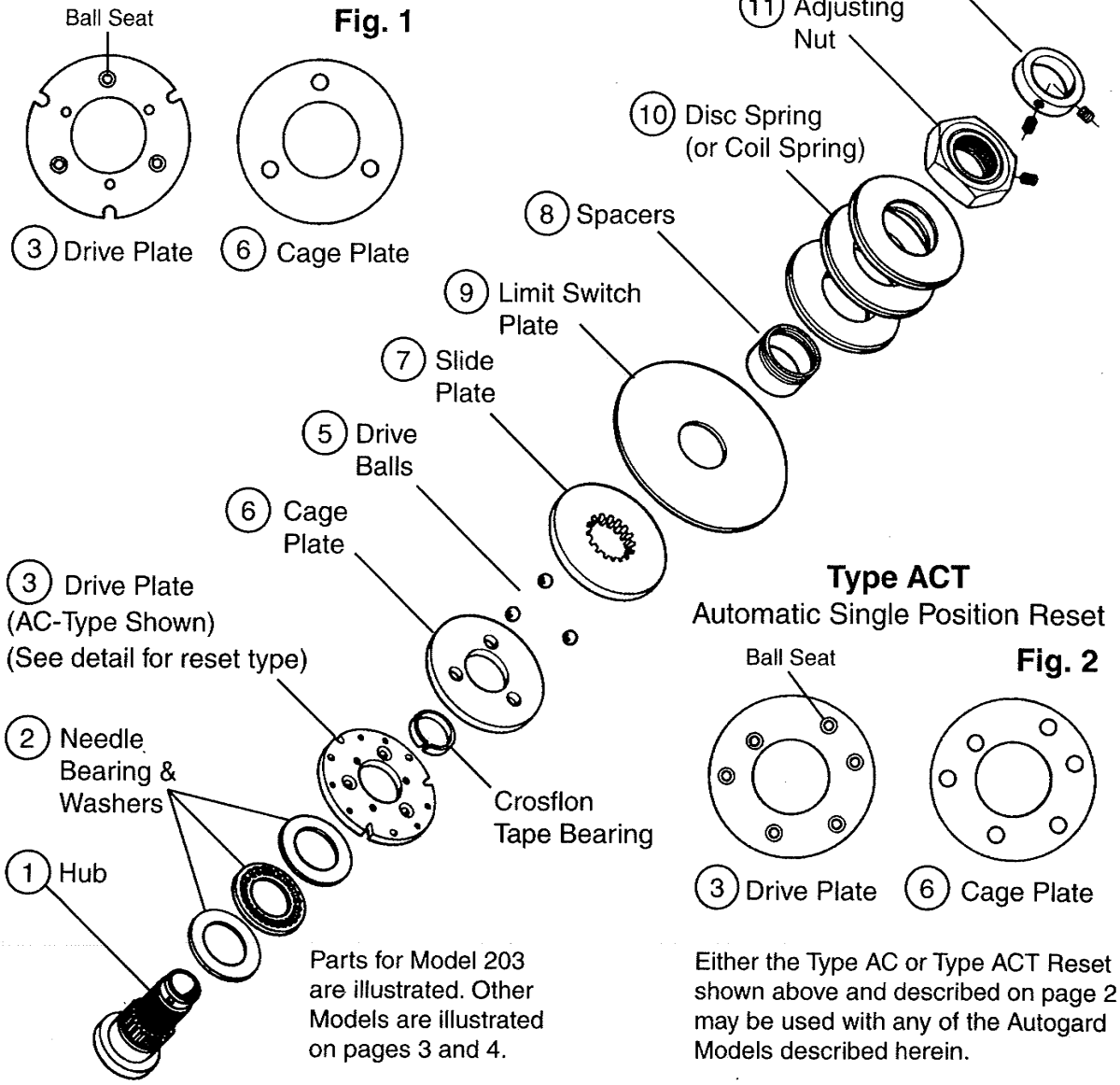
Type AC
Automatic Random Reset

Fig. 1



Parts for Model 203 are illustrated. Other Models are illustrated on pages 3 and 4.

Type ACT
Automatic Single Position Reset

Fig. 2

Either the Type AC or Type ACT Reset shown above and described on page 2 may be used with any of the Autogard Models described herein.

Description of Reset Types

Type AC - Automatic Random Reset

The ball seats in the Drive Plate (3) and Slide Plate (7), as well as the retaining holes in the Cage Plate (6), are equally spaced on the same pitch diameter (See Fig. 1, Page 1). Upon disengagement the balls roll at the pitch diameter of the ball seats and drop into the seats as they are encountered. This re-engagement is audible as the balls contact the seats.Typically Autogard Torque Limiters are bi-directional and can trip in either direction.

Type ACT - Single Position Reset

This reset type automatically resets each time in the same position for drives requiring synchronization. The balls are arranged on different pitch diameters (See Fig. 2 ,Page 1) so that when an overload occurs, the balls must return to their original positions before they re-seat. Engagement will occur within two revolutions in either direction.

Recommended maximum operating speeds are:

Type AC - 200 RPM **Type ACT - 500 RPM**

Consult factory for assistance if the above recommendations cannot be followed.

Prior to Installation

1. Mounting a Sprocket or Sheave on Model 201

(See Fig. 4).

A. Mounting with a tapered bushing

(Taper-Lock, QD, Etc.).

A sprocket, sheave or timing pulley may be mounted directly on Model 201 by using a tapered bushing. Select a sprocket or sheave to fit "M" dia. of the Autogard (Fig. 4 bottom). No key is used with the bushing when mounting on the torque limiter. Thoroughly clean all grease and oil from "M" dia. with solvent prior to mounting the bushing. Be certain that the bushing is properly mounted and tightened according to the instructions accompanying each bushing.

Caution: It is possible to overtighten the bushing capscrews to an extent that will deform the adapter (4) and prevent its free rotation on the hub (1). Make sure that the adapter and bushing assembly are free to rotate on the hub after the bushing is fully tightened. To check this, the adjusting nut (11) must be backed off to release all spring (10) pressure. Retighten adjusting nut to original position after free-rotation check is completed.

B. Mounting with Bolts.

A sprocket, sheave, etc. may also be mounted on Model 201 by bolting as shown in Fig. 4, top. The adapter (4) must be removed for drilling and tapping the mounting holes if they were not ordered with the unit (Table 1). See Disassembly Procedure on Page 7. Care must be taken not to drill into other holes in the adapter. Attach sprocket, sheave, etc. onto adapter prior to reassembly. Use bolts of a length that provides no more engagement in the adapter (4) than the maximum shown in Table 1. Make sure there are no protrusions inside the adapter which might interfere with the hub. The unit may then be reassembled.

2. Mounting Sprocket or Sheave on Models 202 & 209

(See Fig. 5.) The sprocket or sheave (14) on these Models are generally supplied by Autogard and fitted to the Hub (1) at the factory. If part 14 is to be furnished and fitted by the customer, please consult factory for procedure.

3. Proper Springs (All Models)

Check to see that the spring will provide the desired range for release torque (Refer to Table 8, Page 5). NEVER TIGHTEN THE SPRING BEYOND ITS MINIMUM OPERATING LENGTH (measured with the torque limiter engaged) or the spring will not allow sufficient movement of the slide plate to let the balls leave their seats during an overload. Damage to the machinery or torque limiter may result.

4. Lubrication (All Models)

The needle bearing, spline surfaces, plate faces and balls have the proper type and amount of lubricant applied during assembly at the factory. No further lubrication should be required at initial installation.

Table 1: Standard Mounting Hole Patterns (•1)

(These are minimum diameters in order to accommodate the smallest acceptable sprocket shown in Table 2)

Autogard Size	No. of Bolts (•2)	Bolt size	Max. Bolt Engagement in Adapter	Bolt Circle Diameter (inches)	Sprocket Bore (inches)
1	6	#8-32	0.267	1.625	1.252/1.254
2	6	#8-32	0.194	2.375	2.002/2.004
3	6	1/4 - 20	0.36	3.000	2.502/2.504
4	6	5/16 - 18	0.479	4.125	3.502/3.504
5	6	3/8 - 16	0.61	5.687	5.002/5.004
5S	Consult Factory				

(•1) Standard mounting holes furnished for standard price adder. Special mounting holes quoted on request

(•2) Bolt holes to be equally spaced on bolt circle diameter specified. Care must be taken not to drill into other mounting holes in adapter.

Table 2: Smallest Acceptable Sprockets or Sheaves

Size	Smallest sprocket (No. of teeth)					Smallest Sheave dia. (•3)
	3/8" pitch (#35)	1/2" pitch (#40)	5/8" pitch (#50)	3/4" pitch (#60)	1" pitch (#80)	
1	20	16	13	12	10	1.90
2	26	20	17	15	12	2.65
3	32	25	21	18	14	3.38
4	42	32	27	23	18	4.59
5	-	43	35	30	23	6.25
5S	-	-	48	40	31	8.50

(•3) The diameter quoted is to the bottom of a V-sheave groove or to the inside diameter of the flange of a timing belt pulley. For sprockets, the above information applies only to single strand chain. For multiple strand consult factory.

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Drive Shutdown

It is necessary to shut down the drive quickly after disengagement upon overload. We recommend that all applications use an automatic mechanism to switch off the drive motor. On the 200 Series Autogard, a flat limit switch plate for actuating a control to shut down the drive is furnished at no charge. The flat limit switch plate is used to actuate an Autogard limit switch, proximity sensor or equivalent shown in Fig. 3 using dimensions in Table 3.

Fig. 3

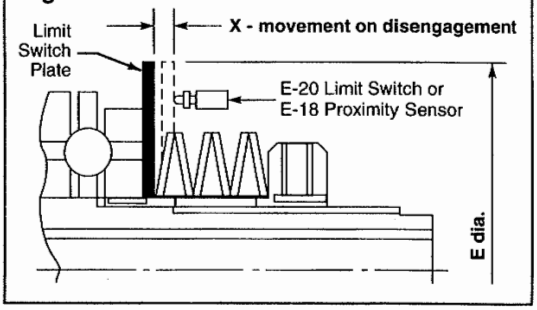


Table 3

Size	1	2	3	4	5	5S
X-inches	.095	.173	.173	.209	.248	.320
E-inches	3.25	5.50	6.50	8.00	10.00	12.00

Parts List

Note: Figures 4, 5 and 6 show typical sprocket in top half of drawing and typical sheave in bottom half.

Fig. 4: Model 201

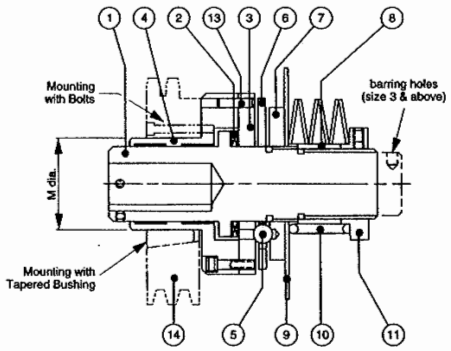


Fig. 5: Model 202

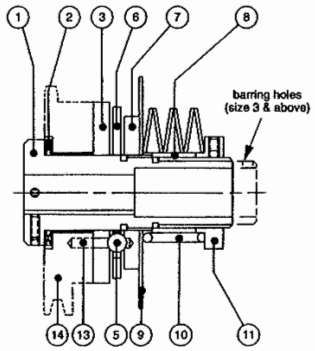


Fig. 6: Model 209

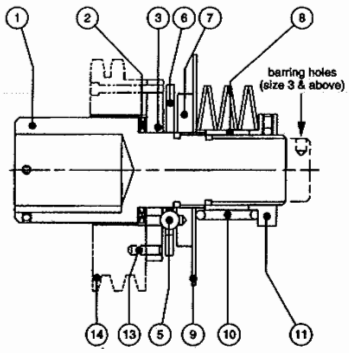


Table 3: "M" Dia. for Fig 4

Size	M Dia.
1	1.250"
2	2.000"
3	2.500"
4	3.500"
5	5.000"
5S	Consult Factory

Table 4: Parts List for Fig. 4 thru 10

No.	Description
1	Hub
2	Needle Bearing
3	Drive Plate
4	Adapter (201 Only)
5	Drive Balls
6	Cage Plate
7	Slide Plate
8	Calibration Spacers
9	Limit Switch Plate
10	Spring (Disc or Coil)
11	Adjusting Nut
12	Locking Ring (Models 203 thru 206)
13	Drive Pins
14	Sprocket or Sheave

Mounting Torque Limiter on Shaft

Models 201, 202 & 209

(See Figs 4, 5 & 6 page 3)

With the torque limiter completely assembled, apply anti-sieze to the hub ID then carefully engage hub (1) on shaft. The standard clearance fit bore in the hub should permit the hub to be pushed or lightly tapped in place on the shaft.

WARNING: DO NOT STRIKE HEAVY HAMMER BLOWS ON THE HUB AS THIS COULD DAMAGE THE TORQUE LIMITER, USE SOFT HAMMER.

The torque limiter may be moved axially on the shaft to some degree to obtain proper alignment of the sprocket or sheave with the chain or belt. The minimum shaft engagement is 1-1/2 times the shaft diameter. Tighten the setscrews fully to the recommended torque values shown in Table 6.

Table 5 - Standard Bore Tolerances

Over-to Incl.	H8 (Inches)
.2362 -.3937	-0/+.0009
.3937-.7087	-0/+.0011
.7087-1.1811	-0/+.0013
1.1811-1.9658	-0/+.0015
1.9685-3.1496	-0/+.0018

Table 6 - Set Screw Torque

Size	#10	1/4"	5/16"	3/8"	7/16"	1/2"
Seating Torque Lb. in.	33	87	165	290	430	620

Models 203*, 204, 205 & 206

(See Figs 7, 8, 9 & 10 below)

Mount the torque limiter hubs on the shafts in the same manner as described for Models 201, 202 & 209 on this page. For coupling units, Models 204, 205 & 206, mount the torque limiter assembly on one of the shafts and the coupling hub (Part 15, 16 or 18) on the other shaft. Bring the shafts together and align the coupling carefully, checking with a dial indicator. For optimum life and performance maintain alignment within the limits shown in Table 7.

Table 7 - Alignment

Model	Size	Allowable Misalignment		Gap between hub and adapter inches	
		Angular Degrees	Parallel Inches	Min.	Max
203*	1-5S	0	0	—	—
204	1-5S	0	0	—	—
205	1-5S	.50	0	—	—
206	1	.09	.005	.08	.16
	2	.09	.007	.08	.16
	3	.10	.009	.08	.16
	4	.10	.011	.08	.25
	5	.10	.017	.12	.31
	5S	.10	.017	.12	.31

* For Model 203, the driven member may be supplied by customer. If used for offset drive, the sheave, gear, etc. must be mounted on its own bearing.

Fig. 7: Model 203

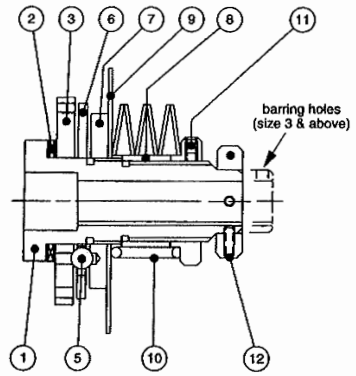


Fig. 8: Model 204

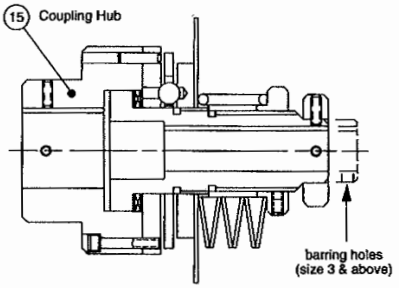


Fig. 9: Model 205

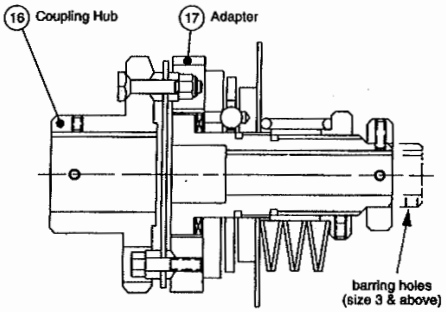
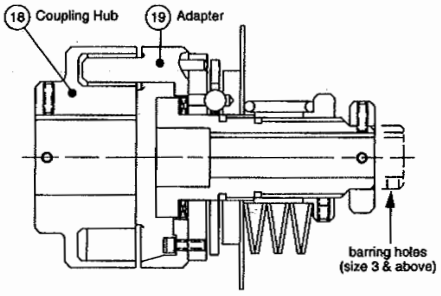


Fig. 10: Model 206



Part numbers not shown in Figs. 8, 9 & 10 are the same as those shown in Fig. 7.

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Table 8: Torque Adjustment & Drive Ball Data

Size	Standard Torque Adjustment Springs					Drive Balls			Torque Range by Type (AC & ACT)				Minimum Allowable Spring Length (Y)	
									AC		ACT			
	Type	Code	Color	Qty	Stack as	Dia. in.	AC	ACT	lb. in.	Nm.	lb. in.	Nm.	in.	mm.
1	Coil	1C/1	White + Red	1	Fig 11	1/4	3	6	60-250	6.8-28	80-250	9.0-28	.95	24.1
	Coil	1C/2	White + Green	1	Fig 11				30-130	3.4-15	40-200	4.5-23	.95	24.1
	Coil	1C/3	White + Yellow	1	Fig 11				5-75	.6-8.5	10-110	1.1-12	.70	17.8
2	Disc	2D/1/S	Blue + Black	6	Fig 13	1/2	3	6	600-2,000	68-226	800-2,000	90-226	1.00	25.4
	Coil	2C/1	Blue + Red	1	Fig 11				400-800	45-90	600-1,200	68-136	1.00	25.4
	Coil	2C/2	Blue + Green	1	Fig 11				150-500	17-56	250-800	28-90	.85	21.6
	Coil	2C/3	Blue + Yellow	1	Fig 11				40-150	4.5-17	60-250	6.8-28	.75	19.1
3	Disc	3D/1/D	Brown + Black	8	Fig 12	1/2	6	6	1,500-6,000	170-678	2,000-6,000	226-678	1.20	30.5
	Disc	3D/1/S	Brown	6	Fig 13				500-3,500	56-395	1,000-4,500	113-508	1.00	25.4
	Coil	3C/1	Brown + Red	1	Fig 11				400-2,500	45-282	600-3,500	68-395	1.50	38.1
	Coil	3C/2	Brown + Green	1	Fig 11				150-1,200	17-136	250-1,700	28-192	1.30	33.0
	Coil	3C/3	Brown + Yellow	1	Fig 11				60-600	6.8-68	100-900	11-102	1.10	27.9
4	Disc	4D/1/S	Orange + Black	5	Fig 14	5/8	6	6	2,500-10,000	282-1,130	3,000-10,000	339-1,130	1.40	35.6
	Disc	4D/2/S	Orange	6	Fig 13				1,500-6,500	169-734	2,000-8,500	226-960	1.40	35.6
	Coil	4C/1	Orange + Red	1	Fig 11				300-4,000	34-452	500-5,000	56-565	1.95	49.5
5	Disc	5D/1/S	Grey + Black	6	Fig 13	3/4	9	11	5,000-22,500	565-2,542	6,000-22,500	678-2,542	2.40	61.0
	Disc	5D/2/S	Grey	6	Fig 13				3,000-18,000	339-2,034	4,000-20,000	452-2,260	2.00	50.8
	Coil	5C/1	Grey + Red	1	Fig 11				500-5,000	56-565	600-6,000	68-678	1.90	48.3
5S	Disc	5SD/1	Natural	5	Fig 14	1	12	16	12,000-50,000	1,356-5,650	12,000-50,000	1,356-5,650	2.00	50.8

* Not associated with maximum torque.

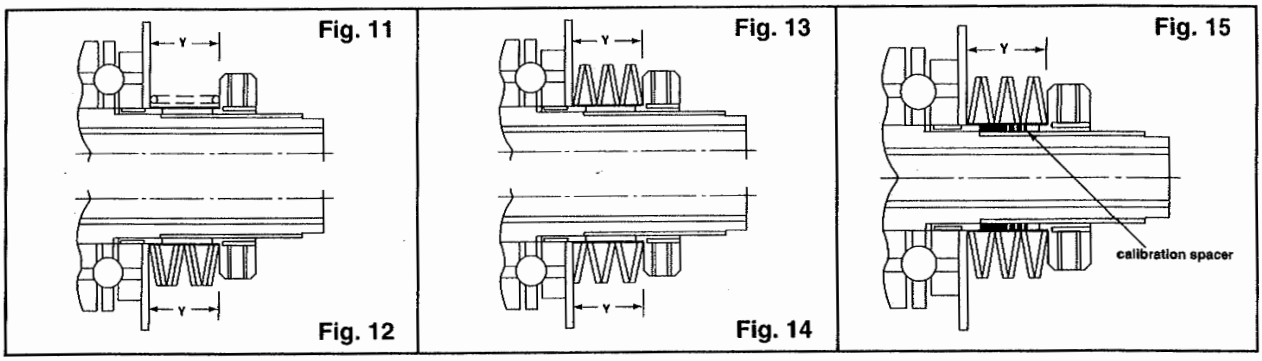


Fig. 11 Fig. 12 Fig. 13 Fig. 14 Fig. 15

Calibration Spacers

The torque limiter is shipped from the factory either (A) with the torque setting pre-adjusted as specified at the time of order, or (B) furnished unset for adjustment at the time of installation.

A. If the torque limiter has been furnished with a factory adjusted torque setting, calibration spacers of the proper total length will be in place on the hub to provide a stop for the adjusting nut at the specified torque setting.

B. If the torque limiter has been furnished for adjustment at the time of installation, a complete stack of calibration spacers of different widths will be in place on the hub. These will provide a stop for the adjusting nut at minimum torque setting. It will be necessary to remove one or more spacers to permit tightening of the adjusting nut to achieve higher torque settings.

In addition to functioning as a stop for torque adjustment, the calibration spacers are also required to properly position the springs (when disc springs are used).

Caution

DO NOT TIGHTEN THE SPRING BEYOND ITS MINIMUM OPERATING LENGTH, *dimension Y, Table 8, (with the torque limiter engaged) or the spring will not allow sufficient movement of the slide plate to let the balls leave their seats during an overload. Damage to the machinery or to the Autogard will result.*

It is important that our product is used in the correct manner and that adjustments and settings in relation to a particular function follow recommended procedures.

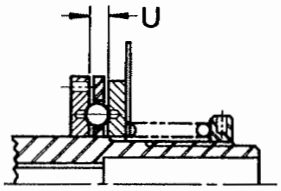
Initial Start-up

Prior to start-up, examine torque limiter to make sure it is fully engaged with the balls seated correctly in both plates. When fully engaged, the dimension between the drive plate and slide plate should be as shown in Table 9.

Table 9

Size	U-in.
1	5/32
2	5/16
3	5/16
4	13/32
5	1/2
5S	11/16

Fig. 16



Obtain initial torque setting by one of the following methods:

A. Torque limiter set at factory

The setting as furnished will be within ±10% of the torque value specified on the order. If the factory adjustment has been altered during assembly procedure, be sure the adjusting nut is tightened against the calibration spacers. (See Fig. 15, page 5). Secure the nut in place with setscrew.

If an increased torque setting is desired, the adjusting nut must first be backed off and calibration spacer(s) removed, then retighten to the desired setting.

B. Torque limiter to be set at job site.

1. Setting by trial adjustments:

Remove spacer(s) if operational torque is higher than the minimum shown in Table 8, page 5. (See description of calibration spacers, page 5.) Start up the drive at minimum torque setting. If the torque limiter disengages before normal operating load level is reached, progressively tighten the adjusting nut until the drive will start and operate without tripping. Starting torque is usually the highest torque that the torque limiter must transmit, but occasionally the torque limiter must be set to accommodate higher peak operating torques. After the desired torque setting has been obtained, secure the adjusting nut with setscrew.

2. Setting to an established specified torque:

A precise setting can be obtained before the unit is installed by means of a bench test (see Fig. 18 for a typical arrangement).

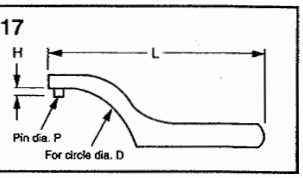
The torque setting may also be checked by using a torque wrench, platform scale, etc. These methods will require modifications to the arrangement shown in Fig. 18

After the desired torque setting is obtained, secure the adjusting nut with setscrew.

Torque Adjustment Wrenches

For unit sizes 1& 2 the torque adjusting nuts are hexagonal and a standard open end wrench may be used. A wrench opening of 1-5/16" is required for size 1 unit and a 2-1/4" for size 2 unit. Sizes 3, 4 & 5 have a circular adjusting nut and require a spanner wrench as shown in Fig. 17.

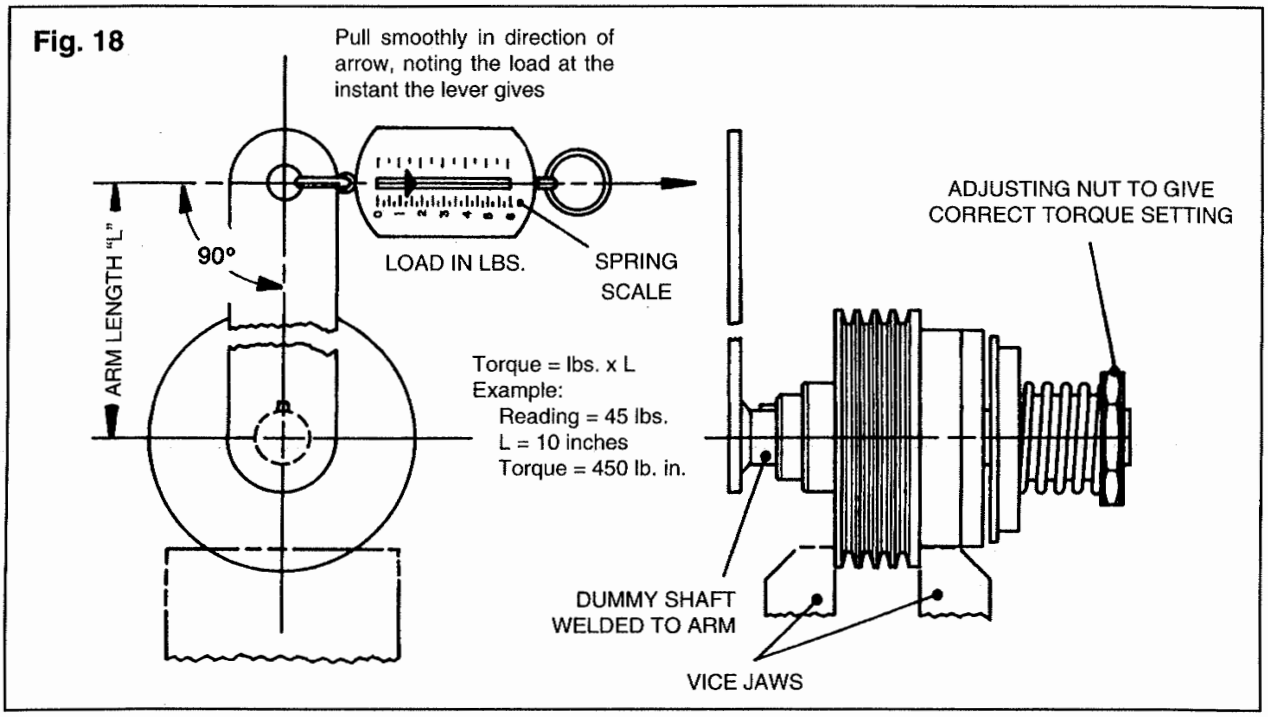
Fig. 17



Autogard T/L Size	Inches D	L	P	H	Armstrong Tool Co. Part #
3	3	8	5/16	9/32	34-225
4	4	10	3/8	11/32	34-237
5	6	14	1/2	9/16	34-243

Bench Test for Torque Setting

Fig. 18



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Resetting Procedure

1. Shut down the drive.
2. Investigate and remove cause of overload or jam.
3. Reset.

   A. "AC" Type

   It is likely that the unit stopped in the engaged state. If it did not, rotation of the drive for a maximum of 240 degrees will reengage the unit. To check for full engagement, see Table 9, page 6.

   B. "ACT" Type

   Rotation of either side of the drive for a maximum of 720 degrees (2 revolutions) will reengage the unit. To check for full engagement, see Table 9, page 6.

Maintenance

The frequency of maintenance will depend on the operating environment and number of trips, but once every 2,000 operating hours should be adequate in most applications. This can best be accomplished by disassembly of the torque limiter as described under DISASSEMBLY PROCEDURE.

Inspect for sprocket wear, tightness of torque limiter on its shaft, etc. at this time.

For unusual conditions such as very high RPM, high ambient temperatures, high vibration, high humidity or dirty environment; more frequent or special maintenance may be required.

Disassembly Procedure

1. Measure and make note of the position of the adjusting nut on the hub before proceeding with disassembly.
2. With the spring end up, loosen setscrew from adjust nut and remove adjust nut, spring, spacers, limit switch plate, slide plate and drive balls.
3. On Model 201, remove sprocket or sheave from adapter.
4. On Models 201 & 204:

   a. Tap drive pins free of drive plate.

   b. Remove capscrews which join drive plate to adapter or to coupling hub.
5. Carefully work drive plate (or drive plate together with sprocket or sheave on Models 202 and 209) over spline so as not to damage bearing material on I.D. of drive plate.
6. On Model 201, slide adapter off hub carefully so as not to damage bearing material on I.D.
7. Clean all parts thoroughly, and inspect the bearing surfaces. Carefully blend out any scratches.
8. Apply a liberal coating of lubricant to the needle bearing, spline surfaces, plate faces and balls. Use a good grade lubricant of specification NLGI No. 2.
9. For reassembly, reverse steps 2 through 6.
10. Tighten adjusting nut to position noted in step 1, and secure with setscrew.

NOTE: If, after the drive has been in operation for some time, and the torque limiter suddenly starts disengaging for no apparent reason; check to see whether something in the drive train or driven machine, such as normal wear, a bad bearing, damaged sprocket, misalignment, change in machine duty, etc. may be the cause of the problem.

A visual inspection of the drive and slide plate is then recommended. Follow disassembly procedure above. Note that although a ball path between the ball seats should normally be visible, excessive wear on the seats themselves may require replacement of the drive plate.

Reassemble and follow INITIAL START-UP procedure on page 6.

Troubleshooting Guide

Problem	Probable Cause	Corrective Action
Autogard will not drive.	Machine jammed.	Carefully inspect machine for signs of jamming, and clear.
	Torque setting too low	Increase torque setting by tightening adjusting nut, removing calibration spacers as necessary. Do not tighten beyond minimum spring length (see Table 8). Use stronger spring or larger size unit if necessary.
Will not rotate freely when disengaged.	Lacks lubrication	Lubricate with grease equivalent to specification NLGI No. 2.
	Scratch on internal bearings	Disassemble and inspect. Carefully blend out any blemishes. Lubricate well upon reassembly.

NOTES

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