USER GUIDE
UGG062-0817

www.conairgroup.com

FLEX Series Shredders

It's a good idea to record the model and serial number(s) of your equipment and the date you received it in the User Guide. Our service department uses this information, along with the manual number, to provide help for the specific equipment you installed.

Please keep this user guide and all manuals, engineering prints and parts lists together for documentation of your equipment.

Date: _____

Manual Number: UGG062-0817_____

Serial Number(s):_____

Model Number(s): _____

Software Version: _____

Disclaimer: Conair shall not be liable for errors contained in this User Guide or for incidental, consequential damages in connection with the furnishing, performance or use of this information. Conair makes no warranty of any kind with regard to this information, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Shipping Info

Unpacking and Inspection
You should inspect your shredder for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

In the Event of Shipping Damage
According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. **Do not return any goods before the transportation company's inspection and authorization.**

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

If the Shipment is Not Complete
Check the packing list as back-ordered items are noted on the packing list. You should have:

- ✓ Bill of lading
- ✓ Packing list
- ✓ Operating and Installation packet
- ✓ Electrical schematic and panel layout drawings
- ✓ Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

If the Shipment is Not Correct
If the shipment is not what you ordered, **contact the parts and service department immediately at (877) 637-6778.** Have the order number and item number available. *Hold the items until you receive shipping instructions.*

Returns
Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

Table of Contents

Chapter 1: Safety

1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining your shredder. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The Functional Description section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the shredder. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the shredder. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Operation chapter includes a description of electrical and mechanical controls, in addition to information for operating the shredder safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that your shredder provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. A spare parts list with part numbers specific to your machine is provided with your shipping paperwork package. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

Safety Symbols Used in this Manual

The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

DANGER! ***DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.***

WARNING! WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.

Caution! CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.

1-2 General Safety Regulations

This machine uses knives for the performance of its intended use. Consequently, it can be a dangerous machine to operate and maintain unless these safety regulations are followed.

These regulations should be read, understood and periodically reviewed by all personnel involved in any way with this machine.

Never operate or remove any machine components that are secured by wrench-type fasteners unless the motor is electrically locked out and the rotor is motionless.

Never operate the machine or jog the rotor unless the cutting chamber covers, discharge chute, or any guards or covers are in place and secure. Do not circumvent the safety interlocks.

Prior to clearing a jam or performing any maintenance, the motor should be turned off and electrically locked out. Be sure that the rotor has come to a stop. Hands must not be inserted into the machine to clear the jam.

Do not extend any part of the body into hopper openings or discharge area unless the motors are electrically locked out and the rotor and ram are motionless.

Never extend fingers through holes in screen. Be sure that the v-belts are properly aligned and that tension is at its prescribed value.

Extreme care should be taken to see that all bolts are properly tightened at all times. During the operation of the machine, rotor knife bolts may come loose. Although, fine threads are used on the cutter bolts because vibration does not easily loosen them, you should inspect the tightness of the bolts frequently.

This machine is designed for the shredding of wood, plastic, rubber, and paper materials. Do not feed any other materials into the machine.

1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machine should become familiar with its operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Becoming familiar with materials, inspection, speed limitations, screens, and guard maintenance and total user responsibility will assist you in learning potential areas in need of observation for danger.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All caution, warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

1-4 Warnings and Precautions

Our shredders are designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this shredder, use good judgment and follow these safe practices:

- ✓ **LEARN AND OBEY** your company's safety policy regarding shredding equipment.
- ✓ **MOVING OR LIFTING THE SHREDDER:** Although our equipment is built and engineered for great ruggedness in operation, care must be taken when moving the machine along the floor or lifting it. Damage may occur to sheet metal covers, electrical cabinets, or small brackets if pressure is applied to them when moving the shredder. When lifting the shredder, be certain of total machine weight and the capability of the lifting equipment. (See the Shredder Specification Sheets for machine weights and dimensions.)
- ✓ **SHREDDER LOCATION:** Adequate area for routine maintenance should be provided in order to open the machine for knife, screen, or cleanout service. Proper service area clearances also should allow people who are working on the machine to be clearly visible to others, thereby reducing the potential safety hazards.
- ✓ **SAFE HOUSEKEEPING:** The work area must be kept clean and uncluttered during periods of operation or maintenance. No hand tools or other metal objects should be left on or around the machine. Any tools or other metal objects that mistakenly fall into the hopper feed opening can cause severe damage to internal cutting chamber, rotor and screen components.
- ✓ **SAFETY GLASSES OR A FACE SHIELD MUST ALWAYS BE WORN** when servicing or operating the machine. Although our machines are designed for the maximum in flyback control, caution must be used when operating near the hopper feed opening in order to guard against unexpected material flyback.
- ✓ **EAR PROTECTION** may be required when operating the machine during shredding of very hard or noisy materials. The Occupational Safety and Health Act of 1970 has established guidelines for Permissible Noise Exposures (OSHA 1910.95) that should be followed.
- ✓ **NEVER** attempt to operate the shredder unless it is fully assembled with all guards and interlocks in place and functional.
- ✓ **OBSERVE** all danger, warning, caution and safety labels on the equipment.
- ✓ Upon completion of any machine maintenance, be certain **ALL SAFETY GUARDS AND COVERS** are securely and properly fastened prior to resuming machine operation. All fasteners must be in place and properly tightened. **ANY SHORTCUTS MAY RESULT IN INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.**
- ✓ **NEVER** wear any loose fitting clothes, neckties, or dangling items such as earrings, belts, or shoestrings. Jewelry, such as wristwatches, bracelets, or rings should NEVER be worn. Long hair must be tied back or placed in a tight fitting hairnet. NEVER lean against or rest hands or feet on the shredder when it is in operation or open for maintenance. NEVER stand on the shredder when it is in operation.
- ✓ **ROTATION OF MOTORS:** The correct rotating direction for the shredder motor is clearly marked on the machine. Always check for proper rotation of motors. Incorrect rotation direction can cause severe damage.
- ✓ **ELECTRICAL GROUNDING:** All electrical equipment on the shredder must be grounded in accordance to all local codes and Article 250 of the National Electric Code.

- ✓ **ALWAYS DISCONNECT AND LOCKOUT** the main electrical power to the shredder before performing any service.
- ✓ **SAFETY INTERLOCKS MUST NOT BE BYPASSED.** The mechanical and electrical safety interlocks ensure the safety of personnel. They should never be tampered with or removed for ANY reason. They should be checked frequently by a qualified mechanic for proper operation.
- ✓ **NEVER** modify the machine configuration or any individual component without written notice from the factory.

Remaining Risks

The machine is constructed so that you are able to operate it safely. Non-avoidable dangers are prevented as greatly as possible by the protective devices. Remaining risks always exist. Please be aware of the risks described below as this will help operators/staff avoid accidents. To further avoid danger, please adhere to all advice provided in the operational manual.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Crushing due to heavy parts falling down or over.	Unloading/transporting the machine and/or components.	Serious injury.	•Wear personal protective gear and follow the instructions provided in the operational manual.
Cutting caused by sharp knives--even when the rotor is stationary.	Knife replacement, knife setting, knife sharpening, and other maintenance.	Serious injury--particularly to the hands and fingers.	•Wear personal protective gear and follow the instructions provided in the operational manual.
Crushing when opening/closing the doors on front side of machine.	Maintenance.	Serious injury.	•Ensure no persons are in the danger area while closing the door.
Tripping over cables and other surrounding objects.	All activities.	Serious injury.	•Lay cables in accordance with regulations. •Keep work station clean and tidy.
Crushing, cutting, amputation caused by run-down of the rotor.	Maintenance.	Serious injury or death.	•The maintenance doors must always be tightly locked during operation. •DO NOT make the run-down safety devices ineffective by using technical aids or other manipulations. •NEVER use hands to check if the rotor has stopped.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Direct/indirect contact with live parts in terminal box.	Maintenance; start-up.	Serious injury or death.	•Only trained electricians may carry out work on the electrical equipment. •If work is necessary on parts that could conduct dangerous voltage, a second person should be present to break the power supply in case of an emergency. •Only use original safety fuses with stipulated intensity of current. •Faulty electrical components must be replaced immediately. •If faults occur in electrical energy supply, switch the machine OFF immediately. •The terminal box must be locked during operation. Before opening the terminal box turn the main switch to 0.
Failure of the Emergency Stop Function.	All activities.	Serious injury or death.	•There must be a guarantee that the machine will be stopped immediately upon failure of an Emergency Stop button.
Fire/explosion caused by throwing dangerous objects (i.e. spray cans) into the shredder.	Shredding.	Serious injury or death.	•Only shred material that corresponds to the agreed customer-specific specifications.
Damage to hearing.	All activities.	Diminished hearing, headaches, impaired balance, deterioration of concentration.	•Reduce noise levels by taking suitable measures and wear ear protection.
Unstable machine due to vibration.	All activities.	Serious injury.	•Install the machine according to the instructions in the operational manual.
Loose cutter/bed knife mountings due to vibration.	All activities.	Serious injury.	•Check the cutter/bed knife mountings regularly.
Inhalation of grinding dust.	All activities.	Respirator disease, etc.	•Mount a suitable air suction device. DO NOT blow out grinding dust when cleaning the machine.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Crushing, cutting, amputation caused by manipulation of protective devices.	All activities.	Serious injury or death.	•Never make the protective devices ineffective; check the devices regularly for proper function.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

Chapter 2: Functional Description

2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for FLEX Series Shredders of various sizes and specifications. See below for a list of models.

- FLEX 1530 Shredder with Allen-Bradley Controls
- FLEX 1542 Shredder with Allen-Bradley Controls
- FLEX 1554 Shredder with Allen-Bradley Controls
- FLEX 1566 Shredder with Allen-Bradley Controls
- FLEX-2054 Shredder with Allen-Bradley Controls
- FLEX-2066 Shredder with Allen-Bradley Controls
- FLEX-2078 Shredder with Allen-Bradley Controls

2-2 General Description & Typical Features

The FLEX Series shredder is designed for processing wood, plastic, rubber, and paper materials. The shredder reduces material to approximately 1 to 4 inches (25 to 100 mm) when using the optional discharge screen. For plastic applications when the shredder is combined with a granulator (stacked 2-stage or in-line with conveyors) output material sizes can range from 1/8 to 1/2 inches (3 to 13 mm). The shredder can average 150% of its stated throughputs without heavy power consumption loads (typically seen when using a granulator alone).

In-feed Hopper
The grinding material in-feed moves through an in-feed hopper so the material is delivered correctly and safely. The grinding material can be fed into the shredder using many methods. Typical in-feed options include manual in-feed of the shredding material directly into the hopper with or without the help of an additional in-feed device or automatic in-feed of the shredding material with an additional in-feed device (i.e. conveyor belt).

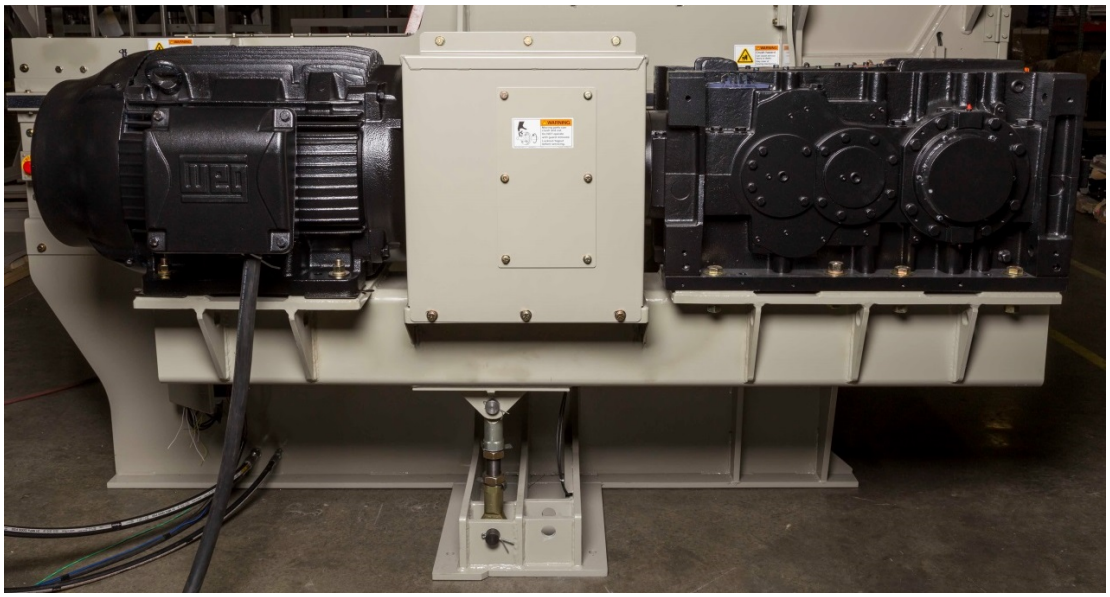
Discharge of Grinding Material
The shredded material is usually discharged into a box; an available option is discharge with a conveyor. Shredded material is optionally classified thru a discharge screen.

Rotor and Cutters
The material is ground between the cutters assembled on the rotor and the bed knives, which are mounted in a fixed position on the machine's lower section. All rotors are equipped with either square or trapezoidal shaped cutters; these cutters make light work of the heaviest pieces. The square cutters have four corners so they can be easily turned once a corner has worn out. The trapezoidal cutters have two sides so they can be easily flipped once a side has worn out. The design of the rotor has a significant influence on the quality of the grinding process and its results. The rotor construction, the type of knife mounting, and the number of cutters have all been exactly matched to the allocated tasks of the machine.

The rotor is accessible after opening the rotor doors. The rotor is arranged on roller bearings, which are located outside the cutting chamber. Gearbox is attached to the rotor axis and rotational energy is derived from an electric motor. The electric motor is connected to the gearbox either directly or with pulley driven belt drive.

Ram
The ram provides force necessary to introduce shredding materials to the cutting rotor. The ram is moved by pressure from hydraulic cylinder. The ram action is controlled by PLC logic. The ram uses spring loaded wipers on all sides to contain shredded materials inside the cutting chamber.

Drive
The drive consists of either a belt connected pulley mounted to parallel shafted gearbox or a direct driven right-angle gearbox. In either case an over-torque limiting clutch is mounted between the electric motor and the gearbox. The design of the drive provides enough horsepower to effectively shred the appropriate materials; the over-torque limiting clutch provides protection to the gearbox above the required horsepower for shredding materials. The clutch operation is monitored at all times with high-speed counter sensors. Both drive designs use a rigid torque arm to offset gearbox loading.



Hydraulic Power Unit

The hydraulic power unit provides hydraulic pressure, velocity, and directional control to the hydraulic cylinder(s) that control the ram action. A typical hydraulic power unit consists of electrical motor, hydraulic pump(s), directional solenoid valve(s), return filter, temperature/level switch, and pressure transducer.

Control Panel
The control panel provides logic control for the main rotor motor and hydraulic system. The various input sensors and limit switches from the shredder and hydraulic power unit provide feedback to the programmable logic controller (PLC) thus producing machine functionality. Wiring from the control panel will connect to the main rotor motor, main machine junction box, and hydraulic power unit junction box. A typical control panel consists of operator interface touch screen, main disconnect, and emergency stop push button. Further details of functioning components can be found in the appendix of this manual or within electrical schematics provided with the shredder at the time of shipment.

2-3 Safety Features

Protective Devices
The machine must never be operated without the following protective devices or with faulty or manipulated protective devices.

Rotor/Screen door safety device
The shredder must only be operated if the rotor door(s) are closed and the lock is tightened – otherwise, the safety switch will be activated. If the rotor door(s) are opened during operation, the safety switch will be tripped, and the machine will shut off.

Ram & Clutch access covers
The rear and sides of the machine are covered by removable access covers for maintenance purposes. The access covers must be bolted in place and must be installed at all times for safe operation of the machine.

Hopper
The input opening of the machine is elongated with an infeed hopper. The hopper is bolted in place and must be installed at all times for safe operation of the machine.

Splash guard
The input opening of the machine is optionally provided with a splash guard to prevent fly-out in case the ground material is introduced directly in the feed hopper.

Safety Markings
Safety markings are attached to the machine. If one of these markings becomes detached or is no longer recognizable, the marking must be replaced. New markings can be ordered from the manufacturer; please contact customer service.

Emergency Stop Button
The machine must only be operated with the installed Emergency Stop buttons. One Emergency Stop button must be mounted onto the control cabinet and a second onto the shredding material in-feed.

In case of an emergency, immediately press one of the Emergency Stop buttons.

CAUTION! The Emergency Stop button must be activated in all situations in which injury or damage could result!

Re-operation

1. Eliminate the cause of the emergency stop.
2. Unlock the Emergency Stop button.
3. Acknowledge fault.
4. The machine is ready for re-operation.

Personal Protective Gear
The following protective gear must be worn when carrying out the outlined tasks. Use breathing equipment before inhaling substances that may be harmful to your health if necessary.

Task	Safety Helmet	Safety Boots	Safety Gloves	Safety Goggles	Ear Muffs
Unloading machine	X	X	X		
Connecting machine		X			
Operation.		X	X	X	X
Cleaning.		X	X	X	
Maintenance of bearings		X			
Maintenance of gearbox motor		X			
Maintenance of cutters/bed knives		X	X		
Knife sharpening		X	X	X	X

Chapter 3: Installation

The following listed installation information should be observed as closely as possible to ensure proper machine operation.

3-1 Lifting and moving

The machine must be handled with care whenever being moved. This is to prevent damage to any part of the machine. The machine is provided with lifting lugs which should be used whenever the machine is being moved. It is recommended that the machine be lifted only in this manner.

3-2 Foundation

The machine must be secured to a firm foundation that is flat. This foundation must be of a material that will provide a firm rigid support for the machine.

3-3 Leveling and securing

The machine should be positioned in a level condition. It should be secured to the foundation through the holes provided in the base or using toe clamps with spacers for machines without holes. Fastening should be secure enough to prevent machine movement during operation. Shim machine to ensure that base is not in a strained condition.

A 1/8” to 1/4" thick rubber strip may be used between foundation and machine base to reduce vibration.

Recommended fastening instructions for toe-clamp are as follows:

1. Use hammer drill with concrete bit to drill 7/8” diameter holes at depth of 5” (locate holes using drawing supplied with this manual)
2. Cut 3/4” threaded rod into 8” lengths, one for each hole (more length will be required if using shims or rubber strips)
3. Install threaded rod into drilled holes using concrete epoxy (Conair Machine recommends Unitex Pro-Poxy 300 Fast (A/B) with dual-pack and dual-cartridge gun for ease of use) Follow manufacturer’s directions, typical cure time before tightening is 24 hours.
4. Secure toe clamps with 3/4" washer and nut using spacer block underneath free end of clamp at same thickness or less of material to be clamped. (Conair recommends McMaster-Carr p/n: 4997A13 toe clamps)
5. Tighten fasteners to proper torque. (NOTE: Bolt torque chart located in the appendix)

3-4 Electrical installation

All electrical installation should conform to local, state and federal regulations and should be performed by qualified personnel. All electrical wiring should be of sufficient size to ensure adequate power supply without a power drop. The electrical control panel should be located as close to the main drive motor as is feasible. This will ensure a minimum voltage drop. The control panel should be installed in a well ventilated area protected from the elements, free of dust and the direct rays of the sun.

Before applying power on a permanent basis check the following:

1. Direction of rotation of main motor
2. Direction of rotation of hydraulic pump motor

It is strongly recommended that power be applied to the machine only after pre-startup tests are performed by Cconair service representatives.

3-5 General Installation Information

The machine should be located in an area that is protected from the elements. The machine is normally delivered containing lubricants with minimum operating temperatures as follows:

Minimum Temperatures	
Hydraulic System	20 deg F
Fluid Coupling	10 deg F
Bearings	0 deg F
Main motor	0 deg F

If special requirements exist below these temperatures, contact Conair. Optional heating element is available for the hydraulic system. The machine should be located in an area that will provide adequate accessibility for maintenance.

Before starting machine rotate rotor slowly by hand to insure clearance between rotor, counter-knife, cutters and screen. Check oil in gearbox and hydraulic reservoir. These units are filled with specified fluid; refer to the maintenance section before adding any fluid to these units. Before adding fluid insure that fluid and reservoir are clean.

Before operating machine, cycle the hydraulic pump several times for a short duration to insure pump has fluid available. After establishing that hydraulic pump is providing pressure, cycle the hydraulic cylinders without load several times to insure proper operation. Check Hydraulic reservoir after each cycle. When hydraulic system is operating properly it should cycle through all functions without hesitation.

Run machine approximately 30 minutes empty and then feed material slowly to the hopper until a full load is established.

After two (2) hours of operation, then after every fifty (50) hours of operation check for loose bolts and screws as well as belt tension. Tighten all loose bolts, screws and retighten belt if necessary.

This page is intentionally left blank.

Chapter 4: Machine Operation

4-1 General Operating Description

The machine is designed to reduce a variety of material to various chip sizes by the action of a rotor containing specially designed cutters, passing through counter-knives, with the ultimate chip size controlled by screen opening size. The process is summarized as follows.

The main drive motor, in conjunction with an electronic soft start and a direct right-angle drive, transmits rotation to the gearbox. The gearbox in turn drives the rotor. The electronic soft start allows the motor to start with minimal inrush current while being under a load. The gearbox and rotor are protected from sudden shock loads by a torque arm and over-torque limiting clutch. Excessive overload is also limited by a sensor device on the clutch. The product is pushed to the rotor by a hydraulically operated ram.

The functions of the machine are directed by an Allen Bradley programmable logic controller (PLC), which receives input from a hydraulic pressure transducer, main drive motor current, clutch sensors, safety interlock switch on rotor/screen door, a combined hydraulic high temperature sensor and low fluid level, ram position sensors and external interlock. These elements combine to cause the machine to operate or stop for personal safety or machine protection.

The material feeding mechanism will push as much material as the rotor can size reduce. When the rotor torque requirement causes the main drive motor load to reach programmable maximum amperage, the feed mechanism stops or reverses and resumes pushing forward when the motor load drops below programmed level.

The rotor is always turning in a forward direction during normal operation. The motor amperage is being monitored using an analog input to the PLC. The amperage can reach either minor or major faults.

Minor faults are reached when the rotor amperage is at or near full load amps. The full load amperage is programmed using a percent (%) of load parameter. Actions on minor fault are programmed for a ram hold or ram reversal. The ram reversal is either time based or until current is under programmed limit. The ram hold is held until the amperage is under the programmed limit.

Major faults are reached when the rotor significantly over amps the full load. This is normally set at 140 – 150 % of load. Actions on major faults result in either a reversal procedure or an E-Stop. The other major fault for the rotor is over torque. This would normally only happen from a sudden shock stoppage such as tramp metal in the processing stream. This results in an e-stop to the system. The machine should be inspected for damage and cause of the over torque before resuming operation. The sensors and spring force of the over torque device should not be adjust in the field. Contact RMI for field service consultation.

The ram force & hydraulic system pressure is being controlled by a pressure transducer on forward strokes. This transducer is controlling the shift from high speed to low speed (on 2 speed machines only), when to start and stop the ram and major and minor faults.

Major faults for the hydraulic system are low oil, high oil temperature or motor current overloads. All of these actions result in a system shutdown. These are discreet inputs to the PLC. The electrical diagram will show the inputs involved in these major faults. The front panel of the PLC will show their status. The color LCD touch screen software system shows status of all inputs on machine status page.

Minor faults for the hydraulic system entail meeting programmable pressure limits. The ram is pushing the material towards the rotor. When resistance is met, pressure begins to build. The pressure transducer measures this pressure buildup and the PLC reads the analog signal. The signal is converted to PSI and presented to the user. The high speed

pump on a two speed system is capable of generating 1500 psi and the low speed is capable of generating 3000 psi. The system allows you to program a speed change from high to low below 50% of 3000 psi. The system allows you to program a ram hold or reversal below 2500 psi. The ram reversal is for a set amount of time and ram hold is for a maximum accumulated amount of time. The ram will start and stop as the pressures obtain the desired amount.

The ram direction is controlled as well by two limit switches, one for full forward and one for full back. The ram changes direction when either of these switches are met. The reverse speed is at full rate.

4-2 Material to be processed

Material to be size reduced can vary in size and types. Consideration should be given to the hardness and consistency of the material. Metal parts should not be allowed into the hopper at any time. Small nails and staples are acceptable. The size and output of the product is determined by the use of an optional screen. Screen size is exchangeable for different application of the end product. Screen sizes are from 3/8" to 4" in size.

4-3 Start-up procedure

After performing the inspections called for in the installation and maintenance sections, the only additional inspection required is to ensure that no material is lodged against the rotor that may impede its rotation. All other start up requirements are controlled by the PLC and main control panel. Starting procedure is as follows:

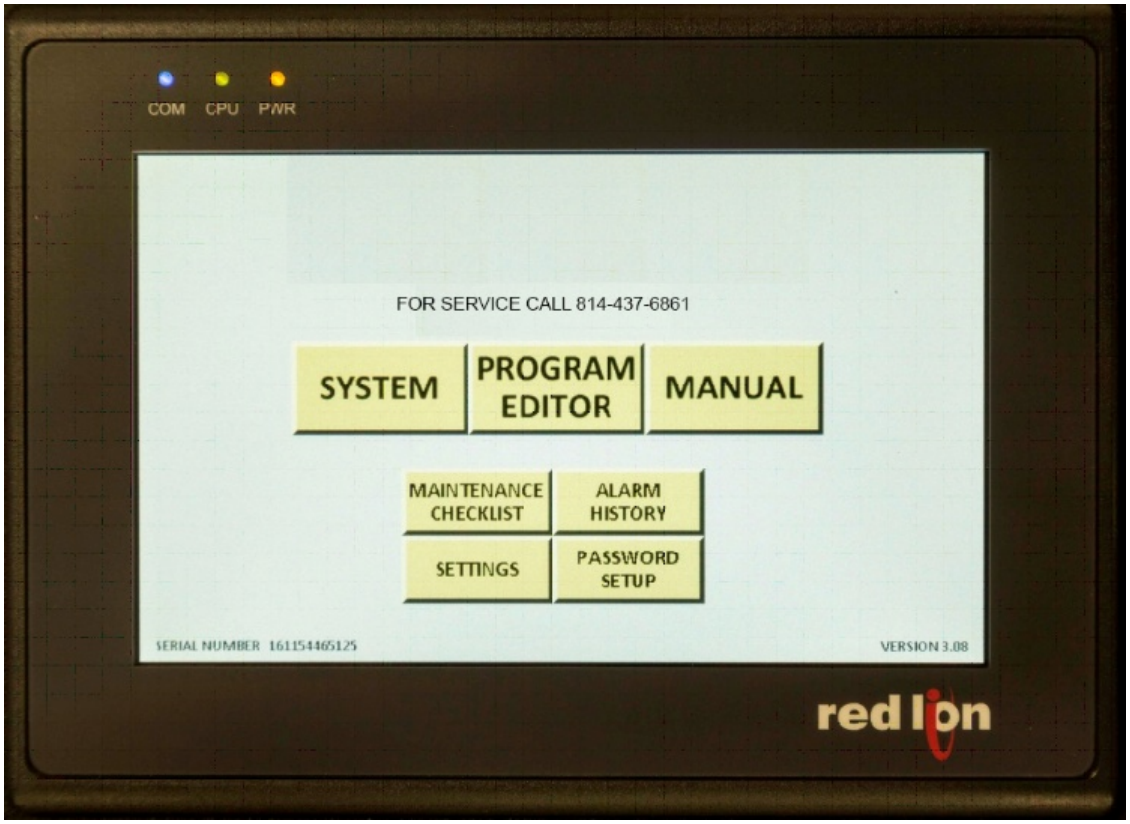
1. Make sure emergency stop buttons are off
2. Verify all input status lights are green
3. Press cycle start

4-4 Shut-down procedure

It is suggested that the machine not be turned off with the rotor under load. This could prevent a smooth restart. All other requirements are controlled by the PLC and main control panel. Press the cycle stop button; the machine will shutdown at the end of the current cycle. If emergency conditions exist press any of the E-Stop buttons.

4-5 Operator Screens

4-5-1 Main Menu



The Grinder Operating System is Menu Driven. On power up, the main menu appears. The user can navigate to any of the following functional screens from the main menu:

SYSTEM – Operator interface for starting up machine and monitoring pertinent information while running
PROGRAM EDITOR – A user interface for entering parameters for up to 6 unique programs
MANUAL OPERATION – Displays I/O status and provides limited machine operation
MAINTENANCE CHECKLIST– Displays the status of required maintenance items and allows user update
ALARM HISTORY – Displays a history of alarms and their details
SETTINGS – Allows administrator to make system specific settings updates
PASSWORD SETUP – A utility for changing user passwords

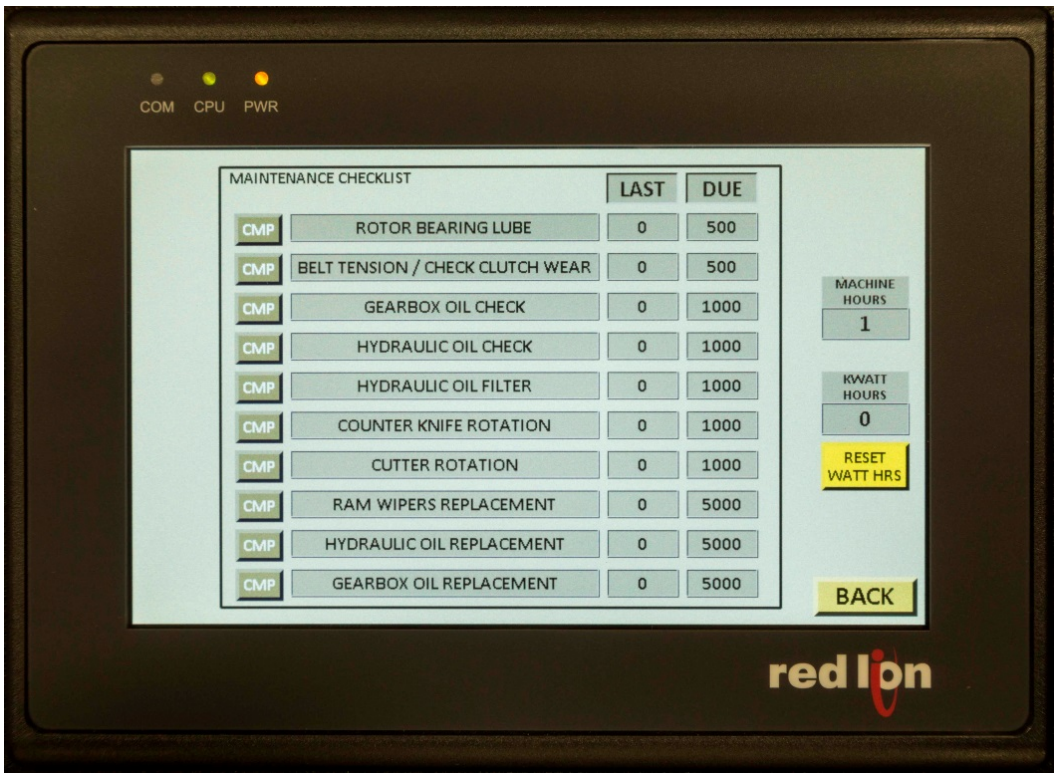
4-5-2 Password Setup

Many functions of the shredder user software are password protected. Three customer passwords are in place: Administrator (admin), Maintenance (maint), and User (user). The administrator has privileges for every function which is password protected. A Maintenance password may be used to update periodic maintenance action items. And a User password may be used to select running programs.

The password setup screen is shown above. To edit a password, touch the appropriate button and enter a value up to 15 characters long. All passwords are set to 12345 when shipped from the factory. Each user can update their password individually. If passwords are lost or forgotten contact Conair service department for a master password.

The Conair password is available only to factory personnel.

4-5-3 Periodic Maintenance



The Periodic Maintenance screen is used to view and update the current status of each maintenance action. When shipped from the factory, each maintenance action is assigned a frequency based on machine hours. The 'LAST' column displays the machine hours at which the maintenance action was performed. The 'DUE' column displays the next machine hours at which the action will be required.

When the number of machine hours is within 25 hours of the due time for the action, it will appear yellow. When the number of machine hours has exceeded the due time for the action, it will appear red. To update the status when a maintenance action is performed, touch the button to the left of the action and confirm that the action has been completed. (Note: Updating a maintenance action item requires the administrator or maintenance password.)

Total accumulated Machine Hours are displayed as well as KiloWattHours. The KiloWattHours may be reset here.

4-5-4 Alarms

Alarms occur whenever the machine drops out of auto cycle mode. When this happens the reason for the loss of auto cycle and its input number will be captured and recorded as an alarm. For example, if the E-Stop button is pressed while the machine is running, the alarm will display “E-stop Condition”. If an alarm occurs, a red *ALARM* button will flash on the System screen. Touching this button or the Alarm History button on the Main Menu will cause the Alarm History screen to be displayed. From this screen, alarm details can be viewed, and alarms can be deleted.

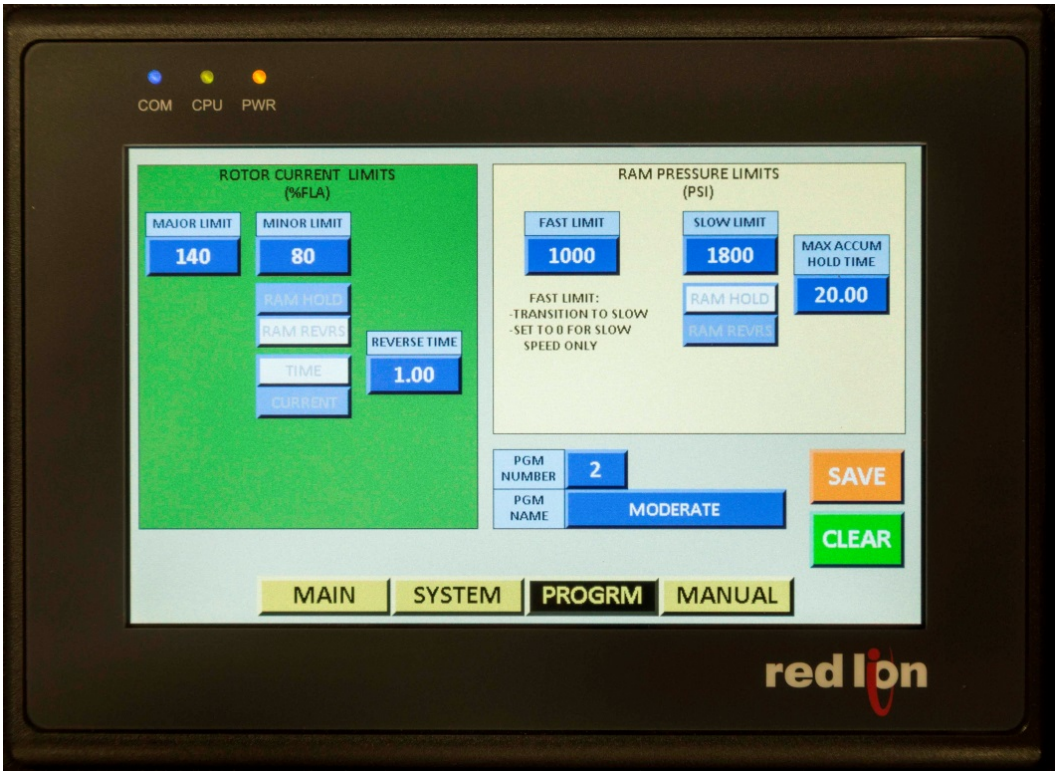
In addition to being recorded on the Alarm History screen, the current alarm will be displayed in the operator prompt area of the Auto screen. To clear the alarm message from the display and stop the alarm button from flashing, touch the *ALARM ACK* button.

4-5-5 Program Editor

Up to six unique programs defining rotor current and ram pressure limits and resulting limit action selections can be set up in the program editor. To begin, press the ***PGM NUMBER*** button in the bottom right to choose the program number to edit. When a program is selected, the current values of the parameters are displayed. To edit a value, touch the button and a keypad will be provided for entering new values. The ***SAVE*** button will cause the new values to be saved; the ***CLEAR*** button will cause the most recently saved program to be displayed. The name of the program (20 characters or less) may be entered or edited at ***PGM NAME***.

The Program Editor Screen may be viewed while the machine is cycling; however, program modifications will only be permitted when the machine is not running automatic operation.

(Note: Updating program settings requires the administrator password.)



ROTOR CURRENT LIMITS

MAJOR LIMIT (%FLA) – Enter the value of the rotor current (in % Full Load Amps) which will cause a major action.

E-STOP/ RTR REVRS - Use the toggle switch to select the action to occur for a major limit: either ***E STOP*** for a complete machine stop or ***RTR REV*** for a rotor reversal sequence. Note: A rotor reversal action may occur only once per hour. If rotor reversal is the action selected for a major limit, but a reversal sequence has occurred with the last hour, the machine will e-stop if a major limit occurs.

MINOR LIMIT (%FLA) – Enter the value of the rotor current (in % Full Load Amps) which will cause a minor action.

RAM HOLD / RAM REVRS – Use the toggle to select the action to occur for a minor current limit: either ***HOLD*** for Ram Hold Mode, or ***REVRS*** for Ram Reversal Mode.

REVERSE PARAMETER – (Only visible if ***RAM REVRS*** is selected) Choose ***TIME*** to reverse for a certain amount of time; choose ***CURRENT*** to reverse until the current limit returns to normal.

REVERSE TIME – (Only visible if ***RAM REV*** by **TIME** is selected) Enter the time (in seconds) for reversal.

MAX ACCUM HOLD TIME – (Only visible if ***RAM HOLD*** is selected) Enter the maximum time (in seconds) to be accumulated during a single forward stroke event (from rear to front limit switch) before the ram aborts forward motion and returns home for another attempt.

RAM PRESSURE LIMITS

FAST LIMIT – Enter the value of ram pressure at high speed (in PSI) which will cause ram to switch into slow speed. (NOTE: Set this parameter to ZERO to eliminate high-speed forward ram movement)

SLOW LIMIT – Enter the value of ram pressure at low speed (in PSI) which will cause a minor action.

RAM HOLD / RAM REVRS – Use the toggle to select the action to occur for a minor current limit: either ***HOLD*** for Ram Hold Mode, or ***REVRS*** for Ram Reversal Mode.

MAX ACCUM HOLD TIME – (Only visible if ***RAM HOLD*** is selected) Enter the maximum time (in seconds) to be accumulated during a single forward stroke event (from rear to front limit switch) before the ram aborts forward motion and returns home for another attempt.

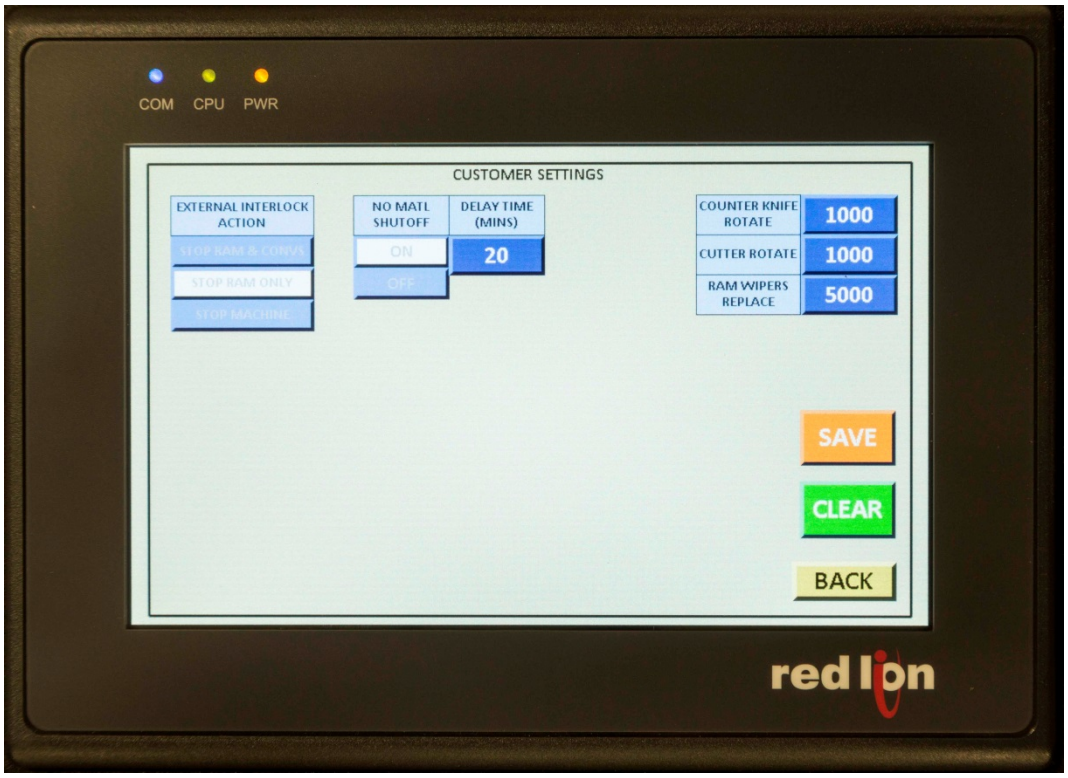
REVERSE TIME – (Only visible if ***RAM REV*** is selected) Enter the time (in seconds) for reversal.

MAX # REVRS – (Only visible if ***RAM REV*** is selected) Enter the maximum attempts for ram reversal before ram sequence is aborted and ram returns home.

4-5-6 Customer Settings

The customer settings screen allows the user to make certain changes to operating parameters of the PLC program. The current values of the parameters are displayed. To edit a value, touch the button and a keypad will be provided for entering new values. The ***SAVE*** button will cause the new values to be saved; the ***CLEAR*** button will cause the most recently saved settings to be displayed.

(Note: Updating a customer setting requires the administrator password.)



EXTERNAL INTERLOCK ACTION – Choose the reaction for when external interlock (downstream interlock) input number 10 on the PLC is open status. ***STOP RAM & CONVS*** for pausing the hydraulic ram and outfeed conveyor belt, or ***STOP RAM ONLY*** for pausing only the hydraulic ram, or **STOP MACHINE** for initiating CYCLE STOP for the shredder itself (shredder will not restart automatically when STOP MACHINE is chosen). (NOTE: Infeed conveyor follows ram operation status)

NO MATL SHUTOFF – Choose ON to shut down the machine if running idle for too long. Choose OFF to turn off this feature. (NOTE: Running idle condition is when the shredder has not encountered either a rotor MINOR LIMIT nor ram SLOW LIMIT event)

DELAY TIME – (Only visible if **NO MATL SHUTOFF** is turned ON) Enter the time (in minutes) for delay when determining shredder idle status.

GRANULATOR HIGH CURRENT – (Only visible if machine equipped with granulator amp monitoring feature) Use the toggle to select the action to occur for a granulator over current limit: either ***STOP RAM & BELT*** for pausing the hydraulic ram and outfeed conveyor belt, or ***STOP RAM ONLY*** for pausing only the hydraulic ram. (NOTE: Infeed conveyor follows ram operation status)

START FEED %FLA – Enter the value of the granulator rotor current (in % Full Load Amps) which will release the ram pause event.

STOP FEED %FLA – Enter the value of the granulator rotor current (in % Full Load Amps) which will initiate the ram pause event.

STOP DEBNCE (SEC) – Enter the time (in seconds) for delay when determining granulator high current event.

COUNTER KNIFE ROTATE / CUTTER ROTATE / RAM WIPERS REPLACE – Enter the number of hours typical between maintenance events. Used to calculate the NEXT DUE hours on preventative maintenance screen

The Customer Settings screen may be viewed while the machine is cycling; however, customer setting modifications will only be permitted when the machine is not running automatic operation.

4-5-7 System

The System screen is used to start the machine into Automatic Cycle and to monitor machine status and various parameters while it is running.

The status indicators on the right side display general machine conditions. Run Hours displays total number of accumulated rotor hours. The Operator Prompt box displays alarm messages and current machine status

The PM Indicator on the right side displays the status of any periodic maintenance items. The indicator has three states. Green (PM OK) indicates that all maintenance items are more than 25 run hours from being due. Yellow (PM Due) indicates that one or more maintenance items are less than 25 hours from being due. Red (PM Overdue) indicates that one or more maintenance items are overdue. More detailed information on Maintenance can be viewed on that screen.

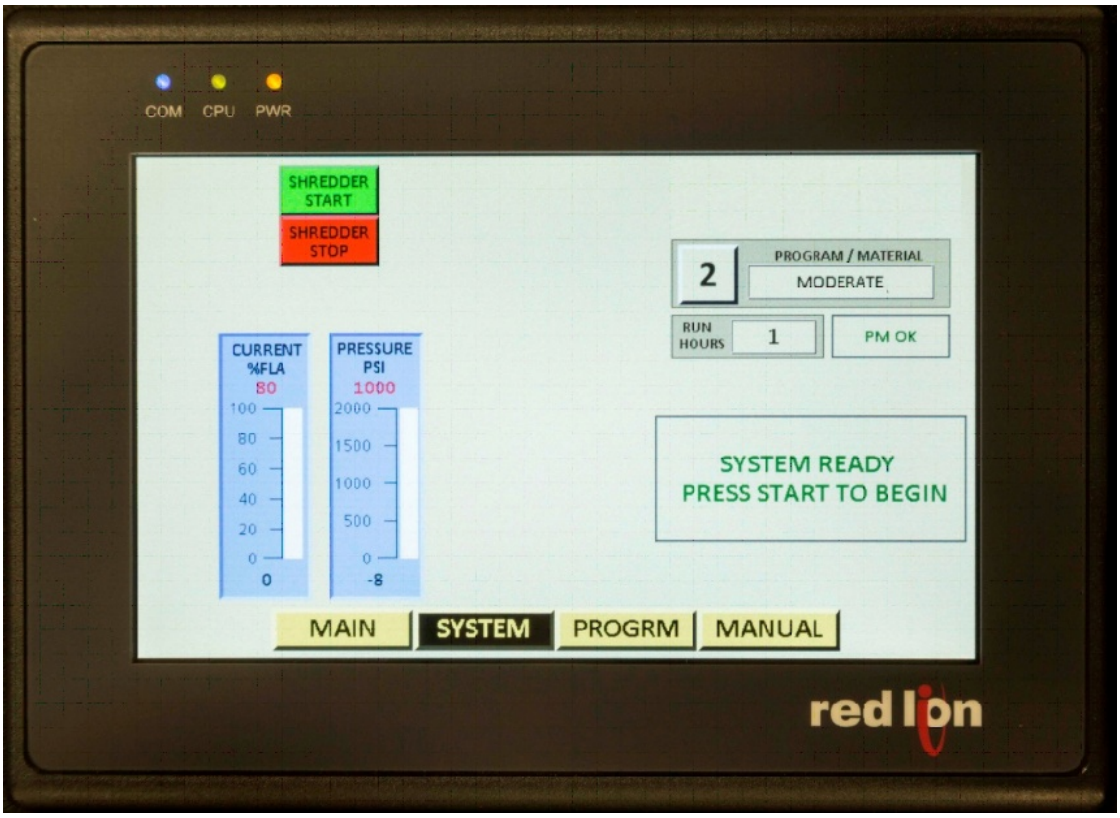
At the top right corner of the screen the ***PROGRAM/MATERIAL*** button is used to select the program to run. (Note: The user or administrator password is required to select a program.) The selected program's name is displayed.

To start an automatic cycle, all machine safety inputs must be enabled and the ram must be fully retracted into home position. A ***RAM HOME*** button is provided for manually retracting it. If the machine is not ready to start a cycle, text messages will provide specific details and/or instructions in the Operator Prompt area. If the machine is ready the ***SHREDDER START*** button will be visible and will initiate the currently selected program when touched.

When the cycle begins, the rotor will be enabled and allowed to run for 10 seconds. Next the hydraulic pump will be started and allowed to run for 5 seconds. Lastly the ram will begin proceeding through its programmed sequence, moving forward then reverse while reacting to ram position limit switches, rotor current events, or ram pressure events. Touching the ***CYCLE STOP*** button will cause the ram to return to home position on the next ram reverse, and then the machine will shut down.

The bank of bar meters on the bottom of the screen display actual values and target values or limits. For instance, the rotor current and ram pressure displays contain the actual values and the limit settings for the current program. Adjacent to the ram pressure meter directional arrows will display the direction and speed of the hydraulic ram. The indicators show ram forward slow is a right-hand solid arrow, ram forward fast is a right-hand broken arrow, ram paused or stopped is a solid square, ram reverse slow is a left-hand solid arrow, and ram reverse fast is a left-hand broken arrow.

The Clutch Cool Down Time (seconds) will display following a clutch slippage event and will continue to count down until the time has reached zero. The machine cannot be operated while this time is counting down.



SHREDDER START – Depress for automatic cycle start, ram must be home and all alarms cleared. The light is orange when the output is energized, green when off.
SHREDDER STOP – Depress for automatic cycle stop. Ram will complete its current step before returning ram home to stop machine
RAM HOME – (Only shown when machine is not running and ram is not at home position) Yellow indicates ram not ready for system start. Depress to send ram home.

PROGRAM / MATERIAL – (User Password required) Select program number 1- 6

ALARM ACK – Is invisible until an alarm occurs. Alarm must be acknowledged before restarting equipment

4-5-8 Manual Operation

The Manual Operation utility can be used to view the status of the digital and analog inputs and to operate the output devices. The circular lights across the bottom half indicate the status of inputs; green for ready, red for not ready (fault), white/yellow for status only.

The square pushbuttons across the top half are used to operate the outputs and to indicate their status. The text of the jog ram pushbuttons will vary depending on the type of hydraulic pump used on the machine. Orange indicates the output is on, yellow and green are off. All buttons except PUMP START STOP are momentary buttons and require continued pushing to operate device.

Analog values are displayed in the middle of the screen. Ram pressure is displayed in PSI. Rotor current is displayed in percent of full load amps and actual measured amps. For machines with granulator amp feedback granulator rotor current is displayed in percent of full load amps and actual measured amps.

Manual operations are not permitted if the machine is running an automatic cycle.

4-5-9 Torque Clutch

The machine is equipped with an over-torque limiting clutch. In the event tramped metal is introduced into the cutting chamber at any time during normal operation of the machine and comes into contact with the rotor assembly, the shock load produced will stop the rotor rotation; thus the clutch will slip from rotational inertia of the motor. There are sensors monitoring the relative rotational position of the two clutch halves. The maximum instantaneous and accumulated slip count values are factory set and vary with shredder model. If an over-torque event occurs exceeding either the instantaneous or accumulated maximum value the machine will shutdown and enter into a factory programmed 10 minute clutch cool down period. The machine should be inspected following all lock-out tab-out safety procedures in order to find the cause for the over-torque event. The machine should also be inspected for damaged components and replacements should be made as necessary. The machine can be restarted after the clutch cool down period.

(NOTE: The adjustment to the clutch spring pretension must not be changed as it may result in faulty switching. This unit is factory calibrated and severe damage could result if unit is adjusted improperly. If it is felt that adjustment is necessary, contact Conair.)

Chapter 5: Maintenance

5-1 Preventative maintenance

To insure a trouble free operation of the machine the following recommendation are important:

- ✓ Replace any damaged parts as quickly as possible. This will reduce possibility of more severe damages.
- ✓ Check for loose screws, bolts, and hydraulic connection etc. on a regular 50 hour operational interval. Correct any problems that are discovered immediately.
- ✓ Check hydraulic fluid level daily. Check other component functions as outlined in Chapter 4.
- ✓ Rotate or replace indexable cutters located on rotor whenever cutting results are poor. Torque bolts to proper torque according to torque value found in the appendix. Rotate rotor by hand to ensure proper clearance to counter knife before start-up.
- ✓ Replace/rotate/sharpen counter-knives whenever cutting results are poor. Rotate rotor by hand and adjust counter-knives to proper clearance before applying power. Be sure counter-knife retaining bolts are tightened to proper torque according to torque value found in the appendix. Refer to adjustment information for proper alignment.
- ✓ To insure proper cooling of motors and machine components make sure machine is free of dust at all times. Clean on a regular basis.
- ✓ Check on daily basis for unrestricted air flow on hydraulic oil cooler.
- ✓ If machine has air cooler on hydraulic package, remove front cover and clean with compressed air from back side of cooler to remove foreign material, whenever conditions indicate need.
- ✓ Caution – If damage occurs to main rotor (such as ripping cutter holder blocks due to foreign material). Welding these blocks to rotor must be approached with caution. Use weld procedure for AISI 4140 steel with corresponding pre heat and post heat requirements. Do not under any circumstances weld on the shaft of the rotor.

5-2 Lock out / Tag Out

There is one main disconnect located at the control panel. This disconnect controls all normal functions of the machine. Make sure to follow all lock out / tag out procedures while maintaining, servicing or cleaning the shredder. Be sure to also lock out / tag out any additional machinery that has been installed to work in conjunction with this machine (i.e. conveyors, blowers, dumpers, etc…) while performing maintenance, service or cleaning tasks.

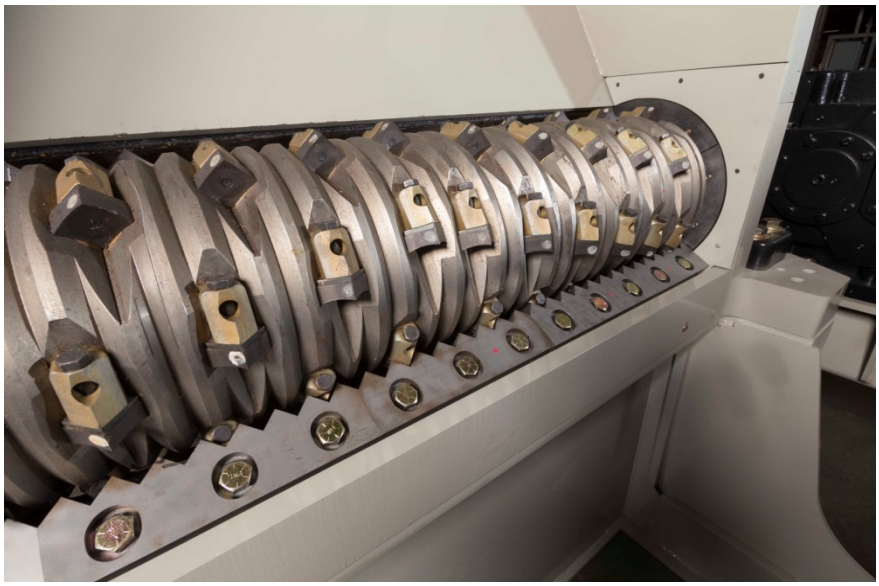
5-3 Split-a-Part Access (Optional)

The Split-a-Part shredder provides direct access to the cutting chamber from the side of the machine to perform upright cleanout and maintenance on the rotor, cutters, counter knives, ram, and ram wipers. Proper lock out / tag out procedures must be followed when opening the machine.

1. Shut down the shredder (it is recommended to wait until hopper is empty)
2. Lock out / tag out the main control panel
3. Remove two ACME bolts on either end of the rotor and remove two (or four optionally) standard bolts on either side of the hopper; disconnecting the rotor module from the sliding ram compartment
4. Split apart the machine (using hand-held drill – NON IMPACT TYPE)
   (It is best to observe the rear as it opens; ensure there are no objects within 36" of machine behind ram compartment)
   a. Connect 7/8" hex socket to drill rated for 1500-1800 RPM
   b. Pull and twist hydraulic directional valve to open position (located on non-drive side of machine)
   c. Use drill to spin hydraulic pump at 1500-1800 RPM to open machine (expect 45-60 seconds to open completely)
5. Perform required cleaning or maintenance
6. Close the machine (using hand-held drill – NON IMPACT TYPE)
   (It is best to observe the opening as it closes; ensure there is no foreign material in the opening and the two vertical walls can come together. The machine will self-align as it comes together.)
   a. Connect 7/8" hex socket to drill rated for 1500-1800 RPM
   b. Pull and twist hydraulic directional valve to closed position (located on non-drive side of machine)
   c. Use drill to spin hydraulic pump at 1500-1800 RPM to close machine (expect 45-60 seconds to close completely)
7. Thread two ACME bolts on either end of the rotor; connecting the rotor module to the sliding ram compartment. Start these threads by hand; torque these threads with impact driver closing the machine tightly. Observe each side of machine to ensure the vertical walls are in contact.
8. Connect two (or four optionally) standard bolts on either side of the hopper.
9. Continue normal operation of the shredder.

5-4 Rotor Assembly

The rotor carries a limited lifetime warranty; it is the user's responsibility to maintain the rotor and components secured preventing excessive wear or neglect. The rotor surface should be routinely inspected for gouges or indentations caused by tramped metal impacts. The rotary seals bolted to the ends of the rotor should be maintained with bolts tightened, locking tabs secured, and clearance from the fixed rotary seal. The roller bearings at each end of the rotor should be inspected regularly and maintained accordingly. The gearbox mounted on the drive-side of the machine should be maintained accordingly and hollow shaft mounting system should be tight and locking tabs secured. Cutters and tool holders should be maintained and replaced as necessary; the rotor should never be allowed to run with tool holders and cutters missing from any intended pocket.



5-5 Cutters

Whenever cutters require replacement due to wear or damage the following procedure must be followed. Cutters are attached to the rotor shaft using a hex screw and a ribbed lock washer. It is advised to rotate or replace all cutters at the same time. It is advised to replace mounting bolt and ribbed washer at the time of cutter replacement. (NOTE: Ensure only one operator is responsible for rotation of the rotor shaft while maintenance is being performed on the cutters to prevent pinching/cutting accidents)

Hawksbill (Square) Cutters (M12 Bolts)

1. Follow all "lock out" procedures to insure machinery cannot be operated while making repairs.
2. To gain access to cutters, open the rotor doors or provide safe access inside the hopper.
3. Remove existing cutter by loosening hex screw and ribbed lock washer.
4. Thoroughly clean mounting areas with suitable wire wheel or brush to insure all foreign material is removed. Visually inspect area for nicks and flatness of cutter mounting area. If indexing existing cutter inserts be sure to clean sides of cutter insert before indexing. **(Note: *The bottom mating area of the cutter holder must support the complete area of cutter insert.)***
5. Install cutter into pocket on rotor assembly torque at 20 ft/lb temporarily. Firmly seat cutter in pocket using hammer and suitable punch or drift made of brass or aluminum.
6. Tighten cutter bolts to proper torque starting at center working outward. (NOTE: Bolt torque chart located in the appendix) (RMI recommends using a marking device to confirm that the proper torque has been applied to every cutter.)

7. Rotate the rotor assembly checking for interference.

Zoidal Cutters (M14 Bolts)

1. Follow all "lock out" procedures to insure machinery cannot be operated while making repairs.
2. To gain access to cutters, open the rotor doors or provide safe access inside the hopper.
3. Remove existing cutter by loosening hex screw and ribbed lock washer assembly. This may require removing material from the recessed hex head bolt area. This can be easily removed by using a 1" hole saw with no center drill bit. Cutters can be difficult to remove if running certain material. RMI recommends using an air chisel to vibrate the cutter seat loose. The cutter will remove easily after the seat is removed.
4. Thoroughly clean the hex head bolt recessed pocket. A good tool for this purpose is a 1" end mill mounted in a cordless screwdriver with torque control on.
5. Thoroughly clean mounting areas and cutter seats with suitable wire wheel or brush to insure all foreign material is removed. Visually inspect area for nicks and flatness of cutter mounting area. If indexing existing cutter inserts be sure to clean sides of cutter insert before indexing. **(Note: *The bottom mating area of the cutter holder must support the complete area of cutter insert.)***
6. Install seat and cutter into pocket on rotor assembly torque at 20 ft/lb temporarily. (Install all cutters before aligning cutters)
7. Each cutter will need aligned axially. This is easily achieved by rotating the rotor to each cutter pair and aligning to the counter knife. Gently tap each cutter with a brass drift to seat radially and axially. Use a feeler gage to achieve the proper spacing axially.
8. Tighten cutter bolts to proper torque starting at center working outward. (NOTE: Bolt torque chart located in the appendix) (RMI recommends using a marking device to confirm that the proper torque has been applied to every cutter.)
8. Rotate the rotor assembly checking for interference.

5-6 Counter Knives

Whenever counter knives require adjustment or replacement due to wear or damage the following procedure must be followed. Counter knives are attached to the anvil using multiple hex screws. Counter knives may be flipped/rotated once and then sharpened using a surface grinder, grind .030" or less to sharpen the knives. It is advised to rotate or replace all counter knives at the same time. It is advised to replace mounting bolts at the time of counter knife replacement. (NOTE: Ensure only one operator is responsible for rotation of the rotor shaft while maintenance is being performed on the counter knives to prevent pinching/cutting accidents)

Flat Reversible Counter Knives (3/4" Fine Bolts)

1. Follow all "lock out" procedures to insure machinery cannot be operated while making repairs.
2. To gain access to counter knives provide safe access inside the hopper.
3. Use a cordless drill to drill out jack screw holes in counter knives (if equipped). Operator needs to be careful not to damage inside threads.
4. Use a 1/2" course thread bolt to lift counter knives (if equipped).
5. Thoroughly clean mounting areas and counter knife seats with suitable wire wheel or brush to insure all foreign material is removed. Visually inspect area for nicks and flatness of counter knife mounting area.
6. Mount counter knives in proper locations. Secure with hex bolts allowing counter knife movement to position adjacent knife and relative to cutters.
7. Rotate the rotor through two full turns to ensure proper cutter clearance. Some adjustment may be necessary.
8. Tighten mounting bolts to proper torque starting at center working outward. (NOTE: Bolt torque chart located in the appendix) (RMI recommends using a marking device to confirm that the proper torque has been applied to every cutter.)

5-7 Bearings

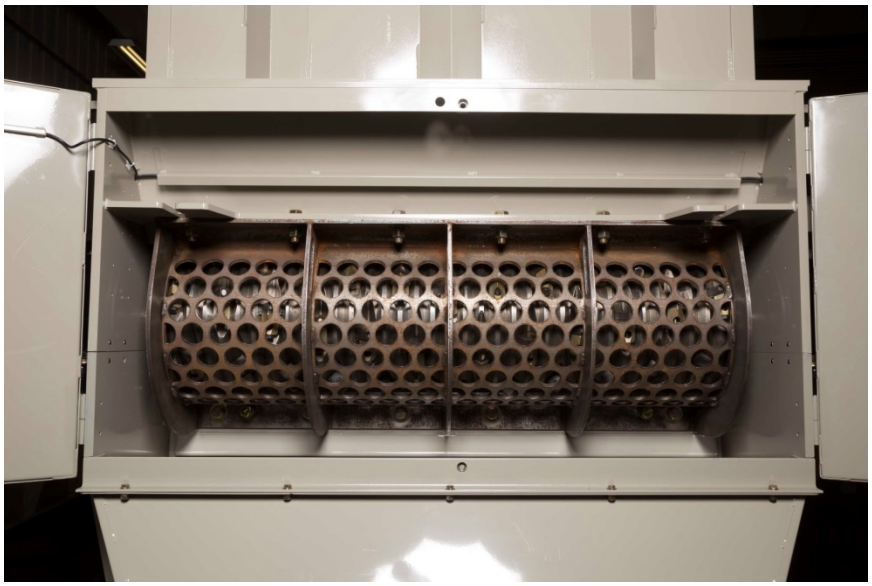
The two main pillow block bearings are located at each end of the rotor shaft and are used to support and locate the rotor shaft. The rotor is positioned in relation to counter knives at machine assembly and the bearings are positioned to maintain this location. Both bearings are floating allowing end-to-end movement due to heat growth. If rotor removal is required, you should consult Conair service for resetting the bearings on the rotor.

The two main pillow block bearings were packed with grease at machine assembly. They should be lubricated on a regular basis. The recommended cycle to grease these bearings is every 50 hours of operation. Do not over grease. Shell Albida 220 Synthetic Lithium Complex grease or equivalent should be used. (Refer to manufacturer's manual provided)

5-8 Screen (Optional)

A screen is optionally used to regulate particle size of material being processed. It is recommended that the screen condition and mounting should be inspected once a week for tightness, damage, and deformation. When replacement or removal is required the following procedure should be followed:

1. Follow all "Lock Out" procedures to insure machine cannot be operated while procedure is performed.
2. Remove mounting bolts that secure screen to machine.
3. Remove screen from discharge area.
4. Inspect mounting holes to insure threaded hole is clean from debris and foreign materials and threads are not damaged.
5. Install and locate screen to machine using suitable pry bar or lifting devise. Install mounting bolts and washers.
6. Locate screen in such a position as to insure no interference with rotor assembly is present.
7. Tighten mounting bolts to proper torque starting at center of screen working outward. (NOTE: Bolt torque chart located in the appendix)
8. Rotate rotor assembly 2 full rotations by hand to insure there is no interference before restarting machine.



5-9 Gear Box

The gear box is mounted on the rotor shaft and power from main motor is transmitted by either a banded V-belt or direct drive right-angle system. The function of the gear box is to reduce the drive motor RPM to the correct RPM for the rotor. The gear box contains a filler plug, pressure vent, and dip stick.

The gearbox was filled with oil at machine assembly. The oil level in the gearbox should be checked on a regular basis. Refill gearbox oil as necessary according to the manufacturer's recommendations for volume and type. Do not overfill the gearbox with oil. Refer to the included gearbox manufacturer's maintenance manual that was provided with this manual.

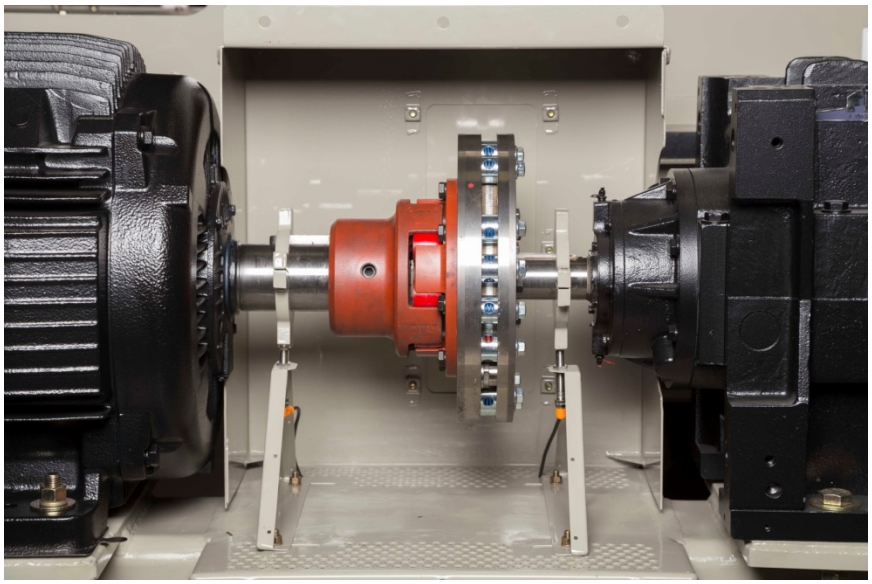
5-9a Direct Right-angle Drive

Most machines may be equipped with a right-angle direct drive gear box in place of the V-Belt drive. The direct drive system utilizes a flexible coupling between the motor and gearbox input shaft with an over-torque limiting clutch on the motor side. This arrangement allows torque to transmit below the clutch setting while allowing enough torque to shred material effectively. The clutch torque setting has been factory set.

(NOTE: The adjustment to the clutch spring compression must not be changed as it may result in drive system failure and voided warranty. This unit is factory calibrated and severe damage could result if unit is adjusted improperly. If it is felt that adjustment is necessary, contact Conair.)

The following procedure should be used when checking the coupling and clutch.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated, before maintenance is performed.
2. Open or remove clutch guard cover to gain access to coupling
3. Remove bolts on coupling cover
4. Inspect for cracks or tears in the flexible coupling; replace as necessary
5. Re-place coupling cover bolts
6. Inspect over-torque clutch for loose bolts or nuts; tighten as necessary (do not adjust spring compression value without consulting Conair)
7. Re-install clutch guard cover before restarting machine



5-9b V-Belt Drive (Optional)

Some machines are equipped with a parallel shaft gearbox. This parallel drive system utilizes two sheaves coupled together with a V-Belt to transmit motor power to the gearbox. There is an over-torque limiting clutch inside the sheave mounted directly to the gearbox input shaft. This arrangement allows torque to transmit below the clutch setting while allowing enough torque to shred material effectively. The clutch torque setting has been factory set.

(NOTE: The adjustment to the clutch spring compression must not be changed as it may result in drive system failure and voided warranty. This unit is factory calibrated and severe damage could result if unit is adjusted improperly. If it is felt that adjustment is necessary, contact Conair.)

One of the most important requirements in a V-belt drive system is belt tension. If the tension is less than recommended the drive will not deliver proper torque because of slippage and therefore shorten belt life. If the tension is more than recommended it will also shorten belt life and cause premature bearing failure. (NOTE: Over tension of the V-Belt may cause premature over-torque clutch failure from excessive side loading and void product warranty)

The belts should be checked on a regular basis. When new V-belts are installed on a drive the initial tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. After this initial time the recommended cycle to check belt tension is every 1000 hours of operation. Conair recommends the use of an accurate belt tension measurement device. (NOTE: Gates sells a belt sonic tension meter that works well in this application)

The belts used on this machine are banded 5V Predator (Kevlar) belts. Kevlar belts tension at a higher value than traditional rubber belts providing less slipping and slapping while providing more torque transmission. Special care must be taken to prevent over tension of these belts. The slapping of belts against the drive guard or other obstruction can cause V-Belt noise. Check for an improperly installed guard, loose belts or excessive vibration. Squealing of belts when a drive is started or while it is running is usually caused by a poorly tensioned drive and/or by a build-up of foreign material in the sheave grooves. But it can also be caused by oil or grease between the belt and the sheave groove.

Under no circumstances is the use of belt dressing recommended on a V-belt. The remedial effect is only temporary. It is much better to keep the belts and grooves of the drive clean. Dirt and grease reduce belt life. Belts should be wiped with a dry cloth occasionally to remove any build-up of foreign material. If the belts have been splattered with grease and/ or oil, clean them with methyl chloroform or soap and water. Flammable cleaners such as gasoline are to be avoided as a matter of safety.

Keep all sheave grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil and other foreign matter can lead to pitting and rust and should be avoided as much as possible. The belt's wedging action is reduced and it loses its gripping power. A shiny groove bottom indicates that the sheave, the belt or both are badly worn and the belt is bottoming in the groove. Badly worn grooves cause one or more belts to ride lower that the rest and the effect is the same as with mismatched belts.

Check alignment of drive. Sheaves that are not aligned properly cause excessive belt and sheave wear. When the shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. These overloaded belts wear out faster, reducing the service life of the entire set. If the misalignment is between the sheaves, the belts will enter and leave the grooves at an angle, causing excessive cover and sheave wear and premature failure.

The following procedure should be used when tensioning or replacing belts.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated, before maintenance is performed.
2. Open or remove belt guard cover to gain access to belts
3. Loosen locking nuts on torque arm turnbuckle
4. Adjust turnbuckle to obtain proper belt adjustment
5. Using a belt tension checking device adjust belts to manufacturer's specification. (Conair recommends using an ultrasonic belt tensioning meter to ensure proper tightness)
6. Re-tighten locking nuts on torque arm turnbuckle.
7. Secure locking tabs on locking nuts and turnbuckle to prevent loosening of the nuts from machinery vibration
8. Re-install belt guard access cover before restarting machine

5-10 Fluid Coupling (optional)

The fluid coupling is mounted on the main drive motor shaft and is designed to provide a smooth even start when the motor is started. It provides rotating force through a belt to the gear box that drives the rotor.

The gearbox was filled with oil at machine assembly. The oil level in the gearbox should be checked on a regular basis. Refill gearbox oil as necessary according to the manufacturer's recommendations for volume and type. Do not overfill the gearbox with oil. Refer to the included gearbox manufacturer's maintenance manual that was provided with this manual.

The fluid coupling is filled with oil at the machine manufacturer. The oil level in the fluid coupling should be checked on a regular basis. Fluid coupling oil should be checked after every 6 months of operation (fluid should be cold while performing check). Fluid coupling oil should be replaced after every 4000 hours of service. Refill fluid coupling oil as necessary according to the manufacturer's recommendations. Do not overfill the fluid coupling with oil. Refer to the fluid coupling manufacturer's maintenance manual that was provided with this manual.

The filling procedure is given here to provide the user with the knowledge of the design of the coupling. Because the fluid level affects the performance of the coupling, a correct filling procedure is necessary.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated before maintenance is performed.
2. Open or remove belt guard cover to gain access to fluid coupling
3. Turn the coupling so the "x" mark, which is cast into the housing, is at the top (maximum filling) position. This will ensure the filler plug is in the correct angular position.
4. Fill the coupling with oil until it overflows out of the filler hole. During filling, rock the coupling gently on its axis to ensure all excess air is vented.
5. Different filling levels (X-1-2-3-4) can be selected at the user's discretion to obtain different performances from the coupling. With "x" position fill (maximum) the fluid coupling will operate with minimum slippage and

maximum efficiency. By decreasing the oil filling level (X-1-2-3-4) slippage increases and maximum torque decreases. High values of slip decreases the units efficiency and will cause the oil to overheat.

6. Re-install the thermal fuse filler plug into the filler hole
7. Re-install belt guard access cover before restarting machine

Oil Temperature increases as the unit is used. The unit is equipped with a 250 deg F fusible plug. If the fusible plug blows at regular intervals in normal service, check the following listed possible causes for correction. High oil operating temperature can be caused by the following:

- ✓ Insufficient oil level
- ✓ Absorbed power is higher than the motor rated power
- ✓ High ambient temperature
- ✓ Too frequent starts
- ✓ Long starting time
- ✓ Inadequate air ventilation to allow cooling of the coupling. If coupling is operated in a restricted space, adequate ventilation apertures should be provided.

5-11 Main Rotor Motor

The motor is mounted to either the frame of the shredder or the swingbase of the right-angle drive system. Motor torque is transmitted either by a banded V-belt or direct drive right-angle system. Clean debris from around drive motors on regular basis. Inspect motor mounting for cracks or visual damage on regular basis. The motor contains grease fittings for bearing lubrication.

The motor was filled with grease at motor manufacturer. The grease level in the motor is sufficient for many years of lubrication under normal use. The time period between lubrication can vary depending on the ambient temperature and type of service. Grease the motor bearings as necessary according to the manufacturer's recommendations for volume and type. Do not over grease the motor bearings.

5-12 Torque Arm

The torque arm is bolted to the gearbox. Visual inspections of this device are recommended on a monthly basis. Inspect bushing for fatigue cracks in rubber cushion area. Inspect bushing pin bore for excessive movement between diameter and bore of bushing. The bushings are pressed into the torque arm assembly; therefore it is recommended to replace torque arm assembly and adjusting pin if bushing replacement is necessary.

5-13 Ram Wipers

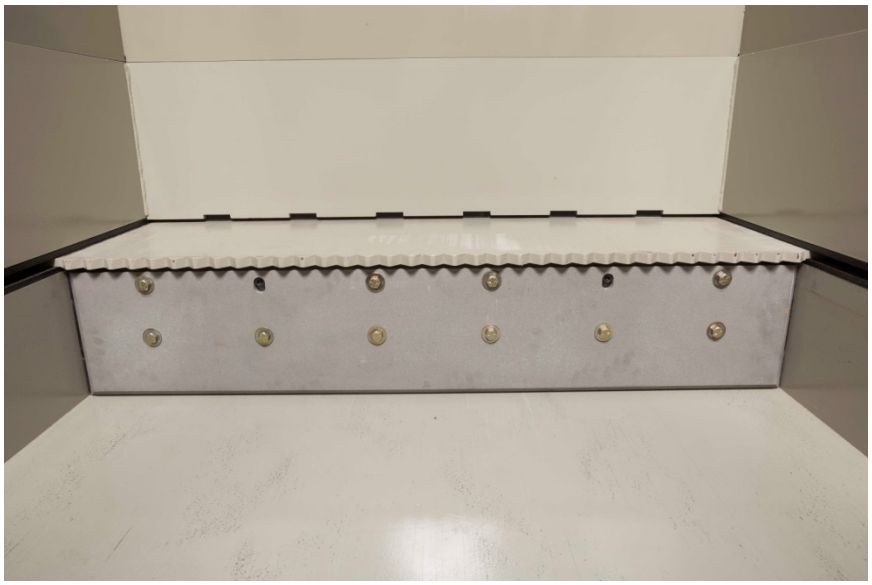
The ram is used to push product in the cutting chamber to the rotor for shredding. The ram assembly consists of frame, guide rail assembly, guide bearings, wipers, springs, and face plate. These components are used to support, align, and seal the ram feed mechanism.

Wipers are used to seal cutting chamber. Wipers consist of 2 lower, 2 sides, and 1 upper. Springs are used to keep pressure on wipers against the floor, sidewall and top of ram plate. It is recommended to inspect wipers on a monthly basis. Replacement will be necessary when 5/8" to 3/4" of wear is present. The following procedure should be used when inspecting or replacing ram wipers.

1. Follow all "Lock Out" procedures to insure machine cannot be operated while making repair.
2. Replace ram face wipers
    a. To gain access to ram face wipers provide safe access inside the hopper.
    b. Remove ram face plate hex bolts and ram face plate (two socket head screws remain in place to capture spacer plates and guide faceplate re-assembly)

c. Remove lower wipers, side wipers and springs
d. Clean the wiper pocket from all debris and contamination
e. Replace springs and wipers at the same time
f. Replace ram faceplate and hex bolts. Align plate as necessary preventing interference with the chamber floor and walls.
g. Tighten ram face plate bolts to proper torque (NOTE: Bolt torque chart located in the appendix)

3. Replace ram top wiper
    a. To gain access to ram top wiper remove frame cover plates above ram
    b. Remove ram top face plate hex bolts and ram top face plate (two socket head screws remain in place to capture spacer plates and guide faceplate re-assembly)
    c. Remove top wiper and springs
    d. Clean the wiper pocket from all debris and contamination
    e. Replace springs and wiper at the same time
    f. Replace ram top faceplate and hex bolts. Align plate as necessary preventing interference with the ram top
    g. Tighten ram top face plate bolts to proper torque (NOTE: Bolt torque chart located in the appendix)
4. Replace frame cover plates above ram before restarting machine



5-14 Ram Guide Rails

The ram is mounted on two plastic side guide rails in the frame of the machine. In addition the ram has cam followers for additional support either vertically or side to side.

The guide rails are typically made from UHMW plastic. They are generally considered worn when approximately 1/8” from original specs and should be replaced. Inspect for wear on monthly basis. The following procedure should be used when inspecting or replacing guide rails.

1. Follow all "Lock Out" procedures to insure machine cannot be operated while making repair.
2. Empty machine of all product
3. Manually move ram to full forward position
4. Remove all mounting bolts holding side rails in position
5. Remove and replace portion of side rail located furthest from rotor. The new guide rail should be flush with the vertical plane of the side rails.

6. Drill new locating holes for mounting bolts using a 3/8” drill bit
7. Replace bolts in only the portion of rail replaced
8. Turn on machine and manually move ram to full back position
9. Follow all "Lock Out" procedures to insure machine cannot be operated while continuing to make repair
10. Remove and replace portion of side rail located nearest to rotor. The new guide rail should be flush with the recently replaced rail
11. Drill new locating holes for mounting bolts using a 3/8” drill bit
12. Replace remaining bolts
13. Replace frame cover plates above ram before restarting machine

5-15 Ram Rollers

Ram guide rollers are used to limit side-to-side movement of ram plate assembly. It is necessary to maintain proper adjustment of bearings at all times. Inspect on a weekly basis. Failure to adjust bearings at regular intervals could result in hydraulic cylinder failure, hydraulic cylinder mounting trunion failure or premature guide rail and wiper wear/failure. The following procedure should be used when inspecting or replacing ram rollers.

1. Manually move ram to full reverse position
2. Follow all "Lock Out" procedures to insure machine cannot be operated while making repair.
3. Remove two mounting bolts from ram roller bracket
4. Add or remove ram roller shim plates as necessary. Move roller assembly outward until bearing face contacts machine wall
5. Replace two roller bracket mounting bolts
6. Repeat above procedures for the remaining roller brackets

5-16 Hydraulic System

The hydraulic system consists of a dual main pump, drive motor, one or two hydraulic cylinder(s), reservoir and related control valves. It is used to control the feed ram of the machine. The programmable controller in the main electrical control panel controls the operation of the system. The auxiliary pump is control by a separate control panel located on side of main panel.

Power Unit
The hydraulics power system employs a high quality return oil filter. The filter has an indicator that changes color when it is time to be changed. Check filter every 30 days. The hydraulic fluid should last indefinitely unless it suffers severe overheating.

A temperature and level switch stops machine operation whenever fluid level is too low or operating temperature is too high.

Inspect breather filter and replace when required. If machine is operated in extreme temperature conditions, adding an oil heater or oil cooler may be required.

The hydraulic power unit was filled with M.G. Premium AW32 hydraulic oil at machine assembly. The oil level in the tank should be checked on a regular basis. Refill hydraulic oil as necessary with this oil or equivalent. Do not overfill the hydraulic tank with oil.

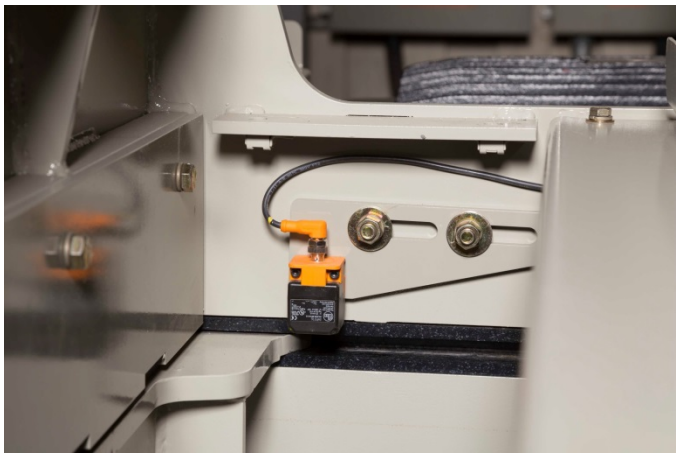
Before operating machine during initial start-up, cycle the hydraulic pump several times for a short duration to insure pump has fluid available. After establishing that hydraulic pump is providing pressure, cycle the hydraulic cylinders without load several times to insure proper operation. Recheck hydraulic reservoir after first 30 minutes of operation.

Cylinder(s)
The hydraulic cylinder requires lubrication to clevis pins. Grease fittings located on clevis eye require lubrication with grease once monthly. Visually inspect following items frequently:

- ✓ Inspect all lines and fittings for leakage
- ✓ Inspect rod end of cylinder for leakage at packing cap seals.
- ✓ Inspect support eyes for wear
- ✓ Inspect clevis pin and snap rings.
- ✓ Inspect clevis for cracks and looseness, Replace all loose or worn parts immediately.
- ✓ Visually inspect all fittings and hoses and components for leakage on a daily basis. Replace or repair all defective items immediately.
- ✓ Keep areas around motor and hydraulic unit clean of debris, foreign materials on a daily basis.

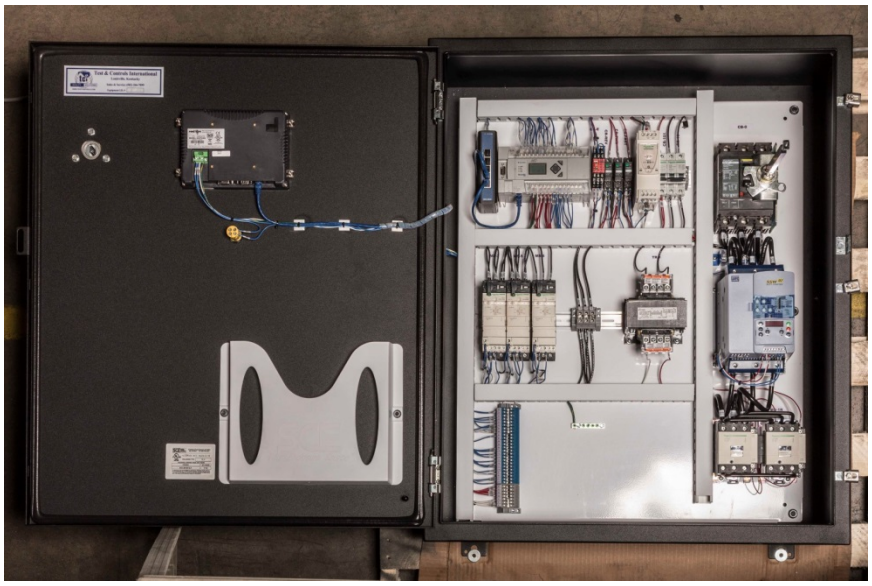
5-17 Safety Sensors

The shredder uses inductive proximity sensors throughout the machine. The rotor door safety sensor is mounted below the hopper lip and switches when the doors are opened. The ram forward and reverse sensors are mounted on the sidewall of the machine and open/close when the ram passes underneath. The over-torque limiting clutch pulse counter safety sensors are mounted on the gearbox and accumulate pulses as the clutch turns. Each of these sensors should be inspected routinely for loose hardware, loose wires, or damage. If any of these sensors are disconnected from the junction box / control panel the machine will stop and red light will mark the fault on the manual operation screen. See the parts list in the Appendix section for replacement items.



5-18 Control Panel

The shredder control panel includes various electrical components to control the normal operation functions of the shredder. Electrical schematics, layout diagrams and parts lists were supplied with this manual and inside the electrical enclosure at the time of shipment.



The brain of the panel is the Allen-Bradley Micrologix 1400 Programmable Logic Controller (PLC). The relay output contacts of this PLC are protected by isolation relays where solenoids and contactors are controlled. The input contacts are 24vdc and derive from various sensors, relay contacts and switches. The analog input receives 24vdc scaled inputs from a pressure transducer and current transducer providing the necessary signal to trigger machine operating responses. (These 24vdc analog sources should be carried in shielded cable separate from 460vac and 115vac wiring)

The high-voltage wiring is fused at the main disconnect and additional branch fuses for the smaller amperage devices; all fusing provided via resettable circuit breakers. The high-amperage wiring for the main rotor motor passes through a soft-starter device and reversing contactor set before exiting the cabinet to the motor. The main control panel breaker provides line protection for this high-amperage wiring and the soft-starter provides overload protection for the motor. The low-amperage wiring for the smaller hydraulic motor passes through a circuit breaker and starter/overload combination device before exiting the cabinet to the hydraulic motor.

The low-voltage wiring is stepped down from the 3-phase service and fused with circuit breaker. The PLC and soft starter are powered from line source and the remaining inputs/outputs for the machine are derived after series of multiple E-Stop buttons.

Chapter 6: Troubleshooting

6-1 Introduction

The utmost in safety precautions should be observed at all times when working on or around the machine and the electrical components. All normal trouble-shooting must be accomplished with the power off, line fuses removed, and with the machine tagged as out of service.

The use of good quality test equipment cannot be over-emphasized when troubleshooting is indicated. Use a good ammeter that can measure at least twice the AC and DC current that can be encountered for the machine. Be sure that the voltmeter has at least minimum impedance of 5,000 OHMS-per-volt on AC and 20,000 OHMS-per-volt on DC scales. Popular combination meters, VOM and VTVM can be selected to provide the necessary functions.

Before making haphazard substitutions and repairs when defective electrical components are malfunctioning, we recommend that you check the associated circuitry and assemblies for other defective devices. It is common to replace the obviously damaged component without actually locating the real cause of the trouble. Such hasty substitutions will only destroy the new component. Refer to wiring diagrams and schematics.

Locating mechanical problems, should they occur, is relatively straightforward. When necessary, refer to the parts catalog section.

Problem	Possible Cause	Possible Remedy
Machine blocks or switches itself off.	1. Too much feed material. 2. Knife condition. 3. Cutting gap. 4. Discharge blocked. 5. Fuse too small. 6. Rotational direction of rotor. 7. Rotor speed.	1. Reduce shreding material. 2. Check knives and re-sharpen if needed. 3. Check cutting gap and set according to this manual. 4. Check if discharge conveyor is running. 5. Fit larger fuse - only after consulting customer service. 6. Check motor and reverse polarity if necessary. 7. Change rotor speed - only after consulting customer service.
Rotor does not grip bulky material.	1. Knife condition. 2. Protruding bed knife.	1. Check and sharpen if needed, according to the instructions manual. 2. Consult customer service
Overheating grinding material.	1. See first five causes for “Machine blocks or switches itself off” 2. Knives sharpened wrongly. 3. Insufficient cooling.	1. See first five causes for “Machine blocks or switches itself off” **2.** Modify knife finish **after consulting customer service.** 3. Fit rotor cooling.

Problem	Possible Cause	Possible Remedy
Unusual vibrations.	1. Bearing damage. 2. Anti-vibration pads defective.	1. Check bearings and replace if needed. 2. Check mounting pads and renew if needed.
Extreme cutter wear.	1. Bearing damage. 2. Knife finish. 3. Wrong cutting gap. 4. Foreign matter.	1. Check bearings and replace if needed. 2. Check knife and sharpen/replace if needed. 3. Check cutting gap and set according the instructions in this manual. 4. Fit feed device with metal detector.
Bearings too hot.	1. Too much grease. 2. Rubbing on housing sealing ring. 3. Bearing damage. 4. No grease in bearing.	1. Reduce amount of grease. 2. Check sealing ring, oil or replace. 3. Check bearings and replace if needed. 4. Lubricate bearing.
Cutting gap alters during operation.	1. Knife mounting screws not tight. 2. Screw fatigue. 3. Washers are deformed. 4. Knife holder surface is deformed. 5. Support surfaces are dirty. 6. Threads in housing are worn.	1. Re-tighten using torque wrench in accordance with this manual. 2. Fit new screws. 3. Insert new washers. 4. Insert new knife holders. 5. Clean and re-dust surfaces. 6. Fit new brushes in housing.
Shredder does not start.	1. Main and control fuses. 2. Feed device not connected. 3. Material jam. 4. Motor protection switches are off.	1. Replace fuse. 2. Switch ON in sequence. 3. Empty shredder before switching ON. 4. Check motor relay for correct setting and increase if needed.
Shredder blocks when under load.	1. Feed starts too early. 2. Fuse is defective. 3. Motor fuse switches off - red indicator.	1. Start feed only after soft-starter startup ramp. **2.** Replace fuse; Fit larger fuse - **only after consulting customer service.** 3. Reduce feed quantity; Correct setting; Replace fuse.
Frequent switching OFF of grinding material in-feed device.	1. Current relay switches off.	1. Correct setting.

Chapter 7: Appendix

7-1 Returned Material Policy

Credit Returns

Prior to the return of any material, authorization must be given by the **manufacturer**. A return material authorization (RMA) number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

All returned material purchased from the **manufacturer** is subject to 15% ($75.00 minimum) restocking charge.

All returns are to be shipped prepaid. The invoice number and date or purchase order number and date must be supplied.

No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

Warranty Returns

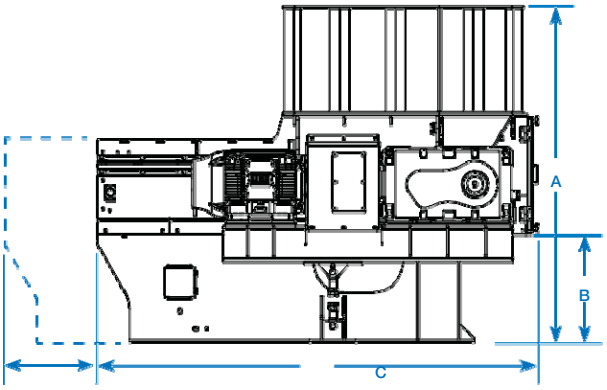
Prior to the return of any material, authorization must be given by the **manufacturer**. A return material authorization (RMA) number will be assigned for the equipment to be returned.

Reason for requesting the return must be given. All returns are to be shipped prepaid. The invoice number and date or purchase order number and date must be supplied.

After inspecting the material, a replacement or credit will be given, at the manufacturer's discretion, if the item is found to be defective in materials or workmanship. Purchased components are covered under their specific warranty terms.

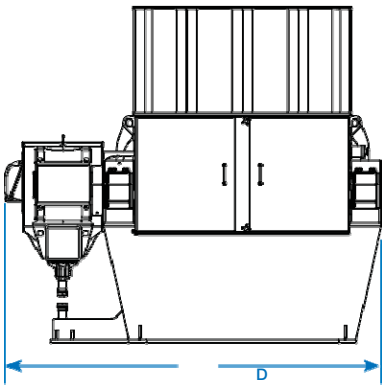
7-2 Technical Specifications

Front view

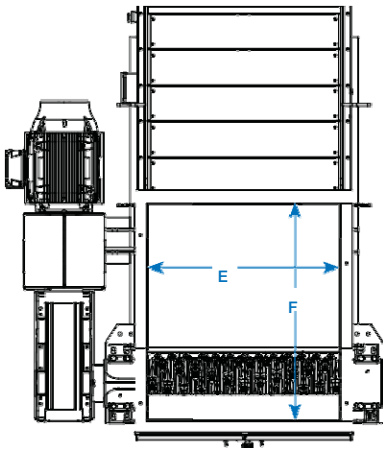


Open clearance add
36 inches {914 mm}

Side view



Top view



Models	FLEX 1530	FLEX 1542	FLEX 1554	FLEX 1566	FLEX 2054	FLEX 2066	FLEX 2078
Performance characteristics							
Cutting chamber opening inches {mm}	30 x 50 {762 x 1270}	42 x 50 {1067 x 1270}	54 x 60 {1372 x 1524}	66 x 85 {1676 x 2159}	54 x 65 {1372 x 1651}	66 x 90 {1676 x 2286}	15 {381}
Rotor speed rpm	110 - 130						
Rotor diameter inches {mm}	15 {381}				20 {508}		
Motor range Hp {kW}	40-75 {30-56}	40-100 {30-75}	75-200 {56-149}	100-250 {75-186}	100-250 {75-186}	125-300 {93-224}	150-300 {112-224}
Ram height inches {mm}	11 {279}				16 {406		
Ram hydraulic motor Hp {kW}	7.5 {5.6}						
Screen hole diameter inches {mm}	3/8 - 4 {9 - 102}						
Screen type	standard round or square options available						
Dimensions standard configuration inches {mm}							
A - Overall height (to infeed)	93.5 {2375}						
B - Height of discharge	30.0 {762}						
C - Total length	103.0 {2616}		123.0 {3124}	173.0 {4394}	133.0 {3378}	183.0 {4648}	213.0 {5410}
Length when open	139 {3530}		159 {4039}	209	169	219	249
D - Total width	74.5 {1892}	92.5 {2350}	104.5 {2654}	116.5 {2959}	108.5 {2756}	120.5 {3061}	131.5 {3340}
E - Feed hopper opening width	29.3 {744}	41.1 {1044}	53.1 {1349}	65.1 {1654}	53.1 {1349}	65.1 {1654}	76.1 {1933}
F - Feed hopper opening length	50.0 {1270}		60.0 {1524}	85.0 {2159}	65.0 {1651}	90.0 {2286}	105.0 {2667}
Approximate installed weight lb {kg}	8000 {3629}	10000 {4536}	14000 {6350}	17000 {7711}	15000 {6804}	18000 {8165}	22000 {9979}
Voltages Full load amps							
460 V/3 phase/60 hz	Consult Conair						

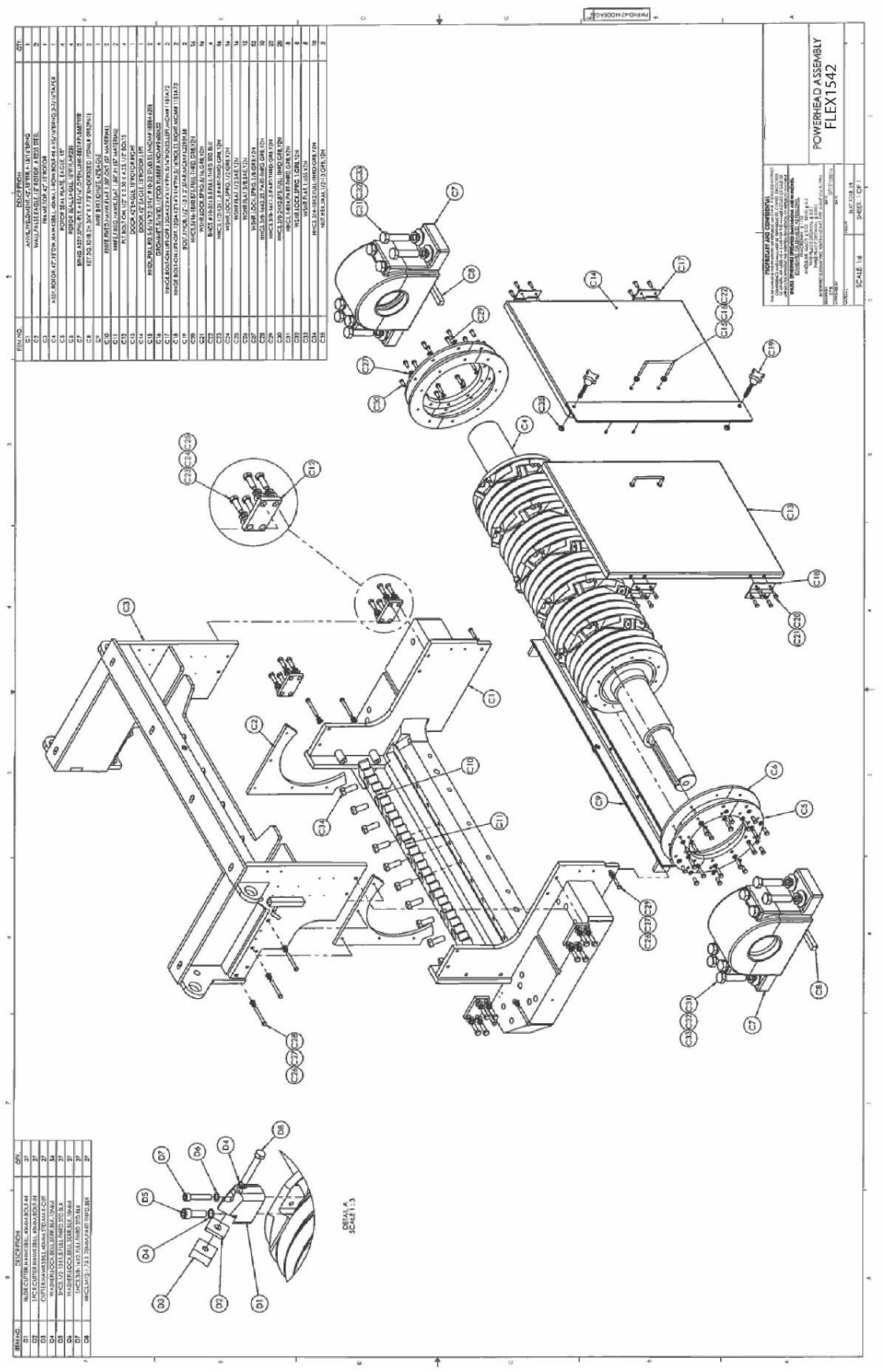
Specification Notes

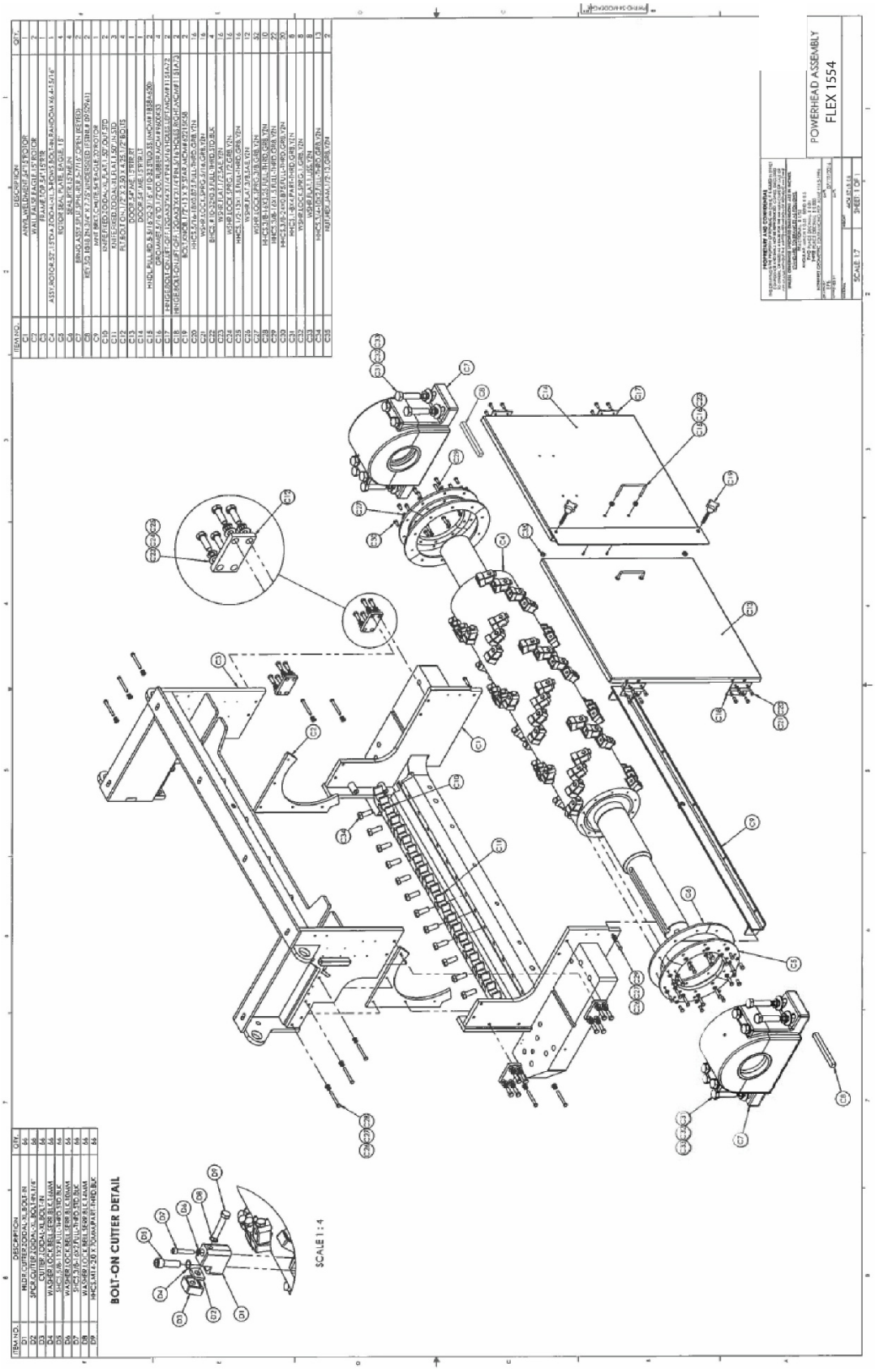
Consult factory for throughput specifications.

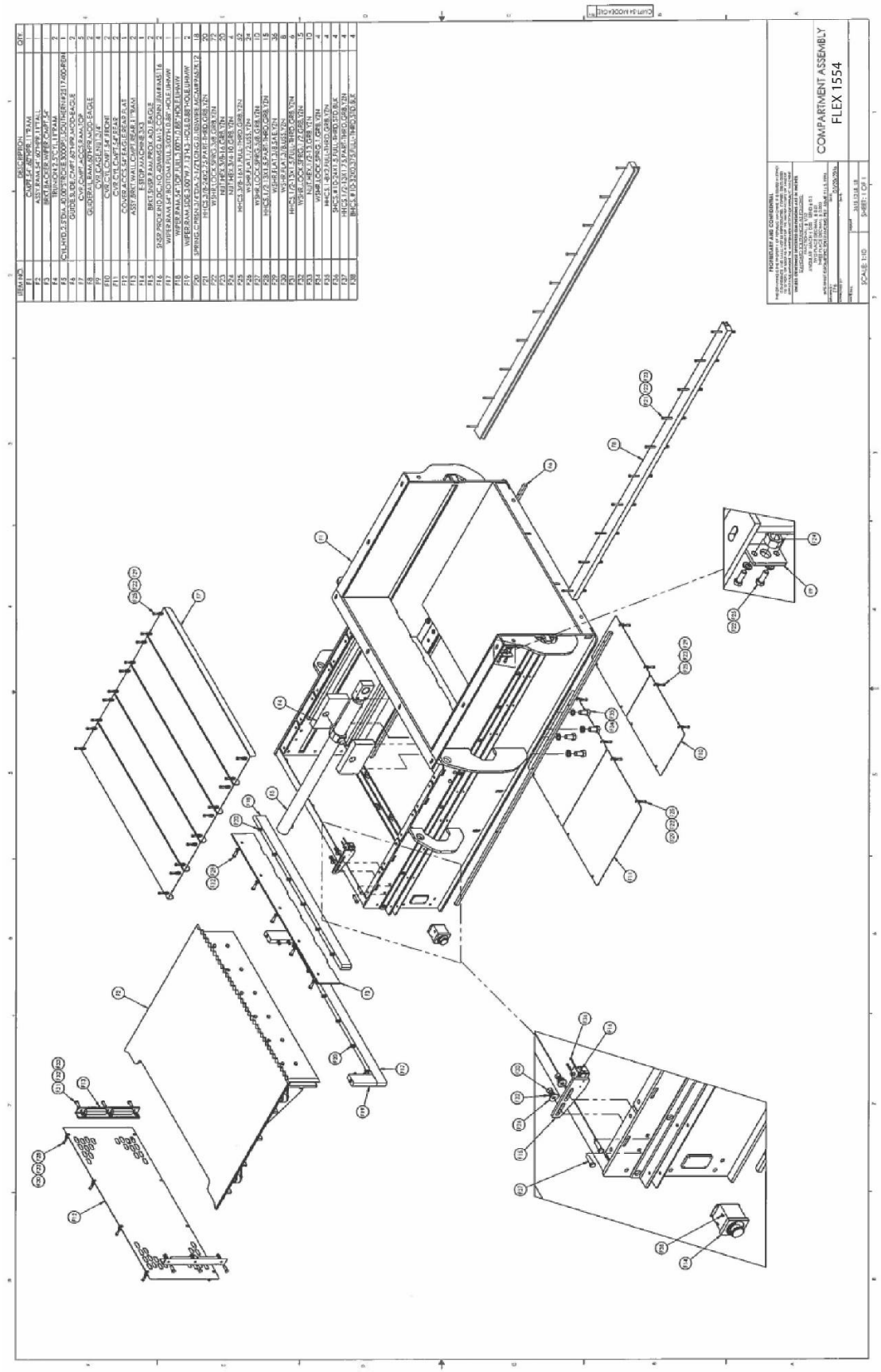
Specifications may change without notice. Consult with a Conair representative for the most current information.

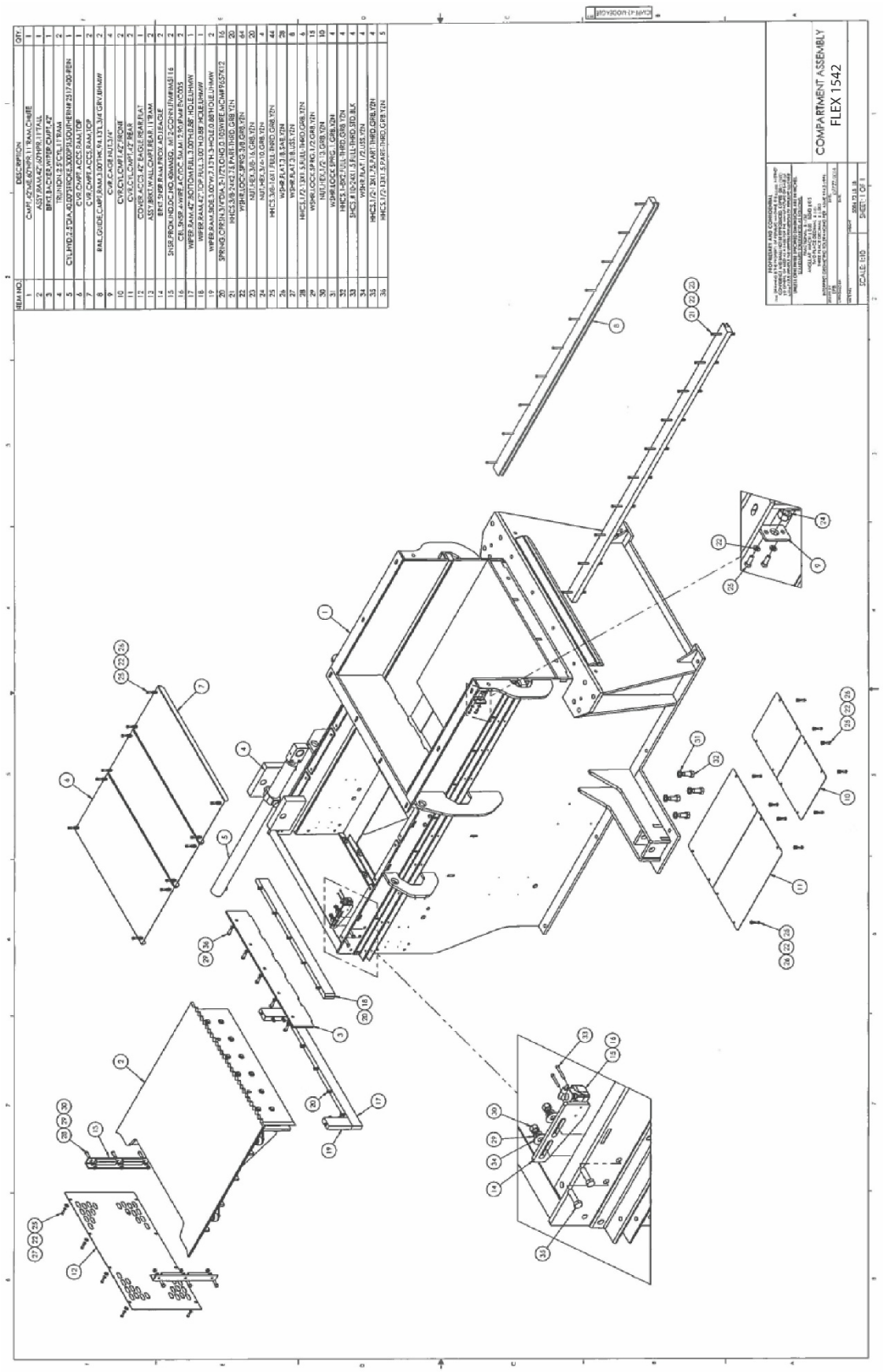
7-3 Exploded View Drawings

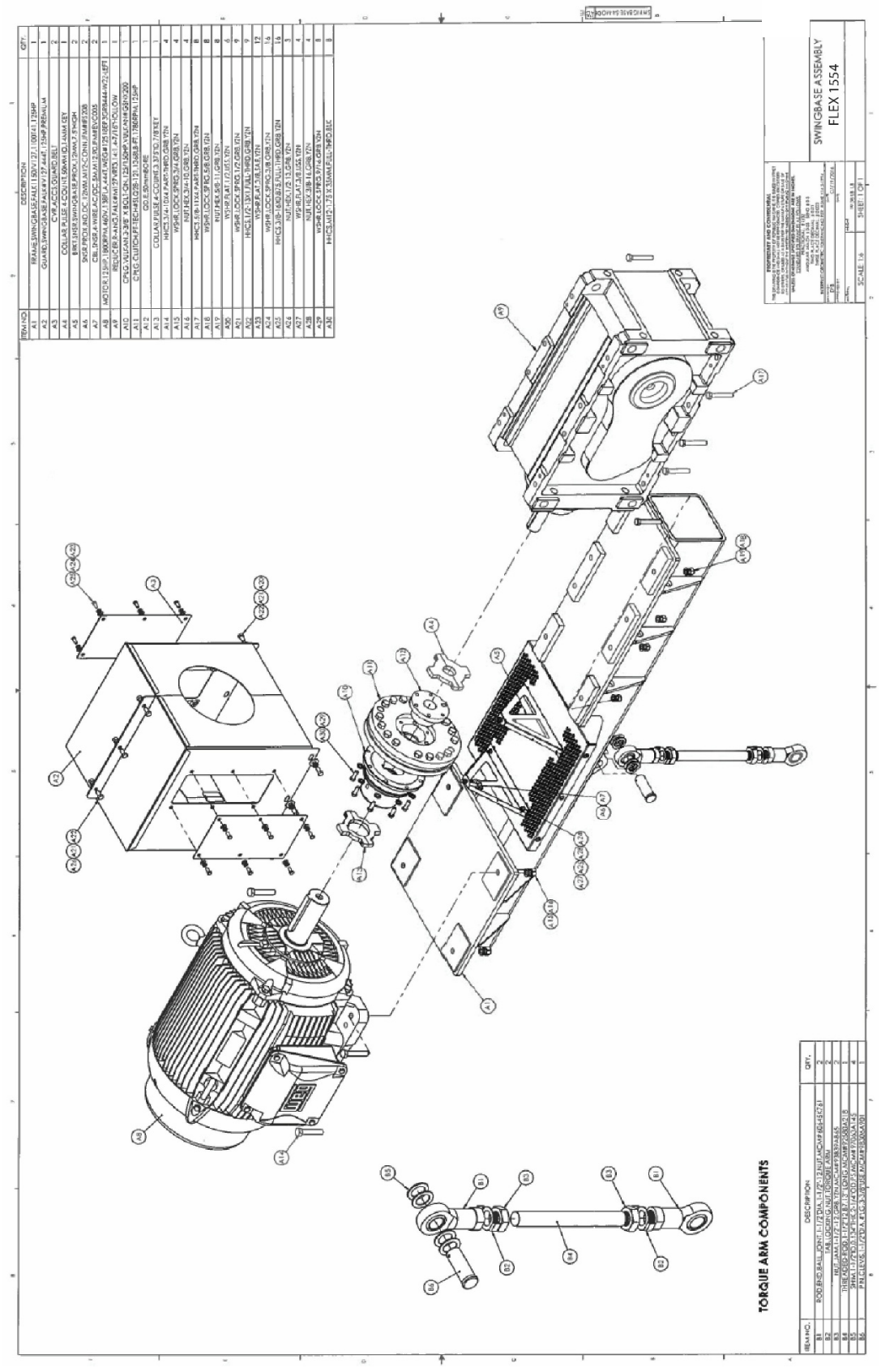
7-4 Parts List

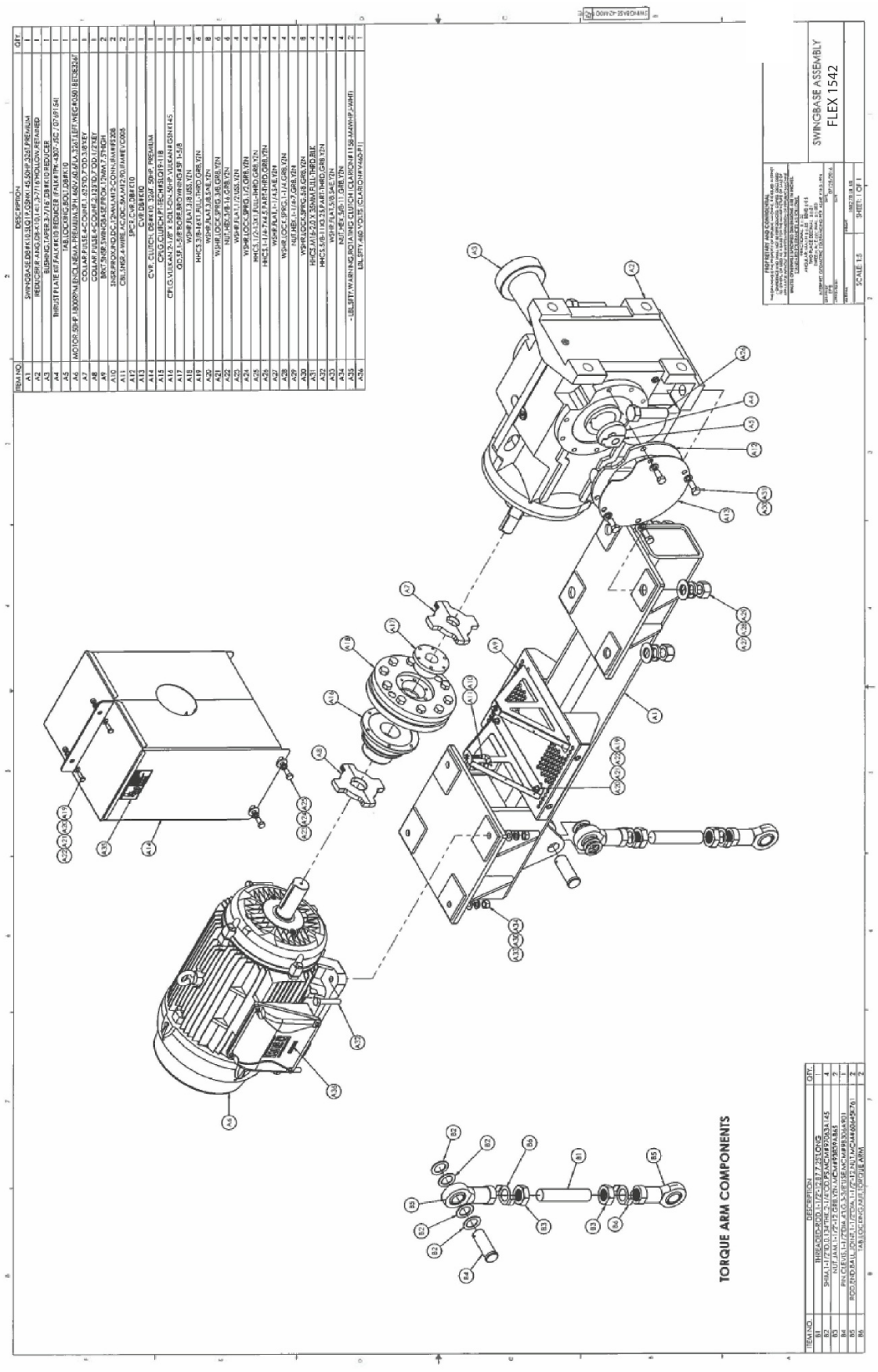



POWERHEAD ASSEMBLY
FLEX 1554
SCALE 1:7
SHEET 1 OF 1
BOLT-ON CUTTER DETAIL
SCALE 1 : 4


COMPARTMENT ASSEMBLY
FLEX 1554


COMPARTMENT ASSEMBLY
FLEX 1542


SWINGBASE ASSEMBLY
FLEX 1554
TORQUE ARM COMPONENTS


SWINGBASE ASSEMBLY
FLEX 1542
TORQUE ARM COMPONENTS

7-5 Hydraulic Schematic

The hydraulic schematic for the shredder was supplied inside the main control cabinet at the time of shipment and with this manual.

7-6 Electrical Schematic

The electrical schematic for the shredder was supplied inside the main control cabinet at the time of shipment and with this manual.

7-7 Bolt Torque Chart

Grade 8 - Zinc Plated				
Dia	Coarse Thread		Fine Thread	
1/4	20	11 ft-lbs	28	13 ft-lbs
5/16	18	22	24	24
3/8	16	39	24	45
7/16	14	63	20	70
1/2	13	96	20	108
5/8	11	191	18	216
3/4	10	339	16	378
7/8	9	545	14	602
1	8	818	14	918
1-1/8	7	966	12	1083
1-1/4	7	1363	12	1509
1-3/8	6	1787	12	2034
1-1/2	6	2371	17	2668

Socket Head Cap Screw - Plain				
Dia	Coarse Thread		Fine Thread	
1/4	20	14 ft-lbs	28	16 ft-lbs
5/16	18	29	24	32
3/8	16	51	24	58
7/16	14	81	20	91
1/2	13	124	20	140
5/8	11	238	18	270
3/4	10	423	16	472
7/8	9	682	14	752
1	8	1022	14	1147

Metric Grade 10.9 - Plain				
Dia	Coarse Thread		Fine Thread	
M6	1	11		
M7	1	18		
M8	1.25	27	1	
M10	1.5	53	1.25	
M12	1.75	93	1.25	
M14	2	148	1.5	
M16	2	230	1.5	
M18	2.5	318	1.5	
M20	2.5	449	1.5	
M22	2.5	613	1.5	
M24	3	777	2	
M27	3	1139	2	
M30	3.5	1544	2	
M33	3.5	2101	2	
M36	4	2700	3	

7-8 Technical Assistance

Parts & Service Department

Call toll-free 8am–5pm EST (800) 458-1960 or call (814) 437-6861. The Conair customer service group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. Conair welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

Sales Department

Call (814) 437-6861 Monday–Friday, 8am–5pm EST Our products are sold by a worldwide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

Contract Department

Call (814) 437-6861 Monday–Friday, 8am–5pm EST Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

We're Here to Help

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

How to Contact Customer Service

To contact Customer Service personnel, call:

- **NOTE:** Normal operating hours are 8:00 am - 5:00 pm EST. After hours emergency service is available at the same phone number.

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

Before You Call...

If you do have a problem, please complete the following checklist before calling Conair:

Make sure you have all model, control type from the serial tag, and parts list numbers for your particular equipment. Service personnel will need this information to assist you.

Make sure power is supplied to the equipment.

Make sure that all connectors and wires within and between control systems and related components have been installed correctly.

Check the troubleshooting guide of this manual for a solution.

Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.

Check that the equipment has been operated as described in this manual.

Check accompanying schematic drawings for information on special considerations.

Equipment Guarantee

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

Performance Warranty

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- .... Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices or improper operation.)
- .... Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- .... Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

Warranty Limitations

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.