

SIMPLEX®

TRIDENT



Portable Load Bank

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For up-to-date information on this product or others,
please contact Simplex at 800-637-8603 or
visit us on the web at www.simplexdirect.com.

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I. WARNINGS AND CAUTIONS

I-A. Safety Information Symbols:



This General warning symbol points out important information that, if not followed, could endanger personal safety and/or property.



This Explosion warning symbol points out potential explosion hazards.



This Fire warning symbol points out potential fire hazards.



This Electrical warning symbol points out potential electrical shock hazards.

I-B. Cautions:

This load bank is high-powered, technical, industrial equipment operating at dangerous voltages and temperatures. It is capable of damaging itself, property or personnel if improperly used. It is not a consumer product.

It must be installed, connected and operated by personnel properly trained and experienced in its use. An operator's manual is supplied with each load bank and available online at www.simplexdirect.com. The operator must be familiar with its contents and have access to it during operation.

- **High Voltage:** Turn off and disconnect power source before opening this equipment
- **High Temperature:** Allow hardware to cool before servicing or opening this equipment.
- **Rotating Equipment:** Ensure that the fans have stopped before opening this unit.
- **For Operator Safety:** Make sure this equipment is properly grounded when in use.

All compression-type connections on fuse blocks, load blocks, and contactors should be checked for tightness frequently. This check should be established as part of routine maintenance.

The following cautions should be observed before and during operation:

- Check intake and exhaust screens as well as fan and load elements for foreign objects.
- Position and install the load bank with consideration given to large cubic airflow requirements, exhaust temperature, and velocity. Do not point exhaust at any nearby surface or object that may be adversely affected by high temperature. This includes but is not limited to painted surfaces, tar paper and asphalt roofs, water sprinkler heads, fire alarms, and volatile material.

- Do not use in confined spaces. The load bank may have to compete with cooling air requirements of a nearby running engine generator set where cooling air intake to a confined space may not be adequate for both engine and load bank. Be especially careful not to bounce hot exhaust air off nearby obstructions for re-circulation through the load bank.
- Verify that all control switch positions are set correctly for your intended usage before connecting the load bank to the source to be tested.
- The load cables carry high amperage. Be constantly aware of possibility of inductively heating adjacent ferrous objects to temperatures sufficient to damage cable insulation.
- Always connect the safety ground cable to a proper ground. Do not rely on a possible grounded neutral somewhere else in the system.
- Do not let the load bank run unattended for long periods of time.
- Do not store or operate in rain unless adequate protection is provided.
- Routinely inspect all components and electrical connections for tightness and integrity.
- Repair any damaged or degraded components and wiring without delay.
- If technical assistance, service, or parts are needed, please call 800-837-8603 (24 Hours).



- All hardware covered by this manual have dangerous electrical voltages and can cause fatal electrical shock. Avoid contact with bare wires, terminals, connections, etc. Ensure all appropriate covers, guards, grounds, and barriers are in place before operating the equipment. If work must be done around an operating unit, stand on an insulated dry surface to reduce the risk of electrocution.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while your hands or feet are wet.
- If people must stand on metal or concrete while installing, servicing, adjusting, or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- The National Electrical Code (NEC), Article 250 requires the frame to be connected to an approved earth ground and/or grounding rods. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition or by static electricity. Never disconnect the ground wire while the load bank is in use.
- Wire gauge sizes of electrical wiring, cables, and cord sets must be adequate to handle the maximum electrical current (ampacity) to which they will be subjected.
- Before installing or servicing this (and related) equipment, ensure that all power voltage supplies are completely turned off at their source. Failure to do so can result in hazardous and possibly fatal electrical shock.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. **AVOID DIRECT CONTACT WITH THE VICTIM.** Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and seek immediate medical attention.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock or may get caught in moving components causing injury.



- Keep a fire extinguisher near the hardware at all times. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic, and the liquid can deteriorate wiring insulation. Keep the extinguisher properly charged and be familiar with its use. If there are any questions pertaining to fire extinguishers, please consult the local fire department.



- The illustrations in this manual are examples only and may differ from your load bank.
- Load Bank warranty is void if incorrectly cooled.

II. DESCRIPTION AND SPECIFICATION

II-A. Overview of Use

Simplex Trident load banks are precision test instruments designed to apply a selectable load to a power source and measure the source's response. They are used for routine maintenance exercise to ensure the long-term reliability and readiness of the standby generator. Load banks can also eliminate the detrimental effects of unloaded operation of diesel engine generators as well as prevent damage from reverse power generation.

Trident load banks are available in models ranging from 150 kilowatts up to 1250 kilowatts. All standard Trident models have a step resolution of 50 kilowatts.

II-B. Control System

Trident load banks feature a Human-Machine Interface (HMI) touchscreen, which controls load bank operation and displays the unit's status. With the HMI, the operator can apply a desired load and measure the response of the test source.

II-C. Cooling System

Trident load banks are cooled by forced air, delivered by an aluminum fan blade directly driven by a TEFC motor. The air is brought in through the front of the load bank and expelled through the rear.

II-D. Load System

The load system comprises independently controlled Simplex Powr-Web resistors, which have been designed specifically for use in load bank systems. The load elements are supported by high-temperature, ceramic-clad, stainless-steel rods across their entire length, virtually eliminating element-to-element short circuits. The elements are arrayed in discrete trays, which are independently serviceable.

II-E. Safety

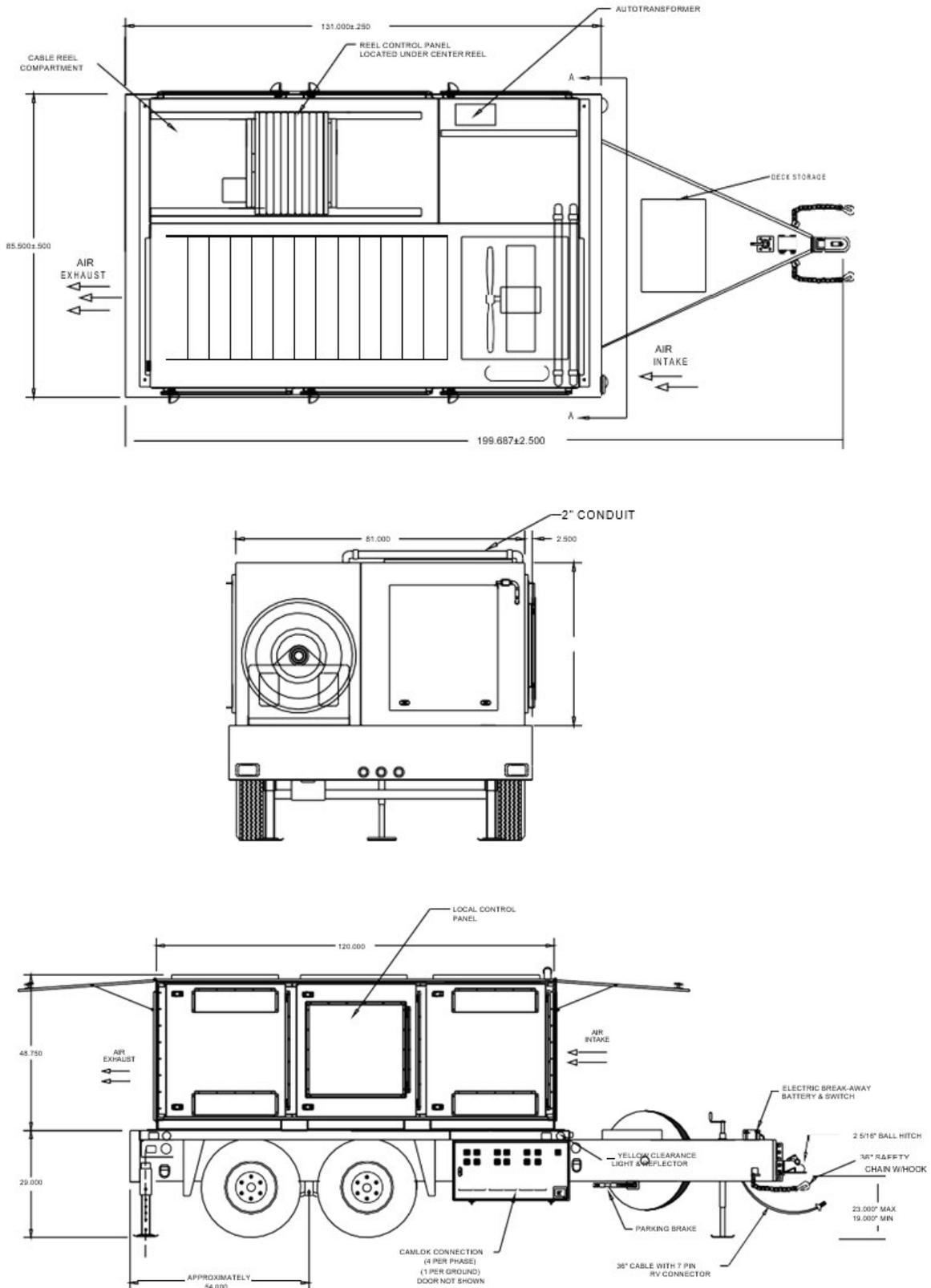
The Trident is protected by sensors to ensure that the load bank is sufficiently cooled and that the exhaust does not exceed a safe temperature, which could damage the load bank or present a safety hazard to the operator. When a failure occurs, the safety system immediately removes the load to protect the equipment from permanent damage.

II-F. Specification

Capacity	150-1250 Kilowatts
Power	Factor 1.0
Load Step Resolution	50 Kilowatts
Load Type	Resistive

Cooling System	Forced air
Voltages	208V, 220V, 240V, 416V, 440V, 450V, 460V, 480V, 575V, 600V
Frequency	50, 60Hz standard
Connection	Cam-Lock
Time Rating	Continuous
Ambient Air Temperature	120° F
Fault Rating	5KAIC
Dimensions	126"W x 48.7"H x 47"D
Weight	3,000 lbs.

II-G. Product Dimensions



III. UNPACKING

III-A. Included Components and Parts

The following items are included with your load bank. If any of the following are not included, please contact Simplex Direct, Inc., at 800-637-8603, ext. 4.

1. Load bank
2. Manual
3. Human-Machine Interface (HMI)
4. Electrical drawings package

III-B. Primary Inspection

Preventative visual inspection of the load bank is advised. Physical or electrical problems due to handling and vibration may occur. Never apply power to a load bank before performing this procedure. The following five-point inspection is recommended before installation and as part of a 6-month maintenance schedule or as a load bank is relocated:

1. Examine the load bank for signs of initial problems.
2. Check the entire outside of the cabinet for any visual damage, which could cause internal electrical or mechanical problems due to reduced clearance.
3. Inspect all relays and control modules. Make sure all components are secure in their bases and safety bails are in place. Spot check electrical connections for tightness. If any loose connections are found, inspect and tighten all remaining connections.
4. Examine all accessible internal electrical components such as fuses, contactors, and relays. Check lugged wires at these components.
5. Visually inspect the element chamber for foreign objects, broken ceramic insulators, and mechanical damage.



**Call Simplex if you have any problems during installation.
24-hour contact at 800-637-8603**

IV. INSTALLATION

IV-A. Load Bank Placement

Trident load banks are intended for outdoor installation. A forced air system, which discharges out of the rear of the unit, cools the load elements (See **Figure 1.**) Load banks require large quantities of air circulation, so it is essential to place the unit in an area that provides adequate airflow. Before conducting load tests, a review of site conditions by trained personnel is recommended.

The load bank requires at least 50 feet of clearance on the rear side and 10 feet on the front side.

The load bank should be placed in a secure area accessible by trained personnel only.

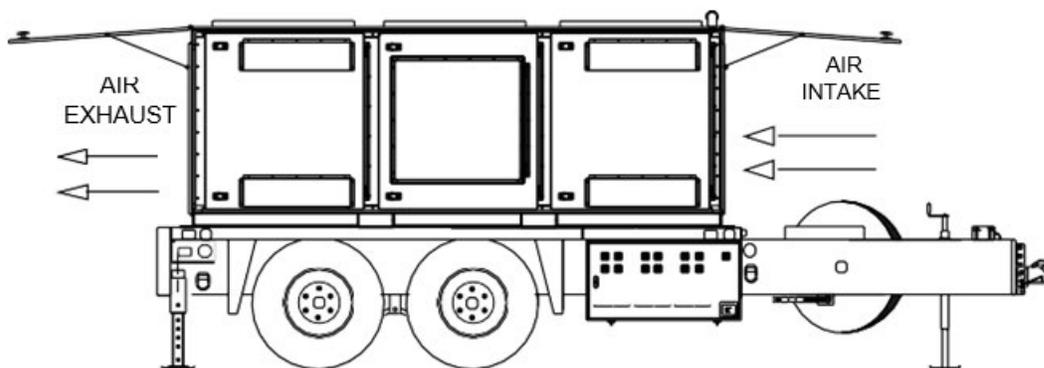
Because the unit generates a lot of heat, never operate near sprinkler systems.

Operating the load bank in a confined space will recycle hot exhaust air through the cooling system, which can cause severe damage.

The load bank may compete with nearby generators for cooling air.



Figure 1: Airflow Diagram



V. OPERATING INSTRUCTIONS

V-A. Conducting a Test

1. If you wish to enable data logging, insert a USB thumb drive into the port located either underneath the HMI screen or on a separate panel.
2. If you will be using external control/ fan power, connect the load bank to a 240/480 volt, 3-phase power source with a 30-amp maximum breaker (see [Figure 2](#)).
3. If you will be connecting multiple load banks, use customer-supplied CAT-5, CAT-5E, or CAT-6 ethernet cables to create a network by connecting the output of the master load with a 30-amp maximum breaker (see [Figure 2](#)).
4. Connect the load bank to the generator or power source with the included cables. The connections on the load bank are located on the right side of the trailer, near the front (see [Figure 4](#)).
5. Start up the generator set or otherwise bring the test source online.
6. Press the “Control Power” to switch it to the “On” position on the Main Screen (see [Figure 5](#)). If multiple units are networked, the Main Screen is only available via the Master Load Bank. Slave units will only display the single-unit monitoring screen (see [Figure 6](#)).
7. Make sure the fan is spinning, check the air intake for obstructions, confirm air flow and investigate any unusual noises.
8. Make sure no errors are registered in the “System” area in the bottom left of the screen. If any errors are indicated, consult the troubleshooting section on [page 16](#) for information on to resolve them.
9. Adjust the voltage and frequency of the generator.
10. Press the “KW to Apply” button and enter the desired load (see [“Figure 7: Numeric keypad”](#) on [page 13](#)).
11. Press the “Apply” button.
12. Monitor and adjust load steps as needed.

Figure 2: Fan/Control Power Inlet



Figure 3: Network Ports



Figure 4: Load Connections



Figure 6: Single-Unit Monitoring Screen

V-B. Metering Line Trends Screen

While the load bank is operating, pressing the Metering Line Trends button in the bottom right corner of the screen will bring up the Metering Line Trends screen. This screen provides a graph displaying voltage, current, frequency, and kilowatts detected by the load bank.

Figure 5: Main Screen



If you want to record this data, insert a USB drive into the port below the screen and press the “Data Logging Disabled” button. When you are done, press the button again and the load bank will write the data in a tab-delimited format to the thumb drive.

V-C. Single Unit Monitoring

If you have networked multiple load banks together, you can monitor just the master load bank by pressing the “Load Bank Monitoring” button. This will bring up the single-unit monitoring screen (Figure 6).

V-D. Shutdown

1. Remove all load by pressing the Remove button on the main screen.
2. Allow the cooling fan to run for approximately five minutes to provide a thorough cooldown for the entire system.
3. Press the “Control Power” button to switch it to the “Off” position.
4. Turn off the test source.
5. Disconnect the cables and store them in the cable compartment.
6. Disconnect the controller(s) and ethernet cable(s) and store them appropriately.

V-E. Maintenance Mode

While the load bank’s control power is turned off, pressing the “Maintenance Mode” button in the bottom right corner of the screen will make the unit enter maintenance mode (Figure 9).

On this screen you can see the values the temperature sensors are reading, the voltages of the three phases, and check the operation of the unit’s load steps by activating them individually.

Any load that you activate on the maintenance screen will be dumped when you leave the screen.

The Factory Setup screen can be accessed from maintenance mode, but it is intended for Simplex service representatives only and is password protected.

Figure 7: Numeric Keypad



Figure 8: Metering Lines Trend Screen



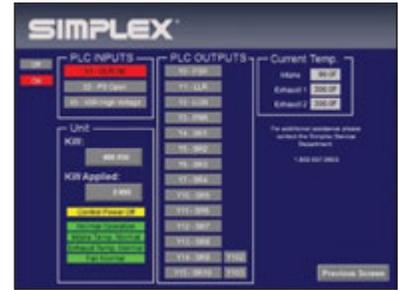
Figure 9: Maintenance Mode



Figure 10: Diagnostics Screen

V-F. Diagnostics Screen

From the maintenance mode screen, you can enter the Diagnostics screen (Figure 10), which displays the status of the load bank's programmable logic controller. This screen can be useful when working with the Simplex Service Department should a problem arise with your load bank.



VI. ALARMS AND WARNINGS

VI-A. Sensors

Trident load banks are protected by four types of sensors.

1. Intake temperature, which checks the incoming air to ensure the load elements can be adequately cooled.
2. Exhaust temperature, which checks the temperature of the air coming out the load bank to ensure the load elements are being adequately cooled.
3. Fan pressure, when ensures the fan blades are forcing air into the load element chamber.
4. Fan current, which ensures the fan motor isn't overloaded or jammed.



VI-B. Alarms

If the Trident registers an alarm, the green “Normal Operation” indicator on the main screen will change to a red “Load Bank Failure” notification and the unit will dump the load. Details about the alarm can be found on the Maintenance screen, accessible by pressing the “Maintenance Mode” button.

The Trident load bank’s HMI can alert you to four alarms:

- **Load Bank Failure:** Indicates that there is a problem with the load bank that must be resolved immediately.
- **Exhaust Temp. Failure:** Air leaving the load bank is too hot.
- **Fan Failure:** Either the fan is not pushing cooling air into the element chamber, or the fan is overloaded.
- **Over Voltage:** Indicates that the load bank has been connected to a power source that produces a higher voltage than the unit is configured for.

The load bank will alert you to alarms by turning the status areas for the alarm on the home screen from green to red.

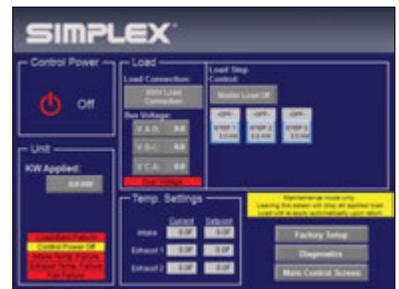
VI-C. Warnings

The Trident features one warning: Intake Temp Failure. This warning will not disable the unit and dump the load as with the alarms, but the issue should be investigated and resolved as soon as possible

Figure 11: Failure Indicator



Figure 12: Alarm Indicator



VII. MAINTENANCE/TROUBLESHOOTING

VII-A. General Maintenance

The load bank has been designed to require minimum maintenance. All components have been chosen for a long, reliable life. Two basic intervals of maintenance are required: each operation and either every 50 hours or 6 months (whichever comes first).

VII-B. Each Operation

The air intake screens and louvers, fan and cooling chamber, and exhaust openings must be checked for any obstructions or foreign objects.

Due to the high volume of air circulated, paper and other items can be drawn into the air intake. Clear the area around the load bank of any debris that may be sucked into the intake area.

During load bank operation, ensure that air is exiting from the exhaust vent.

The load branches should be checked for blown fuses or opened load resistors. To check the fuses or load resistors, operate the load bank from a balanced 3-phase source and check the three-line currents. The three current readings should be essentially the same. If a sizable difference is indicated, one or more load fuses or load resistors may have malfunctioned.



Remove all power before servicing the load bank.

Never operate or service a load bank that is not grounded.

VII-C. Trouble Shooting

Any of the alarms detailed on [page 15](#) will result in the load bank entering a failure state and dumping the load. All load steps are locked out until the problem is corrected. Until the failure is investigated and corrected, the load cannot be reapplied. For possible solutions to the problems causing the alarms, please consult the following sections. If the load bank still won't operate, please call the Simplex service department at 800-637-8603.

VII-D. Intake Temp. Failure

- Clear intake screen located on bottom of unit.
- Move load bank to cooler location or wait to conduct test on cooler day, if possible.

VII-E. Exhaust Temp. Failure

- The unit needs to be serviced. Please call the Simplex service department at 800-637-8603 ext. 4.
- Move the unit to an area that allows for proper air circulation. See “Load Bank Placement” on page 12 for more information.

VII-F. Fan Failure

- Clear intake screen located on bottom of unit.
- Make sure nothing has jammed the fan blades.

VII-G. Over Voltage

- Connect load bank to appropriate voltage source.



Contact Simplex
for all your Load Bank and Fuel Supply needs.

Simplex, Inc.
5300 Rising Moon Road
Springfield, IL 62711

800-637-8603
www.simplexdirect.com

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