

Parts Manual
PL12EN-48EA
08/06/2015

OMEGA TECHNOLOGIES

Cleco®

48EA Series
Electronically Controlled Right Angle Nutrunner



For additional product information visit our website at:
<https://dotcotool.com/product-category/cleco-tools/cleco-corded-electric-nutrunners-cleco-air-tools/cleco-48-series-transducer-control-right-angle-corded-electric-nutrunners/>

Cleco®
Model Nomenclature

PL12EN-48EA
08/06/2015

“A”

	48	E	A	X	XXX	XXX	X
<u>Tool Series</u>							
48							
<u>Motor Style</u>							
E = Brushless Electric Motor							
<u>Tool Type</u>							
A = Right Angle							
<u>Feature</u>							
- = Matrix Tool Connector (Standard)							
E = Air LB Connector							
<u>Maximum Torque Nm (rounded to nearest Nm)</u>							
15 = 15 Nm							
28 = 28 Nm							
41 = 41 Nm							
58 = 58 Nm							
90 = 87 Nm							
105 = 104 Nm							
135 = 133 Nm							
175 = 176 Nm							
230 = 230 Nm							
<u>Attachment</u>							
AL3 = 3/8" Square Drive - Right Angle							
AM3 = 3/8" Square Drive - Right Angle							
AM4 = 1/2" Square Drive - Right Angle							
AH4 = 1/2" Square Drive - Right Angle							
MH4 = 1/2" Square Drive - Right Angle							
AX6 = 3/4" Square Drive - Right Angle							
<u>Spindle Type</u>							
- = Pin Retainer (Standard)							
B = Ball Retainer							

48EA Series Technical Data

48EA Series Specifications - Matrix Tool Connector

Model Number	Tool Range				Max. Speed (rpm)	Length		Weight		Head Height		Side to Center		Ouput Drive Size
	Max Tq		Min Tq			in	mm	lbs	kg	in	mm	in	mm	
	ft-lb	Nm	ft-lb	Nm										
48EA15AL3(B)	11.1	15	2.2	3.0	2855	15.7	398	3.8	1.7	1.6	41	0.59	15	3/8"
48EA28AL3(B)	20.7	28	4.4	6.0	1300	16.2	410	4.1	1.9	1.6	41	0.59	15	3/8"
48EA41AM3(B)	30.2	41	6.6	9.0	1090	17.3	440	4.3	2.0	1.9	48	0.75	19	3/8"
48EA58AM3(B)	42.8	58	8.9	12	770	17.3	440	4.3	2.0	1.9	48	0.75	19	3/8"
48EA58AM4(B)	42.8	58	8.9	12	770	17.3	440	4.3	2.0	1.9	48	0.75	19	1/2"
48EA90AH4(B)	64.2	87	13.3	18	515	18.5	470	6.6	3.0	2.3	58	0.81	21	1/2"
48EA105AH4(B)	76.7	104	15.5	21	340	18.5	470	6.6	3.0	2.3	58	0.81	21	1.2"
48EA135MH4(B)	98.1	133	19.9	27	265	19.1	485	7.3	3.3	2.4	61	0.94	24	1/2"
48EA175AX6(B)	129.8	176	26.6	36	190	21.6	549	10.2	4.6	2.7	69	1.06	27	3/4"
48EA230AX6(B)	169.6	230	33.9	46	145	21.6	549	10.2	4.6	2.7	69	1.06	27	3/4"

48EA Series Tool Memory Parameters - Matrix Tool Connector

Model Number	Max Speed [RPM]	Max Torque [Nm]	Torque Cal [Nm]	Transducer Type	Angle Cal [PPD]	Static Current Factor [Nm/A]
48EA15AL3(B)	2855	15	17.9794	542846-12	29.8662	0.6929
48EA28AL3(B)	1300	28	42.8072	542846-31	65.6023	1.4458
48EA41AM3(B)	1090	41	50.9609	542846-31	78.0980	1.7212
48EA58AM3(B)	770	58	77.2838	542846-48	110.2015	2.4287
48EA58AM4(B)	770	58	77.2838	542846-48	110.2015	2.4287
48EA90AH4(B)	515	87	158.3540	542846-100	165.6771	3.6514
48EA105AH4(B)	340	104	156.6510	542846-100	248.0254	5.4662
48EA135MH4(B)	265	133	199.7300	542846-100	316.2324	6.9694
48EA175AX6(B)	190	176	231.2227	542846-40	441.5931	9.2456
48EA230AX6(B)	145	230	228.7037	542846-40	575.9910	12.0595

Cleco®
48EAE Series Technical Data

PL12EN-48EA
08/06/2015

48EAE Series Specifications - Air LB Tool Connector

Model Number	Tool Range				Max. Speed (rpm)	Length		Weight		Head Height		Side to Center		Ouput Drive Size
	Max Tq		Min Tq			in	mm	lbs	kg	in	mm	in	mm	
	ft-lb	Nm	ft-lb	Nm										
48EAE15AL3(B)	11.1	15	2.2	3.0	2855	15.7	398	3.8	1.7	1.6	41	0.59	15	3/8"
48EAE28AL3(B)	20.7	28	4.4	6.0	1300	16.2	410	4.1	1.9	1.6	41	0.59	15	3/8"
48EAE41AM3(B)	30.2	41	6.6	9.0	1090	17.3	440	4.3	2.0	1.9	48	0.75	19	3/8"
48EAE58AM3(B)	42.8	58	8.9	12	770	17.3	440	4.3	2.0	1.9	48	0.75	19	3/8"
48EAE58AM4(B)	42.8	58	8.9	12	770	17.3	440	4.3	2.0	1.9	48	0.75	19	1/2"
48EAE90AH4(B)	64.2	87	13.3	18	515	18.5	470	6.6	3.0	2.3	58	0.81	21	1/2"
48EAE105AH4(B)	76.7	104	15.5	21	340	18.5	470	6.6	3.0	2.3	58	0.81	21	1.2"
48EAE135MH4(B)	98.1	133	19.9	27	265	19.1	485	7.3	3.3	2.4	61	0.94	24	1/2"
48EAE175AX6(B)	129.8	176	26.6	36	190	21.6	549	10.2	4.6	2.7	69	1.06	27	3/4"
48EAE230AX6(B)	169.6	230	33.9	46	145	21.6	549	10.2	4.6	2.7	69	1.06	27	3/4"

48EAE Series Tool Memory Parameters - Air LB Tool Connector

Model Number	Max Speed [RPM]	Max Torque [Nm]	Torque Cal [Nm]	Transducer Type	Angle Cal [PPD]	Static Current Factor [Nm/A]
48EAE15AL3(B)	2855	15	17.9794	542846-12	29.8662	0.6929
48EAE28AL3(B)	1300	28	42.8072	542846-31	65.6023	1.4458
48EAE41AM3(B)	1090	41	50.9609	542846-31	78.0980	1.7212
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48EAE58AM4(B)	770	58	77.2838	542846-48	110.2015	2.4287
48EAE90AH4(B)	515	87	158.3540	542846-100	165.6771	3.6514
48EAE105AH4(B)	340	104	156.6510	542846-100	248.0254	5.4662
48EAE135MH4(B)	265	133	199.7300	542846-100	316.2324	6.9694
48EAE175AX6(B)	190	176	231.2227	542846-40	441.5931	9.2456
48EAE230AX6(B)	145	230	228.7037	542846-40	575.9910	12.0595

The original language of this manual is English.

Product Safety Information:

Intended Use:

These DC electric tools are intended for tightening of threaded joints or running down fasteners. Use only for their designated purpose. Do not use in any improper manner that could cause damage to the tool or injure the operator.

For additional product safety information refer to Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG document CE-2002, General Safety Instructions Electric Assembly Tools.



These DC electric assembly tools must not be modified in any manner unless approved in writing by Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG. All safety devices must be properly installed and maintained in good working order. Abuse, misuse, or failure to obey this and any other issued warnings may result in injury or death.

EC Declaration of Conformity:

We affirm that the product specified herein is to be considered a machine in conjunction with a fastening control from Apex Tool Group. We further declare that this machine is in accordance with the following EC Regulations, 2006/42/EC and 2004/108/EC. Applied harmonized standards are ISO 12100:2010.

The name, job function and address of the person authorized to compile the technical file.

Mr. Vishnu Irigireddy
Director of Global R&D- Mechanical Engineering
Apex Tool Group
670 Industrial Drive
Lexington, SC 29072

I. V. Vishnu Varadhan

Signature: Vishnu Irigireddy
Date: March 24, 2015

Noise and Vibration:

48EA Series: Noise Level ≤ 68 dB(A)
48EAE Series: Noise Level ≤ 68 dB(A)

48EA Series: Vibration < 2.5 m/s²
48EAE Series: Vibration < 2.5 m/s²

Service and Repair:

Tool service and repair should be performed by an authorized Apex Tool Group, LLC or Apex Tool Group GmbH & Co. OHG Center. Refer to the last page of this manual for locations.

Disposal:



Observe local disposal guidelines for all components of this tool and its packaging.

Copyright Protection:

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Gearing and angle head grease:

For proper function and long service life, use of the correct grease is essential.

Part No.	Packaged	Designation
544076	2 oz. (0.06 kg)	Molytex EP2
544077	16 oz. (0.45 kg)	Molytex EP2
540395	2 oz. (0.06 kg)	Magnalube-G
513156	16 oz. (0.45 kg)	Magnalube-G
541444	2 oz. (0.06 kg)	Rheolube 363AX-1
541445	16 oz. (0.45 kg)	Rheolube 363AX-1

“B”

TME-200 Series
Controller



m-Pro-400 Series
Controller



Tool In/Out Tool Cable

Complete Tool Order Number	Angle Attachment Order Number
48EA(E)15AL3	301676
48EA(E)15AL3B	301677
48EA(E)28AL3	301674
48EA(E)28AL3B	301675
48EA(E)41AM3	301670
48EA(E)41AM3B	301671
48EA(E)58AM3	301670
48EA(E)58AM3B	301671
48EA(E)58AM4	301672
48EA(E)58AM4B	301673
48EA(E)90AH4	301824
48EA(E)90AH4B	301827
48EA(E)105AH4	301824
48EA(E)105AH4B	301827
48EA(E)135MH4	301825
48EA(E)135MH4B	301835PT
48EA(E)175AX6	301839
48EA(E)175AX6B	301840
48EA(E)230AX6	301839
48EA(E)230AX6B	301840



m-Pro-400GC
Global Controller



m-Pro-400-IT
Isolation Transformer
(48EA Models)



Tool Cable

Tool Cable

48EAE Models



TME and m-Pro-400 Series Controllers

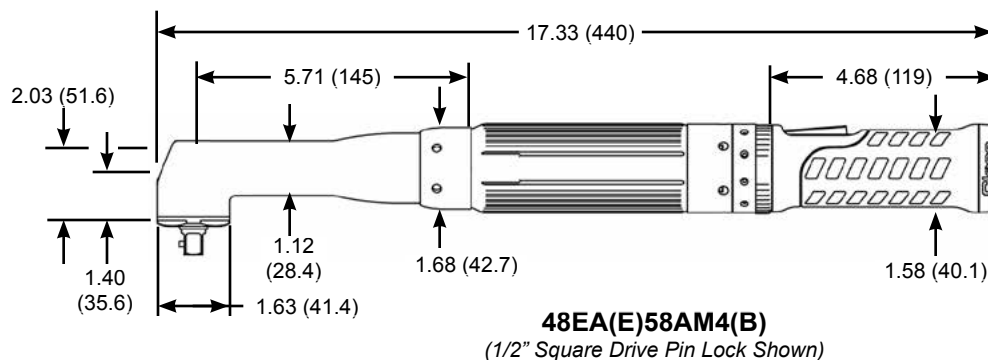
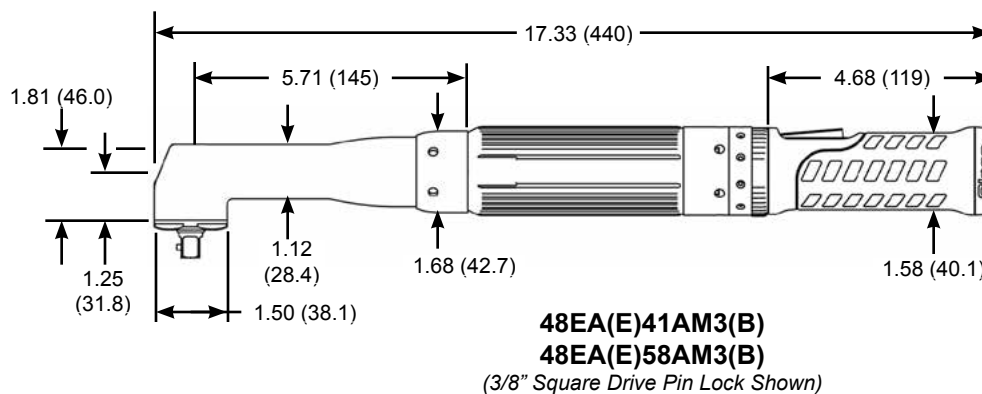
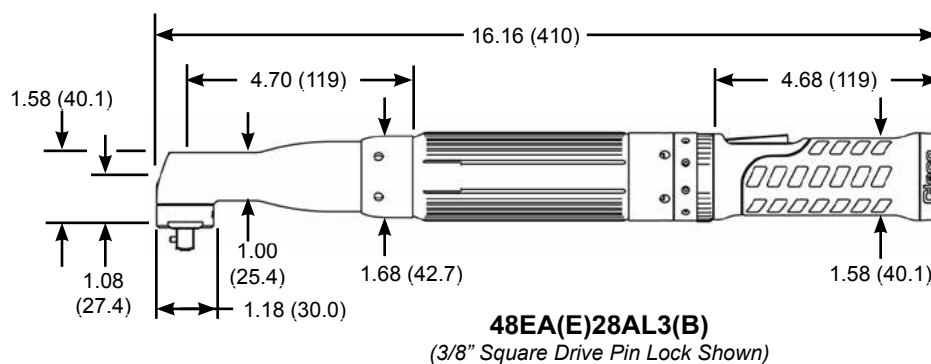
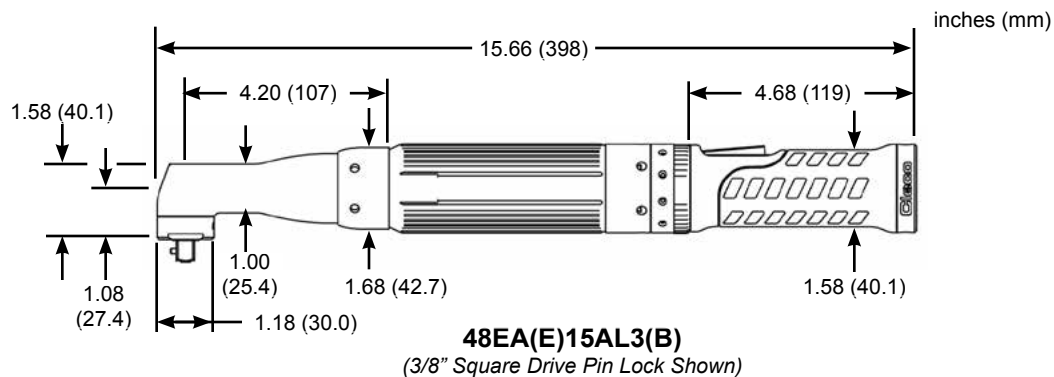
48EA	48EAE	EN Description
115 VAC	Standard	TMEI-114-15-U
115 VAC	DeviceNet	TMEI-114-15-U-ED
115 VAC	ProfiBus	TMEI-114-15-U-EP
TME-200	m-Pro-400	Controller
PL12()-1300	*	Programming Notes
575708	*	Battery
541683-01	*	Power Cord: 115VAC - USA
541683-02	*	Power Cord: 230VAC - USA
541683-03	*	Power Cord: 230VAC - Europe
542779-XXX	301877-XXX	Extension Cable
544056-XXX	301904-XXX	Swivel Cable
544055-XXX	301903-XXX	Swivel Cable - Right Angle
542778-XXX	301866-XXX	Tool Cable

* Note: Contact Apex Tool Group

TME-200 Series Controller

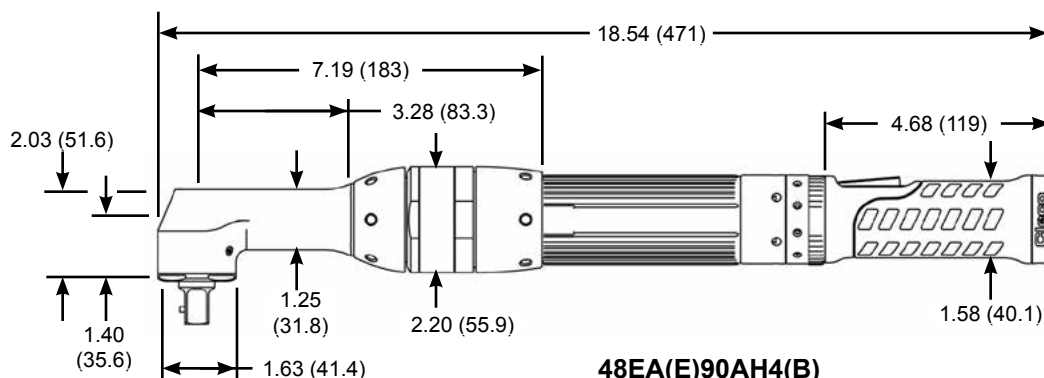
Supply Voltage	EN Order Number
115 VAC	TME-211-15-U
115 VAC	TME-221-15-U
230 VAC	TME-211-30-U
230 VAC	TME-221-30-U

“C1”

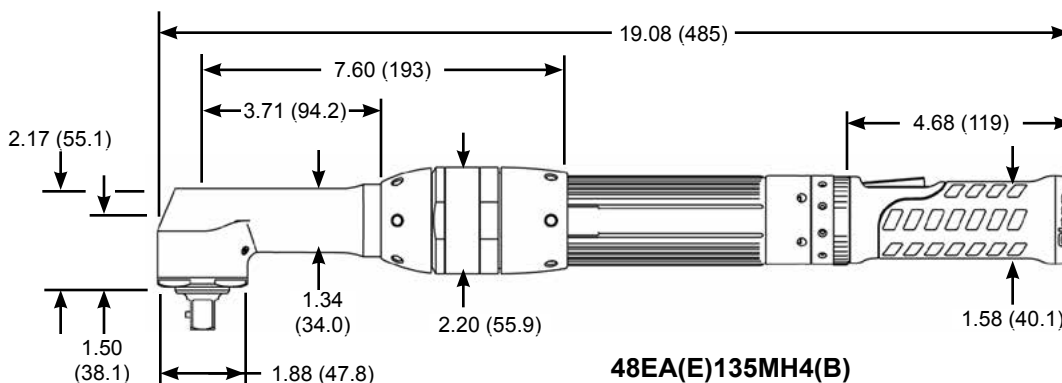


“C2”

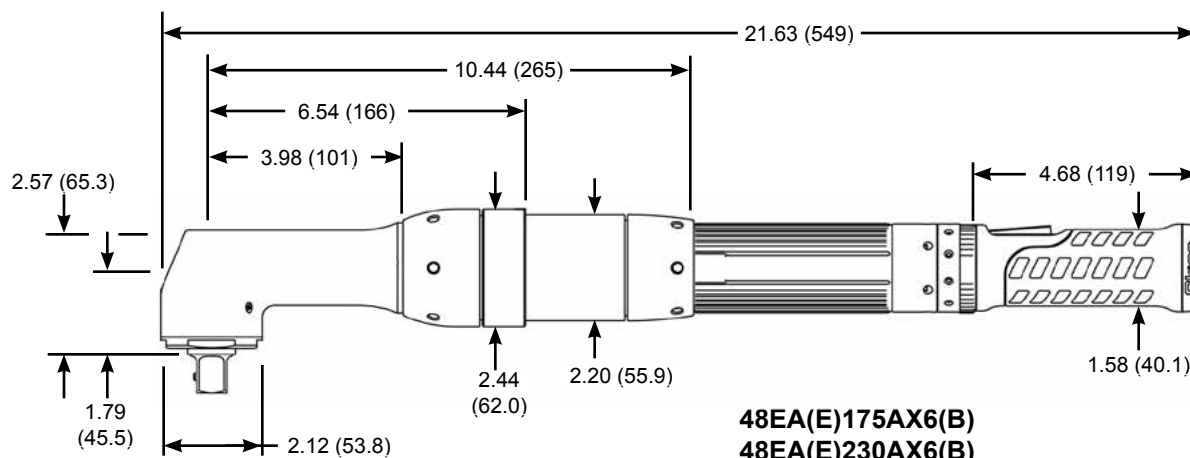
inches (mm)



48EA(E)90AH4(B)
48EA(E)105AH4(B)
(1/2" Square Drive Pin Lock Shown)



48EA(E)135MH4(B)
(1/2" Square Drive Pin Lock Shown)



48EA(E)175AX6(B)
48EA(E)230AX6(B)
(3/4" Square Drive Pin Lock Shown)

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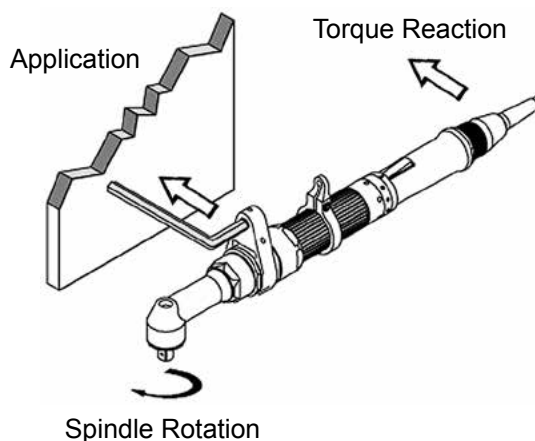
Troubleshooting

Malfunction	Possible causes	Remedy
Tool does not start	Start switch faulty	→ Replace start switch
	No speed (RPM) programmed	→ Program a speed for all active stages
	Controller is waiting for a Tool Enable	→ Make the Tool Enable connection or disable Tool Enable if not required
	Faulty cable	→ Replace or repair cable
	Bent pins in cable or tool	→ Straighten pins or replace faulty connector
Tool runs forward but not Reverse	No speed programmed for Reverse	→ Enter a speed (RPM) for Reverse
	Faulty reverse switch	→ Replace Start/Reverse switch assembly
	Faulty cable	→ Replace or repair cable
	Bent pins in cable or tool	→ Straighten pins or replace faulty connector
Tool shuts off at desired torque but reports no angle	Angle Threshold value is set to high	→ Correct fastening strategy programming to include a low Angle threshold value
Tool shuts off prematurely	Operator is releasing the start switch before the controller stops the tool	→ Verify that the operator is keeping the start switch depressed through the entire rundown
	Rundown time exceeds the default time value of 10 seconds	→ Increase the rundown timer to exceed the rundown time required
	Tool has reached Angle High Limit before reaching the Torque target	→ Check the fastening strategy programming to verify that the Torque target and Angle High Limit are correct. If the parameters are correct, see if something has changed in the assembly that would cause an incorrect torque/angle relationship.
Tool won't change speeds	Speeds are the same in all applicable stages	→ Verify that all speeds and shift points are correct in the stages that are being used.
All the lights on the tool begin flashing when the reverse collar/switch is put in reverse	This is a normal function as set by the default parameters. If the lights are not flashing when the tool is in reverse the "Blinking Lights in Reverse" check box is not selected.	→ Check selections in the ADVANCED menu, Tool Settings tab.
Warning message in the RUN screen reports "Transducer Offset Error"	The tool transducer is not returning to a zero torque condition	→ Transducer has been over-stressed and needs replacement
	Faulty wiring in tool or cable	→ Check tool with different cable to see if the condition remains. Transducer offset and full scale voltages can be seen in the DIAGNOSTICS menu.
"Tool Not Connected" message appears in the RUN screen	Tool has not been accepted in the TOOL SETUP screen	→ Verify that the tool has been accepted in the TOOL SETUP screen. Before accepting the tool, the message "Needs User Acceptance" should appear in the tool overview screen. Verify that the correct tool is highlighted when going to Tool Settings to accept the tool.
	Faulty cable is preventing the tool from being "seen" by the controller	→ Replace or repair cable
Torque reported by the controller doesn't match the torque reported by an external transducer	Torque calibration factor in Tool Settings in the TOOL SETUP menu needs to be adjusted	→ Adjust torque calibration factor using the formula below: New Cal Factor = (External Reading/Tool Reading) x Existing Torque Calibration Factor
	Custom head has been added to the tool and the tool needs updated tool memory information	→ Tool memory must be programmed to accommodate new attachment
Tool cable will not fit in tool handle	Wrong cable. Tools used with Global Controller utilize an Air-Ib connector, which has a smaller ID housing in the tool than previous Matrix style connector housings.	→ Utilize the correct cable for the tool being used.

Operation:



A reaction bar and bracket must always be used in high torque applications above 50 ft.-lbs. (68 Nm) or in close quarter areas where entrapment and injury to hands or fingers could occur.



Maintenance:

Only qualified and trained personnel are to perform maintenance on these tools.

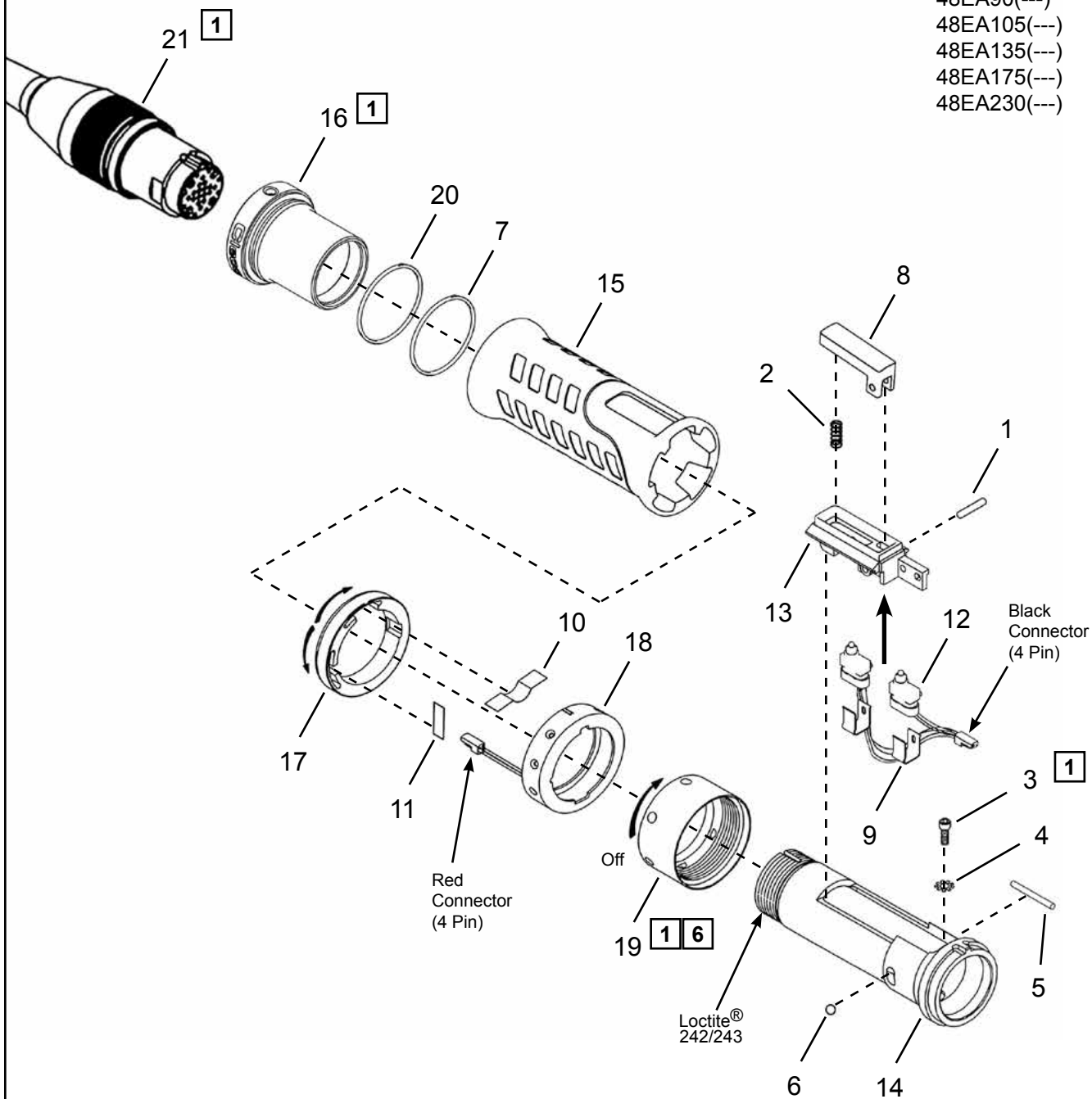
Regular maintenance reduces operating faults, repair costs and downtime. In addition to the following service schedule, implement a safety related maintenance program that takes the local regulations for repair and maintenance for all operating phases of the tool into account.

Maintenance Interval	Rundowns	Designation
Daily	Daily	→ Visual inspection of all cables and connections → Visual inspection of the 48EA tool → Check the tool for excessive vibration or unusual noises → Visual inspection of all external components of the tool
Approximately	100,000	→ Inspect the tool cable for damage or wear → inspect the square drive output spindle for damage or wear → Inspect the tool cable connection for a secure fit → Check the maximum free speed
Approximately	500,000	→ Visual inspection of disassembled 48EA tool → Check individual parts for wear or damage and replace if necessary → Clean and lubricate angle head, gearing and motor bearings → Check and recalibrate transducer (48EA models)
Approximately	1,000,000	→ Visual inspection of disassembled 48EA tool → Check individual parts for wear or damage and replace if necessary → Clean and lubricate angle head, gearing and motor bearings → Check and recalibrate transducer (48EA models)

“D1”

Models

48EA15(---)
48EA28(---)
48EA41(---)
48EA58(---)
48EA90(---)
48EA105(---)
48EA135(---)
48EA175(---)
48EA230(---)



Cleco®
Handle - Matrix Tool Connector

PL12EN-48EA
08/06/2015

Illustration "D1": 48EA Series Handle - Matrix Tool Connector

Ref	Number	#	X	EN
				Description
1	541480	1	3	Switch Pin
2	266255	1	3	Switch Spring
3	B159V	1	3	Cap Screw - #6-32
4	W115	1	3	Lock Washer
5	1009089	1	3	Housing Pin
6	1091PT	1	3	Steel Ball - 3/16"
7	22598	1	3	O-Ring
8	F900185	1		Switch Actuator
9	207317	2	2	Switch Spring Clip
10	541033	1	2	Reverse Spring
11	541624	1	2	Forward/Reverse Spring
12	F900571	1	2	Start/Reverse Switch
13	207316	1		Switch Holder
14	541015	1		Handle
15	207323	1		Handle Sleeve
16	207325	1		Connector Sleeve
17	542938	1		Reverse Ring
18	542819	1		Light Ring Assembly
19	541017	1		Handle Retainer Nut
20	524818	1	3	O-Ring
Tool Cable (Optional Length)				
21	542778-1M	1		1 meter cable
	542778-2M			2 meter cable
	542778-3M			3 meter cable
	542778-6M			6 meter cable
	542778-8M			8 meter cable
	542778-10M			10 meter cable
	542778-15M			15 meter cable
	542778-50M			50 meter cable
Inline Swivel Cable (Optional Length)				
21	544056-1M	1		1 meter cable
	544056-2M			2 meter cable
	544056-3M			3 meter cable
	544056-6M			6 meter cable
	544056-8M			8 meter cable
	544056-10M			10 meter cable
	544056-15M			15 meter cable
Angle Swivel Cable (Optional Length)				
21	544055-1M	1		1 meter cable
	544055-2M			2 meter cable
	544055-3M			3 meter cable
	544055-6M			6 meter cable
	544055-8M			8 meter cable
	544055-10M			10 meter cable
	544055-15M			15 meter cable
Tool Cable Extension (Optional Length)				
21	542779-1M	1		1 meter cable
	542779-2M			2 meter cable
	542779-3M			3 meter cable
	542779-6M			6 meter cable
	542779-10M			10 meter cable
	542779-15M			15 meter cable
	542779-50M			50 meter cable

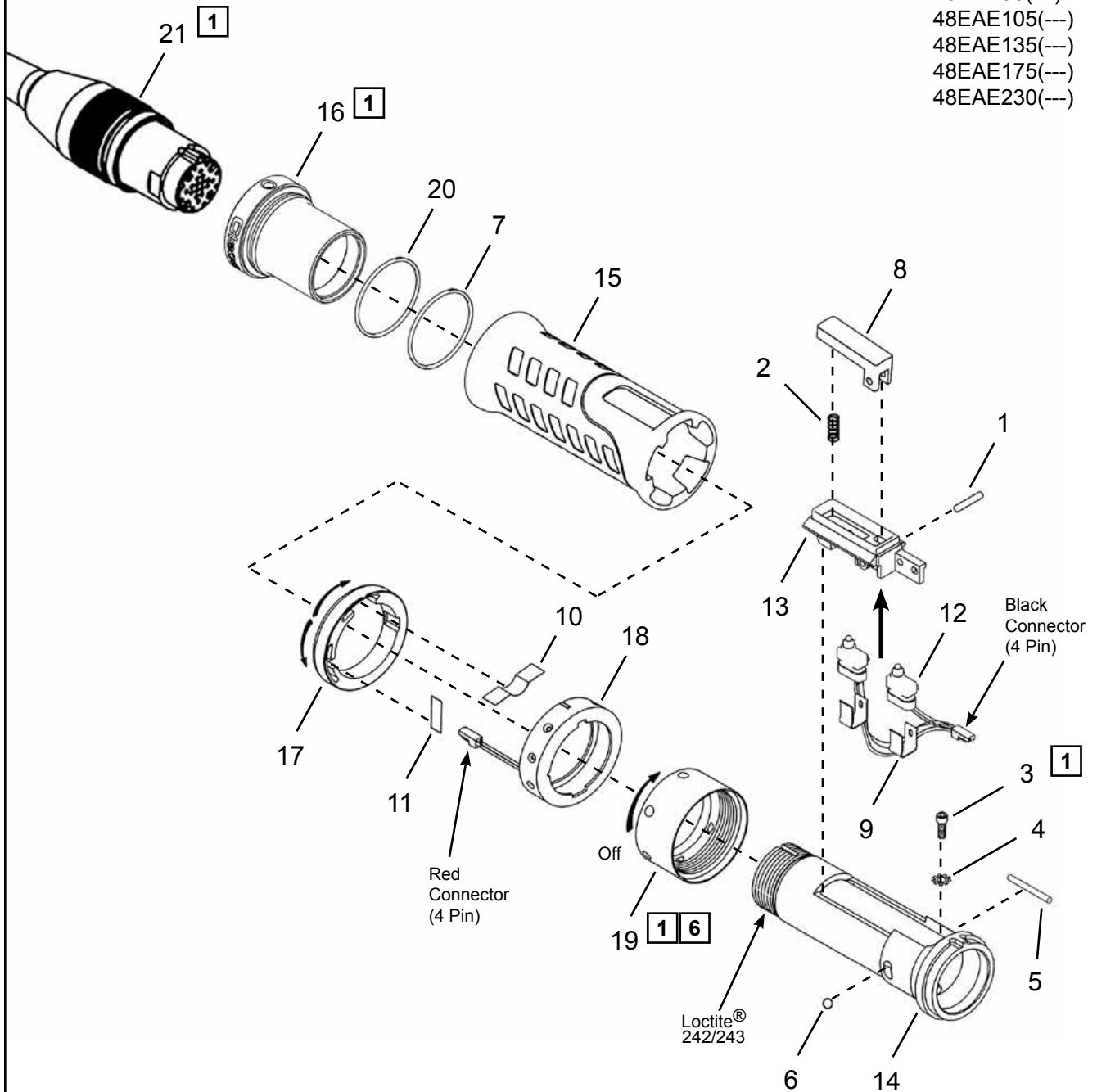
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

"D2"

Models

48EAE15(---)
48EAE28(---)
48EAE41(---)
48EAE58(---)
48EAE90(---)
48EAE105(---)
48EAE135(---)
48EAE175(---)
48EAE230(---)



Cleco®
Handle - Air LB Tool Connector

PL12EN-48EA
08/06/2015

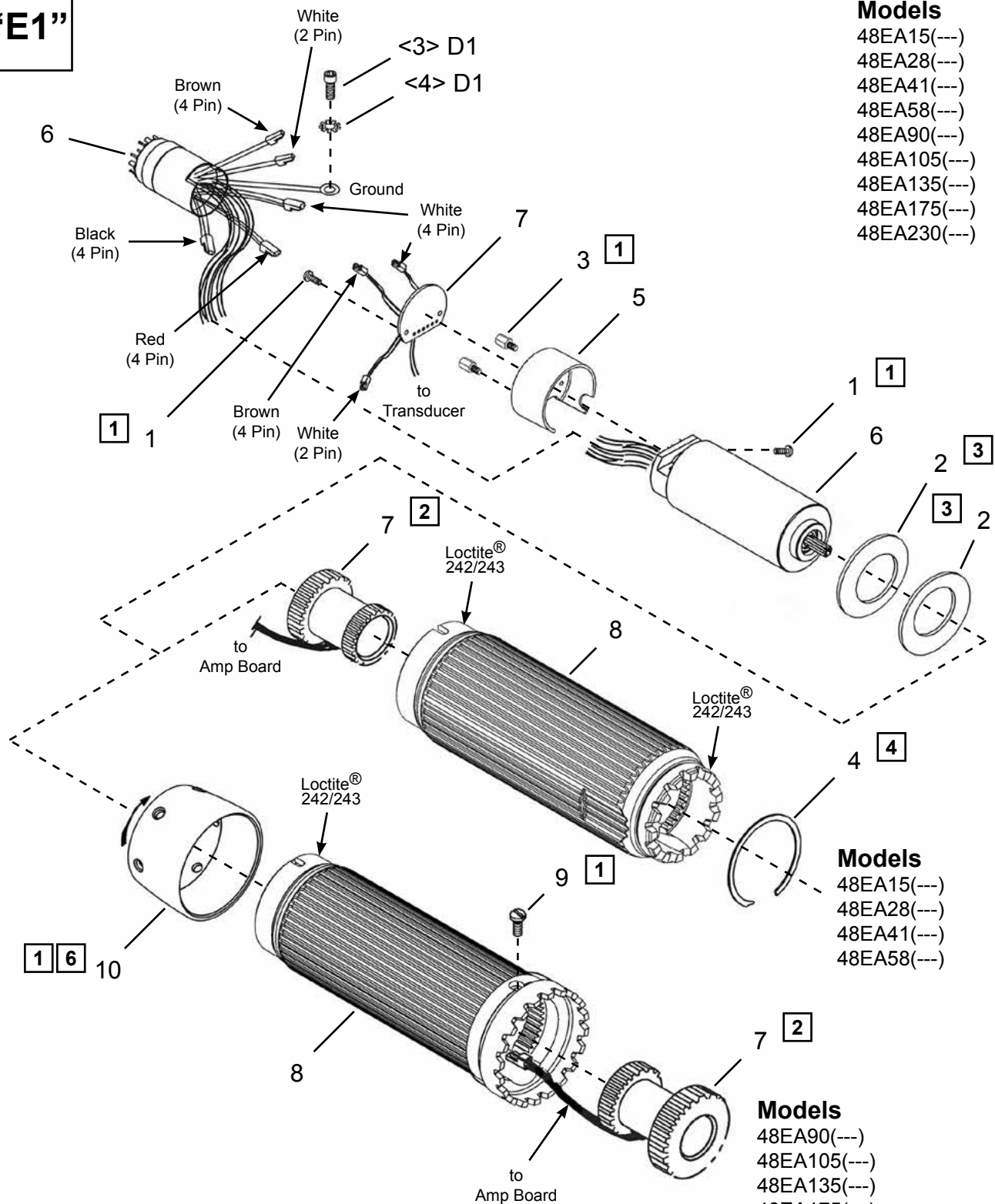
Illustration "D2": 48EAE Series Handle - Air LB Tool Connector

Ref	Number	#	X	EN
				Description
1	541480	1	3	Switch Pin
2	266255	1	3	Switch Spring
3	B159V	1	3	Cap Screw - #6-32
4	W115	1	3	Lock Washer
5	1009089	1	3	Housing Pin
6	1091PT	1	3	Steel Ball - 3/16"
7	22598	1	3	O-Ring
8	F900185	1		Switch Actuator
9	207317	2	2	Switch Spring Clip
10	541033	1	2	Reverse Spring
11	541624	1	2	Forward/Reverse Spring
12	F900571	1	2	Start/Reverse Switch
13	207316	1		Switch Holder
14	207322	1		Handle
15	207323	1		Handle Sleeve
16	207325E	1		Connector Sleeve
17	542938	1		Reverse Ring
18	542819	1		Light Ring Assembly
19	541017	1		Handle Retainer Nut
20	524818	1	3	O-Ring
Tool Cable (Optional Length)				
21	301866-2M	1		2 meter cable
	301866-3M			3 meter cable
	301866-4M			4 meter cable
	301866-6M			6 meter cable
	301866-8M			8 meter cable
	301866-10M			10 meter cable
	301866-15M			15 meter cable
Inline Swivel Cable (Optional Length)				
21	301904-2M	1		2 meter cable
	301904-3M			3 meter cable
	301904-8M			8 meter cable
	301904-15M			15 meter cable
Angle Swivel Cable (Optional Length)				
21	301903-2M	1		2 meter cable
	301903-3M			3 meter cable
	301903-8M			8 meter cable
	301903-15M			15 meter cable
Tool Cable Extension (Optional Length)				
21	301877-4M	1		4 meter cable
	301877-8M			8 meter cable
	301877-10M			10 meter cable
	301877-20M			20 meter cable
	301877-30M			30 meter cable
	301877-40M			40 meter cable
	301877-50M			50 meter cable

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

"E1"



1 2 3 4 6 See Service Notes

Cleco®
Motor - Matrix Tool Connector

PL12EN-48EA
08/06/2015

Illustration "E1": 48EA Series Motor - Matrix Tool Connector

Ref	Number	#	X	EN
				Description
1	17-111	3	6	Pan Head Screw - #4-40 x .19
2	541009	2	2	Wave Washer
3	542244	2	2	Stand Off - 5/16"
4	Table "E1"	1	2	Retaining Ring
5	542588	1		Motor Spacer
6	301761	1		Motor Assembly
7	Table "E1"	1		Transducer Assembly
8	Table "E1"	1		Housing
9	B159X	1	3	Pan Head Screw - #4-40 x 1/4
10	207353	1		Lock Nut

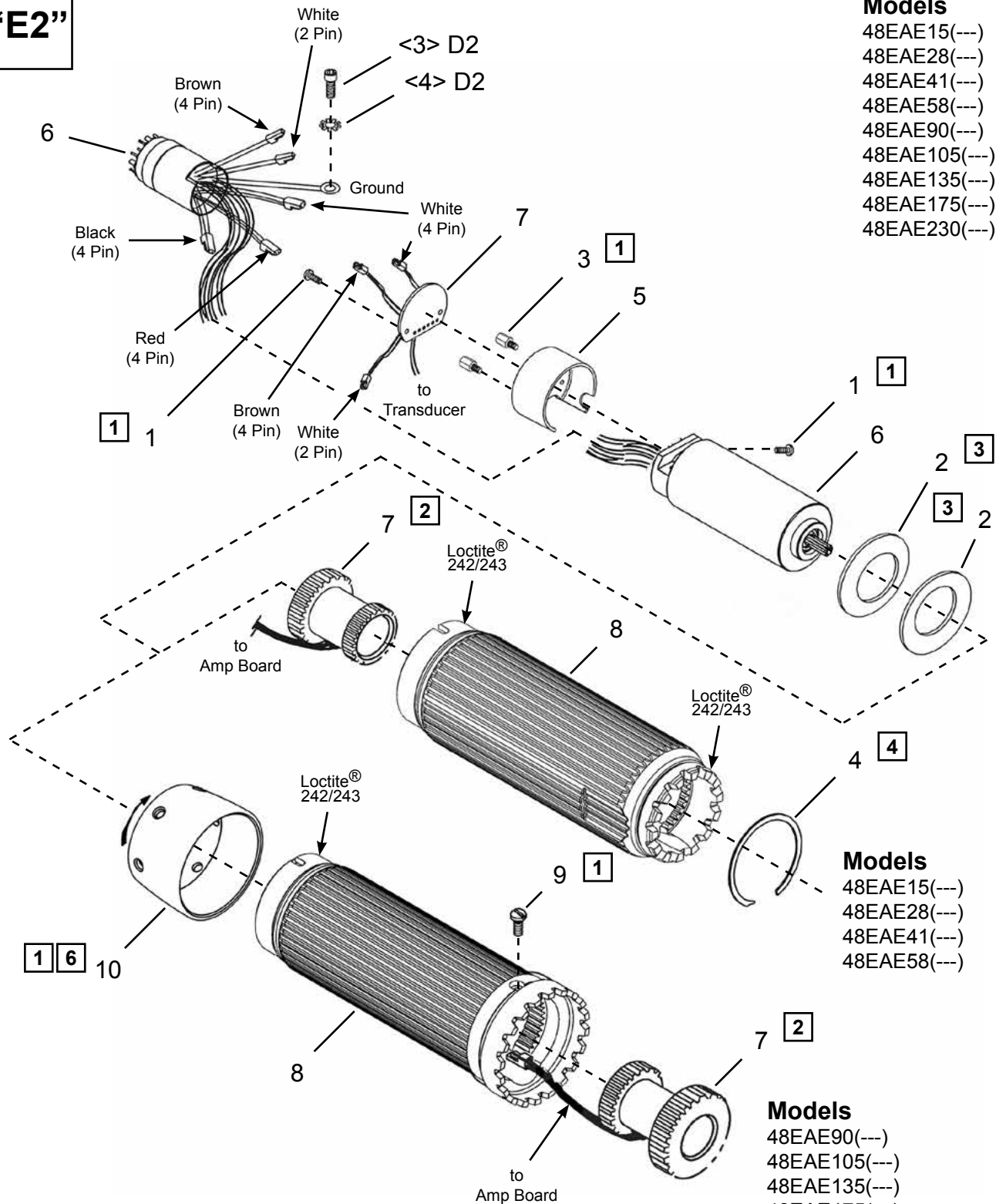
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

Table "E1"

Ref.	Description	#	48EA15	#	48EA28 48EA41	#	48EA58	#	48EA90 48EA105 48EA135	#	48EA175 48EA230
4	Retaining Ring	1	505306	1	505306	1	505306		-----		-----
7	Transducer (unprogrammed)	1	542846-12	1	542846-31	1	542846-48	1	542846-100	1	542846-40
	Transducer (programmed)	1	542846-12P	1	542846-31P	1	542846-48P	1	542846-100P	1	542846-40P
	Transducer Capacity		12 Nm		31 Nm		48 Nm		100 Nm		40 Nm
8	Housing	1	207340	1	207340	1	207340	1	207341	1	207341

"E2"



1 2 3 4 6 See Service Notes

Cleco®
Motor - Air LB Tool Connector

PL12EN-48EA
08/06/2015

Illustration "E2": 48EAE Series Motor - Air LB Tool Connector

Ref	Number	#	X	EN
				Description
1	17-111	3	6	Pan Head Screw - #4-40 x .19
2	541009	2	2	Wave Washer
3	542244	2	2	Stand Off - 5/16"
4	Table "E2"	1	2	Retaining Ring
5	542588	1		Motor Spacer
6	301761E	1		Motor Assembly
7	Table "E2"	1		Transducer Assembly
8	Table "E2"	1		Housing
9	B159X	1	3	Pan Head Screw - #4-40 x 1/4
10	207353	1		Lock Nut

(#) Quantity

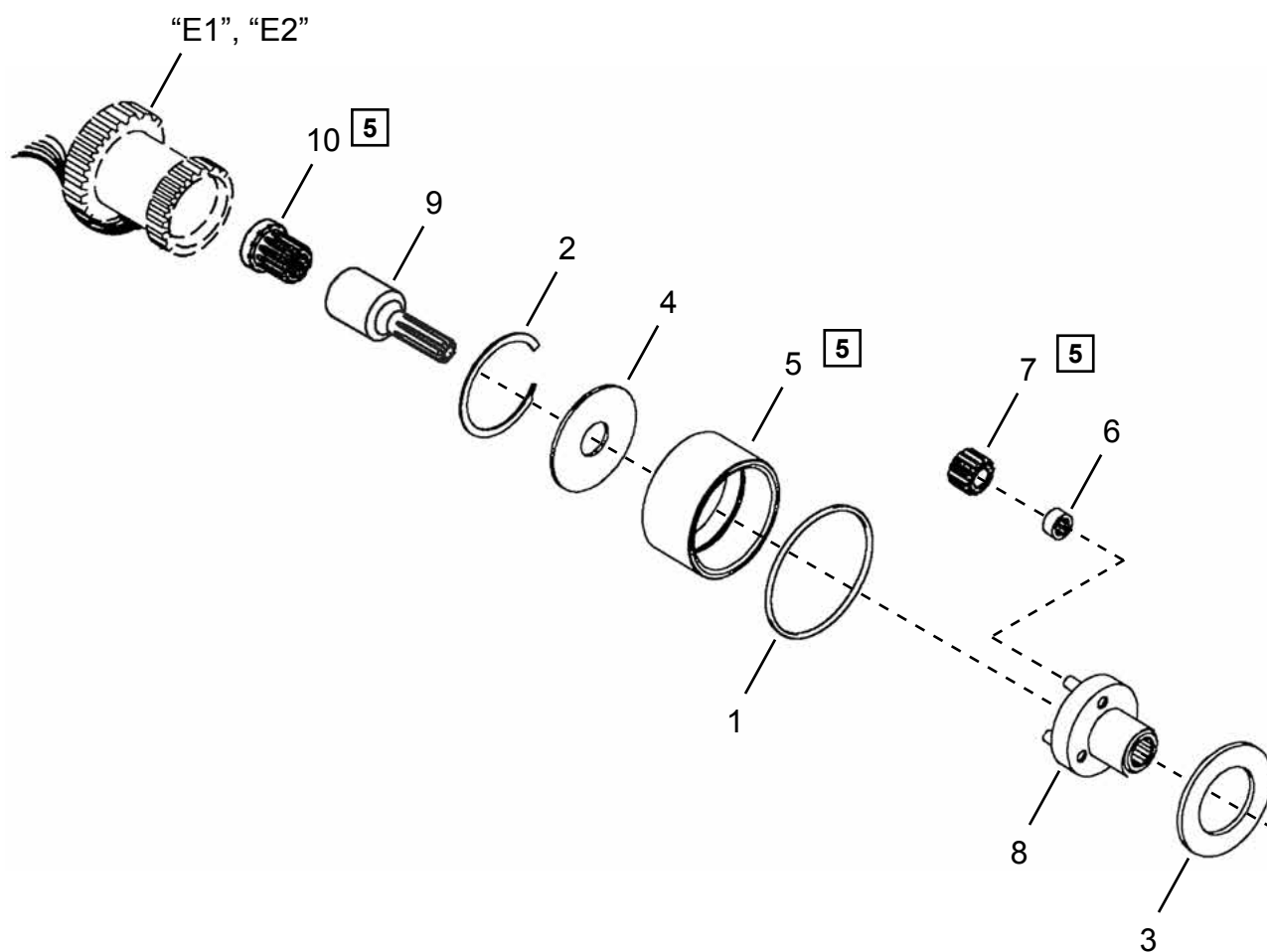
(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

Table "E2"

Ref.	Description	#	48EAE15	#	48EAE28 48EAE41	#	48EAE58	#	48EAE90 48EAE105 48EAE135	#	48EAE175 48EAE230
4	Retaining Ring	1	505306	1	505306	1	505306		-----		-----
7	Transducer (unprogrammed)	1	542846-12	1	542846-31	1	542846-48	1	542846-100	1	542846-40
	Transducer (programmed)	1	542846-12P	1	542846-31P	1	542846-48P	1	542846-100P	1	542846-40P
	Transducer Capacity		12 Nm		31 Nm		48 Nm		100 Nm		40 Nm
8	Housing	1	207340	1	207340	1	207340	1	207341	1	207341

“F”

Model
48EA(E)15(---)



5 See Service Notes

Cleco®
Single Stage Gearing

PL12EN-48EA
08/06/2015

Illustration "F": Single Stage Gearing Assembly

Ref	Number	#	X	EN
				Description
1	1011732	1	4	O-Ring
2	800116	1	2	Retaining Ring
3	502983	1	2	Thrust Washer
4	541887	1		Washer
5	542090	1		Ring Gear
6	203749	3	6	Needle Bearing
7	541893	3	6	Planet Gear (21T)
8	542793	1		Planet Carrier
9	541898	1	2	Extension Pinion
10	541044	1	2	Pinion Adapter

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

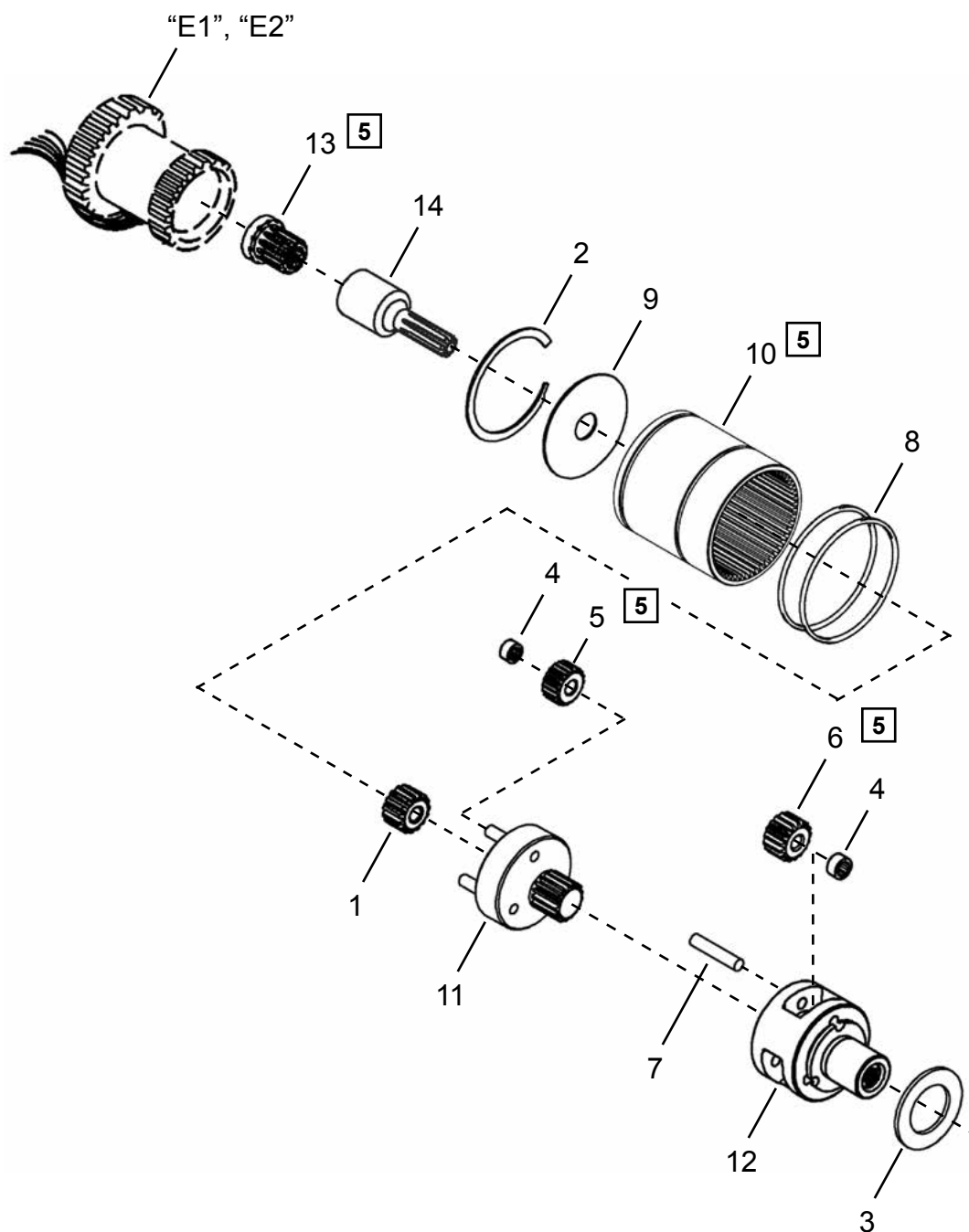
(T) Teeth

Cleco®
Double Stage Gearing

"G"

Models

48EA(E)28(---)
48EA(E)41(---)
48EA(E)58(---)



5 See Service Notes

Cleco®
Double Stage Gearing

PL12EN-48EA
08/06/2015

Illustration "G": Double Stage Gearing Assembly

Ref	Number	#	X	EN
				Description
1	541899	1	3	Slip-On Gear (17T)
2	800116	1	2	Retaining Ring
3	Table "G"	1	2	Thrust Washer
4	203749	6	12	Needle Bearing
5	541894	3	6	Planet Gear (17T)
6	Table "G"	3	6	Planet Gear
7	541888	3	6	Planet Pin
8	542724	2	6	O-Ring
9	541887	1	2	Washer
10	542722	1		Ring Gear
11	Table "G"	1		Planet Carrier
12	Table "G"	1		Planet Cage
13	541044	1	2	Pinion Adapter
14	541898	1	2	Extension Pinion

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

(T) Teeth

Table "G"

Ref.	Description	#	48EA(E)28	#	48EA(E)41	#	48EA(E)58
3	Washer	1	502983	1	207303	1	207303
6	Planet Gear	3	541894 (17T)	3	541894 (17T)	3	541897 (20T)
11	Planet Carrier	1	542230	1	542230	1	542233
12	Planet Cage	1	542079	1	542079	1	542099

(T) Teeth

Cleco®
Double Stage Gearing

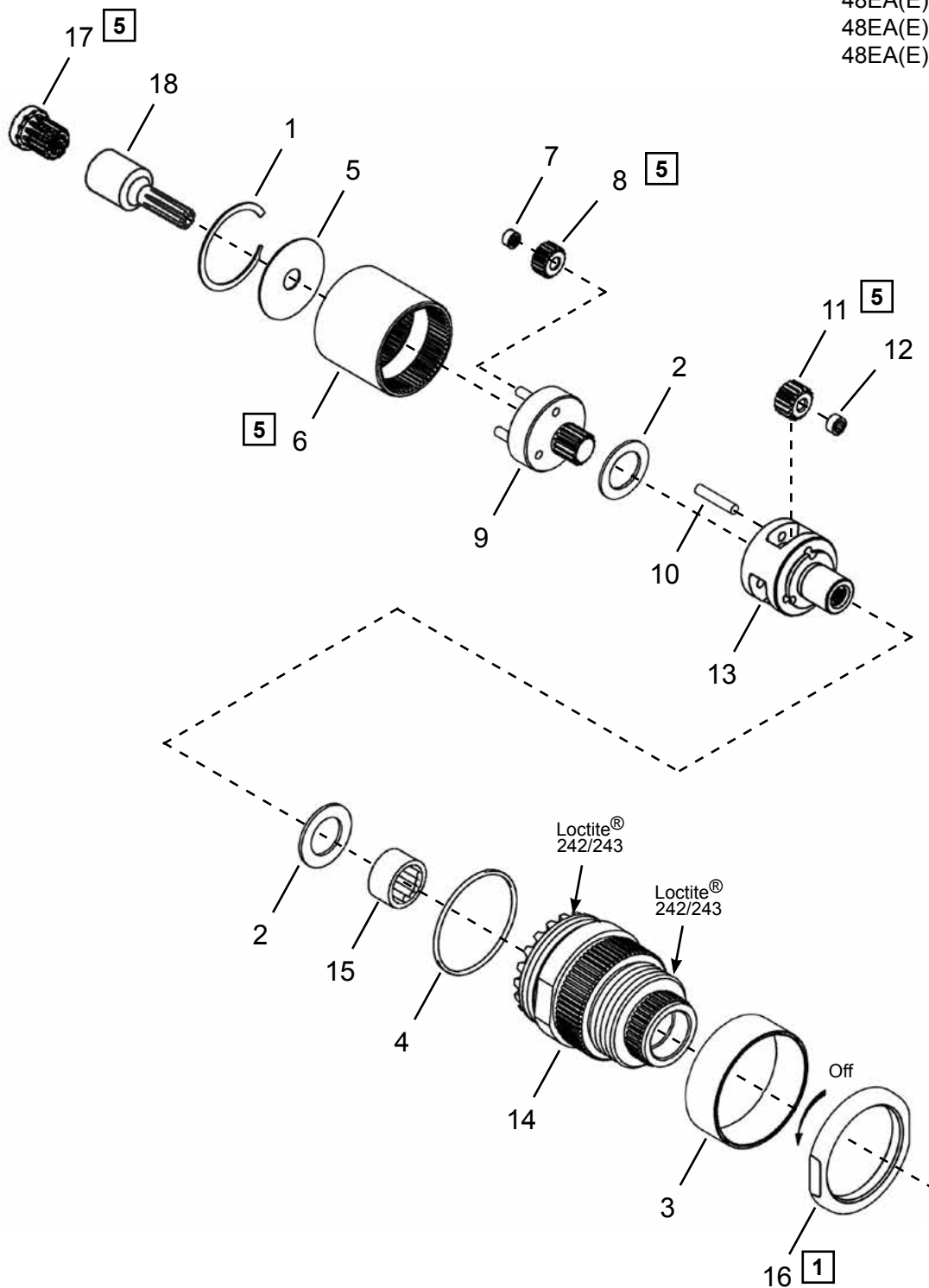
"H"

Models

48EA(E)90(---)

48EA(E)105(---)

48EA(E)135(---)



[1] [5] See Service Notes

Cleco®
Double Stage Gearing

PL12EN-48EA
08/06/2015

Illustration "H": Double Stage Gearing Assembly

Ref	Number	#	X	EN
				Description
1	541210	1	2	Retaining Ring
2	510675	2	4	Thrust Washer
3	541169	1		Cover
4	1010843	1	3	O-Ring
5	541185	1		Washer
6	541167	1		Ring Gear
7	541488	3	6	Needle Bearing
8	541478	3	6	Planet Gear (27T)
9	Table "H"	1		Planet Carrier
10	541492	3	6	Planet Pin
11	Table "H"	3	6	Planet Gear
12	541489	3	6	Needle Bearing
13	Table "H"	1		Planet Cage
14	541045	1		Gear Case (includes Ref. 15)
15	800177	1	3	Needle Bearing
16	207352	1		Retaining Nut
17	541044	1	2	Pinion Adapter
18	541043	1	2	Extension Pinion

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

(T) Teeth

Table "H"

Ref.	Description	#	48EA(E)90	#	48EA(E)105 48EA(E)135
9	Planet Carrier	1	542333	1	542332
11	Planet Gear	3	541474 (17T)	3	541475 (21T)
13	Planet Cage	1	541279	1	541278

(T) Teeth

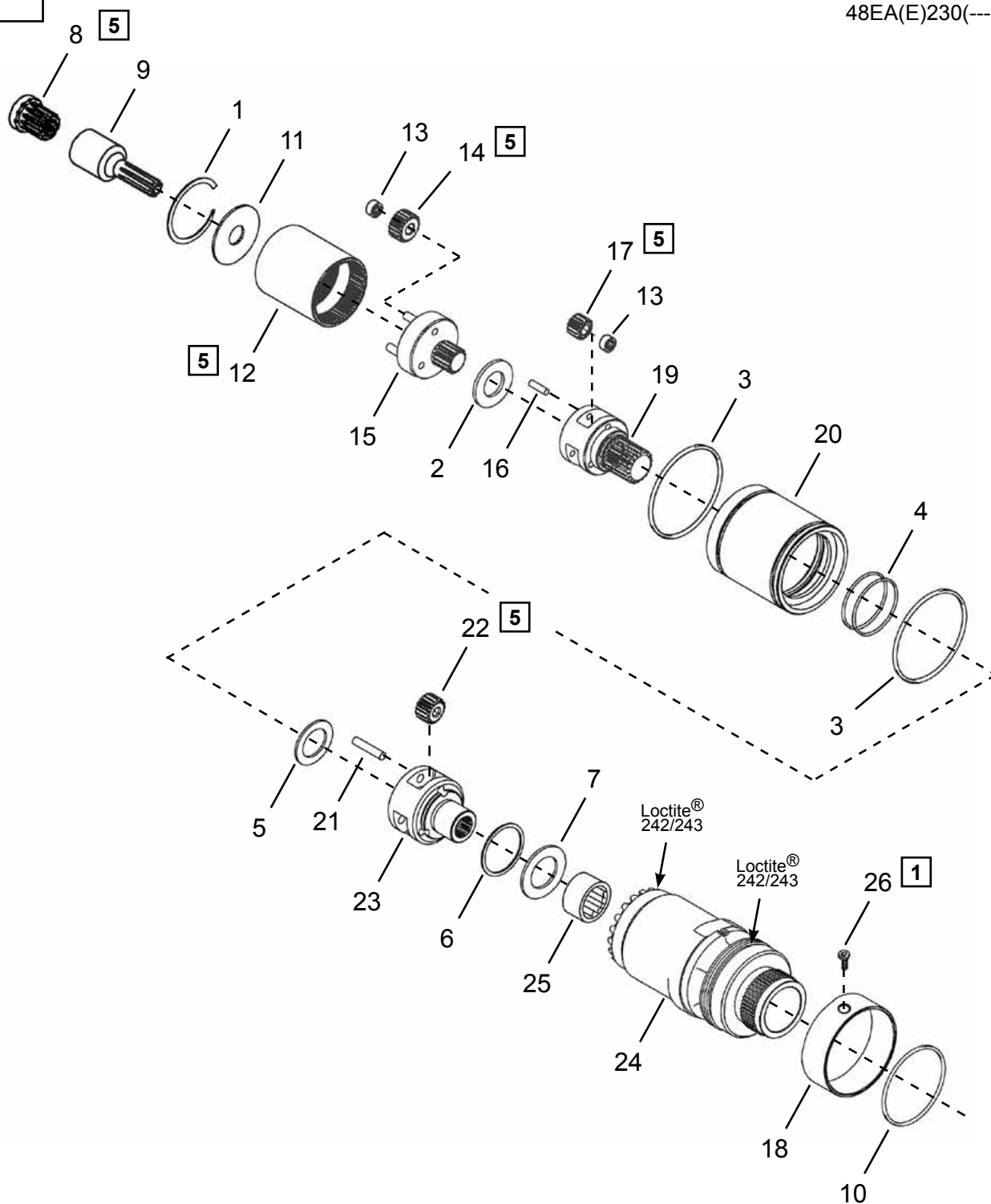
Cleco®
Triple Stage Gearing

Models

48EA(E)175(---)

48EA(E)230(---)

"1"



1 **5** See Service Notes

Cleco®
Triple Stage Gearing

PL12EN-48EA
08/06/2015

Illustration "I": Double Stage Gearing Assembly

Ref	Number	#	X	EN
				Description
1	503405	1	2	Retaining Ring
2	542536	1	2	Thrust Washer
3	1012614	2	4	O-Ring
4	22598	2	4	O-Ring
5	510675	1	2	Thrust Washer
6	800201	1	2	Retaining Ring
7	502981	1	2	Thrust Washer
8	541044	1	2	Pinion Adapter
9	541479	1	2	Extension Pinion
10	30923	1	3	O-Ring
11	542337	1	2	Washer
12	541008	1		Ring Gear
13	203749	6	12	Needle Bearing
14	541477	3	6	Planet Gear (20T)
15	Table "I"	1		Planet Carrier
16	541480	3	6	Planet Pin
17	Table "I"	3	6	Planet Gear
18	542473	1		Cover
19	Table "I"	1		Planet Cage
20	541438	1		Ring Gear Adapter
21	510754	3	6	Planet Pin
22	542474	3	6	Planet Gear (16T)
23	541436	1		Planet Cage
24	542471	1		Gear Case (includes Ref. 25 - 26)
25	800168	1	3	Needle Bearing
26	B124Z	1	2	Socket Head Cap Screw - #6-32 x 1/4

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

(T) Teeth

Table "I"

Ref.	Description	#	48EA(E)175	#	48EA(E)230
15	Planet Carrier	1	542327	1	542331
17	Planet Gear	3	541472 (14T)	3	541473 (17T)
19	Planet Cage	1	542531	1	542478

(T) Teeth

Cleco®

Reaction Bar Installation

“J”**Models**

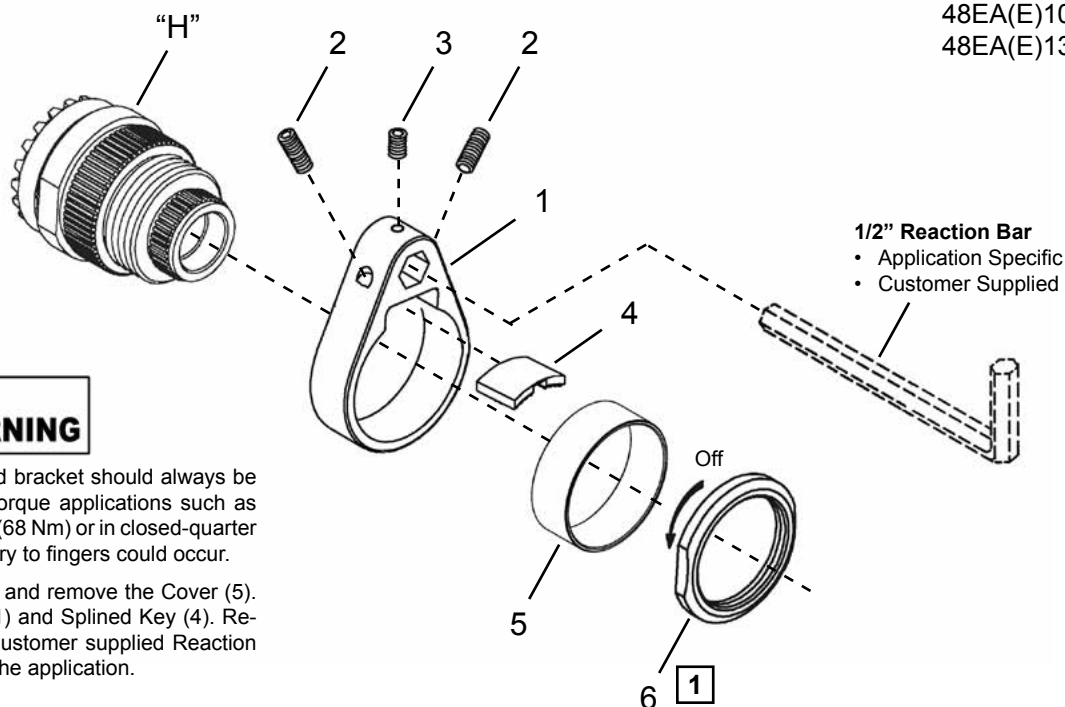
48EA(E)90(---)
 48EA(E)105(---)
 48EA(E)135(---)

**WARNING**

Reaction bar and bracket should always be used in higher torque applications such as above 50 ft.-lbs. (68 Nm) or in closed-quarter areas where injury to fingers could occur.

Unscrew Nut (6) and remove the Cover (5). Install Bracket (1) and Splined Key (4). Re-install Nut (6). Customer supplied Reaction Bar bends to fit the application.

1 See Service Notes

**“K”****Models**

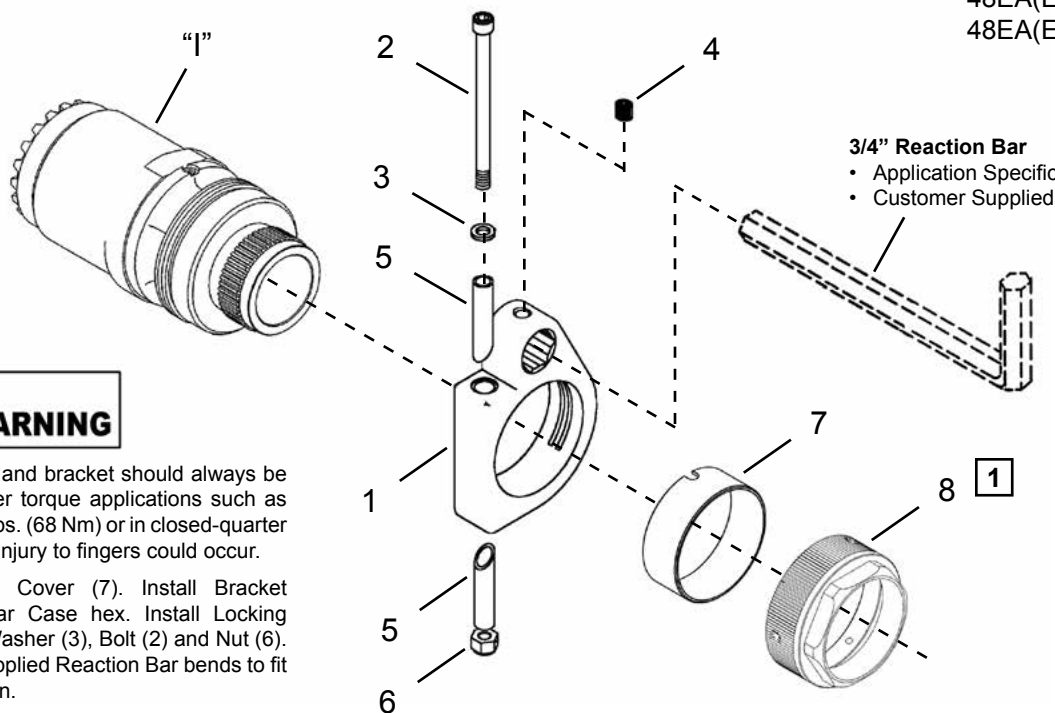
48EA(E)175(---)
 48EA(E)230(---)

**WARNING**

Reaction bar and bracket should always be used in higher torque applications such as above 50 ft.-lbs. (68 Nm) or in closed-quarter areas where injury to fingers could occur.

Remove the Cover (7). Install Bracket (1) over Gear Case hex. Install Locking Sleeve (5), Washer (3), Bolt (2) and Nut (6). Customer supplied Reaction Bar bends to fit the application.

1 See Service Notes



Cleco®
Reaction Bar Installation

PL12EN-48EA
08/06/2015

Illustration "J": Reaction Bar Installation

Ref	Number	#	X	EN
				Description
1	541206	1		Bracket (includes Ref. 2-3)
2	B132Z	2	4	Set Screw - #8-32 x 1/2
3	B129J	1	2	Set Screw - #8-32 x 5/16
4	541207	1		Splined Key
5	541169	1		Cover
6	207352	1		Retaining Nut

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

Illustration "K": Reaction Bar Installation

Ref	Number	#	X	EN
				Description
1	531297	1		Bucking Bar Collar (includes Ref. 2-6)
2	B156A	1	2	Socket Head Screw
3	25285	1	2	Washer
4	B110D	1	3	Set Screw
5	531281	2	2	Locking Sleeve
6	C108Y	1	3	Nut
7	542473	1		Cover
8	207354	1		Retaining Nut

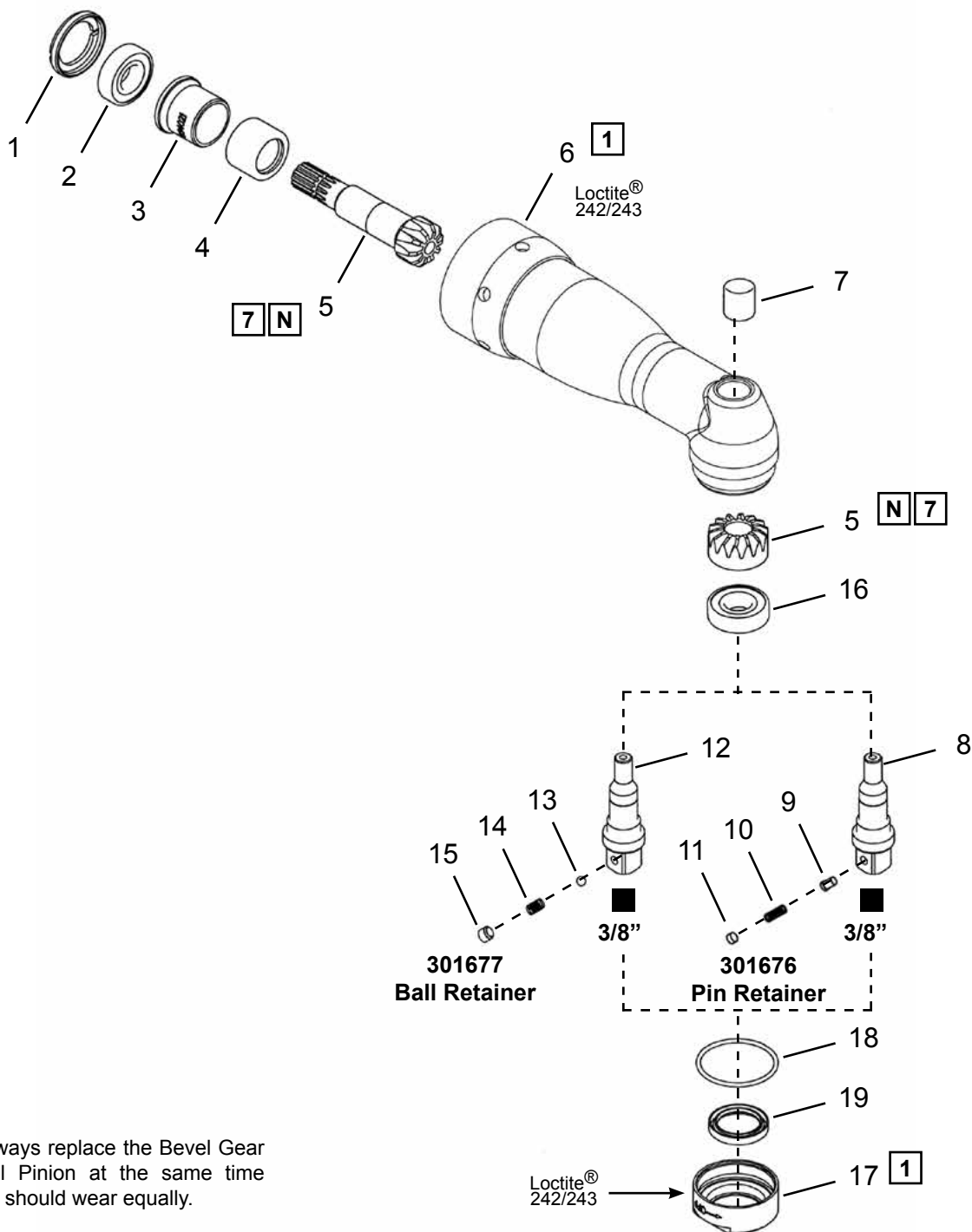
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

“L”

3/8" Square Drive - 301676 (Pin Retainer)
3/8" Square Drive - 301677 (Ball Retainer)

Model
 48EA(E)15(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1

7

See Service Notes

Cleco®
Angle Head Attachment (Code AL3)

PL12EN-48EA
08/06/2015

Illustration "L": 301676 AL3 Attachment (3/8" Square Drive)
301677 AL3 Attachment (3/8" Square Drive)

Ref	Number	#	X	EN
				Description
1	934023	1		Lock Ring
2	934035	1	2	Ball Bearing
3	934021	1		Spacer
4	526942	1	2	Bearing
5	933792	1	1	Bevel Gear Set
6	207294	1		Angle Housing
7	500499	1	2	Needle Bearing
8	934025	1		Output Spindle - 3/8" (includes Ref. 9-11)
9	24499	1	3	Retainer
10	9D6481	1	3	Spring
11	26989PT	1	3	Plug
12	543363	1		Output Spindle - 3/8" (includes Ref. 3-15)
13	1091PT	1	3	Steel Ball
14	WS-371	1	3	Spring
15	LB-370	1	3	Bushing
16	207622PT	1	2	Ball Bearing
17	929177	1		Retainer Nut (includes Ref. 18-19)
18	905084	1	3	O-Ring
19	918163	1	3	Shaft Seal

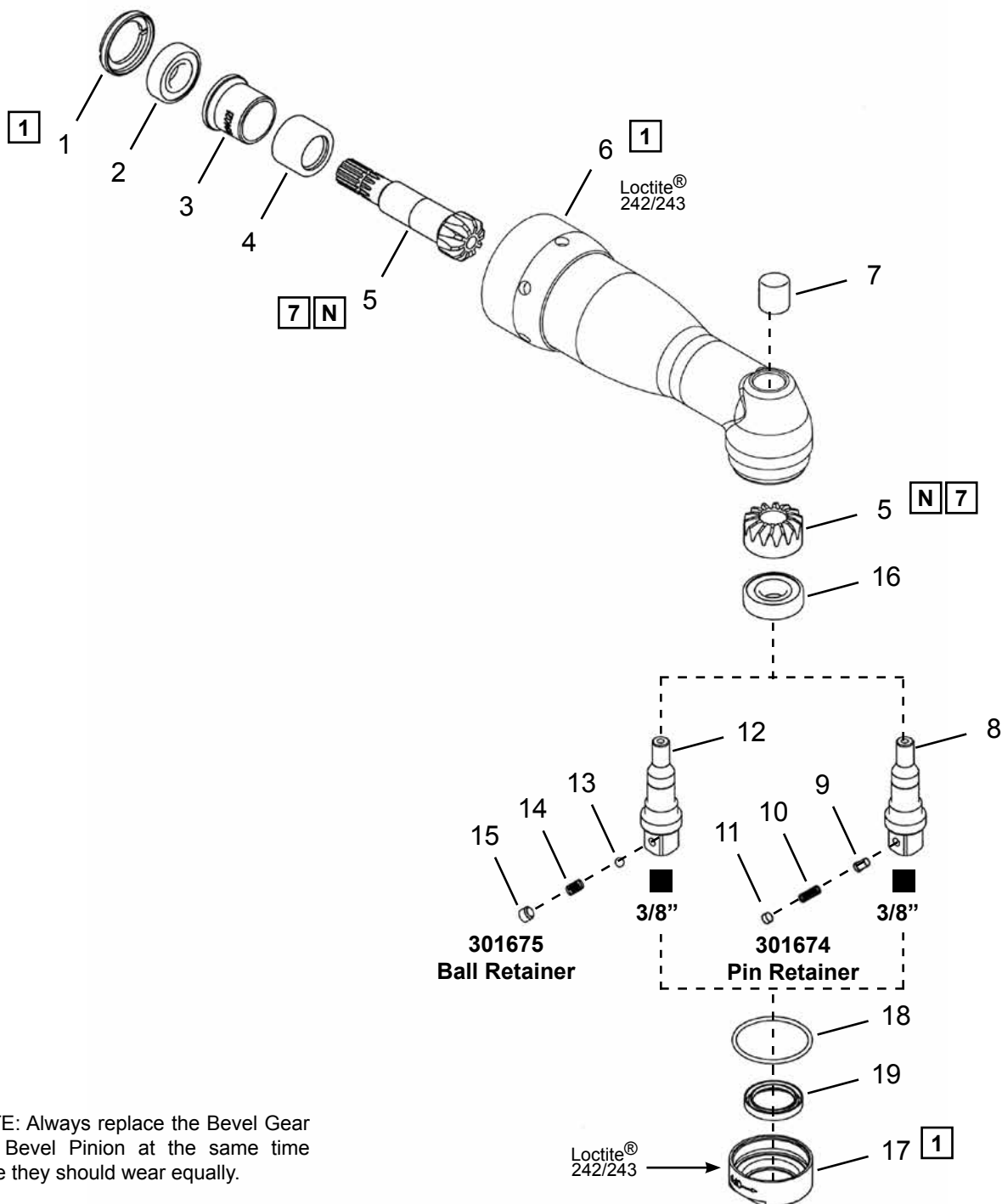
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

“M”

3/8” Square Drive - 301674 (Pin Retainer)
3/8” Square Drive - 301675 (Ball Retainer)

Model
 48EA(E)28(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1 7 See Service Notes

Cleco®
Angle Head Attachment (Code AL3)

PL12EN-48EA
08/06/2015

Illustration "M": 301674 AL3 Attachment (3/8" Square Drive)
301675 AL3 Attachment (3/8" Square Drive)

Ref	Number	#	X	EN
				Description
1	934023	1		Lock Ring
2	934035	1	2	Ball Bearing
3	934021	1		Spacer
4	526942	1	2	Bearing
5	933792	1	1	Bevel Gear Set
6	207295	1		Angle Housing
7	500499	1	2	Needle Bearing
8	934025	1		Output Spindle - 3/8" (includes Ref. 9-11)
9	24499	1	3	Retainer
10	9D6481	1	3	Spring
11	26989PT	1	3	Plug
12	543363	1		Output Spindle - 3/8" (includes Ref. 3-15)
13	1091PT	1	3	Steel Ball
14	WS-371	1	3	Spring
15	LB-370	1	3	Bushing
16	207622PT	1	2	Ball Bearing
17	929177	1		Retainer Nut (includes Ref. 18-19)
18	905084	1	3	O-Ring
19	918163	1	3	Shaft Seal

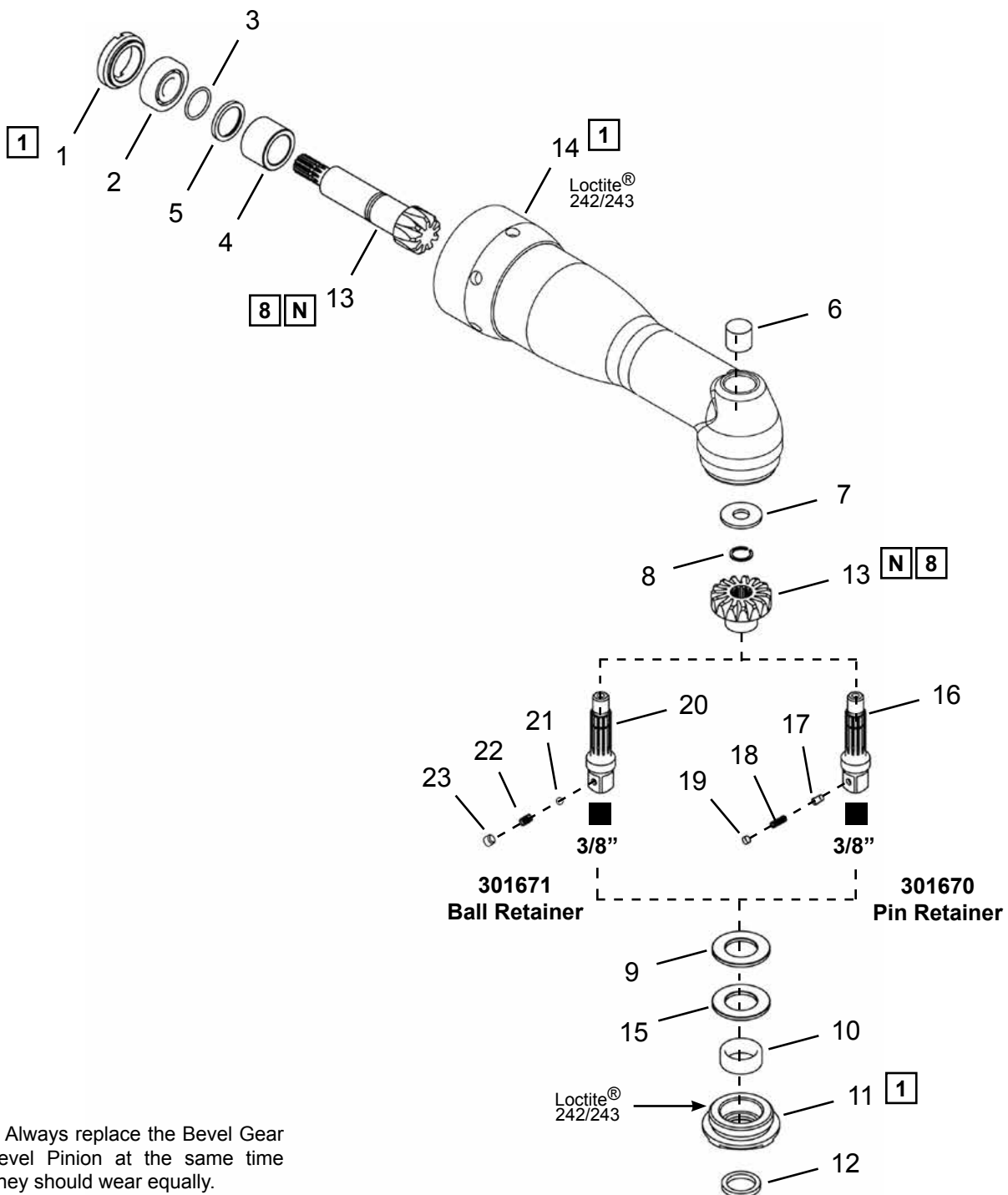
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

“N”

3/8” Square Drive - 301670 (Pin Retainer)
3/8” Square Drive - 301671 (Ball Retainer)

Model
 48EA(E)41(---)
 48EA(E)58(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1 8 See Service Notes

Angle Head Attachment (Code AM3)

Illustration "N": 301670 AM3 Attachment (3/8" Square Drive)

301671 AM3 Attachment (3/8" Square Drive)

Ref	Number	#	X	EN
				Description
1	207307	1	2	Bearing Retainer
2	19469	1	2	Ball Bearing
3	250497PT	1	3	Retaining Ring
4	526916	1	2	Needle Bearing
5	541694	1		Lock Ring
6	800170	1	2	Needle Bearing
7	510732	1	2	Thrust Washer
8	513000	1	3	Retaining Ring
9	847596	1	3	Thrust Bearing
10	500487	1	3	Needle Bearing
11	510692	1		Retaining Nut (includes Ref. 12)
12	30573	1	3	Seal
13	301923	1	1	Bevel Gear Set
14	301927PT	1		Angle Housing
15	502983	1	2	Thrust Washer
16	510689	1		Spindle - 3/8" (includes Ref. 17-19)
17	24499	1	3	Button
18	9D6481	1	3	Spring
19	26989PT	1	3	Plug
20	541108	1		Spindle - 3/8" (includes Ref. 21-23)
21	1091PT	1	3	Steel Ball
22	WS-371	1	3	Spring
23	LB-370	1	3	Bushing

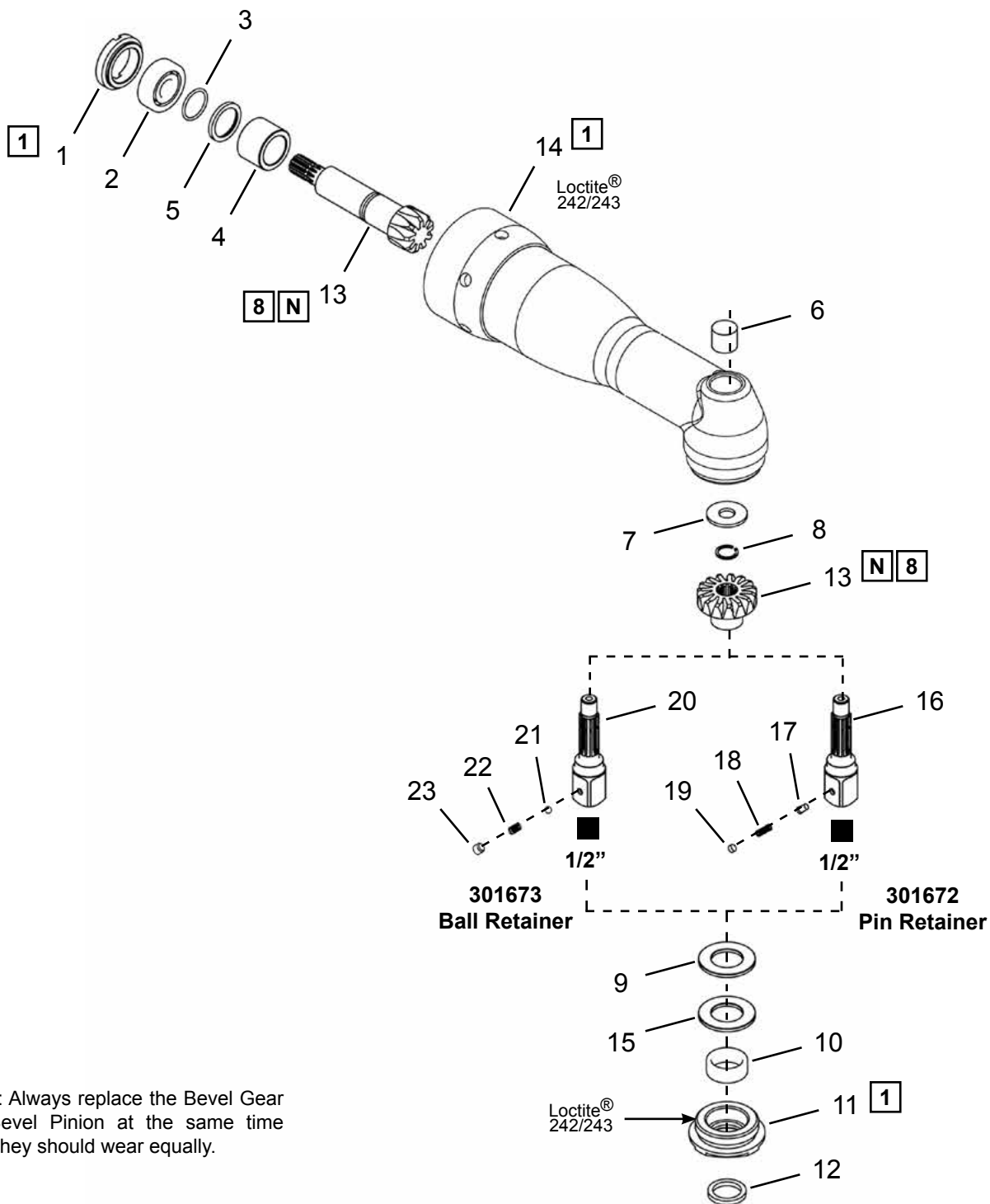
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

“O”

1/2” Square Drive - 301672 (Pin Retainer)
1/2” Square Drive - 301673 (Ball Retainer)

Model
 48EA(E)58(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1 8 See Service Notes

Angle Head Attachment (Code AM4)

Illustration "O": 301672 AM4 Attachment (1/2" Square Drive)
301673 AM4 Attachment (1/2" Square Drive)

Ref	Number	#	X	EN
				Description
1	207307	1	2	Bearing Retainer
2	19469	1	2	Ball Bearing
3	250497PT	1	3	Retaining Ring
4	526916	1	2	Needle Bearing
5	541694	1		Lock Ring
6	800170	1	2	Needle Bearing
7	510732	1	2	Thrust Washer
8	513000	1	3	Retaining Ring
9	847596	1	3	Thrust Bearing
10	500487	1	3	Needle Bearing
11	510692	1		Retaining Nut (includes Ref. 12)
12	30573	1	3	Seal
13	301923	1	1	Bevel Gear Set
14	301927PT	1		Angle Housing
15	502983	1	2	Thrust Washer
16	510735	1		Spindle - 1/2" (includes Ref. 17-19)
17	24499	1	3	Button
18	9D6481	1	3	Spring
19	207764PT	1	3	Plug
20	543364	1		Spindle - 1/2" (includes Ref. 21-23)
21	1014198	1	3	Steel Ball
22	WS-371-B	1	3	Spring
23	LB-501	1	3	Bushing

(#) Quantity

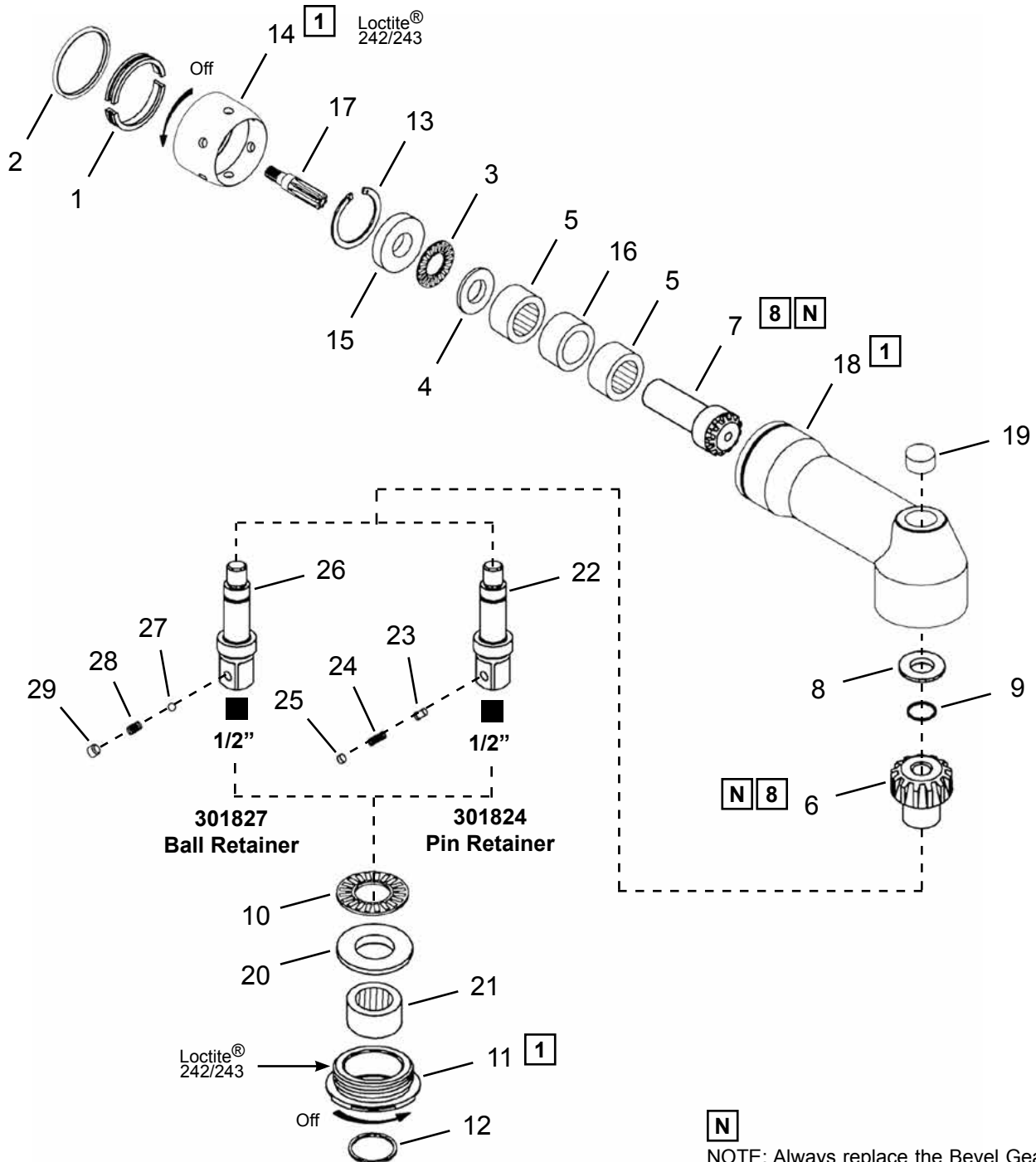
(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

"P"

1/2" Square Drive - 301824 (Pin Retainer)
1/2" Square Drive - 301827 (Ball Retainer)

Model

48EA(E)90(---)
 48EA(E)105(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1 8 See Service Notes

Cleco®
Angle Head Attachment (Code AH4)

PL12EN-48EA
08/06/2015

Illustration "P": 301824 AH3 Attachment (1/2" Square Drive)
301827 AH3 Attachment (1/2" Square Drive)

Ref	Number	#	X	EN
				Description
1	515544	1		Split Ring (includes Ref. 2)
2	526483	1	3	Rubber Band
3	847104	1	3	Thrust Bearing
4	544179PT	1	2	Thrust Washer
5	526917	2	2	Needle Bearing
6	510680	1	1	Bevel Gear
7	529246	1	1	Bevel Pinion
8	512552	1	2	Thrust Washer
9	513001	1	3	Retaining Ring
10	259144	1	3	Thrust Bearing
11	510669	1		Retaining Nut
12	24751	1	3	Seal
13	800075	1	2	Retaining Ring
14	207351	1		Lock Nut
15	510691	1	2	Thrust Washer
16	526924	1		Bearing Spacer
17	533983	1	1	Splined Adapter
18	510685	1		Angle Housing (includes Ref. 19)
19	882629	1	2	Needle Bearing
20	510723	1	2	Thrust Washer
21	800168	1	3	Needle Bearing
22	510681	1		Spindle - 1/2" (includes Ref. 23-25)
23	24499	1	3	Button
24	9D6481	1	3	Spring
25	207764PT	1	3	Plug
26	541110	1		Output Spindle - 1/2" (includes Ref. 27-29)
27	1014198	1	3	Steel Ball
28	WS-371-B	1	3	Spring
29	LB-501	1	3	Bushing

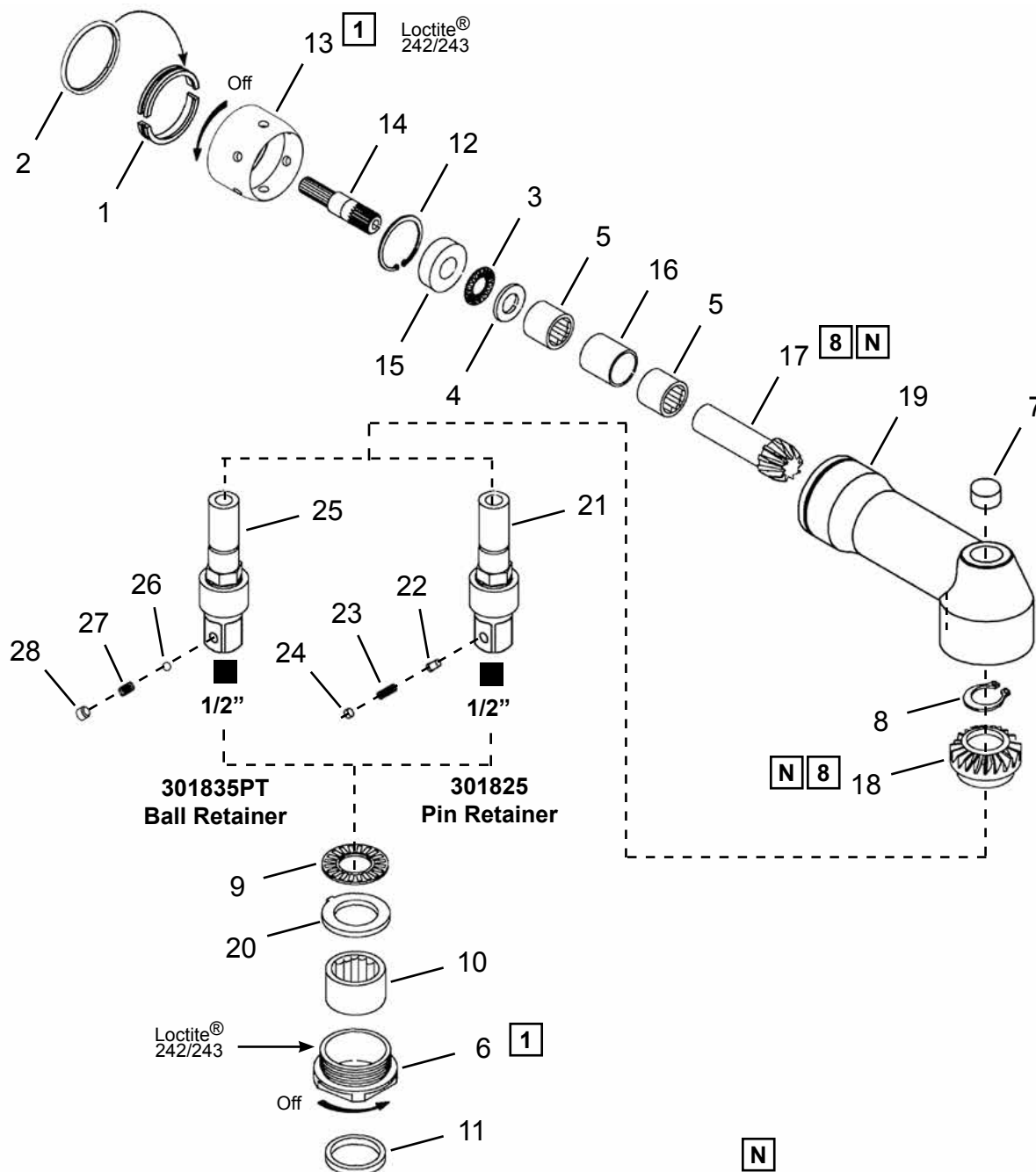
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

“Q”

1/2" Square Drive - 301825 (Pin Retainer)
1/2" Square Drive - 301835PT (Ball Retainer)

Model
 48EA(E)135(---)



1 **8** See Service Notes

N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

Angle Head Attachment (Code MH4)

Illustration "Q": 301825 MH4 Attachment (1/2" Square Drive) 301835PT MH4 Attachment (1/2" Square Drive)

Ref	Number	#	X	EN
				Description
1	515544	1		Split Ring (includes Ref. 2)
2	526483	1	3	Rubber Band
3	847104	1	3	Thrust Bearing
4	544179PT	1	2	Thrust Washer
5	526917	2	2	Needle Bearing
6	515086	1		Retaining Nut
7	541162	1	2	Needle Bearing
8	800151	1	3	Retaining Ring
9	1013571	1	3	Thrust Bearing
10	500514	1	3	Needle Bearing
11	515083	1	3	Seal
12	800075	1	2	Retaining Ring
13	207351	1		Lock Nut
14	533983	1	1	Splined Adapter
15	510691	1	2	Thrust Washer
16	526924	1		Bearing Spacer
17	529244	1	1	Bevel Pinion
18	515085	1	1	Bevel Gear
19	515088	1		Angle Housing
20	515104	1	2	Thrust Washer
21	525103	1		Output Spindle - 1/2" (includes Ref. 22-24)
22	24499	1	3	Button
23	9D6481	1	3	Spring
24	207764PT	1	3	Plug
25	543365	1		Output Spindle - 1/2" (includes Ref. 26-28)
26	1014198	1	3	Steel Ball
27	WS-371-B	1	3	Spring
28	LB-501	1	3	Bushing

(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

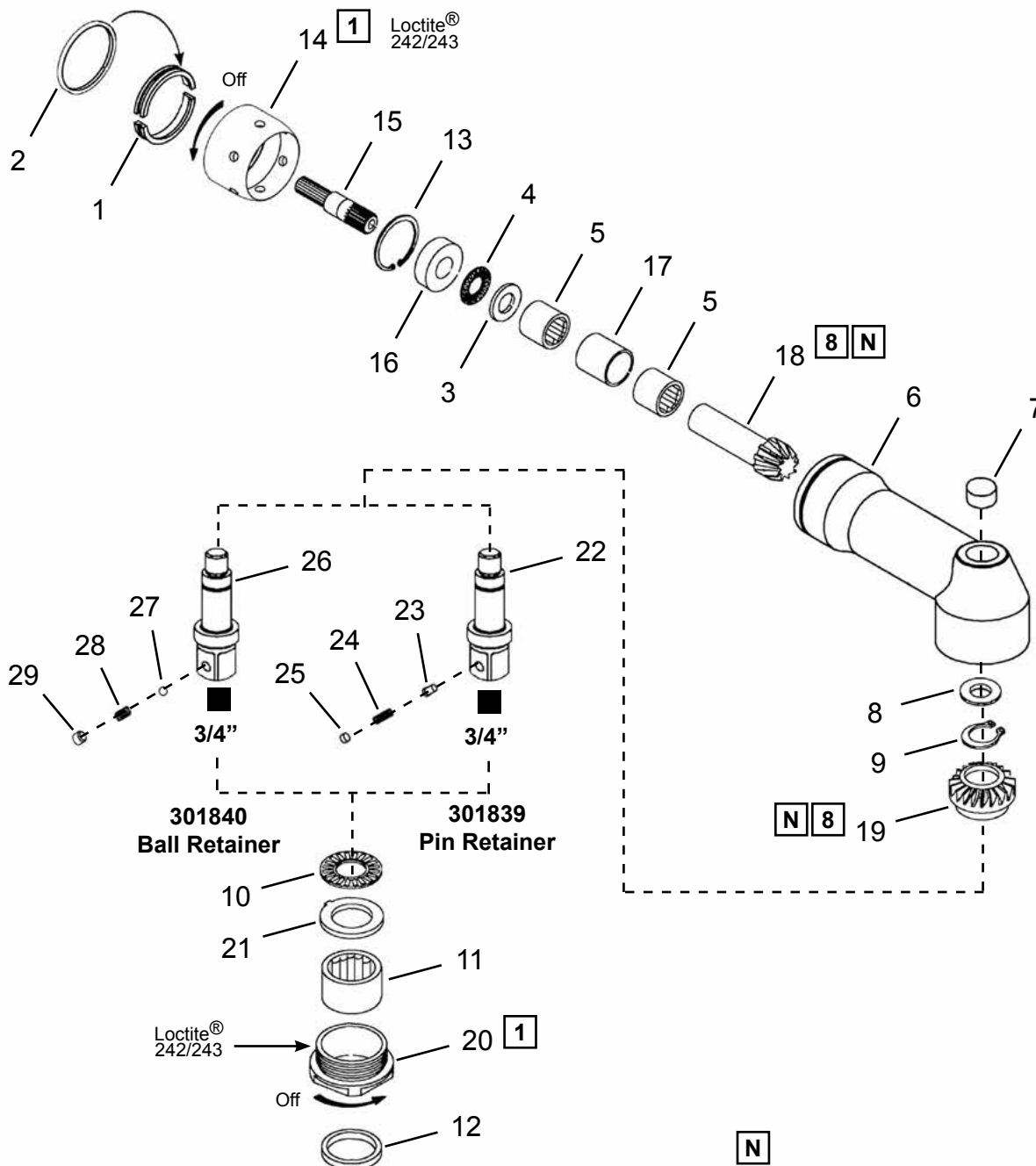
“R”

3/4” Square Drive - 301839 (Pin Retainer)
3/4” Square Drive - 301840 (Ball Retainer)

Model

48EA(E)175(---)

48EA(E)230(---)



N

NOTE: Always replace the Bevel Gear and Bevel Pinion at the same time since they should wear equally.

1 8 See Service Notes

Cleco®
Angle Head Attachment (Code AX6)

PL12EN-48EA
08/06/2015

Illustration "R": 301839 AX6 Attachment (3/4" Square Drive)
301840 AX6 Attachment (3/4" Square Drive)

Ref	Number	#	X	EN
				Description
1	515539	1		Split Ring (includes Ref. 2)
2	526483	1	3	Rubber Band
3	502983	1	2	Thrust Washer
4	847596	1	3	Thrust Bearing
5	523945	2	4	Needle Bearing
6	513253	1		Angle Housing (includes Ref. 7)
7	500510	1	2	Needle Bearing
8	512553	1	2	Thrust Washer
9	513002	1	3	Retaining Ring
10	1013571	1	3	Thrust Bearing
11	500507	1	3	Needle Bearing
12	514883	1	3	Seal
13	503404	1	2	Retaining Ring
14	207354	1		Lock Nut
15	542472	1	1	Splined Adapter
16	513235	1	2	Thrust Washer
17	523946	1		Bearing Spacer
18	526728	1	1	Bevel Pinion
19	513244	1	1	Bevel Gear
20	513245	1		Retaining Nut
21	513230	1	2	Thrust Washer
22	513219	1		Output Spindle - 3/4" (includes Ref. 23-25)
23	23355	1	3	Button
24	9D6481	1	3	Spring
25	207766PT	1	3	Plug
26	543420	1		Output Spindle - 3/4" (includes Ref. 27-29)
27	1005005	1	3	Steel Ball
28	WS-750	1	3	Spring
29	LB-751	1	3	Bushing

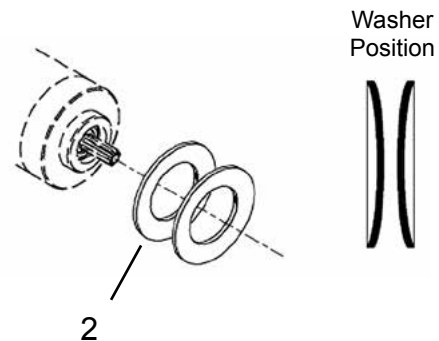
(#) Quantity

(X) Recommended Spare Parts (quantity shown based on 1-5 tools in operation)

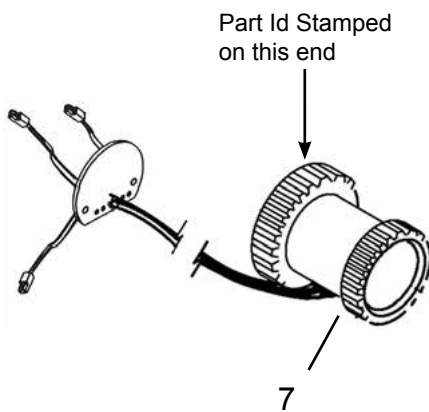
1 Tightening Torque

Illustration	Reference	Tightening torque	
		Ft-Lbs (in-lbs)	Nm
D1, D2	3	(10-14)	1.1-1.6
	16	25-30	34-41
	19	35-40	47-54
	21	15-18	20-25
E1, E2	1	(4-6)	0.45-0.68
	3	(4-6)	0.45-0.68
	9	(4-6)	0.45-0.68
	10	60-65	81-88
H	16	15-20	20-27
I	26	(10-14)	1.1-1.6
J	6	40-50	54-68
K	8	40-50	54-68
L, M	1	7-11	10-15
	6	35-40	47-54
	17	13-16	18-22
N, O	1	7-11	10-15
	11	35-40	47-54
	14	35-40	47-54
P	11	50-55	68-75
	14	40-50	54-68
Q	6	50-55	68-75
	13	40-50	54-68
R	14	40-50	54-68
	20	80-100	108-136

3 Washer Assembly

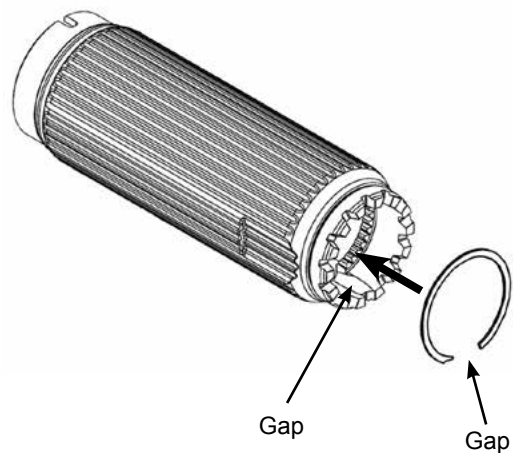


2 Transducer Identification



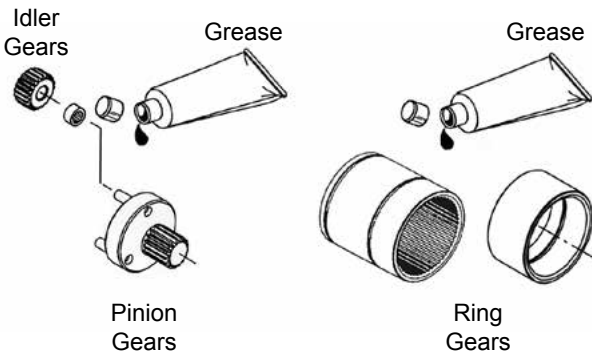
Transducers are not interchangeable, check part number.

4 Retaining Ring Assembly



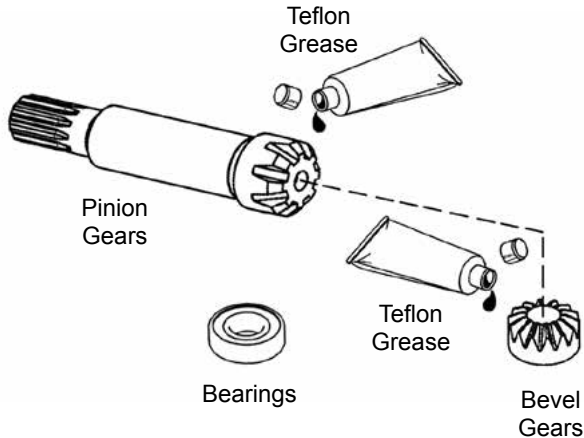
5 Gear Train Lubrication

541444 - 2 oz. (56 g)
541445 - 1 pound (0.45 kg)

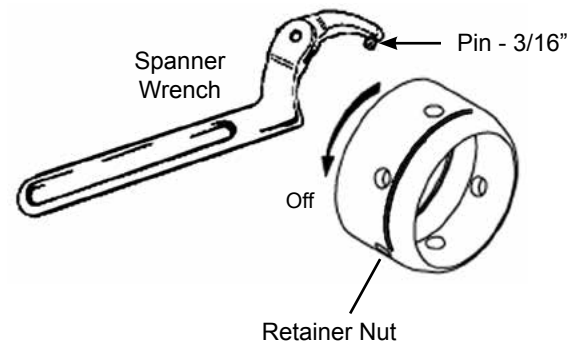


7 Angle Head Lubrication

544076 - 2 oz. (56 g)
544077 - 1 pound (0.45 kg)

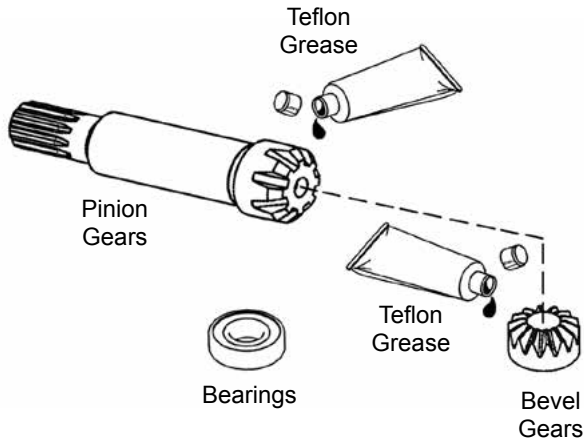


6 Spanner Wrench



8 Angle Head Lubrication

540395 - 2 oz. (56 g)
513156 - 1 pound (0.45 kg)



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Please note that all locations may not service all products.

Contact the nearest Apex Tool Group Sales & Service Center for the appropriate facility to handle your service requirements.

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