DURATECH®

Manual I: Operating Instructions

4012™
Tub Grinder

PRODUCT INFORMATION

DURATECH INDUSTRIES

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DURATECH®

Clearing the Way for a Better Tomorrow

4012™

Tub Grinder

Manual 2:
Parts Reference

DuraTech Industries International Inc. (DuraTech) has made every effort to assure that this manual completely and accurately describes the operation and maintenance of the 4012™ Tub Grinders as of the date of publication. DuraTech reserves the right to make updates to the machine from time to time. Even in the event of such updates, you should still find this manual to be appropriate for the safe operation and maintenance of your unit.

This manual, as well as materials provided by component suppliers to DuraTech are all considered to be part of the information package. Every operator is required to read and understand these manuals, and they should be located within easy access for periodic review.

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Clearing the Way for a Better Tomorrow

Foreword

All personnel must read and understand before operating unit

DuraTech Industries International Inc. (DuraTech Industries) has made every effort to assure that this manual completely and accurately describes the operation and maintenance of this Industrial Grinder as of the date of publication. DuraTech Industries reserves the right to make updates to the machine from time to time. Even in the event of such updates, you should still find this manual to be appropriate for the safe operation and maintenance of your machine.

This manual, as well as materials provided by component suppliers to DuraTech Industries are all considered to be part of the information package. Every operator is required to read and understand these manuals All manuals should be located within easy access for troubleshooting and periodic review.

Appropriate use of the unit

This Industrial Grinder is designed to grind wood waste and other materials, including: grass clippings, leaves, pallets, construction and demolition debris, tree branches and tree trunks.

It is **NOT** designed to grind rocks, steel, concrete, or the like.

Operator protection

As with all machinery, care needs to be taken by the operator in order to insure the safety of the operator and those in the surrounding area.

WARNING: Operators and those observing the operation of the Industrial Grinder are required to wear head, eye, and ear protection. No loose clothing is allowed.

DURATECH®

4012™

Tub Grinder

Manual 1:
Operating Instructions

Introduction

This Industrial Grinder is designed to grind wood waste and other materials, including grass clippings, leaves, construction and demolition debris, tree branches and tree trunks It is **NOT** designed to grind rocks, steel, concrete, or the like.

Purpose

The purpose of this owner's manual is to explain maintenance requirements and routine adjustments for the most efficient operation of your 4012 DuraTech Tub Grinder . There is also a trouble shooting section that may help in case of problems in the field. Any information not covered in this manual may be obtained from your dealer.

SPECIAL NOTE: When reference is made as to front, rear, left hand, or right hand of this machine, the reference is always made from standing at the rear end of the machine and looking toward the hitch. Always use serial number and model number when referring to parts or problems. Please obtain your serial number and write it below for your future reference.

MODEL: 4012 DuraTech Tub Grinder SERIAL NO. _____

How to use this manual

Manual organization

This manual is organized into the following parts:

- **Manual 1: Operating instructions** explain how to set up, use and maintain the 4012 DuraTech Tub Grinder.
- **Manual 2: Parts reference** contains diagrams of each assembly with the number of each part identified. A key on the facing page contains a description of the part and the quantity used.

Operator responsibilities

- The operator is responsible for his own safety.
- The operator is responsible for the safety of all others in the area.
- Note the important safety information in the Foreword and in Section 1, "Safety."
- Thoroughly review sections 1 through 3 which explain normal operation of the machine, and section 4 and 5 which explain maintenance requirements. These sections will function as a textbook during the dealer-conducted training course that is required before use of the unit.
- When all primary operators have read the operating instructions and understand all information concerning the safe operation of the unit, the dealer will be required to sign the User Training Verification Form found in the 4012 DURATECH TUB GRINDER documentation packet.

NOTE: This form requires both the dealer's signature and the customer's signature. The dealer is responsible for returning the signed form to DuraTech Industries.

- Manuals for certain third-party components are provided separately. The operator must also be familiar with their contents.
- Keep copies of all manuals in a readily-accessible location for future reference.

Section 1: Safety

Thank you for taking the time to read the operation and maintenance manual for the DuraTech Industries 4012 DuraTech Tub Grinder. Because your safety and that of others is of the utmost importance, you should familiarize yourself with this entire manual before operating this unit.

The 4012 DURATECH TUB GRINDER incorporates a number of third party products. For example, the engine, and wet clutch are third party products. More information about the operation and care of these products can be found in each product's respective manual(s). Before operating this unit, you should familiarize yourself with these manuals as well.

Safety is an ongoing job experience, and DuraTech Industries has made every effort to make sure that the 4012 DuraTech Tub Grinder provides operator security and comfort. DuraTech Industries encourages you to bring to our attention as quickly as possible any suggestions you may have concerning the safety of the equipment. DuraTech Industries is dedicated to enhancing the safety of the DuraTech Industries 4012 DuraTech Tub Grinder.

This unit is supplied with an operation and maintenance manual and this manual should be kept with the unit for periodic review by operational personnel.

Operators of the 4012 DURATECH TUB GRINDER are recommended to wear head, eye, and ear protection as well as clothing appropriate for the application. Individuals with loose clothing, unrestrained long hair, jewelry, or other accessories which may hang loosely away from the body should not be allowed on or near the machine.

WARNING: FAILURE TO COMPLY WITH SAFETY INSTRUCTIONS THAT FOLLOW WITHIN THIS MANUAL COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH. BEFORE ATTEMPTING TO OPERATE THIS MACHINE, CAREFULLY READ ALL INSTRUCTIONS CONTAINED WITHIN THIS MANUAL.

THIS MACHINE IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THOSE EXPLAINED IN THE OPERATOR'S MANUAL, ADVERTISING LITERATURE OR OTHER DURATECH INDUSTRIES WRITTEN MATERIAL PERTAINING TO THE 4012 DURATECH TUB GRINDER.

1.1 Safety-alert symbols (REV. 11-14)

Decals are illustrated in **Manual 2: Parts Reference.**

The safety decals located on your machine contain important and useful information that will help you operate your equipment safely.

To assure that all decals remain in place and in good condition, follow the instructions below:

- Keep decals clean. Use soap and water - not mineral spirits, adhesive cleaners and other similar cleaners that will damage the decal.
- Replace all damaged or missing decals. When attaching decals, surface temperature of the machine must be at least 40° F (5° C). The surface must be also be clean and dry.
- When replacing a machine component to which a decal is attached, be sure to also replace the decal.
- Replacement decals can be purchased from your DuraTech dealer.

DuraTech Industries uses industry accepted **ANSI** standards in labeling its products for safety and operational characteristics.

Safety-Alert Symbol

Read and recognize safety information. Be alert to the potential for personal injury when you see this safety-alert symbol.

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

DANGER:
Signal word - White Lettering/Red Background
Safety Alert Symbol - White Triangle/Red Exclamation Point

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

WARNING:
Signal word - Black Lettering/Orange Background
Safety Alert Symbol - Black Triangle/Orange Exclamation Point

CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION:
Signal word - Black Lettering/Yellow Background
Safety Alert Symbol - Black Triangle/Yellow Exclamation Point

This manual uses the symbols to the right to denote important safety instructions and information.

The **DANGER**, **WARNING** and **CAUTION** symbols are used to denote conditions as stated in the text above. Furthermore, the text dealing with these situations is surrounded by a box with a white background, will begin with **DANGER**, **WARNING**, or **CAUTION**.

The **INFORMATION** symbol is used to denote important information or notes in regards to maintenance and use of the machine. The text for this information is surrounded by a box with a light grey background, and will begin with either **IMPORTANT** or **NOTE**.

	**1. Yellow warning triangle/black graphical symbol, indicates what the hazard is.** **Hazard Identification**
	**2. Red circle-with-slash/black graphical symbol indicates a prohibited action to avoid the hazard.** **Prohibited Action**
	**3. Blue mandatory action circles/white graphical symbol - indicates an action to take to avoid the hazard.** **Mandatory Action**

1.2 Operator - personal equipment (REV. 06-18)

THE OPERATOR

Physical Condition

You must be in good physical condition and mental health and not under the influence of any substance (drugs, alcohol) which might impair vision, dexterity or judgment.

Do not operate a 4012 DURATECH TUB GRINDER when you are fatigued. Be alert - If you get tired while operating your 4012 DURATECH TUB GRINDER, take a break. Fatigue may result in loss of control. Working with any equipment can be strenuous. If you have any condition that might be aggravated by strenuous work, check with your doctor before operating

Proper Clothing

Clothing must be sturdy and snug-fitting, but allow complete freedom of movement. Avoid loosefitting jackets, scarfs, neckties, jewelry, flared or cuffed pants, unconfined long hair or anything that could become entangled with the machine.

Protect your hands with gloves when handling parts. Heavyduty, nonslip gloves improve your grip and protect your hands.

Good footing is most important. Wear sturdy boots with nonslip soles. Steel-toed safety boots are recommended.

To reduce the risk of injury to your head never operate a 4012 DURATECH TUB GRINDER unless wearing a hard hat.

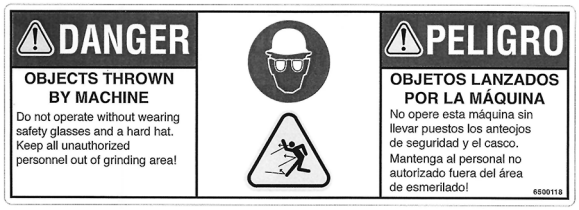
To reduce the risk of injury to your eyes never operate a 4012 DURATECH TUB GRINDER unless wearing goggles or properly fitted safety glasses with adequate top and side protection.

Noise may damage your hearing. Always wear sound barriers (ear plugs or ear mufflers) to protect your hearing. Continual and regular users should have their hearing checked regularly.

1.3 Machine safety labels (REV. 11-14)

The safety decals located on your machine contain important information that will help you operate your equipment. Become familiar with the decals and their locations.

DANGER: OBJECTS THROWN BY MACHINE
DO NOT OPERATE WITHOUT WEARING SAFETY GLASSES AND A HARD HAT.
KEEP UNAUTHORIZED PERSONNEL OUT OF THE GRINDING AREA



6500118

DANGER: ROTATING PART HAZARD, STAY OUT OF TUB WHEN ENGINE IS RUNNING.

1. KEEP OTHERS AWAY.
2. PLACE ALL CONTROLS IN NEUTRAL, STOP ENGINE, REMOVE KEY, AND WAIT FOR ALL MOVING PART TO STOP BEFORE SERVICING, ADJUSTING, REPAIRING, UNPLUGGING, OR ENTERING THE TUB FOR ANY REASON.
3. DISCONNECT DRIVELINE ON PTO MODELS.

6500212

DANGER: ELECTROCUTION HAZARD
TO PREVENT SERIOUS INJURY OR DEATH FROM ELECTROCUTION:

STAY AWAY FROM POWER LINES WHEN OPERATING BOOM LOADER, FOLDING AND RAISING CONVEYORS, AND TRANSPORTING ON ROADS.

THIS MACHINE IS NOT GROUNDED, ELECTROCUTION MAY OCCUR WITHOUT DIRECT CONTACT.

6500216

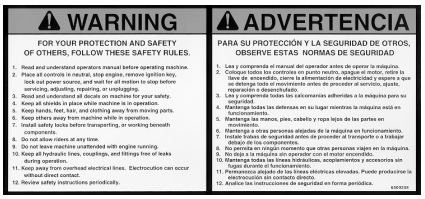
WARNING: CHECK FOR FIRES, CLEAN OFF DEBRIS, SWITCH OFF BATTERY
NEVER LEAVE THIS MACHINE UNATTENDED UNTIL ALL POTENTIAL FIRE DEBRIS IS REMOVED, NO FIRE OR SMOLDERING EXISTS, AND THE BATTERY IS SWITCHED OFF. REMOVE ALL FLAMMABLE DEBRIS FROM ENGINE, SHIELDING, CONTROL PANEL, UNDER MACHINE AND ANYWHERE MATERIAL IS COLLECTED.

DURATECH INDUSTRIES IS NOT RESPONSIBLE FOR FIRES CAUSED BY HAZARDS LEFT TO SMOLDER OR BURN, OR IMPROPER SHUTDOWN PROCEDURES.

6500425

WARNING: FOR YOUR PROTECTION AND SAFETY OF OTHERS, FOLLOW THESE SAFETY RULES

1. READ AND UNDERSTAND OPERATORS MANUAL BEFORE OPERATING MACHINE.
2. PLACE ALL CONTROLS IN NEUTRAL, STOP ENGINE, REMOVE IGNITION KEY, LOCK OUT POWER SOURCE, AND WAIT FOR ALL MOVEMENT TO STOP BEFORE SERVICING, ADJUSTING, REPAIRING, OR UNPLUGGING.
3. READ AND UNDERSTAND ALL DECALS ON MACHINE FOR YOUR SAFETY.
4. KEEP ALL SHIELDS IN PLACE WHILE MACHINE IS IN OPERATION.
5. KEEP HANDS, FEET, HAIR, AND CLOTHING AWAY FROM MOVING PARTS.
6. KEEP OTHERS AWAY FROM MACHINE WHILE IN OPERATION.
7. INSTALL SAFETY LOCKS BEFORE TRANSPORTING, OR WORKING BENEATH COMPONENTS.
8. DO NOT ALLOW RIDERS AT ANY TIME.
9. DO NOT LEAVE MACHINE UNATTENDED WHILE ENGINE IS RUNNING.
10. KEEP ALL HYDRAULIC LINES, COUPLINGS, AND FITTINGS FREE OF LEAKS DURING OPERATION.
11. KEEP AWAY FROM OVERHEAD ELECTRICAL LINES. ELECTROCUTION CAN OCCUR WITHOUT DIRECT CONTACT.
12. REVIEW SAFETY INSTRUCTIONS PERIODICALLY.



6500208

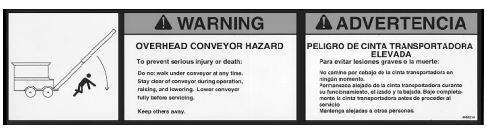
WARNING: NO RIDERS
SERIOUS INJURY COULD RESULT FROM RIDING ON THE MACHINE.

6500043

WARNING: TO PREVENT SERIOUS INJURY OR DEATH:

DO NOT WALK UNDER CONVEYOR AT ANY TIME. STAY CLEAR OF CONVEYOR DURING OPERATION, RAISING, AND LOWERING. LOWER CONVEYOR FULLY BEFORE SERVICING.

KEEP OTHERS AWAY.



6500214

WARNING: THROWN OBJECT HAZARD, TO PREVENT SERIOUS INJURY OR DEATH DO NOT RAISE TUB WHEN ROTOR IS TURNING.

1. DISENGAGE ROTOR AND ALLOW TO COME TO A COMPLETE STOP.
2. BE CERTAIN THAT ALL PERSONNEL ARE CLEAR OF MACHINERY AREA.
3. RAISE TUB TO FULL VERTICAL POSITION.
4. STOP ENGINE AND REMOVE KEY BEFORE APPROACHING TUB AND ROTOR AREA.

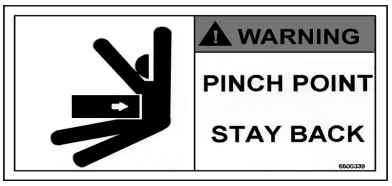
6500209

WARNING: HIGH-PRESSURE FLUID HAZARD, TO PREVENT SERIOUS INJURY OR DEATH:

- RELIEVE PRESSURE ON SYSTEM BEFORE REPAIRING OR ADJUSTING OR DISCONNECTING.
- WEAR PROPER HAND AND EYE PROTECTION WHEN SEARCHING FOR LEAKS. USE WOOD OR CARDBOARD INSTEAD OF HANDS.
- KEEP ALL COMPONENTS IN GOOD REPAIR.

6500220

WARNING: PINCH POINT STAY BACK



6500339

CAUTION: DO NOT OPERATE MACHINE UNLESS AN APPROVED FIRE EXTINGISHER IS INSTALLED.

6500497

KEEP WHEEL BOLTS TIGHT

6500042

1.4 Shielding (REV. 04-03)

This Tub Grinder is equipped with heavy-duty shielding at major points of potential injury. All Shields should be kept in place during operation. Bodily injury may occur if the unit is operated without shields.

WARNING: Shields are installed for your protection and to keep material off machine parts. Do not operate this Tub Grinder without shields in place.

1.5 Tub Grinder safety review (REV. 04-03)

WARNING: Before attempting to operate your Tub Grinder, carefully read and follow instructions given below and contained elsewhere in this manual.

Each and every aspect of the **DuraTech Industries 4012 DuraTech Tub Grinder** should be reviewed by each operator on a frequent basis. Safety systems are in place that result in direct operator security.

- Keep all foreign objects such as rocks, pieces of metal and other incompressibles out of the tub and away from the mill. Foreign objects may result in personnel injury or damage to the machine. A foreign object is any object which the unit in not designed to grind.
- Allow only responsible, properly instructed individuals to operate machines. Carefully supervise inexperienced operators.
- **Never operate the unit without all safety features, including shields, in place and in operating condition.**
- Make no modifications to this equipment unless specifically requested or recommended by DuraTech Industries.
- Tighten or replace any loose or cracked bolts, chains, hoses or connections.
- Check overhead for electrical power lines or other obstructions and be certain there is adequate clearance.
- Allow no one on the Tub Grinder at any time during operation.
- Unauthorized personnel should stay out of the grinding area.
- Always perform the pre-operation inspection before operating this machine.
- Ensure rotor is at a complete stop and engine is shut down before any performing any maintenance.
- **Never grab rope, cable, twine or similar material hanging out of tub while the tub grinder is running.**
- **Never enter the conveyor pivot area when the engine is running.**

WARNING: Loose clothing, necklaces and similar items are easily caught in moving parts. Avoid the use of these items if possible. Keep long hair confined. Keep hands, feet and clothing away from power driven parts.

1.6 Thrown objects and operator safety (REV. 04-03)

An operational characteristic of all tub grinders is that objects may be thrown out of the tub. Thrown objects may present a safety hazard to persons in the area. This section is to inform the operator of this characteristic, and what can be done to reduce the risk of injury to the operator and persons in the area. Keep all observers away from the machine.

Figure 1.1

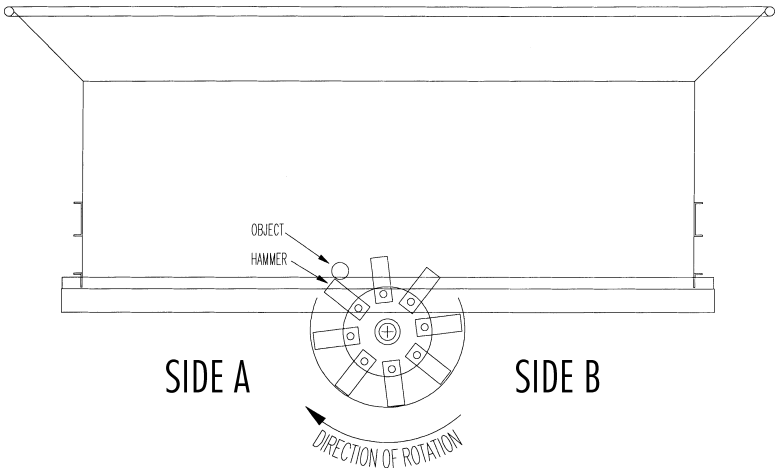


Figure 1.1 shows an object being hit as the hammer is on the upswing. A general pattern for where thrown objects may land is shown in Figure 1.2.

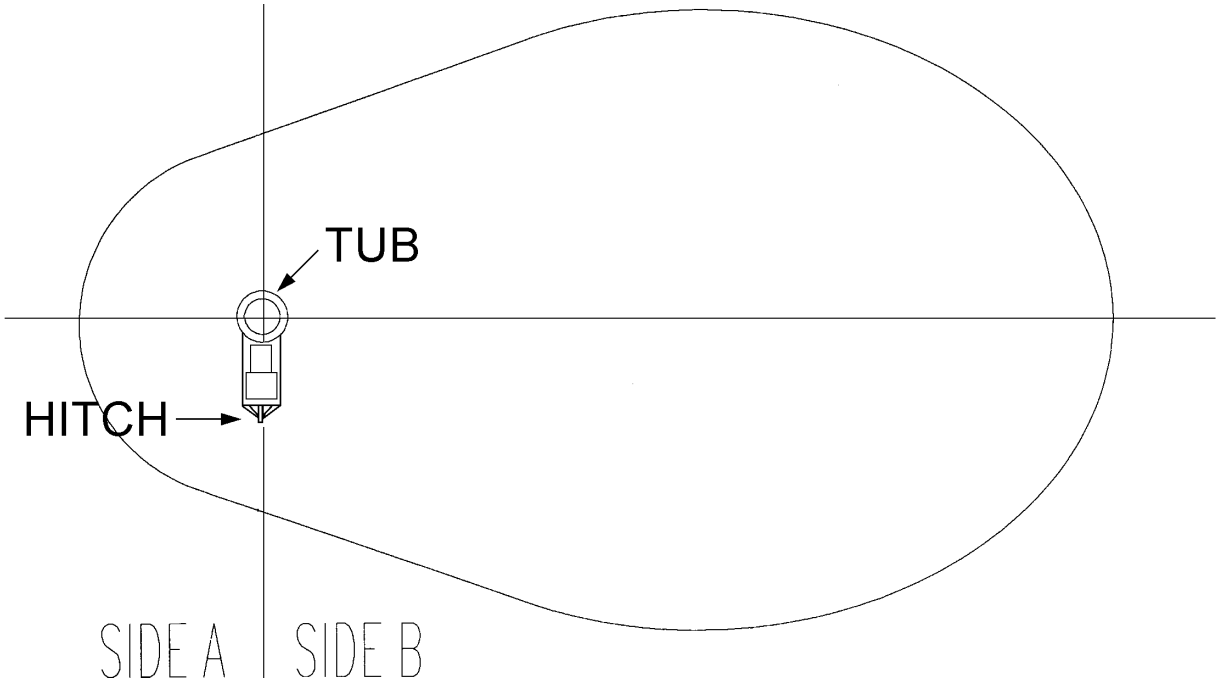


Figure 1.2 Thrown object hazard

NOTE: The thrown object pattern will be larger on side B

Dimensioning the size of this area is not practical. The distance a thrown object may travel is dependent on several conditions, including, but not limited to, rotor speed and diameter, condition of the hammers, style of hammers, object mass, object shape, amount of material in the tub, and how the hammer strikes the object.

The amount of material in the tub can dampen or stop the object's potential flight. Keeping the tub full will reduce the risks. Filling the tub at least 1/2 full before engaging tub rotation will reduce the risk. Using a geyser plate can help reduce thrown objects. A risk may arise when the tub is being emptied, such as at the end of the grind. Running the engine at slower speeds when starting or finishing the grind will also help, especially slowing down when emptying the tub. Keeping the tub covered with DuraTech Industries Tub Covers will also reduce the risk of potential injury or property damage. Use of a Tub Cover will not reduce the area over which thrown objects may fall, but it does reduce the percentage of objects thrown from the tub.

WARNING: To minimize the potential risk of injury or property damage, the operator must:

a) Place side B towards open areas, away from property and people.

b) Load the grinder from side A with a loader equipped with an enclosed cab.

c) Keep observers out of the area.

d) Wear a hard hat and safety glasses, at a minimum, and require that any other persons in the area are similarly equipped.

e) If the optional tub cover is installed on the machine, the operator should keep the Tub Cover over the tub as much as possible while grinding. While grinding, the Tub Cover should be raised only when adding material to the tub, and then the Tub Cover should only be raised enough to allow the new materials to be placed in the tub.

1.7 Service and maintenance (REV. 06-18)

CAUTION: The stored up energy in the rotor causes it to rotate long after the engine rotor clutch or fluid coupler has been disengaged. Before performing any maintenance on the machine or getting into the tub, be sure rotor and all moving parts have come to a complete stop. Shut off engine and remove the key.

Before working on or near the Tub Grinder for any reason such as servicing, inspecting or unclogging the machine:

- Follow the normal shutdown procedure found on Section 3.6 of this manual.
- If the unit is still attached to a towing vehicle, place the towing vehicle's transmission in park and set the parking/emergency brake.
- Relieve all pressure in the hydraulic system before disconnecting hydraulic lines or performing work on the system. Make sure all connections are tight and the hoses and lines are in good condition before applying pressure to the system.

When replacing any part on your Tub Grinder, be sure to use only DuraTech Industries authorized parts.

WARNING: Hydraulic fluid escaping under pressure can be invisible and have enough force to penetrate the skin. When searching for a suspected leak, use a piece of wood or a cardboard rather than your hands. If injured, seek medical attention immediately to prevent serious infection or reaction.

1.8 Fire Prevention (REV. 08-10)

Grinding material in a tub grinder produces a large amount of potentially combustible material. The risks of fire can be significantly reduced with proper operating and maintenance procedures. This does include frequent removal of dust, debris, and other combustible materials.

Most of the products that are ground are dry and the grinding process can produce fine, dusty material. The grinding process can produce heat and the spinning rotor will circulate air within the grinding chamber. For a fire to start, fuel, oxygen and heat in sufficient quantity, must be present. During normal operation and with a properly maintained tub grinder, the material being ground will move through the grinding chamber so quickly that it doesn't have a chance to heat up sufficiently to start a fire. Also, the rapid rate that a tub grinder can pile material will quickly smother small hot spots that might occur during normal grinding operations. Keeping the material moving through the machine and across the top of the rotor is important to keep frictional heating of the material to a minimum.

IMPORTANT: NEVER leave the vicinity of the unit with the engine running**.**

PROPER OPERATION OF THE TUB GRINDER:

- Do not grind materials any finer than necessary. Finely ground materials will produce more dust and increase the risk of fire. If finely ground materials are required, it is better to grind the materials coarse first with large opening screens installed in the grinder and then regrind them to the desired consistency by installing smaller opening screens in the grinder. Be especially cautious when grinding materials that can burn easily.
- When filling the tub grinder during start-up begin by filling the front of the tub and avoid placing materials on the spinning rotor. When material begins to fall over the rotor, set the governor control on "Manual" and rotate the tub slowly while continuing to fill the tub. When the tub is 1/2 to 2/3 full, the governor control can be set to "auto" and grinding operations can resume normally. Do not allow the tub to stop for any significant amount of time with material over the rotor to minimize frictional heating.
- Do not smoke when working with combustible materials.

REMOVAL AND CLEANING INSTRUCTIONS:

- Clean the engine compartment daily or more often if conditions require it be done more frequently. When cleaning the engine compartment, always clean the top of the engine and the areas around exhaust manifolds, exhaust plumbing and turbochargers.
- Check the rotor box for debris built up around the rotor. Remove material that may be packed tight near the bearings, on shaft or other rotating components because it will become hot due to friction.
- At shutdown, always clean and remove all dust, debris, or combustible material off the entire grinder. Use high-pressure air or water if necessary. Always move the grinder and all other equipment away from the ground material pile before leaving the job site in case of smoldering combustion in the ground material.

TUB GRINDER MAINTENANCE:

- Repair any fuel or hydraulic leaks as quickly as they are discovered. Clean up spills immediately. Fuel or oil soaked materials can contribute significantly to the rapid spreading of a fire once it has begun.
- Inspect all electrical wiring periodically. Any chafed or damaged wires should be repaired immediately. Keep all electrical connections tight to prevent arcs or sparks.
- Contact between the rotor and any stationary component of the grinding chamber such as contact between the hammers and the screens must be corrected immediately.

1.9 Fire Extinguishers (REV. 04-03)

Fire extinguishers are provided on these DuraTech grinders in the unlikely event that a fire does start on the grinder. An extinguisher is located on both sides of the machine near the front hydraulic reservoir. The extinguishers are ABC dry chemical extinguishers that are appropriate for use with all materials normally encountered on a tub grinder.

If a fire does start, CALL THE LOCAL FIRE DEPARTMENT IMMEDIATELY. Then, use the fire extinguisher if you feel confident that you can extinguish the fire. A 10# extinguisher will last about 15-20 seconds and a 20# extinguisher will last about 20-24 seconds, so they will not stop a large fire.

When using a fire extinguisher, use the P A S S method:

- Approach the fire with the wind at your back.
- **Pull the pin,**
- **Aim the spout,**
- **Squeeze the trigger, and**
- **Sweep along the base of the fire from about 6-8 feet away.**

fire extinguisher location

Read the label on your extinguisher now, most extinguishers have descriptions of this method, and an estimated working time.

If an extinguisher is only partially used, the dry chemical will jam in the seals, allowing the extinguisher to loose its pressure charge in less than an hour, making it useless to you. It must be recharged before placing it back on the machine. Have the extinguisher recharged today; a fire will not wait for you to recharge your extinguisher tomorrow!

Fire extinguishers should be inspected and recharged by a professional at least annually to keep them at optimum performance! A "verification of service" collar that confirms the month and year of service should be attached to the neck of the container to confirm when the extinguisher was last serviced.

1.10 Towing (REV. 04-03)

Check all lights, brakes and hitch connections before towing. Check your state laws regarding the use of lights, safety chains, moving wide loads on public roads, and other possible requirements.

Use caution when traveling on public roads, rough or winding roads, or steep terrain.

See Section 3.23 for more information about preparing the unit for transport.

1.11 Important safety reminders (REV. 04-03)

Always follow basic safety precautions when using this unit to reduce the risk of injury.

IMPORTANT: NEVER climb on the machine, crawl under the machine, or enter the tub when the engine is running or the machine is in operation.

Unauthorized personnel should stay out of the grinding area. Flying debris can injure inattentive personnel.

IMPORTANT: NEVER perform maintenance in the tub, under the machine, on the conveyor, or other moving part of the machine without first shutting off the engine and removing the key. Place padlock on control panel, and attach "DO NOT OPERATE" label.

Section 2: Introduction

2.1 Description of the 4012 DuraTech Tub Grinders (REV. 04-03)

The Tub Grinder is designed to grind wood waste, green waste, construction and demolition debris, tree branches and trunks, compostables and mulch. The unit incorporates a number of basic features including the engine, electronic engine controls, rotating tub, the electronic governor, the rotor and hammer assemblies, the tub chain and drive assemblies, as well as the belly and discharge conveyors assemblies.

Material is fed into the tub of the unit by an appropriate means, such as a wheel loader or the optional grapple loader. As the tub rotates, the material is exposed to the rotating hammers. The hammers then grind up the material before the material is discharged by the belly and discharge conveyors.

2.2 Electronic governor (REV. 06-18)

The Model RCB93 Electronic Governor regulates the speed at which the tub rotates. The electronic governor has two modes of operation, the Engine (Auto) mode and the Tub (Manual) mode. The Engine (Auto) mode is the preferred mode of operation and should be used whenever possible.

IMPORTANT: Except when calibrating or trouble shooting the electronic governor always use the Engine (Auto) mode of the electronic governor.

Engine (Auto) Mode

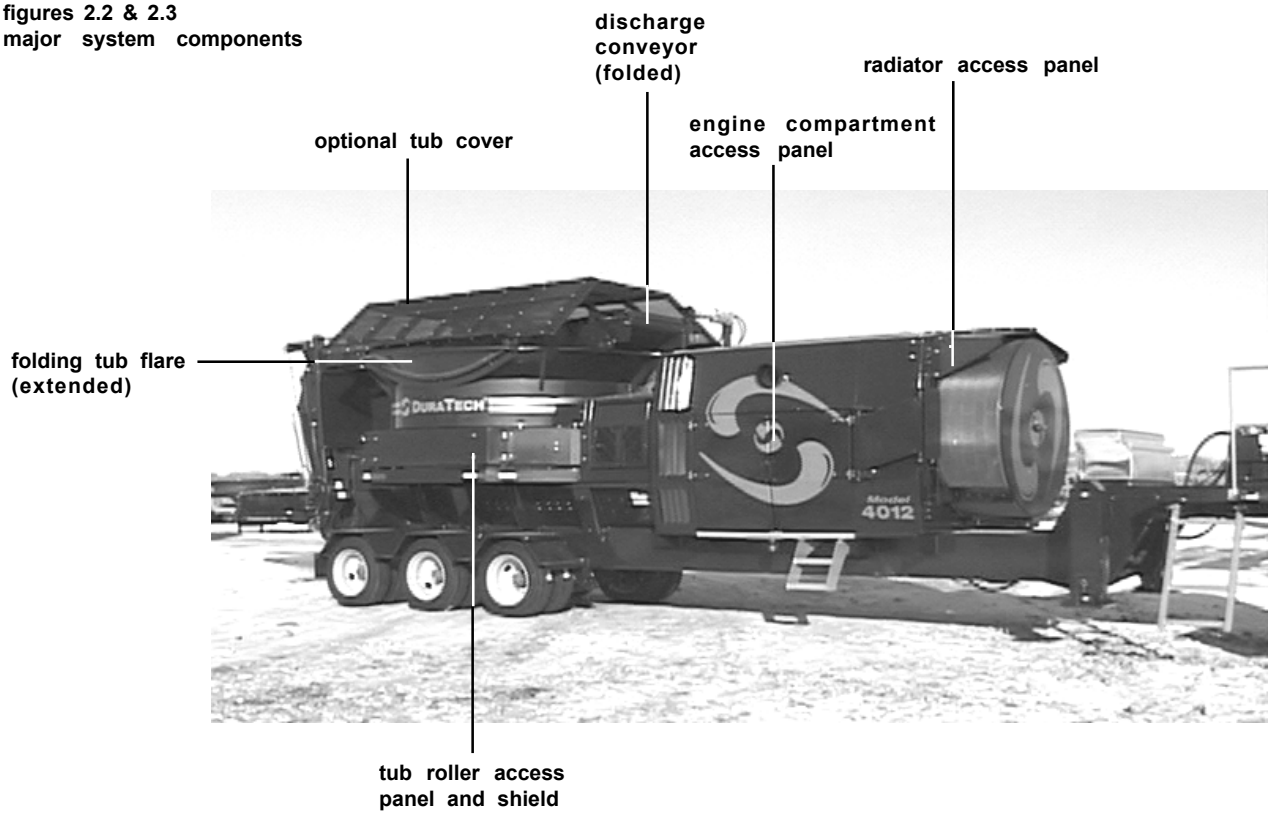
When the electronic governor is switched to the Engine (Auto) mode, it is monitoring the rotation speed of the engine. The hydraulic flow to the tub drive mechanism is regulated proportionally to the engine speed. When the engine begins to lug down, the hydraulic oil flow is reduced which in turn slows down the tub rotation. With proper calibration, the engine will only lug down to its optimum horsepower RPM and the tub rotation will be varied proportionally to keep the engine at this RPM. The result is a nearly constant load on the engine, which will maximize grinding efficiency. **See Section 3.28 for calibration instructions.**

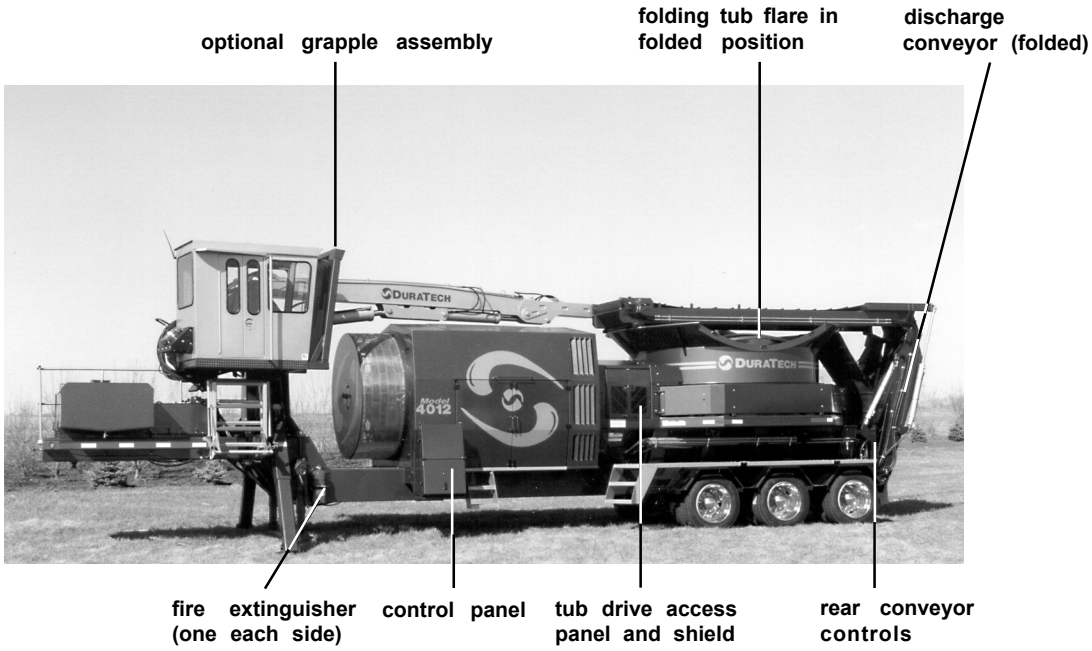
figure 2.1 model RCB93 electronic governor

Tub (Manual) Mode

In this mode the tub speed is constant and it will not change to match varying load conditions.

figures 2.2 & 2.3
major system components





2.3 Wet clutch (REV. 04-03)

The HPTO Hydraulic Power Take-off is a totally enclosed wet hydraulic clutch that requires no adjustment throughout its wear life. During a torque spike, the wet clutch will act as a torque limiter by slipping to absorb the shock load

The controller contains the preprogrammed settings for how the HPTO will function during startup. The “Power” LED will illuminate when power is received from the ignition switch. Note that power is off when the tub is raised. This prevents the operator from spinning the rotor while the tub is raised.

The “Engine Speed Detected” LED illuminates when the engine is spinning.

To engage the wet clutch, set engine speed below 1100 RPM, and press the Clutch Start Button for 3 seconds (the blue beacon light should be lit during this time). When the “Clutch Engaged” symbol illuminates, the start button can be released. The controller will “bump” the wet clutch several times while bringing the rotor up to speed.

If the engine speed is above 1100 RPM, the “RPM Too High” symbol will illuminate, and the wet clutch will not engage. Reduce engine speed below 1100 rpm and try again.

To disengage the wet clutch, press the Clutch Start Button. If engine speed is above 1200 RPM, the “RPM Too High” symbol will illuminate. Reduce engine speed below 1200 RPM and try again.

The controller will allow 3 starts in 5 minutes. If a 4th start is attempted, the “Timed Lockout” symbol will illuminate, and the wet clutch will not engage for 10 minutes.

The blue beacon light will flash during startup, and during some fault conditions. If the oil gets too hot, the light will flash, the “Oil Temperature” symbol will illuminate, but the wet clutch will stay engaged. The operator must disengage the wet clutch, and allow the system to cool off. With a plugged oil filter, the “Filter Clogged” symbol will illuminate. The operator must disengage the wet clutch, shut the engine off, and change the filter (4400073).

The wet clutch will disengage when there is an oil pressure fault, or when the engine speed signal is lost.

2.4 Rotor (REV. 04-03)

The rotor is the heart of the grinder. The standard rotor contains fixed hammers and is used for general grinding. Swinging hammers are available for use when grinding debris contaminated with tramp metal.

2.5 Screens (REV. 04-03)

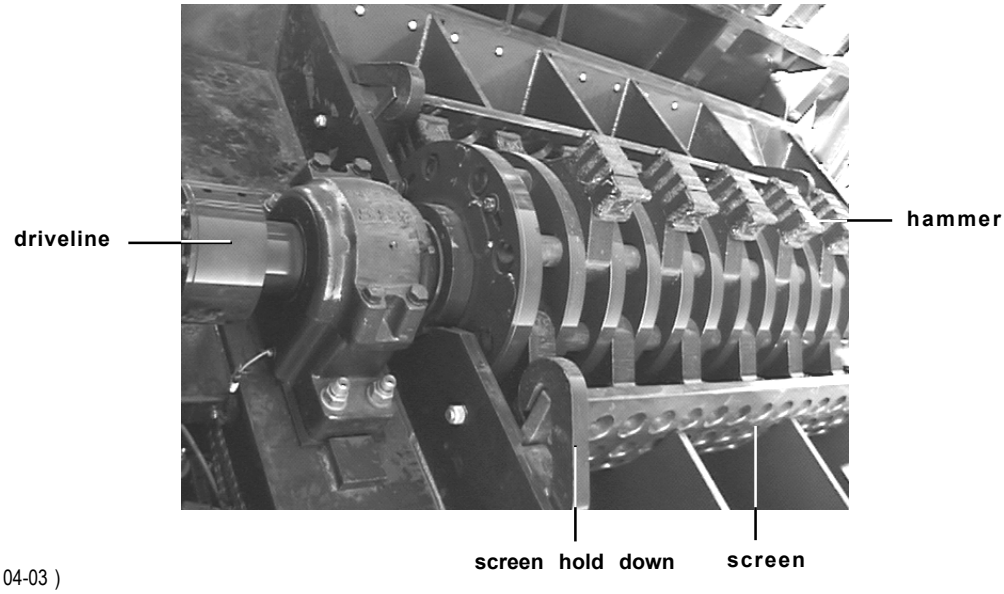
All DuraTech Industries tub grinders come equipped from the factory with two screens. The size of the openings in the screens are specified by the customer at the time of purchase.

Any combination of hole sizes may be used to alter the coarseness of the output material. The coarseness of the ground material is determined by the size of the screen holes. As the size of the screen holes becomes larger, the coarseness of the ground material increases.

Round perforated screens are available with 1-1/2”, 2”, 3", 4", & 5” round hole, and 6”x 7” demolition screen. The 1-1/2” screen is made from 1/2” thick Hardox material; all other screens are 1” thick steel.

Note: If a combination of screens with different hole diameters are used, the screen with the smallest hole diameter is normally placed on the left hand side of the rotor box.

figure 2.4
driveline, rotor, and screens



2.6 Tub (REV. 04-03)

Material to be ground is loaded into the tub using a wheel loader, optional grapple loader, or other suitable method. As the tub rotates, this material is fed to the rotor. The faster the tub rotates , the more material is exposed to the rotor, and the greater the load on the engine. The tub's rotation speed is controlled by the electronic governor. To reduce the amount of material thrown from the tub during operation, the tub should be kept 1/2 to completely full.

The 4012 DURATECH TUB GRINDER's tub can be tilted 90 degrees for access to the rotor, screens, and drive line. The tub has an electronic safety switch that will not allow the tub to be raised with the rotor turning. The switch provides feedback to the operator through two indicator lights which are located on the control panel. If the green indicator light is on, the operator may tilt the tub. Conversely, if the red indicator light is on, the safety switch will prevent the operator from tilting the tub.

2.7 Hydraulic cooler (REV. 04-03)

The hydraulic system has a radiator to disperse excess heat. It is mounted in front of the engine radiator, and can be accessed via the radiator rotating screen.

2.8 Wet clutch cooler (REV. 04-03)

The wet clutch system has a radiator to dissipate excess heat. It is mounted in front of the engine radiator, and can be accessed via the radiator rotating screen.

2.9 The conveyor system (REV. 04-03)

The conveyor system on the 4012 DURATECH TUB GRINDER consists of a belly conveyor and a discharge conveyor. The belly conveyor transfers the ground material from the rotor to the discharge conveyor. The discharge conveyor then moves the material away from the unit. The conveyors are run by two hydraulic orbit motors which are turned on and off with one control switch. This switch is located at the control panel. The discharge conveyor can be raised or lowered from the control panel or from the conveyor controls located at the left rear of the machine. The discharge conveyor can also be swung left or right using the controls at these locations. The discharge conveyor can also be folded for transport from the conveyor controls located at these locations.

2.10 Tub cover (optional) (REV. 04-03)

An optional tub cover may be added to the unit that helps to reduce the amount of material ejected from the tub while grinding.

figure 2.5
tub grinder with optional tub cover installed

2.11 Grapple loader (optional) and Cab Controls (REV. 08-10)

An optional grapple loader is available for the 4012 Industrial Tub Grinder. This loader can be used to place most materials into the grinder's tub. From the loader's cab, the operator is able to see what is occurring in the tub.

Stabilizer legs are included with the optional loader, and their controls are located in the operator's cab with the other controls for operating the loader. The stabilizer legs stabilize the loader during operation.

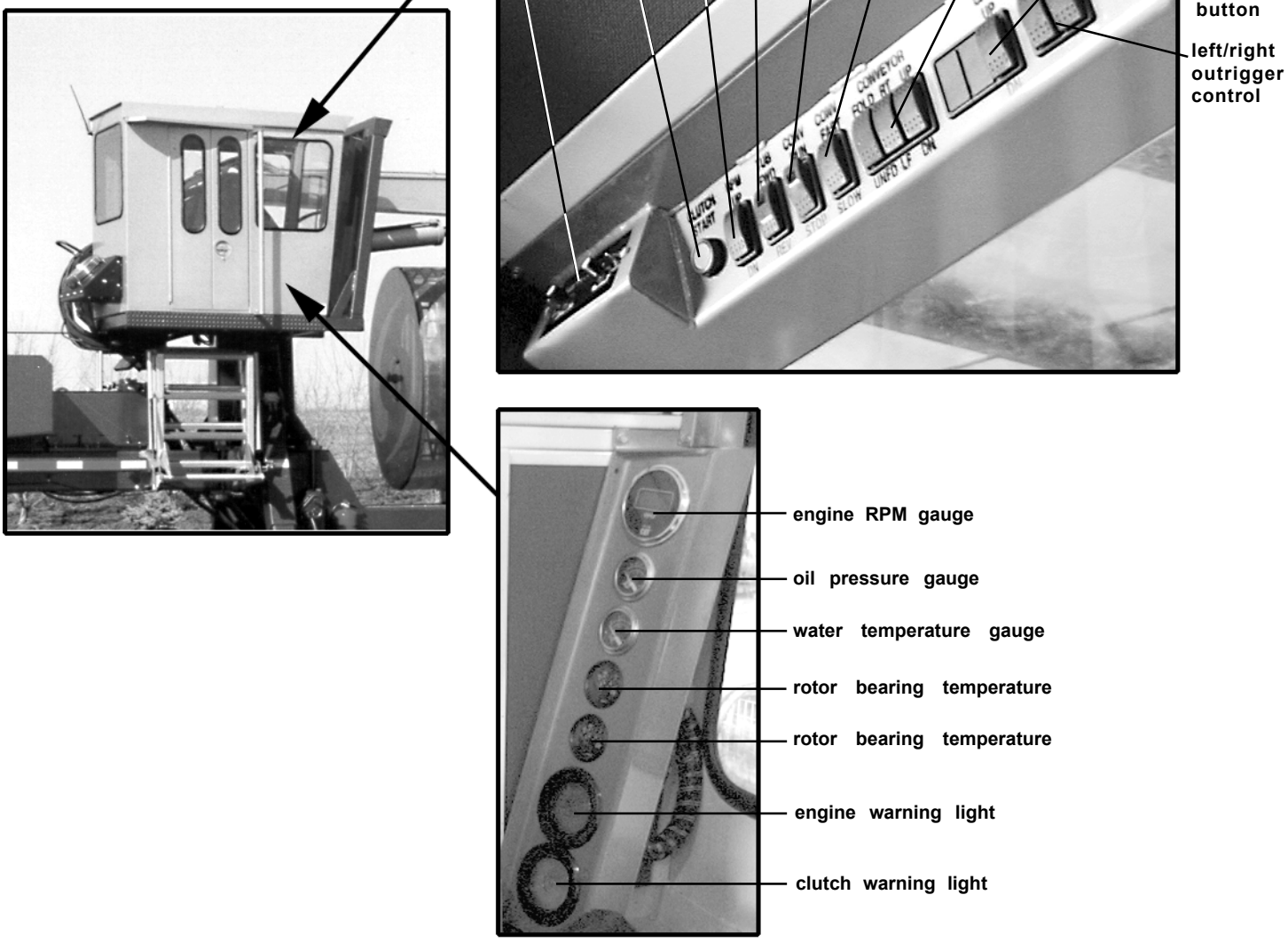
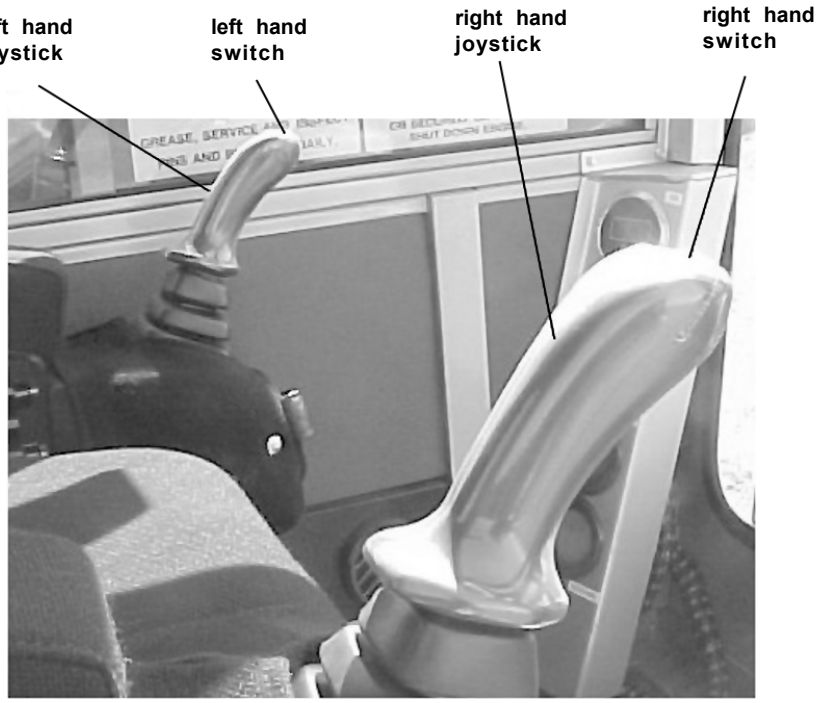
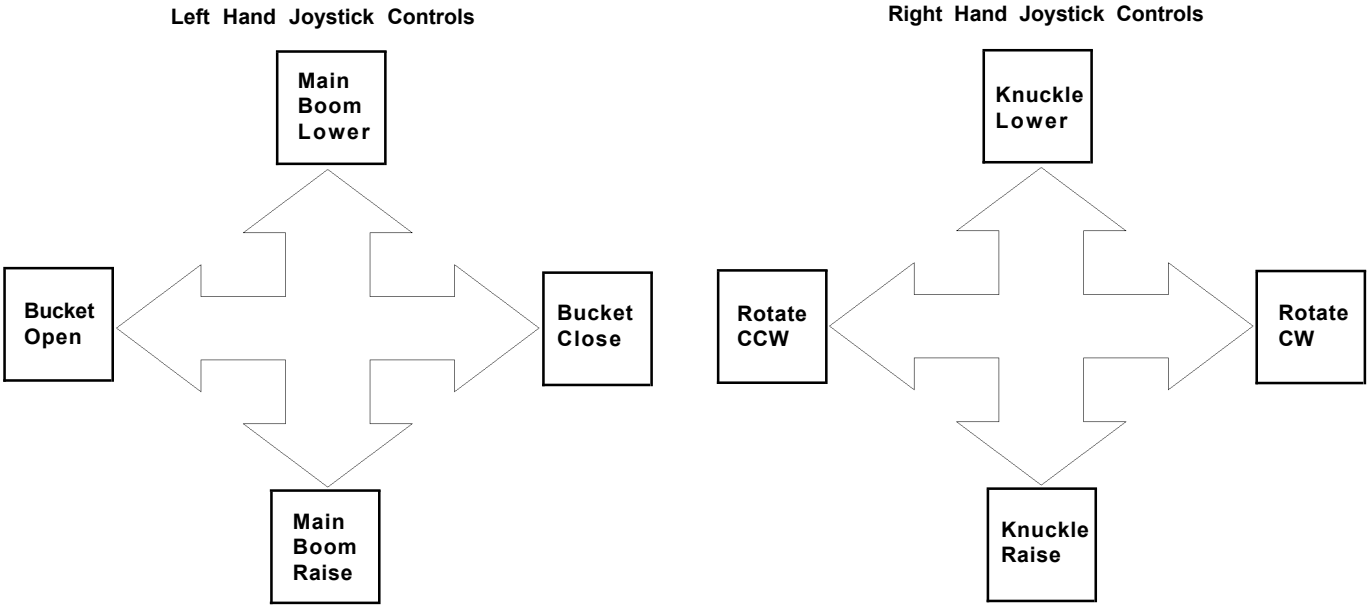


figure 2.6
grapple loader controls and gauges

Joystick Controls for 4012 Grapple Loader





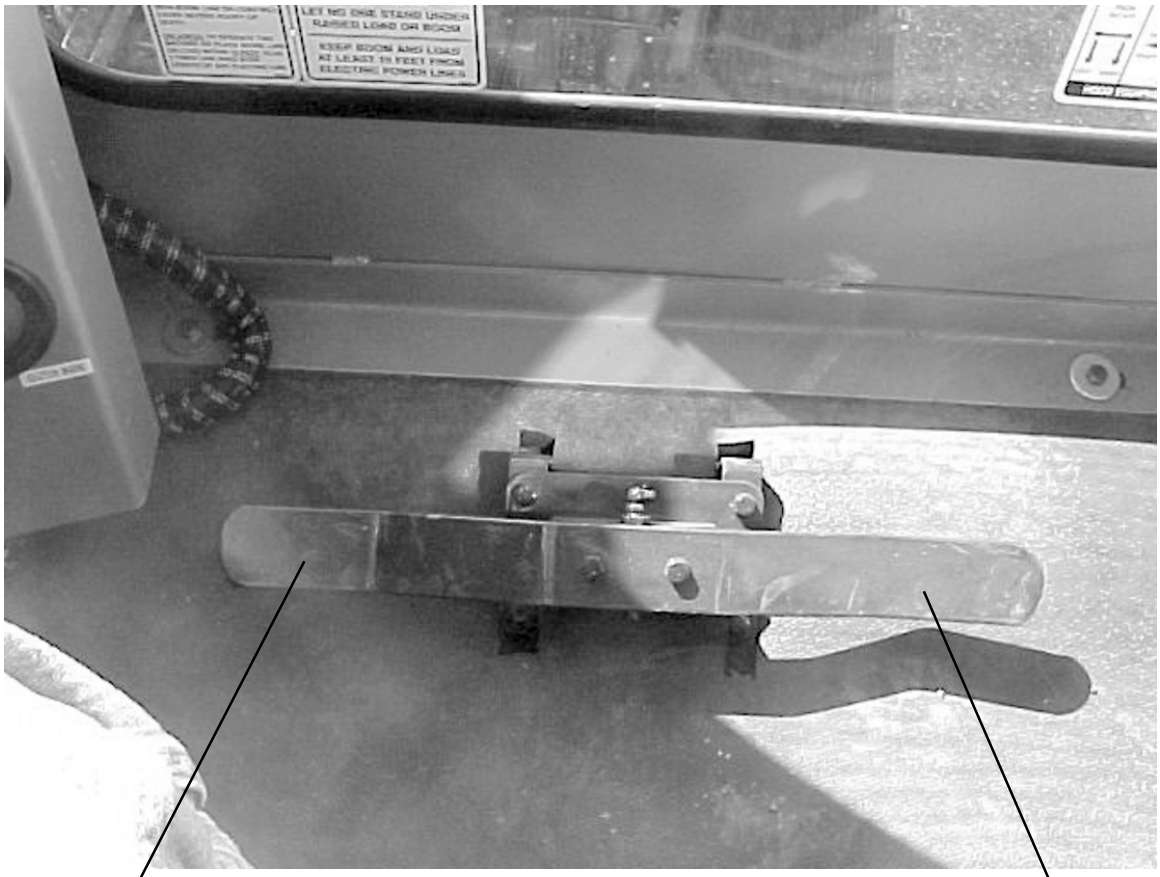
Switches on the Joysticks

With the Tub Cover: Left switch controls the IN/OUT. Right switch controls the UP/DOWN.

With no Tub Cover, the switches are used for the discharge ciconveyor: Left switch controls the UP/DOWN for the discharge conveyor.

Right switch controls the SWING LEFT/SWING RIGHT.

Foot Controls



2.12 4012 DuraTech Tub Grinder Electronic Engine Controls (REV. 06-18)

figure 2.7.1
control panel
for S.N. up to
40-2-15-015

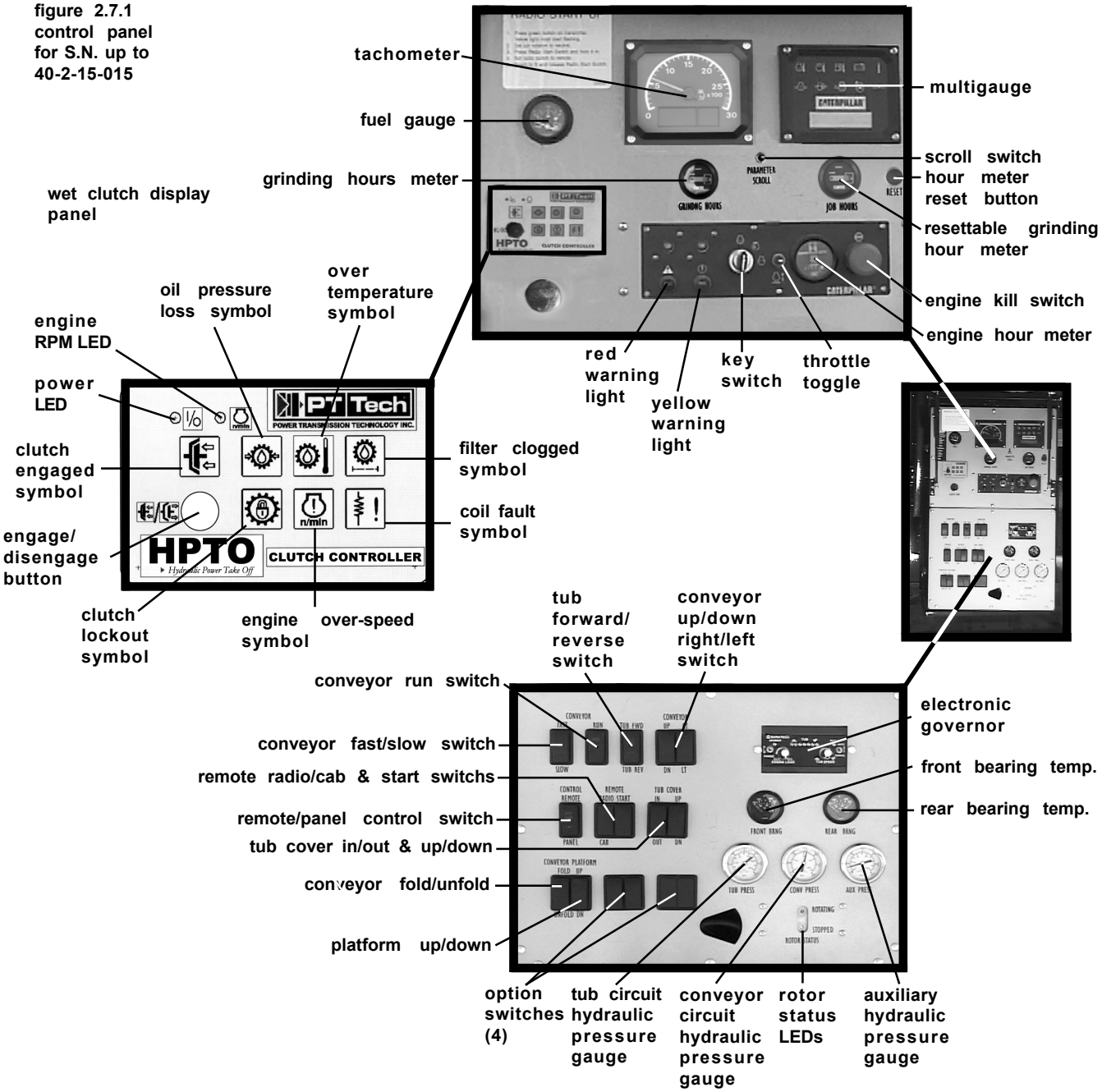
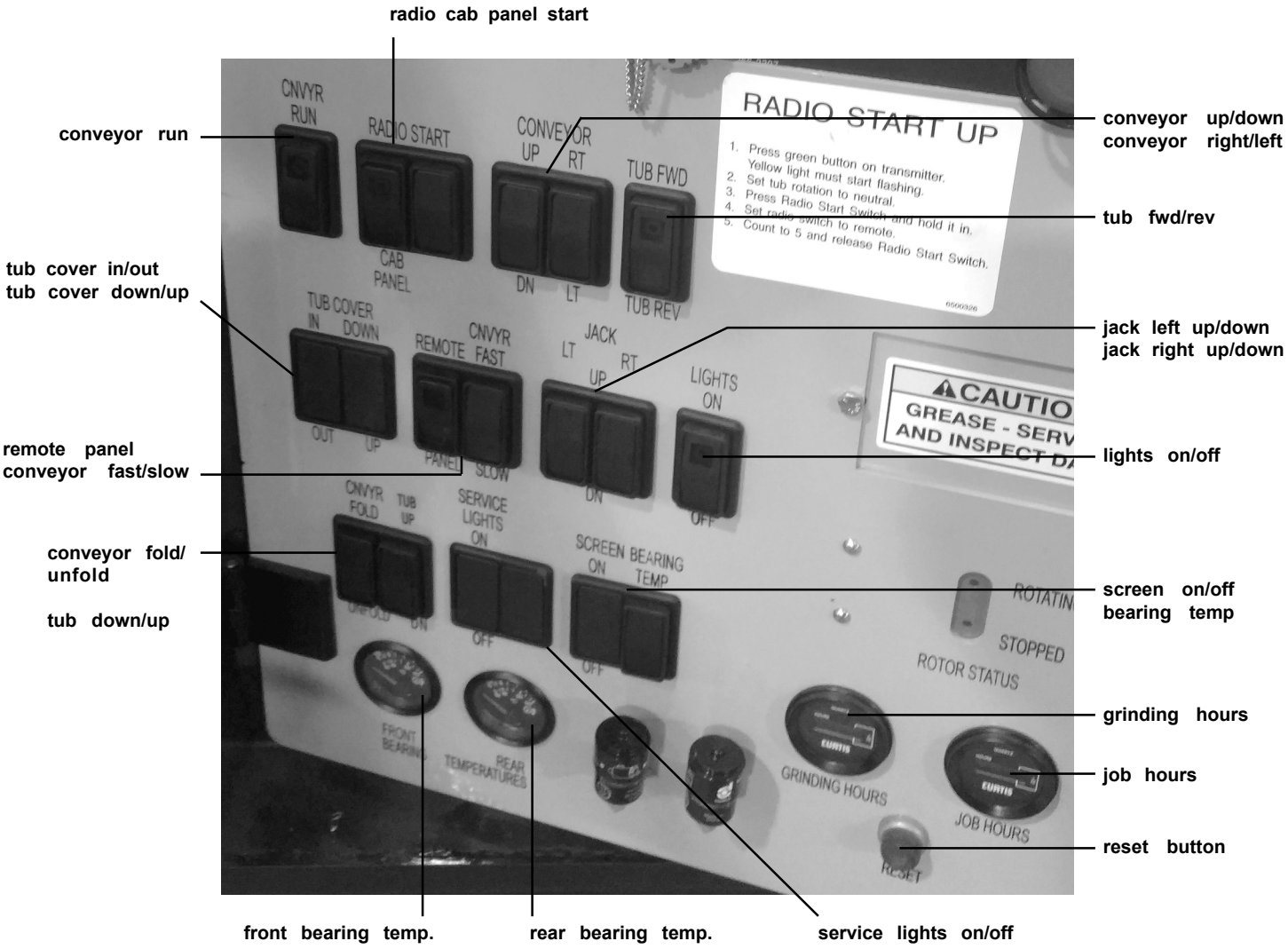
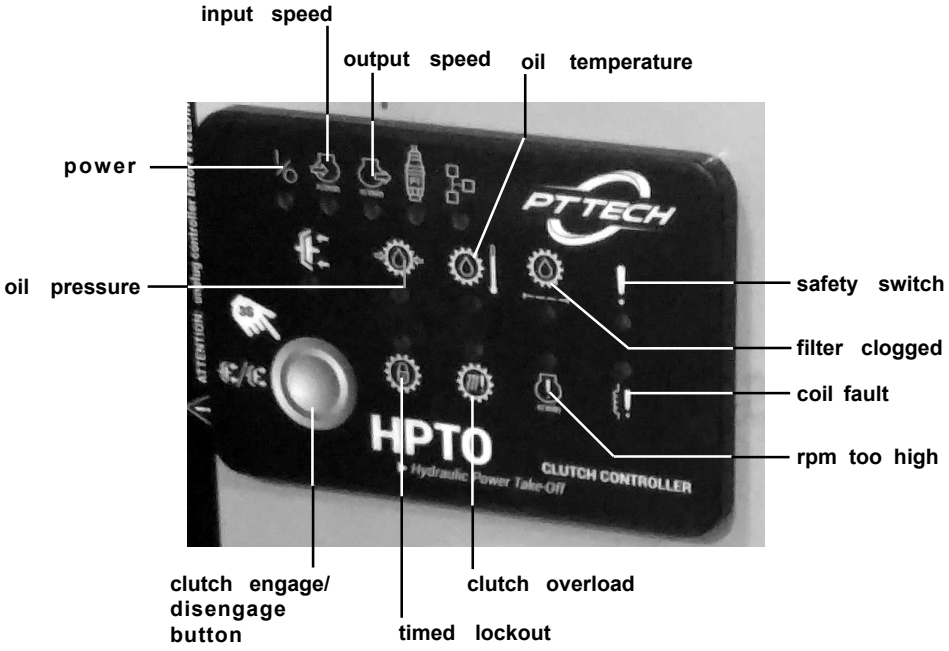


figure 2.7.2
control panel
for S.N. 40-2-16
and up





2.12.1 Control panel (REV. 04-03)

The control panel is located on the left hand side of the engine. Controls on the control panel include; engine start, emergency kill switch, throttle, tub controls, conveyor on/off, conveyor positioning, rotor engage button, tub governor, tub tilt, and the job hours reset button.

Gauges on the control panel include; tub circuit hydraulic pressure, conveyor hydraulic pressure, auxiliary hydraulic pressure, fuel level, grinding hours gauge, job hours gauge, tachometer, and a multi gauge.

2.13 Other controls (REV. 04-03)

Rear conveyor controls

The rear conveyor controls are located at the rear left corner of the machine. From left to right operator can use the first toggle switch to fold and unfold the conveyor from the conveyors transport position, the second toggle switch allows the operator to raise or lower the discharge conveyor, and the final toggle switch allows the operator to pivot the conveyor left and right.

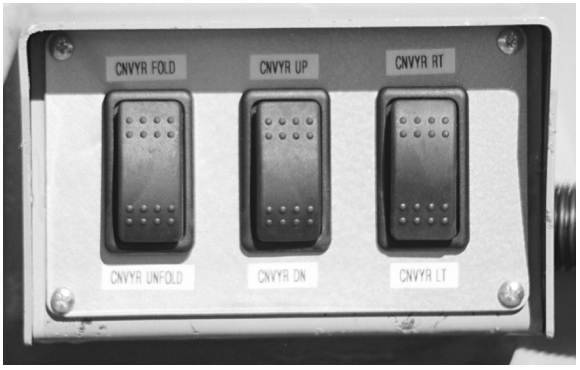


figure 2.8 rear conveyor controls

Radio remote control unit (optional)

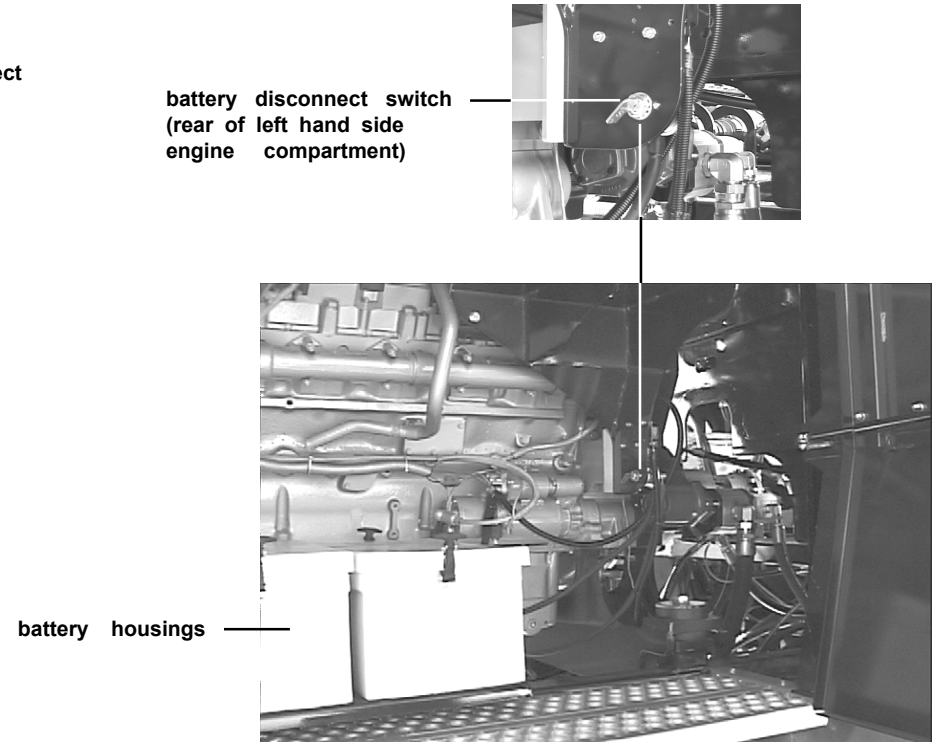
The optional radio remote control unit allows the operator to remotely start and stop the tub, change the tub's direction of rotation to forward or reverse, perform an emergency stop, raise and lower the conveyor, and swing the conveyor left and right.

NOTE: See also section 3.18, "Operating the grinder using the remote radio option."

Battery disconnect switch

The battery disconnect switch is used to connect and disconnect the main battery cable to the machine. When the machine is not in use, it should be disconnected.

figure 2.9
battery disconnect switch



Section 3: Operation

3.1 Pre-operation inspection (REV. 04-03)

Read and have a thorough understanding of the operator's manual, especially the sections pertaining to machine operation and safety. Also make sure that anyone who will assist you in the operation or maintenance of this machine understands how the machine operates.

Before operating the 4012 DuraTech Tub Grinder, perform an inspection that includes the following items. As each task is performed, check or initial the adjacent box.

- ❑ Check lubrication points and lubricate as recommended in the general maintenance section of this manual.
- ❑ Make sure that the machine is properly adjusted. Procedures for making adjustments to various 4012 DURATECH TUB GRINDER components can be found later in this section.
- ❑ Check engines oil level and coolant level, and add or change as necessary. Also look for oil or coolant leaks and repair as necessary.
- ❑ Check the hydraulic oil level, and add or change the hydraulic oil as necessary. Also look for leaks in the hydraulic system.
- ❑ Check the air cleaner service indicator. If the red indicator is visible, service the air cleaner.
- ❑ Check for buildup of debris around the radiator, turbocharger, manifolds, air intake and moving parts. Remove the debris before operating the unit.
- ❑ Inspect belts for cracks, breaks, or other damage.
- ❑ Inspect wiring for loose connections and for worn or frayed wires.
- ❑ Check the fuel supply, and drain any water from the water separator.
- ❑ Visually examine the rotor to see if any parts show excessive wear. These parts include shaft, plates, rods, hammers and movable plate. Replace or repair any worn parts before operating the unit.
- ❑ Check the screens for wear. Also check the screen hold downs for wear and tightness. Replace or repair any worn parts before operating the unit.
- ❑ Visually examine the rotor bearings and the mounting bolts and check all bearings for wear. Replace or repair any worn parts before operating the unit.
- ❑ Make sure that all shields and guards are in place and in operating condition.
- ❑ Check clutch oil level.
- ❑ Check rotor bearing oil level.
- ❑ Check pressure rollers for proper bearing adjustment.

3.2 Starting the Tub Grinder (REV. 04-03)

NOTE: The engine will start easier at cool temperatures by use of a starting aid. A block heater or other means can be used to warm the engine.

NOTE: Do not crank the engine for more than 30 seconds. Allow the starter motor to cool for two minutes before cranking again.

Check engine manufacturers recommendations for starting the engine, and follow their recommendations where applicable.

Check for **DO NOT OPERATE** or similar warning tags. Do not move any controls if such tags are on the machine.

To start the engine, perform the following steps:

1. Perform the pre-operation inspection.
2. Turn the battery disconnect switch to “ON”.
3. Shout the word **“CLEAR”.**
4. Turn the key to the start position and release it when the engine starts.
5. If the oil pressure does not rise within ten seconds after starting, stop the engine and make the necessary repairs.
6. Reduce the engine speed to a low idle. Allow the engine to idle for 3 to 5 minutes, or until the water temperature gauge indicator has begun to rise. The engine should run smoothly at low idle.
7. Make another walk-around inspection checking the engine and hydraulic system for fluid leaks.
8. Follow the engine manufacturers recommendations for the care and maintenance of a new engine.

NOTE: See also section 3.18, “Operating the grinder using the remote radio option”

3.3 If the engine fails to start (REV. 04-03)

If the engine doesn’t start on the first try, perform the following steps:

1. Wait two minutes before attempting to restart.
2. Shout the word “**CLEAR**”.
3. Do not run the starter for more than 30 seconds.
4. If the engine fails to start, contact a qualified diesel mechanic for further advice.

3.4 Throttle operation (REV. 04-03)

To increase throttle speed push and hold the throttle switch up.

To decrease throttle speed, push and hold the throttle switch down.

3.5 Automatic engine shutdown system (REV. 04-03)

The engine will automatically shut down if it overheats or if engine oil pressure is inadequate. If this happens, perform the following steps:

1. Check the engine oil level.
2. Inspect the radiator, rotating screen, and clean if necessary.
3. Check tension and condition of the fan and rotating screen belts.
4. Allow engine to cool and check the coolant level.
5. Attempt to restart engine following the normal starting procedure.
6. If the engine will not continue running, contact a qualified mechanic.

3.6 Normal shutdown procedure (REV. 04-03)

NOTE: Stopping the engine immediately after it has been working under load can result in overheating and accelerated wear of the engine components. Allow the engine to cool down before stopping. Avoiding hot engine shutdowns will maximize turbocharger, shaft, and bearing life.

Use the following procedure to shut down the Tub Grinder under normal operation:

1. Disengage the tub drive.
2. Allow the conveyor belts to run until empty.
3. Reduce engine speed below 1200 RPM.
4. Disengage the rotor by pressing the clutch start button on the control panel.
5. After the rotor has stopped, disengage the conveyor drive.
6. Follow the engine manufacturer's recommendations for cooling the engine; generally, this consists of running the engine at 1/2 speed or idle for 5 minutes.
7. Shut off the engine and remove the key.
8. Turn the battery disconnect switch to "OFF".
9. Note the service hour meter reading, and perform periodic maintenance as required.
10. Repair any leaks, perform minor adjustments, tighten loose bolts, etc.

3.7 Emergency shutdown procedure (REV. 04-03)

IMPORTANT: Emergency shutoff controls are for **EMERGENCY** use Only. **DO NOT** use the emergency shutoff controls for normal stopping procedure.

NOTE: The emergency stop button will have to be reset before restarting the engine.

1. Push in emergency stop button located on the control panel (large red button), and remove key.

NOTE: See also section 3.18, "Operating the grinder using the remote radio option".

3.8 Grinding (REV. 04-03)

Before you begin grinding, start the machine and check the direction of the tub's rotation. Also check the electronic governor for proper operation.

Watch for unusual or excessive vibration. If any occur, immediately shut off the power. Determine the cause and correct it before starting the grinder again.

In cold weather, warm up the machine for five minutes before grinding.

To begin grinding, perform the following steps:

1. Start the engine as described in "Starting the Grinder."
2. Unfold the discharge conveyor and set it to the desired height.
3. Engage the conveyor run switch to the forward position.
4. Engage the wet clutch by pressing the wet clutch start button in and holding it for 3 seconds. (clutch engage symbol will illuminate)

3.9 Engaging the wet clutch (REV. 04-03)

IMPORTANT: Read and have a thorough understanding of the wet clutch's operators manual.

IMPORTANT: **Never** engage the wet clutch when platform is raised.

To engage the wet clutch, perform the following steps:

1. Before starting engine, the rotor box should be cleared of all material.
2. Start the engine. Engine must be at 800-1100 rpm; the controller will not engage the wet clutch when engine speed is above 1100 rpm. The "POWER" LED and the "ENGINE RPM" LED will be illuminated.
3. Push the Clutch Start Button in for about 3 seconds. (The blue beacon light should be lit during this time). When the "CLUTCH ENGAGE" symbol illuminates, the Start Button can be released.

3.10 Disengaging the wet clutch (REV. 04-03)

To disengage the wet clutch:

1. Reduce engine speed to below 1200 rpm
2. Push the Clutch Start Button for 1 second. The wet clutch will disengage.

3.11 Grinding with tub cover (REV. 04-03)

The Tub Cover is designed to deflect most objects thrown out of an Tub Grinder. The movable top cover does the deflecting, and the closer it is set to the tub, the more debris it will deflect. The Tub Cover can be rotated up and down, and the support frame can be rotated in towards the tub or out away from the tub. During normal grinding, keep the tub cover as close to the tub as practical. When emptying the tub, close the tub cover until it almost contacts the tub, providing coverage of most of the tub, and stopping most of the debris as the tub empties out.

3.12 Loading the tub (REV. 04-03)

IMPORTANT: Never drop a large object or objects into the tub from a high level. Ease the material over the edge and down into the tub carefully.

Material to be ground should be placed directly into the tub. The best method for filling the tub is:

1. Engage the rotor as described above.
2. Fill the tub about halfway full of unground material before starting tub rotation.
3. Start tub in the forward direction by switching the electronic governor Engine(Auto) mode and switching tub direction to forward.
4. Place additional materials in the tub as needed.

3.13 If lodging occurs while grinding (REV. 04-03)

Occasionally materials may lodge against the side of the tub and not feed down to the mill. If this occurs, reverse the tub direction briefly, and then start the tub in a forward direction again. This practice normally dislodges any materials.

CAUTION: Never attempt to dislodge material inside the tub when machine is in operation by manually pushing materials down. TO PREVENT SERIOUS INJURY OR DEATH, STAY OUT OF THE TUB WHEN THE MACHINE IS IN OPERATION!

3.14 Grinding wet material (REV. 04-03)

Wet material is the toughest material for any grinder to handle. If possible, try to mix the wet materials with drier materials before grinding. When grinding wet material, deposit small quantities on a more frequent basis rather than filling the tub with wet material.

3.15 Starting and stopping the belly and discharge conveyors (REV. 04-03)

The belly and discharge conveyors are on one circuit, so one control starts and stops both conveyors. The control is found at the operator panel near the engine. Conveyors should be started before the rotor is started, and should be allowed to run until the rotor stops turning.

> **NOTE: If equipped with grapple loader option - conveyor run switches are on the panel, and in the cab. ONLY ONE WILL WORK, depending on setting of local/remote switch.**

3.16 Raising the discharge conveyor (REV. 04-03)

The discharge conveyor can be raised or lowered as needed. There are two sets of controls for raising and lowering the conveyor. One set of controls is at the operator panel and one set is at the rear left of the machine. There are additional controls in the optional grapple loader cab, and in the optional remote radio.

NOTE: See also section 3.18, "Operating the grinder using the remote radio option"

3.17 Swinging the discharge conveyor (REV. 04-03)

The conveyor can be swung left or right as needed. There are two sets of controls for swinging the conveyor. One set of controls is at the operator panel and one set is at the rear left of the machine. There are additional controls in the optional grapple loader cab, and in the optional remote radio.

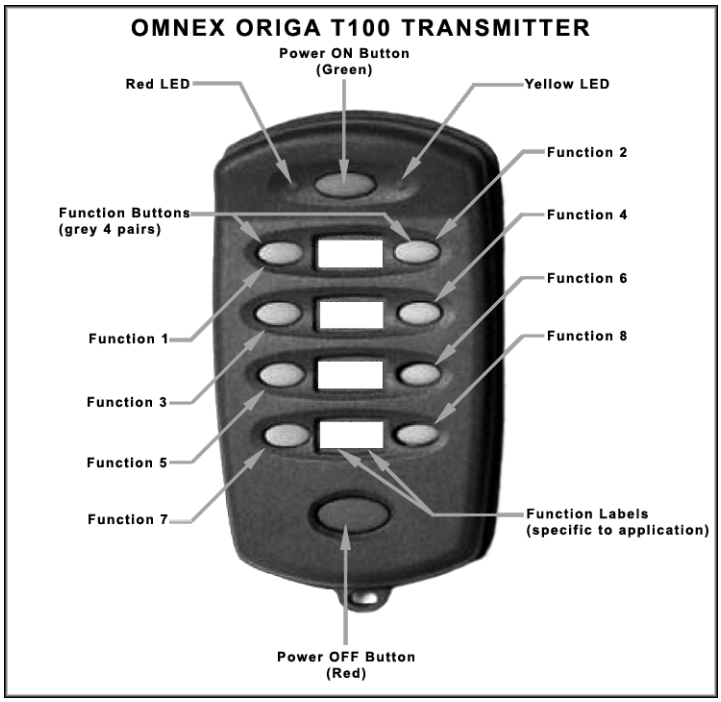
> **NOTE:** The conveyor controls are set in reference to machine left and machine right.

> **CAUTION:** Make sure that no one is between the conveyor and the main frame before pivoting the conveyor.

NOTE: See also section 3.18, "Operating the grinder using the remote radio option"

3.18 Operating the grinder using the remote radio option (REV. 04-03)

Using the Omnex Origa remote radio transmitter



The Remote/Local switch located on the control panel will switch from manual to remote control. Switch to remote when remote control is desired.

Refer to “Remote radio start up” for detailed instructions.

The transmitter will stop the engine, start, stop and reverse the tub, and raise, lower, and swing the conveyor.

LED indicators

The yellow LED indicator is located on the upper right hand side of the radio transmitter. This LED indicates that the controller is powered up and transmitting. Light may be solid or flashing depending on mode. During normal operation this LED is flashing.

The red LED indicator is located on the upper left hand side of the radio transmitter. This LED flashes slowly to indicate the transmitter has less than twenty percent of battery capacity remaining.

When both the red and yellow LEDs are on, the transmitter is in configuration/program mode.

Mode of operation

The Omnex Origa system has several modes of operation. The mode preset for DuraTech Industries is:

1. The Power ON (green) button powers up the transmitter.
2. All functions are shut off when the Power OFF button (red button) is pressed. When the radio is restarted, all functions will be off. The transmitter will stay on until the Power OFF button is pressed.

> **NOTE:** The engine will also be shut off when the Power OFF button is pressed and the remote/ localswitch is set on radio.

3. Functions 1 & 2 are for tub rotation. Pressing one function will start that function. It will not stop until either button is pressed. There is a two second delay when changing tub direction.
4. Functions 3-8 are used for hydraulic cylinder functions. These functions are energized only when the buttons are pressed. Functions 3 & 4 are used for conveyor lift and functions 5 & 6 are used for conveyor swing.

For more information on using and troubleshooting the Omnex Origa system, please refer to Section 6.3, “Troubleshooting the Omnex Wireless Remote Controls which starts on page 72, and the Omnex manual.

Remote radio start up

To begin using the remote radio, perform the following steps:

1. Press the green (power on} button on the transmitter. The yellow LED should start flashing to indicate that the transmitter is transmitting.
2. Set tub rotation to neutral on the machine's control panel.
3. Press and hold the Radio start switch on the control panel.
4. Set the radio switch on the control panel to "REMOTE".
5. Count to 5 and release the Radio start switch.

Radio shutdown (switching back to local)

1. Set the radio switch on the control panel to "LOCAL".
2. Press red button on the transmitter, and set the in the storage location on the control panel.

3.19 Preparing the 4012 DURATECH TUB GRINDER for transport (REV. 04-03)

To prepare the 4012 DURATECH TUB GRINDER for transport over public roads, perform the following steps:

1. Be sure all loose parts such as screens, hammer rods, or extra hammers are properly stowed.
2. If the machine has folding flares, rotate the tub so the folding flares line up with the side of the machine.
3. Fold the discharge conveyor, and then raise the discharge conveyor into the transport position which is shown in figure 3.2 on the next page. When folding the conveyor, do not exceed an engine speed of 1000 RPM. Excessive engine RPM will cause the conveyor to fold too fast and may cause damage. Be certain that no power lines, branches, roof trusses, etc. will obstruct the folding operation of the conveyor.

CAUTION: DO NOT MOVE TUB GRINDER without first securing the conveyor in transport position as shown in figure 3.1 on the facing page.

4. If your 4012 is equipped with a grapple loader, move the loader to the transport position by:
   a. Closing the grapple.
   b. Placing the grapple on the right side of the tub floor (operator left side in cab).
   c. Straightening the boom.
   d. Lowering the cab.
   e. Raising the loader stabilizer legs.
   f. Folding and pinning the cab ladder.
5. If your machine is equipped with a tub cover, then lower tub cover
6. Shut down the engine using the normal shutdown procedure
7. Verify that the semi-tractor is properly coupled to the grinder hitch, and that the trailer wiring harness and air brake lines are properly connected to the semi-tractor.
8. Raise the trailer landing gear and lock the handle in its storage position.
9. Check the lights and the brakes for proper function.

figure 3.1
conveyor in the transport position

3.20 Preparing the 4012 DURATECH TUB GRINDER for operation after transport (REV. 04-03)

To prepare the 4012 DuraTech Tub Grinder for operation after transport, perform the following steps:

1. Check the location.
   - Are there power lines, branches, roof trusses, etc. that will obstruct the unfolding operation of the conveyor and the loading operation of the tub?
   - Position grinder to minimize the risk of thrown objects. For more information see section 1.6 on page 11.
2. Perform pre-operation inspection of the tub grinder.
3. Turn the battery disconnect switch to “ON”.
4. Start the engine.
5. Lower the conveyor fully.
6. Unfold the top section of the discharge conveyor until it is fully extended. When unfolding the conveyor, do not exceed an engine speed of 1000 RPM. Excessive engine RPM will cause the conveyor to fold too fast and may cause damage.
7. Raise the conveyor to operating height.
9. Set tub cover to desired postion.
10. Check local ordinances regarding restrictions for machine travel on local roads.
11. Read Section 1.10 “Towing” in the “Safety” section in this manual.

3.21 Preparing the 4012 DURATECH TUB GRINDER for storage (REV. 04-03)

To prepare the 4012 DURATECH TUB GRINDER for storage, perform the following steps:

1. The grinder has 4 pressure rollers with tapered roller bearings. These bearings should be regreased annually.
2. Change the hydraulic oil and filter every 500 hours of operation.
3. To prevent rust and make inspection easier, thoroughly clean the machine.
4. Lubricate according to chart.
5. Check for loose or worn chains, belts, sprockets and pulleys.
6. Check the condition of bearings.
7. Change the engine oil and filter.
8. Make sure that the batteries are fully charged before storing the unit, and turn the battery disconnect switch to “OFF”.

3.22 Removing the 4012 DURATECH TUB GRINDER from storage (REV. 06-18)

To remove the 4012 DURATECH TUB GRINDER from storage, perform the following steps:

1. Perform a thorough pre-operation inspection as specified in Section 3.1 of this manual.

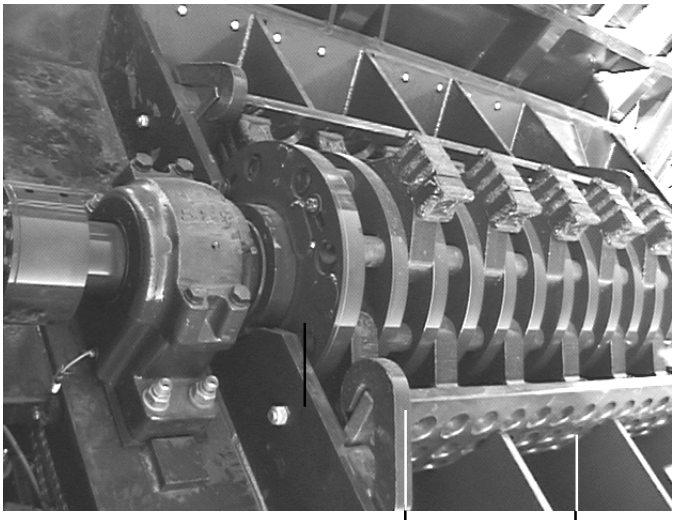
3.23 Installing a screen (REV. 04-03)

CAUTION: Disengage the wet clutch, shut off the engine, remove the key, and wait until the rotor has stopped spinning before entering the tub. The 4012 is equipped with a rotor brake system.

CAUTION: Follow normal shutdown procedure after tilting the tub and prior to performing any service work in the rotor area.

To install a screen, perform the following steps:

1. Raise the tub completely, and install the hydraulic cylinder lock.
2. Unlatch the screen hold-downs.
3. Screens may be lifted from or placed in the machine with a hoist or lifting device.
4. Securely attach the screen to the lifting device with a sturdy chain or nylon sling. Stuck screens can require a force many times their weight to lift them free of the grinder.
5. Use only pry bars to guide the screens in and out of the machine. The screens are very heavy and could easily cause injury if the screen moves suddenly or is inadvertently dropped.
6. Clear all material from the screen track before installing a new screen.
7. Install the new screen using the lifting device and pry bars as explained above.
8. Make certain that the screen fits completely in place, and latch the screen hold-downs.
9. Make sure all personnel and equipment are clear of the tub platform.
10. Remove the hydraulic cylinder lock, and lower the tub.



3.24 Raising the tub (REV. 04-03)

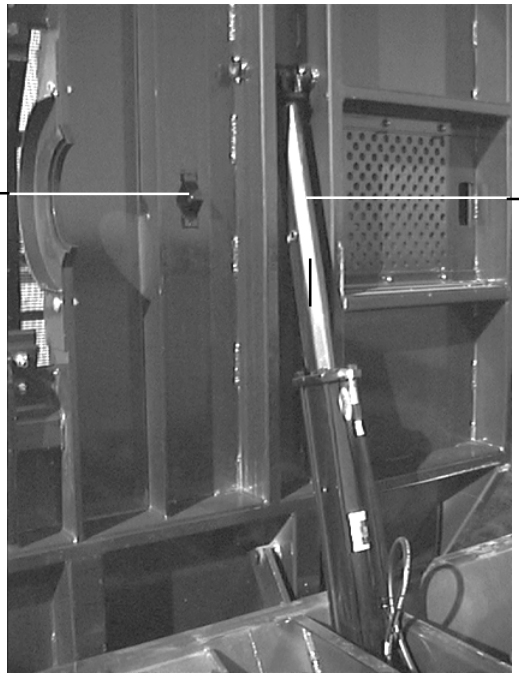
NOTE: If the grinder becomes plugged or if the rotor requires maintenance, do not raise the platform with the tub full of material.

To raise the tub, perform the following steps:

1. Verify that the tub grinder is parked on level surface.
2. Disengage the wet clutch, and wait for the rotor to stop turning.
3. If your machine is equipped with a tub cover place tub cover in fully closed postion
4. As material in the tub may roll some distance, make sure the area on the right hand side of machine is clear of personnel and equipment. Shout the word "**CLEAR**".
5. The engine speed should be 1000 RPM.
6. Operate the tub tilt switch on the control panel to raise the tub. If the red tub interlock indicator on the operator station control panel is lit, the tub will not raise. If the green tub interlock indicator on the operator station control panel is lit, the tub may be raised.
7. Raise the tub fully, and install the safety stop on the hydraulic cylinder. The safety stop is located in its storage location on the underside of the platform.

NOTE: The tub will not lift if the rotor is turning. Also, when the tub is raised, the wet clutch will not engage.

If the tub is full of material, the hydraulic cylinder will not raise the tub. Remove material from the tub before lifting the tub.



3.25 Lowering the tub (REV. 04-03)

To lower the tub, perform the following steps:

1. Clear the area of equipment and personnel.
2. Clean all contact areas so material is not pinched between platform and mainframe.
3. Engine speed should be 1000 RPM.
4. Remove the safety stop on the hydraulic cylinder, and place safety stop in storage location on underside of the platform.
5. Operate the tub tilt switch on the control panel to lower the tub.

3.26 Parts of the electronic governor (REV. 04-03)

FUSE LIGHT

This light is on when the key switch is receiving power.

SENSOR LIGHT

This light is on whenever the electronic governor is receiving an adequate input signal from the sensor. For the sensor light to work you must:

- Have the wet clutch engaged.
- The engine running at grinding RPM.
- The Mode Switch must be switched to the engine (auto) or manual position.

SPEED LIGHTS

These lights provide a relative indication of how fast your tub should be turning based on the output signal that the electronic governor is sending to the electro-hydraulic valve when in engine (auto) mode.

MODE SWITCH

The mode switch has three possible positions.

The off position which turns the electronic governor off and two other positions which correspond to the tub (manual) and engine (auto) modes of operation.

In the “tub (manual)” position the tub will rotate at a constant speed based on the settings of the Tub Limit Knob (Tub Speed Knob).

The “engine (auto)” position uses all the functions of the Electronic Governor. The maximum tub speed will be limited by the Tub Limit Knob (Tub Speed Knob), and the engine load will be controlled by the Engine Load Knob.

TUB LIMIT KNOB (TUB SPEED KNOB)

This knob sets the maximum speed at which the tub will rotate in both the tub (manual) and engine (auto) modes. In the engine (auto) mode tub speed will vary between zero and this setting depending on the engine load.

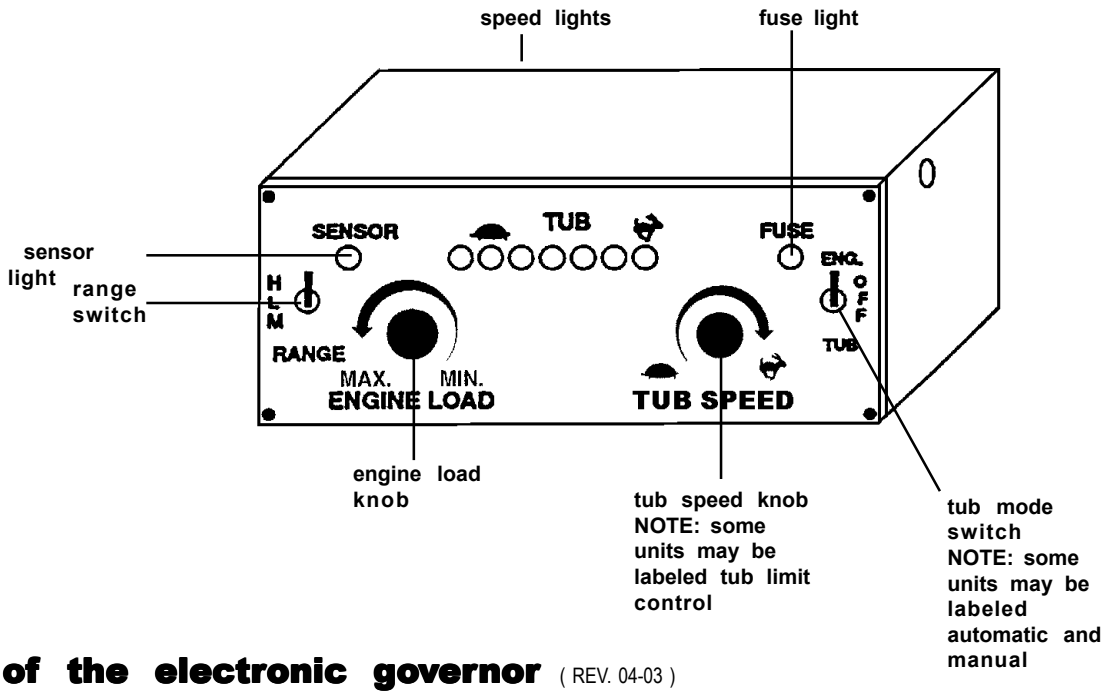
ENGINE LOAD KNOB

This knob is used only in engine (auto) mode. It controls the load placed on the engine. Turning the knob clockwise decreases engine load, and turning the knob counterclockwise increases the engine load.

RANGE SWITCH

This switch is a coarse adjustment for the engine load knob and can be switched to a H- high, M-medium or L-low setting.

figure 3.2
electronic governor controls



3.27 Operation of the electronic governor (REV. 04-03)

Engine (Auto) mode

IMPORTANT: Except when calibrating or trouble shooting the electronic governor always use the engine (auto) mode of the electronic governor.

In engine (auto) mode, the electronic governor monitors the rotation speed of the engine. The hydraulic flow to the tub drive mechanism is regulated in proportion to the engine speed. As the engine speed slows, the electronic governor decreases the hydraulic flow which slows down the tub's rotation. Conversely, as the engine speed increases, the electronic governor increases the hydraulic flow which speeds up the tub's rotation. This allows the electronic governor to automatically control the feed rate keeping the engine running within the governor's optimum power zone. When the load on the grinding rotor begins to lug the engine, the governor automatically reduces the tub's rotation speed in proportion to the load. The result is nearly a constant load on the engine, which maximizes the grinding efficiency.

The range of rotor speeds for which the electronic governor will regulate the hydraulic flow is determined by the setting of the engine load knob. For example, turning the engine load knob counter clockwise will increase the load on the engine by keeping the tub engaged to a lower engine RPM.

With proper calibration, the engine will only load down to its optimum horsepower RPM, and the tub's rotation speed will be varied proportionally to keep the engine at this RPM.

Tub (Manual) mode

In tub (manual) mode, the electronic governor performs as a simple tub speed control. In this mode the tub speed is constant and it will not change to match varying load conditions.

3.28 Calibration of the electronic governor (REV. 04-03)

To calibrate the electronic governor, perform the following steps:

1. Begin calibration procedure with 4012 DURATECH TUB GRINDER Tub Grinder completely shutdown. Place the MODE switch in the OFF position and the RANGE switch in the H-High position. Rotate the TUB SPEED KNOB fully clockwise toward the rabbit position. Turn the ENGINE LOAD KNOB fully clockwise, and switch the MODE switch to ENGINE (Auto) Position.
2. Verify that wet clutch is disengaged. Inspect machine to verify that all personnel are clear of the machine.
3. Start engine and run the grinder at about 1/2 throttle to allow the hydraulic system to warm up before calibrating the RCB93 Electronic Governor.
4. When the system has reached operating temperature, throttle the engine to under 1100 RPM. Engage the wet clutch and tub drive then throttle up to 1800 RPM. The FUSE light and the SENSOR light should come on. The tub should not be rotating at this time. If the tub is rotating, read section 6.1 “Troubleshooting the electronic governor system” in this manual.
5. Slowly rotate the ENGINE LOAD KNOB counter-clockwise until the tub just begins to move. The tub should begin to rotate. If it does not begin to rotate, switch the range switch to M-Medium or L-Low and repeat as necessary.

TEST: Throttle the engine down and the tub should stop rotating, return the engine to 1800 RPM and the tub should start to rotate.

If the tub will not rotate, read section 6.1 “Troubleshooting the electronic governor system” in this manual.

3.29 Adjusting tub rotation speed (REV. 04-03)

Tub rotation is controlled by two components. The tub is started, stopped, and reversed by a switch on the control panel, the loader cab, or the remote radio. The tub’s rotation speed is controlled by the tub limit knob (tub speed knob) on the electronic governor.

3.30 Electro-hydraulic valve coil test (REV. 08-10)

See the figure 3.4 for the location of the electro-hydraulic valve coil.

This test requires an accurate ohm meter. Disconnect the wiring harness leads at the electro-hydraulic valve coil. Check resistance of valve coil leads at the terminals. The resistance should be between 38 to 44 ohms. If the values are not within this range, replace the electro-hydraulic valve coil.

MANUAL OVERRIDE

NOTE: If there is an electrical failure with the machine, it may still be able to grind. Switch the electronic governor off. Remove the acorn nut and loosen the jam nut on the electro-hydraulic valve. Start the machine and engage the tub drive.

figure 3.3
electronic governor system

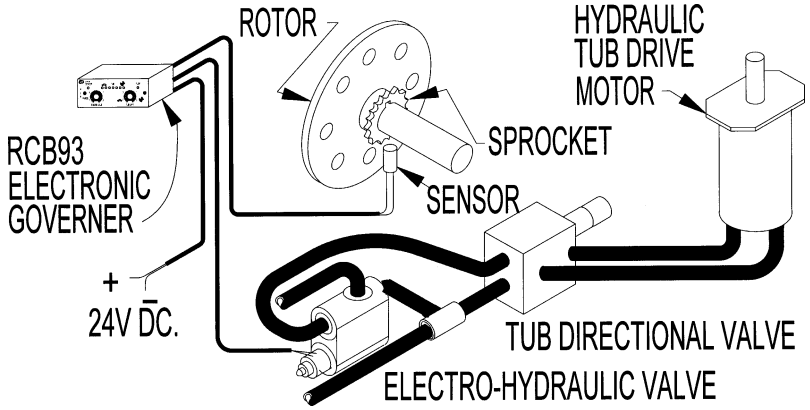
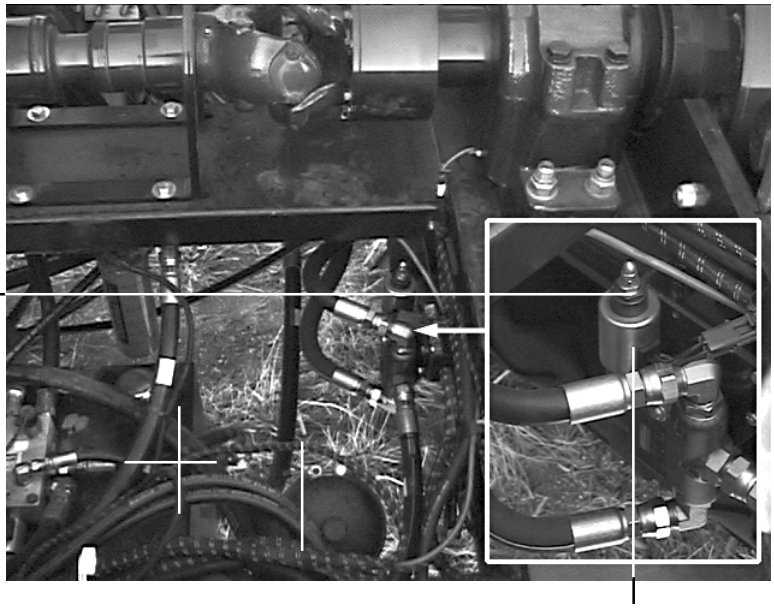


figure 3.4
location of the electro-hydraulic valve

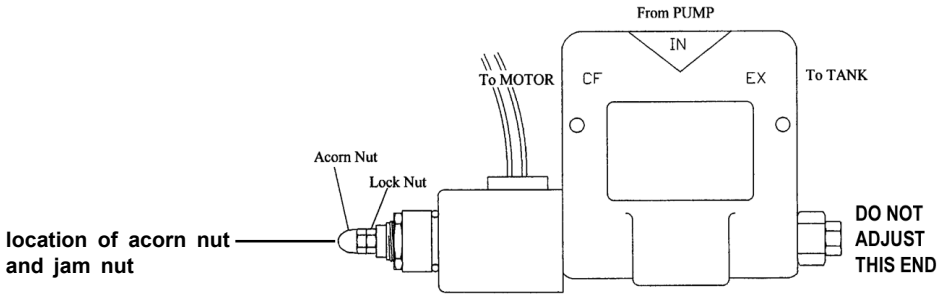


IMPORTANT! - DO NOT ENGAGE THE WET CLUTCH AT THIS TIME!

Turn the adjusting stud clockwise until the tub rotates at the desired speed. Lock the jam nut on the adjusting stud and replace the acorn nut on the electro-hydraulic valve. When the electro-hydraulic valve is adjusted in this manner, it will function only as a manual flow control. The grinder will now operate as it would if the electronic governor were switched to the tub (manual) mode. The tub speed will be constant and it will not change to match varying load conditions.

Contact your dealer for repairs or replacement parts. When the problems are corrected, calibrate the electro-hydraulic valve as described in the next section.

3.31 Electro-hydraulic valve calibration (REV. 08-12)



electro-hydraulic valve

To calibrate the electro-hydraulic valve coil after following the three steps above, perform the following steps:

1. Shut down the machine using the normal shutdown procedure in this manual
2. Disconnect the wiring harness from the electro-hydraulic valve coil.
3. Remove the acorn nut from the end of the electro-hydraulic valve. This will reveal a jam nut and a adjusting stud with a screwdriver slot.
4. Loosen the jam nut.
5. Turn the adjusting screw counterclockwise until tub stops.
6. Lock the adjusting screw with the jam nut and replace the acorn nut. Reconnect the wiring harness to the electro-hydraulic valve coil.

3.32 Adjusting the conveyor belt tension (REV. 04-03)

IMPORTANT: Do not overtighten conveyor belts. Use only enough tension to eliminate belt slippage.

Both rollers on the belly conveyor and the discharge conveyor are adjustable to allow for belt stretch and tracking. If the conveyor belt slows down or stops during operation, slippage may be the cause. To eliminate slippage, tighten the adjusting bolts on the conveyor equally. This will increase the conveyor belt's tension and help to keep the belt centered on the rollers.

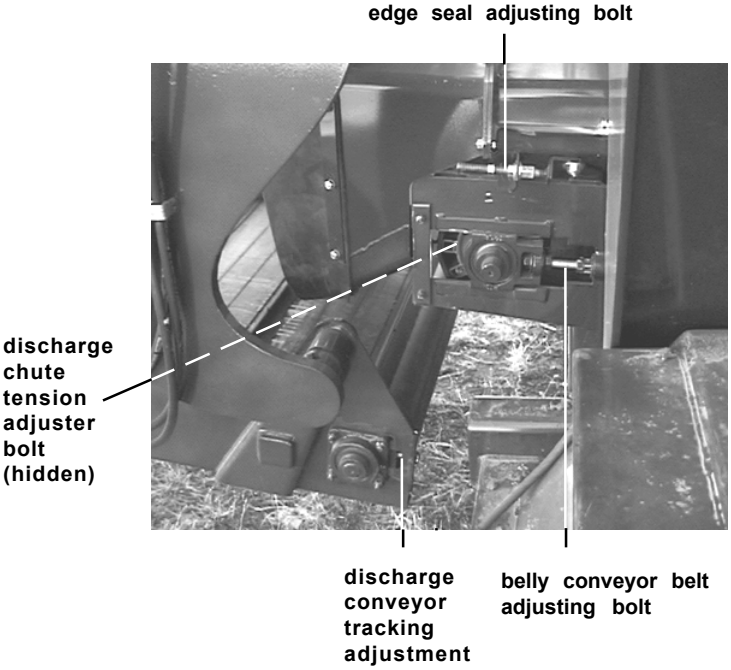
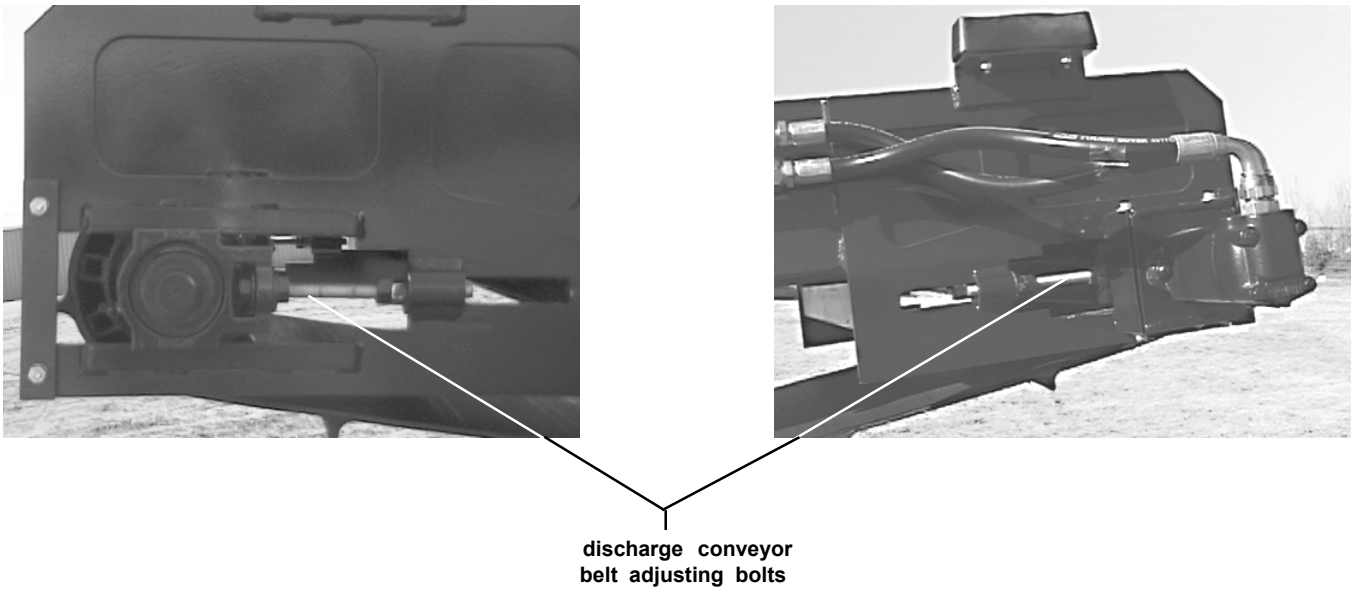


figure 3.5
belly conveyor belt adjusting bolts

figure 3.6
discharge conveyor belt adjusting bolts



3.33 Adjusting the conveyor belt tracking (REV. 05-04)

A. When a new belt is installed, use only genuine DuraTech Industries parts.

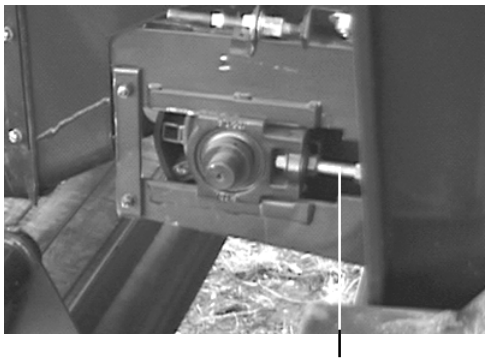
1. Begin by adjusting the drive roller so that the mounting bearings are the same distance from the end of the conveyor frame. This ensures that the roller centerline is square with conveyor frame. Adjust the idler roller bolts so that they are equal on both sides of the conveyor.

B. If the belt is running to the right side, perform the following steps:

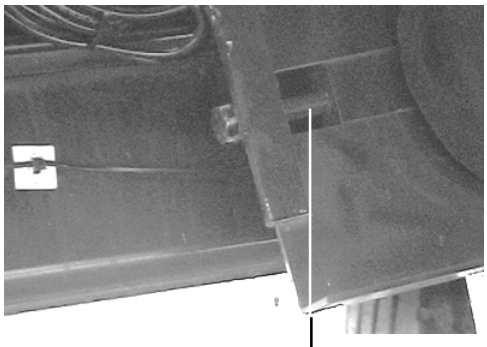
1. Adjust the idler roller adjustment bolt on the right side of the conveyor (figure 3.5 & 3.6). Increase tension by approximately 1/2 turn of the adjusting nut.
2. Make certain that all personnel are clear of machine and the start engine. Engage the hydraulic conveyor drive switch.
3. Observe conveyor belt tracking from a safe location.
4. If further adjustment is required, disengage hydraulic conveyor drive switch and shut down the machine using the normal shutdown procedure.
5. Some adjustment of the drive roller may be required if no improvement is noted by adjusting the idler roller tension.
6. Repeat steps 1-5 until proper tracking is achieved.

C. If the belt is running to the left side, perform the following steps:

1. Adjust the idler roller tension bolt on the left side of the conveyor. Increase the tension by approximately 1/2 turn of the adjusting nut.
2. Make certain that all personnel are clear of machine and start engine. Engage the hydraulic conveyor drive switch.
3. Observe the tracking of the conveyor belt from a safe location.
4. If further adjustment is required, disengage hydraulic conveyor drive switch and shutdown using the normal shutdown procedure.
5. Some adjustment of the drive roller may be required if no improvement is noted by adjusting the idler roller tension.
6. Repeat steps 1-5 until proper tracking is achieved.



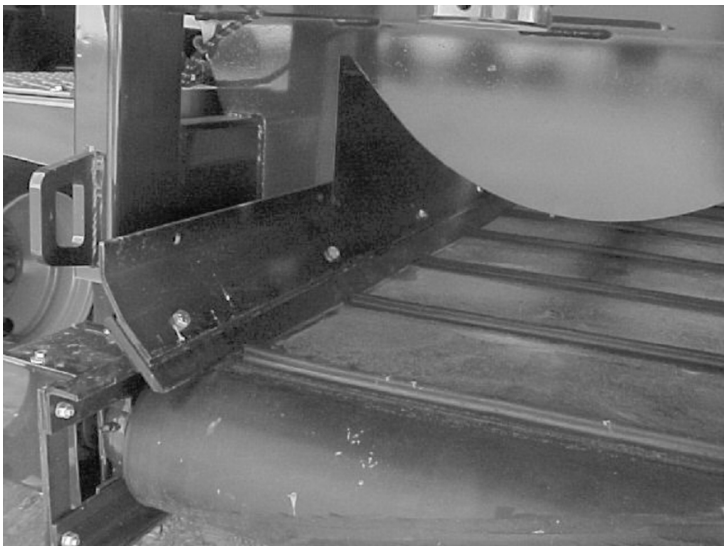
rear tracking adjustment bolt (belly conveyor)



forward tracking adjustment bolt (belly conveyor)

3.34 Adjustable belly belt seals (REV. 05-04)

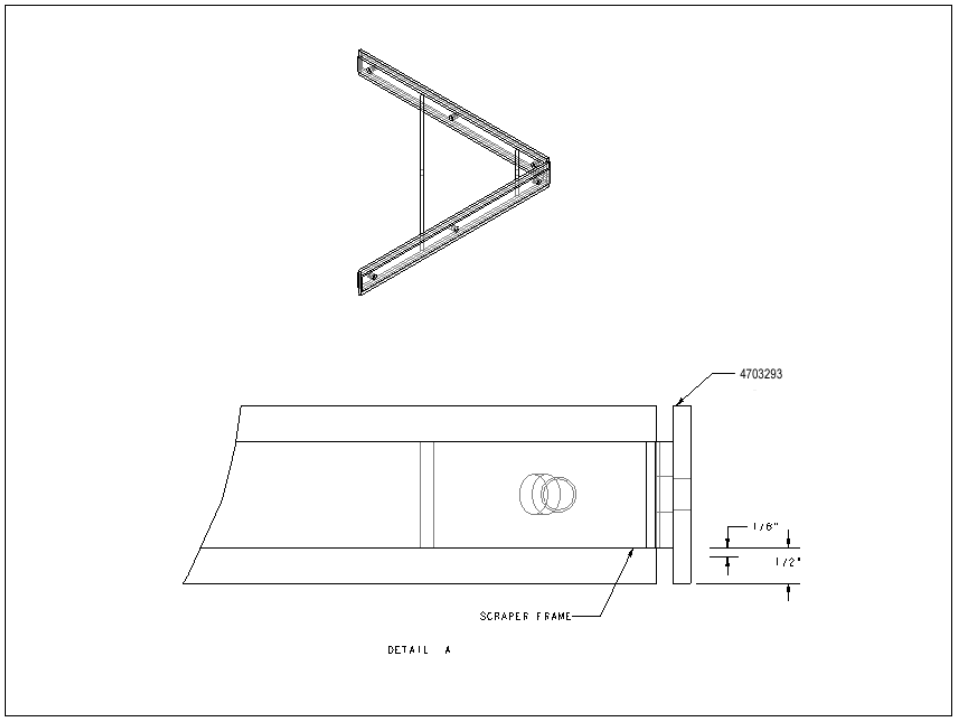
1. Always make sure the belt seals (pn # 4703249) and endless belt are in contact with each another.
2. When adjusting the belt seal as it wears down, loosen the bolts and push belt seal down so that it comes in contact with the endless belt again.
3. Note that the adjustment bolts should be pointed outward.



3.35 Belt scrapers on belly and discharge conveyors (REV. 05-04)

Belt scrapers have a poly blade (pn# 4703293) that wears down and needs to be flipped around or replaced. When the poly blades wear to within 1/8" of the scraper frame and doubler, either flip the poly blade around or replace with a new one.

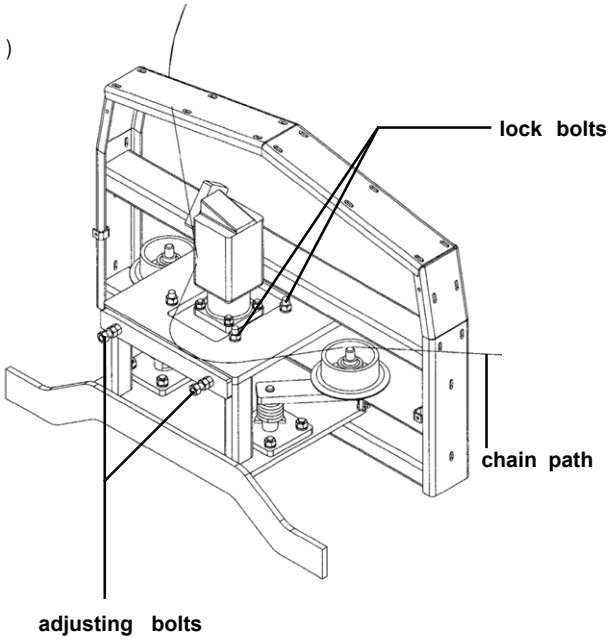
> **Note**: the belt scrapers are located inside the belt.



3.36 Adjusting tub chain tension (REV. 04-03)

To adjust the tub chain tension, perform the following steps:

1. Loosen (4) bolts holding motor mounting plate.
2. Turn (2) adjusting bolts to set chain tension.
3. Tighten the (4)bolts holding motor mounting plate.



Section 4: Engine Maintenance

Engine oil level, engine coolant level, air filters, and fan belt tension should be checked daily. All debris, and combustible or ignitable material should be cleared from the engine compartment daily or more often as conditions warrant. When cleaning the engine compartment, pay particular attention to the top of the engine. Follow the engine manufacturer's recommendations for the replacement of parts and fluids, and follow the manufacturer's recommended maintenance schedule . Engine specifications should be found in the Operation and Maintenance manual for the engine.

Section 5: General Maintenance

WARNING: Before servicing machine, read the Service and Maintenance section of the Safety Instructions.

IMPORTANT: If for any reason arc welding is to be done, always ground rotor to frame of machine to prevent arcing in bearings.

5.1 Welding Procedure (REV. 04-03)

Welding on a machine that is equipped with an Electronic Engine.

Proper welding procedures are necessary in order to avoid damage to the computerized equipment. Computerized equipment includes but is not limited to the following; the Engine Control Module (ECM), electronic governor, HPTO Control Module, Omnex Radio Receiver (if equipped), and ABS Controller (if equipped).

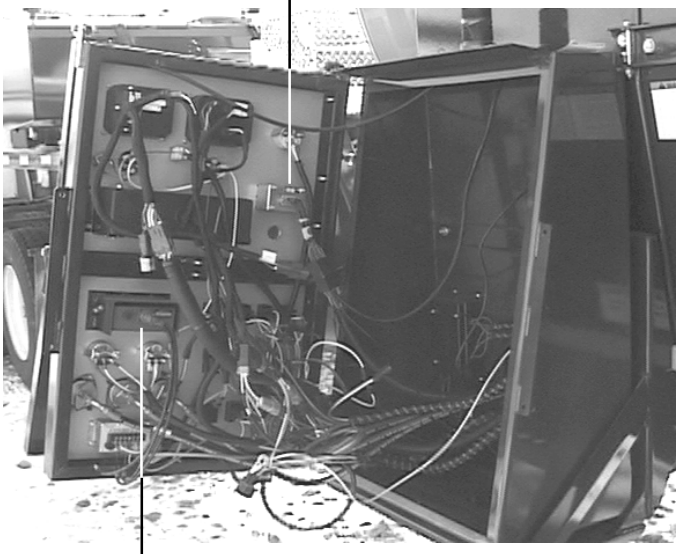
If at all possible, the component that is to be welded should be removed from the machine for welding. If removal of the component is not possible, the following procedure must be followed when welding on a machine that is equipped with electronic engine. This procedure is considered the safest and should provide minimun risk of electronic component damage.

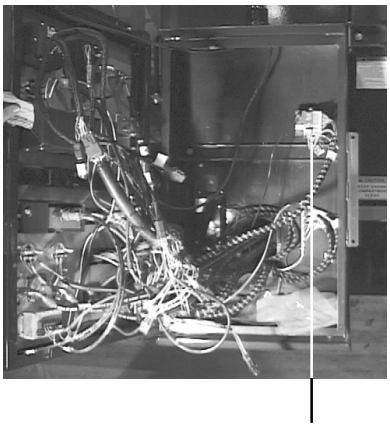
NOTE: Do not ground the welder to electrical components such as the ECM or sensors. Improper grounding can also damage the drive train bearings or hydraulic components. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. This will help reduce the possibility of damage.

1. Stop the engine. Turn the switched power to the OFF position.
2. Disconnect the negative battery cable from the battery.
3. Disconnect the connectors from the computerized equipment listed on the previous page. Move each harness to a position that will not allow the harness to accidentally move back and make contact with any of the connector pins.
4. Connect the welding ground cable directly to the part that will be welded. Place the ground cable as close as possible to the weld in order to reduce the possibility of welding current damage to the bearings, hydraulic components, electrical components, and ground straps.

NOTE: If the electrical/electronic components are used as a ground for the welder, or electrical/electronic components are located between the welder ground and the weld, current flow from the welder could damage the components.

5. Protect the wiring harness from welding debris and spatter.
6. Use standard techniques to weld the materials.





5.2 Batteries (REV. 04-03)

Check the condition of the batteries to insure that the electrolyte level is correct. Make sure that the terminals and cables are not corroded, and that the battery is held in place properly. Also make sure there is no arcing or grounding by the terminals.

The system uses two 12 volt batteries in series to produce a 24 volt system for the engine.

CAUTION: Hydrogen gas given off by a battery is explosive. Keep sparks and flames away from the battery. Before connecting or disconnecting a battery charger, turn the charger off. Make last connection and first disconnection at a point away from the battery. Always connect the NEGATIVE(-) cable last and disconnect the NEGATIVE(-) cable first. When charging a 24 volt twin battery system with a 12 volt charger, charge each battery independantly.

5.3 Lubrication (REV. 04-03)

CAUTION: Always shut off machine before adjusting or lubricating. When grinder is operated during cold weather, all lubrication should be performed after bearings are at operating temperatures.

Since a full bearing with a slight leakage is the best protection against entrance of foreign material, bearings operating in the presence of dust and water should contain as much grease as speed will permit. At higher speed ranges, too much grease will cause the bearings to overheat.

Abnormal bearing temperature during high speed operation may indicate faulty lubrication. The normal temperature may range from cool to warm to the touch. If a bearing is too hot to touch for more than a few seconds and the bearing is leaking grease excessively, there is too much grease in the bearing. High bearing temperatures with no grease showing at the seals, particularly if the bearing seems noisy, usually indicates too little grease. Normal temperature and slight showing of grease at the seals indicate proper lubrication.

The Lubrication Chart is a general guide for “relubrication”. Certain conditions may require a change of lubrication periods as dictated by experience.

A heavy-duty, general-purpose, lithium-based grease is recommended for lubricating the 4012 DuraTech Tub Grinder.

LUBRICATION CHART

STANDARD EQUIPMENT				
REF. NO.	**LOCATION**	**NO. OF ZERKS**	**FREQUENCY**	**REFERENCE SECTION #**
1	Rotor brg, check oil level		Daily	5.5
2	wet clutch, check oil level		Daily	5.7
3	Hydraulic system, check oil level		Daily	5.6
4	Tub chain idler pivot	2	Daily	
5	Wheel bearings, check oil level		Daily	5.8
6	Roller chains		1. Daily in dusty conditions or as needed 2. Use graphite lubricant	5.4
7	Drive line	5	40 Hours	
8	Tub rollers	0	Sealed	5.4
9	Discharge conveyor rollers	4	40 Hours	
10	Discharge conveyor swing pivot	2	40 Hours	
10a	Discharge conveyor fold pivot	2	40 Hours	
11	Discharge conveyor lift pivot	2	40 Hours	
12	Belly conveyor rollers	4	40 Hours	
13	Tub pivot, 90 deg tub tilt	2	40 Hours	
14	Manual jackstands	5	40 Hours	
15	Radiator fan pulley	1	40 Hours	
16	Rotor brg, change oil		500 Hours	5.5
17	Wet clutch	2	2 Shots per zerk 500 Hours	5.7
18	Axles	18	4 Months	5.8
19	Pressure roller, inspect and repack	2	1000 Hours	5.4
20	Clutch, change oil		Annually	5.7
21	Rotating screen U - joint	1	40 Hours	

figure 5.1
drive line lubrication points

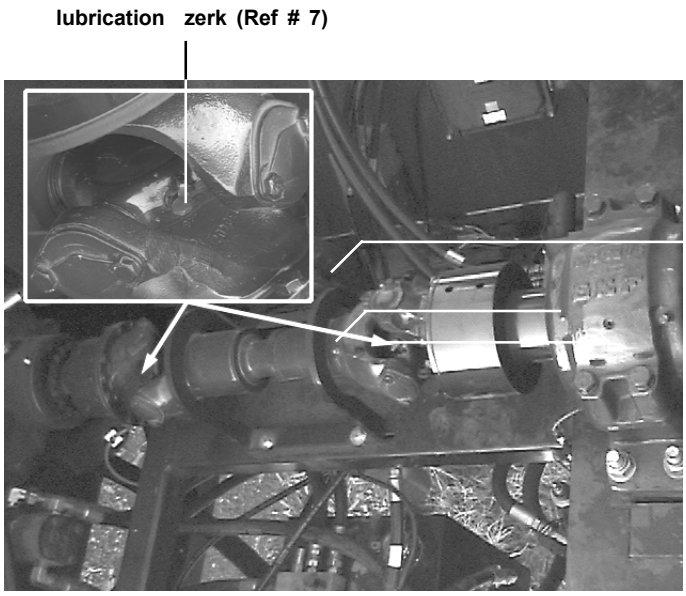
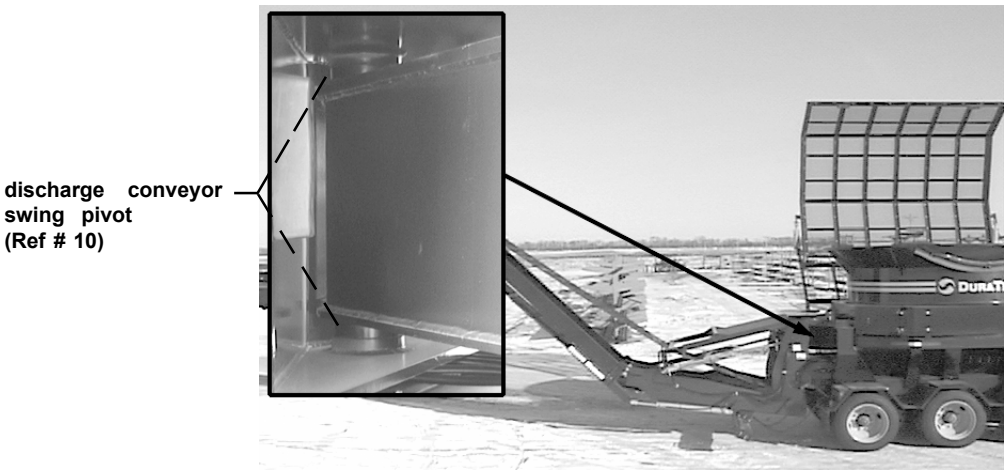


figure 5.2
discharge conveyor swing pivot, and discharge conveyor fold pivot lubrication points



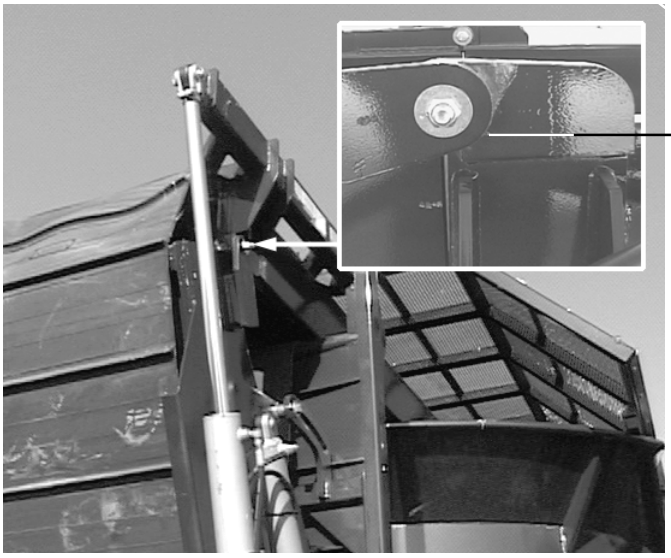


figure 5.3
belly conveyor roller& discharge conveyor roller lubrication points

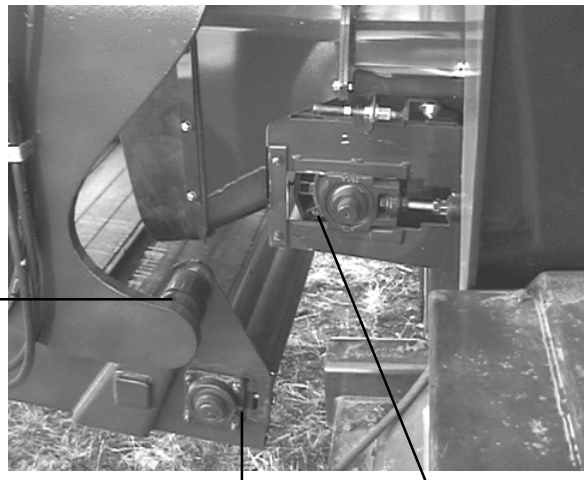


figure 5.4
discharge conveyor roller lubrication point

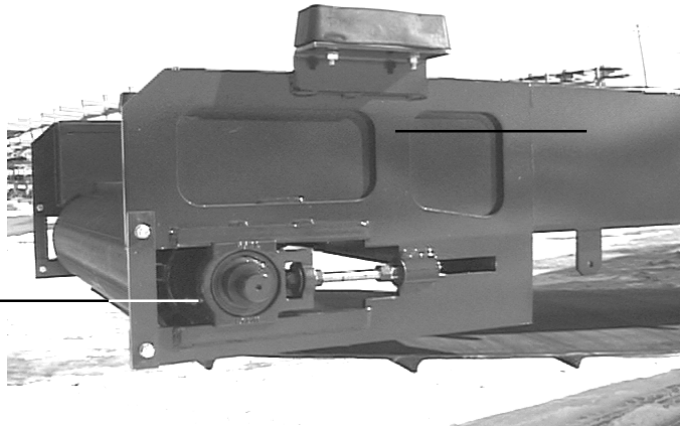
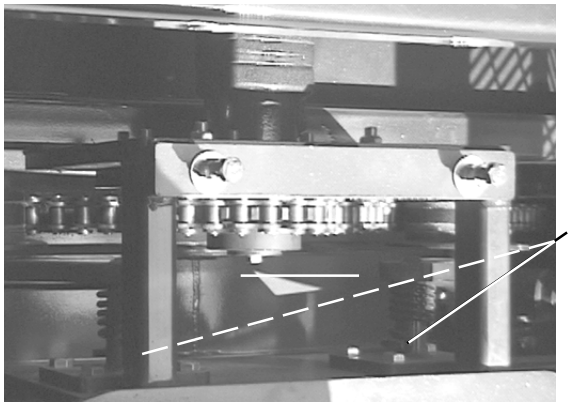
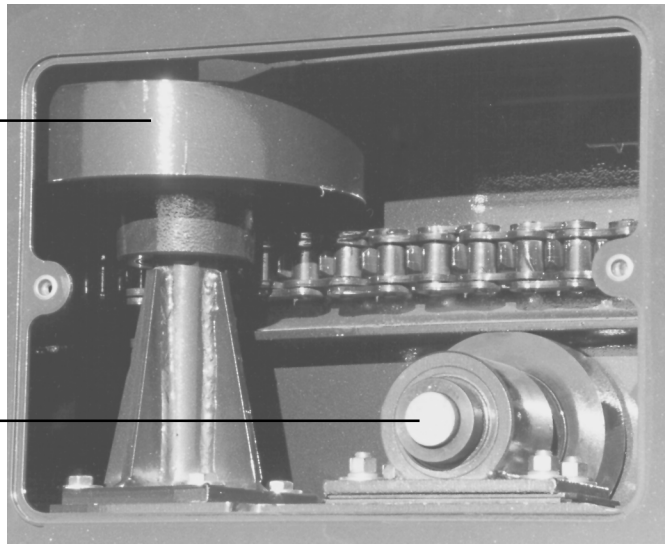


figure 5.5
tub chain idler lubrication point



5.4 Pressure roller lubrication (REV. 03-03)

The grinder has a pressure roller with tapered roller bearings. These bearings should be checked for lubrication every 1000 hours of operation or annually- whichever comes first. These bearings should be checked for proper adjustment daily.

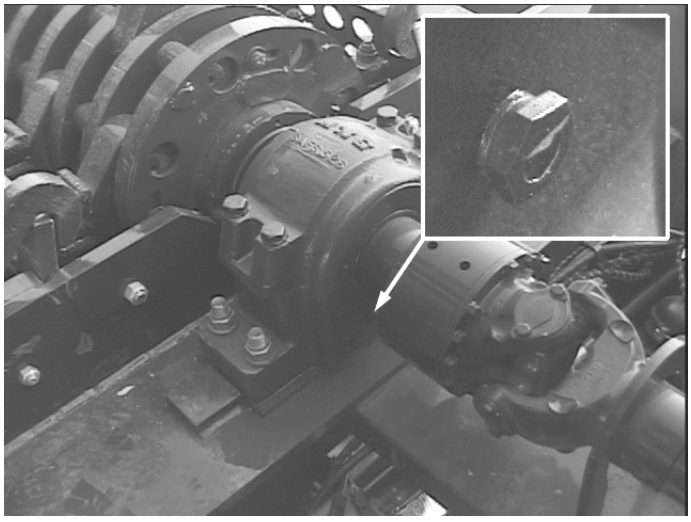


5.5 Rotor bearing lubrication (REV. 04-03)

As a general rule, rotor bearing oil should be replaced every 500 hours of operation. However, if the oil becomes discolored or milky in appearance, the oil should be replaced immediately.

The static oil level should bring oil to the centerline of the bottom roller. The oil level in the sight glass should be centered in the sight glass.

When adding or replacing rotor bearing oil, use Mobil SHC-626 oil or other similar oil, but never use a detergent motor oil.

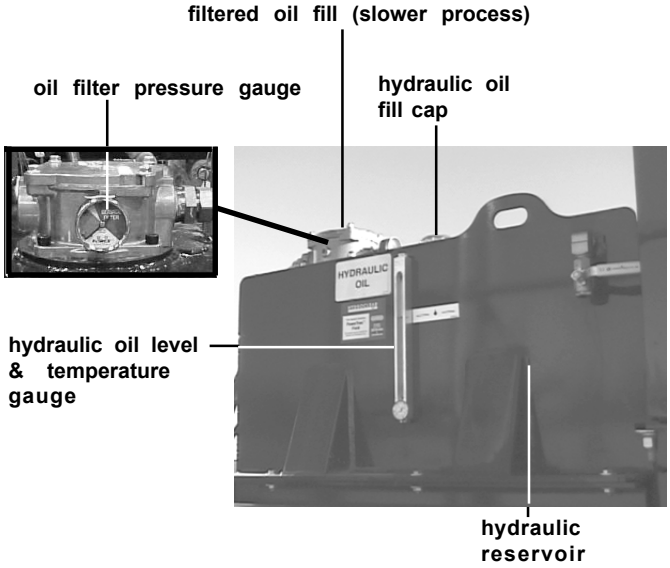


5.6 Hydraulic system (REV. 03-08)

CAUTION: Lack of proper hydraulic oil level in the reservoir tank will cause system to heat under continuous running. Check the hydraulic oil level daily and replace as necessary.

The in tank hydraulic oil filters should be changed after the first 10 hours of operation. Change hydraulic oil and filters after the first 100 hours of operation. Thereafter, change hydraulic oil filters every 500 hours and change hydraulic oil and filters at least every 1000 hours of operation. Change the in tank oil filter if the oil filter pressure gauge indicates a plugged filter

Check the hydraulic oil regularly, and if the oil has a burnt smell or milky appearance, change it immediately.



DuraTech Industries recommends using Cenex Qwicklift HTB if your machine has a Qwicklift decal on the hydraulic tank. Other acceptable fluids include Mobil 423, Farmland Super HTB, Conoco Hydroclear Power Tran Fluid or other similar fluids. If the hydraulic tank does not have this decal, then all of the above fluids are acceptable.

5.7 Wet Clutch System (REV. 03-08)

Change the clutch oil after the first 100 hours of use. Thereafter, change the clutch oil, oil filter, and breather cap every 500 hours of use, annually, or if the oil color changes, whichever comes first.

> **Note:** Drain cooler and tank when changing oil.

Change the oil filter (4400073) if the clutch is disengaged due to high oil pressure.

The clutch contains at least 15 gallons of oil. **Only the following oils are approved by PT TECH for use in the HPTO system.**

Mobilfluid 424 is preferred oil of choice.

When the clutch will be operating in environmental conditions where the ambient air temperature is below 15 degrees F for extended periods of time, it is recommended by PT TECH that a cold climate oil be used.

Warm Climate Oils (when ambient temperature is greater than 15 degrees F)

1. Mobilfluid 424
2. Caterpillar TDTO (SAE 30 ONLY)
3. Shell Donax TD (TD ONLY)
4. Vermeer VMF Ultra Gold

Cold Climate Oils (When ambient temperature is below 15 degrees F)

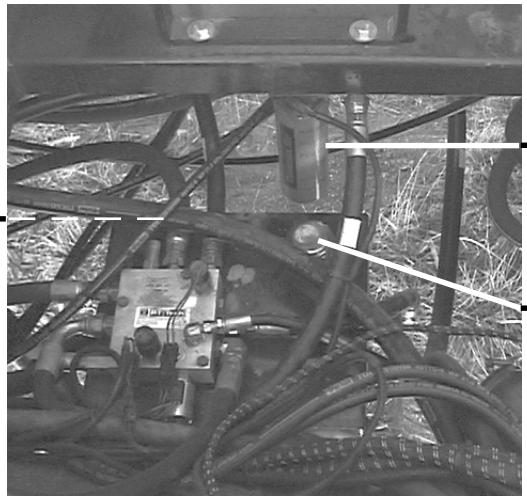
1. Mobilfluid 424
2. Caterpillar TDTO (10W ONLY)
3. Shell Donax TD low vis

> **NOTE: DO NOT USE ANY OTHER OILS, OR CLUTCH LIFE WILL BE SHORTENED.**

Wet clutch is to be serviced and inspected after 5000 hours of operation – contact your dealer for details.

To locate retail oil sales locations in your local area, use the phone number provided below.

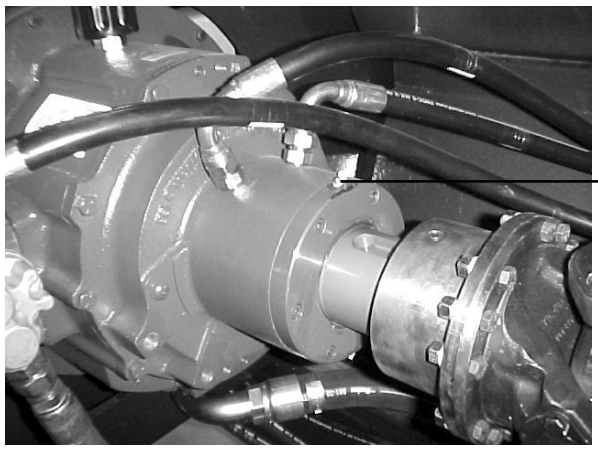
Mobilfluid 424 or LT	Phone: 1-800-662-4525
Caterpillar TDTO SAE 30 or 10W	Phone: 1-800-321-7332
Shell Donax TD of TD Low Vis	Phone: 1-800-231-6950



wet clutch level & temperature gauge
(hidden on far side)

wet clutch oil filter

wet clutch breather and fill cap



wet clutch lubrication zerk
(1 top, 1 bottom)
(Ref # 18)

5.8 Axle, wheels and tires (REV. 04-03)

TIRE PRESSURE

Set the tire pressure according to the manufacturer's specifications. The appropriate tire pressure can be found on the sidewall of the tire.

WHEEL BEARINGS

The wheels have tapered roller bearings in an oil bath. Each hub is equipped with a transparent oil cap which has an oil level indicator mark that allows for easy checking of the oil level. The oil level should be checked daily during the pre-operation inspection. This lubrication method assures long bearing life with proper maintenance of the oil level When adding or replacing oil in the wheel bearings, use SAE 80W-90 HYPOID GEAR OIL

oil level indicator (Ref # 5)

AIR BRAKES

The air brakes should be inspected periodically by a qualified air brake technician.

5.9 Brake component lubrication (REV. 04-03)

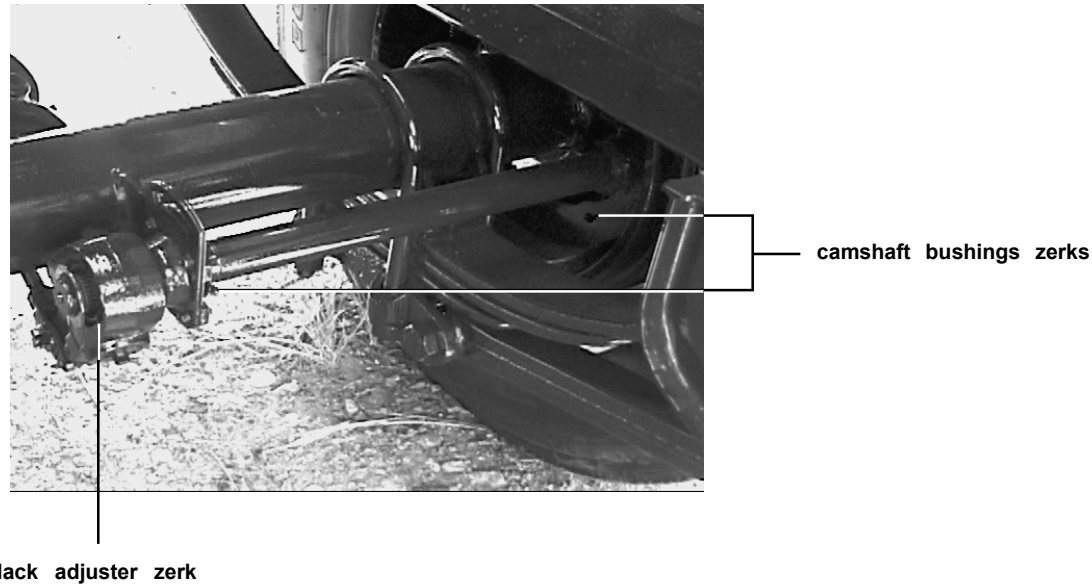
CAUTION: Care must be exercised when lubricating the camshaft bushings and anchor pins. Over lubrication could cause a safety problem as brake linings become saturated with lubricants.

NOTE: When reline shoe linings become saturated with grease, replace with new shoe and lining assemblies.

A schedule for the periodic lubrication of brake components should be established by the operator on the basis of past experience and the severity of operating conditions.

GUIDELINES

- **For camshaft roller journals:** Lubricate with high temperature anti-seize grease.
- **For anchor pins**: Lubricate with high temperature anti-seize grease.
- **For manual slack adjusters:** Lubricate with NLGI Grade 2.
- **For automatic slack adjusters:** Lubricate with ASA manufacturer's recommended lubricant.



FREQUENCY OF SERVICE

Camshaft roller journals, anchor pins, slack adjusters every 25,000 to 30,000 miles or every six months depending on severity of operating conditions. (For off highway use: service every 4 months depending on severity of operating conditions

SUGGESTED PREVENTATIVE MAINTENANCE

- **Every 1,000 miles:** Check oil level in wheel hub and inspect wheel for leaks.
- **Every 15,000 miles:** Check brake adjustment. Repack wheel bearings (grease application).
- **Every 25,000 to 30,000 miles:** Check lining wear and estimate reline time. Inspect camshaft, camshaft spider bushing and camshaft support bracket bushing for any signs of wear. Lubricate brake actuating components.
- **Every 100,000 miles, once a year, or at brake reline:** Replace wheel bearing lubricating oil (if applicable). Check brake air chambers and slack adjusters. Inspect brake rollers, roller shafts, anchor pins and bushings and replace if necessary.

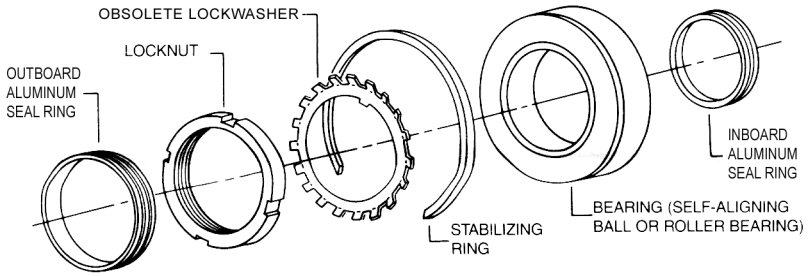
5.10 Rotor bearing installation (REV. 03-08)

WARNING: To ensure the rotor is not unexpectedly started, turn off and lock out or tag the power sources before proceeding. Failure to observe these precautions could result in bodily injury.

NOTE: Bearing housing caps and bases are not interchangeable and must be matched with mating half. Install the non-expansion bearing first.

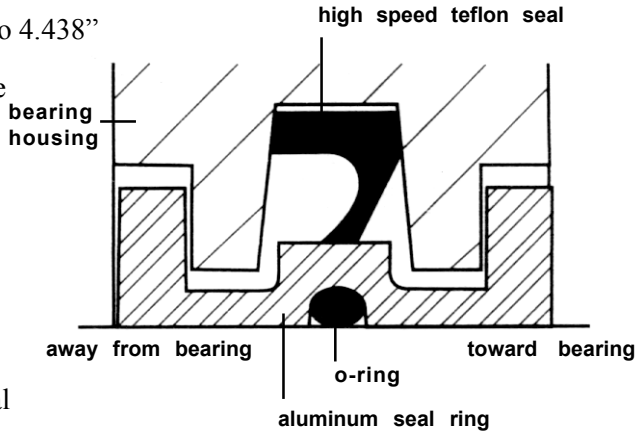
NOTE: Do not rotate bearing when the moving feeler gauge is between the roller and the outer ring.

figure 5.6
rotor bearing



1. Check shaft tolerance, the shaft should be 4.433” to 4.438”

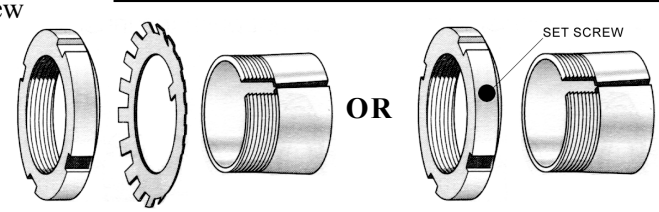
2. Install inboard seal ring. Slide the seal ring onto the shaft. Resistance should only require slight hand pressure to overcome. The O-ring can be lubricated with grease or oil to ease assembly. Locate the seal ring to match the Labyrinths in the housing. The teflon seal requires greasing which requires greasing the teflon seal lip at assembly. Note the orientation of the teflon seal, one way prevents oil leakage, the other way prevents dirt from entering the bearing. Assemble the teflon seal to prevent dirt contamination (this means there will be a slight oil leakage around the seal).



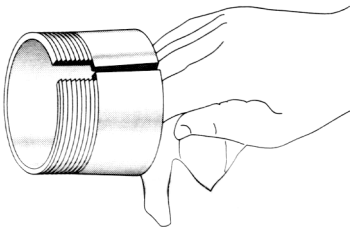
3. Mount bearing on shaft.

   a. For older bearings with a lock washer, screw off the locknut and remove the locking washer. For new bearings with a set screw, oil the set screw, hit with hammer to release the threads, and unscrew the locknut.

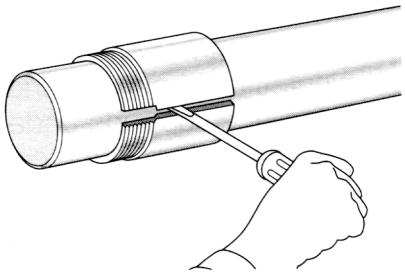
NOTE: There is only one way to correctly install the bearing. Refer to Figure 5.6 for illustration.



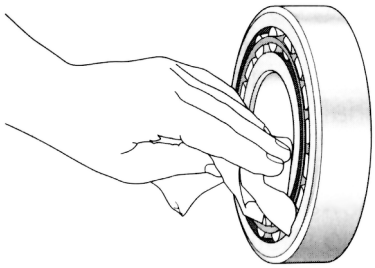
b. Wipe preservative from the surfaces of the sleeve and apply light oil to the sleeves outside diameter surface for easier bearing mounting and dismounting.



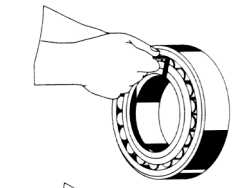
c. Open the sleeve by inserting a screwdriver in the slot, then position the adapter sleeve on the shaft, thread outward as indicated, to approximate location with respect to the required bearing centerline.

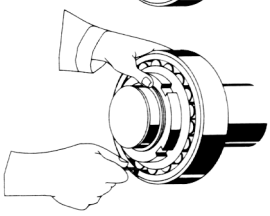


d. Wipe the preservative from the bore of the bearing and then oil the surface light. Use a thin mineral oil.

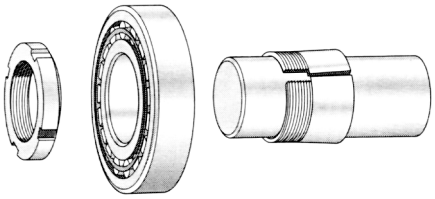


e. Measure the unmounted internal radial clearance in the bearing by inserting progressively larger feeler blades the full length of the roller between the most vertical unloaded roller and the outer sphere. Write this number down.

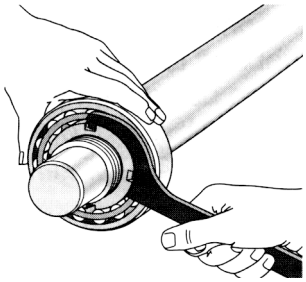




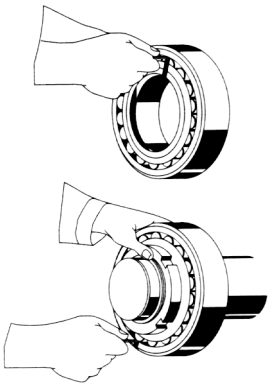
f. Place the bearing on the sleeve. Screw the nut with its chamfered face toward the bearing, but do not mount the lock washer. Do not push the inner ring up the taper of the sleeve.



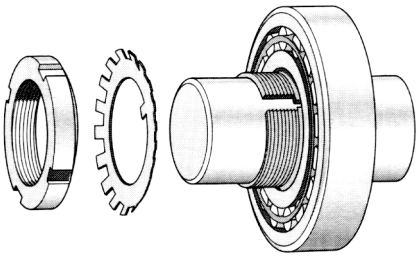
g. Turn the nut sufficiently to ensure that the shaft makes proper contact (self-locking) with the sleeve, continuing to drive the bearing up the sleeve.



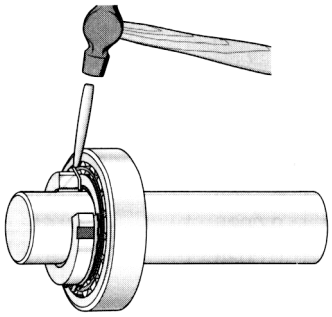
h. Check the mounted internal clearance until the bearing internal clearance has been reduced by 0.0025” to 0.0035” on the front bearing and from 0.0047” to 0.0055” on the rear (floating) bearing (from step e).



i. For older bearings with a lock washer, unscrew the nut, placing the lock washer in position, and tighten the nut firmly again. Make sure that the bearing is not driven up the sleeve any further.

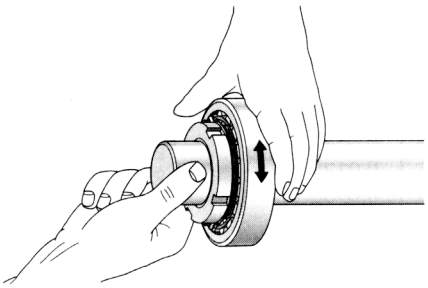


For new bearings
with a set screw, tighten the locknut firmly again then tighten the set screw to 25 ft lbs (35 N•m). Make sure that the bearing is not driven up the sleeve any further.



j. For older bearings with a lock washer, lock the nut by bending one of the lock washer tabs down into one of the slots in the nut. Do not bend it to the bottom of the slot.

k. Check that the shaft or bearing can be turned easily by hand.



NOTE: Each cap must be matched with its mating lower half, as these parts are not interchangeable.

4. Install outboard seal. Again, watch orientation of seal, position the seal to prevent dirt from entering the bearing

5. Set lower halves of housings on base and lightly oil the bearing seats.

   Place the shaft with bearings into the lower half of the housing, carefully guiding seals into the seal grooves. Be certain that the bearings' outer rings sit squarely in the pillow lock bearing seats.

   Bolt the "fixed" housing securely in place (see step 6). The "free" bearing housing will be located and bolted to its mounting surface after properly positioning the bearing in the "free" housing to ensure correct float. Note: if shimming is required, shims must cover the entire mounting surface of the pillow block

6. A stabilizing ring is used for both bearings. The front bearing is a spherical roller bearing, and the addition of the stabilizing ring fixes its position.(This is the "fixed bearing") The rear bearing is a CARB (toroidal roller) bearing, and the outer race must be fixed (the rollers and inner race of this bearing is free to move axially with respect to the outer race; this is the "free" bearing- the CARB bearing should be centered at room temperature). On both bearings, move the shaft axially so that the stabilizing ring can be inserted between the bearing outer race and housing shoulder on the locknut side of the bearing.

7. The bearing seat on the upper half of the housing (cap) should be checked for burrs, thoroughly cleaned, lightly oiled, and placed over the bearing. With oil lubrication, use a sealing compound such as Permatex 2 or equivalent at the split surfaces, applying sparingly. Wipe a thin film near the outer edges. Excessive amounts of sealing compound will be forced out and also between the housing bore and bearing outside diameter. This can interfere with the outer race of the bearing. The two dowel pins will align the upper half of the housing to its mating base.

NOTE: Caps and bases of pillow blocks are not interchangeable. Each cap and base must be assembled with its original mating part. The housings are marked with serialized adhesive labels on the cap and base to assist in assembling of mating parts.

Lock washers and cap bolts are then applied and tightened to 900 ft lbs (1220 N•m) to complete the assembly.

5.11 Hammermill maintenance (REV. 04-03)

Visually examine the mill to see if any of the internal parts show excessive wear. These parts should include liners, rotor discs and the holes in the discs that support the rods. Enlarged holes can cause rods to break or bend. Also check rods, rod locking or retaining devices, hammers, screens, screen tracks and hold downs, main shaft, platform locking devices, hinges or anything else that could wear and perhaps fail and causing damage to the hammermill and/or personnel if not properly maintained. The bearings and motor alignment should also be checked along with mounting bolts to insure a firm foundation and reduced vibration.

CAUTION: Keep all foreign objects out of the tub and away from the mill. Foreign objects may result in personal injury or damage to the machine.

The hammers are designed to grind products such as wood and fiberous organic material that may be reduced in size in a hammermill. The hammers are not designed to grind or crush hard materials such as coal, minerals, metals, rock, or other incompressibles, which will cause parts to fail. These materials must never be allowed to enter a hammermill.

The hammers have been designed and manufactured to provide the best compromise between hardness for good wearing qualities and strength for dependability and resistance to breakage.

WARNING: The hammers have been heat treated, and any alteration of the hammers by heating, grinding, resurfacing or any other process can change the mechanical properties of the hammer and make it unsuitable or dangerous to use.

Because of the high capacity of the machine, the hammers will wear and must be considered expendable. Each fixed hammer has two (2) cutting edges and each swinging hammer has two (2) cutting edges. For maximum life, it is suggested that hammers be rotated periodically to even out the wear over the entire rotor. If one end of a hammer is allowed to wear too long, one of the hammer's cutting edges will be lost.

Screens also have two (2) cutting edges. When cutting edges become rounded, the screen can be turned end for end exposing the new cutting edges. The results of badly worn hammers and screens is loss of capacity, and added horse power requirements.

Hammer rods are case hardened to maximize wearability and toughness. Hammer rods must be considered expendable.

NOTE: Hammer and hammer rod life can be extended by keeping rotor rotating at 2000 RPM. Over powering or over feeding the rotor will cause the swinging hammers to lay back resulting in excessive wear on both the hammers and the rods.

5.12 Fixed hammer maintenance and replacement (REV. 06-18)

CAUTION: Disengage the wet clutch. Shut off the engine. Remove the key before working on the rotor.

IMPORTANT: The bolts on the hammer tips should be checked periodically for proper torque. Torque ratings for single bolt and two bolt tips are given in the hammer tip replacement procedure in this section.

Note: Single bolt and two bolt tips are available. Maximum torque values are different, based on bolt diameters.

When replacing hammer tips, We recommend the following:

A. Always replace fixed hammer tips in pairs, 180 degrees apart (same as with the swinging hammers, illustrations A & B).

B. Tips placed 180 degrees apart should be the same weight.

C. When starting the hammermill after installing a new set of tips or after turning the tips to expose new faces, watch for unusual or excessive vibration. If any is noticed, shut off the hammermill. Determine the cause and correct it before starting the mill again.

To replace the hammer tips on machines with fixed hammers, perform the following steps:

1. Be sure to disengage the clutch, shut down the engine, and remove the key.
2. Identify the tips to be removed, then loosen and remove the bolts and tips.
3. Rotate or replace tips. Use new bolts and lock nuts when replacing tips.

4. **FIXED HAMMER TORQUE SPECIFICATIONS**

   For two-bolt tips with 5/8” NF grade 8 bolts and grade 8 toplock nuts, Torque to 190-210 ft. lbs. (258-285 Nm).

   For one-bolt tips with 7/8” NF grade 9 bolts and grade 9 toplock nuts, Torque to 509 ft. lbs. (690 Nm).

5. After 2 hours of grinding, retighten the bolts to the same torque values.
6. Periodically retighten the bolts to the same torque values.

5.13 Swinging hammer replacement and maintenance (REV. 04-03)

CAUTION: Disengage the wet clutch, shut off the engine and remove the key before working on the rotor.

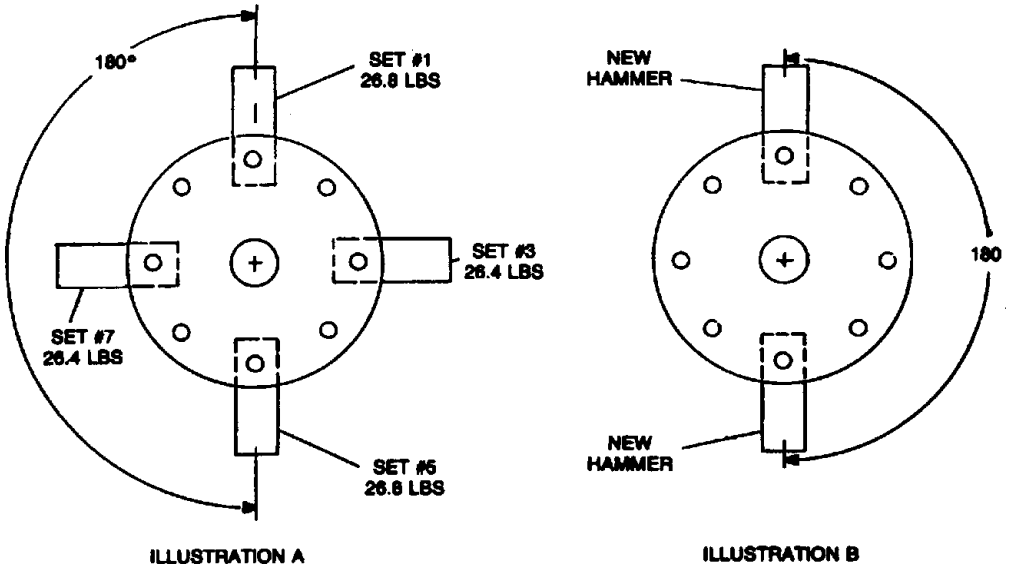
When installing or changing hammers, be sure to follow the hammer diagram carefully. Misplacement of the hammers could cause excessive vibration. We recommend that hammers be balanced in sets according to the rod on which they are to be installed. Sets of equal weight should be installed 180 degrees apart (See Illustration A). When replacing a worn or broken hammer with a new hammer always install a second new hammer 180° away from the first (see Illustration B). When starting the hammermill after installing a new set of hammers or turning corners, watch for unusual or excessive vibration. If any occurs, immediately shut off the mill. Determine the cause and correct it before starting the mill again.

To replace worn hammers on machines with swinging hammers, perform the following steps:

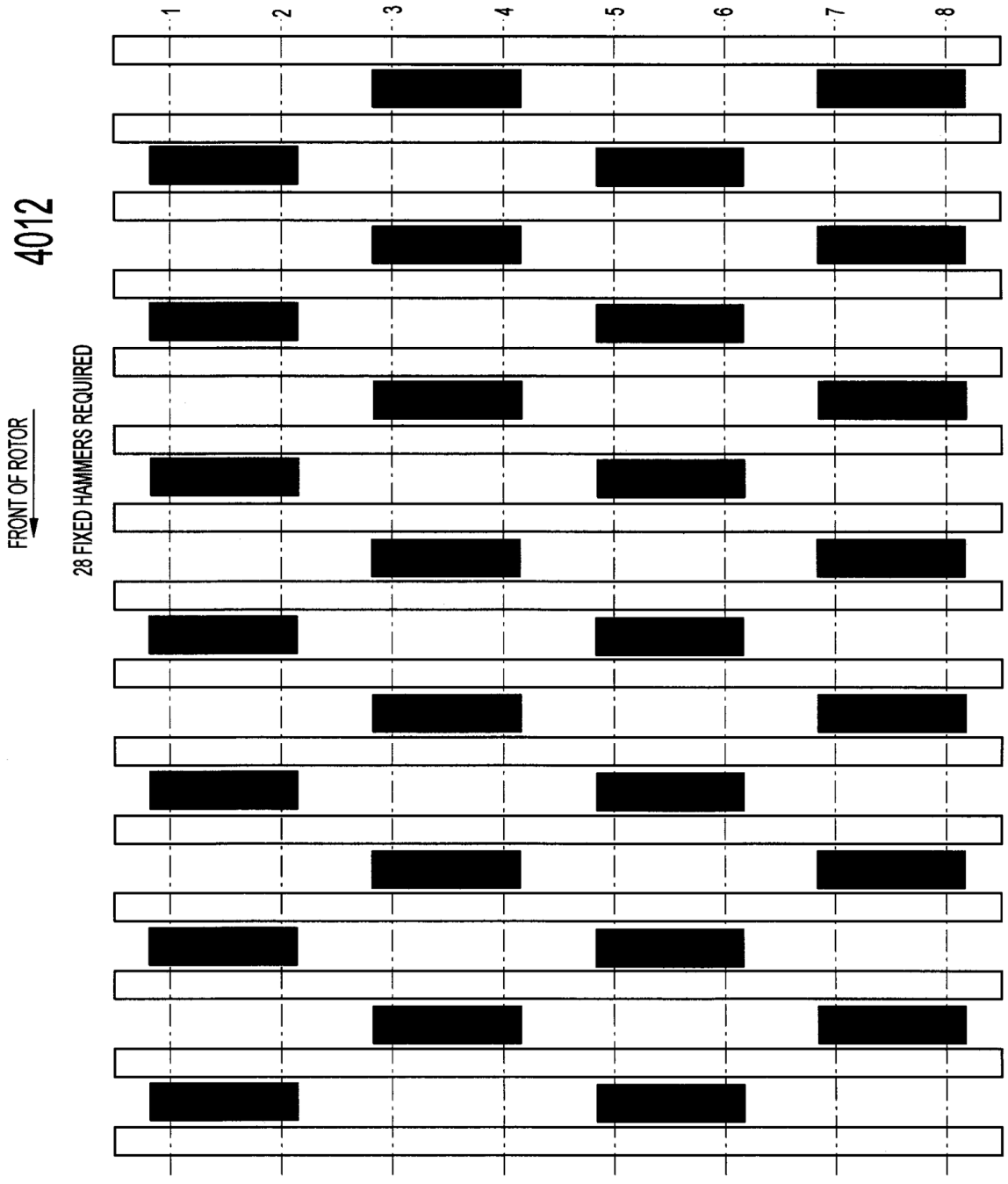
1. Follow the normal shutdown procedure which can be found in section 3.6 of this manual.
2. Loosen the four bolts at the rear of the rotor which holds the hammer rod retainer plate in place.
3. Rotate the retainer plate to align holes allowing the hammer rods to be removed through the rear of rotor.
4. Remove one row of hammers and replace individual hammers as necessary. Note the location of any spacers. See hammer spacing charts.
5. After all the hammers have been replaced, rotate the retainer plate to lock hammer rods in place, and tighten the four retainer plate bolts.

IMPORTANT: Care should be exercised when replacing only a few hammers and not the entire set. If one or more new hammers are inserted on a rod, the same number of new hammers should be inserted on the rod directly across the rotor. This will maintain a balanced rotor for vibration free operation.

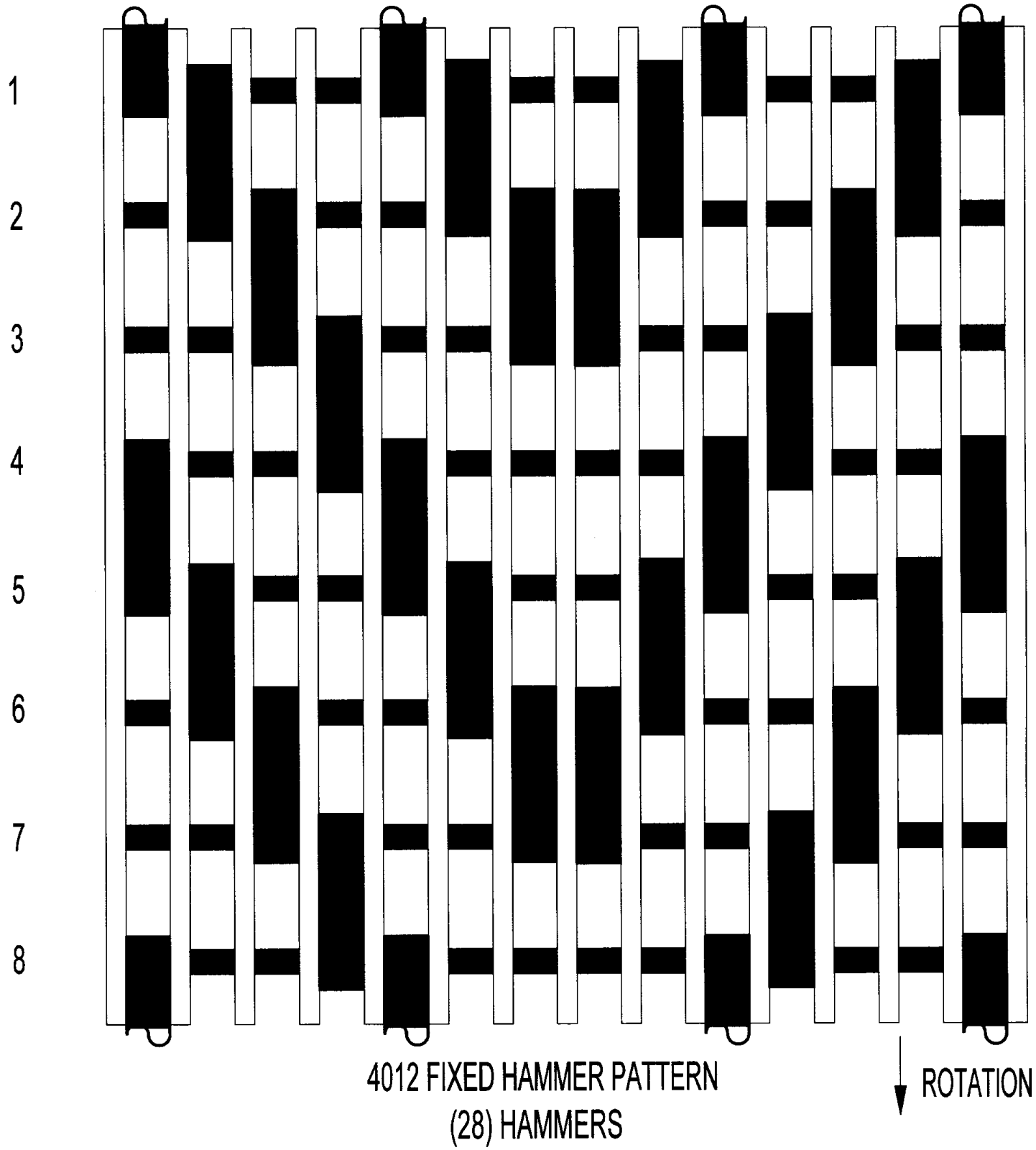
figure 5.7
hammer replacement
illustrations A + B



hammer spacing chart- pattern "A"



hammer spacing chart- pattern "B"



Section 6: Troubleshooting the 4012 DURATECH TUB GRINDER

6.1 Troubleshooting the electronic governor system (REV. 06-18)

1. When power is reaching the electronic governor the fuse light should be on.
   If this light fails to go on, check the fuse, the battery connections, the wiring harness, and the indicator lamp. If the fuse light is on, the wiring harness, battery connections, fuse and bulb are functioning correctly.

2. Check the TUB MODE operation of the electronic governor. With the engine and hydraulic systems at operating temperature, and the tub drive control valve in the forward position, throttle the engine up to 1800-2000 RPM.

With the mode switch in the tub position, the tub should be rotating. The speed of the tub can be varied by rotating the tub limit knob. The number of tub speed lights which are lit will vary with the setting of the tub limit knob.

If the number of tub speed lights lit varies as you rotate the tub limit knob, the manual portion of the controls are functioning correctly. Proceed to step 3.

If the manual portion is not working properly, proceed to trouble shooting table 6.1.

table 6.1
troubleshooting the electronic governor in tub mode

PROBLEM	CAUSE	REMEDY
1. The tub does not rotate but the electronic governor and the tub directional valve are working properly. There is pressure to the orbit motor.	1. The tub is binding. 2. There is too much material in tub. 3. The tub is overloaded due to wet or tough grinding material. 4. The pressure relief valve in the control valve set too low or is faulty.	1. Remove the material causing problem. 2. Reduce the amount of material in the tub. 3. Check oil pressure.
2. The tub does not rotate, but the electro-hydraulic valve is receiving 18 to 24 volts of DC power. There is no pressure to the orbit motor. For more information see "Electronic governor hardware test" later in this section.	1. The tub directional valve is not engaged. 2. The valve assembly is dirty or faulty. 3. The solenoid is faulty.	1. Engage the manual hydraulic valve. 2. Clean or replace the valve assembly. 3. Test the solenoid and replace as necessary.
3. The tub does not rotate, and there is no voltage to the electro-hydraulic valve.	1. There is no power to the electronic governor. a. The electronic governor is switched off. b. The fuse is blown. c. The tub limit knob is set fully counterclockwise. 2. A wire in the wiring harness is broken. 3. The electronic governor is faulty.	1. a. Switch the electronic governor mode switch to tub. b. Replace the fuse. c. Turn the tub speed knob clockwise. 2. Replace or repair the wiring harness. 3. Replace the electronic governor.
4. The tub runs with the electronic governor switch off. Disconnect the wiring harness at the valve. A. If the tub stops B. If the tub keeps turning	1A. The electronic governor is out of adjustment. 2.A The electronic governor is faulty. 1B. The valve override screw is adjusted in too far. 2.B The valve is faulty.	1.A Readjust the electronic governor. 2.A Replace electronic governor. 1.B Adjust the override screw. 2.B Replace the valve.
5. The tub speed can not be varied with the tub limit knob.	1. Valve override is adjusted in too far. 2. The valve is stuck. 3. The solenoid is stuck. 4. The electronic governor is faulty.	1. Adjust the override screw. 2. Clean or replace the valve assembly. 3. Test the solenoid and replace as necessary. 4. Replace the electronic governor.

3. Checking the ENGINE MODE operation of the electronic governor. If the tub mode controls function correctly after following the tub mode trouble shooting check list, then follow the calibration instructions in Section 3.28 of this manual. If the tub will not rotate, proceed to trouble shooting table 6.2.

Table 6.2
Troubleshooting the electronic governor's engine mode

PROBLEM	CAUSE	REMEDY
1. The tub will not rotate, and the sensor light is not lit.	1. The sensor gap is out of adjustment. 2. There is a broken wire on the wiring harness. 3. The sensor is faulty. 4. The electronic governor is faulty.	1. Readjust the sensor gap to 3/32". This is roughly the thickness of a nickel. 2. Repair or replace the wiring harness. 3. Test and replace the sensor as necessary. 4. Replace the electronic governor.
2. The tub will not rotate, and the sensor light is lit.	1. The tub limit knob is turned fully counterclockwise. 2. The tub directional valve is in the neutral position. 3. The electronic governor is faulty.	1 Adjust the tub limit knob clockwise. 2 Engage the tub directional valve. 3. Replace the electronic governor.

ELECTRONIC GOVERNOR HARDWARE TEST

NOTE: 4012 DURATECH TUB GRINDERs contain 24 volt systems.

1. Power source: 24 volts DC

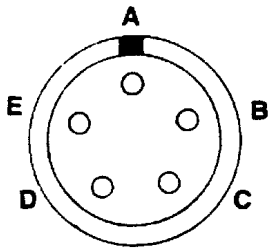
   Red wire + positive pin A wiring harness

   Black wire - Negative Pin B wiring harness

2. Test output voltage to valve DC

   Red wire + positive pin D wiring harness.

   Black wire - negative pin E. wiring harness.



A - 24 volts DC ignition
B - Ground
C - Digital sensor signal*
D - 0 to 24 volts (+) to valve
E - 0 (-) to valve

Test the electronic governor with power supplied to the governor control box and the mode switch set to the tub position. The grinder does not need to be running for this test. Disconnect the wiring harness at the valve. With a voltmeter set for 24 volts DC, connect the red lead of the voltmeter to the red lead of the wiring harness and black lead to the black wire. Turn the tub limit knob until the left speed light (turtle) is on. The voltmeter should read approximately 6 volts. Turn the tub limit knob clockwise. As more speed lights light up, the voltage should increase. Turn the knob until the right speed light (Rabbit) is lit. The volt meter should now read a minimum of 18 volts.

3. Output voltage of sensor AC

   red wire - Pin C wiring harness

   Black wire - Pin B wiring harness.

Set the sensor gap to 3/32”.

Remove the wiring harness from the electronic governor.

With the engine at operating temperature and the wet clutch engaged, throttle the engine up to the desired engine RPM.

With volt meter set to AC volts, connect leads to pins B and C. The volt meter should read 2 to 3 volts AC .

ELECTROHYDRAULIC VALVE COIL TEST

See the figure 6.2 for the location of the electro-hydraulic valve coil.

This test requires an accurate ohm meter. Disconnect the wiring harness leads at the valve coil. Set the meter to read ohms. Place one test lead from the meter on each of the two electrical connections of the valve coil. The reading should be 38-44 ohms for 24 Volt machines. If the reading is not in this range, replace the coil.

MANUAL OVERRIDE

NOTE: If there is an electrical failure with the machine, it may still be able to grind. Switch the electronic governor off. Remove the acorn nut and loosen the jam nut on the electro-hydraulic valve. Start the machine and engage the tub drive.

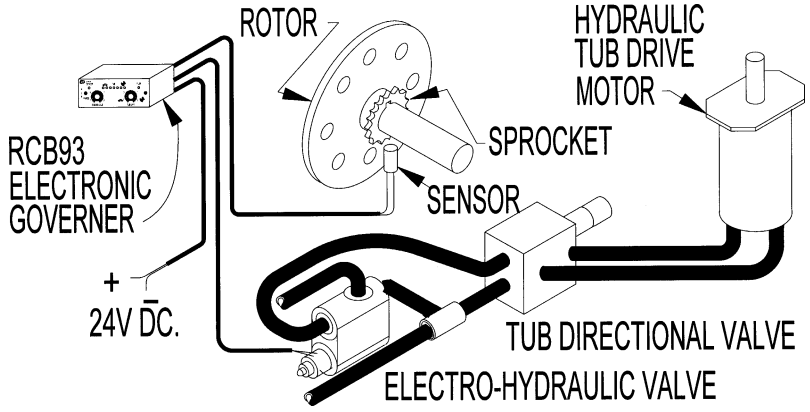


figure 6.1 electronic governor system

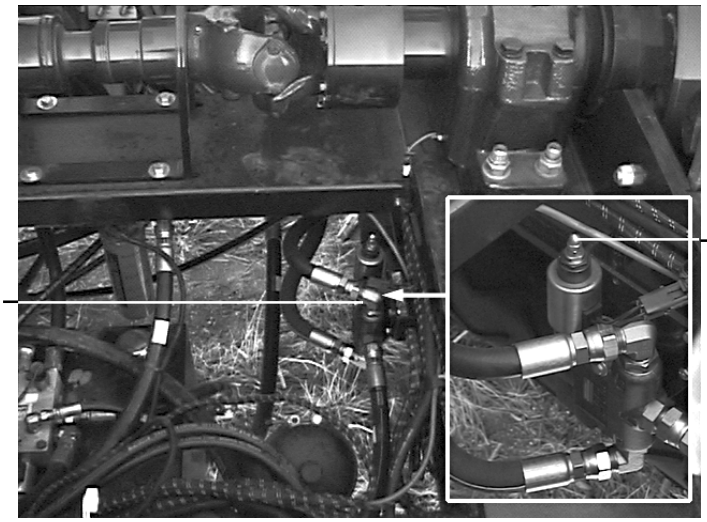


figure 6.2 location of the electro-hydraulic valve

IMPORTANT! - DO NOT ENGAGE THE WET CLUTCH AT THIS TIME!

Turn the adjusting stud clockwise until the tub rotates at the desired speed. Lock the jam nut on the adjusting stud and replace the acorn nut on the electro-hydraulic valve. When the electro-hydraulic valve is adjusted in this manner, it will function only as a manual flow control. The grinder will now operate as it would if the electronic governor were switched to the tub (manual) mode. The tub speed will be constant and it will not change to match varying load conditions.

Contact your dealer for future repairs or replacement. When the problems are corrected, calibrate the electro-hydraulic valve as shown in section 3.34.

6.2 General Troubleshooting (REV. 04-03)

general troubleshooting

PROBLEM	CAUSE	REMEDY
1. No grinding capacity	1. The screen is plugged. 2. The hammers or screens are badly worn. 3. Materials are too light or fluffy.	1. Clean out the holes in the screen. 2. Replace or turn worn parts. 3. Mix the lighter material with heavier material. 4. Use a larger screen.
2. The tub slows down or turns slowly.	1. The electronic governor is not adjusted properly. 2. The electronic governor system malfunctions. 3. The hydraulic pressure is low	1. See the sections on the electronic governor in the operations section of this manual. 2. See Troubleshooting the electronic governor in this manual. 3. Look for internal leakage or wear in the orbit motor or pump.
3. The machine vibrates excessively.	1. A hammer is broken. 2. The rotor bearing is defective. 3. The driveline is worn or misaligned. 4. Foreign material is wrapped in the rotor. 5. The hammer pattern is incorrect.	1. Replace the broken hammer. See page 57 for more information about replacing hammers. 2. Replace the rotor bearing. 3. Replace worn part or the complete driveline. 4. Remove the foreign material. 5. See page 57 for more information about replacing hammers.
4. The engine looses excessive RPM's before the tub stops.	1. The electronic governor is not adjusted properly.	1. See the sections on the electronic governor in the operations section of this manual.
5. The tub stalls.	1. The tub hydraulic system, pressure relief valve is set too low 2. The tub is overloaded due to wet or tough grinding materials. 3. Too much material in the tub. 4. The tub is binding. 5. The hydraulic oil is too hot causing electronic governor valve to bind.	1. Readjust the pressure relief valve to 2,500 PSI max. 2. Reduce amount of material in tub or shift the hydraulic tub drive to low range. 3. Reduce the amount of material in tub. 4. Remove material buildup between the tub and the platform framework. 5. Reduce the load on the hydraulic system, or stop and allow the hydraulic oil to cool.
7. The hydraulic oil overheats.	1. Pressure relief valve in control valve set too low 2. The tub is overloaded. 3. Worn pump, control valve, hyd. motors, etc.	1. Readjust the pressure relief valve to 2,500 PSI max. 2. Reduce the amount of material in the tub. 3. Rebuild or replace the hydraulic components as necessary.

6.3 Troubleshooting Omnex Wireless Remote Controls (REV. 04-03)

The OMNEX ORIGA is a portable, long range, programmable, 8-channel radio remote control unit for 10 to 32VDC operated fixed and mobile equipment. Designed as a safe, compact and easy-to-use radio remote control, the ORIGA puts complete control where it is needed most: with the operator.

TROUBLESHOOTING THE OMNEX ORIGA

THE REMOTE RADIO CONTROLLER (T100)/TRANSMITTER

SYMPTOM	POSSIBLE CAUSE	REMEDY
Flashing red LED	Battery power level is less than 20%	Replace batteries
Flashing red and yellow LEDs flashing at same speed	T100(remote controller) is in Program mode	Press red button to close Program mode
Yellow LED does not flash when buttons 1-8 are pressed.	T100 not activated / Batteries are dead	Initiate appropriate power on sequence / Replace batteries
Yellow LED flashes when button is pressed, but machine has shut off	Out of Range	Relocate closer to machinery; restart the grinder

THE REMOTE RADIO RECEIVER (R100e)

SYMPTOM	POSSIBLE CAUSE	REMEDY
Out LED is extinguished	No power to the R100e (Receiver)	Check power source
SETUP Yellow LED illuminated	R100e is in Program mode	Allow R100e to timeout after 20 seconds
Green LINK LED does not flase when transmitter is ON	R100e does no t have the correct ID - not likely on a new system - may occur where either the transmitter or the receiver is replaced individually	Initiate SETUP sequence - see SYSTEM SERVICE
STATUS Red LED is flashing	Incorrect input voltage	Check power source
STATUS Red LED is steady	Permenent internal fault	Disconnect R100e and return unit to manufacturer for repair
STATUS Green LED is flashing	Output shorted	Check wiring
Output LEDs do not light up when activated.	Output shorted	Check wiring, relays, and selenoids

PROGRAMMING A REPLACEMENT TRANSMITTER

To program a replacement transmitter, complete the following steps:

1. Power up the R100E Receiver and verify that the Green Status LED and the Red E-Stop LED are on steady.

2. Power up the T100 Transmitter into Programming Mode by Pressing and holding the RED E-Stop button and then the Green Power Button at the same time. This will power up the T100 into Programming Mode. The Yellow LED to the right of the GREEN Power Button will begin flashing slowly, (once per second).

3. Enter the Programming Password Code by pressing buttons (functions) (3, 1, 4, 2) and then press the GREEN Power button once. The Yellow LED to the right of the GREEN Power Button and the Red LED to the left of the GREEN Power button will begin flashing rapidly.

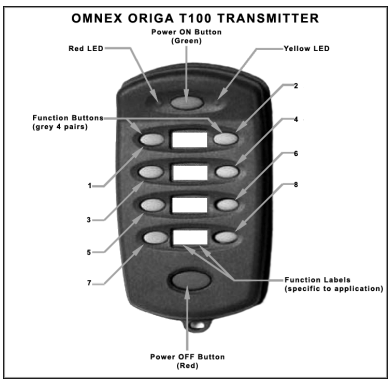
4. Enter the programming values. The programming values for DuraTech are 1266888888. If throttle is included, use 1266228888

5. Press and hold the SETUP button on the R100E Receiver (approx. 5 sec.). The Yellow Setup LED will start flashing slowly while the R100E Receiver enters into programming mode. Once the Yellow Setup LED on the R100E Receiver begins to flash rapidly, release the SETUP button. The R100E is now ready to receive the programming information from the T100 Transmitter.

6. Press and release the GREEN Power Button on the T100 to start sending the Programming information to the R100E Receiver. The Green Link LED on the R100E Receiver will begin to flash, and the Green Status LED on the R100E Receiver will be ON steady. Wait for the Link LED to stop flashing, for the Status LED to begin flashing, and for the transmitter to shut off. This signifies that the programming information has been successfully sent from the T100 Transmitter to the R100E Receiver.

7. Momentarily Power OFF the R100E Receiver and wait for 5 seconds, then power up the R100E Receiver again. The new program settings will now take effect.

8. Press the GREEN Power Button on the T100 Transmitter and observe that the Yellow LED to the right of the GREEN Power Button of the T100 Transmitter will begin flashing. Also note that the Green Link LED on the R100E Receiver is flashing and the Green Status LED on the R100E Receiver is on steady. You are now ready to operate your T100/R100E system.



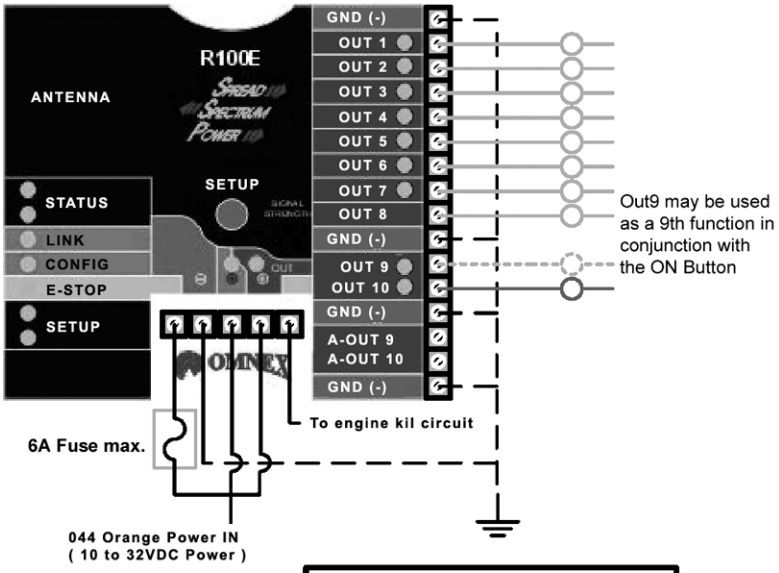
OUT OF RANGE/LOSS OF SIGNAL

The range of the OMNEX ORIGA is approximately 1,200'. Under certain circumstances, such as low or dead batteries, loss of signal can occur within that distance. In the event that loss of signal occurs, the transmitter will shut off, and the engine will be shut off by the engine kill circuit.

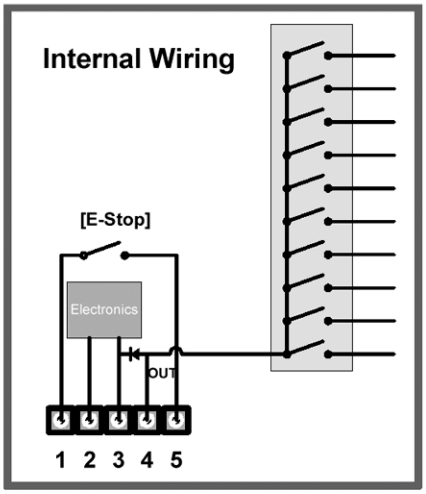
REPLACING BATTERIES

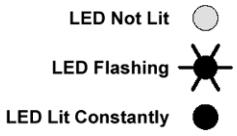
Install batteries by removing the battery cover using a slotted screwdriver and inserting 4 "AA" Alkaline batteries. Orientation for batteries is embossed inside the battery housing.

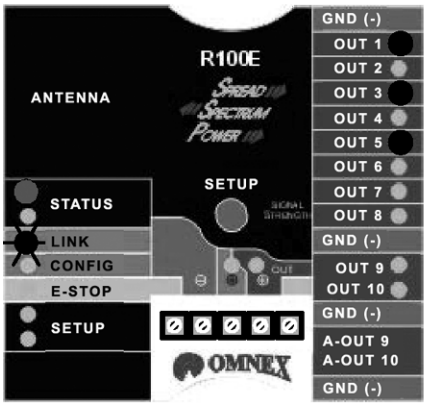
WIRING SCHEMATIC FOR THE R100e RECEIVER



NOTE: Although the Outputs are rated at 10A, the [E-Stop] relay is only 6A and therefore must be fused appropriately

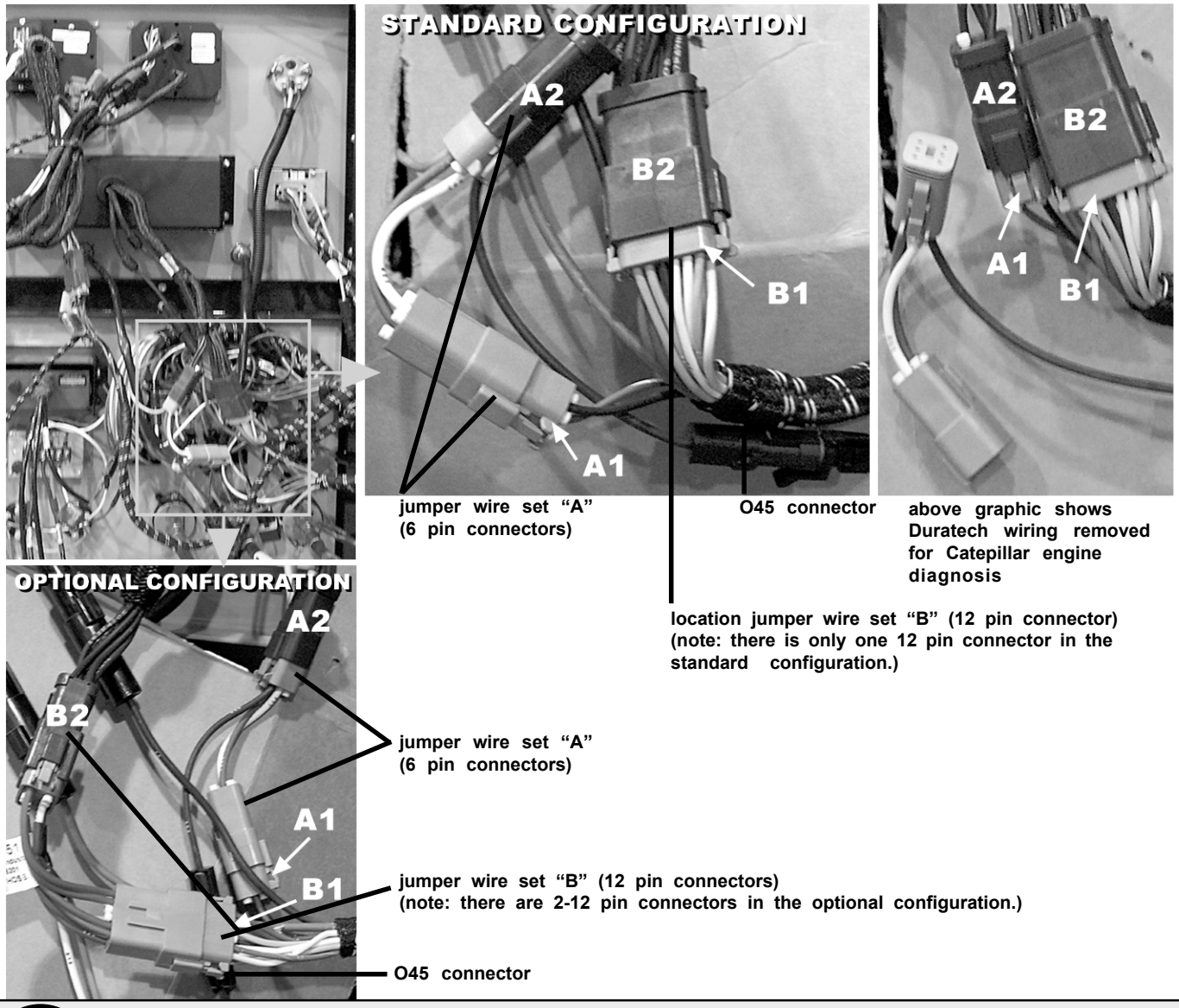






6.4 Troubleshooting the Caterpillar C15 Tier 1 & 2 and 3412 Tier 1 Engine

Caterpillar engine Duratech wiring bypass connections



NOTE: That the wires for connectors A2 and B2 come out of the ignition switch section of the panel.

Several connections are made to connect the Duratech wiring to the Caterpillar wiring.

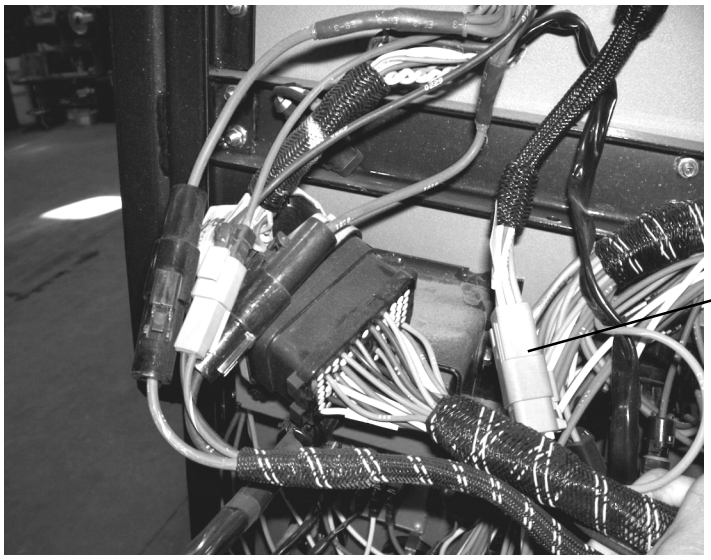
If the Caterpillar engine requires troubleshooting, the Duratech connections can be removed during the diagnosis.

Jumper wire set "A" is standard on all machines; jumper wire set "B"is used with certain options only, and is **NOT** used on all machines.

To remove Duratech wiring for Catepillar engine diagnosis in a system with the 'STANDARD CONFIGURATION", disconnect both "A" six pin connectors and reconnect "A1" to "A2". For a system with the "OPTIONAL CONFIGURATION" disconnect both "A" six pin connectors and both "B" 12 pin connectors, then reconnect "A1" to "A2" and "B1" to "B2".

There is a 15 Amp fuse or circuit breaker in Caterpillar wiring near the starter.

6.5 Troubleshooting the Caterpillar C9 & C15 Tier III Engine and the Caterpillar C27 Tier II Engine



One connector is used to connect the DuraTech wiring harness to the Caterpillar wiring.

If the Caterpillar engine requires troubleshooting, the DuraTech connection can be removed during the diagnosis. To remove the DuraTech wiring for Caterpillar engine diagnoses disconnect connection A.

There is a 15 Amp fuse or circuit breaker in the Caterpillar wiring harness near the starter

Appendix A: Warranty

DuraTech Industries International Inc. warrants to the original purchaser for 1 year from purchase date that this product will be free from defects in material and workmanship when used as intended and under normal maintenance and operating conditions. This warranty is limited to the replacement of any defective part or parts if DuraTech Industries is notified within thirty (30) days of failure.

This warranty shall become void if in the judgment of DuraTech Industries International, Inc. the machine has been subject to misuse, negligence, alterations, damaged by accident or lack of required normal maintenance, or if the product has been used for a purpose for which it was not designed.

All claims for warranty must be made through the dealer which originally sold the product and all warranty adjustments must be made through same.

This warranty does not apply to tires, bearings, batteries, engines, or any other trade accessories not manufactured by DuraTech Industries International Inc. Buyer must rely solely on the existing warranty, if any, of these respective manufacturers.

DuraTech Industries International Inc., shall **not** be held liable for damages of any kind, direct, contingent, or consequential to property under this warranty. DuraTech Industries International Inc., cannot be held liable for any damages resulting from causes beyond its control. DuraTech Industries International Inc., shall **not** be held liable under this warranty for rental costs or any expense or loss for labor or supplies.

DuraTech Industries International Inc., reserves the right to make changes in material and/or designs of this product at any time without notice.

This warranty is void if DuraTech Industries International Inc. does not receive a valid warranty registration card at its office in Jamestown, North Dakota, USA, within 10 days from date of original purchase.

All other warranties made with respect to this product, either expressed or implied, are hereby disclaimed by DuraTech Industries International Inc.

Appendix B: SPECIFICATIONS

MODEL 4012 DURATECH TUB GRINDER

General

Weight ..... 64,100 lbs. (W/O loader)
Transport Width ..... 10’6”
Transport Height ..... W/O loader-11’ 10” ..... With loader -13’ 5”
Transport Length with folded conveyor ..... 46’8”
Axles ..... (3) 22,500 lb. axles
Tires ..... 255 / 70R 22.5
Brakes ..... Air brakes
Weight on Hitch Point ..... 19,500 lbs.
Fuel Capacity ..... 300 US Gallons
Hydraulic Oil Capacity ..... 110 US Gallons
Lights ..... Clearance, directional, and tail lights.

Tub features

Tub Width ..... 12’6”
Depth ..... 55”
Tub Diameter at base ..... 10’
Tub Wall ..... 3/8” gauge
Tub Floor ..... 1/2” thick AR steel
Tub Drive ..... Single hydraulic orbit motor direct drive chain.
Service Access ..... 90° hydraulic tilting tub
Discharge Conveyor ..... 26’ (l) x 36”(w), hydraulic end driven cleated belt
Belly Conveyor ..... 36” wide impact resistant
Tub Speed Sensor ..... Electronic self-governing

Hammermill

Hammer Size ..... 3’ sq. replaceable inserts on fixed hammers
Rotor - Shaft diameter ..... 7”
Rotor Length ..... 56”
Rotor Plates ..... 18” diameter x 1-1/2” thick
Feed Opening ..... 58-1/2” x 26-1/2”
Screen Area ..... 3140 sq. in.
Hammer Rods ..... (8) 2” diameter case hardened rods
Bearings ..... 4-7/16” pillow block bearings
Hammermill Drive ..... Direct drive through HPTO oil cooled clutch
Wear Plates ..... 1” thick

Options

Radio remote that features the following commands; tub start-stop, tub forward-reverse, conveyor up-down, and emergency stop.

Air Compressor
Grapple Loader
Tub Cover
Swinging or Fixed Hammers
Various Screen Options
Magnetic Head Pulley on Discharge Conveyor
Mill Cover
Hydraulic or Manual Jackstands
Hammer Rod Puller
Tub Agitator
Anti-Lock Brake System

Appendix C: Operator Training Form

The following personnel, by their signature, certify that they have read this manual in its entirety and comprehend its instructions. Only personnel so qualified are allowed to operate this unit.

Printed Name	Review Date	Signature

4012 DURATECH TUB GRINDER Documentation Comment Form

DuraTech Industries welcomes your comments and suggestions regarding the quality and usefulness of this manual. Your comments help us improve the documentation to better meet your needs.

- Did you find any errors?
- Is the information clearly presented?
- Does the manual give you all the information you need to operate the equipment safely and effectively?
- Are the diagrams and illustrations correct?
- Do you need more illustrations?
- What features do you like most about the manual? What features do you like least?

If you find errors or have specific suggestions, please note the topic, chapter and page number.

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Send your comments to:

DuraTech Industries International, Inc.
P.O. Box 1940
Jamestown, ND 58402-1940
OR
Contact us through our website: www.duratechindustries.net

Thank you for taking the time to help us improve our documentation.

Please fill out the delivery report on the following pages. The white copy is to be returned to:

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The yellow copy is the dealer copy; the pink copy is to be retained by the customer.