

Ray-Tech Infrared Corp.

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3 Ton TMV (Total Maintenance Vehicle)

Owners Manual

RAY-TECH 3 TON TMV MANUAL

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1. GENERAL:

This machine is designed to provide an infrared heating system capable of heating a 6' x 8' (48 ft. ²) area (based on the standard chamber, larger size chamber available) without burning or damaging asphalt. This unit features the best of both our reclaimer units and asphalt heater units combined and mounted on a customer supplied truck chassis. Our truck mounted units have grown in popularity quickly in recent years.

2. INFRARED PAVEMENT HEATER:

Infrared does not flame or alter the binding effect of the asphalt. The key to proper infrared heating is in the infrared light rays that are created by the pre-mixed gas and air delivered under pressure to a series of heating units. The heating units are composed of the following:

- A) The *converter* is composed of 30" and 36" segments of 16 gauge stainless steel and is formed in a way that creates a consistent, even flow of fuel-air mixture.
- B) The *orifice strip* feeds the air-gas mixture into the combustion area and is composed of ½" stainless steel ribbon. This ribbon is welded solidly to ensure uniformity and long-term durability under intensive use.
- C) The *assembly* of the converter and orifice strip is designed for rigidity and reliability throughout the repeated heating and cooling cycles that infrared equipment goes through.
- D) The *reflectors* are made of 16 gauge stainless steel in order to ensure the proper deflection of the infrared rays toward the asphalt pavement.
- E) The *inconel grids* are made of high-temperature alloy material and serve both to limit the combustion area and as the body which emits the infrared rays.

This heater unit is a dual system meaning each half of the chamber can be operated together or independently. It can be fired in any position, vertical or horizontal, as well.

Each 30" converter has a maximum fuel consumption of 2.727 lbs. per hour. Each 36" converter has a maximum fuel consumption of 3.273 lbs. per hour. *For this 6' x 8' chamber, the maximum fuel consumption will be approximately 36 lbs. per hour.*

3. REFLECTIVE CHAMBER:

The chamber is constructed of 16 gauge stainless steel, measures 8' wide x 6' long (standard chamber) and is properly vented. The standard chamber accommodates six (6) 30" converters and six (6) 36" converters. The chamber frame is primed and painted with a high heat aluminum paint.

4. FUEL:

Propane gas is delivered by two (2) 100 gallon propane tanks (vapor withdrawal only/tanks included) which are mounted on the unit. Fuel is delivered, via high pressure gas lines, through a strainer to a regulator, where the pressure is reduced to 11" water column, then through a 24 volt solenoid valve. After this, a limiting orifice valve reduces the volume, before being delivered to a 24 volt *long life* brushless motor/blower mixer system.

5. OPERATING CONTROLS/POWER:

Each individual system is powered by four (4) 6 volt batteries wired in series creating a 24 volt system. The system is charged by a power converter that converts 12 volt power from the truck battery to 24 volt power. The power converter is located inside the wall of the equipment deck. There are two (2) weatherproof switches #1 and #2 to control blower motors. All other equipment controls are located in the control panel mounted in the wall of the equipment deck. Another safety feature is the pressure switch located by the motor/blower with 0.3"- 1.0" water column. This switch will not allow the gas solenoid to open until proper pressure has been obtained.

6. WINCH SPECIFICATION/OPERATION:

- A) The winch gearbox is an industrial duty right angle helical worm gear 60:1 ratio reducer. The ½ hp motor is heavy duty, maintenance free, powered by 24 volts, and runs at 1800 rpm continuous duty. Coupled with the 60:1 gear reducer, its output torque rating is 749 in-lbs. at 29.1 rpm. Running at this speed and torque ensures a very long life compared to off-the-shelf winches. The reducer gears are bathed in gear oil, to ensure very smooth and quiet operation.
- B) The TMV is equipped with two (2) of these custom winches; one for raising and lowering the heating chamber and one for loading and unloading a compactor or roller as well as for dumping the side dump waste bin.
- C) Four (4) spring loaded momentary on-off-on switches are located two (2) on each side of the truck for operation of the winches from either side of the vehicle.

7. CONSTRUCTION:

The heating chamber is located to the rear of the waste bin/ compactor compartment on the rear of the truck. The chamber is mounted on 2" x 2" angle frame and secured with channel and tubing hangers. The reclaimer is designed to mount directly behind the cab on the truck chassis. Gas tank platform, spoils bin and compactor area are constructed of 10 and 12 gauge steel on 6" channel frame.

Storage Bin: Double and triple walled construction. The hopper and sidewalls are fabricated of 12 gauge steel, and the deck is 10 gauge steel.

- 1) **Insulation:** The third middle wall of 16 gauge steel supports 2" thick rigid insulation with a 1" air space. The inside of the middle wall is coated with 1250 degrees F aluminum paint, for proper infrared reflection and heat distribution around the inner material wall.
- 2) **Loading Doors:** Top loading, manual operation, with a wide opening to form a chute for maximum loading efficiency. Doors are fabricated of 12 gauge steel, with 2" rigid insulation, securely held in place with reinforced 16 gauge steel.
- 3) **Shoveling Doors:** Manual operation. Four (4) vertical track doors, two (2) on each side of unit, with double action linkage, positive safety lock, and shear angle base for maximum positive cutoff.

8. RECLAIMER HEATING SYSTEM:

- A) Energy Converters: Four (4) 22,000 BTU infrared type ceramic faced converters, two (2) each side, secured under shoveling doors in heating chamber, in such a way as to provide a balanced heat distribution and thereby ensure maximum efficiency of each converter. Independent thermostatic control of each converter, to more accurately control temperatures of the asphalt.
- B) Electronic Ignition: Consisting of electronic module, flame sensing probe and direct spark electrode.
- C) Safety Control and Flame Protection: A 100% shut-off gas valve, controlled by the electronic module, automatically shuts down ignition and gas valve if no flame is present for 12 seconds. Regulator to reduce withdrawal pressure to 11" water column. High pressure hose with reusable fitting. External emergency shut-off valve.
- D) Fuel: 100% propane gas (vapor withdrawal) drawn from the central fuel supply of the unit (see section 4).

9. TEMPERATURE CONTROLS:

- A) Power switches, batteries and power converter, for the reclaimer/pavement heater, are located in weatherproof boxes, with lockable doors.
- B) A combination of sensing devices, thermostats and timers control the reclaiming and holding cycles automatically.
- C) The reclaiming cycle will maintain a skin temperature not to exceed 320 degrees F. When material is completely reclaimed, the skin temperature will automatically drop and hold at a temperature between 280 degrees and 300 degrees.
- D) Maximum complete reclaim time is 16 hours. Unit will hold reclaimed/plant mix approximately 48 hours without damage to asphalt.
- E) Will reclaim in *Minus 10 Degree F* ambient temperatures.

10. MOUNTING:

Equipment can either be mounted by Ray-Tech (see available options) or shipped to customer to be mounted. Customer will supply truck chassis and frame rails should be free and clear of obstructions within 9" of the top of the frame rails.

11. ELECTRICAL SYSTEMS:

- A) Reclaimer Gas Controls: Electrical gas controls are 12 volts, powered by the truck's 12 volt battery.
- B) Infrared Heating Chamber: 24 volt power supplied as per section 5.

12. EQUIPMENT DECK:

Directly behind reclaimer is a diamond plate platform with ladder. This allows access for opening the top doors of the reclaimer as well as access to the fuel storage.

13. WASTE BIN:

Located on the rear of the equipment deck will be a 34"W x 54"L x 15"D waste bin. This container is designed to hold waste materials and to dump towards the driver's side of the vehicle. One of the winches will be used to dump this container.

14. COMPACTOR/ROLLER COMPARTMENT:

Located on the rear of the equipment deck and opposite the waste bin will be a 40"W x 28"L space to serve as a storage area for a plate compactor or walk behind roller. The compaction tool will be loaded and unloaded by means of the same winch that operates the waste bin.

15. PAINT:

- A) Frame – Black.
- B) Reclaimer, walls, winch hood – Ray-Tech Safety Lime Green.
- C) All parts prime coated with catalyzed etching primer, followed with two (2) coats of acrylic urethane finish colors.

16. DIMENSIONS:

Complete Unit

Overall length: 15' 10"
Overall width: 8'
Overall height: Determined by truck height

Reclaimer

Length: 4' 10"
Width: 8' 0"
Height: 4' 9"

17. WEIGHT:

Complete Unit

All Components: 6,650 lbs

Reclaimer

Weight: 2,880 lbs

18. PERFORMANCE SPECIFICATION:

While everyone has equipment warranties, Ray-Tech Infrared is unique in that we also have a performance specification that acts as a guarantee of our equipment's *performance* under proper working conditions and operation procedures.

Pavement Heater: The asphalt pavement will attain a 220°F minimum temperature at 2" depth, with 400°F maximum temperature at the surface, within 7-9 minutes of heating time, at a 50°F ambient temperature day and standard asphalt mix design.

Reclaimer: The asphalt pavement will attain a 270°F minimum average mix temperature after twelve (12) hours of heating time, at a 50°F ambient temperature day, using broken asphalt or standard asphalt mix design.

19. OPTIONAL EQUIPMENT:

- A. Time Delay System (TDS): Allows you to pre-set the time that the reclaimer will automatically turn on. (Set Friday afternoon to turn on Sunday afternoon to be ready for Monday morning).
- B. Tool Storage Tray: Expanded metal tray suspended under one side of the truck and about 24"W x 84"L x 12"D.
- C. 12 Volt Lighting: To extend work period.
- D. Aluminum Wind Guards: 1' x 4' x 2" thick insulated wind guards; also protects concrete, grass, building and other uses.
- E. Brush Motors: Two (2) motors with brushes and armatures.
- F. Propane Cylinders: Five (5) 100 lb cylinders instead of the standard two (2) 100 gallon tanks. This option gets you under the HAZMAT certification requirements.
- G. Double Receiver Trailer Hitch: Heavy duty trailer hitch with pintle/2 5/16" ball combo.
- H. Installation: Installation of the unit on truck chassis by Ray-Tech.

GETTING ACQUAINTED WITH YOUR TMV SYSTEM

All Ray-Tech infrared heating chambers are pressurized, not aspirated. The propane gas exits the vapor withdrawal cylinder and is passed through a strainer in order to remove impurities. The gas pressure is then reduced to 11" water column via a regulator and then passed through a 24V gas solenoid. When the main switch is turned on, the blowers begin to operate. This increases the pressure in the feed system, which closes a pressure switch. This opens the solenoid valve, which allows gas to pass to the mixing chamber of the blower. In this way, the pressure switch makes sure the unit is running before allowing gas to flow. After the solenoid, the needle valve controls the amount of gas for proper combustion. The air intake adjustment on the blower motor adjusts the proper quantity of air in order to achieve combustion. All these controls are preset at the factory. If there is any need for adjustment, first consult the factory for proper instructions.

There are several tools we strongly suggest having for proper operation of this equipment:

- Handheld torch (for lighting rows of converters)
- Iron rake (avoid garden rakes as they are often not rugged enough)
- Lute
- Shovel
- Wheelbarrow
- Push broom
- Putty knife (To scrape your tools clean afterwards)

EQUIPMENT SETUP PROCEDURE AND OPERATION

BEFORE USING YOUR MACHINE, PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. The heater unit, reclaimer/hotbox, valves, pressure switches and motors have all been preset and tested at the factory. **No adjustments should be needed.**
2. After placing and securing the propane cylinders (vapor withdrawal only) in tank holders, connect hose fittings to cylinders (left hand thread) and tighten firmly. **Open cylinders very slowly** (if this is opened too fast, safety check valve will subsequently not permit propane flow).

THE FOLLOWING DIRECTIONS WILL INSTRUCT YOU ON PROPER OPERATION OF YOUR EQUIPMENT ON YOUR FIRST JOBSITE:

1. Thoroughly sweep the area you will be working on. Remember, infrared rays will not penetrate the asphalt if any dirt, sand or puddle/running water is in the way.
2. To light the unit, raise chamber to 45° angle. Turn blower #1 switch to on. You will hear the first blower motor begin powering up. Turn blower #2 switch to on. When the blower motors reach their capacity, you will hear the 24 volt solenoid open with a **slight click**. This indicates the blower motor is up to proper speed and the gas-air mixture will begin being fed into the infrared converters. Using your torch, ignite the converters (touch the flame to each row of converters). This will allow each row to ignite properly. Allow 30 to 45 seconds for the grids to glow a bright orange color. You are now ready to operate.
3. Lower the chamber over the area where you will be working, leaving it approximately 4-6 inches above the surface you are heating. The age and color of the asphalt, type and size of the aggregates, outside temperature and height of the chamber will determine time and depth of penetration. Average complete heating times are between 7-9 minutes.
4. Allow the unit to heat the area for about 4-6 minutes. After this time, use the corner of the rake to test if the asphalt is soft enough to work. **DO NOT** rake and loosen an area and attempt to reheat. Heating must be done on a solid surface. To reheat you would need to compact first. Care should be taken not to scorch the surface of the asphalt. (Scorching will turn the asphalt to a grayish color and you will not get penetration).
5. Leave the outermost 6" of the heated area untouched by the rake throughout the entire patching process. This will thermally bond the old material to the new. If disturbed, the edge will unravel over time.
6. Once the asphalt is completely heated, move the unit away from the area and onto the next work area if possible. Caution should be used when moving the unit as it reaches very high temperatures when in operation, and may not cool down quickly.
7. Without wasting time and letting the area cool, press the back of your rake into the asphalt all the way around the trouble spot. This is called "Picture framing" and it defines the area you need to work on. Remember to leave the 6" on each side untouched for thermal bonding. Rake the entire patch inside the picture framed area.
8. Patching usually requires some new material to be added and this can be done after raking the existing material loose. Once material is added, lute the surface so that you have a smooth area for compaction. Thickness differs but on the usual pothole, you should make the top of the now luted area stand about ½" to 1" above the outside, untouched area.
9. It is now time to begin compacting or rolling. **This is the most important step.** Begin by rolling or compacting a 1" wide strip down each side of the luted area. This is called "pinching" the edge and if you skip this, you might as well have not used infrared at all as the edges will ravel. Work your way into the patch an inch or so at a time and then as you get further into the patch, begin making broader passes. Once entirely compacted, go over it a few more times from different directions to ensure complete compaction. You now have a permanent infrared repair.
10. When transporting the unit after completion, make sure the valves on the propane cylinders are closed and the cylinders are securely in place.

RECLAIMER PROCEDURE AND OPERATION

- 1) Open both propane cylinders very SLOWLY until fully open (if cylinders valves are opened to fast, a safety check valve will not permit propane flow). If this happens, turn off the cylinder valve and start over – SLOWLY.
- 2) Turn on the switches on the control panel for the reclaim / hotbox. A red light should turn on, the igniters will spark, the gas valves will open (with a click) and the burners will light. If this is the first time with new cylinders, or if the unit has sat for a few days, you might need to turn off the switches, wait 10-15 seconds and turn them back on again. You might need to do this three or four times before all air is purged from the system.
- 3) The reclaimer has been designed to begin running on timers. The burners will light for nine minutes and turn off for three to keep the material from overheating. When the material has reached a certain temperature, the thermostat takes over, lighting the burners as heat is called for. The normal cycle for reclaiming is 12-16 hours.

Periodically check the burners and tiles. Thermostats, timers and temperature controls are pre-set at the factory and should not require adjustment in the field.

GENERAL EQUIPMENT MAINTENANCE

Ray-Tech Pavement Heater units are designed for minimal maintenance and long life, with the heater units, valves, pressure switches and motors all being preset and tested at the factory. **No adjustments should be needed.**

Propane Supply System

All hoses when connected should be firmly tightened and checked for leaks. You can check for gas leaks with a soap and water solution sprayed on the fittings. Equipment should NEVER be operated if there is a propane leak or if the odor of gas is present. Plastic caps should be placed on tank connectors when not in use.

Reclaimer/Hotbox

The reclaimer requires some routine maintenance to ensure it will continue to work to its full capacity. All moveable parts such as the top loading door hinges and battery compartment door hinges should be cleaned after every use. Not cleaning them could lead to asphalt buildup which may cause stress to these parts and lead to breakage. All vents to the box should be cleaned daily as well. If vents become clogged, heat cannot properly exit the unit and this will lead to equipment damage or burning of your asphalt.

The burner compartment should be inspected often to ensure the burners are working correctly. A troubleshooting reference is included below. All wiring to and from the burners, as well as hoses for the fuel, should be checked and tightened as needed.

Cleaning of asphalt from inside the box should be done with a flat tool such as a square spade. Use of picks, iron bars and any other such implement can damage the inside walls and will

actually make the process of removing asphalt harder later on by creating dips and crevices for material to get stuck in.

Heating Chamber

Ray-Tech heaters require minimal maintenance. Normal life under heavy use for the infrared converters is eight years and for the grids is two years. Therefore maintenance is not normally required for the first two years.

The stainless steel heating chamber should be kept clean and you should assure that the surface louvers do not get crushed or blocked, thereby restricting proper air flow. The grids are made of very soft material and should not be bumped, flattened, or pushed out of shape. If this happens, or if holes are visible, they should be removed and straightened or replaced. A visual inspection should be done at least daily to insure that all burners are properly lit.

Converters

A standard Ray-Tech 6' x 8' chamber accommodates six (6) 30" and six (6) 36" infrared converters (part # 132100 & 132000 respectively) and twelve (12) 15" and twelve (12) 18" inconel grids (part # 132015 & 132018 respectively). The grids should NEVER be painted or have any foreign material placed on them. When the unit is fired these grids should have a bright orange color and no visible flames outside of the grids.

The angle at which reflector panels are placed is very important for proper infrared ray deflection. They must not be bent out of shape.

To prevent damage to the orifice ribbon in the converters, it is advisable to clean them periodically. The best method we have found is by spraying them with an oven cleaner type chemical and letting them sit overnight. The next day you should take a pressure washer or high powered hose and blow the cleaner out from the inside of the converter tube. This needs to be done by removing the converters from the chamber. If done on the unit, water will get into the motors and damage them. Periodic cleaning of the entire machine will undoubtedly prolong its lifespan.

If the orifice ribbon does become damaged or deformed over time, one of two problems will occur. There will be excessive supply of gas supplied to a concentrated point causing either a blow torch effect and burning out the grid, or a blow back may occur causing combustion inside the converter. These problems can be detected by visual inspection. The unit will not be giving off an infrared glow. These orifice ribbons cannot be repaired and instead the entire converter with reflectors should be replaced by the manufacturer. The reflectors can be replaced, if lost, via heliarc welding.

TROUBLESHOOTING YOUR RECLAIMER/HOTBOX

If burners do not ignite:

- Check battery to make sure there is a minimum of 12 volts. If there is not 12 volts, recharge or replace as necessary.
- Check gas tank to make sure there is gas in it, and that the valve is completely on.

- Check fuse in control box to make sure the fuse that goes to the reclaimer/hotbox is good.
- Turn the control box switch to on, the red light should come on.
- Look inside the burner door to make sure the igniters are sparking. If they are, listen for a faint click about 6 seconds after the switch is turned on, which is the gas valve opening. If the valve opens but the burner does not light, there may be air in the lines. Turn off the switch for 10 seconds and try again. Burner should light on the second or third try.
- If igniter does not spark, the gap on the electrode needs to be checked to make sure the gap is not excessive and that it is 1/16" to 1/8" from face of the burner. If there is still no spark, check all wiring to the Electronic Module (ECM) and igniter, checking for 12 volts at the red wire on the ECM. If there are no problems there you may have a bad ECM.

If burners ignite but do not stay lit:

- If more than one burner lights but does not stay lit, it is likely that there is a grounding problem with the gray control modules. Check that there is a good connection between the yellow ground wire from the control module and the chassis.
- On days when humidity is extremely high, the unit may have trouble lighting or staying lit. Enough moisture collects in the ceramic tiles of the converters to prevent proper combustion. A hair dryer may be used to dry the ceramic components. Do not use a heat gun as this may damage components.
- If the ceramic tiles become loose or cracked, or the fibrefrax become loose and worn from extended over-the-road vibration, you may experience "popping" and "crackling" indicating that the converter is not burning properly. You may also hear a roaring, indicating that the flame is burning inside of the burner. If you experience any of these conditions, make repairs AS SOON AS POSSIBLE, or severe damage will happen to the burners.
- If the burners light but do not stay lit, it may be a gas problem or an electrical problem. In order to distinguish between the two, you will need a torch. Carefully and safely hold the torch flame on the tip of the flame sensor and turn the unit on. If the burner now stays lit, the flame sensor is not receiving enough heat from the converter. If it does not stay lit, the sensor is faulty and the igniter needs to be replaced. The flame sensor should be 1/16" from the surface of the converter. If it is not, adjust as necessary. Otherwise the problem is with the gas supply. Check all lines and connections for leaks.
- If the burners light but do not turn bright orange, the solenoid valve may not be opening completely. In this case, the solenoid valve needs to be cleaned or replaced.

If the material is cold after reclamation period:

- Check and clean all interior wall vents to insure that hot air is circulating. If vents are clear and there is still no hot air circulating, check burners.

**OPTIONAL EQUIPMENT:
TIME DELAY SYSTEM (T.D.S.) OPERATING INSTRUCTIONS**

1. Set the T.D.S. Timer to the desired hours to start reclaiming.
2. There is a T.D.S. security switch inside the battery box. Make sure you turn the security switches for the T.D.S. and both Reclaimer Heaters in the “on” position.
3. Switch the T.D.S. to the “on” position.
4. Turn both reclaim side control toggle switches to the “on” position.

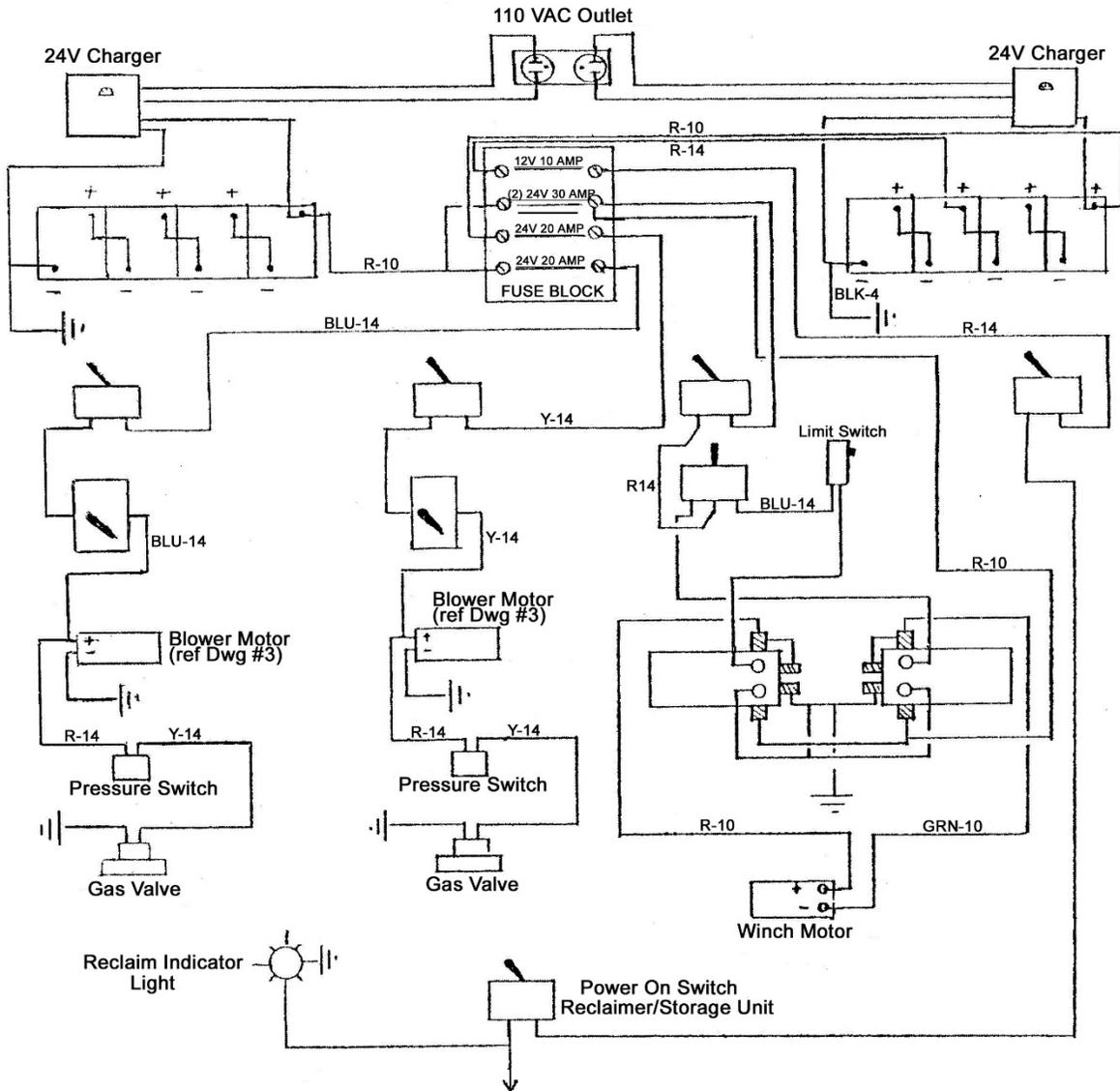
At this time the green light (T.D.S.) only will be illuminated. When the reclaiming cycle starts, the two red lights and the green light will be illuminated. This indicates that the unit is reclaiming. The T.D.S. System is not field serviceable. After reclaiming the material, the T.D.S. switch can be turned “off”. The Reclaimer will continue to reclaim / hold the asphalt at the desired working temperature.

RECOMMENDED SPARE PARTS

The list below are the parts and quantity of each that we recommend you keep in stock for quick repairs on the jobsite. Ray-Tech carries most parts in stock, but depending on the time of year there may be a delay in shipping:

<u>PART#</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
50100	12 Volt Timer	1
50101	Timer Base	1
51900-72	72" Heat Sensor	1
70109	22,000 BTU Ceramic Plates	3
70110	Fibrefrac (per foot)	10 Ft
70111	Fibrefrac (per 50 Ft Package)	1
71800	Pressure Switch	1
74033	12 Volt Gas Valve	1
74031A	24 Volt Gas Valve	1
52500-24	24 Volt Solenoid	1
55102	12 Volt Electronic Control Module	1
55103	Igniter/Sensor Probe	1
55104	High Voltage Igniter Wire	1
55105	ECM Wiring Harness With Plug	1
132015	15" Grid	2
132018	18" Grid	2
58007	24V Brushless Motor	1
58008	24V Control	1
58086	Reversing Solenoid For Chamber	1

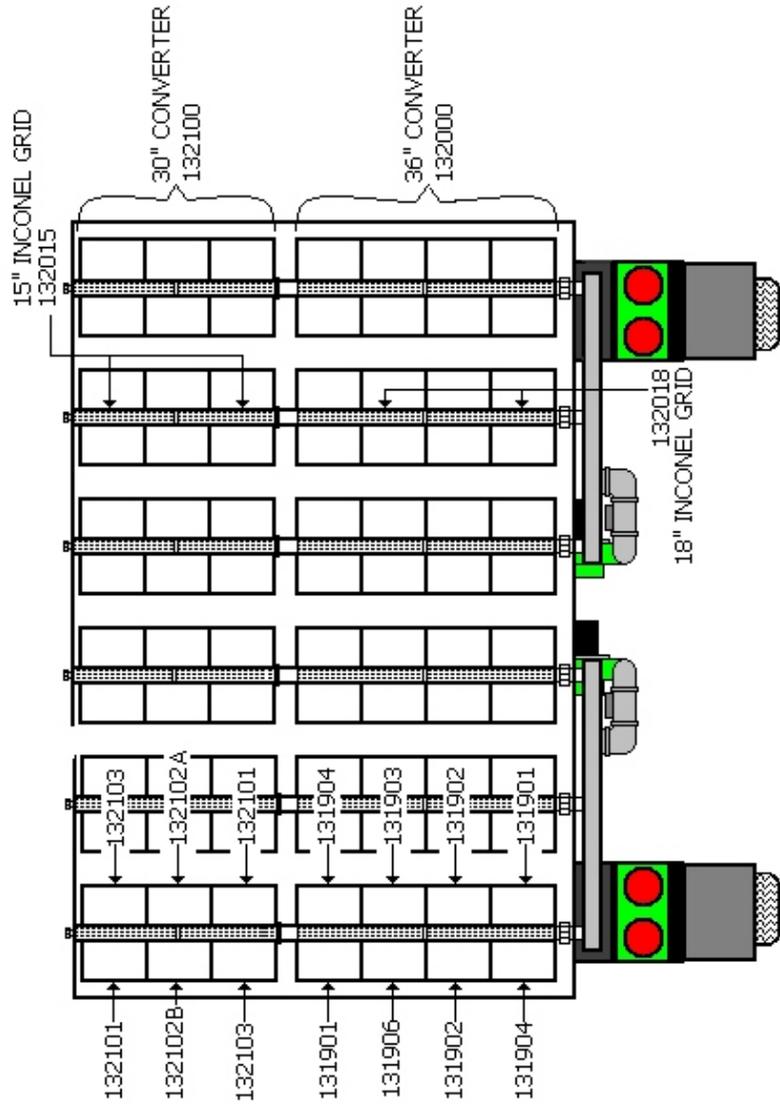
DRAWING #1



(See Timer Base/Thermostat and Electronic Ignition Wiring Diagrams)

MINI COMBO WIRING DIAGRAM

DRAWING #2

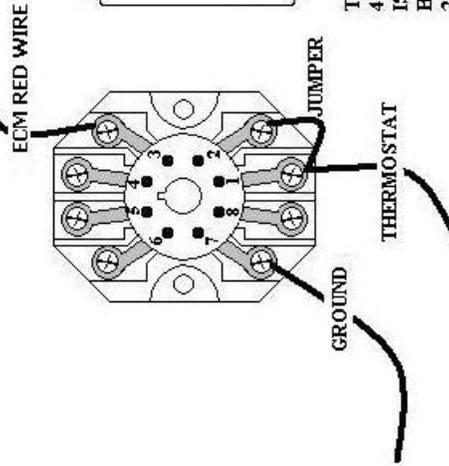


CHAMBER COMPONENTS- REFLECTORS, GRIDS, AND CONVERTERS
RAY-TECH INFRARED CORP.

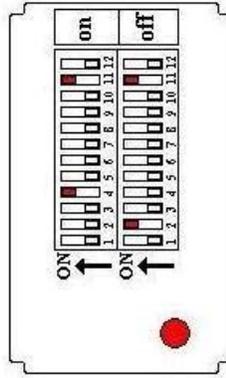
DRAWING #3

BASE WIRING

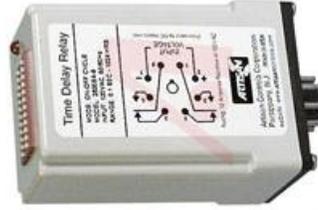
TIMER SETTING



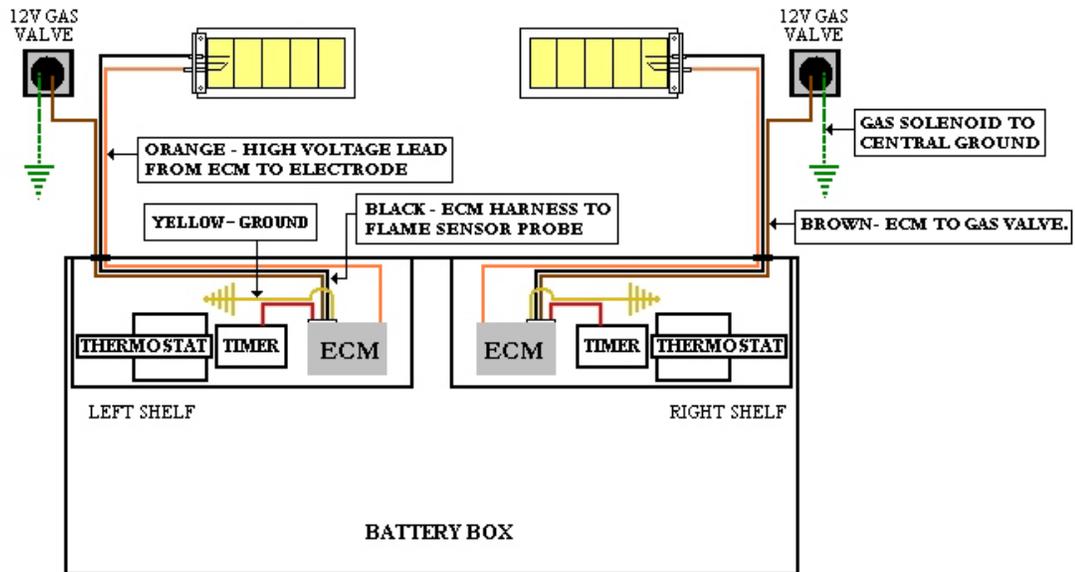
PRESET AT RAY-TECH FOR 9 ON/3 OFF



TOP ROW SET FOR 9 MINUTES ON.
 4 SLOT INDICATES 8 MINUTES AND 1 MINUTE IS FACTORY LOADED TO EQUAL 9.
 BOTTOM ROW SET FOR 3 MINUTES OFF.
 2 SLOT INDICATES 2 MINUTES AND 1 MINUTE IS FACTORY LOADED TO EQUAL 3.
 11 SLOT ON BOTH ROWS INDICATES TIMER IS WORKING IN MINUTE INTERVALS.



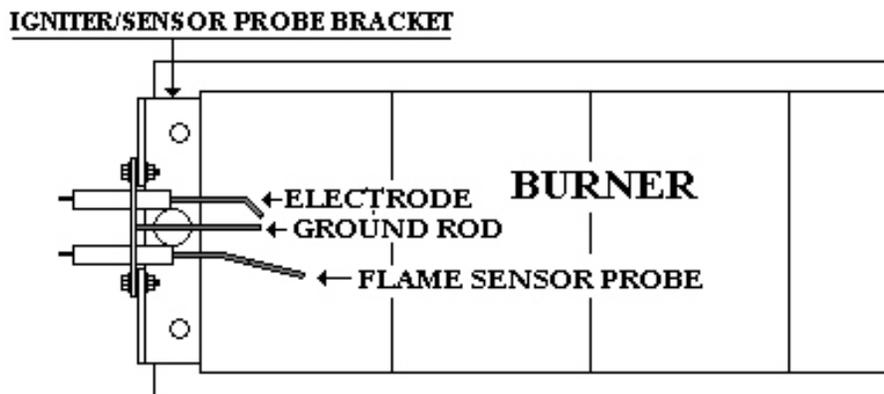
DRAWING #4



MINI - COMBO
ELECTRONIC IGNITION WIRING DIAGRAM
RAY-TECH INFRARED CORP.
RAFIAN, 2011

DRAWING #5

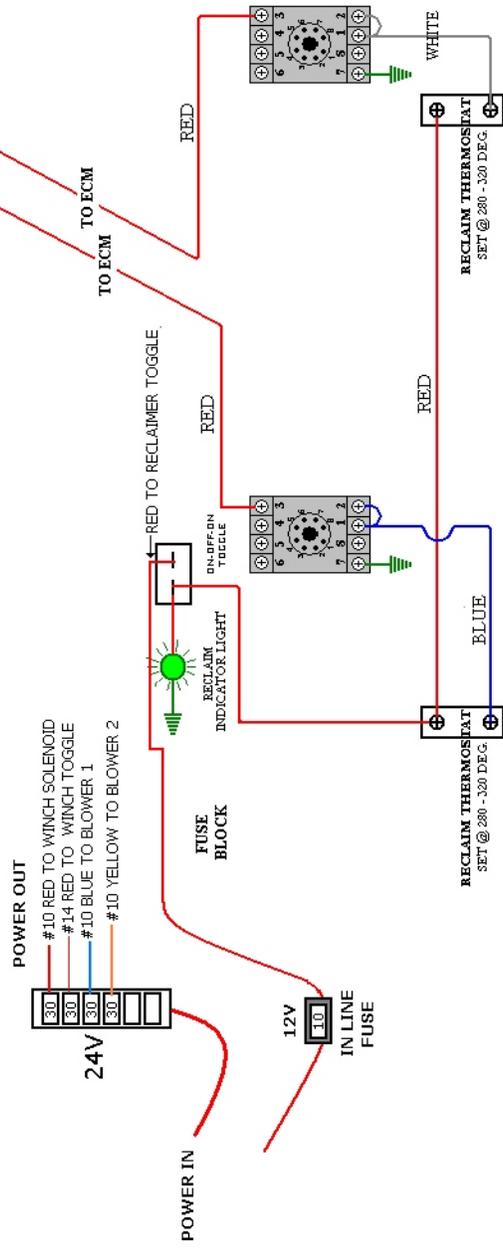
IGNITER/SENSOR PROBE POSITIONING



**BE SURE THE GROUND ROD IS AT THE BOTTOM
WHEN ATTACHING TO BURNER.**

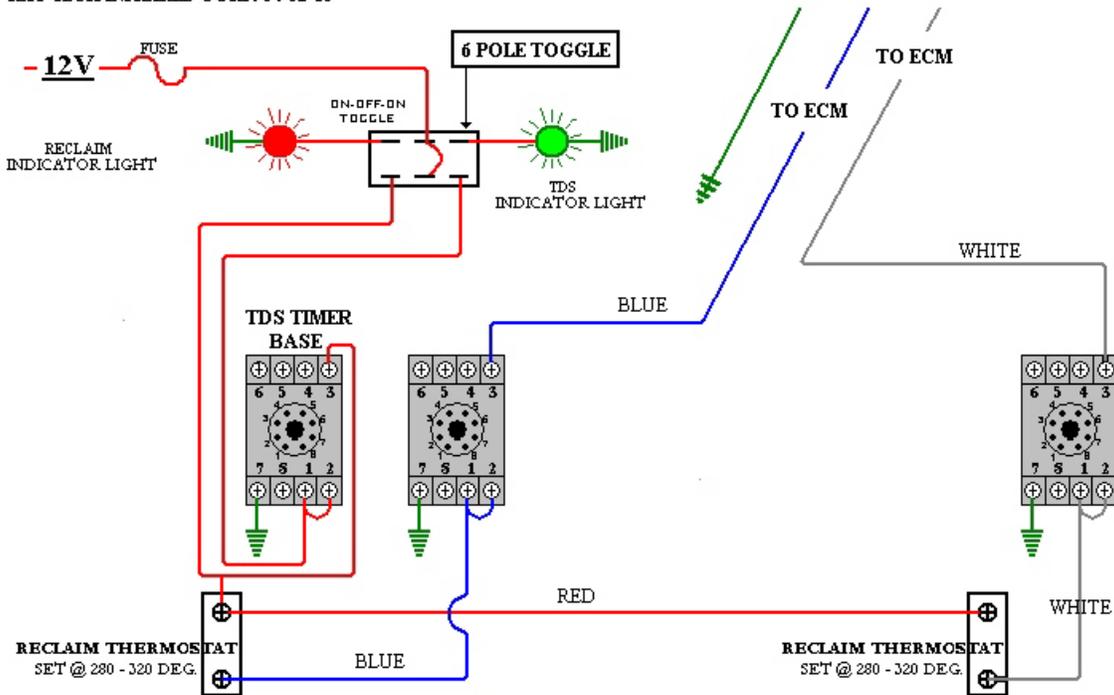
DRAWING #6

COMBO TIMER BASE AND THERMOSTAT WIRING RAY-TECH INFRARED CORP. 1-24-2007



DRAWING #7

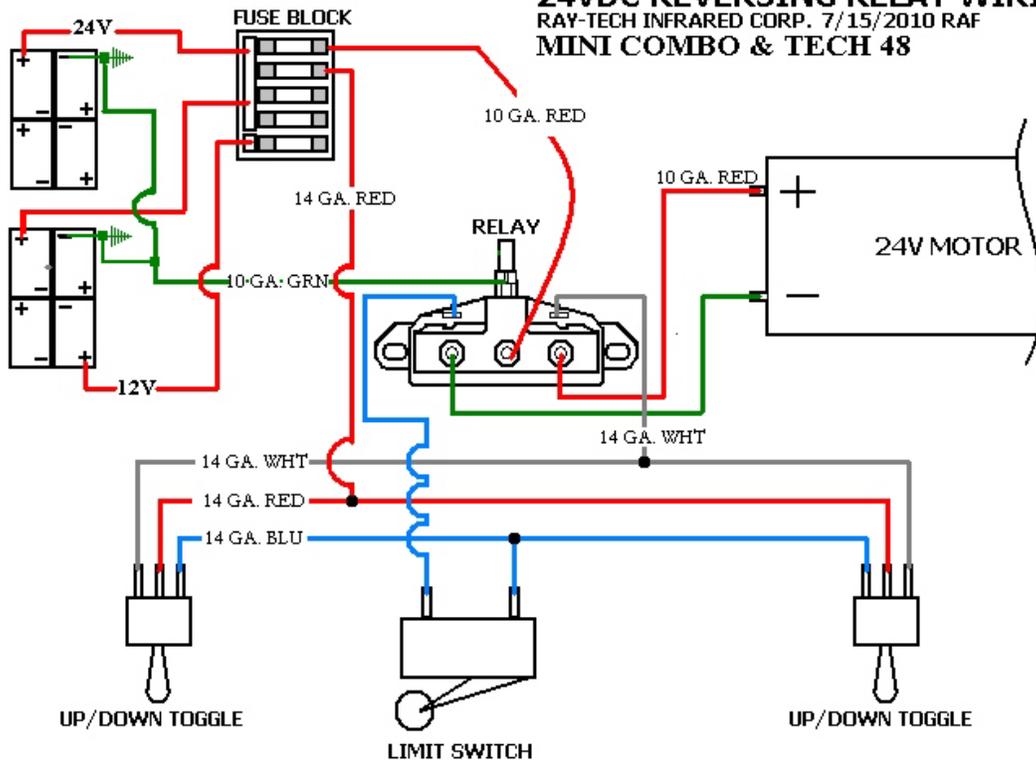
MINI COMBO W/TDS
RAY-TECH INFRARED CORP. 04-02-10



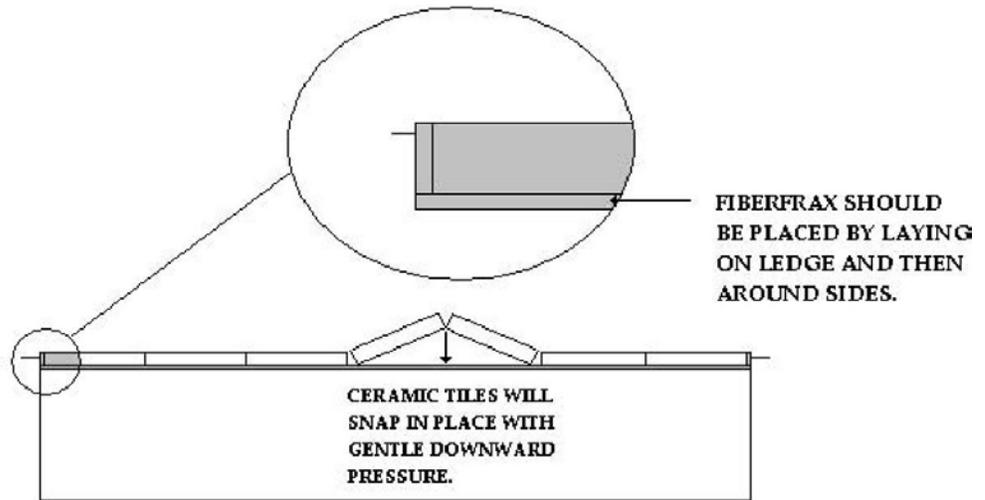
RECLAIMER - TIMER AND THERMOSTAT WIRING WITH TDS
RAY-TECH INFRARED CORP.

DRAWING #8

24VDC REVERSING RELAY WIRING
RAY-TECH INFRARED CORP. 7/15/2010 RAF
MINI COMBO & TECH 48



DRAWING #9



**TILE REPLACEMENT
RAY-TECH INFRARED CORP.
RAF 04-25-06**

SAFETY PRECAUTIONS

We include this section to point out situations that may lead to accidents before, during or after the use of your equipment. The following steps may be obvious but should be followed:

- 1) Become familiar with your machine. Identify all stickers and signage and contact us for replacements if needed. Know where all controls, valves and switches are and understand what each one does before operating the machine.
- 2) Perform a daily check of your machine. It is a good idea to do a visual check of the machine before operation. Make sure tank fittings are tightened and that tanks are secured tightly if they were removed to be filled. Check that handles, valves and switches are clear of obstructions and wipe them clean of oils or greases. Remove any items that may fall off during moving or towing such as rags, gloves, tools, etc. Check for fuel, hydraulic fluid or other leaks.
- 3) Avoid fire hazards. Allow your machine to cool down before refilling the tanks. Do not have any open flames or sparks nearby when refueling. Keep flames and sparks away from batteries as they can produce gases as well. Remove trash, oily rags or other flammable materials from machine before use.
- 4) Keep safety items on hand. In the event that an accident does occur, you should have certain items nearby the machine and ready. We recommend 10+ lb type ABC or CO2 fire extinguisher, a commercial grade first aid kit (with burn packs) or separate burn packs.
- 5) Dress appropriately. We recommend long pants, long sleeve shirts, heat resistant gloves, hard soled work boots, eye protection and safety vests during operation.

FIRST AID: BURNS

In the event of an asphalt burn, cool the affected area immediately. Submerge area if possible in cool or cold water. We recommend bringing the victim to a physician or hospital soon afterward as they may require a physician's assistance with removing the asphalt from the burned area. For serious burns, proceed to a hospital or closest physician immediately. DO NOT attempt to remove asphalt with products containing solvents or ammonia. Natural separation will occur in 48 – 72 hours if not removed by a physician. If immediate removal is necessary, soak a bandage in mineral oil and place over the affected area for 2 – 3 hours.

AVOID EQUIPMENT DAMAGE

When working on your machine, contact Ray-Tech with any questions about voiding parts warranties or damaging the equipment. Be especially careful when working with your blower motors and batteries. **When welding, disconnect all wires from battery terminals or batteries may be rendered useless or could explode. When working on blower motors, DO NOT open the cover of the motor itself. That will immediately void the warranty – no exceptions.**

Remember:

Ray-Tech cannot control the safe use of your machine. All of our equipment is manufactured with safety of the operator in mind and we incorporate safety precautions into every component.



Ray-Tech Infrared Corp.

P.O. Box 1119 • Charlestown, NH 03603 • Phone (800) 884-2072 • FAX: (603) 826-3447

Ray-Tech Infrared Equipment Warranty

Ray-Tech Infrared Corp. warrants, to the original owner, all equipment of its own manufacture to be free from defects in material and workmanship for a period of **2 years** from the date of shipment. Parts not of Ray-Tech Infrared Corp. manufacture will carry the vendor or manufacturer's standard warranty.

Concurrently, Ray-Tech Infrared Corp. warrants specific parts for periods of time other than the two year term:

- All reclaimer/storage box hoppers are warranted against burnout for **10 years**.
- All winches (mfg. by Ray-Tech Infrared Corp.) are warranted for **10 years**.
- All trailer frames (mfg. by Ray-Tech Infrared Corp.) are warranted for **5 years**.
- All heating converters (mfg. by Ray-Tech Infrared Corp.) are warranted for **5 years**.
- All inconel grids (manufactured by Ray-Tech Infrared Corp.) are warranted for **6 months**.
- All blower motors are warranted for **1 year**. Determination of repair or replacement of blower motors will be at the sole discretion of Ray-Tech, pending evaluation of maintenance and abnormal operating/environmental conditions. * When working on blower motors DO NOT open the T-box on the motor itself. That will void the warranty. *
- All batteries and tires will be **pro-rated**.
- All electrical parts carry a **limited 60 day** warranty.

During the warranty period, Ray-Tech Infrared Corp will repair or replace defective parts at its sole discretion. The seller's obligation under this warranty is limited to the above and does not apply to replacement or repairs which are required as the result of improper installation, misuse, maladjustment, abnormal operating conditions or lack of routine maintenance. Parts damaged by misuse, negligence or accidents are excluded from this warranty. This warranty does not include the furnishing of services for maintenance or any problems arising from the foregoing causes. No claims for labor or other expenses will be recognized.

All other warranties, whether express, implied or statutory (such as warranties of merchantability or fitness for a particular purpose) are hereby excluded and disclaimed to the extent that they exceed the warranties granted herein. In no event shall the seller be liable for consequential or incidental damages. No agreement extending this warranty shall be binding upon the seller unless in writing and signed by seller's duly authorized officer or representative.

To maintain this warranty, the purchaser must perform maintenance and inspections as prescribed in the routine maintenance chart on the following page. This shall include prompt replacement or repair of worn or consumable parts and other such necessary repairs as may be required, according to use of the equipment. Disassembly of parts, other than that covered in the owner's manual, may void this warranty.

Routine Maintenance Checklist

Component	Part	Action	Schedule
Heating Chamber	Vents/Louvers	Clean Out	Every Operating Day
Heating Chamber	Grids	Check For Burnouts	Every Operating Day
Heating Chamber	Grids	Watch For Hot Spots	Every Operating Day
Heating Chamber	Converters	Clean Ribbon At Hot Spots	If Hot Spots Are Found
Heating Chamber	Converters	Tighten Connections	Every 1 – 2 Weeks
Chamber Winch	Cable	Check For Breaks/Damage	Every 1 – 2 Weeks
Chamber Winch	Grease Fitting	Check/Add Grease	Every 1 – 2 Weeks
Reclaimer	Vents/Louvers	Clean Out	Every Operating Day
Reclaimer	Top Door Hinges	Clean	Every Time Box Is Filled
Reclaimer	Burners	Check Tiles/Mesh For Damage	Weekly
Reclaimer	Burners	Check For Orifice Obstructions	Weekly
Batteries	Batteries	Top Off Battery Fluid	Monthly
Batteries	Batteries	Charge	Before Every Operating Day
Batteries	Batteries	Charge	Monthly (If not being used over winter)
Propane Tanks	Tank Connections	Tighten If Necessary	Every Operating Day