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OCT 13 2000

IBC 20™
Intelligent Balance Controller

Customer Service Manual

Introduction

This manual contains customer service information for the Simco Intelligent Balance Controller, Model IBC 20 power supply. The contents of this manual are divided into sections that include both specific information and procedures for installing, operating, and maintaining the IBC 20 power supply.

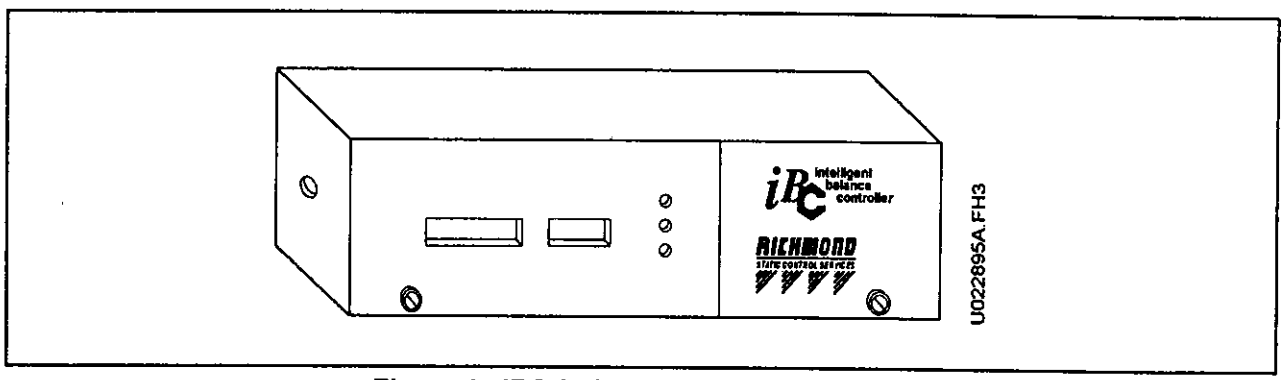


Figure 1. IBC 20 Ionization Power Supply

General Description

The IBC 20 Intelligent Balance™ Controller is a technologically advanced air ionization power supply with sensor and alarm capabilities. The IBC 20 provides the positive and negative low-current high-voltage necessary for corona ionization. The IBC 20 power supply can be used with a number of Simco air ionizers including the Simco Air Ring™, CleanTrac™, PulseBar® and the QwikTrac™ ionization bars.

Features

- A double-pole Power Entry Module with an externally accessed fuse drawer
- An internal low voltage power supply sustains a balanced ionization output even when the AC line voltage varies
- Six variable controls for adjusting the IBC 20
- Five DIP switch selections for different operating modes
- Three LEDs indicate the output and alarm status of the power supply
- A Sensor provides continuous monitoring of the ionization balance and automatically adjusts the ion voltage output
- Two HV output connectors, one positive and one negative, provide the voltage to a Simco ionizer
- A two-pin connector provides isolated relay contacts for an external alarm indicator

Specifications

Table 1
IBC 20 Specifications

Characteristic	Description
Input Voltage	115 VAC (± 15%) at 50/60 Hz (factory selected) 230 VAC (± 10%) at 50/60 Hz (factory selected)
Power Consumption	23 Watts nominal (50 Watts maximum)
Output Voltage	± 3.5 KV minimum, ± 12 KV maximum (no load)
Output Current	10 uA nominal operating (3 uA to 40 uA range) both polarities
Current Protection	Two 315 mA/250V Fuses (Power Entry Module) One 400 mA/250 V Fuse (PC Board)
Operating Temperature	32° to 158° F (0° to 70° C) ambient
Relative Humidity	0% to 85% non-condensing
Weight	2 lbs, 1 oz (.94 kgs)
Dimensions	7.00" x 3.7" x 2.6" (177,8 x 94 x 66 mm)
Ionization Balance *	0 V ± 10V (typical)
Alarm Contact Rating	0.5 Amp at 125 VAC; 1 Amp at 24 VDC

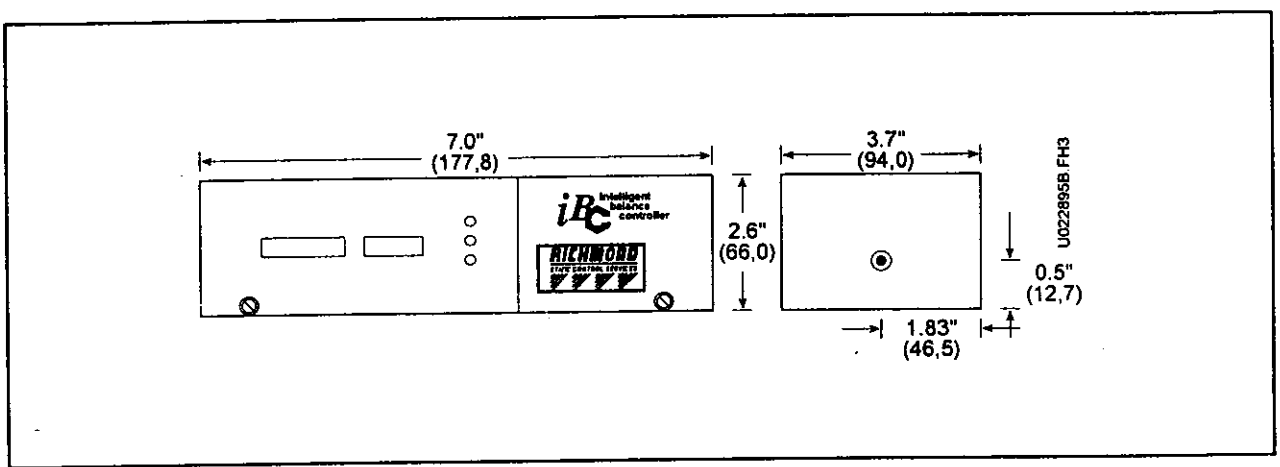


Figure 2. IBC 20 Dimensions

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

Operational Safety

Please take the time to read and understand this manual before installing and operating the IBC 20 power supply. To avoid personal injury or damage to the equipment, **do not** perform any servicing other than as instructed in this manual.



WARNING!

***Do not** operate the IBC 20 power supply in any manner other than as prescribed in this manual.*

***Do not** open the IBC 20 power supply case. No user serviceable parts inside. Violation voids all warranties and may cause damage to this or other equipment, or may result in personal injury due to electric shock.*

***Do not** operate the IBC 20 power supply until all electrical and mechanical connections are complete and secure.*



***Do not** operate the IBC 20 or its ionizer in an area where volatile chemicals or explosives are present.*

***Do not** expose the IBC 20 power supply to excessive moisture and **do not** submerge in any liquid. Personal injury due to electric shock or damage to the equipment may result.*

***Do not** connect or disconnect either of the two HV connectors when the IBC 20 power is **on**. Damage to this equipment or other devices that are ESD sensitive may result.*

***Do not** apply power when servicing the IBC 20 power supply or its ionizer. Be sure to turn **off** the IBC 20 Power switch and disconnect the IBC 20 power cord to prevent personal injury due to electric shock or damage to the equipment.*



Important!

*The IBC 20 power cord and the AC outlet to be used must be properly grounded and phased to ensure proper operation. **Do not** use an extension cord, receptacle adapter, or other outlet that does not use, or exposes any part of, all three prongs of the AC plug or outlet.*

Installation

The IBC 20 is shipped from the factory with two mounting brackets and two lengths of cleanroom approved Velcro®. Either or both can be used to mount the IBC 20 power supply on a wall or other flat surface. Two 6-32 x 1/4" stainless-steel screws are also provided to fasten the mounting brackets to the ends of the IBC 20 case. The IBC 20 should be mounted so that access to the controls is not obstructed.

1. Turn off the IBC 20 Power switch (push in the "O" on the switch for off).
2. Determine a suitable location for mounting the IBC 20. Use the mounting holes in the supplied brackets as a template to mark the mounting surface. The IBC 20 weighs about two pounds (.9 kgs), make sure that the mounting surface material can support the weight of the unit.
3. Drill both holes to the specifications of the mounting hardware. The minimum mounting screw size is #6 x 1/2". Hollow wall anchors, molly, and toggle bolts may also be used.
4. Connect the ionizer HV cable to the IBC 20 as follows:

Note

*The female HV receptacles in the IBC 20 are **not** dimensionally compatible with male HV plugs from Simco Ionizers manufactured prior to October 1993. A connector adaptor is available from Simco. Refer to the Parts and Accessories section in this manual.*

   a. Insert both HV plugs from the ionizer into their mating connectors on the side of the IBC 20. (NOTE: The air ring ionizer polarity does not matter. Either HV connector can be plugged into either the positive or negative HV receptacle.)
   b. If an ionizer cable has a ground wire, fasten it to one of the two IBC 20 mounting bracket screws and tighten securely.
   c. If the ionizer has an ion sensor cable, insert the ionizer sensor plug into the IBC 20 connector marked "Sensor".
   d. If the alarm contacts are to be used, install the Molex connector for connection to the power supply (not suppled by SIMCO). (See Table 1 for contact ratings.)

5. Plug the IBC 20 power cord into the Power Entry Module on the connector panel side of the IBC 20.
6. Plug the IBC 20 power cord into an appropriately **grounded** AC outlet of the correct voltage and phase. **Do not** turn on the IBC 20 at this time.
7. Check that the ionizer cable and the IBC 20 power cord are properly routed and secured away from any moving parts. Verify that both the IBC 20 and its ionizer are securely mounted.
8. Proceed to the Operating and Test section for IBC 20 operating intructions.

Optional Equipment and Accessories

Additional fuses for the Power Entry Module can be purchased from Simco or a local retail electronics store. Refer to the Replacement Parts section in this manual.

A potentiometer (trimmer) adjustment tool for adjusting the controls can be purchased from Simco or a local retail electronics store. Refer to Appendix A, Replacement Parts in this manual.

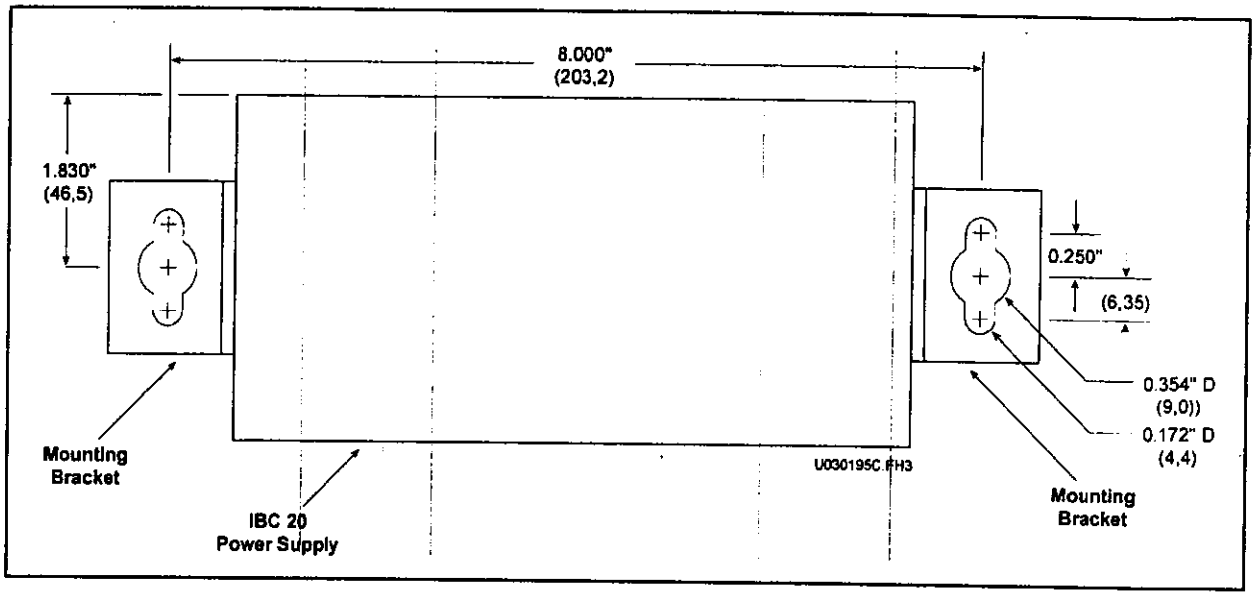


Figure 3. IBC 20 Mounting Dimensions

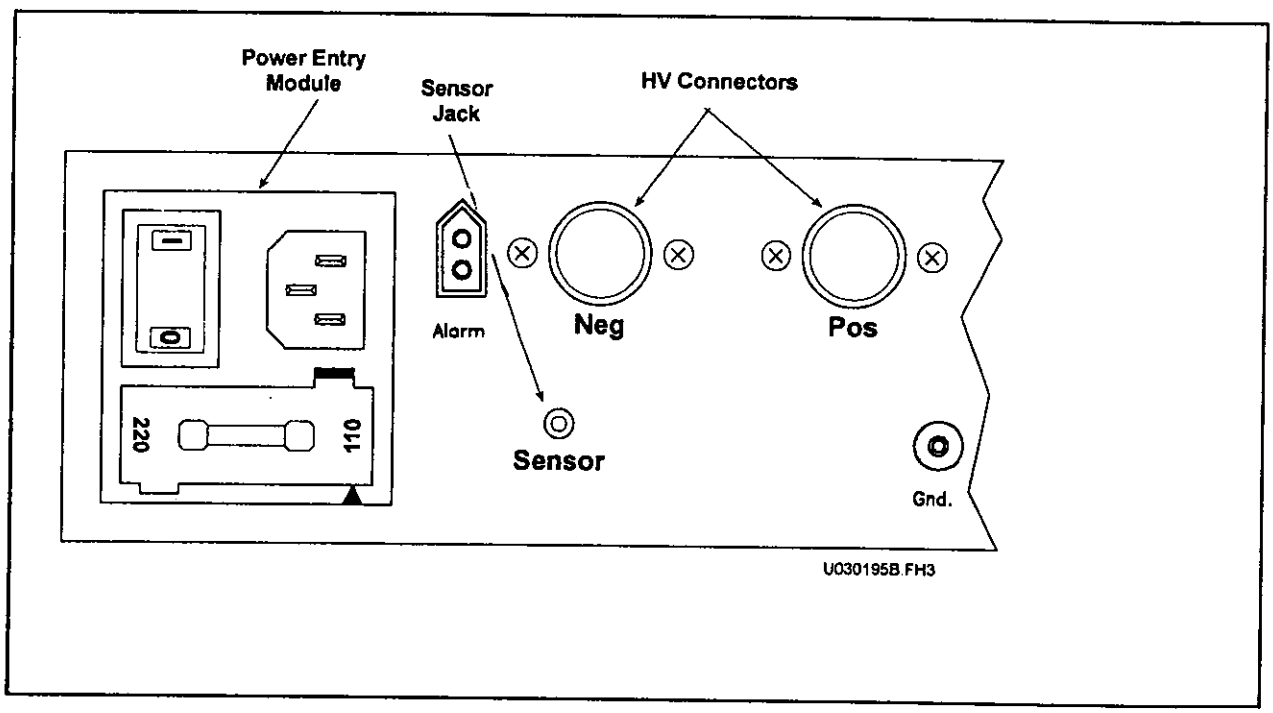


Figure 4. IBC 20 Connector Panel View

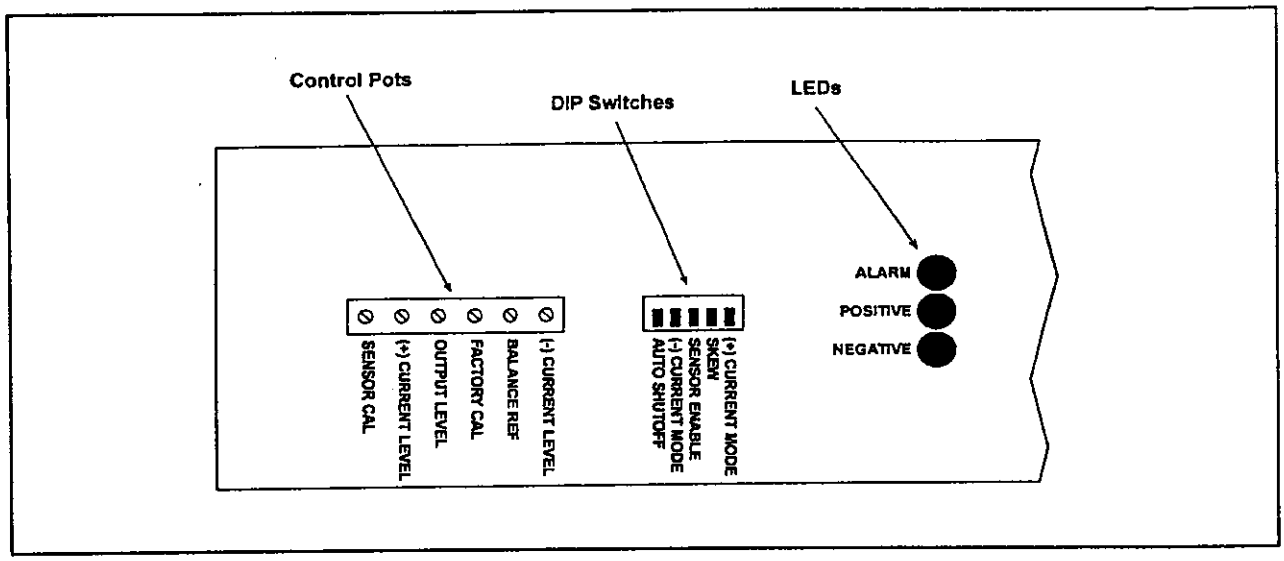


Figure 5. IBC 20 Control Panel

Controls and Functions

Operating Modes and Adjustments

The IBC 20 has five externally accessed DIP switches that determine the various modes for normal operation and adjustment setup. A DIP switch is *off* in the up position or *on* in the down position. Use a potentiometer adjustment tool or a #1 flat-blade screwdriver to select switches and adjust the potentiometers.

Sensor Mode

DIP switches S1-4 **on**, S1-1 and S1-3 **on** or **off**, S1-2 and S1-5 **off**. The Sensor mode is for use when:

- The Simco ionizer has a sensor, and
- The ionizer has anywhere from one to twenty emitter pairs.

Any imbalance in the ion current is detected by the external sensor. The sensor voltage is applied through a high-impedance amplifier to the skew control circuit. This adjusts both high voltage outputs, bringing the IBC 20 back into balance. The skew correction is determined by using a Charge Plate Monitor and by adjusting the Sensor Cal pot.

The Sensor mode is highly stable, allowing minimum drift (0 V ± 10 V upon initial setup and up to ± 25 V over 90 days typical *). The IBC 20 should be operated in this mode whenever an ionizer has sensor capability.

Dual Current Feedback Mode

DIP switches S1-2 and S1-5 **on**, S1-1 **on** or **off**, S1-3 and S1-4 **off**. The Dual Current Feedback mode is for use when:

- The Simco ionizer does not have a sensor, and
- Three or more emitter pairs for the ionizer are used.

This is the normal internal control mode. Both the positive and negative near-balanced ion currents are regulated by internal feedback loops. Refer to the Manual Mode for use with one or two emitter pairs.

Manual Mode

All DIP switches **off** (up). The Manual mode is for use when:

- The Simco ionizer does not have a sensor, and
- Only one or two emitter pairs for the ionizer are used.

In this mode, the power supply operates without feedback control.

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

Auto Shutoff Mode

When using this mode with a unit having a sensor, you must first switch on S1-3 DIP Switch then S1-1 DIP Switch. This must be done in this order for units having a sensor. When Auto-Shutoff Enable switch S1-1 is on, any alarm condition shuts down the high voltage modules through their control circuits. The Auto Shutoff mode can be used when operating the IBC 20 in the Sensor mode, or the Dual Current Feedback mode, or the Manual mode. Select the Auto Shutoff mode only after adjusting the IBC 20 for ion balance to prevent the automatic shutdown of the HV outputs.

Sensor Alarm Mode

DIP switch S1-3 **on**, any others **off** or **on**. The Sensor Alarm mode verifies that the internal sensor circuitry is functioning properly. It detects when the sensor voltage is too high such as when something interferes with the sensor itself. The Sensor Alarm mode works with the Sensor mode and affects the Auto Shutoff mode as well. The red Alarm LED turns on when a sensor problem occurs. **Do not** use this mode when operating the IBC 20 with an ionizer that does not have a sensor or when using the Dual Current Feedback or Manual modes.

LED Indicators

Positive Drive (yellow) and Negative Drive (green)

The level of brightness of these two LEDs indicates the level of the input currents of the high voltage modules. A slightly unsteady light indicates that some control loop is operating and controlling the output levels. A large difference in brightness normally indicates an imbalance somewhere in the system.

Alarm (red)

This alarm light triggers when any of three internal alarm circuits detect an error. These include the balance alarm comparator, the low-current comparator, and the sensor comparator.

- The **Balance Alarm** triggers when an imbalance between ion currents and their internal references exceed a factory preset level or range. An internal Balance Alarm Level circuit, determines the range of the alarm level. The Balance Alarm Reference potentiometer, VR5, (Simco use only) adjusts the offset or center of the alarm. The sensitivity of this alarm depends on the type of ionizer in use.
- The **Low Output Alarm** triggers when the total positive and negative ion currents become smaller than a preset value. This alarm has no offset or sensitivity adjustment.
- The **Sensor Alarm** triggers when the amplified signal detected by the sensor exceeds a preset value. This alarm automatically zeroes when Sensor potentiometer, VR1, is adjusted for the Sensor mode. This alarm itself has no offset or sensitivity adjustment. The Sensor Alarm is enabled only when DIP switch S1-3 is on (Sensor Alarm mode).
- The Alarm Contacts can be used to provide a remote indication of the Alarm state. When the Alarm LED (red) turns on, the contacts close; thus closed contacts indicate the same conditions as when the Alarm LED is on, as described above.

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

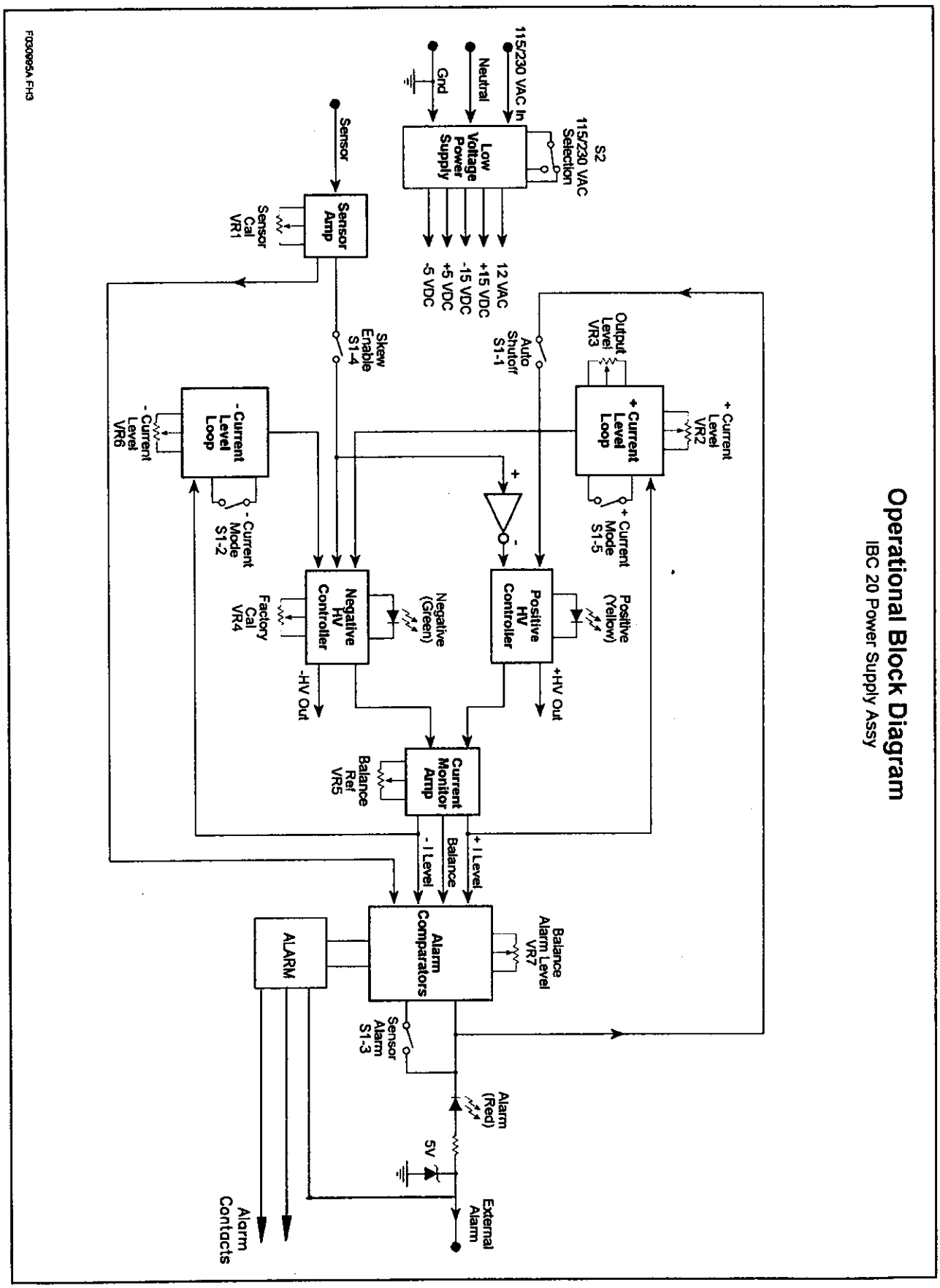


Figure 6. IBC 20 Operational Block Diagram

Operation and Test

The following section gives the theory of operation for the IBC 20 Power Supply, the operating and adjustment instructions, and a simple test and verification procedure using a Charge Plate Monitor.

Theory of Operation

The purpose of the IBC 20 Power Supply is to provide positive and negative low-current high-voltage to an ionizer from which a balanced flow of positive and negative air ions is directed toward a target area to neutralize electrostatic charges in that area.

Two high voltage modules (DC/DC converters), one positive and one negative, provide the outputs. The high voltages and the dependent ion flow is maintained in balance by control circuits that respond to either an external sensor or an internal current regulating amplifier. Any imbalance in ion production can be externally monitored by:

- Measuring the voltage generated on a charge plate monitor positioned as near as possible to the target area (refer to ESD Association Standard 3.1).
- Measuring the current detected by a sensor placed in the ion flow near the ionizer. This is typically accomplished by an Simco ionizer with a built-in sensor that is plugged into the IBC 20 power supply.

The IBC 20 power supply can operate in several modes depending on the settings of DIP switches S1-1 through S1-5. A switch is **off** in the up position or **on** in the down position. Six adjustable controls (potentiometers) allow complete ion balancing of the IBC 20 power supply using an ionizer with or without a sensor.

Operating Instructions - Sensor Mode
(for use with ionizers that have a sensor)

The following procedure is for operating the IBC 20 power supply when using an ionizer with a sensor that is connected to the IBC 20. The primary mode of operation is the Sensor mode. A Charge Plate Monitor or equivalent test equipment is required to verify and balance the IBC 20 output. Should the IBC 20 not perform as specified, refer to the Diagnostics section in this manual or contact Simco.

1. Set the DIP switches for IBC 20 as follows:
   - S1-1 **off** to disable the Auto Shutoff mode
   - S1-2 **off** to disable the (-) Current for the Dual Current Feedback mode
   - S1-3 **on** to enable or **off** to disable the Sensor Alarm mode
   - S1-4 **on** to enable the Sensor mode
   - S1-5 **off** to disable the (+) Current for the Dual Current Feedback mode
2. Turn **on** the IBC 20 Power switch (push in the "I" on the switch for on). The Pos and Neg LEDs (yellow and green) on the side of the unit light up, indicating that both HV outputs are working. It is normal for the Alarm LED (red) to be either off or on at this time.

   The IBC 20 immediately begins supplying positive and negative low-current high-voltage to the ionizer. As it does so, the internal sensor feedback circuitry automatically makes the necessary electronic adjustments to provide a low ionization balance at the fastest possible decay times. When balanced, the Alarm LED turns off.

3. Measure the decay times and the ionizing voltage offset using a Charge Plate Monitor (CPM). Refer to the Test and Verification procedure for CPM operating instructions and correct usage.

Note

The IBC 20 is pre-adjusted at the factory to be close to a desired ion balance of 0V ± 10V for ionizers with a sensor. However, if necessary, adjust the Sensor Cal pot while viewing a CPM to obtain the lowest possible voltage offset for a particular ionization setup or location.*

4. Very slowly adjust the Sensor Cal pot either clockwise or counterclockwise for 0V ± 10V* while viewing the CPM. Because of the sensitivity of the internal IBC 20 circuitry and the slight delay for the CPM to register a change in the ion balance, adjust the Sensor Cal pot no more than 1/8th turn at a time. For accuracy, wait at least one minute between adjustments to let the IBC 20 and the CPM stabilize. After obtaining a desired balance, proceed to Step 5.

Note

If the CPM registers wide swings in the balance when adjusting the Sensor Cal pot, check the sensor cable or connection for either a short or open circuit.

5. Turn on S1-1, if desired, to enable the Auto Shutoff mode after all adjustments have been made.

Operating Instructions - Dual Current Feedback Mode
(for use with ionizers that do not have a sensor)

The following procedure is for operating the IBC 20 power supply using an ionizer that does not have a sensor. The primary mode of operation is the Dual Current Feedback mode when the ionizer has anywhere from three to twenty emitter pairs. A Charge Plate Monitor or equivalent test equipment is required to verify and balance the IBC 20 output. Should the IBC 20 not perform as specified, refer to the Diagnostics section in this manual or contact Simco.

1. Set the DIP switches for IBC 20 as follows:
   - S1-1 **off** to disable the Auto Shutoff mode
   - S1-2 **on** to enable the (-) Current for the Dual Current Feedback mode
   - S1-3 **off** to disable the Sensor Alarm mode
   - S1-4 **off** to disable the Sensor mode
   - S1-5 **on** to enable the (+) Current for the Dual Current Feedback mode
2. Turn on the IBC 20 Power switch (push in the "I" on the switch for on). The Pos and Neg LEDs (yellow and green) on the side of the unit light up, indicating that both HV outputs are working. It is normal for the Alarm LED (red) to be either off or on at this time.

   The IBC 20 immediately begins supplying positive and negative low-current high-voltage to the ionizer. As it does so, the internal dual current feedback circuitry automatically provides a low ionization balance at the fastest possible decay times. If balanced, the Alarm LED turns off. However, the Alarm LED remains on if out of balance until adjustments are made to balance the offset voltage.
3. Measure the decay times and the ionizing voltage offset using a Charge Plate Monitor (CPM). Refer to the Test and Verification procedure for CPM operating instructions and correct usage.

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

4. Very slowly adjust the (-) Current Level pot either clockwise to increase or counterclockwise to decrease the negative current level to obtain an ion offset voltage of 0V ± 10V* while viewing the CPM. Because of the sensitivity of the internal IBC 20 circuitry and the slight delay for the CPM to register a change in the ion balance, adjust the (-) Current Level pot no more than 1/8th turn at a time. For accuracy, wait at least one minute between adjustments to let the IBC 20 and the CPM stabilize.

   If a specific ion balance cannot be obtained using (-) Current Level pot, it may be necessary to adjust the (+) Current Level pot. Use the same technique for adjusting the (+) Current Level pot as described for the (-) Current Level pot.

Note

Try to use only the (-) Current Level pot. Excessive current levels can overdrive the ion voltage output, causing improper operation.

Operating Instructions - Manual Mode
(for use with ionizers that do not have a sensor)

The following procedure is for operating the IBC 20 power supply using an ionizer that does not have a sensor. The primary mode of operation is the Manual mode when the ionizer has either one or two emitter pairs. A Charge Plate Monitor or equivalent test equipment is required to verify and balance the IBC 20 output. Should the IBC 20 not perform as specified, refer to the Diagnostics section in this manual or contact Simco.

1. Set the DIP switches for IBC 20 as follows:
   - S1-1 **off** to disable the Auto Shutoff mode
   - S1-2 **off** to disable the (-) Current for the Dual Current Feedback mode
   - S1-3 **off** to disable the Sensor Alarm mode
   - S1-4 **off** to disable the Sensor mode
   - S1-5 **off** to disable the (+) Current for the Dual Current Feedback mode
2. Turn **on** the IBC 20 Power switch (push in the "I" on the switch for on). The Pos and Neg LEDs (yellow and green) on the side of the unit light up, indicating that both HV outputs are working. It is normal for the Alarm LED (red) to be either off or on at this time.

   The IBC 20 immediately begins supplying positive and negative low-current high-voltage to the ionizer. As it does so, the internal dual current feedback circuitry automatically provides a low ionization balance at the fastest possible decay times. If balanced, the Alarm LED turns off. However, the Alarm LED remains on if out of balance until adjustments are made to balance the offset voltage.
3. Measure the decay times and the ionizing voltage offset using a Charge Plate Monitor (CPM). Refer to the Test and Verification procedure for CPM operating instructions and correct usage.
4. Make either or both of the following adjustments only as necessary. **Do not** adjust the control pots any more than 1/8th turn at a time. For accuracy, wait at least one minute between adjustments to let the IBC 20 and the CPM stabilize.
   a. Adjust the manual balance potentiometer, clockwise or counterclockwise to balance the positive and negative ion current output.
   b. Adjust the Output Level pot, clockwise to increase or counterclockwise to decrease the positive and negative output voltage simultaneously.
   c. Repeat Steps 4a or 4b as needed.
5. Turn **on** S1-1, if desired, to enable the Auto Shutoff mode after all adjustments have been made.

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

Test and Verification

The IBC 20 power supply is preset at the factory to operate with an Air Ring or a specific length CleanTrac bar. There is a label on the side of the IBC 20 power unit which identifies the CleanTrac bar for which the IBC 20 has been calibrated. If adjustments are necessary to "fine tune" an ionizer, this test and verification procedure gives adequate instructions to verify that the IBC 20 and its connected ionizer are functioning within specification.

General

This procedure offers a way to measure the performance of the IBC 20 power supply. The ionization output of any ionizer can be accurately checked with a Charge Plate Monitor (CPM). The following tests are recommendations based on test methods set forth by ESD Association Standard 3.1 (1992).

Should any of the ionization tests fail to meet the criterion listed in the Specifications Table, refer to the appropriate Operating Instructions procedure previously described in this manual. Should the power supply malfunction, refer to the Diagnostics section in this manual or contact Simco.

Suggested Test Equipment

- Charge Plate Monitor (Simco Model EA-3 or Richmond Model TI-7000)
- TI800 Current Meter

CAUTION

Make certain that any moving or stationary objects, including yourself, ***do not*** *come in contact with the charge plate or its cable when performing these tests. Damage to the equipment or personal injury may occur.*

Charge Plate Monitor (Richmond TI-7000)

The Charge Plate Monitor (CPM) provides precise measurements of decay times and offset voltages. The following procedure uses an Richmond Model TI-7000 Charge Plate Monitor. If using a different CPM, refer to the operating instructions provided with that particular model. The following tests are based on using the IBC 20 power supply with a small ionizer such as the Simco Model AR 1000 Air Ring Ionizer.

This test setup uses a 1 KV charge with decay time measurements to 100 V (10%). If required for room ionizers, use a 5 KV charge with decay time measurements to 500V (10%) or less. Charge Plate Controls also need to be changed accordingly (refer to the CPM Operating Instructions).

1. Place the charge plate within the area prescribed for ionization.

Note

The decay times observed using the CPM Remote Test Probe are approximately 6 to 8 times longer than if checked with the standard 6" x 6", 20pf charge plate (as specified in ESD Association Standard 3.1). This is because the sensor is 1/6th the size of the charge plate and has the additional capacitance of the cable. The times listed in the specifications do not reflect this difference.

* *As measured by ESD Association Standard 3.1 Test Method using Simco AR 1000 with IBC 20 in Sensor Mode. Actual balance may vary using different ionizers.*

2. Set the controls on the charge plate monitor as follows:
   - Plate Voltage meter to the 2 KV scale (in)
   - Normal/Peak to the Norm position (out)
   - Timer Limit to the 1 KV - 100 V position (in)
   - Plate Control to the Zero position (in)
   - Polarity to + (in).
3. Turn on the CPM Power switch.
4. Allow the CPM to warm up for at least five minutes. After warm up, check the Plate Voltage meter to verify that the plate voltage reads 0V ± 5V. Should the plate voltage require adjusting, use a small #1 screwdriver or trimmer adjustment tool to adjust the Zero pot located just under the charge plate toward the front right side. Clockwise increases the voltage. Counterclockwise decreases the voltage. Let the CPM stabilize for at least one minute between "zero" adjustments. Repeat as necessary.
5. Let the CPM stabilize for at least ten minutes before beginning the decay time tests and the balance test.

Decay Times

Testing the decay times of an ionizer primarily verifies that both positive and negative polarities of the power supply are working correctly. Testing for positive decay times checks that the negative ionization is working. Conversely, testing for negative decay times checks that the positive ionization is working. Although you can check any polarity at any time, for the sake of this procedure, the positive polarity is checked first.

Positive Decay Times

1. Press the Polarity button (in) to select the positive (+) polarity.
2. Press the Charge button (Plate Control) to charge the plate with a positive voltage.



CAUTION

HIGH VOLTAGE! ***Do not*** *touch the charge plate with any object, including yourself, while it is charged. An electric discharge occurs, causing a mild shock to people or an electric arc to metal objects.*

3. Adjust the Plus Plate Voltage control until the Plate Voltage meter reads at least +1,000 volts (+1 KV), but no more than +1,500 volts. Clockwise increases the voltage. Counterclockwise decreases the voltage.
4. Press the Decay button (Plate Control) and observe the Seconds meter. As the plate voltage drops below +1 KV due to ionization, the time it takes for the plate to reach +100 volts (10% of +1000V) appears on the meter.

Note

The timer begins counting in seconds only when the plate voltage falls below the 1 KV mark. It continues counting until the voltage crosses the 100 V mark, where, at that point, it stops counting. Although the timer stops counting, the Plate Voltage meter continues to monitor the status of the ionization process.

5. Log the positive decay time for future reference.
6. Press the Zero button (Plate Control) to zero the charge plate.

Negative Decay Times

1. Press the Polarity button (out) to select the negative (-) polarity.
2. Press the Charge button (Plate Control) to charge the plate with a negative voltage.



CAUTION

HIGH VOLTAGE! Do not *touch the charge plate with any object, including yourself, while it is charged. An electric discharge occurs, causing a mild shock to people or an electric arc to metal objects.*

3. Adjust the Minus Plate Voltage control until the Plate Voltage meter reads at least -1,000 volts (-1 KV), but no more than -1,500 volts. Clockwise increases the voltage. Counterclockwise decreases the voltage.
4. Press the Decay button (Plate Control) and observe the Seconds meter. As the plate voltage drops below -1 KV due to ionization, the time it takes for the plate to reach -100 volts (10% of -1000V) appears on the meter.

Note

The timer begins counting in seconds only when the plate voltage falls below the 1 KV mark. It continues counting until the voltage crosses the 100V mark, where, at that point, it stops counting. Although the timer stops counting, the Plate Voltage meter continues to monitor the status of the ionization process.

5. Log the negative decay time for future reference.
6. Press the Zero button (Plate Control) to zero the charge plate.

Offset Voltage (Ion Balance)

1. Press the Zero Button (Plate Control) to clear the charge plate of any residual voltage. Again, verify that the plate's zero calibration is 0V ± 5V.
2. Press the Decay button (Plate Control). The voltage on the Plate Voltage meter fluctuates slightly as the ionization counters a charge on the plate.
3. Observe the Plate Voltage meter. Determine whether the average voltage is more positive, more negative, or zero.
4. Record the readings for future reference.

Conclusion

- If the ion balance (offset voltage) and decay times are acceptable, the Test and Verification procedure is complete.
- If any of the ionization readings are not within specification, refer to the appropriate Operating Instructions procedure in this manual.

This concludes the Test and Verification procedure for the IBC 20 power supply. Because there are so many elements that can affect the ionization process, including environmental conditions (humidity, temperature, etc.), there are no absolute settings. However, the procedures in this manual provide specifications for optimum ionization and performance.

Cleaning and Maintenance

Periodic maintenance of the IBC 20 is recommended to help ensure optimum ionization and ion balance. Harsh environmental conditions such as high temperature, high relative humidity, airborne contaminates, etc., can have an affect on the IBC 20 and the ionizer performance. Although the following maintenance criteria is suggested, a more frequent schedule may be required if unfavorable environmental conditions prevail. Refer to the Ionizer Instructions for its maintenance details.

CAUTION



*To avoid possible electric shock, make certain that the IBC 20 Power switch is **off** or the unit is unplugged from an AC outlet prior to any major cleaning of the unit, or when disconnecting one of its ionizer cables, or when servicing the ionizer itself.*

Clean the exterior of the IBC 20 every 90 days or as necessary using a soft, lint-free cloth moistened with deionized water. Simco recommends verifying the IBC 20 for proper ionization balance and decay times at least on a monthly basis. Test and adjustment of the IBC 20 should be performed as needed.

Removal and Replacement

Fuses

To remove and replace the fuses in the Power Entry Module, refer to Figure 7 and proceed as follows:

1. Turn **off** the IBC 20 Power switch.
2. Unplug the power cord from the Power Entry Module (PEM).
3. Check to see which fuse drawer voltage markings (110 or 220) are adjacent to the arrow on the PEM.
4. Remove the fuse drawer from the PEM using a small, #1 flat-blade screwdriver as follows:
   a. Insert the screwdriver into the slot between the drawer and the receptacle.
   b. Gently pry the drawer out by pushing the screwdriver down across the receptacle until the drawer "pops" out.
5. Lift the black plastic retainer on the fuse drawer while simultaneously pulling outward on the fuse carriage. Figure 8 shows the fuse drawer disassembly.
6. Remove the blown fuse or fuses from the fuse carriage and discard.
7. Install two 315 mA, 250V "slo-blo" fuses (5x20 mm or 2 AG) into the fuse drawer. Be sure both fuses are against the solid plastic end and that each fuse end has metal to metal contact.
8. Insert the fuse carriage into the fuse drawer. The retainer "clicks" when the carriage is all the way into the drawer.
9. Insert the fuse drawer into the PEM so that the **110** marking is adjacent to the arrow for 110 VAC operation or **220** for 220 VAC operation. The fuse drawer "clicks" into place when properly installed.
10. Plug the power cord into the PEM.
11. Turn **on** the IBC 20 Power switch.
12. Verify the IBC 20 power supply is operating by observing that the yellow and green LEDs are on.
    - If they are off, repeat Step 1 through Step 5 and check for proper fuse installation.
    - Verify that both fuses are good.
    - Repeat Step 6 through Step 12 for assembly.
    - If the unit still does not operate, refer to the Diagnostics section in this manual for troubleshooting information or contact Simco.

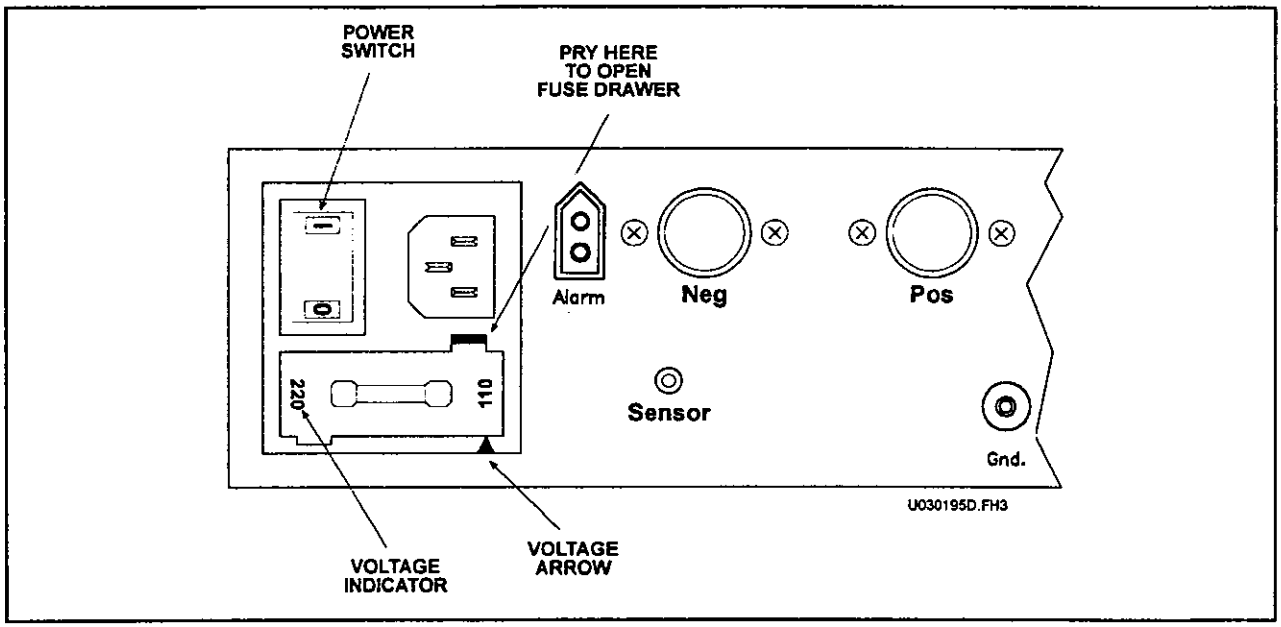


Figure 7. Fuse Drawer Removal

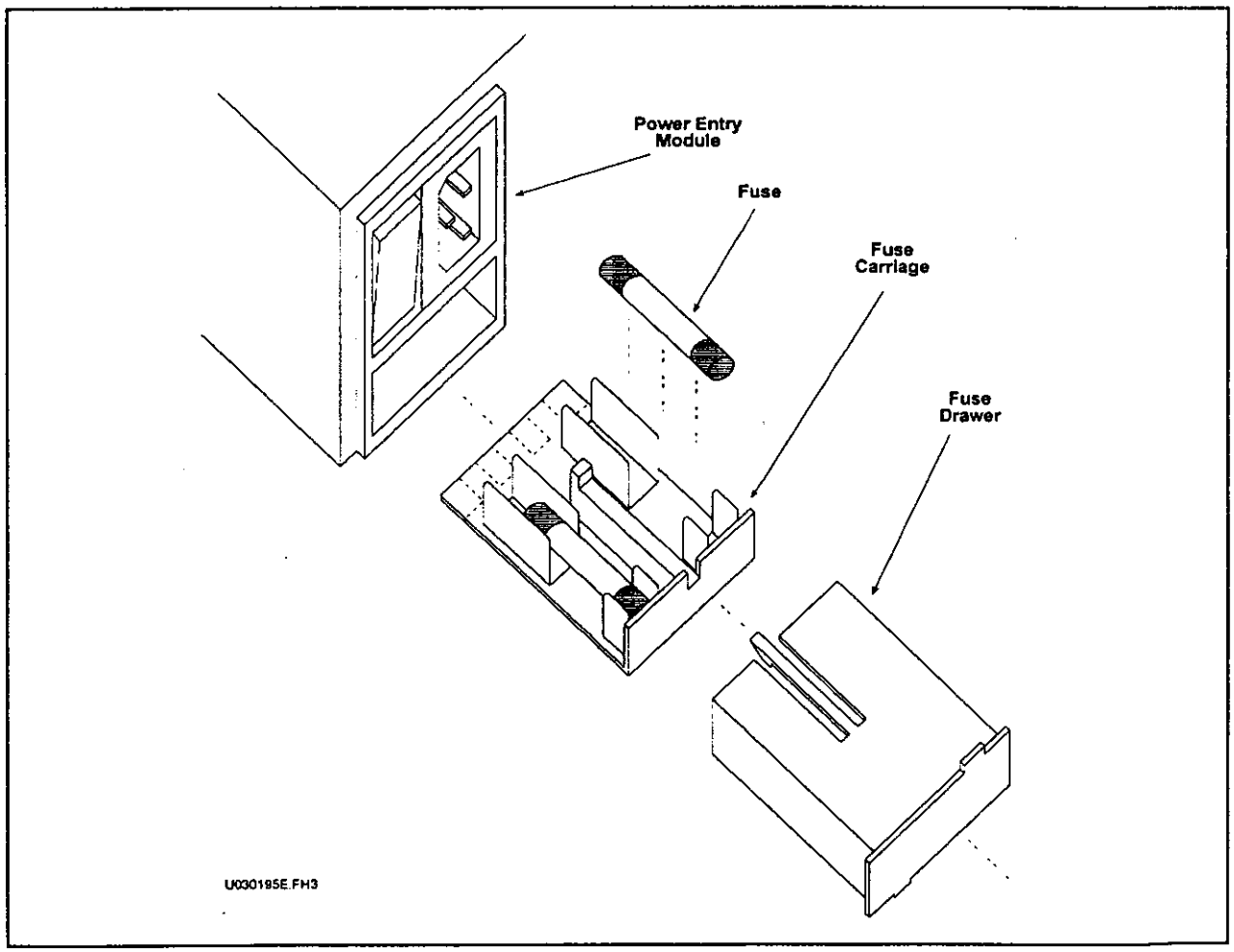


Figure 8. Fuse Removal and Replacement

Diagnostics

Table 2 is a Troubleshooting Reference for the IBC 20. If the suggested solutions do not remedy the problem, call SIMCO Customer Service at 800-538-0750 or 215-997-0590. DO NOT TRY TO SERVICE ANY INTERNAL COMPONENT. Opening the IBC 20 voids all warranties and may damage the equipment or result in personal injury.

Table 2
Troubleshooting

Symptom	Possible Cause/Solution
LEDs do not light upon power up	No power. Check power cord. Check fuses. Check power outlet for correct line voltage. Auto Shutoff mode may be on (S1-1).
Only one LED is on.	An HV output may be shorted. Check ionizer cable. Check ionizer itself. The power supply is faulty.
One LED significantly brighter than the other.	Indicates an ion voltage imbalance. Refer to the Operating Instructions procedure. Check ionizer.
Arc sound upon power up or while unit is on.	Turn **off** immediately! Faulty ionizer cable or routing. Faulty or damaged ionizer, or incorrect placement. Check cable distribution and ionizer placement.
Emitters make a hissing sound.	Ionizer voltage may be too high (Output Level pot misadjusted). Ionizer emitters are dirty or close to contacting an object. Clean and inspect ionizer emitters.
Pos and Neg LEDs on, but only one output.	Check DIP switch settings. Ionizer cable disconnected from power supply. Check cable's connectors. Ionizer or power supply faulty.
Alarm LED always on.	Check DIP switch settings. Sensor Cal pot or others are misadjusted. Ionizer's sensor is faulty. Foreign contact with sensor.
Sensor Cal pot has little or no effect.	Check DIP switch settings. Contact Simco.
(+) Current Level pot has no effect.	Check DIP switch settings. Contact Simco.
Output Level pot has little or no effect.	Check DIP switch settings. Contact Simco.
Manual Balance pot has no effect.	Check DIP switch settings. Contact Simco.
Balance alarm Ref pot has little or no effect.	Check DIP switch settings. Contact Simco.
(-) Current Level pot has no effect.	Check DIP switch settings. Contact Simco.
Balance Alarm Level pot has no effect.	Check DIP switch settings. Contact Simco.

Appendix A - Parts

As stated before, the IBC 20 power supply contains no user serviceable parts inside. However, external parts are readily available through you local Simco distributor or directly from Simco. When ordering from Simco, please contact our Sales department for prompt customer service.

Replacement Parts

Part Number	Description
4610862	315 mA, 250V, 5 x 20 mm SB Fuse (two required)
5050520	115 VAC Power Cord
5050521	230 VAC Power Cord
5050518	IBC 20 Mounting Bracket (1 pair)
4640035	6-32 x 1/4" Stainless Steel Mounting Screw (2 required)
4671213	Clean room Velcro (12")
	Operating Instructions
	IBC 20 Technical Service Manual

Accessories

Part Number	Description
4105979	HV-2, Two to One HV Adapter (new style) (1 pair)
4105980	HV-4, Four to One HV Adapter (new style) (1 pair)
5050532	Ext-6, 6 ft. (1.8M) HV Extension Cable without Ground
5050533	Ext-12, 12 ft. (3.6M) HV Extension Cable without Ground
5050534	Ext-18, 18 ft. (5.5M) HV Extension Cable without Ground
213046	EC-6, 6 ft. (1.8M) HV Extension Cable with Ground
213047	EC-12, 12 ft. (3.6M) HV Extension Cable with Ground
213048	EC-18, 18 ft. (5.5M) HV Extension Cable with Ground

Alarm Connector Mating Parts (not supplied by SIMCO):

PN 03-06-2023 Molex Mating Connector, free-hanging plug
PN 02-06-6103 Molex Receptacles, (18-24 AWG)

Warranty

SIMCO warrants its products to be free of defects in components, workmanship, or materials for a period of one year from the date of purchase. This warranty does not apply to any physical or electrical damage done to the product through misuse or abuse or negligence (such as any modifications made to the unit or service work done by any other than SIMCO authorized technicians). Any unit that has had its serial number altered or removed will be ineligible for warranty.

SIMCO will not be liable for loss or damage due directly or indirectly to an occurrence or use for which the product is not designed or intended. In no event shall SIMCO be liable for incidental or consequential damages except where state laws override.

This warranty extends to the original purchaser and is not transferable. No person, agent, distributor, dealer or company is authorized to change, modify, or amend the terms of this warranty in any manner whatsoever.

All product returned must have an "RA" (Return Authorization) number regardless of its warranty status. Refer to the customer service information in this manual.

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