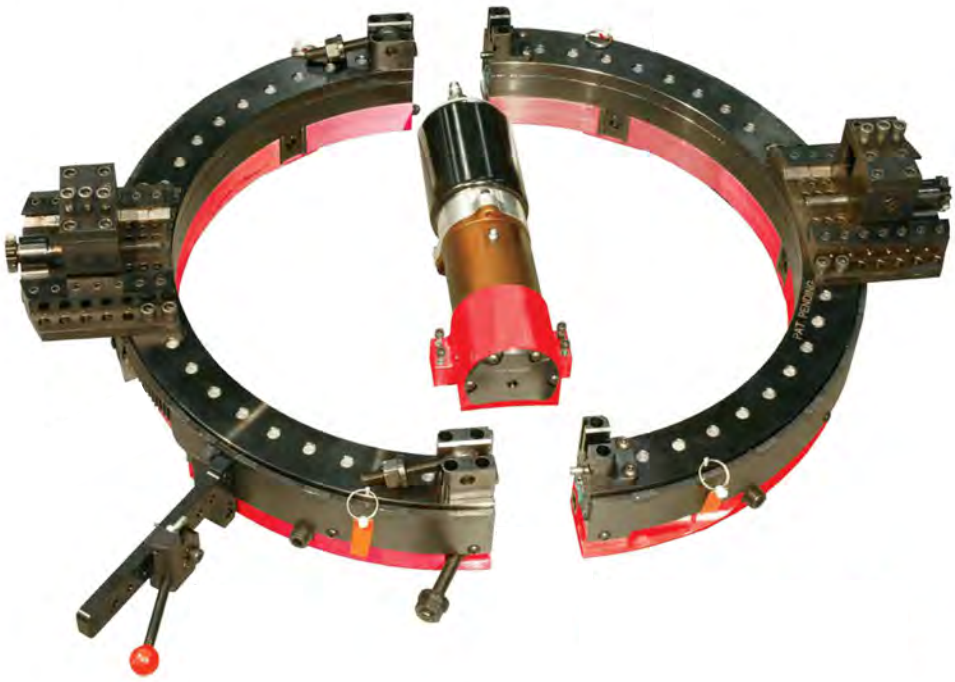
CE SPLIT FRAME CLAMSHELL

SPLIT FRAME CLAMSHELL

OPERATING MANUAL

ORIGINAL INSTRUCTIONS



H&S TOOL
A CLIMAX COMPANY

P/N 100580
May 2022
Revision 1

CLIMAX | BORTECH CALDER H&S TOOL

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CLIMAX World Headquarters

2712 East 2nd Street
Newberg, Oregon 97132 USA

Telephone (worldwide): +1-503-538-2815
Toll-free (North America): 1-800-333-8311
Fax: 503-538-7600

CLIMAX | H&S Tool World Headquarters

715 Weber Dr.
Wadsworth, OH 44281 USA

Telephone: +1-330-336-4550
Fax: 1-330-336-9159
hstool.com

CLIMAX | H&S Tool (UK Headquarters)

Unit 3 Martel Court
S. Park Business Park
Stockport SK1 2AF, UK

Telephone: +44 (0) 161-406-1720

CLIMAX | H&S Tool (European Headquarters)

Am Langen Graben 8
52353 Düren, Germany

Telephone: +49 24-219-1770
E-mail: ClimaxEurope@cpmt.com

CLIMAX | H&S Tool (Asia Pacific Headquarters)

316 Tanglin Road #02-01
Singapore 247978

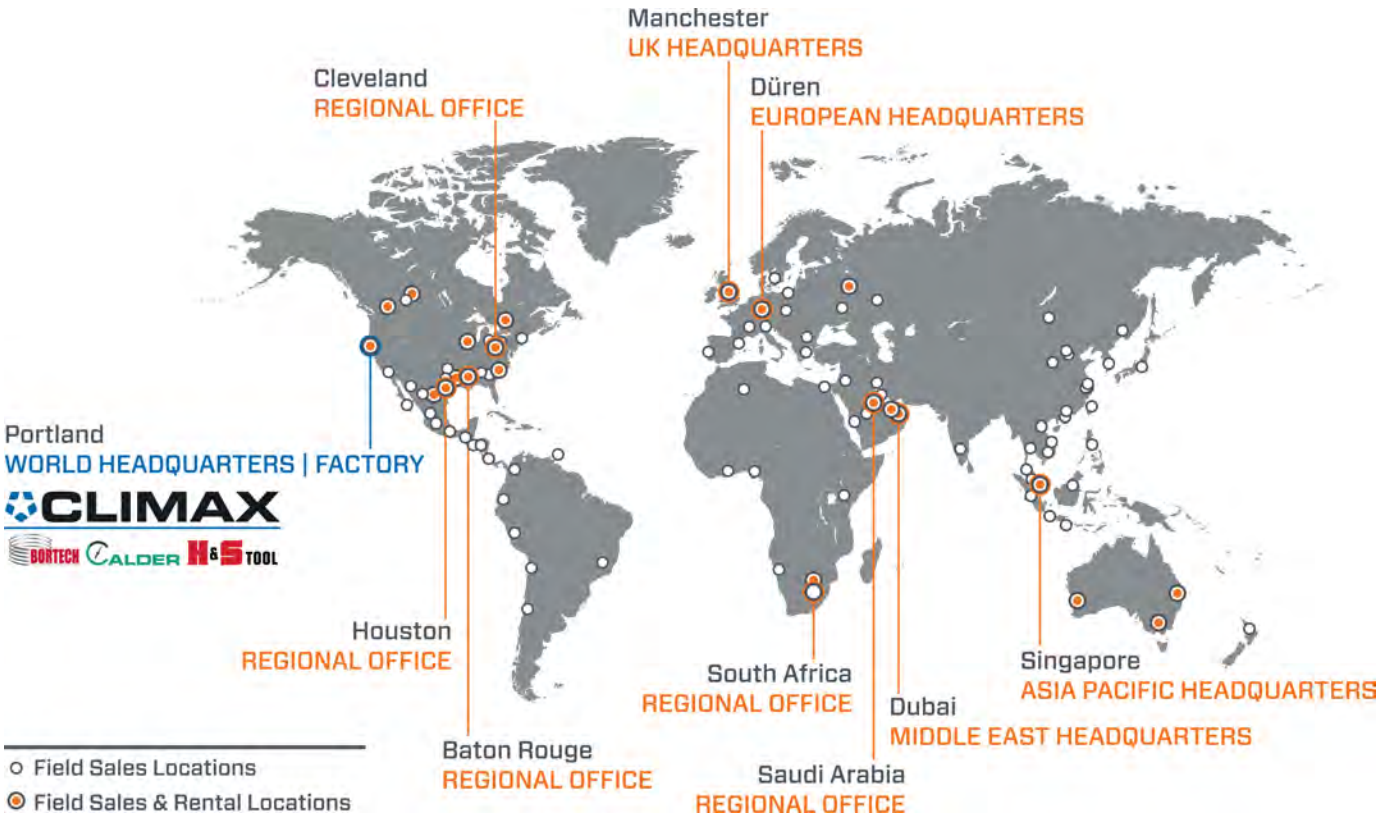
Telephone: +65 9647-2289
Fax: +65 6801-0699

CLIMAX | H&S Tool (Middle East Headquarters)

Warehouse #5, Plot: 369 272
Um Sequim Road
Al Quoz 4
PO Box 414 084
Dubai, UAE

Telephone: +971 04-321-0328

CLIMAX GLOBAL LOCATIONS



CE DOCUMENTATION

Declaration of Conformity

2006/42/EC Machinery Directive

Choose an item.

Choose an item.

Name of Manufacturer:
H&S Tool

Full postal address including country of origin:
2712 E. Second St., Newberg, OR 97132, USA

Object(s) of the Declaration:
Split-Frame Machine(s)

Name, type or model, batch or serial number:
MFC-2 (MO2) S/N MO2061203 and up
AFC-4 (S/N A04100901 and up), AFC-6 (S/N A06080901 and up), AFC-8 (S/N A08020901 and up), AFC-10 (S/N A10011002 and up), AFC-12 (S/N A12080901 and up), AFC-14 (S/N A1401101 and up), AFC-16 (S/N A16080901 and up), AFC-18 (S/N A18011001 and up), AFC-20 (S/N A20070701 and up), AFC-24 (S/N A24080901 and up), AFC-26 (S/N A26041201 and up), AFC-28 (S/N A280021001 and up), AFC-30 (S/N A30081001 and up), AFC-32 (S/N A32081001 and up), AFC-36 (S/N A36071001 and up), AFC-42 (S/N A42081001 and up), AFC-48 (S/N B48021101 and up), BFC-48 (S/N B48021101 and up), BFC-56 (S/N B56061101 and up), BFC-66 (S/N B66021301 and up), BFC-72 (S/N B72031401 and up), BFC-86 (S/N B86071401 and up):
Electrically, Hydraulically, or Pneumatically Powered

Harmonised Standards used, including number:

EN 349:1993+A1:2008 - Safety of Machinery; Gaps
EN 982:1996+A1:2008 - Safety of Machinery; Fluid Power
EN 1032:2003+A1:2008 - Mechanical Vibration Testing
Controls
EN ISO 3744:2010 - Acoustic Power
Milling Machine Safety
EN ISO 4413:2010 - Hydraulic Fluid Power
EN ISO 4414:2010 - Pneumatic Fluid Power
EN ISO 11201:2010 - Acoustics; Noise Emitted
EN ISO 13849-1:2015 - Safety of Machinery;
BS EN ISO 16090-1:2018 Machining centres,
Choose an item.

Full postal address of the authorized person in the Community:
Guido Ewers zum Rode
Climax GmbH
Am Langen Graben 8
52353 Duren, Germany

Approved as conforming to Standard ISO 9001:2015 by:
Eagle Registrations Inc.
40 N. Main Street, Suite 1880
Dayton, OH 45423

Declaration
I declare that the above information in relation to the supply / manufacture of this product is in conformity with the relevant provisions of the Directives and Harmonised Standards listed above in this document along with their respective amendments and other related documents. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Signature of Manufacturer: _____ **Position: VP of Engineering**

Date and Place: 4/4/2022 **, USA**

CE

LIMITED WARRANTY

CLIMAX Portable Machine Tools, Inc. (hereafter referred to as “CLIMAX”) warrants that all new machines are free from defects in materials and workmanship. This warranty is available to the original purchaser for a period of one year after delivery. If the original purchaser finds any defect in materials or workmanship within the warranty period, the original purchaser should contact its factory representative and return the entire machine, shipping prepaid, to the factory. CLIMAX will, at its option, either repair or replace the defective machine at no charge and will return the machine with shipping prepaid.

CLIMAX warrants that all parts are free from defects in materials and workmanship, and that all labor has been performed properly. This warranty is available to the customer purchasing parts or labor for a period of 90 days after delivery of the part or repaired machine or 180 days on used machines and components. If the customer purchasing parts or labor finds any defect in materials or workmanship within the warranty period, the purchaser should contact its factory representative and return the part or repaired machine, shipping pre-paid, to the factory. CLIMAX will, at its option, either repair or replace the defective part and/ or correct any defect in the labor performed, both at no charge, and return the part or repaired machine shipping prepaid.

These warranties do not apply to the following:

- Damage after the date of shipment not caused by defects in materials or workmanship
- Damage caused by improper or inadequate machine maintenance
- Damage caused by unauthorized machine modification or repair
- Damage caused by machine abuse
- Damage caused by using the machine beyond its rated capacity

All other warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose are disclaimed and excluded.

Terms of sale

Be sure to review the terms of sale which appear on the reverse side of your invoice. These terms control and limit your rights with respect to the goods purchased from CLIMAX.

About this manual

CLIMAX provides the contents of this manual in good faith as a guideline to the operator. CLIMAX cannot guarantee that the information contained in this manual is correct for applications other than the application described in this manual. Product specifications are subject to change without notice.

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LIST OF FIGURES

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LIST OF TABLES

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1 INTRODUCTION

IN THIS CHAPTER:

1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the Split Frame Clamshell.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the Split Frame Clamshell before attempting to set it up or operate it.

1.2 Safety alerts

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here[1]:

⚠ DANGER

indicates a hazardous situation which, if not avoided, ***WILL*** result in death or severe injury.

⚠ WARNING

indicates a hazardous situation which, if not avoided, ***COULD*** result in death or severe injury.

1. For more information on safety alerts, refer to *ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials*.

⚠ CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results.

1.3 GENERAL SAFETY PRECAUTIONS

CLIMAX leads the way in promoting the safe use of portable machine tools and valve testers. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

Training – Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact CLIMAX for machine-specific training information.

Risk assessment – Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.

Intended use – Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.

Personal protective equipment – Always wear appropriate personal protective gear when operating this or any other machine tool. Wear appropriate protective safety equipment including: Safety glasses, gloves, hard hat, steel toe shoes, ear plugs, hair restraints, and coveralls. Keep loose clothing, long hair, or any unsecured parts away from operating machines and moving parts. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine. Hot chips from the workpiece may burn or cut bare skin.

Work area – Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area. Use a brush to remove chips from cutting area and equipment. Do not use your hands or an air hose to remove chips and swarf.

Lifting – Many CLIMAX machine components are very heavy. Whenever possible, lift the machine or its components using proper hoisting equip-

ment and rigging. Always use designated lifting points on the machine. Follow lifting instructions in the setup procedures of this manual.

Lock-out/tag-out – Lock-out and tag-out the machine before performing maintenance.

Moving parts – CLIMAX machines have numerous exposed moving parts and interfaces that can cause severe impact, pinching, cutting, and other injuries. Except for stationary operating controls, avoid contact with moving parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts. Follow your company protocol on glove protection around moving or rotating parts and sharp edges.

Sharp edges – Cutting tools and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a cutting tool or workpiece.

Hot surfaces – During operation, motors, pumps, HPUs, and cutting tools can generate enough heat to cause severe burns. Pay attention to hot surface labels, and avoid contact with bare skin until the machine has cooled.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

Pneumatic powered machines with a hand throttle – When using a Series 75 pneumatic motor with a "Dead Man Handle" (DMH), as seen in Figure A-68 on page 150 and following, make sure the throttle lever is locked in the "OFF" position when not in use to avoid unexpected movement or injury. Make sure the DMH throttle lever operates properly before running the machine. Disengage the safety lock and depress the DMH throttle lever to actuate the motor.

Workpiece separation – When severing pipe, ensure that once the pipe is cut through, neither piece (the one the machine is mounted to or the cut piece) can move or come loose in a way that will cause personal injury.

Eye hazard – This machine produces metal chips during operation. Always wear eye protection when operating the machine.

Sound level – This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it. During testing, the machine produced the sound levels[1] listed in Table 1-1.

TABLE 1-1. PNEUMATIC MACHINE SOUND LEVELS

	AFC motors	BFC motors
Sound power	103.5 dBA	103.8 dBA
Operator sound pressure	100.7 dBA	102.3 dBA
Bystander sound pressure	100.0 dBA	102.9 dBA

TABLE 1-2. ELECTRIC MACHINE SOUND LEVELS

	AFC and BFC motors
Sound power	94.0 dBA
Operator sound pressure	91.4 dBA
Bystander sound pressure	89.6 dBA

TABLE 1-3. HYDRAULIC MACHINE SOUND LEVELS

	AFC and BFC motors
Sound power	73.9 dBA
Operator sound pressure	76.5 dBA
Bystander sound pressure	76.1 dBA

Hazardous environments – Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.

Machine mounting – Do not operate the machine unless mounted to a workpiece in accordance with this manual. If mounting the machine in an overhead or vertical position, do not remove hoist rigging until the machine is mounted to the workpiece in accordance with this manual.

1. Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure to which it is attached become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this. However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

TABLE 1-4. RISK ASSESSMENT CHECKLIST BEFORE SET-UP

	Before set-up
☐	I took note of all the warning labels on the machine.
☐	I removed or mitigated all identified risks (such as tripping, cutting, crushing, entanglement, shearing, or falling objects).
☐	I considered the need for personnel safety guarding and installed any necessary guards.
☐	I read the machine assembly instructions (Section 3) and took inventory of all the items required but not supplied (Section 2.6).
☐	I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine.
☐	I located the fall paths involved in lifting and rigging operations. I have taken precautions to keep workers away from the identified fall path.
☐	I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.
☐	I evaluated and mitigated any other potential risks specific to my work area.

TABLE 1-5. RISK ASSESSMENT CHECKLIST AFTER SET-UP

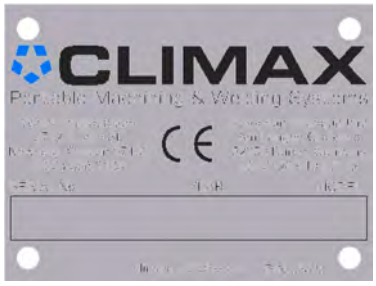
	After set-up
☐	I checked that the machine is safely installed (according to Section 3) and the potential fall path is clear. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.
☐	I checked that any cut sections of the workpiece cannot fall or cause an additional hazard.
☐	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.
☐	I planned for containment of any chips or swarf produced by the machine.
☐	I followed the required maintenance checklist (Section 5.1) with the recommended lubricants (Section 5.2).
☐	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.
☐	I checked that all affected personnel understand and are clear of the danger zone.
☐	I evaluated and mitigated any other potential risks specific to my work area.

1.7 LABELS

The following warning and identification labels should be on your machine. If any are defaced or missing, contact CLIMAX immediately for replacements.

1.7.1 Split Frame Clamshell labels

TABLE 1-6. SPLIT FRAME CLAMSHELL LABELS

	P/N 35828 CE mass plate		P/N 100904 Warning label: hand crush hazard from above
	P/N 100905 Label: remove locking pin		P/N 1113333 Warning label: pinch point
		P/N 1114444 Warning label: wear safety glasses and hearing protection. Read the operating manual	
	P/N 1117777 Label: made in the USA		P/N 1118888 H&S Tool label
	P/N 1119999 H&S Tool label		

Refer to the exploded views in Appendix A for label locations on the Split Frame Clamshell.

1.7.2 Defender™ labels

TABLE 1-7. DEFENDER™ LABELS

	P/N 96876 H&S tool horizontal label (black background)		P/N 96877, 96878 H&S Tool vertical labels (black background)
	P/N 96879 H&S Tool Defender label		P/N 96881 H&S Tool label (white background)
	P/N 97510, 97511, 97512 H&S Tool Clamshell logo		
	Defender™ label -- curved to fit guard on all models See Table 1-8 for part numbers per model		

TABLE 1-8. DEFENDER™ LABEL PART NUMBERS

Part number	Description
97064	LABEL DEFENDER CLEAR AFC-4
97065	LABEL DEFENDER CLEAR AFC-6
97052	LABEL DEFENDER CLEAR AFC-8 10 X 1.875
97066	LABEL DEFENDER CLEAR AFC-10
96913	LABEL DEFENDER CLEAR AFC-12 10 X 1.875
97067	LABEL DEFENDER CLEAR AFC-14
96880	LABEL DEFENDER CLEAR AFC-16 19.5 X 2.375
97068	LABEL DEFENDER CLEAR AFC-18
97069	LABEL DEFENDER CLEAR AFC-20

TABLE 1-8. DEFENDER™ LABEL PART NUMBERS

Part number	Description
97053	LABEL DEFENDER CLEAR AFC-24 19.5 X 2.375
97054	LABEL DEFENDER CLEAR AFC-26
97055	LABEL DEFENDER CLEAR AFC-28
97056	LABEL DEFENDER CLEAR AFC-30
97057	LABEL DEFENDER CLEAR AFC-32
97058	LABEL DEFENDER CLEAR AFC-36
97059	LABEL DEFENDER CLEAR AFC-42
97060	LABEL DEFENDER CLEAR BFC-48
97061	LABEL DEFENDER CLEAR BFC-56
97062	LABEL DEFENDER CLEAR BFC-66
97063	LABEL DEFENDER CLEAR BFC-72
97503	LABEL DEFENDER CLEAR BFC-86

The following figures display the location of the labels on each of the components of the Defender™. For further identification of location placement, refer to the exploded views in Appendix A.

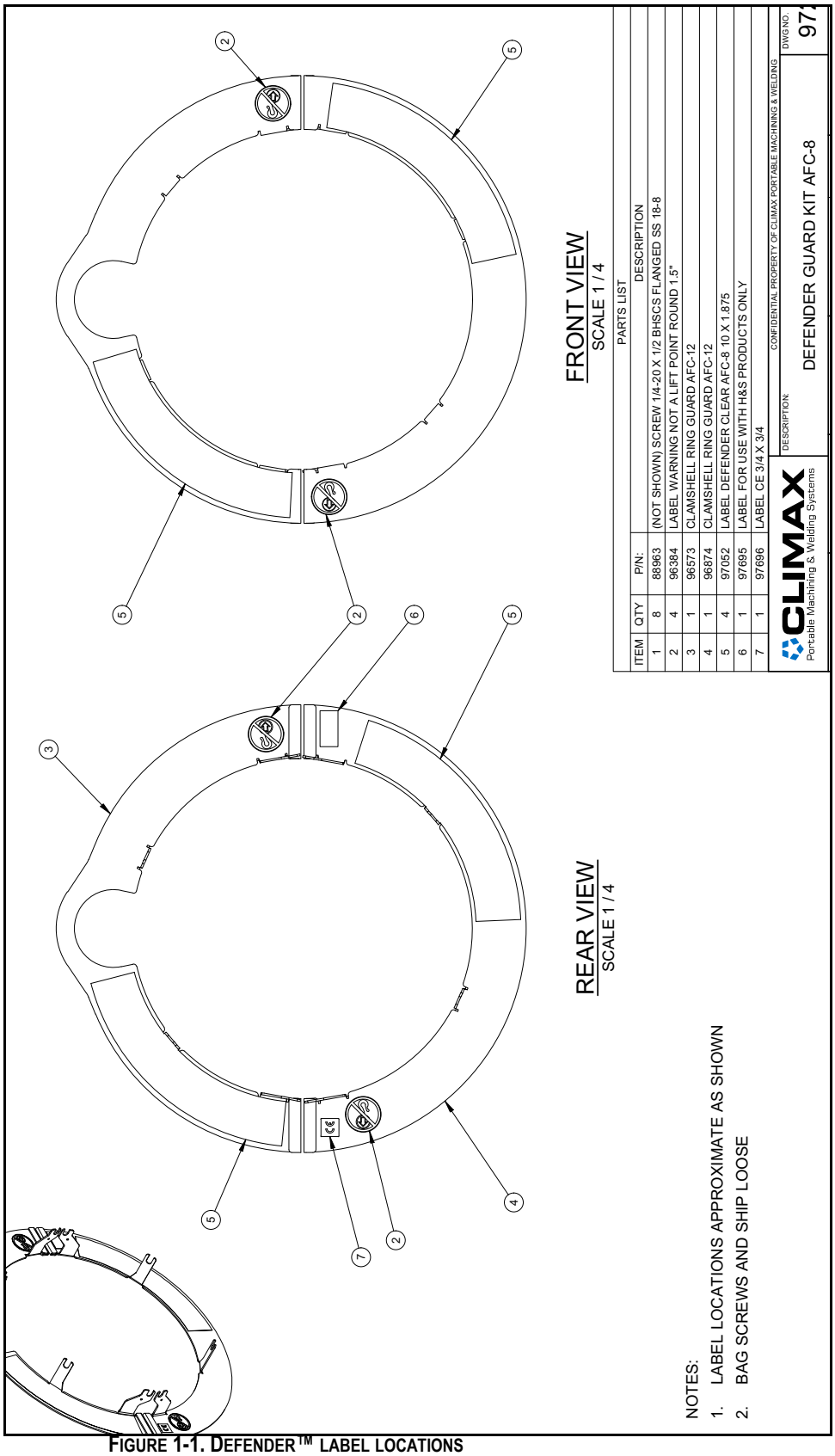


FIGURE 1-1. DEFENDER™ LABEL LOCATIONS

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2 OVERVIEW

IN THIS CHAPTER:

2.1 SPLIT FRAME CLAMSHELL FEATURES AND COMPONENTS

The H&S Tool Split Frame Clamshell machines are portable pipe lathes designed to simultaneously sever and bevel in-line pipe.

The frame is split for easy installation onto in-line pipe. The machine is light-weight, but its patented design makes it one of the most rigid machines in the industry. It can easily cut and bevel up to 4" (102 mm) maximum wall thickness pipe and tubing.

The tool slide automatically feeds the tool bit into the workpiece with each rotation of the clamshell (approximately 0.003" [0.076 mm] per rotation per tripper) to assure a smooth, precise finish.

The versatile AFC series cuts and bevels pipes from 1–42"(25–1,067 mm) outside diameter (OD).

The heavy-duty BFC series features a thicker body to withstand the high loads required for heavy wall pipes in large diameters. They are available for pipes ranging 33.75–86" (897–2,184 mm) in OD.

In additional to cutting and severing, the Split Frame Clamshell has several universal attachments that may be used on H&S AFC4" (102 mm) clamshells all the way up to BFC86" (2,184 mm) clamshells, including the following:

- Counter-bores
- Axial feed slides for reducing the OD of a pipe or shaft
- Flange facing kits
- Low-clearance tool slides and motors

Machining function and capacities include the following:

- Sever in-line pipe

- Sever and bevel in-line pipe
- Sever and j-bevel in-line pipe
- Sever and double bevel (that is, bevel both sides of the cut) in-line pipe
- Counter bore
- Flange resurfacing

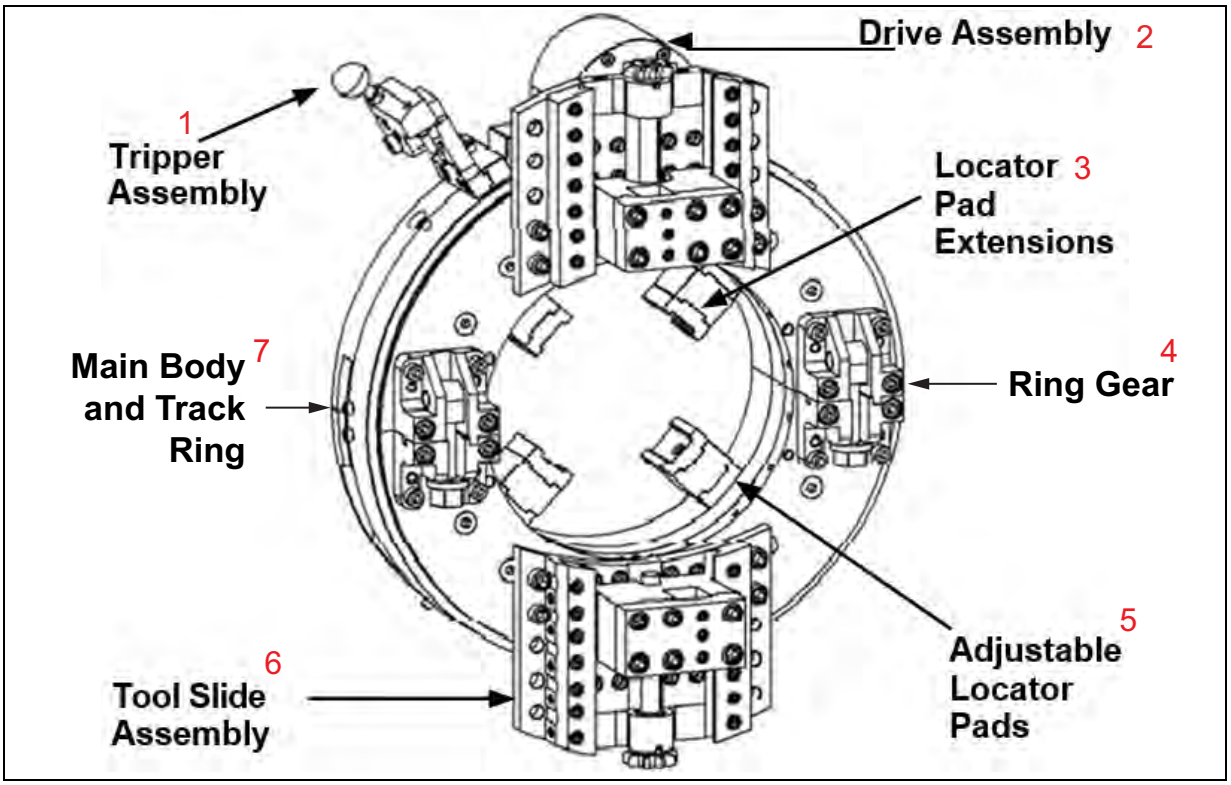

FIGURE 2-1. SPLIT FRAME CLAMSHELL MAIN COMPONENTS

TABLE 2-1. SPLIT FRAME CLAMSHELL COMPONENT IDENTIFICATION

Number	Component
1	Tripper assembly
2	Drive assembly
3	Locator pad extensions
4	Ring gear
5	Adjustable locator pads
6	Tool slide assembly
7	Main body and track ring

Principle components include the following:

Tripper assembly – The tripper assembly is bolted to the outside of the of the body ring and holds the tripper pin. The tripper pin is used to turn the star wheel on the feed screw slide assembly. This “feeds” the tool bit into the work piece. One or more tripper assemblies can be used at a time.

Drive assembly – The drive assembly is an aluminum housing that contains a pinion gear on a shaft that is supported by a patented bearing arrangement. The motor assembly is designed to be removed easily and provide the appropriate gear mesh for smooth operation. Solidly mounted with four bolts, the assembly is consistently located flush with the back of the body ring.

There are several different drive arrangements, including electric, hydraulic, and pneumatic, available for the H&S clamshells (see Section 3.8 on page 48). Drive options may be changed to suit particular needs or type of environment in which the work is being performed.

Ring gear – The ring gear provides the front surface that the tool slides and accessories attach to. It also provides the mechanical interface with the drive motor through gear teeth.

Locator pad assembly – The Split Frame Clamshell series use adjustable locator pad assemblies with 3/4" (19 mm) of travel. Turning set screws located on the outside of the body ring actuates the adjustable locators. To mount the clamshell on smaller diameters, locator extensions are bolted to the adjustable locator pads.

Tool slide assembly – The slide assembly tool block holds the different types of cutting tools, using shims for proper alignment, that are provided in the toolkit, when needed. The slide assembly has an adjustable gib and a feed screw that provides the ability to feed the tooling into the work piece.

The slide assembly is bolted to the ring gear face of the clamshell and can be adjusted in or out in 3/4" (19 mm) increments by moving four bolts.

Main body – An aluminum split ring that is capable of being disassembled for installation on in-line piping and holds the motor assembly and adjustable locator clamping pads and tripper assembly.

Track ring – A precision machined ring, attached to the main body that provides a tough, wear resistant bearing surface for the roller bearings to ride in providing the means for the assembly to rotate.

Bearing assemblies – The cutting head assembly runs on precision bearings mounted on the ring gear. The bearings are encapsulated in the track ring and are designed to provide for axial and radial forces created during cutting operations.

Tooling – Both M2 and T15 tooling in 0.5" x 1" (13 x 25 mm) for severing and 1" x 1" (25 x 25 mm) for severing and beveling in left-hand and right-hand are carried in standard and special degrees at your local distributor. Insert holders with replaceable carbide inserts are available for harder, more exotic materials in the industrial standard degrees and straight sever. Specialty tool bits can be designed as required by your application.

2.2 DEFENDER™ FEATURES AND COMPONENTS

The Defender™ is a plug-and-play accessory package that can be added to any H&S Clamshell machine measuring from 4–86" (102–2,184 mm).

The Defender™ package consists of a guard assembly and a pneumatic controller. The easy on-and-off guards eliminate pinch points on the rotating equipment when an operator must be within reach during normal operation.

The Defender™ remote pendant allows the operator to activate and deactivate the tripper mechanism up to 72" (1,829 mm) from the workpiece, so that the operator may observe the machine operation while not risking contact with rotating equipment. This is an important feature when operating in a restrictive area such as ditches, confined areas, or overhead areas.

The remote tripper mechanism connects to an Air Caddy with a CE-compliant emergency stop. The system also includes a low-pressure drop-out function.

If power loss occurs, the machine cannot restart when power is restored without operator action.

2.3 CONTROLS

The Split Frame Clamshell has the option of an air motor driven, electric motor driven or hydraulically driven machine.

The air motor driven machine is supplied with an Air Caddy control box which provides the proper operator controls with safety lockout and unintentional start up controls.

The electric drive application has the controls built into the motor and the hydraulic motors require a hydraulic power unit which includes the safety lockout and unintentional start-up controls.

2.3.1 Air motor controls (with the Defender™)

The controls for the Split Frame Clamshell, when accompanied with the Defender™ kit, are all located on the operator pendant (P/N 96374, shown in Figure 2-2 on page 17).

The operator pendant connects to the Defender Air Caddy P/N 102850 for single air motors and P/N 102960 for dual air motors.

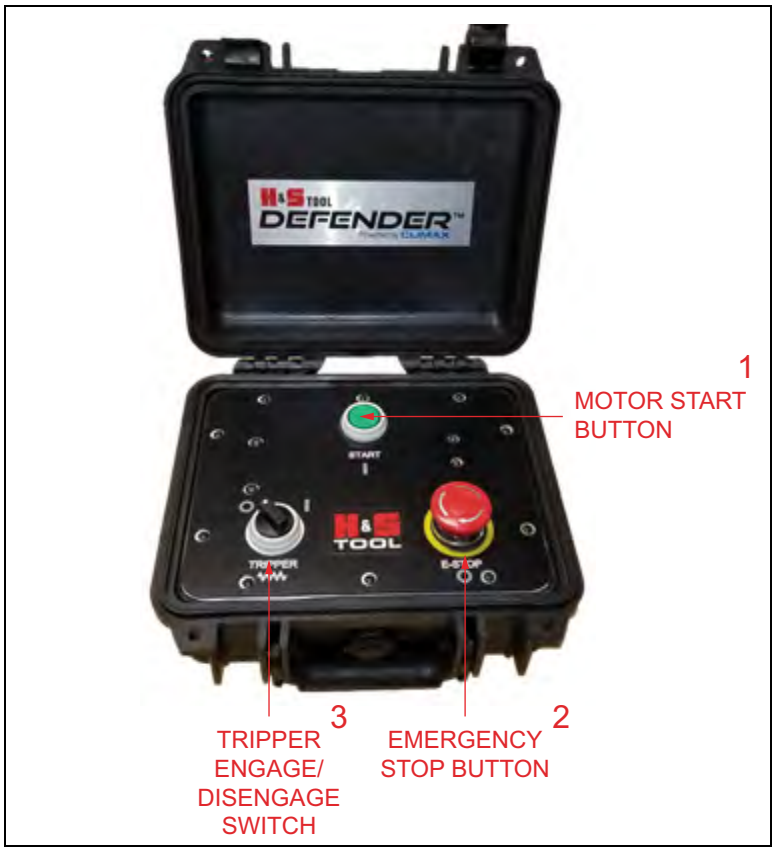

FIGURE 2-2. OPERATOR PENDANT (P/N 96374) CONTROLS

TABLE 2-2. OPERATOR PENDANT CONTROLS IDENTIFICATION

Number	Component	Function
1	Motor start button	Starts the motor rotation and resets the low-pressure dropout.
2	Emergency STOP	Isolates the supply air and vents the downstream air. Press down to stop the machine; twist and pull up to reset.
3	Tripper engage/disengage switch	Engages and disengages the tripper. The tripper feeds the tool in the engaged position. See Appendix A for parts list information.

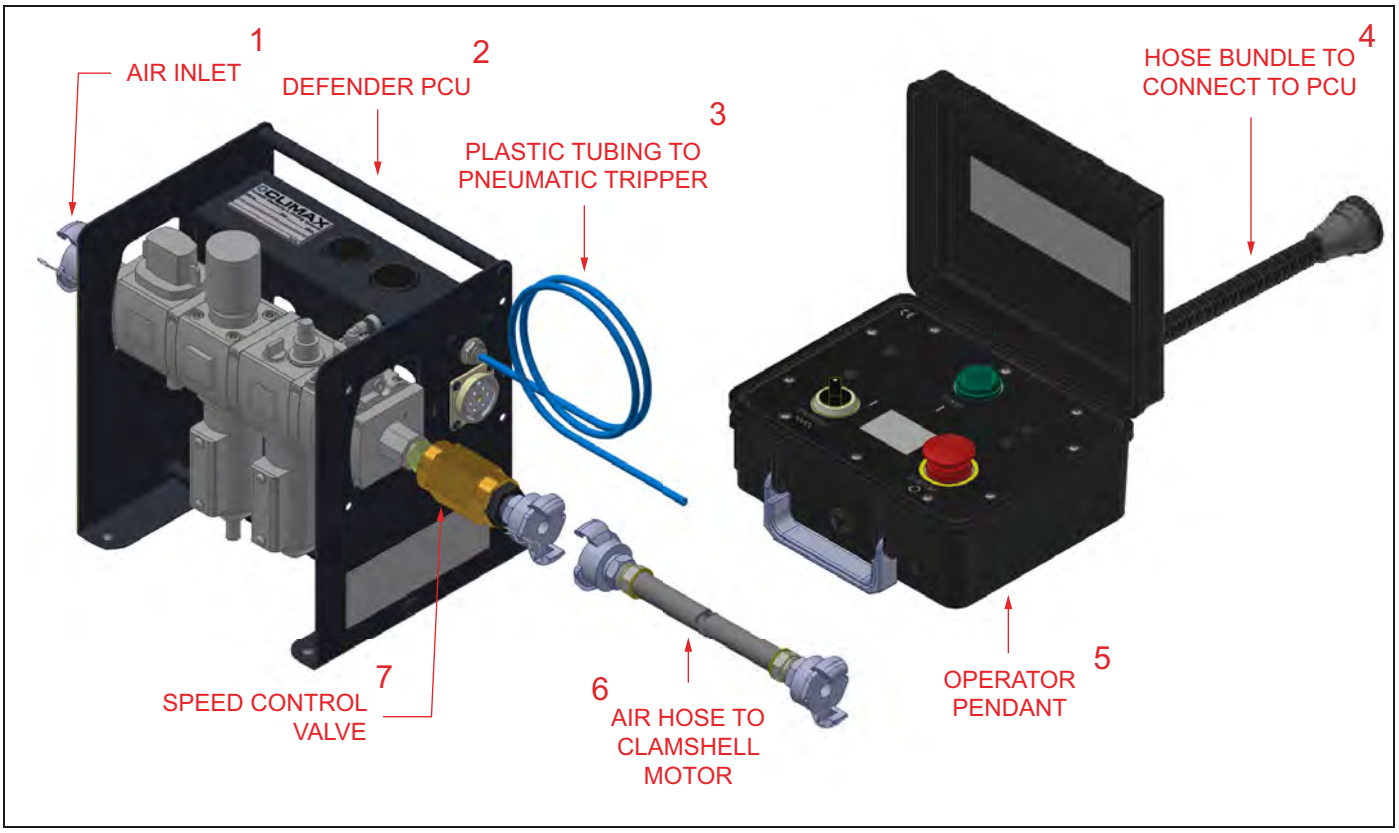

FIGURE 2-3. DEFENDER AIR CADDY AND PENDANT

TABLE 2-3. SPLIT FRAME CLAMSHELL COMPONENT IDENTIFICATION

Number	Component
1	Air inlet
2	Defender Air Caddy
3	Plastic tubing to pneumatic tripper
4	Hose bundle to connect to the Air Caddy
5	Operator pendant
6	Air hose to the clamshell motor
7	Speed control valve

2.3.2 Air motor controls (without the Defender™)

See Figure A-53 on page 137 for the components and parts list of the NAC Air Caddy.

⚠ WARNING

Always stop the machine and lock-out/tag-out the Air Caddy before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

Emergency shutdown

The clamshell controls without the Defender™ kit consist of an Air Caddy, as seen on Figure A-53 on page 137, for the main pneumatic drive motor. Rotation speed is controlled with a throttle valve. The start and stop functions are controlled with a dead-man handle (DMH). The tripper is activated manually.

To stop machine operation immediately, release the throttle lever on the DMH.

Before restarting the Split Frame Clamshell, do the following:

1. Check that the area around the machine swing area is free from loose tools, obstructions or personnel.
2. Squeeze the throttle lever of the DMH.

If using a pneumatic motor with the DMH, as seen in Figure A-52 on page 136, make sure the throttle lever is locked in the “OFF” position when not in use to avoid unexpected movement or injury. Make sure the DMH throttle lever operates properly before running the machine. Disengage the safety lock and depress the DMH throttle lever to actuate the motor.

⚠ WARNING

Do not disable the throttle lever or throttle lever lock. This could lead to accidental startup, severe personal injury, and death.

⚠ WARNING

Always stop the machine and lock-out/tag-out the air supply before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

2.3.3 Hydraulic motor controls

Hydraulic-powered Clamshells are operated with the controls supplied with the hydraulic power unit (HPU). Refer to those instructions before operating the equipment.

Hydraulic-powered machines can still use the Defender remote tripper pendant shown in Figure 2-2 on page 17.

2.3.4 Electric motor controls

Electric-powered Clamshells are operated by the switch on the electric drive motor. The motor trigger switch may be locked at the desired speed setting. Momentarily pushing the motor trigger will stop the motor.

Electric-powered machines can still use the Defender remote tripper pendant shown in Fig 2-2.

2.4 DIMENSIONS

See Appendix A for figures showing the machine and operating dimensions.

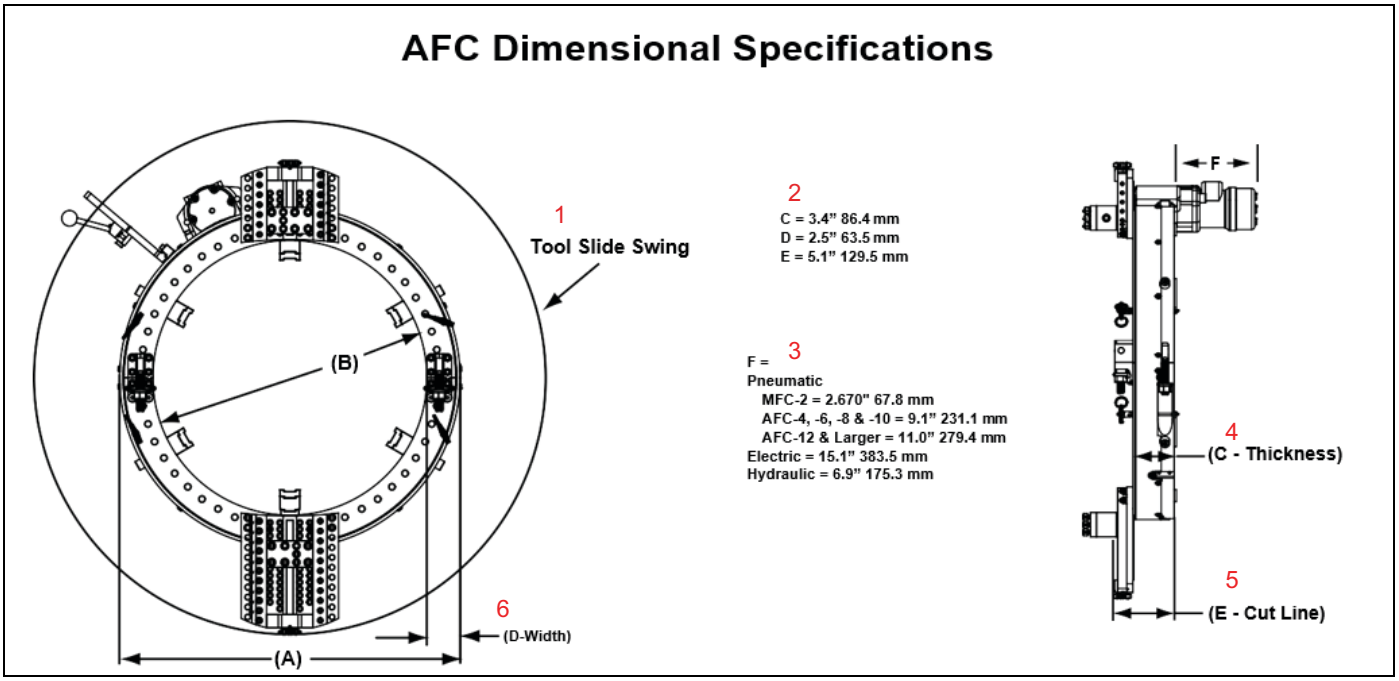

FIGURE 2-4. AFC DIMENSIONS

TABLE 2-4. AFC DIMENSIONS IDENTIFICATION

Number	Component
1	Tool slide swing
2	C= 3.4" 86.4 mm D= 2.5" 63.5 mm E= 5.1" 129.5 mm

TABLE 2-4. AFC DIMENSIONS IDENTIFICATION (CONTINUED)

Number	Component
3	F= Pneumatic AFC-4, -6, -8 and -10 = 9.1” 231.1 mm AFC-12 and larger = 11.0” 279.4 mm Electric = 15.1” 383.5 mm Hydraulic = 6.9” 175.3 mm
4	C-Thickness
5	E-Cut line
6	(D-Width)

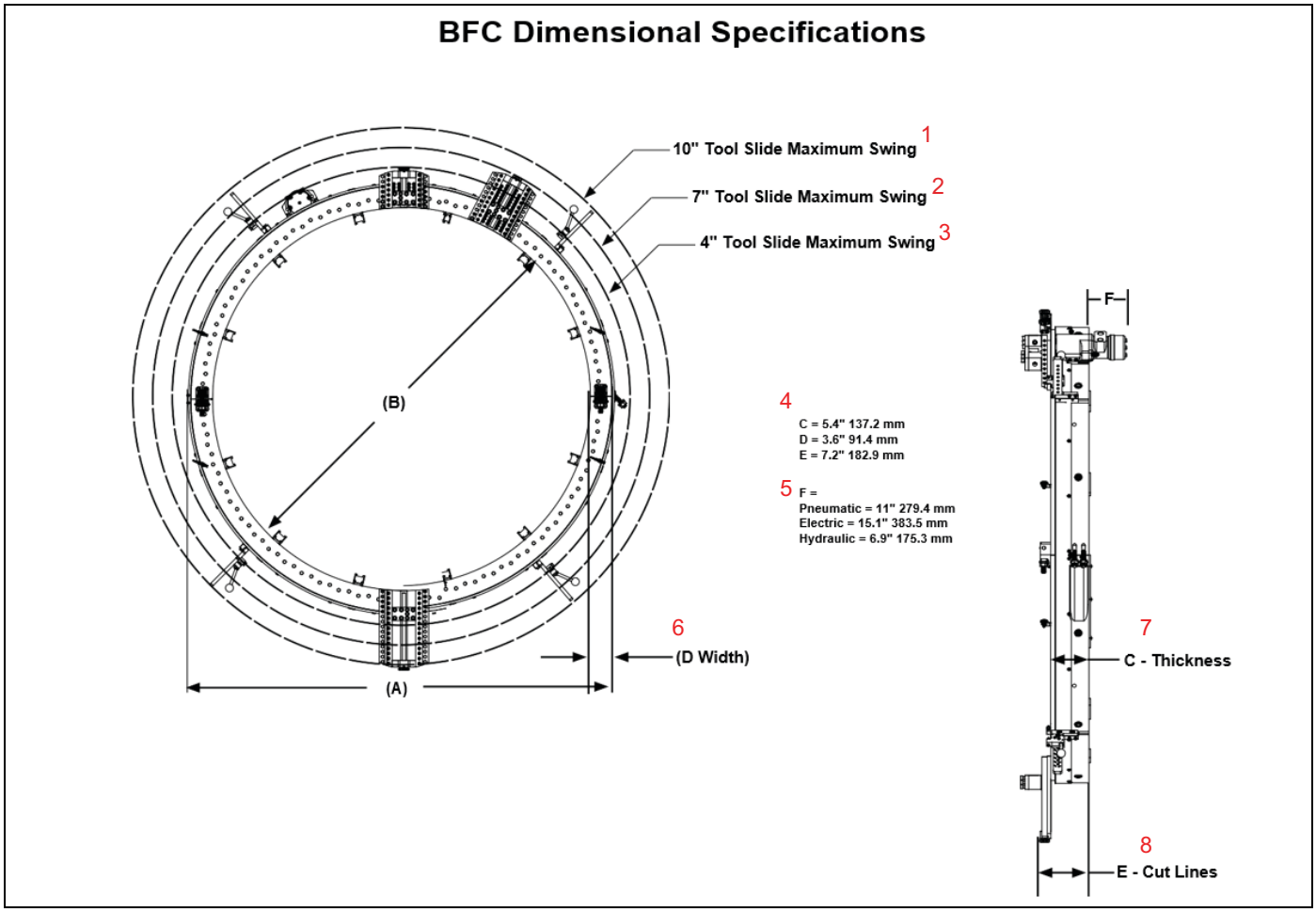

FIGURE 2-5. BFC DIMENSIONS

TABLE 2-5. BFC DIMENSIONS IDENTIFICATION

Number	Component
1	10” (254 mm) Tool slide maximum swing
2	7” (178 mm) Tool slide maximum swing
3	4” (102 mm) Tool slide maximum swing
4	C= 5.4” 137.2 mm D= 3.6” 91.4 mm E= 7.2” 182.9 mm
5	F= Pneumatic = 11” 279.4 mm Electric= 15.1” 383.5 mm Hydraulic= 6.9” 175.3 mm
6	(D Width)
7	C- Thickness
8	E- Cut lines

2.5 SPECIFICATIONS

TABLE 2-6. MASS SPECIFICATIONS

AFC-4:	37 lbs (17 kg)
AFC-6:	45 lbs (20 kg)
AFC-8:	54 lbs (24.5 kg)
AFC-10:	63 lbs (29 kg)
AFC-12:	72 lbs (33 kg)
AFC-14:	78 lbs (35 kg)
AFC-16:	91 lbs (41 kg)
AFC-18:	96 lbs (43.5 kg)
AFC-20:	108 lbs (49 kg)
AFC-24:	125 lbs (27 kg)
AFC-26:	140 lbs (63.5 kg)
AFC-28:	142 lbs (64 kg)
AFC-30:	157 lbs (71 kg)

TABLE 2-6. MASS SPECIFICATIONS (CONTINUED)

AFC-32:	165 lbs (75 kg)
AFC-36:	187 lbs (85 kg)
AFC-42:	210 lbs (95 kg)
AFC-48:	236 lbs (107 kg)
BFC-36:	405 lbs (184 kg)
BFC-42:	450 lbs (204 kg)
BFC-48:	543 lbs (246 kg)
BFC-56:	602 lbs (273 kg)
BFC-66:	708 lbs (321 kg)
BFC-72:	760 lbs (345 kg)
BFC-86:	886 lbs (402 kg)

2.5.1 AFC specifications

AFC Locator Extensions Coverage

	STANDARD RANGE	½"	1"	1.5"	2"	2.5"	3"	3.5"	4"
AFC4	5.000" - 3.500"	4.000" - 2.500"	3.000" - 1.500"	2.000" - 0.500"					
mm	127 - 88.9	101.6 - 63.5	76.2 - 38.1	50.8 - 12.7					
AFC6	7.125" - 5.625"	6.125" - 4.625"	5.125" - 3.625"	4.125" - 2.625"	3.125" - 1.625"				
mm	181.0 - 142.9	155.6 - 117.5	130.2 - 92.1	104.8 - 66.7	79.4 - 41.3				
AFC8	9.125" - 7.625"	8.125" - 6.625"	7.125" - 5.625"	6.125" - 4.625"	5.125" - 3.625"	4.125" - 2.625"			
mm	231.8 - 193.7	206.4 - 168.3	181.0 - 142.9	155.6 - 117.5	130.2 - 92.1	104.8 - 66.7			
AFC10	11.250" - 9.750"	10.250" - 8.750"	9.250" - 7.750"	8.250" - 6.750"	7.250" - 5.750"	6.250" - 4.750"	5.250" - 3.750"		
mm	285.8 - 247.7	260.4 - 222.3	235.0 - 196.9	209.6 - 171.5	184.2 - 146.1	158.8 - 120.7	133.4 - 95.3		
AFC12	13.250" - 11.750"	12.250" - 10.750"	11.250" - 9.750"	10.250" - 8.750"	9.250" - 7.750"	8.250" - 6.750"	7.250" - 5.750"	6.250" - 4.750"	
mm	336.6 - 298.5	311.2 - 273.1	285.8 - 247.7	260.4 - 222.3	235.0 - 196.9	209.6 - 171.5	184.2 - 146.1	158.8 - 120.7	
AFC14	14.500" - 13.000"	13.500" - 12.000"	12.500" - 11.000"	11.500" - 10.000"	10.500" - 9.000"	9.500" - 8.000"	8.500" - 7.000"	7.500" - 6.000"	6.500" - 5.000"
mm	368.3 - 330.2	342.9 - 304.8	317.5 - 279.4	292.1 - 254.0	266.7 - 228.6	241.3 - 203.2	215.9 - 177.8	190.5 - 152.4	165.1 - 127.0
AFC16	16.500" - 15.000"	15.500" - 14.000"	14.500" - 13.000"	13.500" - 12.000"	12.500" - 11.000"	11.500" - 10.000"	10.500" - 9.000"	9.500" - 8.000"	8.500" - 7.000"
mm	419.1 - 381.0	393.7 - 355.6	368.3 - 330.2	342.9 - 304.8	317.5 - 279.4	292.1 - 254.0	266.7 - 228.6	241.3 - 203.2	215.9 - 177.8
AFC18	18.750" - 17.250"	17.750" - 16.250"	16.750" - 15.250"	15.750" - 14.250"	14.750" - 13.250"	13.750" - 12.250"	12.750" - 11.250"	11.750" - 10.250"	10.750" - 9.250"
mm	476.3 - 438.2	450.9 - 412.8	425.5 - 387.4	400.1 - 362.0	374.7 - 336.6	349.3 - 311.2	323.9 - 285.8	298.5 - 260.4	273.1 - 235.0
AFC20	20.750" - 19.250"	19.750" - 18.250"	18.750" - 17.250"	17.750" - 16.250"	16.750" - 15.250"	15.750" - 14.250"	14.750" - 13.250"	13.750" - 12.250"	12.750" - 11.250"
mm	527.1 - 489.9	501.7 - 463.6	476.3 - 438.2	450.9 - 412.8	425.5 - 387.4	400.1 - 362.1	374.7 - 336.6	349.3 - 311.2	323.9 - 285.8
AFC24	24.750" - 23.250"	23.750" - 22.250"	22.750" - 21.250"	21.750" - 20.250"	20.750" - 19.250"	19.750" - 18.250"	18.750" - 17.250"	17.750" - 16.250"	16.750" - 15.250"
mm	628.7 - 590.6	603.3 - 565.2	577.9 - 539.8	552.5 - 514.4	527.1 - 489.0	501.7 - 463.6	476.3 - 438.2	450.9 - 362.0	425.5 - 387.4
AFC26	26.750" - 25.250"	25.750" - 24.250"	24.750" - 23.250"	23.750" - 22.250"	22.750" - 21.250"	21.750" - 20.250"	20.750" - 19.250"	19.750" - 18.250"	18.750" - 17.250"
mm	679.5 - 641.4	654.0 - 616.0	628.65 - 590.6	603.25 - 565.2	577.9 - 539.8	552.5 - 514.4	527.1 - 489.0	501.7 - 463.6	476.3 - 438.2
AFC28	28.750" - 27.250"	27.750" - 26.250"	26.750" - 25.250"	25.750" - 24.250"	24.750" - 23.250"	23.750" - 22.250"	22.750" - 21.250"	21.750" - 20.250"	20.750" - 19.250"
mm	730.3 - 692.2	704.9 - 666.8	679.5 - 641.4	654.04 - 616.0	628.7 - 590.6	603.3 - 565.2	577.9 - 539.8	552.5 - 514.4	527.9 - 489.0
AFC30	31.000" - 29.500"	30.000" - 28.500"	29.000" - 27.500"	28.000" - 26.500"	27.000" - 25.500"	26.000" - 24.500"	25.000" - 23.500"	24.000" - 22.500"	23.000" - 21.500"
mm	787.4 - 749.3	762.0 - 723.9	736.6 - 698.5	711.20 - 673.1	685.8 - 647.7	660.4 - 622.3	635.00 - 596.9	609.6 -571.5	584.2 - 546.1
AFC32	33.000" - 31.500"	32.000" - 30.500"	31.000" - 29.500"	30.000" - 28.500"	29.000" - 27.500"	28.000" - 26.500"	27.000" - 25.500"	26.000" - 24.500"	25.000" - 23.500"
mm	838.2 - 800.1	812.8 - 774.7	787.4 - 749.3	762.0 - 723.9	736.6 - 698.5	711.2 - 673.1	685.8 - 647.7	660.4 - 622.3	635.0 - 596.9
AFC36	37.000" - 35.500"	36.000" - 34.500"	35.000" - 33.500"	34.000" - 32.500"	33.000" - 31.500"	32.000" - 30.500"	31.000" - 29.500"	30.000" - 28.500"	29.000" - 27.500"
mm	939.8 - 901.7	914.4 - 876.3	889.0 - 850.9	863.6 - 825.5	838.2 - 800.1	812.8 - 774.7	787.4 - 749.3	762.0 - 723.9	736.6 - 698.5
AFC39	40.000" - 38.500"	39.000" - 37.500"	38.000" - 36.500"	37.000" - 35.500"	36.000" - 34.500"	35.000" - 33.500"	34.000" - 32.500"	33.000" - 31.500"	32.000" - 30.500"
mm	1016.0 - 977.9	990.6 - 952.5	965.2 - 927.1	939.8 - 901.7	914.4 - 876.3	889.0 - 850.9	863.2 - 825.5	838.2 - 800.1	812.8 - 774.7
AFC42	43.000" - 41.500"	42.000" - 40.500"	41.000" - 39.500"	40.000" - 38.500"	39.000" - 37.500"	38.000" - 36.500"	37.000" - 35.500"	36.000" - 34.500"	35.000" - 33.500"
mm	1092.2 - 1054.1	1066.8 - 1028.7	1041.4 - 1003.3	1016.0 - 977.9	990.6 - 952.5	965.2 - 927.1	939.8 - 901.7	914.4 - 876.3	889.0 - 850.9

FIGURE 2-6. AFC LOCATOR EXTENSIONS COVERAGE

AFC Series									
Model	Nom. Pipe Size	A	B	1" Slide Swing	2" Slide Swing	3" Slide Swing	4" Slide Swing	7" Slide Swing	Locator Pads
AFC-4	1" - 4"	10.026"	5.000"	10.649"	12.869"	14.921"	16.921"		4
mm	33.4 - 114.3	254.7	127.0	270.5	326.9	379.0	429.8		
AFC-6	2" - 6"	12.150"	7.125"	12.801"	15.021"	17.073"	19.073"		4
mm	60.3 - 168.3	308.6	181.0	325.1	381.5	433.7	484.4		
AFC-8	3" - 8"	14.149"	9.125"	15.149"	17.369"	19.423"	21.421"	27.370"	4
mm	88.9 - 219.1	359.4	231.8	384.8	441.2	493.3	544.1	695.2	
AFC-10	4" - 10"	16.315"	11.250"	17.468"	19.688"	21.740"	23.740"	29.688"	4
mm	114.3 - 273.1	414.40	285.75	443.7	500.1	552.2	603.0	754.1	
AFC-12	6" - 12"	18.400"	13.250"	19.014"	21.234"	23.286"	25.286"	31.234"	4
mm	152.4 - 323.9	467.4	336.6	483.0	539.3	591.5	642.3	793.3	
AFC-14	6" - 14"	19.650"	14.500"	20.228"	22.448"	24.500"	26.500"	32.449"	4
mm	168.3 - 355.6	499.11	368.3	513.8	570.18	622.3	673.1	824.2	
AFC-16	8" - 16"	21.650"	16.500"	22.117"	24.337"	26.389"	28.389"	34.337"	6
mm	219.1 - 406.4	549.9	419.1	561.8	618.2	670.3	721.1	872.2	
AFC-18	10" - 18"	23.900"	18.750"	24.540"	26.76"	28.812"	30.812"	36.761"	6
mm	273.1 - 457.2	607.1	476.2	623.3	679.7	731.8	782.6	933.7	
AFC-20	12" - 20"	25.776"	20.750"	26.520"	28.740"	30.792"	32.792"	38.740"	6
mm	323.9 - 508.0	654.7	527.1	673.6	730.0	782.1	832.9	984.0	
AFC-24	16" - 24"	29.776"	24.750"	30.439"	32.659"	34.711"	36.711"	42.659"	10
mm	406.4 - 609.6	756.3	628.7	773.2	829.5	881.7	932.5	1083.5	
AFC-26	18" - 26"	31.900"	26.750"	32.503"	34.723"	36.775"	38.775"	44.723"	10
mm	457.2 - 660.4	810.3	679.5	825.6	882.0	934.1	984.9	1124.5	
AFC-28	20" - 28"	33.900"	28.750"	34.558"	36.778"	38.830"	40.830"	46.778"	10
mm	508.0 - 711.2	861.1	730.3	877.8	1620.0	986.3	1037.1	1188.2	
AFC-30	22" - 30"	36.150"	31.000"	36.861"	39.081"	41.133"	43.133"	49.082"	10
mm	558.8 - 762.0	918.2	781.1	981.7	1074.4	1044.8	1095.6	1246.7	
AFC-32	24" - 32"	38.150"	33.000"	38.902"	41.122"	43.165"	45.174"	51.123"	10
mm	609.6 - 812.8	969.0	838.2	988.1	1044.5	1223.6	1147.4	1298.5	
AFC-36	28" - 36"	42.150"	37.000"	42.978"	45.198"	47.250"	49.250"	55.199"	10
mm	711.2 - 914.4	1070.6	939.8	1091.6	1148.0	1200.2	1251.0	1402.1	
AFC-39	31" - 39"	45.150"	40.000"	46.013"	48.233"	50.285"	52.285"	58.234"	10
mm	787.4 - 990.6	1146.8	1016.0	1168.7	1225.1	1277.2	1328.0	1479.1	
AFC-42	34" - 42"	48.150"	43.000"	49.049"	51.269"	53.321"	55.321"	61.270"	10
mm	863.6 - 1066.8	1223.0	1092.2	1245.8	1302.2	1354.4	1405.2	1556.3	

FIGURE 2-7. AFC SERIES SPECIFICATIONS

2.5.2 BFC specifications

BFC Locator Extensions Coverage*

	STANDARD RANGE	½"	1"	1.5"	2"	2.5"	3"	3.5"	4"
BFC-36	37.000" - 35.500"	36.000" - 34.500"	35.000" - 33.500"	34.000" - 32.500"	33.000" - 31.500"	32.000" - 30.500"	31.000" - 29.500"	30.000" - 28.500"	29.000" - 27.500"
mm	939.8 - 901.7	914.4 - 876.3	889.0 - 850.9	863.6 - 825.5	838.2 - 800.1	812.8 - 774.7	787.4 - 749.3	762.0 - 723.9	736.6 - 698.5
BFC-42	43.000" - 41.500"	42.000" - 40.500"	41.000" - 39.500"	40.000" - 38.500"	39.000" - 37.500"	38.000" - 36.500"	37.000" - 35.500"	36.000" - 34.500"	35.000" - 33.500"
mm	1092.2 - 1054.1	1066.8 - 1028.7	1041.4 - 1003.3	1016.0 - 977.9	990.6 - 952.5	965.2 - 927.1	939.8 - 901.7	914.4 - 876.3	889.0 – 850.9
BFC-48	49.250" - 47.750"	48.250" - 46.750"	47.250" - 45.750"	46.250" - 44.750"	45.250" - 43.750"	44.250" - 42.750"	43.250" - 41.750"	42.250" - 40.750"	41.250" - 39.750"
mm	1251.0 - 1212.9	1225.6 - 1187.5	1200.2 - 1162.1	1174.8 - 1136.7	1149.4 - 1111.3	1124.0 - 1085.9	1098.6 - 1060.5	1073.2 - 1035.1	1047.8 - 1009.7
BFC-56	57.250" - 55.750"	56.250" - 54.750"	55.250" - 53.750"	54.250" - 52.750"	53.250" - 51.750"	52.250" - 50.750"	51.250" - 49.750"	50.250" - 48.750"	49.250" - 47.750"
mm	1454.2 - 1416.1	1428.8 - 1390.7	1403.4 - 1365.3	1378.0 - 1339.9	1352.6 - 1314.5	1327.2 - 1289.1	1301.8 - 1263.7	1276.4 - 1238.3	1251.0 - 1200.2
BFC-66	67.500" - 66.000"	66.500" - 65.000"	65.500" - 64.000"	64.500" - 63.000"	63.500" - 62.000"	62.500" - 61.000"	61.500" - 60.000"	60.500" - 59.000"	59.500" - 58.000"
mm	1714.5 - 1676.4	1689.1 - 1651.0	1663.7 - 1625.6	1638.3 - 1600.2	1612.9 - 1574.8	1587.5 - 1549.4	1562.1 - 1524.0	1536.7 - 1498.6	1511.3 - 1473.2
BFC-72	73.500" - 72.000"	72.500" - 71.000"	71.500" - 70.000"	70.500" - 69.000"	69.500" - 68.000"	68.500" - 67.000"	67.500" - 66.000"	66.500" - 65.000"	65.500" - 64.000"
mm	1866.9 - 1828.8	1841.5 - 1803.4	1816.1 - 1778.0	1790.7 - 1752.6	1765.3 - 1727.2	1739.9 - 1701.8	1714.5 - 1676.4	1689.1 - 1651.0	1663.7 - 1625.6
BFC-86	87.500" - 86.000"	86.500" - 85.000"	85.500" - 84.000"	84.500" - 83.000"	83.500" - 82.000"	82.500" - 81.000"	81.500" - 80.000"	80.500" - 79.000"	79.500" - 78.000"
mm	2222.5 - 2184.4	2197.1 - 2159.0	2171.7 - 2133.6	2146.3 - 2108.2	2120.9 - 2082.8	2095.5 - 2057.4	2070.1 - 2032.0	2044.7 - 2006.6	2019.3 - 1981.2

	4.5"	5"	5.5"	6"	6.5"	7"	8"
BFC-42	34.000" - 32.500"	33.000" - 31.500"	32.000" - 30.500"	31.000" - 29.500"	30.000" - 28.500"	29.000" - 27.500"	N/A
mm	863.6 - 825.5	838.2 - 800.1	812.8 - 774.7	787.4 - 749.3	762.0 - 723.9	736.6 - 698.5	
BFC-56	48.250" - 46.750"	47.250" - 45.750"	46.250" - 44.750"	45.250" - 43.750"	44.250" - 42.750"	43.250" - 41.750"	41.250" - 39.750"
mm	1022.4 - 1187.5	1200.2 - 1162.1	1174.8 - 1136.7	1149.4 - 1111.3	1124.0 - 1085.9	1098.6 - 1060.5	1047.8 - 1009.7
BFC-66	58.500" - 57.000"	57.500" - 56.000"	56.500" - 55.000"	55.500" - 54.000"	54.500" - 53.000"	53.500" - 52.000"	51.500" - 50.000"
mm	1485.9 - 1447.8	1460.5- 1422.4	1435.1 - 1397.0	1409.7 - 1371.6	1384.3 - 1346.2	1358.9 - 1320.8	1308.1 - 1270.0
BFC-72	64.500" - 63.000"	63.500" - 62.000"	62.500" - 61.000"	61.500" - 60.000"	60.500" - 59.000"	59.500" - 58.000"	57.500" - 56.000"
mm	1638.3 - 1600.2	1612.9 - 1574.8	1587.5 - 1549.4	1562.1 - 1524.0	1536.7 - 1498.6	1511.3 - 1473.2	1460.1 - 1422.4
BFC-86	78.500" - 77.000"	77.500" - 76.000"	76.500" - 75.000"	75.500" - 74.000"	74.500" - 73.000"	73.500" - 72.000"	71.500" - 70.000"
mm	1993.9 - 1955.8	1968.5 - 1930.4	1943.1 - 1905.0	1917.7 - 1879.6	1892.3 - 1854.2	1866.9 - 1828.8	1816.1 - 1778.0

***All locator extensions over 4" (101.6 mm) are achieved by combining other sizes (i.e. 7"[177.8 mm] can use a 4" and 3" [101.6 and 76.2 mm] or a 4", 2" and 1" [101.6, 50.8 and 25.4 mm]**

FIGURE 2-8. BFC LOCATOR EXTENSIONS COVERAGE

BFC Series

Model	Nom. Pipe Size	A	B	4" Slide Swing	7" Slide Swing	10" Slide Swing	Locator Pads
			NA				
			NA				
BFC-48	34" - 48"	56.420"	49.250"	61.507"	67.457"	73.455"	12
mm	863.6 - 1219.2	1433.1	1251.0	1562.3	1713.4	1865.8	
BFC-56	42" - 56"	64.420"	57.250"	69.229"	75.179"	81.177"	12
mm	1066.8 - 1422.4	1636.3	1454.2	1758.4	1909.5	2061.9	
BFC-66	52" - 66"	74.754"	67.500"	79.671"	85.621"	91.619"	12
mm	1320.8 -1676.4	1898.8	1714.5	2023.6	2174.8	2327.1	
BFC-72	58" - 72"	80.904"	73.500"	85.672"	91.608"	97.626"	12
mm	1473.2 - 1828.8	2054.9	1866.9	2176.0	2326.8	2479.7	
BFC-86	72" - 86"	94.904	87.500"	99.671"	105.621"	111.618"	12
mm	1828.8 - 2184.4	2410.5	2222.5	2531.6	2682.7	2835.1	

FIGURE 2-9. BFC SERIES SPECIFICATIONS

CLIMAX electrical equipment is suitable for use in the physical environment and operating conditions specified in Table 2-7. When the physical environment or the operating conditions are outside those specified, consult CLIMAX before putting the electrical equipment into service.

TABLE 2-7. ELECTRICAL SPECIFICATIONS

Mains voltage (AC):	±10% of nominal
Mains frequency (AC):	±1% of nominal
Mains harmonics:	10% of RMS volts 2nd through 30th harmonic
Voltage imbalance (3-phase supplies):	2% maximum
Voltage impulses:	200% of nominal 1.5 milliseconds (ms) maximum duration
Voltage interruption:	3 ms maximum with 1 second between
Voltage dip (brownout):	20% of peak volts for 1 second maximum
Voltage supplied from batteries:	±10% of nominal
Voltage interruption (DC):	5 ms maximum
Ambient temperature (operating):	41–104°F (5–40°C)

TABLE 2-7. ELECTRICAL SPECIFICATIONS (CONTINUED)

Ambient temperature (transport and storage):	-13–131°F (-25–55°C)
Relative humidity:	20–95% non-condensing
Altitude:	6,600 ft (2,000 m)
Contaminants:	IP54 environment except for some motors and slip ring assemblies that are IP 20
Available fault current:	Not greater than that listed on the controls nameplate
Vibration	
Pushbuttons:	5g at 5–300 Hz
Relays, contactors, and breakers:	2g at 5–300 Hz
Touchscreen HMI:	1g at 9–150 Hz
Servo amplifiers and PLC:	1g at 9–150 Hz
Physical shock (impact)	
Pushbuttons:	30g for 18ms
Relays, contactors, and breakers:	6g for 11ms
Touchscreen HMI:	15g three times in X, Y, and Z
Servo amplifiers and PLC:	1g three times in X, Y, and Z

2.6 ITEMS REQUIRED BUT NOT SUPPLIED

The following items are required but not supplied in your CLIMAX product kit:

- Shop air (90 psi) with the following scfm ratings per motor type:
  - IR3800: 48 scfm (1.36 m^3/minute)
  - IR4800: 97 scfm (2.75 m^3/minute)
  - Right-Angle Drive Series 75 Motor: 65 scfm (1.84 m^3/minute)
  - Cleaning supplies such as hand towels and cleaners
  - Brush for chip removal
  - Personal protective equipment
  - Rigging equipment such as slings or hoists

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3 SETUP

IN THIS CHAPTER:

This section describes the setup and assembly procedures for the Split Frame Clamshell.

3.1 RECEIPT AND INSPECTION

Your CLIMAX product was inspected and tested prior to shipment, and packaged for normal shipment conditions. CLIMAX does not guarantee the condition of your machine upon delivery.

NOTICE

Models BFC-66 and larger are shipped in four sections. See index page for location of pre-assembly instructions.

When you receive your CLIMAX product, perform the following receipt checks:

1. Inspect the shipping containers for damage.
2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
3. Inspect all components for damage.

Contact CLIMAX immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

The machine ships from CLIMAX with a coating of LPS 2, which may be cleaned off with a rag and WD40. All parts must be cleaned before use.

3.2 LIFTING AND RIGGING

Before lifting, make sure all parts are securely attached.

⚠ WARNING

Models AFC-16 and larger weigh from 91–886 lbs (41–402 kg). To prevent serious injury to yourself and others, always follow the operating procedures outlined in this manual, your own company rules, and local regulations for heavy lifting. Serious injury or fatalities can result from improper lifting methods.

For models AFC-16 and larger, only lift the clamshells with hoist shackles, not by hand.

⚠ CAUTION

Make sure the shackles are correctly attached before lifting the machine. Lift the machine slowly. If the rigging causes the Split Frame Clamshell to swing or become unstable, lower it and adjust the rigging.

3.3 SEPARATING THE CLAMSHELL HALVES

Do the following to separate clamshell halves:

1. Rotate the ring gear by hand until both the gear and main body housing split lines are aligned.

TIP:

If the lock pin holes in the gear will not line-up with the holes in the housing, rotate the gear back and forth until the holes are aligned. Place the lock pins through the gear and housing to hold the halves from any further movement (see Figure 3-1 on page 31). There are four positions and locking pins.

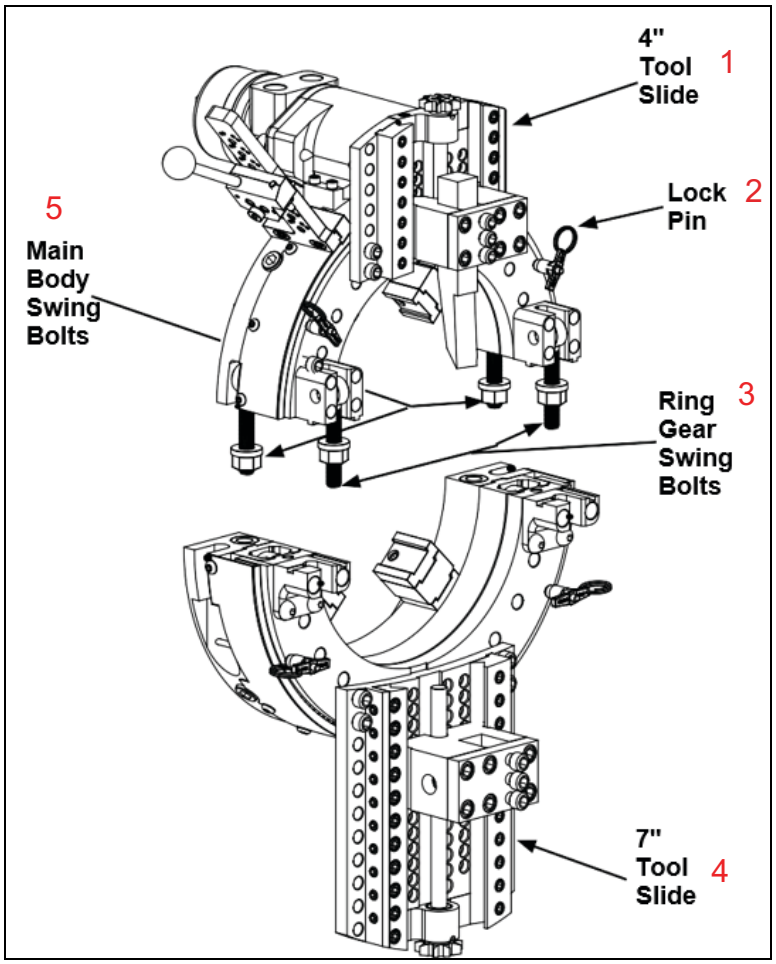

FIGURE 3-1. SEPARATION COMPONENT

TABLE 3-1. SEPARATION COMPONENT IDENTIFICATION

Number	Component
1	4" (102 mm) Tool slide
2	Lock pin
3	Ring gear swing bolts
4	7" (178 mm) Tool slide
5	Main body swing bolts

2. Loosen the two main body swing bolt flange nuts in the and swing them out of the pockets. Loosen the two ring gear swing bolts and swing them out of the way.
3. Separate the clamshell halves by pulling them apart at the split line.

NOTICE

Do not force the halves apart. The soft dead-blow hammer (supplied in your tool kit) can be used to tap the assembly at the split line. The halves must separate evenly.

3.3.1 Installing the locator pads

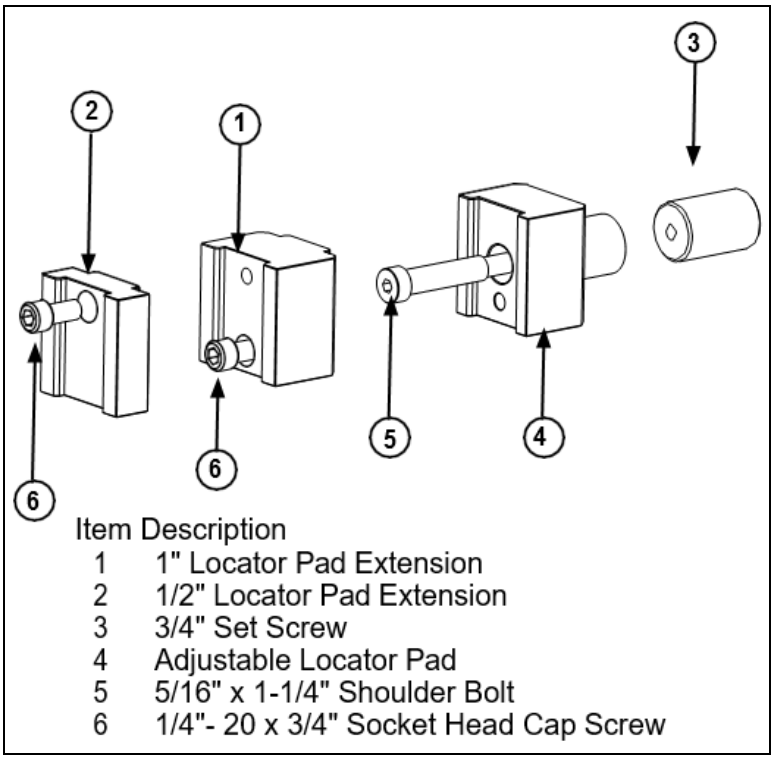

FIGURE 3-2. LOCATOR PADS AND COMPONENTS

TABLE 3-2. LOCATOR PAD COMPONENT IDENTIFICATION

Number	Component
1	1" (25.4 mm) Locator pad extension
2	0.5" (13 mm) Locator pad extension
3	0.75" (19mm) Set screw
4	Adjustable locator pad
5	5/16” (8 mm) x 1-1/4” (32 mm) Shoulder bolt
6	0.25" (6.4 mm)-20 x 0.75" (19 mm) Socket head cap screw

Do the following to install the locator pads (see Figure 3-2 on page 32)

1. Determine the pipe outside diameter and select the proper locator extensions, according to Figure 2-6 on page 24 and Figure 2-8 on page 25. If

required, bolt the locator extensions to the adjustable locator pads (see Figure 3-2).

2. Adjust the locator pads by using a 3/8" hex key to turn the 3/4" set screws that are accessed from the outside of the main body.
3. Back up the locator pads as needed for the proper clearance of the pipe diameter.

TIP:

CLIMAX recommends having as much of the adjustable locator pad in the pocket of the main body as possible. This adds rigidity to the entire machine.

4. Check that the motor mount area will be accessible when the clamshell is tightened into position.

3.3.2 Installing the tool slides

Do the following to install the tool slides:

1. Check that the tool slide assemblies are positioned to clear the workpiece but are as close to the outside diameter as possible (see Figure 3-3 and Figure 3-4 on page 34).

   Do the following to move the tool slides:

   a) Remove the four 3/8"-16 socket head cap screws at the base of the slides.
   b) Reposition them to a new set of holes and replace the bolts.

NOTICE

The 3/8"-16 bolts for the slide assembly are 1" (25.4 mm) long. If the longer bolts are used, they may interfere with the proper operation of the rollers beneath in the track ring. If shorter bolts are used, they may not properly secure the tool slide to the ring gear.

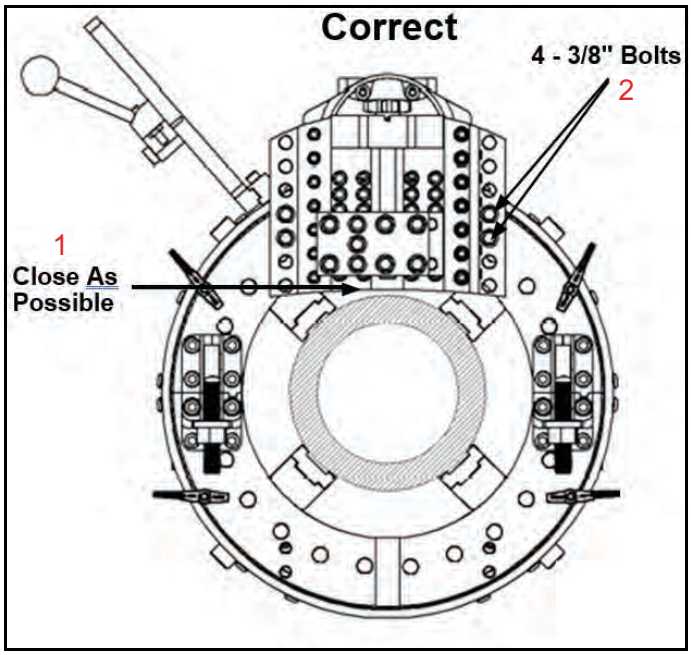

FIGURE 3-3. CORRECT TOOL SLIDE ASSEMBLY POSITION

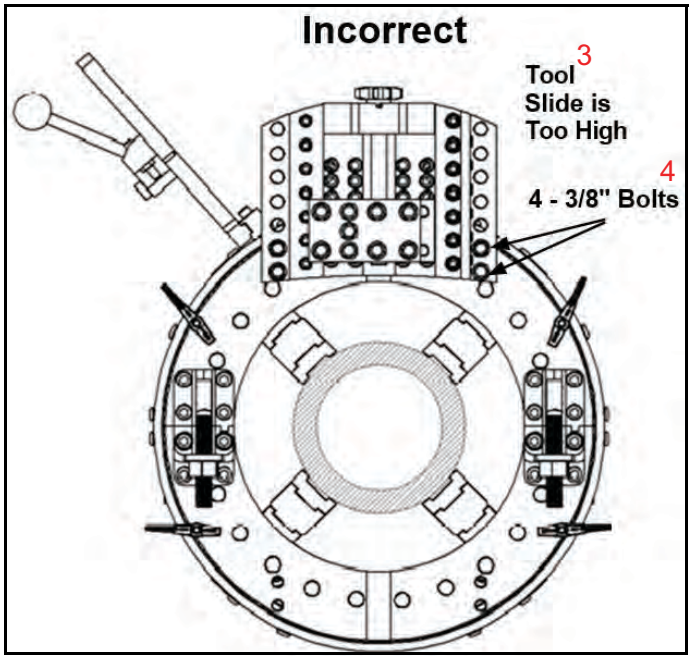

FIGURE 3-4. INCORRECT TOOL SLIDE ASSEMBLY POSITION

TABLE 3-3. CORRECT AND INCORRECT TOOL SLIDE POSITION IDENTIFICATION

Number	Component
1	Close as possible
2	4-3/8” (111mm) bolts
3	Tool slide is too high
4	4-3/8” (111mm) bolts

2. Remove the lock pins so that ring gear may be turned by hand.

3.3.3 Installing the tripper

Do the following to install the tripper (see Figure 3-5 on page 35):

1. Position the handle of the tripper assembly so that it is in the “engaged” position (see Figure 3-5 on page 35).

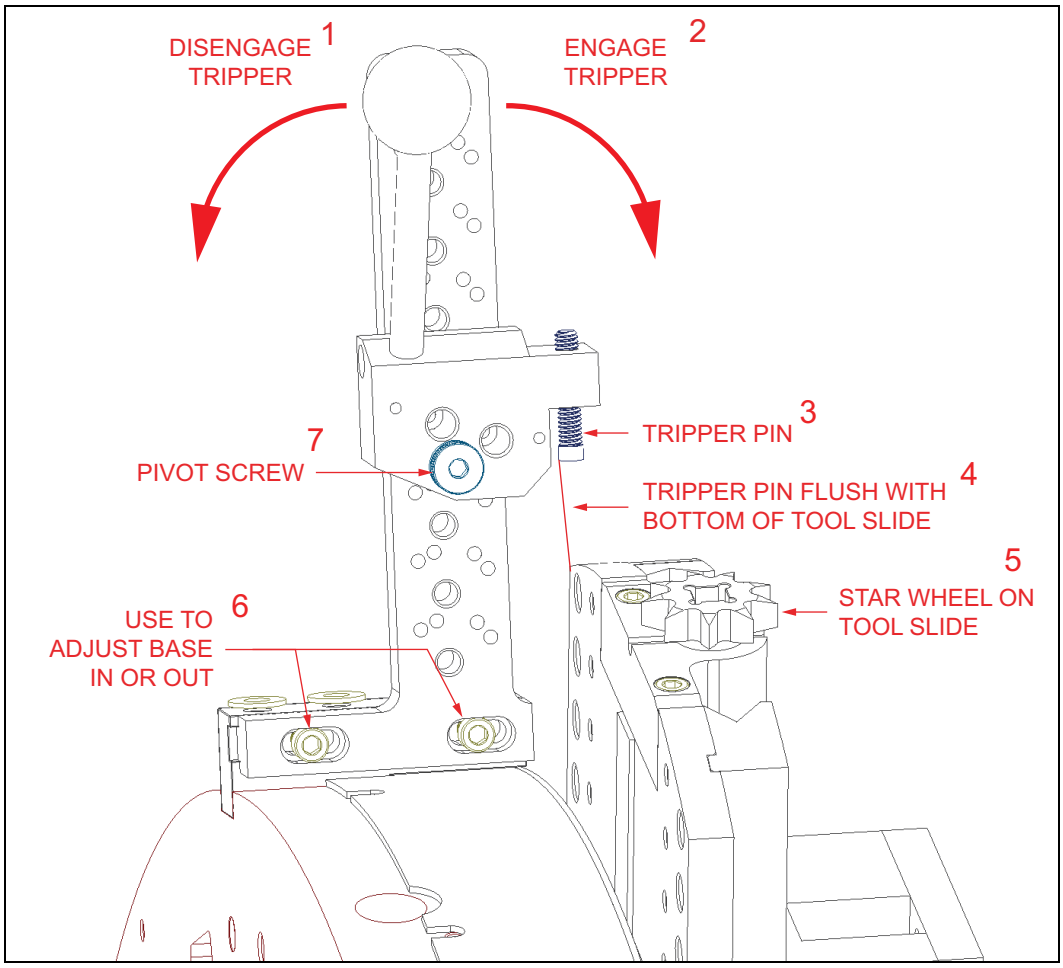

FIGURE 3-5. FEED TRIPPER ASSEMBLY

TABLE 3-4. FEED TRIPPER ASSEMBLY IDENTIFICATION

Number	Component and function
1	Direction to disengage tripper
2	Direction to engage tripper
3	Tripper pin that may be adjusted up or down. Check for tool slide clearance.
4	Bottom of the tripper pin should be flush with the bottom of the tool slide.
5	Star wheel on the tool slide
6	Use to adjust the base in or out, and to set the tripper pin flush with the tool slide, as shown in the figure.
7	Pivot screw. Adjust the screw position to match the tool slide location.

⚠ CAUTION

Keep your hands out of any pinch points while operating the feed engage-disengage handle.

2. Check that the tripper pin is correctly aligned to the star wheel so it doesn't interfere with the tool slide or the ring gear. The tripper bracket at the base and the length of the tripper pin may be adjusted as needed.

⚠ CAUTION

Before running the clamshell under powered conditions, rotate the ring gear by hand to make sure there are no interferences in the engagement of the tripper pin and the tool slide. Also check the operation of the tripper assembly.

3.3.4 Installing the tripper pin extension

TIP:

A tripper pin extension is included in the tool kit. This extension is required when the tool slide is mounted evenly with the outside diameter of the main body.

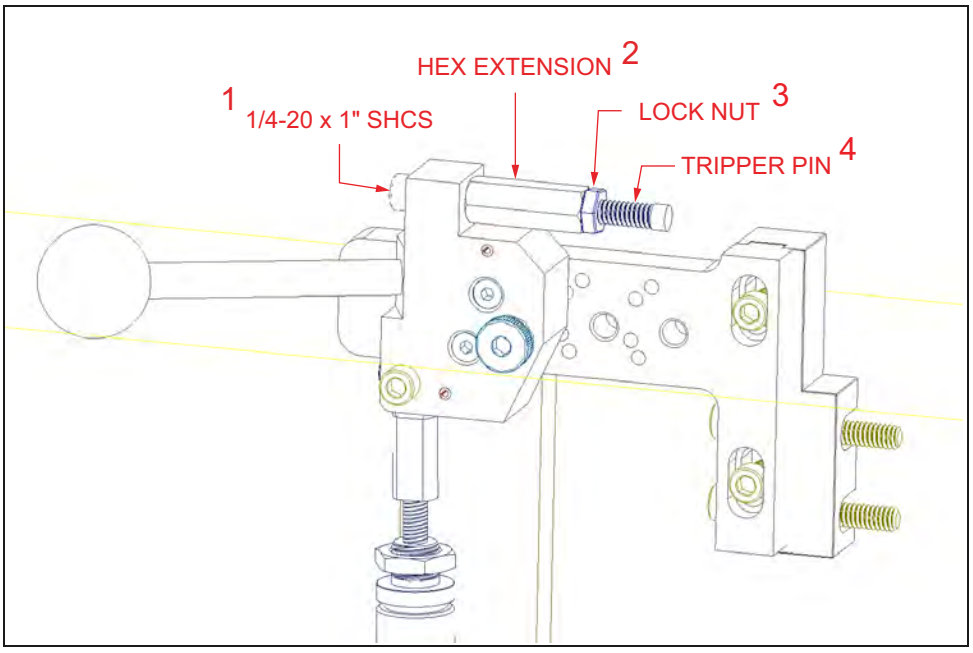

FIGURE 3-6. TRIPPER PIN EXTENSION COMPONENTS

TABLE 3-5. TRIPPER PIN EXTENSION COMPONENTS IDENTIFICATION

Number	Component
1	1/4-20 x 1" SHCS
2	Hex extension
3	Lock nut

TABLE 3-5. TRIPPER PIN EXTENSION COMPONENTS IDENTIFICATION

Number	Component
4	Tripper pin

Do the following to install the tripper pin extension, referring to Figure 3-6:

1. Remove the tripper pin and nut.
2. Thread the 1/4"-20 x 1" socket head cap screw from the top until it contacts the tripper bracket and tighten securely.
3. Screw the hex extension onto the exposed threads of the 1/4-20 SHCS in step 2 under the tripper bracket and tighten it securely.
4. Thread the lock nut onto the tripper pin and insert the tripper pin into the hex extension.
5. Adjust the depth of the tripper pin to achieve proper alignment with the star wheel and tighten the lock nut against the hex extension.

3.4 JOINING THE CLAMSHELL HALVES

Do the following to join clamshell halves:

1. Install the two halves of the clamshell around the pipe. Tighten the main body swing bolts and the ring gear swing bolts.

NOTICE

Both the main body swing bolts must be tightened before tightening the ring gear swing bolts. Failure to do so will pull the two mating surfaces of the main body apart so that the operator will not be able to secure the main body ring together. If the machine is operated without the main body secured correctly, this will cause damage to the machine.

TIP:

If the clamshell will not close, check the locator pads for proper size and clearance (see Figure 3-7 on page 38). Adjust the locators if necessary.

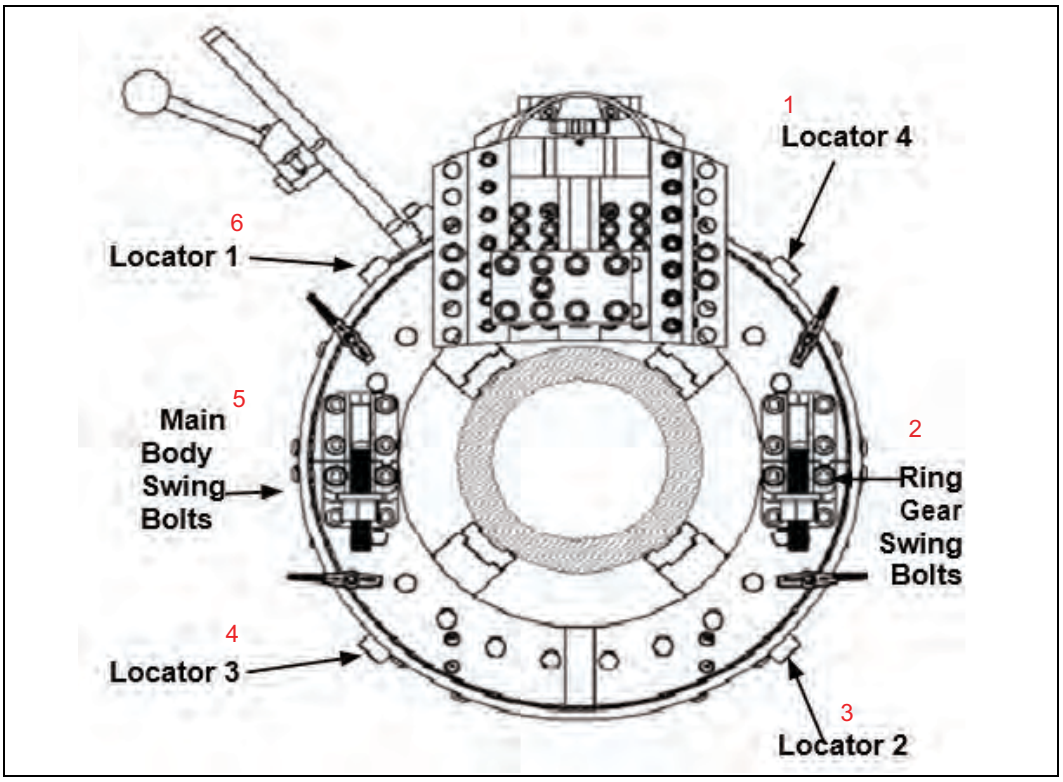

FIGURE 3-7. LOCATOR PADS

TABLE 3-6. LOCATOR PAD IDENTIFICATION

Number	Component
1	Locator 4
2	Ring gear swing bolts
3	Locator 2
4	Locator 3
5	Main body swing bolts
6	Locator 1

2. Lightly tighten the two adjustable locator pads directly across from each other (locators 1 and 2) only enough to secure the clamshell while keeping it centered on the workpiece.
3. Lightly tighten two more locator pads that are directly across from each other and close to 90° away from the first set of (locators 3 and 4).

NOTICE

Do not tighten the locators down completely until the clamshell has been squared to the pipe. Tightening the locators too much at this stage will prevent a degree of movement necessary to square the machine. The locators must be snug enough to clamp the machine to the pipe, but loose enough to allow movement when the machine is struck with the dead-blow hammer.

3.4.1 Squaring and centering

Square is checked at the locator positions. Do the following to square:

1. Hold the square against the face of the ring gear and the pipe.

NOTICE

The square should be placed on the front face of the machine (the ring gear), not the back. The front face is a steel machined surface to which the tool slides are bolted.

Square the machine to the cut line and not behind the machine. Over time, the aluminum main body is exposed to wear and may not maintain its original manufactured tolerance.

2. Move the machine to square and tighten the locator a little more at each location.

Do the following for centering:

1. Using a scale, measure the distance from the pipe outside diameter to the clamshell inside diameter at opposing locator positions (#1 and #2, #3 and #4 in Figure 3-7 on page 38).
2. Adjust the locator pads until they are as close to the same dimension as possible.
3. Tighten the locators securely to lock the machine in position on the pipe.
4. Pull out the locking pins so the ring gear can rotate.

Do the following for fine centering:

1. Mount a dial indicator on the gear face with the tip resting on the work-piece outside diameter.
2. Turn the gear so the indicator is positioned over one of the locators then tighten (locator 1) and set the dial to zero.
3. Slowly rotate the gear 180° to another locator (locator 3) and take an indicator reading. If the reading is not zero, adjust the locators until the indicator reads one-half of the original reading. Reset the indicator dial to zero and repeat.

TIP:

If the machine cannot be centered and properly locked, different locators are required.

4. Rotate the ring gear so the indicator is positioned over another locator (locator 2) and tighten, then set the dial to zero.
5. Slowly rotate the gear 180° to another locator (locator 4) and take an indicator reading. If the reading is not zero, adjust the locators until the indicator reads one-half of the original reading. Reset the indicator dial to zero and repeat.

TIP:

The first two locators may need to be slightly loosened in order to zero the clamshell to the workpiece.

6. Repeat step 1 through step 5 for all of the locators.

TIP:

Most thin wall pipes are out of round, therefore a zero reading all the way around may not be possible.

3.4.2 Setting tool bits

Before installing tool bits, determine which tool bits are necessary for your specific machining operations.

NOTICE

The clamshell cuts in a clockwise direction, when viewed at its face. There are right-hand and left-hand bevel and sever bits. Right-hand bits bevel on the side that the clamshell is mounted. Left-hand bits bevel on the opposite side.

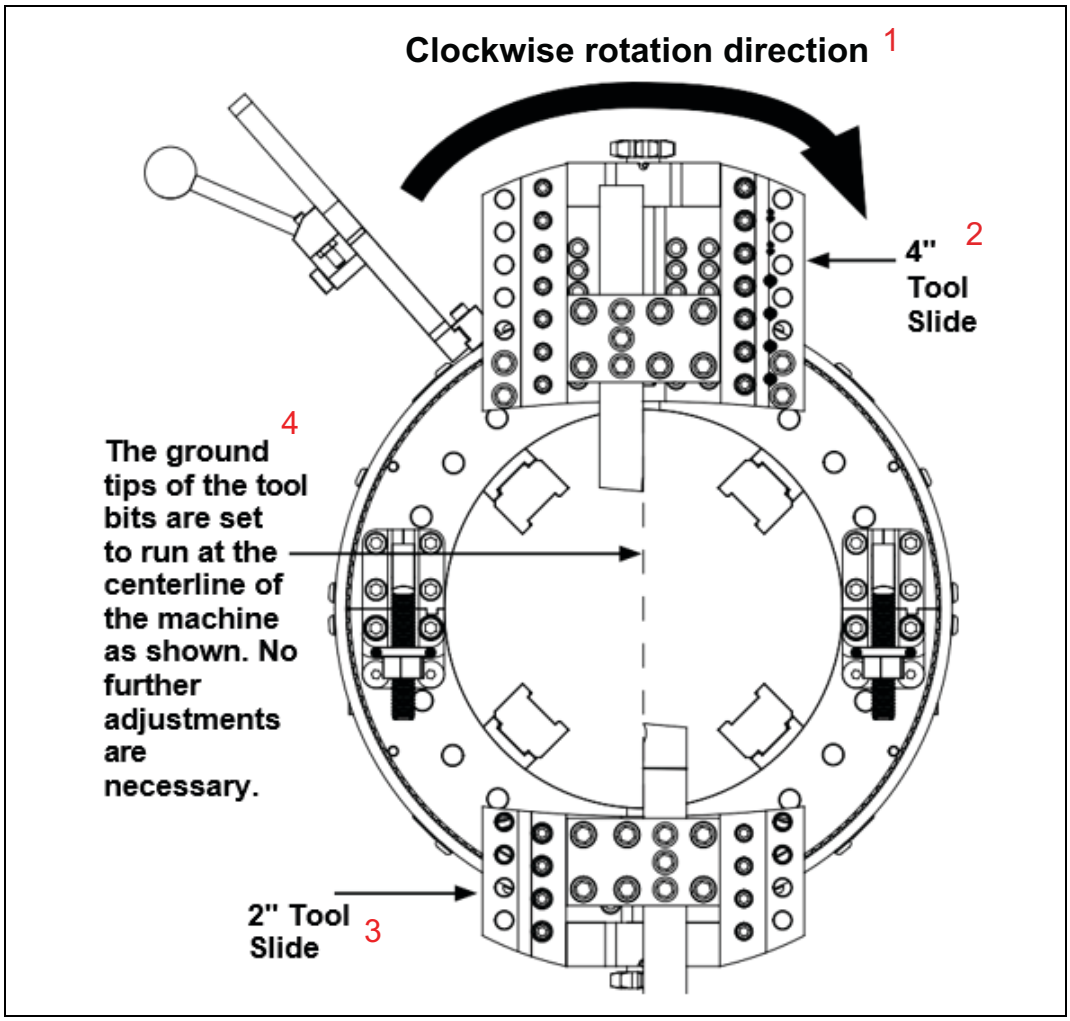

FIGURE 3-8. TOOL BITS AND TOOL SLIDES

TABLE 3-7. TOOL BITS AND SLIDES IDENTIFICATION

Number	Component
1	Clockwise rotation direction
2	4" (102 mm) tool slide
3	2" (51 mm) tool slide
4	The ground tips of the tool bits are set to run at the centerline of the machine as shown. No further adjustments are necessary.

Do the following to install tool bits:

1. Using the star wheel wrench, back the tool blocks away from the pipe, to allow enough room for the tool bits to pass completely through the work-piece without the tool block hitting the workpiece.
2. Disengage the tripper assembly.

3. Insert the proper beveling and severing tool bits so that the tip of the bit touches the pipe outside diameter.
4. Hold each tool bit with one cap screw, snug but not tight.
5. Manually rotate the cutting head counter-clockwise one revolution. This reverse action pushes the tool bits away from any high spots in the pipe that could cause tool damage.
6. After one complete revolution, tighten the cap screws on both tool blocks.
7. Back the bevel bit 1/32" away from the workpiece with the star wheel wrench.

NOTICE

The 1/4" (6 mm) sever bit must always cut ahead of either the 3/8" (9.5 mm) sever bit or any bevel bit in order to avoid damage and increase accuracy.

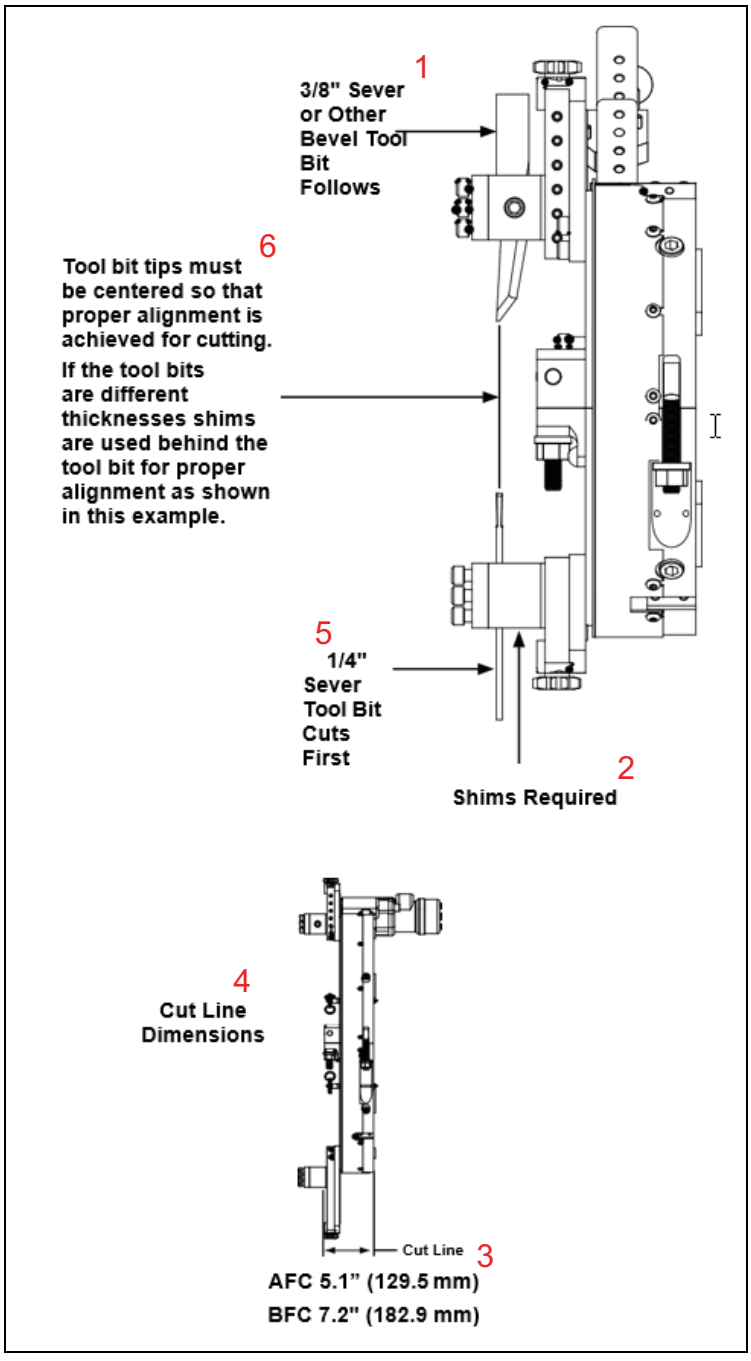

FIGURE 3-9. SEVER BITS AND CUT LINE DIMENSIONS

TABLE 3-8. SEVER BITS AND CUT LINE DIMENSION IDENTIFICATION

Number	Component
1	3/8" (9.5 mm) Sever or other bevel tool bit follows
2	Shims required (this is supplied with the tool kit)

TABLE 3-8. SEVER BITS AND CUT LINE DIMENSION IDENTIFICATION

Number	Component
3	AFC 5.1" (129.5 mm) BFC 7.2" (182.9 mm)
4	Cut line dimensions
5	1/4" (6.4 mm) Sever tool bit cuts first
6	Tool bit tips must be centered so that proper alignment is achieved for cutting. If the tool bits are different thicknesses shims are used behind the tool bit for proper alignment as shown in this example.

3.5 INSTALLING THE MOTOR

⚠ CAUTION

All locking pins must be removed from the gear face before installing the motor, and all power must be turned off.

There are multiple motor options available for powering the clamshell: electric, pneumatic size 3800, pneumatic size 4800, right angle drive and hydraulic, depending on the job requirements. See Table 3-10 for maximum speeds for each drive type.

	AFC															
size	4	6	8	10	12	14	16	18	20	24	26	28	30	32	36	42
IR 3800 MOTOR	22	18	15	13	12	11										
IR 4800 MOTOR					14	13	11	10	10	8	8	7	7	6	6	5
Series 75 Right Angle MOTOR	11	9	7	6	6	5	5	4	4	3	3	3	3	3	2	2
HYC Charlyn MOTOR	32	26	22	19	17	16	14	13	12	10	10	9	9	8	7	6
HYD Danfoss MOTOR	61	50	42	36	32	30	27	25	23	20	18	17	16	15	14	12

	BFC				
size	48	56	66	72	86
IR 4800 MOTOR	4	4	3	3	3
Series 75 Right Angle MOTOR	2	1	1	1	0
HYC Charlyn MOTOR	5	5	4	4	3
HYD Danfoss MOTOR	10	9	8	7	6

FIGURE 3-10. MAXIMUM RPM FOR MOTOR DRIVE TYPES

NOTICE

The size 3800 motor is normally used for Clamshells AFC10 and smaller. The size 4800 motor is used on clamshells AFC12 and larger.

Note that all motors will fit all clamshell sizes, but smaller motors or electric motors may have limited power for larger clamshell sizes.

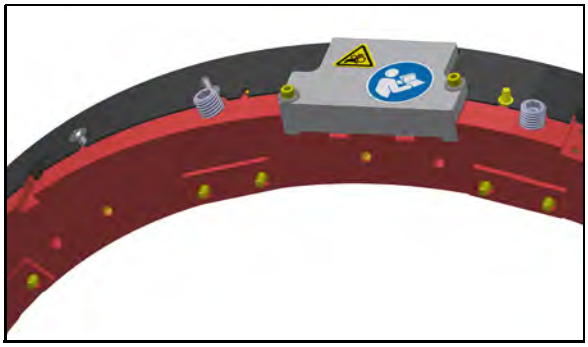

FIGURE 3-11. COVER GEAR GUARD (P/N 102861

For the AFC-42 and all the BFC machines, there are two motor mounting locations for added torque. When not using a second motor, cover the second opening covered with the cover gear guard (see Figure 3-11).

Do the following to install the motor:

1. Position the drive gear of the motor towards the rear of the body of the clamshell.
2. Align the four fasteners with their mating holes in the body, snug the fasteners up evenly, and tighten.

TIP:

If there is interference with the motor, adapters may be used to mount the motor at the front, at a right angle, and one that is bidirectional.

TIP:

If the motor does not engage, check that the two gears are properly aligned. Rotate the ring gear by hand if necessary to align gear teeth.

Hydraulic motors require a separate HPU with a flow rate of 10 gpm (37 liters per minute) at a maximum pressure not to exceed 2,000 psi (6 bar).

3.6 USING THE DEFENDER™

Before assembling the machine, follow the risk assessment checklist in Table 1-2 on page 5.

Do the following to assemble the Defender™, referring to Figure 2-1 on page 10 and Figure 2-2 on page 11:

1. Check that the clamshell is fully installed on the workpiece with the motor and trippers installed.

TIP:

The tool slide may be installed already, but it is easier to mount the guards before mounting the tool slide.

2. To determine which screws on the clamshell body need to be replaced, line up the guards with the clamshell. The parts must align with the split line of the clamshell, and one guard has a cutout for the motor.
3. Remove the screws identified for replacement and set them aside. They will be needed for machine disassembly after operation.
4. Mount the guards to the clamshell, making sure to align the face of the guard with the face of the motor cover.

NOTICE

If the guard is not properly positioned, it might rub against the tool slide and cause damage to the guard.

TABLE 3-9. GUARD MOTOR AND COVER IDENTIFICATION

Number	Component
1	Guard
2	Motor cover

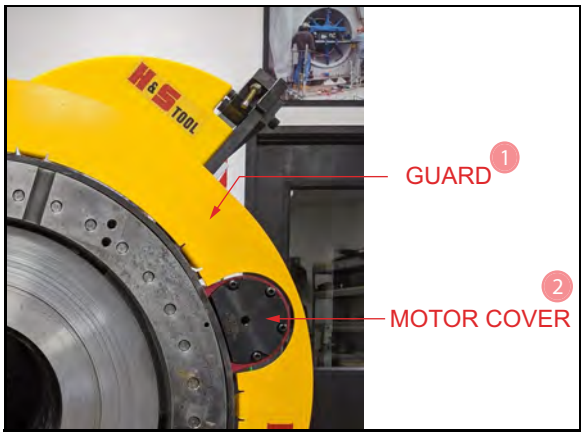

FIGURE 3-12. GUARD AND MOTOR COVER

5. If using a 7" (178 mm) or 10" (254 mm) tripper post, install the fin guard assembly onto the tripper post. The fin should be installed as close to the tripper rocker as possible for proper fit.

TABLE 3-10. TRIPPER POST AND FIN IDENTIFICATION

Number	Component
1	Tripper post
2	Fin

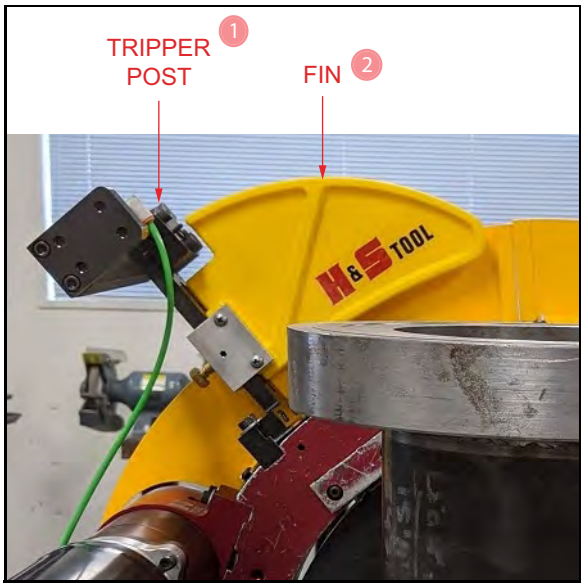

FIGURE 3-13. TRIPPER POST AND FIN

TIP:

Note that 4" (102 mm) trippers do not need the additional fin assembly.

3.7 WITH DEFENDER™ KITS: CONNECTING THE AIR CADDY

When using the Defender™ with the Split Frame Clamshell, do the following to connect the Air Caddy (referring to Figure 2-2 on page 17 and Figure 2-2 on page 11):

1. Check that the Air Caddy E-Stop is in the off position, and that the regulator is set to minimum.
2. Connect an air hose from the air supply with 90 psi (6 bar) pressure using a minimum 0.5" (12 mm) air hose.
3. Connect the air hose from the clamshell air motor to the outlet of the Air Caddy.

4. Connect the pneumatic hose bundle from the Air Caddy to the operator pendant (see Figure 3-14).

TABLE 3-11. AIR CADDY CONNECTION IDENTIFICATION

Number	Component
1	Pneumatic cylinder connection
2	Operator pendant connection

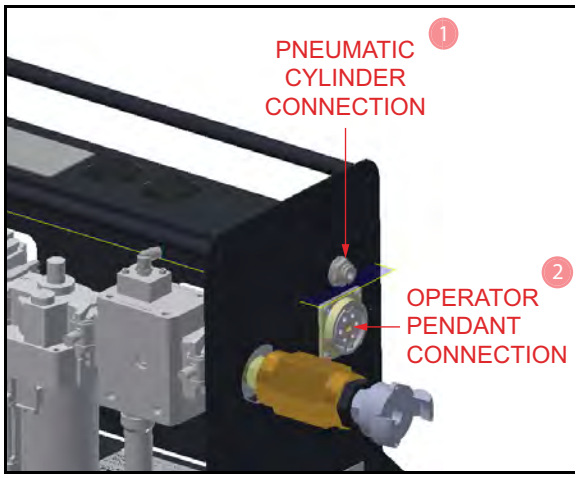

FIGURE 3-14. AIR CADDY CONNECTIONS

5. Connect the plastic tubing from the tripper connection to the pneumatic cylinder on the tripper assembly (see Figure 3-15).

NOTICE

Make sure to fully install the plastic tubing into the PushLok fitting.

CLIMAX recommends using cable ties or otherwise restraining the pneumatic tube to the motor hose to prevent damage to the tube.

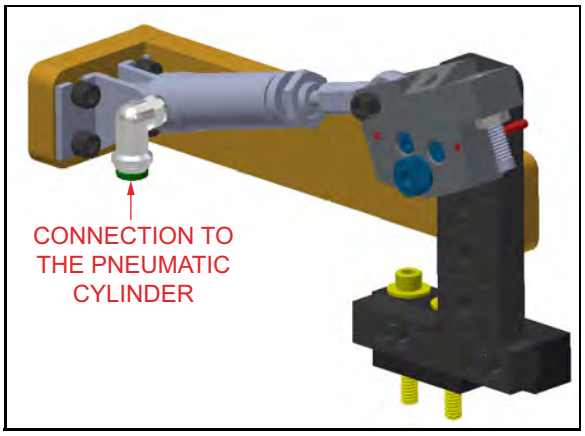

FIGURE 3-15. CONNECTION TO THE PNEUMATIC CYLINDER

3.8 SPECIAL OPERATIONS: COUNTERBORING AND FLANGE FACING

Both counterboring and flange facing operations use the counterbore tool holder. Travel counterbore tools are available in 6" (152 mm) and 10" (254 mm).

The fixed counter bore bit always enters the work piece at a 90° angle. The swivel bit can enter the workpiece from 0°–30°. The swivel type also offers coverage over a greater range of pipe sizes.

⚠ WARNING

Wear all the recommended protective equipment (see Section 1.4 on page 3 and Section 1.4 on page 3). This machine design requires that exposed components rotate under extreme power. Never insert body parts near rotating machine. Loose clothing is a hazard and should be taped (or otherwise gathered) to avoid catching.

3.8.1 Mounting the machine for flange facing

Use an approved overhead crane to suspend the tool.

Do the following to center the tool on the flange:

1. Measure from the inside of the tool ring to the outside of the flange bolt ring.
2. Measure in four directions at 90° points and slowly tighten the locator pads to secure the tool.
3. Snug the locator pads evenly with just enough pressure to hold the tool in position.

The locator pads must be approximately 1/4" (0.065 mm) below the bolt pattern surface (see Figure 3-16).

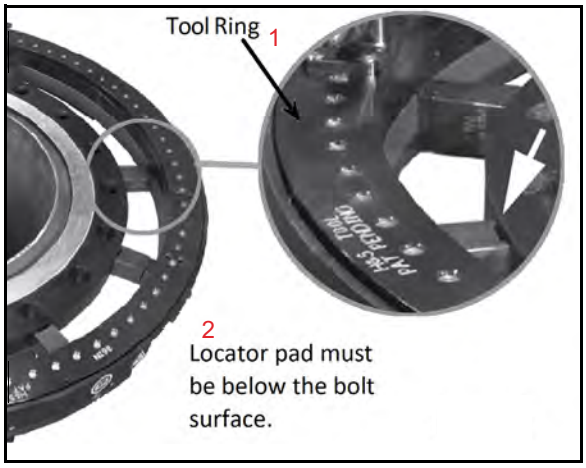

FIGURE 3-16. TOOL RING AND LOCATER PAD LOCATION

TABLE 3-12. TOOL RING AND LOCATER PAD IDENTIFICATION

Number	Component
1	Tool ring
2	Locator pad must be below the bolt surface

⚠ CAUTION

Do not remove the suspension equipment until the locator pads are fully tightened. Failure to do so could result in components twisting during operation or falling on personnel.

Rough squaring is accomplished by measuring from the top of the flange bolt surface to the top of the locator pad.

Alignment brackets are used for applications with 1" (25.4 mm) and larger locator pad extensions (see Figure 3-17). Either three or four brackets (depending upon the size of the flange) are fastened to locator pads at even locations.

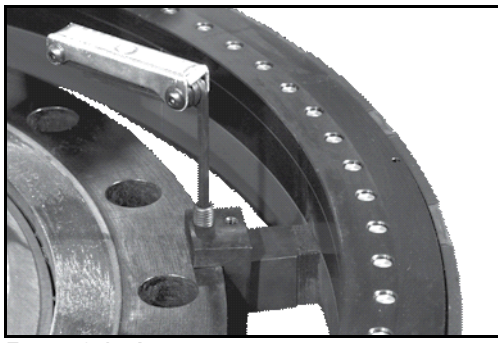

FIGURE 3-17. LOCATOR PAD EXTENSIONS

Once the plate (or the brackets) are mounted, do the following for fine squaring:

1. Check that the adjustment screw is not touching the work surface.
2. Place the dial indicator on the plate (see Figure 3-18), or on the tool ring when using the brackets (see Figure 3-16 on page 49).
3. Rotate the ring to find the lowest point.
4. Turn the adjustment screw clockwise until it contacts the work surface.
5. Continue to turn it until the dial indicator shows the desired reading.
6. Continue this process until the tool is properly squared all of the way around the surface.

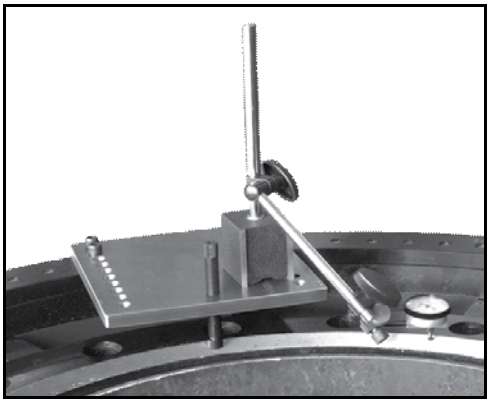

FIGURE 3-18. DIAL INDICATOR ON THE PLATE

Once the tool is squared, fully tighten all locator pads.

Rotate the ring/dial indicator to confirm accuracy.

Remove the dial indicator and the adjustment plates/brackets.

The suspension equipment may now be removed.

3.8.2 Mounting the counter-bore attachment

The counter-bore attachment can be mounted in two configurations: directly to the tool slide, or with the cross slide.

Direct mount – The direct mount tool slide bolts to the tool ring. Select the proper size tool slide to cover the full travel required. Adjust the counter-bore attachment within the bracket to allow for sufficient travel for depth of cut required (see Figure 3-19).

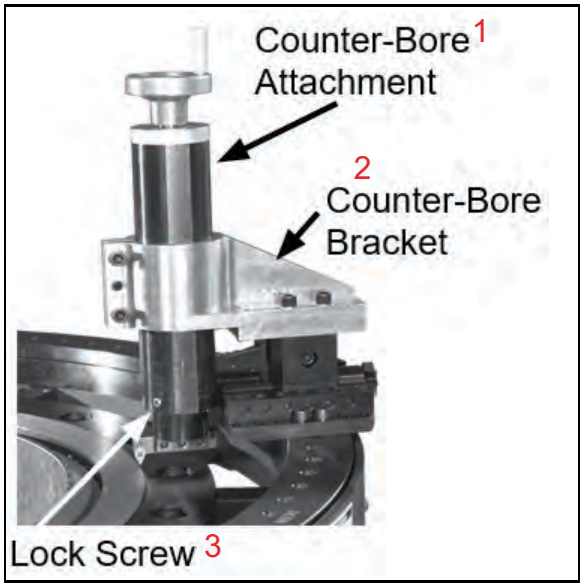

FIGURE 3-19. COUNTER-BORE ATTACHMENT COMPONENTS

TABLE 3-13. COUNTER-BORE ATTACHMENT IDENTIFICATION

Number	Component
1	Counter-bore attachment
2	Counter-bore bracket
3	Lock screw

Cross-slide mount – Cross slides are available in a variety of lengths to match your application requirements. The cross slide attachment uses a tool slide on one end and a blank slide on the other end. The tool slide and blank are mounted on the ring at 180° positions. Bolt both slides to the ring at a point where the leading edge is equal to the outside diameter of the flange bolt ring (see Figure 3-20).

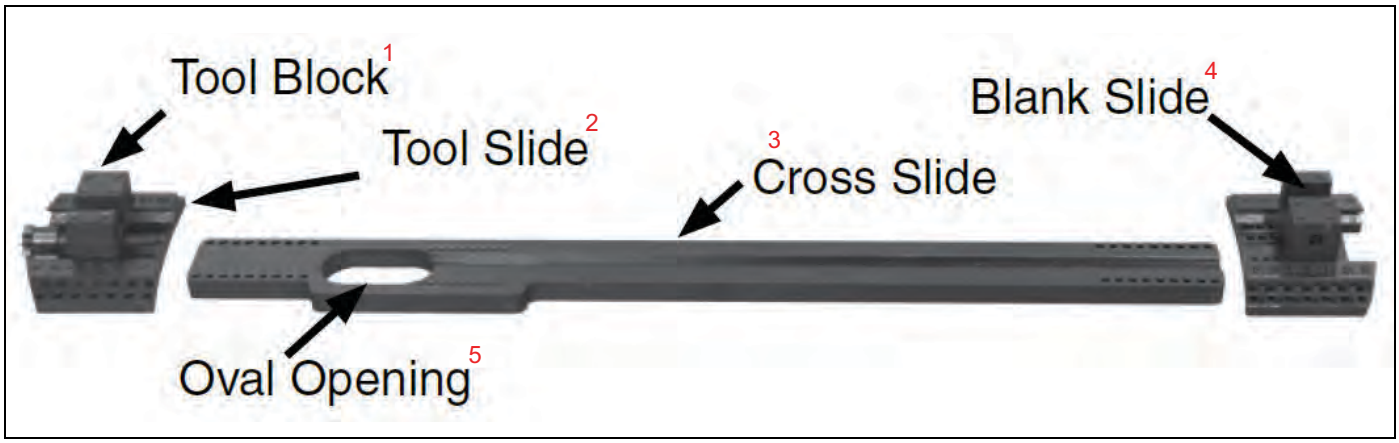

FIGURE 3-20. TOOL SLIDE AND CROSS SLIDE

TABLE 3-14. TOOL SLIDE AND CROSS SLIDE IDENTIFICATION

Number	Component
1	Tool block

TABLE 3-14. TOOL SLIDE AND CROSS SLIDE IDENTIFICATION

Number	Component
2	Tool slide
3	Cross slide
4	Blank slide
5	Oval opening

Turn the star wheel on the tool slide until the tool block is fully retracted (see Figure 3-21).

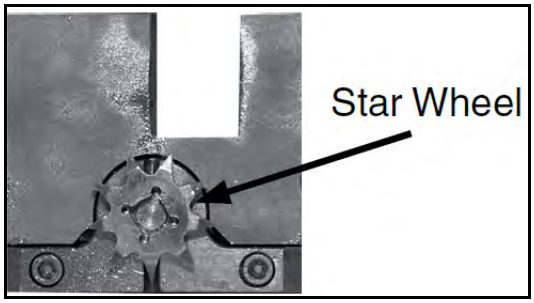

FIGURE 3-21. STAR WHEEL

Locate the cross slide on the tool block at a point where the oval opening (see Figure 3-20) is centered over the surface to be machined and bolt it securely to the tool slide and the blank slide.

Mount the counter-bore assembly so the barrel is centered in the oval opening and bolt it securely.

Tool holders are available in two styles: left and right (see Figure 3-22). These give the operator flexibility of locating the left or right side of the counter-bore barrel at the beginning of the surface to be machined to avoid clearance problems.

FIGURE 3-22. RIGHT AND LEFT HAND TOOL HOLDERS

TABLE 3-15. TOOL HOLDER IDENTIFICATION

Number	Component
1	Right hand
2	Left hand

Select the appropriate tool holder and install the insert so the formed cutting edge faces the direction of the rotation.

Install the tool holder/insert and lock it in position near the beginning of the surface to be machined (see Figure 3-23).

Using the speed wrench, turn the star wheel until the cutting insert is at the leading edge of the surface to be machined.

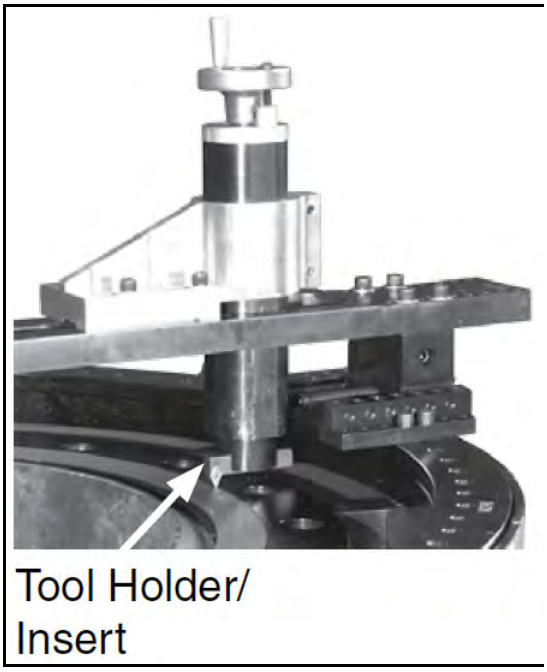

FIGURE 3-23. TOOL HOLDER/INSERT

Turn the handle wheel slowly until the tip of the insert touches the surface. Note the location of the wheel indicator line with the markings on the top of the barrel (see Figure 3-24).

TABLE 3-16. HANDLE WHEEL IDENTIFICATION

Number	Component
1	Handle wheel
2	Depth of cut indicators

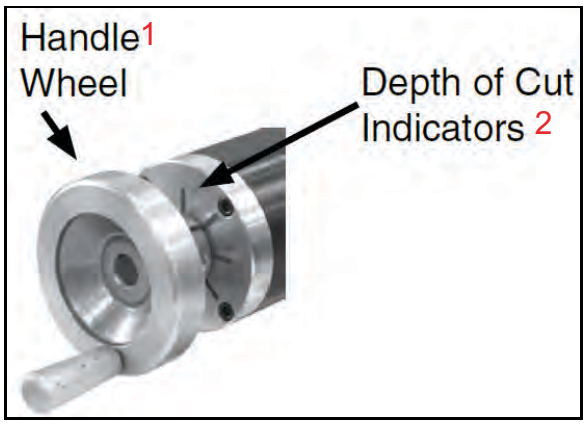

FIGURE 3-24. HANDLE WHEEL AND DEPTH OF CUT INDICATORS

Turn the wheel knob a half-turn to raise the insert above the surface.

Turn the star wheel to pull the insert between 0.25–0.5" (6.4–12.7 mm) away from the beginning of the work surface.

Return the insert to surface depth by returning the half-turn of the hand wheel.

Finished depth of cut is set by continuing to turn the handle wheel the appropriate number of lines past the surface level. Each line on the top of the barrel is approximately 0.006" (0.2 mm).

Tighten the lock screw on the counter-bore barrel.

NOTICE

Failure to perform this step will result in damage to the tool.

The insert is now set at the desired cut depth and is between 0.25–0.5" (6.4–12.7 mm) from the edge of the surface to be machined.

Adjust the “lash” by turning the star wheel by hand, moving the cutting insert toward the leading edge of the work surface.

Once you feel resistance, continue turning until the closest tip of the star wheel is aligned with the vertical line on the base of the tool slide.

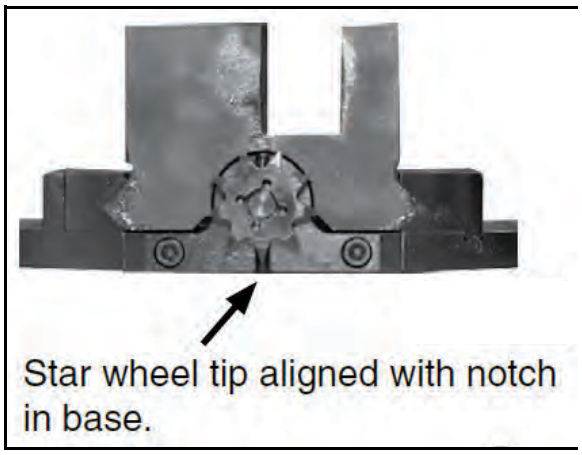

FIGURE 3-25. STAR WHEEL TIP ALIGNED WITH NOTCH IN BASE

3.8.3 Installing the trippers

The number of trippers used determines the surface finish (see Table 3-17).

TABLE 3-17. TRIPPERS FOR SURFACE FINISH

Tripper quantity	Approximate finish (RMS)
1	63
2	125
3	250
4	500

Determine the number of trippers required and bolt them securely in locations as evenly around the ring as possible (see Figure 3-26).

After installation, check that they are in the disengaged position.

⚠ CAUTION

Thoroughly inspect the immediate work area and remove any interferences. The counter-bore attachment and cross-slide (if used) will be rotating during operation. Keep body parts and clothing clear.

FIGURE 3-26. TRIPPERS INSTALLED EVENLY AROUND THE RING

3.8.4 Installing the motor for counterboring and flange facing

Do the following to install the motor:

1. Before installing the motor, remove the lock pin identified by red tape.
2. Install the motor and secure it tightly (Figure 13).

FIGURE 3-27. MOTOR INSTALLED

NOTICE

Make sure that the throttle is disengaged.

3. Attach the power source.
4. Slowly rotate the tool and inspect that all centering and squaring procedures have been accomplished.
5. With the tool rotating, engage all trippers.
6. Allow the cutter to travel the full surface.
7. Inspect the surface for any imperfections. If necessary, return to Section 3.8.2 on page 50 and set the depth of cut to clean the surface fully.

⚠ CAUTION

This process produces sharp, hot chips. Take extreme care to avoid personal injury.

3.9 ASSEMBLING THE 4-SECTION SPLIT FRAME

The serial number of the machine is stamped on each of the four sections. Compare these numbers to confirm that they all match prior to assembling these pieces. Each section also has a section number and there are letter designations A, B, C or D located at multiple positions on the ends.

The halves are usually kept separate as the pipe typically has flanges that prevent sliding clamshell onto pipe when assembled.

Once the two halves are securely bolted together, refer to Section 3.8 on page 48 for mounting the machine on the workpiece.

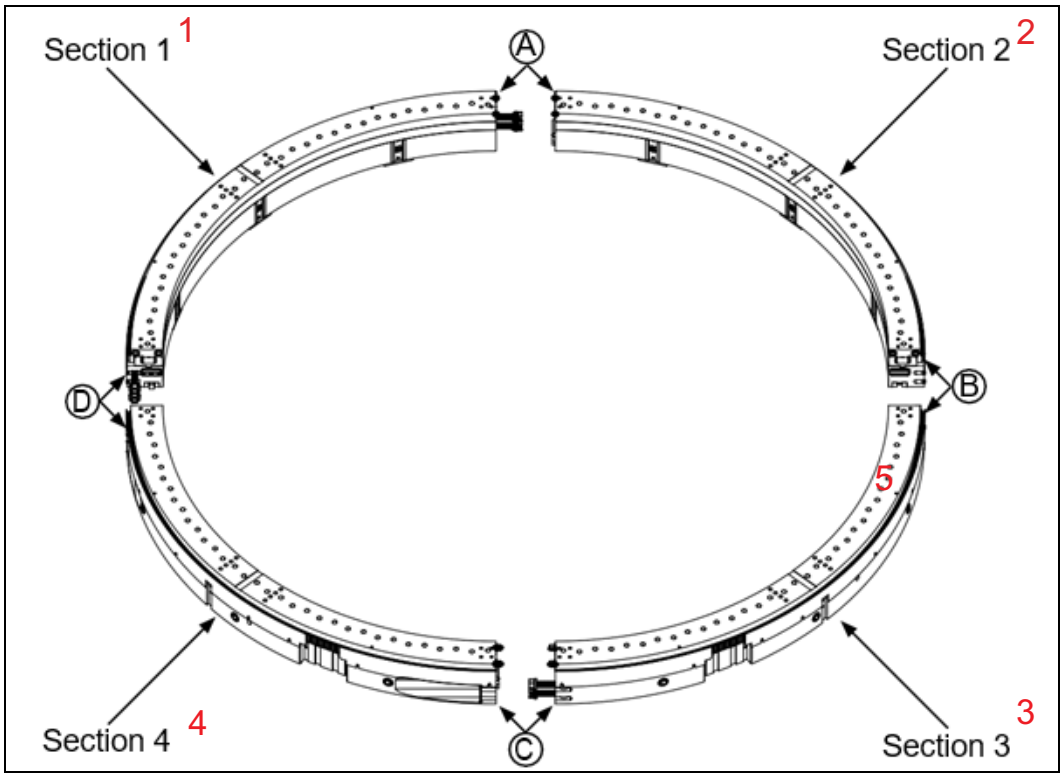

FIGURE 3-28. CLAMSHELL SECTIONS

TABLE 3-18. CLAMSHELL SECTION IDENTIFICATION

Number	Component
1	Section 1
2	Section 2
3	Section 3
4	Section 4

Do the following to assemble the clamshell:

1. Locate section 1 and section 2.
2. Align the ends, joining ends marked with A.
3. Swing the locking bolts into position and tighten each securely.
4. Join sections 3 and 4 by aligning ends marked with C.
5. Swing the locking bolts into position and tighten them securely.

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4 OPERATION

IN THIS CHAPTER:

⚠ DANGER

Rotating equipment can cause serious injury. Do not reach inside the swing of the machining arm during operation or while the machine is energized. Always be aware of the location of all personnel near the machine.

Adjustments should only be made when the clamshell is stopped and the power source is disconnected.

Never move or work on the clamshell without checking that all air, hydraulic or electric power has been removed and that there is no chance of any power being supplied to the assembly.

In the event of a power failure: close all valves and remove hoses and or electric lines to reduce the risk of operator injury when power returns.

4.1 PRE-OPERATION CHECKS

⚠ WARNING

Rotating machinery can seriously injure the operator. Turn off and lock out the machine before making the pre-start checks.

Do the following checks before operating the machine:

1. Complete the risk assessment checklist in Table 1-3 on page 5.
2. Check that the work area is clear of non-essential personnel and equipment.
3. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
4. Check that the machine is securely mounted to the workpiece.
5. Check that air hoses, hydraulic hoses, and electrical cords are routed and secured to avoid tripping, entanglement, damage from hot chips, or other damage should a hose or connection fail.
6. Check the tool condition and sharpness.
7. On the Air Caddy (for pneumatic-powered machines), check that the oil drip rate is set to 1 drip per 10 SCFM of air flow.
8. Check that all hand tools are removed from inside the machine and the work area.
9. Check that the lock pins have been removed.
10. Before connecting the power source to the clamshell, check that the following pieces are tightly secured:
    - Clamshell split line at the aluminum body swing bolts
    - Ring gear swing bolts – front of clamshell
    - Tool block – tool holder – tool bit inserts
    - Locator pads – locator pad extensions
    - Tripper assembly components
    - Motor and motor mounts

⚠ CAUTION

Always follow safe work practices, including site-specific safety requirements. It is your responsibility to perform a risk assessment before you set up the machine and each time before you operate the machine.

4.2 PNEUMATIC OPERATION

⚠ CAUTION

If the machine stops moving unexpectedly, de-pressurize and lock out the air valve located on the Air Caddy before performing any troubleshooting.

4.2.1 Starting the pneumatic-powered machine with the Defender™

After completing the pre-operation checklist in Section 4.1 on page 60, do the following to operate the machine:

1. Push the start button on the operator pendant (see the controls shown in Figure 2-2 on page 17).
2. Use the speed adjustment valve (see Figure 2-3 on page 18) to adjust the drive motor speed to achieve the desired rotations per minute (RPM).

⚠ WARNING

Rotating machinery can cause serious injury. Turn off the air control valve and disconnect the air line before removing chips. Remove chips with a brush.

4.2.2 Stopping the pneumatic-powered machine with the Defender™

Emergency shutdown

To stop machine operation immediately, press the Emergency Stop button on the operator pendant (see Figure 2-2 on page 17).

Before restarting the Split Frame Clamshell, do the following:

1. Check that the area around the machine swing area is free from loose tools, obstructions or personnel.
2. Close the speed adjustment valve.
3. Pull the emergency stop button up.
4. Press the start button (repeat step 1 in Section 4.2.1 if necessary).

4.2.3 Starting the pneumatic-powered machine without the Defender™

After completing the pre-operation checklist in Section 4.1 on page 60, do the following to operate the machine:

1. Press the throttle valve (“deadman”) handle.

DANGER

Do not disable the operation of the deadman valve by taping or other means of keeping it closed. This will prevent the machine's ability to immediately stop when necessary.

2. Use the speed adjustment valve to adjust the drive motor speed to achieve the desired rotations per minute (RPM).

WARNING

Rotating machinery can cause serious injury. Turn off the air control valve and disconnect the air line before removing chips. Remove chips with a brush.

4.2.4 Stopping the pneumatic-powered machine without the Defender™

Emergency shutdown

To stop machine operation immediately, release the throttle valve ("deadman") handle.

DANGER

Do not disable the operation of the deadman valve by taping or other means of keeping it closed. This will prevent the machine's ability to immediately stop when necessary.

4.3 HYDRAULIC OPERATION

4.3.1 Starting the hydraulic-powered machine

DANGER

To avoid serious injury to hands or arms, do not reach inside the swing of the clamshell rotating assembly during operation.

This type of machine has a hydraulic powered rotation.

CAUTION

Using a different HPU than the one specified in this manual will require a separate evaluation.

Do the following to operate the HPU:

1. Connect the energy sources.

2. On the HPU controller, turn the Emergency Stop button clockwise to reset the emergency stop.
3. Press the Start button to start the HPU motor.
4. Press the Speed Control Slower button until it is at the minimum.
5. Press the Hydraulic On button.
6. Press the Speed Control Faster button to reach the desired speed.
7. Use the speed control buttons to adjust the drive motor to achieve the desired cut.

⚠ WARNING

Disconnect power to the HPU or disconnect the hydraulic hoses before making any machine adjustments. Failure to disconnect power or the hoses could result in severe personal injury or machine damage.

4.3.2 Stopping the hydraulic-powered machine

Emergency shutdown

To stop machine operation immediately, press the Emergency Stop button on the HPU operator pendant.

Before restarting the Split Frame Clamshell, do the following:

1. Check that the area around the machine swing area is free from loose tools, obstructions or personnel.
2. Turn the HPU speed controller to the minimum.
3. Pull the emergency stop button up.
4. Press the start button on the HPU operator pendant.

4.4 ELECTRIC OPERATION

4.4.1 Starting the electric-powered machine

After completing the pre-operation checklist in Section 4.1 on page 60, do the following to operate the machine:

1. Push the start button on the control trigger.
2. Use the [thumb knob?] to adjust speed.
3. Momentarily pull the trigger again to unlock and stop the drive.

⚠ WARNING

Rotating machinery can cause serious injury. Disconnect power to the motor before removing chips or making machine adjustments. Remove chips with a brush.

4.4.2 Stopping the electric-powered machine

Emergency shutdown

To stop machine operation immediately, momentarily pull the trigger on the motor to unlock and stop the drive.

Before restarting the Split Frame Clamshell, do the following:

1. Check that the area around the machine swing area is free from loose tools, obstructions or personnel.
2. Plug the motor back into the power source.

4.5 ENGAGING THE FEED

4.5.1 Engaging the feed with the Defender™ (pneumatic only)

The operator pendant (see Figure 2-2 on page 17) has a selector switch that engages or disengages the tripper.

To engage the feed, switch to "I".

To disengage the feed, switch to "O".

4.5.2 Engaging the feed with all other machine types

To engage the feed, move the manual handle from disengage to engage (see Figure 3-5 on page 35).

To disengage the feed, move the handle back to the disengage position.

Move the appropriate number of trippers into the feed position to achieve the desired feed rate setting.

⚠ CAUTION

Keep your hands out of any pinch points while operating the feed engage-disengage handle.

TIP:

The P/N 102947 assembly hose and air valve may be used to operate pneumatic trippers with other drives or non-Defender Air Caddies.

After disengaging, let the machine rotate a few times to clear the tool bit, then turn off power to stop the clamshell rotation. Letting the tool bit clear will prevent tool damage and gouging.

Each tripper advances the tooling approximately 0.0035" (0.0889 mm) per revolution.

4.6 OPERATION MODES

4.6.1 Severing in-line pipe

NOTICE

When severing pipe, support both sides of the cut to avoid the bit becoming trapped or breaking.

Do the following for severing in-line pipe:V

1. Following Section 3.4.2 on page 40, replace the bevel tool bit with another sever tool bit.
2. Back up both tool bits (out approximately 1/32" [0.79 mm]).
3. Attach the drive motor to the clamshell, disengage the tripper pin, and-check function and speed by doing the following, depending on the machine type:
   - For non-Defender™ models: depress the deadman handle throttle lever slowly.
   - For Defender™ models: use the operator pendant (see Figure 2-2 on page 17).

TIP:

Typical sever tooling includes 1/4" (6.4 mm) wide and 3/8" (0.375 mm) wide sever blades run together with the 1/4" (6.4 mm) blade, cutting 1/32" deeper ahead of the 3/8" (0.79 mm) wide blade.

NOTICE

The cutting operation is continuous until terminated by the operator. To stop the cutting feed during rotation, disengage the feed (see Section 4.5 on page 64).

4. Start the motor and engage the tripper pin by moving the tripper handle towards the front of the machine. Each rotation will advance the tool bit approximately 0.0035" (0.0889 mm).
5. Allow the tripper pin to advance the feed of the tool bits until both of the tool bits are cutting.

NOTICE

If chatter or vibration occurs, reduce the cutting RPM. If the tool bits chip or become dull, replace them immediately with sharp bits. Never try to re-sharpen the tool bits. They must be sent back to the factory for regrinding to maintain proper relief angles. Otherwise, damage to the machine could occur.

TIP:

Use cutting lubricant during the cutting operation to reduce friction and extend bit life.

6. Stop the machine when severing is complete. Retract the tool blocks with the star wheel wrench to the start position.

4.6.2 Severing and beveling in-line pipe

Most of the bevel blades have a compatible sever blade. A 1/4" (6 mm) sever typically leads the bevel to relieve pressure on the bevel blade.

When cutting and beveling together, a 1/4" sever usually leads the bevel to relieve pressure on the bevel blade.

Do the following to sever and bevel in-line pipe:

1. Follow Section 3.4.2 on page 40 to replace both sever tool bits with either left-hand or right-hand sever and bevel combinations.
2. Retract the bevel tool bit 1/32” above the sever bit and follow the procedures in Section 4.6.1 on page 65.

⚠ CAUTION

To prevent damage to the tool bit or personal injury, the workpiece must be rigged properly to keep the tool from binding when the pipe is severed. Improperly rigged piping may result in personal injury.

4.6.3 Using the counter-bore attachments

Two types of counter bore attachments are available: fixed and swivel (see Section 3.8 on page 48). Each can be ordered with a 6" or 10" barrel. Beveling and flange reconditioning may also be accomplished with these.

4.6.3.1 Mounting the attachment

Do the following to mount either counter bore attachment:

1. Remove the tool slide cap from the machine that is already mounted on the pipe and bolt the attachment onto the tool block.

2. Insert the bit into the counter bore attachment and secure it with the set screws. The cutting edge side faces the same as the set screws.

Fixed type set-up

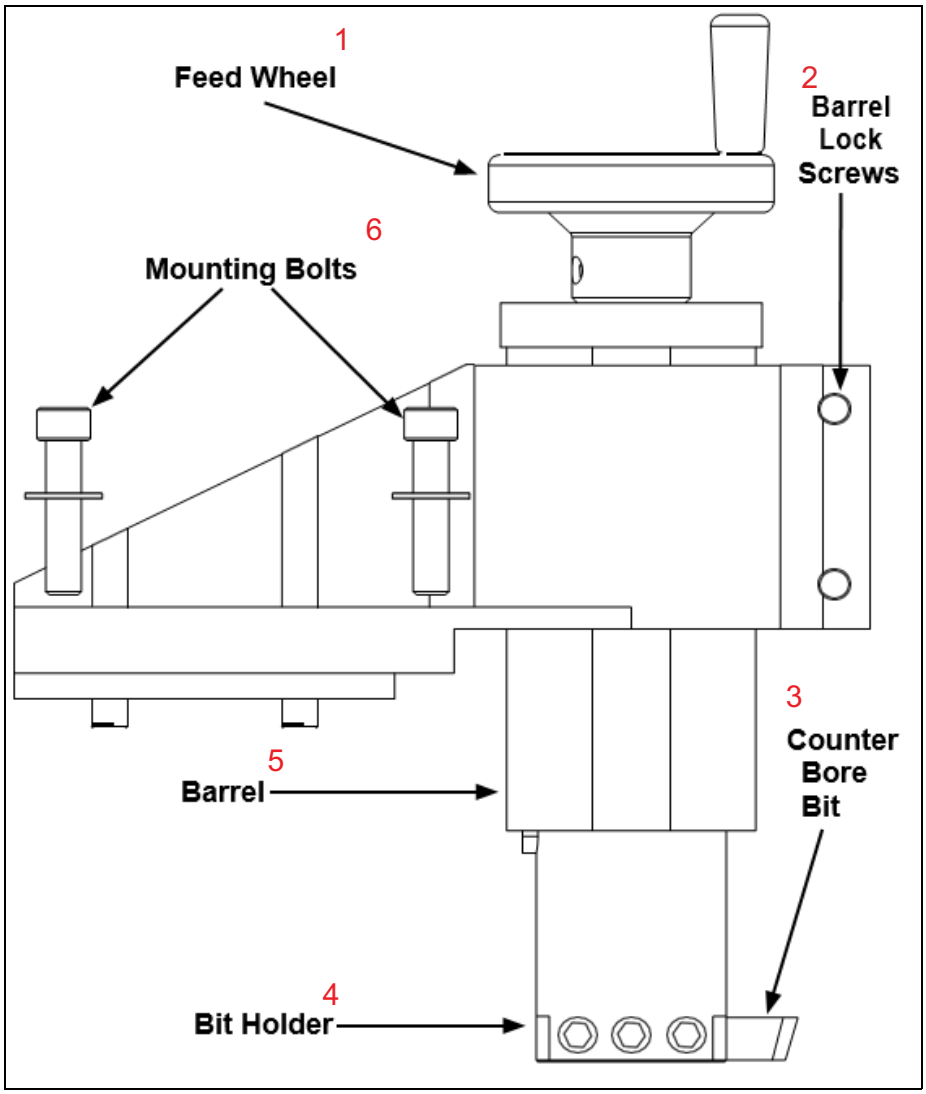

FIGURE 4-1. FIXED COUNTER-BORE ATTACHMENT COMPONENTS

TABLE 4-1. FIXED COUNTER-BORE ATTACHMENT IDENTIFICATION

Number	Component
1	Feed wheel
2	Barrel lock screws
3	Counter bore bit
4	Bit holder
5	Barrel
6	Mounting bolts

Do the following for fixed type set-up:

1. Using the feed handle, adjust the bit position at the proper distance to begin the machining process.
2. Lock the barrel in position.
3. Use the speed handle provided to turn the star wheel on the tool slide and set the horizontal position of the bit at the desired entry point of the pipe wall.

Swivel type set-up

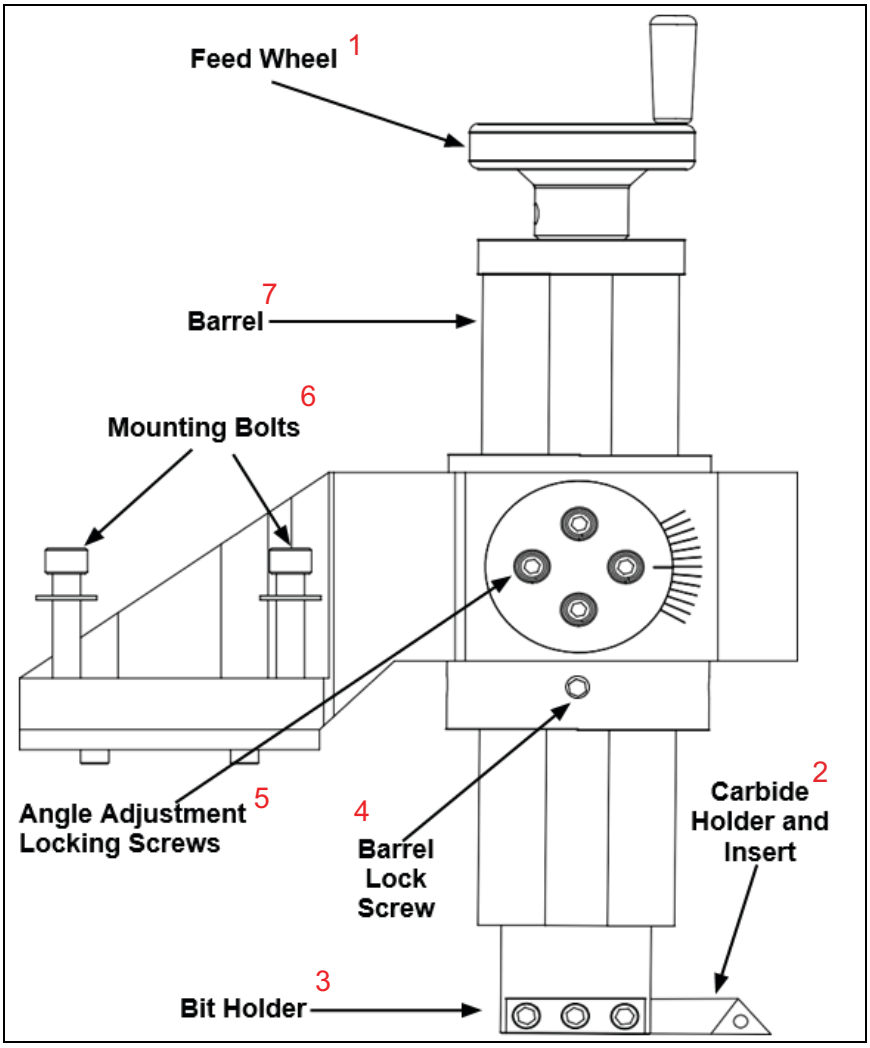

FIGURE 4-2. SWIVEL COUNTER-BORE ATTACHMENT COMPONENTS

TABLE 4-2. SWIVEL COUNTER-BORE ATTACHMENT IDENTIFICATION

Number	Component
1	Feed wheel
2	Carbide holder and insert

TABLE 4-2. SWIVEL COUNTER-BORE ATTACHMENT IDENTIFICATION

Number	Component
3	Bit holder
4	Barrel lock screw
5	Angle adjustment locking screws
6	Mounting bolts
7	Barrel

Do the following for swivel type set-up:

1. Loosen the angle adjustment locking screws and adjust the angle of the barrel to the desired counter bore profile.
2. Tighten the locking screws.
3. Set the barrel height and lock it into position.
4. Turn the feed handle to adjust the height of the tool bit to the entry point of pipe wall.
5. Adjust the horizontal positioning of the bit with the speed wrench in the star wheel on the tool slide.
6. Stop before contacting the pipe wall.

4.6.3.2 Operating the counter bore attachment

Do the following to operate the counter bore attachment:

1. Check that all bolts and screws are tight and that the area is clear for tool operation.
2. Start the motor and turn the feed handle approximately 1/4 turn per revolution.
3. Continue to turn the feed wheel at each revolution until the desired depth is achieved.
4. Stop the motor, reposition the bit to the top entry point of the pipe wall, and adjust the horizontal position to just off of the pipe wall.
5. Continue until the desired inside diameter and depth have been achieved.

4.7 CHIPLESS CUTTING

An optional method of severing pipe is the use of the chipless cutter (P/N 2201395).

This tubing style cutter wheel uses a hardened cutter wheel to deform a thin groove into the wall of the pipe and does not produce chips that could fall into the ID of the pipe.

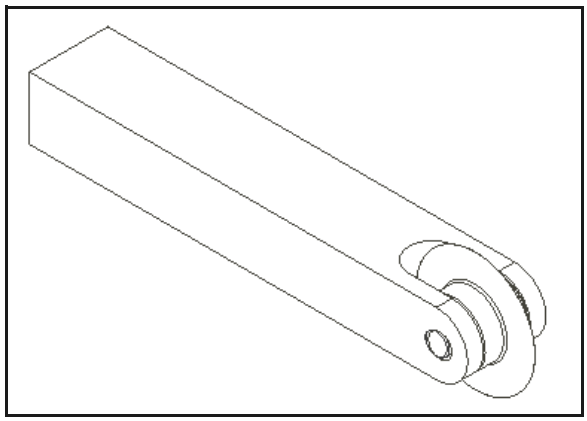

FIGURE 4-3. CHIPLESS CUTTER

NOTICE

This cutter can only be used with pipe that has a 0.39" (10 mm) or less wall thickness). If the pipe is thicker than this, the operator must use other tooling to first plunge cut an area at least 1.3" (33 mm) wide before switching to the chipless cutter.

4.8 DISASSEMBLY

Do the following for disassembly:

1. Disconnect the power cables or hoses from the machine.
2. Remove the motor.
3. If using the Defender™ kit, remove the guards and replace the original clamshell screws (see Section 3.3 on page 30)
4. Install the lock pins to stop ring/gears from spinning freely and causing injury to operator (see Figure 3-1 on page 31).
5. Remove the trippers from the outside diameter of the machine.
6. Remove the tooling and tool slides.
7. Separate the machine halves and store all the components in the storage/ shipping boxes (see Section 6 on page 81).

5 MAINTENANCE

IN THIS CHAPTER:

DANGER

Rotating equipment can cause serious injury. Do not reach inside the swing of the machining arm during operation or while the machine is energized. Always be aware of the location of all personnel near the machine.

Adjustments should only be made when the clamshell is stopped and the power source is disconnected.

Never move or work on the clamshell without checking that all air, hydraulic or electric has been removed and that there is no chance of any power being supplied to the assembly.

In the event of a power failure: close all valves and remove hoses and or electric lines to reduce the risk of operator injury when power returns.

5.1 Maintenance procedures

Before each use, do the following checks on the Air Caddy:

1. Check the Air Caddy oil reservoir levels.
2. Check the pneumatic lines for damage and wear.
3. Perform an Air Caddy emergency stop check.
4. Perform an Air Caddy drop-out circuit check.

Do the following to clean all components of the Split Frame Clamshell:

1. Remove the gear guard and set it aside. Separate the gear from the track.

2. Check all 1/4"-20 threaded holes at the tripper locations, motor locations, and locator pads for damage or wear.
3. Check all 1/2"-13 threaded holes if there is any damage or wear.
4. Check and clean all 3/4"-10 or 1"-8 locator pad threaded holes in the body. Check that the locator works in body with minimal resistance. Tap helical (helicoil) if needed. Replace helical (helicoil) only if needed.
5. Check the locator pad assembly to ensure that the shoulder bolt to the set screw is tight and that the locator pad moves easily on the shoulder bolt. Check to see that the set screw is not damaged. Replace the set screw if needed.
6. Check all tripper slots to ensure that a tripper will install properly.
7. Check that the motor housing fist into the clamshell properly by using a gear housing not attached to a motor.
8. Clean the track of old grease, dirt, and rust.
9. Check that the button head cap screws (BHCS), which hold the track to the body, are hand tight.
10. Clean the ring gear of old grease, dirt, and rust.
11. Check the 3/8"-16 tool slide holes in the ring gear with BHCS (P/N 10191). Re-tap if needed.
12. Check that all guide rollers are moving with ease. Change bearings or other components if needed.
13. Grease the guide rollers.
14. Check the body ring for damage or burrs. Smooth out surfaces if needed.
15. Remove and clean the strike plates, then check the dowel pin set screws on the female and male sides. Tighten if needed. Reinstall the strike plates.
16. Grease the track with fresh grease.
17. Assemble the clamshell.
18. Clean the gear guard, replace stickers where needed, and install the gear guard back onto the clamshell.
19. Install the locking pins with pull pin tags, one in the male side and one in the female side, or one in each quarter of the clamshell.

5.2 APPROVED LUBRICANTS

CLIMAX recommends using the following lubricants at the locations indicated. Failure to use the appropriate lubricants can result in damage and premature machine wear.

⚠ CAUTION

Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.

TABLE 5-1. APPROVED LUBRICANTS

Application Area	Lubricant	Biodegradable Lubricant	Viscosity (cSt)	Quantity
Per use or as required				
Air Caddy lubricator	Mobil Almo 525 Air Tool Oil	N/A	32 @ 40 °C 6 @ 100 °C	Refill oil lubricator
Clamshell surfaces	WD 40	N/A	N/A	As required
Clamshell track and rollers	Mobilith SHC 460	N/A	N/A	1 oz
Tool slides	WD 40 dry lube	N/A	N/A	As required
Storage				
Unpainted surfaces	LPS 2	N/A	7 @ 25 °C	As required
Unpainted surfaces	LPS 3	N/A	N/A	As required
Machine surfaces	LPS PreSolve Orange degreaser (cleaner to remove LPS 3)	N/A	N/A	As required

5.3 MAINTENANCE TASKS

Before and after each use, remove debris, oil, and moisture from machine surfaces.

Maintenance tasks are described in the following sections.

5.3.1 Repairing the tool slide

Do the following to repair the tool slide:

1. Insert the tool slide into the jig.
2. Visually check all the bolts.
3. Remove and inspect the four bolts (P/N 10191) bolts and check them for wear. If the ends are flat or worn, replace the bolts.
4. Replace any missing bolts on the tool slide (P/N 10191, P/N 10160, P/N 12324).
5. Insert and hand-tighten the bolts. If they are difficult to insert, tap the bolts with a 3/8-16 tap.
6. Run the feed screw in reverse until the tool block comes off the tool slide.

TIP:

The operator may need to loosen some of the set screws if the block is too tight.

7. Use the star wheel gauge to check the star wheel. If it fits inside the gauge, change the star wheel.

Do the following to replace the star wheel:

1. Remove the roll pin.
2. Remove and inspect the feed screw. If needed, clean the threads with a 1/2-32 die.
3. Using compressed air or a brush, remove debris and wipe down the tool slide.
4. Check the thrust washer for excessive wear.
5. Replace the feed screw through the thrust washer and onto the tool slide. The fit should be fairly tight through the flange bearing.
6. Replace the tool block after the star wheel is back on.
7. Rotate the star wheel clockwise by hand to start moving the tool block.
8. Tighten the last set screw until there is no movement in the tool block.
9. Continue spinning the star wheel until you reach the center of the tool slide, checking for tool block movement. Adjust the set screw until the tool block is fixed in place.
10. Continue spinning the star wheel until you reach the front of the tool slide, taking care not to go too far and jam the tool block too far forward.
11. Tighten the set screws at the front of the tool slide until they are snug.
12. Rotate the star wheel counter-clockwise. There should be a slight drag with no movement in the tool block. Continue until you reach the end of the travel.
13. Once the tool block is set, remove the tool slide from the jig.
14. Check the bottom side of the tool block for wear. Clean all marred edges until smooth.

5.3.2 Check the Air Caddy oil reservoir levels

Do the following to check the Air Caddy oil reservoir levels:

1. Check the Air Caddy oil reservoir levels.
2. Refill as necessary. See Table 5-1 on page 73 for information on recommended lubricants.
3. Check that the oil drip rate is set at six drops per minute.

5.3.3 Empty the air filter water trap

Check and drain the water from the air filter water trap.

5.3.4 Air Caddy emergency stop check

Do the following to check the Air Caddy emergency stop:

1. With the machine running, press the emergency stop button (see Figure 2-2 on page 17 and Figure A-53 on page 137).
2. Check that the machine stops.
3. Reset the emergency stop by pulling the button up.
4. Check the machine doesn't restart.

5.3.5 Air Caddy drop-out circuit check

The Air Caddy drop-out circuit prevents the machine from restarting unexpectedly after air supply to the Air Caddy is lost and restored.

Do the following to check the Air Caddy drop-out circuit:

1. Check that the Air Caddy is connected to an air supply and to the Split Frame Clamshell.
2. Set the speed adjustment valve to zero.
3. Check that the air-supply lock-out is open (pulled up).
4. Press the START button.
5. Slowly open the Air Caddy speed adjustment valve until the rotary drive engages.
6. Close (press down) the lock-out valve.
7. Check that the Split Frame Clamshell stops.
8. Open the lock-out valve.
9. Check that the machine does not automatically restart when the lock-out valve is re-opened in step 7.

⚠ WARNING

Do not operate the machine if the Air Caddy starts in step 8. Contact Climax for service recommendations. If the machine unexpectedly restarts, it could cause severe personal injury or death.

5.4 TROUBLESHOOTING

This section is intended to help you solve basic machine performance problems. For serious maintenance or if you have questions on the following procedures, contact CLIMAX.

TABLE 5-2. TROUBLESHOOTING

Problem	Remedy
Tool chatter	Decrease the rotation drive motor speed.
Machine is unstable	Tighten all clamps and hardware. Provide additional support.
Ring gear will not rotate	Check electrical connections and circuit breakers.
	Check for seized bearings and replace as needed.
	Clean any swarf (chips) from the track ring.
	Check that there is enough grease on the track ring and bearings.
Feed is in wrong direction	Change the direction on the control screen (either the machining screen or the feed axis setup screen).
	If using hydraulic power: check that the hose are appropriate for the required pressure. Check that the hoses are not installed the wrong way; switch them if necessary.
	The cylinder and seal in the motor may have been fitted the wrong way. If so, contact CLIMAX.

5.5 DEFENDER™ KITS

Table 5-3 shows the applicable Defender™ guard kits for each size of Split Frame Clamshell. Call CLIMAX for more information on obtaining a kit.

TABLE 5-3. DEFENDER KITS

Clamshell size	Defender guard kit P/N
AFC 4	97204
AFC 6	97205
AFC 8	97206
AFC 10	97207
AFC 12	97208
AFC 14	97209
AFC 16	97210
AFC 18	97211
AFC 20	97212
AFC 24	97213
AFC 26	97214
AFC 28	97215
AFC 30	97216
AFC 32	97217
AFC 36	97218
AFC 42	97219
BFC 48	97220
BFC 56	97221
BFC 66	97222
BFC 72	97223
BFC 86	97501

Each Defender™ guard kit contains guards that are unique to the specific Clamshell size, as well as standard labels.

For information on the shark fin (P/N 96742), see Appendix A.

5.5.1 AFC Defender™ kit parts

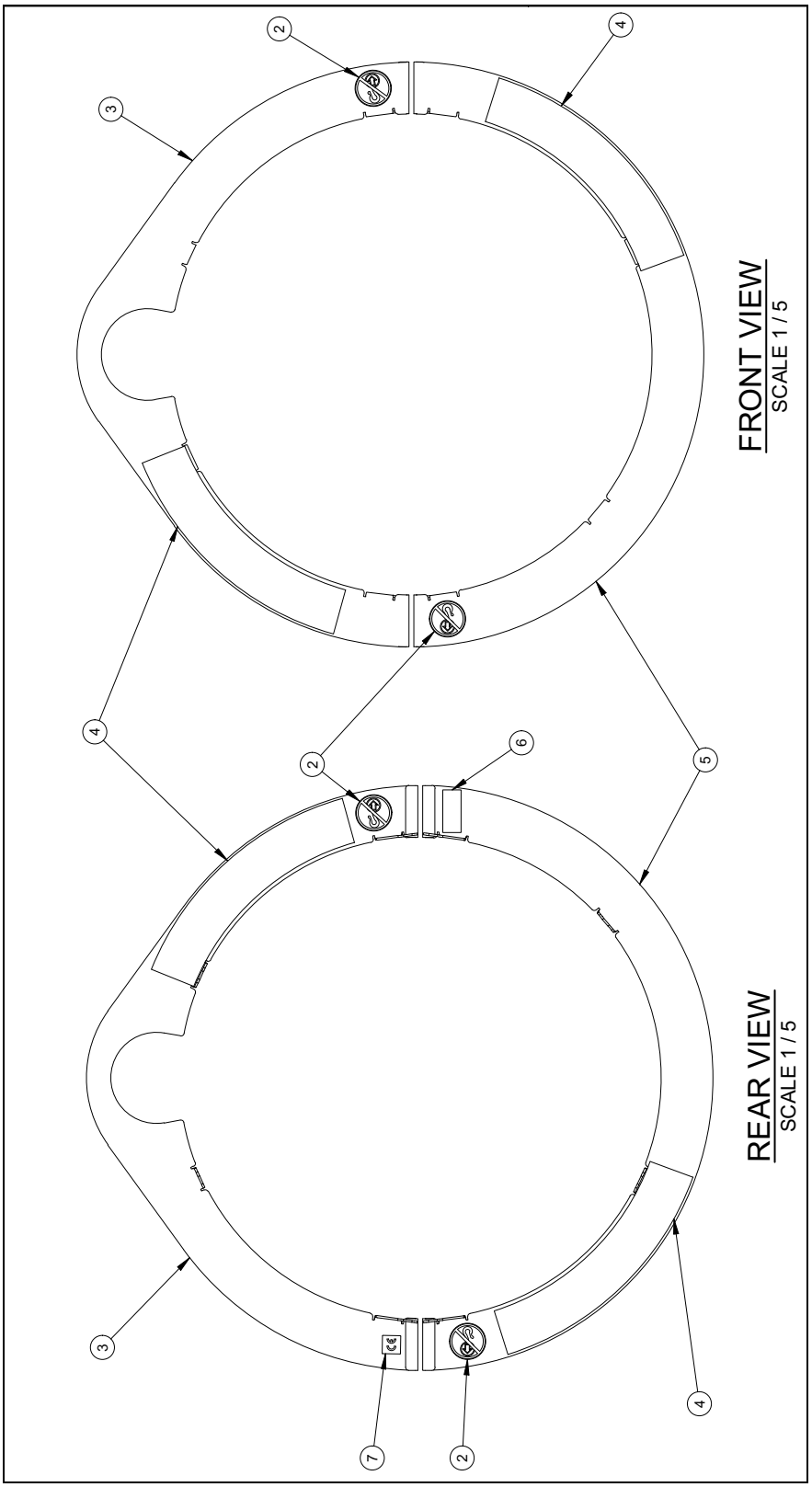

FIGURE 5-1. AFC-14 DEFENDER™ GUARD KIT EXPLODED VIEW (P/N 97209)

TABLE 5-4. AFC-14 DEFENDER™ GUARD KIT (P/N 97209)

Item	Part number	Description	Quantity
1	88963	SCREW 1/4-20 X 1/2 BHSCS FLANGED	see Table 5-5
2	96384	LABEL WARNING NOT A LIFT POINT ROUND	4
3	see Table 5-5	RING GUARD MOTOR SIDE	1
4	see Table 5-5	LABEL DEFENDER CLEAR	4
5	see Table 5-5	RING GUARD NON MOTOR SIDE	1
6	97695	LABEL FOR USE WITH H&S PRODUCTS 1.875 X .75	1
7	97696	LABEL CE 3/4 X 3/4	1

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TABLE 5-5. AFC DEFENDER™ GUARD ASSEMBLY KITS

Model	Item 1		Item 3		Item 4		Item 5	
	Part number	Quantity	Part number	Quantity	Part number	Quantity	Part number	Quantity
AFC 4	88963	7	96593	1	97064	4	96594	1
AFC 6	88963	8	96595	1	97065	4	96596	1
AFC 8	88963	8	96573	1	97052	4	96574	1
AFC 10	88963	8	97290	1	97066	4	96574	1
AFC 12	88963	8	96851	1	96913	4	96575	1
AFC 14	88963	8	96576	1	97067	4	97420	1
AFC 16	88963	8	96577	1	96880	4	96578	1
AFC 18	88963	9	96579	1	97068	4	96580	1
AFC 20	88963	9	96581	1	97069	4	96582	1
AFC 24	88963	9	96593	1	97053	4	96584	1
AFC 26	88963	9	96585	1	97054	4	96586	1
AFC 28	88963	9	96587	1	97055	4	96588	1
AFC 30	88963	9	96589	1	97056	4	96590	1
AFC 32	88963	9	96591	1	97057	4	96592	1
AFC 36	88963	9	96625	1	97058	4	96626	1
AFC 42	88963	9	96695	1	97059	4	96696	1

If the Air Caddy or operator pendant malfunctions, call CLIMAX to order one of these replacement kits.

6 STORAGE AND SHIPPING

IN THIS CHAPTER:

6.1 Storage

Proper storage of the Split Frame Clamshell will extend its usefulness and prevent undue damage.

Before storing, do the following:

1. Clean the machine with solvent to remove grease, metal chips, and moisture.
2. Drain all liquids from the pneumatic conditioning unit.

Store the Split Frame Clamshell in its original shipping container. Keep all packing materials for repackaging the machine.

6.1.1 Short-term storage

Do the following to store split-frame machines (three months or less):

1. Retract the tool head from the workpiece.
2. Remove the tooling and hoses.
3. Remove the motor, tool slides, and trip assembly.
4. Add oil directly to the air inlet of the pneumatic motor, then run briefly to coat internal components.
5. If using the Defender™ kit, remove the guards and replace the original clamshell screws.
6. Clean the machine to remove dirt, grease, metal chips, and moisture.
7. Spray all unpainted surfaces with LPS-2 to prevent corrosion.
8. Install locking pins, split the machine into halves, and place them in the container.
9. Position accessories in the container along the bottom. If using the Defender™ kit, store the guard kit in its original shipping box.
10. Secure the lid on the storage container.

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
2. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
3. Store the shipping container in an environment out of direct sunlight with temperature < 70ºF (21ºC) and humidity < 50%.

6.2 SHIPPING

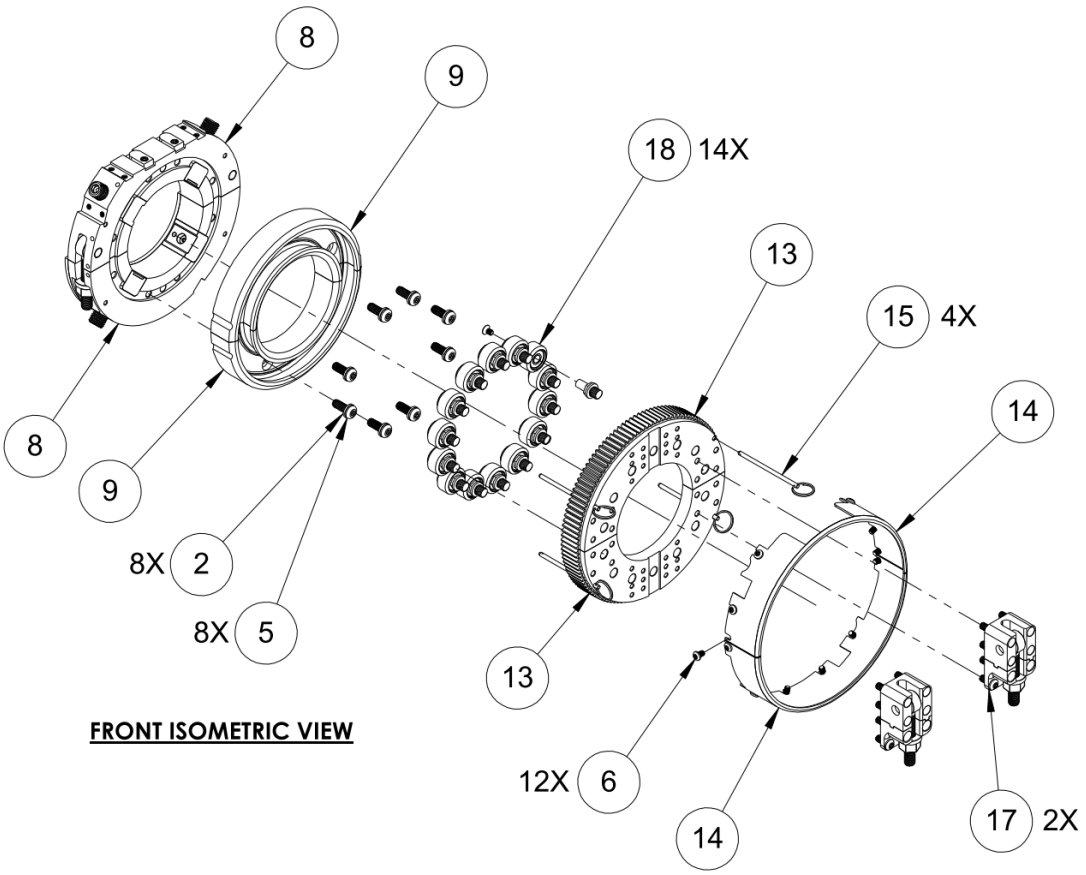
The Split Frame Clamshell and the Defender™ guard kit can be shipped in their original shipping containers.

6.3 DECOMMISSIONING

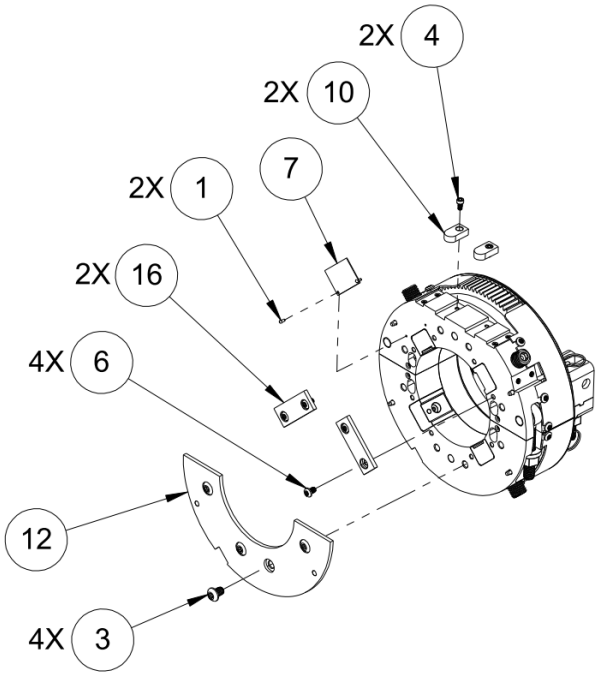
To decommission the Split Frame Clamshell before disposal, remove the drive motor and dispose of the drive assembly, controls, or controllers separately from the rest of the machine components. Refer to Appendix A for component assembly information.

APPENDIX A ASSEMBLY DRAWINGS

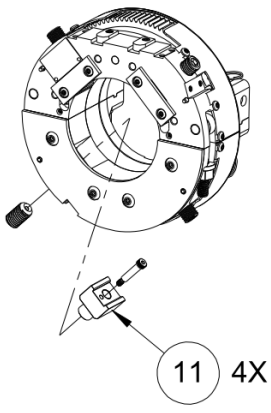
Drawing list



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-1. AFC4 ASSEMBLY

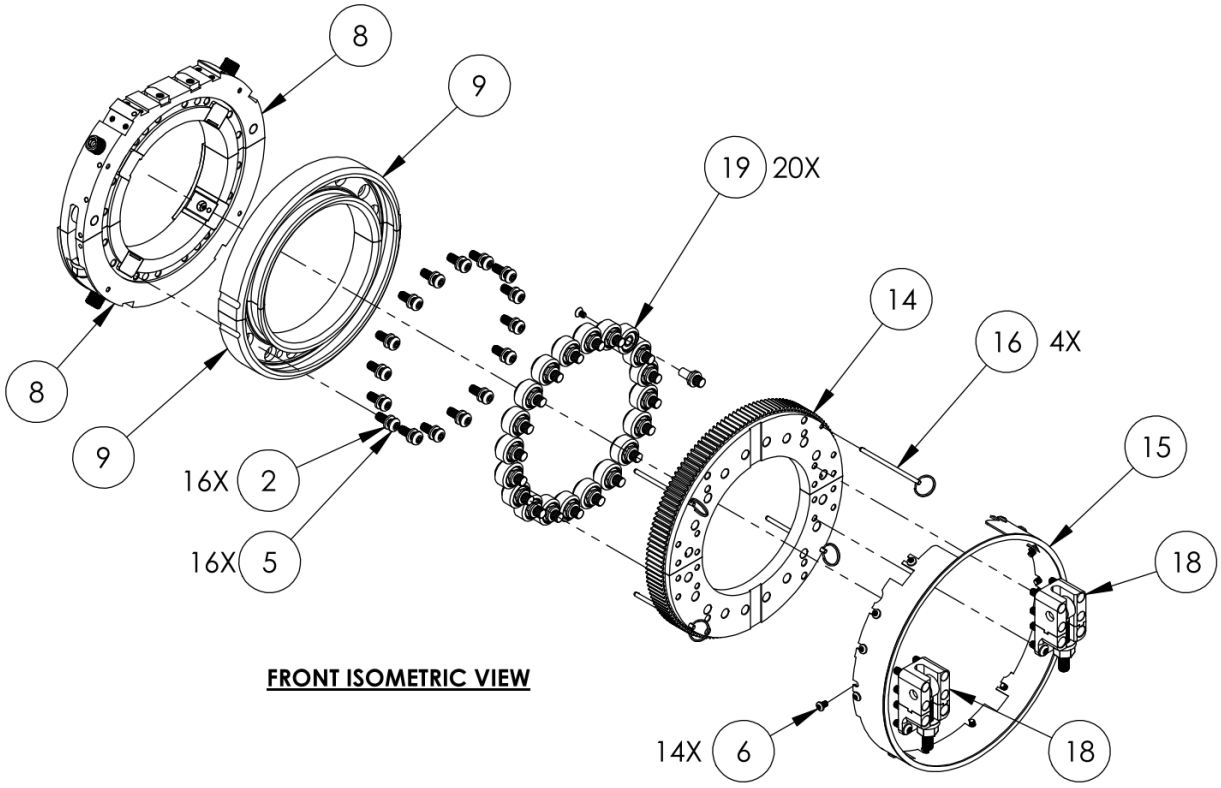
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

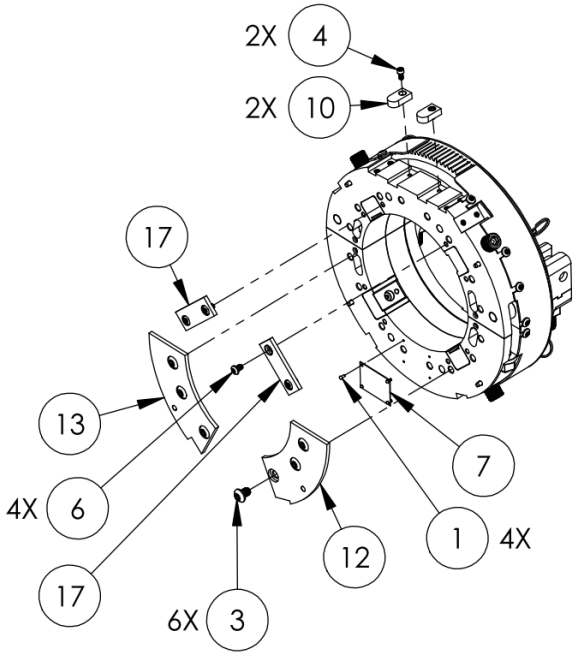
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
18	14	5001035	GUIDE ROLLER BEARING ASSEMBLY
17	2	5001027	RING GEAR CLAMP ASSEMBLY
16	2	5001025	AFC BACKING STRAP
15	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
14	1	4004504	AFC 4 GEAR GUARD
13	1	3003504	AFC 4 RING GEAR
12	1	2161450	AFC 4 STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002504	AFC 4 TRACK RING
8	1	1001504	AFC 4 MAIN BODY RING
7	1	101239	PLATE SERIAL YEAR MODEL CE MODIFIED
6	16	18286	SCREW 1/4-20 X 3/8 BHSCS
5	8	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	8	10595	WASHER 3/8 LOCW
1	2	10588	SCREW DRIVE #2 X 1/4 HOLE SIZE .089 X .250 DP HOLE

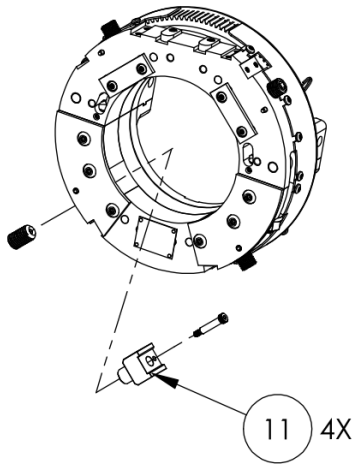
FIGURE A-2. AFC4 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-3. AFC6 ASSEMBLY

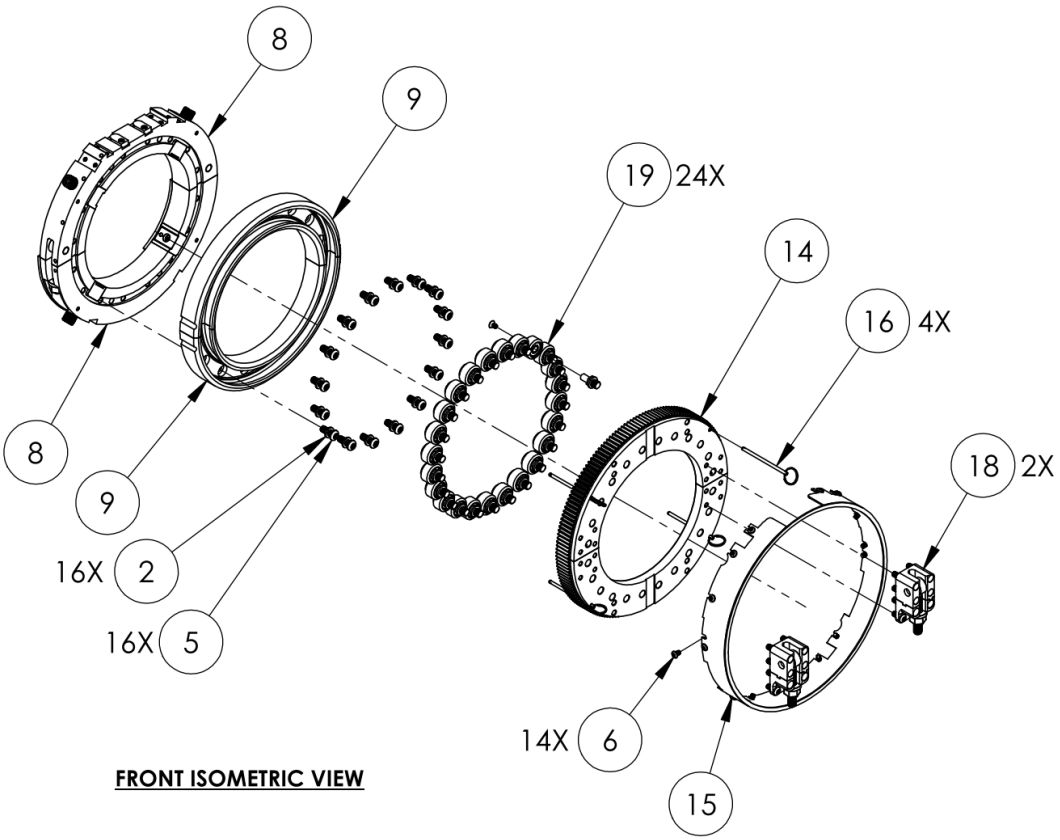
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

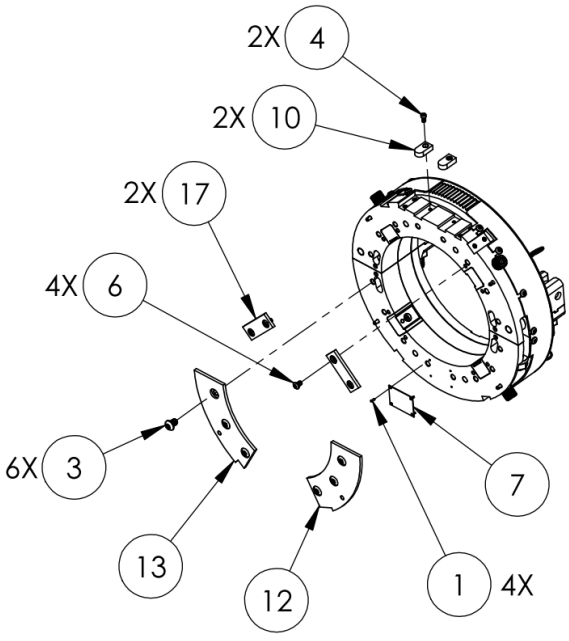
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

19	20	5001035	GUIDE ROLLER BEARING ASSEMBLY
18	2	5001027	RING GEAR CLAMP ASSEMBLY
17	2	5001025	AFC BACKING STRAP
16	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
15	1	4004506	AFC 6 GEAR GUARD
14	1	3003506	AFC 6 RING GEAR
13	1	2161452	AFC 6 RH STRIKE PLATE
12	1	2161451	AFC 6 LH STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002506	AFC 6 TRACK RING
8	1	1001506	AFC6-R BODY RING
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	18	18286	SCREW 1/4-20 X 3/8 BHSCS
5	16	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	16	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION

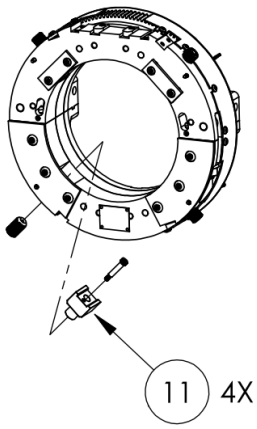
FIGURE A-4. AFC6 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-5. AFC8 ASSEMBLY

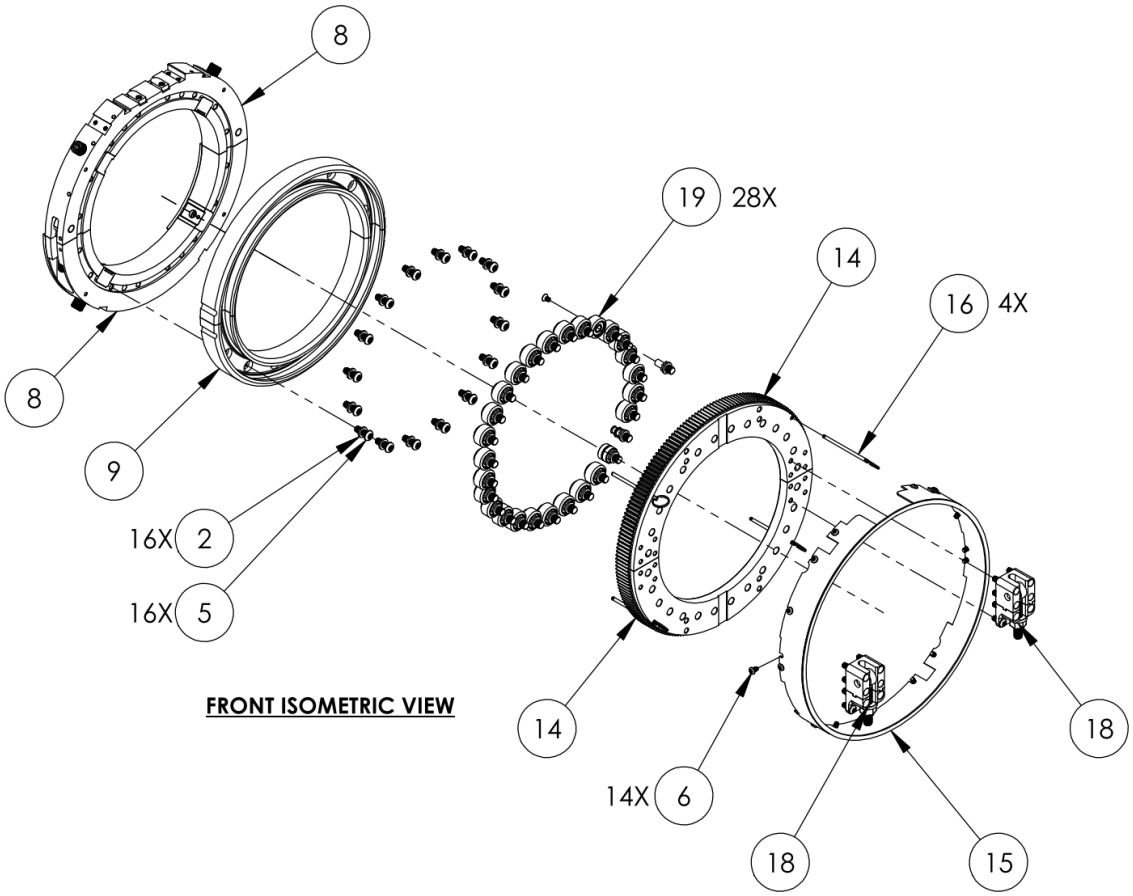
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

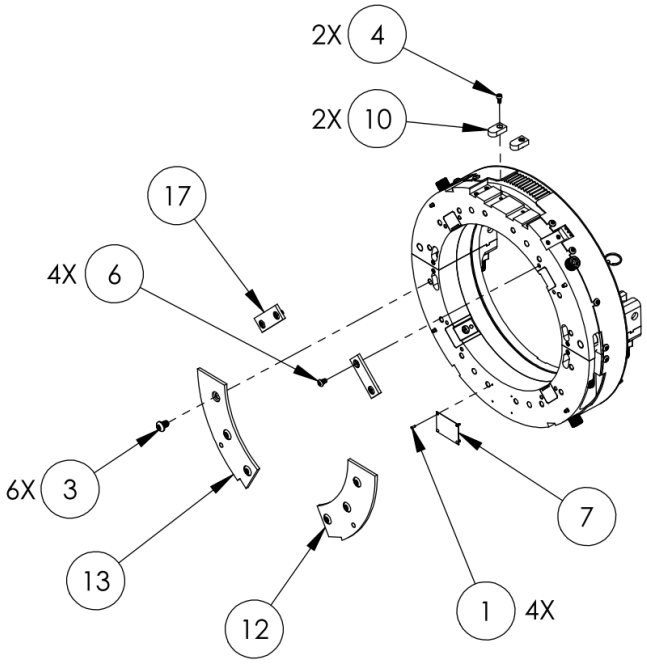
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

19	24	5001035	GUIDE ROLLER BEARING ASSEMBLY
18	2	5001027	RING GEAR CLAMP ASSEMBLY
17	2	5001025	AFC BACKING STRAP
16	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
15	1	4004508	AFC 8 GEAR GUARD
14	1	3003508	AFC 8 RING GEAR
13	1	2161454	AFC 8 RH STRIKE PLATE
12	1	2161453	AFC 8 LH STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002508	AFC 8 TRACK RING
8	1	1001508	AFC 8 MAIN BODY RING
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	18	18286	SCREW 1/4-20 X 3/8 BHSCS
5	16	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	16	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION

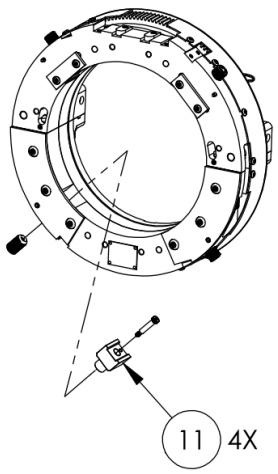
FIGURE A-6. AFC8 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-7. AFC10 ASSEMBLY

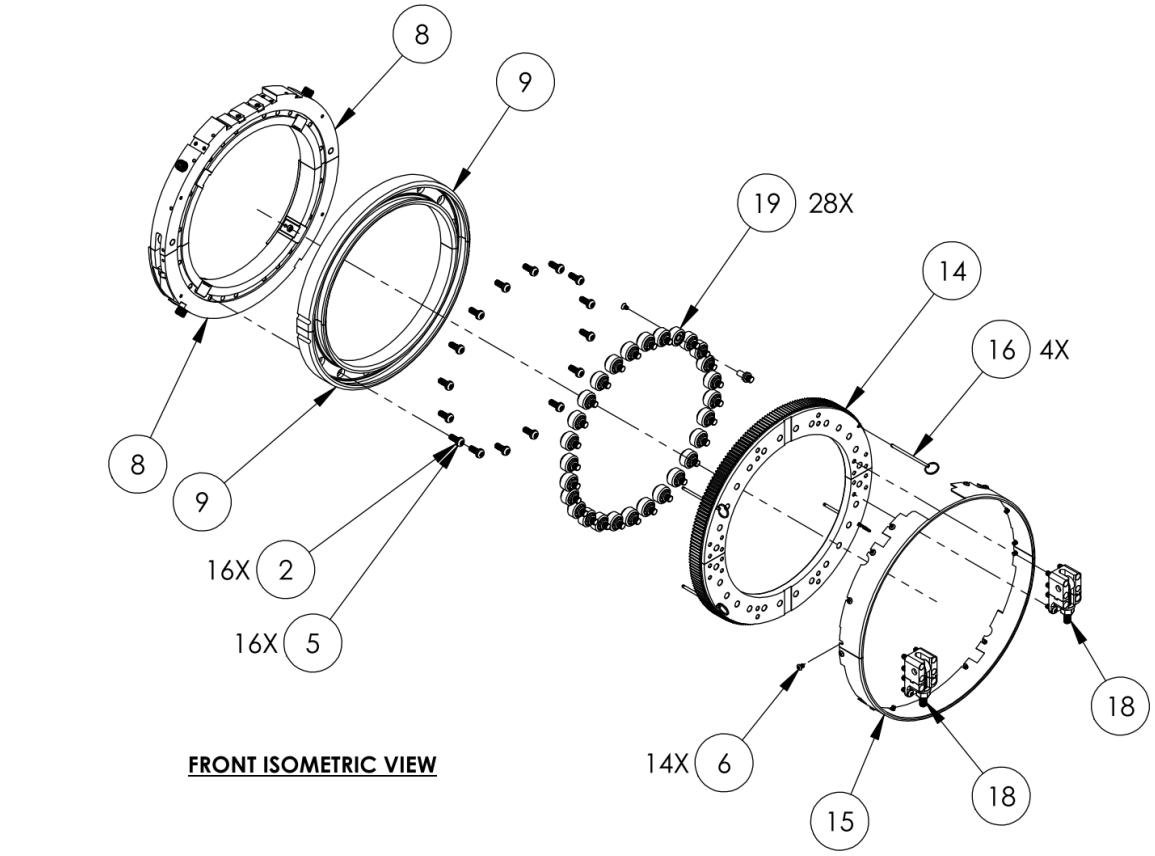
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

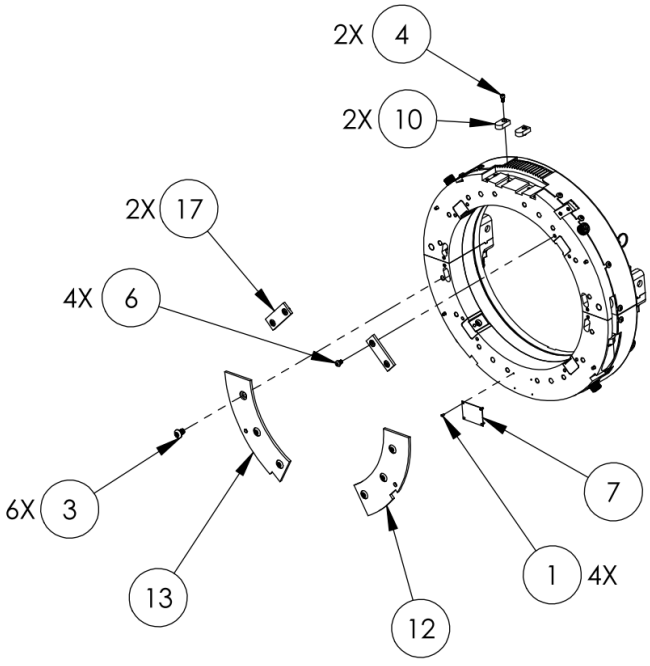
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
19	28	5001035	GUIDE ROLLER BEARING ASSEMBLY
18	2	5001027	RING GEAR CLAMP ASSEMBLY
17	2	5001025	AFC BACKING STRAP
16	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
15	1	4004510	AFC 10 GEAR GUARD
14	1	3003510	AFC 10 RING GEAR
13	1	2161456	AFC 10 RH STRIKE PLATE
12	1	2161455	AFC 10 LH STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002510	AFC 10 TRACK RING
8	1	1001510	AFC 10 MAIN BODY RING
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	18	18286	SCREW 1/4-20 X 3/8 BHSCS
5	16	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	16	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

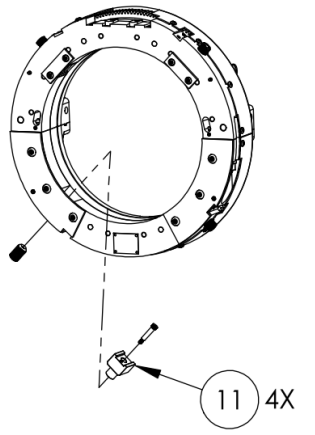
FIGURE A-8. AFC10 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-9. AFC12 ASSEMBLY

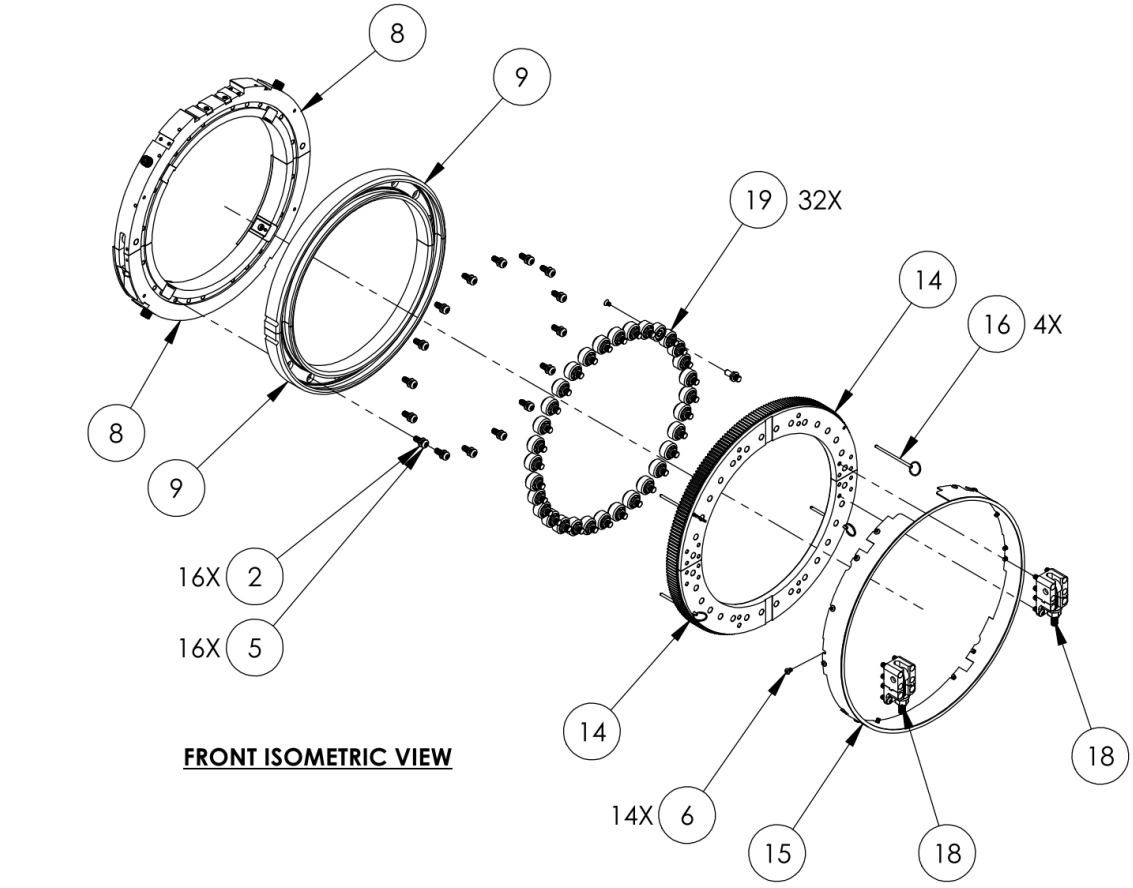
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

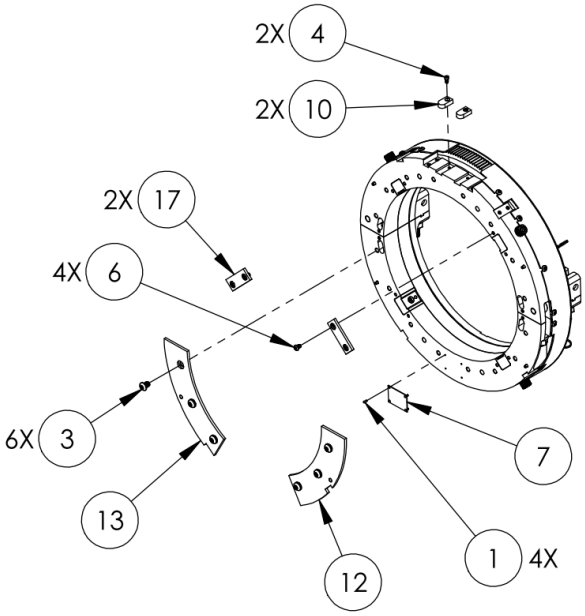
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
19	28	5001035	GUIDE ROLLER BEARING ASSEMBLY
18	2	5001027	RING GEAR CLAMP ASSEMBLY
17	2	5001025	AFC BACKING STRAP
16	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
15	1	4004512	AFC 12 GEAR GUARD
14	1	3003512	AFC 12 RING GEAR
13	1	2161458	AFC 12 RH STRIKE PLATE
12	1	2161457	AFC 12 LH STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002512	AFC 12 TRACK RING
8	1	1001512	AFC 12 MAIN BODY RING
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	18	18286	SCREW 1/4-20 X 3/8 BHSCS
5	16	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	16	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

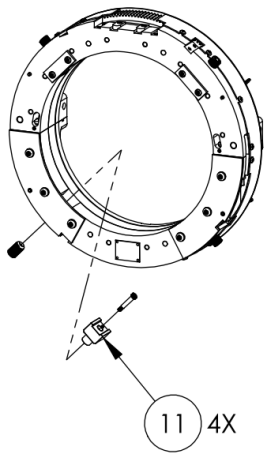
FIGURE A-10. AFC12 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-11. AFC14 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	PART NAME
19	32	5001035	GUIDE ROLLER BEARING ASSEMBLY
18	2	5001027	RING GEAR CLAMP ASSEMBLY
17	2	5001025	AFC BACKING STRAP
16	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
15	1	4004514	AFC 14 GEAR GUARD
14	1	3003514	AFC 14 RING GEAR
13	1	2161460	AFC 14 RH STRIKE PLATE
12	1	2161459	AFC 14 LH STRIKE PLATE
11	4	2121130	LOCATOR PAD ASSEMBLY
10	2	2119999	MOTOR MOUNT KEY
9	1	2002514	AFC 14 TRACK RING
8	1	1001514	AFC 14 MAIN BODY RING
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	18	18286	SCREW 1/4-20 X 3/8 BHSCS
5	16	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	16	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-12. AFC14 ASSEMBLY PARTS LIST

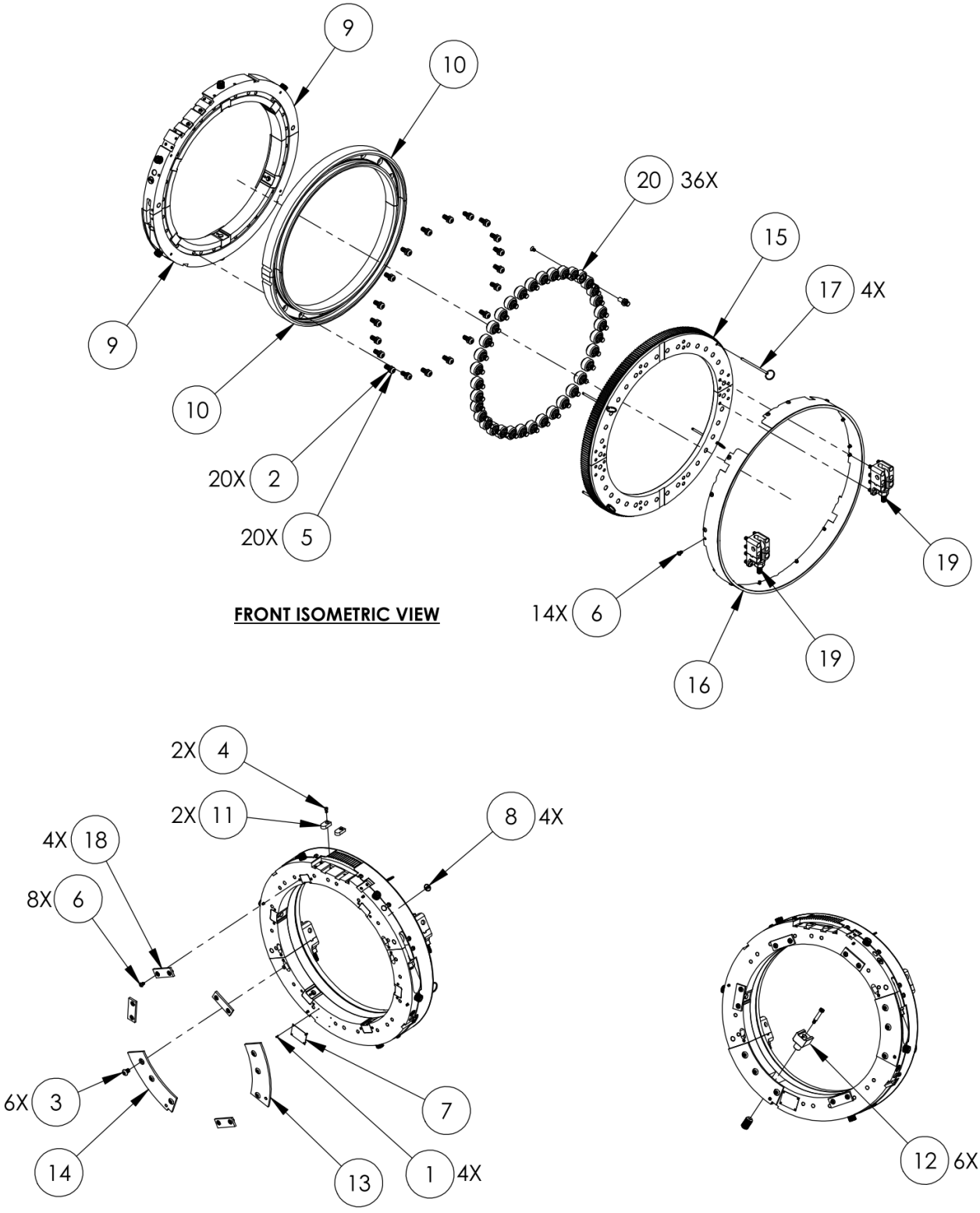


FIGURE A-13. AFC16 ASSEMBLY

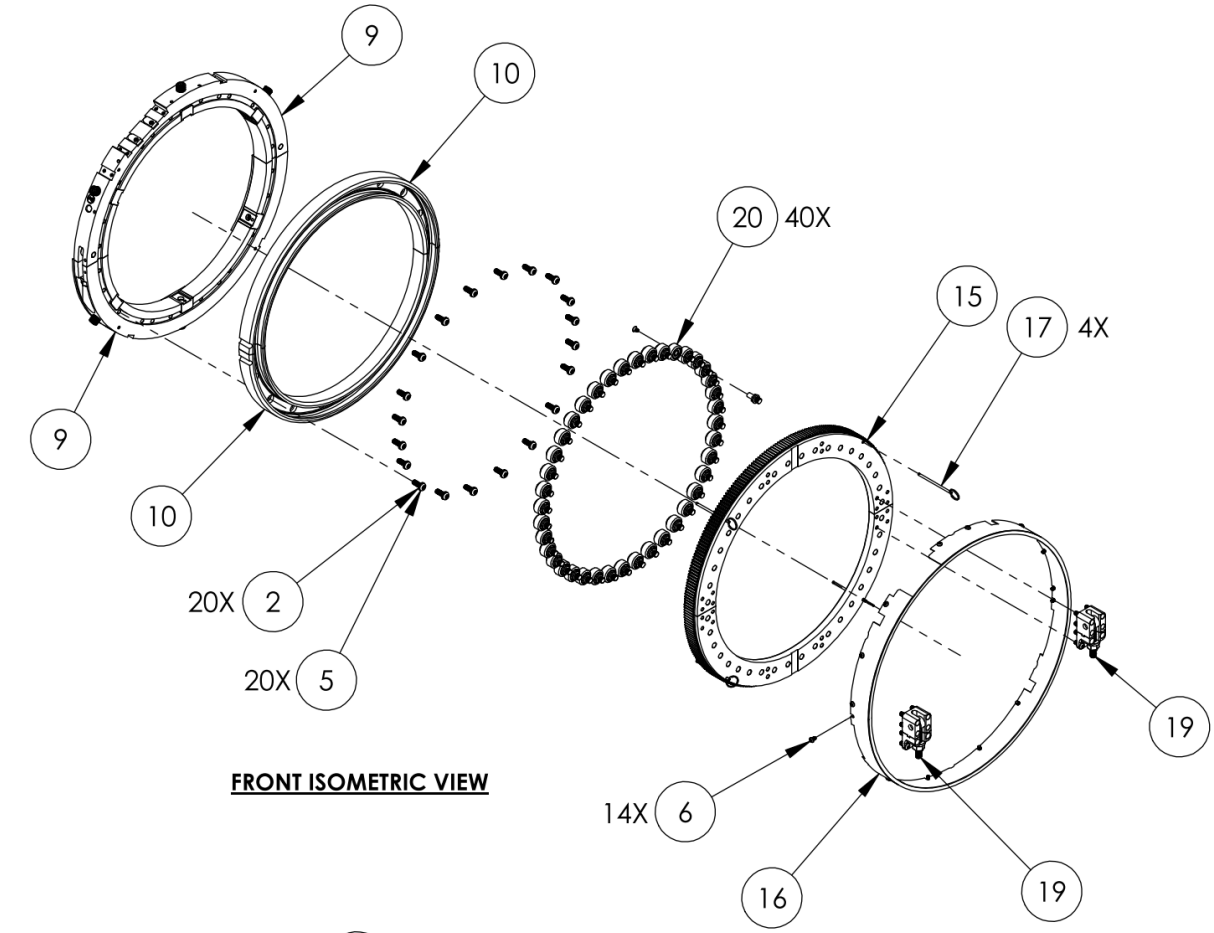
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

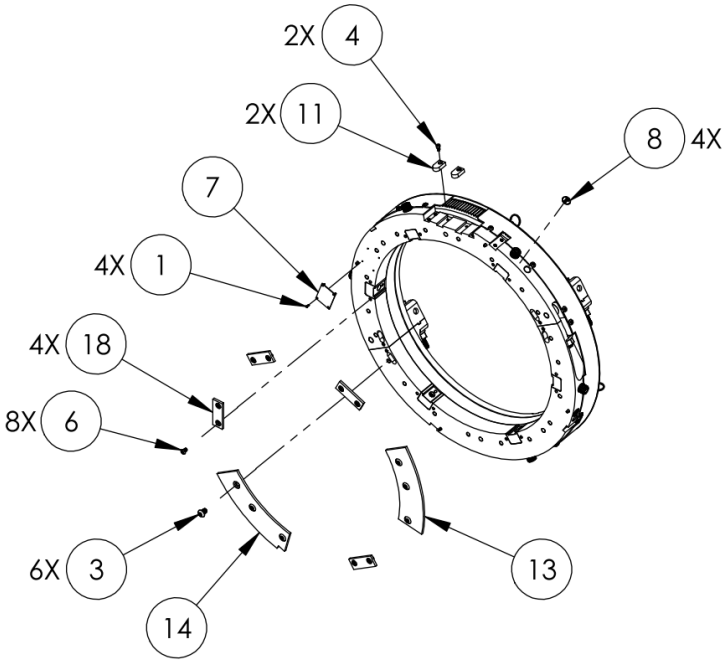
   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98146: CRATE H&S SIZE 7 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	36	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	4	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004516	AFC 16 GEAR GUARD
15	1	3003516	AFC 16 RING GEAR
14	1	2161462	AFC 16 RH STRIKE PLATE
13	1	2161461	AFC 16 LH STRIKE PLATE
12	6	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002516	AFC 16 TRACK RING
9	1	1001516	AFC 16 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	22	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

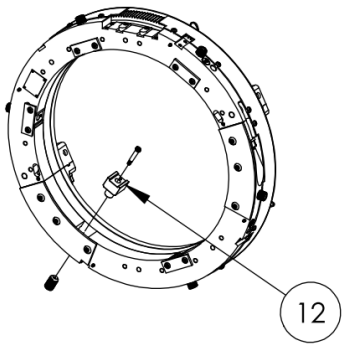
FIGURE A-14. AFC16 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-15. AFC18 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	40	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	4	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004518	AFC 18 GEAR GUARD
15	1	3003518	AFC 18 RING GEAR
14	1	2161464	AFC 18 RH STRIKE PLATE
13	1	2161463	AFC 18 LH STRIKE PLATE
12	6	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002518	AFC 18 TRACK RING
9	1	1001518	AFC 18 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	22	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-16. AFC18 ASSEMBLY PARTS LIST

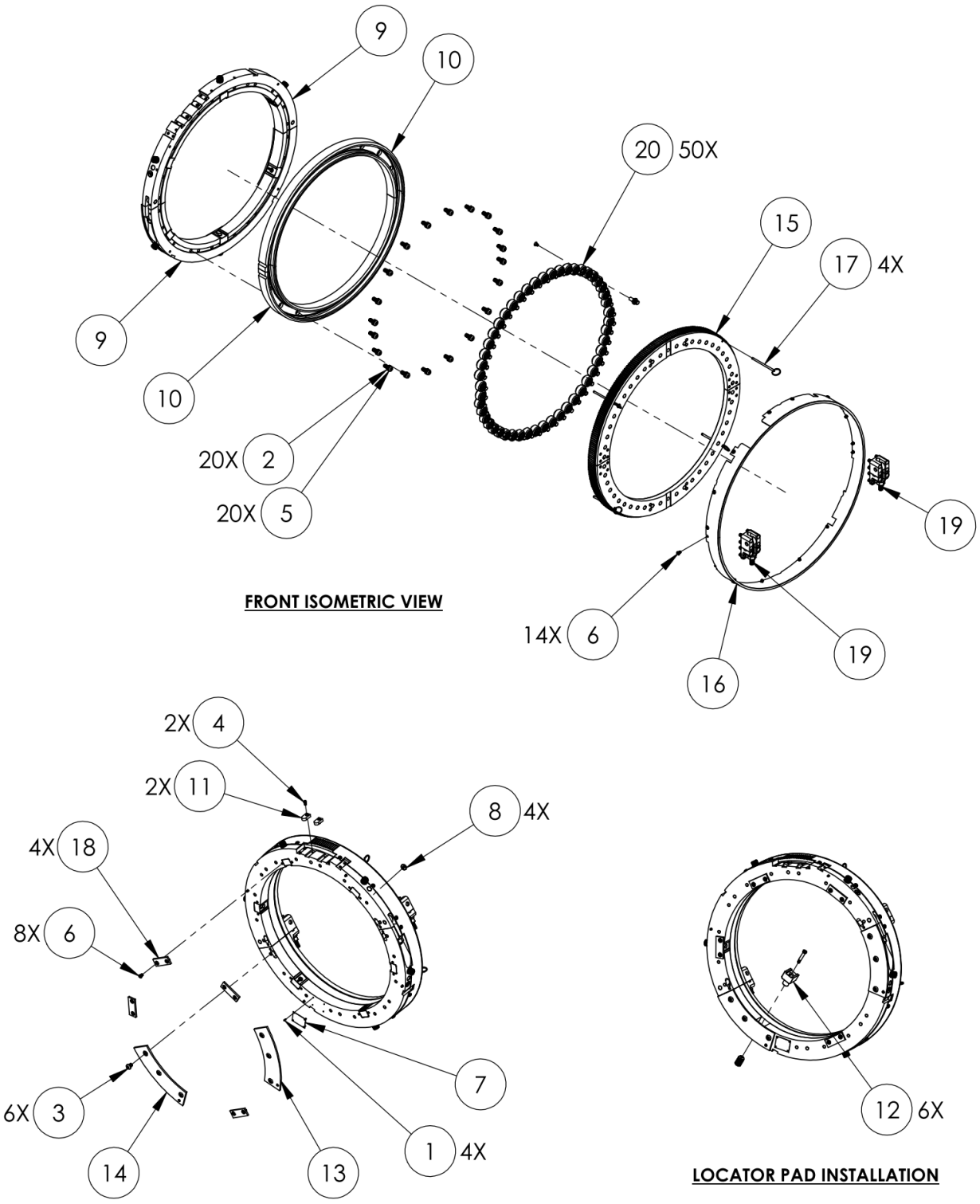


FIGURE A-17. AFC20 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	50	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	4	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004520	AFC 20 GEAR GUARD
15	1	3003520	AFC 20 RING GEAR
14	1	2161466	AFC 20 RH STRIKE PLATE
13	1	2161465	AFC 20 LH STRIKE PLATE
12	6	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002520	AFC 20 TRACK RING
9	1	1001520	AFC 20 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	22	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-18. AFC20 ASSEMBLY PARTS LIST

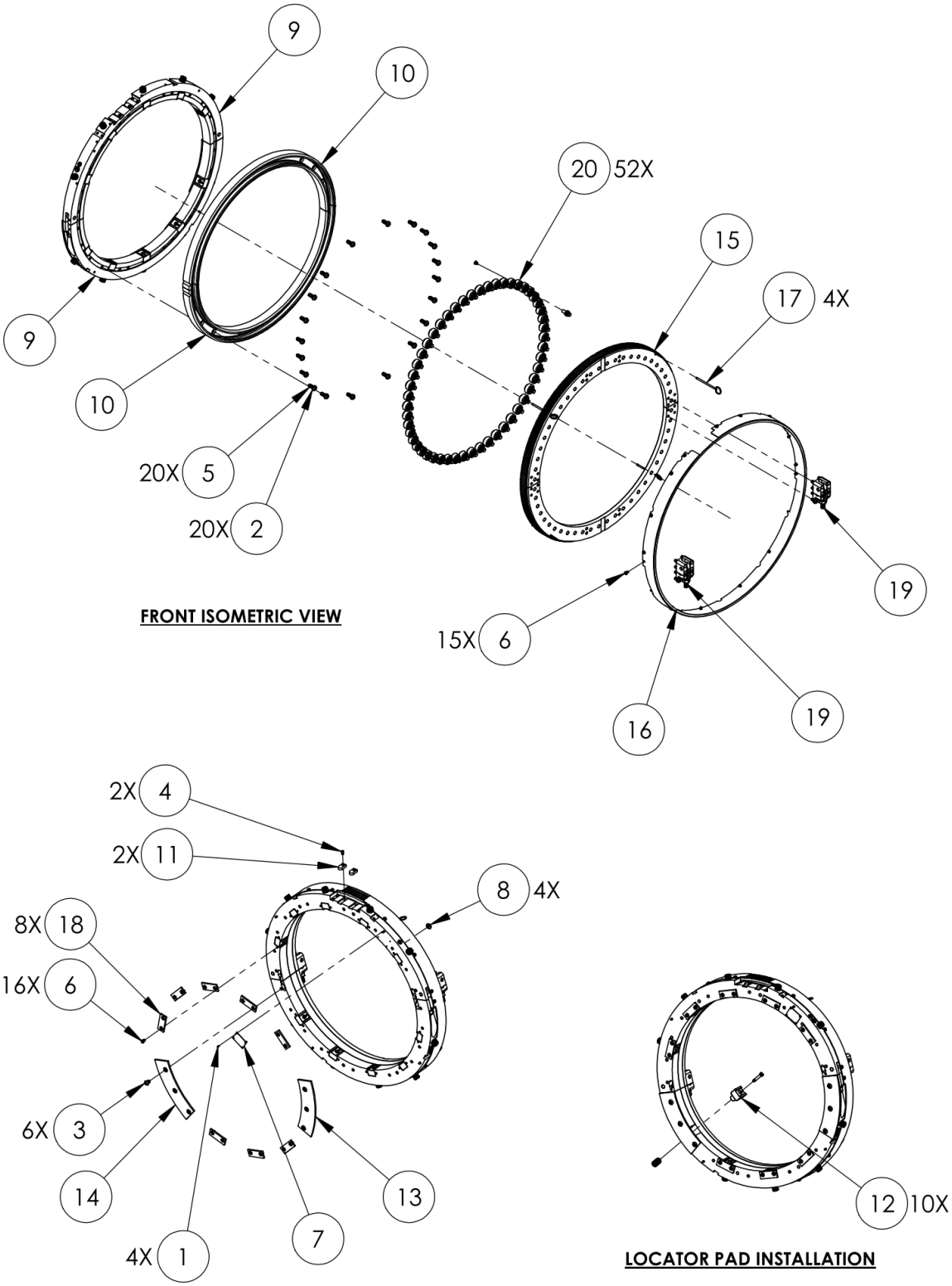


FIGURE A-19. AFC24 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
98051: KIT AFC CLAMSHELL LABELS
98147: CRATE H&S SIZE 8 WITH INSERTS
100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	52	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	8	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004524	AFC 24 GEAR GUARD
15	1	3003524	AFC 24 RING GEAR
14	1	2161468	AFC 24 RH STRIKE PLATE
13	1	2161467	AFC 24 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002524	AFC 24 TRACK RING
9	1	1001524	AFC 24 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	31	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-20. AFC24 ASSEMBLY PARTS LIST

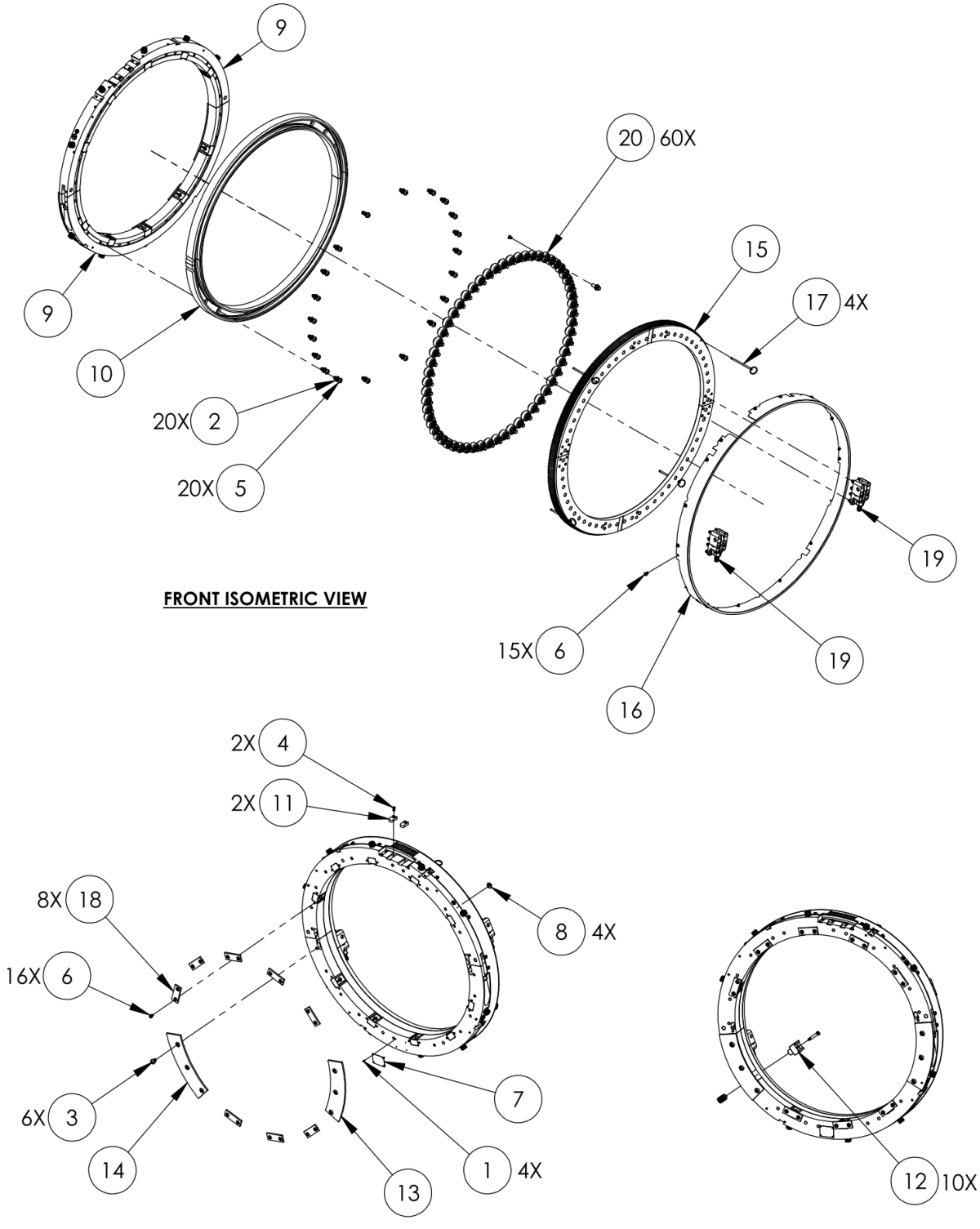


FIGURE A-21. AFC26 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	60	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	8	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004526	AFC 26 GEAR GUARD
15	1	3003526	AFC 26 RING GEAR
14	1	2161470	AFC 26 RH STRIKE PLATE
13	1	2161469	AFC 26 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002526	AFC 26 TRACK RING
9	1	1001526	AFC 26 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	31	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	6	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-22. AFC26 ASSEMBLY PARTS LIST

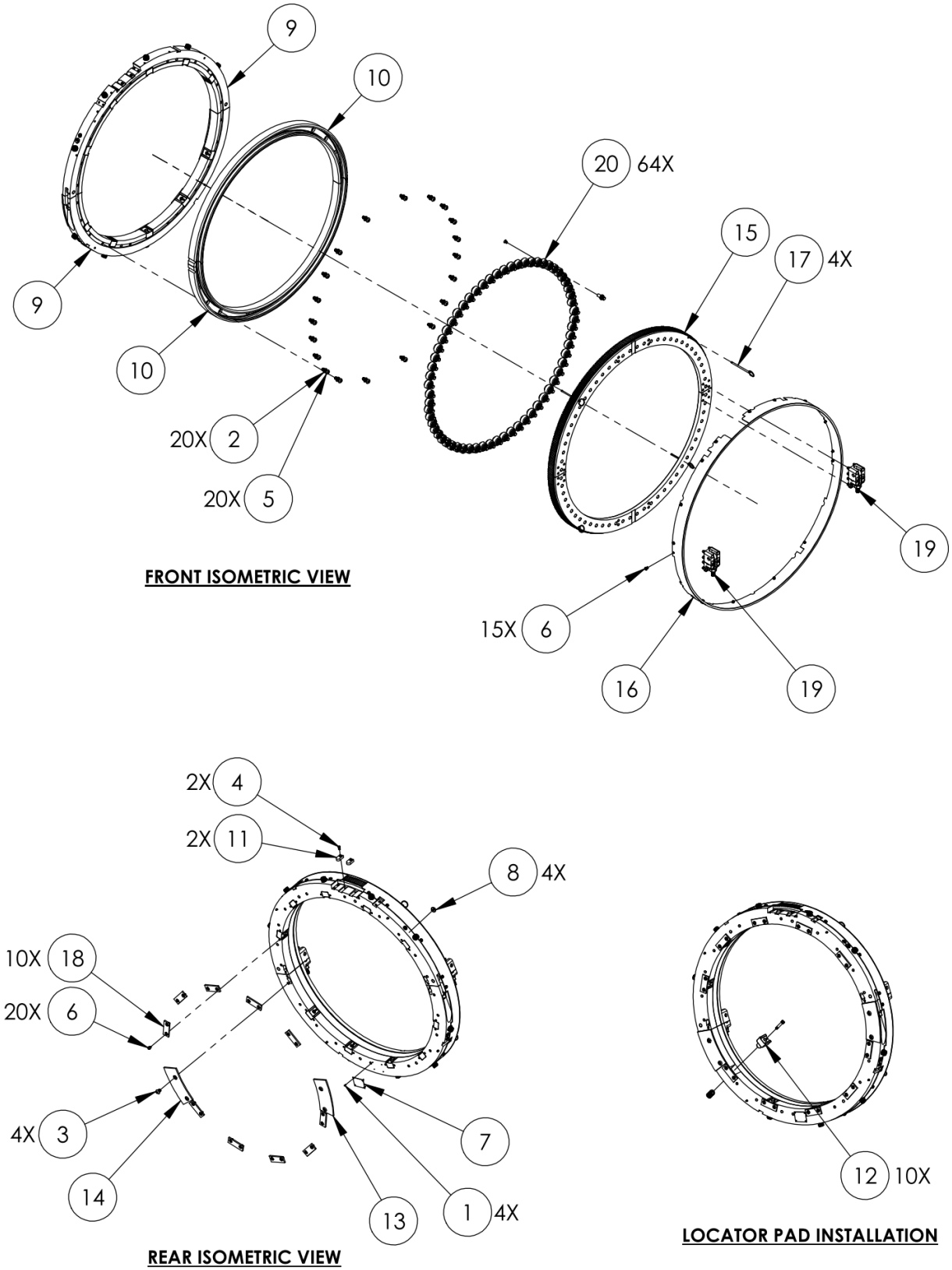


FIGURE A-23. AFC28 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	64	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	10	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004528	AFC 28 GEAR GUARD
15	1	3003528	AFC 28 RING GEAR
14	1	2161472	AFC 28 RH STRIKE PLATE
13	1	2161471	AFC 28 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002528	AFC 28 TRACK RING
9	1	1001528	AFC 28 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	35	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

FIGURE A-24. AFC28 ASSEMBLY PARTS LIST

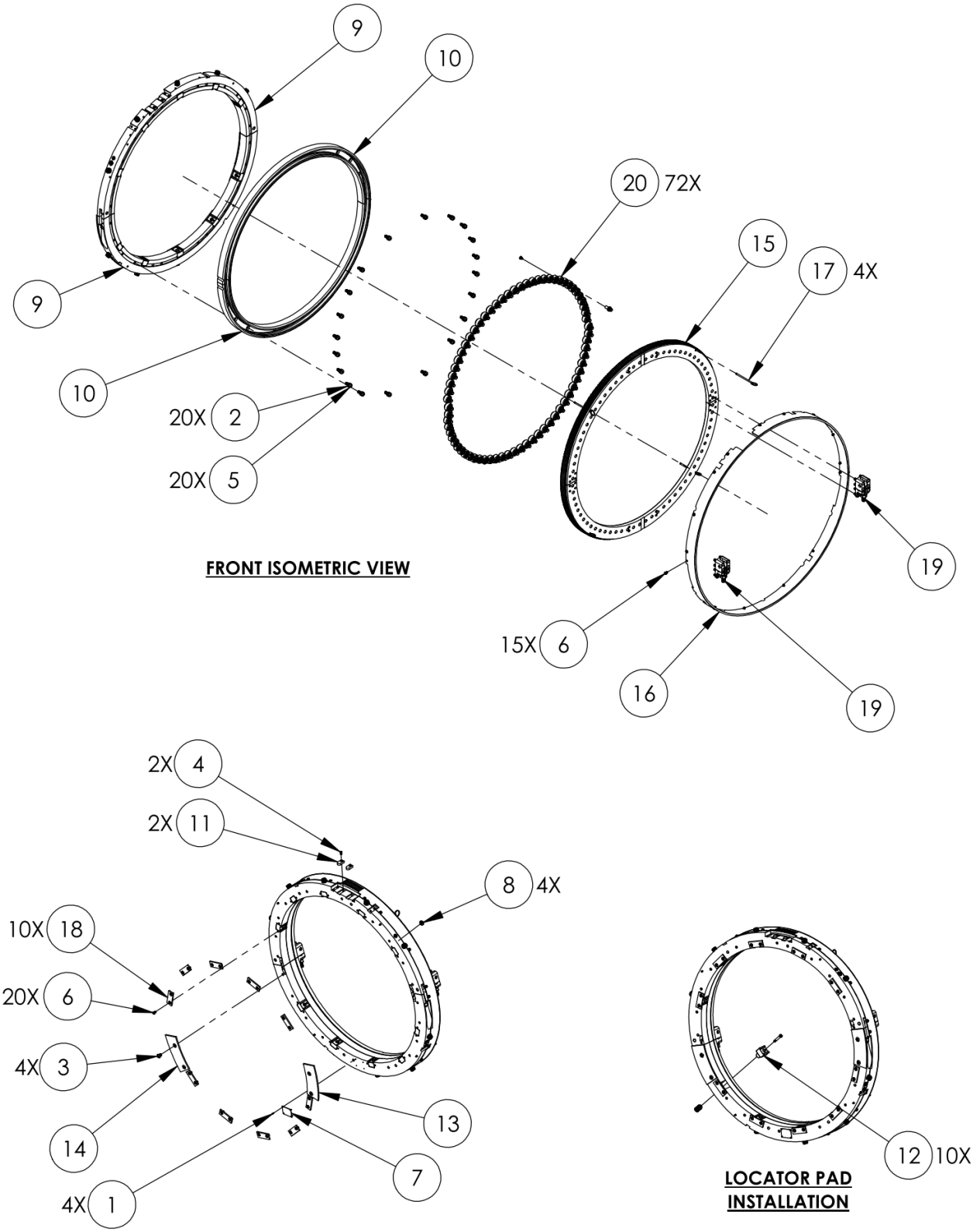


FIGURE A-25. AFC30 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

20	72	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	10	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004530	AFC 30 GEAR GUARD
15	1	3003530	AFC 30 RING GEAR
14	1	2161474	AFC 30 RH STRIKE PLATE
13	1	2161473	AFC 30 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002530	AFC 30 TRACK RING
9	1	1001530	AFC 30 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	35	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION

FIGURE A-26. AFC30 ASSEMBLY PARTS LIST

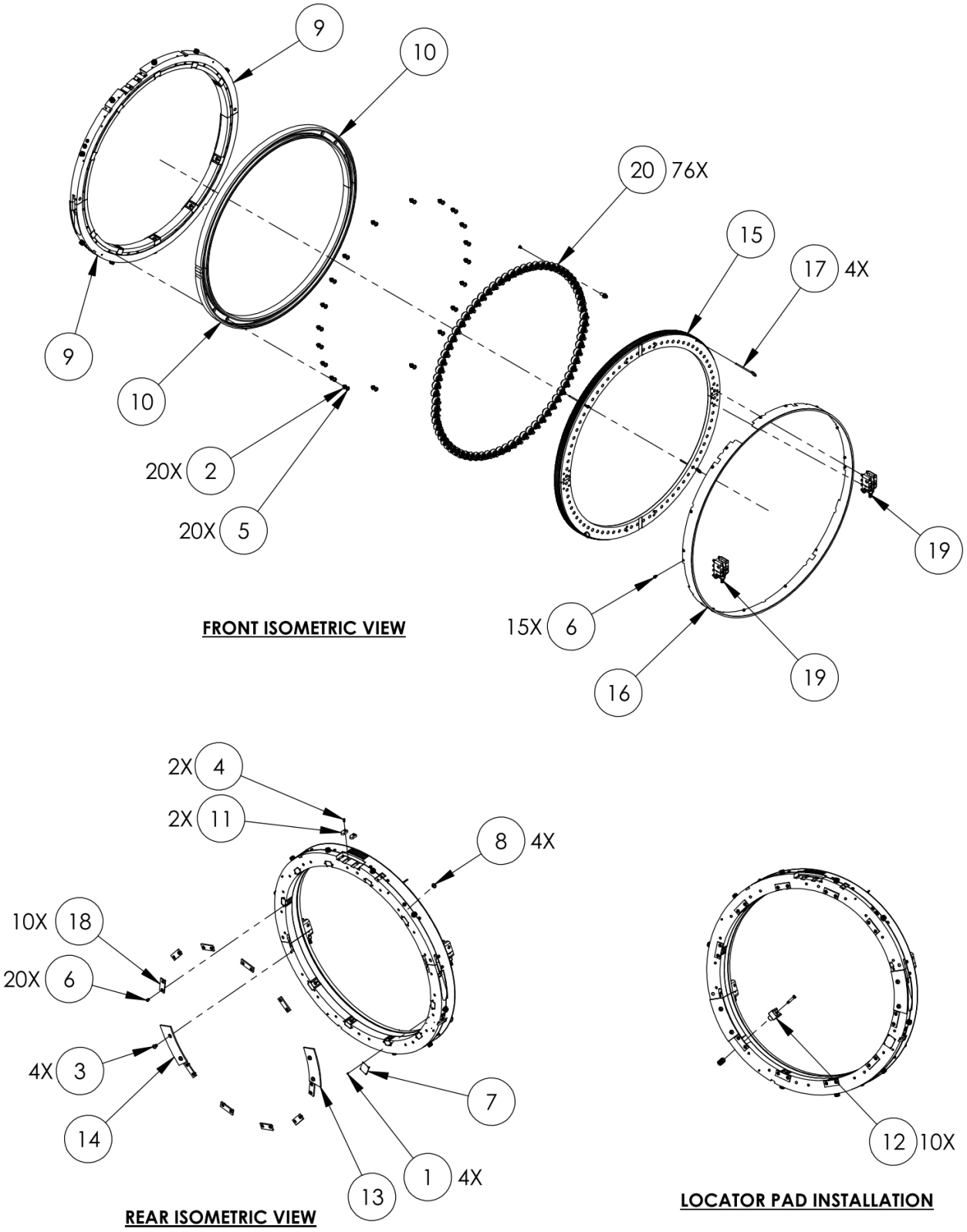


FIGURE A-27. AFC32 ASSEMBLY

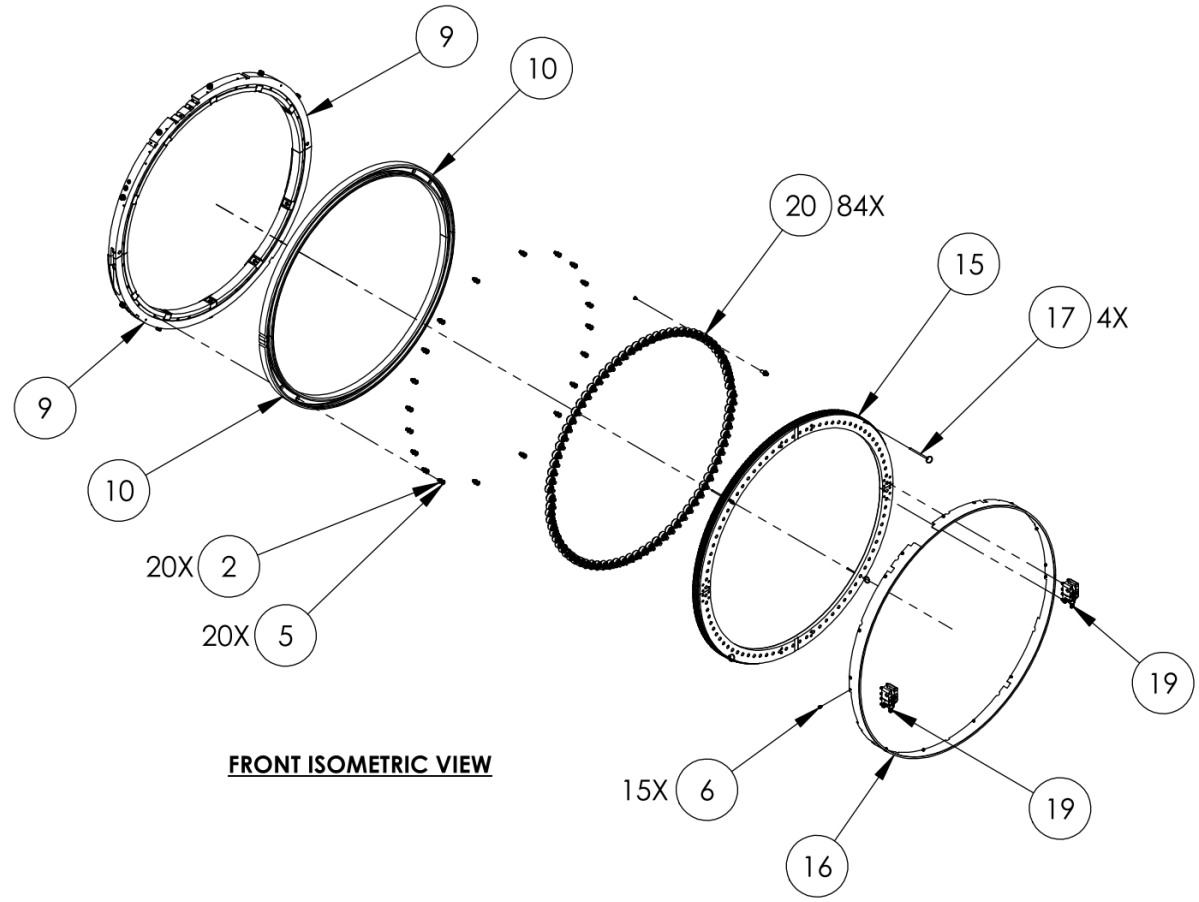
NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

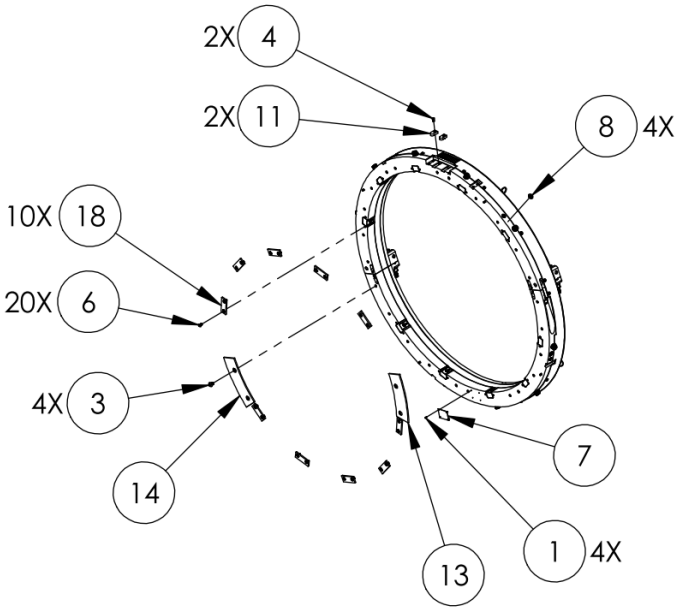
   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98147: CRATE H&S SIZE 8 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
20	76	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	10	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004532	AFC 32 GEAR GUARD
15	1	3003532	AFC 32 RING GEAR
14	1	2161476	AFC 32 RH STRIKE PLATE
13	1	2161475	AFC 32 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002532	AFC 32 TRACK RING
9	1	1001532	AFC 32 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	35	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE

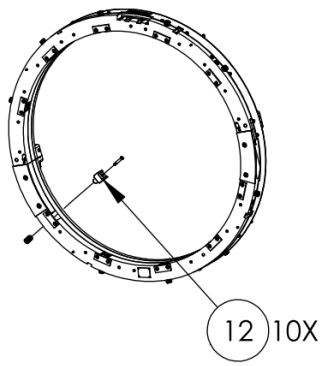
FIGURE A-28. AFC32 ASSEMBLY PARTS LIST



FRONT ISOMETRIC VIEW



REAR ISOMETRIC VIEW



LOCATOR PAD INSTALLATION

FIGURE A-29. AFC36 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98148: CRATE H&S SIZE 9 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

20	84	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	10	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004536	AFC 36 GEAR GUARD
15	1	3003536	AFC 36 RING GEAR
14	1	2161478	AFC 36 RH STRIKE PLATE
13	1	2161477	AFC 36 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	2	2119999	MOTOR MOUNT KEY
10	1	2002536	AFC 36 TRACK RING
9	1	1001536	AFC 36 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	35	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	2	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION

FIGURE A-30. AFC36 ASSEMBLY PARTS LIST

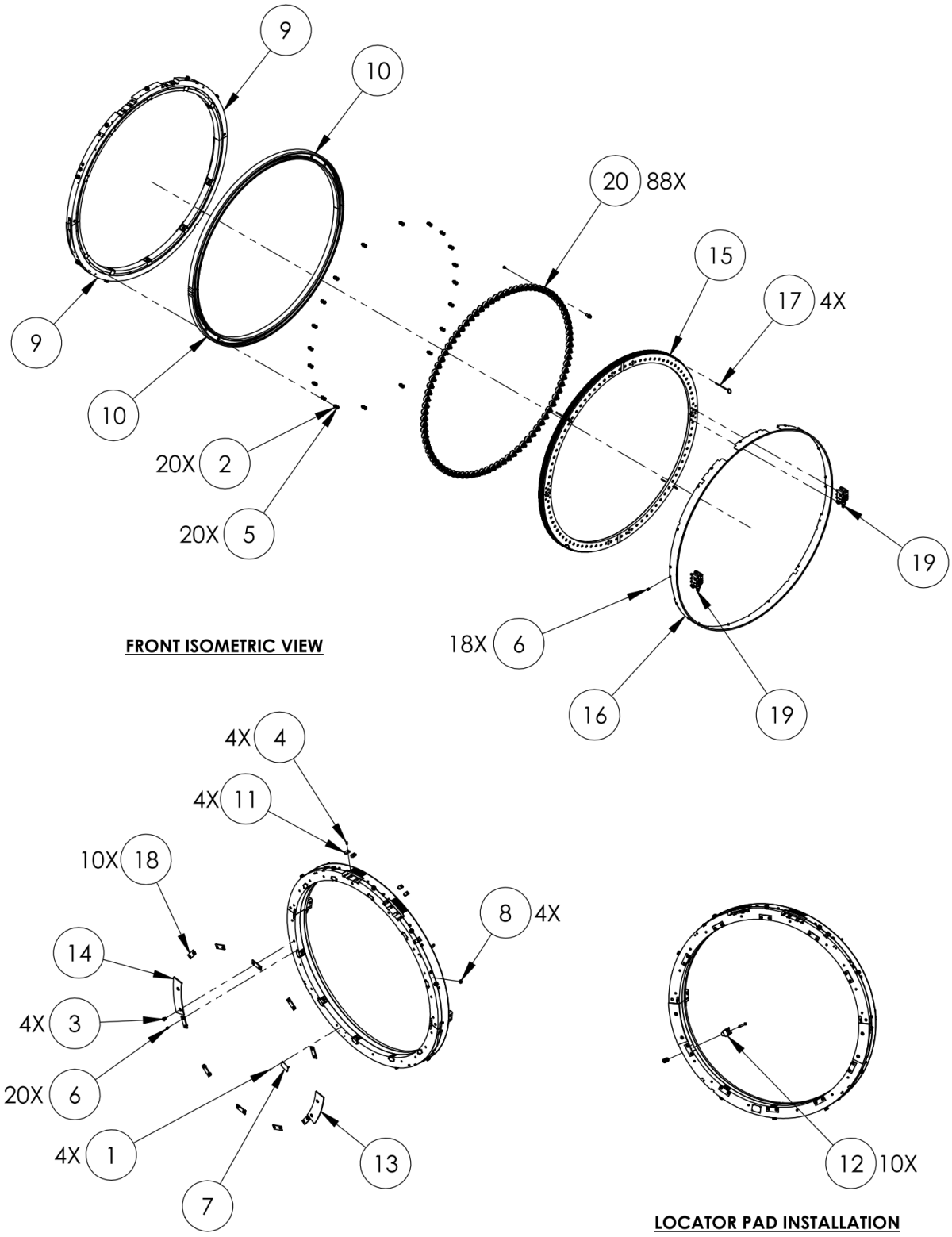


FIGURE A-31. AFC42 ASSEMBLY

NOTES:

1. THE FOLLOWING PART NUMBERS ARE INCLUDED BUT NOT SHOWN:

   30193 (QTY 4): LIFTING EYE MODIFIED 1/2-13 X .8 1-3/16 ID 2-1/8 OD
   98051: KIT AFC CLAMSHELL LABELS
   98148: CRATE H&S SIZE 9 WITH INSERTS
   100580: MANUAL INSTRUCTION SPLIT FRAME CLAMSHELL
   4001000: CLAMSHELL TOOL KIT COMPLETE

20	88	5001035	GUIDE ROLLER BEARING ASSEMBLY
19	2	5001027	RING GEAR CLAMP ASSEMBLY
18	10	5001025	AFC BACKING STRAP
17	4	5001024	LOCKING PIN 3/16" DIA X 3 1/2"
16	1	4004542	AFC 42 GEAR GUARD
15	1	3003542	AFC 42 RING GEAR
14	1	2161482	AFC 42 RH STRIKE PLATE
13	1	2161481	AFC 42 LH STRIKE PLATE
12	10	2121130	LOCATOR PAD ASSEMBLY
11	4	2119999	MOTOR MOUNT KEY
10	1	2002542	AFC 42 TRACK RING
9	1	1001542	AFC 42 MAIN BODY RING
8	4	70554	LABEL WARNING LIFT POINT ROUND .75"
7	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
6	38	18286	SCREW 1/4-20 X 3/8 BHSCS
5	20	13340	SCREW 3/8-16 X 1 BHSCS
4	4	12648	SCREW 10-24 X 3/4 SHCS
3	4	10650	SCREW 3/8-16 X 1/2 BHSCS
2	20	10595	WASHER 3/8 LOCW
1	4	10588	SCREW DRIVE #2 x 1/4 HOLE SIZE .089 X .250 DP HOLE
ITEM NO.	QTY.	PART NUMBER	DESCRIPTION

FIGURE A-32. AFC42 ASSEMBLY PARTS LIST

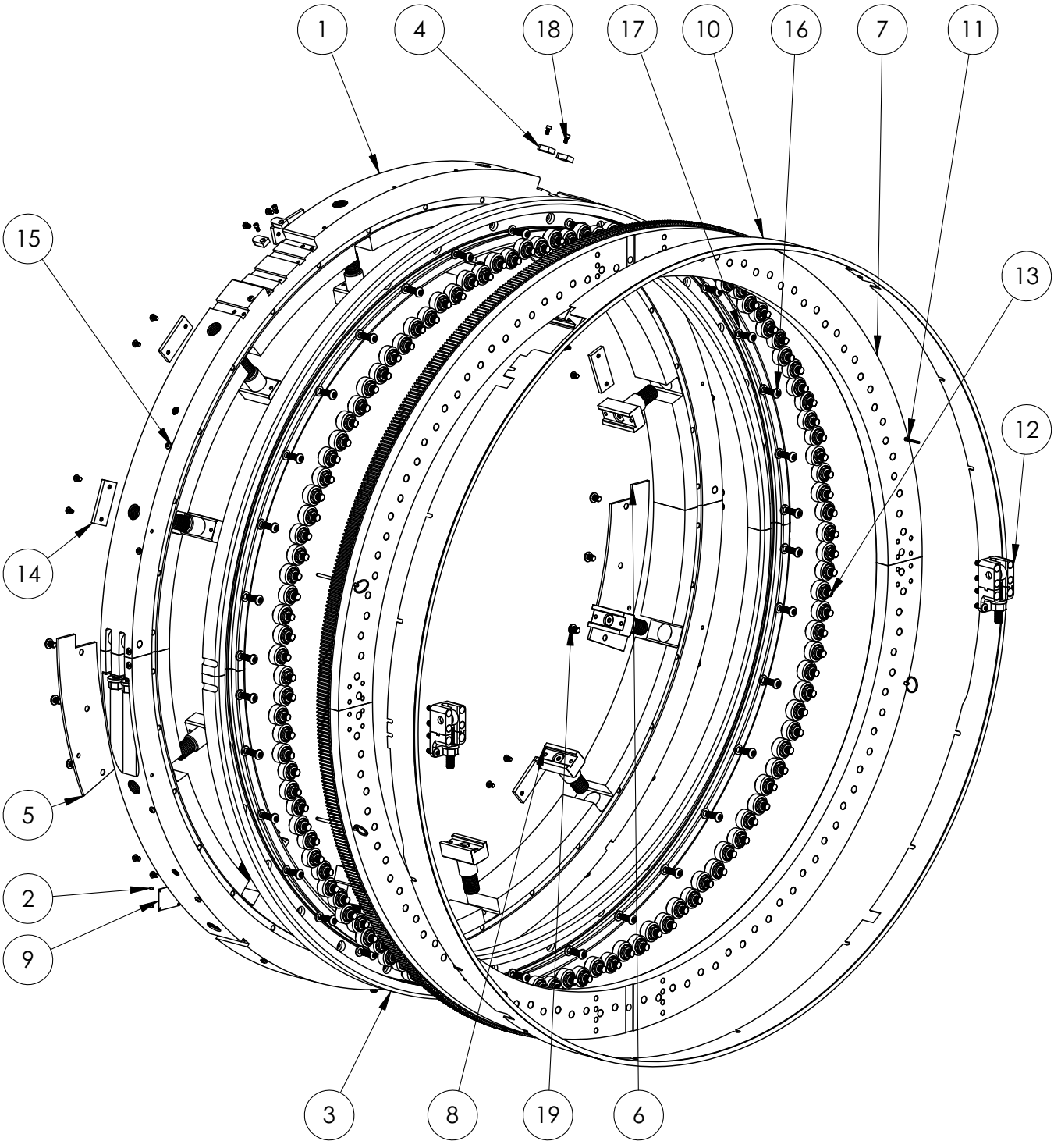


FIGURE A-33. BFC48 ASSEMBLY

19	6	5001098	3/8-16 x 1/2" BUTTON HEAD CAP SCREW
18	4	5001078	#10-24 x 3/8" SOCKET HEAD CAP SCREW
17	34	5001077	3/8" LOCK WASHER
16	34	5001076	3/8-16 x 1" BUTTON HEAD CAP SCREW
15	38	5001069	1/4-20 x 3/8" BUTTON HEAD CAP SCREW
14	10	5001037	BACKING STRAP
13	118	5001035	GUIDE ROLLER BEARING ASSEMBLY
12	2	5001027	GEAR CLAMP ASSEMBLY
11	4	5001024	∅3/8 X 3-1/2"LOCKING PIN
10	1	4004648	GUARD ASSEMBLY
9	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	12	3121130	LOCATOR PAD ASSEMBLY
7	1	3003648	RING GEAR ASSEMBLY
6	1	2171484	RIGHT HAND STRIKE PLATE
5	1	2171483	LEFT HAND STRIKE PLATE
4	4	2119999	MOTOR MOUNT KEY
3	1	2002648	TRACK RING ASSEMBLY
2	4	10588	SCREW DRIVE#2 X 1/4 FOR .089 X .250 DP HOLE
1	1	1001648	BODY RING ASSEMBLY
ITEM NO.	**Default/QTY.**	**PART NUMBER**	**PART NAME**

FIGURE A-34. BFC48 ASSEMBLY PARTS LIST

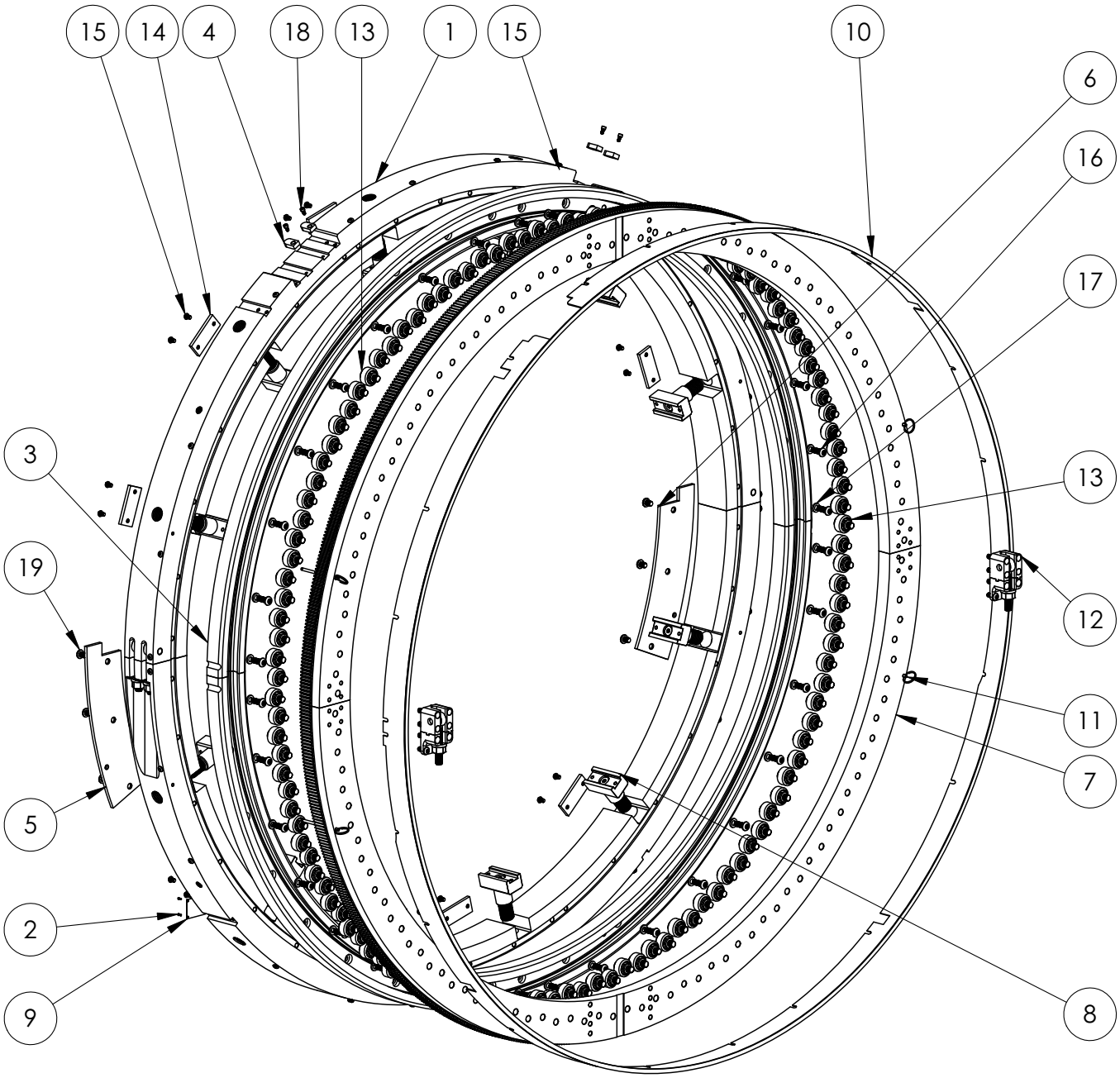


FIGURE A-35. BFC56 ASSEMBLY

19	6	5001098	3/8-16 x 1/2" BUTTON HEAD CAP SCREW
18	4	5001078	#10-24 x 3/8" SOCKET HEAD CAP SCREW
17	36	5001077	3/8" LOCK WASHER
16	36	5001076	3/8-16 x 1" BUTTON HEAD CAP SCREW
15	44	5001069	1/4-20 x 3/8" BUTTON HEAD CAP SCREW
14	10	5001037	BACKING STRAP
13	124	5001035	GUIDE ROLLER BEARING ASSEMBLY
12	2	5001027	GEAR CLAMP ASSEMBLY
11	4	5001024	∅3/8 X 3-1/2"LOCKING PIN
10	1	4004656	BFC-56 2 PC. GUARD ASSEMBLY
9	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	12	3121130	LOCATOR PAD ASSEMBLY
7	1	3003656	BFC56-R 2 PC. RING GEAR ASSEMBLY
6	1	2171486	BFC56-R RH. STRIKE PLATE
5	1	2171485	BFC56-R LH. STRIKE PLATE
4	4	2119999	MOTOR MOUNT KEY
3	1	2002656	BFC-56 2 PC. TRACK RING ASSEMBLY
2	4	10588	SCREW DRIVE#2 X 1/4 FOR .089 X .250 DP HOLE
1	1	1001656	BODY RING ASSEMBLY
ITEM NO.	**Default/QTY.**	**PART NUMBER**	**PART NAME**

FIGURE A-36. BFC56 ASSEMBLY PARTS LIST

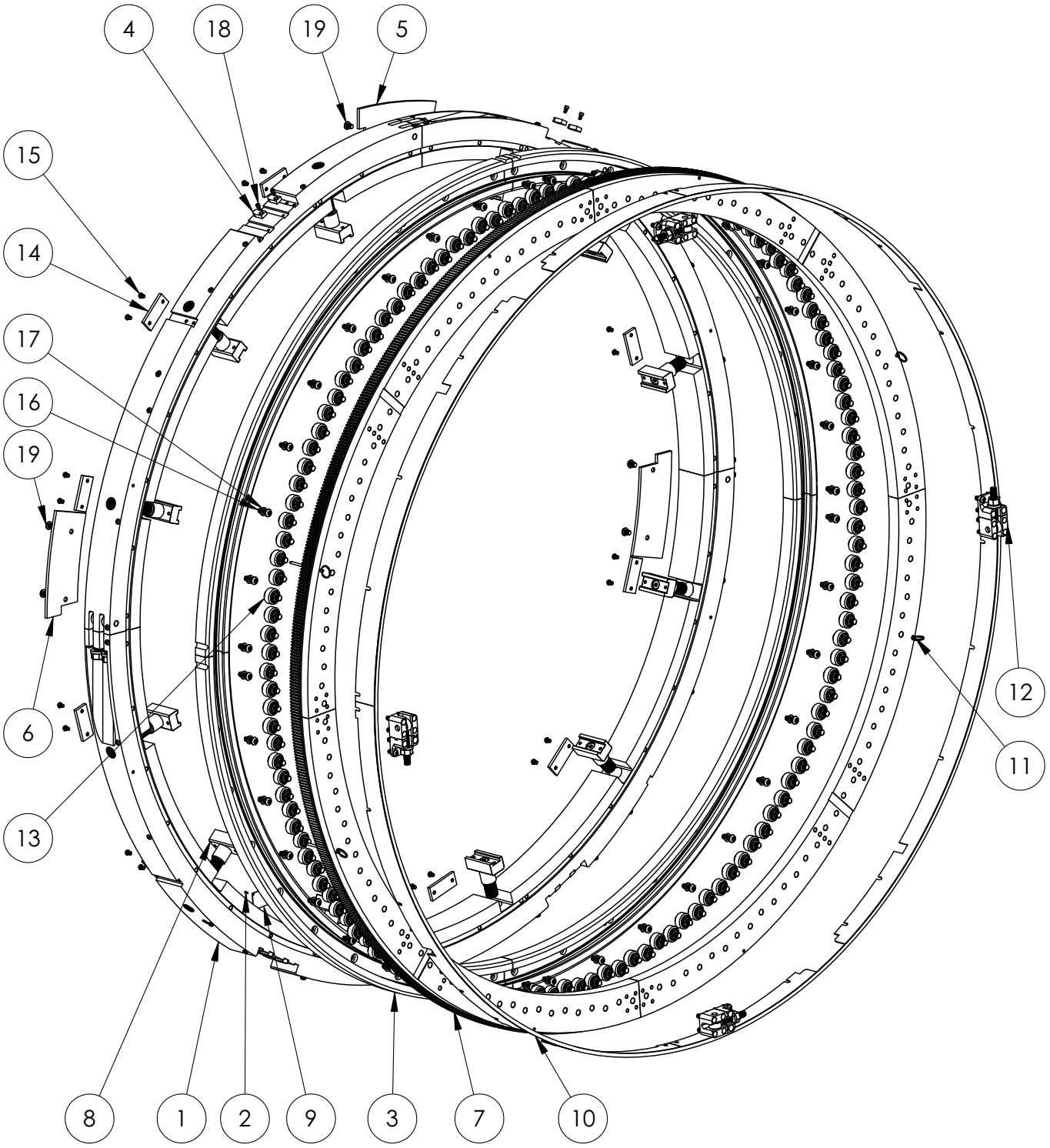


FIGURE A-37. BFC66 ASSEMBLY

19	8	5001098	3/8-16 x 1/2" BUTTON HEAD CAP SCREW
18	8	5001078	#10-24 x 3/8" SOCKET HEAD CAP SCREW
17	40	5001077	3/8" LOCK WASHER
16	40	5001076	3/8-16 x 1" BUTTON HEAD CAP SCREW
15	52	5001069	1/4-20 x 3/8" BUTTON HEAD CAP SCREW
14	12	5001037	BACKING STRAP
13	136	5001035	GUIDE ROLLER BEARING ASSEMBLY
12	4	5001027	GEAR CLAMP ASSEMBLY
11	4	5001024	∅3/8 X 3-1/2"LOCKING PIN
10	1	4004666	BFC66-R GUARD
9	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	12	3121130	LOCATOR PAD ASSEMBLY
7	1	3003666	BFC-66 RING GEAR ASSEMBLY
6	2	2171488	BFC66-R lower left & UPPER RIGHT STRIKE PLATE
5	2	2171487	BFC66-R lower right & UPPER LEFT STRIKE PLATE
4	8	2119999	MOTOR MOUNT KEY
3	1	2002666	BFC66-R TRACK RINGASSEMBLY
2	4	10588	SCREW DRIVE#2 X 1/4 FOR .089 X .250 DP HOLE
1	1	1001666	BODY RING ASSEMBLY
ITEM NO.	**QTY.**	**PART NUMBER**	**PART NAME**

FIGURE A-38. BFC66 ASSEMBLY PARTS LIST

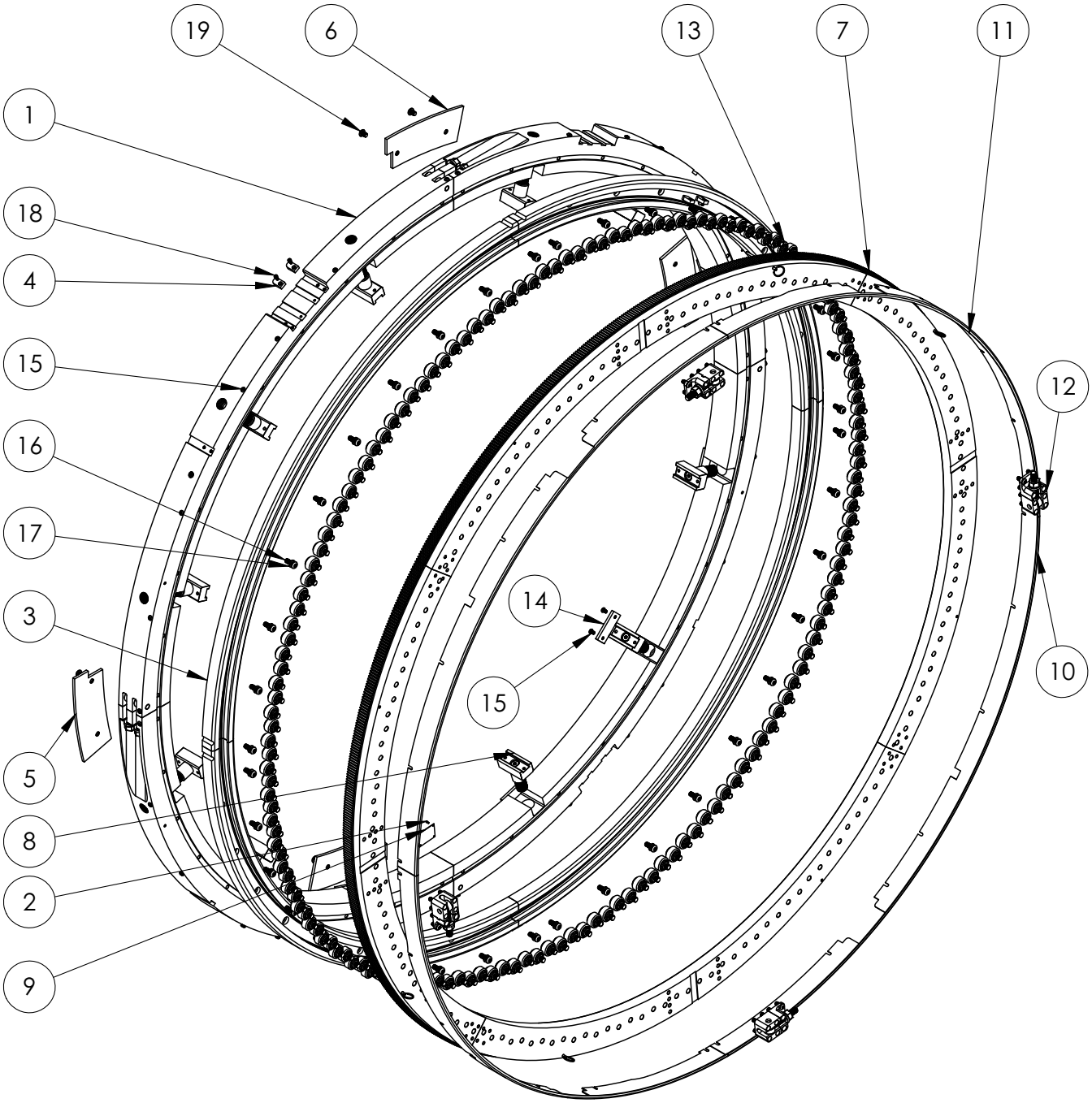


FIGURE A-39. BFC72 ASSEMBLY

19	8	5001098	3/8-16 x 1/2" BUTTON HEAD CAP SCREW
18	4	5001078	#10-24 x 3/8" SOCKET HEAD CAP SCREW
17	40	5001077	3/8" LOCK WASHER
16	40	5001076	3/8-16 x 1" BUTTON HEAD CAP SCREW
15	52	5001069	1/4-20 x 3/8" BUTTON HEAD CAP SCREW
14	12	5001037	BACKING STRAP
13	160	5001035	GUIDE ROLLER BEARING ASSEMBLY
12	4	5001027	GEAR CLAMP ASSEMBLY
11	4	5001024	∅3/8 X 3-1/2"LOCKING PIN
10	1	4004672	GEAR GUARD
9	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	12	3121130	LOCATOR PAD ASSEMBLY
7	1	3003672	RING GEAR SEGMENT
6	2	2171490	LOWER RIGHT & UPPER LEFT STRIKE PLATE
5	2	2171489	LOWER LEFT & UPPER RIGHT STRIKE PLATE
4	4	2119999	MOTOR MOUNT KEY
3	1	2002672	TRACK RING ASSEMBLY
2	4	10588	SCREW DRIVE#2 X 1/4 FOR .089 X .250 DP HOLE
1	1	1001672	BODY RING QUADRANT
ITEM NO.	**QTY.**	**PART NUMBER**	**PART NAME**

FIGURE A-40. BFC72 ASSEMBLY PARTS LIST

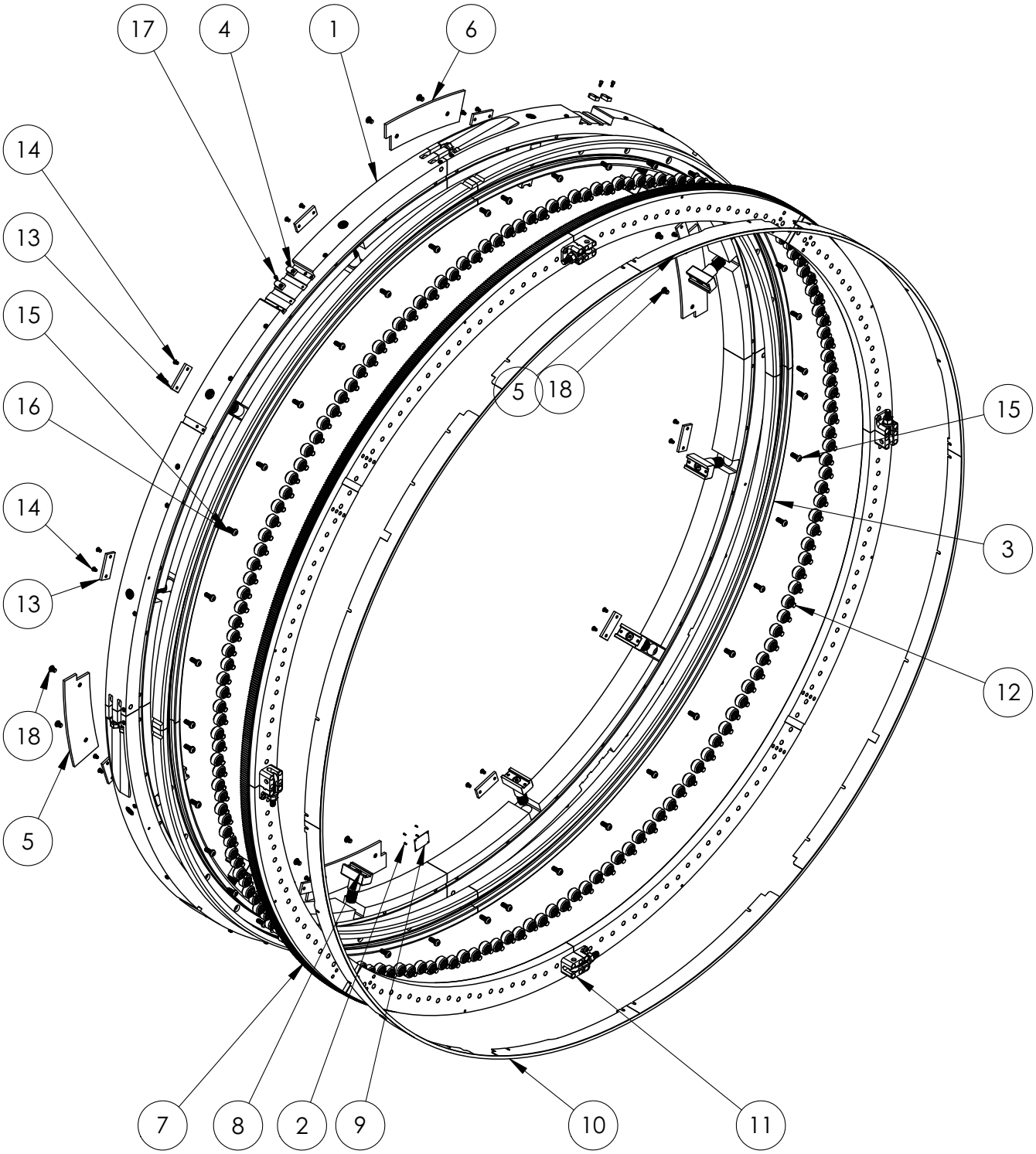
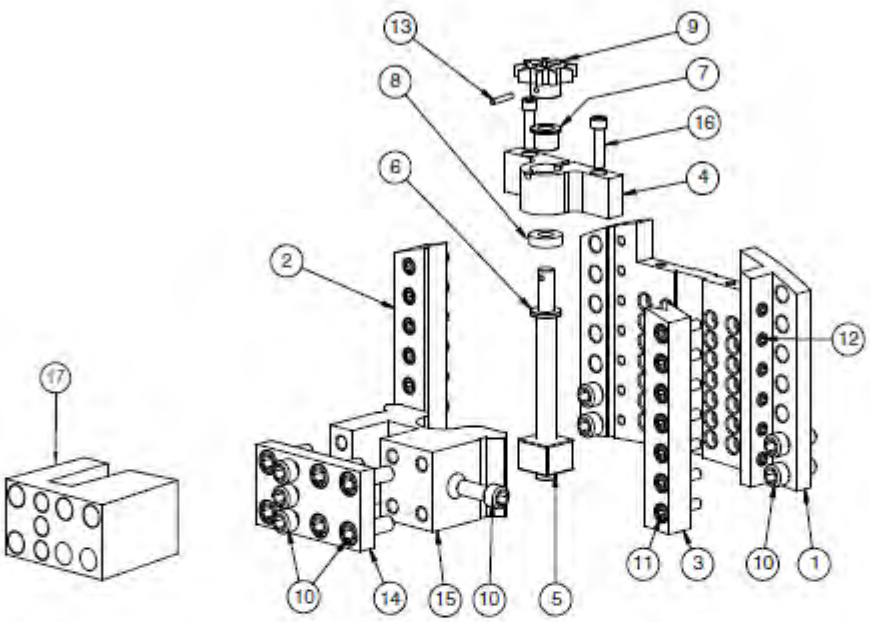


FIGURE A-41. BFC86 ASSEMBLY

18	8	5001098	3/8-16 x 1/2" BUTTON HEAD CAP SCREW
17	4	5001078	#10-24 x 3/8" SOCKET HEAD CAP SCREW
16	40	5001077	3/8" LOCK WASHER
15	40	5001076	3/8-16 x 1" BUTTON HEAD CAP SCREW
14	52	5001069	1/4-20 x 3/8" BUTTON HEAD CAP SCREW
13	12	5001037	BACKING STRAP
12	172	5001035	GUIDE ROLLER BEARING ASSEMBLY
11	4	5001027	GEAR CLAMP ASSEMBLY
10	1	4004686	GEAR GUARD ASSEMBLY
9	1	35828	PLATE SERIAL YEAR MODEL CE 1.5 X 2.0
8	12	3121130	LOCATOR PAD ASSEMBLY
7	1	3003686	RING GEAR ASSEMBLY
6	2	2171492	LOWER RIGHT & UPPER LEFT STRIKE PLATE
5	2	2171491	LOWER LEFT & UPPER RIGHT STRIKE PLATE
4	4	2119999	MOTOR MOUNT KEY
3	1	2002686	TRACK RING ASSEMBLY
2	4	10588	SCREW DRIVE#2 X 1/4 FOR .089 X .250 DP HOLE
1	1	1001686	BODY RING ASSEMBLY
ITEM NO.	**QTY.**	**PART NUMBER**	**PART NAME**

FIGURE A-42. BFC86 ASSEMBLY PARTS LIST

Tool Slide
1" Part No. 210-0010
2" Part No. 210-0020
3" Part No. 210-0030
4" Part No. 210-0040
7" Part No. 210-0070
10" Part No. 210-0100

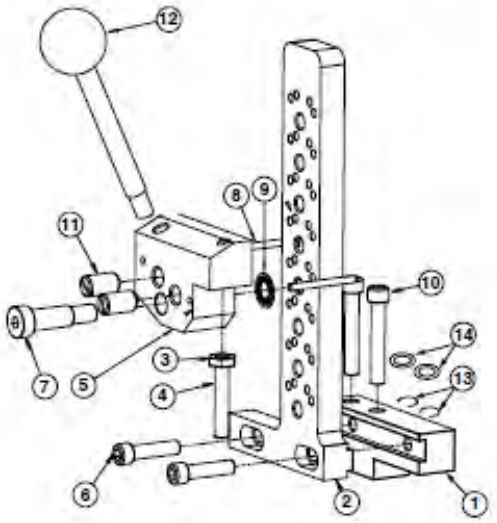


Item No.	Description	Part No.						Quantity
		1"	2"	3"	4"	7"	10"	
1	Tool Slide Base	210-0101	210-0120	210-0130	210-0140	210-0170	210-0110	1
2	L. H. Fixed Gib	210-0102	210-0122	210-0132	210-0142	210-0172	210-0112	1
3	R.H. Adjustable Gib	210-0103	210-0123	210-0133	210-0143	210-0173	210-0113	1
4	Feed Screw Mount	500-1013	500-1013	500-1013	500-1013	500-1013	500-1013	1
5	Feed Screw Nut	500-1014	500-1014	500-1014	500-1014	500-1014	500-1014	1
6	Feed Screw	210-0104	210-0121	210-0131	210-0141	210-0171	210-0111	1
7	Flange Bearing	500-1015	500-1015	500-1015	500-1015	500-1015	500-1015	1
8	Thrust Washer	500-2829	500-2829	500-2829	500-2829	500-2829	500-2829	1
9	Feed Screw Star Wheel	101926	101926	101926	101926	101926	101926	1
10	3/8"-16 x 1" Socket Head Cap Screw	10191	10191	10191	10191	10191	10191	As Required
11	1/4"-20 x 3/4" Socket Head Cap Screw	10160	10160	10160	10160	10160	10160	As Required
12	5/16"-18 x 3/8" Socket Head Set Screw	12324	12324	12324	12324	12324	12324	As Required
13	1/8" x 3/4" Roll Pin	10847	10847	10847	10847	10847	10847	1
14	Tool Block Cap	500-1011	500-1011	500-1011	500-1011	500-1011	500-1011	1
15	Tool Block	500-1010	500-1010	500-1010	500-1010	500-1010	500-1010	1
16	1/4"-20 x 1-1/4" Socket Head Cap Screw	10671	10671	10671	10671	10671	10671	2
17	1" Tool Block Extended Cap	order separately						1
	3" Tool Block Extended Cap							1

FIGURE A-43. TOOL SLIDE ASSEMBLY

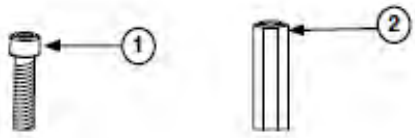
Tripper Assembly

4" AFC Part No. 500-4444 BFC Part No. 555-4444
7" AFC Part No. 500-7777 BFC Part No. 555-7777
10" AFC Part No. 500-0010 BFC Part No. 555-1010



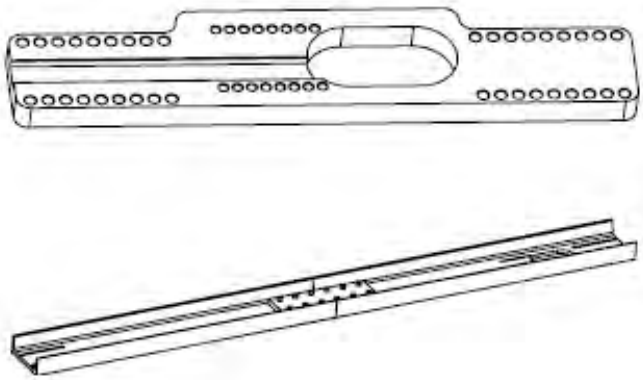
Item No.	AFC Part No.	BFC Part No.	Description	Quantity
1	500-1003	500-1003	Tripper Base	1
2	500-1004	555-1004	4" Tripper Stand	1
	500-1007	555-1007	7" Tripper Stand	1
	500-0110	555-0110	10" Tripper Stand	1
3	500-1002	500-1002	1/4"-20 Hex Nut	1
4	500-1001	500-1001	Tripper Pin	1
5	500-1005	500-1005	Tripper Rocker	1
6	500-1061	500-1061	1/4"-20 x 3/4" Socket Head Cap Screw	2
7	500-1009	500-1009	3/8" x 7/8" Shoulder Bolt	1
8	500-1062	500-1062	1/8" x 1-3/8" Roll Pin	2
9	500-1063	500-1063	5/16" ID x 5/8" O.D. Push Nut	1
10	500-1030	500-1030	1/4"-20 x 1-3/4" Socket Head Cap Screw	2
11	500-1008	500-1008	3/8"-16 Spring Plunger	2
12	500-1006	500-1006	Ball Knob Handle	1
13	500-1031	500-1031	Retainer Ring	2
14	500-1032	500-1032	1/4" Washer	2

Tripper Pin Extension Assembly
Part No. 500-1000



Item No.	Part No.	Description	Quantity
1	500-1421	1/4"-20 x 1" Socket Head Cap Screw	1
2	500-1060	Hex Tripper Pin Extension	1

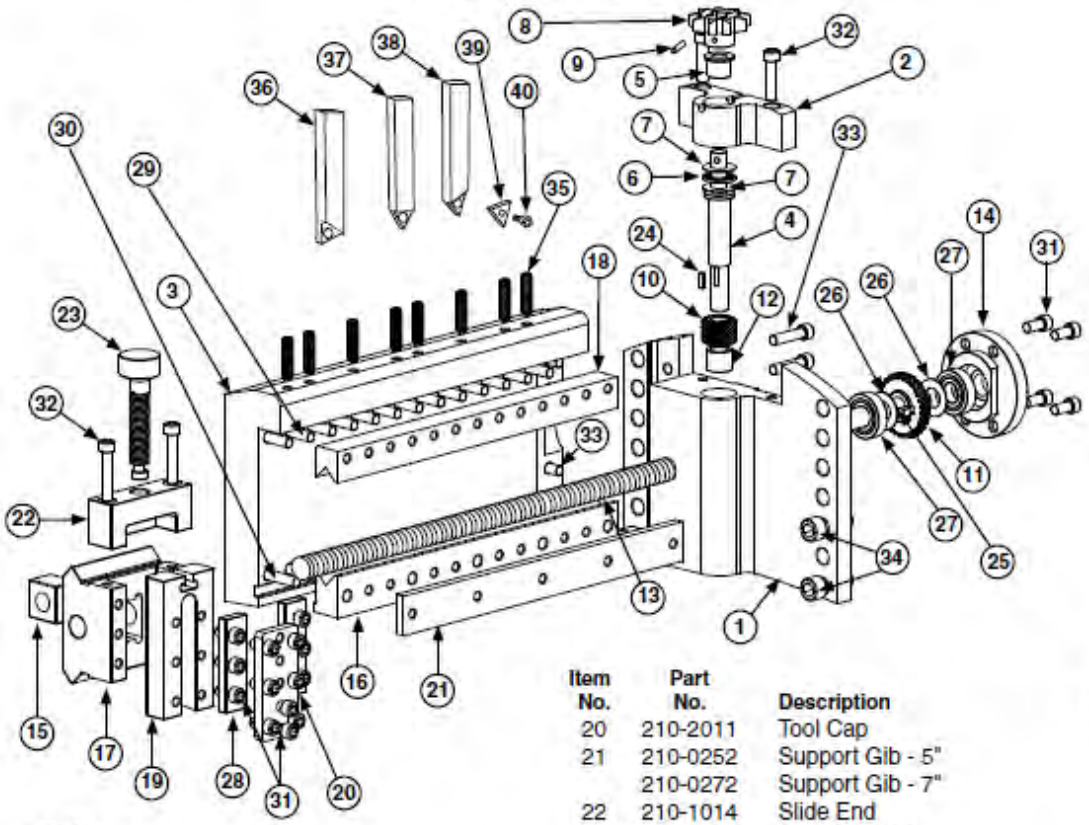
Cross Slide



Part No.	Description
217-0814	8" - 14" (203.2 - 355.6 mm)
217-1420	14" - 20" (355.6 - 508.0 mm)
217-2026	20" - 26" (508.0 - 660.4 mm)
217-2632	26" - 32" (660.4 - 812.8 mm)
217-3238	32" - 38" (812.8 - 965.2 mm)
217-3844	38" - 44" (965.2 - 1117.6 mm)
217-4450	44" - 50" (1117.6 - 1270.0 mm)
217-5056	50" - 56" (1270.0 - 1422.4 mm)
217-6268	62" - 68" (1574.8 - 1727.2 mm)
217-6874	68" - 74" (1727.2 - 1879.6mm)
217-8086	80" - 86" (2032.0 - 2184.4 mm)

FIGURE A-44. TRIPPER SLIDE, TRIPPER PIN EXTENSION, AND CROSS SLIDE ASSEMBLIES

Axial Tool Slide
5" Part No. 210-0055
7" Part No. 210-0077

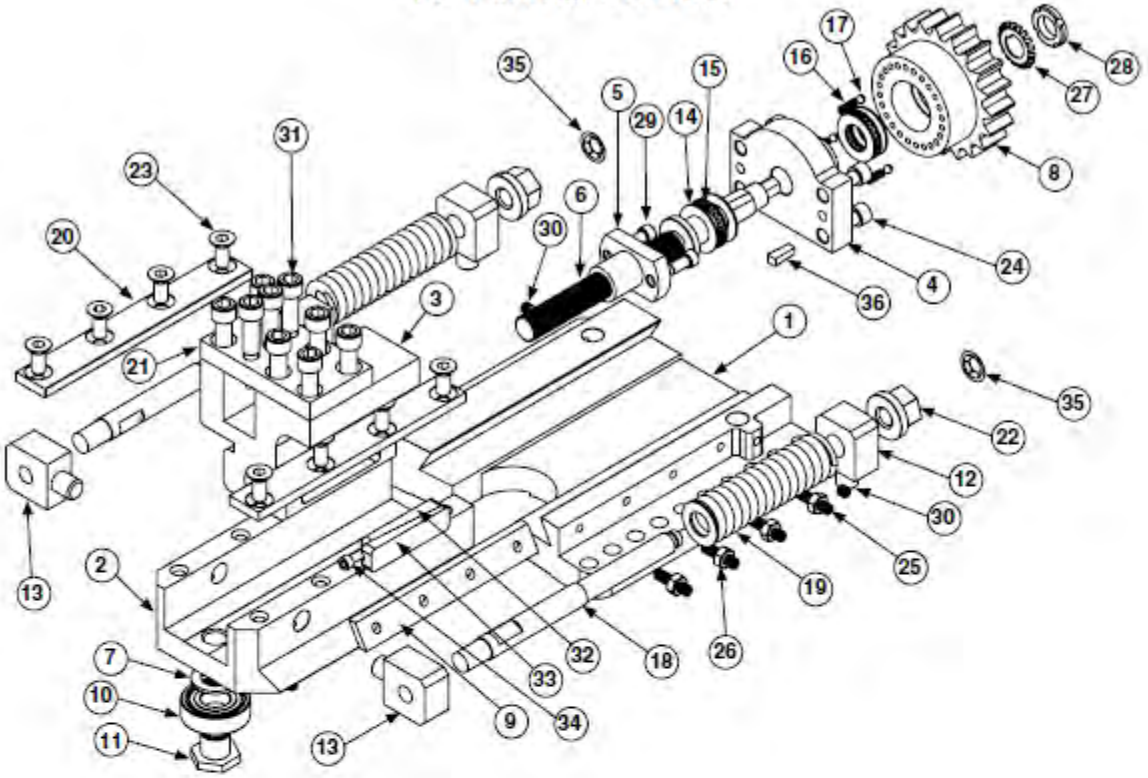


Item No.	Part No.	Description	Qty.
1	210-0200	Base Plate	1
2	500-1013	Feed Screw Mount	1
3	210-5555	Upright - 5"	1
	210-7777	Upright - 7"	1
4	210-0257	Drive Shaft	1
5	500-1015	Flange Bearing	1
6	500-1029	Needle Roller	1
7	500-1028	Thrust Washer	2
8	500-1200	Feed Screw Star Wheel	1
9	500-1073	1/8" x 3/4" Roll Pin	1
10	500-2088	Small Helical Gear	1
11	500-2087	Large Helical Gear	1
12	500-2128	Sleeve Bearing	1
13	210-0251	Feed Screw - 5"	1
	210-0271	Feed Screw - 7"	
14	210-1011	End Cap	1
15	500-1014	Feed Screw Nut	1
16	210-0254	Stationary Gib - 5"	1
	210-0274	Stationary Gib - 7"	1
17	210-1010	Tool Block Slide	1
18	210-0253	Adjustable Gib - 5"	1
	210-0273	Adjustable Gib - 7"	1
19	210-1012	Tool Slide	

Item No.	Part No.	Description	Qty.
20	210-2011	Tool Cap	1
21	210-0252	Support Gib - 5"	1
	210-0272	Support Gib - 7"	1
22	210-1014	Slide End	1
23	210-1013	Thumb Screw	1
24	210-0001	1/8" Sq. Key	1
25	210-0002	3/16" Sq. Key	1
26	500-2028	Thrust Washer	2
27	500-2015	Bearing	2
28	210-1015	Tool Slide Gib	2
29	500-1412	1/4-20 x 1-1/2" Socket Head Cap Screw	21
30	500-1030	1/4-20 x 1-3/4" Socket Head Cap Screw	5
31	500-1420	1/4-20 x 1/2" Socket Head Cap Screw	18
32	500-1074	1/4-20 x 1-1/4" Socket head Cap Screw	4
33	500-1421	1/4-20 x 1" Socket Head Cap Screw	10
34	500-1071	3/8-16 x 1" Socket Head Cap Screw	4
35	500-1422	1/4-20 Set Screw With Brass Tip	8
36	220-1309	Left Hand insert Holder	1
37	220-1311	Center Insert Holder	1
38	220-1313	Right Hand Insert Holder	1
39	INS 3/8N	Carbide Insert	1
40	220-1310	6-32 x 1/2"Socket Head Cap Screw	1

FIGURE A-45. AXIAL TOOL SLIDE ASSEMBLY

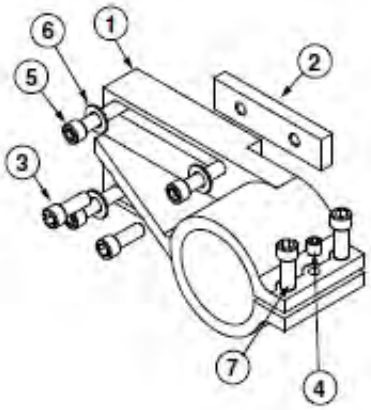
Out of Round Tool Slide
7" Part No. 210-0099
10" Part No. 210-1000



Item No.	Part No.	Description	Quantity	Item No.	Part No.	Description	Quantity
1	210-1245	Spring Slide Base, 7"	1	21	500-1011	Tool Block Cap	1
	210-1215	Spring Slide Base, 10"	1	22	500-1020	Swivel Flange Nut	2
2	210-1246	Spring Slide-1, 7"	1	23	500-1191	5/16"-18 x 3/4" Flat Socket Head Cap Screw	8
	210-1216	Spring Slide-1, 10"	1				
3	210-1247	Spring Slide-2	1	24	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	4
4	210-1248	Slide End Cap	1				
5	210-1249	Bronze Nut	1	25	913-0001	1/4"-20 x 3/4" Brass Tip Set Screw	4
6	210-1250	Feed Screw, 7"	1				
	210-1211	Feed Screw, 10"	1	26	500-1002	1/4"-20 Hex Nut	4
7	210-1251	Spacer Washer	1	27	210-1269	Lock Washer	1
8	210-1252	Index Wheel	1	28	210-1270	15 x 1mm Bearing Nut	1
9	210-1253	Adjustable Gib	1	29	500-1094	1/4"-20 x 5/8" Socket Head Cap Screw	2
10	R3H-24	Roller Bearing	1				
11	210-1255	Bearing Post	1	30	500-1091	1/4"-20 x 1/4" Brass Tip Set Screw	4
12	210-1260	Spring Stud End, Top	2				
13	210-1261	Spring Stud End, Bottom	2	31	500-1071	3/8"-16 x 1" Socket Head Cap Screw	9
14	210-1262	Thrust Washer	4				
15	210-1263	Thrust Bearing	2	32	210-1272	Wedge	1
16	210-1264	Spring	3	33	210-1273	Gib	1
17	210-1265	Ball	3	34	500-1100	10-24 x 7/8" Socket Head Cap Screw	1
18	210-1266	Spring Stud	2				
19	210-1267	Spring	2	35	210-1274	Retainer Clip	2
20	210-1268	Capture Plate	2	36	210-1212	1/8" x 1/2" Square Key	1

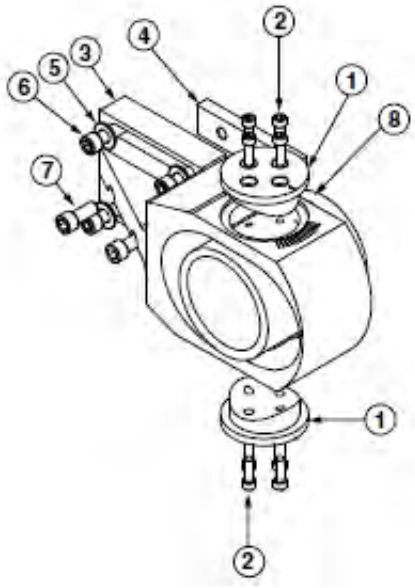
FIGURE A-46. OUT OF ROUND TOOL SLIDE ASSEMBLY

Standard Fixed Counter Bore Base Assembly
Part No. 214-0000



Item No.	Part No.	Description	Quantity
1	214-0065	Body	1
2	214-0066	Boring Bar Key	1
3	500-1064	3/8"-16 X 7/8" Socket Head Cap Screw	2
4	500-1055	3/8"-16 X 3/4" Set Screw	1
5	500-1067	3/8"-16 X 1-3/4" Socket Head Cap Screw	4
6	500-1068	3/8" Flat Washer	4
7	500-1071	3/8"-16 X 1" Socket Head Cap Screw	2

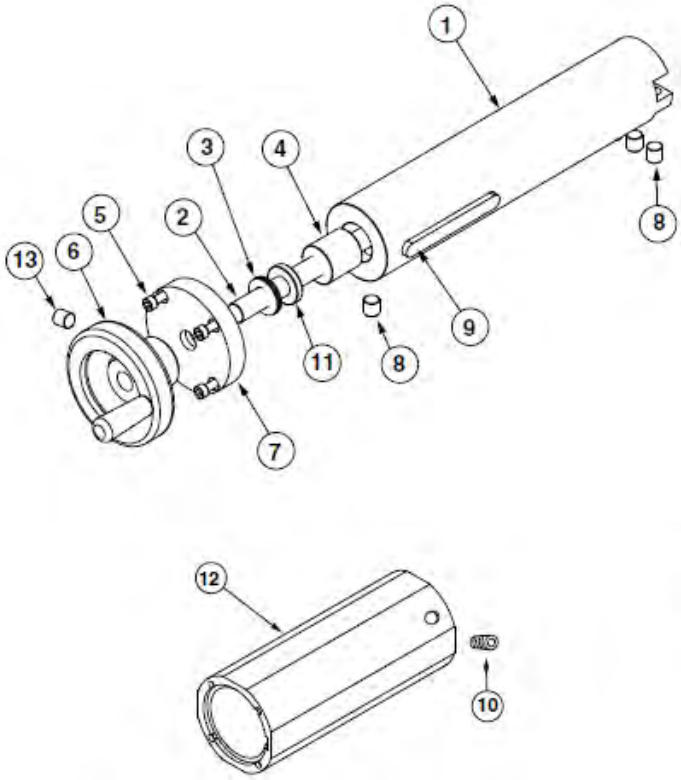
Swivel Counter Bore Base Assembly
Part No. 214-0011



Item No.	Part No.	Description	Quantity
1	214-1018	Side Clamp	2
2	500-1061	1/4"-20 X 3/4"Socket Head Cap Screw	8
3	214-1019	Body	1
4	214-0066	Boring Bar Key	1
5	500-1068	3/8" Flat Washer	4
6	500-1067	3/8"-16 X 1-3/4" Socket Head Cap Screw	4
7	500-1064	3/8"-16 X 7/8" Socket Head Cap Screw	2
8	214-1020	Clamping Sleeve	1

FIGURE A-47. COUNTER BORE BASE ASSEMBLIES

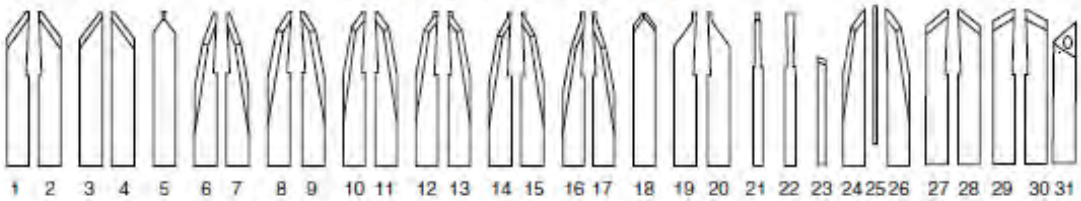
Counter Bore Barrel Assembly
6" Part No. 214-0600
10" Part No. 214-0100



Item No.	Part No.	Description	Quantity
1	214-0072	Boring Head, 6"	1
	214-1017	Boring Head, 10"	1
2	214-0067	Feed Screw, 6"	1
	214-1015	Feed Screw, 10"	1
3	214-0069	Thrust Washer	2
4	214-0073	Nut	1
5	500-1066	10-24 X 3/4" Socket Head Cap Screw	4
6	214-0070	Hand Wheel	1
7	214-0075	End Cap	1
8	500-1065	3/8"-16 X 3/8" Set Screw	4
9	214-0074	Key	1
10	214-0082	5/16"-18 x 1/4" Brass Tip Set Screw	1
11	214-0068	Thrust Bearing	1
12	214-0071	Sleeve, 6"	1
	214-1016	Sleeve, 10"	1
13	500-1072	5/16"-18 x 3/8" Socket Head Set Screw	1

FIGURE A-48. COUNTER BORE BARREL ASSEMBLY

Standard Tool Bits

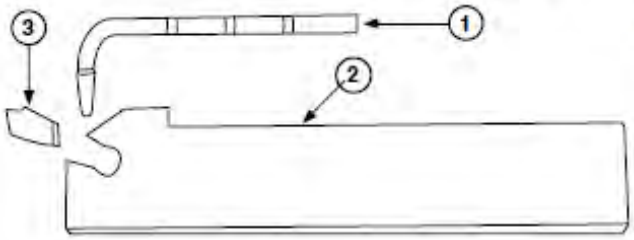


Item	Part No.	Description
1	220-1013	37° R.H. Bevel, 7"
	220-1064	37° R.H. Bevel, 3.5"
2	220-1014	37° L.H. Bevel, 7"
	220-1061	37° L.H. Bevel, 3.5"
3*	220-1016	37° R.H. Double Bevel, 7"
	220-1077	37° R.H. Double Bevel, 3.5"
4*	220-1015	37° L.H. Double Bevel, 7"
	220-1078	37° L.H. Double Bevel, 3.5"
5	220-1080	37° Double Bevel Sever, 7"
	220-1020	37° Double Bevel Sever, 3.5"
6	220-1025	20° - 10° R.H. Bevel, 7"
7	220-1023	20° - 10° L.H. Bevel, 7"
8	220-1029	30° - 10° R.H. Bevel, 7"
9	220-1027	30° - 10° L.H. Bevel, 7"
10	220-1009	37° - 10° R.H. Bevel, 7"
11	220-1012	37° - 10° L.H. Bevel, 7"
12	220-1010	37° - 10° R.H. Sever, 7"
13	220-1011	37° - 10° L.H. Sever, 7"
14	220-1028	30° - 10° R.H. Sever, 7"
15	220-1026	30° - 10° L.H. Sever, 7"
16	220-1024	20° - 10° R.H. Sever, 7"
17	220-1022	20° - 10° L.H. Sever, 7"

Item	Part No.	Description
18	220-1079	37° Double Bevel, 7"
	220-1019	37° Double Bevel, 3.5"
19	220-1063	37° R.H. Sever, 7"
	220-1062	37° R.H. Sever, 3.5"
20	220-1060	37° L.H. Sever, 7"
	220-1059	37° L.H. Sever, 3.5"
21	220-1002	1/4" Sever, 7"
	220-1041	1/4" Sever, 3.5"
22	220-1001	3/8" Sever, 7"
	220-1042	3/8" Sever, 3.5"
23	220-1081	10° Counter Bore, 2"
24*	220-1018	37° - 10° R.H. Double Bevel, 7"
25*	220-1248	1/8" Sever, 6"
26*	220-1017	37° - 10° L.H. Double Bevel, 7"
27	220-1225	45° R.H. Bevel, 7"
	220-1223	45° R.H. Bevel, 3.5"
28	220-1226	45° L.H. Bevel, 7"
	220-1224	45° L.H. Bevel, 3.5"
29	220-1129	30° R.H. Bevel, 7"
	220-1099	30° R.H. Bevel, 3.5"
30	220-1131	30° L.H. Bevel, 7"
	220-1125	30° L.H. Bevel, 3.5"
31	220-1308	Counterbore Insert Holder
	INS38N	Carbide Insert

* Blades used as a set.

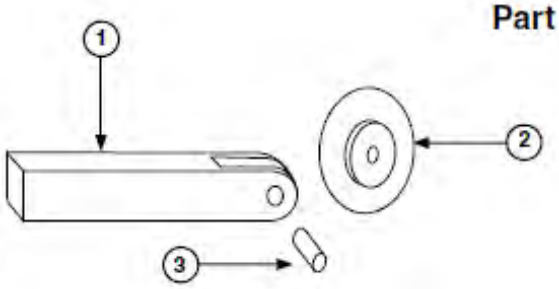
Carbide Insert Holder



Item No.	Part No.	Description	Quantity
1	220-1307	Insert Extraction Tool	1
2	220-1300	#4 Insert Holder, 5/32" x 5"	1
	220-1303	#6 Insert Holder, 1/4" x 5"	1
3	220-1301	#4 Carbide Insert, 5/32"	1
	220-1304	#6 Carbide Insert, 1/4"	1

Please see pages 50 and 51 for Carbide Insert Holders and Inserts.

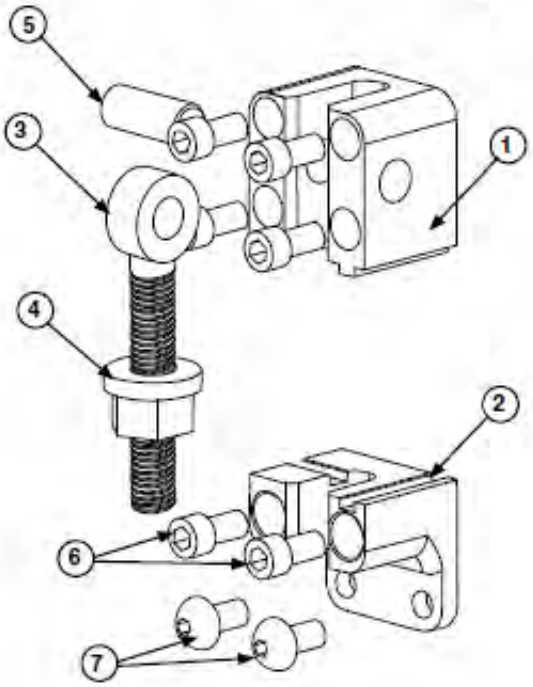
Chipless Cutter Wheel
Part No. 220-1395



List No.	Part No.	Description	Quantity
1	220-1390	Holder	1
2	220-1391	Cutter Wheel	1
3	500-1088	3/8" X 1-1/4" Dowel Pin	1

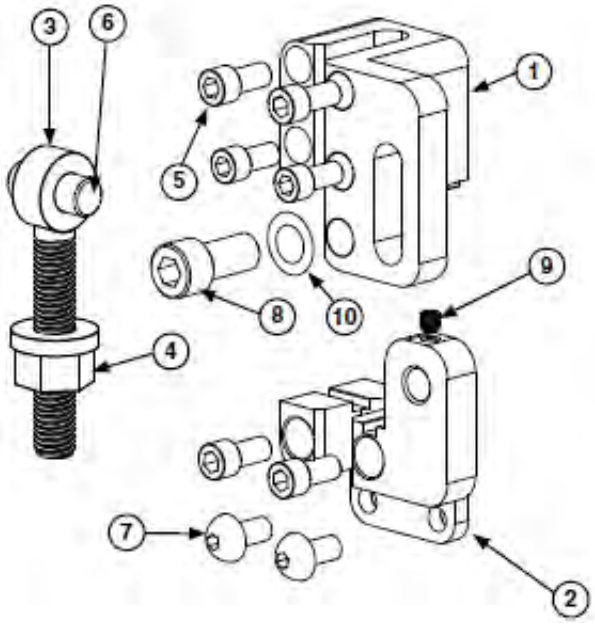
FIGURE A-49. STANDARD TOOL BITS, CARBIDE INSERT HOLDER, AND CHIPLESS CUTTER WHEEL ASSEMBLIES

Gear Clamp
Part No. 500-1027



Item No.	Part No.	Description	Quantity
1	500-1017	Male Gear Clamp	1
2	500-1018	Female Gear Clamp	1
3	500-1019	Swing Bolt	1
4	500-1020	Swivel Flange Nut	1
5	500-1021	1/2" x 1-1/2" Dowel Pin	1
6	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	6
7	500-1075	5/16"-18 x 3/4" Button Head Cap Screw	2

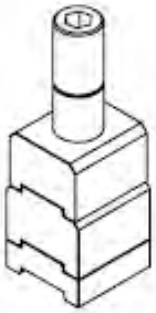
Hinge Clamp
Part No. 500-1095

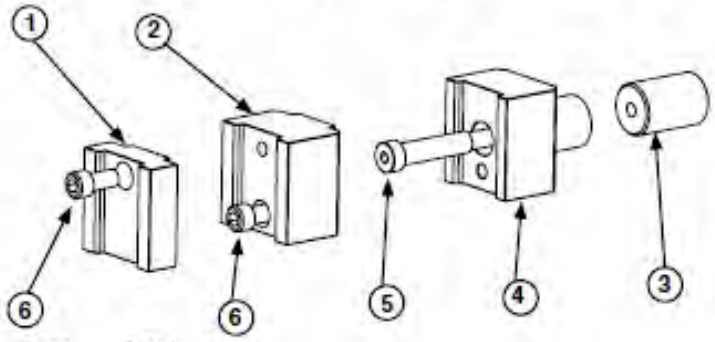


List No.	Part No.	Description	Quantity
1	500-1096	Male Hinge Gear Clamp	1
2	500-1097	Female Hinge Gear Clamp	1
3	500-1019	Swing Bolt	1
4	500-1020	Swivel Flange Nut	1
5	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	6
6	500-1021	1/2" x 1-1/2" Dowel Pin	1
7	500-1075	5/16"-18 x 3/4" Button Head Cap Screw	2
8	500-1090	1/2"-13 x 1" Socket Head Cap Screw	1
9	500-1091	1/4"-20 x 1/4" Set Screw	1
10	500-1092	1/2" Flat Washer	1

FIGURE A-50. GEAR CLAMP AND HINGE CLAMP ASSEMBLY

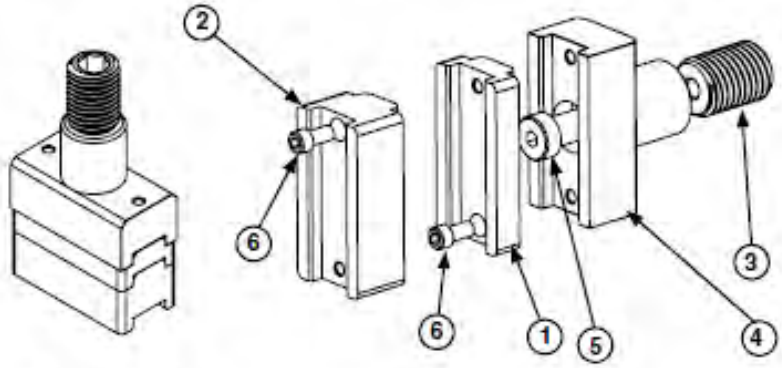
Locator Pad and Extensions
AFC Part No. 212-1130 (Consists of Items #3, 4, & 5)





Item No.	Part No.	Description	Quantity
1	212-0012	1/2" Locator Pad Extension	1
2	212-0100	1" Locator Pad Extension	1
	212-0200	2" Locator Pad Extension	1
	212-0300	3" Locator Pad Extension	1
	212-0400	4" Locator Pad Extension	1
3	212-1234	3/4" Set Screw	1
4	212-1034	Adjustable Locator Pad	1
5	212-1134	5/16" x 1-1/4" Shoulder Bolt	1
6	500-1058	1/4"-20 x 5/8" Socket Head Cap Screw	2

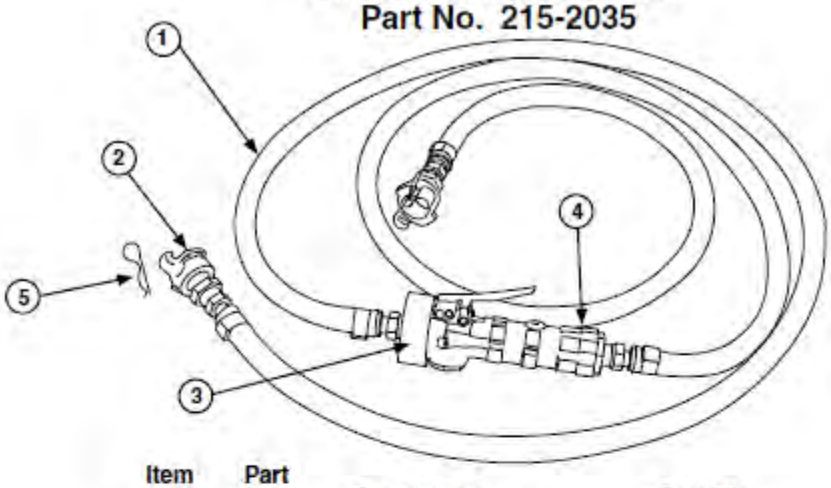
BFC Part No. 312-1130 (Consists of Items #3, 4, & 5)



Item No.	Part No.	Description	Quantity
1	312-0012	1/2" Locator Pad Extension	1
2	312-0100	1" Locator Pad Extension	1
	312-0200	2" Locator Pad Extension	1
	312-0300	3" Locator Pad Extension	1
	312-0400	4" Locator Pad Extension	1
3	312-1234	1" Set Screw	1
4	312-1034	Adjustable Locator Pad	1
5	312-1134	1/2" x 1-3/4" Shoulder Bolt	1
6	500-1058	1/4"-20 x 5/8" Socket Head Cap Screw	2

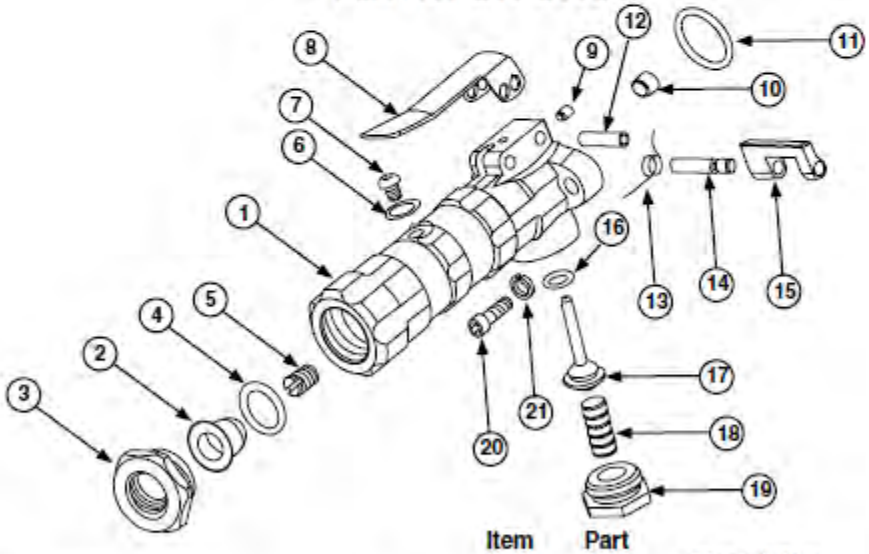
FIGURE A-51. LOCATOR PAD AND EXTENSIONS FOR AFC AND BFC ASSEMBLY

Air Hose/Throttle Handle
Part No. 215-2035



Item No.	Part No.	Description	Quantity
1	215-2030	Hose Section w/Fittings	2
2	215-1011	Claw Fitting, Female	2
3	215-2031	Adapter	1
4	215-2032	Throttle Assembly	1
5	215-2012	Safety Clip	2

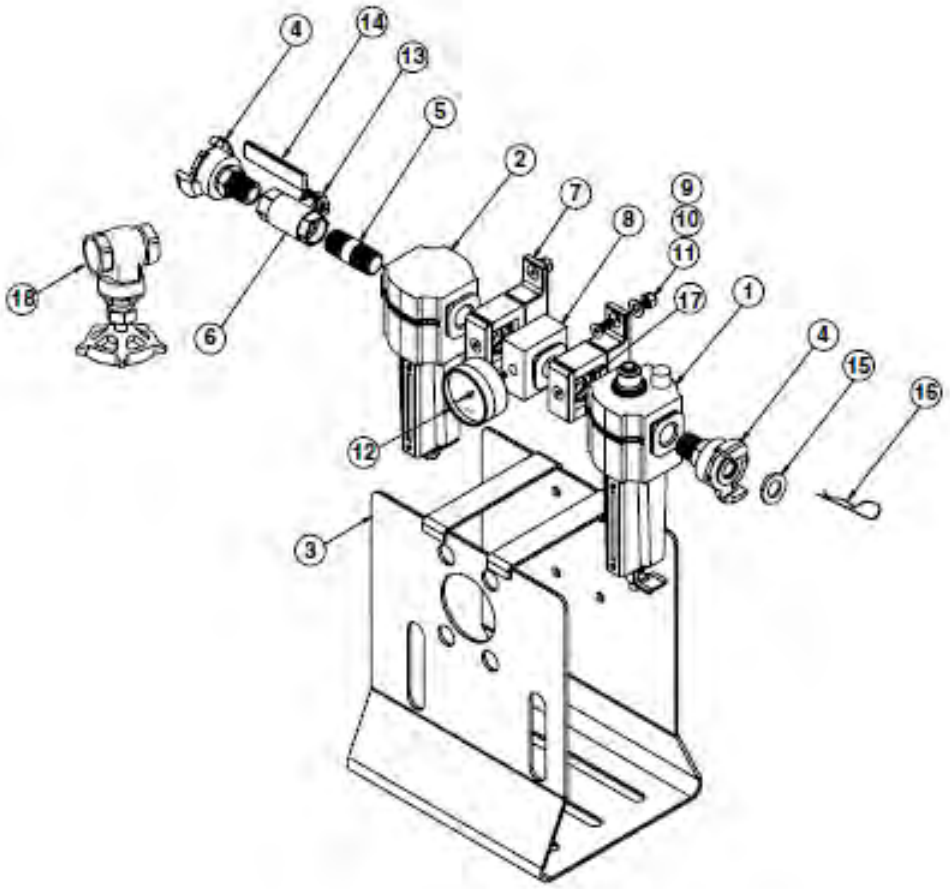
Air Hose Throttle Handle
Part No. 215-2032



Item No.	Part No.	Description	Quantity
1	215-2040	Throttle Body	1
2	215-2041	Screen	1
3	215-2042	Adpater Cap	1
4	215-2043	O-Ring	1
5	215-2044	Oiler Valve	1
6	215-2045	Gasket	1
7	215-2046	Screw	1
8	215-2047	Lever	1
9	215-2048	Set Screw	1
10	215-2049	Pipe Plug	1
11	215-2050	O-Ring	1
12	215-2051	Pin	1
13	215-2052	Safety Lockout Spring	1
14	215-2053	Lockout Pin	1
15	215-2054	Lockout	1
16	215-2055	O-Ring	1
17	215-2056	Throttle Valve Assembly	1
18	215-2057	Spring	1
19	215-2058	Throttle Valve Plug	1
20	215-2019	5/16"-18 x 1" Socket Head Cap Screw	2
21	215-2060	5/16" Split Lock Washer	2

FIGURE A-52. AIR HOSE THROTTLE HANDLE ASSEMBLY

Air Caddy, NAC
Assembly No. 255-2025

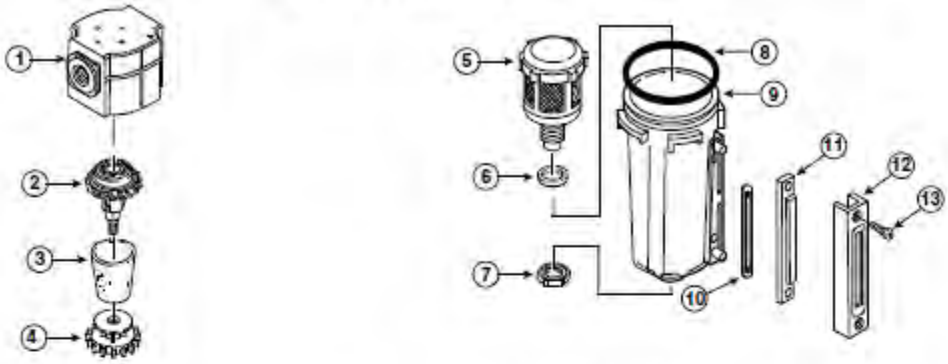


Reference No.	Part No.	Description
1	255-2026	Lubricator Assembly
2	255-2027	Filter Assembly
3	255-2028	Frame
4	215-1012	(2) 1/2" Claw Fitting, Male
5	215-2013	1/2" NPT x 2" Nipple
6	215-2014	1/2" Ball Valve
7	255-2029	(2) Mounting Bracket
8	255-2030	Port Block
9	901-0001	(4) 1/4" - 20 x 3/4" Flat Socket Head Cap Screw

Reference No.	Part No.	Description
10	500-1032	(4) 1/4" Flat Washer
11	255-2032	(4) 1/4" - 20 Hex Locknut
12	255-2033	2" Pressure Gauge
13	255-2035	Valve Handle Nut
14	255-2034	Valve Handle
15	215-2020	(2) Claw Fitting Rubber Seal
16	215-2012	(2) Safety Clip
17	255-2036	(4) O-Ring
18	215-2015	Gate Valve, Optional

FIGURE A-53. AIR CADDY NAC ASSEMBLY

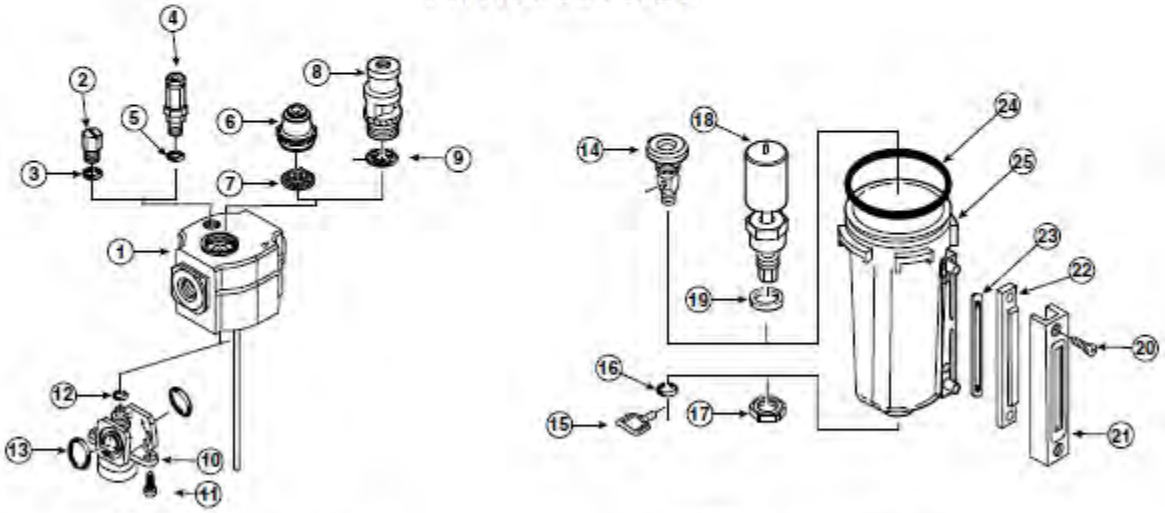
Filter Assembly
Part No. 255-2027



Reference No.	Part No.	Description
1	255-2100	Body
2	255-2101	Louver - Center Post
3	255-2102	Filter Element
4	255-2103	Baffle
5	255-2104	Automatic Drain Assembly
6	255-2105	Gasket
7	255-2106	Nut

Reference No.	Part No.	Description
8	255-2107	O-Ring
9	255-2108	Bowl
10	255-2109	Sight Glass Lens Seal
11	255-2110	Sight Glass Lens
12	255-2111	Sight Glass Clamp
13	255-2112	(2) Screw

Lubricator Assembly
Part No. 255-2026

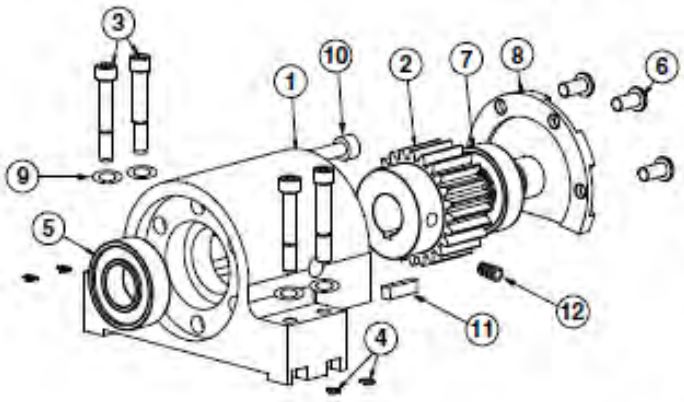


Reference No.	Part No.	Description
1	255-2201	Body
2	255-2202	Fill Plug
3	255-2203	O-Ring
4	255-2204	Quick Fill Cap
5	255-2205	O-Ring
6	255-2206	Sight Feed Dome
7	255-2207	Seal
8	255-2208	Sight Feed
9	255-2209	Seal
10	255-2210	Cartridge
11	255-2211	(2) Screw
12	255-2212	O-Ring
13	255-2213	(2) O-Ring

Reference No.	Part No.	Description
14	255-2214	Manual Drain
15	255-2215	Drain Valve
16	255-2216	O-Ring
17	255-2217	Nut
18	255-2218	Remote Fill
19	255-2219	Gasket
20	255-2220	(2) Screw
21	255-2221	Sight Glass Clamp
22	255-2222	Sight Glass Lens
23	255-2223	Sight Glass Lens Seal
24	255-2224	O-Ring
25	255-2225	Bowl

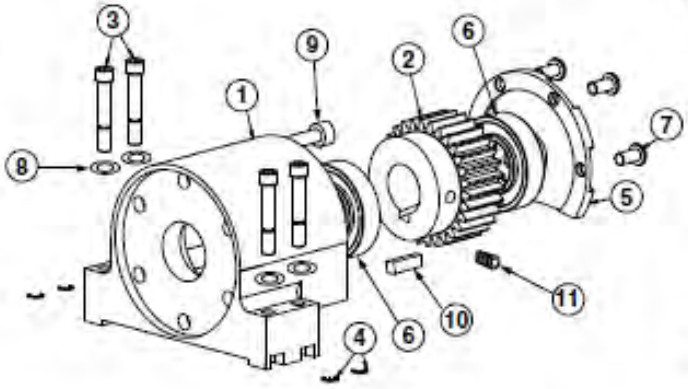
FIGURE A-54. FILTER AND LUBRICATOR ASSEMBLY

3800 Air Motor Gear Drive
Part No. 211-1380



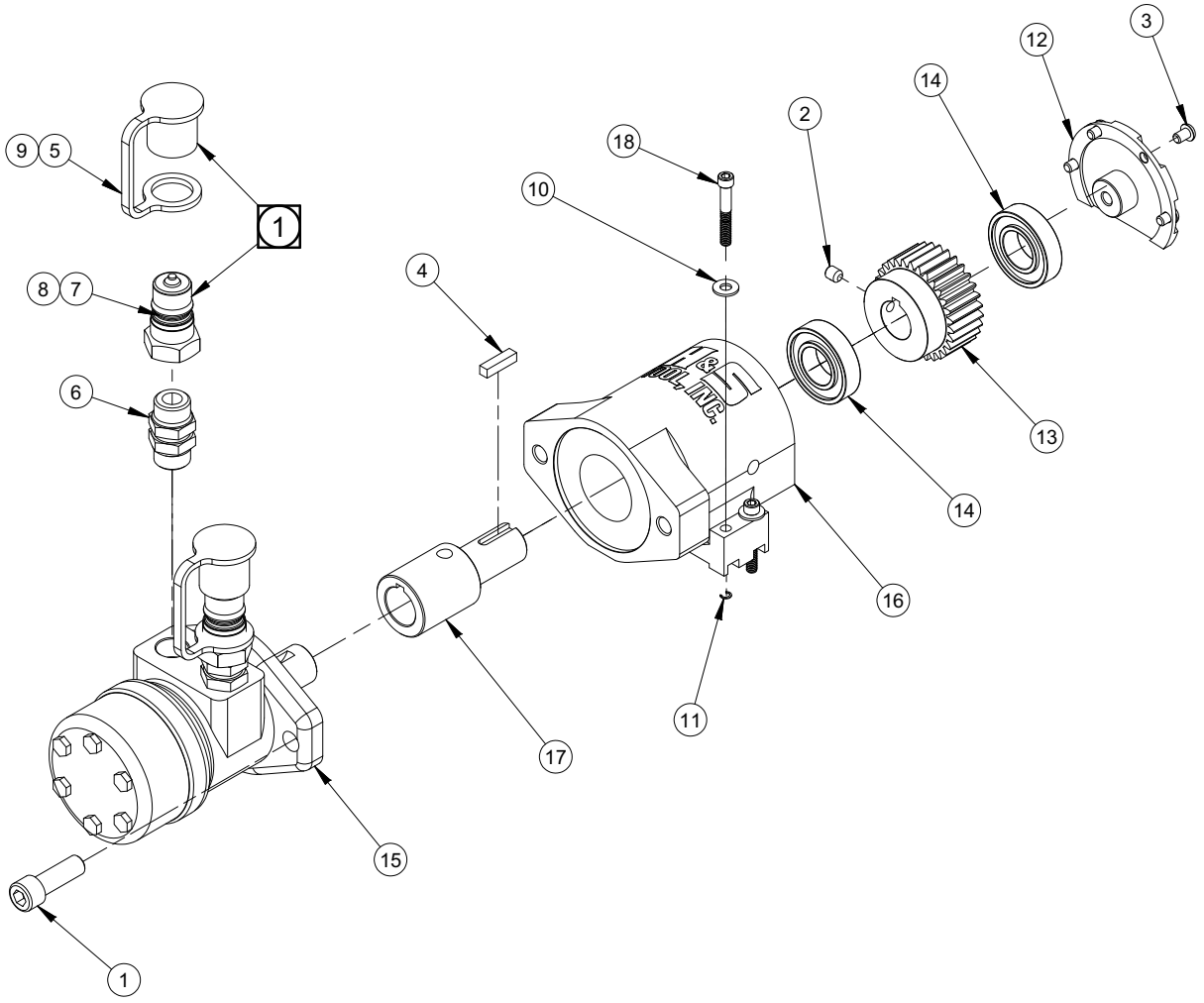
Item No.	Part No.	Description	Quantity
1	211-0381	Motor Mount Housing	1
2	211-0383	Drive Gear	1
3	500-1030	1/4"-20 x 1-3/4" Socket Head Cap Screw	4
4	500-1031	1/4" Low-Clearance Retaining Ring	4
5	211-0384	Roller Bearing	1
6	500-1069	1/4"-20 X 3/8" Button Head Cap Screw	4
7	211-0385	Roller Bearing	1
8	211-0382	Drive Gear Cover	1
9	500-1032	Washers	4
10	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	6
11	211-0486	Square Key	1
12	500-1072	5/16"-18 x 3/8" Socket Head Set Screw	1

4800 Air Motor Gear Drive
Part No. 211-1480



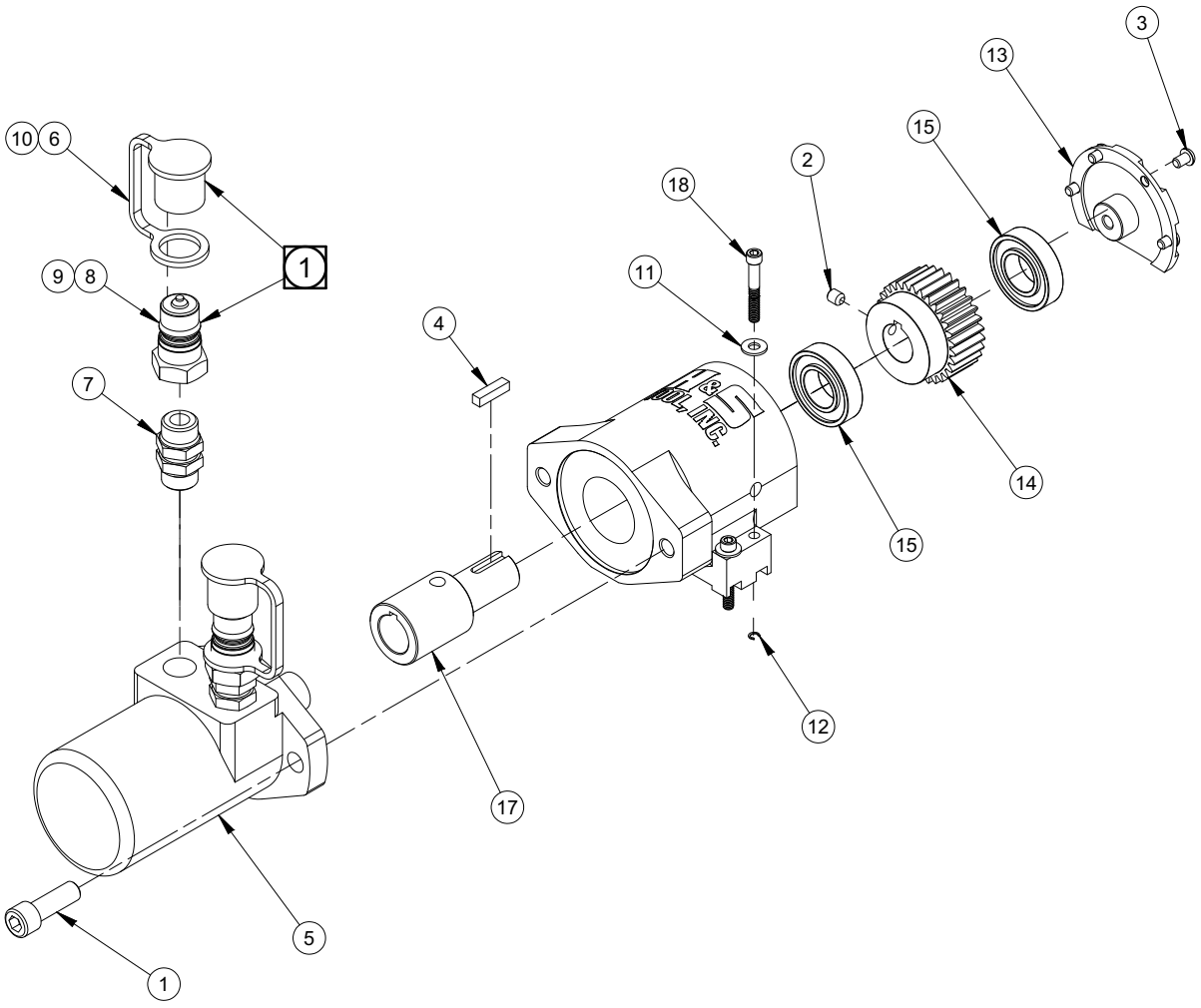
Item No.	Part No.	Description	Quantity
1	211-0481	Motor Mount Housing	1
2	211-0483	Drive Gear	1
3	500-1030	1/4"-20 x 1-3/4" Socket Head Cap Screw	4
4	500-1031	1/4" Low-Clearance Retaining Ring	4
5	211-0482	Drive Gear Cover	1
6	211-0484	Roller Bearing	2
7	500-1069	1/4"-20 X 3/8" Button Head Cap Screw	4
8	500-1032	Washers	4
9	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	6
10	211-0486	Square Key	1
11	500-1072	5/16"-18 x 3/8" Socket Head Set Screw	1

FIGURE A-55. AIR MOTOR GEAR DRIVE ASSEMBLIES



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	11691	SCREW 1/2-13 X 1-1/2 SHCS
2	1	12324	SCREW 5/16-18 X 3/8 SSSCPPL
3	4	18286	SCREW 1/4-20 X 3/8 BHSCS
4	1	20273	KEY 1/4 SQ X 1.00 SQ BOTH ENDS
5	2	27978	FTG DUST CAP 1/2 MALE QUICK COUPLING
6	2	29100	FTG UNION SAE-10M X SAE-10M (KB)
7	2	40614	FTG QUICK COUPLER MALE 1/2B X SAE-10F
8	2	63427	FTG QD NIPPLE 1/2B ISO 16028 STYLE X SAE-10F
9	2	63428	DUST CAP QD NIPPLE 1/2B ISO 16028 STYLE RUBBER
10	4	88969	WASHER 1/4 FLTW ZINC PLATED
11	4	102979	RING SNAP 7/32 OD X .025 TH LOW CLEARANCE
12	1	2110482	DRIVE GEAR COVER
13	1	2110483	DRIVE GEAR - 4800 MOTOR MOUNT 30T 1"BORE
14	2	2110484	ROLLER BEARING R16ZZ
15	1	2110580	MOTOR HYDRAULIC 9.5 CID 1 IN STRAIGHT KEYED SHAFT #10 SAE PORTS DANFOSS DS SERIES
16	1	2110581	MOTOR MOUNT HOUSING
17	1	2110584	ADAPTER DRIVESHAFT
18	4	5001030	SCREW 1/4-20 x 1 3/4" SHCS MODIFIED

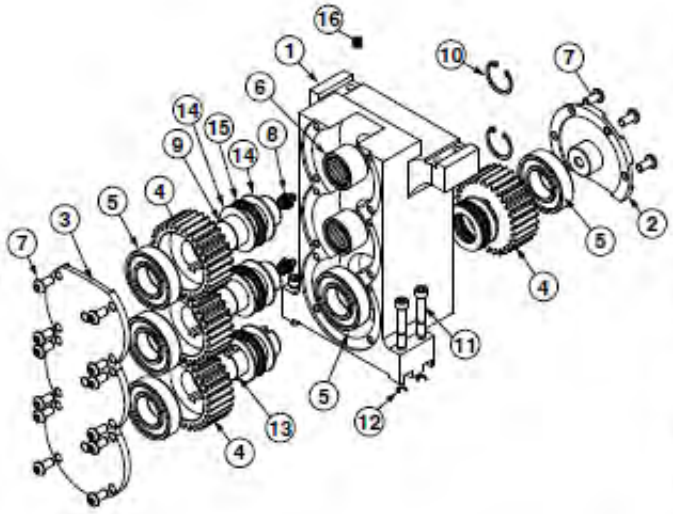
FIGURE A-56. DANFOSS HYDRAULIC MOTOR ASSEMBLY (P/N HYD-R)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	2	11691	SCREW 1/2-13 X 1-1/2 SHCS
2	1	12324	SCREW 5/16-18 X 3/8 SSSCPPL
3	4	18286	SCREW 1/4-20 X 3/8 BHSCS
4	1	20273	KEY 1/4 SQ X 1.00 SQ BOTH ENDS
5	1	21534	MOTOR HYD 17.9 CU IN KEYED SAE O-RING
6	2	27978	FTG DUST CAP 1/2 MALE QUICK COUPLING
7	2	29100	FTG UNION SAE-10M X SAE-10M (KB)
8	2	40614	FTG QUICK COUPLER MALE 1/2B X SAE-10F
9	2	63427	FTG QD NIPPLE 1/2B ISO 16028 STYLE X SAE-10F
10	2	63428	DUST CAP QD NIPPLE 1/2B ISO 16028 STYLE RUBBER
11	4	88969	WASHER 1/4 FLTW ZINC PLATED
12	4	102979	RING SNAP 7/32 OD X .025 TH LOW CLEARANCE
13	1	2110482	DRIVE GEAR COVER
14	1	2110483	DRIVE GEAR - 4800 MOTOR MOUNT 30T 1"BORE
15	2	2110484	ROLLER BEARING R16ZZ
16	1	2110581	MOTOR MOUNT HOUSING
17	1	2110584	ADAPTER DRIVESHAFT
18	4	5001030	SCREW 1/4-20 x 1 3/4" SHCS MODIFIED

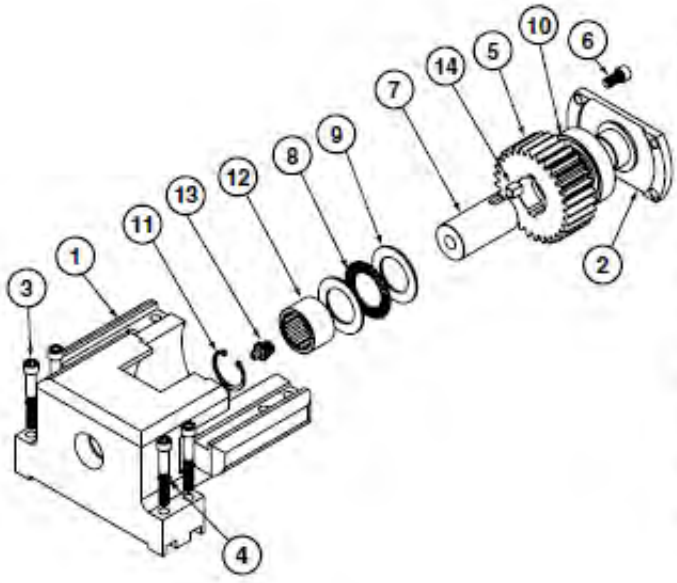
FIGURE A-57. CHARLYN HYDRAULIC MOTOR ASSEMBLY (P/N HYC-R)

Front Drive Motor Adapter
Part No. 213-1010



Item No.	Part No.	Description	Quantity
1	213-1011	Adapter Housing	1
2	211-0482	Drive Gear Cover	1
3	213-1012	Housing Cover	1
4	213-1014	Drive Gear	4
5	211-0484	Ball Bearing	5
6	213-1018	Needle Bearing	2
7	500-1034	1/4"-20 x 1/2"Button Head Cap Screw	16
8	500-1033	Grease Fitting	2
9	213-1016	Intermediate Shaft	2
10	213-1021	Internal Snap Ring	2
11	500-1030	1/4"-20 x 1-3/4" Socket Head Cap Screw, Special	4
12	500-1031	1/4" Low-Clearance Snap Ring	4
13	213-1015	Keyed Drive Shaft	1
14	213-1020	Thrust Washer	8
15	213-1019	Thrust Bearing	4
16	500-1080	1/4"-20 Helical Thread Insert	4

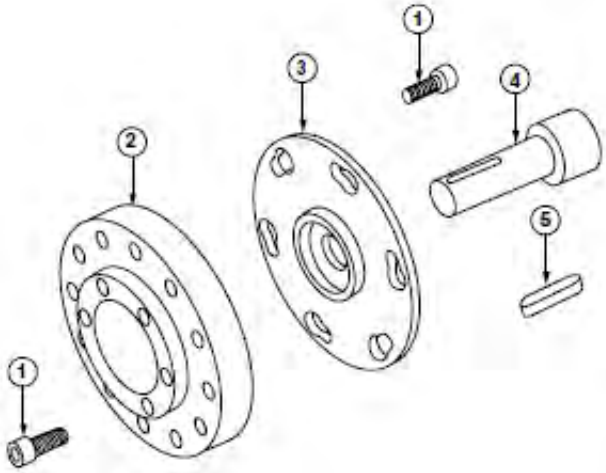
Reverse Front Drive Adapter
Part No. 213-2035



Item No.	Part No.	Description	Quantity
1	213-2034	Adapter Housing	1
2	213-2033	Drive Cap	1
3	500-1030	1/4"-20 x 1-3/4" Socket Head Cap Screw	4
4	500-1031	Low Clearance Retainer Ring	4
5	213-1014	Drive Gear	1
6	500-1420	1/4"-20 x 1/2" Socket Head Cap Screw	4
7	213-2028	Drive Shaft	1
8	213-1019	Thrust Bearing	1
9	213-1020	Thrust Washer	2
10	211-0484	Roller Bearing	1
11	213-1021	Retainer Ring	1
12	213-1018	Needle Bearing	1
13	500-1033	Grease Fitting	1
14	213-2021	1/4" Square Key	1

FIGURE A-58. FRONT DRIVE MOTOR ADAPTER AND REVERSE FRONT DRIVE ADAPTER ASSEMBLIES

AFC Right Angle Motor Adapter
55 Series Part No. 211-1338
75 Series Part No. 211-1348



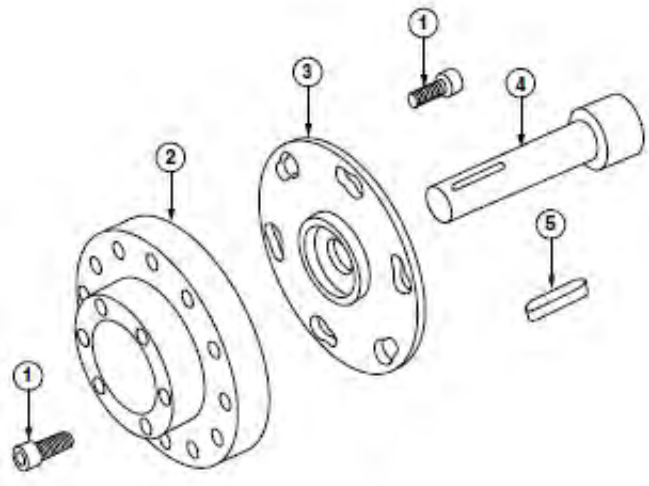
55 Series Right Angle Motor Adapter

Item No.	Part No.	Description	Quantity
1	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	12
2	211-1330	Adapter Plate	1
3	211-1331	Motor Flange	1
4	211-1332	Drive Shaft	1
5	211-1333	Drive Key	1

75 Series Right Angle Motor Adapter

Item No.	Part No.	Description	Quantity
1	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	12
2	211-1340	Adapter Plate	1
3	211-1341	Motor Flange	1
4	211-1342	Drive Shaft	1
5	211-1343	Drive Key	1

BFC Right Angle Motor Adapter
75 Series Part No. 211-1358

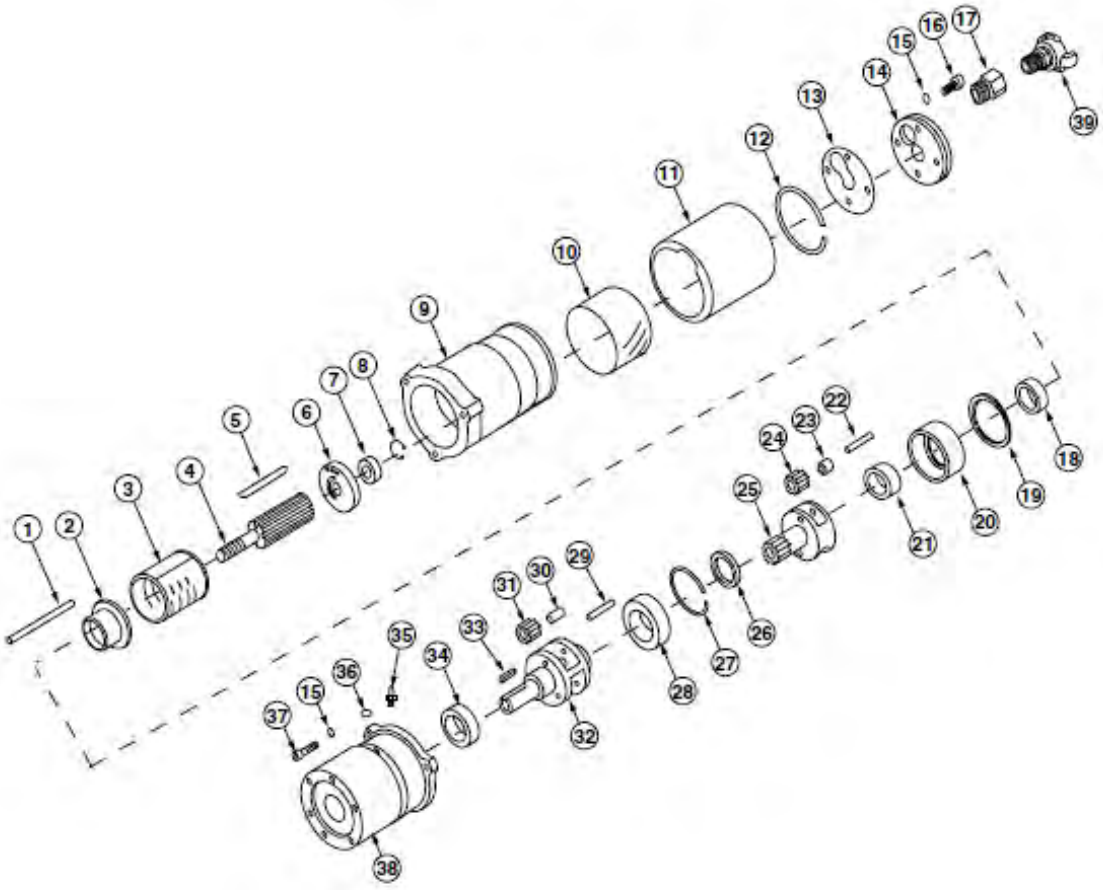


75 Series Right Angle Motor Adapter

Item No.	Part No.	Description	Quantity
1	500-1070	5/16"-18 x 3/4" Socket Head Cap Screw	12
2	211-1350	Adapter Plate	1
3	211-1341	Motor Flange	1
4	211-1352	Drive Shaft	1
5	211-1343	Drive Key	1

FIGURE A-59. AFC AND BFC RIGHT ANGLE MOTOR ADAPTER ASSEMBLIES (P/N RAD-R)

3800 Air Motor
Part No. 211- 0380

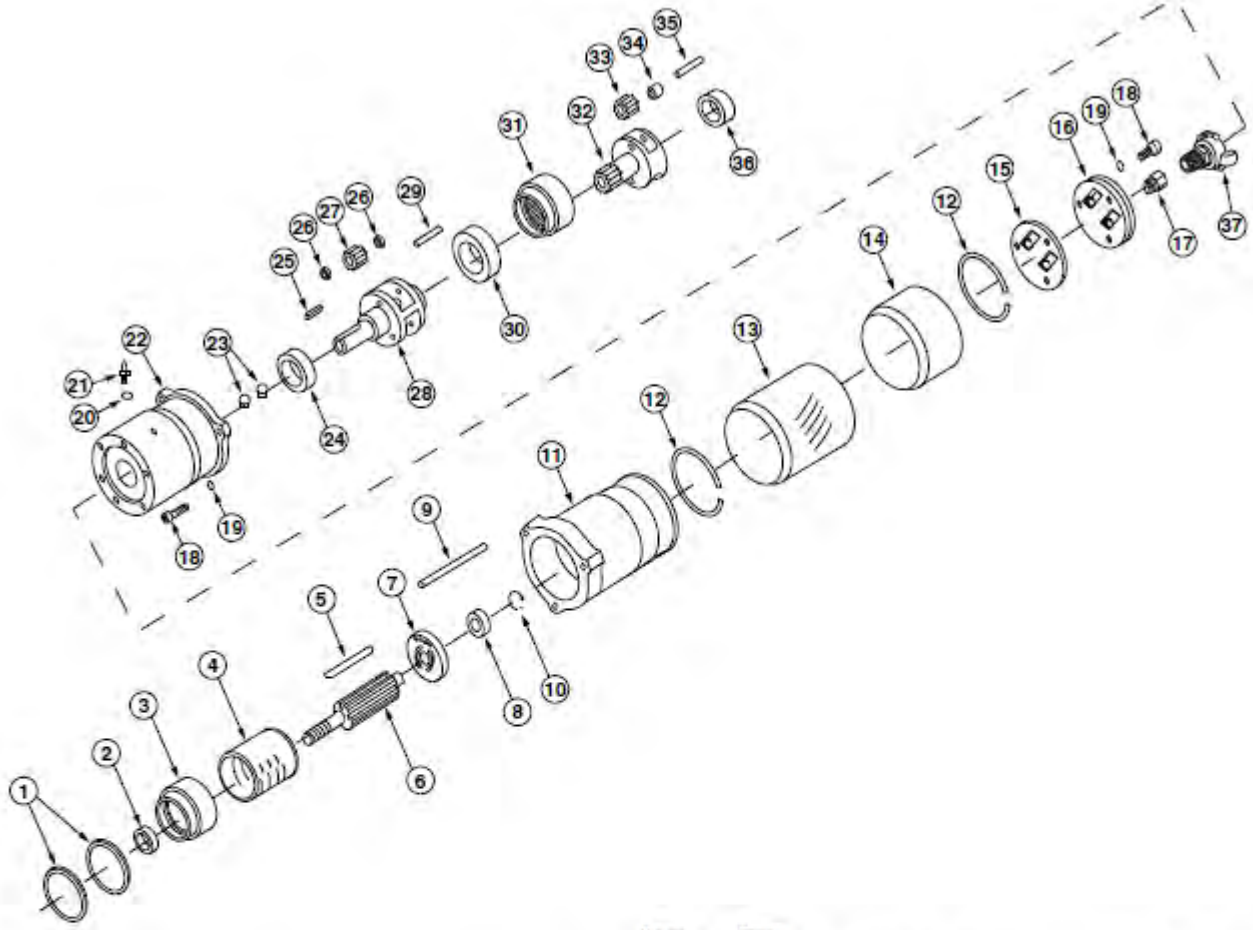


Item No.	Part No.	Description	Quantity
1	R38KT-198	Cylinder Dowel	1
2	R3800-11	Front End Plate	1
3	R3800-3	Cylinder	1
4	R3800M-53	Rotor	1
5	R38-42-5	Vane (set of 5)	1
6	R3800-12	Rear End Plate	1
7	R1-24	Rear Rotor Bearing	1
8	404-118	Rotor Bearing Retainer	1
9	R3800-40	Motor Housing	1
10	R3800-23	Exhaust Deflector	1
11	R38-23	Muffler	1
12	R4-323	Exhaust Deflector Retainer Ring	1
13	R3800-283	Backhead Gasket	1
14	R3800-102	Backhead	1
15	8U-58	1/4" Lock Washer	7
16	510-638	Backhead Cap Screw	4
17	R38-565A	Air Strainer	1
18	R1-24A	Front Rotor Bearing	1
19	34U-216	Motor Retaining Ring	1
20	R3800-118	Motor Retainer	1

Item No.	Part No.	Description	Quantity
	R3800U2-A216	Gear Head Assembly	1
21	4E-510	Gear Head Bearing	1
22	8U-191	Gear Head Planet Gear Shaft	2
23	8U-654	Gear Head Planet Gear Bearing	2
24	4E-10AX	Gear Head Planet Gear	2
25	R3800U2-216	Gear Head	1
26	R38P-80	Gear Head Spacer	1
	R3800-A108	Spindle Assembly	1
27	FMC2-280	Spindle Bearing Retainer	1
28	R38P-97	Spindle Rear Bearing	1
29	R38P-190	Spindle Planet Gear Shaft	3
30	R38P-500	Spindle Planet Gear Bushing	3
31	R3800U2-9	Spindle Planet Gear	3
32	R3800-U108	Spindle	1
33	P25-150	Spindle Key	1
34	4UA9-593	Spindle Front Bearing	1
35	R1-188	Grease Fitting	1
36	R3-92A	Grease Fitting Washer	1
37	ROH-354	Gear Case Cap Screw	3
38	ET3802P-A37	Gear Case	1
39	215-1012	Claw Fitting, Male	1

FIGURE A-60. 3800 AIR MOTOR ASSEMBLY

4800 Air Motor
Part No. 211- 0480



Item No.	Part No.	Description	Quantity
1	R4800-81	Motor Retaining Washer	2
2	R3H-24	Front Rotor Bearing	1
3	R4800-11	Front End Plate	1
4	R4800-3	Cylinder	1
5	R4800-42-5	Vane (set of 5)	1
6	R4800U-53	Rotor	1
7	R4800-12	Rear End Plate	1
8	R2-24A	Rear Rotor Bearing	1
9	R4800-98	Cylinder Dowel	1
10	R4800-119	Rear Rotor Bearing Retainer	1
11	R4800-40	Motor Housing	1
12	R4800-323	Exhaust Deflector Retainer Ring	2
13	R4800-23	Exhaust Deflector	1
14	R4800-23	Muffler	1
15	R4800-283	Backhed Gasket	1
16	R4800-102	Backhead	1
17	R4800-565	Air Strainer	1
18	5080-638	Cap Screw	3
19	8U-58	Lock Washer	3

Item No.	Part No.	Description	Quantity
20	R3-92A	Grease Fitting Washer	1
21	R1-188	Grease Fitting	2
22	R4801U-37	Gear Case	1
23	R4800-407	Internal Gear Key	2
	R4801U-A108	Spindle Assembly	1
24	MR-988	Spindle Front Bearing	1
25	107-54	Spindle Key	1
26	R4801U-510	Spindle Planet Gear Bearing	6
27	R4801U-A9	Spindle Planet Gear	3
28	R4801U-108	Spindle	1
29	R4801U-191	Spindle Planet Gear Shaft	3
30	R4800-97	Spindle Rear Bearing	1
31	R4800-406	Internal Gear	1
	R4801U-A216	Gear Head Assembly	
32	R4801U-216	Gear Head	1
33	R4801U-10	Gear Head Planet Gear	2
34	R4800-654	Gear Head Planet Gear Bearing	2
35	R4800-191	Gear Head Planet Gear Shaft	2
36	W44-97	Gear Head Bearing	1
37	215-1012	Claw Fitting, Male	1

FIGURE A-61. 4800 AIR MOTOR ASSEMBLY

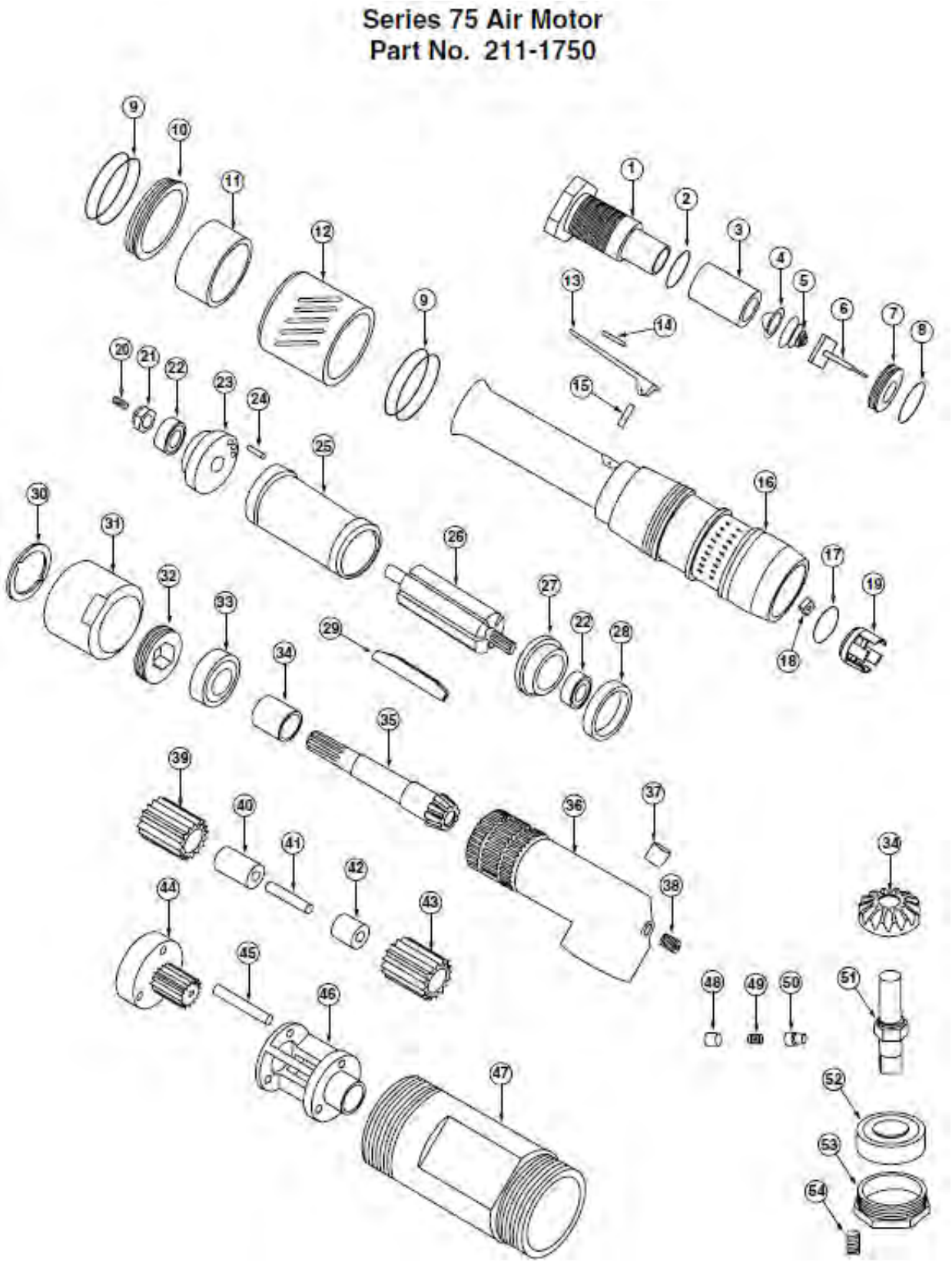


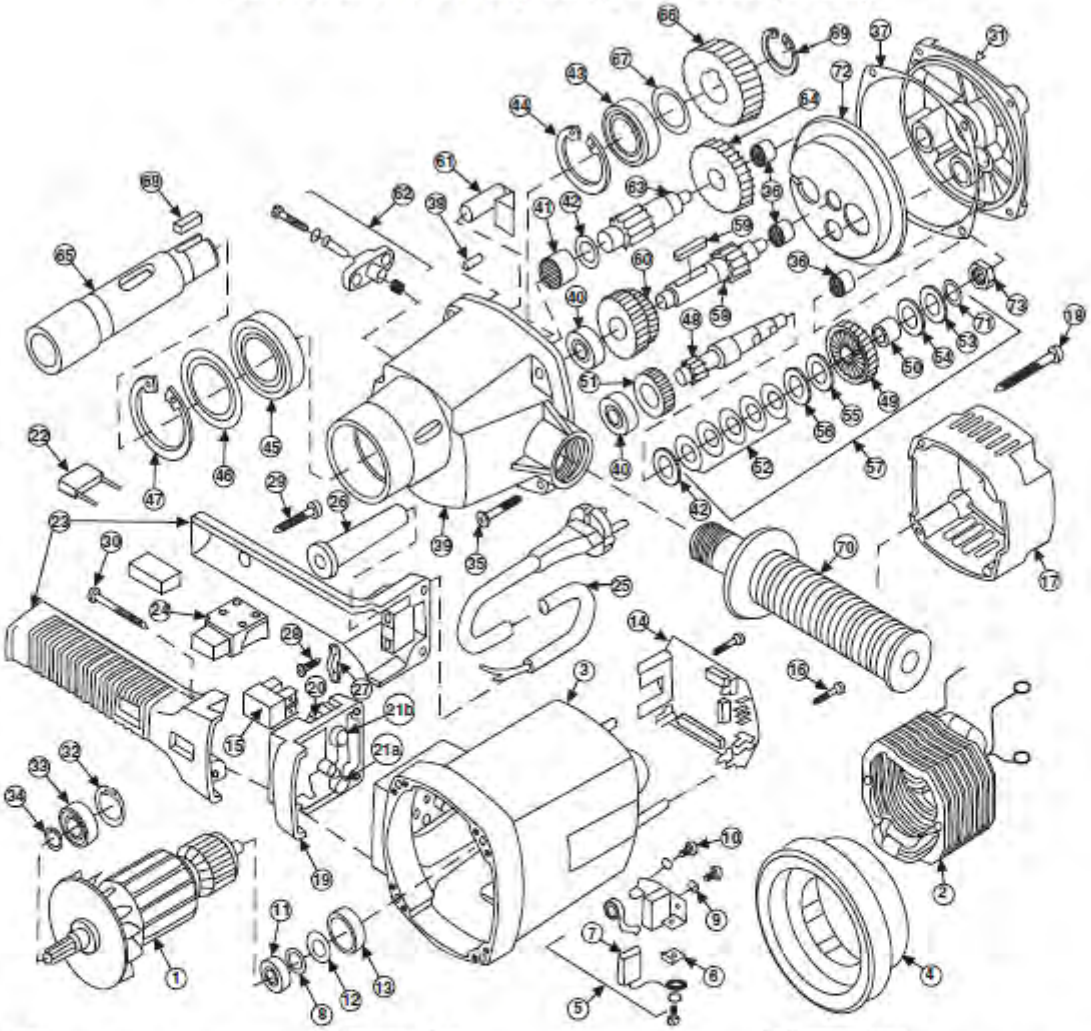
FIGURE A-62. SERIES 75 AIR MOTOR ASSEMBLY

Item No.	Part No.	Description	Quantity
	201328	Motor Housing Assy.	
1	869933	Inlet Bushing	1
2	622881	O-Ring	1
3	202508	Inlet Spacer	1
4	843656	Inlet Screen	1
5	864973	Throttle Valve Spring	1
6	202055	Throttle Valve	1
7	869931	Throttle Valve Seat	1
8	622062	O-Ring	1
9	615018	O-Ring	4
10	202050	Deflector Spacer	1
11	869943	Muffler	1
12	202051	Exhaust Deflector	1
13	865063	Throttle Lever	1
14	864195	Throttle Lever Pin	1
15	202481	Throttle Valve Pin	1
16	203150	Handle	1
17	863880	O-Ring	1
18	869937	Shut-Off Valve	1
19	869936	Valve Block	1
20	847960	Set Screw	1
21	865352	Rotor Lock Nut	1
22	847528	Rotor Bearing	2
23	869925	Rear Bearing Plate	1
24	812918	Cylinder Pin	1
25	203149	Cylinder	1
26	203147	Rotor	1
27	869923	Front Bearing Plate	1
28	869929	Motor Spacer	1
29	869927	Rotor Blade	5
30	869879	Clamp Ring	1

Item No.	Part No.	Description	Quantity
	861906	Right Angle Head Assy.	
31	869878	Clamp Nut	1
32	869877	Bearing Retainer	1
33	847659	Pinion Ball Bearing	1
34	869880	Pinion Needle Bearing	1
35	861905	Gear Set	1
36	869875	Right Angle Head	1
37	883720	Spindle Needle Bearing	1
38	867546	Grease Plug	1
	861915	Gear Train Assy.	
39	869900	Idler Gear	3
40	844774	Needle Roller	39
41	832125	Idler Gear Pin	3
42	869907	Idler Gear Bearing	3
43	869902	Idler Gear	3
44	869897	Spider (Includes Pin)	1
45	869908	Idler Gear Pin	6
46	869904	Spider	1
47	869906	Gear Case	1
48	864710	Lock Pin Retainer	1
49	864712	Lock Pin Spring	1
50	864711	Socket Lock Pin	1
51	869888	3/4" Square Spindle	1
52	812222	Spindle Ball Bearing	1
53	869887	Bearing Cap (includes 867997)	1
54	867997	Bearing Cap Lock Screw	1

FIGURE A-63. SERIES 75 AIR MOTOR ASSEMBLY PARTS LIST

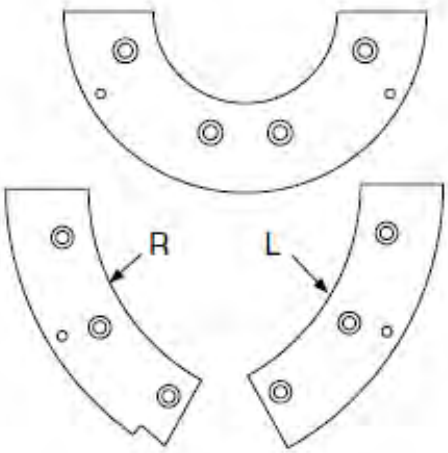
Electric Motor
Part Nos. 211-0110 (120V), 211-0220 (230V)



Reference No.	Part No.	Description
1	74321100	Rotor Assembly, 120V
	7154E100	Rotor Assembly, 230V
2	71528150	Stator Assembly, 120V
	74326150	Stator Assembly, 230V
3	7742A200	Motor Housing
4	71540140	Air Guiding Ring
5	80201199	Brush Holder
6	73320210	Washer
7	80700040	Brush
8	73320999	Disk
9	80201385	(2) Lock Washer
10	80201180	(2) Screw
11	80410021	Bearing
12	80701002	Magnet Ring
13	73320315	Bearing Seal
14	74329280	Circuit Board, 120V
	74326280	Circuit Board, 230V
15	80600110	Reverser
16	80201260	(2) Screw
17	7742A240	Motor Cap
18	80201267	(4) Screw
19	7152B293	Spacer
20	71521230	Selector Wheel
21a	80500020	Speed Dial, 220V
21b	80500007	Torque Dial
22	80500010	Condenser
23	71527260	Handle Halves
24	80600114	Switch
25	80600060	Connecting Cable
26	71323255	Cable
27	71540330	Wire Locking Flange
28	80201271	(2) Screw, 4.2 x 16
29	80201291	Screw
30	80201294	(4) Self-Tapping Screw
31	7152B610	End Shield
32	80201333	Safety Ring, 28/1.2
33	80410031	Bearing
34	80201320	Safety Ring
35	80201292	(4) Screw, 4.2 x 16
36	80420110	(3) Needle Sleeve
37	74429620	Paper Seal
38	80200580	Notched Pin, 5 x 16
39	71521400	Gearbox Housing
40	80410020	(2) Bearing
41	80420001	Needle Bearing
42	71540517	Disk of Needle Bearing
43	80410061	Ball Bearing
44	80201336	Locking Ring
45	80410070	Grooved Ball Bearing
46	71540426	Disk F Grooved Ball Bearing
47	80201338	Locking Ring
48	71526490	Intermediate Shaft 1
49	7154E550	Coupling Wheel
50	80420240	Gear Sleeve
51	71521470	Intermediate Wheel 1
52	80200716	Spring Washer
53	73116496	Washer
54	73116497	Washer
55	73430498	Clutch Washer
56	73430499	C-Clip
57	71526493	Coupling, Complete
58	71526500	Intermediate Shaft 2
59	80200602	Fitting Spring, Hardened
60	71521440	Cluster Gears
61	71521520	Coupling Bolt
62	71540545	Gear Switch
63	71521510	Intermediate Shaft 3r
64	71526480	Intermediate Gear 2
65	71540420	Work Spindle
66	71540430	Spindle Wheel
67	80200512	Fitting Disk
68	80200606	Fitting Spring
69	80201326	Locking Ring
70	71526590	Tube Handle, Complete
71	80200710	Disk Spring
72	7152B625	Grease Chamber
73	80201007	Hex Nut, 8mm 10 x 1

FIGURE A-64. ELECTRIC MOTOR ASSEMBLY

Strike Plate

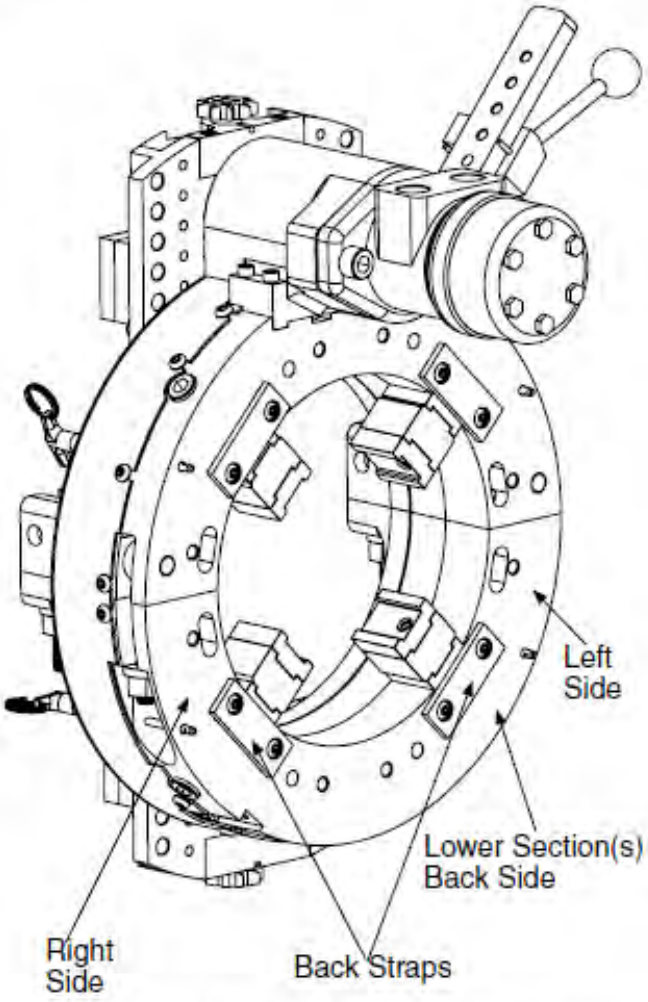


AFC Strike Plate

Model No.	Left Part No.	Right Part No.	Cap Screw Quantity
AFC-4	N/A	216-1450	4
AFC--6	216-1451	216-1452	6
AFC-8	216-1453	216-1454	6
AFC-10	216-1455	216-1456	6
AFC-12	216-1457	216-1458	6
AFC-14	216-1459	216-1460	6
AFC-16	216-1461	216-1462	6
AFC-18	216-1463	216-1464	6
AFC-20	216-1465	216-1466	6
AFC-24	216-1467	216-1468	6
AFC-26	216-1469	216-1470	6
AFC-28	216-1471	216-1472	4
AFC-30	216-1473	216-1474	4
AFC-32	216-1475	216-1476	4
AFC-36	216-1477	216-1478	4
AFC-39	216-1479	216-1480	4
AFC-42	216-1481	216-1482	4

BFC Strike Plate

Model No.	Left Part No.	Right Part No.	Cap Screw Quantity
BFC-36	217-1477	217-1478	4
BFC-42	217-1481	217-1482	4
BFC-48	217-1483	217-1484	6
BFC-56	217-1485	217-1486	6
BFC-66	217-1487	217-1488	8
BFC-72	217-1489	217-1490	8
BFC-86	217-1491	217-1492	8



The strike plate(s) are attached to the lower section of the back side of the clamshell. Some models require that the back straps be removed before installation. The model AFC-4 strike plate is a single-piece. All others require a right and left side component. Right and left orientation is determined by looking at the front (tool slide) side of the machine.

FIGURE A-65. STRIKE PLATE ASSEMBLY

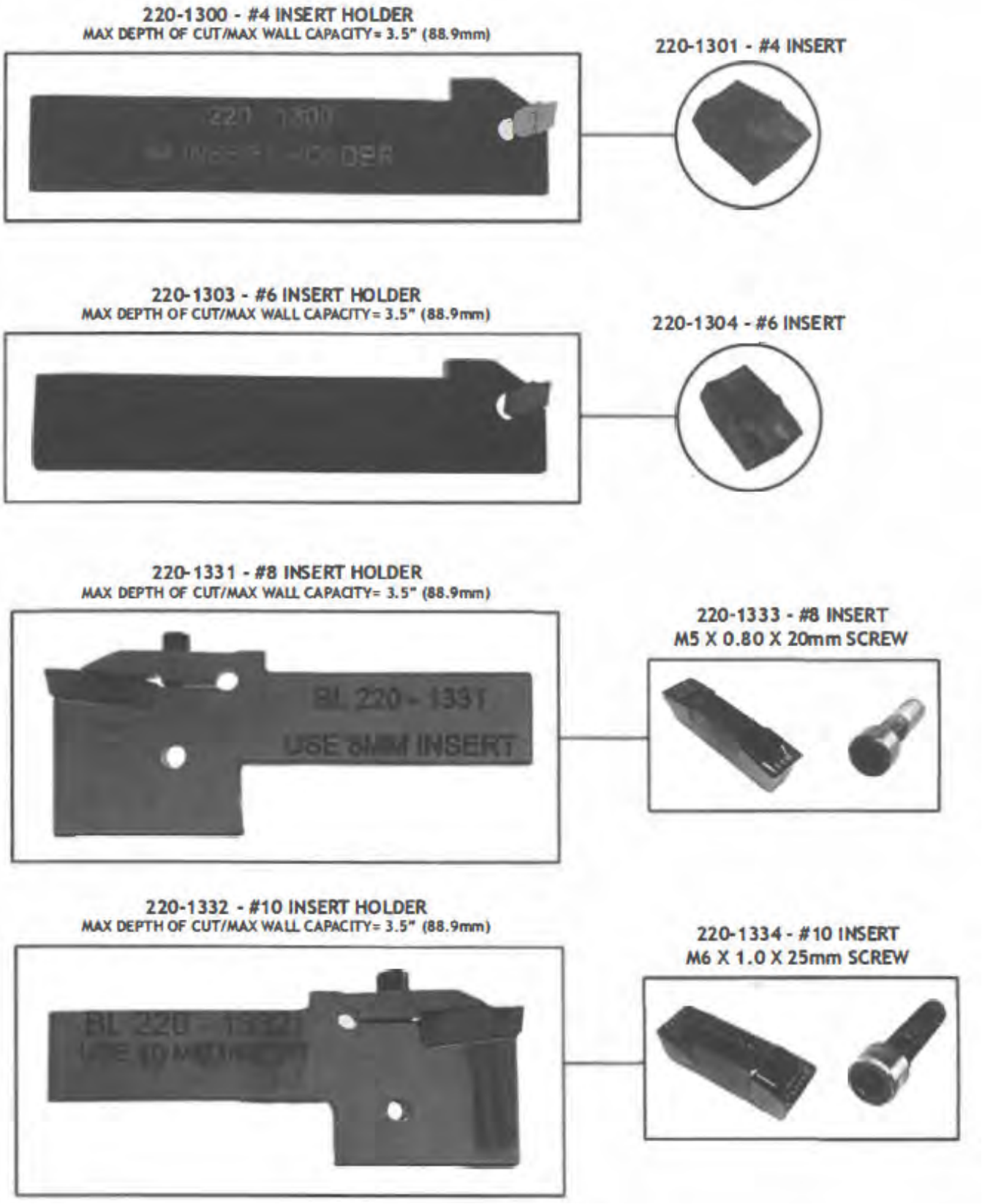


FIGURE A-66. CARBIDE INSERTS ASSEMBLY

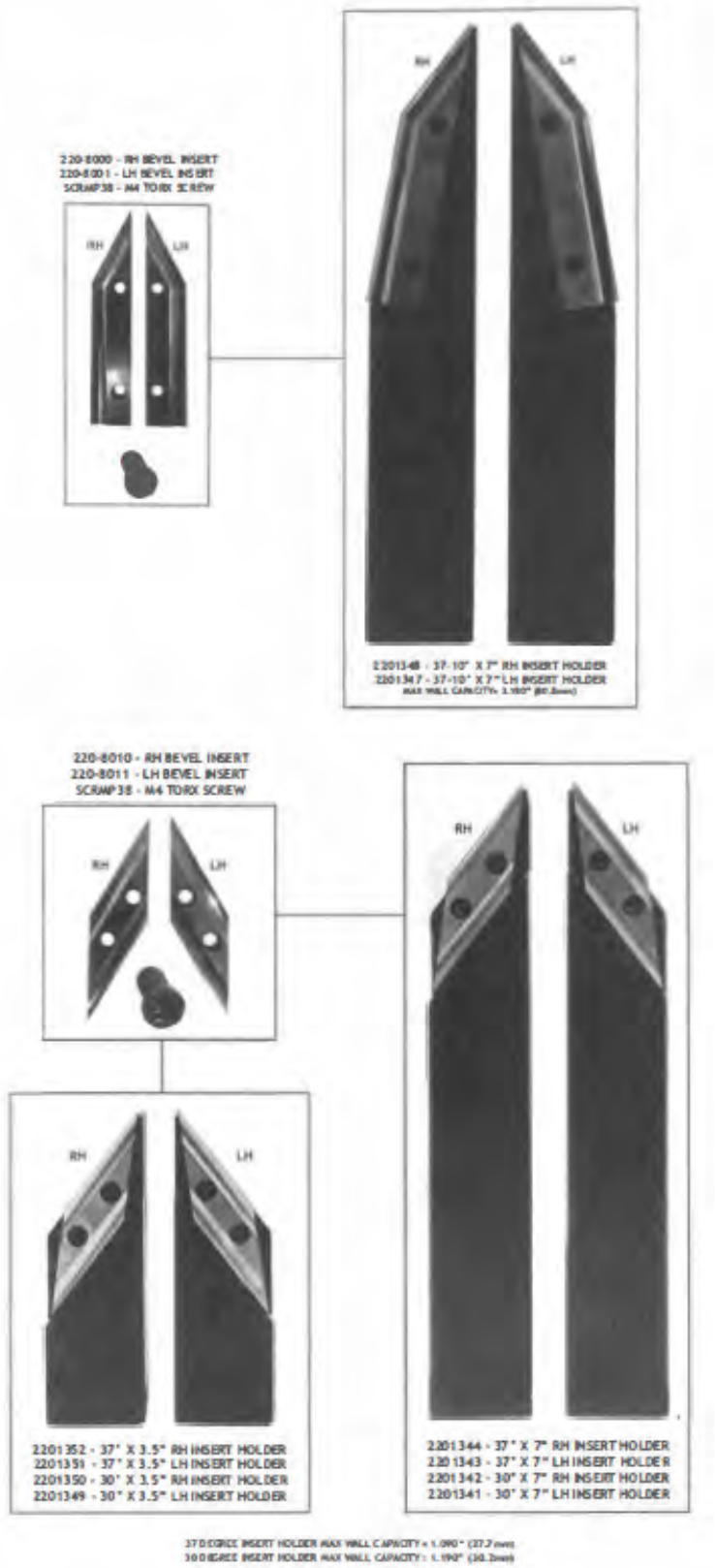
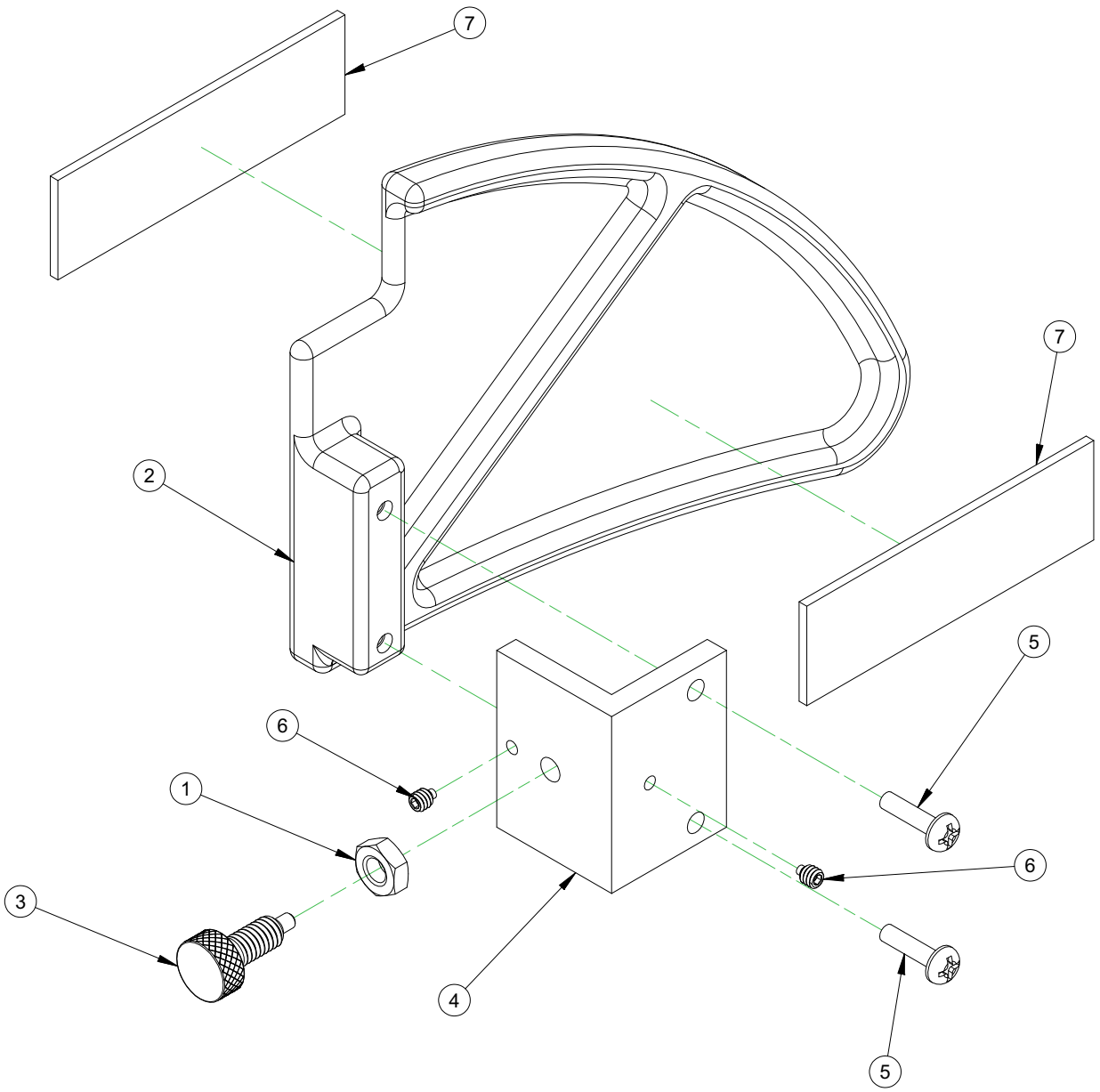


FIGURE A-67. CARBIDE INSERTS AND HOLDERS ASSEMBLY



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	20175	NUT 5/16-18 JAM
2	1	96453	CLAMSHELL FIN GUARD
3	1	96743	SPRING PLUNGER 5/16-18 THD BRASS KNOB
4	1	96750	FIN GUARD MOUNTING BRACKET
5	2	96751	SCREW NO 10 X 3/4 SELF TAPPING 410SS
6	2	96752	SCREW 10-24 X 3/16 SSSDP NYLON TIP
7	2	96881	LABEL H&S CLEAR 3.75 X 1.125

FIGURE A-68. CLAMSHELL FIN DEFENDER™ GUARD ASSEMBLY (P/N 96742)

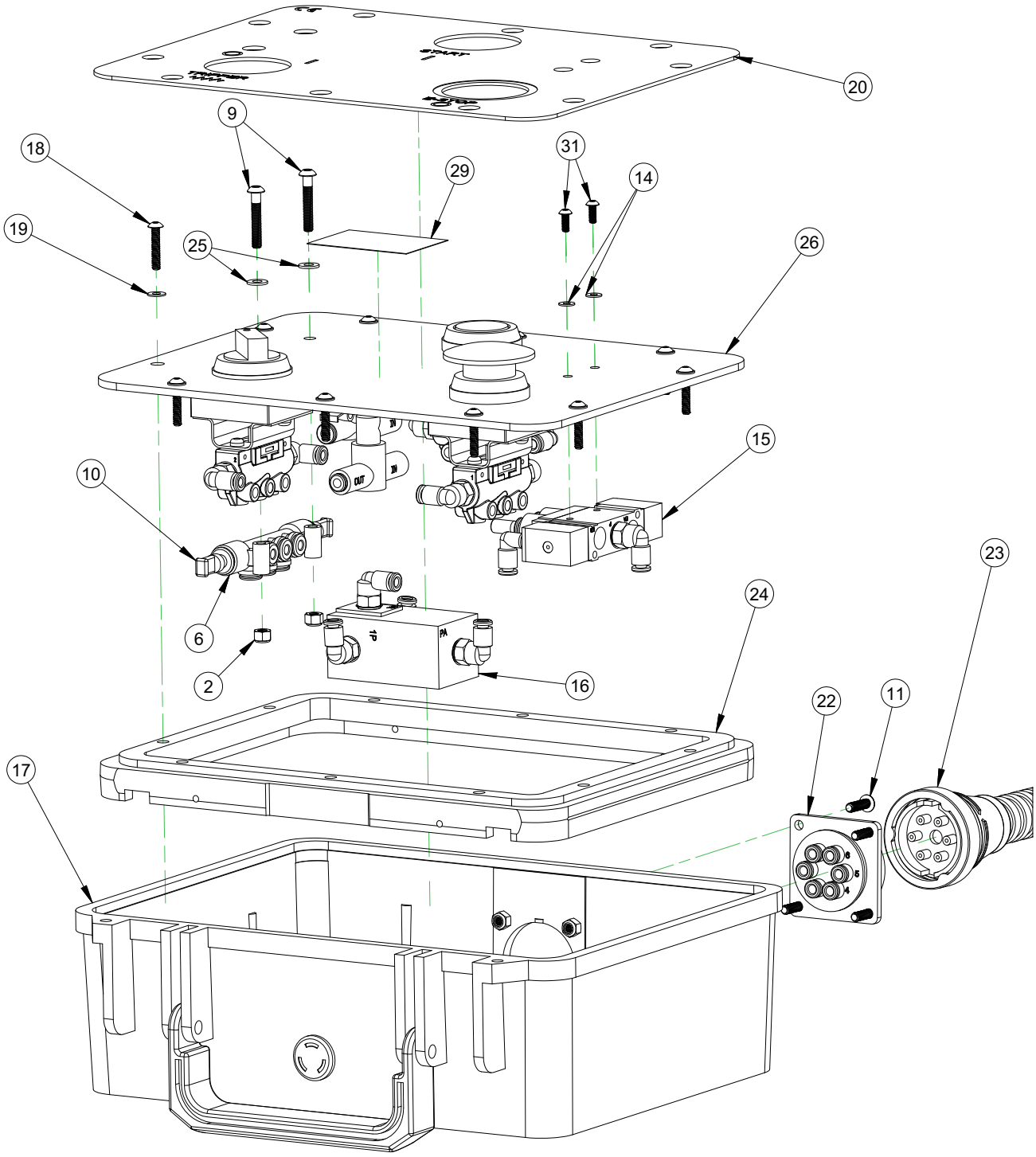
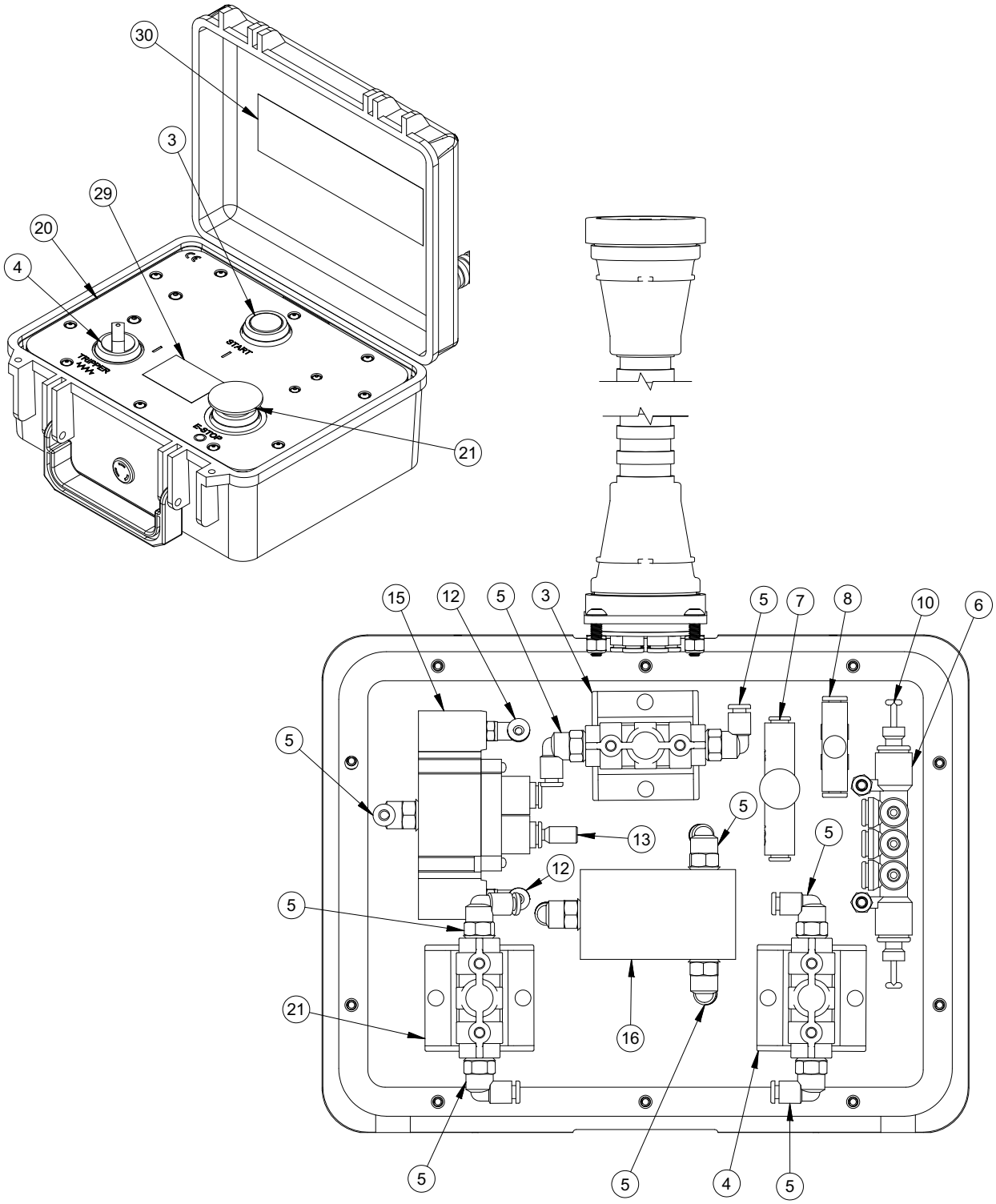


FIGURE A-69. DEFENDER™ OPERATOR PENDANT ASSEMBLY 1 (P/N 96374)



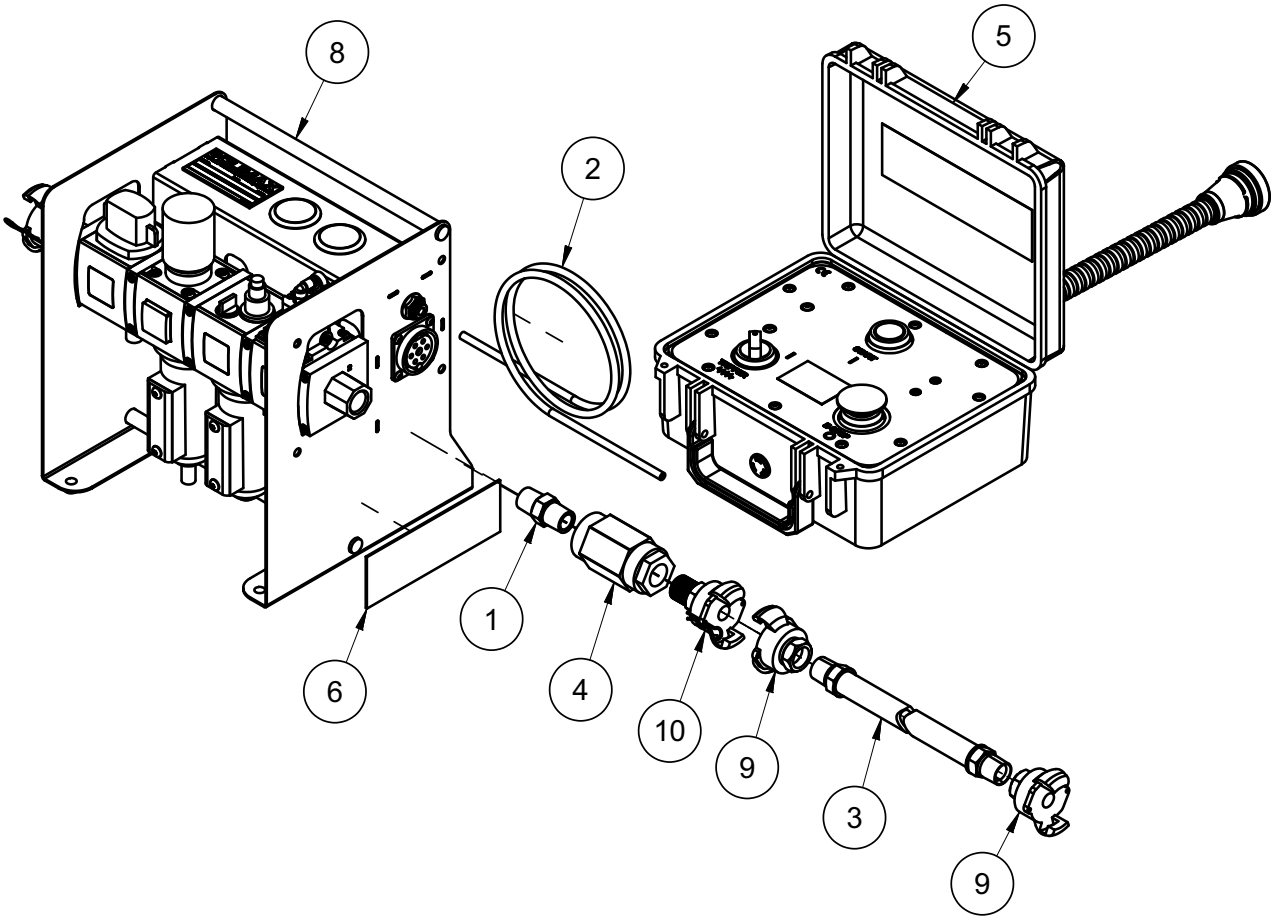
BACK VIEW OF MOUNTING PANEL

SCALE 1 / 2

FIGURE A-70. DEFENDER™ OPERATOR PENDANT ASSEMBLY 1 (P/N 96374)

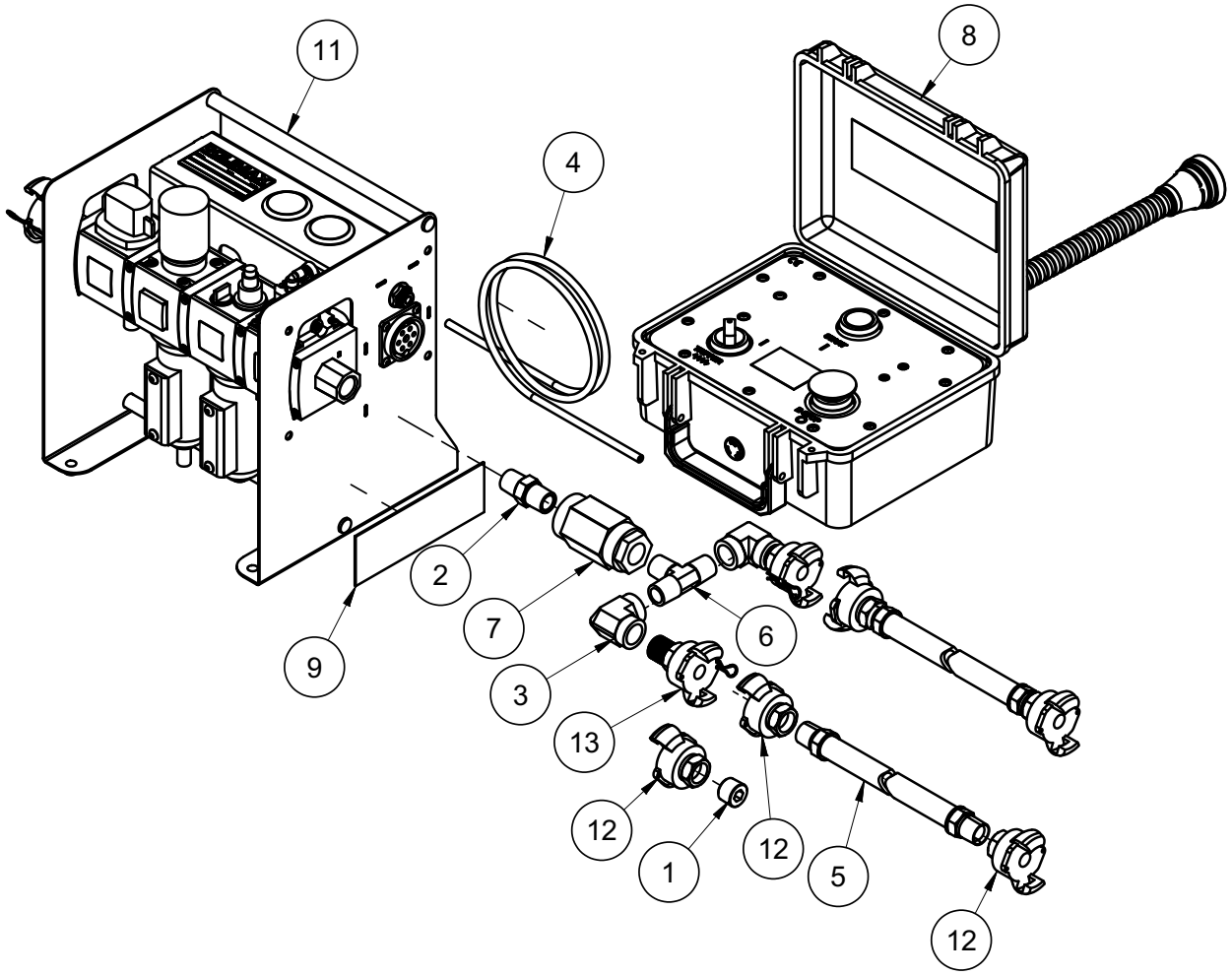
PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	36	76356	(NOT SHOWN) TUBE POLYURETHANE 4MM OD X 2.5MM ID
2	6	78947	SELF-LOCKING HEX NUT DIN985-M4-8-ZN
3	1	96364	FLUSH PUSH BUTTON 3 PORT 1/8 PORT SIZE
4	1	96365	TWIST SELECTOR SWITCH 2 POSITION 1/8 PORT SIZE BLACK
5	11	96366	FTG ELB 4MM PUSH LOK TUBE X 1/8 NPTM 140PSI MAX
6	1	96367	MANIFOLD PUSH LOK 4MM 6 OUTLET X 6MM 2 OUTLET
7	1	96368	SHUTTLE VALVE 4MM PUSH LOK TUBE
8	1	96369	FTG NEEDLE VALVE SPEED CONTROLLER 4MM PUSH LOK TUBE
9	2	96371	SCREW BHSCS M4 X 0.7 X 25MM LG BLACK OXIDE
10	2	96372	PLUG PUSH LOK 6MM TUBE STEM WHITE NYLON
11	4	96375	SCREW BHSCS M4 X 15MM LG 18-8 SS
12	2	96376	FTG ELBOW 4MM PUSH LOK TUBE X M5 THD
13	1	96379	FTG PLUG PUSH LOK 4MM
14	2	96380	WASHER FLTW M3 SCREW 18-8SS BLACK OXIDE
15	1	96381	AIR PILOT VALVE 5 PORT 4MM PUSH LOK 2 POSITION DOUBLE
16	1	96382	3/2 AIR PILOT SPRING VALVE 1/8 PORT
17	1	96383	PELICAN 1200 CASE MODIFIED BLACK NO FOAM
18	10	96385	SCREW BHSCS 6-32 X 3/4 LG 18-8SS
19	10	96394	WASHER FLTW FOR M3.5 SCREW 18-8 SS
20	1	96395	OPERATOR PENDANT INTERFACE PANEL
21	1	96399	VALVE MUSHROOM PUSH BUTTON RED 3 PORT
22	1	96423	PNEUMATIC CONNECTOR SOCKET 6 PORT 4MM PUSH LOK TUBE
23	1	96429	PNEUMATIC CABLE 6 FT LONG 6 PORTS 4MM PUSH LOK TUBE
24	1	96431	PANEL FRAME FOR PELICAN 1200 AND 1300 CASES
25	2	96432	WASHER FLTW M4 SCREW 18-8SS BLACK OXIDE
26	1	96496	OPERATOR PENDANT MOUNTING PANEL
27	1	96781	(NOT SHOWN) FTG TEE 4MM PUSH LOK TUBE
28	1	96877	LABEL H&S BLACK 4 X 2.75
29	1	96878	LABEL H&S BLACK 2 X 1.375
30	1	96879	LABEL DEFENDER BRUSHED METAL 6.75 X 2
31	2	97345	SCREW M3 X .5 X 8MM BHSCS

FIGURE A-71. DEFENDER™ OPERATOR PENDANT ASSEMBLY 1 (P/N 96374)



1	1	14704	FTG NIPPLE 1/2 NPTM X 1/2 NPTM
2	144	50985	TUBING 1/4 OD X .040 WALL DOT 150 PSI NYLON BLUE
3	1	59376	HOSE ASSY 801 1/2 X 1/2 NPTMS ENDS X 180
4	1	96358	INLINE FLOW CONTROL VALVE 1/2 NPTF 1000PSI MAX
5	1	96374	OPERATOR PENDANT HANDS FREE CLAMSHELL CONTROLS
6	1	96876	LABEL H&S BLACK 6 X 2
7	1	98031	(NOT SHOWN) CABLE BAG H&S EMBROIDERED
8	1	102897	PNEUMATIC CONDITIONING UNIT CE UNIVERSAL FOR REMOTE PENDANT
9	2	2151011	FTG COUPLER 1/2 NPTF X CHICAGO W SAFETY PIN & LANYARD
10	1	2151012	FTG COUPLER 1/2 NPTM X CHICAGO W/ SAFETY PIN & LANYARD
ITEM	QTY	PART No.	DESCRIPTION
PARTS LIST			

FIGURE A-72. DEFENDER KIT AIR CONTROL ASSEMBLY (P/N 102850)



ITEM	QTY	PART No.	DESCRIPTION
1	1	12579	FTG PLUG 1/2 NPTM SOCKET
2	1	14704	FTG NIPPLE 1/2 NPTM X 1/2 NPTM
3	2	37675	FTG 90 DEG ELBOW 1/2 NPTF X 1/2NPTF
4	144	50985	TUBING 1/4 OD X .040 WALL DOT 150 PSI NYLON BLUE
5	2	59376	HOSE ASSY 801 1/2 X 1/2 NPTMS ENDS X 180
6	1	81818	FTG TEE 1/2 NPTM X 1/2 NPTM
7	1	96358	INLINE FLOW CONTROL VALVE 1/2 NPTF 1000PSI MAX
8	1	96374	OPERATOR PENDANT HANDS FREE CLAMSHELL CONTROLS
9	1	96876	LABEL H&S BLACK 6 X 2
10	1	98031	(NOT SHOWN) CABLE BAG H&S EMBROIDERED
11	1	102897	PNEUMATIC CONDITIONING UNIT CE UNIVERSAL FOR REMOTE PENDANT
12	5	2151011	FTG COUPLER 1/2 NPTF X CHICAGO W SAFETY PIN & LANYARD
13	2	2151012	FTG COUPLER 1/2 NPTM X CHICAGO W/ SAFETY PIN & LANYARD

PARTS LIST

FIGURE A-73. DEFENDER KIT AIR CONTROL DUAL MOTOR ASSEMBLY (P/N 102960)

PCU REPLACEMENT PARTS:

MFG=AVENTICS SERIES 652 AIR PREP UNIT COMPONENTS

A T652AT502468001 = END PLATES

B P652AT502466001 = BODY CONNECTOR

C P699AT502467001 = BRACKET ATTACHMENT FOR BODY CONN

(1) 8652A3M04011100 = SHUT OFF VALVE

D M652AY524218002 = SIDE COVER PLASTIC

E M2MN = METAL SILENCER

(2) 8652APJM4FA00GA = FILTER/REGULATOR

F M652AU440511003 = BOWL POLYMIDE

G M699AQ501862001 = DRAIN COCK

D M652AY524218002 = SIDE COVER PLASTIC

H M652AE433582003 = ELEMENT 40 MICRON

J M699AG438047005 = GAUGE PSI LOW PRO

(3) 8652AL0M40A0000 = LUBRICATOR

F M652AU440511003 = BOWL POLYMIDE

K M699AQ440512001 = DRAIN COCK PLUG

L M699AY506842001 = SIGHT DOME ASSEMBLY NBR

(4) 8652A4E04NA0000 = SOFT START VALVE

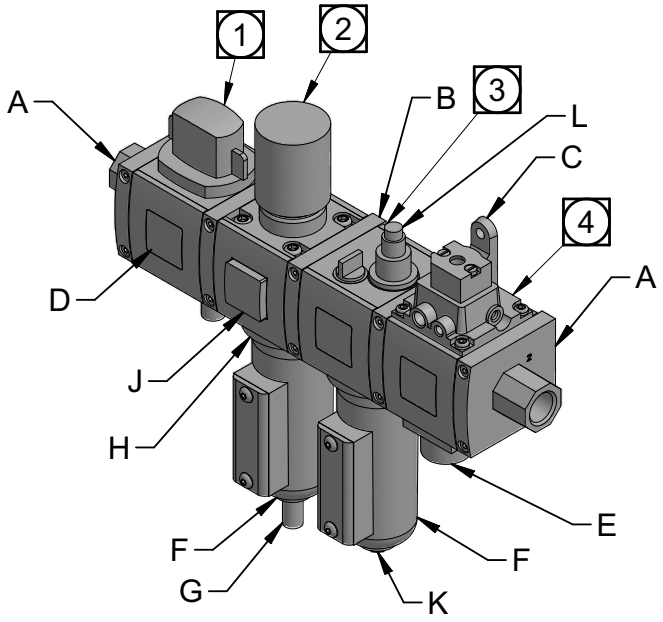
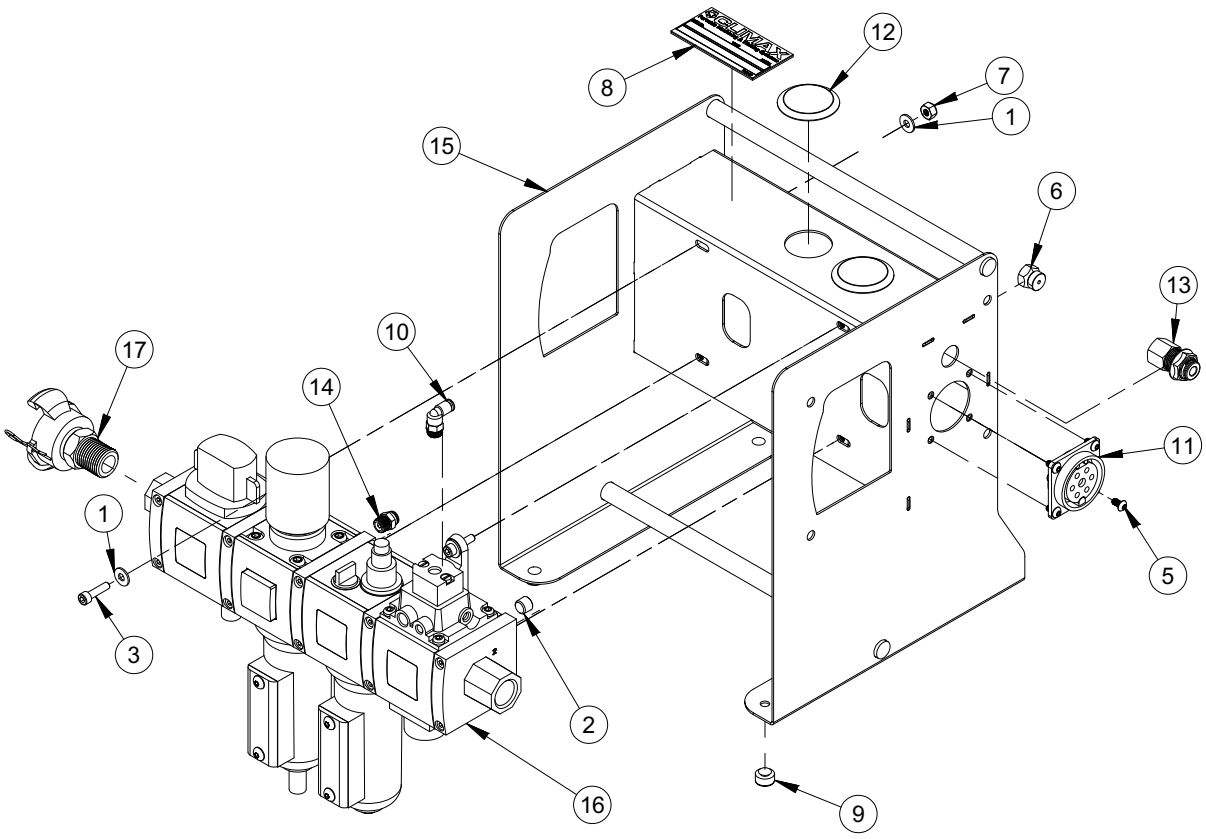
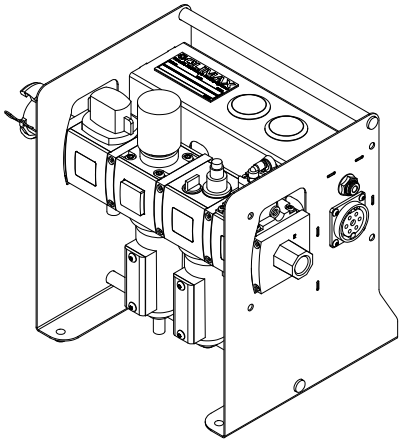


FIGURE A-74. AIR CADDY CE REPLACEMENT PARTS (P/N 102897)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	8	11315	WASHER #10 FLTW BLACK OXIDE
2	1	12616	FTG PLUG 1/8 NPTM SOCKET
3	4	12648	SCREW 10-24 X 3/4 SHCS
4	24	76356	(NOT SHOWN) TUBING 4mm OD x 2.5mm ID GREEN POLYURETHANE (INCHES)
5	4	79219	SCREW M4 X 0.7 X 8MM BHSCS
6	1	82177	FTG - STRAIGHT - UNI 1/4 X 4MM TUBE PUSH NICKEL
7	4	87533	NUT 10-24 STDNYLOC SS
8	1	91792	PLATE PART NO YEAR MODEL 1.5 X 3.0 ADHESIVE BACKED
9	4	96348	BUMPER RUBBER 1/4" ID X 1/2" OD 1/16" MATL THICKNESS
10	1	96366	FTG ELB 4MM PUSH LOK TUBE X 1/8 NPTM 140PSI MAX
11	1	96423	PNEUMATIC CONNECTOR SOCKET 6 PORT 4MM PUSH LOK TUBE
12	2	96434	PANEL PLUG SNAP IN 1.25 ID HOLE BLACK
13	1	96443	FTG BULKHEAD 1/4 PUSH LOK TUBE X 1/4 NPTF
14	1	96572	FTG 4MM PUSH LOK TUBE X 1/8 NPTM STRAIGHT
15	1	101003	STAND PCU
16	1	101206	FILTER REGULATOR LUBRICATOR CONTROL VALVE W SEMI AUTO DRAIN
17	1	2151012	FTG COUPLER 1/2 NPTM X CHICAGO W/ SAFETY PIN & LANYARD

FIGURE A-75. AIR CADDY CE ASSEMBLY (P/N 102897)



ASSEMBLED VIEW
SCALE 1 : 8

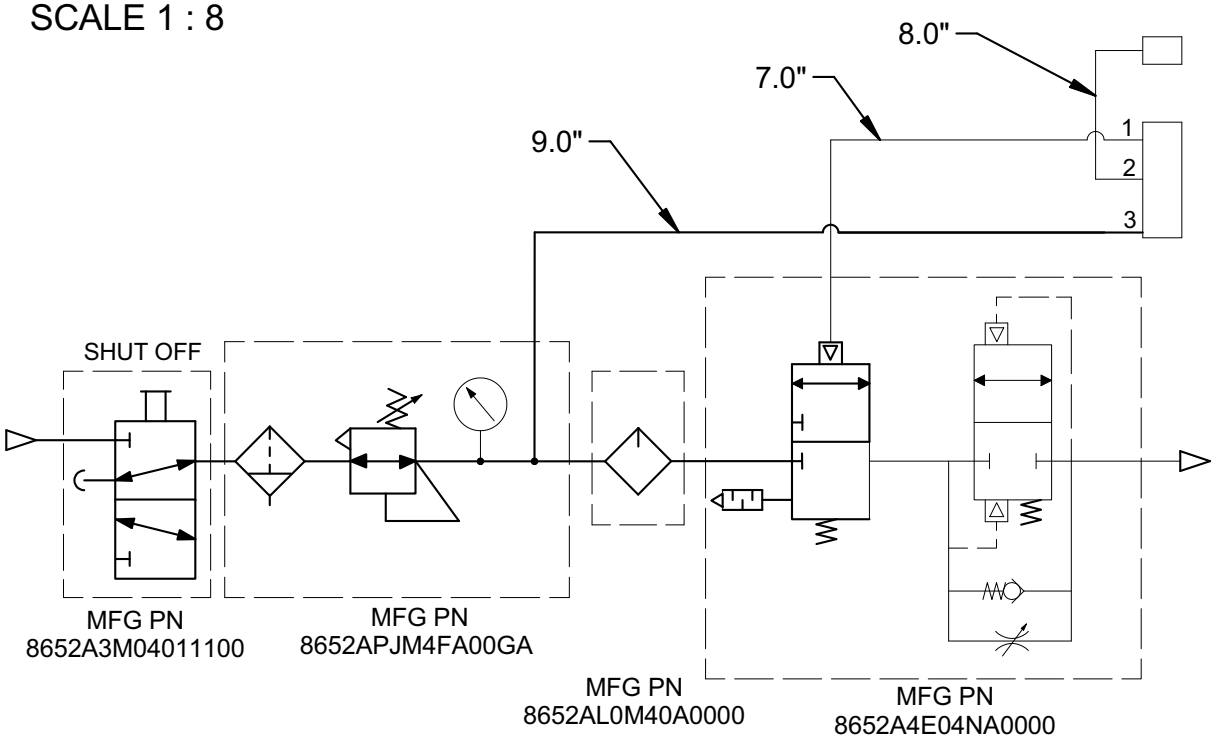
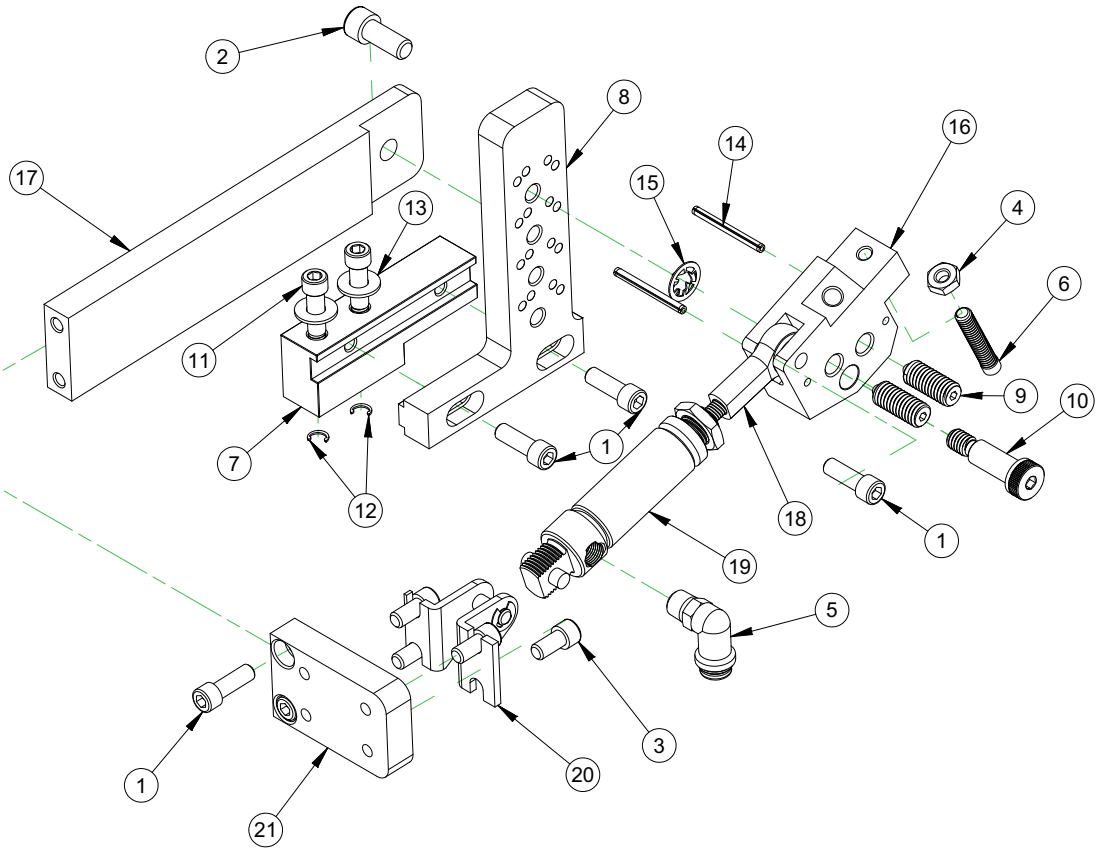
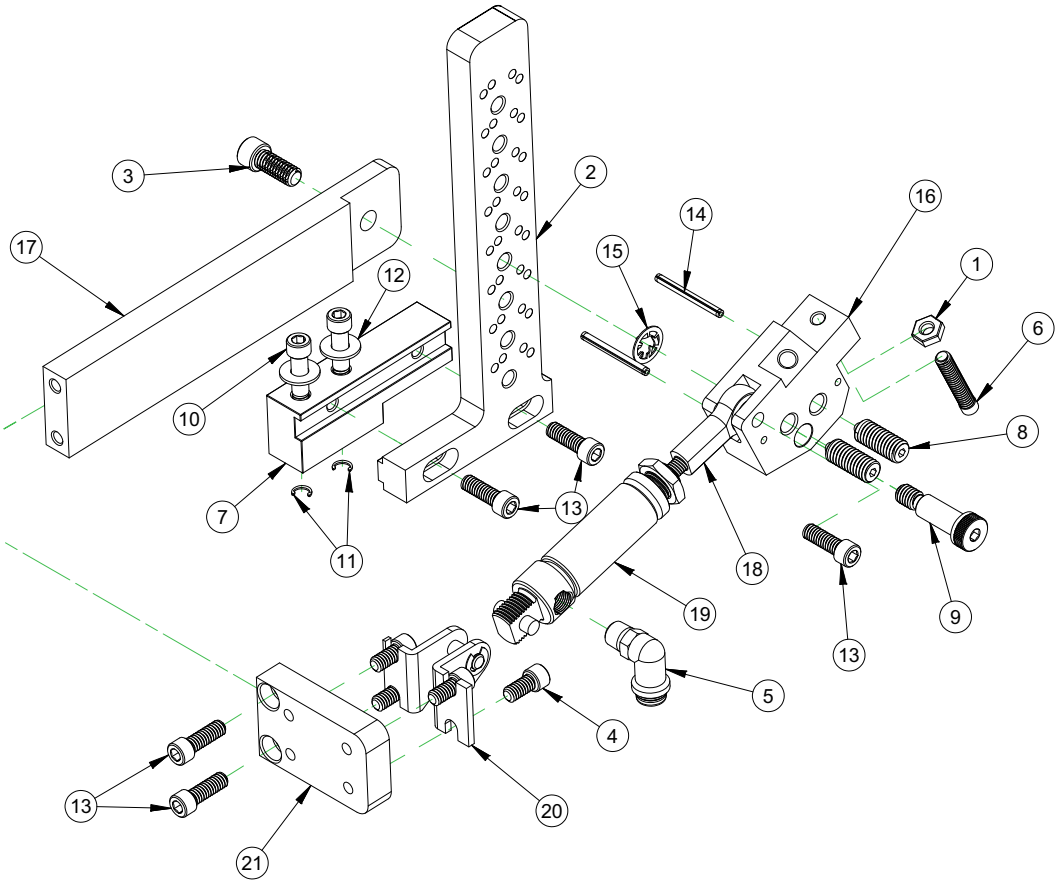


FIGURE A-76. AIR CADDY CE SCHEMATIC (P/N 102897)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	5	10160	SCREW 1/4-20 X 3/4 SHCS
2	1	10657	SHCS 5/16-18 X 3/4
3	4	10800	SCREW 1/4-20 X 1/2 SHCS
4	1	12894	NUT 1/4-20 JAMN
5	1	48648	FTG ELBOW 1/8 NPTM X 1/4 TUBE PRESTOLOK
6	1	5001001	TRIPPER PIN
7	1	5001003	TRIPPER BASE
8	1	5001004	4 IN TRIPPER STAND
9	2	5001008	3/8-16 SPRING PLUNGER
10	1	5001009	3/8 X 7/8" SHOULDER SCREW 5/16-18 THREAD
11	2	5001030	AIR MOTOR ASSY MOUNTING SCREW
12	2	5001031	1/4 LOW CLEARANCE RETAINING RING
13	2	5001032	FLTW 250 OD 625
14	2	5001062	1/8 X 1-3/8 STEEL SLOTTED SPRING PIN
15	1	5001063	5/16 PUSH NUT
16	1	5001105	AFC TRIPPER ROCKER
17	1	5001106	CYLINDER BRACKET
18	1	5001107	ROD END 1/4-28 UNF
19	1	5001109	PIVOT MOUNT CYL 3/4 DIA X 1/2 STROKE
20	1	5001113	PIVOT BRACKET FOR 3/4 CYLINDER
21	1	5001115	CYLINDER BLOCK

FIGURE A-77. 4" (102 MM) PNEUMATIC TRIPPER ASSEMBLY AFC (P/N 5001144)



PARTS LIST			
ITEM	QTY	P/N:	DESCRIPTION
1	1	5001002	1/4-20 UNC JAM NUT
2	1	5001007	7 IN TRIPPER STAND
3	1	5001070	5/16-18 x 3/4 SOCKET HEAD CAP SCREW
4	4	5001420	1/4-20 X 1/2 SOCKET HEAD CAP SCREW
5	1	48648	FTG ELBOW 1/8 NPTM X 1/4 TUBE PRESTOLOK
6	1	5001001	TRIPPER PIN
7	1	5001003	TRIPPER BASE
8	2	5001008	3/8-16 SPRING PLUNGER
9	1	5001009	3/8 X 7/8" SHOULDER SCREW 5/16-18 THREAD
10	2	5001030	AIR MOTOR ASSY MOUNTING SCREW
11	2	5001031	1/4 LOW CLEARANCE RETAINING RING
12	2	5001032	FLTW 250 OD 625
13	5	5001061	1/4-20 X 3/4 SOCKET HEAD CAP SCREW
14	2	5001062	1/8 X 1-3/8 STEEL SLOTTED SPRING PIN
15	1	5001063	5/16 PUSH NUT
16	1	5001105	AFC TRIPPER ROCKER
17	1	5001106	CYLINDER BRACKET
18	1	5001107	ROD END 1/4-28 UNF
19	1	5001109	PIVOT MOUNT CYL 3/4 DIA X 1/2 STROKE
20	1	5001113	PIVOT BRACKET FOR 3/4 CYLINDER
21	1	5001115	CYLINDER BLOCK

FIGURE A-78. 7" (178 MM) PNEUMATIC TRIPPER ASSEMBLY AFC (P/N 5001177)

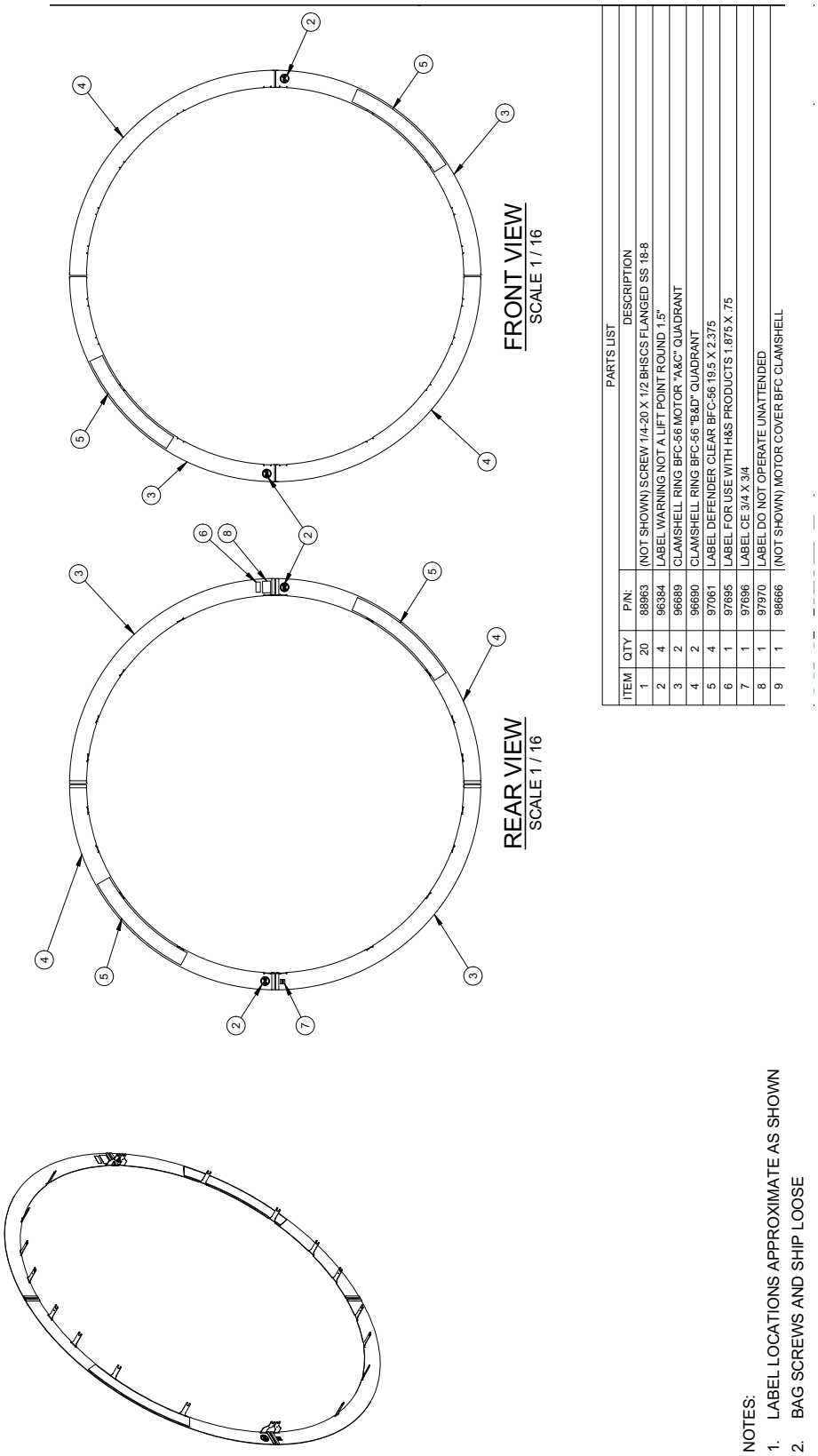


FIGURE A-79. BCF-56 DEFENDER™ GUARD KIT ASSEMBLY (P/N 97221)

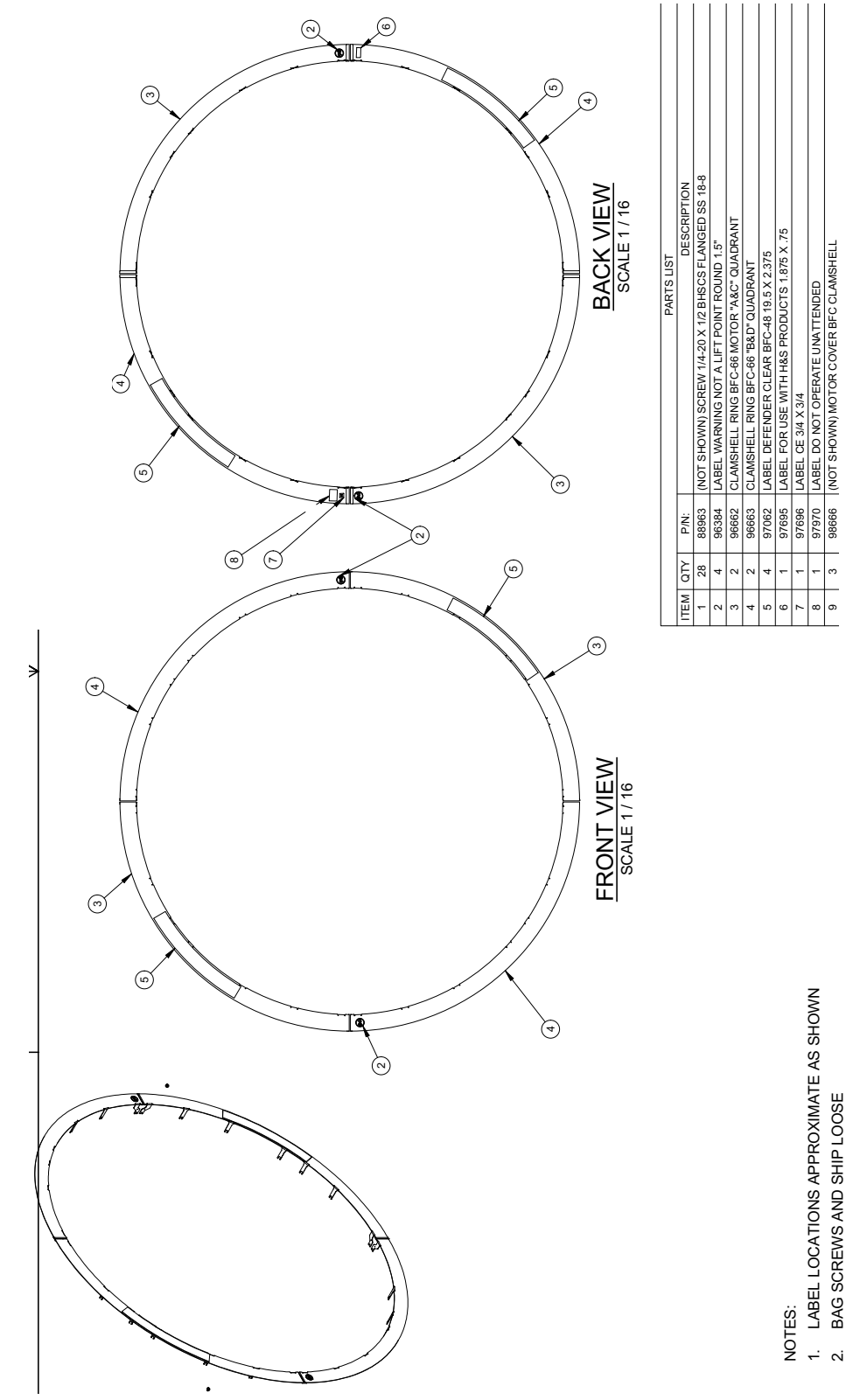
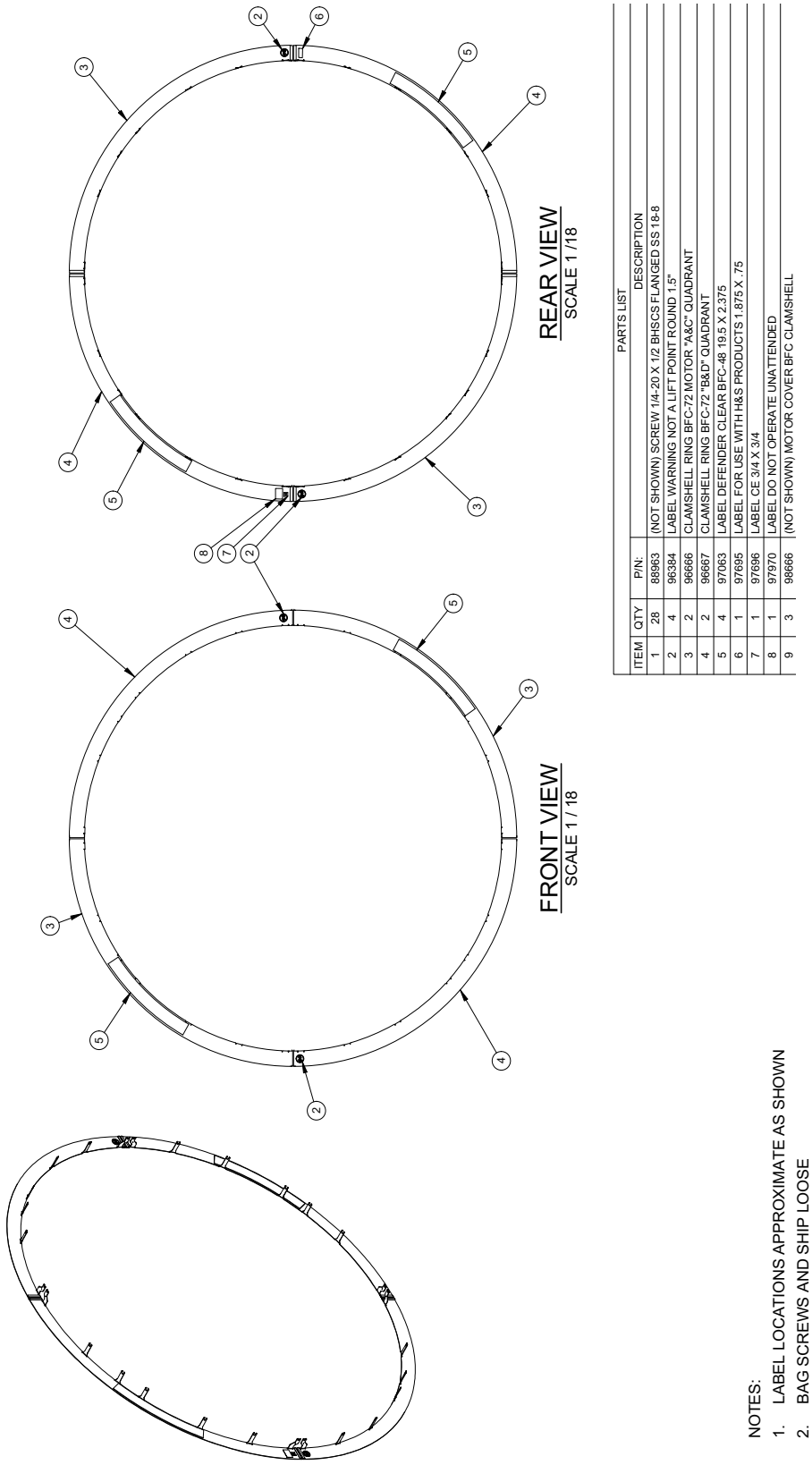


FIGURE A-80. BCF-66 DEFENDER™ GUARD KIT ASSEMBLY (P/N 97222)



PARTS LIST

ITEM	QTY	P/N:	DESCRIPTION
1	28	88963	(NOT SHOWN) SCREW 1/4-20 X 1/2 BHSCS FLANGED SS 18-8
2	4	96384	LABEL WARNING NOT A LIFT POINT ROUND 1.5"
3	2	96666	CLAMSHELL RING BFC-72 MOTOR "A&C" QUADRANT
4	2	96667	CLAMSHELL RING BFC-72 "B&D" QUADRANT
5	4	97063	LABEL DEFENDER CLEAR BFC-48 19.5 X 2.375
6	1	97695	LABEL FOR USE WITH H&S PRODUCTS 1.875 X .75
7	1	97696	LABEL CE 3/4 X 3/4
8	1	97970	LABEL DO NOT OPERATE UNATTENDED
9	3	98666	(NOT SHOWN) MOTOR COVER BFC CLAMSHELL

NOTES:
1. LABEL LOCATIONS APPROXIMATE AS SHOWN
2. BAG SCREWS AND SHIP LOOSE

FIGURE A-81. BCF-72 DEFENDER™ GUARD KIT ASSEMBLY (P/N 97223)

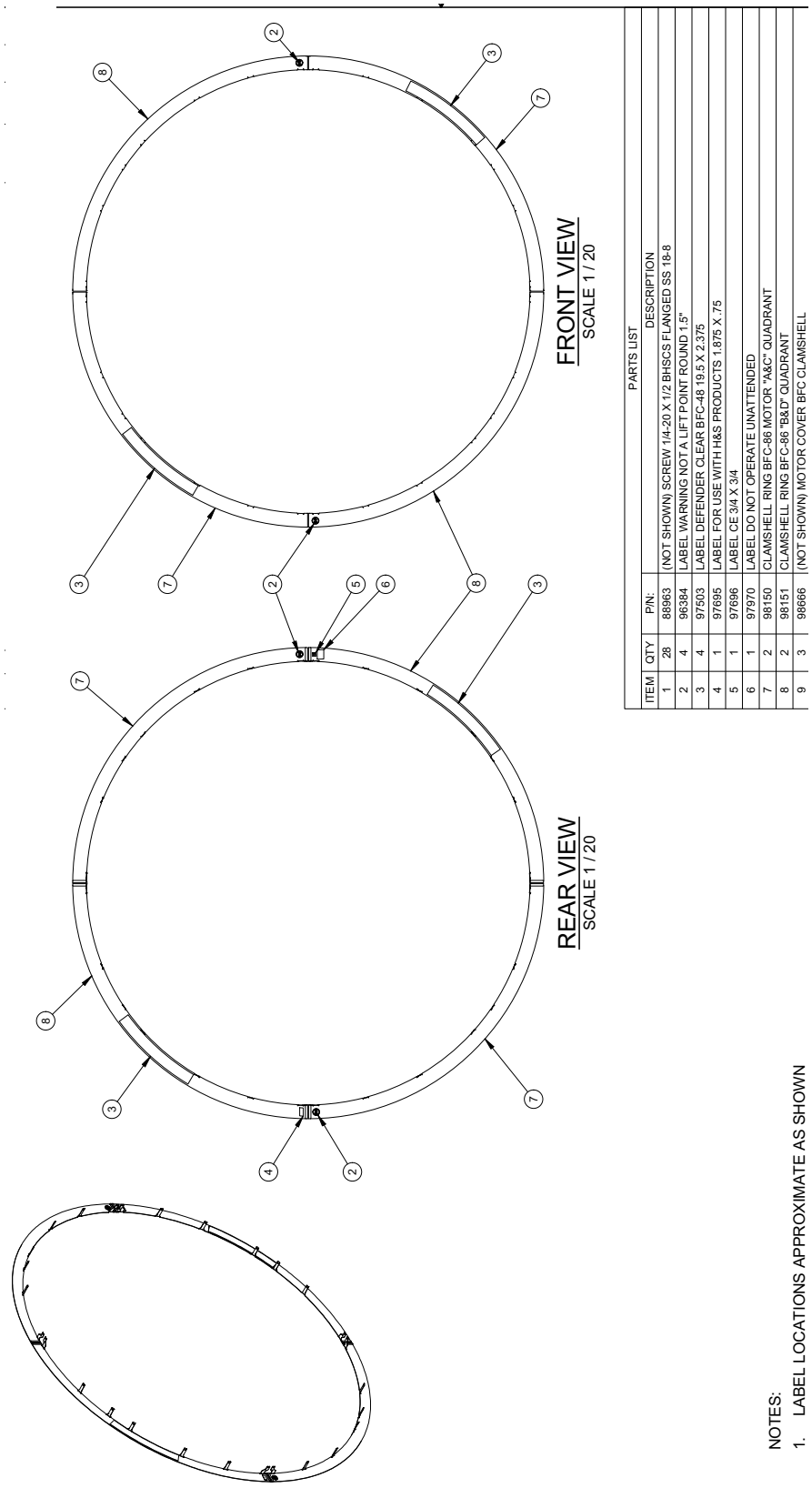


FIGURE A-82. BCF-86 DEFENDER™ GUARD KIT ASSEMBLY (P/N 97501

APPENDIX B SCHEMATICS

Schematic list

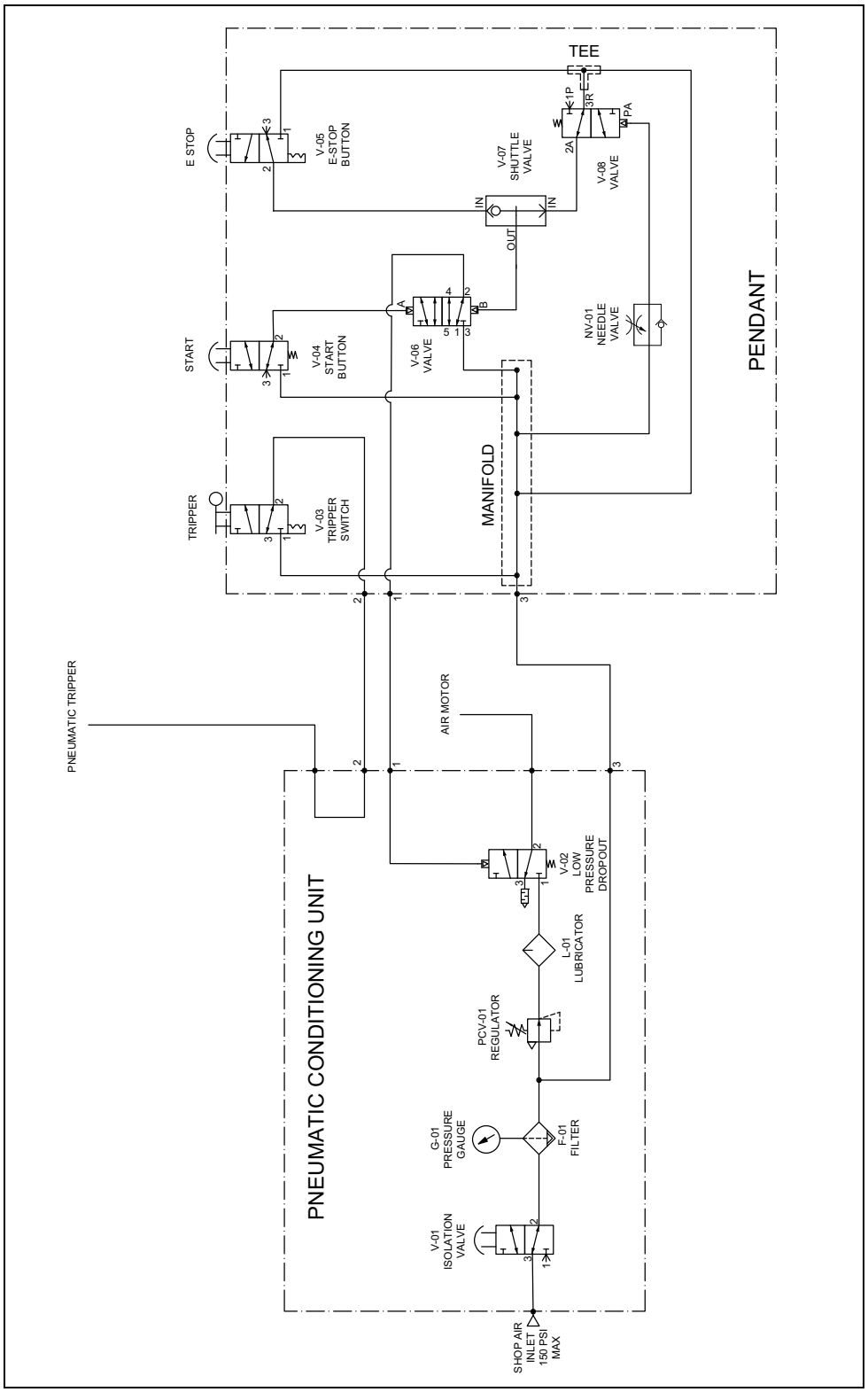


FIGURE B-1. PNEUMATIC CONDITIONING UNIT SCHEMATIC

APPENDIX C SDS

Contact CLIMAX for the current Safety Data Sheets.

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