A.0 Disclaimer / Standard Warranty

CE certification

The equipment listed as CE certified means that the product complies with the essential requirements concerning safety and hygiene. The European directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

ETL certification

The equipment listed as ETL certified means that the product complies with the essential requirements concerning safety and FAA Airfield regulations. The FAA directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

All Products Guarantee

ADB SAFEGATE will correct by repair or replacement per the applicable guarantee above, at its option, equipment or parts which fail because of mechanical, electrical or physical defects, provided that the goods have been properly handled and stored prior to installation, properly installed and properly operated after installation, and provided further that Buyer gives ADB SAFEGATE written notice of such defects after delivery of the goods to Buyer. Refer to the Safety section for more information on Material Handling Precautions and Storage precautions that must be followed.

ADB SAFEGATE reserves the right to examine goods upon which a claim is made. Said goods must be presented in the same condition as when the defect therein was discovered. ADB SAFEGATE furthers reserves the right to require the return of such goods to establish any claim.

ADB SAFEGATE's obligation under this guarantee is limited to making repair or replacement within a reasonable time after receipt of such written notice and does not include any other costs such as the cost of removal of defective part, installation of repaired product, labor or consequential damages of any kind, the exclusive remedy being to require such new parts to be furnished.

ADB SAFEGATE's liability under no circumstances will exceed the contract price of goods claimed to be defective. Any returns under this guarantee are to be on a transportation charges prepaid basis. For products not manufactured by, but sold by ADB SAFEGATE, warranty is limited to that extended by the original manufacturer. This is ADB SAFEGATE’s sole guarantee and warranty with respect to the goods; there are no express warranties or warranties of fitness for any particular purpose or any implied warranties of fitness for any particular purpose or any implied warranties other than those made expressly herein. All such warranties being expressly disclaimed.

Standard Products Guarantee

Products of ADB SAFEGATE manufacture are guaranteed against mechanical, electrical, and physical defects (excluding lamps) which may occur during proper and normal use for a period of two years from the date of ex-works delivery, and are guaranteed to be merchantable and fit for the ordinary purposes for which such products are made.

Note

See your sales order contract for a complete warranty description.

FAA Certified product installed in the United States and purchased or funded with monies through the Airport Improvement Program (AIP) installations guarantee

ADB SAFEGATE L858 Airfield Guidance Signs are warranted against mechanical and physical defects in design or manufacture for a period of 2 years from date of installation, per FAA AC 150/5345-44 (applicable edition).

ADB SAFEGATE L858(L) Airfield Guidance Signs are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years from date of installation, per FAA EB67 (applicable edition).

ADB SAFEGATE LED light fixtures (with the exception of obstruction lighting) are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years from date of installation, per FAA EB67 (applicable edition).
Note
See your sales order contract for a complete warranty description.

Liability

WARNING
Use of the equipment in ways other than described in the catalog leaflet and the manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in the manual.

ADB SAFEGATE cannot be held responsible for injuries or damages resulting from non-standard, unintended uses of its equipment. The equipment is designed and intended only for the purpose described in the manual. Uses not described in the manual are considered unintended uses and may result in serious personal injury, death or property damage.

Unintended uses, includes the following actions:

• Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ADB SAFEGATE replacement parts or accessories.

• Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards if not in contradiction with the general rules.

• Using materials or auxiliary equipment that are inappropriate or incompatible with your ADB SAFEGATE equipment.

• Allowing unskilled personnel to perform any task on or with the equipment.

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1.0 Safety

Introduction to Safety

This section contains general safety instructions for installing and using ADB SAFEGATE equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.

1.1 Safety Messages

HAZARD Icons used in the manual

For all HAZARD symbols in use, see the Safety section. All symbols must comply with ISO and ANSI standards.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbol shown below.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Warning Message</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="warning.png" alt="Warning" /></td>
<td><strong>WARNING</strong> Failure to observe a warning may result in personal injury, death or equipment damage.</td>
</tr>
<tr>
<td><img src="danger.png" alt="DANGER" /></td>
<td><strong>DANGER - Risk of electrical shock or ARC FLASH</strong> Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage. ARC Flash may cause blindness, severe burns or death.</td>
</tr>
<tr>
<td><img src="person.png" alt="Person" /></td>
<td><strong>WARNING - Wear personal protective equipment</strong> Failure to observe may result in serious injury.</td>
</tr>
<tr>
<td><img src="no_touch.png" alt="No Touch" /></td>
<td><strong>WARNING - Do not touch</strong> Failure to observe this warning may result in personal injury, death, or equipment damage.</td>
</tr>
<tr>
<td><img src="caution.png" alt="Caution" /></td>
<td><strong>CAUTION</strong> Failure to observe a caution may result in equipment damage.</td>
</tr>
</tbody>
</table>

Qualified Personnel

Important Information

The term **qualified personnel** is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain and repair the equipment. It is the responsibility of the company operating this equipment to ensure that its personnel meet these requirements.

Always use required personal protective equipment (PPE) and follow safe electrical work practice.
1.1.1 Introduction to Safety

**CAUTION**

Unsafe Equipment Use
This equipment may contain electrostatic devices, hazardous voltages and sharp edges on components

- Read installation instructions in their entirety before starting installation.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Install all electrical connections to local code.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

*Failure to follow this instruction can result in serious injury or equipment damage*

Additional Reference Materials

Important Information

- IEC - International Standards and Conformity Assessment for all electrical, electronic and related technologies.
- IEC 60364 - Electrical Installations in Buildings.
- Maintenance personnel must refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9.
- National and local electrical codes and standards.

1.1.2 Intended Use

**CAUTION**

Use this equipment as intended by the manufacturer
This equipment is designed to perform a specific function, do not use this equipment for other purposes

- Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

*Failure to follow this instruction can result in serious injury or equipment damage*
1.1.3 Material Handling Precautions: Storage

CAUTION

Improper Storage
Store this equipment properly

- If equipment is to be stored prior to installation, it must be protected from the weather and kept free of condensation and dust.

Failure to follow this instruction can result in equipment damage

1.1.4 Material Handling: Heavy Equipment

DANGER

Unstable load
Use caution when moving heavy equipment

- Use extreme care when moving heavy equipment.
- Verify that the moving equipment is rated to handle the weight.
- When removing equipment from a shipping pallet, carefully balance and secure it using a safety strap.

Failure to follow this instruction can result in death, serious injury, or equipment damage

1.1.5 Material Handling Precautions: Fasteners

DANGER

Foreign Object Damage - FOD
This equipment may contain fasteners that may come loose - torque properly.

- Only use fasteners of the same type as the one originally supplied with the equipment.
- Use of incorrect combination of gaskets, bolts and nuts can create severe damages to the product installation and create safety risk.
- You need to know what base the light fixture will be installed in, in order to chose the correct gasket, bolts and nuts.
- Bolt type, length, and torque value are determined by type of base, height of spacers used, and clamp force required in FAA Engineering Brief No 83 (latest revision).
- Due to the risk of bolts vibrating loose, do not use any type of washer with the fixing bolts (such as split lock washers) other than an anti-vibration washer. Anti-vibration washers as defined in FAA EB 83 (latest edition) must be used. For installations other than FAA, use the base can manufacturer’s recommendations.
- Always tighten the fasteners to the recommended torque. Use a calibrated torque wrench and apply the recommended adhesive type.
- Obey the instructions of the adhesives necessary for the fasteners.

Failure to follow these warnings may cause the fasteners to loosen, damage the equipment, potentially to loosen the equipment. This can lead to a highly dangerous situation of FOD, with potential lethal consequences.

Note
To minimize the risk of errors, the ADB SAFEGATE Sales Representative will have information on which gasket goes with which base. This information is also provided in the product Data sheets, the User Manuals and the Spare Part Lists.
CAUTION
Use of incorrect combination of gaskets, bolts and nuts can create severe damages to the product installation and create multiple safety risks.
To obtain a safe and watertight installation the O-ring and retaining bolt stated in the document must be used.
You need to know what base the light fixture will be installed in, in order to choose the correct gasket, bolts and nuts.

Failure to follow these cautions can result in equipment damage or aircraft FOD.

1.1.6 Operation Safety

CAUTION

Improper Operation
Do Not Operate this equipment other than as specified by the manufacturer
• Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.
• Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.
• Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
• Protect equipment with safety devices as specified by applicable safety regulations.
• If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.
• Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
• Never operate equipment with a known malfunction.
• Do not attempt to operate or service electrical equipment if standing water is present.
• Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
• Never touch exposed electrical connections on equipment while the power is ON.

Failure to follow these instructions can result in equipment damage

1.1.7 Maintenance Safety

DANGER

Electric Shock Hazard
This equipment may contain electrostatic devices
• Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
• Disconnect and lock out electrical power.
• Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

Failure to follow these instructions can result in death or equipment damage
1.1.8 Material Handling Precautions, ESD

**CAUTION**

**Electrostatic Sensitive Devices**
This equipment may contain electrostatic devices

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet you shall bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

Failure to follow this instruction can result in equipment damage

1.1.9 Arc Flash and Electric Shock Hazard

**DANGER**

**Series Circuits have Hazardous Voltages**
This equipment produces high voltages to maintain the specified current - Do NOT Disconnect while energized.

- Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.
- Only persons who are properly trained and familiar with ADB SAFEGATE equipment are permitted to service this equipment.
- An open airfield current circuit is capable of generating >5000 Vac and may appear OFF to a meter.
- Never unplug a device from a constant current circuit while it is operating; Arc flash may result.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in the product manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB SAFEGATE replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check the interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with airfield electrical equipment.

Failure to follow these instructions can result in death or equipment damage
2.0 Insulation Resistance Monitoring System

**IRMS (ALCMS) Interface User’s Guide**

The manual shows the information necessary to:

- Install
- Carry out maintenance
- Carry out troubleshooting on the IRMS.

**Table 1: Overview of Users’ Guide**

<table>
<thead>
<tr>
<th>Section</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2, Description</td>
<td>Provides an overview of the IRMS Interface software program, along with descriptions of dialog box functions.</td>
</tr>
<tr>
<td>Section 3, Viewing IRMS Data</td>
<td>Overview of various data view modes with instructions.</td>
</tr>
<tr>
<td>Section 4, Printing</td>
<td>How to print data.</td>
</tr>
<tr>
<td>Section 5, Saving to a File</td>
<td>How to save data to a file and its’ format.</td>
</tr>
<tr>
<td>Section 6, Megging a Circuit</td>
<td>How to do the meg now function</td>
</tr>
</tbody>
</table>

**Note**

ACE is a registered trademark of ADB Airfield Solutions.

2.1 How to work with the manual

1. Become familiar with the structure and content.
2. Carry out the actions completely and in the given sequence.

2.2 Insulation Resistance Monitoring System

**Compliance with Standards**

<table>
<thead>
<tr>
<th>FAA:</th>
<th>AC 150/5340-26 chapter 3, section 2, para. 27.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICAO:</td>
<td>Annex 14 para. 8.3. and Aerodrome Design Manual, Part 5, para. 3.7.11.</td>
</tr>
</tbody>
</table>

**System Overview**

The IRMS provides state-of-the-art configurable insulation resistance measurements on airfield series circuits. Unique IRMS architecture allows up to 256 constant current regulators (CCRs) to be connected to a single IRMS communication server. The system can be provided either as a stand-alone system or as an integral part of an Airport Lighting Control and Monitoring System (ALCMS). See ADB data sheet 1041 for more information.
**Uses**

The IRMS performs scheduled cable insulation resistance measurements and can also perform manually requested measurements, allowing maintenance personnel to monitor the long-term degradation of airfield series circuit cabling. This data can be presented in text or graphical format.

- Aids airport in monthly circuit monitoring for cable degradation as recommended in AC 150/5340-30
- Provides tool to assist maintenance in troubleshooting series circuit failures

**Features**

- Provides a wide range of resistance measurements from less than 20 kΩ up to 2,000 MΩ (2 GΩ)
- Uses user selectable circuit charge voltages of 50, 500, or 1,000 VDC to provide accurate resistance measurement for varying circuit conditions
- Fiber optic interface insures isolation from high-voltage series circuit, providing the highest level of safety
- Automatic self-calibration checks the hardware to verify proper operation prior to taking measurements
- Can be used on energized or de-energized circuits
- User can easily add new circuits and change circuit names
- Resistance measurement data can be printed in graphical trend plots or in tabular format
- Data is automatically logged after each measurement for future analysis and can be easily backed up
- Programmable warning and alarm set points
- Data can be exported to allow for data manipulation by the user
- Compatible with CCRs made by all manufacturers

**Electrical Specification**

When integrated with an ALCMS, an ACE™ Unit, which interfaces with IRMS, is installed at each CCR. See ADB data sheet 2084 for more information.

An Insulation Resistance Monitoring Module (IRMM) is installed at each constant current regulator or circuit selector.

<table>
<thead>
<tr>
<th>Two models available:</th>
<th>6.6 A RMS and 20 A RMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications:</td>
<td>50, 500, 1,000 VDC</td>
</tr>
<tr>
<td></td>
<td>20 kΩ to 2,000 MΩ (2 GΩ)</td>
</tr>
</tbody>
</table>

An automatic self-calibration test is conducted prior to each circuit measurement. The IRMS can be programmed to automatically test energized or de-energized circuits on a regular basis.

**Product Configuration**

The IRMS is designed to airport specifications. Please contact the ADB Sales and provide the following information:

- Number of vaults
- Number of constant current regulators in each vault
- Number of L-847 Circuit Selector Switches for each CCR
- CCR output current type (6.6 A or 20 A)
- Maximum distance between CCRs
Programmable Features

The IRMS will operate while the circuit is energized or de-energized and allows for automatic or manual readings during either condition. The IRMS is user programmable and allows for all of the following variables to be programmed by the user at the IRMS computer:

- **Start Time 1** - This represents the first time of the day in which the IRMS is to take the first automatic reading of the series circuit
- **Start Time 2** - This represents the second time of the day in which the IRMS is to take an additional automatic reading of the series circuit
- **Period** - This specifies how often the circuit is measured (i.e., daily, weekly, monthly, etc.)
- **Warning Limit** - This is a limit value, in ohms, at which point a resistance warning will be generated
- **Alarm Limit** - This is a limit value, in ohms, at which point a resistance alarm will be generated

2.2.1 Customer Support Services

To obtain product information, or for ordering, please contact the ADB Airfield Solutions customer service department or the nearest manufacturer representative. The customer service staff is available between 8:00 AM and 5:00 PM Eastern time, Monday through Friday. The telephone number is (800) 545-4157, (614) 861-1304.

The fax number is (614) 864-2069. See the back cover for other regions.

2.2.2 Product Support Services

For technical assistance with an ADB Safegate product, please contact the ADB Safegate Technical Service Department. The Technical Service staff is available 24 hours a day, 7 days a week. The telephone number is (800) 545-4157 and select the Technical Service option. See the back cover for other regions.

2.2.3 Telephoning Customer Service

When you call for technical assistance, you should have the appropriate product documentation at hand. Be prepared to give the following information:

- To what product does the question relate?
- The exact wording of any messages that appeared on the Operator Interface screens (Computer System related assistance only).
- What happened, and what you were doing before and during when the problem occurred.
- How have you tried to solve the problem.
3.0 Theory of Operation

The megging of a circuit can be initiated in two ways; either by the manual entry of a “MEG NOW” command or by the arrival at a predetermined megging time that has already been entered into the Vault Control Process (VCP) in the ACE2™.

The VCP allows the user to configure the time and frequency of IRMS measurements and the maximum level of DC voltage that will be imposed onto the lighting circuit. The choice of voltage levels is 50VDC, 500VDC and 1000VDC. It is strongly recommended that the upper limit of DC voltage be set at 500VDC. It has been shown that repeated use of 1000VDC for the megging of circuits can degrade the circuit cable insulation and shorten the life of the circuit cable.

Regardless of the way the megging operation is initiated, the ACE sends a message to the IRMS-LI program to perform meg readings at specified DC voltage values. When the meg command is received by the IRMS-LI program, it turns on the IRMS high voltage generator. The initial voltage output will be 50VDC. The system will begin taking measurements at that voltage level. If good measurement values are obtained at 50VDC, the system will begin taking measurements at that voltage level. If good measurements are obtained at that level, the system will move on to 1000 VDC (if that is the maximum voltage selected in the VCP). If the maximum voltage value has been set at 500VDC, meg reading will stop at that level.

The IRMS can report cable resistance ranging between 2KΩ and 2GΩ, with a ±1% error.

3.1 IRMS Operation

The IRMS-LI program sets the current and voltage channel programmable gain amplifiers (PGA) to medium levels and takes 1 second signal level acquisition readings. A “medium” sensitivity setting allows good current and voltage readings to be taken. The level of signal after the 1 second readings have been taken will allow the PGA’s to adjust the sensitivity of the megger.

Meg readings are taken at the rate of 50,000 A/D samples per second at each voltage level for 30 seconds, and are reported to the IRMS-LI program where the impedance values are calculated. The high and low values are dropped and the remaining readings are averaged and reported to the ACE. The level of the resistance value is checked to assure that it is within the “expected” range, using the V = IR relationship. If the checked value is good, the voltage is ramped to the highest allowed value.

The ACE2 collects the resistance data from the IRMS-LI program and sends this data to the ALCMS computer that contains the system database where it is stored for viewing and archiving.

3.1.1 IRMS LED Interpretation

Refer to Figure 1.

The D1 and D5 LED’s flash when the IRMS is communicating with the ACE2™ control board.

When megging begins, the D2 LED on the IRMS board will begin to blink. This is an indication that the system is megging at 50VDC. When the megging is complete at 50VDC, the high voltage generator will output 500VDC and the D3 LED will begin to blink. If a good meg reading is obtained at 500VDC, the voltage output will go to 1000VDC (if that voltage is allowed), and the D4 LED will blink.

If D2, D3 and D4 are all blinking together, this indicates that the megging operation has failed. After the megging operation has been successfully completed, D2, D3 and D4 will begin blinking one after the other in sequence until the next megging command is initiated.

Figure 1: IRMS 44A6397 PCB LED’s
3.1.2 IRMS Auto-Ranging

If the IRMS has been commanded to meg at 500VDC but the circuit is so bad that it cannot be megged at that voltage, the IRMS will “auto-range” downward to find the highest voltage at which a good reading can be obtained. The system will then show the meg reading on the ACE2 display.

The IRMS software records the resistance readings in the ALCMS system's database. In a networked system, the database for the entire system is stored on one of the system computers. The IRMS readings can be viewed from any computer in the system using the IRMS Viewer that will be discussed later in this manual.

3.1.3 IRMS Alarm and Error Messages

If the IRMS display on the ACE2 shows “-----”, it means that no IRMS reading data is available, or no data has been received by the ACE2™.

If the display shows “IRMSTO”, it means that the IRMS could not complete the megging in the allowed time.

If the IRMS board failed to meg the circuit, the display will show “IRMSER” indicating an error in the operation.

If the display shows “IRMSCE” it means there is a communication error between the IRMS board and the control board in the ACE2.

3.1.4 Event Viewer Database

The RELIANCE™ software records the individual ACE Insulation Resistance Measurement System, IRMS, resistance readings in the ALCMS system's database. In an RELIANCE system, the RELIANCE database for the entire system is stored on one computer so that all readings can be viewed from any computer in the system. This is done using the IRMS Viewer that is discussed later in this manual.

3.1.5 Block Diagram of IRMS System

Figure 2: Block Diagram of IRMS System
3.2 Viewing the IRMS Data

3.2.1 Using the Graphic User Interface Screens

The IRMS ALCMS Interface uses simple and easy to learn graphic user interface screens where the operator accesses information through these screens with mouse and keyboard entries. This section explains how to view the IRMS data for each circuit, assuming the IRMS system is configured and set up to take IRMS readings. To launch the IRMS Viewer, select the "IRMS Viewer" icon from the Start Menu as seen in Figure 1.

Figure 3: Starting the IRMS Viewer
3.2.2 IRMS Viewer Window

Select the IRMS Viewer icon, illustrated in Figure 2. In this viewer, retrieve, plot, and print the insulation resistance data for each of the circuits. Use the mouse, the control, the shift key, and the left and right mouse buttons to control the viewer.

Figure 4: Insulation Resistance Data Viewer Window
3.2.3 Composing a Query to View Circuit Data

To view resistance data, select a circuit, adjust the date reading range to retrieve, and execute a query. A query means the computer system searches and retrieves information from a specific section of the database. Continue to the next sections for instructions on retrieving IRMS data. See Figure 3 and click the required circuit. If multiple circuits are required, hold the Shift key down and click on all circuits needed.

Figure 5: Circuit Selection Window

3.2.4 Adjusting the Date Reading Range

Click Select Dates for the window shown in Figure 4. Select the time period of data to view by specifying a Start and Stop dates. The default selected dates for both fields are shown by the blue dot. To select a different date, mouse over to the date required and click on the number. The blue dot moves to the requested date. If different months are required, use the month adjust arrows to go forward or backwards in time. To enter the selected dates click OK. Click again and the Date Range Selection window disappears.
Note

Dates must be selected before a valid send query can be executed.

Figure 6: Date Range Selection Window
3.2.5 Executing the Query

Send Query shown in Figure 5, initiates the query process. Once the circuit is selected and the Date Range is adjusted, select Send Query to execute the retrieval process. The IRMS RELIANCE Interface retrieves the data and displays the information in the Data Viewing window. The default mode for displaying the data is the chart (graphic) view, but can be changed to report (tabular) view. The grayed-out Data report view button specifies the current view mode shown in Figure 5.

Figure 7: Send Query Button
3.3 Changing Viewing Format

3.3.1 Graphic Viewing:
An example of the chart (graphical) data display is seen in Figure 6. The insulation resistance values are displayed along the left (Y-axis) and the time values are displayed across the bottom (X-axis). To change the view to the Chart view, select Chart View. The tool bar, Figure 7, controls graphic functions defined below.

Figure 8: Graphic Display

3.3.2 Tool Bar Menu Definitions
Resume All (Tracking): Snaps graphic back to original view.
Pause All (Tracking): Allows zooming and scrolling (automatic with those modes)
Scroll (axis): For the selected graphic axis, while holding down the left mouse button, allows the axis values to change according to the direction of mouse movement.
Zoom (axis): For the selected graphic axis, while holding down the left mouse button, allows the axis values to increase or decrease amplitude according to the direction of mouse movement.
Zoom (+/-): Increases or decreases magnification around the center of graphic.
Zoom Box: Increases magnification of graphic surrounded by box.
Cursor: Turns on or off a vertical measurement line that provides the properties of the graphic at the line/graphic intersection. Measurement line can be moved by placing the mouse over the line, holding down the left mouse button and dragging the line to the wanted graphic location.
Copy to Clipboard: Copies the displayed graphic to the windows clip board.
Save to File: Operates the same as the Save to File button.
Print: Same as the Print View button.
3.3.3 Report Viewing

The Report view in Figure 8 lists values in chronological order with the most recent reading listed first:

**Circuit Name**: Circuit(s) requested in the query

**Insulation Value**: The resistance reading recorded

**Date/Time**: The date/time the resistance reading was taken.

To change the view to a Report format or text view, select **Report View**. Use the scroll bars along the right side of the screen to access additional query information.

**Figure 10: Report View Display**

Report viewing allows several additional features not available in the Chart view. One feature is a standard Send Query executable for multiple circuits. An example output result is shown in **Figure 9**.
Another feature is a one-day or a one-week quick query. This supplies all IRMS results for that period of time for every circuit description (see Figure 10). Click on one of the quick query buttons to view.
3.4 Printing

To print graphic or tabular data, select **Print View**. A print pop-up window appears allowing selection of any installed printer. The displayed data is printed-out on the selected printer as shown in **Figure 11**.

**Figure 13: Print Display**

![Print Display Diagram](image-url)
3.4.1 Saving to a File

Save to File is only enabled when the Report View is active. When Save to File is pressed, the pop-up File Save Selection window appears, see Figure 12. Use this window to navigate to a selected directory, to define the file name, and to save the data in a text format seen in Figure 13. This is similar to a standard windows interface.

Figure 14: File Save Selection Window

Figure 15: Saved Data Format

```
<table>
<thead>
<tr>
<th>Circuit</th>
<th>Insulation Resistance</th>
<th>Date of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxiway A1</td>
<td>300.00 Ohms</td>
<td>Fri May 25, 2007 @ 10:23:31</td>
</tr>
<tr>
<td>Taxiway A1</td>
<td>1.00 K Ohms</td>
<td>Sun May 20, 2007 @ 10:23:31</td>
</tr>
<tr>
<td>Taxiway A2</td>
<td>200.00 Ohms</td>
<td>Thu May 10, 2007 @ 10:23:31</td>
</tr>
<tr>
<td>Taxiway A2</td>
<td>2.00 K Ohms</td>
<td>Sat May 03, 2007 @ 10:23:31</td>
</tr>
<tr>
<td>Taxiway A1</td>
<td>3.00 K Ohms</td>
<td>Tue May 01, 2007 @ 10:23:31</td>
</tr>
<tr>
<td>Taxiway A2</td>
<td>4.00 K Ohms</td>
<td>Wed Apr 23, 2007 @ 10:23:31</td>
</tr>
</tbody>
</table>
```
### 3.4.2 Megging a Circuit

The Meg now function is available for any ACE™ controlled CCR with IRMS. To implement the meg now function, highlight the circuit or circuits in the circuit list and press Meg Now. This sends out the meg now command to the appropriate ACE(s), which measures the current on a specific circuit over a given time interval. See Figure 14.

**Figure 16: Meg Now Button**

3.4.3 Displaying Readings for All the Circuits

Another method of viewing the insulation resistance data is using the Vault Control Process window. It shows every circuit and the last recorded IRMS reading.

Click Vault Control Process from the Menu bar located along the bottom of the desktop screen. See Figure 15. (This is covered in the RELIANCE Operator Manual)

**Figure 17: ALCMS Menu Bar**

Click on the Vault Control Process icon and this launches the process. A window appears as seen in Figure 18. This window lists all of the circuits configured in the RELIANCE system and displays other information as it relates to the lighting control system such as Primary Power status, Remote/Local status, Current, and Voltage. The most recent IRMS reading is also listed. Use the scroll bars as necessary to search through the listing for a specific circuit.
4.0 Configuring the IRMS

4.1 Starting the Configuration

Before the IRMS system can perform scheduled resistance measurements, configure all circuits. To configure the IRMS circuits including setting alarm/warning limits and schedule reading times:

First, open the Vault Control Process as outlined in the previous section as well as the RELIANCE Operator Manual.

Next, open the configuration window by selecting **CCR configuration** as seen in Figure 17.

**Figure 19: Vault Control Process: CCR configuration**
4.2 CCR Configuration

Select **CCR configuration**; Figure 18 shows the window open. The IRMS configuration changes are performed in the Insulation resistance configuration section. ADD ACIRCLE AND AN ARROW FOR THE BUTTON.

**Figure 20: CCR Configuration Window**

---

**4.2.1 CCR Configuration Information**

**Note**
The "Lamps-out configuration" and the "Incorrect current configuration" sections are covered in detail in the RELIANCE Manual and are not part of the Insulation Resistance configuration.

1. Select the CCR to configure

   Use the pull-down menu associated with the CCR to configure field to select the name of the circuit or of the CCR getting a change to configuration data.

   **Insulation resistance configuration**

2. Setting the Warning Level:

   This is a limit value at which point a resistance warning is generated. If a resistance reading is below the selected value, the warning message is sent to the event database. When the value goes above this level, the warning is marked as cleared in the event database. This number can be any value from 20,000 Ohms (20 kOhm) to 2,000,000,000 Ohms (2 G Ohm). Values near 20k Ohms represent circuit shorts.
Note
Note: The warning limit must be larger than the alarm limit.

To adjust the Warning Level, enter a number in the field and select one of the three multipliers, K Ohm, M Ohm, or G Ohm.

3. Setting the Alarm Level:
   **Alarm Level:** This is a limit value at which point a resistance alarm is generated. If a resistance reading is below this value, the alarm is sent to the event database. When the value goes above this level, the alarm is marked as cleared in the event database. This number can be any value between 20,000 (20 kOhm) and 2,000,000,000 (2 G Ohm). Values near 20k Ohms represent circuit shorts.

Note
Note: The alarm limit must be lower than the warning limit.

To adjust the Alarm Level, enter a number in the field and select one of the three multipliers, K Ohm, M Ohm, or G Ohm.

4. Setting the First Sample time:
   The first sample time is the day and time that the IRMS system takes an insulation resistance reading.
   Day: Using the drop-down box, select the day of the week the readings is taken.
   Time: Using the toggle up/down buttons, change to value until it is the time of day desired the reading to be taken.
   Period: Using the drop-down box, select how often the reading is to be taken. Options are daily, weekly, bi-weekly, monthly, or bi-monthly.

5. **Setting the Voltage applied to circuit:**
   This step specifies a maximum voltage to use during resistance readings. This is primarily used with smaller CCRs sizes that may have output lightning protection that activates at voltages greater than 500VDC. Refer to the CCR manual to determine if this applies.
   This value can be set for 50, 500, or 1000VDC. Typically, the IRMS system auto-ranges with the correct voltage value to establish an accurate reading. The system defaults to 1000VDC for resistance readings. To change the voltage, use the drop-down menu and select the desired voltage.

6. **Setting the Second Sample time:** [OPTIONAL]
   The second sample time is the day and time that the IRMS system takes a 2nd insulation resistance reading. This setting is optional and is used only if two readings are performed on the same day or in the same week. To enable the second sample time, select the Enable second sample check-box.
   Day: Using the drop-down box, select the day of the week wanted for the second readings to be taken.
   Time: Using the toggle up/down buttons, change to value until it is the time of day wanted for the second reading to be taken.
   Period: Using the drop-down box, select how often the second reading is to be taken. Options are daily, weekly, bi-weekly, monthly, or bi-monthly.

7. **Saving the configuration changes:**
   To save the configuration changes:
   a) Save changes for only one circuit: To save the changes for the selected circuit only, Select Apply.
   b) Duplicate changes for ALL circuits:
   To apply the changes to ALL the circuits, Select the Apply insulation resistance configuration to all circuits. After selecting Apply, confirm by selecting Yes.

8. **Exiting configuration changes:**
   When configuration changes are complete, select OK to exit. To exit the configuration window without saving the information, select Cancel.
4.2.2 Enabling and Disabling the IRMS

This section deals with the procedures for powering-up and starting the operation of the IRMS system and powering-down and shutting off the system for repair or maintenance.

**WARNING**

**Electric Shock**

To prevent personal injury from electrical shock, read all instructions for system Start-up and Shut-down procedures before performing any repair or maintenance of the system.

**CAUTION**

**Equipment Damage**

To prevent equipment damage, read all instructions for system Start-up and Shut-down procedures before performing any repair or maintenance of the system.

4.2.3 Disabling a Circuit for Maintenance

This section deals with explaining the procedures for disabling a circuit for maintenance. See Figure 19.

**Figure 21: IRMS Activation**

1. **Select the IRMS Activation Screen**

   To keep an individual circuit from performing automatic resistance readings, select IRMS activation from the Vault Control Process window as in Figure 19. A pop-up window appears as seen in Figure 20.

2. **Disable a Circuit**
From the pop-up window select the circuit from the “Enabled circuits:” window and then select **Disable** as seen in Figure 20. This places the circuit in the Disable circuits: window.

**Figure 22: Disabling a Circuit**

3. **Disable the Power to the IRMS System**
   Locate the power for the Insulation Resistance Module associated with the circuit and switch the power **OFF**.

4. **Disable the Constant Current Regulator**
   Turn **OFF** the primary power for the Constant Current Regulator to be worked on.

5. **Isolate the Series Circuit Cabling**
   If SCO Cut-Outs are present, place the cutout into the Maintenance position.
   If L-823 cord set plugs are used, turn off the CCR then, disconnect the series circuit from the regulator and short the CCR outputs.
   At this point, the circuit is ready for maintenance.

**4.2.4 Enabling a Circuit After Maintenance**
This section deals with the proper procedures for enabling a circuit once maintenance is complete.

1. **Reconnect Series Circuit Cabling**
   If SCO Cut-Outs are present, place the cut-out in the Operate position. If L-823 cord set plugs are used, reconnect the series circuit to the regulator.

2. **Enable the Constant Current Regulator**
   Turn **ON** the primary power for the Constant Current Regulator.

3. **Enable Power to the IRMS System**
   Locate the power for the Insulation Resistance Module associated with the circuit and switch the power **ON**.

4. **Enable the Circuit from the IRMS Activation Screen**
   From the pop-up window select the circuit from the **Disabled circuits**: window then press **Enable** as seen in Figure 21. This places the circuit in the **Enabled circuits**: window.
At this point, the circuit is now returned to normal. The IRMS system begins readings at the next scheduled time.

**Figure 23: Enabling a Circuit**

![Image of IRMS activation screen](image)

### 4.2.5 Disabling Entire IRMS System for Maintenance

This section deals with the proper procedures for disabling the entire IRMS system such that all circuits can be worked on.

1. **Disable all circuits from the IRMS Activation Screen**

   To disable ALL circuits so they do not perform any automatic resistance readings, select the **Disable all** as seen in **Figure 22**. This places all the circuits in the **Disabled circuits**: window.

   **Figure 24: Disabling ALL Circuits**

   ![Image of IRMS activation screen](image)

2. **Disable the Power to the IRMS System**

   Locate the power for the Insulation Resistance System and switch the power **OFF**.
3. **Disable the Constant Current Regulator**
   Turn **OFF** the primary power for all the Constant Current Regulators to be worked on.

4. **Isolate the Series Circuit Cabling**
   If SCO Cut-Outs are present, place all the cut-outs for each circuit to be worked on in the Maintenance position.
   If L-823 cord set plugs are used, disconnect the series circuit from all the regulators and short the CCR outputs.
   
   **At this point, the circuits are ready for maintenance.**

4.2.6 **Enabling ALL the Circuits**
This section deals with the proper procedures for enabling ALL of the circuits. In order for the IRMS system to perform its scheduled resistance readings, the circuits must be enabled.

1. **Reconnecting Series Circuit Cabling**
   If SCO Cut-Outs are present, place all the cut-outs, for each circuit to be place into service, in the Operate position. If L-823 cord set plugs are used, reconnect the series circuit from all the regulators.

2. **Enable the Constant Current Regulator**
   Turn **ON** the primary power for all the Constant Current Regulators worked on.

3. **Enable the Power to the IRMS System**
   Locate the power for the Insulation Resistance System and switch the power **ON**.

**Note**
For Systems that use UPS battery back-up power, make sure to turn **ON** the UPS associated with the IRMS System.

4. **Enable all circuits from the IRMS Activation Screen**
To enable ALL circuits to perform automatic resistance readings, select **Enable all** as seen in **Figure 23**. This places all the circuits in the **Enabled circuits**: window.

**Figure 25: Enabling ALL Circuits**
4.3 Megging Process

See the 44A6397 IRMS-LI Board diagram Figure 26 and Figure 1

1. RELIANCE system is running normally while the IRMS system is sitting idle with LED’s D2, D3, and D4 cycling.

2. IRMS system receives a “Meg Now” command or the preprogrammed Meg time in the Vault Control Process has been reached.

3. IRMS-LI begins to Meg the circuit it is associated with.

   It does this with three different voltage values of 50VDC, 500 VDC, and 1000VDC. The initial voltage that will always be used is the lowest value of the three and the highest value will be what the user has programmed or the system will auto scale to the highest voltage value that the circuit can handle. The resistance in the circuit is determined using this equation

   \[ R = \frac{V}{I} \]

4. While the system is Megging (starting at 50VDC), the LED D2 will flash when the specified voltage is reached.

   The IRMS-LI sets the current and voltage channel Programmable Gain Amplifiers (PGA’s) to a medium range so the reading is not too high or low to get a good reading automatically. The IRMS-LI uses the equation

   \[ I = \frac{V_{(VDC\ Source \ Voltage)}}{R_{(Leakage) + 2R_{(Resistor \ inside \ IRMS \ module)}}} \]

   as a “checker” equation to ensure that the proper readings are coming to the system for the final IRMS reading.

   If this is ok, the high voltage generator will ramp up to the user programmed voltage (or highest voltage possible). As the voltage ramps up, the LED’s that flash also change (D3 for 500VDC and D4 for 1000VDC). The system does this for 30 seconds and then uses the equation.

   \[ R_{(Leakage)} = \frac{V}{I} \]

   to determine the IRMS reading. If there is an error at any time, all three of the LED’s will flash at the same time.

5. The ACE receives the final IRMS reading and sends it back to the IRMS computer for viewing and recording in the archive.
The LED's return to cycling.

**Figure 26: 44A6397 IRMS-LI PCB**
Insulation Resistance Monitoring System (IRMS)
Configuring the IRMS
Appendix A: SUPPORT

Our experienced engineers are available for support and service at all times, 24 hour/7 days a week. They are part of a dynamic organization making sure the entire ADB SAFEGATE is committed to minimal disturbance for airport operations.

ADB SAFEGATE Support

Live Technical Support - Americas
If at any time you have a question or concern about your product, just contact ADB SAFEGATE’s technical service department. Trained in all areas of system issues, troubleshooting, quality control and technical assistance, our highly experienced Technical support specialists are available 24 hours a day, seven days a week to provide assistance over the phone.

ADB SAFEGATE Americas Technical Service & Support (US & Canada): +1-800-545-4157

During regular business hours, you can also Chat with a Service Technician. We look forward to working with you!

Before You Call
When you have an airfield lighting or system control system problem it is our goal to support airfield maintenance staff as quickly as possible. To support this effort we ask that you have the following information ready before calling.

• The airport code
• If not with an airport, then company name (prefer customer id number)
• Contact phone number and email address
• Product with part number preferable or product number
• Have you reviewed the product’s manual and troubleshooting guide
• Do you have a True RMS meter available (and any other necessary tools)
• Be located with the product ready to troubleshoot

Note
For more information, see www.adbsafegate.com, or contact ADB SAFEGATE Support via email at support@adbsafegate.com or
Brussels: +32 2 722 17 11
Rest of Europe: +46 (0) 40 699 17 40
Americas: +1 614 861 1304. Press 3 for technical service or press 4 for sales support.
China: +86 (10) 8476 0106

A.1 ADB SAFEGATE Website

The ADB SAFEGATE website, www.adbsafegate.com, offers information regarding our airport solutions, products, company, news, links, downloads, references, contacts and more.
A.2 Recycling

A.2.1 Local Authority Recycling
The disposal of ADB SAFEGATE products is to be made at an applicable collection point for the recycling of electrical and electronic equipment. The correct disposal of equipment prevents any potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling. The recycling of materials helps to conserve natural resources. For more detailed information about recycling of products, contact your local authority city office.

A.2.2 ADB SAFEGATE Recycling
ADB SAFEGATE is fully committed to environmentally-conscious manufacturing with strict monitoring of our own processes as well as supplier components and sub-contractor operations. ADB SAFEGATE offers a recycling program for our products to all customers worldwide, whether or not the products were sold within the EU.

ADB SAFEGATE products and/or specific electrical and electronic component parts which are fully removed/separated from any customer equipment and returned will be accepted for our recycling program.

All items returned must be clearly labeled as follows:

- For ROHS/WEEE Recycling
- Sender contact information (Name, Business Address, Phone number).
- Main Unit Serial Number.

ADB SAFEGATE will continue to monitor and update according for any future requirements for EU directives as and when EU member states implement new regulations and or amendments. It is our aim to maintain our compliance plan and assist our customers.
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