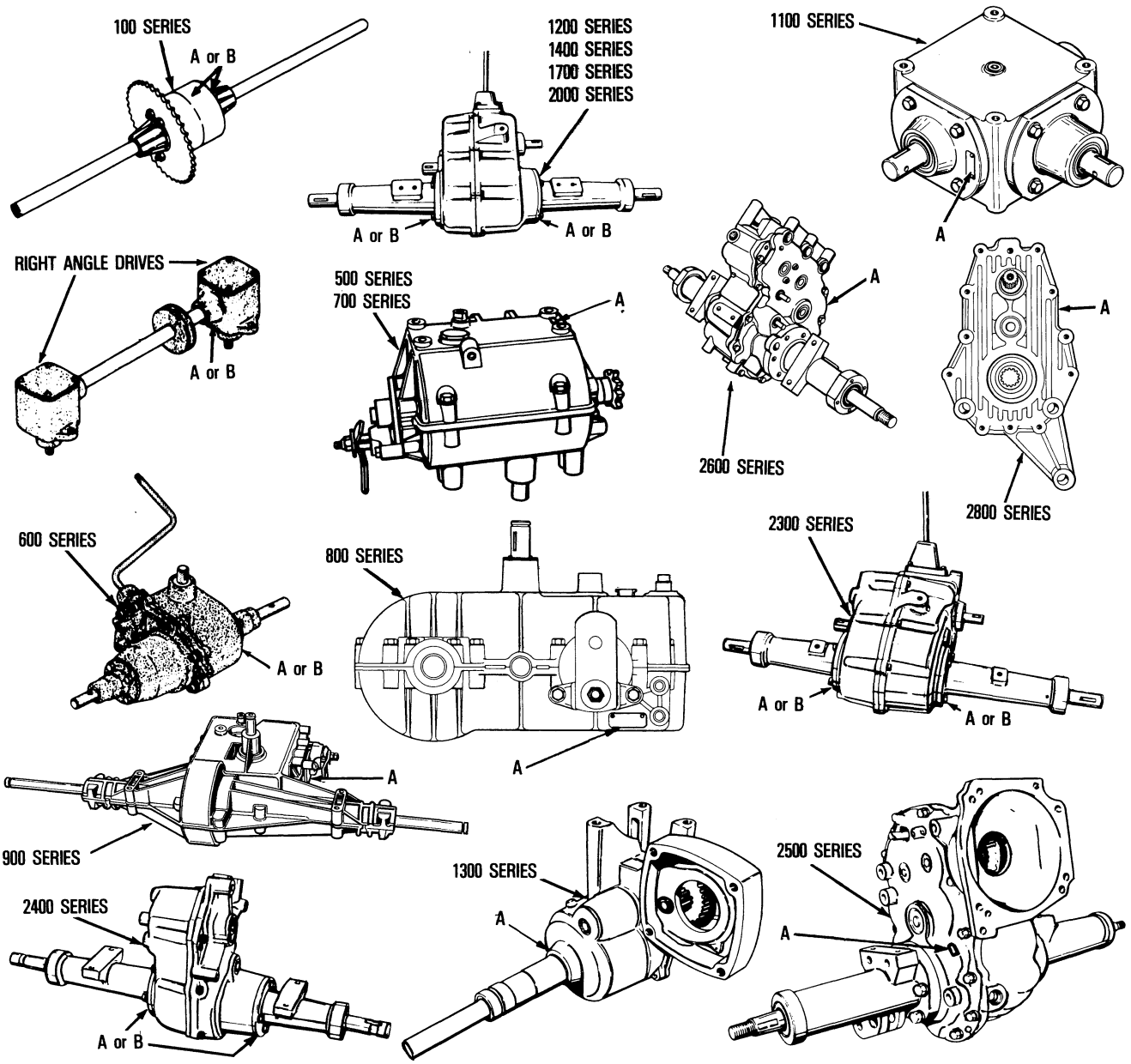
NOTICE

All 900 Transaxles use 24 oz. of Bentonite grease ONLY.

This grease is available under Part No. 788067.

Rev. 4/86

SECTION 3. IDENTIFICATION



SAMPLE

MOD 506
PEERLESS
3 275 1374

Individual Serial Number
Manufactured on the 275th Day
Manufactured in 1983

Early Models were not identified with a model number on the unit.
THE MODEL NUMBER WILL BE FOUND ON: A. Metal tag attached to unit as illustrated.
B. Stamped on unit as illustrated.

Identification Number Locations

SECTION 4. TORQUE CHART

TORQUE VALUE			
PART	MODELS AFFECTED	IN-LBS	FT-LBS
Bolt 5/16-18 (Housing)	100 Series	228-264	19-22
Nut 5/16-18 (Housing)	100 Series	120-156	10-13
Bolt 1/4-20 (Case to Cover)	200 Series	90-110	7.5-9.2
Bolt 1/4-20 (Case to Cover)	350 Series	90-110	7.5-9.2
Bolt 1/4-20 (Shift Lever Housing)	350 Series	84-108	7-9
Bolt 1/4-20 (Case to Cover)	400 Series	90-110	7.5-9.2
Bolt 1/4-20 (Shift Lever Housing)	400 Series	84-108	7-9
Bolt 1/4-20 (Case to Cover)	500 & 700 Series	90-110	7.5-9.2
Bolt 1/4-20 (Brake-Disc)	500 & 700 Series	90-110	7.5-9.2
Bolt 5/16-24 (Shifter Rod)	500 Series	156-180	13-15
Bolt 1/4-20 (Case to Cover)	600 Series	84-108	7-9
Bolt 5/16-18 (Axle Support Housing)	600 Series	156-180	13-15
Bolt 1/4-20 (Shift Lever Housing)	600 Series	84-108	7-9
Bolt 1/4-20 (Brake-Disc)	600 Series	84-108	7-9
Bolt 1/4-20 (Case to Cover)	800 & 900 Series	90-100	7.5-8.3
Bolt 1/4-20 (Brake-Disc)	800 & 900 Series	85-110	7.1-9.2
Bolt 5/16 x 18	1100 Series	180-216	15-18
Bolt 5/16 x 18	2800 Series	180-216	15-18
Bolt 1/4-20 (Case to Cover)	1200 Series	96-120	8-10
Bolt 1/4-20 (Shift Lever Housing)	1200 Series	84-108	7-9
Bolt 1/4-20 (Differential)	1200 Series	84-120	7-10
Bolt 1/4-20 (Case to Cover)	1300 Series	90-110	7.5-9.2
Bolt 1/4-20 (Differential)	1300 Series	84-120	7-10
Bolt 1/4-20 (Case to Cover)	1400 Series	96-120	8-10
Bolt 1/4-20 (Shift Lever Housing)	1400 Series	84-108	7-9
Bolt 1/4-20 (Differential)	1400 Series	84-120	7-10
Bolt 1/4-20 (Case to Cover)	1700 & 2000 Series	96-120	8-10
Bolt 1/4-20 (Shift Lever Housing)	1700 & 2000 Series	84-120	7-10
Bolt 5/16-18 (Axle Support Housing)	1700 & 2000 Series	156	13
Bolt 1/4-20 (Differential)	1700 & 2000 Series	85-120	7-10
Bolt 1/4-20 (Case to Cover)	2300 Series	96-120	8-10
Bolt 1/4-20 (Shift Lever Housing)	2300 Series	96-120	8-10
Bolt 5/16-18 (Axle Support Housing)	2300 Series	180-216	15-18
Bolt 1/4-20 (Differential)	2300 Series	84-120	7-10
Bolt 3/8-16 (Axle Support Housing)	2300 Series	240-312	20-26
Bolt 1/4-20 (Case to Cover)	2400 Series	96-120	8-10
Bolt 1/4-20 (Axle Support Housing)	2400 Series	96-120	8-10
Bolt 1/4-20 (Differential)	2400 Series	84-120	7-10
Bolt 5-16/18 (Case to Cover)	2500 Series	180-216	15-18
Bolt 3/8-16 (Differential)	2500 & 2600 Series	420-480	35-40
Bolt 1/2-13 (Axle Support Housing)	2500 & 2600 Series	720-780	60-65
Screws No. 10-24 (Cover)	R.A.D.	20-24	1.6-2
Bolts 1/4-20 (Retainer Cap)	R.A.D.	90-110	7.5-9.2

NOTE: On all units containing two jam nuts securing brake lever, Hold bottom nut and torque top nut to 100 in. lbs.

Differential Bolts	7 ft. lbs. (ref. 6-6)
"T" Drive Bolt	8-11 ft. lbs.
"T" Drive Cover Screw	20-24 in. lbs.

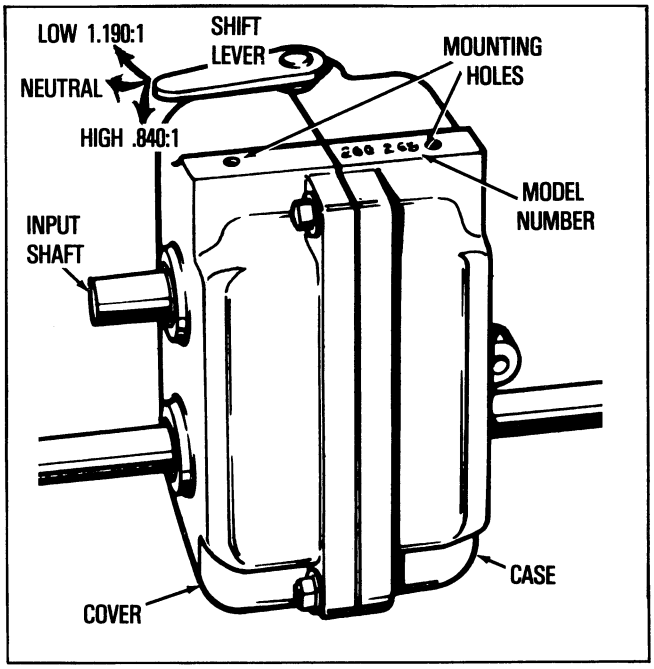
SECTION 5. TROUBLE SHOOTING TABLE

CAUSE	REMEDY
UNIT CANNOT BE SHIFTED (OR DIFFICULT TO SHIFT)	
Gears improperly installed	Review positioning of gearing.
Forks and Rod assembly incorrectly installed	Remove assembly. Recheck and correctly position parts.
Axle Housing not installed or not tightened	Seal retainers are not properly sealed. Tighten axle housing bolts.
Same items covered under heading, "Axles cannot be turned (same direction) while unit in Neutral gear"	Review remedy listed
Shifting lever improperly positioned	Determine if finger of shifting lever is correct for the unit and is correctly installed. Make sure shift lever housing has required gasket.
Shift lever housing misaligned to case	Check if alignment marks on unit are correctly positioned. Also, determine if bend on shaft is in correct position.
Parts missing	Install missing parts.
Equipment clutch not disengaging	Adjust clutch according to equipment instruction.
Shifter stop assembled backwards	Determine that notch in STOP aligns with shifter forks in NEUTRAL position.
Chamfer on shift gears on wrong side	Check that bevels on shifter gears are correct (fork flanges should be toward each other). On 3 gear cluster, small gear and medium gear chamfers go down toward big gear.
Improper fit of case to cover	Recheck positioning of thrust washers. A misplacement or omission of washer can cause binding.
Dowel pins not installed	Check unit for correct assembly of parts.
Gears improperly installed	Check unit for correct assembly of parts.
Input shaft not properly installed	Input shaft spline must be fitted into gear and must be tapped completely into the case.
Differential installed improperly	Re-check positioning of bolts in differential - must be opposite output shaft gear (except 2400).
Seal retainers improperly positioned	Check that seals are correctly installed.
UNIT IS NOISY	
Gearing is overly noisy - chatter, etc.	Check oil level.
Metallic pieces and/or other foreign objects in unit	Remove bits of broken metal, loose washers, etc.
Worn gears	Remove and replace with new gears.
Worn bearings - mainly input shaft ball bearing	Replace bearing.
UNIT JUMPS OUT OF GEAR	
Shifting lever improperly assembled in housing	Disassemble shifting lever and check for proper assembly.
Teeth of gears are worn beyond tolerances	Replace worn gears.
Spring in shifter fork weak or broken	Replace spring.
Attaching screws for shift lever and housing assembly not properly torqued	Torque screws to 10 ft. lbs.
Shift lever bent and hitting unit frame	Replace shift lever.
Shift rod grooves worn	Replace shift rods.
Shift rod of improper length or grooving installed	Check rod length. Replace with correct part.
Constant mesh gears improperly installed on counter shaft.	Reposition gears.

TROUBLE SHOOTING TABLE (Continued)

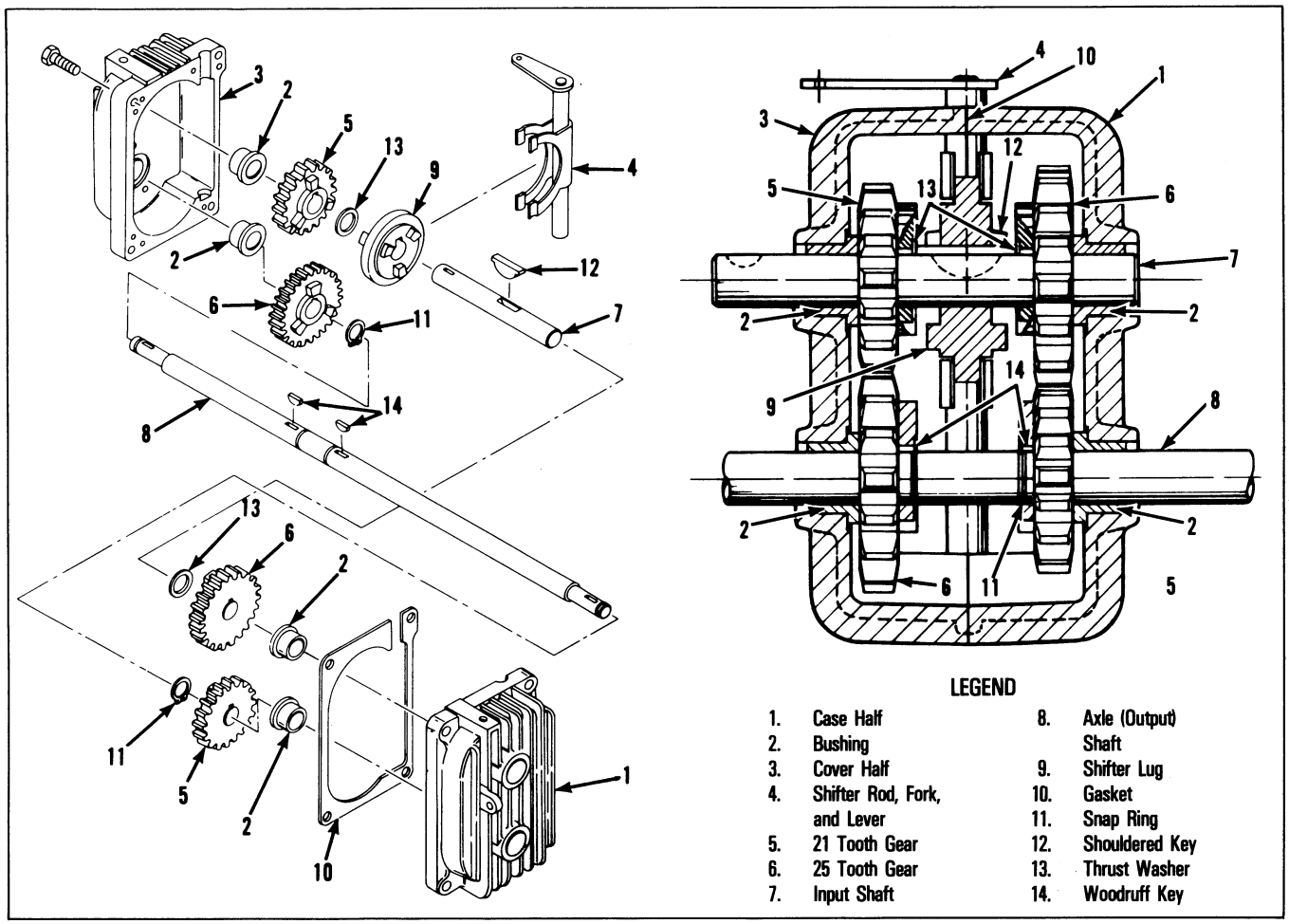
CAUSE	REMEDY
AXLES CANNOT BE TURNED (SAME DIRECTION) WITH UNIT IN NEUTRAL GEAR	
Axle housing not installed (or not tightened)	Seal retainers are not properly seated. Tighten axle housing bolts.
Burrs on gearing	Remove gear and hone with a stone.
Parts missing	Install missng parts.
Broken shifter stop allowing unit to be shifted into two speeds at the same time	Replace snap rings on shift rod out of groove.
Thrust washers in wrong position	Recheck thrust washer and reposition, if wrong.
Bearings not pressed in deep enough	Use the proper bearing tool to seat the bearing.
UNIT DOES NOT DRIVE	
Differential bevel gears broken	Replace.
3 gear cluster countershaft key sheared in Model 600, 350 and 400	Replace.
Stripped teeth on gears	Replace.
Keys sheared in drive pulleys	Replace.
Broken input gear	Replace.

CHAPTER 2. TRANSMISSIONS
SECTION 1. 200 SERIES — 2 SPEED

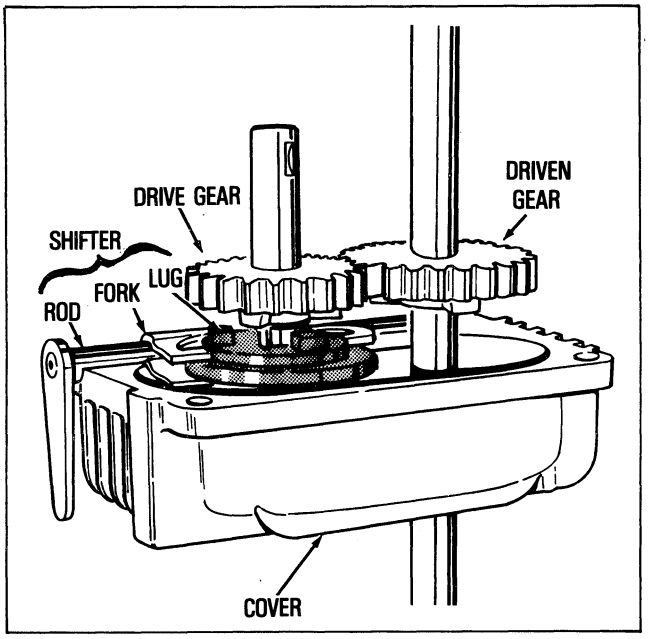


A. OPERATION

1. The input shaft (7) idles through the two gears (5) and (6) held in position by the bushing (2) flanges, a shouldered key (12), and thrust washers (13). The input shaft (7) however, turns the shifter lug (9) splined to the shaft by the shouldered key (12).
2. With the lug (9) centered on the key (12), the unit is in neutral, since neither of the 21 tooth or 25 tooth gears is rotating.
3. If the shifter lever (4) is moved to LOW position, rotating its rod and fork to the left, the fork engaged in the lug (9) moves left along the shaft (7) so that its lug engage lugs in the 21 tooth gear (5). There is a reduction in speed through the 25 tooth (6) gear to the axle (8).
4. By rotating the shifter rod and fork (4) HIGH so that the lug (9) goes right along the shaft (7) to engage the 25 tooth gear (6), there is a speed increase through the driven 21 tooth gear (5) to the axle (8).



200 Series View of Upper Half



B. REMOVAL

1. When removing the transmission from the equipment loosen the mounting bolts to relieve pressure on the belt or link chain.
2. Clean the outside of the unit. Grind off any high spots on the axle. Clean off any rust, corrosion, or paint which will bind parts during disassembly.
3. Remove any attached parts such as pulleys or sprockets.
4. Note the unit identification number on the case.

C. DISASSEMBLY

1. Remove the capscrews retaining the housing halves together. Lift the case from the cover while pressing on the axle and input shafts to keep those parts remaining with the cover.
2. Clean excess grease from around the transmission internal parts.
3. Lift out the axle and gears. Note that the axle extension from the gears is of a different length.
4. Remove the input shaft, drive lug and gears and shifter shaft as a unit, then separate parts.
5. Degrease all parts.
6. Check keys and keyways for wear, galling or breaks.

D. INSPECTION AND REPAIR

1. Replace axle ends with worn grooves.
2. Replace gears with worn teeth or lugs.
3. Replace snap rings, thrust washers and gaskets.
4. Replace case and cover if cracked, or with stripped thread. Replace worn bushings.

E. ASSEMBLY

1. Position snap rings and keys on axle. Install 25 tooth gear to the short side of the axle and one tooth to the longer side.
2. Smear E.P. Lithium grease around the bushings in the case and cover.
3. Press the shouldered key into the large keyway on input shaft, then slide the shifter lug onto the shaft over the key.
4. Position a thrust washer on each side of the key.
5. Install the remaining 21 tooth gear on the woodruff keyway side of the shaft and the 25 tooth gear on the smooth side of the shaft.
6. Hold the input shaft so that the other parts stay in their correct position.
7. Fit the shifter forks over the flange of the shifter lug.
8. Install the assembly into the unit cover so that the exposed woodruff key slot goes through the upper bushing and the shifter rod lays in its recesses at the top and bottom of the cover.
9. Insert the short axle extension through the lower bushing on the cover.
10. Smear 2 oz. E.P. Lithium grease in the cover around the gears and shafts.
11. Position the new gasket on the cover and install the case onto the axle and input shaft until it contacts the gasket.
12. Install four self-tapping 1/4-20 x 3/4 cap screws to secure the case and cover and torque to 90-110 lbs. in.

F. INSTALLATION

1. Install the woodruff key and sprocket or pulley on the input shaft.
2. Loosely position the unit in place on the equipment with the mounting bolts.
3. Install the chain or belt and align the parts, then tighten mounting screws.
4. Perform all other re-assembly steps called out in the equipment mechanics instructions.

G. TESTING

1. Turn the input and output shafts to insure that they are free from binding.
2. Shift the shifter lever to LOW, then turn input shaft; output shaft should turn slowly.
3. Shift the shifter lever to HIGH, then turn input shaft; output should turn faster.
4. Check for seal around gasket surfaces.

SECTION 2. 200 SERIES 3 SPEED

A. OPERATION

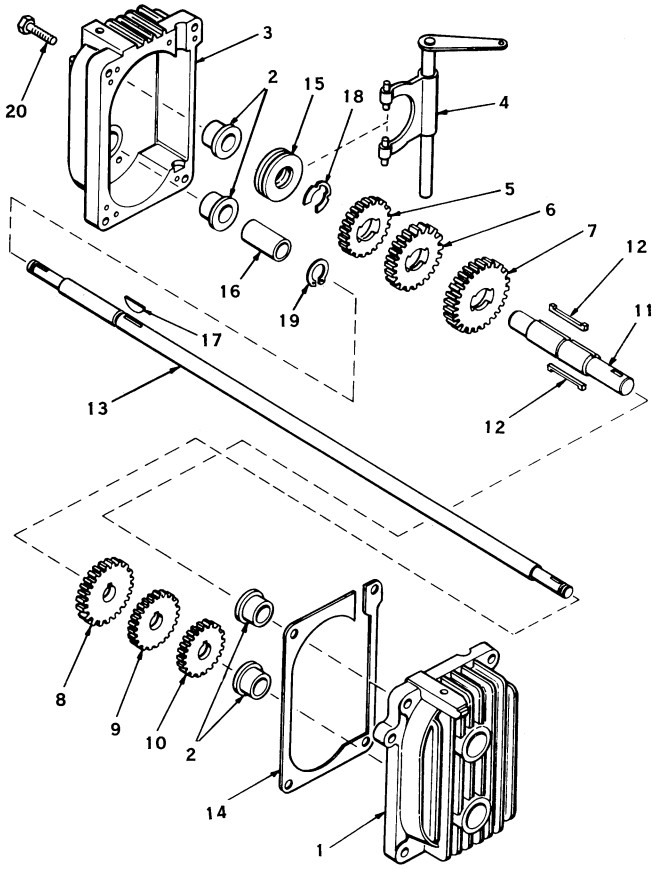
1. The input shaft (11) idles through the three gears (5), (6), and (7) held in position by the retaining ring (18). Next to the retaining ring find the shift collar (15) which slides over the input shaft. The keyways on the input shaft accept the keys (12) held in location by the inside diameter of the shift collar.
2. Neutral is experienced when the shift rod lever (4) is rotated fully clockwise, (See Paragraph I). First, second or third gear is obtained by rotating the shift rod lever (4) counterclockwise causing engagement of the keys (12) in the internal splines of the shift spur gears (5), (6) and (7). The axle spur gears (8), (9) and (10) are locked to the axle by means of a woodruff key (17) and are in constant mesh with the shift gears.
3. When the shift rod lever (4) is moved counterclockwise causing the collar to move the keys (12), the keys will engage the internal splines of the shift spur gears (5), (6) or (7) the input force is then transferred to a meshed spur gear on the axle, thus giving torque to the axle.

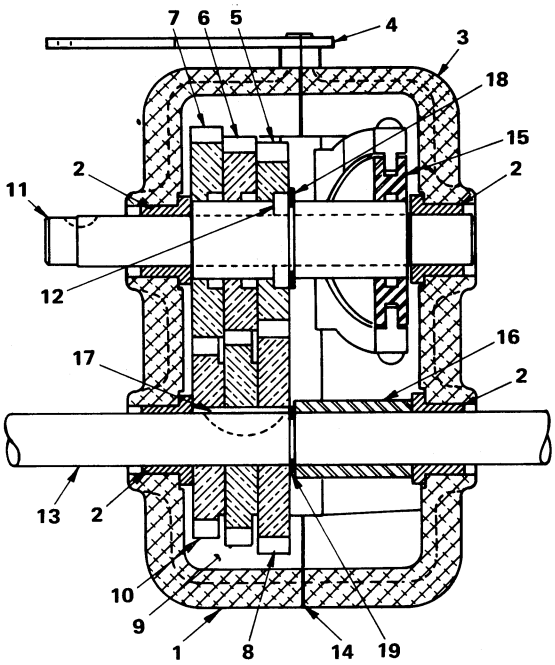
B. REMOVAL

1. When removing the transmission from the equipment, loosen the mounting bolts to relieve pressure on the belt or link chain.
2. Clean the outside of the unit. Smooth off any high spots on the axle. Clean off any rust, corrosion, or paint which will bind parts during disassembly.
3. Remove any attached parts as pulleys or sprockets.

C. DISASSEMBLY

1. Rotate shift rod lever fully clockwise (neutral).
2. Remove cap screws securing the cover to the case while pressing on the axle and input shafts to keep parts in the case.
3. Remove the gasket and clean any grass, dirt, or grease from around the external surfaces of the transmission.
4. Remove shift rod lever from its location in the case by lifting the lever up and away from the case by clearing the pins on the rod from the shift collar.

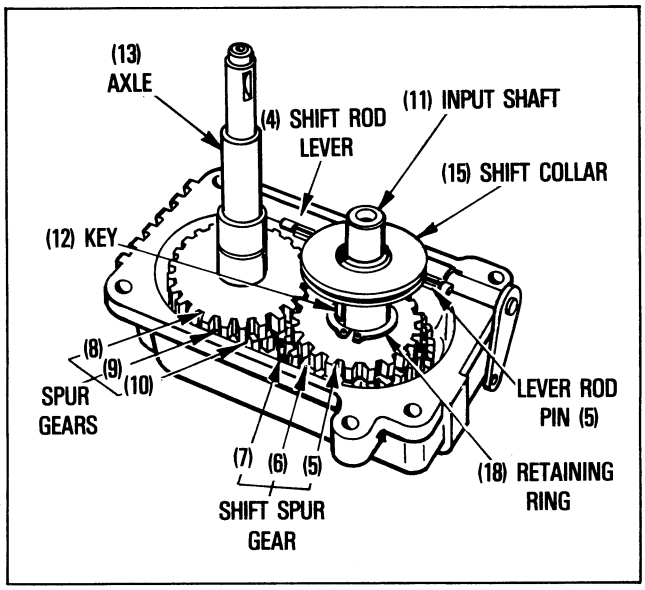




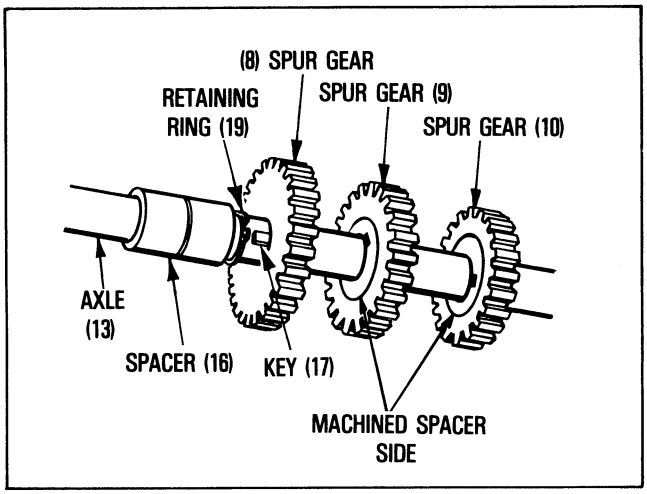
LEGEND

1.	Case Half	11.	Input Shaft
2.	Bushing	12.	Key (2)
3.	Cover	13.	Axle (Output) Shaft
4.	Shift Rod & Fork Assy.	14.	Gasket
5.	Shift Spur Gear (21 Teeth)	15.	Shift Collar
6.	Shift Spur Gear (23 Teeth)	16.	Spacer
7.	Shift Spur Gear (25 Teeth)	17.	Woodruff Key (No. 7)
8.	Spur Gear (25 Teeth)	18.	Retaining Ring
9.	Spur Gear (23 Teeth)	19.	Retaining Ring
10.	Spur Gear (21 Teeth)	20.	Self-tapping Hex hd. screw (4)

View of Upper Half



5. Remove the axle from the case, with gears. Remove gears, items 8, 9 and 10, keyed to axle. Remove spacer (16).



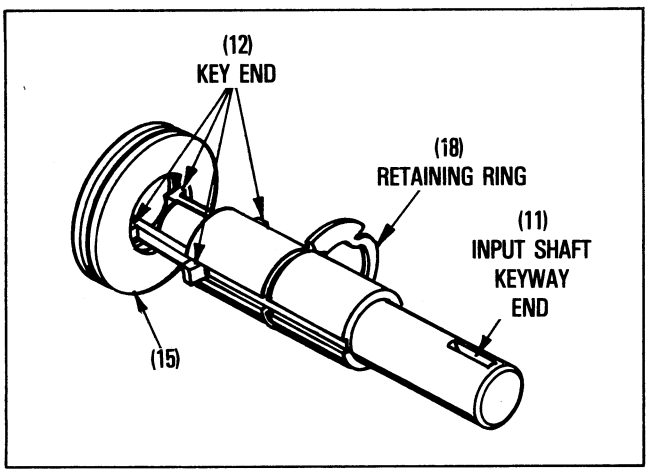
6. Pull the input shaft out of the case. Remove the shift spur gears. (If the keys are not engaged, the input shaft will come out without the gears). Remove the retaining ring from the input shaft. Remove shift collar (15) and key (12) from input shaft.
7. Degrease all the disassembled parts.
8. Check keys, keyways, gears and associated parts for wear and damage. Replace as necessary.
9. To remove and install bushings, use tool part #670210.

D. INSPECTION AND REPAIR

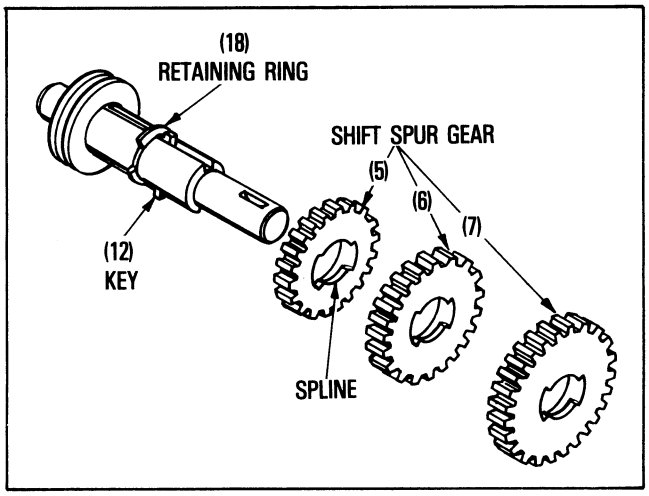
1. Replace axle ends with worn grooves.
2. Replace gears with worn teeth or lugs.
3. Replace retaining ring, keys, keyways and gaskets.
4. Replace case and cover if cracked, or with stripped thread. Replace worn bushings.

E. ASSEMBLY

1. Using the input shaft, install key (12) end into the grooved inside diameter of the shift collar (15). Pilot collar and keys into keyways on input shaft with collar locating opposite keyway end. Install retaining ring (18) on input shaft in groove provided.



2. Make sure that the retaining ring keeps at least one key from moving past ring toward collar. Install gears with smallest shift spur gear toward collar. Be certain the internal spline on each gear faces away from retaining ring side. Install input shaft with gear (5) into the case half.



3. Install retaining ring (19) on axle. Install spacer on axle shaft.
4. Apply 2 ounces of extreme pressure (E.P.) lithium grease in case around gears.
5. Install largest to smallest spur gears on the key on the axle. Be certain the machined spacer side of gears face the cover half. Install axle with gears into case half. All six gears must be in mesh.
6. Install shift rod and fork assembly, making sure pins on fork locate in groove on collar.
7. Install new gasket on the case and install cover on case until both halves lock gasket in place.
8. Install self-tapping screws to secure the cover.
9. Torque the case to 90-110 in. lbs.

F. INSTALLATION

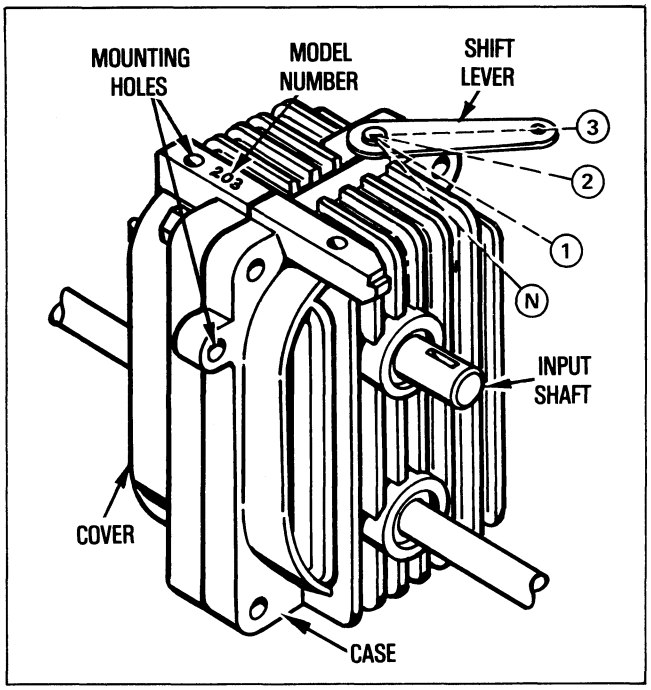
1. Install the woodruff key and sprocket or pulley on the input shaft.
2. Loosely position the unit in place on the equipment with the mounting bolts.
3. Install the chain or belt and align the parts, then tighten mounting screws.
4. Perform all other reassembly steps called out in the equipment mechanics instructions.

G. TESTING

1. Turn input and output shafts to insure that they are free from binding.
2. Shift the shifter lever to first gear position, then turn input shaft; output should turn slowly.
3. Shift the shifter lever to second gear position, then turn input shaft; output should turn faster.
4. Same as 3 except for third gear position.
5. Check for seal around gasket surfaces.

H. IDENTIFICATION

The model number identification is found stamped on the edge as shown.



I. SHIFTING PATTERN

The shifting pattern of the Model 203 Transmission is shown.

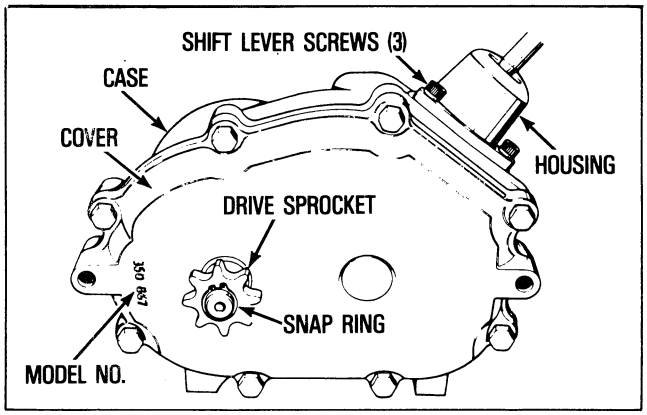
SECTION 3. 350 and 400 SERIES

CAUTION

TO AVOID PREMATURE TRANSMISSION FAILURE, DECLUTCHING IS REQUIRED WHEN SHIFTING FROM NEUTRAL TO FIRST OR REVERSE, FROM ANY FORWARD TO REVERSE GEAR, FROM REVERSE TO ANY FORWARD GEAR OR WHEN OPERATING EQUIPMENT ON A HILL OR UNDER HEAVY LOAD.

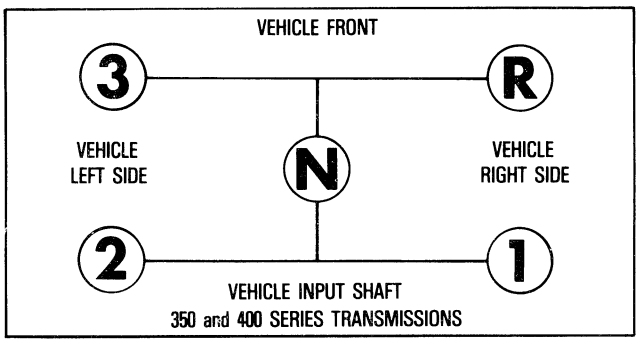
A. GENERAL

The Model 350 and 400 series transmission are basically the same. The major difference is that the 350 series have bronze bushings and the 400 series have needle bearings. The transmission may have a brake shaft if the application requires a transmission brake. The model number is stamped on the cover.

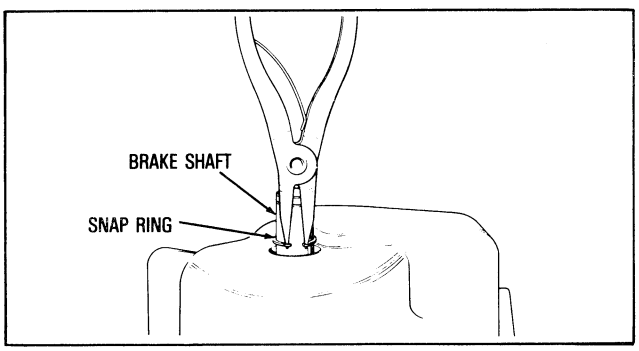


B. TRANSMISSION DISASSEMBLY

1. Clean the outside surface of the transmission. Position shift fork in neutral position. Remove (3) screws holding shift lever and shift lever housing. Remove shift lever housing. For repair of shift lever assembly, see Chapter 10.

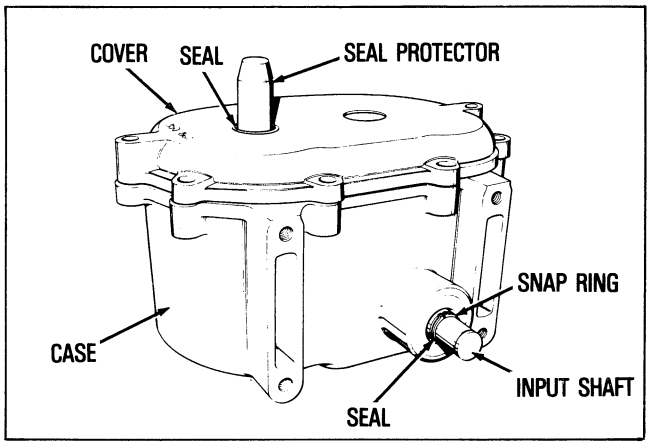


2. If a brake shaft is on the unit, remove snap ring from shaft. Clean shaft of dirt or burrs.

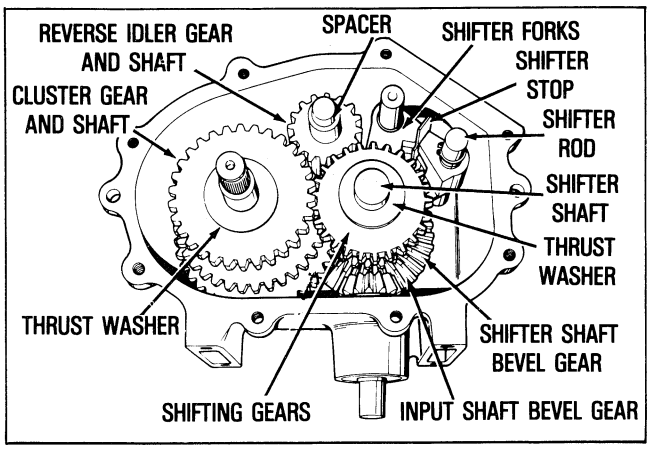


3. Remove snap ring holding sprocket to the output shaft and remove sprocket. Clean shaft of dirt and burrs.
4. Remove two dowel pins by tapping out with metal punch. Remove cover screws (8).

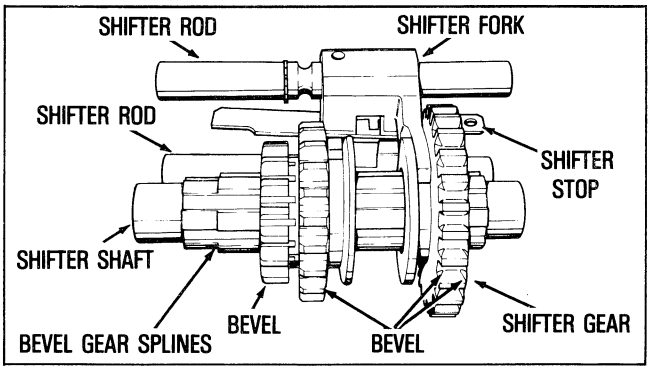
   NOTE: Wipe grease from parts as they are removed.
5. Prior to lifting off the cover, install seal protector 670182 to protect seal for output shaft on units having it. Remove cover and discard gasket.



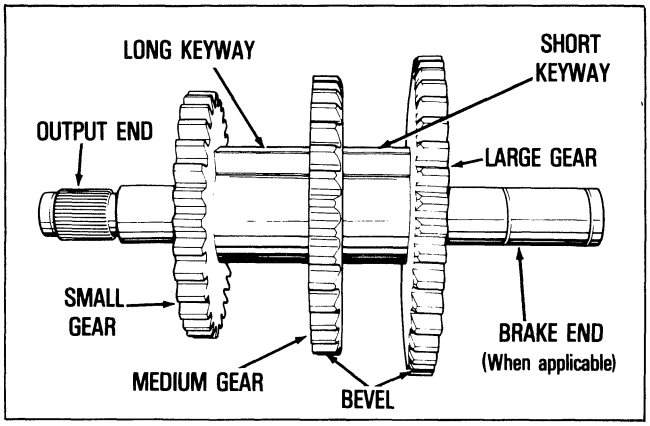
6. Remove reverse idler gear, shaft and spacer. Install gear with bevel out toward spacer.



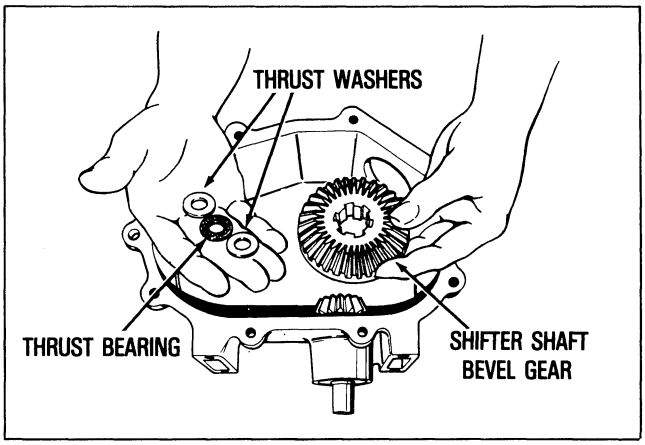
7. Remove shift fork, gears and shaft assemblies. Grasp shifter forks, gears and shaft and raise up while tapping shifter shaft bevel gear with handle of hammer to separate from shaft splines. If no service is required, put unit aside for easy reassembly. To repair unit, refer to Chapter 10.



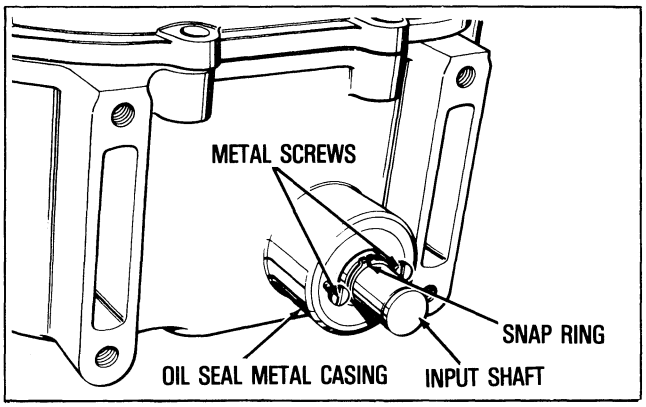
8. Remove cluster gears and shaft. To separate gears, remove outer gears first, then slide off middle gear and key. For replacement, note that the larger gear belongs on the short keyway opposite the output end of the shaft. Note the bevel edge position of the gears.



9. Remove the shifter shaft bevel gear, and the thrust bearing and washers.

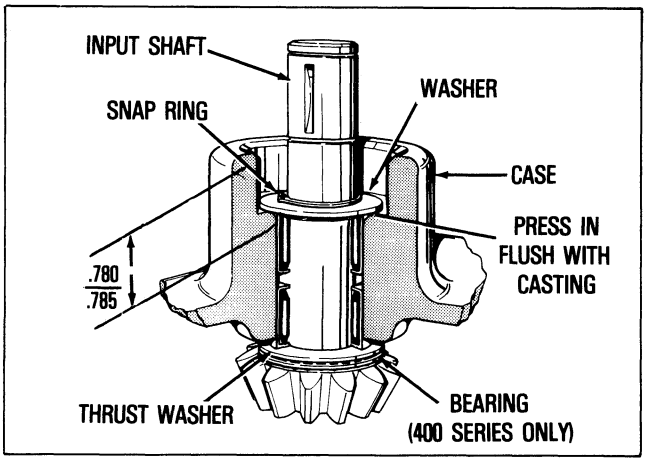


10. To remove the input shaft oil seal in the 400 series, use metal screws to puncture the seal casing and lift out the seal. Seal must be replaced. Clean the input shaft of scratches and sharp edges. Remove the snap rings and thrust washer and press or tap the input shaft into the case. A thrust washer (Model 350) or a thrust washer and a thrust bearing (Model 400) should be on the shaft.



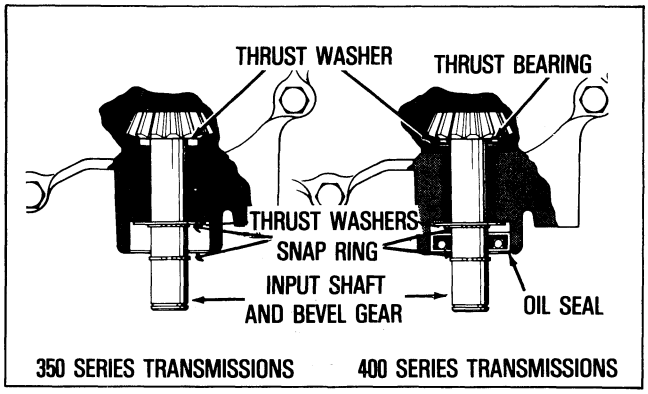
C. INSPECTION AND REPAIR

Examine all parts. Check gears for worn or chipped teeth and splines. Check shaft for wear or scratches and condition of snap ring grooves, splines and keyways. Examine case and cover for cracks and stripped thread condition. To replace bearing or bushing, refer to Chapter 11. To replace input shaft bearings, drive out bearings using bearing driver 670207. Inside bearing protrudes above the casting.



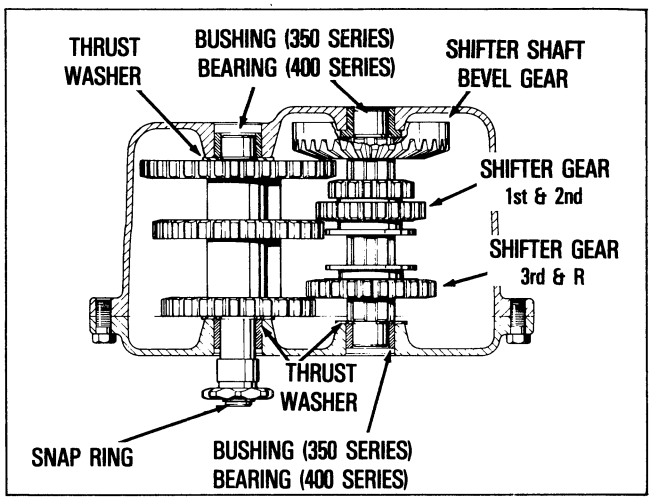
D. ASSEMBLY

1. Install and secure the input shaft. Refer to arrangements of parts depending upon series being repaired.
2. Install cluster gears and shaft with a thrust washer between the large gear and case. The small and middle gear bevel faces down, the large gear bevel faces up.
3. Install the shifter bevel gear. For 400 series, be sure thrust washers and bearings are between gear and case. Align the gear with the center of the hole.



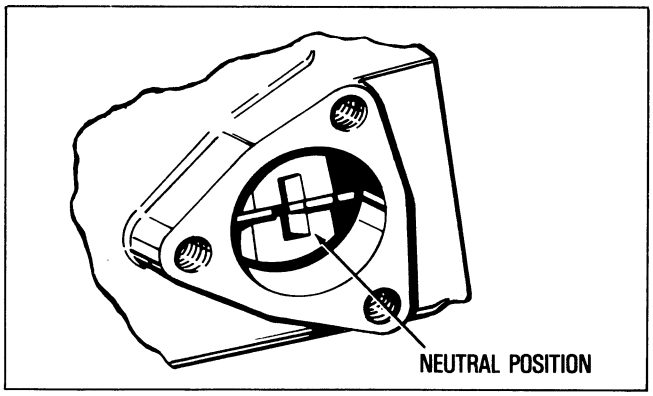
4. Install the shift mechanism. Try to align the gear and shaft splines before inserting the shaft. To do so, visualize the shifter mechanism in position and note the position of one spline. Position a spline on the gear so that its relationship is the same. Carefully guide the shifter shaft through the gear, disturbing the gear and thrust washers as little as possible. The shifter mechanism must be held firmly to keep parts from changing position so that they appear as in the next Figure. Install shifter stop.
5. Install reverse idler shaft, gear and spacer. Install gear with bevel out toward spacer.

6. Install washers on the cluster gear and shifter shafts. Coat with 12 oz. of E.P. Lithium grease around gearing if unit uses grease. (See chart SECTION 1, Page 1-6).
7. Install gasket to case.
8. Install cover to case and secure by cross-tightening eight cap screws to 90-110 in. lbs. If cover does not close, use needle-nosed pliers to reposition shifter components until cover seats. Do not force cover on.
9. Install oil seals on 400 series. Use oil seal sleeve #670143 and oil seal driver #670203 on the brakeshaft oil seals. Use oil sleeve #670102 and oil seal driver #670209 on the input shaft oil seal.
10. Install new gasket, shift lever and housing with three socket head cap screws.
11. Install sprocket and snap ring on output shaft.
12. Turn input shaft to check for binding. Check for correct shifting pattern.



E. TESTING UNITS

1. With the unit in neutral, turn the output sprocket. The input shaft should not turn. With unit in any gear, input shaft turns.



SECTION 4. TRANSMISSIONS (500 SERIES)

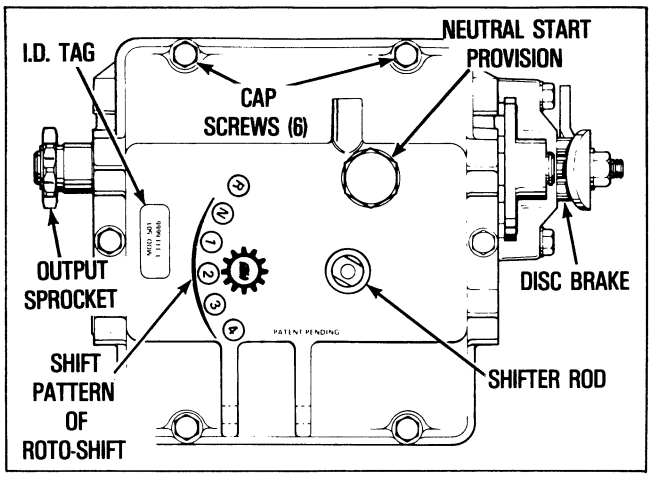
CAUTION

TO AVOID PREMATURE TRANSMISSION FAILURE, DECLUTCHING IS REQUIRED WHEN SHIFTING FROM NEUTRAL TO FIRST OR REVERSE, FROM ANY FORWARD TO REVERSE GEAR, FROM REVERSE TO ANY FORWARD GEAR OR WHEN OPERATING EQUIPMENT ON A HILL OR UNDER HEAVY LOAD.

A. GENERAL

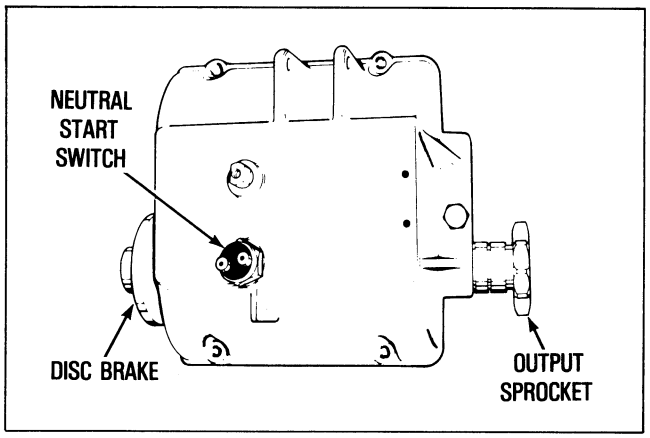
The model 500 series transmission is the first of the "Roto-Shift" variety to be produced by the Peerless Gear Division of Tecumseh Products Company. Capable of delivering 3 or 4 speeds forward, depending on equipment manufacturer's specifications, the "500" will adapt itself to any conventional riding mower, lawn tractor or rear engine riding mower. The figure below is a 4 speed forward, 1 reverse with neutral start provision. Options available on the 500 include right or left hand output and disc brake.

NOTE: Due to the many variations of equipment braking systems, adjustments and repair to these components and linkages are not to be considered warranty.

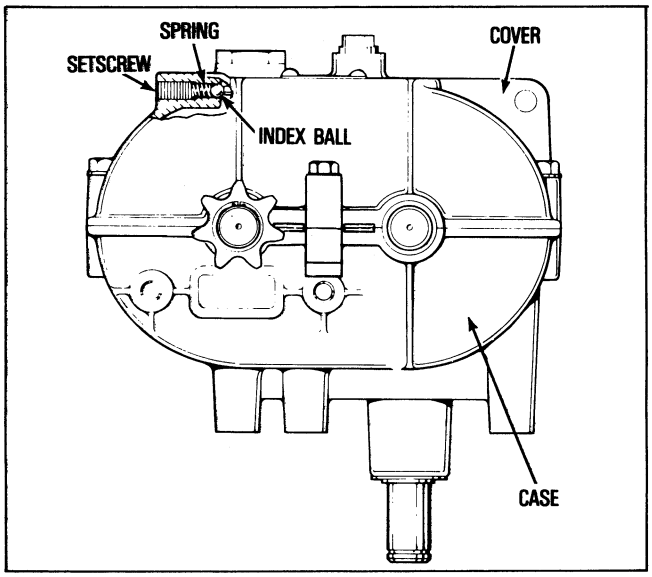


B. DISASSEMBLY

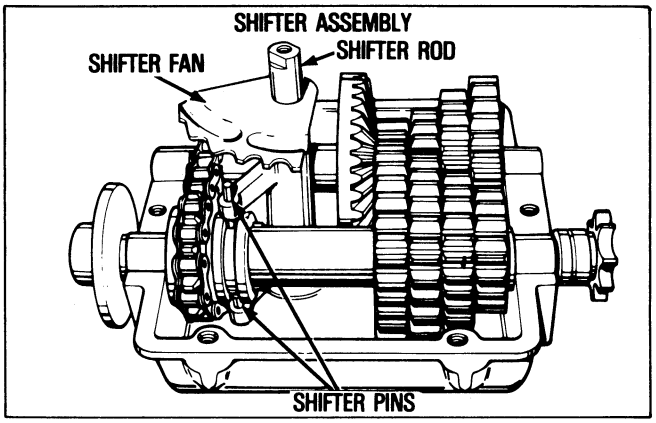
1. Clean outside surface of transmission. Position shift lever in neutral position as indicated by shift pattern. Remove shift lever. If installed, remove neutral start switch.



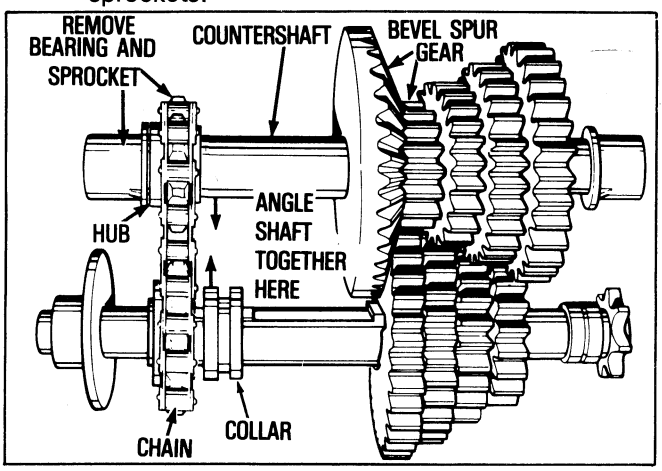
2. Remove setscrew, spring and index ball from transmission cover.
3. Remove six cap screws that maintain cover to case. Remove cover.



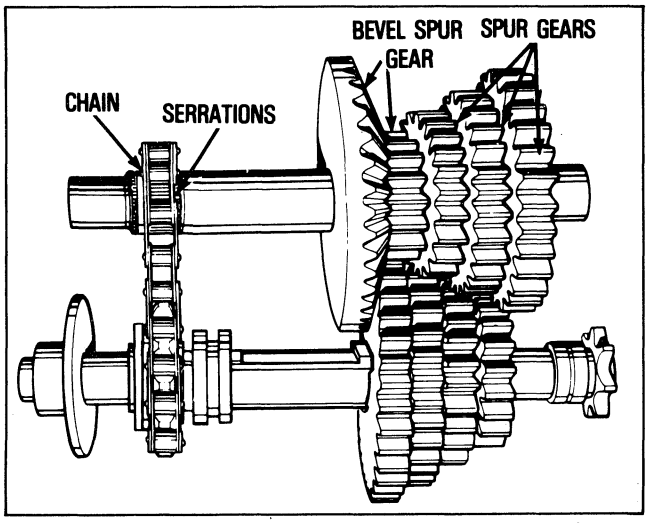
4. Remove shifter assembly (includes shaft, pins and fan) from transmission case by lifting shaft out of case.



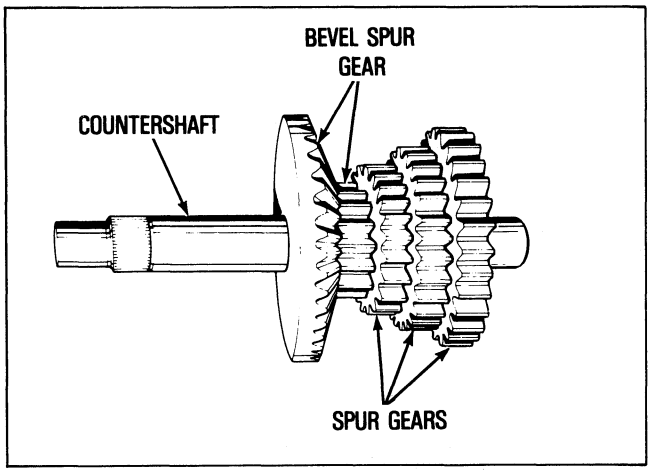
5. Remove gear and shaft assemblies from case half of the transmission by lifting the two shafts out of the bearing supports taking care not to disturb drive chain relationship with hubs on sprockets.



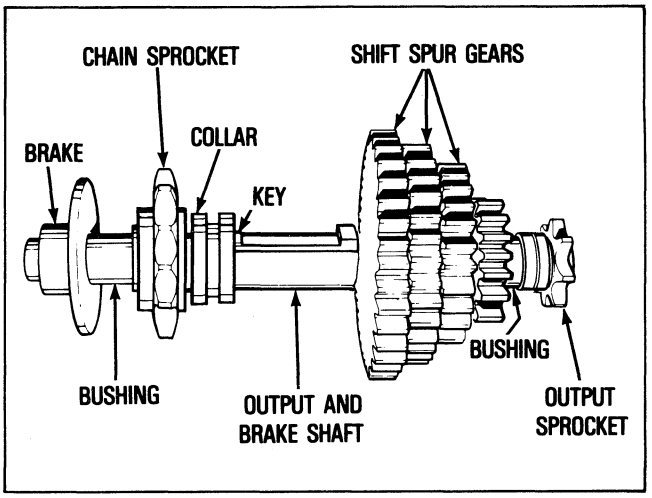
6. Angle sprocket ends of shafts towards each other, removing the bearing and sprocket from the countershaft. Note the collar on the sprocket faces away from the bevel gear. Remove chain.



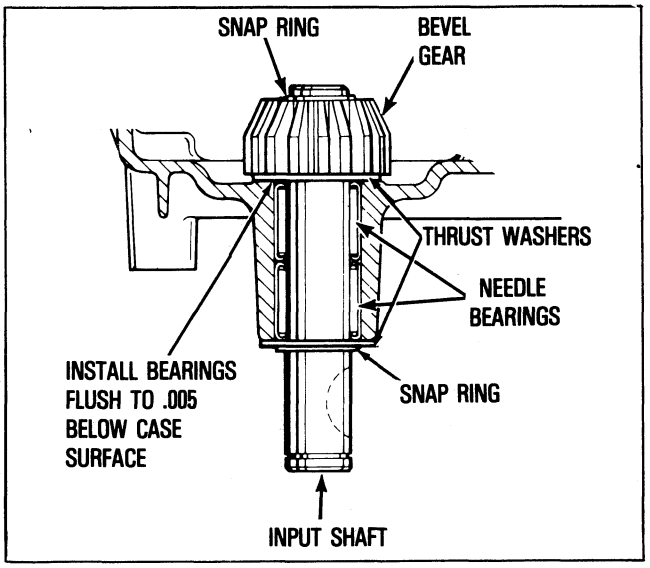
7. Remove bevel spur gear combinations and spur gears from countershaft; these gears spline to countershaft.



8. Remove output sprocket from output shaft and remove shift spur gears, keys and collar, and chain sprocket.



9. Remove snap ring from input shaft, remove bevel gear and pull shaft through case.
10. Input shaft needle bearings should be installed flush to .005 below bearings bore surfaces from inside and outside case.

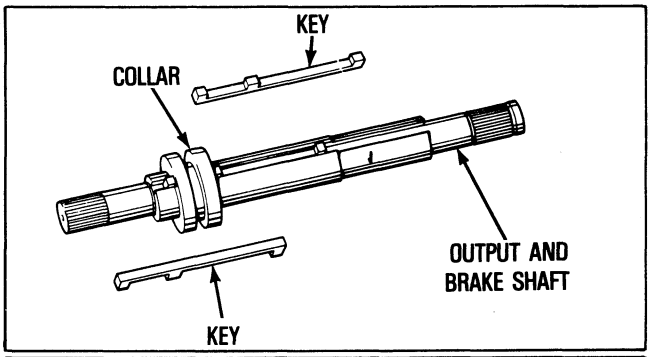


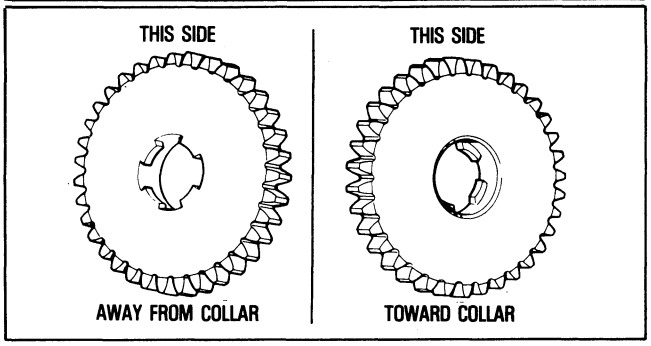
C. INSPECTION AND REPAIR

Examine all parts after removing grease with cleaning solvent. Check gears and sprockets for worn or chipped teeth or splines. Check for shaft and bearing wear or damage. Check bearings, shifter keys and keyway, shifter shaft, pins and fan. Replace damaged parts.

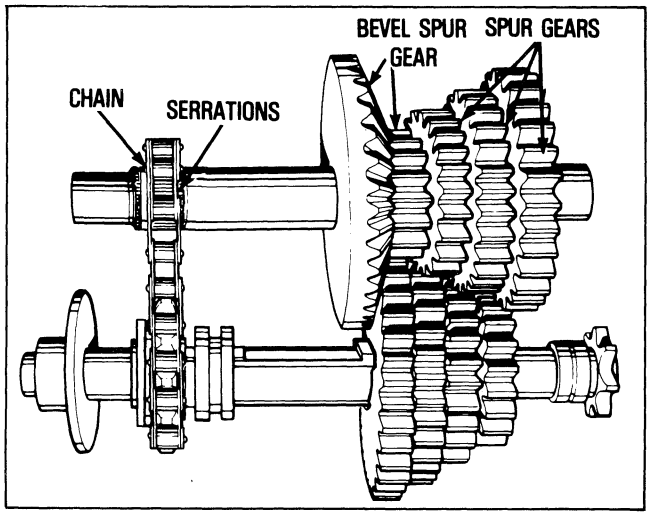
D. REASSEMBLY

1. Install and secure the input shaft and bevel gear in the case.
2. Install collar and shifter keys to output and brake shaft and follow with largest to smallest shift spur gears. Install chain sprocket, bearing, thrust washer and output sprocket.

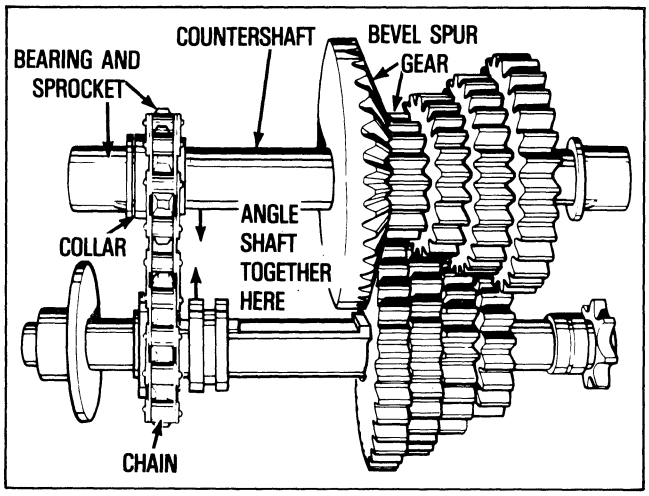




3. Install bevel spur gear and smallest to largest mating spur gears to splined end of countershaft. Install chain over two shafts registering chain on output shaft sprocket and in-line with serration on countershaft.



4. Slip sprocket onto serrations and install chain, thrust washers and remaining bearings to shafts.

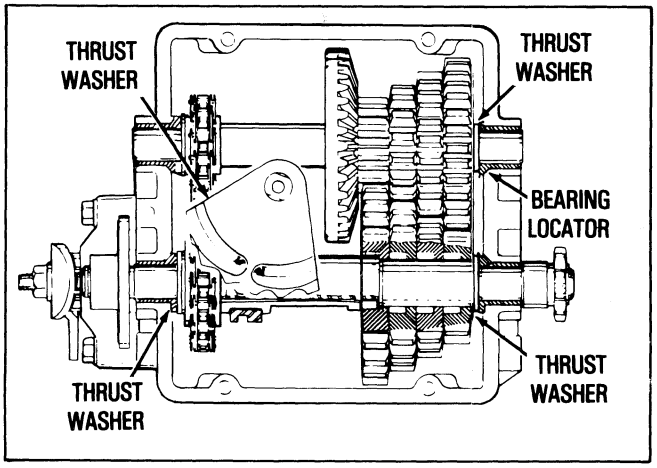


5. Install shaft assemblies into case utilizing piloting locators on bearings to properly align notches in case. **CAUTION**: Be sure locators are seated in transmission case.

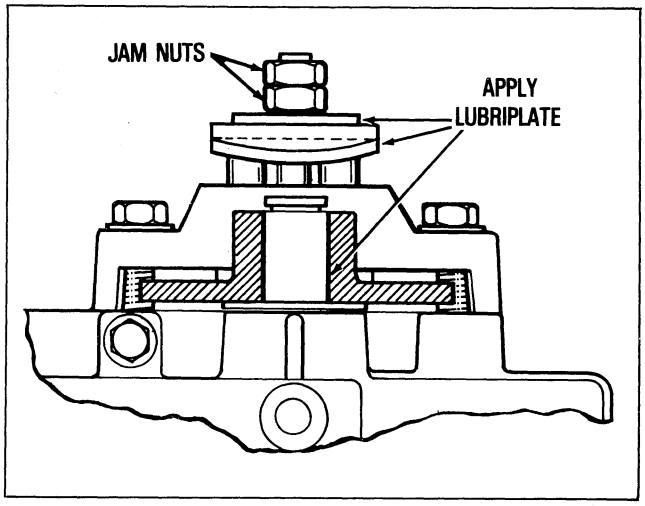
6. Install shifter assembly (shaft, pins and fan), 12 oz. E.P. Lithium grease around gearing, and reinstall cover on case. Torque cap screws 90-100 in. lbs.

7. Install index ball, spring and setscrew, in that order into cover and tighten the screw two full turns from flush. Install shift lever.

8. Check for binding by turning input shaft. Install transmission to equipment. Install and adjust brake linkage to disengage when clutch is engaged.



9. Apply a light film of lubriplate to the inside of lever portion which contacts pins, also to outside of lever which contacts flat washer, and between shaft O.D. and bore of brake disc. Brake pads and brake disc must be free of grease and oil.



NOTE: To secure brake lever, hold bottom nut and torque top nut to 100 in. lbs.

Brake and linkages may vary.

NOTE: If adjusted incorrectly, the brake will do one of two things:

a. It will not brake (stop) the vehicle when the brake is applied, or

b. If adjusted too tightly, a drag or continued braking effect will be evident until the brake wears out.

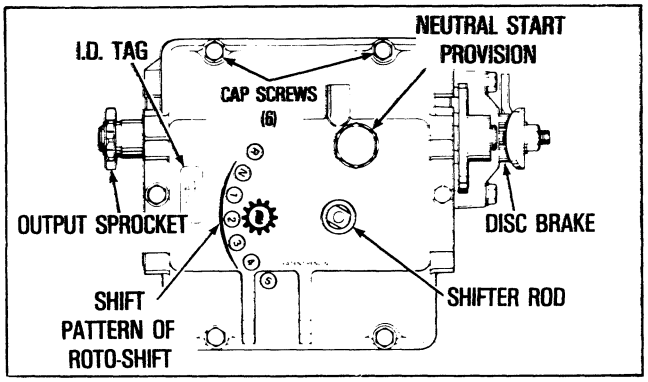
SECTION 5. TRANSMISSIONS 700 SERIES

CAUTION

TO AVOID PREMATURE TRANSMISSION FAILURE, DECLUTCHING IS REQUIRED WHEN SHIFTING FROM NEUTRAL TO FIRST OR REVERSE, FROM ANY FORWARD TO REVERSE GEAR, FROM REVERSE TO ANY FORWARD GEAR OR WHEN OPERATING EQUIPMENT ON A HILL OR UNDER HEAVY LOAD.

A. GENERAL

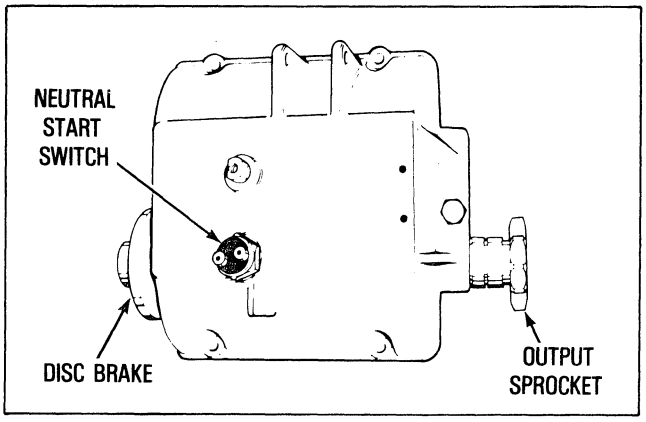
The 700 Series in-line transmission is available in 2, 3, 4 or 5 speeds forward depending on equipment manufacturer's specifications.



The two speed unit is not covered here but can be disassembled and reassembled using the same information for the 700 described in this section. Optional features include right or left hand output and disk brake, for either in-line or "H" pattern unit.

NOTE: Due to the many variations of equipment braking systems, adjustments and repair to these components and linkages are not to be considered warranty.

If installed, (optional equipment), remove neutral start switch.

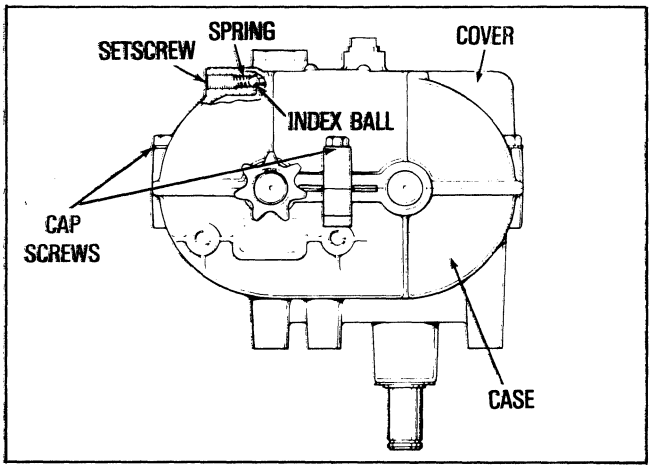


B. DISASSEMBLY OF SHIFTER MECHANISM

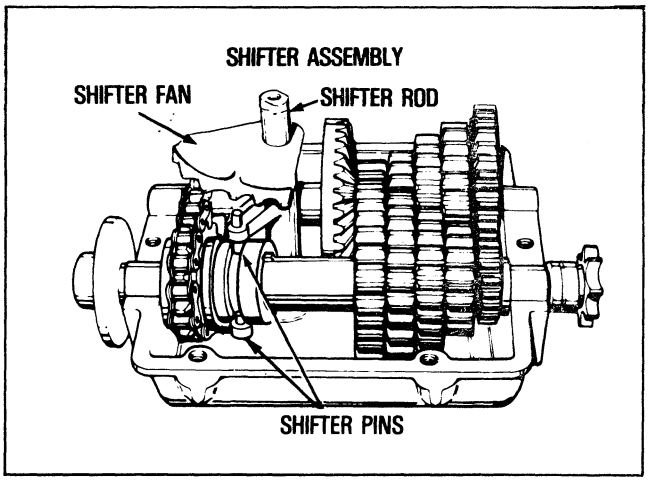
Clean outside surface of transmission. Position shift lever in neutral position as indicated by the shift pattern.

FOR IN-LINE SERIES TRANSMISSION

1. Remove setscrew, spring and index ball from transmission cover.
2. Remove six cap screws that maintain cover to case.

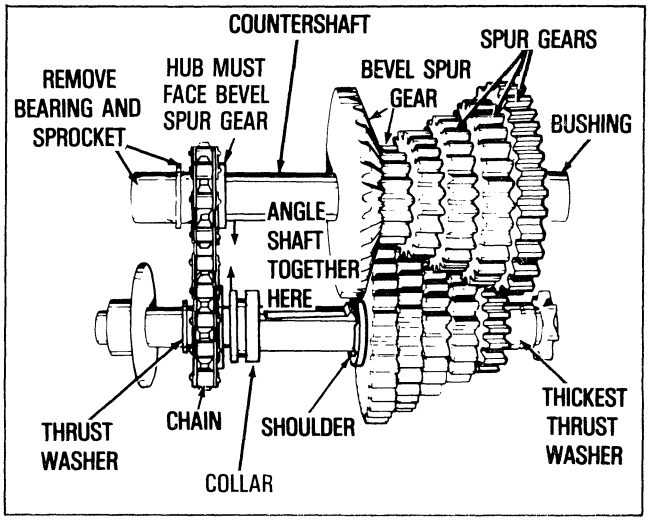


3. Remove cover. Remove shifter assembly (includes shafts, pins and fan from transmission by lifting shaft out of case.

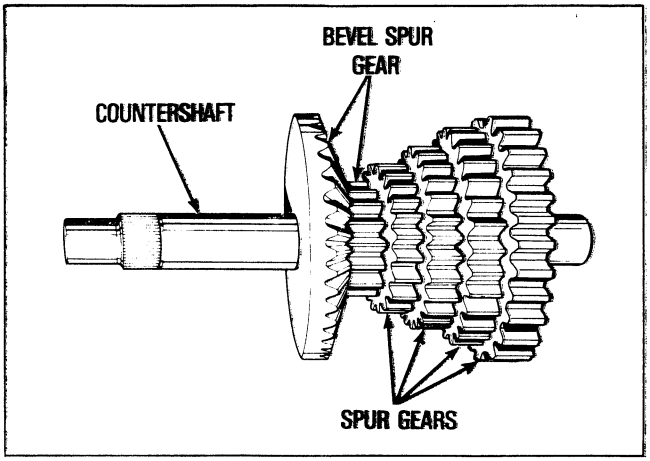


C. DISASSEMBLY OF UNIT

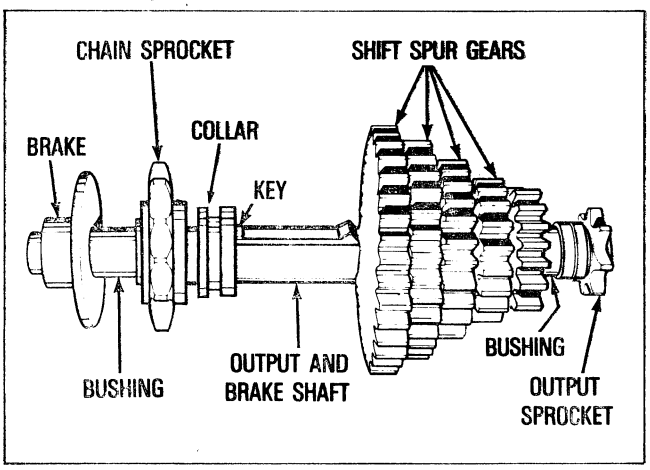
1. Remove gear and shaft assemblies from case half of the transmission by lifting the two shafts out of the bearing supports taking care not to disturb drive chain relationship with hubs on sprockets.



2. Remove bevel spur gear combination and spur gears from the countershaft; these gears are splined to the countershaft.



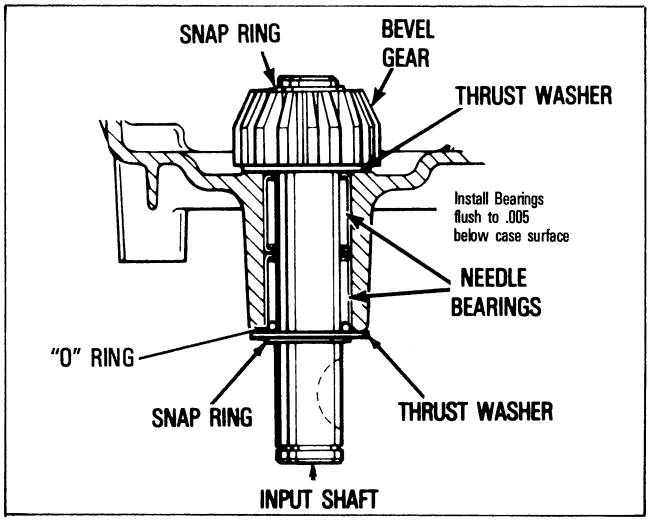
3. Remove the output sprocket and brake disc from the output shaft. Remove the bushings, shift spur gears, chain sprocket, collar and keys.



Input shaft removal for 700 series in-line transmission.

4. Remove snap ring from input shaft; remove bevel gear and pull shaft through case.

5. Input shaft needle bearings should be installed flush to .005 below bearing bore surfaces from inside and outside case.



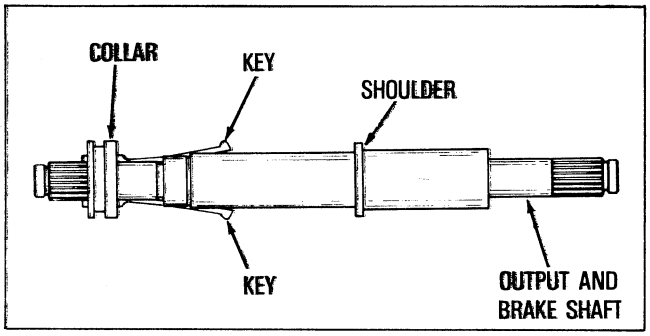
D. INSPECTION AND REPAIR

Examine all parts after removing grease with cleaning solvent. Replace damaged parts.

E. ASSEMBLY OF 700 SERIES IN-LINE TRANSMISSION

1. Install and secure the input shaft and bevel gear in the case. See Paragraphs 4 & 5 under "Disassembly Instructions" and reverse the order.

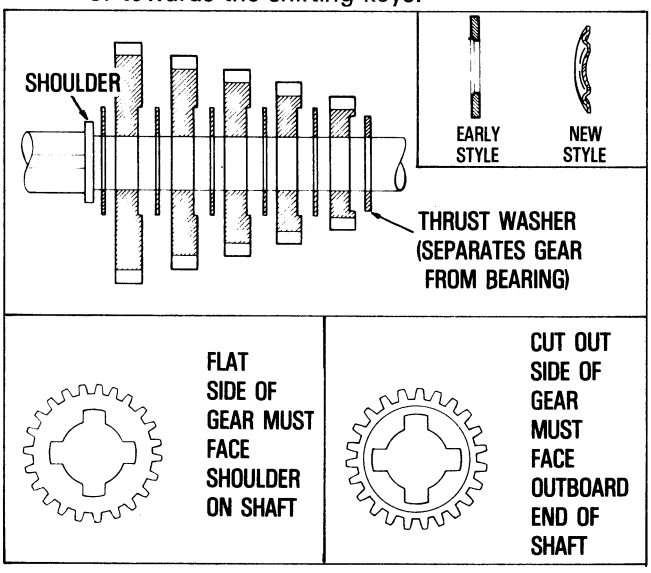
2. Install collar and keys on output shaft. Thick side of collar MUST face shoulder on shaft.



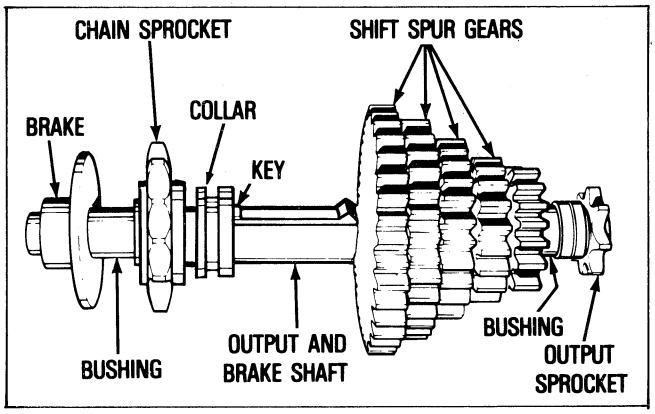
3. Install the thrust washers and shifting gears onto the shifter/brake shaft. The number of gears and/or spacers will be determined by the number of speeds in the transmission.

WASHERS. A running change has been made to the shifting washers. Many models have used the thrust washer with a 45° chamfer on the inside diameter. The latest style washer has a curved or rounded side. The purpose of both washers is to compress the shifting keys as they slide into the gears. Therefore, the chamfered or rounded side of these washers must face the shoulder of the shaft or towards the shifting keys. The washers are interchangeable.

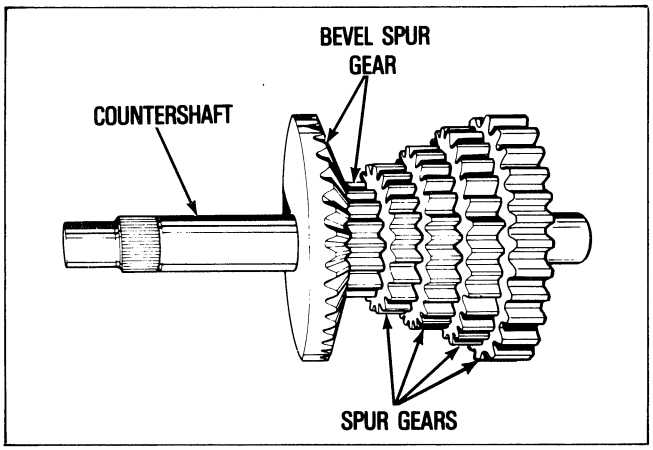
SHIFTING GEARS. The 2 sides of the shifting gears are different. One side is flat and the other side is cut out. The flat side of the gear is placed onto the shaft towards the shoulder of the shaft or towards the shifting keys.



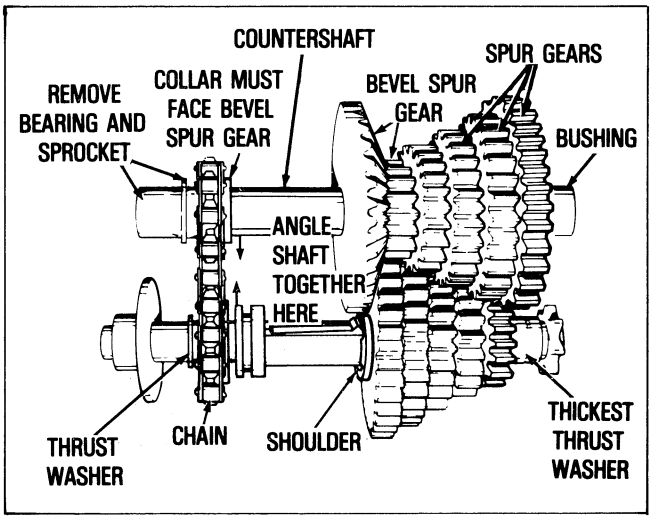
4. When correctly assembled the output shaft should appear as shown.



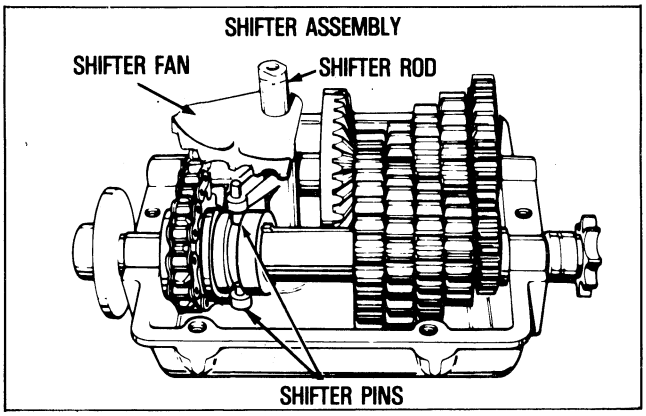
5. Install bevel spur gear and smallest to largest spur gears to the splined end of the countershaft.



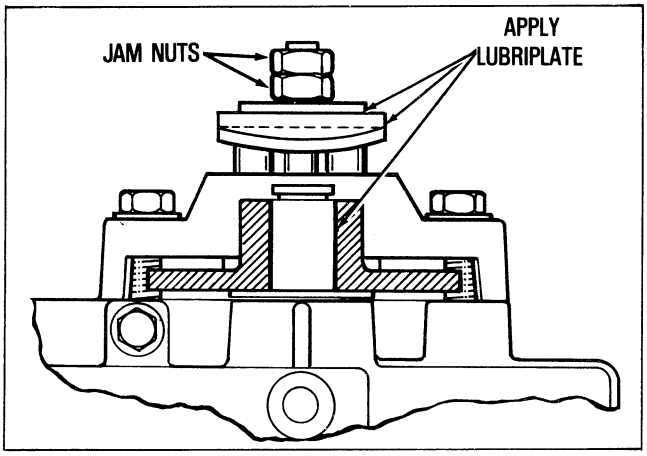
6. Install chain over two shafts registering chain on output shaft sprocket and in-line with serrations on countershaft. Be sure collar on sprocket faces shifting keys and collar.



7. Install shaft assemblies into case utilizing piloting locators on bearings to properly align notches in case.
CAUTION: Be sure bearing locators are seated in transmission case.



8. Install shifter assembly (shaft, pins and fan) 12 oz. E.P. Lithium grease around gearing, and reinstall cover on case. Torque cap screws 90-110 in. lbs.
9. For "in-line transmission", install index ball, spring, and setscrew, in that order, into cover and slowly tighten the screw from flush to two turns below flush, depending on personal preference.
10. Check for binding by turning input shaft. Install transmission on equipment. Install brake and linkage and adjust to disengage when clutch is engaged. Consult equipment Owner's Manual.
11. Apply a light film of lubriplate to the inside of lever portion which contacts pins, also to outside of lever which contacts flat washer and between shaft O.D. and bore of brake disc. Brake pads and brake disc must be free of grease and oil.



NOTE: To secure brake lever, hold bottom nut and torque top nut to 100 in. lbs.

Brake and linkages may vary.

NOTE: If adjusted incorrectly, the brake will do one of two things;

a. It will not brake (stop) the vehicle when the brake is applied, or

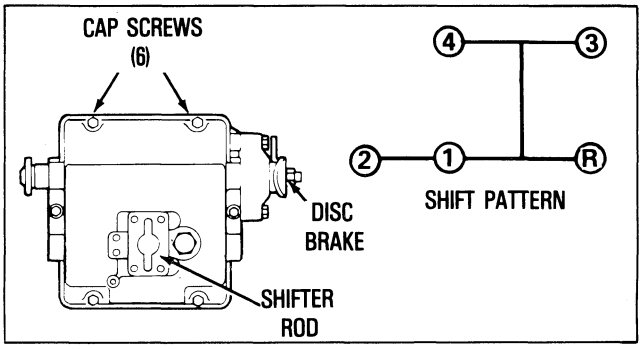
b. If adjusted too tightly, a drag or continued braking effect will be evident until the brake wears out.

SECTION 6. 700H SERIES

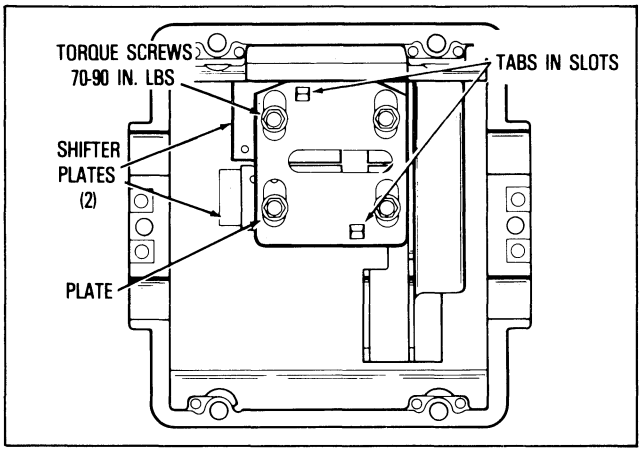
CAUTION

TO AVOID PREMATURE TRANSMISSION FAILURE, DECLUTCHING IS REQUIRED WHEN SHIFTING FROM NEUTRAL TO FIRST OR REVERSE, FROM ANY FORWARD TO REVERSE GEAR, FROM REVERSE TO ANY FORWARD GEAR OR WHEN OPERATING EQUIPMENT ON A HILL OR UNDER HEAVY LOAD.

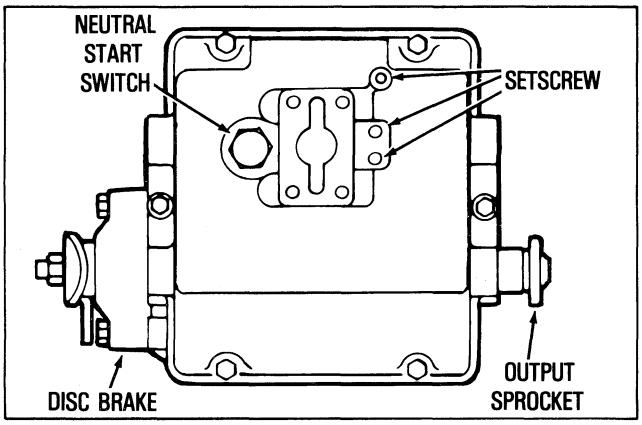
The "H" pattern transmission described here is a 4-speed forward, 1 reverse unit.



The 700 series "H" pattern transmission gear arrangement is the same as the in-line transmission except for the shifting portion and an additional collar on the output and brake shaft and an additional spacer on the countershaft and spacer on the output and brakeshaft.



If installed, (optional equipment), remove neutral start switch.



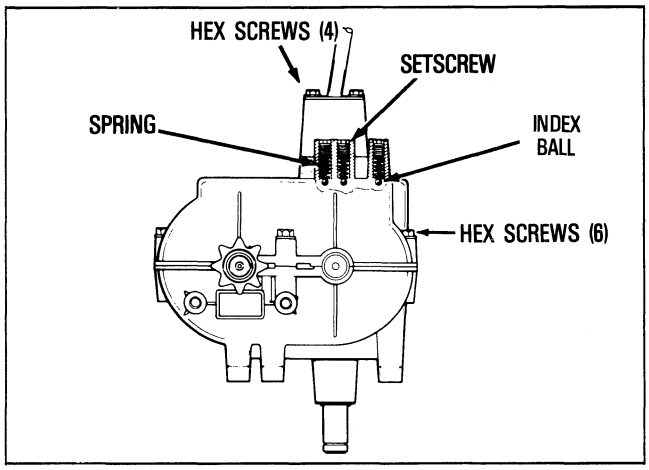
NOTE: Due to the many variations of equipment braking systems, adjustments and repair to these components and linkages are not to be considered warranty.

A. DISASSEMBLY OF SHIFTER MECHANISM

Clean outside of transmission. Position shift lever in neutral position as indicated by the shift pattern.

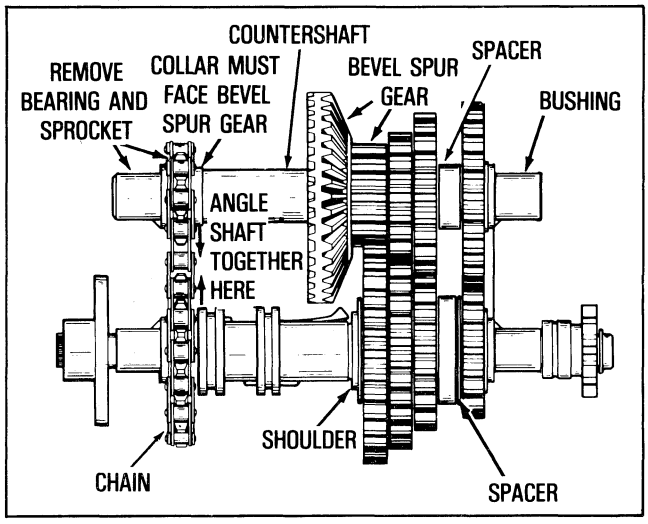
FOR THE "H" SHIFT PATTERN 700 SERIES TRANSMISSION.

1. Remove shift lever by removing four hex screws on shift lever cover.
2. With a 3/32 inch Allen wrench, remove screw, spring and index ball in three places (balls will roll out once spring is removed).
3. Remove six cap screws that maintain cover to case. Remove cover.

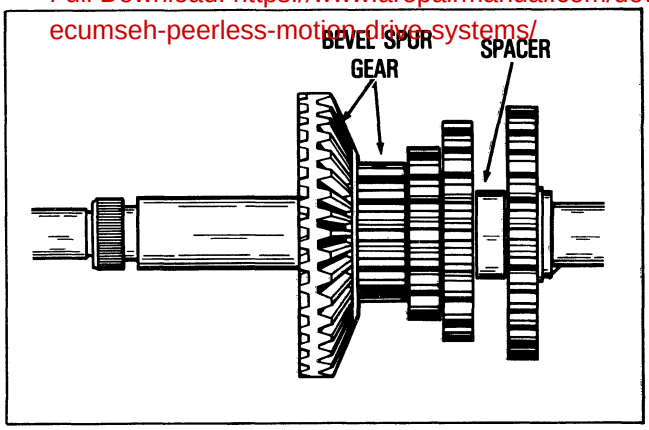


B. DISASSEMBLY OF UNIT

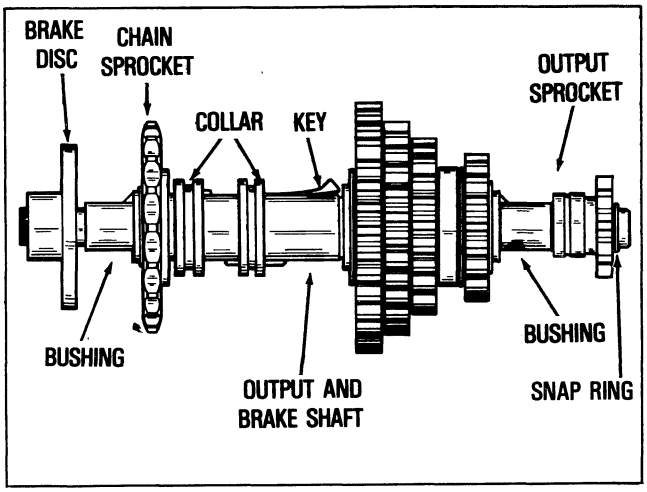
1. Remove gear and shaft assemblies from case half of the transmission by lifting the two shafts out of the bearing supports taking care not to disturb drive chain relationship with sprockets.
2. Angle chain and sprocket ends of shaft toward each other, removing the bearing and sprocket from the countershaft. Note the collar on the sprocket faces the bevel spur gear. Remove chain.



Disassembly of the 700 series "H" shift pattern includes spacer.

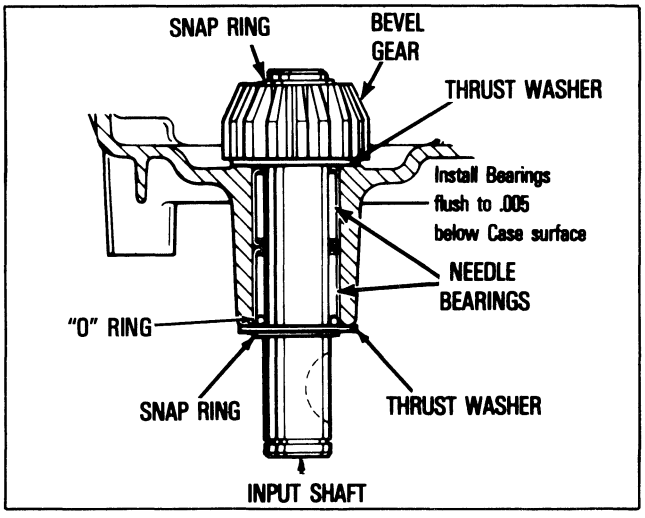


Disassembly of the 700 series "H" shift pattern includes a second collar and a spacer.



Input shaft removal same for 700 series in-line and "H" shift pattern transmissions.

3. Remove snap ring from input shaft; remove bevel gear and pull shaft through case.
4. Input shaft needle bearings should be installed flush to .005 below bearing bore surfaces from inside and outside case.

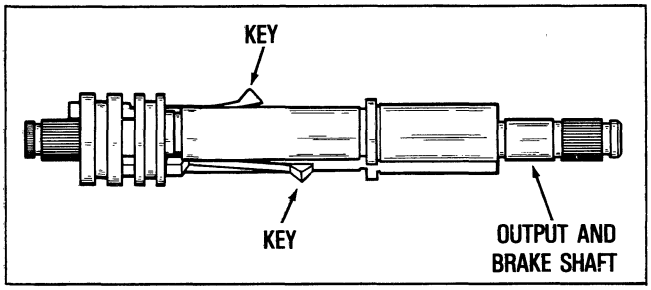


C. INSPECTION AND REPAIR

Examine all parts after removing grease with cleaning solvent. Replace damaged parts.

D. ASSEMBLY OF 700 SERIES "H" SHIFT PATTERN

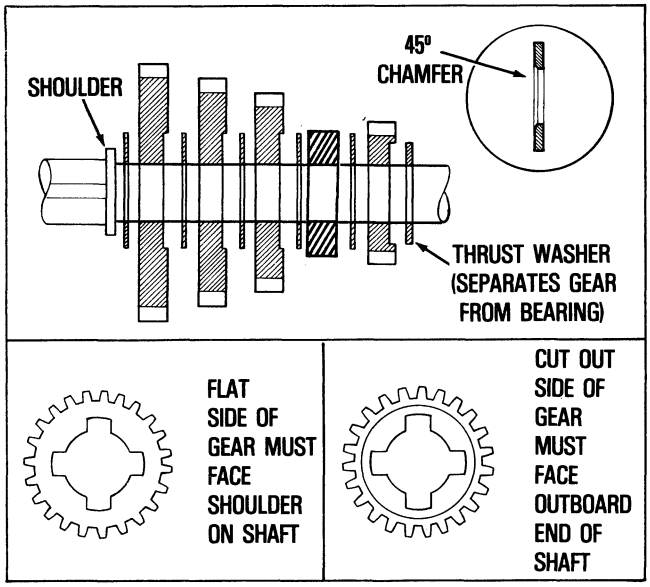
Same as 700 series in-line except for additional collar and spacer.



ASSEMBLY OF 700 SERIES "H" SHIFT PATTERN

Same as for 700 series in-line transmission except for additional spacer.

NOTE: The thrust washer on the shift gear end of the output shaft does not have a chamfer on the inside diameter and must be positioned as shown. It is thicker than the other thrust washers separating the gearworks from the bearings.



Correct assembly for 700 Model "H" shift pattern.

First, second and third gears have to be forced over the key, when assembling.