



**AVTRON MODEL K875A  
OUTDOOR LOAD BANK  
Part Number K875A 1035409**

600 kW @ 480 VAC, 3-Phase, 60 Hz  
150, 150, 150, and 150 kW



# ***PROPRIETARY NOTE***

This document contains information PROPRIETARY TO Avtron Loadbank, Inc. It is furnished solely to provide information sufficient for instruction, operation, maintenance, evaluation, and testing of the equipment herein disclosed; is not to be used for manufacturing or procurement; and is not to be disclosed to anyone other than persons in the Division, or the Company, or the Government, as the case may be, responsible for action relating to this document without the express written permission of Avtron Loadbank, Inc.

## ***WARRANTY***

The last page of this document contains an express limited warranty. The provisions of this warranty cover any and all rights extended to holders of Avtron Loadbank, Inc. equipment.

Form 831B-LB Rev. 02-12





AVTRON LOADBANK  
Cleveland, Ohio

AVTRON MODEL K875A  
OUTDOOR LOAD BANK  
Part Number K875A 1035409

**TABLE OF CONTENTS**

	<u>Page</u>
Section I SAFETY CONSIDERATIONS.....	1-1
Section II DESCRIPTION.....	2-1
Section III INSTALLATION .....	3-1
Section IV OPERATION.....	4-1
Section V MAINTENANCE .....	5-1
Section VI OPTIONS.....	6-1
Section VII REPLACEMENT PARTS LIST.....	7-1

APPENDIX - Avtron Load Bank Troubleshooting Guide

DRAWINGS

SB2196	Outline Drawing, Load Bank, Wall Mount Enclosure
SB2793	Outline Drawing, Load Bank, Outdoor, Single Bay
1036587	Outline Drawing, Control Panel
1036579	Load Bank Schematic Diagram
1036580	Load Bank/Control Panel Interconnection Diagram
D27553-1	Resistor Assembly



# TABLES OF CONTENTS

## VENDOR MANUALS (Provided Separately)

The following are provided separately only when Option 62, 63, 64, 65, 66, 68, 69, or 79 is purchased:

Electro Industries      SHARK 100 Installation and Operation Manual – CD-ROM, E14520

Electro Industries      Quick Start for SHARK Series Meters, E145703





## TABLE OF CONTENTS (Cont.)

OPTIONS - Refer to Section VI (K875A OPTIONS LIST) of this manual. The following drawings apply to the various options. Only drawings for the options provided have been included in this manual. Not all options can be installed in the same unit. Installed options are marked on the identification tag.

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
* D27683-1	1	Control Transformer Option, 500 to 2000 kW Load Banks, (240/120V Control Transformer)
* D27683-2	2	Control Transformer Option, 500 to 2000 kW Load Banks, (380/110V Control Transformer)
* D27683-3	3	Control Transformer Option, 500 to 2000 kW Load Banks, (480/120V Control Transformer)
* D27683-4	4	Control Transformer Option, 2001 to 2500 kW Load Banks, (480/120V Control Transformer)
* D27683-5	5	Control Transformer Option, 2501 to 3000 kW Load Banks, (480/120V Control Transformer)
* D27683-6	6	Control Transformer Option, 2501 to 3000 kW Load Banks, (575/115V Control Transformer)
A24925	7	Remote Control Unit, Mounted (Left Side)
* B26013	8	Overvoltage Protection
* B26019	9	Elapse Time Meter
* D27682-1	10	1 kW Resolution (for 480 Volt Load Banks)
* D27682-2	11	1 kW Resolution (for 240/480 Volt Load Banks)
A25057-1	12	Intake Overtemp Protection
A25057-2	13	Intake Overtemp Protection

\*This drawing includes schematic wiring information.

## TABLE OF CONTENTS (Cont.)

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
A25057-3	14	Intake Overtemp Protection
* D27684-1	15	Dual Voltage Control Transformer and Blower Circuit (for Load Banks Using 5 HP Motor @ 240/480V)
* D27684-2	16	Dual Voltage Control Transformer and Blower Circuit (for Load Banks Using 10 HP Motor @ 240/480V)
A24744	17	Control/Meter Enclosure, Wallmount
A25353	18	Local Control/Metering Unit, Mounted (Left Side)
** D29421-1 (Instruction Manual)	19	Digital Power Metering Option (“D” Style) (V, A, kW, F, kVAR, PF, kVA), CT Ratio 1200:5
* D27683-7	20	Control Transformer Option, 500 to 2000 kW Load Banks, (440/115V Control Transformer)
* D29476-1	21	Dual Voltage Control Transformer (500-2000 kW Load Banks, 240/480 Control Transformer)
* D27685-1	22	Load Shedder Option, Single Board Load Shedder
* D27685-2	23	Load Shedder Option, Dual Board Load Shedder
* D27685-3	24	Load Shedder Option, Single Board Load Shedder (No component Mounting Panel)
* D27685-4	25	Load Shedder Option, Dual Board Load Shedder (No component Mounting Panel)
** D29785-1 (Instruction Manual)	26	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 1200/5
** D29785-2 (Instruction Manual)	27	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 2500/5

\* This drawing includes schematic wiring information.

\*\* This is a Supplemental Instruction Manual.

## TABLE OF CONTENTS (Cont.)

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
** D29785-3 (Instruction Manual)	28	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 1500:5
** D29421-2 (Instruction Manual)	29	Digital Power Metering Option (“D” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 3000:5
** D30857-1 (Instruction Manual)	30	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 3000/5
** D29785-4 (Instruction Manual)	31	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 2000:5
** D30857-2 (Instruction Manual)	32	Digital Power Metering Option (“DZ” Style) (V, A, kW, kVAR, kVA, PF, F), CT Ratio: 4000:5
** D29421-3 (Instruction Manual)	33	Digital Power Metering Option (“D” Style) (V, A, F, kW, kVAR, PF, kVA), C.T. Ratio 2500:5, 400 Hz
B27647	34	Wallmount Enclosure, Large, Remote Control/Meter
** D30857-3 (Instruction Manual)	35	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 2000:5, RS485
* B27730	36	Remote Monitoring Contacts
** D29421-4 (Instruction Manual)	37	Digital Power Metering Option (“D” Style) (V, A, kW, kVAR, kVA, PF, F), CT Ratio 1500:5
** D29785-5 (Instruction Manual)	38	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 4000:5
** D30857-4 (Instruction Manual)	39	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 1200:5

\*This drawing includes schematic wiring information.

\*\*This is a Supplemental Instruction Manual.

## TABLE OF CONTENTS (Cont.)

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
** D30857-5 (Instruction Manual)	40	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 2500:5
* D27683-8	41	Control Transformer, 380/115V (for 2001 to 2500 kW Load Banks)
** D30857-6 (Instruction Manual)	42	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 1500:5
** D30857-7 (Instruction Manual)	43	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 2500:5, RS485
** D30857-8 (Instruction Manual)	44	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 3000:5
* D32051-1	45	1 kW Load Step Resolution (240/480)
** D30857-9 (Instruction Manual)	46	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 2000:5
* D27685-5	47	Load Shedder Option, Single Board Load Shedder, Double Stack
* D27685-6	48	Load Shedder Option, Single Board Load Shedder, Double Stack (No component mounting panel)
* A28623-1	49	Blower and Control Power Disconnect, Single Stack
* A28623-2	50	Blower and Control Power Disconnect, Multiple Stack
* D27683-9	51	Control Transformer, 208/115V (for 500 to 2000 kW Load Banks)
* D35895-1	52	Control Transformer Option, 500 to 2000 kW Load Banks, (240/120V Control Transformer), Stainless Steel Panel

\*This drawing includes schematic wiring information.

\*\*This is a Supplemental Instruction Manual.

## TABLE OF CONTENTS (Cont.)

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
* D35895-2	53	Control Transformer Option, 500 to 2000 kW Load Banks, (380/110V Control Transformer), Stainless Steel Panel
* D35895-3	54	Control Transformer Option, 500 to 2000 kW Load Banks, (480/120V Control Transformer), Stainless Steel Panel
* D35895-4	55	Control Transformer Option, 2001 to 2500 kW Load Banks, (480/120V Control Transformer), Stainless Steel Panel
* D35895-5	56	Control Transformer Option, 2501 to 3000 kW Load Banks, (480/120V Control Transformer), Stainless Steel Panel
* D35895-6	57	Control Transformer Option, 2501 to 3000 kW Load Banks, (575/115V Control Transformer), Stainless Steel Panel
* D35895-7	58	Control Transformer Option, 500 to 2000 kW Load Banks, (440/115V Control Transformer), Stainless Steel Panel
* D35895-8	59	Control Transformer, 380/115V (for 2001 to 2500 kW Load Banks), Stainless Steel Panel
* D35895-9	60	Control Transformer, 208/115V (for 500 to 2000 kW Load Banks), Stainless Steel Panel
* D27683-10	61	Control Transformer 575/115V (for 500 to 2000 kW Load Banks)
* D37723-1 **	62	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 800:5
* D37723-2 **	63	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 2500:5
* D37723-3 **	64	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1500:5

\*This drawing includes schematic wiring information.

\*\* This is a supplemental instruction manual on CD.

## TABLE OF CONTENTS (Cont.)

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
* D37723-4 **	65	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 2000:5
* D37723-5 **	66	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 4000:5
* D37723-6 **	67	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 3000:5
* D37723-7 **	68	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1200:5
* D37723-8 **	69	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1000:5
* D27683-11	70	Control Transformer, 220/110V (for 500 to 2000 kW Load Banks)
A32404	71	Control Unit, Mounted (Front)
* D38803	72	Dual Voltage Blower/Control Transformer (2 Stack, 10 HP)
*** A32573-1	73	Gravity Hood Replacement, Single Stack
*** A32573-2	74	Gravity Hood Replacement, Two Stack
*** A32573-3	75	Gravity Hood Replacement, Three Stack
A33333-1	76	Hinged Access Panel, Single Stack
A33333-2	77	Hinged Access Panel, Two Stack
A33333-3	78	Hinged Access Panel, Three Stack

\* This drawing includes schematic wiring information.

\*\* This is a supplemental instruction manual on CD.

\*\*\*Load Banks equipped with Option 73 should be supplied with special Outline Drawing SB3145.  
Load Banks equipped with Option 74 should be supplied with special Outline Drawing SB3146.  
Load Banks equipped with Option 75 should be supplied with special Outline Drawing SB3147.

**TABLE OF CONTENTS (Cont.)**

<u>Drawing</u>	<u>Option</u>	<u>Description</u>
* D37723-9 **	79	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio 5000:5
A34920-1	80	Aluminum Hood Replacement with Stainless Steel Screen (1 Stack Units)
A34920-2	81	Aluminum Hood Replacement with Stainless Steel Screen (2 Stack Units)
A34920-3	82	Aluminum Hood Replacement with Stainless Steel Screen (3 Stack Units)
B32580-1	83	Overhead Lift, Single Stack
B32580-2	84	Overhead Lift, Two Stack
B32580-3	85	Overhead Lift, Three Stack
A37255	86	Bus Bar, Customer Connection, Replacement
A37594	87	Local Control/Metering Unit, Mounted
B33795-1	88	Elevating Stand (One Bay)
B33795-2	89	Elevating Stand (Two Bay)

\* This drawing includes schematic wiring information.

\*\* This is a supplemental instruction manual on CD.





AVTRON MODEL K875A  
OUTDOOR LOAD BANK  
Part Number K875A 1035409

**SECTION I**  
**SAFETY CONSIDERATIONS**

Throughout this manual, you will find **WARNING** and **CAUTION** statements. Personal injury to an operator using or repairing the equipment may occur if a **WARNING** statement is ignored. Damage to the equipment and potentially hazardous conditions for personnel may occur if a **CAUTION** statement is ignored.

Each Avtron unit is safety checked for opens and shorts, and the insulation is high potential tested to ensure safe operation. All fuses, safety interlocks, and related safety equipment have been proven reliable as part of the testing procedure of each unit.

As part of your safety program, an initial inspection after receiving the unit(s) and periodic preventive maintenance and safety inspections should be conducted to ensure the reliability and safety built into your Avtron equipment.

The Model K875A Load Bank is an industrial test unit designed to be used outdoors safely with an exhaust hood. The unit should not be installed indoors. Because the function of the Load Bank is to dissipate electrical energy, there are inherent dangers to operators and equipment. These dangers are outlined in this section.

Electrical energy is transformed into heat by the resistors. This heat must be removed from the Load Bank by the cooling fans/blowers. If there is any restriction or stoppage of airflow, the Load Bank will overheat and may start a fire. It is recommended that:

1. The operator should read the manual before using the Load Bank.
2. Run an approved ground wire from the Load Bank ground bus bar to the generator frame. Run an approved ground wire from the generator frame to a good earth ground. Size ground wire in accordance with National Electrical Code and any local codes.
3. Do not bypass the airflow safety switch or exhaust over-temperature switch to prevent nuisance tripping.

4. Replace any burned out bulbs on the control panel. Each lamp is an indication that a system is active or has failed and is important to the operation of the Load Bank and safety of the operator.
5. Maintenance personnel must always exercise caution when the access panels or intake screens are removed. Personal injury from electrical shock or from the rotating fan blades may result if all sources of power are not disconnected before servicing. Maintenance work must be done only by qualified personnel.
6. The Load Bank must be used in a cool, well ventilated area as described in the INSTALLATION section of this manual. Do not allow exhaust air to recirculate through the Load Bank. This causes a constant rise in cooling air temperature and may cause the Load Bank to overheat.
7. Install the factory-provided exhaust hood(s) as soon as possible. This protects the open resistor element section from debris and environmental conditions such as freezing rain. Failure to install hoods in a timely manner may void warranty.
8. Venting the heated air from the exhaust toward overhead cables, sprinkler systems, or into a room with insufficient volume or "Make-Up" air is a definite hazard. The Load Banks should be used in a cool, well ventilated area. This Load Bank is specifically designed for outdoor use with an exhaust hood. Indoor mounting is not recommended and requires special attention to exhaust hot air outdoors. Consult Avtron Engineering prior to indoor mounting.
9. After running a load test, residual heat may be removed from the Load Bank by allowing the fans to operate for a few minutes after load is removed. This procedure is not required for maintaining Load Bank integrity, but it may guard operating personnel from possible burn injuries.
10. The operator should avoid coming in contact with the resistor elements or surrounding covers during and for some time after operation. These portions of the Load Bank become quite hot and may result in a serious burn should contact be made with them.
11. Do not allow objects to enter or block the air intake or exhaust of the Load Bank. A blockage can cause Load Bank overheating. If an object enters the screens, it will cause damage to the resistor elements, possibly shorting them and causing shock and/or fire hazards.
12. Operators must not operate the Load Bank with the access panels or screens removed. To do so exposes the operator and other persons to possible personal injury from electrical shock or from the moving fan blades.

13. Emergency Shutdown Procedure
  - A. In an emergency, turn off the MASTER LOAD switch, then the generator. The MASTER LOAD switch will allow disconnection of all load steps and still allow for the motor to run, cooling any heated elements.
  - B. The power ON/OFF switch will disconnect both load steps and the fan motor. The Generator Emergency "OFF" switch should be located near the load system.
14. An approved electrical fire extinguisher should be on hand at all times.
15. It is the responsibility of the customer to take diligent care in installing the Load Bank. The National Electrical Code (NEC), sound local electrical and safety codes, and the Occupational Safety and Health Act (OSHA) should be followed when installing the equipment to reduce hazards to persons and property.
16. Read and heed all **WARNING** and **CAUTION** statements in the manual.
17. Do not let the Load Bank sit idle or store outdoors for more than 30 days. If Load Bank is to be stored, store indoors with exhaust covered. If outdoor, energize heaters. Spin fan motors monthly to prevent motor bearing issues. Fan motor(s) should be run for 30 minutes minimum, every month to prevent/limit condensation problems. Consult Avtron Prior to placing unit in storage.



# **SECTION II**

## **DESCRIPTION**

The Avtron Model K875A 1035409 Resistive Load Bank is a vertical airflow unit designed to provide a balanced resistive load of unity power factor, at a specified 3-phase voltage. The total load capability of the K875A Load Bank is 600 kW at 480 VAC, 3-phase, 60 Hz. Load steps are 150, 150, 150, and 150 kW. Using the toggle switches on the control panel, any combination of the available load steps may be selected to achieve a desired load.

This Load Bank provides a pilot relay interface (120 VAC) for complete control of the Load Bank including blower, load steps, and safety control circuits. It is the customer's responsibility to remove all the load steps if the blower is turned off or an airfail/overtemperature condition is detected.

The K875A 1035409 Load Bank contains a fan with a 3-phase, 480 VAC, 60 Hz, 10 H.P. 1800 RPM fan motor which provides the necessary cooling air for the load elements. The fan motor is controlled by a motor starter contactor. Overcurrent protection is provided for the motor by three fuses and an overload relay. The overload relay does not have an automatic reset provision and must be reset manually. The fan's free air delivery is nominally 20,000 CFM.

\*\*\*\*\*

### **CAUTION**

This Load Bank should never be used without the fan motor operating. Inadequate cooling airflow will result in resistor elements causing overheating and a definite fire hazard.

\*\*\*\*\*

An airflow switch is provided to monitor the flow of cooling air. This differential pressure switch is electrically interlocked with the load application controls to prevent load application if the fan is not working properly (AIR FAILURE light comes on).

An overtemperature switch is provided to monitor exhaust air temperature. This switch is electrically interlocked with the load application controls to prevent load application if the resistor stack exhaust temperature exceeds 375°F (OVERTEMP light comes on).

Control power is derived from an integral 480:120 volt control transformer that derives its source voltage from the blower input terminals.

The control panel contains a POWER ON-OFF switch with a CONTROL POWER light, a BLOWER POWER light, blower power START and STOP pushbutton switches, an AIR FAILURE light, a Load Bank OVER TEMP light, an AUTO/MANUAL selector switch, an AUTO light, a MANUAL light, a MASTER LOAD ON-OFF switch, and individual KW LOAD STEP switches. All load step switches are the toggle type with metal levers. The control panel also contains a FUSE for protection of the control circuit and a Digital Meter (optional). Reference Outline Drawing 1036587.

Sized for mounting in a 19-inch rack enclosure, the control panel has a vertical height of 14.00 inches, and requires a minimum of 8 inches of clearance behind the panel. A remote control enclosure is provided. Reference Outline Drawing SB2196.

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistance elements if the airflow switches have not closed. It is the customer's responsibility to ensure all load is dropped if an air failure is detected. DO NOT jumper out any air switches to prevent nuisance tripping.

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistive elements if any fault (overtemperature, motor overload, air failure) is indicated. It is the customer's responsibility to ensure all load is dropped if any fault or alarm is detected.

\*\*\*\*\*

The K875A Load Bank is fabricated using heavy-gauge aluminized sheet steel, making a rigid structure. Mounted within the structure are the load element resistor assemblies, load contactors, and the cooling fans/blowers. The resistive elements are porcupine type, fully supported along their length. Mounted on separate panels are the motor starter, motor overload relay, fuses, and customer connection terminals. The cooling air is drawn in from the two sides and the back, forced across the resistor elements, and exhausted out the top. The panel includes a temperature controlled heater, which may be used to prevent condensation from hindering operation of the Load Bank.

The Load Bank is equipped with screens mounted at the inlet openings and exhaust hoods. The Load Bank uses a welded base to facilitate handling by a forklift truck. Bolt holes are also supplied in the base to permit permanent mounting to a concrete pad or metal foundation.

\*\*\*\*\*

**CAUTION**

Never exceed the rated voltage as this will cause the Load Bank to overheat.

Do not apply DC voltages as the contactors do not have arc blowout magnets.

\*\*\*\*\*

**DIGITAL METER (OPTIONAL)**

Refer to the supplemental meter manual for digital meter description and operation.





<p><b>SECTION III</b></p> <p><b>INSTALLATION</b></p>
------------------------------------------------------

**INSTALLATION CHECKOUT PROCEDURE -  
TO BE DONE PRIOR TO OPERATION**

This Installation Checkout Procedure is intended to be used upon initial receipt of equipment and following any relocation of a permanently mounted Load Bank. These procedures apply to Load Banks in general and may include steps not relevant to the specific unit being installed. Disregard those procedures which do not apply.

\*\*\*\*\*

**W A R N I N G**

THE FOLLOWING TESTS ARE TO BE ACCOMPLISHED BY A QUALIFIED ELECTRICIAN OR TECHNICIAN USING EXTREME CAUTION AS POTENTIALLY LETHAL VOLTAGES AND DANGEROUS ROTATING COMPONENTS ARE PRESENT. IF ASSISTANCE IS REQUIRED, AVTRON CAN PROVIDE START UP SERVICE AT A NOMINAL CHARGE. AVTRON ALSO WILL PROVIDE TELEPHONE ASSISTANCE IF REQUIRED BY CALLING (216) 573-7600.

\*\*\*\*\*

1. Verify the Load Bank placement meets the installation requirements found in the INSTALLATION section of the instruction manual:
  - A. Check the clearance from both intake and exhaust to any obstruction.
  - B. If the location has a prevailing wind, make the wind aid in the cooling of the resistor elements.

- C. Follow these steps to mount hoods on exhaust (top) of Load Bank. (If applicable)
  - 1) Hoist hoods by installing two heavy rods (5/8" or 3/4" dia.) completely through unit.
  - 2) Make sure at least 6" projects beyond sides.
  - 3) Then attach minimum 6' long four-chain/cable sling to rod ends.
  - 4) Anchor hoisting device.
  - 5) Verify device with attachments will safely hoist hoods.
  - 6) Lift hoods and seat over full perimeter flange (curb) on roof (top) of Load Bank.
  - 7) Mounting can be directed toward front or rear of Load Bank.
  - 8) Secure. Use 3/8-16 S/S fasteners provided.
2. Check the mechanical integrity of all customer-supplied interconnection wiring:
  - A. Ensure lugs are properly crimped.
  - B. Ensure terminations are properly torqued.
  - C. Verify proper phase to phase clearance on main bus bars, load wiring, and mounting hardware.
3. Utilize system schematics to ohm out customer-supplied interconnection control wiring and safety circuits:
  - A. If control wiring is all the same color, ohm out each individual wire to confirm proper labeling and placement.

**CAUTION**

Control wiring must be a minimum of 14 AWG for wire runs under 50 feet. Consult Avtron factory for wire sizing when wire run exceeds 50 feet.

- B. Confirm the correct wire gauge has been used for interconnection wiring. Control wiring should be a minimum of 14 AWG for control panel to Load Bank lengths of 50 feet or less. For lengths of greater than 50 feet, consult the factory.

- 4. Energize the source of control power only:
  - A. Check the control voltage and confirm it is within 10% of the required voltage.

\*\*\*\*\*

**W A R N I N G**

Control power is present on terminal block in steps 4 through 6.

\*\*\*\*\*

- B. Operate the safety circuitry with a jumper across the air switch contact at its termination at the terminal block.
- 5. Verify the proper relays energize with each individual load switch.
  - A. Turn on each load step individually and observe that each relay or relays pulls in without chatter or hesitation.
  - B. Turn off the master load switch. Turn on all the load steps. Turn the master load on and observe the pull in of all the contactors. If chatter or hesitation is observed, locate the cause of the voltage drop causing the problem.
- 6. While the load relays are energized, remove the jumper across the air switch. All the load contactors should drop out after a delay of 5 seconds. **Leave the jumper off the air switch(es).**
- 7. Apply the rated fan voltage. Start fans/blowers and verify that air is exiting the resistor assembly end (top).

The air switches must be checked and/or field adjusted. This adjustment must be made after installation and during full operation of any supplemental equipment, which may influence the air-handling system. Follow these steps to verify and/or adjust:

- A. Stop fan(s)/blower(s) and remove all sources of power from the Load Bank.
- B. Remove the front access panel to gain entry to the control area.
- C. Verify each air switch individually by removing the control wiring from the switch terminals.

- D. Connect an ohmmeter across the air switch normally open terminals.
- E. Run ohmmeter wiring outside of the unit and temporarily install access panel.
- F. Reapply fan/blower voltage and control power.
- G. Start fan(s), allowing them to come up to speed, approximately 10 seconds. The normally open contacts should close. If more than one fan/blower, all must be operating before continuing.
- H. Press fan/blower stop button. Count down the number of seconds before switch opens. It should take 3-5 seconds. If not, adjust the air switch by turning the screw on the air switch out to increase time. (Turning in decreases time.)
- I. Once 3-5 seconds have been established, repeat for the other air switch(es) if applicable.
- J. Stop fan(s) and remove all sources of power from the Load Bank.
- K. Remove access panel, remove ohmmeter wiring, and replace factory wiring. Replace access panel.

This checkout procedure is intended to be a guide to Load Bank installations in general. Special installation considerations not addressed herein may be necessary due to installation site or environment. Any questions or concerns regarding Load Bank installation should be directed to Avtron Field Service at (216) 573-7600.

\*\*\*\*\*

**W A R N I N G**

It is vitally important to install the Load Bank properly. Installation errors may result in a catastrophic failure. The airflow switch, a protective device in the Load Bank, will guard against some of these problems. If protective circuitry prevents application of the load, determine the source of the problem. **DO NOT DISABLE THE AIRFLOW SWITCH.** This causes a safety hazard and voids our warranty. The following installation instructions are critical to the safe operation of the Load Bank. Refer to the **SAFETY CONSIDERATIONS** section of this manual.

\*\*\*\*\*

## **LOCATION**

Do not install the Load Bank in any area where standing water can pool or accumulate. Do not install near: a drainage basin, surface/ground or roof runoff, sewer collection, or any location where water can back up or collect. If flooding can occur, we recommend a different location or a raised platform sufficiently above high water level. Do not operate if any portion of the Load Bank is submerged. Always install above grade.

The Load Bank must be used in a cool, well-ventilated area. It must be installed where cool air is continually available and where hot exhaust air will not be recirculated through the Load Bank. The Load Bank must not be operated in a closed space. Exhaust temperature may exceed 400°F over ambient, under full load conditions.

The Load Bank should be positioned so that there is a minimum of 36 inches of clearance on all sides to provide room for intake air flow and maintenance. A minimum of twelve feet of clearance from the exhaust is required for proper airflow. (Refer to Outline Drawing SB2793.)

The exhaust air may exceed 400°F above ambient under full load conditions. The unit must not be installed near any equipment, wiring, or plumbing which may be damaged by high air temperatures or which may constitute a fire hazard.

## **AIRFLOW CONSIDERATIONS**

Even with an ample supply of cooling air, the Load Bank may overheat if it is not properly installed. There are two types of airflow problems that should be avoided:

1. Recirculating Airflow - If the hot, exhausted air is permitted to recirculate through the Load Bank, it will reach such a high temperature and low density that it will no longer cool the elements. A Load Bank should not be installed so close to any surface as to reflect the exhausted air back to the air intake.
2. Restriction of Cooling Air - Any obstruction located within five (5) feet of the inlet and twelve (12) feet of the exhaust hood (duct) will restrict the Load Bank's airflow. Airflow is also restricted when two or more Load Banks have air inlets positioned close to each other. This competition for cooling air causes a low pressure area, restricting adequate airflow. It is recommended that the factory exhaust hoods be used.
  - a. If the exhaust hoods are not used, the Load Banks are designed to tolerate up to 0.25" water gage additional system airflow resistance. This includes air intake resistance (building make up air pressure) and resistance due to exhaust duct/louvers/screen. The exhaust must be screened to keep debris from entering unit. The screen must be a minimum 75% open area and/or exceed Load Bank duct area by a minimum of 50%.

- b. If exhaust duct exits through motorized louvers, the design must be interlocked to assure full open prior to operation. Consideration must also be given for louver design and actuator to prevent heat problems.
- c. The fan/blower is designed to move 20,000 cfm per resistor stack. Therefore, if installed indoors, the building air intake system must be upgraded to provide this continuous additional 20,000 cfm of free air.

Consult the factory if hoods are not used or if strong prevailing winds exist. Failure to obtain written factory approval for special intake or exhaust conditions voids warranty.

### **ADDITIONAL AIRFLOW CONSIDERATIONS**

1. Load Banks mounted into a channel, trough, hollow, well, pit, surrounded completely by a parapet wall or backed into a full corner require special considerations even if the other conditions are met. In these cases, provide detailed site layout drawings to Avtron for inspection and comments.
2. Locations which have full or partial perimeter fence necessitate a review. The fencing material should have at least 75% open area. The minimum clearances still apply. Overhead fencing or grating is not recommended.
3. Do not install Load Banks or other air handling devices within the same area. Any high velocity air stream near the Load Bank air flow can disrupt the cooling. This is critical if the other equipment is a source of heat. Any thermal rise on Load Bank intake air can create a potential hazard.
4. The Load Bank cooling system cannot be used for any purpose other than cooling the Load Bank.
5. In northern climates with snow depths exceeding 6 inches or blowing and drifting snow, a physical inspection of the Load Bank intake and exhaust is required prior to operation. Any significant snow drifts or snow depths must be cleared prior to operation.
6. Standard Load Banks are designed for operation between sea level and 2,000 feet maximum altitudes. Operation at altitudes over 2,000 feet above sea level requires special consideration. As the altitude increases, the effective cooling air diminishes. Contact Avtron for assistance.

## **CONTROL CONNECTIONS**

The control panel is mounted in a control enclosure. Connect terminals of the control panel to terminals of the Load Bank as shown on Interconnection Diagram 1036580.

Control power is obtained from a 480:120 volt, 60 Hz AC, 750 VA transformer mounted on the Load Bank and wired to the main Load Bank bus. Reference Schematic Diagram 1036579. For Remote Load Dump, refer to Interconnection Diagram 1036580.

## **CONTROL INTERFACE CONNECTION POINTS**

Sixteen (16) terminal block connections (TB300) marked GND, 1-6, and 10-18, are provided for the control input scheme for automatic operation. These will be described in the operation section of the manual. These terminals are located on the right side wall. Reference Interconnection Diagram 1036580.

## **ENCLOSURE HEATERS**

A 100 watt strip heater is located inside the Load Bank enclosure on the control/blower panel. It is controlled by a temperature switch. The heater is used to control condensation problems. The switch is factory calibrated to 50°F.

## **FAN/BLOWER MOTOR CONNECTION**

The fan/blower circuit consists of fuses, a motor starter contactor, an overload relay, and the fan motor. The blower input power connections are wired to TB1(19), (20), and (21) located on the control/blower assembly and are then wired directly to the main Load Bank bus.

Required power for the blower motor is 480V, 3-phase, 60 Hz, 14 amps/phase.

Make sure that the correct phase rotation is wired to the fan motor. Improper phase rotation will cause the fan to run in the reverse direction. The cooling air should be pushed from the fan, across the resistor elements, and out the top exhaust hood/duct. This phase rotation check is mandatory each time the source or fan connections are changed.

If fan rotation is incorrect, shut down the Load Bank and remove all power from the Load Bank. Switch any two phase load cables at the Load Bank bus or any two input power connections at Load Bank terminal block TB1(19), (20), and (21). Reference Schematic Diagram 1036579.



If external 480 volt power is provided, safe practice dictates that the fan power be wired through a safety disconnect switch that can be locked out.

## **LOAD CONNECTIONS**

Load connections are made to the 3-phase bus bars located in the Load Bank. (Refer to Outline Drawing SB2793.) The connections are marked A, B, and C. Cables to the Load Bank should be of adequate size to handle maximum rated load according to the National Electrical Code and any local codes.

The ampacities of these load connections are shown on Load Bank Schematic Diagram 1036579.

## **GROUNDING**

A permanent ground conductor must be connected to the Load Bank enclosure by an individual ground wire to prevent a potential above ground on the enclosure. There is a ground bus bar in the Load Bank frame for this connection. This ground conductor should be run with the load power conductors to provide the lowest impedance fault path. The ground bus bar must be connected to both the power source frame and to a good earth ground. The ground conductor should be sized per the National Electrical Code Table 250.122, if not superseded by local codes.

If the Load Bank has been idle for more than two months consult factory and refer to Maintenance section of this manual. Perform the check out and maintenance procedure required.

<p><b>SECTION IV</b></p> <p><b>OPERATION</b></p>
--------------------------------------------------

\*\*\*\*\*

**W A R N I N G**

DO NOT touch the top exhaust hood/duct or cover panel during operation. The hood will become hot from the exhausted heat and will cause a serious burn. Refer to the SAFETY CONSIDERATIONS section of this manual.

DO NOT allow objects to enter or block screens.

\*\*\*\*\*

**C A U T I O N**

Never exceed the rated voltage as this will cause the Load Bank to overheat.

Do not apply DC voltages as the contactors do not have arc blowout magnets.

\*\*\*\*\*

**MANUAL OPERATION PROCEDURE**

1. Place all switches on the control panel to the OFF position.
2. Connect the power source to be tested to the Load Bank as described in the INSTALLATION section.

\*\*\*\*\*

**CAUTION**

DO NOT operate the Load Bank over the rated voltage as this will cause catastrophic failure in the Load Bank.

\*\*\*\*\*

- 3. Place the AUTO/MANUAL selector switch to the MANUAL position.
- 4. Start the generator under test.
- 5. Place the control POWER ON/OFF switch to the ON position. The CONTROL POWER light will be energized, indicating control power is present. The MANUAL light will also be energized.
- 6. Push the blower START pushbutton. Note that the AIR FAILURE indicator will flash on momentarily. When the blower motor reaches proper speed, the AIR FAILURE lamp de-energizes. Load voltage is not connected to Load Bank resistance elements unless the airflow switch closes and the load dump relay (K99) interlocks.

\*\*\*\*\*

**CAUTION**

The operation of the blower is vital to the safe operation of this Load Bank. When the BLOWER START switch is pressed, the AIR FAILURE light will come on momentarily until the blower accelerates up to its operating speed and K99 has been interlocked. If the load elements are energized when the blower is not operating, the Load Bank will burn up. If the AIR FAILURE indicator light stays on for more than a few seconds, shut down the Load Bank, and do not operate the unit until the problem is corrected. Refer to the SAFETY CONSIDERATIONS section of this manual.

\*\*\*\*\*

- 7. With the MASTER LOAD switch in the OFF position, use any one or combination of the toggle switches to make up a given load.
- 8. By placing the MASTER LOAD switch to the ON position, the preselected load will be applied to the power source.

- 9. Any load switch can be added or removed as required while the MASTER LOAD switch is closed (ON).
- 10. To remove the load, open the MASTER LOAD switch by placing it in the OFF position.

**SHUTDOWN PROCEDURE**

- 1. Place the MASTER LOAD switch to the OFF position.

**NOTE**

After running a load test, residual heat may be removed from the Load Bank by allowing the blower to operate for a few minutes after load is removed. This procedure is not required for maintaining Load Bank integrity, but it may guard operating personnel from possible burn injuries.

- 2. Place the control POWER ON/OFF switch to the OFF position. Other switches on the control panel should be OFF.
- 3. Shut down the power source(s).
- 4. Disconnect the Load Bank from the power source(s).

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistance elements if the airflow switch has not closed. It is the customer’s responsibility to ensure all load is dropped if an air failure is detected. DO NOT jumper out the air switch to prevent nuisance tripping.

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistive elements if any fault (overtemperature, motor overload, air failure) is indicated. It is the customer’s responsibility to ensure all load is dropped if any fault or alarm is detected.

\*\*\*\*\*

**AUTOMATIC OPERATION PROCEDURE**

1. Place the AUTO/MANUAL selector switch to the AUTO position.
2. Start the generator under test.
3. Place the control POWER ON/OFF switch to the ON position. The CONTROL POWER light will be energized, indicating control power is present. The AUTO light will also be energized.
4. Customer interface connection points are described as follows:
  - A. (120 VAC LOW): 120 VAC LOW return for pilot relays TB300(1). Reference Interconnection Diagram 1036580.
  - B. BLOWER ON (120 VAC HI): A contact closure to TB300(2) will enable the blower circuit. Reference Interconnection Diagram 1036580.
  - C. FIXED LOAD STEP INPUTS (120 VAC HI): A contact closure to the respective terminal on TB300 will turn on the load step. TB300(3)-(6). Reference Interconnection Diagram 1036580.
  - D. AIR FAILURE: A set of contacts is brought out to TB300(10,11,12) for customer usage. Reference Interconnection Diagram 1036580.
  - E. OVER TEMP: A set of contacts is brought out to TB300(13,14,15) for customer usage. Reference Interconnection Diagram 1036580.
  - F. BLOWER ON: A set of contacts is brought out to TB300(16,17,18) for customer usage. Reference Interconnection Diagram 1036580.
  - G. GND: Ground TB300(GND). Reference Interconnection Diagram 1036580.

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistance elements if the airflow switch has not closed. It is the customer’s responsibility to ensure all load is dropped if an air failure is detected. DO NOT jumper out the air switch to prevent nuisance tripping.

\*\*\*\*\*

\*\*\*\*\*

**CAUTION**

Voltage must not be connected to the Load Bank resistive elements if any fault (overtemperature, motor overload, air failure) is indicated. It is the customer's responsibility to ensure all load is dropped if any fault or alarm is detected.

\*\*\*\*\*





## ESD PRECAUTIONARY GUIDELINES

### CAUTION

Certain circuit card assemblies and their components, typically integrated circuits, may be damaged by seemingly undetectable electrostatic discharge (ESD). Care must be exercised during handling/repair of these items. Use electrostatic discharge precautionary procedures.

The following guidelines are not necessarily all inclusive but rather serve as reminders for good shop practices for the handling/ repair of ESD sensitive circuit card assemblies and devices.

- Store ESD sensitive items in their original containers. These items are often marked with the symbol shown at the top of this page.
- Put on a grounded wrist strap before handling any ESD sensitive item.
- Clear work area of Styrofoam®, plastic, and vinyl items such as coffee cups.
- Handle ESD items by the body, never the open edge connectors.
- Never slide ESD sensitive items over any surface.
- Transport ESD sensitive items in a static shielding container to a static-free work station.
- If a static-free work station is not available, ground the transport container before removing or inserting an ESD item.
- Electric tools used during repair should be grounded. For example, use only anti-static type solder suckers and grounded tip soldering irons. Discharge non-electric tools before use.
- Pack ESD items in static shielding containers before shipping them to Avtron for repair.

\* Styrofoam® is a registered trademark of Dow Chemical.





<p><b>SECTION V</b></p> <p><b>MAINTENANCE</b></p>
---------------------------------------------------

To provide long equipment life and to reduce the chance of electric shock, fires, and personal injury, good maintenance procedures must be used. Before servicing, review the SAFETY CONSIDERATIONS section of this manual.

The following examples of scheduled maintenance procedures are not intended to be all-inclusive, but must be accomplished to maintain the equipment in a good, safe condition. All maintenance work must be performed only by qualified personnel.

\*\*\*\*\*

**W A R N I N G**

Personal injury from electrical shock or from the moving fan blade may result if ALL sources of power are not disconnected. Refer to the SAFETY CONSIDERATIONS section of this manual.

Eye protection should be worn when cleaning the unit with compressed air.

\*\*\*\*\*

**DAILY**

1. Remove any restrictions to the airflow through the Load Bank.
2. Check the screens to make sure that no objects have blocked or entered the openings. If freezing conditions exist (below 32°F or 0°C) and freezing rain, sleet, or snow block the exhaust hood/duct/louver, the following special precautions must be taken. Clear area around exhaust opening. Do not use a shovel or heavy sharp object or damage to the screen may occur. If exhaust hood/duct/louver is blocked by ice or snow and manual clearing is not possible, limited use of the Load Bank to melt the blockage is possible. Run the Load Bank at a reduced load of approximately 200 kW for one-minute intervals (1 minute on,

10 minutes off). The exhaust heat will slowly melt the blockage. Continue cycling for 10-minute intervals until exhaust is clear. Do not apply full load until both intake and exhaust openings are clear.

3. Verify that the airflow is in the proper direction.
4. Assure that there is no recirculation of the exhaust air through the Load Bank.

### **THREE MONTHS**

1. Remove the access panels and screens, and inspect the load resistors for mechanical breakdown which is demonstrated by excessive sagging of the elements. Replace worn resistor elements with new resistor elements as required.
2. Inspect for broken ceramic insulators. Replace any broken or cracked insulator with a new ceramic insulator.
3. Inspect for loose hardware or loose connections. Tighten where required.
4. Inspect all connections for oxidation or corrosion. Clean the connection or replace the hardware where required.
5. Verify that the airflow switch works properly.
6. Inspect all magnetic contactors to make sure that the contacts are not severely pitted or corroded. The contacts must move freely and be properly seated.
7. Clean all dirt and debris out of the Load Bank. This can be accomplished by blowing the inside of the units with clean, dry compressed air (not to exceed 40 PSI). Eye protection should be worn when cleaning the Load Bank with compressed air.
8. Inspect all the wiring for any sign of insulation failure.
9. Replace all access panels and screens. Tighten all the fastening hardware securely.
10. Check the indicator lamps on the control panel.
11. Fan motors must be energized for a minimum of 30 minutes every month to drive off moisture. For fan motor lubrication, follow this procedure: If Load Bank runs continuously, lubricate after every 2,000 hours (3 months), per tag on fan housing. Do not cross contaminate bearing grease, see caution and consult factory if any concerns. Grease fittings may be plumbed to outside of housing. If not run continuously or at least 30 minutes every month, follow motor manufacturer's requirements.

**ANNUALLY**

1. The fan blower motor should be lubricated per the motor manufacturer's requirements and specifications on the motor nameplate.
2. Inspect exhaust hood and screens.
3. If Load Bank sits idle for more than two months consult Avtron for special written factory authorized procedure.



## SECTION VI

### K875A OPTIONS LIST

These options are available for Avtron Model K875A Load Banks. Not all options can be installed in the same unit. Installed options are marked on the identification tag.

<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
D27683-1	1	Control Transformer Option, 500 to 2000 kW Load Banks, (240/120V Control Transformer)
D27683-2	2	Control Transformer Option, 500 to 2000 kW Load Banks, (380/110V Control Transformer)
D27683-3	3	Control Transformer Option, 500 to 2000 kW Load Banks, (480/120V Control Transformer)
D27683-4	4	Control Transformer Option, 2001 to 2500 kW Load Banks, (480/120V Control Transformer)
D27683-5	5	Control Transformer Option, 2501 to 3000 kW Load Banks, (480/120V Control Transformer)
D27683-6	6	Control Transformer Option, 2501 to 3000 kW Load Banks, (575/115V Control Transformer)
A24925	7	Remote Control Unit, Mounted (Left Side)
B26013	8	Overvoltage Protection
B26019	9	Elapse Time Meter
D27682-1	10	1 kW Resolution (for 480 Volt Load Banks)
D27682-2	11	1 kW Resolution (for 240/480 Volt Load Banks)
A25057-1	12	Intake Overtemp Protection
A25057-2	13	Intake Overtemp Protection
A25057-3	14	Intake Overtemp Protection

<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
D27684-1	15	Dual Voltage Control Transformer and Blower Circuit (for Load Banks Using 5 HP Motor @ 240/480V)
D27684-2	16	Dual Voltage Control Transformer and Blower Circuit (for Load Banks Using 10 HP Motor @ 240/480V)
A24744	17	Control/Meter Enclosure, Wallmount
A25353	18	Local Control/Metering Unit, Mounted (Left Side)
D29421-1	19	Digital Metering (“D” Style) (V, A, kW, kVAR, kVA, PF, F), CT Ratio 1200:5
D27683-7	20	Control Transformer Option, 500 to 2000 kW Load Banks, (440/115V Control Transformer)
D29476-1	21	Dual Voltage Control Transformer (500-2000 kW Load Banks, 240/480 Control Transformer)
D27685-1	22	Load Shedder Option, Single Board Load Shedder
D27685-2	23	Load Shedder Option, Dual Board Load Shedder
D27685-3	24	Load Shedder Option, Single Board Load Shedder (No component Mounting Panel)
D27685-4	25	Load Shedder Option, Dual Board Load Shedder (No component Mounting Panel)
D29785-1	26	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 1200/5
D29785-2	27	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 2500/5
D29785-3	28	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 1500:5
D29421-2	29	Digital Power Metering Option (“D” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 3000:5
D30857-1	30	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA; CT Ratio 3000/5)

<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
D29785-4	31	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 2000:5
D30857-2	32	Digital Power Metering Option (“DZ” Style) (V, A, kW, kVAR, kVA, PF, F), CT Ratio: 4000:5
D29421-3	33	Digital Power Metering Option (“D” Style) (V, A, F, kW, kVAR, PF, kVA), C.T. Ratio 2500:5, 400 Hz
B27647	34	Wallmount Enclosure, Large, Remote Control/Meter
D30857-3	35	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 2000:5, RS485
B27730	36	Remote Monitoring Contacts
D29421-4	37	Digital Power Metering Option (“D” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 1500:5
D29785-5	38	Digital Power Metering Option (“DX” Style) (V, A, F, kW), CT Ratio 4000:5
D30857-4	39	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 1200:5
D30857-5	40	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, PF, kVA), CT Ratio 2500:5
D27683-8	41	Control Transformer, 380/115V (for 2001 to 2500 kW Load Banks)
D30857-6	42	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 1500:5
D30857-7	43	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 2500:5
D30857-8	44	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 3000:5
D32051-1	45	1 kW Load Step Resolution (240/480)
D30857-9	46	Digital Power Metering Option (“DZ” Style) (V, A, F, kW, kVAR, kVA, PF), CT Ratio 2000:5



<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
D27685-5	47	Load Shedder Option, Single Board Load Shedder, Double Stack
D27685-6	48	Load Shedder Option, Single Board Load Shedder, Double Stack (No component mounting panel)
A28623-1	49	Blower and Control Power Disconnect, Single Stack
A28623-2	50	Blower and Control Power Disconnect, Multiple Stack
D27683-9	51	Control Transformer Option, 208/115V (for 500 to 2000 kW Load Banks)
D35895-1	52	Control Transformer 240/120V (Load Banks 500-2000 kW) SST Panel
D35895-2	53	Control Transformer 380/110V (Load Banks 500-2000 kW) SST Panel
D35895-3	54	Control Transformer 480/120V (Load Banks 500-2000 kW) SST Panel
D35895-4	55	Control Transformer 480/120V (Load Banks 2001-2500 kW) SST Panel
D35895-5	56	Control Transformer 480/120V (Load Banks 2501-3000 kW) SST Panel
D35895-6	57	Control Transformer 575/115V (Load Banks 2501-3000 kW) SST Panel
D35895-7	58	Control Transformer 440/115V (Load Banks 500-2000 kW) SST Panel
D35895-8	59	Control Transformer 380/115V (Load Banks 2001-2500 kW) SST Panel
D35895-9	60	Control Transformer 208/115V (Load Banks 500-2000 kW) SST Panel
D27683-10	61	Control Transformer 575/115V (Load Banks 500 to 2000 kW)
D37723-1	62	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 800:5

<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
D37723-2	63	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 2500:5
D37723-3	64	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1500:5
D37723-4	65	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 2000:5
D37723-5	66	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 4000:5
D37723-6	67	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 3000:5
D37723-7	68	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1200:5
D37723-8	69	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio: 1000:5
D27683-11	70	Control Transformer, 220/110V (for 500 to 2000 kW Load Banks)
A32404	71	Control Unit, Mounted (Front)
D38803	72	Dual Voltage Blower/Control Transformer (2 Stack, 10 HP)
A32573-1	73	Gravity Hood Replacement, Single Stack
A32573-2	74	Gravity Hood Replacement, Two Stack
A32573-3	75	Gravity Hood Replacement, Three Stack
A33333-1	76	Hinged Access Panel, Single Stack
A33333-2	77	Hinged Access Panel, Two Stack
A33333-3	78	Hinged Access Panel, Three Stack
D37723-9	79	Digital Power Metering Option (DW Style) (V, A, F, KW, KVAR, PF, KVA) CT Ratio 5000:5
A34920-1	80	Aluminum Hood Replacement with Stainless Steel Screen (1 Stack Units)

---

<u>Option Drawing No.</u>	<u>Option</u>	<u>Description</u>
A34920-2	81	Aluminum Hood Replacement with Stainless Steel Screen (2 Stack Units)
A34920-3	82	Aluminum Hood Replacement with Stainless Steel Screen (3 Stack Units)
B32580-1	83	Overhead Lift, Single Stack
B32580-2	84	Overhead Lift, Two Stack
B32580-3	85	Overhead Lift, Three Stack
A37255	86	Bus Bar, Customer Connection, Replacement
A37594	87	Local Control/Metering Unit, Mounted
B33795-1	88	Elevating Stand (One Bay)
B33795-2	89	Elevating Stand (Two Bay)

## **REPLACEMENT PARTS LIST**

### **INTRODUCTION**

The parts list in this section contains the description, quantity required, and Avtron part numbers for each listed part. The list also includes schematic reference designators to facilitate troubleshooting.

#### **NOTE**

Every effort has been made to ensure the accuracy of this information. However, changes are sometimes necessary and revisions to the parts list may be made at any time without notice.

### **REFERENCE DESIGNATORS**

Service personnel may use this parts list along with the Avtron system schematics to identify and order replaceable parts. The reference designators were carefully selected and matched to those on the schematic diagrams and equipment to simplify the troubleshooting and repair process.

#### **NOTE**

When ordering replacement parts, be certain to state the part's description, Avtron part number, and the schematic reference designator number if one is available. Also include the model and serial number of the equipment.

## REPLACEMENT PARTS LIST

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
XF210-212 F212 F210,211 T1	OPTION #1: CONTROL TRANSFORMER	D27683-1	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
	.FUSE, CARTRIDGE, 8 AMP, 600V, TIME DELAY, CLASS RK-5	324699	2
	.TRANSF, CONT: 750 VA	371148	1
XF210-212 F212 F210,211 T1	OPTION #2: CONTROL TRANSFORMER	D27683-2	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
	.FUSE, 5 AMP, 600V, TIME DELAY, CLASS RK-5	324394	2
	.TRANSF, CONT: 750 VA	370940	1
XF210-212 F212 F210,211 T1	OPTION #3: CONTROL TRANSFORMER	D27683-3	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
	.FUSE, CARTRIDGE, 4 AMP, 600V, TIME DELAY, CLASS RK-5	324424	2
	.TRANSF, CONT: 750 VA	371148	1
XF210-212 F212 F210,211 T1	OPTION #4: CONTROL TRANSFORMER	D27683-4	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 12 AMP, 600V, TIME DELAY, CLASS RK-5	324468	1
	.FUSE, 5 AMP, 600V, TIME DELAY, CLASS RK-5	324394	2
	.TRANSFORMER, CONTROL: 1000 VA	370258	1
XF210-212 F212 F210,211 T1	OPTION #5: CONTROL TRANSFORMER	D27683-5	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 17.5 AMP, 600V TIME DELAY, CLASS RK-5	324432	1
	.FUSE, CARTRIDGE, 7 AMP, 600V, TIME DELAY, CLASS RK-5	324697	2
	.TRANSF, CONTROL; 1500 VA	371085	1
XF210-212 F212 F210,211 T1	OPTION #6: CONTROL TRANSFORMER	D27683-6	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 17.5 AMP, 600V TIME DELAY, CLASS RK-5	324432	1
	.FUSE, 5 AMP, 600V, TIME DELAY, CLASS RK-5	324394	2
	.TRANSF, CONT: 1500 VA	371287	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
K101	<u>OPTION #8: OVERVOLTAGE PROTECTION</u>	B26013	
R101	.RELAY, VOLTAGE CONTROL; INPUT POWER 110 VAC	351653	1
	.RESISTOR, CARB COMP 1/2W, 10%, 100 KOHM	110048	1
M101	<u>OPTION #9: ELAPSE TIME METER</u>	B26019	
	.ELAPSED TIME METER: 6 DIGIT, 115/120V, 60 HZ	369222	1
K10A, 11A, 12A	<u>OPTION #10: 1 KW RESOLUTION</u>	D27682-1	
	.RELAY; 3P, N.O., 600 VAC, 9A @	351889	3
	0.05PF, 110 VAC, 60 HZ COIL		
XF13-15	.FUSEBLOCK, 30 AMP, 3 POLE, CLASS T	324977	1
F13-15	.FUSE, CARTRIDGE, 10 AMP, 600V,	324480	3
	VERY FAST ACTING, CLASS T		
R1-9	.LOAD BANK RESISTOR	B26020	1
S1-3	.SWITCH, TOGGLE DPST, 4 TERM ON-NONE-OFF	360589	3
K10, 11, 12A, 12B	<u>OPTION #11: 1 KW RESOLUTION</u>	D27682-2	
	.RELAY; 3P, N.O., 600 VAC, 9A @	351889	6
	0.05PF, 110 VAC, 60 HZ COIL		
XF13-18	.FUSEBLOCK, 30 AMP, 3 POLE, CLASS T	324977	2
F13-18	.FUSE, CARTRIDGE, 10 AMP, 600V,	324480	6
	VERY FAST ACTING, CLASS T		
S1-9	.LOAD BANK RESISTOR	B26020	1
S1-3	.SWITCH, TOGGLE DPST, 4 TERM ON-NONE-OFF	360589	3
S4	<u>OPTION #12: INTAKE OVERTEMP PROTECTION</u>	A25057-1	
	.TEMP. CONTRLR; K THRMCPLE INPUT	491017	1
	RELAY CONT OUTPUT, 120/240V		
	.THERMOCOUPLE	A24741	1
XS4	.SOCKET: 8 PIN, DIN RAIL OR BASE MOUNT	358311	1
S4	<u>OPTION #13: INTAKE OVERTEMP PROTECTION</u>	A25057-2	
	.TEMP. CONTRLR; K THRMCPLE INPUT	491017	2
	RELAY CONT OUTPUT, 120/240V		
	.THERMOCOUPLE	A24741	2
XS4	.SOCKET: 8 PIN, DIN RAIL OR BASE MOUNT	358311	2
S4	<u>OPTION #14: INTAKE OVERTEMP PROTECTION</u>	A25057-3	
	.TEMP. CONTRLR; K THRMCPLE INPUT	491017	3
	RELAY CONT OUTPUT, 120/240V		
	.THERMOCOUPLE	A24741	3
XS4	.SOCKET: 8 PIN, DIN RAIL OR BASE MOUNT	358311	3

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/ UNIT
	<u>OPTION #15: DUAL VOLTAGE CONTROL</u> XFMR & BLOWER CIRCUIT	D27684-1	
CB1	.CIRCUIT BREAKER; 16A, 480V, 2 POLE	310336	1
XF212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
XF206-208	.FUSEHOLDER 3 POLE 30A 60V	325016	1
F206-208	.FUSE, CARTRIDGE, 10 AMP, 600V, TIME DELAY, CLASS J	324282	3
XF300	.FUSEKIT, TRANSFORMER SECONDARY	324964	1
F300	.FUSE CARTRIDGE 0.5A 250V	324005	1
K75	.RELAY, OVERLOAD* 6-25 AMP	350980*	1
XK75	.BRACKET, DIN RAIL MTG*	408304*	1
K100,130,131 133,134,240	.RELAY; 3P, 25A, 600 VAC IND, 35A, 600 VAC RES, 110/120V, 50/60 HZ	350833	6
K481	.RELAY, UNDER VOLTAGE 220 VAC -30% TO +15%	350583	1
K132	.RELAY; 3P, 25A, 120V, 60 HZ, 1-SPDT AUX, DIN RAIL MT	351925	1
K480	.RELAY; 3P, 25A, 208/240V, 60 HZ, 2-SPDT AUX, DIN RAIL MT	351924	1
T2	.TRANSF, CONT; 50 VA, 440/460/480V PRI, 220/230/240V SEC, 50/60 HZ	370528	1
T1	.TRANSF, CONT: 850 VA, 240/480 VAC PRI, 120 VAC SEC, 50/60 HZ	371148	1
S24, S102	.SWITCH, TOGGLE	360747	2
S100	.SWITCH, PUSHBUTTON, BLACK	361874	1
S101	.SWITCH, PUSHBUTTON, RED	361873	1
	<u>OPTION #16: DUAL VOLTAGE CONTROL</u> XFMR & BLOWER CIRCUIT	D27684-2	
CB1	.CIRCUIT BREAKER; 16A, 480V, 2 POLE	310336	1
XF212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
XF206-208	.FUSEHOLDER 3 POLE 30A 600V	325016	1
F206-208	.FUSE, CARTRIDGE, 20 AMP, 600V, TIME DELAY CLASS J	324283	3
XF300	.FUSEKIT, TRANSFORMER SECONDARY	324964	1
F300	.FUSE CARTRIDGE 0.5A 250V	324005	1
K75	.OVERLOAD RELAY, 13-18 AMPS*	350980*	1
XK75	.BRACKET, DIN RAIL MTG*	408304*	1
K100,130,131, 133,134,240	.RELAY; 3P, 25A, 600 VAC IND, 35A, 600 VAC RES, 110/120V, 50/60 HZ	350833	6
	*If relay fails, replace relay and mounting bracket.		

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #16: DUAL VOLTAGE CONTROL XFMR &amp; BLOWER CIRCUIT (CONT.)</u>		
K481	.RELAY, UNDER VOLTAGE 220 VAC -30% to +15%	350583	1
K132	.RELAY; 3P, 25A, 120V, 60 HZ, 1-SPDT AUX, DIN RAIL MT	351925	1
K480	.RELAY; 3P, 25A, 208/240V, 60 HZ, 2-SPDT AUX, DIN RAIL MT	351924	1
T2	.TRANSF, CONT; 50 VA, 440/460/480V PRI, 220/230/240V SEC, 50/60 HZ	370528	1
T1	.TRANSF, CONT: 850 VA, 240/480 VAC PRI, 120 VAC SEC, 50/60 HZ	371148	1
S24, S102	.SWITCH, TOGGLE	360747	2
S100	.SWITCH, PUSHBUTTON, BLACK	361874	1
S101	.SWITCH, PUSHBUTTON, RED	361873	1
	<u>OPTION #19: DIGITAL METERING UNIT</u>	D29421-1	
CT1,2	.TRANSFORMER, CURRENT, 1200:5, 50-400 HZ	370323	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER W/OPTIONS 85 (FREQ) 55 (KVAR) 79 (PF) 67 (KVA)	A21028-6	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	<u>OPTION #20: CONTROL TRANSFORMER</u>	D27683-7	
XF210-212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
F210,211	.FUSE, 5 AMP, 600V, TIME DELAY CLASS RK-5	324394	2
T1	.TRANSF, CONT: 850 VA, 380/440/550 VAC, 50/60 HZ. SECONDARY	370940	1



SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #21: DUAL VOLT CONTROL TRANSFORMER</u>	D29476-1	
CB1	.CIRCUIT BREAKER; 16A, 480V, 2 POLE	310336	1
XF212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
XF300	.FUSEKIT, TRANSFORMER SECONDARY	324964	1
F300	.FUSE CARTRIDGE 0.5A 250V	324005	1
S100	.SWITCH, PUSH MOM	361662	1
S101	.SWITCH, PUSHBUTTON RED	361661	1
S102	.SWITCH, TOGGLE 125 VAC, 28 VDC	360785	1
K100,240	.RELAY; 3P, 25A, 600 VAC IND, 35A, 600 VAC RES, 110/120V, 50/60 HZ	350833	2
K481	.RELAY, VOLTAGE SENSING; 180-276V PICKUP	350740	1
XK481	.RELAY SOCKET DIN RAIL MOUNT	358280	1
XK481	.CLIP, RETAINER	467522	2
K480	.RELAY; 3P, 25A, 208/240V, 60 HZ, 2-SPDT AUX, DIN RAIL MT	351924	1
T2	.TRANSF, CONT; 50 VA, 440/460/480V PRI, 220/230/240V SEC, 50/60 HZ	370528	1
T1	.TRANSF, CONT: 850 VA, 240/480 VAC PRI, 120 VAC SEC, 50/60 HZ	371148	1
	<u>OPTION #22: LOAD SHEDDER</u>	D27685-1	
K50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
XK50,51	.HOLDDOWN SPRING	467550	2
A101	.PRINTED CIRCUIT BOARD ASSY ..SCHEMATIC	A22829 D26034	1 REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360747	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	1
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1
	<u>OPTION #23: LOAD SHEDDER</u>	D27685-2	
K50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
XK50,51	.HOLDDOWN SPRING	467550	2
A101,102	.PRINTED CIRCUIT BOARD ASSY ..SCHEMATIC	A22829 D26034	2 REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360747	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	2
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
K50,51	OPTION #24: LOAD SHEDDER	D27685-3	
XK50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
A101	.HOLDDOWN SPRING	467550	2
	.PRINTED CIRCUIT BOARD ASSY	A22829	1
	..SCHEMATIC	D26034	REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360747	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	1
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1
K50,51	OPTION #25: LOAD SHEDDER	D27685-4	
XK50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
XK50,51	.HOLDDOWN SPRING	467550	2
A101,102	.PRINTED CIRCUIT BOARD ASSY	A22829	2
	..SCHEMATIC	D26034	REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360747	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	2
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1
CT1,2	OPTION #26: DIGITAL POWER METERING	D29785-1	
F100-102	.TRANSFORMER, CURRENT, 1200:5, 50-400 HZ	370323	2
	.FUSE CARTRIDGE, 1 AMP, 600 VAC	324449	3
	TIME DELAY CLASS CC		
XF100-102	.FUSEBLOCK CLASS CC, 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER 3 PHASE	A22821	1
CT1,2	OPTION #27: DIGITAL POWER METERING	D29785-2	
F100-102	.TRANSFORMER, CURRENT, 2500:5	370336	2
	.FUSE CARTRIDGE, 1 AMP, 600 VAC	324449	3
	TIME DELAY CLASS CC		
XF100-102	.FUSEBLOCK CLASS CC, 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER 3 PHASE	A22821	1
CT1,2	OPTION #28: DIGITAL POWER METERING	D29785-3	
F100-102	.TRANSFORMER, CURRENT, 1500:5	370159	2
	.FUSE CARTRIDGE, 1 AMP, 600 VAC	324449	3
	TIME DELAY CLASS CC		
XF100-102	.FUSEBLOCK CLASS CC, 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER 3 PHASE	A22821	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
CT1,2	<u>OPTION #29: DIGITAL METERING UNIT</u> .TRANSFORMER, CURRENT, 3000:5, 50-400 HZ, WINDOW SIZE 3.75" X 7.45"	D29421-2 370351	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER W/OPTIONS 85(FREQ)55(KVAR)79(PF)67(KVA)	A21028-6	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
CT1-4	<u>OPTION #30: DIGITAL METERING UNIT (DZ STYLE)</u> .TRANSFORMER, CURRENT, 3000:5, 50-400 HZ	D30857-1 370351	4
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
CT1,2	<u>OPTION #31: DIGITAL POWER METERING</u> .TRANSFORMER, CURRENT, 2000:5	D29785-4 370157	2
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC, 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER 3 PHASE	A22821	1
CT1-2	<u>OPTION #32: DIGITAL METERING UNIT (DZ STYLE)</u> .TRANSFORMER, CURRENT, 4000:5	D30857-2 371053	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
CT1,2	OPTION #33: DIGITAL METERING UNIT .TRANSFORMER, CURRENT, 2500:5, 50-400 HZ, WINDOW SIZE 4.75" X 3.75"	D29421-3 370331	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER W/OPTIONS 85 (FREQ) 55 (KVAR) 79 (PF) 67 (KVA)	A21449-6	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	OPTION #35: DIGITAL METERING UNIT (DZ STYLE), CT RATIO 2000:5, RS485	D30857-3	
CT1-2	.TRANSFORMER, CURRENT, 2000:5	370157	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338288	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	OPTION #36: REMOTE MONITORING CONTACTS	B27730	
K101-103	.RELAY, 3PDT	351060	3
XK101-103	.SOCKET, RELAY	358280	3
XK101-103	.SPRING, HOLD DOWN	467550	3
	OPTION #37: DIGITAL METERING UNIT	D29421-4	
CT1,2	.TRANSFORMER, CURRENT, 1500:5	370159	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER W/OPTIONS 85 (FREQ) 55 (KVAR) 79 (PF) 67 (KVA)	A21028-6	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	OPTION #38: DIGITAL POWER METERING	D29785-5	
CT1,2	.TRANSFORMER, CURRENT, 4000:5	371053	2
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC, 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER 3 PHASE	A22821	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #39: DIGITAL METERING UNIT (DZ STYLE), CT RATIO 1200:5, RS485</u>	D30857-4	
CT1-2	.TRANSFORMER, CURRENT, 1200:5	370323	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	<u>OPTION #40: DIGITAL METERING UNIT (DZ STYLE), CT RATIO 2500:5, RS485</u>	D30857-5	
CT1-2	.TRANSFORMER, CURRENT, 2500:5	370336	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	<u>OPTION #41: CONTROL TRANSFORMER</u>	D27683-8	
XF210-212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 12 AMP, 600V, TIME DELAY, CLASS RK-5	324468	1
F210,211	.FUSE, 7 AMP, 600V, TIME DELAY CLASS RK-5	324697	2
T1	.TRANSFORMER, CONTROL	370824	1
	<u>OPTION #42: DIGITAL METERING UNIT (DZ STYLE), CT RATIO 1500:5</u>	D30857-6	
CT1-2	.TRANSFORMER, CURRENT, 1500:5	370159	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #43: DIGITAL METERING UNIT</u> (DZ STYLE), CT RATIO 2500:5, RS485	D30857-7	
CT1-2	.TRANSFORMER, CURRENT, 2500:5	370336	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338288	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	<u>OPTION #44: DIGITAL METERING UNIT</u> (DZ STYLE), CT RATIO 3000:5	D30857-8	
CT1-2	.TRANSFORMER, CURRENT, 3000:5	370351	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1
	<u>OPTION #45: 1 KW RESOLUTION</u> FOR 240/480 VOLT LOAD BANKS	D32051-1	
K10-12 (A&B)	.RELAY, 9 AMP MAX MOTOR STARTING	351687	6
XF13-18	.FUSEHOLDER, 30 AMP, 3 POLE	324977	2
F13-18	.FUSE, 10 AMP, 600 VOLTS	324480	6
R1-9	.RESISTOR ASSEMBLY	B26020	1
S1-3	.SWITCH, TOGGLE	360664	3
	<u>OPTION #46: DIGITAL METERING UNIT</u> (DZ STYLE), CT RATIO 2000:5	D30857-9	
CT1-2	.TRANSFORMER, CURRENT, 2000:5	370157	2
T100	.TRANSF, POTENTIAL; 480V PRI, 120V SEC, +/-1% ACC @ 1.0 & .95 PF, 50/60 HZ	371046	1
F100-102	.FUSE CARTRIDGE, 1 AMP, 600 VAC TIME DELAY CLASS CC	324449	3
XF100-102	.FUSEBLOCK CLASS CC 600V REJ TYPE	324998	1
M1	.DIGITAL POWER METER	338272	1
CR30	.BRIDGE RECTIFIER 35A, 600V	354821	1
C30	.CAPACITOR, ELECTROLYTIC 250V, 100 MFD.	222097	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #47: LOAD SHEDDER</u>	D27685-5	
K50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
XK50,51	.HOLDDOWN SPRING	467550	2
A101	.PRINTED CIRCUIT BOARD ASSY	A22829	1
	..SCHEMATIC	D26034	REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360591	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	2
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1
	<u>OPTION #48: LOAD SHEDDER</u>	D27685-6	
K50,51	.RELAY, 3PDT, 120 VAC COIL	351060	2
XK50,51	.RELAY SOCKET DIN RAIL MOUNT	358280	2
XK50,51	.HOLDDOWN SPRING	467550	2
A101	.PRINTED CIRCUIT BOARD ASSY	A22829	1
	..SCHEMATIC	D26034	REF.
DS30	.LAMP, INDICATOR, NEON, PANEL MNT, 110/125 VAC, AMBER, .375 MTG. HOLE	329681	1
S30	.SWITCH, TOGGLE DPDT, 6 TERM, ON-NONE-ON	360591	1
K71 (AUX2)	.CONTACT, AUX, SPDT	312361	2
R30	.RESISTOR, 12K OHM, 2W, 5%	119311	1
	<u>OPTION #49: BLOWER DISCONNECT SINGLE STACK</u>	A28623-1	
	.SWITCH, SAFETY, ENCLOSED	361603	1
	<u>OPTION #50: BLOWER DISCONNECT MULTIPLE STACK</u>	A28623-2	
	.SWITCH, SAFETY, ENCLOSED	361692	1
	<u>OPTION #51: CONTROL TRANSFORMER</u>	D27683-9	
XF210-212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 15 AMP, 600V TIME DELAY, CLASS RK-5	324346	1
F210,211	.FUSE, 20 AMP, 600V, TIME DELAY CLASS RK-5	324143	2
T1	.TRANSFORMER: 1500 VA, 1 PH, 50/60 HZ	371319	1
	<u>OPTION #52: CONTROL TRANSFORMER</u>	D35895-1	
XF210-212	.FUSEBLOCK 3 POLE	324496	1
F212	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
F210,211	.FUSE, CARTRIDGE, 8 AMP, 600V, TIME DELAY, CLASS RK-5	324699	2
T1	.TRANSF, CONT: 850 VA, 240/480 VAC PRI, 120 VAC SEC, 50/60 HZ	371148	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
XF210-212	OPTION #53: CONTROL TRANSFORMER	D35895-2	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
T1	.FUSE, 5 AMP, 600V, TIME DELAY CLASS RK-5 .TRANSF, CONT: 850 VA, 380/440/550/ 600V PRI, 115/230V SEC, 50/60 HZ	324394 371149	2 1
XF210-212	OPTION #54: CONTROL TRANSFORMER	D35895-3	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
T1	.FUSE, CARTRIDGE, 4 AMP, 600V, TIME DELAY, CLASS RK-5 .TRANSF, CONT: 850 VA, 240/480 VAC PRI, 120 VAC SEC, 50/60 HZ	324424 371148	2 1
XF210-212	OPTION #55: CONTROL TRANSFORMER	D35895-4	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 12 AMP, 600V, TIME DELAY, CLASS RK-5	324468	1
T1	.FUSE, 5 AMP, 600V, TIME DELAY CLASS RK-5 .TRANSFORMER, CONTROL: 1100 VA, 240/480V PRI, 120V SEC, 50/60 HZ	324394 370258	2 1
XF210-212	OPTION #56: CONTROL TRANSFORMER	D35895-5	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 17.5 AMP, 600V TIME DELAY, CLASS RK-5	324432	1
T1	.FUSE, CARTRIDGE, 7 AMP, 600V, TIME DELAY, CLASS RK-5 .TRANSF, CONTROL; 1500 VA, 240/480V PRI, 120V SEC, 60 HZ, UL/CSA CERT.	324697 371085	2 1
XF210-212	OPTION #57: CONTROL TRANSFORMER	D35895-6	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 17.5 AMP, 600V TIME DELAY, CLASS RK-5	324432	1
T1	.FUSE, 5 AMP, 600V, TIME DELAY CLASS RK-5 .TRANSF, CONT: 1500 VA, 230/460/575V PRI, 115/95V SEC, 50/60 HZ	324394 370294	2 1
XF210-212	OPTION #58: CONTROL TRANSFORMER	D35895-7	
F212	.FUSEBLOCK 3 POLE	324496	1
F210,211	.FUSE, CARTRIDGE, 9 AMP, 600V, TIME DELAY, CLASS RK-5	324431	1
T1	.FUSE, 5 AMP, 600V, TIME DELAY CLASS RK-5 .TRANSF, CONT: 850 VA, 380/440/550/ 600V PRI, 115/230V SEC, 50/60 HZ	324394 371149	2 1



SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
XF210-212 F212 F210,211 T1	OPTION #59: CONTROL TRANSFORMER	D35895-8	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 12 AMP, 600V, TIME DELAY, CLASS RK-5	324468	1
	.FUSE, 7 AMP, 600V, TIME DELAY CLASS RK-5	324697	2
	.TRANSFORMER, CONTROL	371213	1
XF210-212 F212 F210,211 T1	OPTION #60: CONTROL TRANSFORMER	D35895-9	
	.FUSEBLOCK 3 POLE	324496	1
	.FUSE, CARTRIDGE, 9 AMP, 600V TIME DELAY, CLASS RK-5	324431	1
	.FUSE, 6 AMP, 600V, TIME DELAY CLASS RK-5	324393	2
	.TRANSF, CONT: 850 VA, 208V PRI, 115 SEC	371247	1
XF210-212 F212 F210, F211 T1	OPTION #61: CONTROL TRANSFORMER	D27683-10	
	.Fuseholder	324496	1
	.Fuse, 9 Amp, 600V, Time Delay	324431	1
	.Fuse, 4 Amp, 600V, Time Delay	324424	2
	.Transformer	371088	1
CT1,CT2 F100-102 XF100-102 M1	OPTION #62: DIGITAL METERING UNIT (DW Style), CT Ratio 800:5, RS485	D37723-1	
	.Transformer, Current, 800:5	371200	2
	.Fuse, 1 Amp, 600V, Time Delay	324449	3
	.Fuseblock	324998	1
	.Meter, Digital	338344	1
CT1,CT2 F100-102 XF100-102 M1	OPTION #63: DIGITAL METERING UNIT (DW Style), CT Ratio 2500:5, RS485	D37723-2	
	.Transformer, Current, 2500:5	370336	2
	.Fuse, 1 Amp, 600V, Time Delay	324449	3
	.Fuseblock	324998	1
	.Meter, Digital	338344	1
CT1,CT2 F100-102 XF100-102 M1	OPTION #64: DIGITAL METERING UNIT (DW Style), CT Ratio 1500:5, RS485	D37723-3	
	.Transformer, Current, 1500:5	370159	2
	.Fuse, 1 Amp, 600V, Time Delay	324449	3
	.Fuseblock	324998	1
	.Meter, Digital	338344	1
CT1,CT2 F100-102 XF100-102 M1	OPTION #65: DIGITAL METERING UNIT (DW Style), CT Ratio 2000:5, RS485	D37723-4	
	.Transformer, Current, 2000:5	370157	2
	.Fuse, 1 Amp, 600V, Time Delay	324449	3
	.Fuseblock	324998	1
	.Meter, Digital	338344	1

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	<u>OPTION #66: DIGITAL METERING UNIT</u> (DW Style), CT Ratio 4000:5, RS485	D37723-5	
CT1,CT2	.Transformer, Current, 4000:5	371053	2
F100-102	.Fuse, 1 Amp, 600V, Time Delay	324449	3
XF100-102	.Fuseblock	324998	1
M1	.Meter, Digital	338344	1
	<u>OPTION #67: DIGITAL METERING UNIT</u> (DW Style), CT Ratio 3000:5, RS485	D37723-6	
CT1,CT2	.Transformer, Current, 3000:5	370351	2
F100-102	.Fuse, 1 Amp, 600V, Time Delay	324449	3
XF100-102	.Fuseblock	324998	1
M1	.Meter, Digital	338344	1
	<u>OPTION #68: DIGITAL METERING UNIT</u> (DW Style), CT Ratio 1200:5, RS485	D37723-7	
CT1,CT2	.Transformer, Current, 1200:5	370323	2
F100-102	.Fuse, 1 Amp, 600V, Time Delay	324449	3
XF100-102	.Fuseblock	324998	1
M1	.Meter, Digital	338344	1
	<u>OPTION #69: DIGITAL METERING UNIT</u> (DW Style), CT Ratio 1000:5, RS485	D37723-8	
CT1,CT2	.Transformer, Current, 1000:5	371191	2
F100-102	.Fuse, 1 Amp, 600V, Time Delay	324449	3
XF100-102	.Fuseblock	324998	1
M1	.Meter, Digital	338344	1
	<u>OPTION #70: CONTROL TRANSFORMER</u>	D27683-11	
XF210-212	.Fuseholder	324496	1
F212	.Fuse, 12 Amp, 600V, Time Delay	324468	1
F210, F211	.Fuse, 10 Amp, 600V, Time Delay	324059	2
T1	.Transformer	371148	1
	<u>OPTION #72: DUAL VOLTAGE CONTROL TRANSFORMER &amp; BLOWER CIRCUIT (2 Stack)</u>	D38803	
CB1	.Circuit Breaker, 20A, 2 Pole, 240 VAC	310388	1
XF212	.Fuseholder	324496	1
F212	.Fuse, 17.5 Amp, 600V, Time Delay	324432	1
XF206-211	.Fuseholder	325016	2
F206-211	.Fuse, 20A, 600V, Time Delay	324283	6
XF300	.Fusekit	324964	1
F300	.Fuse	324005	1
K75,76	.Relay, Overload	350980	2
XK75,76	.Bracket, Relay Mounting	408304	2

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	OPTION #72: DUAL VOLTAGE CONTROL	D38803	
	TRANSFORMER & BLOWER CIRCUIT (2 Stack) (Cont.)		
K100,130,131, 133-136, 138,139,240	.Relay, 3P, 25A, 600 VAC	350833	10
K481	.Relay, Volt Sensing	350583	1
K132,137	.Relay	351925	2
K480	.Relay	351924	1
T2	.Transformer, Control, 50 VA	370528	1
T1	.Transformer	371286	1
S24,S102	.Switch, Toggle	360747	2
S100	.Switch, Pushbutton	361874	1
S101	.Switch, Pushbutton	361873	1
	OPTION #76: HINGED ACCESS PANEL, SINGLE STACK	A33333-1	1
	.Panel, Machining (Top)	D32672	1
	.Hinge	B28406	1
	.Latch, Spring, Flush Head	442595	3
	.Handle	B27422	1
	.Label, Warning	B15868	1
	.Panel, Machining (Bottom)	D33312	1
	OPTION #77: HINGED ACCESS PANEL, TWO STACK	A33333-2	2
	.Panel, Machining (Top)	D32672	1
	.Hinge	B28406	1
	.Latch, Spring, Flush Head	442595	3
	.Handle	B27422	1
	.Label, Warning	B15868	1
	.Panel, Machining (Bottom)	D33312	1
	OPTION #78: HINGED ACCESS PANEL, THREE STACK	A33333-3	3
	.Panel, Machining (Top)	D32672	1
	.Hinge	B28406	1
	.Latch, Spring, Flush Head	442595	3
	.Handle	B27422	1
	.Label, Warning	B15868	1
	.Panel, Machining (Bottom)	D33312	1
	OPTION #79: DIGITAL METERING UNIT	D37723-9	
	(DW Style), CT Ratio 5000:5		
CT1,CT2	.Transformer, Current, 5000:5	370867	2
F100-102	.Fuse, 1 Amp, 600V, Time Delay	324449	3
XF100-102	.Fuseblock	324998	1
M1	.Meter, Digital	338344	1

<p style="text-align: center;"><b>SECTION VII</b></p> <p style="text-align: center;"><b>REPLACEMENT PARTS LIST</b></p>
------------------------------------------------------------------------------------------------------------------------

**INTRODUCTION**

The parts list in this section contains the description, quantity required, and Avtron part numbers for each listed part. The list also includes schematic reference designators to facilitate parts identification.

**NOTE**

Every effort has been made to ensure the accuracy of this information. However, changes are sometimes necessary and revisions to the parts list may be made at any time without notice.

**REFERENCE DESIGNATORS**

Service personnel may use this parts list along with the Avtron system schematics to identify and order replaceable parts. The reference designators were carefully selected and matched to those on the schematic diagrams and equipment to simplify the troubleshooting and repair process.

**NOTE**

When ordering replacement parts, be certain to state the part's description, Avtron part number, and the schematic reference designator number if one is available. Also include the model and serial number of the equipment.

## REPLACEMENT PARTS LIST

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/ UNIT
	AVTRON MODEL K875A LOAD BANK, OUTDOOR	K875A	
		1035409	
	.SCHEMATIC DIAGRAM	1036579	REF
	.INTERCONNECTION DIAGRAM	1036580	REF
RA1-RA4	.RESISTOR ASSEMBLY	D27553-1	4
F1-F3	..FUSE, 80A	324420	3
F7-F9	..FUSE, 150A	324463	3
K1A	..RELAY	351885	1
K2A	..RELAY	B14796	1
	..RESISTANCE ELEMENT, 50 KW	A24059	6
	..RESISTANCE ELEMENT, 100 KW	A23914	6
	..SPRING, COMPRESSION	473042	24
	..PIN, SPRING CLIP	461156	24
	..WIRE SET	1031249	1
K71 (AUX 2)	.CONTROL/BLOWER ASSEMBLY	D27681-3	1
F203-205	..FUSE	324283	3
XF203-205	..FUSEHOLDER	324997	1
K71	..RELAY	B14711	1
K72	..RELAY, OVERLOAD	350980	1
XK72	..BRACKET, RELAY MOUNTING	408304	1
K73	..RELAY	B17839	1
R1	..HEATER	352026	1
S1	..SWITCH	363099	1
S2	..SWITCH, SENSING	360772	1
S3	..CONTROLLER, TEMP	491017	1
XS3	..SOCKET	358311	1
XS3	..THERMOCOUPLE	A24741	1
	..AUXILIARY CONTACT, SPDT	312413	1
	.CONTROL ASSEMBLY	1036578	1
K71A,100-107, 110,111,200-203	..RELAY	351060	15
XK71A,100-107, 110,111,200-203	..SOCKET, RELAY	358280	15
XK71A,100-107, 110,111,200-203	..RETAINER, RELAY	467550	15
K99A	..RELAY, 30 AMP	350539	1
F210,211	..FUSE, 4 AMP	324424	2
F212	..FUSE, 9 AMP	324431	1
XF210-212	..FUSEHOLDER	324496	1
T1	..TRANSFORMER, 750VA	371148	1
	.MOTOR, 10HP	341143	1
	.IMPELLER, FAN	406060	1
	.RETAINER, FILTER	B26555	1
	.FILTER	432031	2

**Replacement Parts List**

Avtron Outdoor Load Bank • Part Number K875A 1035409

SCHEMATIC REFERENCE	DESCRIPTION	AVTRON P/N	QTY/UNIT
	.CONTROL PANEL	1036581	1
DS1,3,5,6	..LAMP, INDICATOR, AMBER	AVT-329681	4
DS2,4	..LAMP, INDICATOR, RED	329682	2
F1	..FUSE, 20 AMP	324754	1
XF1	..FUSEHOLDER	324985	1
KA,KM	..RELAY	351060	2
XKA,XKM	..SOCKET, RELAY	358280	2
XKA,XKM	..SPRING, HOLD DOWN	467550	2
K99	..RELAY	350525	1
S1-4,19,20	..SWITCH, TOGGLE	360589	6
S22	..SWITCH, PUSHBUTTON	361873	1
S23	..SWITCH, PUSHBUTTON	361874	1
S25	..SWITCH, TOGGLE	360747	1
R1-5	..RESISTOR, 12K OHM, 2W	119311	5



# APPENDIX

## LOAD BANK TROUBLESHOOTING GUIDE

### NOTE

Servicing should always be done only by trained, qualified service technicians.

\*\*\*\*\*

### W A R N I N G

Be sure that all sources of power to the Load Bank are disconnected before servicing.

\*\*\*\*\*

PROBLEM	POSSIBLE CAUSES/REMEDIES
1. Load Bank main power fails to come on.	a. Main switch or circuit breaker is not closed. b. Unit is not connected according to the Schematic/Interconnection Diagram. c. Terminals were damaged during shipment. d. Fuses are blown. (Check and replace as required.)* e. Fuse is blown in Load Bank control circuit. (Check and replace as required.)* f. Dirty or loose connection at Main Power Switch.
2. Blower motor does not operate.	a. Main switch or circuit breaker is not closed. b. Power is not connected to Load Bank blower circuit. c. External power source is inadequate. d. Motor fuses are blown. (Check and replace as required.)*

\* When checking fuses for continuity, be sure to remove all fuses from clips (in fuseblock or Disconnect Switch). Test each fuse individually, out of circuit. (If tested in circuit, there is the possibility of feedback which causes false readings. A blown fuse may still check out OK.)



PROBLEM	POSSIBLE CAUSES/REMEDIES
2. Blower motor does not operate. (Cont.)	<ul style="list-style-type: none"> <li>e. Motor overload is tripped.</li> <li>f. Motor start is malfunctioning.</li> <li>g. Main Power Switch is inoperative.</li> <li>h. Connections are broken or loose.</li> <li>i. Motor shaft does not turn due to improper lubrication. (Replace or repair as necessary.)</li> </ul>
3. BLOWER FAILURE indicator lights, yet blower is operating.	<ul style="list-style-type: none"> <li>a. Airflow restrictions present at Load Bank intake or exhaust.</li> <li>b. Improper fan blade rotation or phase reversal. (Check fan motor power connections for proper phase sequence.)</li> <li>c. Air Differential Pressure Switch is malfunctioning.</li> <li>d. Blower Fail Relay is malfunctioning.</li> </ul>
4. Fan blade is broken or not turning.	<ul style="list-style-type: none"> <li>a. Fan blade motion is obstructed.</li> <li>b. Fan blade is loose at hub or is not keyed properly.</li> </ul>
5. Load step(s) cannot be energized.	<ul style="list-style-type: none"> <li>a. A blower failure exists. (See problem 2.)</li> <li>b. MASTER LOAD Switch is inoperative.</li> <li>c. Control power is inadequate.</li> <li>d. Fuse is blown in Load Bank control circuit or individual branch circuit load fuse (if so equipped) is blown. (Check and replace as required.)*</li> <li>e. Blower Fail Relay is malfunctioning.</li> <li>f. Load step switch is inoperative.</li> <li>g. Load step contactor is inoperative.</li> <li>h. Magnetic contactor has an open coil.</li> <li>i. Load step resistor is open.</li> </ul>

\* When checking fuses for continuity, be sure to remove all fuses from clips (in fuseblock or Disconnect Switch). Test each fuse individually, out of circuit. (If tested in circuit, there is the possibility of feedback which causes false readings. A blown fuse may still check out OK.)

PROBLEM	POSSIBLE CAUSES/REMEDIES
6. Contactor "chattering" exists.	<ul style="list-style-type: none"> <li>a. Contacts and/or core are dirty or corroded.</li> <li>b. Connections to contactor coil are loose.</li> <li>c. Control circuit line voltage is too low.</li> </ul>
7. Load Bank or load step does not give rated load.	<ul style="list-style-type: none"> <li>a. Applied load voltage is either derated or inadequate.</li> <li>b. Contactor does not close properly.</li> <li>c. Load step resistor element is open.</li> <li>d. One of the individual load branch circuit fuses is blown (if so equipped).</li> </ul>
8. Disconnect Switch fuses are blown.	<ul style="list-style-type: none"> <li>a. Fuses are undersized.*</li> <li>b. A short circuit exists in the blower or control circuit.*</li> </ul>

\* When checking fuses for continuity, be sure to remove all fuses from clips (in fuseblock or Disconnect Switch). Test each fuse individually, out of circuit. (If tested in circuit, there is the possibility of feedback which causes false readings. A blown fuse may still check out OK.)



# **DRAWINGS**

## **PROPRIETARY NOTE**

This document contains information PROPRIETARY TO Avtron Loadbank, Inc. It is furnished solely to provide information sufficient for instruction, operation, maintenance, evaluation, and testing of the equipment herein disclosed; is not to be used for manufacturing or procurement; and is not to be disclosed to anyone other than persons in the Division, or the Company, or the Government, as the case may be, responsible for action relating to this document without the express written permission of Avtron Loadbank, Inc.

Form 831A-LB Rev. 02-12





## Limited Warranty

This Warranty is given **ONLY** to purchasers who buy for commercial or industrial use in the ordinary course of each purchaser's business.

### **General:**

Avtron Loadbank branded products and systems by ASCO Power Technologies, L.P., are in our opinion the finest available. We take pride in our products and are pleased that you have chosen them. Under certain circumstances we offer with our products the following One Year Limited Warranty against defects in material and workmanship.

Please read your Warranty carefully. This Warranty sets forth our responsibilities in the unlikely event of defect and tells you how to obtain performance under this Warranty.

### **ONE YEAR LIMITED WARRANTY AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP**

### **Terms of Warranty:**

The foregoing Limited Warranty is conditioned upon User's compliance with the following:

1. The Avtron Product is deployed in accordance with Avtron specifications and state and local codes and standards, including installation by an electrician licensed in the state where used if required.
2. The Avtron Product is maintained in accordance with Avtron instructions and used under normal conditions for the purposes intended by Avtron.

As provided herein, the Avtron product is warranted to be free of defects in material and workmanship for a period of one year from date of first use by the User, or fifteen months from the date of shipment, whichever expires first. The product shipment date will be determined only from the ASCO bill of lading. If any part or portion of the Avtron product fails to conform to the Warranty within the Warranty period, ASCO, at its option, will furnish new or factory remanufactured products for repair or replacement of that portion or part. This is a parts Warranty **ONLY** that does not include services; all services shall be provided by a qualified service provider.

### **Warranty Extends to First Purchaser for Use, Non-transferable:**

This Warranty is extended to the first person, firm, association or corporation for whom the Avtron product specified herein is originally deployed for use (the "User") in the fifty United States or Canada. This Warranty is not transferable or assignable without the prior written permission of ASCO.

### **Assignment of Warranties:**

ASCO assigns to User any warranties which are made by manufacturers and suppliers of components of, or accessories to, the Avtron product and which are assignable, but ASCO makes **NO REPRESENTATIONS** as to the effectiveness or extent of such warranties, assumes **NO RESPONSIBILITY** for any matters which may be warranted by such manufacturers or suppliers and extends no coverage under this Warranty to such components or accessories.

### **Drawings, Descriptions:**

ASCO warrants for the period and on the terms of the Warranty set forth herein that the Avtron product will conform to the descriptions contained in the certified drawings, if any, applicable thereto, to ASCO's final invoices, and to applicable Avtron product brochures and manuals current as of the date of product shipment ("Descriptions"). ASCO does not control the use of any Avtron product. Accordingly, it is understood that the Descriptions are **NOT WARRANTIES OF PERFORMANCE** and **NOT WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE**.

### **Warranty Claims Procedure:**

Within a reasonable time, but in no case to exceed thirty (30) days, after User's discovery of a defect, User shall contact Avtron product service department at [www.avtronloadbank.com](http://www.avtronloadbank.com) and select the support tab or by phone at **(216) 573-7600** and request a return authorization number for products to be returned. Subject to the limitations specified herein, ASCO will repair or replace, at its option, without charge for materials, subsequent to its inspection the defective product shipped to ASCO with a return authorization number.

Avtron products shipped to ASCO without a return authorization number may be refused and returned freight collect to User at User's expense. Avtron products shipped by User to ASCO which have incurred freight damage due to User's improper packaging of the product will not be covered by this Warranty and any repairs or replacement parts, components or products needed will be invoiced in the full current price amount and returned freight collect to User.



ASCO Power Technologies  
6255 Halle Drive  
Cleveland, OH 44125

T (216) 573 7600  
F (216) 573 5953

[www.avtronloadbank.com](http://www.avtronloadbank.com)

If replacement parts, components or products are shipped or caused to be shipped by ASCO prior to inspection of the product claimed to be defective, the replacement parts, components or products shall be invoiced in the full current price amount and shipped freight collect F.O.B. ASCO's facility. If ASCO's inspection determines that the returned item(s) is covered by this warranty, User will be issued a credit in an amount equal to the parts prices previously invoiced. Warranty coverage will be provided only after ASCO's inspection discloses the claimed defect and shows no signs of treatment or use which would void the coverage of this Warranty. All defective products and component parts replaced under this warranty become the property of ASCO.

**Warranty Performance of Component Manufacturers:**

It is ASCO's practice, consistent with its desire to remedy Warranty defects in the most prompt and effective manner possible, to cooperate with and utilize the services of component manufacturers and their authorized representatives in the performance of work to correct defects in the product components. Accordingly, ASCO may utilize third parties in the performance of Warranty work, including repair or replacement hereunder, where, in ASCO's opinion, such work can be performed in less time, with less expense, or in closer proximity to the Avtron product.

**Items Not Covered By Warranty:**

THIS WARRANTY DOES NOT COVER DAMAGE OR DEFECT CAUSED BY misuse, improper application, wrong or inadequate electrical current or connection, negligence, inappropriate on site operating conditions, repair by non-Avtron designated personnel, accident in transit, tampering, alterations, a change in location or operating use, exposure to the elements, water, or other corrosive liquids or gases, Acts of God, theft, installation and/or deployment contrary to ASCO's recommendations or specifications, or in any event if the Avtron serial number has been altered, defaced, or removed.

THIS WARRANTY DOES NOT COVER shipping costs, installation costs, or maintenance or service items and further, except as may be provided herein, does NOT include labor costs or transportation charges arising from the replacement of the Avtron product or any part thereof or charges to remove or reinstall same at any premises of User.

REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT OR PART THEREOF DOES NOT EXTEND THE ORIGINAL WARRANTY PERIOD.

THE PRODUCTS LISTED IN THIS WARRANTY ARE NOT FOR USE IN THE CONTROL AREA OR ANY REACTOR CONNECTED OR SAFETY APPLICATIONS OR WITHIN THE CONTAINMENT AREA OF A NUCLEAR FACILITY OR FOR INTEGRATION INTO MEDICAL DEVICES.

**Limitations:**

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

USER'S SOLE AND EXCLUSIVE REMEDY IS REPAIR OR REPLACEMENT OF THE AVTRON PRODUCT AS SET FORTH HEREIN.

IF USER'S REMEDY IS DEEMED TO FAIL OF ITS ESSENTIAL PURPOSE BY A COURT OF COMPETENT JURISDICTION, AVTRON'S RESPONSIBILITY FOR PROPERTY LOSS OR DAMAGE SHALL NOT EXCEED THE NET PRODUCT PURCHASE PRICE.

IN NO EVENT SHALL ASCO ASSUME ANY LIABILITY FOR INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION LOST PROFITS, BUSINESS INTERRUPTION OR LOSS OF DATA, WHETHER ANY CLAIM IS BASED UPON THEORIES OF CONTRACT, NEGLIGENCE, STRICT LIABILITY, TORT, OR OTHERWISE.

**Miscellaneous:**

NO SALESPERSON, EMPLOYEE OR AGENT OF ASCO IS AUTHORIZED TO ADD TO OR VARY THE TERMS OF THIS WARRANTY. Warranty terms may be modified, if at all, only in writing signed by an ASCO officer.

ASCO obligations under this Warranty are conditioned upon ASCO timely receipt of full payment of the product purchase price and any other amounts due. ASCO reserves the right to supplement or change the terms of this Warranty in any subsequent warranty offering to User or others.

In the event that any provision of this Warranty should be or becomes invalid and/or unenforceable during the warranty period, the remaining terms and provisions shall continue in full force and effect.

This Warranty shall be governed by, and construed under, the laws of the State of New Jersey, without reference to the conflict of laws principles thereof.

This Warranty represents the entire agreement between ASCO and User with respect to the subject matter herein and supersedes all prior or contemporaneous oral or written communications, representations, understandings or agreements relating to this subject.

