Aldon® GATEMASTER

Owner's Manual

4020-05 & 4020-06



ALDON®
Safety on Track Since 1904

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WARNINGS

When using the GATEMASTER Hopper Car Door Opener in damp or corrosive environments, the following routine maintenance is required:

1. Spray daily with some type of rust preventative oil.
2. Weekly open tool and regrease. Take bolt out from under square drive and separate halves from ring gear.
3. Wipe unit with oily rag whenever possible.
4. Make sure selector pawl is always oiled and moves freely.

GATEMASTER l Torque Multiplier Operating Instructions

Important Instructions

1. Read and understand these Operating Instructions before using the torque multiplier.
2. **DO NOT IMPACT THE TORQUE MULTIPLIER.**
3. When using a **Power** drive input, **be sure selector pawl (Fig. 2, Item 3) has been locked in neutral position.**
4. When positioning the torque multiplier, be sure socket attached to the output is positioned so that the reaction anchor (Fig. 1, Item 2) is at right angles to the fastener. REMEMBER: Torque reaction creates a rotational force in the opposite direction from which input force is applied.
5. Since torque reaction equals OUTPUT torque, be sure to select an anchoring point sufficient to withstand the torque reaction force!
6. When using the torque multiplier without a torque wrench, remember that output is 18.5 times greater than input.
7. Use only Aldon approved output square drives and replacement parts.

Descriptions & Specifications

1. Model (Fig. 1) uses a planetary geared action to tighten and loosen nuts, bolts and cap screws with a continuous 360° rotation in either clockwise or counter-clockwise direction. Input and output rotation direction are the same. (EXAMPLE: Input clockwise, output clockwise.) An internal, two-directional anti-backlash device holds torque in both directions, clockwise or counter-clockwise. **NOTE:** This is not a ratchet input, but an anti-backlash device. Firm hand control must be maintained on input wrench when applying or releasing input torque.
2. The Torque Multiplier is equipped with an Angle-of-Turn Protractor (Fig. 3, Item 2) that measures output in degree-of-turn if torquing specifications so require.
3. A Controlled-Shear Output Square Drive (Fig. 3, Item 3) protects internal components in the event maximum output capacity is exceeded. This overload-protection feature causes the drive to fracture when output exceeds from 3% to 10% of rated output capacity. One replacement drive is included with the Torque Multiplier. Additional replacements (Part No. 393-70) can be ordered from your distributor.
4. The Selector Pawl (Fig. 2, Item 3) controls rotational direction for manually-applied input. It can also be set in a neutral position for power drive output.

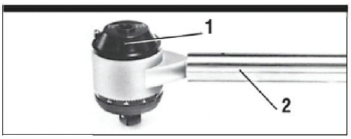


Figure 1.

1. GateMaster I Torque Multiplier
2. Reaction Anchor (secured in position over Anchor Stub)

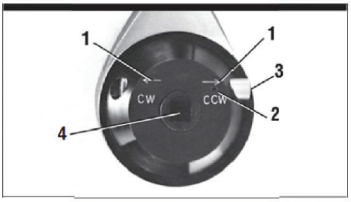


Figure 2. Input End Detail

1. Rotational Direction Indicators
2. Neutral Positioning Set Screw
3. Selector Pawl
4. 1/2" Female Input Socket

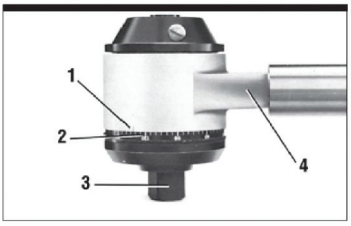


Figure 3. Angle-of-Turn Protractor Detail

1. Index Line
2. Rotating Protractor Scale
3. Controlled-Shear Output Square Drive Assembly
4. Anchor Stub

5. Specifications

Rated Input Capacity: 173 lbf-ft. (234 N-m)
Rated Output Capacity: 3,200 lbf-ft. (4338 N-m)
Unit Size: (l) 19-5/8" (508mm) x (W) 4-1/16" (102mm) x (H) 6-3/8" (162mm)
Type Anchoring: Tube-type reaction anchor.
Type of Action: 360° continuous rotation in either direction.
Input Drive: 1/2" (13mm) sq. F.
Output Drive: 1" (25mm) sq. M.
Gear Ratio: 20.25:1
Accuracy: ±5%
Torque Ratio: 18.5:1
Weight: 18 lbs. (8.16kg)

6. Torque Conversions

POUND FOOT		NEWTON METRE	
INPUT	**OUTPUT**	**INPUT**	**OUTPUT**
22	400	22	400
32	600	38	700
43	800	54	1000
54	1000	70	1300
65	1200	86	1600
76	1400	97	1800
86	1600	108	2000
97	1800	119	2200
108	2000	135	2500
119	2200	151	2800
130	2400	168	3100
141	2600	184	3400
151	2800	200	3700
162	3000	216	4000
173	3200	232	4300

Installation & Operation

1. Depress the detent pin on the Anchor Stub (Fig. 3, Item 4) and slide Reaction Anchor end over Stub until detent pin snaps into locking hole in Reaction Anchor. Test to be sure Anchor is securely locked to Stub. NOTE: The Anchor Stub may be used alone as a suitable anchor in confining areas.
2. **For manually applied input:** Set the desired input/output rotational direction by pushing the Selector Pawl in the direction indicated by the letters and directional arrows (Fig. 2, Item 1) stamped on the input end case. EXAMPLE: If counter-clockwise rotation is desired, push Pawl to end of travel in the direction shown by the "CCW" arrow. For clockwise rotation, push Pawl in the opposite direction. See reminder on page 1.
3. **For Power Drive Input:** Lock Selector Pawl in the "neutral" position by centering Pawl between the CW/CCW range of travel and tightening set screw (Fig. 2, Item 2). When properly positioned, screw will be seated in a groove on Selector Pawl, and Pawl cannot be moved in either direction. NOTE: Be sure Power Drive is set to deliver no more than 173 ft./lb.
4. Mount a proper size 1" square female drive socket onto the Torque Multiplier Output Square Drive (Fig. 3, Item 3), then position Socket and Multiplier on the fastener to be tightened. Remember: When socket is positioned on fastener, Reaction Anchor must be at right angles to the fastener to which torque is being applied.

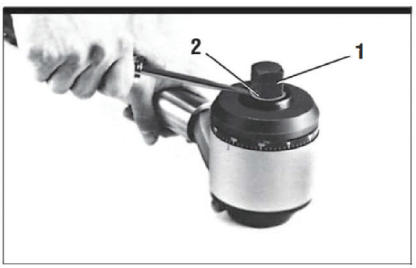


Figure 4. Replacing Output Square Drive Fitting

1. Controlled-Shear Output Square Drive Assembly
2. Retaining Ring

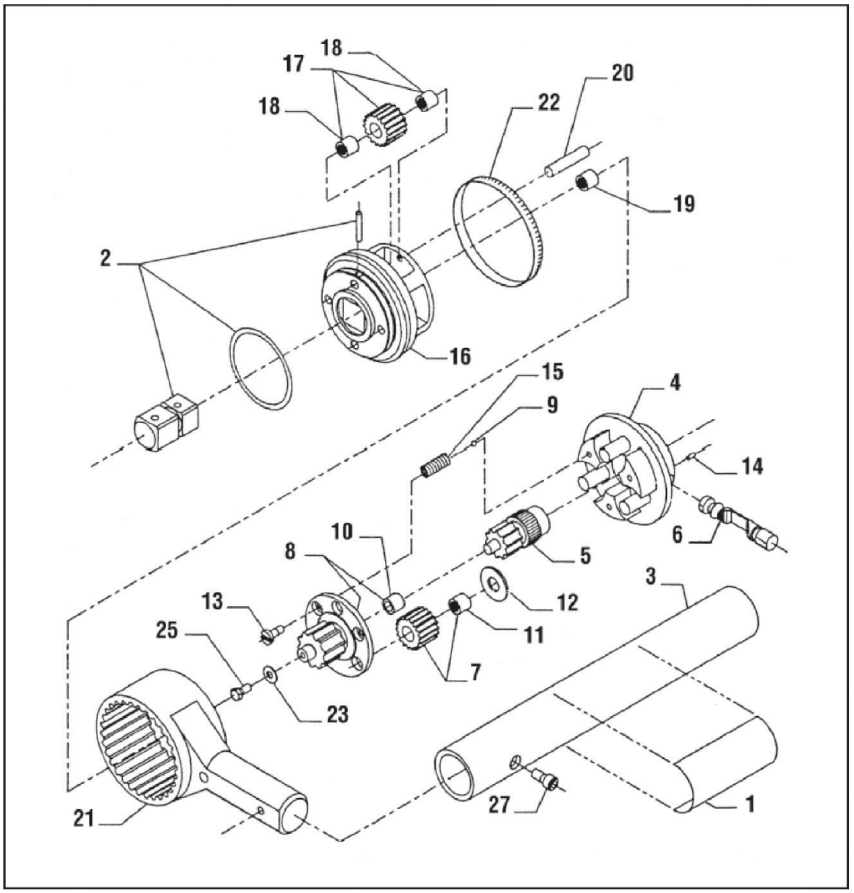
5. Butt the Reaction Anchor securely against a suitable object to absorb torque reaction when input load is applied. (See 5 on page 2.)

6. **To Tighten Manually With Torque Wrench:** Refer to Torque Data Plate on Reaction Anchor or Torque Conversions chart (Page 4) to determine proper input for desired output (REMEMBER: Controlled-Shear Output Square Drive will fracture if output exceeds rated output capacity by between 3% and 10%.) Apply torque with torque wrench until desired input torque is achieved.
7. **To Remove Multiplier From Fastener:** Apply enough input torque to release internal anti-backlash device (see note), then push Selector Pawl into opposite position (EXAMPLE: Pawl in CW position for tightening, push Pawl in CCW position for release) and **slowly** relax input torque because recoil (wind up) will be experienced.
8. **To Tighten Manually To Pre-calculated Angle-of-turn Output Specifications:** Use torque wrench to apply pre-load torque as specified by manufacturer hand-tightening is **not sufficient.** Then manually rotate Angle-of-Turn Protractor (Fig. 3, Item 2) until "0" on scale aligns with index line (Fig. 3, Item 1) scribed on case. As input is applied, protractor scale begins to rotate. Continue tightening until desired angle-of-turn reading aligns with index line.
9. **To Loosen:** Follow same procedures as for tightening except set Selector Pawl in opposite position. (EXAMPLE: If fastener requires clockwise clockwise tightening rotation, set Pawl in counter-clockwise position for loosening.) Use work handle**–not torque wrench–**to loosen fastener. **If loosening with a power drive input,** be sure Selector Pawl is locked in neutral position.

How to Replace a Broken Square Drive Shaft Assembly

1. Remove square drive assembly by inserting prying tool behind tab on Retaining Ring (Fig. 4, Item 2), pry up **carefully** and lift Assembly out of Carrier.
2. Insert replacement Square Drive Assembly into Carrier. Compress Ring so it snaps into groove to lock Square Drive Assembly in place.

Parts List Diagram



Parts List

Fig. & Item	Part No.	Description	Qty.
	393B	TORQUE MULTIPLIER	1
1	393-204	• PLATE, NAME/DATA	1
	3933	• MULTIPLIER, BASIC TORQUE	1
2	393-700	• KIT, SQUARE DRIVE (INCLUDING PIN AND "O" RING)	1
3	393-610	• ANCHOR, REACTION	1
	393-110	•• ASSEMBLY, INPUT GEAR	1
4	392-11	••• ASSEMBLY, INPUT END	1
5	392-13	••• GEAR, INPUT	1
6	392-14	••• PAWL, SELECTOR	1
7	393-18	••• ASSEMBLY, INPUT PLANET W/BEARING	3
8	393-17	••• ASSEMBLY, SECONDARY PINION W/BEARING	1
9	900001	••• BALL, 7/32	1
10	904057	••• BEARING	1
11	904113	••• BEARING	3
12	906052	••• RACE, THRUST	3
13	A000151461001	••• SCREW, B.H. CAP	3
14	A000155798001	••• SCREW, NYLON CUP SET	1
15	950019	••• SPRING	1
	393-220	•• ASSEMBLY, OUTPUT GEAR	1
16	393-211	••• CAGE, GEAR	1
17	393-25	••• ASSEMBLY, OUTPUT PLANET W/BEARINGS	4
18	904113	••• BEARING	8
19	910204	••• BUSHING	1
20	W000141076001	••• PIN, DOWEL	4
21	393-300	•• GEAR, RING	1
22	392-50	•• ASSEMBLY, PROTRACTOR	1
23	392-63	•• SPACER	1
24	913007	• KEY, HEX (NOT SHOWN FOR ITEM #27)	1
25	A000153001003	•• SCREW, B.H. CAP	1
26	913001	•• KEY, HEX (NOT SHOWN FOR ITEM #13)	1

Reminders

– Read and understand all Operating Instructions before using the Torque Converter.

– Check connection between Torque Converter and Torque Multiplier and tighten, if necessary, prior to each use.

– Keep hands clear of all moving parts.

– Maintain firm hand control of torque wrench or input work handle during during entire torquing operation, because torque wind-up could cause torque wrench or input work handle to spin in the reverse direction. **Never** let go of the handle when wrench is under tension. Ease up slowly to release the tension.

Important Instructions

Safe Use

1. Remember that the total torque ratio equals the resultant of the two ratios Torque Multiplier torque ratio times Torque Converter torque ratio).
2. When using a power driven input, be sure Torque Multiplier Selector Pawl (if furnished) has been locked in the neutral position **before** attaching the Torque Converter.
3. Use only Aldon approved replacement parts.

Description & Specifcations

1. The GateMaster II uses planetary gearing to reduce the input torque required to drive any Aldon 390 or 490 Series Torque Multiplier. It is capable of continuous 360 degree rotation in either clockwise or counterclockwise direction. Direction of input and output rotation are the same.

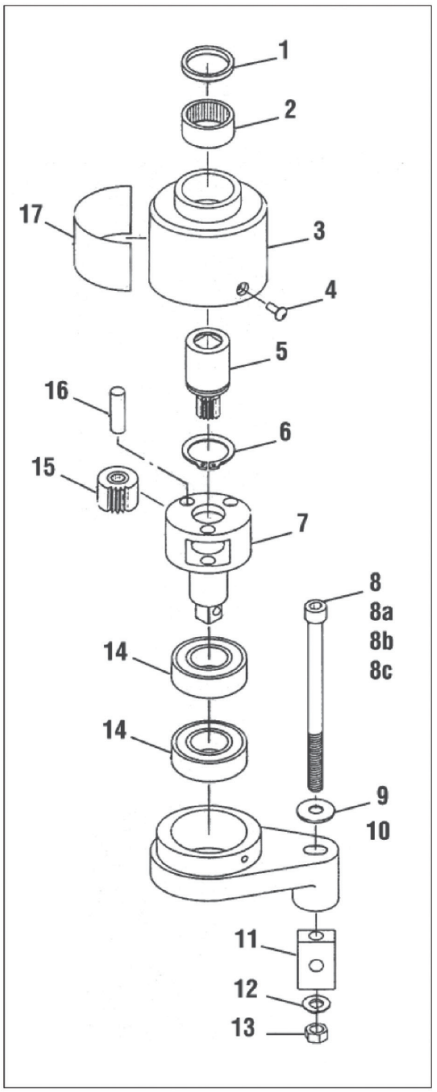
2. Specifications

Maximum Input Torque: 38.5 lbf-ft (52 N-M)
Maximum Output Torque: 200 lbf-ft (270 N-M)
Torque Ratio: 1 : 5.2
Gear Ratio: 1 : 5.43
Input Drive: 1/2" Sq. F. (13mm)
Output Drive: 1/2" Sq. M. (13mm)
Weight: 6 Pounds
Height: (H) 3-1/4 in.
Diameter: (D) 3 in.
Rotation: CW & CCW 360°

3. Torque Conversions

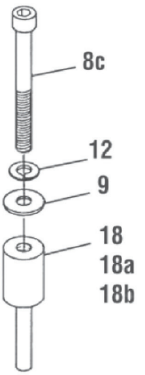
POUND FOOT		NEWTON METRE	
INPUT	**OUTPUT**	**INPUT**	**OUTPUT**
4.8	25	11.5	60
9.6	50	17.3	90
14.4	75	23.1	120
19.2	100	28.8	150
24.0	125	34.6	180
28.8	150	40.3	210
33.6	175	46.1	240
38.5	200	51.9	270

Parts List Diagram



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	942047	SEAL	1
2	904046	BEARING, ROLLER	1
3	3990-10	HOUSING	1
4	916166	SCREW, B.H. SOC. CAP	3
5	18931-15	GEAR, INPUT SUN	1
6	948037	RING, RETAINING	1
7	3900-681	DRIVE, OUTPUT	1
8	916169	SCREW, S.H. CAP (4 1/2)	1
8a	916107	SCREW, S.H. CAP (3 1/4)	1
8b	916126	SCREW, S.H. CAP (3)	1
8c	916059	SCREW, S.H. CAP (2)	1
9	956038	WASHER, FLAT	1
10	3900-657	CAP, REACTION	1
11	3900-651	STUB, BRACKET	1
12	956035	WASHER, LOCK	1
13	932038	NUT, HEX	1
14	902063	BEARING, BALL	2
15	3900-111	ASSEMBLY, OUTPUT GEAR	3
16	920037	PIN, DOWEL	3
17	3990-200	PLATE, DATA/NAME	1
18	3990-42	PIN, REACTION	1
18a	3990-41	PIN, REACTION	1
18b	3990-40	PIN, REACTION	1

Quick Mount Anchor



Reminders

– To reduce the possibility of torque release, the neutral positioning set screw (Fig. 2, Item 2) must be flush with the top of the Input Cap whenever the Torque Multiplier is operated MANUALLY. ALSO, you must maintain firm hand control of Torque Wrench or Input Handle since recoil (windup) will be experienced. Never let go of the handle when wrench is under tension. Ease up slowly to release the tension.

– Inspect output square drive (Fig. 3, Item 3) for visible sign of fatigue or fracture prior to EACH use. Replace if necessary (see Figure 4). Failure of the output square drive could result in an immediate torque release, causing torque multiplier to fall from the fastener and result in personal injury.

– Do not hold multiplier (Fig. 1, Item 1) or reaction handle (Fig. 1, Item 2) while applying torque since normal multiplier deflection might cause fingers to be pinched; especially in confined locations.

– Maintain firm hand control of torque wrench or input handle when when releasing multiplier, since recoil (wind up) will be experienced.

– When using the Gatemaster Hopper Car Door Opener in damp or corrosive environments, the following routine maintenance is required:

1. Spray daily with some type of rust preventative oil.
2. Weekly open tool and regrease. Take bolt out from under square drive and separate halves from ring gear.
3. Wipe unit with oily rag whenever possible.
4. Make sure selector pawl is always oiled and moves freely.

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