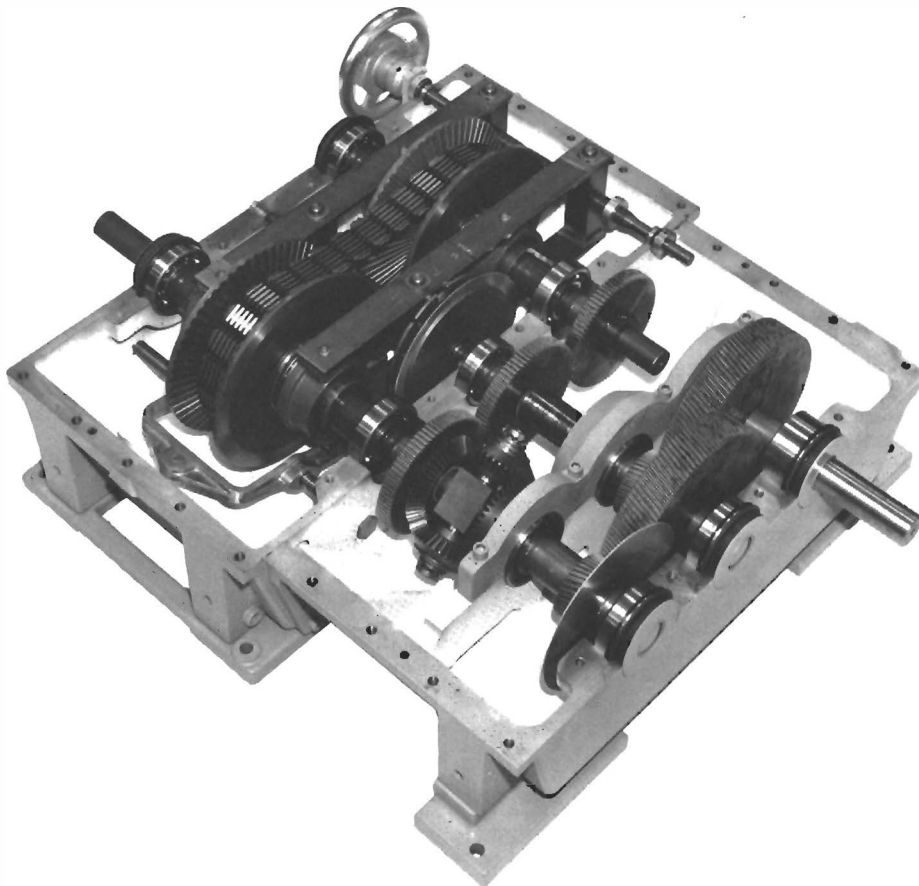




MECHANICAL DIFFERENTIAL WIDE SPEED RANGE TRANSMISSIONS

Installation, Operating and Maintenance Instructions



Specon MD variable speed transmissions are complete units consisting of positive-drive variable speed mechanisms in combination with gear boxes which incorporate bevel gear differential assemblies.



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 relationship see Specon Bulletin 202B.

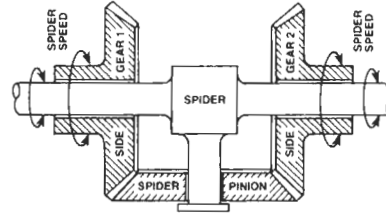


Figure 1

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. Shims should be used for leveling.

Accurately align shafts, use flexible couplings.

Lubrication

UNIT IS SHIPPED WITHOUT OIL. BEFORE RUNNING, remove top oil plug and fill Vari-Chain unit and Specon Transmission with quantity of oil to indicated level on Vari-Chain sight glass. Use a high grade gear oil, such as Compound BB (AGMA #4), a Socony Mobil product, or equivalent.

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

Adjustment

There are no field adjustments required.

Operation

The Specon MD or MDD Draw Transmission is a self-contained unit which includes the Vari-Chain. In order to vary the output ratio (percent of draw for MDD Transmission or speed for MD Transmission) turn the control handwheel to the desired setting. Vary the ratio **ONLY** when the drive is in operation.

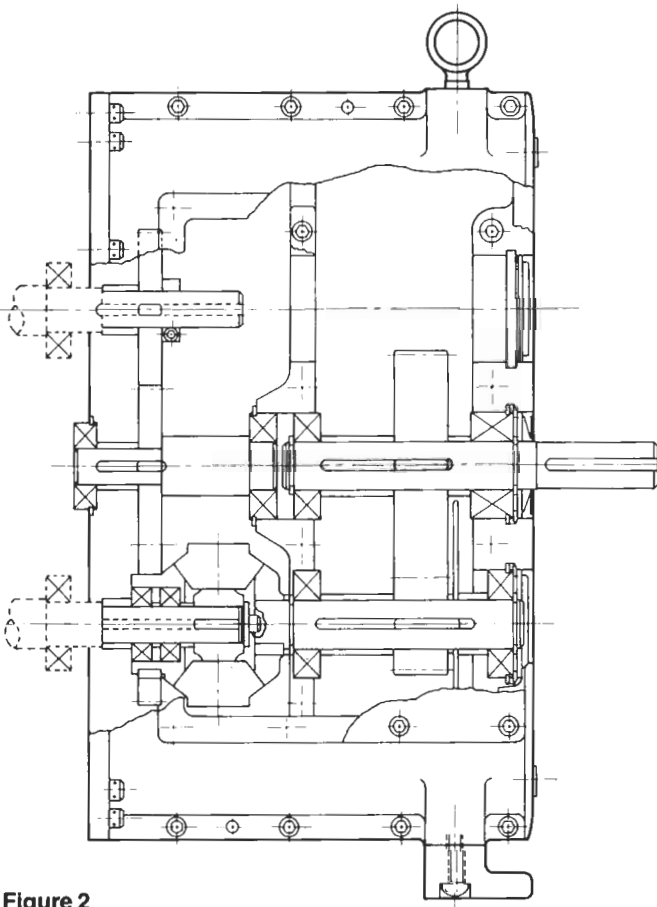


Figure 2

Maintenance

In addition to the oil changes as mentioned under lubrication, the chain tension must be periodically checked. To check chain tension, first remove the cover plate of the unit. Then, by pressing down and lifting up the chain and shoe assembly as a unit, check the total movement at the shoe. The allowable chain movement is indicated on the nameplate. In no case should the chain be so tight that no slack exists.

Figure 2 is a typical MD assembly. Assembly and disassembly of the differential transmission involves procedure for

- (1) Spider Assembly
- (2) Side Gear 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.

1. Spider Assembly (Figure 3)
 - A. Push tapered roller bearing (G) outer races with standard spacer (F) into each differential pinion. Note that the angles converge between the bearings.
 - B. Press a tapered roller inner race onto both spider journals (L), the large end toward the center of the spider.
 - C. Place pinion gears (E) on spider.
 - D. Press tapered roller inner race onto both ends.
 - E. Add hardened washer (H), lock washer (J), and lock nut (K) 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,

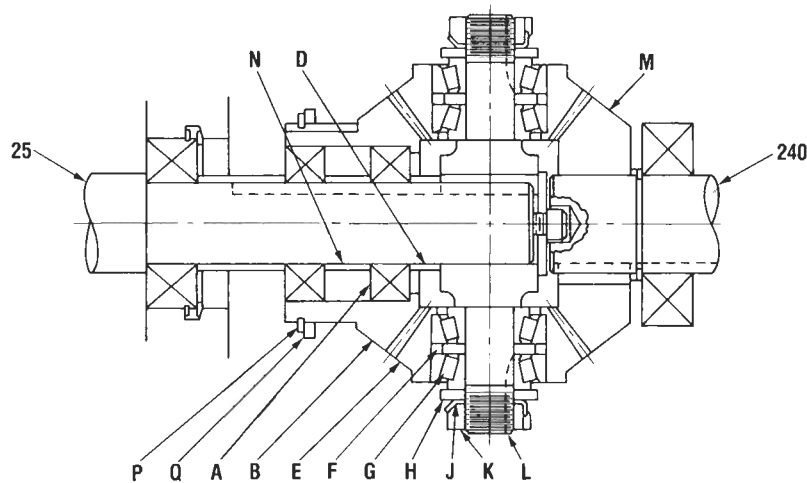


Figure 3

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 (B) is controlled by a spacer (D, Figure 3) between the inner ball bearing (A) 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.
 - B. Mounting procedure is as follows: On a push fit dummy shaft similar to the shaft that holds the differential, push on bearing to shaft shoulder, add the inner race spacer, then push on the second bearing.
 - C. The side gear (B) is then pushed on over the bearing's 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 is 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 input shaft (25 Figure 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.

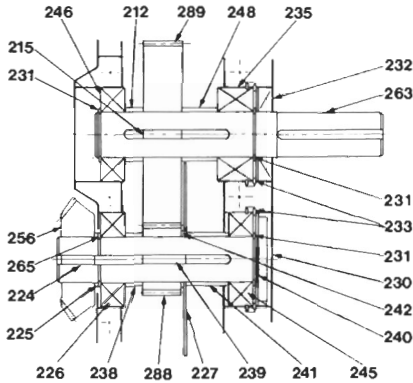
- L. Note that the key, $\frac{3}{16} \times \frac{3}{15} \times 1\frac{1}{4}$, must also be a tight fit to preclude any looseness in the assembly.
 - M. Add the cap screw and washer to the shaft where it extends through the spider.
3. Final Assembly (Figure 2)
- A. With the assembly to this point assembled in the housing, the bearing retainer holding the snap ring bearing bolted in place, the next step is the shaft mounted differential side gear (M) first assuming the gear to be too long.
 - B. Press the gear onto its shaft (240 Figure 3) journal firmly against the shaft shoulder with the shaft bearings in their positions.
 - C. Lay the assembly in the housing, 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. 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 measure with micrometer for the second figure.
 - I. The difference will be the thickness of steel shim needed between the gear hub 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.

Table I

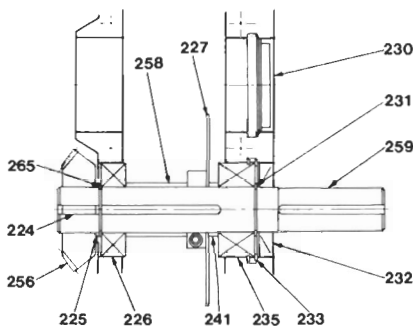
Differential Size	Backlash/Mesh (Assembled)	
00	.002	.004
0	.002	.004
1	.002	.004
3	.003	.006
5	.003	.006
7	.004	.009

Repair Parts List

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

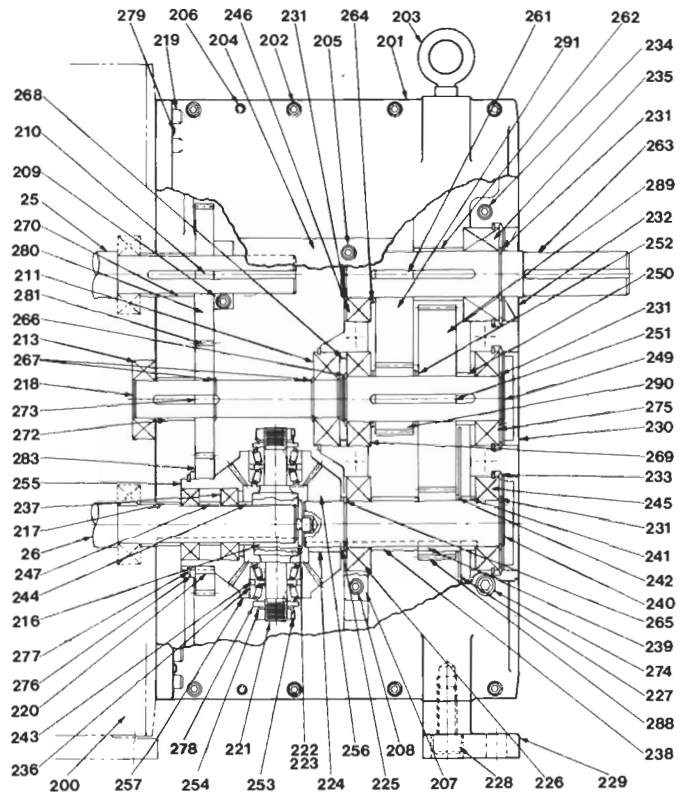


MDX31-66 & MDY31-66



MDX11-66 & MDY11-66

NOTE MDX-13 and MDY-13 (not shown) are configured like the MDX-31 and MDY-31 except that gear set 288 and 289 are arranged for gear speed up (Output)



MDX91-66 & MDY91-66

NOTE 1 Refer to Bulletin 207 IOM for Vari-Chain parts other than 25 and 26

COMMON PARTS

Loc. No.	Description	Quan.
25	Variable Speed Shaft	1
26	Constant Speed Shaft (input)	1
200	See VARI-CHAIN Transmission Parts List	1
201	Housing Assembly	1
202	Socket Head Cap Screw	10
203	Eye Bolt	1
204	Inspection Cover	1
205	Socket Head Cap Screw	10
206	Roll Pin	2
207	Bearing Bridge	1
208	Socket Head Cap Screw	4
209	Split Clamp	1
210	Key	1
211	Bearing	1
213	Bearing	1
216	Key	1
217	Spacer	1
218	Shaft	1
219	Socket Head Cap Screw	16
220	Key	1
221	Differential Spider	1
222	Button Head Cap Screw	1
223	Washer	1
224	Key	1
225	Spacer	1
226	Bearing	1
227	Oil Slinger	1
228	Button Head Cap Screw	4
229	Mounting Foot	1
230	Closure	2
232	Seal	1
234	Socket Head Cap Screw	4
235	Bearing	1
236	Bearing	4
237	Bearing	2
241	Spacer	1
243	Spacer	2
244	Spacer	1

Loc. No.	Description	Quan.
247	Spacer	1
253	Lock Nut	2
254	Lock Washer	2
255	Differential Side Gear	1
256	Differential Side Gear	1
257	Differential Pinion Gear	2
265	Snap Ring (omitted on sizes 1/2, 4 & 5)	1
267	Snap Ring (size 1/2 & 1 only)	2
270	Spacer	1
272	Spacer	1
273	Key	1
274	Pipe Plug	2
276	Spacer (size 1 only)	1
277	Snap Ring	1
278	Hardened Washer	2
279	Dowel Pin	2
280	Connecting Gear	1
281	Connecting Gear	1
283	Connecting Gear	1

MDX31-66 & MDY31-66

Loc. No.	Description	Quan.
212	Spacer	1
215	Key	1
231	Snap Ring	3
233	Bevel Snap Ring	2
238	Spacer	1
239	Key	1
240	Shaft	1
242	Spacer	1
245	Bearing	1
246	Bearing	1
248	Spacer	1
263	Output Shaft	1
265	Snap Ring	1
288	Output Gear	1
289	Output Gear	1

MDX11-66 & MDY11-66

Loc. No.	Description	Quan.
231	Snap Ring	1
233	Bevel Snap Ring	1
258	Spacer	1
259	Output Shaft	1

MDX91-66 & MDY91-66

Loc. No.	Description	Quan.
231	Snap Ring	4
233	Bevel Snap Ring	3
238	Spacer	1
239	Key	1
240	Shaft	1
242	Spacer	1
245	Bearing	1
246	Bearing	1
249	Shaft	1
250	Spacer	1
251	Key	1
252	Spacer	1
261	Key	1
262	Spacer	1
263	Output Shaft	1
264	Spacer	2
266	Snap Ring (omitted on size 1/2)	1
268	Spacer (size 1/2 only)	1
269	Bearing	1
275	Bearing	1
288	Output Gear	1
289	Output Gear	1
290	Output Gear	1
291	Output Gear	1

Note: 1. Oil Slinger not used on all units.