



# Operating Manual T24 BurnBoss<sup>®</sup>

#### **Trailer Mounted Refractory Walled Air Curtain Burner**

Equipped With Kubota Z482-E4 Diesel Engine Engine U.S. EPA Tier 4F Certified



"Better Economically - Better Environmentally"

MADE IN THE USA

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#### Caution:

The T24 BURNBOSS<sup>®</sup> as "Trailer- Mounted Machinery" is "Non-Self-Propelled Agricultural/Forestry/Construction Equipment"

The dual axle T24 BurnBoss Air Curtain Burner is street legal. Its GVWR is 9980 lb. (4726 kg). A suitable Heavy Duty Hitch on the towing vehicle is required (Ball Size: 2-5/16 in. or 58.75 mm). Familiarity with all state and local trailer towing regulations and ordinances is advised.

Before traveling on public roadways, check functionality of the towing vehicle's brake controller and trailer hitch, and on the T24 BurnBoss check ball coupler, safety chains, break-away system, self-adjusting electric brakes, wheels, tires and trailer lighting. Ensure the T24 BurnBoss Travel Safety Pins on the two hydraulic actuators are properly in place and secured with their hitch pins (See Page 10 for more details).

The firebox (burn chamber) of the T24 BurnBoss has no bottom and must be lowered onto level earthen ground (dirt) and never onto combustibles like dry grass or peat moss and the machine must also not be operated on a surface like a concrete pad, gravel, crushed stone or asphalt (See Page 5 for more details).

Always wear Personal Protective Equipment (PPE) when working with or around the T24 BurnBoss and especially when handling the residual wood ash. Be mindful of Pinch Point Hazards. Keep your hands clear from all moving parts and hot parts of the T24 BurnBoss while it is being set up or in operation (See Pages 6 & 7 for more details).

#### **CAUTION**

<u>Please, read and understand all Caution and Warning Notices</u> and Operating Instructions before working with the T24 BurnBoss and always follow them diligently. Disregarding these important Notices may lead to an accident that may result in property damage and a person's injury or death.

Contact Air Burners, Inc. Customer Service should you require any assistance. Send Email to support@airburners.com, call 772-220-7303 or 888-566-3900.

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T24 BurnBoss Trailer Mounted FireBox (Firebox UP in Travel Mode)



T24 BurnBoss Trailer Mounted FireBox (Firebox DOWN in Operational Mode)

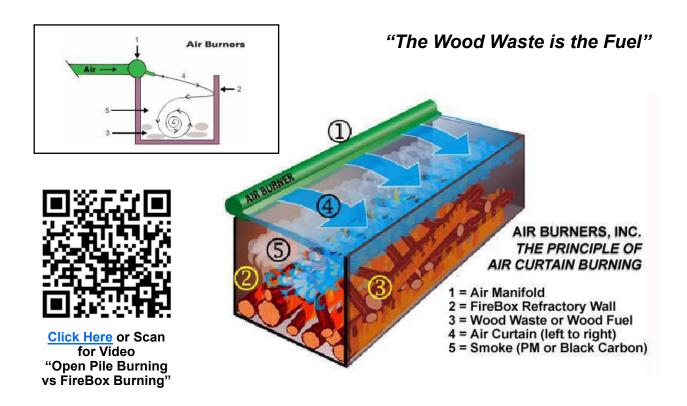


#### PRINCIPLE OF AIR CURTAIN INCINERATION

#### **OPERATION**

Air curtain burners are designed primarily as a pollution control device to make open pile burning cleanest. Using a Diesel engine driven air fan, these machines generate a curtain of air with a very particular mass flow and velocity. This curtain of air acts as a trap over the top of a thermal ceramic lined firebox like the BurnBoss.

The wood waste is dumped into the firebox (burn chamber) and then ignited (usually with a propane torch and with a small amount of diesel fuel where permitted) just as you would light any other pile of wood you intended to burn. Once the fire has gained strength, the air curtain is turned on. The air curtain traps most of the smoke particles and causes them to re-burn directly under the air curtain where the temperatures can exceed 1800° F (≈1000° C). These machines do not inject any fuels into the fire, the fire is sustained only by adding more wood feedstock. The air from the air curtain is not heated. The only fuel used in the continuous operation is that for the Diesel engine that powers the air fan.



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### **GENERAL DESCRIPTION OF T24 BURNBOSS®**

The BurnBoss design is intended to allow for the use of our self-contained refractory walled air curtain system configuration but mounted on a trailer frame for ease of mobility.

The standard S-Series ("FireBox") machines are offered in several sizes as indicated below. Most of the functions and principles that apply to the BurnBoss apply also to the standard S-Series units.

Our recently expanded "Boss-Series" adds the T26 CharBoss, a trailer-mounted street-legal Biochar Processor designed to optimize the production of high-grade Biochar, and the self-propelled T28 TrackBoss which is similar to the T24 BurnBoss, however, with the trailer frame replaced by a remotely controlled track system.

Above-Ground Air Curtain Burner Dimensions					
Model	Overall Size L x W x H	Firebox L x W x H	Weight lbs.	<b>Fuel</b> gal/hr.	Average Thru-put* tons/hr.
S330	40' 4" x 11' 10" x 9' 6"	30' 2" x 8' 5" x 8' 1"	59,000	3.0	11-13
S327	37' 4" x 11' 10" x 9' 6"	27' 2" x 8' 5" x 8' 1"	54,600	3.0	9-11
S223	33' 3" x 8' 6" x 8' 6"	22' 11" x 6' 2" x 7' 1"	40,250	2.0	7-9
S220	30' 1" x 8' 6" x 8' 6"	19' 8" x 6' 2" x 7' 1"	36,650	2.0	5-7
S119	27' 3" x 7' 2" x 7' 4"	19 x 5' x 6'	30,100	1.9	3-5
S119R**	27' 6" x 7' 2" x 8' 3"	19 x 5' x 6'	39,900	1.9	3-5
S116	24 7"' x 7' 2" x 7' 4"	16' x 5' x 6'	27,500	1.9	2-4
S116R**	24' 11" x 7' 2" x 8' 3"	16' x 5' x 6'	36,300	1.9	2-4
T28	17' 10" × 8' 5" × 5' 8"	12' × 4' × 4'	15,350	1.1	1/2-1
T26	21' 8" × 7' 8" × 6' 8"	12' × 4' × 4'	17,500	1.1	1/2-1
T24	19' 8" × 7' 8" × 5' 8"	12' × 4' × 4'	9,980	0.56	1/2-1

<sup>\*</sup> Approximate values. Achievable through-put depends on nature of waste stream and other factors.

<sup>\*\*</sup> Cable-hoist version; Hook-lift version is 5" shorter



T26 CharBoss (Biochar Processor)



T28 TrackBoss (Remote Control)



#### **GENERAL DESCRIPTION OF BURNBOSS**

The T24 BurnBoss is a proven design that adds mobility to the Air Burners S-Series FireBox line of machines. When delivered to a job site, the machine is ready for use as soon as it arrives. The firebox system (burn chamber) is built on a patented trailer frame that allows the firebox to be raised and lowered for easy movement over the ground. The firebox is lined with proprietary thermal-ceramic refractory panels. The panels are cured prior to installation at the factory to drive out any moisture to ensure they are stable at first use in the field.

The forward equipment deck under the cowling supports a two cylinder Diesel engine, a 10 gal. fuel tank, the direct drive system and the air fan. In addition, the battery and hydraulic controls for the firebox are located here. When viewed from the rear of the unit, the patented air disbursement manifold is mounted on the right top side of the combustion chamber, the firebox.

The Diesel engine is directly coupled to the air fan. The high velocity air is sent down the manifold through the vanes and directed to the outlet nozzles. A balanced and distributed air flow is directed across the top of the firebox (burn chamber) and then reflected down into the combustion zone.

The curtain of air acts like a top over the firebox, trapping most of the escaping particulate matter (smoke) and causing it to re-burn just below the air curtain before finally escaping through the curtain as a hot gas. The air from the nozzles travels across the firebox creating the air curtain effect, then it reflects off the far side thermal-ceramic wall adding oxygen to the combustion zone helping to generate a hotter more complete fire. This additional agitation helps prevent the fire from starving for oxygen as the ash builds up during burning operations.

#### **NOTICE:**

All of this is carefully engineered to provide the correct amount of air at the correct velocity. It is sometimes thought that more air flow will actually increase the burn rate. This is INCORRECT. Modifying the air flow will actually have the opposite effect and reduce the machine's throughput. Additionally, it will reduce the machine's ability to meet minimum air quality standards. There is a maximum rate at which wood can burn. Trying to exceed that rate by adding more air to an air curtain burner causes two major problems:

- It will cool the fire reducing combustion efficiency which will create more smoke (enriched with more carbon dioxide and oxides of nitrogen). This will begin a circular effect of further reducing the oxygen and further reducing combustion efficiency. The result is your throughput drops and smoke increases.
- 2. Increasing the air flow beyond design standards will over pressurize the firebox causing larger sized particles to be ejected from the firebox. Besides violating the EPA limits for PM (particulate matter) the larger hotter embers ejected will pose a much greater fire hazard.

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T24 BurnBoss in Full Operation

#### WARNING: PINCH POINT HAZARDS

Be mindful of Pinch Point Hazards. Keep your hands clear from all moving parts and hot parts of the T24 BurnBoss while it is being set up or in operation.



T24 BurnBoss - Firebox Lowered to Ground

#### **WARNING:**

Watch for, read, and understand the <u>CAUTION</u> and <u>DANGER NOTICES</u> you will find throughout this operating manual. Failure to heed these warning notices could result in an accident causing property damage and <u>serious personal injury or death.</u>

#### PERSONAL PROTECTIVE EQUIPMENT (PPE) & WOOD ASH CAUTION:

Always wear appropriate Personal Protective Equipment (PPE) while working with the T24 BurnBoss, especially a breathing apparatus like a respirator while removing wood ash from the machine and while handling the wood ash.



#### **SAFETY CONSIDERATIONS**

### READ AND UNDERSTAND ALL SECTIONS OF THIS MANUAL BEFORE YOU BEGIN BURNING OPERATIONS

The BurnBoss operator is dealing with fire on a daily basis; it is very important that each and every individual involved with the machine be alert and practice very rigid safety precautions.

When you are running the BurnBoss you are responsible for ensuring that it is operated in the safest possible manner at all times. If you notice something wrong, correct it immediately, and if you cannot correct it, find someone who can and/or shut down the machine.

#### **Basic Safety Points:**

- 1. The BurnBoss must be placed onto cleared, level ground.
  - The BurnBoss should be driven onto level ground to facilitate loading, dumping and moving of the unit. When lowered, the firebox must touch the ground on all four sides or smoke and embers will escape.
- 2. The unit should be placed such that no combustible material is stored within a minimum 100 ft. clearance in any direction and never on a concrete pad or gravel stones.

The firebox of the BurnBoss does not have a bottom and must not be located over combustibles such as dry grass or peat moss which may cause a fire to spread to other areas. It is equally important not to place the BurnBoss on anything other than earthen soil, never on a concrete pad, on gravel, crushed stones or asphalt. There is a good reason for this warning. Concrete or gravel can contain water which the heat in an operating BurnBoss could vaporize quicker than it can be drawn out. This could result in increased vapor pressure that can cause the concrete or stones to explode. Fragments could possibly fly out of the firebox and cause an accident resulting in injury or death to persons nearby.

In addition *hot embers* will escape from the firebox and, depending on the wind, will land on the ground around the unit. The unit should not be located within 100 ft. of any stored combustible materials. The waste material to be burned during the day's operation can be staged within the 100 ft. perimeter to facilitate loading. The operator must monitor the loading pile to ensure embers do not ignite the loading pile. The combustible materials to be stored for burning at a later date must be stored outside the 100 ft. perimeter or in accordance with the chart on page 6 of this manual which suggests adjustments for wind speed.

3. The unit should not be operated when the wind speeds reach 20 mph, as the potential to carry hot embers is significantly increased.

As an operator you should always be aware of wind speed and direction. Increased wind speed will affect the integrity of the "air curtain" and will cause hot embers to travel farther. See the wind speed chart regarding suggested set-back on the next page.

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#### 4. NEVER use highly combustible materials to light the wood waste.

Highly combustible materials such as gasoline, refined spirits, etc. ignite at an explosive rate which may cause an accident resulting in serious injury or death. The safest method to start the fire in the firebox is to use wood waste materials such as kindling wood. In the absence of these materials or when starting feedstock with a high moisture content, use diesel fuel as an acceptable option if permitted.

#### 5. NEVER climb onto the T24 BurnBoss or lean over to view or light the fire.

Always load and operate the machine from the MANIFOLD side (right side). Hot embers will escape at a low height opposite the manifold which is he left side of the machine. Access to the area on the left side of the T24 BurnBoss must be clearly marked <u>restricted access</u> to prevent injury to persons (For details see page 11).

#### 6. Shut the T24 BurnBoss down in an emergency.

Stop loading the unit, stop the air flow by shutting down the engine. Dump dirt or sand onto the fire. Water should only be used as a last resort as it will likely damage the refractory panels.

#### **DANGER:**

Do not sit or stand on any part of the T24 BurnBoss. Falling into the firebox will cause an accident resulting in serious injury or death.

DO NOT enter the 20 ft. restricted area opposite the manifold or left side of the machine. Low flying embers in this area may cause an accident that may result in injury or death.

WIND SPEED VS. SAFE DISTANCE			
	Ар	proximate Safe Distance t	for:
Wind Speed mph	Structures (Houses, etc.) ft.	Woods/Trees ft.	Stored Brush Piles ft.
10	300	150	100
12	300	150	100
14	300	200	150
16	400	250	150
18	400	250	200
20	500	250	200

#### **DANGER:**

The above distances serve as a GUIDELINE ONLY! You MUST ALWAYS observe the down range area regardless of the wind speed. You must always observe local fire ordinances and directives from the local fire department or other competent authorities.



#### 7. Personal Safety (Personal Protective Equipment – PPE)

#### Operators need to be aware of the following potential hazards:

a. Flying hot embers being released from the fire. Operators or anyone within the 100 ft. radius of the fire should wear appropriate fire resistant clothing. The ideal outerwear for an operator would include a Nomex jacket, leather gloves, eye protection, hard hat, cotton work jeans and steel toe boots. Operators should never wear synthetic material (i.e., polyester) around the fire as this type of material can melt and cause injury. Additionally, some synthetic materials will support combustion and could be very dangerous around fire. One hundred percent cotton materials would be the minimum, cotton treated with a fire retardant would be better and fire proof materials like Nomex would be best.



- b. Noise: Ear protection is recommended around the T24 BurnBoss. It is a good practice to wear approved ear protection when working in close proximity to the fan and engine.
- c. Hot Panels: The backs of the thermo-ceramic panels and parts of the steel structure can reach temperatures as high as 500°F (260°C). Caution should be taken to ensure operator and visitors do not come in contact with these hot areas.
- d. Wood ash and dust will be released during the BurnBoss operation, especially during biochar collection and ash cleanout. Operators must wear appropriate Personal Protective Equipment (PPE) like suitable body suits, eye protection, gloves, boots, etc. and in particular face masks like respirators to keep ash that may be suspended in the air from entering their lungs. It must be understood that all persons near the BurnBoss must protect themselves from dust and wood ash as it may be harmful if wood ash and dust enters their airways which may result in injury or death.

Upon moving the BurnBoss briskly forward for ash cleanout, there may be hot embers and hot coals hidden within the ash bed left behind and wood ash may be suspended in the air from stirring up the ash bed. This may make it difficult to breathe. While handling hot wood ash particulate matter may be released which could be harmful if they would enter a person's airways. Always wear appropriate Personal Protective Equipment (PPE) while handling the wood ash residue.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE) & WOOD ASH CAUTION:

Always wear appropriate Personal Protective Equipment (PPE) while working with the T24 BurnBoss, especially a breathing apparatus like a respirator while removing wood ash from the machine and while handling the wood ash.

DANGER: You must ensure debris does not build up on any part of the T24 BurnBoss. It must be kept clean at all times during operation to prevent a fire that could damage or destroy the engine and accessories which result in injury or death to persons nearby.



#### HOW TO TRANSPORT THE MACHINE

#### A. Towing T24 BurnBoss

Towing the T24 BurnBoss is like towing any other "heavy" trailer. <u>It is important that the frame rails</u> are as level as possible when hooked to the truck. The T24 BurnBoss comes equipped with electric

brakes, be sure your truck has an appropriate brake controller.

T24 BurnBoss models shipped from the Factory after September 1, 2021 are fitted with self-adjusting brakes. They are properly adjusted at the Factory, but it is the operator's responsibility to keep them adjusted by periodically backing up the T24 BurnBoss while applying the brakes hard.

The T24 BurnBoss is also fitted with a breakaway system. Make sure the battery is charged and the pig tail is properly connected to the towing vehicle, so that the brakes and lights will function and the breakaway battery be charged (Refer also to page 28). Be sure your hitch assembly is rated for the towing weight of 9,983 lb. (4528 kg) and tongue weight of 1200 lb. (544 kg). A 2-5/16 in. (58.7 mm) trailer hitch ball is required.

Always maintain correct tire pressure to prevent premature wear and blow outs. Consult the tire decal usually inside the fuel tank access door. Though it is street-legal, should the need arise to

move the BurnBoss a distance of more than 150 or 200 miles, it is recommended to transport it on a suitable trailer rather than towing it on roadways. This is not a requirement, but will reduce wear and tear. Always tow the T24 BurnBoss at safe travel speeds.

#### TOWING AND TRUCK CONNECTION

- 1. The BurnBoss lower trailer frame rail MUST be level to the ground when connected to the towing vehicle.
- 2. The electrical "pigtail" connection must be properly made. Check the electric brakes, break-away system and lights to make sure they operate properly.



Frame Rail

T24 BurnBoss

- 3. The front jack stand must be up and secure.
- 4. Make sure the firebox travel safety pins in front and rear are properly in place and secured with their hitch pins for towing (See page 10).
- 5. The safety chains and breakaway cable must be properly connected to the truck.
- 6. Test the brakes before you drive away.

<u>DANGER:</u> The BurnBoss lower trailer frame rail MUST be level to the ground when connected to the tow vehicle or an accident may occur resulting in injury or death. Always test the electric brakes before towing the T24 BurnBoss to confirm that they operate properly. Back up periodically and apply the brakes to adjust them. They are self-adjusting.



#### HOW TO TRANSPORT THE MACHINE

#### **B. LOWERING THE FIREBOX FOR USE**

- 1. The firebox must be lowered onto level ground directly on dirt, not on any combustible, like dry grass or peat moss and not on a concrete pad, gravel, crushed stone or asphalt.
- 2. The machine should be disconnected from the tow vehicle.
- 3. The front jack stand must be down and secure.
- 4. Use the tethered hydraulic control (inside left access door) to raise the firebox slightly to release the load on the travel safety pins (if needed).
- 5. Remove the travel safety pin at each end of the firebox. Store them as shown to right as to not misplace them.



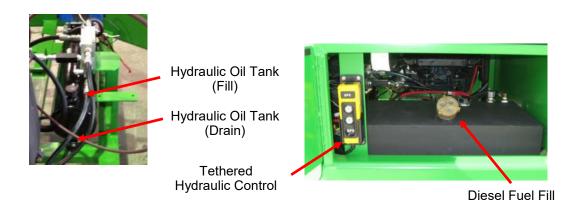
Travel Safety Pin stored with firebox lowered

- 6. Lower the firebox until it contacts the ground.
- 7. Important: Shovel dirt around the <u>inside</u> edges where the firebox contacts the ground to prevent heat and smoke from leaking out, especially behind the tires.
- 8. Always wear Personal Protective Equipment (PPE).

#### **Hydraulic Oil**

If you are operating in cold weather you may need to warm up the hydraulic oil before use. In most cases running the engine for 30 minutes will generate enough heat for that. If you still have difficulties operating the hydraulic system you should change the oil to one with a lower temperature (viscosity) rating. The hydraulic system of the T24 BurnBoss comes standard from the factory with "Am Soil Synthetic Hydraulic Oil ISO32" (Am Soil P/N HVH05-EA).

If your machine will operate in cold temperatures or remain outside for long periods in cold temperatures you must use a synthetic hydraulic oil such as Am Soil P/N HVG05-EA, ISO22. The hydraulic system of the T24 BurnBoss holds approximately 2.16 gal. (8.18 L) of fluid.





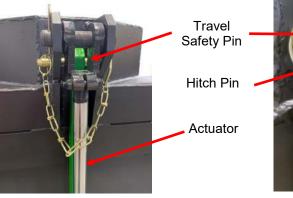
#### C. RAISING THE FIREBOX FOR TRANSPORT

- 1. Connect machine to tow vehicle.
- 2. Raise jack stand.
- 3. Raise the firebox until it stops.
- 4. <u>Immediately</u> move the machine forward if there are hot ashes in the firebox to prevent tire or axle damage by hot coals or embers.
- 5. Install both safety pins, front and rear along with the proper hitch pins.
- 6. Make all safety chain and electrical pigtail connections to towing vehicle.
- 7. Ensure you have read the section on "TOWING" (page 8) prior to moving the machine.

<u>DANGER:</u> If the firebox contains hot ashes, the T24 BurnBoss must be moved immediately after the firebox is raised to prevent damage to the tires and axles.



Jack Stand Break-Away Unit



Travel Pin Installed



Hitch Pin Attached to Chain

<u>DANGER:</u> Do not tow the machine <u>unless both travel safety pins and hitch pins are properly installed,</u> as the hydraulic actuators may bleed down dropping the firebox on the road which may cause an accident resulting in injury or death.



Adjustable Height Ball Hitch & Safety Chains

The T24 BurnBoss Ball Hitch Trailer Coupler in the adjustable Channel Mount Receiver shown to the left can be replaced with an optional Pintle Hitch (MIL Hitch) available from the Air Burners Parts Department.

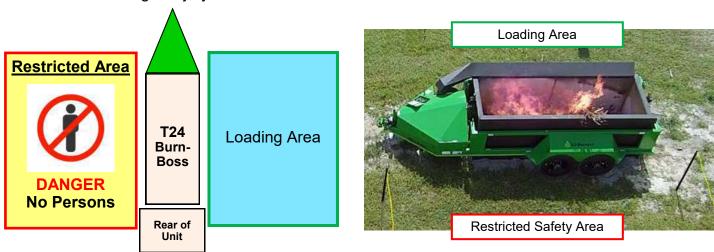


#### HOW TO SET UP THE MACHINE

#### A. POSITIONING THE UNIT

The T24 BurnBoss unit is self-contained and ready to use upon delivery to the job site.

- 1. The BurnBoss must be setup on level ground.
- The firebox is lowered to the ground using the hydraulic controls (see page 12).
- 3. The bottom edges of the firebox must touch the ground to ensure smoke and embers will not escape underneath the firebox walls. If necessary shovel some dirt into (INSIDE) the firebox to seal the edges. This must be done prior to loading the firebox. Add dirt around the bottom behind the tires to prevent any heat from damaging the tires.
- 4. With respect to the prevailing wind direction, the unit should be positioned such that the wind comes over the back of the manifold. This is the preferred position. It is also acceptable to have the wind blow into the manifold. It is discouraged, however, to have the wind come from either end of the machine, as this will tend to disrupt the air curtain.
- 5. The firebox will be loaded either by hand or by machine OVER THE MANIFOLD. The firebox must not be loaded from the side opposite the manifold or the left side as there may be airborne hot embers in this area which would make it unsafe for personnel to be there.
- 6. Create a well identified restricted area of not less than 20 ft. x 20 ft on the left side of the T24 BurnBoss by marking it with orange safety cones, caution or warning tape, ropes, stakes, fencing, etc. (See sketch below). Ensure no personnel or lookers-on enter this restricted area as flying hot embers and the intense heat from the combustion process may cause them to have an accident resulting in injury or death.



DANGER: Always load the T24 BurnBoss from the right side <u>over the manifold</u> to prevent any flying hot embers from endangering personnel.



#### **B. PRE-OPERATION CHECKS:**

- 1. Air filter for cleanliness (VERY IMPORTANT).
- 2. Engine oil level and hydraulic oil level.
- 3. Engine coolant level and antifreeze rating.
- 4. Diesel fuel level (Check fuel gauge).
- 5. Battery cable connections.
- 6. Check hydraulic lines for leaks.

**DANGER:** Never move the machine with the firebox down as this will cause significant damage to the machine.



**Engine Controls** 



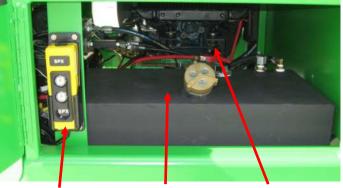
Access Cover for Battery, Fuel Tank, Hydraulic Control



For Operating Manual & Servicing Information

**Engine Oil** Check

Operating Instructions



**Tethered** Hydraulic Control

Fuel Tank

Battery



#### HOW TO SET UP THE MACHINE

#### C. STARTING (Kubota Engine Z482-E4)

- 1. Turn the speed control knob clockwise to ensure engine speed is at idle.
- 2. If needed, turn key switch counterclockwise to the PREHEAT position for not more than 5 seconds.
- 3. Turn the key switch clockwise to the RUN position.
- 4. The gauges will register to confirm that power is supplied to the panel.
- 5. Start the engine by turning the key switch all the way clockwise to "START", then release key switch, and warm up the engine at idle speed of 1,000 RPM for 5 to 10 minutes.
- **6.** Shut the engine down to prepare for loading and lighting (see pages 16-18 for loading and lighting instructions). The fan is direct-drive, so leaving the engine running during lighting will make it more difficult to light.
- 7. Once running, the engine speed may be varied as required by turning the speed control knob clockwise to decrease, counter clockwise to increase.
- 8. The maximum engine speed is governed to provide the correct amount of air flow.



Throttle



Control Panel



#### SITE PREPARATION

#### THE GOALS TO GOOD SITE PREPARATION ARE:

To place the BurnBoss for easy access. To sort the waste wood pile. To organize the inflow of new wood waste.

When towing and positioning the T24 BurnBoss at the burn site:

- 1. Consider where the waste piles will be located. We generally recommend two waste piles (explained in next section).
- 2. Consider the predominate wind direction. Hot embers <u>will be</u> escaping from the firebox during all burning operations.
- 3. Consider clearances to empty the firebox. The firebox must raised and the machine towed *forward* until all the ash is left behind. During this process the tires and axles must not come in contact with the hot embers and coals as that would damage them. In most cases the cold ash can be reapplied to the land. Check your local ordinances.
- 4. Once the T24 BurnBoss is in position, it is important to place dirt around the <u>inside bottom</u> of the firebox where the thermal-ceramic panels meet the ground to "seal" the bottom. This will prevent smoke and heat from escaping. Pay particular attention to the seal between the tires and firebox and between the front wall and engine bay.

**DANGER:** Never dig a pit in the center of the firebox. This will allow high level heat to destroy the bottom of the T24 BurnBoss, voiding the Limited Factory Warranty.

<u>DANGER:</u> Never operate the T24 BurnBoss on a combustible like peat moss or dry grass, and never position it on a concrete pad, gravel, crushed stones or asphalt.

<u>DANGER:</u> This machine DOES NOT prevent hot embers from escaping. This machine is designed primarily as a pollution control device to reduce the smoke generated from open pile burning of clean wood waste and to reduce the wood waste efficiently.

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#### SITE PREPARATION

#### **FASTER OPERATION THROUGH STAGING THE WOOD PILES**

Air Burners air curtain burners were designed primarily as a pollution control device but operated correctly they will burn clean wood two or three times faster than open pile burning. To achieve the best throughput the fire must remain at the highest temperature possible. You achieve this by remembering three rules:

- 1. Don't smother the fire with a huge load or a load of very dense material.
- 2. Load "less more often" smaller bucket loads more often.
- 3. Sort out a pile of your best burnable wood, use it to create a hot fire.

The basic principle of operation is not too different from a campfire. You use your best wood to get it started and if the fire dies down you add some more "Good Wood" to bring it back up. The big difference is that on your campfire you are probably not adding root balls, leaves or pine needles. These are the high moisture content and dense materials that bring the fire temperature down.

The temperature drops (smoke increases) and your burn rate slows down, if you overload the machine with materials that have high moisture content such as tree branches with leaves and needles or green branches such as palm fronds. While these are certainly acceptable to burn in the T24 BurnBoss, you want to add them to a hot fire, so they dry out and ignite quickly.

To keep the temperature up and to maintain the highest throughput of waste, you should mix the very burnable wood with the less burnable materials throughout the course of the burning operation. The most common way to accomplish this is to stage a pile of the most burnable materials or what we call the "Two Pile System."

#### **DANGER:**

Always load the T24 BurnBoss from the right side over the manifold, never from within the restricted safety area.



T24 BurnBoss in Full Operation

"If it's burning clean, it's burning hot, If there is smoke, you're losing money."

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#### SITE PREPARATION

#### THE "TWO PILE SYSTEM"

For an efficient operation you should have two piles:

The **first pile** or <u>"Main Debris" Pile</u>, is the material being generated from the land clearing or forest clearing operation and it is located away from the ember path but with good access to your loading machinery.

The **second pile** or <u>"Good Wood" Pile</u> is your best and most burnable wood waste. When you first setup the site, the operator should spend some time sorting through the main debris pile pulling out what appears to be your best and most burnable feedstock. This is the material you will use to start the fire, as this is the material that will give you a good hot burning base fire. You will also draw from the "Good Wood" pile throughout the day if you should need to stoke up the fire (more on this in the following sections).

As the BurnBoss operator is drawing from the main debris pile throughout the day he or she should continue to replenish the "Good Wood" pile as necessary. The "Good Wood" pile only needs to be enough material to stoke-up the fire if needed and enough material to get you started the next day if a "Hot Start" is contemplated.

#### **IMPORTANT WARNING ABOUT BURNING OF PALLETS:**

Wooden Pallets, especially spent pallets burn extremely hot. DO NOT load the T24 BurnBoss above approximately 3/4 of the height of the firebox. Heat damage to the manifold and other structure may occur which would not be covered under your Limited Factory Warranty.

#### **DANGER:**

You must ensure debris does not build up on any part of the machine. It must be kept clean at all times during operation to prevent a fire that would damage or destroy the engine and accessories.

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#### LOADING AND STARTING THE BURNBOSS

#### THE GOALS IN STARTING A T24 BURNBOSS ARE:

To achieve an even fire across the length of the firebox. To start the fire from the bottom of the initial pile.

To build a hot base fire.

There are two methods for lighting the unit; a <u>cold start and a hot start</u>. A cold start means the BurnBoss is clean and has no hot coals left from a previous burn. A hot start uses heat from the coals of the previous day's burn.

#### COLD START

- 1. T24 BurnBoss must be on level ground.
- 2. The Engine should be off, (but as described on page 13, the engine should have been brought up to operating temperature).
- 3. Shovel dirt along the inside bottom edges of the panels to "seal" them. It will only need a couple inches to prevent the smoke from escaping underneath the unit.
- 4. Load the T24 BurnBoss from the side of the air manifold. This is safer as there is less chance of the operator coming in contact with hot embers (See page 11).
- 5. Load your most burnable material (materials from the "Good Wood" pile as discussed in the previous section) which is the smaller, dryer and cleaner wood waste into the BurnBoss to a level of about half way up. Ensure the entire bottom area of the firebox is covered.
- 6. If you are using diesel fuel to assist in the lighting (where permitted), spray it (approx. 3 gal.) across the top of this first load of woody feedstock.

#### **DANGER:**

If you are using an accelerant (where permitted), first ensure there are NO HOT COALS remaining in the BurnBoss.

#### **DANGER:**

<u>DO NOT use highly volatile accelerants like</u> gasoline or kerosene, to light the fire. These fluids ignite almost explosively and may cause an accident resulting in injury or death.



#### LOADING AND STARTING THE T24 BURNBOSS

- 7. Once you have this smaller material loaded and your accelerant added (if used) load some larger heavier material on top, such as logs or big branches. Load these heavier materials, also from your "Good Wood" pile, to a height just below the manifold nozzles. This heavier material will help compress the smaller feedstock which will give you a better light-off. If there are large air spaces between the materials in the firebox, the heat will not build up as quickly and the fire may be more difficult to light.
- 8. This material, once burning, will become your hot base fire to support continued burning. Use your best and driest materials ("Good Wood") for startup, as this will form a strong base for continued burning plus it will start quicker and burn hotter. If you will be burning stumps then it is best to load them after the first hour of burning when the fire is up to full temperature.
- 9. The level of material in the firebox for light-off should be kept just below the manifold nozzles.
- 10. Using an appropriate method, such as a propane torch (like a weed burner) or oil soaked rags on poles to light the fire.
- 11. Once the fire is burning start the engine. Do not increase the engine speed too fast as the air from the manifold could "blow-out" your fire.
- 12. There is always smoke on start-up, as <u>all</u> of the material in the firebox contains moisture, compared to later in the burn operation, when only the new material you are loading contains moisture. Plus, the air curtain cannot be fully engaged, until the fire has strengthened or you run the risk of blowing out the fire.
- 13. Do not load new material into the BurnBoss too fast during the first hour of burning operations until a good hot base has been achieved.
- 14. Once a good hot fire base is achieved load new material at a rate that causes good ignition and does not "smother" the fire.

#### WARNING: PINCH POINT HAZARDS

Be mindful of Pinch Point Hazards. Keep your hands clear from all moving parts and hot parts of the T24 BurnBoss while it is being set up or in operation.

"Less material, more often, will give you the fastest burn rate."

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#### LOADING AND STARTING THE BURNBOSS

#### **HOT START**

A hot start uses the coals from the previous days burning operation. Depending on how much ash is in the unit, a hot start can usually be done only once before the unit will need to be emptied. The more ash in the T24 BurnBoss that you start with the LESS room you have for burning new materials. Hot starting may not be practical for the BurnBoss due to its smaller size compared to an S-Series FireBox.

First, ensure there are enough coals remaining to generate sufficient heat to get the new waste materials burning. You CANNOT and MUST NOT add an accelerant, if the waste materials do not light, as that would be too dangerous. If the material does not light, the T24 BurnBoss must be emptied completely before trying a cold start with the use of an accelerant.

#### **DANGER:**

**Never** use an accelerant to overcome a lighting of the initial load that failed, as it may ignite unexpectedly and cause an accident resulting in injury or death.

#### **HOT START LIGHTING**

Similarly to a cold start you begin with your best and most burnable materials.

- 1. Load the T24 BurnBoss to about one third or half way with the "Good Wood". The wood should begin burning as soon as you start loading.
- Start the engine and run it at approximately 1400 RPM. This should help fan the flames and spread the fire. If you experience heavy smoke then reduce the RPM. Be cautious not to "blow out" the fire.
- As the fire begins to heat up, increase the RPM.

#### **DANGER:**

Do not step or climb on any part of the T24 Burn Boss. Falling off the machine or falling into the firebox will cause a serious accident resulting in injury or death.

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#### **HOW TO FEED A FIRE**

It will generally take 30 minutes for the fire to build to a point where the temperatures are sufficient for the unit to be operating with minimal smoke.

- 1. Add material from your "Good Wood" pile slowly for the first hour. It takes about an hour for the fire to reach minimum temperature. Your goal is to achieve an even and hot fire across the unit.
- 2. For continuous operation the engine RPM is run at full throttle (preset at the factory). If the fire is burning very hot with no smoke the RPM can be reduced by 1000 RPM to save fuel but that is very dependent on the waste material.
- 3. If you get excessive smoke and ash when you load the wood waste while dropping the load through the air curtain, then you may need to turn the RPM down temporarily as you load. This is most likely earlier in the burn operation.
- 4. Take caution when loading the unit that the material to be burned is not "dumped" in the firebox too quickly causing hot embers to be thrown from the unit. If you have an area in the firebox that is smoking, this indicates the temperature is low in that area. Add material from the "Good Wood" pile to get the fire temperature up. Once that area is burning add some of the heavier material.
- 5. The rate at which you load the unit varies depending on moisture content of the materials and the temperature of the fire. If you overload the firebox you will notice an increase in white smoke. White smoke is an indication that the temperature is dropping. If the smoke increases stop loading until the fire has caught-up. You can also bring the temperature up by adding materials from the "Good Wood" pile.
- 6. For the highest throughput load "LESS MORE OFTEN." Smaller bucket loads more often will give the wood waste a better chance to ignite and will result in your highest throughput of material. Oversized bucket loads may smother the fire for a short period before the feedstock ignites; this will slow the burning down and reduce your daily throughput.
- 7. The load in the firebox should not go higher than the bottom of the manifold. If the material is piled higher, it will begin to break the air curtain and more smoke will escape.
- 8. The fire should be loaded continuously throughout the day in order to maintain operating temperatures. If the fire is not loaded continuously, the temperature will drop, the through-put will go down and more smoke will escape.

"If it's burning clean, it's burning hot, If there is smoke, you're losing money."

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#### SHUTDOWN

#### HOW TO BURN FIRE DOWN FOR SHUTDOWN

All loading should stop one or two hours before you intend to put the fire out.

As the fire burns down, maintain the air speed until the firebox begins to smoke. As the smoke increases, reduce the air speed in increments of about 300 RPM. This will help to reduce the smoke.

The air in the manifold needs air flow, both to accelerate the burn down and to protect the manifold from warping due to excessive heat. **DO NOT shut off the air flow while there are still flames within 12 inches of the manifold.** Doing so may cause elevated temperatures to warp the manifold, nozzle assembly, etc. Your warranty does NOT cover damage due to excessive heat.

Once the fire has burned down to about one or two feet and flames are not visible near the manifold, it will be safe to shut the engine and air down. Make sure the fire is extinguished before you leave the job site. The best way is to load dirt or sand into the firebox, **but do not spray the refractory walls with water as this will damage them** (except in a dire emergency).

When the burning materials in the T24 BurnBoss have burnt down to ash, reduce engine RPM to 900 RPM. Move the key switch counterclockwise to the OFF position to shut down the engine.

Most local authorities allow the T24 BurnBoss to be secured and the embers to smolder all night. There is generally no smoke from this smoldering. Ensure the work site is secured or has a constant security guard to prevent any people or animals from getting near the T24 BurnBoss. The inside temperatures of the BurnBoss will remain very high most of the night.

If you are not allowed to smolder through the night, then verify the fire inside the firebox is completely out. If it is still burning or smoldering you can raise the firebox and pull the trailer forward allowing the ashes and embers to remain behind. Then water down the embers. Ensure the fire is completely extinguished and the job site secure before you leave.

#### **DANGER:**

Do not climb on any part of the T24 BurnBoss as that may cause an accident resulting in injury or death. Falling into the firebox will cause an accident resulting in injury or death.

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#### ASH REMOVAL

#### **HOW TO EMPTY THE T24 BURNBOSS**

We recommend removing the ash every morning before burning operations begin. This will give you maximum capacity in the firebox and the ash will be easier to handle.

The T24 BurnBoss will operate with up to 1½ ft. of ash inside, but as the ash gets deeper the efficiency of the unit goes down. One and half feet of ash would represent approximately 35% of the firebox capacity that would be unusable.

The ash is emptied by raising the firebox and towing the machine briskly forward. It is important to tow the machine away from the embers as soon as the firebox has been raised to prevent hot embers form damaging wheels, tires or axles. The machine should only be towed forwards as the tires cannot be driven through the hot embers.

#### **DANGER:**

When removing ash from the BurnBoss, be aware of the wind direction and ensure all operators and lookers-on wear appropriate Personal Protective Equipment (PPE) like respirators to prevent inhaling the ash.

#### **ASH REMOVAL**

- 1. Turn off engine.
- 2. Connect tow vehicle.
- 3. Raise jack stand.
- 4. Raise firebox into full UP position and IMMEDIATELY pull forward leaving the hot embers and ash behind.
- 5. Ensure the ash pile is not left HOT as you leave burn site, use water to ensure all fire is out.
- 6. Ash can be land applied or loaded in a dumpster for removal. Check your local ordinances.

#### **DANGER:**

When removing ash from the BurnBoss, move the machine swiftly as soon as the firebox has been raised to prevent any hot embers from damaging the wheels, tires and axles. Do not tow the machine further away from the burn site <u>unless both travel safety pins</u> and hitch pins have been properly installed, Always wear suitable Personal Protective Equipment (PPE), especially when cleaning out and handling wood ash residue.



#### **TROUBLESHOOTING**

#### 1. Fire will not start.

Material in fire firebox has too much air space. To correct, load heavy material such as stumps to make the lower material pack down. Use torches and light from the bottom, so the fire burns up.

#### 2. Fire burning at one end.

Load heavy materials directly on top of the burning area. This causes the flames to fan out in an effort to reach the top of the pile. As the fire begins to spread, keep material piled on top of the flames until the entire firebox is burning.

#### 3. Fire smoking too much.

The most common reason for a smoking fire is too much dirt or dense materials going into the firebox and reducing the heat. You must make sure the wood waste material is free from large amounts of dirt. Load from your "Good Wood" pile to bring the temperature back up

You may have overloaded the firebox or loaded the firebox too fast. Example; if you only have one ton of material burning you can not load in 3 tons of additional feedstock. The new material will smother the fire. Stop loading and let the fire catch up. The material you are loading may have a very high moisture content. You can either load at a slower rate or mix the wetter material with dryer material.

If you are letting the fire burn down or the load in the firebox is less than 3 ft. deep, you may need to turn the air down by reducing the engine RPM.

#### 4. Smoke from one area of the firebox.

The area is probably not burning well. Add smaller material from your "Good Wood" pile to this area to help build the fire. As the smoke clears add heavier material.

#### 5. Smoke from under the base rails or bottom of panels.

Loose dirt was not properly shoveled around inside of firebox to seal between panel bottoms and the ground. To fix this, shovel dirt around the <u>outside</u> where the smoke is escaping. Once the ash inside builds up this will stop.

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#### MAINTENANCE, CARE AND SAFETY CHECKS

#### 1. Daily Check List:

- a. Engine oil level (top off as needed).
- b. Engine coolant level (top off as needed).
- c. Diesel fuel level in fuel tank.
- d. Tap dirt out of air intake housing and check for excessive dirt.
- e. Clean out any debris under engine cowling and wheel fenders.
- f. Ensure the hydraulics are in proper condition, no leaks.

#### 2. Periodic Maintenance and Check List Before Hauling T24 BurnBoss

- a. Change engine oil and oil filter.
- b. Clean/replace fuel filter as needed.
- c. Clean and inspect air filter and replace as needed.
- d. Grease axles as shown on Page 24.
- e. Check bolts and set screws to ensure they are tight.
- f. Clean debris off radiator.
- g. Check alternator V-belt and adjust as needed.
- h. Check hydraulic system for leaks and sufficient fluid in reservoir.
- Check wheel lug nuts and tires for condition and set pressure at 105 psi (cold).
- j. Back up T24 BurnBoss and apply the brakes hard so that they will self-adjust.
- k. Check break-away battery and steel cable.
- I. Check trailer hitch and safety chains.
- m. Check trailer brakes and all trailer lights.
- n. Ensure that the hitch pins with chains that are part of the actuator travel safety pins are in place and properly installed.

#### **DANGER:**

Ensure there is no build-up of debris under the engine cowling or wheel fenders as this will create a fire hazard that could destroy your machine and may cause an accident resulting in injury or death.

Contact Air Burners, Inc., should you require assistance with any of these necessary maintenance tasks. Send Email to <a href="mailto:support@airburners.com">support@airburners.com</a>, call 772-220-7303 or 888-566-3900 (Customer Support)

Consult also the supplied Kubota Engine Service Manual.



#### MAINTENANCE, CARE AND SAFETY CHECKS

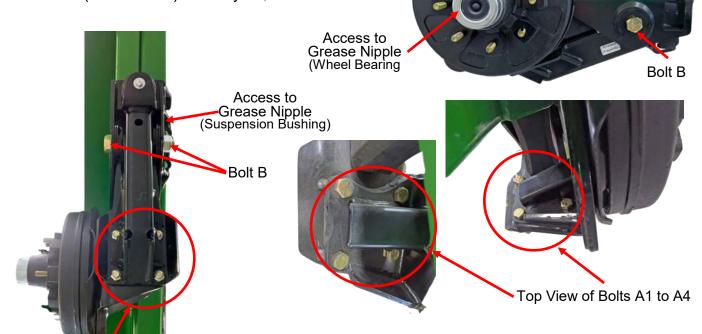
#### 1. FIRST WEEK OF OPERATION CHECK LIST: AXLE MAINTENANCE

This maintenance work requires that the trailer be chocked for safety, raised and supported by suitable jacks placed under the frame to a height that will relax the torsion springs and removal of each wheel. The firebox must be raised and the travel safety pins properly in place. This will allow access to the four (4) Bolts A and the large Bolt B. Hold the Bolts A topside with a wrench and tighten the bottom nut by torque wrench. See also NOTE below. Upon reinstallation of the wheels, torque the lug nuts to 80 ft-lb (109 N·m).

a. Retorque the four (4) outboard arm (spindle) Bolts A to 155-165 ft-lb. (210-224 N·m).

b. Retorque control arm pivot bolt B to 430-470 ft-lb. (583-638 N·m).

c. Grease suspension bushing and wheel bearing every 6 months (off road use) or every 12,000 miles.



Bottom View of Bolts A (Nuts Shown) and Grease Nipple Access

#### NOTE:

On T24 models manufactured after May 1, 2023, the A bolts & nuts have been reversed. The bolts are inserted from the bottom and the nut placed on top,

#### Wear suitable Personal Protective Equipment (PPE) while performing these tasks.

Check the proper torque of the Bolts A (1-4) and B and the wheel lugs periodically, especially before longer roadway travels. Grease the suspension bushing and wheel bearings with grease gun at the location indicated above. Rotate wheel by hand as grease is applied to bearing until old grease is visible. See Page 27 for lubricant grade.



#### THERMAL-CERAMIC PATCHING COMPOUND

#### THERMAL-CERAMIC WET PRE-MIX PART # 6900-1003

For minor repair of Air Burners BurnBoss refractory panels.

#### **Directions:**

- 1. Cracking of the panels is normal as they flex in the heat. Filling the cracks every 6 months or as needed will extend the life of your Thermal-ceramic Panels.
- 2. Air Burners patching compound is pre-mixed and ready to use (may require some stirring).
- 3. Storage: Compound should be stored indoors in a frost free location.
- 4. Preparation: The area in and around the damaged area to be patched must be cleaned and brushed to provide the best surface for the compound to adhere. Remove all loose refractory and debris from the area to be patched.
- 5. Wet the cleaned surface with a light spray or damp cloth.
- 6. Installation: Using a trowel or similar tool, pack the refractory compound material into cracks and into areas where the refractory is missing. To achieve proper thickness trim off the excess material using a sharp flat blade or the side of the trowel.
- 7. Allow the material to harden overnight before placing the T24 BurnBoss back into service. After the compound has hardened operate the machine under normal conditions.

#### NOTE:

This is an air cured product. Reseal unused portion immediately.

Once opened the shelf life is one (1) year.

#### **WEAR PERSONAL PROTECTIVE EQUIPMENT (PPE):**

Always wear appropriate Personal Protective Equipment (PPE) while working with the thermal ceramic patching compound repairing the T24 BurnBoss refractory panels or while performing any other maintenance task.

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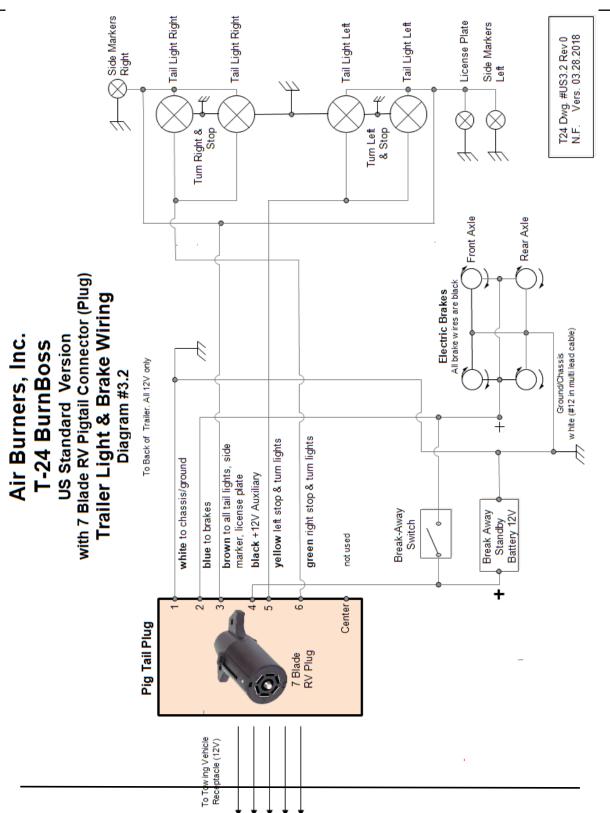
## SERVICING SPECIFICATIONS Parts List for Routine Service of Kubota Industrial Diesel Engine Z482-E4

Also Refer to Engine Manufacturer's Service Manual for Engine Service Details (Engine should be serviced after first 50 hours, then every 100 hours of operation)

Description	Air Burners P/N	Manufacturer's P/N	Service Interval
Air Cleaner Element	3060-1022	Kubota 1G659-11222	1 Year or as needed
Oil Filter	3060-1020	Kubota HH150-32430	200 Hours
Fuel Water Separator Element	5000-2462	Kubota 1T021-43560	200 Hours or as needed
In-line Fuel Filter	5000-2463	Kubota 12581-43012	200 Hours or as needed
V-Belt (Engine)	3060-1023	Kubota 15881-97010	200 Hours or as needed
Electrical System Fuse 40A Automotive ATC Blade Fuse	5000-1987	NAPA BK7822022	As needed
Battery, 12V, Max 120 Ah; Max. CCA 800; Min. CCA 750; RC 130	5000-2472	Interstate Batteries 24M-XHD	2 Years or as needed

Tire Pressure	105 psi (724 kPa) Cold
THE FRESSURE	,
Tire Size	ST235/80R16
Rim	16 x 6 (8 Lugs)
Engine Oil	15W40 Diesel Grade
Engine Oil Capacity	2.6 qt. (2.5 L)
Bearing Lubricant	NLGI Grade 2
Engine Coolant	Low Silicon Anti-Freeze (Green). Units are shipped from factory with 50-50 mixture green antifreeze/water.
Hydraulic Oil	ISO32 Synthetic Hydraulic oil, factory installed is Amsoil HVH05-EA. (cold weather option is ISO22 synthetic, i.e. Amsoil HVG05EA). Change Hydraulic Oil every 1 to 2 years, depending on condition and environment.
Hydraulic Oil Capacity	Approx. 2.16 gal. (8.19 L).
Break-Away Switch	12V Battery - See Owner's Manual
Fuel Tank Capacity	Minimum 10 gal. (37.8 L)









Applies to Air Burners Models T26 (Special VIN)

Rev.2.1 (01.17.2023)



#### VIN NUMBER AND TIRE PLACARD

BurnBoss T24 machines built after February 2018 are street legal and have a Manufacturer's Certification Label for a Trailer (VIN placard) and a tire placard. They are located on the left trailer tongue near the hitch. The tire placard may also be affixed to the inside of the left access door. Examples are shown below.





Example of T24 BurnBoss VIN Placard



Example of T24 BurnBoss Tire Placard

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