CUMBERLAND®

INSTRUCTION MANUAL

28B GRANULATOR

D-349357

Plastics Machinery
JOHN BROWN

CUMBERLAND

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MACHINE DATA

MODEL_____

SERIAL NUMBER_____

CUMBERLAND CUSTOM ORDER NUMBER_____

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SAFETY INSTRUCTIONS

STOP!

BEFORE YOU START: IMPORTANT DO NOT OPERATE OR SERVICE YOUR GRANULATOR UNTIL YOU READ THESE SAFETY RULES

GENERAL SAFETY REGULATIONS FOR SIZE REDUCTION MACHINERY OPERATION

CUMBERLAND EXERTS ITS BEST EFFORTS TO DESIGN AND MANUFACTURE ITS EQUIPMENT IN COMPLIANCE WITH GENERALLY ACCEPTED SAFETY STANDARDS AND NEWLY ENACTED LAWS. HOWEVER, UNDER OSHA ULTIMATE RESPONSIBILITY FOR COMPLIANCE WITH THE PROVISIONS OF THAT ACT RESTS WITH THE USER OF EQUIPMENT COVERED BY THE ACT ALSO, UNDER OSHA SOME STANDARDS HAVE NOT YET BEEN DEFINED AND SOME STANDARDS OF MEASUREMENT HAVE NOT BEEN DEVELOPED OR AGREED UPON. ENVIRONMENTAL AND ADMINISTRATIVE CONTROL OF THE EQUIPMENT, AS WELL AS LOCAL ENGINEERING ADAPTATIONS AND MAINTENANCE, ARE WITHIN THE EXCLUSIVE CONTROL OF THE USER AFTER SALE. THEREFORE, WHILE THE EQUIPMENT TO BE DELIVERED HEREUNDER MAY BE IN COMPLIANCE WITH THE PROVISIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 WHEN OPERATED UNDER PARTICULAR ENVIRONMENTAL, MAINTENANCE AND PRODUCTION CONDITIONS, CUMBERLAND CANNOT REPRESENT THAT STANDARD EQUIPMENT TO BE DELIVERED BY IT WILL BE IN COMPLIANCE WITH THE SAID ACT AND EXPRESSLY DISCLAIMS ANY RESPONSIBILITY FOR ANY NON-COMPLIANCE OF THIS EQUIPMENT WITH SAID ACT.

SAFETY AND YOUR CUMBERLAND ENGINEERING GRANULATOR

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.

PARTICULAR ATTENTION MUST BE PAID TO THE APPROPRIATE PAGES OF THIS MANUAL WHERE WARNINGS AND CAUTIONS ARE CLEARLY WRITTEN OUT FOR YOUR PROTECTION. ALSO HELPFUL AS A GUIDE, IS THE OSHA GENERAL INDUSTRY SAFETY AND HEALTH STANDARDS (OSHA) 2206 (29CFR 1910) SECTIONS 1910.216 AND 1910.221.

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.

FOR ALL REPAIRS, REPLACEMENTS OR SERVICING, TURN POWER OFF AT ALL SOURCES OF ELECTRICAL AND PNEUMATIC SYSTEMS BEFORE ATTEMPTING ANY SERVICING.

IN READING THE FOLLOWING GUIDELINES FOR SAFETY, IT SHOULD BE RECOGNIZED THAT IT IS THE RESPONSIBILITY OF EACH INDIVIDUAL TO OBSERVE THE PRESCRIBED SAFETY RULES AS OUTLINED, ALL WARNING AND DANGER SIGNS MUST BE OBSERVED AND OBEYED. ALL ACTUAL OR POTENTIAL DANGER AREAS MUST BE REPORTED TO YOUR IMMEDIATE SUPERVISOR.

THIS MANUAL EMPHASIZES INSTRUCTIONS AND DESCRIPTIONS WHERE SAFETY AND PRECAUTIONS ARE RECOMMENDED FOR THE OPERATION AND MAINTENANCE OF THIS GRANULATOR AS DESCRIBED THEREIN.

POST A CONSPICUOUS WARNING SIGN OVER THE CONNECTOR FOR THE POWER SOURCE WARNING OTHERS **NOT** TO TURN POWER "ON" WHEN REPAIRS ARE BEING MADE.

GENERAL SAFETY RULES

1. ABIDE BY YOUR COMPANY'S SAFETY REGULATIONS

2. KNOW THE WEIGHT OF THE MACHINE

   Select lift trucks, cranes, slings and ropes of ample strength to lift this weight if necessary to place the machine where it cannot be rolled into position.

3. USE THE LIFTING POINTS DESIGNATED

   Slings attached to small brackets, metal cabinets, hoppers or sheet metal covers may break away and drop the machine.

4. LOCATE THE MACHINE SO THAT ACCESS IS GIVEN TO ELECTRICAL COMPONENTS, SCREEN, HOPPER ETC.

   Safety of service and maintenance personnel is involved. Maintenance personnel should have unobstructed access to the units on which they will be working.

5. LOCATE FOR ADEQUATE CLEARANCE

   To avoid squeezing people working near a machine, there should be adequate clearance maintained between machines, walls or partitions.

6. CHECK OPEN POSITION OF DOORS

   Hinged doors and covers should have full swing. Restrictions may force work in cramped quarters. An off-balance operator with an awkward reach into a partially obscured area is unsafe.

7. CHECK DIRECTION OF ROTATION OF MOTORS

   Test motors for rotational direction as stipulated in the manual. Wrong direction may cause damage, back off threaded fasteners, make pieces of materials being granulated fly up in unexpected directions.

8. GROUND THE MACHINE

This will make sure the machine will never be a "HOT WIRE", a source of electrical potential.

9. MAINTAIN A SAFE WORKING AREA

Your working area should be clean and uncluttered. Give yourself room for a firm, well balanced stance.

10. BE HARD TO CATCH

Don't wear dangling neckties, necklaces, medallions, loose fitting clothing, wrist watches, bracelets or rings, tie back long hair or wear hair net.

11. WEAR A FACE SHIELD OR SAFETY GLASSES

Unexpected heavy cutting or granulating may give a shower of abrasive pieces. Protect your eyes.

12. CHECK: ARE ALL COVERS, SCREENS AND GUARDS IN POSITION AND SECURELY FASTENED

Be sure all covers and guards are in position before operating the machine. Do not operate a machine with missing covers, screens, or guards. Be sure that all fasteners are being used and that all are firmly tightened.

13. REMOVE WRENCHES, LOOSE TOOLS AND ALL LOOSE OBJECTS FROM THE MACHINE

Free objects may walk into the machine areas and cause unexpected interferences and damage.

14. DON'T LEAN AGAINST THE MACHINE OR REST YOUR HANDS OR FEET ON IT

You may be surprised or injured by a moving part or shower of material. Don°t let talking companions lean on your machine while it is running, they, too, might be surprised and injured.

15. NEVER OPEN OR REMOVE ANY MACHINE COMPONENTS, WHICH ARE SECURED BY WRENCH-TYPE FASTENERS, UNLESS THE MOTOR IS ELECTRICALLY LOCKED OUT AND THE ROTOR IS COMPLETELY MOTIONLESS.

GENERAL SAFETY REGULATIONS
FOR
SIZE REDUCTION MACHINERY OPERATION
****

This machine utilizes 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 and understood and periodically reviewed by all personnel involved in anyway with this machine.

NEVER OPERATE OR REMOVE ANY MACHINE COMPONENTS WHICH ARE SECURED BY WRENCH-TYPE FASTENERS UNLESS THE MOTOR IS ELECTRICALLY LOCKED OUT AND THE ROTOR IS MOTIONLESS.

NEVER OPERATE MACHINE WITH CUTTING CHAMBER COVERS, DISCHARGE CHUTE OR ANY GUARDS OR COVERS REMOVED OR UNSECURED. SAFETY INTERLOCKS MUST NOT BE CIRCUMVENTED.

Prior to clearing a jam, 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 MACHINE TO CLEAR JAM.

NEVER EXTEND ANY PART OF BODY INTO FEED ROLL OPENINGS UNLESS THE MOTORS ARE ELECTRICALLY LOCKED OUT AND THE ROTOR AND FEED ROLLS ARE MOTIONLESS.

NEVER EXTEND FINGERS THROUGH HOLES IN SCREEN.

NEVER EXTEND ANY PART OF BODY INTO DISCHARGE AREA UNLESS THE MOTOR IS ELECTRICALLY LOCKED OUT AND THE ROTOR IS MOTIONLESS.

Be sure that the v-belts are properly aligned and that tension is at its maximum. See Chart on Page 7-3.

NEVER ATTEMPT TO START MACHINE OR JOG ROTOR UNLESS THE DISCHARGE CHUTE AND ALL COVERS AND GUARDS ARE SECURELY BOLTED IN THEIR CORRECT OPERATING POSITIONS.

SAFETY EQUIPMENT

A) A magnetic motor starter with control transformer must be used when safety switches are installed. Manual starters should not be used under any conditions.

B) SAFETY SWITCHES FOR GRANULATORS

1. CUTTING CHAMBER

Safety switches at all access covers are wired into the starter control circuit. The machine cannot be started when these parts are open. However, for safety purposes, the machine should be disconnected from the power lines by a disconnect switch or by removing the plug from its receptacle. Check all safety switches periodically for proper operation.

C) SAFETY TAGS

A set of metal plates which should be attached to the machine to warn of potential danger.

D) BELT TENSIONING GAUGE AND CHARTS

Provides a method of obtaining correct belt tension to prevent belt slippage.

E) BRAKE MOTORS (OPTIONAL)

An integral brake stops motor within a few seconds of actuation of stop button. Greatly reduces time required for rotor to stop.

F) SOUND REDUCTION EQUIPMENT (OPTIONAL)

Sound reduction equipment will bring the sound level of your machine to within the limitations of the Occupational Safety and Health Act. Material, part configuration, feed rate and ambient noise level must be specified at time of inquiry.

CLEARING A JAMMED CUTTING CHAMBER

1. DISCONNECT AND LOCK OUT POWER

2. BE CERTAIN THAT ROTOR IS MOTIONLESS

3. OPEN MACHINE AS PER INSTRUCTIONS

4. REMOVE SCREEN

NEVER ATTEMPT TO FREE A JAMMED MACHINE BY PLACING HANDS ON ROTOR, ROTOR KNIVES OR WITHIN CUTTING CHAMBER

HANDS MUST BE KEPT CLEAR OF THE ROTATIONAL PATH OF THE ROTOR KNIVES

A PRY BAR SHOULD BE USED TO EXERT FORCE ON THE ROTOR, USUALLY IN THE DIRECTION OPPOSITE NORMAL ROTATION.

GOOD FOOTING ON A CLEAN FLOOR IS ESSENTIAL AND THE BODY SHOULD BE WELL BRACED WHEN PERFORMING THIS ACT. GUARD AGAINST LOSS OF BALANCE SHOULD THE JAMMED CONDITION SUDDENLY COME FREE.

A LEATHER MALLET AND BLOCK OF WOOD OF SUFFICIENT LENGTH TO KEEP HANDS AWAY FROM PATH OF KNIVES CAN BE USED IF REQUIRED.

USE PLIERS IN REMOVING MATERIAL FROM THE CUTTING CHAMBER, KEEPING IN MIND THAT THE REMOVAL OF MATERIAL MAY CAUSE ROTATION OF THE ROTOR AND ROTOR KNIVES.

AFTER CLEARING THE JAM, BE CERTAIN THAT THE SCREEN AND ALL GUARDS AND COVERS ARE SECURED IN PLACE BEFORE CONNECTING POWER AND STARTING MACHINE.

I. INTRODUCTION AND DESCRIPTION

1.0 INTRODUCTION

THIS MANUAL PROVIDES THE NECESSARY INSTRUCTIONS FOR THE INSTALLATION, SET-UP AND MAINTENANCE OF THE MODEL 28B GRANULATOR.

THE GRANULATOR IS DESIGNED, ENGINEERED AND MANUFACTURED BY CUMBERLAND ENGINEERING, P.O. BOX 6065, PROVIDENCE, RI 02940 TEL. (401) 728-1600

NOTE: THIS MANUAL ONLY COVERS LIGHT CORRECTIVE MAINTENANCE AND RECOMMENDS THAT NO OTHER MAINTENANCE BE UNDERTAKEN WITHOUT FIRST CONTACTING A CUMBERLAND APPLICATIONS ENGINEER

1.1 DESCRIPTION

THE MODEL 28B GRANULATOR IS A RUGGED, LOW PROFILE, ROTARY CUTTING MACHINE DESIGNED TO CUT, CHIP AND GRANULATE THE TOUGHEST PLASTIC MATERIALS WITH A MINIMUM EXPENDITURE OF HORSEPOWER.

1.2 FUNCTIONAL DESCRIPTION

A. HOPPER

THE HOPPER IS AN UPRIGHT ENCLOSURE BOLTED TO THE TOP OF THE CUTTING CHAMBER. THE HOPPER IS DESIGNED TO FACILITATE FEEDING OF CUSTOMER'S MATERIALS TO THE CUTTING CHAMBER AND TO REDUCE NOISE.

B. CUTTING CHAMBER

THE CUTTING CHAMBER IS A RECTANGULAR ENCLOSURE COMPRISING THE MAIN FRAME, THE BED KNIVES, THE BED KNIFE SHIELDS, ROTOR AND SCREEN.

THE MAIN FRAME OF THE CUTTING CHAMBER CARRIES THE BED KNIVES AND THE BED KNIFE SHIELDS. THE DOWNSTROKE BED KNIFE SHIELD IS ADJUSTABLE. THE SCREEN IS SUPPORTED IN POSITION BELOW THE ROTOR AND ACTS AS A BARRIER TO THE MATERIAL RETAINING THE MATERIAL IN THE CUTTING CHAMBER UNTIL THE PARTICLE SIZE IS SUCH THAT IT WILL FALL THROUGH THE SCREEN PERFORATIONS.

THE ROTOR CARRIES THE ROTOR KNIVES. THE ROTATION OF THE ROTOR PRODUCES A CUTTING ACTION BETWEEN THE ROTOR KNIVES AND THE STATIONARY BED KNIVES, THUS REDUCING THE MATERIAL SIZE.

C. SAFETY SWITCH ASSEMBLIES FOR CUTTING CHAMBER COVERS AND SCREEN CLOSURE PLATE.

SWITCHES ARE MOUNTED TO THE MACHINE AND MUST BE WIRED INTO THE CONTROL CIRCUIT SO THAT THE MACHINE CANNOT BE STARTED WITH THESE PARTS OPEN OR REMOVED. HOWEVER, FOR SAFETY PURPOSES, THE MACHINE SHOULD BE DISCONNECTED FROM THE POWER LINES BY A DISCONNECT SWITCH OR BY REMOVING THE PLUG FROM ITS RECEPTACLE.

D. THE DRIVE

THE ROTOR IS INDIRECTLY DRIVEN BY THE MOTOR THROUGH V-BELTS. THE MOTOR SHAFT PULLEY, V-BELTS AND THE ROTOR SHAFT PULLEY ARE SHIELDED BY SAFETY GUARDS OR SOUND ENCLOSURE.

THE MOTOR IS MOUNTED ON AN ADJUSTABLE SLIDING BASE, THAT IS MOUNTED AT THE LEFT END OF THE GRANULATOR.

E. DISCHARGE SYSTEM

THE GRANULATED MATERIAL THAT FALLS THROUGH THE SCREEN IS COLLECTED BY THE CUSTOMER'S GAYLORD BOX.

ON MODELS FITTED WITH AN AIRVEYING SYSTEM (OPTIONAL), THE GRANULATED MATERIAL WHICH HAS FALLEN THROUGH THE SCREEN IS COLLECTED IN A TRANSITION PIECE LOCATED BENEATH THE CUTTING CHAMBER.

THE TRANSITION PIECE IS CONNECTED TO A BLOWER, WHICH CONVEYS THE GRANULATED MATERIAL THROUGH DUCTING TO THE CYCLONE SEPARATOR. THE CYCLONE SEPARATOR ALLOWS THE GRANULATED MATERIAL TO DROP OUT OF THE AIR SYSTEM INTO A CONTAINER.

F. BASE

THE BASE IS A FLOOR MOUNTED PLATE TYPE SUPPORTING THE CUTTING CHAMBER ON ITS TOP SURFACE AND THE DRUM CHUTE FROM BELOW THE TOP SURFACE. THIS BASE SHOULD BE FASTENED SECURELY TO THE SURFACE BENEATH IT.

II. INSTALLATION

2.0 INTRODUCTION

THIS SECTION DETAILS THE INSTALLATION AND SET-UP INSTRUCTIONS FOR THE GRANULATOR. IT DOES NOT INCLUDE ANY SPECIAL ACCESSORY OR OPTIONAL EQUIPMENT, DUE TO THE MANY TYPES PRESENTLY AVAILABLE.

REQUIREMENTS FOR SPECIAL INSTALLATIONS, CONDITIONS OR USE WITH OTHER EQUIPMENT SHOULD BE DISCUSSED WITH A CUMBERLAND APPLICATIONS ENGINEER.

2.1 EQUIPMENT SPECIFICATIONS

A. FLOOR SPACE REQUIREMENTS: REFER TO TABLE 9-1 SPECIFICATION SHEET.

B. ELECTRICAL REQUIREMENTS: REFER TO PAGE 9-1 SPECIFICATION SHEET AND WIRING DIAGRAM

C. MECHANICAL REQUIREMENTS: REFER TO SECTION III OPERATING PROCEDURE AND SECTION IV MAINTENANCE, FOR CORRECTIVE MAINTENANCE REQUIREMENTS.

D. LUBRICATION REQUIREMENTS: REFER TO SECTION IV MAINTENANCE FOR LUBRICATION POINTS AND FREQUENCY INFORMATION

2.2 UNLOADING AND ASSEMBLY

THE COMPLETE GRANULATOR, INCLUDING ACCESSORY AND AUXILIARY EQUIPMENT IS PACKED IN A SPECIAL WOODEN CASE FOR SHIPMENT.

REFER TO SPECIFICATION SHEET FOR DETAILED DIMENSIONAL DATA AND PERTINENT WEIGHTS.

BECAUSE OF THE SIZE AND WEIGHT OF THE 28B GRANULATOR, IT IS RECOMMENDED THAT ONLY QUALIFIED RIGGERS BE EMPLOYED TO UNPACK AND LOCATE GRANULATOR.

THE GRANULATOR SHOULD BE CAREFULLY INSPECTED AND ANY DAMAGE INCURRED IN TRANSIT BE REPORTED TO THE CARRIER AT ONCE. CHECK THE PACKING LIST TO SEE THAT ALL ACCESSORIES, AUXILIARY EQUIPMENT, SPARES ETC. HAVE BEEN RECEIVED. NOTIFY CUMBERLAND IMMEDIATELY OF ANY SHORTAGES.

IF AFTER INSPECTION, NO DAMAGE HAS BEEN DETECTED, THE GRANULATOR SHOULD BE CLEANED TO REMOVE THE PROTECTIVE COVERING FROM THE AREAS COATED.

NOTE: INSPECT CUTTING CHAMBER CAREFULLY TO INSURE NOTHING HAS FALLEN INTO IT DURING SHIPPING

WARNING: KEEP HANDS CLEAR OF THE REVOLVING ROTOR

CAUTION: BEFORE STARTING GRANULATOR, CHECK THAT THE ROTOR ROTATES FREELY BY TURNING THE DRIVE SYSTEM. REFER TO SECTION III OPERATING PROCEDURE

IT IS INADVISABLE TO SECURE ANY ITEMS TO THE INFEED CHUTE. VIBRATION OF THE GRANULATOR COULD DETACH SUCH ITEMS RESULTING IN SERIOUS DAMAGE TO THE MACHINE.

2.3 ELECTRICAL CONNECTIONS

GRANULATOR CONTROLS (IF ORDERED) ARE SHIPPED SEPARATELY FOR MOUNTING AT A SUITABLE LOCATION. THE SAFETY SWITCHES ARE CONNECTED TO A COMMON TERMINAL BOX FOR EASE OF WIRING. THE CUSTOMER IS REQUIRED TO PROVIDE A SUITABLE FUSED SUPPLY WITH A DISCONNECT SWITCH AND A CABLE FOR THE INCOMING LINE TO THE STARTER (IF ORDERED WITH THE MACHINE).

REFER TO TABLE 9.1 SPECIFICATION SHEET FOR THE HORSEPOWER REQUIREMENTS, VOLTAGE, PHASE AND FREQUENCY TO DETERMINE THE SIZE AND THE RATING OF THE SUPPLY CABLE REQUIRED.

IF OPTIONAL CONTROLS ARE REQUIRED, AN ELECTRICAL WIRING DIAGRAM WILL BE PROVIDED WITH THE MACHINE, IN ADDITION TO THE BASIC ELECTRICAL DIAGRAM.

WHEN THE CUSTOMER IS PROVIDING EITHER THE MOTOR OR THE STARTER, THE MACHINE MUST BE WIRED IN ACCORDANCE WITH THE BASIC ELECTRICAL DIAGRAM AND THE STARTER MANUFACTURER'S INSTRUCTIONS.

CHECK TO BE CERTAIN THAT THE STARTER HEATER ELEMENTS CORRESPOND WITH THE MOTOR REQUIREMENTS. IF CONTROLS ARE NOT SUPPLIED, THE LIMIT SWITCHES SUPPLIED ON THE MACHINE MUST BE WIRED INTO THE CIRCUIT AT THE COMMON TERMINAL BOX.

CHECK THAT THE LIMIT SWITCHES ARE CLOSED.

TURN SWITCH ON AT THE MAIN POWER SUPPLY.

PRIOR TO ATTACHING DRIVE BELTS, JOG MOTOR BY PRESSING THE START AND THEN THE STOP BUTTON. THIS STARTS AND STOPS THE MOTOR.

WITH THE ELECTRICAL POWER ON, CHECK THAT MOTOR ROTATES IN THE PROPER DIRECTION (NOTE DIRECTION OF ARROW ON GUARD). IF INCORRECT, SHUT POWER OFF AND DISCONNECT INCOMING POWER SUPPLY.

REVERSE ANY TWO OF THE THREE POWER LINE CONNECTIONS TO THE MACHINE.

RECONNECT THE INCOMING POWER SUPPLY LINE AND TURN ON THE MAIN POWER SWITCH TO RE-CHECK MOTOR DRIVE ROTATION.

TURN POWER OFF.

III OPERATING PROCEDURE

3.0 INTRODUCTION

THIS MACHINE HAS BEEN RUN UNDER POWER AND TESTED AT THE FACTORY PRIOR TO SHIPMENT.

THE NECESSARY SETTINGS AND ADJUSTMENTS HAVE BEEN MADE SO THAT IN STARTING UP THE MACHINE IN ITS NEW LOCATION, A MINIMUM AMOUNT OF SETTING UP OR RE-ADJUSTMENT IS REQUIRED.

WITH ALL ELECTRICAL, MECHANICAL CONNECTIONS AND LUBRICATION REQUIREMENTS HAVING BEEN ATTENDED TO AS STIPULATED IN SECTION II, THE FOLLOWING START-UP STEPS SHOULD BE CAREFULLY CARRIED OUT BEFORE ATTEMPTING TO PLACE ANY MATERIAL INTO THE INFEED CHUTE.

WARNING: BEFORE OPERATING THE GRANULATOR, IT IS IMPORTANT TO INSURE THAT THE GRANULATOR HAS BEEN CORRECTLY ASSEMBLED AND WIRED.

3.1 START-UP PROCEDURES

1. OBSERVE ALL FOREGOING SAFETY REGULATIONS AT ALL TIMES. REFER TO SAFETY INSTRUCTIONS BEFORE PROCEEDING.

2. ON RECEIVING THE MACHINE, THOROUGHLY CLEAN THE RUST PREVENTATIVE MATERIALS OR GREASE FROM THE INSIDE OF THE CUTTING CHAMBER AND SCREEN.

3. ACCESS TO CUTTING CHAMBER

   A. MOTOR TURNED OFF AND ELECTRICALLY LOCKED OUT.

   B. THE INSIDE OF THE CHAMBER CAN BE EASILY REACHED BY REMOVING THE HEX HEAD BOLTS ALONG THE TOP OF THE CUTTING CHAMBER COVERS. SWING COVERS DOWNWARD USING THE HANDLE THAT IS PROVIDED ON EACH COVER. DO NOT ALLOW COVERS TO DROP FREELY OF THEIR OWN WEIGHT.

4. THE SCREEN IS REMOVED BY LOOSENING THE SCREW IN EACH SCREEN RETAINER CLAMP ON THE END OF THE MACHINE OPPOSITE THE DRIVE. AFTER REMOVING THE SCREEN CLOSURE, THE SCREEN OR SCREENS MAY BE WITHDRAWN THROUGH THE CURVED SLOT IN THE END PLATE. IT MAY BE NECESSARY TO BACK OUT THE SCREWS, ALONG THE SIDES OF

THE MACHINE, WHICH HOLD THE SCREEN DOWN ON THE SCREEN SUPPORTS. WHEN REPLACING THE SCREEN, BE CERTAIN THAT THE SCREEN LIPS ARE BELOW THE HOLD-DOWN SCREWS.

5. CHECK THE CLEARANCE BETWEEN THE ROTOR AND THE BED KNIVES BY TURNING THE ROTOR BACKWARDS, USE A FEELER TO OBTAIN PROPER SETTING. CHECK THE KNIVES ON EACH END ONLY. ROTATING THE ROTOR BACKWARDS GIVES A BETTER FEEL AND DOES NOT CUT THE GAUGE, SHOULD THEY BE TOO CLOSE. SEE PARA. 7.2 RECOMMENDED CLEARANCES.

6. BEFORE ADJUSTING THE BED KNIVES, CHECK ALL ROTOR KNIVES TO MAKE SURE THEY ARE PROPERLY SEATED ON THE ROTOR AND SECURELY FASTENED. ALTHOUGH THEY ARE GROUND AS A SET, ONE KNIFE WILL PROBABLY BE .001" TO .002" HIGHER THAN THE OTHERS. THIS SHOULD BE MARKED AND USED WHEN ADJUSTING THE BED KNIVES FOR PROPER CLEARANCE.

7. TO MAKE THE ADJUSTMENT ON THE BED KNIVES, THE BED KNIFE BOLTS SHOULD BE HAND TIGHTENED TO HOLD KNIFE FIRMLY AGAINST KNIFE SEAT WHILE ADJUSTING KNIFE FORWARD, USING PUSH AND PULL SCREWS. THE KNIFE CLEARANCE BE SET BY USING A FEELER GAUGE AND ROTATING THE ROTOR SHEAVE BACKWARDS BY HAND. AFTER KNIFE CLEARANCE IS SET, TIGHTEN THE KNIFE BOLTS TO THE RECOMMENDED TORQUE VALUE GIVEN IN THE TABLE ON PAGE 7-1 AND ALSO TIGHTEN CHECKS NUTS ON PUSH AND PULL SCREWS.

IMPORTANT !! THREAD SHOULD BE DRY, RECHECK KNIFE CLEARANCE TO MAKE SURE CLEARANCE HAS NOT CHANGED.

WHEN INSTALLING BED KNIVES, THE KNIFE SEATS SHOULD BE THOROUGHLY CLEAN TO INSURE THAT THE KNIFE SEATS FIRMLY IN PLACE.

8. WITH THE EXPOSED PARTS OF THE MACHINE THOROUGHLY CLEAN, AND ALL KNIFE CLAMPING BOLTS SECURELY FASTENED, REPLACE THE SCREEN, RAISE THE DOORS OF THE CUTTING CHAMBER BACK INTO THEIR CLOSED POSITION AND REPLACE CLAMP BOLTS. REPLACE SCREEN CLOSURE PLATE, SECURELY FASTEN ALL CLAMPING BOLTS.

9. WHEN THE MACHINE IS SHIPPED, THE BEARINGS ARE FILLED WITH GREASE. THE BEARINGS SHOULD REQUIRE NO LUBRICATION FOR A MONTH UNDER USUAL OPERATING CONDITIONS. IF THE MACHINE IS OPERATED CONTINUOUSLY, IT MAY BE DESIRABLE TO LUBRICATE THE MACHINE EVERY TWO OR THREE WEEKS. THIS MACHINE SHOULD BE LUBRICATED WITH A HIGH TEMPERATURE BEARING GREASE.

RECOMMEND GREASES ARE: ALEMITE #38, SUN OIL #844, SOVAREX #2, SHELL EP GREASE #1 OR ESSO MULTI-PURPOSE GREASE H.

10. INSTALL THE HOPPER ON TOP OF THE CUTTING CHAMBER WITH THE TRAY ON THE SAME SIDE AS THE DOWNSTROKE BED KNIFE.

IN CASE OF ALL HOPPERS, THE OPERATORS SHOULD BE CAUTIONED TO NEVER REACH INTO THE HOPPER TO DISLODGE ANY BRIDGED PARTS. TO CLEAR THE HOPPER OF A JAM, THE MACHINE SHOULD BE TURNED OFF AND ELECTRICALLY LOCKED, OUT. BE SURE THAT THE ROTOR HAS COME TO A STOP.

11. BEFORE POWER IS APPLIED TO THE MACHINE, ROTATE THE ROTOR BY HAND FROM OUTSIDE THE MACHINE, USING EITHER THE COUPLING OR THE SHEAVE DEPENDING ON THE TYPE OF DRIVE.

12. PRESS AIRVEYOR "START" BUTTON. CHECK DIRECTION OF ROTATION. IF ROTOR OR FAN REQUIRE REVERSAL, MAKE NECESSARY ELECTRICAL ADJUSTMENTS.

13. PRESS MOTOR "START" BUTTON. OBSERVE THAT DIRECTION OF ROTOR ROTATION IS CORRECT OR CHANGE PER SECTION 2.3

14. ALLOW ALL MOTORS TO RUN UP TO SPEED FOR AT LEAST 30 SECONDS. THE GRANULATOR IS NOW READY FOR OPERATION.

NOTE: WHEN AIRVEYING IS FURNISHED, THE GRANULATOR SHOULD BE WIRED TO INSURE BLOWER OPERATION BEFORE STARTING GRANULATOR. BLOWER SHOULD BE OPERATING WHENEVER GRANULATOR IS RUNNING.

3.2 FEEDING THE GRANULATOR

FEEDING THE GRANULATOR IS VIA THE OPENING IN THE HOPPER. THE METHOD OF FEEDING THE GRANULATOR DEPENDS UPON THE PHYSICAL FORM AND NATURE OF THE MATERIAL TO BE PROCESSED. FOR MAXIMUM EFFICIENCY, THE GRANULATOR SHOULD BE FED AT A RATE CONSISTENT WITH ITS CAPACITY, i.e. IF THE GRANULATOR IS RATED AT 2000 LBS/HR. (906.67KG/HR), THEN THE GENERAL FEED RATE IS 33.33 #/MIN. (15.33 KG/MIN).

UNDER THESE OPERATING CONDITIONS, THE CORRECT PROPORTIONS OF CUT AND UNCUT PARTICLES WILL BE PRESENT IN THE CUTTING CHAMBER.

WARNING: UNDER NO CIRCUMSTANCES SHOULD THE OPERATOR ATTEMPT TO REACH INTO THE HOPPER TO DISLODGE ANY BRIDGED OR JAMMED MATERIAL WHILE THE GRANULATOR IS IN OPERATION. TO CLEAR THE HOPPER OF BRIDGED OR JAMMED MATERIAL, THE MAIN POWER TO THE MACHINE MUST BE TURNED OFF AND DISCONNECTED ELECTRICALLY.

NOTE: IF FEEDING OR GRANULATING PROBLEMS OCCUR, PLEASE CONTACT A CUMBERLAND ENGINEERING REPRESENTATIVE.

3.3 MACHINE SHUT DOWN

BEFORE COMMENCING SHUT DOWN PROCEDURES:

1. STOP ALL FEEDING OF MATERIAL
2. ALLOW GRANULATOR TO RUN UNTIL THE CUTTING CHAMBER IS COMPLETELY EMPTY.
3. PRESS THE DRIVE MOTOR "STOP" BUTTON. THIS SHUTS OFF THE ROTOR DRIVE MOTOR.
4. PRESS THE AIRVEYOR STOP BUTTON LOCATED AT THE BLOWER MOTOR, AFTER THE GRANULATOR HAS STOPPED.
5. TURN THE MAIN POWER SWITCH TO THE OFF POSITION.

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IV MAINTENANCE

4.0 INTRODUCTION

THIS SECTION COVERS THE MAINTENANCE POINTS AND THEIR FREQUENCIES OF APPLICATION. THE USE OF PROPER LUBRICANTS WILL HELP REDUCE WEAR AND DOWN TIME. THIS SECTION ALSO DELINEATES THE PREVENTIVE AND CORRECTIVE MAINTENANCE PROCEDURES REQUIRED TO INSURE PROPER FUNCTIONING OF THE MACHINE.

4.1 PERIODIC MAINTENANCE CHECK LIST

CHECK	CHECK WEEKLY	CHECK MONTHLY
1. KNIFE CLEARANCE AND WEAR	X	
2. ROTOR KNIFE RETAINING SCREWS ARE TIGHT	X	
3. DOWNSTROKE BED KNIFE AND SHIELD RETAINING SCREWS ARE TIGHT	X	
4. UPSTROKE BED KNIFE AND SHIELD RETAINING SCREWS ARE TIGHT	X	
5. SCREEN WEAR		X
6. SCREEN CRADLE RETAINING SCREWS ARE TIGHT	X	
7. UPSTROKE & DOWNSTROKE COVER & CLAMPING PLATE SCREWS ARE TIGHT	X	
8. BELT TENSION		X
9. HOPPER AND CUTTING CHAMBER SCREWS ARE TIGHT		X
10. DRIVE MOTOR BEARING* LUBRICATION		X
11. ROTOR BEARING* LUBRICATION	X (SEE NOTE BELOW)	

NOTE: ROTOR BEARING LUBRICATION (REFER TO SECT. III, PARA. 9.0)

NOTE: *GRANULATOR ROTOR OR MOTOR ROTOR MUST BE ROTATED ONCE EVERY 30 DAYS AT LEASE 2 REVOLUTIONS TO PREVENT BRINNELLING AND CORROSION OF RACEWAYS.

4.2 CORRECTIVE MAINTENANCE

A. CAUTIONS

1. THE OPERATORS SHOULD BE CAUTIONED TO NEVER REACH INTO THE HOPPER TO DISLODGE ANY BRIDGED PARTS. TO CLEAR A JAM, THE MACHINE SHOULD BE TURNED OFF AND ELECTRICALLY LOCKED OUT. BE SURE THAT THE ROTOR HAS COME TO A STOP.

2. ON ALL V-BELT DRIVEN UNITS, BE SURE THAT THE BELT TENSION IS AT ITS MAXIMUM. SEE CHART IN SECTION VII 7.3.

3. NEVER ATTEMPT TO START MACHINE OR JOG ROTOR UNLESS THE HOPPER, SCREEN, DISCHARGE CHUTE AND ALL COVERS AND GUARDS ARE SECURELY BOLTED IN THEIR CORRECT OPERATING POSITIONS.

4. AFTER INITIAL START-UP, ROTOR KNIFE RETAINING SCREWS SHOULD BE CHECKED AFTER 8 HOURS RUN TO BE ASSURED THAT 200 FT. LB. OF TORQUE IS MAINTAINED.

   THEREAFTER, ROTOR KNIFE RETAINING SCREWS SHOULD BE CHECKED WEEKLY.

B. ROTOR BEARINGS

TO REMOVE AND REPLACE ROTOR BEARINGS, THE FOLLOWING SEQUENCE SHOULD BE USED: (REF CECO DWGS. LCS, VCS)

1. SHUT OFF MACHINE AND MAINPOWER DISCONNECTS PER SAFETY REGULATION SECTION OF THIS MANUAL.

2. REMOVE FLYWHEEL GUARD ON THE REQUIRED SIDE OF THE MACHINE. REMOVE DRIVE BELTS.

3. LOOSEN FLYWHEEL SHEAVE BUSHINGS, BOLTS AND THEN REMOVE SHAFT END CAP. REMOVE THE FLYWHEEL AND BUSHING. LOOSEN BOLTS ON THE BEARING END CAP AND SHEAVE SPACER.

4. CLEAN BEARING EXPOSED SURFACES AND SHAFT SURFACES OF GREASE AND DIRT.

5. REMOVE THE BEARING HOUSING CONTAINING THE BEARING FROM THE SHAFT USING THE SYMMETRICAL PATTERN FOR PUSH SCREWS IN THE BEARING HOUSING.

6. NOTE THE CONDITION OF THE SHAFT JOURNAL AND CLEAN AND DRESS SURFACE TO REMOVE ALL IRREGULARITIES BEFORE PROCEEDING TO INSTALL THE NEW BEARING.

7. REPLACE THE BEARING HOUSING IN ITS CORRECT POSITION AND TIGHTEN THE 5/8 - 18 BOLTS TO 144 FT/LBS.

8. CLEAN THE BEARING BORE SURFACE AND THE SHAFT JOURNAL.

9. INSTALL THE BEARING ON THE SHAFT JOURNAL BY LIGHTLY TAPPING THE INNER RACE IN A UNIFORM FASHION UNTIL IT BOTTOMS OUT ON THE BEARING HOUSING SEAT.

10. PACK GREASE BETWEEN THE BEARING ROLLERS AND RE-INSTALL THE SHEAVE SPACER AND BEARING END CAP AND TIGHTEN THE 1/2-20 BOLTS TO 58 FT. LBS.

11. REPLACE FLYWHEEL/SHEAVE BUSHING WITHOUT TIGHTENING BUSHING BOLTS. REPLACE SHAFT END PLATE AND TIGHTEN THE 5/8-18 BOLTS TO 144 FT. LBS. SUCH THAT THE FLYWHEEL BUSHING AND SHEAVE SPACER ARE LOCKING THE BEARING INNER RACE TO THE SHAFT SHOULDER.

12. TIGHTEN THE SHEAVE BUSHING TO THE FLYWHEEL/SHEAVE. REPLACE AND ADJUST BELTS PER SECTION VII PARA. 7.3. REPLACE FLYWHEEL GUARD.

4.3 DRIVE ADJUSTMENTS

FOR CONTINUOUS RELIABLE OPERATION OF THE GRANULATOR, IT IS IMPORTANT THAT THE BELT TENSION IS CORRECT. CORRECT TENSION REDUCES WEAR ON ROTOR AND MOTOR BEARINGS AND BELT SLIP TO A MINIMUM.

1. SWITCH OFF THE GRANULATOR AT THE MAIN ISOLATOR SWITCH AND REMOVE FUSES
2. REMOVE THE COVER TO GAIN ACCESS TO THE BELTS
3. REFER TO SECTION VII PARA. 7.3 FOR CORRECT TENSIONING.
4. TURN THE ADJUSTING SCREW ON THE MOTOR SLIDE BASE TO TENSION THE BELTS AS REQUIRED.
5. REPLACE THE COVERS.

4.4 REPLACEMENT OF KNIVES-FOLLOW ALL SAFETY REGULATIONS

A. INSTALLATION OF KNIVES

BEFORE ASSEMBLING A NEW OR REGROUND SET OF KNIVES WITH THE MACHINE, MAKE SURE THE KNIFE SEATS AND MOUNTING HOLES ARE CLEAN. DO NOT USE GREASE OR OIL ON SCREWS OR TAPPED HOLES WHEN ASSEMBLING THE KNIVES.

B. REMOVAL OF WORN KNIVES-FOLLOW ALL SAFETY REGULATIONS

1. OPEN THE CUTTING CHAMBER COVERS. REFER TO SECTION III.
2. BE SURE TO DISCONNECT ALL ELECTRICAL POWER TO THE MACHINE.
3. BEFORE APPLYING A WRENCH TO ANY KNIFE BOLT, BE CERTAIN THAT ROTOR IS BLOCKED TO PREVENT ROTATION. ONE SUCH METHOD IS TO USE A BLOCK OF WOOD AT LEAST 1-1/2" THICK BETWEEN A KNIFE AND A FIXED PORTION OF THE FRAME.
4. LOOSEN CHECK NUTS ON BED KNIFE ADJUSTING SCREWS AND BACK OFF SCREWS.
5. REMOVE BED KNIFE SHIELDS.
6. DISENGAGE BED KNIFE PULL SCREWS.
7. REMOVE BED KNIFE BOLTS AND BED KNIVES.
8. REMOVE ROTOR KNIFE BOLTS AND KNIVES ON ONE SEAT. THIS SHOULD BE DONE FROM THE DOWNSTROKE SIDE OF THE CUTTING CHAMBER.

9. THOROUGHLY CLEAN KNIFE SEAT

10. INSTALL NEW KNIFE ON SEAT AND TIGHTEN KNIFE BOLTS

- BOLT THREADS SHOULD NOT BE OILED-MERELY WIPE THREAD WITH AN OIL DAMPENED CLOTH

- SEE SECT. VII PARA. 7-1 FOR TORQUE RECOMMENDATIONS

- CHECK TO SEE THAT KNIFE IS PROPERLY SEATED

11. FOLLOW SAME PROCEDURE FOR EACH ROTOR KNIFE

12. ROTOR KNIVES SHOULD BE CHANGED ONE SEAT AT A TIME TO PREVENT ROTOR FROM BEING ROTATED IN AN OUT-OF-BALANCE CONDITION.

C. INSTALLATION AND ADJUSTMENT OF BED KNIVES

1. BEFORE INSTALLING AND ADJUSTING THE BED KNIVES, CHECK ALL ROTOR KNIVES TO MAKE SURE THEY ARE PROPERLY SEATED ON THE ROTOR AND SECURELY FASTENED. ALTHOUGH THEY ARE GROUND AS A SET, ONE KNIFE WILL PROBABLY BE .001" TO .002" HIGHER THAN THE OTHERS. THIS SHOULD BE MARKED AND USED WHEN ADJUSTING THE BED KNIVES FOR PROPER CLEARANCE.

   BE CERTAIN THAT FINGERS AND ALL PORTIONS OF BODY ARE CLEAR OF PATH OF KNIVES AT ALL TIMES. WHEN TURNING ROTOR SHEAVE WITH ONE HAND, BE CERTAIN THAT OTHER HAND IS NOT TOUCHING MACHINE.

   BE CERTAIN THAT ALL PERSONNEL IN PROXIMITY OF MACHINES ARE WELL CLEAR OF KNIVES WHENEVER ROTOR IS TURNED.

   EACH BED KNIFE HALF WILL BE TREATED SEPARATELY FOR THESE INSTRUCTIONS.

2. DOWNSTROKE BED KNIFE

   LOCATE THE DOWNSTROKE BED KNIFE AND ITS SHIELD IN PLACE AND HAND TIGHTEN KNIFE BOLTS TO HOLD THEM FIRMLY TO THE KNIFE SEATS. THE KNIFE CLEARANCE CAN BE SET WITH A FEELER GAGE AT

EACH END OF THE KNIFE HALF ONLY AND BY ROTATING THE ROTOR SHEAVE BACKWARDS BY HAND. USE THE PUSH AND PULL SCREWS FOR ADJUSTING TO THE CORRECT GAP. AFTER THE KNIFE CLEARANCE IS SET, ADJUST THE SHIELD BY MEANS OF ITS PUSH AND PULL SCREWS TO LOCATE ITS FRONT EDGE TO WITHIN 1/16" OF BED KNIFE EDGE AFTER SHIELD IS SET, TIGHTEN KNIFE BOLTS TO THE RECOMMENDED TORQUE VALUES AS GIVEN IN SECTION VII PARA. 7-1.

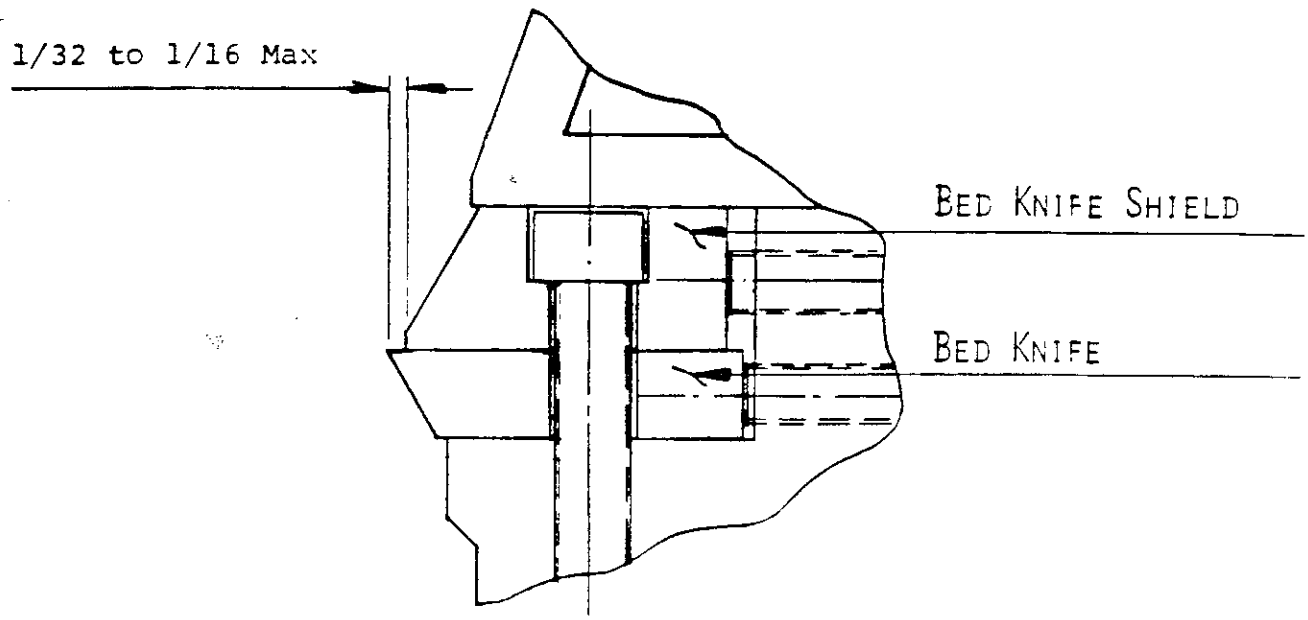
IMPORTANT: THREADS SHOULD BE DRY EXCEPT WIPE THREADS WITH OIL DAMPENED CLOTH TO PREVENT GALLING. RECHECK KNIFE CLEARANCE TO MAKE SURE IT HAS NOT CHANGED.

DOWNSTROKE KNIFE SHIELD ADJUSTMENT

SEE PAGE 4-7

NOTE: ALL SCREW TIGHTENING TORQUE FIGURES QUOTED ARE FOR UNLUBRICATED THREAD CONDITIONS. EXCESSIVE LUBRICATION WILL CAUSE BOLT STRETCH.

DOWNSTROKE KNIFE SHIELD ADJUSTMENT



NOTE: ALL SCREW TIGHTENING TORQUE FIGURES QUOTED ARE FOR UNLUBRICATED THREAD CONDITIONS. EXCESSIVE LUBRICATION WILL CAUSE BOLT STRETCH.

3. UPSTROKE BED KNIFE

LOCATE THE UPSTROKE BED KNIFE AND ITS SHIELD IN PLACE AND HAND TIGHTEN KNIFE BOLTS TO HOLD THEM FIRMLY TO THE KNIFE SEAT.

SEAT KNIFE CLEARANCE USING FEELER GAGE AND ADJUST WITH PUSH AND PULL SCREWS AS OUTLINED IN PROCEDURE ABOVE. AFTER CLEARANCE IS SET, TIGHTEN BOLTS TO RECOMMENDED TORQUE VALUES AS GIVEN IN SECTION VII PARA. 7.1. RECHECK KNIFE CLEARANCE TO MAKE SURE IT HAS NOT CHANGED.

4. REASSEMBLY

WITH THE EXPOSED PARTS OF THE MACHINE THOROUGHLY CLEAN AND ALL KNIFE CLAMPING BOLTS SECURELY FASTENED, SWING THE DOORS OF THE CUTTING CHAMBER BACK INTO THEIR CLOSED POSITION, AND REPLACE CLAMPS BOLTS.

SECURELY FASTEN ALL CLAMPING BOLTS. RESTORE SAFETY SWITCH ACTUATING MEANS TO OPERATING POSITIONS AND REPLACE SCREWS. BE CERTAIN THAT ALL BOLTS, NUTS AND CHECK NUTS ARE PROPERLY TIGHTENED.

THE OPERATORS SHOULD BE CAUTIONED TO NEVER REACH INTO THE INFEED OPENINGS TO DISLODGE ANY BRIDGED PARTS. TO CLEAR A JAM, THE MACHINE SHOULD BE TURNED OFF AND ELECTRICALLY LOCKED OUT. BE SURE THAT THE ROTOR HAS COME TO A STOP.

BEFORE POWER IS APPLIED TO THE MACHINE, ROTATE THE ROTOR BY HAND FROM OUTSIDE THE MACHINE, USING THE SHEAVE OR BELTS. CHECK TO BE SURE THAT NO TOOLS, GAGES OR LOOSE PARTS HAVE BEEN LEFT ON OR IN MACHINE. WHEN THE MACHINE IS SHIPPED, THE TWO ROTOR BEARINGS ARE FILLED WITH GREASE. THE BEARINGS SHOULD REQUIRED NO LUBRICATION FOR A MONTH UNDER USUAL OPERATING CONDITIONS. IF THE MACHINE IS OPERATED CONTINUOUSLY, IT MAY BE DESIRABLE TO LUBRICATE THE MACHINE TWICE A WEEK, OTHERWISE ONCE A WEEK SHOULD BE SUFFICIENT. THIS MACHINE SHOULD BE LUBRICATED WITH A HIGH TEMPERATURE BEARING GREASE. LUBRICATING SHOULD BE DONE WITH ROTOR TURNING AT A SLOW RPM.

RECOMMENDED GREASES: SEE SECTION III PARA. 9.0

BE SURE THAT THE V-BELT TENSION IS AT ITS MAXIMUM. SEE CHART IN SECTION VII PARA. 7.3.

NEVER ATTEMPT TO START MACHINE OR JOG ROTOR UNLESS THE HOPPER, SCREEN, DISCHARGE CHUTE AND ALL COVERS AND GUARDS ARE SECURELY BOLTED IN THEIR CORRECT OPERATING POSITIONS.

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4.5 REMOVAL OF SCREENS

1. MOTOR TURNED OFF AND ELECTRICALLY LOCKED OUT
2. ALLOW ROTOR TO STOP ROTATING
3. REFER TO SECTION III PARA. 3.1.4.

C A U T I O N

IT IS TO BE CAUTIONED THAT IT IS POSSIBLE TO HAVE COSTLY WRECKS WITH THIS TYPE OF MACHINE. SUCH WRECKS ARE USUALLY CAUSED BY FEEDING A METAL PART SUCH AS A WRENCH OR A LARGE BOLT INTO THE MACHINE OR BECAUSE SOME OF THE BOLTS USED IN ASSEMBLING THE MACHINE ARE TOUCHING THE KNIVES DUE TO INSUFFICIENT TIGHTENING BEFORE PLACING THE MACHINE IN OPERATION, THEREFORE, PLEASE EXERCISE ALL PRECAUTION NOT TO FEED SOME FOREIGN MATERIAL SUCH AS A WRENCH OR BOLT INTO THE MACHINE WITH THE SCRAP THAT IS BEING GRANULATED. SUCH ITEMS OFTEN BECOME MIXED WITH THE SCRAP AND ARE ACCIDENTALLY FED INTO THE MACHINE. ALSO, WHEN THE KNIVES ARE RESHARPENED OR RESET, EXTREME CARE SHOULD BE TAKEN TO SEE THAT ALL BOLTS ARE PROPERLY TIGHTENED.

IN THE FOREGOING PARAGRAPH, WE CAUTIONED YOU ABOUT SEEING THAT ALL BOLTS OF THE MACHINE ARE THOROUGHLY TIGHTENED AT ALL TIMES. PLEASE BEAR IN MIND THAT THE OPERATION OF THE MACHINE, PARTICULARLY ON HEAVY CROSS-SECTION AND DIFFICULT MATERIAL, MAY CAUSE THE ROTOR KNIFE BOLTS TO BECOME LOOSE. THE TIGHTNESS OF THESE KNIFE BOLTS SHOULD, THEREFORE, BE INSPECTED FREQUENTLY; PARTICULARLY AFTER A SET OF KNIVES HAS BEEN REPLACED. FINE THREADS ARE USED ON THE ROTOR KNIFE BOLTS BECAUSE VIBRATION DOES NOT LOOSEN THEM READILY; NONETHELESS, IT SHOULD BE BORNE IN MIND THAT THE TIGHTNESS OF THESE BOLTS SHOULD BE CHECKED FREQUENTLY, PARTICULARLY AFTER INSTALLING NEW OR RESHARPENED KNIVES.

THERE ARE A GREAT MANY POINTERS THAT WE ARE IN POSITION TO OFFER CONCERNING THE GRANULATING OF VARIOUS TYPES OF PLASTIC MATERIALS, BUT SINCE THERE ARE SO MANY DIFFERENT PLASTIC MATERIALS AND SINCE THEY ARE GRANULATED IN SUCH A WIDE VARIETY OF FORMS, IT IS NOT POSSIBLE FOR US TO ENTER INTO THIS LENGTHY DISCUSSION HERE. WE INVITE THE CUSTOMER TO CALL UPON US WHEN HE DOES NOT FIND A READY SOLUTION FOR ANY PARTICULAR GRANULATING PROBLEM.

V. AUXILIARY EQUIPMENT

5.1 BELT TENSIONING GAUGE AND CHARTS

PROVIDES A METHOD OF OBTAINING CORRECT BELT TENSION TO PREVENT BELT SLIPPAGE. SEE SECTION 7.

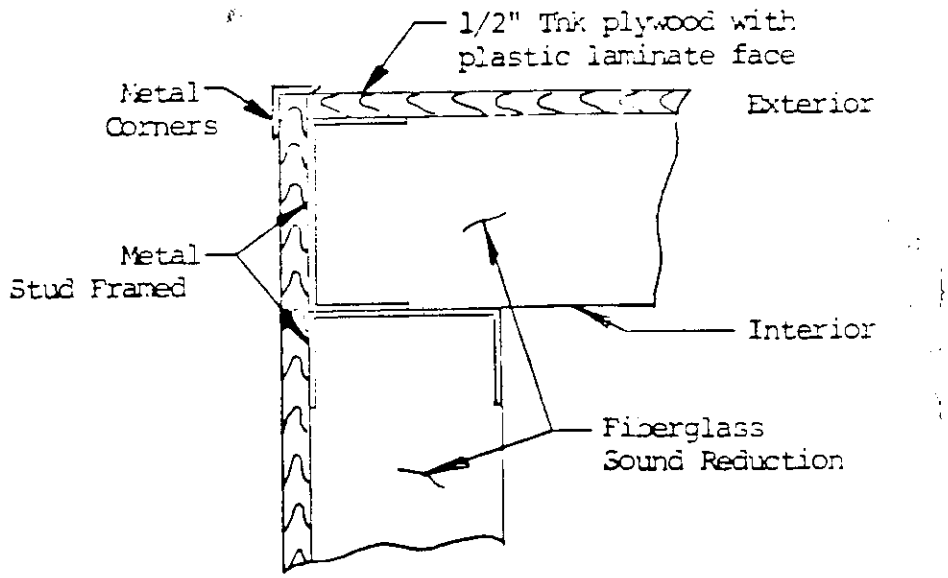
5.2 BRAKE MOTORS

AN INTEGRAL BRAKE STOPS MOTOR WITHIN A FEW SECONDS OF ACTUATION OF STOP BUTTON GREATLY REDUCES TIME REQUIRED FOR ROTOR TO STOP.

5.3 SOUND ENCLOSURE

CONSISTING OF A WOODEN EXTERIOR (1/2" THK PLYWOOD WITH PLASTIC LAMINATE FACE) LINED WITH SOUND ABSORBING MATERIAL AND FRAMED WITH METAL STUDS, WHICH WILL BRING THE SOUND LEVEL OF YOUR MACHINE TO WITHIN THE LIMITATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).

TYPICAL ENCLOSURE X-SECTION:



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VI FAULT ANALYSIS

ELECTRICAL FAULT	POSSIBLE CAUSES	REMEDY
MOTOR FAILS TO START	SUPPLY FAILURE	CHECK FUSES
	STARTER INOPERATIVE	CHECK MAIN SUPPLY
	STARTER OVERLOADS CUTS OUTS	CHECK MOTOR REQUIREMENTS AND ADJUST ACCORDINGLY
	SAFETY SWITCHES INOPERATIVE	CHECK AND ADJUST AS NEEDED
MOTOR STARTS BUT WILL NOT TAKE LOAD	TOO MUCH BELT TENSION	CHECK BELT TENSION AND ADJUST AS NECESSARY
	INCORRECTLY CONNECTED MOTOR	CHECK TERMINAL CONNECTION WITH MANUFACTURER'S CONNECTION DIAGRAM AND ADJUST AS NECESSARY
	DEFECTIVE STARTER WINDING	CHECK CURRENT IN EACH PHASE WITH AMMETER, IF A MARKED DIFFERENCE IN CURRENT IN ONE PHASE-CONTACT MOTOR MANUFACTURER
MOTOR WILL START WHEN DISCONNECTED FROM LOAD BUT NOT WHEN CONNECTED	WORN BEARINGS	CHECK AND REPLACE IF NECESSARY, ACCORDING TO MANUFACTURER'S LITERATURE

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PROCESSING FAULT	POSSIBLE CAUSES	REMEDY
STALLING	OVERFEEDING	REDUCE FEED RATE
	PARTIAL OR COMPLETE SCREEN BLOCKAGE	REMOVE SCREEN, CLEAR AND INSPECT FOR DAMAGE
	INSUFFICIENT TENSION ON V-BELT DRIVE CAUSING BELT SLIP AND AND BURNING	CHECK TENSION OF BELT AND ADJUST AS NECESSARY. CHECK THAT MOTOR SLIDE BASE SCREWS ARE SECURE
	BADLY BLUNTED OR DAMAGED KNIVES	FIT RE-SHARPENED OR NEW KNIVES AS REQUIRED
	KNIFE SETTING TOO WIDE	CHECK CLEARANCES GIVEN AND ADJUST AS REQUIRED
	INSTALLATION FAULT, MOTOR RUNNING IN REVERSE DIRECTION	CHECK WITH DI-RECTION ARROW AND RE-FIT ELECTRICAL CONNECTIONS TO GIVE CORRECT DIRECTION
	SAFETY SWITCH CUT OUT WHERE FITTED	TIGHTEN SAFETY SWITCH SETTING SCREW
MATERIAL OVERHEATING	CHECK ITEMS 1, 2, 4, 5 AND 6 UNDER "STALLING"	REMEDY AS SHOWN AGAINST THOSE ITEMS
	OVERFEEDING; - FURTHER TO ITEM 1 UNDER "STALLING"	DO NOT ALLOW A HEAD OF MATERIAL TO BUILD UP IN HOPPER
	SCREEN SIZE TOO SMALL	INCREASE SCREEN SIZE

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PROCESSING FAULT	POSSIBLE CAUSES	REMEDY
MATERIAL OVERHEATING	WHEN GRANULATING RUBBER INSUFFICIENT TALC CAUSING FRESHLY CUT SURFACES TO RE-ADHERE	INCREASE TALC PERCENTAGE RATE OF INFEED
	(WHERE FITTED) BLOCKAGE IN AIRVEYING	CHECK DIRECTION OF FAN ROTATION, CHECK VENTURI AND LINE/OR CHUTE FOR BLOCKAGE

MECHANICAL FAULT	POSSIBLE CAUSES	REMEDY
BEARING OVERHEATING	EXCESSIVE TENSION ON BELT DRIVE	CHECK TENSION OF BELT AND ADJUST AS NECESSARY
	LUBRICATION FAULT	CHECK LUBRICATION FREQUENCY AND RECOMMENDED LUBRICANT
VISIBLE CRACKS IN KNIFE	THIS IS A SIGN OF INCORRECT GRINDING OR GRINDING PROCEDURE IS BEING USED	CHECK METHOD OF GRINDING AND CONTACT OUR TECHNICAL SALES DEPARTMENT
KNIVES MOVING ON KNIFE SEATS	UNEVEN KNIFE SEAT SURFACES	CLEAN UP TO PROVIDE MAXIMUM BEARING SURFACE
	LOOSE KNIFE SCREWS	KNIFE SCREWS SHOULD NOT BE USED MORE THAN SIX TIMES, RENEW IF THERE IS EVIDENCE OF STRETCH
KNIVES BREAKING	FROM CRACKS CAUSED BY INCORRECT GRINDING	CONTACT OUR TECHNICAL/SALES DEPARTMENT

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MECHANICAL FAULT	POSSIBLE CAUSES	REMEDY
EXCESSIVE KNIFE WEAR	OPEN KNIFE SETTING	RE-SET AS INSTRUCTED
SCREEN BREAKAGE	INCORRECTLY SEATED	CHECK THAT SCREEN IS SEATED CORRECTLY AND FULL ON ITS CRADLE

VII REFERENCE MATERIAL

7.1 RECOMMENDED TORQUE FOR TIGHTENING ROTOR AND BED KNIFE SCREWS

(GRADE 8 ALLOY STEEL HEAT TREATED SCREWS)

SCREW SIZE	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
TORQUE FOOT POUNDS W/DRY THREADS	13	26	46	76	110	220	400	635	870

IMPORTANT THREADS MUST BE DRY

SCREW THREADS SHOULD BE WIPED WITH AN OIL DAMPENED CLOTH BEFORE INSTALLATION TO PREVENT GALLING

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7.2 RECOMMENDED CLEARANCES FOR KNIVES:

.005" TO .008" CLEARANCE IS USED FOR MOST MATERIALS WITH RADIAL KNIFE ROTORS, .014" TO .016" CLEARANCE IS USED FOR SOLID WALL PIPE .187" WALL THICKNESS OR GREATER.

NOTE: RECHECK KNIFE CLEARANCE AFTER THE FIRST 24 TO 36 HOURS OF OPERATION

7.3 BELT TENSIONING INSTRUCTIONS

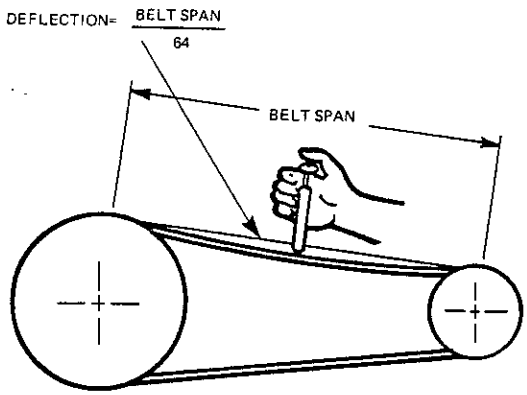
TENSION DRIVES AT THE MAXIMUM RECOMMENDED FORCE. CHECK THE TENSION AT LEAST TWICE DURING THE FIRST DAYS OPERATION. CHECK PERIODICALLY TO MAINTAIN TENSION AT RECOMMENDED VALUE.

THE TABLE BELOW GIVES THE RECOMMENDED FORCE TO DEFLECT EACH BELT BY AN AMOUNT EQUAL TO THE BELT SPAN DIVIDED BY 64.

A GAUGE IS AVAILABLE FROM CUMBERLAND ENGINEERING COMPANY OR THE BELT MANUFACTURER WHICH FACILITATES THE MEASUREMENT OF DEFLECTION AND FORCE.

V-Belt Cross Section	Small Sheave Diameter Range (Inches)	Small Sheave RPM Range	Speed Ratio Range	Recommended Deflection Force (Pounds)	
				Minimum	Maximum
3V	2.65- 2.80	1200-3600	2.00 to 4.00	3.0	4.3
	3.00- 3.15	1200-3600		3.3	4.8
	3.35- 3.65	1200-3600		3.7	5.4
	4.12- 5.00	900-3600		4.4	6.4
	5.30- 6.90	900-3600		4.8	7.1
5V	7.10- 8.00	600-1800	2.00 to 4.00	11	16
	8.50-10.90	600-1800		13	18
	11.80-16.00	400-1200		14	21
8V	12.50-17.00	600-1200	2.00 to 4.00	28	41
	18.00-24.00	400- 900		32	48

V-Belt Cross Section	Small Sheave Diameter Range (Inches)	Small Sheave RPM Range	Speed Ratio Range	Recommended Deflection Force (Pounds)			
				A Power		Tri-Power	
				Minimum	Maximum	Minimum	Maximum
A	3.0	1750	2.0 to 4.0	2.7	3.8	3.8	5.4
	3.2			2.9	4.2	3.9	5.6
	3.4- 3.6			3.3	4.8	4.1	5.9
	3.8- 4.2			3.8	5.5	4.3	6.3
	4.6- 7.0	3600		4.9	7.1	4.9	7.1
B	4.6	1160	2.0 to 4.0	5.1	7.4	7.1	10
	5.0- 5.2			5.8	8.5	7.3	11
	5.4- 5.6			6.2	9.1	7.4	11
	6.0- 6.8			7.1	10	7.7	11
	7.4- 9.4	1800		8.1	12	7.9	12
C	7.0	870	2.0 to 4.0	9.1	13	12	18
	7.5			9.7	14	12	18
	8.0- 8.5			11	16	13	18
	9.0-10.5			12	18	13	19
	11.0-16.0	1800		14	21	13	19
D	12.0-13.0	690	2.0 to 4.0	19	27		
	13.5-15.5	to		21	30		
	16.0-22.0	1200		24	36		
E	21.6-24.0	435 to 900	2.0 to 4.0	32	47		



RECOMMENDED GRANULATOR MOTOR BRANCH-CIRCUIT SHORT-CIRCUIT PROTECTION PER THE 1996 NEC CODE BOOK RULES
FOR STANDARD EFFICIENCY MOTORS* (NEMA DESIGN B,C,&D)

HORSEPOWER	VOLTAGE	TIME DELAY FUSES	CIRCUIT BREAKER AUTO TRANS	CIRCUIT BREAKER ACROSS THE LINE	MOTOR CIRCUIT PROT. AMP RATING	MOTOR CIRCUIT PROT. TRIP RANGE
50	200	300A	400A	400A	400A	875-1750A
	208	250A	400A	400A	400A	875-1750A
	230	250A	350A	350A	250A	625-1250A
	460	125A	175A	175A	100A	300-1000A
	575	100A	150A	150A	100A	300-1000A
60	200	350A	450A	450A	400A	875-1750A
	208	300A	450A	450A	400A	875-1750A
	230	300A	400A	400A	400A	875-1750A
	460	150A	200A	200A	150A	450-1550A
	575	125A	175A	175A	100A	300-1000A
75	200	400A	600A	600A	NOT RECOMMENDED	
	208	400A	500A	500A	NOT RECOMMENDED	
	230	350A	500A	500A	NOT RECOMMENDED	
	460	175A	250A	250A	250A	500-1000A
	575	150A	200A	200A	150A	450-1550A
100	200	500A	800A	800A	NOT RECOMMENDED	
	208	500A	700A	700A	NOT RECOMMENDED	
	230	500A	600A	600A	NOT RECOMMENDED	
	460	225A	350A	350A	400A	625-1250A
	575	200A	250A	250A	150A	450-1550A
125	200	600A	800A	800A	NOT RECOMMENDED	
	208	600A	800A	800A	NOT RECOMMENDED	
	230	500A	800A	800A	NOT RECOMMENDED	
	460	300A	400A	400A	400A	875-1750A
	575	225A	300A	300A	400A	625-1250A
150	200	800A	1200A	1200A	NOT RECOMMENDED	
	208	800A	1000A	1000A	NOT RECOMMENDED	
	230	700A	1000A	1000A	NOT RECOMMENDED	
	460	350A	500A	500A	400A	1000-2000A
	575	300A	400A	400A	400A	625-1250A
200	200	1000A	1400A	1400A	NOT RECOMMENDED	
	208	1000A	1400A	1400A	NOT RECOMMENDED	
	230	800A	1200A	1200A	NOT RECOMMENDED	
	460	450A	600A	600A	NOT RECOMMENDED	
	575	350A	500A	500A	NOT RECOMMENDED	
250	200	1200A	2000A	2000A	NOT RECOMMENDED	
	208	1200A	2000A	2000A	NOT RECOMMENDED	
	230	1200A	1600A	1600A	NOT RECOMMENDED	
	460	500A	800A	800A	NOT RECOMMENDED	
	575	400A	600A	600A	NOT RECOMMENDED	
300	200	1500A	2000A	2000A	NOT RECOMMENDED	
	208	1500A	2000A	2000A	NOT RECOMMENDED	
	230	1200A	2000A	2000A	NOT RECOMMENDED	
	460	650A	1000A	1000A	NOT RECOMMENDED	
	575	500A	800A	800A	NOT RECOMMENDED	

* FOR ENERGY EFFICIENT MOTORS AND OTHER SPECIAL TYPES OF MOTORS CONSULT FACTORY FOR PROPER SIZING OF DISCONNECTS SWITCHES.

WHEN CONTROLS ARE FURNISHED BY THE CUSTOMER, CUMBERLAND BEARS NO RESPONSIBILITY OF IMPROPER SIZING OF DISCONNECT SWITCHES AND STARTERS UNLESS THE CUSTOMER REQUESTS MOTOR INFORMATION AND/OR ASKS FOR ENGINEERING ASSISTANCE IN SELECTING THE PROPER DISCONNECTS AND STARTERS.