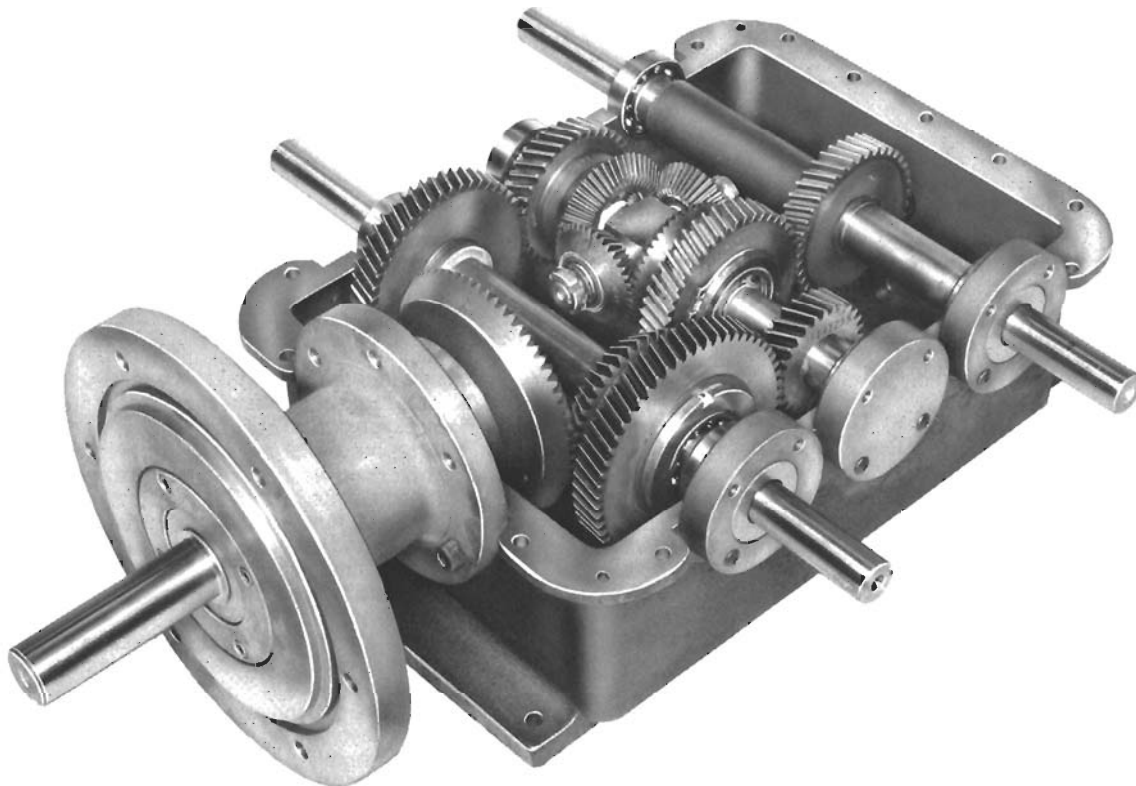




## DIFFERENTIAL TRANSMISSION (TD)

### Installation, Operating and Maintenance Instructions



Specon Differential Transmissions include  
thirteen basic models covering ratings up to 125 H.P.



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# Principles of Operation

Any bevel gear differential consists of three elements: a spider carrying one or more freely running bevel pinions, and two bevel side gears which mesh with the spider pinions. (In the diagram only one spider pinion is shown for the sake of clarity.) The spider shaft and both of the side gears can absorb or deliver power.

For speed and torque relationships see Specon Bulletin 204B.

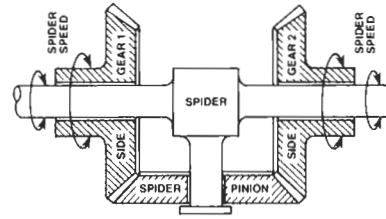


Figure 1

## Installation

Mount unit securely on a flat, rigid foundation without any flexing. Mounting pads of transmission must rest firmly on the foundation before bolting down. Shimms should be used for leveling.

Accurately align shafts, use flexible couplings.

**UNIT IS SHIPPED WITHOUT OIL. BEFORE RUNNING,** remove top oil plug and fill transmission with quantity of oil as specified on each unit. Use a high grade gear oil such as

MOBIL D.T.E. Oil BB (AGMA #4), a Socony Mobil product, or equivalent.

After running 50 hours, change oil and thereafter every 6 months.

In an outdoor application the proper grade oil must be used in order to achieve proper lubrication at different seasonal temperatures.

## Adjustment

There are no field adjustments required.

## Operation

There are no operating controls on the Differential Transmissions.

## Maintenance

The assembly and disassembly of differential transmissions involve procedures for

- (1) Spider Assembly
- (2) Side Gear and Worm Assembly
- (3) Final Assembly

These procedures are basic to all differential transmissions. The procedures for removal and replacement of the additional step up and/or step down gearing which are part of a specific transmission are considered to be within the skills of a competent mechanic.

Figure 2 represents a typical two bore transmission internal arrangement.

The assembly instructions which follow apply to all other transmission arrangements for spider assembly, side gear and worm assembly and final assembly.

### 1. Spider Assembly

- A. Push tapered roller bearing (15) outer races with standard spacer (10) into each differential pinion. Note that the angles converge between the bearings.

- B. Press a tapered roller inner race onto both spider journals (12), the large end toward the center of the spider.
- C. Place pinion gears (9) on spider.
- D. Press tapered roller inner race onto both ends.
- E. Add hardened washer (14), lock washer (11), and lock nut (13) to both ends.
- F. Tighten lock nuts tight with spanner wrench to squeeze out all play and to firmly seat lock washer.
- G. Back lock nuts off and press off, or carefully tap pinions back toward their respective lock nuts with a brass mallet ( $1/16$  inch is sufficient).
- H. Retighten lock nuts to the point that bearings run free, but no end play can be felt when spider assembly is shaken, holding pinion gear.
- I. Tap one tine of each lock washer into a mating groove in the lock nut and the spider assembly is complete.

### 2. Side Gear Assembly

- A. The lash on the bearing-mounted side gear is controlled by a spacer (8) between the inner ball bearing (7) and the spider. The need to change this spacer is unlikely. The table gives the backlash in inches for the assembled unit related to diametral pitch of the gear in the unit.

Table I

Differential Size	Backlash/Mesh (Assembled)	
00	.002	.004
0	.002	.004
1	.002	.004
3	.003	.006
5	.003	.006
7	.004	.009

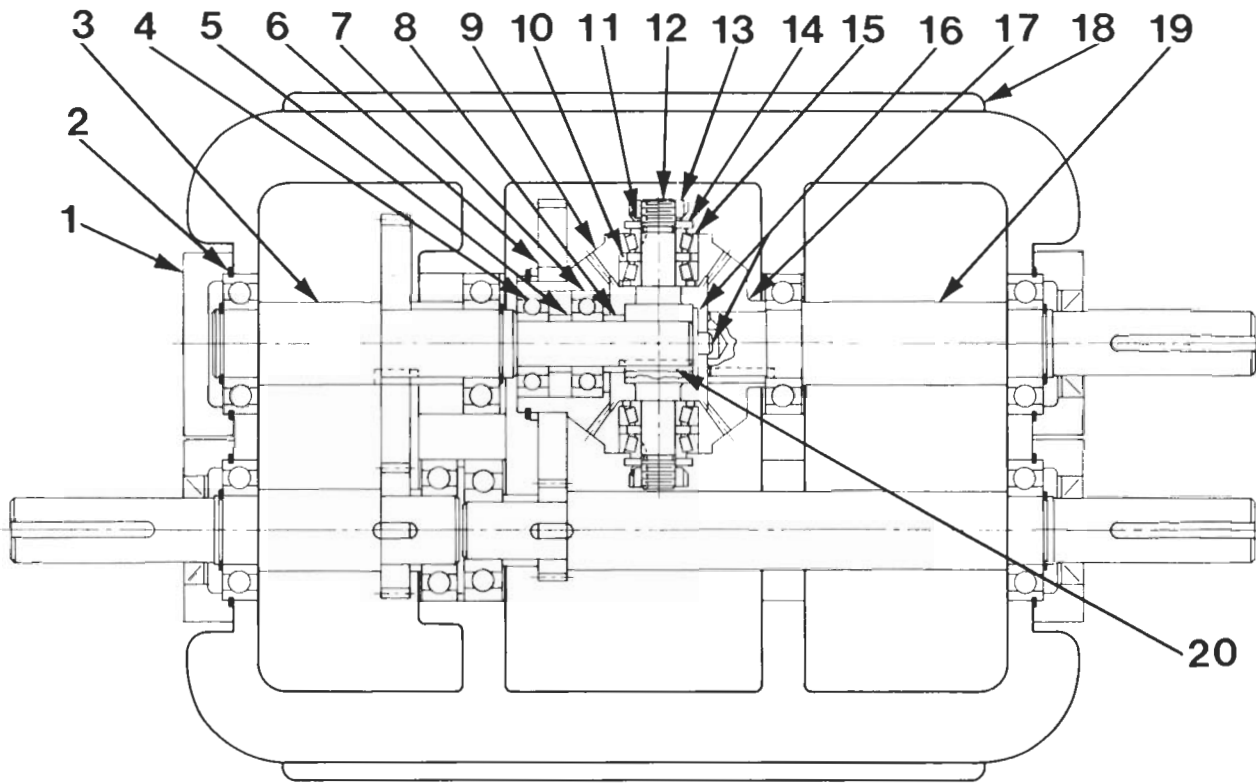


Figure 2

- B. Mounting procedure is as follows: On a push fit dummy shaft similar to the shaft that holds the differential, push on one bearing to shaft shoulder, add the inner race spacer (5), then push on the second bearing.
- C. The side gear with worm gear mounted (6) is then pushed on over the bearings' outer race.
- D. The outer race spacer, if used in original assembly, can be discarded as it serves no useful purpose.
- E. Next push the spider assembly onto the shaft.
- F. Considering the slight accumulative eccentricity determine the point of tightest mesh. White lead paste may be used as a visual aid if desired.
- G. Once the tight point is determined and marked, back the spider assembly off slightly and insert a narrow .002 feeler gage blade into the tight mesh spot.
- H. Push the spider assembly back firmly locking the feeler gage blade in the mesh.
- I. At this point the space between the inner bearing's inner race and the spider can be checked with telescope gage and micrometer. Should a new spacer be required, the ends must be parallel to each other and square with the axis. Surface grinding is recommended. Be sure to deburr the new spacer.
- J. Recheck the fit using the spacer, then disassemble and repeat the mounting procedure on the actual power shaft (3).
- K. This time press fits are involved on both the bearings and the spider. A tube that fits loosely on the shaft must be used so that only the inner race is pressed.
- L. Note that the key,  $\frac{3}{16} \times \frac{3}{16} \times 1\frac{1}{4}$ , must also be a tight fit to preclude any looseness in the assembly.
- M. Add the washer and screw (16) to the shaft where it extends through the spider.

3. Final Assembly

- A. With the assembly to this point assembled in the housing, the bearing retainer (1) holding the snap ring bearing (5) bolted in place, the next step is the shaft mounted differential side gear — first assuming the gear to be too long.
- B. Press the gear onto its shaft (19) journal firmly against the shaft shoulder with the shaft bearings in their positions.
- C. Lay the assembly in the housing (18) rotating it to find the point of tightest mesh as before.
- D. Using once again the .002 feeler gage, insert it into the tight mesh point and push the assembly in to hold the feeler gage blade.
- E. Now with another feeler gage set determine the distance between the machined face of the housing and the inside edge of the bearing snap ring—a snug fit. The resultant figure is the amount that must be surface ground from the back of the gear hub (17). Once done and reassembled the unit is ready to run.
- F. Now assuming that the gear length over all is too short, the snap ring will have to be removed from the bearing to seize the feeler gage in the mesh.
- G. In this position use a depth micrometer from the outer surface of the bearing to the machined surface of the housing for one figure.
- H. Reinstall the bearing snap ring, push it up tight to housing, and use the micrometer to obtain the second figure.
- I. The difference will be the thickness of steel shim needed between the gear hub (17) and the shaft shoulder.
- J. In cutting this shim to the necessary washer shape, be certain that it fits freely on the shaft so that no added thickness will be incurred in final assembly.
- K. Once reassembled with the shim in place the transmission is ready to go back together.

## Repair Parts List

When ordering repair parts, specify model number and serial number of the transmission and part number from bill of materials.



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