



BATTERY BACKUP SYSTEM

MODELS
6160-110-24-NR
6160-110-24-NR-230

INSTALLATION MANUAL

Safety Precautions

The following are general safety precautions that are not necessarily related to any specific part or procedure, and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and apply to all phases of operation and maintenance.

WARNING
Keep Away From Live Circuits
Operating Personnel must at all times observe general safety precautions. Do not replace components or make adjustments to the inside of the test equipment with the high voltage supply turned on. To avoid casualties, always remove power.

WARNING
Shock Hazard
Do not attempt to remove the RF transmission line while RF power is present.

WARNING
Do Not Service Or Adjust Alone
Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

WARNING
Safety Earth Ground
An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

WARNING
Resuscitation
Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

WARNING
Remove Power
Observe general safety precautions. Do not open the instrument with the power applied.

Safety Symbols

WARNING

Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

CAUTION

Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.

Note: *Calls attention to supplemental information.*

Caution Statements

The following equipment cautions appear in the text and are repeated here for emphasis.

CAUTION

For 115 VAC operation, verify jumper is installed on the battery charging unit.
For 230 VAC, verify absence of jumper on the battery charging unit.
Unit failure may result from improper voltage input/jumper setting.

See page 4

CAUTION

All wiring connections made inside of the battery backup unit should be done with both the AC and DC breakers in the OFF position.

See page 4

CAUTION

Do not exceed the alarm contacts maximum current rating of
1 Amp @ 30 VDC or 1 Amp @ 60 VAC.

See page 5

CAUTION

The batteries should not be installed until the unit is physically positioned into it's final location. The unit should not be moved while the batteries are installed.

See page 6

CAUTION

Do not change the position of the Float/Absorption jumpers located on the bottom of the charger assembly. These jumper positions are factory set to match the recommended batteries used in the Battery Backup Unit.

See page 6

Safety Statements

USAGE

ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.

USO

EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.

BENUTZUNG

WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.

UTILISATION

TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.

IMPIEGO

QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROIZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.

SERVICE

SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE - TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.

SERVICIO

LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERLO.

WARTUNG

ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL.

ZUR VERMEIDUNG GEFÄHRLICHE, ELEKTRISCHE SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.

ENTRETIEN

L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.

ASSISTENZA TECNICA

LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE ELETTRICHE NON EFFETTUARE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.

About This Manual

This manual covers the operating & maintenance instructions for models with part number:

6160-110-24-NR	115 volt model
6160-110-24-NR-230	230 volt model

Changes to this Manual

We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Solon, Ohio factory. This manual may be periodically updated. When inquiring about updates to this manual refer to the part number and revision on the title page.

Chapter Layout

Introduction — Describes the features of the Battery Backup System.

Installation — Instructions for locating and connecting the Battery Backup System.

Operation — Describes the normal operating conditions, meaning of status indicator codes and how to test alarm functions.

Maintenance — Lists routine tasks as well as specifications and customer service contact information.

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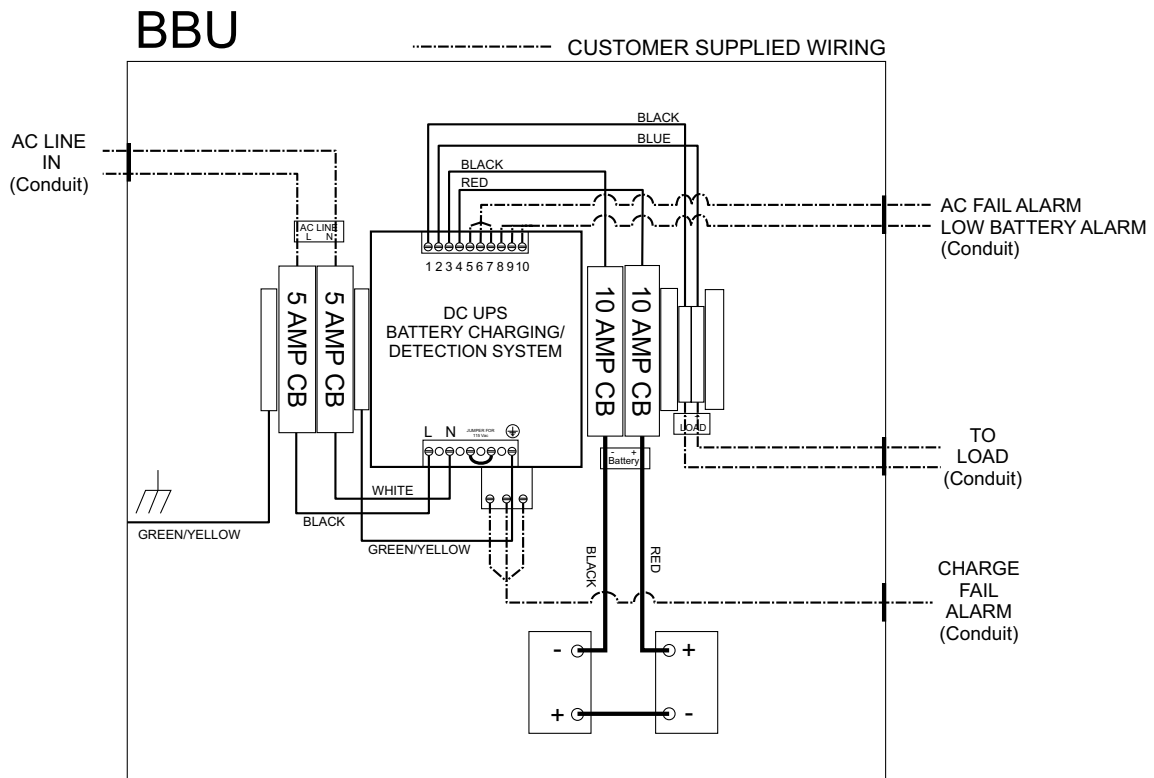
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General Description

The Battery Backup System is designed to provide uninterruptible DC backup voltage for Bird signal boosters. The backup voltage is provided by a pair of high capacity 12 VDC lead acid batteries connected in series, which supplies the 24 VDC needed for backup operation. The unit has an integrated battery charger and monitor system that maintains peak battery charge level when AC mains is present. The battery backup provides operational status indicators and alarm terminal connections for remote monitoring. When used in conjunction with a Rescueline™ signal booster, the battery backup provides a fully NFPA compliant system solution to NFPA72, NFPA1221, or IFC. Specifications for the battery backup system are listed in ["Specifications" on page 11](#).

A block diagram of the battery backup system is shown in [Figure 1](#).

Figure 1 Battery Backup Unit Block Diagram



There are two 110 Amp-hour models

6160-110-24-NR — 115 Volt AC input (a jumper is used on the controller to set the unit to 115 Volt requirement).

6160-110-24-NR-230 — 230 Volt AC input.

The battery backup unit is shown in [Figure 2](#). The batteries are installed on the lower shelf against the back of the cabinet and to the right. This will allow ample room for cable entry into the cabinet. The battery charger assembly is mounted to a DIN Rail above the batteries.

When AC power is applied to the charger assembly it will produce a charging voltage to recharge the batteries as well as supply a voltage to the load terminals. When there is a loss of AC mains power in the signal booster the stored charge in the batteries will supply a voltage to the load until the batteries are depleted to the low voltage disconnect point of the charger assembly.

Note: *The unit is not intended to be transported with the batteries in place. Damage to the batteries, electronic equipment and cabinet may result if this is attempted. The batteries should not be installed until the unit is positioned in it's final location.*

Figure 2 Battery Backup System



Item	Name	Description
1	AC Circuit Breakers	Color indicator flag built into the circuit breakers just below the switch paddle. The indicator will be green when the breaker is off and it will be red when the breaker is on.
2	Battery Charger	DC UPS Combines all system power functions: power supply, battery charger, UPS circuitry and status monitoring in one compact unit that produces 24 volt, 10 amps.
3	DC Circuit Breakers	24 VDC at 10 Amps (max load). Color indicator flag built into the circuit breakers just below the switch paddle. The indicator will be green when the breaker is off and it will be red when the breaker is on.
4	DC output Terminal	Terminals for DC output 24 VDC at 10 Amps.
5	Batteries	110 Amp-hour (6 cells per battery) Maintenance free sealed lead-acid (vent regulated).

The following sections discuss general considerations for installing the battery backup system. All work should be performed by qualified personal in accordance with local codes.

Unpacking and Inspection

1. Carefully inspect shipping container for signs of damage.
 - If the shipping container is damaged, do not unpack the unit. Immediately notify the shipping carrier and Bird Technologies.
 - If the shipping container is not damaged, unpack the unit. Save shipping materials for repackaging.
2. Inspect unit for visual signs of damage.

Note: *If there is damage, immediately notify the shipping carrier and Bird Technologies.*

Location

The layout of the communications system will be the prime factor in determining the mounting location of the battery backup unit. However, safety and serviceability are also key considerations. The unit should be located where it cannot be tampered with by the general public, yet is easily accessible to service personnel. Also consider the weight of the unit and the possibility of injury if the unit should become physically disturbed for any reason.

Installation areas must be clean, dry and free from combustible materials and open flames. The ambient temperature of the mounting location should be maintained between 0° and 50°C (32° and 122° F). The unit is designed for floor or bench mounting only. Install on a surface of non-combustible material, such as stone, brick, concrete or metal. In areas of known seismic activity, additional devices such as tether lines may be necessary.

Note: *The Battery Backup Unit has a NEMA-4 enclosure and can be installed in any location suitable for NEMA-4 enclosure use. However, areas in direct sunlight or areas near heated vent openings should be avoided.*

Due to the weight of the unit after the batteries are installed in the cabinet, the unit is designed for floor or bench mounting only. There are no mounting holes on the cabinet for wall attachment.

AC Input and Ground Connections

CAUTION

For 115 VAC operation, verify jumper is installed on the battery charging unit.
 For 230 VAC, verify absence of jumper on the battery charging unit.
 Unit failure may result from improper voltage input/jumper setting.

CAUTION

All wiring connections made inside of the battery backup unit should be done with both the AC and DC breakers in the OFF position.

The battery backup unit must be connected to an AC mains power source as indicated below.

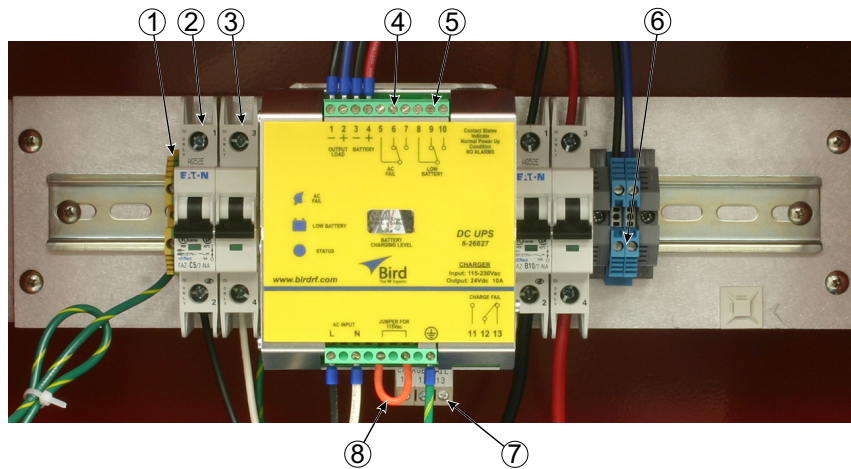
6160-110-24-NR — 90-135 Volt AC input, 47-63 Hz, 3.3 @ 120 VAC (a jumper is used on the controller to set the unit to 115 Volt requirement). See [Figure 3](#) for jumper location.

6160-110-24-NR-230 — 180-305 Volt AC input, 47-63 Hz, 2.2 @ 230 VAC.

There are holes in the left-side of the cabinet for connection of conduit. The AC feedline should be brought into the cabinet through the conduit and terminated at the AC Input breakers and Earth ground terminal strip on the DIN rail. See [Figure 3](#) for terminal connections.

The AC input wire size should be at least 14 AWG and attached at the terminals with a torque of 2.4 Nm (1.77 ft-lbs). To reduce the risk of fire, the AC mains supply should have branch circuit breaker protection of 15 Amps maximum rating in accordance with the National Electric Code, ANSI/NFPA 70 or equivalent.

Figure 3 *Wiring Installation Connections*



Item	Description
1	Earth Ground, ≥ 14 AWG
2	AC Input, Line wire connection, 120 VAC 60 Hz, ≥ 14 AWG
3	AC Input, Neutral wire connection, 120 VAC 60 Hz, ≥ 14 AWG
4	AC Failure Alarm Contacts, 18 - 22 AWG
5	Low Battery Alarm Contacts, 18 - 22 AWG
6	DC output to load (Booster), 10 - 12 AWG
7	Charge Failure Alarm Contacts, 18 - 22 AWG
8	Jumper used in 115 VAC model 6160-110-24-NR only.

Alarm Connections

There are three alarm connections available in the battery backup unit including AC Fail, Low Battery, and Charge Fail. Each alarm is announced using a pair of Form-C contacts. One pair is normally open and the other pair is normally closed. An AC Fail alarm occurs whenever AC line power to the battery backup unit is interrupted. A Charge Fail alarm occurs whenever the charger assembly fails to produce a charging voltage.

The Low Battery alarm occurs whenever the battery voltage falls below a factory defined threshold of 22.8 VDC. This threshold level is factory preset and is not field adjustable. See [Table 1](#) for a truth table of the alarm contact operation. Note that normal operating condition is defined as the battery backup unit powered-up, operating as usual, with no alarms being announced.

When connecting to the alarm terminals use 18 - 22 gauge wire. Route the alarm wiring out the conduit holes in the left side of the cabinet making sure that they are run through conduit separate from the AC supply wires and the DC Output wires.

CAUTION

Do not exceed the alarm contacts maximum current rating of
1 Amp @ 30 VDC or 1 Amp @ 60 VAC.

Table 1 Alarm Connections

Alarm	Terminal	State	
		No Alarm	Alarm
AC Failure	5 (common)		
	6 (normally closed)	Continuity	No Continuity
	7 (normally open)	No Continuity	Continuity
Low Battery	8 (common)		
	9 (normally closed)	Continuity	No Continuity
	10 (normally open)	No Continuity	Continuity
Charge Failure	11 (normally open)	No Continuity	Continuity
	12 (common)		
	13 (normally closed)	Continuity	No Continuity

DC Output Connections

A pair of terminal screws are available on the DIN Rail for DC output from the battery charger to the backed-up equipment such as a Bird signal booster. As shown in figure 3 the DC Output terminals are located on the right side of the DIN rail next to the DC Circuit breaker. The DC Output is limited to 24 VDC at 10 Amps. The available 10 Amps is split between the load demand and the charging demand. The charger assembly will always satisfy the load demand first then apply the remaining current capacity to the charging of batteries.

There are holes in the left-side of the cabinet for connection of conduit. The DC Output voltage should be brought out of the battery cabinet and routed to the equipment requiring backup voltage through the conduit. Route the DC Output wires through a conduit that is separate from the AC supply wires and the alarm wires.

When connecting the load (booster) to the DC Output screw terminals in the battery backup unit use 10 - 12 gauge wire. In addition, these wires should be kept as short in length as possible. DC losses through interconnecting wires will effect the length of time the battery backup system can keep the booster operating in a prolonged power outage situation.

Battery Installation

The battery backup unit and the batteries are shipped separately. The batteries must be installed in the unit as part of the installation process.

CAUTION

The batteries should not be installed until the unit is physically positioned into its final location. The unit should not be moved while the batteries are installed.

Batteries

The batteries supplied by Bird for use in the Battery Backup system are Power Sonic model# PS- 121100 (12.0 Volt at 110 AH) sealed lead acid batteries.

These are high quality, deep discharge batteries with a long shelf and long service life. These are the only batteries Bird recommends for use in this battery backup unit. The charger assembly has been programmed (via jumper settings) to match this battery choice. If the customer chooses to use any other battery that is not supplied by Bird they should contact the factory first for setup advice.

CAUTION

Do not change the position of the Float/Absorption jumpers located on the bottom of the charger assembly. These jumper positions are factory set to match the recommended batteries used in the Battery Backup Unit.

Working with and in the vicinity of lead acid batteries is dangerous and caution must be taken to prevent possible injury. The batteries used in the battery charger system are sealed. However they are equipped with an internal safety release valve which is designed to open, vent, then reseal if internal gas pressure reaches sufficient levels. The battery used in the battery backup unit is an efficient maintenance free electro-chemical system designed to provide years of trouble free service.

The battery is fabricated with sealed construction techniques that guarantee leak-proof operation. There is no need to check the specific gravity of the electrolyte or add water. In fact, there is no provision for this type of maintenance. The batteries performance and service can be maximized by observing the following guidelines.

1. Heat kills batteries. Do not install or operate the battery backup unit in close proximity to heat sources of any kind. Ideal service life will be realized when the batteries are operated in an ambient temperature of 20°C to 25°C. (68°F to 77°F).
2. The battery backup unit should not be installed in air-tight rooms or compartments, adequate ventilation must be provided.
3. Avoid installing the battery backup unit in an atmosphere where organic solvents or adhesives may be present. Do not clean the batteries with oils, thinners or similar substances. The case of the batteries is ABS plastic resin which may suffer damage from these chemicals. If cleaning is required use a damp rag and avoid contact with the terminals. Terminals can be cleaned carefully with a wire brush.

Battery Handling Precautions

Batteries are live at all times and can cause severe shock or eye damage if handled improperly.

Installation should be performed by experienced personnel. The following precautionary measures should be observed whenever working with the batteries.

- Always wear insulated gloves and wear eye protection when handling the batteries.
- Do not solder to the battery terminals.
- Handle batteries cautiously, do not drop them. The electrolyte contains sulfuric acid which can cause serious damage to your eyes and skin. Should this occur, flush profusely with water and seek medical attention immediately.
- Highly flammable hydrogen gas may be vented by the battery if internal gas pressure reaches sufficient levels. To avoid risk of fire or explosion, keep sparks or other sources of ignition away from the immediate vicinity of the battery.
- Do not smoke or allow an open flame near the battery.
- Do not allow metallic materials to simultaneously contact the negative and positive terminals of the battery.
- Mixing batteries of different capacities, age and/or manufacture is not recommended.
- Do not crush, incinerate or dismantle the battery.
- Batteries must be recycled or disposed of properly.

Battery Installation Procedure

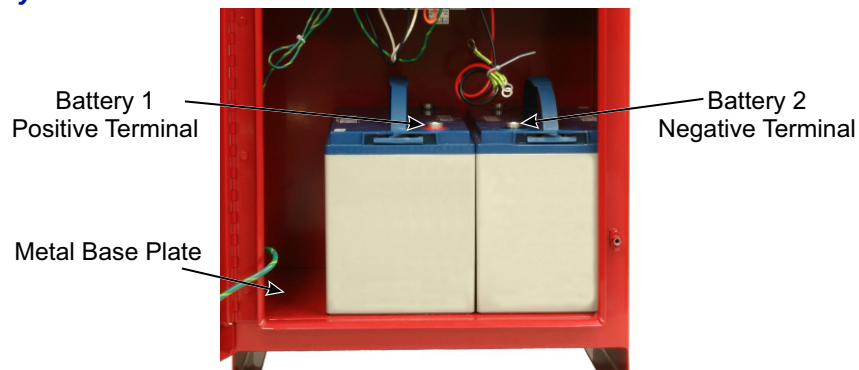
Two 12 Volt batteries are connected and operated in series in order to provide the 24 VDC output voltage of the battery backup unit. Refer to the block diagram shown in [Figure 1 on page 1](#). The wiring needed to make the series connection is included in the enclosure when the unit ships from the factory. The nuts, bolts, and washers needed to connect the cabinet wiring to the batteries is included in small plastic bags located inside of each battery shipping box. To install the batteries into the unit perform the following in a step-by-step fashion;

1. Install the metal plate open side down into the bottom of the cabinet, see [Figure 4](#). The plate is wrapped and shipped outside the cabinet to prevent damage during shipping transport.

Note: When installing new batteries into the battery backup unit a quick functional test of each battery should be performed first. Measure the voltage between the positive and negative terminals of each battery. The voltage should be between 12.5 and 13.75 volts. Voltage readings outside this range might indicate a possibly defective battery.

2. Set the two batteries in an upright vertical posture inside the cabinet as shown in [Figure 4](#). Battery two should have its negative terminal closest to the door and battery one should have its positive terminal closest to the door. The pair of batteries should be placed as far right as possible in order to allow as much room as possible for wires to run into or out of the conduit openings on the left side of the cabinet.

Figure 4 Battery Installation



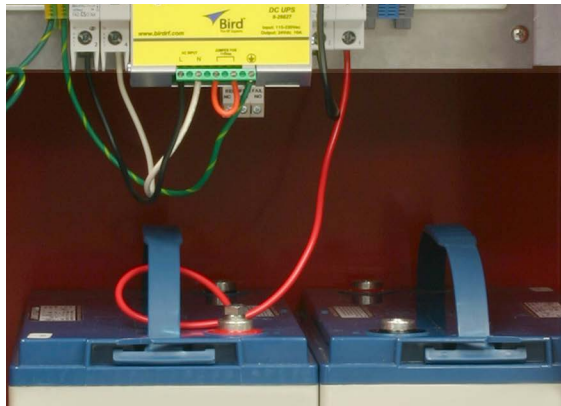
- Cut loose the wire bundle connected to the DC circuit breaker (see [Figure 5](#)) and set aside the short black jumper cable included in the bundle.

Figure 5 Battery Cable Bundle



- Attach the red cable with terminal ring to the forward most (positive) terminal of battery one using a nut, bolt, and two washers. Place a washer on each side of the battery terminal then pass a bolt through the washers, terminal ring and battery terminal then secure the bolt with a nut. Tighten the bolt to the torque specification of 3.9 to 5.4 Nm (2.876 to 3.983 ft-lbs). See [Figure 6](#).

Figure 6 Positive battery Cable Connection



- Attach the black cable with terminal ring to the forward most (negative) terminal of battery two using a nut, bolt, and two washers. Place a washer on each side of the battery terminal then pass a bolt through the washers, terminal ring, and battery terminal then secure the bolt with a nut. Tighten the bolt to the torque specification of 3.9 to 5.4 Nm (2.876 to 3.983 ft-lbs). See [Figure 7](#).

Figure 7 Negative Battery Cable



6. Attach the black jumper cable with terminal ring at both ends, between the negative terminal of battery one and the positive terminal of battery two. Use a nut, bolt, and two washers for each terminal. Place a washer on each side of the battery terminal then pass a bolt through the washers, terminal ring and battery terminal then secure with a nut.
Tighten the bolt to the torque specification of 3.9 to 5.4 Nm (2.876 to 3.983 ft-lbs). See [Figure 8](#).

Figure 8 Battery Jumper Cable



During normal operation the charger assembly provides operating voltage to the load and charges the batteries. Should an event occur that interrupts AC supply voltage to the charger assembly the batteries will be switched to the load in place of the charger assembly output. This switching is automatic.

Note: *The charger assembly must have AC power applied to it in order to turn on and initialize. Once the charger assembly is initialized AC power can be removed and it will continue to operate on power supplied by the battery. If the battery power was then lost or removed the only way to turn the charger assembly back on is to apply AC power.*

To turn on the Battery Backup unit place the AC circuit breaker in the ON (up) position. The charger will go through a power up sequence for about 15 to 20 seconds. During this startup sequence the indicator LED's on the charger assembly will flash. At some point during the sequence operating voltage (24 VDC) will be applied to the load from the charger assembly. After 15 to 20 seconds have passed turn ON (up) the DC circuit breaker. This will allow charging of the batteries as needed. If the current draw of the load is less than 10A the remaining current will be used to charge the batteries.

If the battery backup is connected to a Bird Signal Booster then the booster (load) current draw will be zero because the booster will operate from its AC power source. Therefore the full 10 A will be available to charge the batteries.

LED Indicators

There are three status indicators on the charger assembly including AC Fail, Low Battery, and Status. The AC Fail and Low Battery indicators are normally off and will illuminate when an alarm condition is detected. Whenever these LED's are off the associated alarm Form-C contacts will have continuity between their NC and COM terminals. When these LED's are illuminated, indicating an alarm condition, the associated alarm Form-C contacts will have continuity between their NO and COM terminals. Note that the Charge fail function does not have an associated LED indicator.

The Status LED provides a convenient indication of the overall functionality of the charger assembly.

During normal operation the LED indicator should blink at a steady uninterrupted rate of 1X/second during float charging and 2X/second during strong charging of heavily drained batteries. If a problem is detected the Status indicator will instead blink repetitively at a predefined rate, see [Table 2](#).

Table 2 Status LED Description

Problem	Displayed Code
Reverse polarity or high battery voltage	1 blink / 1 second pause
Battery not connected, no output power	2 blink / 1 second pause
Overload or short circuit on the load	4 blink / 1 second pause
Low battery	5 blink / 1 second pause
Boost condition, battery discharge after 4minutes of overload	8 blink / 1 second pause
Internal fault	9 blink / 1 second pause

Alarm Testing

During system installation it may be necessary to temporarily generate an alarm condition for each of the alarm functions in the battery backup unit. To test the AC Fail and Charge Fail alarm simply disconnect AC operating voltage from the battery backup by turning off the AC circuit breaker. The DC breaker must be on during this test so that the battery voltage can keep the charger assembly powered up.

Likewise to test the Low Battery alarm turn off the DC circuit breaker. The AC breaker must be on during this test so that the AC power can keep the charger assembly powered up.

Routine Inspections

The battery backup system can be expected to operate for years with little maintenance or repair.

Routine inspection of the battery backup unit is recommended and the following items should be checked.

1. Verify all wiring connections are tight and properly connected.
2. The status LED located on the charger assembly should be flashing at a steady rate indicating the charger assembly is functioning normally.
3. The AC Fail and Low Battery LED indicators should be off.
4. The Form-C contacts for all three alarm functions should have continuity between the NC and COM terminals.
5. The voltage between the positive terminal of battery one and the negative terminal of battery two should be within a normal range (~24 VDC) depending on the present charge level of the batteries.
6. Check the batteries for any evidence of cracking, leakage of the electrolyte, or physical swelling or distortion of the batteries.
7. Check the battery terminals and battery cable connections for signs of corrosion.

Specifications

Parameter	Specification
AC Input 6160-110-24-NR 6160-110-24-NR-230	90-135 VAC (3.3 Amps) 47-63 Hz 180-305 VAC (2.2 Amps) 47-63 Hz
DC Output	24 VDC at 10 Amps (max load)
Remote Alarm Outputs	Charge Fail, Low Battery Capacity, and Loss of AC
Alarm Contacts	Form-C, 1A @ 30 VDC, 1A @ 60 VAC
Status LED Indicators	AC Fail Low Battery Status (with different blink rates)
Operating Temperature Range	-0 to +50 °C (32 to 122 °F)
Batteries	two - 110Amp-hour (6 cells per battery) Maintenance free sealed lead-acid (vent regulated)
Cabinet Size	18" W x 26" H x 15" D
Weight	~ 210 lbs.

Customer Service

Any maintenance or service procedure beyond the scope of those in this chapter should be referred to a qualified service center.

If the unit needs to be returned for any reason, request an Return Material Authorization (RMA) through the Bird Technologies website. All instruments returned must be shipped prepaid and to the attention of the RMA number.

Bird Service Center

30303 Aurora Road
Cleveland (Solon), Ohio 44139-2794
Fax: (440) 248-5426
E-mail: bsc@birdrf.com

For the location of the Sales Office nearest you, visit our Web site at:

<http://www.birdrf.com>